TERRA NOSTRA

Schriften der Alfred-Wegener-Stiftung 2005/3

22. Internationale Polartagung der Deutschen Gesellschaft für Polarforschung

18. – 24. September 2005, Jena, Germany

Programm und Zusammenfassung der Tagungsbeiträge

IMPRESSUM

TERRA NOSTRA
Heft 2005/3: **22. Internationale Polartagung der DGP in Jena**
Programm und Zusammenfassung der Tagungsbeiträge

GeoUnion
Alfred-Wegener-Stiftung

Herausgeber: GeoUnion Alfred-Wegener-Stiftung
Arno-Holz-Str. 14
12165 Berlin
Telefon: 030-7901374-0
Telefax: 030-7901374-1
E-Mail: info@aw-stiftung.de

Schriftleitung: Dr. G. Greiner
GeoForschungszentrum Potsdam
Telegrafenberg
14473 Potsdam
Telefon: 0331-2881025
Telefax: 0331-2881002
E-Mail: greiner@gfz-potsdam.de

Verantwortlich: Dr. Hans-Ulrich Peter
Polar & Bird Ecology Group,
Institute of Ecology
Dornburger Str. 159,
D-07743 Jena
phone: +49-(0)3641-949415
fax: +49-(0)3641-949402
E-Mail : Hans-Ulrich.Peter@uni-jena.de

Redaktion: Dr. Hans-Ulrich Peter

ISSN 0946-8978

Selbstverlag der GeoUnion Alfred-Wegener-Stiftung, Berlin, 2005
Printed in Germany

Gesamtherstellung: Weserdruckerei Grassé GmbH, Bremerhaven

DEUTSCHE GESELLSCHAFT FÜR POLARFORSCHUNG

22. Internationale Polartagung

18. – 24. September 2005

in Jena

GERMAN SOCIETY OF POLAR RESEARCH

22nd International Polar Meeting

September 18 – 24, 2005

Jena

Tagungsprogramm / Program

Sonntag, 18.September

15.00	Sitzung des Wissenschaftlichen Beirats und danach des Erweiterten Vorstands im Campus Ernst-Abbe-Platz	Meeting of the Scientific Advisory Committee followed by meeting of the Extended Executive Committee in the University Campus (Ernst-Abbe-Platz)
16.00 – 22.00	Anmeldung im Tagungsbüro im Hörsaal 5 im Campus	Registration in the meeting office in lecture hall 5 in the Campus
19:00	Ice Breaker Party, Hörsaal 5 im Campus	Ice Breaker Party, lecture hall 5 in the Campus

Montag, 19. September

9:00	**Tagungseröffnung (Hörsaal 2 im Campus Ernst-Abbe-Platz)** Begrüßung und Eröffnung durch den Vorsitzenden der Deutschen Gesellschaft für Polarforschung, Prof. Dr. habil. Georg Kleinschmidt, Frankfurt am Main Begrüßung durch den Oberbürgermeister der Stadt Jena, Dr. habil. Peter Röhlinger und den Rektor der Friedrich-Schiller-Universität Jena, Prof. Dr. habil. Klaus Dicke Ehrungen	**Opening (Lecture hall 2 in the Campus)** Welcome and Opening by the President of the German Society of Polar Research, Prof. Dr. Georg Kleinschmidt, Frankfurt am Main Welcome by the Lord Mayor of the City of Jena, Dr. Peter Röhlinger, and the Rector of Friedrich Schiller University Jena, Prof. Dr. Klaus Dicke Presentation of Honors and Awards
10:00	**Eröffnung der Polar-Bilderausstellung von Herrn Gerhard Rießbeck**, Bad Windsheim, "Der Blick des Forschers", im Hörsaal 5, durch den Prorektor für Forschung der Friedrich-Schiller-Universität Jena, Prof. Dr. habil. Herbert Witte Kaffeepause	**Opening of the Polar Painting Exhibition of Gerhard Rießbeck** from Bad Windsheim: "The View of a Scientist" (Lecture hall 5), presented by the Prorector of Research of Friedrich Schiller University Jena, Prof. Dr. Herbert Witte Coffee Break

10:30 – 12.30 Opening Session I (Lecture hall 2)

10:30 – 10:50 *Charny, Idan & Remenik, Tanya, Moshav Ganey-Am/Israel:*
First Israeli Antarctic Expedition 2003

10:50 – 11:30 *Convey, Peter, Cambridge/UK:*
Antarctic terrestrial ecosystems: responses to environmental change

11:30 – 11:50 *Fritzsche, Diedrich, Rainer Schütt, Thomas Opel, Hanno Meyer, Heinz Miller & Frank Wilhelms, Potsdam, Bremerhaven, Berlin:*
Climate of North Siberia during the last 2500 years: an ice-core record from Akademii Nauk ice cap (Severnaya Zemlya)

11:50 – 12:10 *Matthiessen, Jens, Rüdiger Stein &Leg 302 Science Party, Bremerhaven:*
Die Paläoumweltgeschichte des Nordpolarmeeres seit dem Miozän: Neue Ergebnisse aus ODP/IODP Bohrungen

12:10 -12:30 *Dietrich, Reinhard & Karsten Gohl, Dresden, Bremerhaven:*
Das Internationale Polarjahr 2007/2008

12:30 – 14:00 Mittagspause / Lunch Break

14:00 – 15:20 Session II: Global Climate Coupling (Lecture hall 2)

14:00 – 14:20 *Hense, Andreas, Bonn:*
German Contribution to the international ACSYS Project – the joint project

14:20 – 14:40 *Dethloff, Klaus, Annette Rinke, Wolfgang Dorn, Peter Lemke, Abha Sood, Christof Lüpkes, Vladimir Gryanik, Andreas Hense, Günther Heinemann, Burghard Brümmer, Hermann Mächel & Bruno Rudolf, Potsdam, Bremerhaven, Bonn, Hamburg, Offenbach am Main:*
Modelling and measurements for an integrated view of the coupled Arctic climate system

14:40 – 15:00 *Gerdes, Rüdiger & Cornelia Köberle, Bremerhaven:*
Variability of the Arctic Ocean fresh water balance

15:00 – 15:20 *Fahrbach, Eberhard, Olaf Boebel, Mario Hoppema, Olaf Klatt, Gerd Rohardt, Michael Schröder & Andreas Wisotzki, Bremerhaven:*
Decadal-scale variations of water mass properties in the deep Weddell Sea

15:20 – 15:50 Kaffee / Coffee Break

15:50 – 17:10 Session III: Arctic Geology (Lecture hall 2)

15:50 – 16:10 *Winkelmann, Daniel, Rüdiger Stein, Wilfried Jokat & Frank Niessen, Bremerhaven:*
The Yermak Slide - New constraints on extend and age

16:10 – 16:30 *Paech, Hans-Jürgen, Potsdam:*
Inkohlungsuntersuchungen des Tertiärs und seines Liegenden in Grönland und Jakutien und deren Vergleich

16:30 – 16:50 *Pimpirev, Christo & Polina Pavlishina, Sofia/Bulgaria:*
New data on the stratigraphy and palynological assessments of the Upper Jurassic – Lower Cretaceous sediments in the area of Lake Hazen, Ellesmere Island, Canadian Arctic

16:50 – 17:10 *Estrada, Solveig, Friedhelm Henjes-Kunst & Karsten Piepjohn, Hannover:*
Multiphase Cretaceous to early Tertiary magmatism in northern Ellesmere Island (Canadian Arctic) related to the opening of the Arctic Ocean

17:15

Sitzung der Arbeitskreise
AK Geologie und Geophysik, Glaziologie, Geodäsie, Geschichte der Polarforschung in den Hörsälen 2 und 3 sowie den Seminarräumen 120 und 121 (s. aktuelle Aushänge)

Working Group meetings
The Working Groups Geology and Geophysics, Glaciology, Geodesy and History of Polar Research will meet in Lecture halls 2, 3 and Seminar rooms 120 and 121 (for details of rooms please see notices posted during the conference)

20:00

Öffentlicher Abendvortrag (Hörsaal 2) / Public Evening Lecture (Lecture hall 2)
Fletcher, David, Ledbury/UK
Antarctic History: from dogs to skidoos, from compass to GPS, from Morse Key to emails

→ Ott

→ Conway

→ Brandt

→ Piepenburg

→ Rachold

→ Lapin

→ Jarosilo

Dienstag, 20.September

8:30 - 10:30 Session IV: Terrestrial Ecosystems and Marine Biodiversity (Lecture hall 2)

8:30 – 8:50 *Ott, Sieglinde & Peter Convey, Düsseldorf/Germany, Cambridge/UK:*
Long-term studies of coastal terrestrial lichen habitats in the Antarctic

8:50 – 9:10 *Engelen, Andreas, Sieglinde Ott, Peter Convey & Roger Worland, Düsseldorf/Germany, Cambridge/UK:*
The evolution of an Antarctic inland ecosystem depending on environmental factors

9:10 – 9:30 *Brinkmann, Marcus, Sieglinde Ott, David Pearce & Peter Convey, Düsseldorf/Germany, Cambridge/UK:*
Diversity of cyanobacterial communities of an Antarctic inland ecosystem in early stages of colonisation

9:30 – 9:50 *Brandt, Angelika, Hamburg:*
Biodiversity and zoogeography of Southern Ocean deep-sea Isopoda (Crustacea, Malacostraca) – results from the ANDEEP expeditions

9:50 – 10:10 *Piepenburg, Dieter, Kiel, Mainz:*
Recent research on Arctic benthos: Common notions need to be revised

10:10 – 10:30 *Janussen, Dorte & Ole S. Tendal, Frankfurt am Main/Germany, Copenhagen/Denmark*
Deep-Sea sponges of the Weddell Sea (Antarctica) and adjacent areas – preliminary results of ANDEEP I, II and III

10:30 – 11:00 Kaffee / Coffee Break

11:00 – 12.20 Session V (Lecture hall 2)

11:00 – 11:20 *Rachold, Volker, Potsdam:*
Arctic Coastal Processes

11:20 – 11:40 *Lajus, Julia A., St. Petersburg/Russia:*
The Russian - German joint studies of the Barents Sea: a little known case of the international cooperation

11:40 – 12:00 *Gavrilo, Maria, St.-Petersburg/Russia:*
Arctic icebreaker *Svyatogor/Krassin:* exploration of the Northern Sea Route in XX century as reflected in the life history of the vessel

12:00 – 12:20 *Pasda, Clemens, Jena:*
4000 Jahre Kulturlandschaft in Westgrönland

12:20 – 14:00 Mittagspause / Lunch Break

14:00 – 15:20 Session VI: Antarctic Geology (Lecture hall 2)

14:00 – 14:20 *Gazdzicki, Andrzej, Warszawa/Poland:*
Cenozoic glacial history and biota evolution: evidence from South Shetlands and Antarctic Peninsula

14:20 – 14:40 *Miller, Hubert & Christo Pimpirev, München/Germany, Sofia/Bulgaria:*
The Livingston Island Paradoxon: terrane tectonics at the north-western margin of the Antarctic Peninsula

14:40 – 15:00 *Gohl, Karsten & Graeme Eagles, Bremerhaven:*
Tectonics and plate-kinematics of the South Pacific and West Antarctica

15:00 – 15:20 *Henjes-Kunst, Friedhelm, Norbert Roland, Uli Schüssler & Martin Olesch, Hannover, Würzburg, Bremen:*
The age structure of the continental crust of Oates Land and George V Land (Antarctica) – new insights into the position of the boundary between the East Antarctic Craton and the Ross-orogenic belt

15:20 – 16:40 Postersitzung und Kaffee / Poster Session and Coffee Break

16:40 – 18:00 Session VII: Snow and Ice Dynamics of the Antarctic (Lecture hall 2)

16:40 – 17:00 *Blindow, Norbert, Münster:*
GPR measurements on King George Island - Data processing, interpretation, and an improved bedrock model

17:00 – 17:20 *Breuer, Birgit, Norbert Blindow, Martin Rückamp & Manfred A. Lange, Münster:*
The dynamics of the temperate ice cap on King George Island, Antarctica and comparison with in-situ measurements

17:20 – 17:40 *Rotschky, Gerit, Wolfgang Rack & Hans Oerter, Bremerhaven:*
Abschätzung der physikalisch-morphologischen Eigenschaften sowie Akkumulation der polaren Schneebedeckung

17:40 – 18:00 *Wesche, Christine, Olaf Eisen, Daniel Steinhage, Wolfgang Rack & Hans Oerter, Landsberg, Bremerhaven:*
Auswertung und Interpretation der Oberflächentopographie und -geschwindigkeit des Eisschildes in Dronning Maud Land, Antarktis

18:15	**Sitzung der Arbeitskreise und von D-ANDRILL nach Vereinbarung** Hörsäle 2 und 3 sowie Seminarräume 120 und 121 (Anmeldung im Tagungsbüro am Vortag)	**Working Group Meetings (including D-ANDRILL) on appointment** Lecture halls 2, 3 and seminar rooms 120 and 121 (registration in the conference office on the previous day)

20:00 **Öffentlicher Abendvortrag (Hörsaal 2) / Evening Lecture (Lecture hall 2)**
Wolski, Henryk, Berlin: In der Antarktis auf Shackletons Spuren

Mittwoch, 21.September

Vortragssitzung zum DFG- Schwerpunkt „Antarktisforschung mit vergleichenden Untersuchungen in arktischen Eisgebieten“

Lecture Session on the DFG-Priority Program „Antarctic Research with Comparative Studies in the Arctic Polar Regions“

8:30 – 8:35	Einführung durch den Koordinator des Schwerpunktprogramms, Prof. Michael Spindler	Opening by the Co-ordinator of the priority program, Prof. Michael Spindler
8:35 – 8:45	Einführung durch Prüfungsgruppenvorsitzenden Prof. Dieter Etling	Introduction by the leader of the evaluation group, Prof. Dieter Etling
8:45 – 8:55	Teilgebietskoordinatorin Biologie, Prof. Angelika Brandt	Section co-ordinator for Biology, Prof. Angelika Brandt
8:55 – 9:25	Bio 1: *Arndt, Hartmut, Frank Nitsche & Claudia Wylezich, Köln:* Comparison of Artic and Antarctic Nanofauna: Studies of the species distribution, morphology and phylogeny of choanoflagellates	
9:25 – 9:55	Bio 2: *Werner, Iris & Rupert Krapp, Kiel:* Ökologie der arktischen und antarktischen Untereis-Amphipoden	
9:55 – 10:20	**Kaffeepause / Coffee Break**	
10:20 - 10:30	Teilgebietskoordinator Physik, Prof. Peter Lemke	Section co-ordinator for Physics, Prof. Peter Lemke
10:30 - 11:00	Phys 1: *Lange, Manfred A., Klaus Grosfeld & Malte Thoma, Münster, Bremen:* Schelfeis-Ozean Wechselwirkungen und ihre Rolle im globalen Klimasystem	
11:00 - 11:30	Phys 2: *Croot, Peter, Kiel:* Importance of Kinetics to Iron Speciation in the Southern Ocean and Antarctic Waters	
11:30 - 12:00	Bio 3: *Hilbig, Brigitte, Bochum:* Polychaeten des tiefen Südozeans - eine Bestandsaufnahme	
12:00 - 13:30	**Mittagspause / Lunch Break**	
13:30 - 13:40	Teilgebietskoordinator Geowissenschaften, Prof. Lothar Viereck-Goette	Section co-ordinator for Geosciences, Prof. Lothar Viereck-Goette

13:40 - 14:10 Geo 1: *Jacobs, Joachim, Andreas Läufer, Michael K. Wingate & Keith Sircomb, Bremen, Hannover/Germany, Perth/Australia:*
Detrital zircon ages of metasedimentary rocks from Dronning Maud Land and implications for the tectonic evolution of parts of East Antarctica

14:10 - 14:40 Geo 2: *Läufer, Andreas & Glen Phillips, Hannover/Germany, Melbourne/Australia:*
Brittle Structural Architecture of the Lambert Glacier Region (E Antarctica): implications from PCMEGA (2002/03)

14:40 - 15:10 Phys 3: *Christl, Marcus, Boris Schulze, Patrick Wenderoth, Frank Bernsdorff, Augusto Mangini, Dietmar Wagenbach & Peter W. Kubik, Heidelberg/Germany, Zürich/Switzerland:*
Geomagnetic variability over the past 300,000 years from cosmogenic Beryllium-10 in deep sea sediments – a potential global matching tool

15:10 - 15:40 Kaffeepause / Coffee Break

15:40 - 16:10 Geo 3: *Lisker, Frank, Bremen:*
The Antarctic Gondwana basins

16:10 - 16:40 Bio 4: *Hahn, Steffen, Markus Ritz & Hans-Ulrich Peter, Jena:*
Ecological adaptation of skuas in the maritime Antarctic: case studies from a hot spot of global change and speciation

16:40 - 17:10 Phys 4: *Huhn, Oliver, Monika Rhein, Birgit Klein, Mike Schröder, Michael Schodlok, Bremen, Hamburg, Bremerhaven:*
Tracer measurements in the western Weddell Sea – formation of Deep and Bottom Water and the contribution of Ice Shelf Water

17:10 - 17:40 Geo 4: *Dietrich, Reinhard, Hans-Gerd Maas, Axel Rülke, Mirko Scheinert, Michael Bässler & Ellen Schwalbe, Dresden:*
Rezente Vertikale Erdkrustenbewegungen in der Diskobucht/Westgrönland und die Dynamik des Jacobshavn Isbrae

17:40 - 18:10 Diskussion mit der Gutachtergruppe / Discussion with the Referee Group

18:15	**Hof vor dem Vortragsgebäude: Beginn der Wanderung zum Fuchsturm**	**Walking tour to the "Fuchsturm" [Fox Tower] 3,5 km** Meet in the courtyard in front of the lecture building
19:30	**Thüringer Grillabend auf dem Fuchsturm**	**Thuringian Barbeque at the Fuchsturm**

Donnerstag, 22.September

8:30 - 10:10 Session VIII: Research History (Lecture hall 2)
(Alternative for non-German speaking participants: Excursion to Erfurt: 8:30-13:45)

8:30 – 8:50 *Brunner, Kurt, München:*
Kartographie als Klimaarchiv – Karten dokumentieren die „Kleine Eiszeit"

8:50 – 9:10 *Lüdecke, Cornelia & Erki Tammiksaar, Hamburg, Tartu/Estonia*
Holzkajaks für Polarexpeditionen - Eine technische Entwicklung um 1900

9:10 – 9:30 *Berger, Frank, Frankfurt a.M.:*
Theodor Lerner (1866-1931): Polarfahrer oder Polarforscher?

9:30 – 9:50 *Krause, Reinhard A., Bremerhaven:*
Eine Expedition und ihr künstlerischer Chronist
David Paige (1901-1978) und die zweite Byrd Antarktisexpedition (1933-35)

9:50 – 10:10 *Vogt, Steffen, Freiburg:*
Nutzung des SCAR Composite Gazetteer für großmaßstäbige Anwendungen - eine Pilotstudie

10:10 – 10:45 Kaffee / Coffee Break

10:45 – 12:15 Mitgliederversammlung (Hörsaal 2)

Tagesordnung
1. Eröffnung der Versammlung
2. Bericht des Vorstandes
3. Kassenbericht
4. Bericht des Kassenprüfers
5. Entlastung des Vorstandes
6. Wahlen zum Vorstand
7. 23. Internationale Polartagung
8. Verschiedenes

General meeting of the German Society of Polar Research (Lecture hall 2)

Agenda
1. Opening of the General Meeting
2. Report of the Executive Committee
3. Financial report
4. Auditor`s Financial Report
5. Release of current Executive Committee
6. Election of new Executive Committee
7. 23rd International Polar Meeting
8. Miscellaneous

12:15 – 13:45 Mittagspause / Lunch Break

13:45 – 14:45 Postersitzung und Kaffee (Foyer) / Poster Session and Coffee Break (Foyer)

14:50 – 16:10 Session IX: Birds (Lecture hall 2)

14:50 – 15:10 *Creuwels, Jereon, Georg Engelhard & Jan Van Franeker, Den Burg/NL, Lowestoft/UK:*
Do different petrel species feed their chick differently?

15:10 – 15:30 *Büßer, Christina, Steffen Hahn, Petra Quillfeldt, Tim Schmoll, Anja Gladbach, Anja Nordt & Hans-Ulrich Peter, Jena:*
Long-term research on Wilson's and Black-bellied storm-petrels on King George Island, South Shetlands Islands

15:30 – 15:50 *Ritz, Markus, Steffen Hahn, Tim Janicke & Hans-Ulrich Peter, Jena*
Hybridisation between South Polar Skua (*Catharacta maccormicki*) and Brown Skua (*C. antarctica lonnbergi*) in the Antarctic Peninsula region

15:50 – 16:10 *Soloviev, Mikhail, Clive Minton & Pavel Tomkovich, Moscow/ Russia, Beaumaris/Australia:*
Breeding performance of tundra waders in response to rodent abundance and weather from Taimyr to Chukotka

16:10 – 16:30 Kaffee / Coffee Break

18.10

16:30 – 17:50 Session X: Freshwater Climate Archives (Lecture hall 2)

16:10 – 16:30 *Melles, Martin, Olaf Juschus, Frank Niessen & Georg Schwamborn, Leipzig, Bremerhaven, Potsdam:*
16.30 16.50
International continental deep drilling in the El´gygytgyn Crater, Northeastern Siberia – past activities and future prospects

16:30 – 16:50 *Juschus, Olaf, Martin Melles & Catalina Gebhardt, Leipzig, Bremerhaven:*
16.50 - 17.10
The impact of mass movement events in Lake El´gygytgyn, NE Siberia, on the pelagic lake sediment record

16:50 – 17:10 *Niessen, Frank, Catalina Gebhardt & Conrad Kopsch, Bremerhaven, Potsdam:*
17.10 - 17.30
Seismic investigation of 3.6 Mio year old impact crater Lake El'gygytgyn, NE Siberia: Brecciated bedrock, central uplift and up to 370m of lacustrine sediments

17:10 – 17:30 *Diekmann, Bernhard, Andrei A. Andreev, Thomas Kumke, Hermann Lüpfert, Lyudmilla Pestryakova, Steffen Popp, Christine Siegert & Dmitri A. Subetto, Potsdam/Germany, Yakutsk/Russia, St. Petersburg/Russia:*
17.30 17.50
Holocene Lake Development in Eastern Siberia

17:30 – 17:50 *Pirrung, Michael, Georg Büchel & Volker Lorenz, Jena ,Würzburg:*
17.50 18.10
Posteruptive Entwicklung des 1977 eruptierten Ukinrek Ostmaares (SW-Alaska)

20:00 **Öffentlicher Abendvortrag (Hörsaal 2) / Public Evening Lecture (Lecture hall 2)**
Peter, Hans-Ulrich, Jena:
Unter Pinguinen und Robben – 25 Jahre zoologische Forschung auf King George Island

Freitag, 23.September

8:30 - 10:30 Session XI: Permafrost (Lecture hall 2)

8:30 – 8:50 *Morozova, Daria & Dirk Wagner, Potsdam:*
Microbial Life under Extreme Environments of Permafrost: Tolerance Limits of Methanogenic Archaea as Keystone Organisms for the Investigation of Extraterrestrial Life

8:50 – 9:10 *Liebner, Susanne & Dirk Wagner, Potsdam:* Temperature-dependence of Methane oxidation rates in permafrost soils of the Lena Delta, Siberia

9:10 – 9:30 *Wagner, Dirk, Andreas Gattinger, Andrè Lipski & Michael Schloter, Potsdam, Neuherberg, Osnabrück:* Methane fluxes, microbial activities and community structures in a wet tundra of the Lena Delta

9:30 – 9:50 *Schneider, Julia, Arno Kleber & Dirk Wagner, Dresden, Potsdam:*
Bilanzierung von Methanemissionen in Tundragebieten am Beispiel des Lena Deltas, Nordsibirien, auf der Basis von Fernerkundungsdaten und Geländeuntersuchungen

9:50 – 10:10 *Zimmermann, Uta, Christian Knoblauch & Eva-Maria Pfeiffer, Hamburg:*
Community size, structure and properties of methane oxidizing bacteria in Siberian tundra soils

10:10 – 10:30 *Magens, Diana, Hanno Meyer, Lutz Schirrmeister, Alexander Yu. Dereviagin & Hans-W. Hubberten, Potsdam/Germany, Moscow/Russia:*
Die Permafrostabfolgen von Kap Mamontov Klyk – Rekonstruktion der spätquartären Umwelt- und Klimabedingungen der Nordsibirischen Arktis

10:30 – 11:00 Kaffee / Coffee Break

11:00 – 12.20 Session XII: Floating Ice (Lecture hall 2)

11:00 – 11:20 *Nicolaus, Marcel, Christian Haas, Sascha Willmes & Anja Batzke, Bremerhaven, Trier, Oldenburg:* "Superimposed ice" formation on summer sea ice

11:20 – 11:40 *Hellmer, Hartmut & Michael Schodlok, Bremerhaven:*
Weddell Sea icebergs: 5 years of observations

11:40 – 12:00 *Haas, Christian, Marcel Nicolaus, Michael Schröder & Gerhard Dieckmann, Bremerhaven:* Ice Station Polarstern (ISPOL) – Eine Driftstation durch das westliche Weddellmeer

12:00 – 12:20 *Mohrholz, Chris-Oliver & Martin A. Lange, Münster:*
Schelfeismodellierung unter der Berücksichtigung von Scherbrüchen durch Eisströme

12:20 Posterprämierung u. Schlussworte: Prof. Dr. Kleinschmidt
Poster awards and closing address by Prof. Dr. Kleinschmidt

Workshop "Human impact on terrestrial habitats in the Antarctic"

8:30 – 18:30 Parallele Veranstaltung im Hörsaal 3 | **Lecture hall 3 (In parallel with oral presentations)**

08:30 – 08:45 Eröffnung des Workshops, Einführung | Opening of the workshop, introduction

08:45 – 09: 05 *Peter Convey, Cambridge/UK*
How vulnerable are Antarctic terrestrial ecosystems to biological invasions?

09:05 – 09:25 *Kevin Hughes & Bethan Stallwood, Cambridge, Bangor/UK*
Oil spills in Antarctic terrestrial environments – the impact on soil microorganisms

09:25 – 09:45 *Enn Kaup, Tallinn/Estonia*
Human impacts in catchments and lakes of Schirmacher, Thala and Larsemann oases

09:45 – 10:15 Kaffee / Coffee break

10:45 – 11:05 *Victor Pomelov & Maria Gavrilo, St.-Petersburg/Russia*
Environmental activities of the Russian Antarctic Expedition

11:05 – 11:25 *Sally Poncet, Falkland Islands*
Albatross and Prion Islands, South Georgia: a management challenge

11:25 – 11:45 *Michaela Mayer, Bremen/Germany*
Environmental impacts of Polar tourism

11:45 – 12:05 *Marienne De Villiers & John Cooper, Cape Town/South Africa*
Human impacts at the sub-Antarctic Prince Edward Islands

12:05 – 13:30 Mittagspause / Lunch break

13:30 – 13:50 *Rolf Weber, Cristina Engel Alvarez, Antonio Batista, Martin Sander et al., São Paulo, Vitória, Santa Cruz do Sul, Rio de Janeiro, Rio Grande do Sul, Porto Alegre, Viçosa/Brazil*
Environmental Studies of human impacts on the vicinity of Cmte. Ferraz Station (Brasil), Admirality Bay, King George Island

13:50 – 14:05 *Cristina Engel Alvarez, Braz Casagrande, Glyvani Rubin Soares & Daniel Oliveira Cruz, Vitória/Brazil*
Architecture in Antarctica: Concepts and achievements from studies undertaken by the Brazilian Antarctic Program

14:05 – 14:20 *Zipan Wang, Hans-Ulrich Peter & Anne Froehlich, Shanghai/China, Jena/Germany*

Impact of station garbage on the diet of Antarctic skuas on Fildes Peninsula of King George Island

14:20 – 14:40 *Ji Hee Kim & Hosung Chung, Ansan/Korea*
A baseline survey for long-term monitoring of terrestrial vegetation around King Sejong Station, King George Island

14:40 – 15:00 *Dmitry Vlasov & Vycheslav Krylenkov, St. Petersburg/Russia*
Mycobiota of the Antarctic Polar Stations area on the King George Island

15:00 – 15:15 Diskussion / Discussion

15:15 – 15:45 Kaffee / Coffee Break

15:45 – 16:05 *Cristina Engel Alvarez, Martin Sander, Erli Schneider Costa & Glyvani Rubin Soares, Vitória, São Leopoldo/Brasil*
Integratives methodology for planning terrestrial trails for human displacement at Peninsula Keller, Antarctica

16:05 – 16:10 *Hans-Ulrich Peter, Jena/Germany*
Risk assessment for Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas – a short introduction

16:10 – 16:30 *Osama Mustafa, Christina Büßer, Simone Pfeiffer & Hans-Ulrich Peter, Jena/Germany*
Mapping of traffic activities on Fildes Peninsula and Ardley Island – methods and results

16:30 – 16:45 *Christina Büßer, Uwe Grunewald, Tiemo Kahl, Osama Mustafa, Simone Pfeiffer & Hans-Ulrich Peter, Jena/Germany*
Environmental data and human activities on Fildes Peninsula and Ardley Island

16:45 – 17:05 *Hans-Ulrich Peter, Christina Büßer, Osama Mustafa & Simone Pfeiffer, Jena/Germany*
Biological data and risk assessment (Fildes Pensinsula and Ardley Island)

17:05 – 17:25 *Rod Downie, Cambridge/UK*
Deception Island - a trailblazer in Antarctic site management

17:25 - 17:45 Rebecca Roper-Gee & Pamela Toschik, Christchurch/*NZ, Arlington/USA*
Experiences with the Dry Valleys ASMA

17:45 – 18:05 *Simone Pfeiffer, Christina Büßer, Osama Mustafa & Hans-Ulrich Peter, Jena/Germany*
Management plan drafts for the southwestern part of King George Island

18:05 – 18:30 Diskussion und Fazit / Discussion and conclusions

Samstag, dem 24.September

8:30	**Busbahnhof: Beginn der Ganztagsexkursion "Periglazial von Thüringen"**	**Excursion through Thuringia with the topic "Periglacial of Thuringia"** (Meeting point: Bus station near new railway station "Paradies")

Posterbeiträge / Poster

P 1 *Sander, Martin, Tatiana C. Bays & Sabrina R. Balbão, Ana P.B. Carneiro et al., Porto Alegre/Brazil:* Antarctic seabirds: status, population and democraphy in Admirality Bay, King George Island

P 2 *Kim, Jeong-Hoon, Jeong-Chil Yoo, Hosung Chung & Ji Hee Kim, Seoul, Ansan/Korea:* Nest distribution of skuas on Barton and Weaver Peninsulas of the King George Island, the Antarctic

P 3 *Kopp, Matthias, Markus Ritz & Hans-Ulrich Peter, Jena:* South Polar Skua chick growth performance in relation to hatching date- timing of breeding or parental quality?

P 4 *Fröhlich Anne, Hans-Ulrich Peter & Steffen Hahn, Jena:* Feather deformations as a sign of nutritional deficiency in Brown Skuas (*Catharacta antarctica lonnbergi*)?

P 5 *Janicke, Tim, Steffen Hahn, Markus Ritz & Hans-Ulrich Peter, Jena:* Condition and fitness dependence of the long call complex in Brown Skuas *Catharacta a. lonnbergi*

P 6 *Kursa, Maryna & Vladimir Bezrukov, Kyiv/Ukraine:* White blood cell count of *Catharacta maccormicki*

P 7 *Gladbach, Anja, Christina Büßer, Hans-Ulrich Peter & Petra Quillfeld, Jena:* Wilson's storm-petrels (*Oceanites oceanicus*) as a model system for the study of parent-offspring interactions

P 8 *Telegeev, Gennady, Alevtina S. Legeyda, Mykhaylo V. Dybkov, Alexey S. Savov et al., Kyiv/Ukraine, Sofia/Bulgaria:* DNA markers for studing Gentoo Penguins at Antarctic Peninsula

P 9 *Kozeretska, Iryna, Svitlana Pavlovych, Igor Sirenko & Volodymyr Bzrukov, Kyiv/Ukraine:* Sex associated morphological and biochemical markers of penguin *Pygoscelis papua*

P 10 *Polito, Michael, Wayne Z. Trivelpiece & Susan G. Trivelpiece, La Jolla/USA:* Fledging behaviour of Gentoo penguins (*Pygoscelis papua*) at Admirality Bay, King George Island, Antarctica

P 11 *Cremer, Holger, Utrecht/NL:* Planktonic diatom communities in high arctic lakes – examples from Greenland and Russia

P 12 *Wilbert, Norbert, Bonn:* Species composition and structure of the ciliate community in the Antarctic benthos and Endopagial (Sea Ice)

P 13 *Veit-Köhler, Gritta, Wilhemshaven:* Meiofauna studies in a shallow Antarctic bay - species, models and diversity

P 14 *Janussen, Dorte & Ole Secher Tendal, Frankfurt a.M./Germany, Copenhagen/Denmark:* Sponges of the deep Weddel Sea (Antarctica); what does the distribution tell us?

P 15 *von Harbou, Lena, Ilka Peeken & Ulrich Bathmann, Bremerhaven, Kiel:* Responses of the pelagic tunicate *Salpa thompsoni* to an iron induced phytoplankton bloom in the Southern Ocean

P 16 *Fach, Bettina & Bettina Meyer, Bremerhaven:* A biochemically based modeling study of the growth and development of Antarctic krill (*Euphausia superba*)

P 17 *Hahn, Steffen & Hans-Ulrich Peter, Jena:* Habitat selection and reproduction of the Antarctic midge *Parochlus steinenii* at King George Island

P 18 *Werner, Kirstin, Andrei Andreev, Bernhard Diekmann & Wolfgang Zech, Potsdam, Bayreuth:* Holocene vegetation history of the Verkhoyansk Mountains Foreland, North-Eastern Siberia

P 19 *Müller, Stefanie, Andrei Andreev, Bernhard Diekmann & Wolfgang Zech, Potsdam, Bayreuth:* Late Pleistocene and early Holocene vegetation and climate history in the Verkhoyansk Mountains (Yakutia)

P 20 *Hanfland, Claudia, Jana Friedrich, Walter Geibert & Michiel M. Rutgers van der Loeff, Bremerhaven:* Ziele und Vorbereitungen des deutschen Beitrags zum internationalen GEOTRACES Programm

P 21 *Hanfland, Claudia & Michiel M. Rutgers van der Loeff, Bremerhaven:* Die Verteilung von 226Ra und Silikat und ihre Biogeochemie im Atlantischen Teil des Südozeans

P 22 *de Villiers, Marienne, John Cooper, Mariette Bause & Prideel Majiedt, Cape Tow/ South Africa:* Health, wealth and happiness: Wandering Albatrosses on Marion Island

P 23 *Holmes, Nick & Melissa Giese, Hobart, Kingston/Australia:* Investigating the variation in penguin responses to human activity on Macquarie Island

P 24 *Woehler, Eric J. & Martin J. Riddle, Hobart, Tasmania/Australia:* Are there anthropogenic signals in long term population data of Adélie penguins at Casey, East Antarctica?

P 25 *Peter, Hans-Ulrich, Christina Büßer, Osama Mustafa & Simone Pfeiffer, Jena:* Risk assessment for Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas

P 26 *Pfeiffer, Simone, Elke Böhm, Christina Büßer, Igor Chupin, Marcelo Flores, Claudia Godoy, Osama Mustafa, Hans-Ulrich Peter, Jena/Germany, Punta Arenas/Chile, Barnaul/Russia:* Environmental Risk Assessment of ASPA 150 Ardley Island (King George Island, South Shetlands)

P 27 *Temme, Christian, Ralf Ebinghaus & Jürgen W. Einax, Geesthacht, Jena:* Measurements of atmospheric mercury species in polar regions

P 28 *Barnes David & Peter Convey, Cambridge/UK:* Accidental transport of noctuid moths to Southern Ocean islands

P 29 *Milinevsky, Gennadi, Alexej Andreev, Alexander Andreev & Sergey Shnjukov, Kyiv/Ukraine:* Environmental study of the Vernadsky Antarctic station area: approaches and application

P 30 *Curtosi, Antonio, Émilien Pelletier, Walter Patricio Mac Cormack & Cristian Vodopidez, Rimouski/Canada, Buenos Aires/Argentina:* Initial studies about the presence and distribution of PAHs in soil and sediments from Jubany Station, Antarctica

P 31 *Fritzsche, Diedrich, Potsdam:* Paulet Island (63°35'S, 55°47'W) – landscape in conflict of tourism with conservation of nature and historical monuments

P 32 *Haase, Daniela, Christchurch/New Zealand:* Too much pressure on thin ice? Antarctic tourism and self-regulation

P 33 *Lamers, Machiel & Bas Amelung, Maastricht/NL:* Chaos makers and regulators in Antarctic tourism

P 34 *Kovalonok, Svetlana, Vitaly Chizhevsky, Vladimir Glotov & Gennadi Milinevsky, Kyiv, Lviv/Ukraine:* Small glacier and ice cap as indicators of current regional climate change

P 35 *Mustafa, Osama, Doris Bertges, Martin Bertges & Hans-Ulrich Peter, Jena, Neunkirchen a. P.:* Environmental monitoring in the Antarctic by using a Rangefinder-GPS-System for positioning of distant and fast moving objects

P 36 *Damaske, Detlef & Solveig Estrada & Gordon Oakey, Hannover/Germany, Halifax/Canada:* Geological and aeromagnetic investigation of the northern Nares Strait

P 37 *Piepjohn, Karsten, Hannover:* Korrelation phanerozoischer Sedimentbecken und tektonischer Ereignisse in Svalbard (Barentsschelf), Nord-Grönland und auf der Ellesmere-Insel (kanadische Arktis)

P 38 *Piepjohn, Karsten, Werner von Gosen, Solveig Estrada, Lutz Reinhardt & Harald Andruleit, Hannover, Erlangen:* Post-Paläozäner Vulkanismus im Süden der Ellesmere-Insel (Nunavut, Kanada)

P 39 *Emmel, Benjamin, Joachim Jacobs & Peter Crowhurst , Bremen/Germany, North Ryde/Australia:* Long-termed landscape evolution of the Dronning Maud Land constraint by apatite fission-track and (U-Th)/He

P 40 *Hanemann, Ricarda, Lothar Viereck-Goette & Marcus Freise, Jena, Hannover:* Crystallization experiments on low-Ti and high-Ti rocks of the Ferrar Large Igneous Province, Antarctica

P 41 *Hanemann, Ricarda & Lothar Viereck-Goette, Jena:* Systematics of platinum-group elements as petrogenetic indicators of Ferrar igneous rocks from northern Victorialand, Antarctica

P 42 *Henjes-Kunst, Friedhelm & Solveig Estrada, Hannover:* Early Palaeozoic metavolcanics of the Bowers Terrane (Northern Victoria Land, Antarctica) re-investigated: a trace element and Sm-Nd isotope study

P 43 *Läufer, Andreas, Frank Lisker, Georg Kleinschmidt & Friedhelm Henjes-Kunst, Hannover, Bremen Frankfurt a. M.:* Geological Map of the Ebbe Glacier Quadrangle (Victoria Land, Antarctica) 1 : 250 000

P 44 *Niessen, Frank, McMurdo ANDRILL Science Implementation Committee & Uwe Nixdorf, Bremerhaven/Germany, Lincoln/USA:* Two ANDRILL Projects ready for deep drilling in the McMurdo Sound (Antarctica) in 2006 and 2007

P 45 *Mayer, Michael, Bernhard Heck, Gennadi Milinevsky & Rudolf Greku, Karlsruhe/Germany, Kiew/Ukraine:* Kooperationen zwischen dem Geodätischen Institut der Universität Karlsruhe (TH) und dem Ukrainian Antarctic Centre

P 46 *Scheinert ,Mirko, Jan Müller & Reinhard Dietrich, Dresden:* Regionale Geoidbestimmung in der Antarktis

P 47 *Mayer, Michael & Bernhard Heck, Karlsruhe:* Bestimmung von hochgenauen, GPS-basierten Höhenänderungen im Bereich der Antarktischen Halbinsel

P 48 *Morgenstern, Anne, Guido Grosse, Lutz Schirrmeister & Hartmut Asche, Berlin, Potsdam:* Morphometrische Klassifikation und räumliche Verteilung von Seen im Lena-Delta, NE-Sibirien (GIS- und Fernerkundungsanalysen)

P 49 *Mäusbacher, Roland, Klaas v. d. Borg, Gerhard Daut, Ernst Kroemer, Jens Müller & John Wallner, Jena:* Late Pleistocene and Holocene Environmental Changes in NW Spitsbergen – evidence from lake sediments

P 50 *Kleinschmidt, Georg, Frankfurt a.M.:* Eis-Platten-Tektonik

P 51 *Oelke, Christoph, Thomas Kleiner & Manfred A. Lange, Muenster:* New grounding-line module for deriving improved mass-balance estimates of ice sheet/ice shelf system

P 52 *Blindow, Norbert, Matthias Braun, Martin Rückamp & Birgit Breuer, Münster, Bonn:*
Gletscherfließgeschwindigkeiten und Höhenänderungen auf King George Island aus multi-temporalen DGPS-Feldmessungen

P 53 *Braun, Matthias & Albert Moll, Bonn:* Ableitung von Gletscherbewegungen auf der Antarktischen Halbinsel mittels InSAR-Technik

P 54 *Baessler, Michael & Reinhard Dietrich, Dresden:* Anwendung von Feature-Tracking in Envisat-Radardaten zur Bestimmung von Gletschergeschwindigkeiten

P 55 *Stober, Manfred, Stuttgart:* Höhenänderung, Fließgeschwindigkeit und Deformation im westlichen Randbereich des grönländischen Inlandeises zwischen 1991 und 2004

P 56 *Anschuetz, Helgard, Bremerhaven:* First results from geophysical and glaciological studies on Potsdam Glacier, East Antarctica

P 57 *Kroger, Chris, Julian Thomson, Nancy Bertler & Uwe Morgenstern, Lower Hutt, Wellington/New Zealand:* Ice core stratigraphy using dual energy x-ray absorptiometry (DEXA)

P 58 *Willmes, Sascha, Jörg Bareiss & Christian Haas, Trier, Bremerhaven:* Temporal and spatial variability of surface processes on summer sea ice

P 59 *Eisen, Olaf, Frank Wilhelms, Daniel Steinhage & Jakob Schwander, Bremerhaven, Bern:* Geophysical constrains to improve synchronization of deep ice-core records

P 60 *Scheinert, Mirko, Lutz Eberlein, Andreas Groh, Lissy Hennig et al. Dresden, Bremerhaven:* Validierung und Interpretation von Satellitendaten in Dronning-Maud-Land, Ostantarktis, mit Hilfe von geodätischen, geophysikalischen und glaziologischen Methoden — Beobachtungskampagnen 2003-2005 und erste Ergebnisse

P 61 *Steinhage, Daniel, Uwe Nixdorf & Heinz Miller, Bremerhaven*: Charakteristika des Eis-Fels-Übergangs abgeleitet aus flugzeuggestützten EMR-Messungen um NorthGRIP

P 62 *Kopsch, Conrad & Frank Niessen, Potsdam, Bremerhaven:* Geophysikalische Arbeiten am See "Elgygytgyn", Sibirien

P 63 *Lehmann, Sandra & Hans-Werner Jacobi, Bremerhaven:* Frostblumen und ihre Wechselwirkungen mit der Atmosphäre

P 64 *Lüpkes, Christof & Vladimir Gryanik, Bremerhaven:* The effect of sea ice on the atmospheric boundary layer in Arctic regions

P 65 *Heinemann, Günther & Heike Hebbinghaus, Bonn:* High-resolution simulations of the Arctic atmospheric boundary layer and air-sea interaction process

P 66 *Levin, Ingeborg, Rolf Weller, Christel Facklam & Samuel Hammer, Heidelberg, Bremerhaven:* The Heidelberg Observational Program of greenhouse gases and their isotopic properties at the German GAW station Neumayer (Antarctica)

P 67 *Kupfer, Heike & Andreas Herber, Potsdam, Bremerhaven:* Radiation and meteorological parameters of the BSRN-Station Ny-Ålesund between 1993-2002 and long-term variations

P 68 *Milinevsky, Gennadi, Alexander Bilogolovkin & Asen Gritsai, Kyiv/Ukraine:* Antarctic Peninsula troposphere-stratosphere-ionosphere coupling and conjugate events investigation

P 69 *Hense, Andreas, Reinhard Hagenbrock, Rita Glowienka-Hense & Robin Girmes, Bonn, Offenbach:* The spatial-temporal variability of the Arctic hydrological cycle and the connection to large scale atmospheric circulation

P 70 *Dorn, Wolfgang, Klaus Dethloff, Annette Rinke & Subodh Kumar Saha, Potsdam:* Einfluss von Ozean-Meereiskoppelung und Landoberflächen-Bodenfeuchteprozessen auf die atmosphärische Variabilität in einem regionalen Klimamodell der Arktis

P 71 *Mächel, Hermann & Bruno Rudolf, Offenbach:* The Arctic Precipitation Data Archives APDA Some results from the new gridded Arctic climatology

P 72 *Sood, Abha & Peter Lemke, Bremerhaven:* Investigations of the hydrological components of the Greenland ice shield using the regional atmosphospheric model REMO

P 73 *Drüe, Clemens & Günther Heinemann, Hannover, Bonn:* Sea-ice concentration maps derived from high-resolution MODIS satellite data (German ACSYS project)

P 74 *Meyer, Uwe, Daniel Steinhage, Mirko Scheinert, Uwe Casten, Gert Boedecker & Jörn Lauterjung, Hannover, Bremerhaven, Dresden, Bochum, München, Potsdam:* Geowissenschaftliche Anwendungen eines neuen Forschungsflugzeuges in der Antarktis

P 75 *Opel, Thomas, Diedrich Fritzsche, Rainer Schütt, Wilfried Endlicher, Hans-Wolfgang Hubberten, Potsdam, Berlin:* Paläoklimatische Untersuchungen an den obersten 56 Metern eines Eiskerns von der Eiskappe Akademii Nauk (Severnaya Semlja)

P 76 *Hermichen, Wolf-Dieter & Ulrich Wand, Potsdam, Bremerhaven:* Spätquartäre organische Reste in Oasen des Dronning-Maud-Landes, Ostantarktika

P 77 *Nagy, Balázs, Gergely Surányi, Tibor Németh, Zoltan Szalai & Évan Bugya, Budapest/Hungary:* Recent sedimentation, weathering and patterned ground in the oases of the King George Island

P 78 *Nagy, Balázs, Balázs Kohán &Évan Bugya, Budapest/Hungary:* Diversity of periglacial environment and changes in geomorphological zonality of the oases in the King George Island

P 79 *Kutzbach, Lars & Eva-Maria Pfeiffer, Potsdam, Hamburg:* Properties, genesis and classification of gelisols in the Lena Delta

P 80 *Ganzert, Lars, Dirk Wagner, Potsdam:* Biodiversity of methanogenic archaea in permafrost affected soils of the Lena Delta, Siberia

P 81 *Schwamborn, Georg, Grigorij Fedorov, Hanno Meyer & Lutz Schirrmeister, Potsdam/Germany, St. Petersburg/Russia:* Gefrorene Hangsedimente als Archive Holozäner Umwelt- und Klimaänderungen im Umfeld des El´gygytgyn-Impaktkraters, Tschukotka

P 82 *Lüdecke, Cornelia, München:* Deutsche Marinewetterstationen auf Spitzbergen (1941-1945) - Ein Fall für den polaren Denkmalschutz

P 83 *Rack, Ursula, Bremerhaven:* Soziale Bedingungen während der Überwinterung auf Station Eismitte in Grönland 1930/31

P 84 *Herber, Andreas, Inga Bartsch, Gerit Birnbaum & Hartwig Gernandt et al, Bremerhaven:* AWI aircraft operations in the last 20 years and future prospects

P 85 *Neuber, Roland & Franck Delbart, Potsdam/Germany, Plouzané/France*: The French-German Arctic Research Base in Ny-Ålesund, Spitsbergen

Abstracts

Die Abstracts aller Tagungsbeiträge sind alphabetisch hinsichtlich der Erstautoren geordnet. Folgende Abkürzungen wurden für die 4 Kategorien verwendet:

The abstracts of all contributions are arranged alphabetically by the first author. Following abbreviations are used for the four categories:

Vortragssitzung	S	Oral Session
Beitrag zur DFG-Vortragssitzung	DFG	Contribution to the DFG Lecture Session
Workshopbeitrag	WS	Workshop contributions
Poster	P	Poster

Römische Ziffern kennzeichnen die genaue Vortragssitzung des Beitrags, arabische Ziffern den Standort des Posters.

Roman numerals characterize the Session the contribution is given in, Arabic numerals the location of the poster.

WS

Integratives methodology for planning terrestrial trails for human displacement at Península Keller, Antarctica

ALVAREZ, CRISTINA ENGEL (1), MARTIN SANDER (2), ERLI SCHNEIDER COSTA (2) & GLYVANI RUBIN SOARES (1)
(1) Universidade Federal do Espírito Santo, Vitória, Brazil
(2) Universidade do Vale do Rio dos Sinos, São Leopoldo, Brazil
engel@npd.ufes.br

The presence of constructions or a station in Antarctica can provoke alterations in the landscape, causing environmental impact that should be minimized, through analysis of several field information. It tried to elaborate and to define methodology that integrates and it contemplates several aspects related to the environmental conservation. With base in previous information on distribution and breeding areas of birds and mammals, distribution of the vegetation, landscape, geomorphology, and several forms of use of the area: research and recreational activities, environmental education and support were use to defined the trails for human displacement. This procedure also aided in the definition of rules of attitudes and conducts in the use of the soil and superficial occupation of the land. For the definition of the trails, aerial images were used and accomplished several registrations with GPS to correlate the several information of the Keller Peninsula area. Signs plates either will be used only in areas of special interest or considered fragile. In general the information on the use of the trails should be supplied through special publications.

WS

Architecture in Antarctica: Concepts and achievements from studies undertaken by the Brazilian Antarctic Program

ALVAREZ, CRISTINA ENGEL, BRAZ CASAGRANDE, GLYVANI RUBIN SOARES & DANIEL OLIVEIRA CRUZ
Universidade Federal do Espírito Santo, Vitória, Brazil
engel@npd.ufes.br

The objective of the ARQUIANTAR project – Architecture in Antarctica, linked to PROANTAR – Brazilian Antarctic Program – is to develop suitable technologies and to plan the actions that minimize environmental impact of Brazilian buildings in Antarctica through maintenance optimization, planned growth and use-specific procedures. The investigation assessed the impacts of use, maintenance, and probable consequences of future interventions on the buildings. Efforts were directed to identify eventual environmental impacts caused by human presence in the Comandante Ferraz Antarctic Station as well as its habitability conditions for civil and military customers. For the environmental impact assessment, it was adopted the "input and output" method to identify the input elements by compartment (fuel, water, energy, etc) and the consequence of the human presence for the natural environment, such as emission of liquid and solid residues, noise, heat, among others. Data are initially organized on spreadsheets by adopting concepts that, latterly, are refined through measurements and evaluations undertaken by other research groups that integrate PROANTAR's Network 2. The habitability evaluation is done through the application of the POE Methodology, through technical analysis, application of questionnaires, and interviews with project coordinators and the military team that remains year-round at the Station. Corrosion is the main concern of maintenance activities, since most of the units of the Comandante Ferraz Antarctic Station are metallic containers. The treatment of metallic surfaces causes the deposit of residue and noise as well as indirect impacts such as increased consumption of fossil fuel, paint and solvents, and production of waste. To improve maintenance, in 2003 the Comandante Ferraz Atmospheric Corrosion Station was installed, counting initially with 88 samples to be exposed to weather in a 5-year period. Preliminary results led to new treatment procedures to reduce impacts. Acoustic studies pointed that the treatment of metallic surfaces are the most impacting activities, followed by noise from continuous use of generators. Deficient acoustic insulation between cabins was also reported as harm to privacy, which caused discomfort to customers. For future interventions, it has been developed the Comandante Ferraz Antarctic Station Master Plan to be put into practice for the next 10 years, having as main criterion the assessment of the environment's bearing capacity. The main instrument is the Land Use Environmental Zoning, created after the compilation of data from several projects that are part of Network 2. The result is a plan for the Station surrounding area based on the identification of several levels of possible uses and land occupation. The basic layout was also defined. It was based on the need to optimise the fuel consumption for heating; minimise impact on the landscape; improve protection of equipment and vehicles to increase their life spam; reduce maintenance costs; and improve customer's comfort.

P 56

First results from geophysical and glaciological studies on Potsdam Glacier, East Antarctica

ANSCHUETZ, HELGARD
Alfred-Wegner-Institut, Bremerhaven
hanschuetz@awi-bremerhaven.de

We will present preliminary results from geophysical and glaciological measurements on Potsdam Glacier, south of the Schirmacher Oasis, Central Dronning Maud Land, East Antarctica. The data were retrieved during the Antarctic summer season 2003/2004 and consist of ground penetrating radar (GPR) surveys as well as shallow firn cores and snow pits. The GPR surveys were carried out using a central frequency of 500 MHz on the main flow line of Potsdam Glacier with a total length of 50 km and perpendicular to this line with a length of 8 km for each of those three cross profiles. The recording time was 450 ns and traces were recorded each 0.5 m. Radar data were processed by applying static correction, AGC, filtering. The processed data show several internal reflection horizons indicating a change of density (or conductivity) in the subsurface. These horizons were traced throughout the profiles and will be dated by the results of the firn core analyses. The firn cores were drilled at five locations on the radar profile lines, each core being about 12 m in length. At the same locations snow pits were digged with a depth of 2 m and a sampling interval of 5cm, giving 40 snow samples per pit. On the firn cores dielectric profiling measurements were carried out in the laboratory to determine the real part of the dielectric permittivity and the conductivity. Furthermore the density was measured as well as the content of oxygen isotope O-18. From the snow samples density, conductivity and O-18 were also determined. Combining the different data sets will give information about the accumulation pattern and internal structures in the upper 12-13 m of the snowpack. From the firn core data models are derived giving an estimation of the distribution of the radar velocity with depth. Using these models the radar data can be converted from traveltime- to depth-sections so the depths of the different horizons are known. O-18 peaks in the firn core data indicating summer times give information about the annual cycles covered by the firn cores. Comparing the depths of the radar horizons with the dated firn cores allows dating of the horizons. From the depths of the different reflection horizons and their respective ages the mean accumulation along the radar survey lines can be estimated. So the combination of geophysical and glaciological studies provides a powerfull tool for the determination of the accumulation pattern. On Potsdam Glacier the data indicate changing patterns along the main flow line going from accumulation to ablation area.

DFG

Comparison of Artic and Antarctic Nanofauna: Studies of the species distribution, morphology and phylogeny of choanoflagellates

ARNDT, HARTMUT, FRANK NITSCHE & CLAUDIA WYLEZICH
Dept. General Ecology and Limnology, Zoological Institute, University, Köln
Hartmut.Arndt@uni-koeln.de

Choanoflagellates form a conspicuous and abundant component.of heterotrophic marine nanoplankton, which plays a fundamental role for the functioning for marine Antarctic and Arctic pelagic food webs. Recent molecular biological studies of marine nanofauna indicated that morphological investigations of these tiny organisms (3-6µm cell size) reveal only limited

taxonomic resolution. However, until now only four marine choanoflagellate species of the Acanthoecidae and only seven species of Codonosigidae and Salpingoecidae have been sequenced (18S rDNA). We isloated some choanoflagellates and analyzed them by combining morphological and molecular biological methods. In addition, we summarized information on the polar and global distribution of choanoflagellates. A report will be given on the knowledge of the biogeography of choanoflagellates, on the first results regarding the molecular identity of Arctic and Antarctic isolates of the same morphospecies, and on new insights into the phylogenetic relationships within the choanoflagellates.

P 54

Anwendung von Feature-Tracking in Envisat-Radardaten zur Bestimmung von Gletschergeschwindigkeiten

BAESSLER, MICHAEL & REINHARD DIETRICH
Institut für Planetare Geodäsie, University, Dresden
baessler@ipg.geo.tu-dresden.de

Die Kenntnis der Geschwindigkeit schneller antarktischer Ausflußgletscher stellt eine wesentliche Voraussetzung für die Bestimmung der Massenbilanz der antarktischen Eiskappe dar. Für eine flächendeckende Bestimmung der Geschwindigkeit bilden Daten von Fernerkundungssatelliten wie Envisat eine wichtige Grundlage. Wegen der oft hohen Ausflußgeschwindigkeiten und eines 35-Tage-Wiederholzyklus des Orbits ist aufgrund mangelnder Kohärenz keine interferometrische Auswertung (InSAR) der Radardaten möglich. Als Alternative bietet sich das Verfolgen von Signaturen über mehrere Aufnahmezyklen von Envisat an. Im Gegensatz zur interferometrischen Auswertung hat dieser Ansatz außerdem den Vorteil, direkt horizontale Verschiebungen im Satellitenbild zu messen. Eine (mit Annahmen behaftete) Separierung der horizontalen und vertikalen Geschwindigkeitsanteile entfällt somit.

Das Poster stellt die Datenstruktur, die angewendete Methodik sowie die Optimierung des Algorithmus vor und zeigt am Beispiel des Hays-Gletschers die Leistungsfähigkeit des Verfahrens. Die Auswertung von Bildpaaren, die im März/April und Juni/Juli 2004 gewonnen wurden, ergaben Front-Geschwindigkeiten von über 1100 m/Jahr. Es wird gezeigt, dass die Verschiebungen zwischen aufeinanderfolgenden Aufnahmen mit Subpixelgenauigkeit bestimmt werden können. Der Vergleich von Ergebnissen aus unabhängigen Bildpaaranalysen sowie aus aufsteigendem und absteigendem Orbit (leicht unterschiedliche Geometrie) zeigen, dass nach einer Geokodierung Genauigkeiten von +- 10m für die Verschiebung von Oberflächenelementen erreicht werden können, was bei einer Geschwindigkeit von ca. 1100m/Jahr an der Front einem relativen Fehler von weniger als 10% entspricht. Abschließend werden die erhaltenen Geschwindigkeiten mit historischen Feldmessungen verglichen. Dieser Vergleich zeigt, dass der Ausfluß des Hays-Gletschers über einen Zeitraum von 30 Jahren stabil geblieben ist.

P 28

Accidental transport of noctuid moths to Southern Ocean islands

BARNES, DAVID & PETER CONVEY
British Antarctic Survey, NERC, Cambridge, UK
dkab@bas.ac.uk

Many islands around or in the Southern Ocean have few or no non-indigenous species (NIS), being protected to some degree by isolation. We report here an instance of noctuid moths being carried accidentally on a research vessel from Montevideo (Uruguay) first to the Falkland Islands and, eventually, to Signy Island in the Scotia Arc (maritime Antarctic). In late October 2004 we found 38 specimens (of which eight were alive) of *Pseudaletia adultera* Schaus around an external light source when the vessel arrived in the Falkland Islands. There were also three dead individuals of a second noctuid, *Peridroma saucia* (Hübner). We can assume that the moths were attracted to the ship's lights when in the port of Montevideo, as neither species occurs naturally in the Falkland Islands and both are well-known agricultural pest species in Argentina and Uruguay. Five *P. adultera* individuals survived throughout the 4 day period of the ship being in the Falkland Islands, and one then survived a further 4 day Antarctic voyage to Signy Island before expiring.

There are many potential natural and anthropogenic vectors for the import of alien species into the Antarctic, amongst which shipping is amongst the most influential, and a number of reports have highlighted the threat and vulnerability of Southern Ocean islands to NIS invasion. Unlike elsewhere in the world, Antarctic shipping movements are increasing and, with this, the threat of introductions. Our observations highlight the urgent need for measures to be adopted to reduce risks of NIS spread.

S VIII
Theodor Lerner (1866-1931): Polarfahrer oder Polarforscher?

BERGER, FRANK
Historisches Museum, Frankfurt a.M.
frank.berger@stadt-frankfurt.de

Theodor Lerner (1866-1931) war ursprünglich Journalist. Im Juli 1896 weilte er als Berichterstatter beim Ballonfahrer S. Andrée. Im Juli 1897 war er Augenzeuge beim Ballonaufstieg Andrées. 1898 leitete er die Forschungsreise mit der „Helgoland" um Spitzbergen. 1899 betrieb er Kohlenabbau auf der Bäreninsel. 1906 beobachtete er die Vorbereitungen Wellmans zum Polflug und veranlaßte die Rettung der Passagiere der „Isle de France". Im September 1907 war er Augenzeuge und Beteiligter beim Luftschiffflug Wellmans. 1907/1908 Überwinterung mit Hjalmar Johansen auf Kap Boheman und im Frühjahr Durchquerung des Inlandseises Westspitzbergens. 1913 leitete er sein eigenes Hilfsunternehmen für die verunglückte Schröder-Stranz Expedition. 1914 unternahm er eine letzte Forschungsreise nach Südostspitzbergen. Die letzte Reise geschah mit Unterstützung der Senckenbergischen Naturforschenden Gesellschaft zu Frankfurt, die heute auch den Nachlaß Lerners beherbergt. Die Taten Lerners bewegen sich im Schnittfeld von Polarforschung, Tourismus, Bergbau und Abenteuerlust.

S VII
GPR measurements on King George Island - Data processing, interpretation, and an improved bedrock model

BLINDOW, NORBERT
Institut für Geophysik, University, Münster
blindow@nwz.uni-muenster.de

The glaciation of King George Island (South Shetland Islands) is influenced by marine subantarctic climate and is supposed to be sensitive to climatic changes. In spite of the good accessibility there is a lack of data concerning the properties of the ice cap.

As part of a Brazilean-German expedition in austral summer 1997/98 the Institute for Geophysics of the University of Münster carried out extensive ground penetrating radar (GPR) measurements with a 50 MHz monopulse sounder to map ice thickness and englacial features like water inclusions and the water table. Preliminary results were presented at the DGP meeting in Bern 1998 (Blindow and Pfender). The geometry of the ice cap was derived from DGPS and digitizing raw GPR data.

It was used as an input for a model of the dynamics of the temperate ice cap (Breuer et al.) which produced non-consistent results in some areas. The latter are characterized by heavy englacial scattering and/or other phenomena obscuring the bedrock reflection. In about 25% of the 400 profile kilometers the bedrock were not clearly discernable. Digital signal processing of the data has been performed to produce more relyable ice thickness data in these critical areas.

Physical parameters of the temperate ice influencing the GPR measurements and the choice of parameters for signal processing are discussed. An improved dataset of the bedrock topography below the main dome of King George Island is presented.

P 52

Gletscherfließgeschwindigkeiten und Höhenänderungen auf King George Island aus multi-temporalen DGPS-Feldmessungen

BLINDOW, NORBERT (1), MATTHIAS BRAUN (2), MARTIN RÜCKAMP (1), BIRGIT BREUER (1), ALBERT MOLL (2) & Manfred Lange (1)
(1) Institut für Geophysik, University, Münster
(2) Zentrum für Fernerkundung der Landoberfläche, University, Bonn
blindow@nwz.uni-muenster.de

Auswertungen von Luftbildern und Satellitendaten haben gezeigt, dass sich die Auslassgletscher der Eiskappe von King George Island seit 1956 deutlich zurückgezogen haben. Diese werden oftmals direkt in Bezug zu den beobachteten siginifikanten Temperaturerhöhungen der letzten Jahrzehnte gesetzt. Erste Modellierungsansätze bzgl. der Klimasensitivität der Eiskappe von Knap et al. (1996) ergaben eine sehr hohe Empfindlichkeit der Eismassen hinsichtlich einer weiteren Temperaturerhöhung.

Im Rahmen mehrerer Geländekampagnen (1997/98, 1999/2000 und 2004/2005) wurden umfangreiche statische und kinematische DGPS-Messungen auf King George Island durchgeführt.

Aus statischen DGPS-Messungen zu Beginn und am Ende der Feldkampagnen konnten Geschwindigkeitsvektoren der Haupteiskappe ermittelt werden. Die 64 Messpunkte wurden entlang eines Rasters eingerichtet, welche gleichzeitig auch Kreuzungspunkte von Eisdickenmessungen mit GPR und Höhenmessungen mit kinematischem DGPS bilden.
Je nach Lage auf der Eiskappe werden Geschwindigkeiten von bis zu 60 m/a, in einem Auslassgebiet auch 120 m/a erreicht. Diese dienen als Referenz für Satelliteninterferometrie

sowie für die Kalibrierung eines dreidimensionalen Modells der weitgehend temperierten Eiskappe.

Während des Südsommers 2004/05 wurde ein großer Teil der kinematischen DGPS-Profilfahrten von 1997/98 wiederholt. Eine umfangreiche Validierung an Kreuzungspunkten und während Standzeiten sowie an statischen Messpunkten ergab für beide Kampagnen Höhengenauigkeiten von ca. 1.5 m. Aus dem Vergleich der statischen und kinematischen Oberflächenhöhen beider Kampagnen läßt sich für das Untersuchungsgebiet keine signifikante Höhenänderung innerhalb der letzten sieben Jahre nachweisen.

Während des Südsommers 2004/05 wurde ein großer Teil der kinematischen DGPS-Profilfahrten von 1997/98 wiederholt. Eine umfangreiche Validierung an Kreuzungspunkten und während Standzeiten sowie an statischen Messpunkten ergab für beide Kampagnen Höhengenauigkeiten von ca. 1.5 m. Aus dem Vergleich der statischen und kinematischen Oberflächenhöhen beider Kampagnen läßt sich für das Untersuchungsgebiet keine signifikante Höhenänderung innerhalb der letzten sieben Jahre nachweisen.

S IV

Biodiversity and zoogeography of Southern Ocean deep-sea Isopoda (Crustacea, Malacostraca) – results from the ANDEEP expeditions

BRANDT, ANGELIKA
Zoological Institute and Zoological Museum, Hamburg
abrandt@zoologie.uni-hamburg.de

The Antarctic shelf is well isolated and the zoogeographic distribution of the 371 isopod species, which show a degree of endemism of 88%, is well documented (Brandt, 1991). During the expeditions ANDEEP I&II with RV *Polarstern* from January to April 2002, 317 species of deep-sea Isopoda were sampled and discriminated from 5525 specimens yielded from the epibenthic sledge material of these expeditions. Of these 277 were new to the area or even to science, 50 were known from adjacent deep-sea areas and 27 of these from the Southern Ocean (SO), yielding a percentage of 84.7% of deep-sea endemism. During ANDEEP III, questions like the potential origin of Antarctic benthic taxa and colonisation of the deep sea from the Antarctic (submergence versus emergence of species) still remain major objectives especially off the Kapp Norwegia shelf in the deep eastern Weddell Sea. However, the incredible isopod biodiversity reported opens new questions for ANDEEP III like: is the degree of endemism of the SO deep-sea Isopoda really so high, or is this an artefact due to the little knowledge of the isopod faunas of the adjacent deep-sea basins? Which are the dominant isopod taxa in the SO deep-sea, will we find a similar composition of asellote families like during ANDEEP I&II? Preliminary answers to some of these and other questions will be presented.
Some specific aims of ANDEEP III are

- To expand and deepen insights in the potential origin of Antarctic benthic Isopoda, collected during ANDEEP I and II
- To continue the analysis of evolutionary biology and current community patterns on Southern Ocean deep-sea Isopoda
- To test whether the present distributions of Isopoda is the result of progressive retractions of the species from a former more cosmopolitic distribution, which was established during Jurassic or Cretaceous periods, when Gondwana was still clustered, or are these Gondwanian relicts?

- To analyse whether some taxa of the Isopoda have radiated in the Antarctic because of the extinction of potential competitors (brachyurans), i.e. has the emergence of new, adaptive zones and occurrence of mass extinctions in the Antarctic in the Tertiary opened up previously occupied adaptive zones, and thus provided opportunities for spectacular adaptive radiations?
- To analyse whether the Antarctic deep sea serves as a reservoir of high species diversity within all isopod taxa?
- To investigate whether the Antarctic deep-sea fauna differ from that of the deep sea of the other oceans?
- To analyse whether there is still faunal exchange with the isopod fauna found in the area of the Antarctic Peninsula and the Magellan area or are there distinct topographical barriers to migration in and out of Antarctica via the deep sea?
- To analyse whether there is a link between the Antarctic shelf and the deep-sea fauna of the Southern Ocean in present and past?

P 53

Ableitung von Gletscherbewegungen auf der Antarktischen Halbinsel mittels InSAR-Technik

BRAUN, MATTHIAS & ALBERT MOLL
Zentrum für Fernerkundung der Landoberfläche, University, Bonn
matthias.braun@uni-bonn.de

Im Bereich der Antarktischen Halbinsel wurden in der zweiten Hläfte des 20. Jahrhunderts verschiedene klimatische Veränderungen beobachtet wie signifikante Erhöhung der Lufttemperatur, Änderung des Niederschlagsmusters und der Niederschlagsmengen sowie Gletscherrückzüge an verschiedensten Stellen. Alle Informationen deuten auf eine Änderung der Obflächenmassenbilanz hin, jedoch ist die Datenlage hierzu noch sehr gering. Flächenhafte Informationen zu Gletscherbewegung oder eine genauere Oberflächentopographie liegen nur für sehr wenige Gebiete vor.
Mit dem Betrieb der deutschen Empfangsstation in O'Higgins wurde seit dem Start des ERS-1 Satelliten 1991 ein umfangreiches Archiv an Radardaten auch von der Antarktischen Halbinsel aufgebaut. Nur ein kleiner Teil der Daten aus den Ice Missions und ERS-1/2 Tandem Missionen wurde bisher für dieses Gebiet interferometrisch ausgewertet.
Es werden erste Ergebnisse der Ableitung von Bewegungsfeldern von Gletschern im Bereich der Antarktischen Halbinsel vorgestellt. Insbesondere wird auf Auswertungen auf King George Island eingegangen, wo durch die hohe zeitliche Dynamik der Schneedecke die interferometrischen Auswertungen eine besondere Herausforderung darstellen. Die Ergebnisse werden mit in-situ Messungen verglichen.

S VII

The dynamics of the temperate ice cap on King George Island, Antarctica, and comparison with in-situ measurements

BREUER, BIRGIT, NORBERT BLINDOW, MARTIN RÜCKAMP & MANFRED A. LANGE
Institut für Geophysik, University, Münster
b.breuer@uni-muenster.de

In ice sheet dynamics, cold and usually extended ice sheets (temperatures below pressure melting point) with negligible amounts of water that does not affect the ice dynamics are distinguished from smaller and temperate ice caps (temperatures at pressure melting point) where water is percolating through the ice matrix. The present study focuses on King George Island (=KGI), the largest of the South Shetland Islands, which is located north of the Antarctic Peninsula at 62° S. It is largely governed by maritime climate conditions. The overlying ice cap consists of a mainly temperate ice body with a significant amount of water affecting the ice dynamics in a non-negligible way. This fact has to be considered while adapting a 3-D numerical flow model to obtain the ice dynamics of this ice body.
The rheology of an ice body is usually described in numerical models by Glen's flow law. We apply an approach of Greve et al. (1998) to account for the non-negligible water content within the ice matrix. Additionally to assure the energy balance equation, modifications are necessary considering the basal boundary conditions, i.e. basal sliding.
We present these modifications and compare the resulting simulated ice velocity field with recent in-situ stake-measurements obtained from a field campaign during austral summer 2004/05. These diagnostic model runs need to be investigated thoroughly to obtain reliable input data for time-dependent simulations. First results of such a time-dependent model run will be presented, mainly based on a comparison between DGPS measurements obtained during the field campaigns in 1997/98 and 2004/05.

S IV

Diversity of cyanobacterial communities of an Antarctic inland ecosystem in early stages of colonisation

BRINKMANN, MARCUS (1), SIEGLINDE OTT (1), DAVID PEARCE (2) & PETER CONVEY (2)
(1) Botanisches Institut, University, Düsseldorf
(2) British Antarctic Survey, NERC, Cambridge, UK
brinkmam@uni-duesseldorf.de

Inland terrestrial sites are poorly described and understood concerning their ecosystems and biodiversity in comparison with Antarctic coastal regions. As initial colonisers microorganisms are essential for pedogenesis and the subsequent establishment of macroorganisms. The different groups of microbiota are, therefore, integral to ecosystem development. Here we report studies of the microbial communities found in polygon soils of Coal Nunatak (southern Alexander Island, 72°03´S 68°31´W, Antarctic Peninsula). These soils mirror the initial stages of colonisation processes after Pleistocene maxima when glaciers retreated. Two transects (lengths 70m, 140m) across periglacially influenced ground were chosen for sampling. We analysed soils obtained across polygons (perimeter and center) at three depths (0-1cm, 1-2cm, 2-5cm). Cyanobacterial diversity was quantified using molecular biological approaches (temperature gradient gel electrophoresis – TGGE, clone libraries). Investigations on green algae and fungi are in progress. Correlations between microbial diversity, a range of soil physical and chemical parameters and with micro- and mesoclimatic data is the primary aim of this investigation. Understanding the mechanisms underlying biological responses to changing climate will also be contributed by the obtained data.

S VIII

Kartographie als Klimaarchiv – Karten dokumentieren die „Kleine Eiszeit"

BRUNNER, KURT
University, München
kurt.brunner@unibw-muenchen.de

Im 15. Jh. weisen Kartenbeschriftungen in Weltkarten und sog. Tabulae modernae lateinischer Ptolemäus-Ausgaben auf Meereis in Nordeuropa hin; in den ihnen zugrunde liegenden griechischen Codizes finden sich derartige Hinweise nicht. In der zweiten Hälfte des 16. Jh. beginnt die Suche nach einer Nordwestpassage nach Asien durch die Seefahrer Martin Frobisher und John Davis. Zu Beginn des 17. Jh. wurde William Baffin durch Eis endgültig an der Weiterfahrt gehindert und die weitere Suche nach dieser Schiffspassage abgebrochen. Das Mittelalterliche Klimaoptimum ist zu Ende gegangen; die „Kleine Eiszeit" hat begonnen und erst 1853 - am Ende der „Kleinen Eiszeit" – gelang Robert McClure der Nachweis der Nordwestpassage. Atlaskarten belegen das Scheitern der Suche zu Beginn des 17. Jh.
Den Klimawandel in der Frühen Neuzeit belegen auch sog. Augenscheinkarten und gedruckte Regionalkarten ab 1500. Sie dokumentieren die Einstellung von Weinbau und das zum Teil katastrophale Vorrücken von Gletschern der Ostalpen um 1600 und 1680. Gletscherhochstände des 17. Jh. in den Westalpen wurden in Veduten dargestellt. Die Maximalstände der Alpengletscher am Ende des 18. Jh. sind auch in gedruckten Karten der Alpen ausgewiesen.
In der Mitte des 19. Jh. entstehen erste Gletscherkarten, sie halten dabei unbeabsichtigt den letzten Hochstand der Alpengletscher fest. Ab 1880 beginnen genaue Kartierungen von Gletschern in großen Maßstäben, welche den Rückzug der Alpengletscher bis in unsere Zeit dokumentieren.

S IX

Long-term research on Wilson's and Black-bellied storm-petrels on King George Island, South Shetland Islands

BÜßER, CHRISTINA, PETRA QUILLFELDT, STEFFEN HAHN, TIM SCHMOLL, ANJA GLADBACH, ANJA NORDT & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
christina.buesser@uni-jena.de

Wilson's storm-petrels (*Oceanites oceanicus*) and Black-bellied storm-petrels (*Fregetta tropica*) are the smallest endotherm animals breeding in the extreme climatic conditions of the Antarctic and are faced with a seasonally abundant, but hardly predictable and patchy resources. Since 1994/95 a colony of both sympatric breeding petrel species has been studied at King George Island, South Shetlands. The colony is situated at a degraded volcano (Tres Hermanos or Three Brothers Hill) at Potter Peninsula. All extensive studies delivered basic population data, e.g. colony size, number and ratio of breeding and non-breeding birds and biometric analyses as well as data of the breeding and behavioural ecology of both species.
Fundamental questions of seabird ecology have been tackled on the Tres Hermanos population of Wilson's storm-petrels as model organisms especially of adaptations of foraging behaviour to environmental conditions. Variation in feeding rate, feeding frequency and meal size were matched with climate and ice data as well as information about the abundance of Antarctic krill (*Euphausia superba*) within the range of the colony. As Wilson's storm-petrels mainly prey on krill and its feeding rates are correlated to food quantity, they could be used as an indicator

species of krill abundance. Furthermore we used haematology and plasma biochemistry values to measure stress factors and provide information on the physiological state and adaptation of individuals to their habitat, changes in nutritional state, body condition and the level of parasite infestation.
To determine the resource allocation and sexual differences in parental investment we analysed the genetic mating system of Wilson's storm-petrels using Multilocus-DNA-Fingerprinting. No extra-pair paternity and no intraspecific brood parasitism were detected, revealing that Wilson's storm-petrels are socially AND genetically monogamous.
Our long-term data showed clearly that parental investment in terms of nest attendance equals between the sexes. Both sexes provided their single chick equally with food, no statistical differences in feeding frequency and feeding mass were found, but the variation between pairs as well as between study years was exceptional large.
As a species with single-chick brood storm-petrels are ideal models to study the significance of chick begging during parent-offspring conflict periods, because the influence of nestling competition is eliminated. Analysing the begging calls of Wilson's storm-petrel chicks we verified that chicks were able to conveyed information about their current body condition by vocalization and the parents responded by larger meals.
Currently, the focus of ongoing studies lies on the evolutionary significance of sex-specific provisioning and begging behaviour as well as long-term monitoring for the influence of rapid regional warming to marine top-predators in the Maritime Antarctic.

WS
Environmental data and human activities on Fildes Peninsula and Ardley Island

BÜßER, CHRISTINA., UWE GRUNEWALD, TIEMO KAHL, OSAMA MUSTAFA, SIMONE PFEIFFER & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute for Ecology, University, Jena
christina.buesser@uni-jena.de

On Fildes Peninsula and Ardley Island the following assessments have been carried out during the last two field seasons (2003/04 and 2004/05) to record the spatial and temporal environmental data:
The historical and actual waste grounds of Fildes Peninsula and Ardley Island were classified and mapped using GPS and GIS. In this context hazardous material, large quantities of wood, plastic and metal and other objects were found not only close to human infrastructure but also further afield. Stranded material was most common, followed by deposits and wind-drifted material. The majority of waste was classified as originating from earlier years. Furthermore, actual oil leakage and entry of organic material were documented. The mapping of waste ground included the assessment of present management techniques at all stations on site.
Beyond, major construction activities were noted. These included for instance the establishment of a church by Russia in 2003/04 or the construction of an aircraft parking area at the existing runway by Chile in 2004/05. This involved also the establishment of new vehicle and pedestrian lanes. As a consequence of these activities the affected areas were mapped and local environmental impacts on vegetation, breeding habitats and behaviour of birds were recorded.
Marathons, glacier climbing, camping and diving activities have all taken place in recent years, illustrating the diverse spectrum of non-governmental activities in the area, which will certainly continue increasing. As an example of the diverse spectrum of increasing non-governmental activities taking place in the area of Fildes Peninsula and Ardley Island, the Antarctic Marathon

in March 2005 with more than 200 participants was observed in respect of possible impacts on vegetation or breeding birds.
Furthermore, in 2003/04, a peninsula-wide survey of geological-paleontological sites was conducted to update published fossil data and look for a possible adjustment of the boundary of the existing ASPA 125.

Commissioned by the German Federal Environmental Agency, Berlin

S I
First Israeli Antarctic Expedition 2003

CHARNY, IDAN & TANYA REMENIK
Israeli Antarctic Association, Moshav Ganey-Am, Hod-Hasharon, Israel
charny2@bezeqint.net

Idan Charny and Tanya Remenik are representatives of The Israel Antarctic Society. The fellowship society was officially established in the course of the year 2003, after a long period of explorations and contacts with foreign research and governmental bodies. The Vision of the Fellowship Society is to Enrich the knowledge of the Israeli public regarding the Antarctic continent, carry out operations in furtherance of Israel's joining the convention in question and the international research bodies in Antarctica and setting up a first Antarctic center in Israel, which will pool and initiate activities on the subject of Antarctica. As a pilot activity of The Israel Antarctic Association, Idan and Tanya spent six month in Antarctica studying basic aspects of conducting life in the research station at Antarctica. The lecture will cover their activities and experiences in the white continent. The lecture will be accompanied by digital slide show and video film.

DFG
Geomagnetic variability over the past 300,000 years from cosmogenic Beryllium-10 in deep sea sediments – a potential global matching tool

CHRISTL, MARCUS (1), BORIS SCHULZE (1), PATRICK WENDEROTH (1), FRANK BERNSDORFF (1), AUGUSTO MANGINI (1), DIETMAR WAGENBACH (2) & PETER W. KUBIK (3)
(1) Heidelberg Academy of Sciences, University, Heidelberg
(2) Institute of Environmental Physics, University Heidelberg
(3) Institute of Particle Physics, Zurich, Switzerland
mchristl@iup.uni-heidelberg.de

Cosmogenic 10Be is mainly produced in the lower stratosphere by the interaction of galactic cosmic rays with oxygen and nitrogen atoms. Its production rate is known to be inversely related to the solar- and geomagnetic field strength. These variations are globally recorded in very different sedimentary archives. Therefore, the determination of 10Be-fluxes in marine/terrestrial sediments or ice cores provides a totally independent tool for the reconstruction of geomagnetic paleointensity. By matching distinct features between different sequences these records also may be deployed for the synchronization of marine, continental and ice core archives (1).
However, marine 10Be-records may be influenced significantly by oceanic transport processes. For example, dissolved 10Be can be laterally transported by ocean currents and preferentially be deposited in biologically active areas (boundary scavenging). Once deposited, 10Be can be

redistributed by bottom currents and be re-deposited elsewhere (sediment focusing/winnowing). To deploy 10Be in marine sediments as paleointensity tracer these transport processes need to be quantified, therefore (2).
Here we present highly resolved 10Be-fluxes from ODP Site 1089 located in the the South Atlantic Ocean. Due to its location on a drift deposit formed by bottom water currents Site 1089 shows strong sediment focusing while boundary scavenging can be neglected at that site. Consequently, Thorium-normalization that corrects for sediment redistribution (3) is essential to calculate vertical 10Be fluxes. Over the past 330kyr the transport-corrected 10Be-fluxes from Site 1089 show distinct peaks that can be linked to global geomagnetic events like the Jamaica (190kyr) and the Laschamp Event (40kyr). Furthermore, our results are in good agreement with transport-corrected 10Be-records from different ocean basins. Over the past about 60kyr we observe a good correlation with a reconstruction of atmospheric radiocarbon (4) and with the 10Be-fluxes recorded in the GISP2 and GRIP ice cores (5).
Our results show that 10Be-fluxes from very different archives and locations are related to global 10Be-production changes that in turn depend on variations of the solar/geomagnetic field. This indicates that 10Be-records have a great potential to be used as a global matching tool for the synchronization of marine, terrestrial and ice core chronologies.
References
1. M. Sarnthein et al., QSR 21, 1121-1128 (May, 2002).
2. M. Christl, C. Strobl, A. Mangini, QSR 22, 725-739 (2003).
3. M. Frank, R. Gersonde, A. Mangini, in Use of Proxies in Paleoceanography, G. Fischer, G. Wefer, Eds. (Springer-Verlag, NY, 1999) pp. 409-426.
4. A. Voelker et al., Radiocarbon 40, 517-534 (1998).
5. R. Muscheler, J. Beer, P. W. Kubik, H.-A. Synal, QSR In Press, Corr. Proof (2005).

WS
How vulnerable are Antarctic terrestrial ecosystems to biological invasions?

CONVEY, PETER
British Antarctic Survey, NERC, Cambridge, UK
pcon@bas.ac.uk

Antarctica and its surrounding oceans and islands have been remote and protected from human activity until the last two centuries. Sealing, whaling and fishing industries developed in the Southern Ocean between the late 18th and mid 20th centuries, preceding the "heroic age" of continental exploration of the early to mid 20th Century, the progressive focus on scientific endeavour from the mid 20th Century onwards and, most recently, public interest and tourism. Over this short period, many alien terrestrial organisms including microbes, fungi, plants and animals have been introduced to and become established in the Antarctic region, with the large majority of aliens being European in origin. The sub-Antarctic islands in particular have been heavily impacted, with the consequences of plant and vertebrate introductions being particularly visible, while it is also clear that invertebrate introductions may have considerable impacts. A much smaller number of alien biota have been introduced to parts of the Antarctic continent. Here, although few impacts are visible to date, there is also a serious lack of even the most basic survey or monitoring data, particularly in the context of microbial groups. Introduction routes have varied, but are largely associated with movement of people and cargo in connection with industrial and national scientific program operations, which, together, far outweigh in numerical terms the processes of colonization by natural routes. Introduced species have both direct and indirect impacts on the functioning of species-poor indigenous Antarctic ecosystems, in

particular leading to substantial loss of local biodiversity and changes to ecosystem processes. With rapid climate change occurring in some parts of Antarctica, elevated numbers of introductions (natural and anthropogenic) and enhanced success of establishment are likely, with consequent increases in impacts on ecosystems. There is an urgent need for the establishment of effective monitoring programs, backed by appropriate taxonomic resources, across the continent and sub-Antarctic regions, not least to establish a robust baseline measure of the degree of risk currently existing. Mitigation measures that will substantially reduce the risk of introductions to Antarctica and the sub-Antarctic must focus on reducing propagule loads on humans, and their food, cargo, and transport vessels.

S I
Antarctic terrestrial ecosystems: responses to environmental change

CONVEY, PETER
British Antarctic Survey, NERC, Cambridge, UK
pcon@bas.ac.uk

Antarctic terrestrial ecosystems have often been regarded as the "poor relation" in comparison with their marine counterparts – seen as small in extent, low in diversity and biomass, and simple in structure. However, with the contemporary recognition of the global significance of climate change processes, these ecosystems have assumed a new and global importance in developing our understanding of and ability to predict biological responses to climate change. The region of the Antarctic Peninsula, and some parts of the sub-Antarctic, are currently experiencing amongst the fastest rates of climate warming seen worldwide. Temperature is not the only changing environmental variable of significance to biota, and this region is also subject to changes in water availability (precipitation and melt patterns) and ultra-violet radiation (*via* the ozone hole) – a combination that is unique worldwide. Much publicity has been given to certain biological changes linked with environmental warming in the Antarctic, in particular a rapid expansion in populations of the two higher plants native to the Peninsula. It is now becoming clear that many responses will not be as clear-cut as this example. While these are often subtle and hard to detect on the scale of an organism, their ramifications through food webs and ecosystems are potentially far greater. This presentation will give an overview of climate change processes affecting Antarctic terrestrial ecosystems, before considering the range of responses, seen both through field observations and experimental methodologies, attributed to these processes.

P 11
Planktonic diatom communities in high arctic lakes – examples from Greenland and Russia

CREMER, HOLGER
Netherlands Institute of Applied Geoscience TNO, Utrecht, NL
h.cremer@bio.uu.nl

Although vast regions of the Arctic are covered by lakes, ponds and rivers, the knowledge on the biology and development of these ecosystems is incomplete, particularly in remote regions which are relatively difficult to access (e.g., Greenland and northern Russia). Arctic freshwater ecosystems are generally characterized by extremes in temperature, ice cover, seasonality, irradiance and nutrient input, and they react sensitively and quickly to ecological disturbances.

This contribution documents the limnology and diatom phytoplankton in two remote Arctic regions which are hardly affected by direct human influence. The studied lakes are located on several coastal islands in East and Northeast Greenland and in Chukotka. All lakes are cold, monomictic, alkaline, low-conductive and likely ultra-oligotrophic. Diatom phytoplankton diversity in summer 2003 was generally low in all studied lakes. The deep lakes on Store Koldewey (Northeast Greenland) were dominated by *Cyclotella pseudostelligera* and *C. rossii*. The most significant diatom taxa in the shallower lakes on Store Koldewey were *Fragilaria tenera* and *Aulacoseira tethera*. Loon Lake (max. depth is 11 m), located on Geographical Society Island (East Greenland), was co-dominated by *Cyclotella ocellata*, *C. pseudostelligera* and *F. tenera*.

In Chukotka, Lake El'gygytgyn is a 170 m deep impact crater lake measuring 12 km across. This lake was entirely mixed in summer 2003 and the planktonic diatom community was dominated by *Cyclotella ocellata* (> 96 % relative abundance). *Pliocaenicus costatus sensu lato* was of minor importance.

These observations and comparable literature data show that small *Cyclotella*-species are obviously well-adapted to the harsh environmental conditions in High Arctic lakes and that they are most successful in using the short ice-free vegetation period for extensive growth.

S IX
Do different petrel species feed their chick differently?

CREUWELS, JEREON (1), GEORG ENGELHARD (2) & JAN VAN FRANEKER (1)
(1) Alterra – Texel, Den Burg, NL
(2) Lowestoft Laboratory, Lowestoft, UK
jeroen@creuwels.nl

Fulmarine petrels are abundant seabirds in Antarctic waters highly adapted to life in the coldest environments. Contracted breeding cycles and a high frequency of feeding the chick are considered to be adaptations to a reproductive life at high latitudes. On Ardery Island (66°S 110°E), we compared the chick provisioning strategies of the closely related Antarctic Petrel (*Thalassoica antarctica*) and Southern Fulmar (*Fulmarus glacialoides*), two species similar in diet and body size. We used an automated weighing system with artificial nests. Antarctic Petrels continued a pattern of long foraging trips even in the chick period when the extent of sea-ice was minimal and allowed nearby feeding. Fulmars made much shorter trips delivering many more meals to their chicks. The sizes of meals delivered by both species were similar. Despite lower feeding frequency but similar meal sizes, the growth of Antarctic Petrel chicks was comparable to that of Southern Fulmars, and so was the time needed until fledging. We discuss how Antarctic Petrel chicks are able to achieve a higher growth efficiency per delivered meal. Differences in wing morphology between the two species may explain their different foraging techniques and duration of foraging trips.

DFG

Importance of kinetics to Iron speciation in the Southern Ocean and Antarctic Waters

CROOT, PETER
Forschungsbereich Marine Biogeochemie, Chemische Ozeanographie, Leibniz-Institut für Meereswissenschaften, Kiel
pcroot@ifm-geomar.de

Primary productivity in the High Nutrient Low Chlorophyll (HNLC) Southern Ocean has been shown to be strongly controlled by the concentration of the micro-nutrient iron – most notably during the mesoscale iron enrichment experiments: SOIREE, SOFeX, EISENEX and the recently completed EIFeX (Jan-Mar 2004). The low concentrations of iron in seawater are a result of the strong hydrolysis and low solubility of the thermodynamically favoured redox state Fe(III). Oceanic phytoplankton have evolved several strategies to maximise their uptake of Fe from seawater; production of siderophores to increase the amount of soluble iron, the use of reductases to access organically complexed iron. Currently however the biogeochemical cycling of these iron species is poorly understood and information is particularly lacking in cold Polar waters. Our present work at the IfM-Geomar is focussed on obtaining kinetic and thermodynamic data on the interconversion of iron species in polar seawater by examining the properties of natural and artificial iron binding ligands. This information allows an examination of the overall solubility of iron and the rates at which iron may be bioavailable to phytoplankton in seawater and sea ice. Sampling in Sea Ice for iron speciation is experimentally difficult and so initial work is centred on developing a theoretical model which can aid in designing better sampling strategies. By improving our knowledge of these processes we hope to improve modelling of the uptake of iron by phytoplankton and the transport of iron in the Deep Ocean and supply to surface waters by upwelling and diffusion. This presentation will highlight recent results from the laboratory and from the EIFeX experiment.

P 30

Initial studies about the presence and distribution of PAHs in soil and sediments from Jubany Station, Antarctica

CURTOSI, ANTONIO (1), ÉMILIEN PELLETIER (1), WALTER PATRICIO MAC CORMACK (2) & CRISTIAN VODOPIDEZ (2)
(1) ISMER 310, University, Rimouski, Canada
(2) Instituto Antártico Argentino, Buenos Aires, Argentina
tonicur@yahoo.com

Polycyclic aromatic hydrocarbons (PAHs) are among the most common organic pollutants of aquatic sediments and soils. Although these compounds are naturally produced by incomplete combustion of woods, the main source is represented by human activities like fuel spills, petroleum refinery activities, coal combustion and vehicles powered by gasoline or diesel fuels. Antarctica is considered one of the few pristine regions around the world. However, the logistic related to the scientific station, as well as the tourist activity caused local but significant pollution events including PAHs contamination.

As the chemical structure of PAHs determine a tendency to accumulate it in the food chain, important damage could be caused on the biota due to the long-term release of low quantities of these compounds into the environment. In addition, factors as low temperatures and low nutrient

availability observed in many Antarctic soils and sediments significantly reduce activity of PAHs degrading microorganisms and could contribute to the accumulation of significant PAHs levels in the Antarctic environment. Jubany scientific station (62° 14'S, 58° 40'W) is located in 25 de Mayo Island (King George Island) and has an important and permanent human activity since 1952. In this work, the presence of 16 PAHs considered as priority pollutants by the USEPA, as well as several of their derivatives was analysed at three different depths in soil profiles at Jubany station. In addition, surface sediments obtained from three coastal areas were analysed. Twenty-five different sites at the vicinity of the station were sampled during the 2002/03 summer Antarctic expedition at 0, 25 and 75 cm depth of the soil active layer. PAHs concentration was evaluated by GC-MS after extraction of 1 g of dry material in 20 ml dichloromethane-hexane (3:1) solution. PAHs concentration in soil samples from surface and 25 cm-depth ranged between 9 and 100 ng g-1 and showed different patterns depending on the sampling site. However, samples from 75 cm-depth showed a similar pattern in all sites, with phenanthrene and fluorene representing about 90% of the total PAHs and showing concentrations between ten and one-hundred times higher than those observed in surface samples (range: 160-1240 ng g-1). The same pattern observed at 75 cm depth was observed in samples from surface sediments. Results showed that the primary source of PAHs in Jubany Station is the low temperature combustion of organic materials and fossil fuels. The distribution pattern of PAHs observed in Jubany Station suggest that the most water-soluble compounds migrate from surface and accumulate at depths near the permafrost which could act as a low-permeability region of the soil. If this hypothesis is confirmed, the melting of permafrost produced by the global warming in a near future could determine the leaching and release of a great amount of PAHs in the sea, causing a dramatic alteration of the small and confined Potter Cove ecosystem. Samples taken during the 2004/05 summer Antarctic expedition at 0, 75, 100, 150 and 200 cm in the active layer and in the permafrost, which are being processed at the present days could permit us to confirm or discard this hypothesis.

P 36

Geological and aeromagnetic investigation of the northern Nares Strait

DAMASKE, DETLEF (1), SOLVEIG ESTRADA (1) & GORDON OAKEY (2)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) Geological Survey of Canada, Halifax, Canada
d.damaske@bgr.de

The tectonic development of the North Atlantic-Labrador Sea-Baffin Bay ocean systems and the Arctic Ocean caused relative movements of the Greenland plate and the North American plate and led probably to the formation of a transform fault along Nares Strait between Greenland and Ellesmere Island (Wegener Fault). This question has been discussed since the concept of plate tectonics has been developed by Alfred Wegener in 1915.

Geological investigations carried out by the BGR Hannover and the GCS Calgary in1998 to 2000 on the area of Judge Daily Promontory (Canadian side of Nares Strait). They have revealed sinistral strike-slip faults parallel to Nares Strait (Tessensohn et al. in press). Some of these faults are in contact to known, narrow Tertiary pull-apart basins which developed as a result of the strike-slip movements. The basins are filled with Paleocene clastic sediments containing a significant amount of volcanic material. Studies on volcanic pebble-size clasts have shown that they were derived from the same alkaline volcanic suite which is unique in the area. 40Ar-39Ar

dating on amphiboles, alkali feldspar, and whole rock samples yielded ages of about 61-58 Ma (Estrada et al. in press).

An aeromagnetic survey in 2001 has revealed two linear north-east oriented positive magnetic anomalies over Judge Daly Promontory which correlate with fault bounded Tertiary basins. Their infill has increased susceptibility values caused by the content of volcanogenic clastic material. The offshore extension of these anomalies indicates a continuity of the Tertiary basins northeastward to Robeson Channel and to the Lincoln Sea. It does not follow a simple continuous line, but appears to be broken in subsections of slightly differing directions, which may indicate a series of Tertiary pull-apart basins related to sinistral strike-slip movement.

Similar offsets are observed in a parallel magnetic anomaly in Hall Basin suggesting cross-cutting NW-SE trending faults.The magnetic anomalies and onshore geological observations suggest that the Wegener fault is not a simple strike-slip fault, but a complex system of synthetic and antithetic faults and a chain of blocks and basins. Afterwards, parts of the Wegener Fault are overprinted and/or reactivated by Eurekan compression (TESSENSOHN et al. in press).

Estrada, S., Henjes-Kunst, F., Melcher, F. & Tessensohn, F. (in press): Late Paleocene Nares Strait volcanic suite: Evidence from volcanic pebbles. - In: The geology of northeast Ellesmere Island adjacent to Kane Basin and Kennedy Channel, Nunavut. – Bull. Geol. Surv. Canada.
Tessensohn, F., Gosen, W. v., Piepjohn, K., Saalmann, K. & Mayr, U. (in press): Nares Transform Motion and Eureka Compression: Evidence from Structural Work on the Ellesmere Coast, Arctic Canada. - In: The geology of northeast Ellesmere Island adjacent to Kane Basin and Kennedy Channel, Nunavut. – Bull. Geol. Surv. Canada.

WS

Human impacts at the sub-Antarctic Prince Edward Islands

DE VILLIERS, MARIENNE & JOHN COOPER
Avian Demography Unit, Dept of Statistical Science, Cape Town, South Africa
mdevill@adu.uct.ac.za

At first, human concerns for the Prince Edward Islands were primarily exploitative and commercial. These days the islands are increasingly valued because of their worth in terms of conservation and research. More than 50 years of scientific research at the islands have made this one of the most well-studied island systems in the world. The island group is a Special Nature Reserve with substantial legal protection, and its Management Plan emphasizes the maintenance of biological diversity and the minimization of interference with natural processes and the destruction or degradation of natural or historical features. Despite these objectives, humans have had and continue to have negative impacts at the Prince Edward Islands. The most important of these impacts is the introduction of alien species, which continues despite rigorous quarantine procedures. Impacts of introduced species include the devastation of some populations of burrowing petrels by feral cats Felis catus and a reduction in plant species diversity by the widespread introduced grass Agrostis stolonifera. Other negative human impacts include the over-utilisation of the marine resources upon which the islands' terrestrial predators rely (primarily by the illegal Patagonian Toothfish Dissostichus eleginoides industry), the disturbance of wildlife (for example, the number of Wandering Albatrosses Diomedia exulans breeding close to the research station more than halved within the first two decades of human occupation), the trampling of vegetation (in general reducing species richness and plant cover)

and the pollution of the marine and terrestrial environments (the effects of which include the entanglement of seals and seabirds by fishing debris and the ingestion of plastic particles by seabirds). Current management practices aim to reduce or eliminate many of these negative impacts.

P 22

Health, wealth and happiness: Wandering Albatrosses on Marion Island

DE VILLIERS, MARIENNE, JOHN COOPER, MARIETTE BAUSE & PRIDEEL MAJIEDT
Avian Demography Unit, Dept of Statistical Science, Cape Town, South Africa
mdevill@adu.uct.ac.za

Although behavioural responses are often used as measures of the disturbance experienced by animals in response to human activities, interpretation of these responses in terms of long-term effects on the animal's fitness is equivocal. For example, birds which increase alertness most in response to human approaches might be judged as being more stressed by the experience, and might be predicted to have lower breeding success if chronically stressed. Alternatively, such individuals might be able to react more to perceived threats because they have a higher level of fitness and these birds may ultimately be more successful breeders. We recorded the behavioural responses of Wandering Albatrosses *Diomedea exulans* brooding chicks on Marion Island to human approaches. Blood samples were then drawn from the adult birds and various health parameters (heterophil-lymphocyte ratio, haematocrit, total plasma protein and white blood cell count) were determined. The presence of haemoparasites and ectoparasites was noted, and immunocompetency was rated according to levels of heat shock proteins (HSP-60 and HSP-70). The survival of chicks was monitored at monthly intervals after sampling. We were thus able to test the relationship between behavioural responses of individual Wandering Albatrosses to human disturbance and health, immunocompentence and breeding success.

S II

Modelling and measurements for an integrated view of the coupled Arctic climate system

DETHLOFF, KLAUS (1), ANNETTE RINKE (1) , WOLFGANG DORN (1), PETER LEMKE (2), ABHA SOOD (2), CHRISTOF LÜPKES (2), VLADIMIR GRYANIK (2), ANDREAS HENSE (3), GÜNTHER HEINEMANN (3), BURGHARD BRÜMMER (4), HERMANN MÄCHEL (5) & BRUNO RUDOLF (5)
(1) Alfred Wegener Institut, Potsdam
(2) Alfred Wegener Institut, Bremerhaven
(3) Meteorologisches Institut, University, Bonn
(4) Meterologisches Institut, University, Hamburg
(5) Deutscher Wetterdienst, Offenbach am Main
dethloff@awi-potsdam.de

Present climate models suggest that the largest human induced warming will take place in the Arctic although there are considerable variations in the magnitude of the warming between models and considerable variations on time scales from years to several decades suggesting large natural variations. A key scientific focus is to clarify the robustness of Arctic climate change and the feedback processes responsible for the large climate variations. In the ACSYS project we addressed the deficiences in our understanding of the Arctic by developing improved physical descriptions and parameterizations of regional Arctic climate feedbacks in atmospheric regional

climate models, coupled atmosphere-ocean-sea-ice-land regional climate models and global coupled AOGCMs and in close interaction with observations and measurement campaigns. We report here on special issues in Arctic climate modeling and integrated measurements.

1. Arctic Planetary Boundary Layer

To improve the reliability of future Arctic climate scenarios, improved representations of surface exchange processes between snow, sea-ice and the atmosphere and of their effect on the entire boundary layer are needed.

2. Arctic Aerosols

Aerosols influence the Arctic climate both through the direct effect through directly scattering sunlight and the indirect effect through changing cloud optical properties with changes in cloud droplet spectra.

3. Permafrost and surface processes

The unique properties of snow, such as its high albedo, have major impacts on interactions between the atmosphere and Arctic land surfaces. Climate models have only recently begun to include representations of freezing and thawing in their representations of soil thermodynamics. The snow distribution strongly depends on a realistic simulation of precipitation patterns. An improved large-scale precipitation climatology for the Arctic has been developed.

4. Arctic sea-ice

The seasonal and long-term variability of the Arctic climate requires the decoding of the interactions between the climate subsystems atmosphere, hydrosphere, cryosphere and biosphere. One of the major issues in coupled A-O-I models is the realistic simulation of Arctic sea-ice thickness and extent. Changes in the Arctic sea-ice have the potential to impact Arctic and global climate significantly.

5. Global impacts

Climate variations in polar regions arise from the interaction between atmosphere, sea ice, ocean and land areas.

For realistic simulations of the Arctic climate, both thermodynamic and dynamic processes connected with sea-ice have to be taken into account. The reliability of coupling processes between the atmosphere and the ocean and sea-ice system has been investigated in coupled regional and global models o reduce the uncertainties of climate scenarios in coupled AOGCMs.

S X

Holocene lake development in Eastern Siberia

DIEKMANN, BERNHARD (1), ANDREI A. ANDREEV (1), THOMAS KUMKE (1), HERMANN LÜPFERT (1), LYUDMILLA PESTRYAKOVA (2), STEFFEN POPP (1), CHRISTINE SIEGERT (1), DMITRI A. SUBETTO (3)

(1) Alfred Wegener Institute, Potsdam

(2) Department of Ecology, University, Yakutsk, Russia

(3) Institute of Limnology, Russian Academy of Sciences, St. Petersburg, Russia

bdiekmann@awi-potsdam.de

Research work during the last decades highlighted the role of the northern high-latitude regions for global climate variability. The climatic influence arising from the vast periglacial regions of eastern Eurasia is poorly understood. Those regions were only affected by regional mountain glaciations, are covered by tundra and taiga vegetation and are characterized by deep frozen ground. In particular, Yakutia in the northeastern part of Eurasia represents one of Earth's most extreme climate regions with semiarid continental climate and coldest winter temperatures on the northern hemisphere. The landscape of Yakutia is occupied by widespread lake districts.

Dominant lake types mainly comprise thermokarst and alass lakes, fluvial oxbow lakes, and lakes of proglacial origin in the foreland of the Verkhoyansk Mountains. Lacustrine sediment records of these lakes provide the basis for palaeolimnological reconstructions of former environmental and climate conditions of the periglacial realm in eastern Siberia. By using sedimentological, geochemical, and micropalaeontological proxy records, including the application of ecological transfer functions, an interdisciplinary approach is followed to characterize the dynamics of lacustrine systems related to Holocene climate variability. In this contribution, we will show strategies and results of ongoing limnogeological research in Yakutia. So far, a basic finding is that lacustrine systems in central Yakutia reveal marked fluctuations in lake-level status, driven by changes in summer wetness. The cyclic fluctuations appear at centennial time scales with affinities to the multiples of sun-spot cycles, which possibly affected the climatic modes of the Arctic Oscillation.

S I

Das Internationale Polarjahr 2007/2008

DIETRICH, REINHARD (1) & KARSTEN GOHL (2)
(1) Institut für Planetare Geodäsie, University, Dresden
(2) Alfred-Wegener-Institut, Bremerhaven
dietrich@ipg.geo.tu-dresden.de

Das Jahr 2007 markiert das 125-jährige Jubiläum des ersten Internationalen Polarjahres (IPY) 1882/1883, das 75-jährige Jubiläum des zweiten Polarjahres 1932/1933 und das 50-jährige Jubiläum des Internationalen Geophysikalischen jahres (IGY) 1957/1958. Das Internationale Polarjahr 2007/2008 sieht sich in der Fortsetzung dieser Tradition. Es wird gemeinsam getragen durch die ICSU (International Council for Science) und die WMO (World Meteorological Organization). Um jeweils zwei aufeinanderfolgende Mess- und Feldkampagnen in Arktis und Antarktis zu ermöglichen, läuft das IPY vom 1. März 2007 bis zum 1. März 2009. Im Beitrag werden aus der Sicht der deutschen Kommission für das IPY die Zielstellungen und der gegenwärtige Stand bei der Vorbereitung des Internationalen Polarjahres vorgestellt.

DFG

Rezente Vertikale Erdkrustenbewegungen in der Diskobucht/Westgrönland und die Dynamik des Jacobshavn Isbrae

DIETRICH, REINHARD (1), HANS-GERD MAAS (2), AXEL RÜLKE (1), MIRKO SCHEINERT (1), MICHAEL BÄSSLER (1) & ELLEN SCHWALBE (2)
(1) Institut für Planetare Geodäsie, University, Dresden
(2) Institut für Photogrammetrie und Fernerkundung, University, Dresden
dietrich@ipg.geo.tu-dresden.de

Rezente und historische Eismassenänderungen induzieren vertikale Erdkrustenbewegungen. Mittels wiederholter GPS-Messungen im eisfreien Gebiet Westgrönlands von 1995 bis 2002 konnte ein detailliertes Bild über die gegenwärtigen Krustendeformationen gewonnen werden. Für das Gebiet des Eisrandes wurde (relativ zur Küste) eine Senkungsbewegung um ca. 3...4mm/Jahr festgestellt. Diese Beobachtungen stützen die Modellvorstellungen eines Eisrückganges im holozänen Klimaoptimum hinter den jetzigen Eisrand und einen Wiedervorstoß des Eises im Spätholozän.

Für die Aussenküste bei Sisimiut und die Diskobucht bei Ilulissat konnten die größten Hebungsraten festgestellt werden, die bei 1...2 mm/Jahr liegen. Fuer Sisimiut korrespondiert die Hebungstendenz mit dem Langzeittrend des Meeresspiegels, wie er für die letzten 8 000 Jahre aus der Datierung sowohl alter Uferterrassen als auch archäologischer Fundplätze früherer Inuitkulturen abgeleitet wurde. Für die innere Diskobucht haben sowohl geomorphologische als auch archäologische Forschungen fuer die letzten ca. 2000 Jahre einen Meeresspiegelanstieg dokumentiert, der bis in die jüngste Zeit angehalten hat. Wir kommen daher zu dem Schluss, dass die Eismassenverluste des Jakobshavn Isbrae und seiner Nachbarbereiche seit dem Ende der Kleinen Eiszeit eine zusätzliche Komponente der Vertikalbewegung neu induziert haben. Feldarbeiten an der Front des Jacobshavn Isbrae, die im Sommer 2004 durchgeführt wurden, dokumentieren den dramatischen Rückgang des Gletschers in jüngster Zeit. Zusätzlich zum Rückzug der Gletscherfront konnte eine Zunahme der Fliessgeschwindigkeit des Gletschers festgestellt werden, die jetzt mehr als das doppelte des langjährigen Mittels beträgt. Sie erkärt auch die in den letzten Jahren festgestellten erheblichen Massenverluste des Gletschers, die aus wiederholten Höhenmessungen im Einzugsgebiet abgeleitet wurden.

P 70

Einfluss von Ozean-Meereiskoppelung und Landoberflächen-Bodenfeuchteprozessen auf die atmosphärischeVariabilität in einem regionalen Klimamodell der Arktis

Dorn, Wolfgang, Klaus Dethloff, Annette Rinke & Subodh Kumar Saha
Alfred Wegener Institut, Potsdam
wdorn@awi-potsdam.de

Meereis ist ein wichtiger Bestandteil des arktischen Klimasystems, und seine realitätsnahe Darstellung in Klimamodellen ist für glaubhafte Simulationen sowohl des gegenwärtigen als auch des zukünftigen arktischen Klimas von entscheidender Bedeutung. Die grundlegenden physikalischen Prozesse für eine realistische Simulation des arktischen Meereises in gekoppelten Klimamodellen sind allerdings noch nicht hinreichend verstanden, sodass verschiedene Modelle große Unterschiede in der Simulation des arktischen Klimas aufweisen können. Um diese Prozesse zu identifizieren und in ihrer Bedeutung bewerten zu können, wurde ein gekoppeltes regionales Atmosphären-Ozean-Eis-Modell der Arktis konzipiert, das an seinen seitlichen Rändern mit Beobachtungsdaten angetrieben werden kann, um damit die Simulation realer Klimazustände in hoher räumlicher und zeitlicher Auflösung zu ermöglichen.

Mit diesem Modell wurden verschiedene Sensitivitätsstudien durchgeführt, die vor allem zeigen, dass eine realitätsnahe Wiedergabe des sommerlichen Eisrückgangs ganz entscheidend von der simulierten Eisdickenverteilung abhängt. Diese wiederum wird z.B. von der relativ willkürlichen Wahl einer als Rinnenschließungsparameter bezeichneten Größe im Eismodell beeinflusst, die das Verhältnis zwischen Breiten- und Tiefenwachstum des Meereises bestimmt, wodurch das thermodynamische Gleichgewicht des Modells verändert wird. Darüber hinaus wirkt sich auch die Eisalbedoparametrisierung stark auf das thermodynamische Gleichgewicht und damit auf den sommerlichen Eisrückgang aus. Rückkoppelungen zwischen Atmosphäre und Meereis spielen dabei insgesamt eine wichtige Rolle, wobei nicht nur thermodynamische Prozesse, wie die Eis-Albedo-Rückkoppelung, sondern auch dynamische Prozesse, die sich auf die Eisdrift auswirken, im Spiel sind.

Eine weitere wichtige Eigenschaft des arktischen Klimasystems ist die Existenz von Permafrostgebieten, die in Klimamodellen meist nur unzureichend wiedergegeben werden.

Daraus resultieren starke Abweichung im Energie- und Wasserhaushalt über arktischen Landflächen. Um diese zu minimieren, wurde die Atmosphärenkomponente an ein hochentwickeltes Landoberflächenmodell gekoppelt, das eine verbesserteDarstellung von Permafrost ermöglicht. Dadurch ergibt sich insbesondere im Sommer eine verbesserte Simulation der Boden- und Lufttemperaturen mit deutlichen Auswirkungen auf die großräumige atmosphärische Zirkulation. Im Winter sind die simulierten Bodentemperaturen allerdings teilweise noch unbefriedigend. Mehrere Sensitivitätsexperimente zeigen, dass dies vermutlich an einer fehlenden oder zu spät einsetzenden Schneebedeckung im Modell liegt. Eine verbesserte Schneeparametrisierung ist somit erforderlich.

WS
Deception Island - a trailblazer in Antarctic site management

DOWNIE, ROD
British Antarctic Survey, Cambridge/UK
RHD@bas.ac.uk

Deception Island (62°57'S, 60°38'W) is an active volcano in the South Shetland Islands, which has important natural, scientific, historic, educational, aesthetic and wilderness values. Its unique landscape comprises barren volcanic slopes, steaming beaches and ash-layered glaciers. It has a distinctive horse-shoe shape with a large flooded caldera. This opens to the sea through a narrow channel, forming a natural sheltered harbour.

Previously, parts of the island had been given legal protection under the Antarctic Treaty following piecemeal proposals, but no coherent strategy had been formulated for the whole island. In 2000, a strategy for the management of activities there was agreed by Argentina, Chile, Norway, Spain, the UK and the USA. After examining 6 options, the group recommended an island-wide approach to the management of Deception Island as an Antarctic Specially Managed Area (ASMA) comprising a matrix of Antarctic Specially Protected Areas (ASPAs), Historic Sites and Monuments (HSMs), and further zones in which activities would be subject to a code of conduct.

In 2001, Chile held a workshop in Santiago to progress the Management Plan. During February 2002, Argentina hosted an expedition to the island at Decepción Station for representatives from the 6 Parties, as well as advisors from the Antarctic and Southern Ocean Coalition and the International Association of Antarctica Tour Operators. Baseline survey fieldwork was undertaken to assist with the preparation of a Management Package for Deception Island.

The aim of the Management Package is to conserve and protect the unique environment of the island, whilst managing the variety of competing demands placed upon it, including science, tourism, and the conservation of its natural and historic values. It also aims to safeguard those working on, or visiting, the island. It includes:

- Deception Island ASMA Management Plan: The Management Plan includes a general code of conduct for activities on the island. It also provides for a Deception Island Management Group to oversee the implementation of the Management Plan.

- ASPA 140 Management Plan: ASPA 140 comprises 11 small sub-sites of botanical interest on the island. This multi-site approach reflects the characteristic fragmented

distribution of the island's vegetation, and is necessary to protect the unique flora, which includes 18 species not recorded elsewhere in Antarctica, 2 of which are endemic.

- ASPA 145 Management Plan: ASPA 145 comprises two sub-sites within Port Foster which have been subject to long-term research.

- Conservation Strategy for HSM No. 71, Whalers Bay: The aim of the Conservation Strategy is to prevent human disturbance to the structures and artifacts within the site, whilst recognizing that they will deteriorate naturally over time. The conservation strategy includes a code of conduct for visitors to the site.

- Facilities Zone Code of Conduct: A Facilities Zone, located on the western shore of Port Foster, includes Decepción Station (Argentina) and Gabriel de Castilla Station (Spain). A general Code of Conduct for staff at both stations is included.

- Visitors Code of Conduct: Activities at the three other frequently visited sites on the Island (Pendulum Cove, Baily Head, and the east of Telefon Bay) will also be managed by a Code of Conduct.

- Volcanic Alert Scheme and Escape Strategy All activities undertaken on the Island need to be planned taking into account the significant risk of volcanic eruption. An Escape Strategy has been produced, including a map with escape routes to the outer coast for evacuation by boat or helicopter.

The draft Management Package was submitted to the Committee for Environmental Protection during Antarctic Treaty Consultative Meeting XXVII. It was referred to Intersessional Contact Group review, and resubmitted to ATCM XXV for adoption.

P 73

Sea-ice concentration maps derived from high-resolution MODIS satellite data (German ACSYS project)

DRÜE, CLEMENS (1) & GÜNTHER HEINEMANN (2)
(1) Institut für Meteorologie und Klimatologie, University, Hannover
(2) Meteorologisches Institut, University, Bonn
druee@muk.uni-hannover.de

Realistic simulations with numerical weather prediction models in polar regions require sea-ice concentration data as an essential input. For process studies of the atmosphere-sea-ice-ocean interface, gridded values of the sea-ice concentration are hence needed at up to one kilometer resolution. In the present study, new algorithm was implemented to supply such data.

This so called "MODIS potential open water algorithm" (MPA) derives high-resolution data of the sea-ice concentration from infrared satellite images taken by the Moderate Resolution Imaging Spectroradiometer (MODIS, on board NASA satellites Aqua and Terra): First it retrieves sea-ice concentration for each scene from the satellite-sensed surface temperature. Then, multiple satellite overpasses within one day are merged to a composite map. Remaining

gaps (e.g. due to cloud cover) are finally filled in using a scheme considering the brightness temperatures sensed in gap areas.

To assess the accuracy of the MPA maps, in-situ measurements from the field experiment "Atmospheric Boundary layer and Sea ice Interaction Study" (ABSIS) are compared to the MPA output.

ABSIS was conducted in April 2003 over the Fram Strait in the Arctic. In-situ data take during this experiment comprise (among others) aircraft measurements of upwelling longwave radiation and helicopter-based measurements of the sea-ice thickness. The comparison yields that sea-ice concentration can be determined with approximately 10% error for each MODIS orbit. Combining multiple overpasses to composite maps increases the overall uncertainty to 11.5%.

When MPA sea-ice concentration were compared with the widely used Special Sensor Microwave Imager (SSM/I) sea-ice concentration data, both data sets did agree within +/- 7% ice concentration.

P 59

Geophysical constrains to improve synchronization of deep ice-core records

EISEN, OLAF (1), FRANK WILHELMS (1), DANIEL STEINHAGE (1) & JAKOB SCHWANDER (2)
(1) Alfred-Wegener-Institut, Bremerhaven
(2) Physikalisches Institut, University, Bern
oeisen@awi-bremerhaven.de

We present a geophysical method to synchronize deep ice-core records by a combination of radio-echo sounding and numerical modeling of electromagnetic reflections. Most continuous internal reflection horizons are known to form isochrones and can be followed over large distances. With an ice core at either end of the profile, the reflection horizons present time markers that are used to synchronize the ice-core records. Electrical properties along an ice core serve as input to a numerical model which simulates the propagation of electromagnetic waves in the ice and reproduces the reflection characteristics of the radar profile near the ice core. The depth of origin of reflections are identified in two steps: firstly, pronounced series of reflections are used to calibrate the electromagnetic wave speed; secondly, individual peaks in conductivity in the input record are removed, thus also removing the corresponding reflections in the synthetic radargram. Our numerical modeling approach improves the accuracy with which the reflector origins are identified compared to the usual method where reflector traveltimes (respective depths) and ice-core profiles are merely compared. A pilot study at the EPICA drilling site in Dronning Maud Land, Antarctica, shows that it is possible to locate the origin of internal reflections with an accuracy of 0.5 m in a depth of 2000 m and more. The method imposes little constrains on the input records, making it applicable to a number of drilling sites. Both, dielectric profiling and electrical conductivity measurements can be used as electrical input. Moreover, as the method also calibrates the wave speed, only a coarse density profile is required. Application to the deep-drilling locations in Antarctica will improve the relative synchronization and will help to answer the question of phase relation of climate changes observed in the ice-core records at different locations.

P 39

Long-termed landscape evolution of the Dronning Maud Land constraint by apatite fission-track and (U-Th)/He

EMMEL, BENJAMIN (1), JOACHIM JACOBS (1) & PETER CROWHURST (2)
(1) Fachbereich Geowissenschaften, University, Bremen
(2) CSIRO Petroleum, North Ryde, Australia
emmel@uni-bremen.de

The Dronning Maud Land is a piece of an E-W trending mountain range with elevations of up to 3000 m following c. 250 km inland the continental margin of East Antarctica. The main goal of our research is to examine a potential relationship between the tectono-thermal development of that mountain range and the initiation of glaciation during the Oligocene. Apatite fission-track analyses give data that allow to predict time-temperature histories in the temperature range of c. 110±10 – 60°C, whilst (U-Th)/He data on apatite cover the temperature range between c. 70 and 40°C. New apatite fission-track ages range between c. 370 Ma and 180 Ma and (U-Th)/He ages vary between c. 235 Ma and 110 Ma. Modelled apatite fission-track data and some (U-Th)/He ages indicate that the main landscape forming processes are related to the evolution of the Permo-Triassic intracontinental Gondwana rift system. This assumption is manifested by the occurrence of an Early Permian planation surface at the Gjelsvikfjella (Näslund, 2001). During the Early Jurassic some samples were reheated to temperatures above c. 110 °C due to igneous activities probably associated with initial break-up of Gondwana. The latest tectono-thermal event effecting both systems was the Late Cretaceous passive margin evolution of the Dronning Maud Land. We suggest that denudation along the present coastal plains with associated tectonic uplift of the hinterland led to the development of the escarpment like mountain range. Up to now, no post Cretaceous (U-Th)/He ages were dated indicating tectonic quiescence since the Late Cretaceous.

Näslund, J-O (2001) Landscape development in western and central Dronning Maud Land, East Antarctica. Antarctic-Science, 13, 302-311.

S IV

The evolution of an Antarctic inland ecosystem depending on environmental factors

ENGELEN, ANDREAS (1), SIEGLINDE OTT (1), PETER CONVEY (2) & ROGER WORLAND (2)
(1) Botanisches Institut, Univesity, Düsseldorf
(2) British Antarctic Survey, NERC, Cambridge, UK
aneng001@uni-duesseldorf.de

Inland terrestrial habitats in Antarctica are characterised by rocky summits (nunataks) and mountain ranges standing above the surrounding ice sheet. These areas are icefree since several thousand years and provide an interesting perspective on the evolution of Antarctic ecosystems. Colonisation and establishment processes at terrestrial Antarctic inland sites appear to be slower compared with coastal terrestrial areas and may provide insight on first initial stages in the development of communities and successional processes. The research we describe here has been carried out on Coal Nunatak, southern Alexander Island (72°03'S 68°31'W), on the southwest coast of the Antarctic Peninsula. The study aim is to use an inland site barely colonised, focussing on the relationships between colonisation processes, the development of community diversity, and environmental factors. Therefore a broad range of ecological methods

is being used to permit a synthesis of the influences of biological, climatological, geological and geomorphological factors. The results presented emphasise on various soil parameters (physical and chemical characteristics), which play an integral role in the colonisation and successional processes achieved by micro- and macro-organisms. Soils on Coal Nunatak are characterised by periglacial features such as soil polygons, with very limited colonisation by macro-organisms. The investigations have been carried out along two transects at Coal Nunatak (140m, 70m length) differing in developmental stage and size of polygons. The data obtained will be correlated with biological analyses of the diversity of microbial communities, and with micro and mesoclimatic data obtained at the research site, and will be further used to improve understanding of the mechanisms of biological response to changing climate.

S III

Multiphase cretaceous to early Tertiary magmatism in northern Ellesmere Island (Canadian Arctic) related to the opening of the Arctic Ocean

ESTRADA, SOLVEIG, FRIEDHELM HENJES-KUNST & KARSTEN PIEPJOHN
Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
solveig.estrada@bgr.de

The multistage opening of the Arctic Ocean since Cretaceous times was accompanied by intra-continental multiphase igneous activities. At the Canadian margin, exclusively basalts were extruded in several phases during Early Cretaceous to earliest Late Cretaceous (c. 130 – 95 Ma). The basalts form lava flows, pyroclastic deposits, dykes and sills. All these basalts are very similar with respect to their petrography, geochemistry, and initial Nd and Sr isotopic ratios which all show continental flood-basalt signatures. Probably, they form part of a large igneous province (LIP) together with Cretaceous volcanics of similar geochemical characteristics and age in Svalbard and Franz Josef Land. Formation of this Cretaceous LIP preceded the opening of the Canada Basin of Arctic Ocean.
Dyke equivalents of these Cretaceous basalts are found at the northernmost coast of Ellesmere Island where they intrude Proterozoic and Paleozoic metamorphic rocks of the Pearya terrane. In the same area, 92 Ma old bimodal intrusive rocks (gabbroid, syenite, granitoid, and hypabyssal microgranite of the Wootton Intrusive Complex) are exposed within a NE–SW trending fault zone (Mitchell Point Fault Zone).
About 10 Ma later (c. 84–80 Ma), the intrusive magmatism was followed by an extrusive activity which led to the formation of a volcano-sedimentary suite (Hansen Point Volcanic Complex). The volcanic rocks comprise mainly alkali basalts, rhyodacites, trachyandesites, and rhyolites. The Hansen Point Volcanic Complex overlies partly the intrusive rocks and contains eroded fragments of microgranite. It forms small, fault-bounded basins which crop out along the NW side of Mitchell Point Fault Zone. Another chain of volcanic outcrops is exposed to the SW and is related to a parallel-striking fault zone (Emma Fiord Fault Zone). A similar bimodal volcanic suite of Late Cretaceous to earliest Tertiary age (c. 80–64 Ma) is known from the Kap Washington area in North Greenland.
The youngest phase of alkaline volcanism was active between 61 and 58 Ma in NE Ellesmere Island (Estrada et al., in press). It can be reconstructed from the presence of volcanic pebbles preserved in Paleocene clastic sediments, which are deposited into narrow pull-apart basins along the west coast of the Nares Strait (Tessensohn et al., in press).
The Late Cretaceous to early Tertiary bimodal, alkaline volcanic activities can be linked to different phases of strike-slip motions caused by plate tectonic processes related to the opening

of the North Atlantic–Labrador Sea oceanic system on the one hand and the Arctic Ocean on the other hand.
Estrada, S., Henjes-Kunst, F., Melcher, F. & Tessensohn, F. (in press): Late Paleocene Nares Strait volcanic suite: Evidence from volcanic pebbles. - In: The geology of northeast Ellesmere Island adjacent to Kane Basin and Kennedy Channel, Nunavut. – Bull. Geol. Surv. Canada.
Tessensohn, F., Gosen, W. v., Piepjohn, K., Saalmann, K. & Mayr, U. (in press): Nares Transform Motion and Eureka Compression: Evidence from Structural Work on the Ellesmere Coast, Arctic Canada. - In: The geology of northeast Ellesmere Island adjacent to Kane Basin and Kennedy Channel, Nunavut. – Bull. Geol. Surv. Canada.

P 16
A biochemically based modeling study of the growth and development of Antarctic krill (*Euphausia superba*)

FACH, BETTINA & BETTINA MEYER
Alfred-Wegner-Institut, Bremerhaven
bfach@awi-bremerhaven.de

A biochemical model of Antarctic krill (*Euphausia superba*) was developed to investigate environmental and biological factors controlling growth and development of Antarctic krill, which has long been recognized as an important component of the Antarctic marine food web. In this modeling approach data sets on the biochemical composition of krill and its food sources are combined to develop a model that takes the quality of food into account rather than just food availability over the course of the year. It defines krill in terms of their protein, neutral lipid, polar lipid, carbohydrate and chitin content and tracks krill weight separately from length. The model includes parameterizations of filtration, ingestion, and metabolic processes, which determine growth rate. The initial biochemical content of krill is determined by the composition of the Calyptopis I stage of krill. Changes in the initial ratios of protein, neutral lipid, polar lipid, carbohydrate and chitin occur in response to the biochemical composition of available food as krill grows. Results of this modeling effort and model-data comparisons will be presented.

S II
Decadal-scale variations of water mass properties in the deep Weddell Sea

FAHRBACH, EBERHARD, OLAF BOEBEL, MARIO HOPPEMA, OLAF KLATT, GERD ROHARDT, MICHAEL SCHRÖDER & ANDREAS WISOTZKI
Alfred Wegener Institute, Bremerhaven
efahrbach@awi-bremerhaven.de

The Weddell Sea is known to feed freshly formed deep and bottom waters into the Antarctic circumpolar water belt from where it spreads as part of the global thermohaline circulation into the basins of all three world oceans. By this process the Southern Oceans plays a significant role in global climate. Data from cruises between 1989 and 2005 with RV POLARSTERN were used together with historical data to construct section-wide potential temperature and salinity time series of the main water masses in the Weddell Gyre Additionally time series from moored instruments and profiling floats were obtained between 1989 and 2005 are evaluated.

The regional and methodological consistency of the data sets allows us to quantify variations which are not visible in less homogeneous data sets, but relevant since the last over decadal time periods. The data reveal significant temperature and salinity variations of the Warm Deep Water and the Weddell Sea Bottom Water in that time scale. In the bottom water of the Weddell Sea proper a temperature increase by 0.12°C was observed over 16 years from 1989 to 2005. At the prime meridian warming occurred in the Warm Deep Water from 1984 to 1996 followed by cooling since then. The warming trend in the bottom water is detected here as well and started in 1992. The initial warming trend of the Warm Deep Water is consistent with warming trends reported in literature of subsurface waters of the Antarctic Circumpolar Current.

The structure of the time/space variations is used to conclude on mechanisms producing the variations in the Weddell Sea which include external forcing which affect the inflow of Circumpolar Deep Water and internal changes in the Weddell Sea proper. Because the Warm Deep Water is the major source water for the formation of deep and bottom water in the Weddell Sea, it is suggested that its variations initiate the variations in the deeper layers. However the inverse trends during the last decade indicate either relevant time scales longer than a decade or significant other causes.

The observations will hopefully be continued during the International Polar Year 2007/2008 and supplemented by more comprehensive data from new technology and surveys in the adjacent areas in an international context. The need of better spatial and time coverage lead to the use of under-ice ARGO floats. A vision of the final system includes acoustic ranging during the time under the sea ice and data transmission. First floats survived the winter without being destroyed by sea ice and first sound source for under ice navigation are deployed.

S

Antarctic history: from dogs to skidoos, from compass to GPS, from Morse Key to emails

FLETCHER, DAVID
Ledbury, UK
daviddonaldwilliam@hotmail.com

The talk aims to cover the immense changes that took place on Antarctic stations during the 1970's and early 1980's. Modern times started in terms of living accommodation, the way we travelled and communicated to the science. The author will introduce three British Stations as he wintered in Halley in 1972/73, in the Signy Station as base commander in 1973/74, and stayed further 4 summers in the latter. From 1977 until 1981, he worked in Rothera Station as Base Commander and Field Operation Manager. After that he visited many other stations and finished this summer his 27th working season.
When he first went south, most of the bases consisted of accommodation erected in the 1950's to a standard design. Rooms had multiple bunks, kitchens were still struggling on the coal fired cooking stoves and scientific laboratories were basic in the extreme.
From 1974 a huge building programme was undertaken and every station then operated by the British Antarctic Survey was either completely rebuilt or massively modernised. Laboratories were well equipped, living standards improved dramatically from coal fired stoves to modern oil fired cookers and heaters, electric generation systems were upgraded. Freezers made a huge improvement to the food that was available to base members. In contrast, in 1971 tin meats and dried products were the normal fare, often being supplemented with penguins and seals.

At the beginning of the 70's limited Telex access was the principal mode of communication in combination with the Morse Key. This changed rapidly over the following decades.
In sum, bases became easier places to run, to keep clean and far more efficient in their operation. They were able to satisfy the modern demands of science and a changing workforce.
During the 70's the methods of transport and ways of obtaining scientific information also changed dramatically. The author worked first as a dog driver in the South. At that time large tractors were fairly sophisticated but there were no suitable small vehicles to replace dogs - the principal form of transport. In this stage in history the long distance field travel was still the normal method for survey, geology and geophysical operations and the close air support of field parties a decade away. When one looks back on the very basic equipment used it is remarkable what was achieved, both in the quality of the science obtained and the lack of accidents that happened. By 1975, the era of the dog driven field parties was at an end and they were being rapidly replaced by motor sledges.
And finally, another huge change during this decade was the way Antarctic station personnel viewed the environment and the general protection of it. In the 70's science was still more in the collection era and uncontrolled sampling was practised. The modernisation of the stations gave nations the platform to begin to introduce more environmentally sensitive procedures.

P 31

Paulet Island (63°35'S, 55°47'W) – landscape in conflict of tourism with conservation of nature and historical monuments

FRITZSCHE, DIEDRICH
Alfred-Wegner-Institut, Potsdam
dfritsch@awi-potsdam.de

Paulet Island is a roughly circular islet with about 3 km diameter in the north-western Weddell Sea. It is a volcanic crater island with a lake which is about 500 m long and a conic summit rising an elevation of 385 m. Major nesting places of sea birds are situated on the northern scree slopes of the island. The huge rookery of 95,000 – 105,000 pairs of Adélie penguins (*Pygoscelis adeliae*) is the second largest of this species in the area of the Antarctic Peninsula. The population of Blue-eyed Shags (*Phalacrocorax atriceps*) with about 400 nests is one of the largest in the Peninsula as well; Snow Petrel (*Pagodroma nivea*), Wilson's Storm-petrel (*Oceanites oceanicus*) and Pale-faced Sheathbill (*Chionis alba*) are also breed. Kelp Gull (*Larus dominicanus*) is a regular visitor. More than 1000 Weddell (*Leptonychotes weddelli*) and Leopard Seals (*Hydrurga leptonyx*) haul-out on the shoreline each year.

Paulet Island was discovered by the British Antarctic expedition (1839-43) led by James Clarke Ross and was named by him after a captain in the British Royal Navy. In February 1903 *Antarctica*, the relief ship of Otto Nordenskjöld's Swedish Antarctic expedition was crushed by the ice of the Weddell Sea and sank. The ship's crew of 20 managed to get ashore on Paulet Island and erected a stone hut in order to survive the Antarctic winter. This hut is also called *Larsen's hut* after the commander of the ship captain C.A. Larson. Remains of the building are still evident and they attract together with the penguin colony yearly up to 5,000 tourists from cruise vessels.

The hut is halfway between landing beach and lake on the northern shoreline amidst the colony of Adélie penguins. Visitors in guided groups can reach it with minimized disruptions of wildlife on the direct way. Presumably in 2003 the hut was enclosed by Argentines (?) with prefabricated

segments of fences to keep away both tourists and penguins. In January 2005 only 2 segments were found standing with information boards on it. These were placed in such a way, that tourists can read the information only standing in between the nests of the penguins. Trying to avoid this by staying on the other side people risk to damage the historical remains of the hut's walls consisting of stones and penguin guano. Unused metallic fence segments lying around create a harm risk for people and penguins.

A solution of the problem could be to install information boards separately on a proper place and to enclose the hut by a chain similar as used to fence the 2nd hut of the Swedish Antarctic expedition (1901-03) on Esperanza. The existing fence segments are unsuitable.

S I

Climate of North Siberia during the last 2500 years: an ice-core record from Akademii Nauk ice cap (Severnaya Zemlya)

FRITZSCHE, DIEDRICH (1), RAINER SCHÜTT (1),THOMAS OPEL (1, 3), HANNO MEYER (1), HEINZ MILLER (2), FRANK WILHELMS (2)
(1) Alfred Wegener Institute, Potsdam
(2) Alfred Wegener Institute, Bremerhaven
(3) Department of Geography, University, Berlin
dfritsch@awi-potsdam.de

Akademii Nauk is one of the largest Arctic ice caps outside of Greenland. The first ice core was drilled there in 1986/87 by a Russian team. A Late Pleistocene basal age was assumed for this core. A new 724 m long core was drilled on Akademii Nauk between 1999 and 2001 to get climate information for the whole Holocene in high resolution. The project was funded by the Federal Ministry of Education and Research (BMBF) and performed in co-operation of the Alfred Wegener Institute for Polar and Marine Research with the Arctic and Antarctic Research Institute and the Mining Institute in St. Petersburg.

Arctic ice cores outside of central Greenland are characterized by melt-layers caused by melting and even by rain during summertime especially when drilling sites are at relatively low altitude. Special methods were developed recently for interpretation of electrical conductivity, isotopic variations and chemical composition data of ice cores from Svalbard, Franz Josef Land, Canada and Severnaya Zemlya.

We present our results of core dating, the isotopic profile and the interpretation of melt-layer content for the new Akademii Nauk ice core. Isotope data are available in high resolution for the uppermost 136 m of core representing approx. the last 275 years. The dating of the core was done using seasonal variations in isotopic and electrical conductivity records. Signals of historical volcano eruptions are used as additionally dating points. By this method we found a basal age of approx. 2,650 years for the centre of Akademii Nauk. The present-day annual accumulation rate is about 460kgm^{-2} there. The mean air temperature close to the surface was -15.7°C from May 1999 to April 2000. The firn temperature was -10.2°C measured in April 2000 at 10 m depth. It reflects the influence of latent heat released by refreezing of melt water in the firn. The observed annual layer thicknesses indicate a positive annual net mass balance of the ice cap until the recent years at least. The altitude of the glacier surface increased what has been considered in the climate interpretation of the data. The lowest temperature was found about 1790 – the 20th century was the warmest in the whole record.

The trend of $\delta^{18}O$, especially the 11 year running mean, correlates quite well (r=0,93) with the temperature record of Vardö/North Norway, situated 2,000 km south-western of the ice cap. This is a hint that our isotopic data describe the climate/temperature trend at least of the westerly Eurasian Artic.

C-axis analysis of the ice crystals shows an increased crystal orientation with depth.

P 4

Feather deformations as a sign of nutritional deficiency in Brown Skuas (*Catharacta antarctica lonnbergi*)?

FRÖHLICH, ANNE, HANS-ULRICH PETER & STEFFEN HAHN
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
a.froe@web.de

Deformations of feathers are caused by different stressful conditions during feather synthesis and growth. Such harmful conditions are nutritional deficiency, starvation during bad weather periods or handling stress by investigators which all can disturb the consistency of feather synthesis in chicks and cause in macroscopic growth bars.

During the austral season of 2004/05 we investigated the relationship between chick growth, adult provisioning and the occurrence of feather deformation in skuas at King George Island. The growth of 22 chicks of Brown Skua (*Catharacta antarctica lonnbergi*) on Fildes Peninsula were measured from hatching to fledgling (feather and mass development). Additionally, the chick diet was examined by food remains found in each nesting area.

At the end of chick period we collected the left rectrix of each chick and checked for sign of feather deformations. A pre-analysis showed that all feathers showed clearly visible deformations, e.g macroscopic bars.The ongoing investigation will clearly assign if skua chicks in the last Antarctic season had to suffer from nutritional deficit.

P 80

Biodiversity of methanogenic archaea in permafrost affected soils of the Lena Delta, Siberia

GANZERT, LARS & DIRK WAGNER
Alfred-Wegner-Institut, Potsdam
lganzert@awi-potsdam.de

Hydromorphic arctic tundra soils are a very important source of atmospheric methane (CH4) which is according to CO2 the most climate relevant greenhouse gas. Wet tundra environments are generally a net carbon sink since the predominant environmental conditions reduce decomposition of organic matter and support a carbon accumulation. More than 14 % of the global terrestrial carbon is stored in soils and sediments of Arctic permafrost environments. Most of the climate models predict a global warming for the next century, which will be shown in deeper and longer thaw processes in the active layer of permafrost soils in the High Arctic and

probably of a higher rate of degradation of organic matter and emission of methane and carbon dioxide.
The microbial methane production (methanogenesis) is one of the most prominent microbiological processes during the anaerobic decomposition of organic matter. A group of strictly anaerobic organisms called methanogenic archaea is responsible for methanogenesis. The methanogenic archaea use the metabolism end products of bacteria involved in the anaerobic foodchain, which transform complex organic molecules into simple compounds like H2, CO2, acetate, formiate.
After its production methane is partly oxidized either in the aerobic top layer of permafrost soils or in the aerobic rhizosphere by highly specialized Proteobacteria, belonging to the group of methanotrophic bacteria. They are using CH4 as the sole carbon source, while energy is gained by the oxidation of CH4 to CO2.
In this study the community structure of methanogenic archaea was analyzed by polymerase chain reaction (PCR) using a nested primer approach with two different internal primer sets following denaturing gradient gel electrophoresis (DGGE) and sequencing of 16S rRNA gene fragments. These modern molecular ecological methods allow to study the microbial community including uncultivable microorganisms.
To investigate the archaeal community structure samples from three geomorphological different sites were taken:(i) a low centre polygon, (ii) a floodplain (both sites are located on Samoylov Island, Lena Delta) and (iii) a thermoerosion valley (Cape Mammontovy Klyk, ca. 400 km northwest of Samoylov). DNA was extracted directly from soils or from enrichment cultures. Samples for enrichment were taken from two different depths and were incubated under different conditions concerning temperature, salt content and substrates.
The comparsion of the three different habitats showed clear differences between the composition of the methanogenic Archaea in the different environments. Both places on Samoylov showed a higher diversity than samples from Mammontovy Klyk. Results also indicate that there is a shift in the community structure from the top to the bottom of the active layer.
The DGGE method is a very useful tool to get a fast overview about the composition of microbial communities in complex habitats. It can be also used to controll the enrichment and isolation of pure bacterial cultures. But nevertheless for detailed information about the methanogenic diversity the construction of a clone libary must be the next aim.

S V

Arctic icebreaker *Svyatogor/Krassin:* exploration of the Northern Sea Route in XX century as reflected in the life history of the vessel

GAVRILO, MARIA
Museum Icebreaker Krassin, St.-Petersburg, Russia
m_gavrilo@mail.ru

1. *Svyatogor* - a birth of the strongest icebreaker in the world
2. First Arctic resque expedition: Russian-Norwegian co-operation in the Kara Sea
3. Svyatoror returns to the Mortherland
4. Rescue of Nobile airship expedition
5. Leading icebreaker of the Soviet expeditions along the Nortehrn Sea Route
6. Polar convoys and World War II in the Arctic
7. New life - reconstruction of the icebreaker in Germany and further work in the Arctic
8. Cooperation with science - icebreaker became a resaerch vessel
9. A unique icebreaker-museum.

S VI

Cenozoic glacial history and biota evolution: evidence from South Shetlands and Antarctic Peninsula

GAZDZICKI, ANDRZEJ
Institute of Paleobiology, Polish Academy of Science Warszawa, Poland
gazdzick@twarda.pan.pl

The Antarctic Cenozoic contains an important record of deterioration of global climate and biota evolution. The break-up of Gondwanaland, the opening of the Tasman and Drake Passages, and the progressive isolation of Antarctica by the Antarctic Circumpolar Current led to the transition from a warm, ice-free climate (greenhouse) in early Eocene to a colder climate and glacial conditions (icehouse) at the end of Eocene and younger epochs. The first evidence of major climate change with cooling through the late Paleogene is reported from the latest Eocene or Eocene/Oligocene boundary (ca. 34 Ma). Geological and paleontological data indicate cooling, terrestrial and marine ice sheet growth, and initiation of Cenozoic glaciation at that time interval both in East and West Antarctica (Barrett 1996).

While Cenozoic glacial history of Antarctica has been mostly revealed from deep sea drillings (Zachos et al. 2001), West Antarctica shows also a fairly well-preserved glacial record exposed on South Shetland Islands and the Antarctic Peninsula. The Paleogene-Neogene strata on King George Island display a sequence of alternating glacial and interglacial events, with at least two regional ice sheet expansions during the Oligocene Polonez Glaciation (32-26 Ma) and the Miocene Melville Glaciation (23-20 Ma) (Birkenmajer 2001). Polish geologists have recently discovered on King George Island the first Eocene mountain glaciers that preceded major ice sheet formation in Antarctica (Birkenmajer et al. 2005). A terrestial, valley-type tillite up to 65 metres thick was revealed between two basaltic lava sequences in the Eocene-Oligocene Point Thomas Formation at Hervé Cove - Breccia Crag in Admirality Bay (King George Island). K-Ar dating of the lavas suggests the age of the glaciation at 45-41 Ma (Middle Eocene). It is the oldest Cenozoic record of alpine glaciers in West Antarctica, providing insight into the onset of glaciation of the Antarctic Peninsula and South Shetland Islands.

The paleobiological data from King George, Seymour and Cockburn Islands are important in providing information on the spatiotemporal pattern of paleoenvironmental changes and biota evolution that occurred during the crucial Eocene to Pliocene time interval. Gradual cooling of climate, changes of environment and trophic relationships were most probably responsible for the intense speciation and taxonomic diversification of the Antarctic Paleogene-Neogene biota.

Barrett P.J. 1996. Antarctic palaeoenvironment through Cenozoic time – a review. Terra Antartica 3: 103-119.

Birkenmajer K. 2001. Mesozoic and Cenozoic stratigraphic units in parts of the South Shetland Islands and Northern Antarctic Peninsula. Studia Geologica Polonica 118: 5-188.

Birkenmajer K., GaŸdzicki A., Krajewski K.P., Przybycin A., Solecki A., Tatur A. and Yoon Ho Il. 2005. First Cenozoic glaciers in West Antarctica. Polish Polar Research 26 (1): 3-12.

Zachos J., Pagani M., Sloan L., Thomas E. and Billups K. 2001. Trends, rhythms, and aberrations in global climate 65 Ma to Present. Science 292: 686-693.

S II
Variability of the Arctic Ocean fresh water balance

GERDES, RÜDIGER & CORNELIA KÖBERLE
Alfred-Wegner-Institut, Bremerhaven
rgerdes@awi-bremerhaven.de

The fresh water reservoirs of the Arctic Ocean, sea ice and liquid fresh water stored in the halocline can buffer fluctuations in the fresh water sources. On the other hand, they can also feed fresh water export events that constitute large climate anomalies in the downstream ocean basins. Decreasing trends have been observed over the last four decades in the Arctic reservoirs while the salinity in the Nordic Seas and the deep subpolar North Atlantic were declining. With numerical hindcast simulations of the Atlantic-Arctic ocean-sea ice system, we try to emulate these changes and to detect the forcing mechanisms. Most important for the decadal variability as well as the trends are the oceanic exchanges through Fram Strait and the Canadian Archipelago. Internal redistribution of salt within the Arctic Ocean (e.g. associated with changes in Ekman pumping) are of minor importance.

P 7
Wilson's storm-petrels (*Oceanites oceanicus*) as a model system for the study of parent-offspring interactions

GLADBACH, ANJA, CHRISTINA BÜßER, HANS-ULRICH PETER & PETRA QUILLFELDT
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
anja.gladbach@gmx.de

Since 1996 extensive studies on Wilson´s storm-petrel (*Oceanites oceanicus*) are carried out in a breeding colony on King-George-Island (South Shetland Islands, Antarctic). Some of them are addressing basic questions about parent-offspring interactions. The choice of this species is not an arbitrary one but based on its advantageous biology.
Being a member of the order Procellarriformes they got an obligate clutch size of one and parent-offspring interactions (including provisioning by the parents and begging behaviour of the chick) can be studied in the absence of sibling interactions. They nest, like most other seabirds, on remote islands and are nocturnal, hence solicitation behaviour of the chicks is not obscured by the complexities arising from predation pressure caused by small mammals and diurnal predators like skuas and gulls. Also rank in the brood and gender can be excluded as influencing factors as there are neither siblings to compete with, nor morphological differences between the sexes, which could cause higher energy requirements of one sex.
The side of the parents provides a rather simple situation as well. Wilson's storm-petrels, like most seabirds, are socially and genetically monogamous so that parental investment is not affected by an uncertainty about paternity which can cause a sex bias in caring. Both parents share chick feeding and visit the nest only at night. Thus feeding events are discrete and if only the first feeding in one night is analysed, an influence of recent feedings on the begging behaviour of chicks can be excluded.

S VI
Tectonics and plate-kinematics of the South Pacific and West Antarctica

GOHL, KARSTEN & GRAEME EAGLES
Alfred-Wegner-Institut, Bremerhaven
kgohl@awi-bremerhaven.de

Accurate plate-kinematic reconstructions at relatively high spatial and temporal resolution are the basis for understanding the opening of ocean basins and the evolution of seafloor relief and the effect it has had on controlling deep ocean current directions. We developed an animated, grid-based plate-kinematic reconstruction of the southern Pacific Ocean from 90 Ma to present, using the satellite-derived gravity anomaly field, and interpolated isochrons and plate rotation parameters from both published and new studies using marine geophysical data.
The earliest opening with formation of seafloor between Chatham Rise (New Zealand) and Thurston Island (West Antarctica) occurred at 92-90 Ma along a Pacific-Antarctic plate boundary developing along the Bounty Trough and Great South Basin of New Zealand. The break-up between Campbell Plateau and Marie Byrd Land began at 83 Ma. The onset of an independent motion of the Bellingshausen Plate adjacent to the West Antarctic margin can be estimated at 79 Ma. Its motion generated a transpressional eastern plate boundary. The Pacific-Bellingshausen spreading centre developed a set of long offset transform faults (e.g. Udintsev, Tharp, Heezen) that the Pacific-Antarctic plate boundary inherited around 61 Ma when the Bellingshausen plate ceased to move independently as part of a Pacific-wide plate tectonic reorganization event. Southwest of these transforms, the Pacific-Antarctic Ridge saw an increase in transform-fault segmentation by about 58 Ma. At about 47 Ma, the Pacific-Phoenix Ridge jumped northward to directly link the Pacific-Antarctic ridge to the Pacific-Farallon ridge as a result of an unstable Pacific-Antarctic-Phoenix triple-junction configuration. Further reconstruction time steps illustrate the development of the dominant transform and fracture zones systems in the South Pacific.

S XII
Ice Station Polarstern (ISPOL) – Eine Driftstation durch das westliche Weddellmeer

HAAS, CHRISTIAN, MARCEL NICOLAUS, MICHAEL SCHRÖDER & GERHARD DIECKMANN
Alfred-Wegner-Institut, Bremerhaven
chaas@awi-bremerhaven.de

Das gekoppelte System aus Atmosphäre, Meereis und Ozean des westlichen Weddellmeeres spielt eine Schlüsselrolle innerhalb des globalen Klimasystems. Die Region zeichnet sich durch die größte sommerliche Meereisbedeckung innerhalb der Antarktis aus, deren Erforschung bereits 1914/15 mit der legendären, doch unfreiwilligen Eisdrift von Sir Ernest Shackleton begann. Die ganzjährige Bedeckung des Ozeans mit Meereis hat in der modernen Polarforschung nur eine weitere umfangreiche Expedition in das westliche Weddellmeer zugelassen: Ice Station Weddell (ISW-I), eine ca. vier Monate dauernde internationale Driftstation vom 12.02. bis 14.06.1992. Diese Drift fand jedoch im Übergang vom australen Sommer zum Winter statt und untersuchte damit vor allem winterliche Prozesse.
Ice Station POLarstern (ISPOL) wurde daher konzipiert, um physikalische und biologische Veränderungen innerhalb des Atmosphäre-Meereis-Ozean Systems am Übergang Winter/Sommer zu untersuchen. Die internationale und interdisziplinäre Reise in das westliche Weddellmeer fand vom 06.11.2004 bis zum 19.01.2005 statt. Das Kernstück der Expedition

bildete eine 35-tägige (28.11.2004 bis 02.01.2005) Driftstation, während der eine anfänglich ca. 10x10 km große Eisscholle kontinuierlich beobachtet und beprobt wurde. Die Scholle zerfiel aufgrund der hohen Eisdynamik nach und nach in kleinere Elemente, wobei das Kernstück am Ende noch ca. 0,8x0,8 km maß. Insgesamt legte die Scholle eine Strecke von 288,34 km (von 54,84°W, 68,21°S bis 55,41°W, 67,36°S) zurück, wobei die Süd-Nord Versetzung auf Grund mehrerer Wind bedingter Driftschleifen nur 98 km betrug.
Die Messprogramme fanden auf einjährigen und mehrjährigen Schollen bzw. Schollenteilen statt.

P 32

Too much pressure on thin ice? Antarctic tourism and self-regulation

HAASE, DANIELA
Gateway Antarctica, Centre for Antarctic Studies and Research, University, Christchurch, New Zealand
dha48@student.canterbury.ac.nz

In the last few years, the number of tourists visiting Antarctica has increased rapidly to over 15,600 tourists in the 2001/02 season, over 17,500 in the 2002/03 season and even to over 27,500 in the 2003/04 season (IAATO, 2005). Equally, the numbers and scale of tour operators as well as the amount of non-governmental expeditions and private yachts cruising Antarctic and sub-Antarctic waters have risen. The horizontal growth of tourism to the Antarctic was also accompanied by a diversification with respect to the characteristics of the tour packages offered, which could broadly be referred to as vertical growth.
Consequentially, Antarctic tourism nowadays appears on top of the agenda for a variety of institutions, organisations and policy-makers involved in managing, regulating or protecting the Antarctic ecosystem. Current debates dealing with the apparently uncontrolled growth of Antarctic tourism centre on the issue of self-regulation versus government control.
The International Association of Antarctica Tour Operators (IAATO) represents a network of tour operators that advocate and agree to provide safe and environmentally conscious forms of tourism to the Antarctic through self-applied guidelines and codes of conduct. However, this self-regulatory regime currently finds itself under increasing pressures from Antarctic Treaty signatories, environmental organisations and other NGOs campaigning for a centralised regulation of Antarctic tourism. Additionally, further pressures arise from unregulated activities by companies operating outside IAATO.
In response to the passionate debates about the management of Antarctic tourism and the pressures imposed upon the self-regulatory regime and thus, indirectly also upon the Antarctic Treaty System, this research project attempts to focus on the following question:
Faced with the challenges of multinational governance and an increasing diversification and growth of tourism can a self-regulatory regime adequately, effectively and sustainably manage Antarctic tourism?
Hence, this project attempts to

- the adequacy and effectiveness of a self-regulatory framework with respect to Antarctic tourism whilst taking into account the unique nature of the political and legal framework governing the Antarctic continent;
- investigate the practices and ethics of Antarctic tour operators under consideration of the existing institutional framework regulating human activities in Antarctica;
- analyse the potential for internationally comparable and standardised ways to sustainably manage Antarctic tourism; and

- propose a framework for an effective regulation of Antarctic tourism embracing internal and external regulation mechanisms whilst paying attention to the diffusion of power and interest and to the varying approaches towards managing the Antarctic environment.

P 17

Habitat selection and reproduction of the Antarctic midge *Parochlus steinenii* at King George Island

HAHN, STEFFEN & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
steffen.hahn@uni-jena.de

The terrestrial fauna in the maritime Antarctic comprises only two native dipteran species of the family Chironomidae. Hitherto, the biology and ecology of these species have remained largely unknown. We provide the first detailed study of habitat selection and reproduction of the winged Antarctic midge Parochlus steinenii at King George Island, South Shetland Islands.
Parochlus steinenii populated on average 93% of all permanent lakes with stable water level, whereas lakes with variable water levels and temporal melting ponds were less frequently occupied, even if these sites were in closed vicinity of occupied sites. Midges bred in lakes independently from their location above sea level ranging from coastal sites (5m a.s.l.) to lakes in the hills of 115 m a.s.l.. At the edge of lakes midges aggregated in dense male-dominated ground swarms at open sites with a mean density: 40 individuals / cm^2 (max: 150 ind./cm^2). Another aggregation of mainly females occurred under stones directly at the water edge with a mean density up to 2 indi. / cm^2. In this microhabitat females oviposited their eggs submerged under rocks; mean clutch size of females was 247.2 ± 98.6 eggs with a range of 49 - 457 eggs/female. 62% of the clutches contained a single batch, 32% and 2% consisted two and up to four batches, respectively.
Our study revealed for the first time the spatial distribution of *Parochlus steinenii*, which allows a general characterization of their habitat preferences. Our results indicate a strong preference for predictable habitats and avoidance of stochastic habitats, which might be explained by the risk egg-desiccation or freezing of overwintering stages.

DFG

Ecological adaptation of skuas in the maritime Antarctic: case studies from a hot spot of global change and speciation

HAHN, STEFFEN, MARKUS S. RITZ & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
Hans-Ulrich.Peter@uni-jena.de

Skuas are top predators and play an important role in the Antarctic marine ecosystem. Two closely related species Brown Skua (*Catharacta antarctica lonnbergi)* and South Polar Skua (*C. maccormicki)* share the polar habitat with Brown Skuas live at the circumantarctic islands and South Polar Skuas at the continent. In the Antarctic Peninsula region their distribution ranges overlap and they breed sympatrically at the same sites. Skua populations in the area of the South Shetland Islands are of special scientific interest, because
• skuas as top predator are highly sensitive and therefore an appropriate indicator for changes in the food chain

• the region is highly affected by rapid regional warming, which has and will have drastic impacts on ecosystem functioning
• one of the few world wide long-term data covering the last 20+ years is available
• the skua hybrid zone offers the unique possibility for speciation study in polar environment

Foraging strategies:
Skua species are clearly separated in their feeding habits: The Brown skuas feed mainly on seabirds, their eggs and chicks. In contrast, the food spectrum of South Polar skua contains 90-95% food of marine origin, mainly pelagic fish. Furthermore, Brown skuas showed two distinct terrestrial foraging pattern: some pairs occupy feeding territories in penguin colonies; others can only feed in unoccupied areas of a penguin colony without defending a feeding territory. Territory ownership guaranteed sufficient food supply and led to a 5.5 days earlier egg laying and chick hatching. Short distances between nest and foraging site allowed territorial pairs a higher nest attendance rate such that their chicks survived better (71%) than chicks from skua pairs without feeding territories (45%). Due to lower hatching success in territorial pairs, no difference in breeding success of pairs with and without feeding territories was found in three years.
We conclude that skuas owing feeding territories in penguin colonies benefit from the predictable and stable food resource by an earlier termination of the annual breeding cycle and higher offspring survivorship.

Speciation:
The southern skua complex comprises five closely related taxa which are supposed to have diverged during the last glaciation events. We investigated the phylogeography of the southern skua complex by sequencing a hypervariable region (HVR I) of mitochondrial DNA (D-Loop). Samples from skua populations all around Antarctica and from all taxa were included in the analysis. We present first results from nested clade analysis.

Impact of environmental factors and global change
Longterm variation of reproduction verified a twofold separation of the dependencies of reproduction on environmental factors in the skua community: First the skua forms were differently affected by climatic and local weather conditions with Brown Skuas were more less affected than South Polar skuas. Especially maritime factors like sea surface temperature and sea ice contributed to the variation in skua reproduction with increasing strength form Brown to South Polar skuas. Second, egg parameters and hatching dates were more affected by maritime factors, whereas the importance of local weather conditions increased for offspring growth. This implies possibly inverse effects of climate change with more suitable conditions in spring by earlier snowmelt and sea ice break up for foraging, but bad conditions for chick growth even if extreme weather events (e.g. snowstorms) or fish availability decreased due to changes in the maritime food chain. Finally, South Polar skuas with their closed dependency on marine resources will be concerned earlier and in greater extent by changes in the marine ecosystem than Brown skuas.

Supported by DFG (PE 454/11)

P 41

Systematics of platinum-group elements as petrogenetic indicators of Ferrar igneous rocks from northern Victorialand, Antarctica

HANEMANN, RICARDA & LOTHAR VIERECK-GOETTE
Institut für Geowissenschaften, University, Jena
ricarda.hanemann@uni-jena.de

Isotope signatures of tholeiitic rocks from the Ferrar Large Igneous Province in Tasmania and Antarctica indicate an identical magma source for both magma groups present (low-Ti and high-Ti) within the subcontinental lithospheric mantle enriched by a crustal component. However, the thermal source for the generation of the huge amounts of melt is still under debate as the crust-like isotope data obscure the identification of a possible mantle plume involvement. Until recently, platinum-group element (PGE) charcteristics of basaltic rock suites were suggested to be useful tools to distinguish lower and upper mantle reservoirs. Ongoing petrogenetic investigations are intended to further characterize the Ferrar melting source and the subsequent magma evolution. Therefore, we analyzed the PGE abundances (Ir, Ru, Rh, Pt, Pd) of selected basaltic andesites and andesites taken in northern Victorialand during GANOVEX VIII. Analyses were performed by ICP-MS using isotope dilution after preconcentration and separation of the PGE by NiS fire-assay at the university of Karlsruhe. Contrary to the compositionally homogeneous high-Ti samples, the analyzed low-Ti samples display wide variations of mineral and bulk-rock chemistry indicating a significant low-pressure in situ differentiation after the magma emplacement within the continental crust. Similar to the major and trace elements, a noticeable fractionation within the group of PGE is shown with the PPGE (Pt and Pd up to 23 and 17ppb, resp.) being strongly enriched over the IPGE (Ir and Ru < 1ppb) resulting in Pd/Ir ratios varying from 10 to 170. This ratio mainly corresponds to the degree of magma differentiation. In all samples, Ir is positively correlated with MgO supporting its compatible behavior during differentiation. In contrast, Pd and Pt are mainly incompatible, only in a few higher evolved samples they decrease with decreasing MgO. As the PPGE have high sulfide/silicate melt partition coefficients, their variations are compared to the chalcophile element Cu, which uniformly increases with decreasing MgO due to its incompatibility into silicate or oxide phases. This indicates sulfur-undersaturated conditions during subsequent magma differentiation. However, the decoupling of Pd and Pt from Cu in some of the evolved samples can reflect the somewhat higher partition coefficients of the PPGE into sulfides compared to Cu or the involvement of the PPGE into other phases (e.g. metal alloys). In order to interprete the observed Cu and PPGE systematics petrogenetically, we compared the results to published data of tholeiites from mid-ocean ridges, ODP seaward dipping reflector sequences and other large igneous provinces. Thereby, the obtained variably combined trends of Cu, Pd and Pt can be explained by different degrees of S-saturation of mostly S-undersaturated primary magmas reached at distinct degrees of differentiation. Furthermore, these variable degrees of S-saturation indicate that PGE fractionation does not seem to be solely determined by source characteristics. Thus, the data prove that upper mantle (MORB) and lower mantle (plume) sources of tholeiitic magmas cannot be distinguished by their degrees of S-saturation during differentiation. As a result, the PGE systematics of Ferrar magmas demonstrate that small scale variations under low pressure conditions must be considered as well.

P 40

Crystallization experiments on low-Ti and high-Ti rocks of the Ferrar Large Igneous Province, Antarctica

HANEMANN, RICARDA (1), LOTHAR VIERECK-GOETTE (1) & MARCUS FREISE (2)
(1) Institut für Geowissenschaften, University, Jena
(2) Institut für Mineralogie, University, Hannover
ricarda.hanemann@uni-jena.de

The Jurassic Ferrar Large Igneous Province occurs in a linear 3000-km long belt along the western margin of the East Antarctic craton. It comprises intrusive and extrusive occurrences of

mainly basaltic andesites of a tholeiitic magma series, which can be subdivided into the compositionally distinct low-Ti (LTS) and high-Ti (HTS) magma series. Newly sampled Ferrar occurrences from northern Victorialand were investigated with respect to the distinct genesis of the two magma series. As published by others, trace element and isotope studies established a single magma source within the subcontinental lithospheric mantle that was enriched by crust-derived fluidal components during ancient subduction processes. Furthermore, similar partial melting degrees are suggested for both series indicated by their uniform rare earth element patterns. Thus, the petrogenetic differences of both magma series have to be attributed to the subsequent magma evolution supported by following considerations: The analyzed high-Ti samples exhibit higher concentrations of incompatible major and trace elements (incl. REE) than the low-Ti samples at comparable SiO2. Chilled margins of LTS intrusives represent the pre-intrusive composition of the low-Ti magmas, from which cumulates and differentiates resulted from a low-pressure fractionation during in situ – differentiation after the magma emplacement within the continental crust. Considering some element correlations and the mineral chemistry, the high-Ti magmas cannot be generated from subsequent mineral fractionation of the low-Ti magmas. Thus, distinct conditions of differentiation have to be responsible for the genesis of the two magma series. Therefore, crystallization experiments were carried out in an internally heated pressure vessel at 1100 °C and 2 kbar at different oxygen fugacities (fO2) and water activities (aH2O) using a fused glass of a low-Ti chilled margin sample as starting material. The experimental vessel was equipped with a hydrogen membrane to control the fO2 during the experimental runs and with a rapid-quench system to avoid quench-crystallization. The results indicate that fO2 and aH2O have a small but significant effect on the generated phase assemblage and the chemistry of the mineral phases and residual melts. While in all experimental runs the natural phases plagioclase and clinopyroxene could be reproduced, only at higher fO2 and aH2O orthopyroxene (Opx) was found. Since only low-Ti chilled margin samples contain Opx, this observation defines the conditions during the differentiation of the low-Ti magmas prior to their ascent into the upper crustal units and to the surface. As the samples of the high-Ti series do not contain Opx, a genesis at lower fO2 and aH2O is suggested. At the same conditions, a higher compatibility of Na and Si into plagiclase is experimentally shown what corresponds to the higher Albit-component obtained in natural plagioclase of the high-Ti samples. From these indications, a model to explain the differences between both magma series is proposed: after the melt generation from an identical magma source, the magmas of the HTS stagnated in greater depths and differentiated at lower fO2 and aH2O than the LTS magmas. Assuming the HTS stagnated at lower-crustal to upper-mantle conditions, the LTS could be differentiated at mid-crustal conditions at higher fO2 and aH2O.

P 20

Ziele und Vorbereitungen des deutschen Beitrags zum internationalen GEOTRACES Programm

HANFLAND, CLAUDIA, JANA FRIEDRICH, WALTER GEIBERT & MICHIEL M. RUTGERS VAN DER LOEFF
Alfred-Wegner-Institut, Bremerhaven
chanfland@awi-bremerhaven.de

Die Polargebiete nehmen im weltweiten Klimageschehen eine besondere Rolle ein. Änderungen der globalen Umwelt kündigen sich dort früher an als in den gemässigten Breiten. Doch während menschliche Aktivitäten bereits beginnen, das Räderwerk rückgekoppelter Prozesse nachhaltig

zu verändern, haben wir bis heute nur ansatzweise ein Verständnis von den grundlegenden biogeochemischen Abläufen im (polaren) Ozean.

In diesem Zusammenhang liefern Spurenstoffe und ihre Isotope („Trace Elements and their Isotopes", im folgenden kurz TEI genannt) wertvolle Informationen über marine Prozesse. Beispiele dafür sind unter anderem der Eintrag von Mikronährstoffen in produktive Regionen, die Validierung und Entwicklung von Proxies für Klima-Rekonstruktionen oder die Verbesserung der Datenbasis für marine Produktivität oder den Kohlenstoff- und Nährstoffkreislauf. Nicht zuletzt fließen diese Datensätze auch in Modellrechnungen ein.

Enorme Fortschritte in Probenahmetechnik (z.B. kontaminationsfreie Beprobung und Weiterbearbeitung) und Analytik (z.B. ICP-MS) haben in den letzten Jahren die Bestimmung von TEI in kleinsten Konzentrationen im Meerwasser möglich gemacht. Während jedoch viele technische Probleme inzwischen gelöst werden konnten, ist das Wissen über die Biogeochemie vieler TEI bisher noch äußerst lückenhaft oder beschränkt sich auf methodische Betrachtungen. Das internationale Programms GEOTRACES (der zugehörige Science Plan wird zur Zeit diskutiert) will großflächig die Verteilung sowie die Quellen und Senken ausgewählter TEI im Ozean bestimmen. Dazu gehören auch die radioaktiven Isotope der natürlich vorkommenden Uran/Thorium-Zerfallsreihen, welche sich im Wasser in Abhängigkeit von ihrer Partikelreaktivität unterschiedlich stark anreichern. Gelöst vorliegende Radionuklide wie 226Ra, 228Ra und 227Ac dienen für Wassermassenstudien. Die partikelreaktiven Radionuklide und ihre Isotopenverhältnisse 234Th, 210Po/210Pb, 231Pa/230Th liefern Auskunft über Exportvorgänge und Partikeldynamik. Während GEOTRACES soll die Verteilung dieser Radionuklide erstmals hochauflösend zeit- und ortsgleich mit vielen weiteren TEI bestimmt werden, um kohärente Datensätze zu erhalten. Dies ist eine der Grundvoraussetzungen für eine gemeinsame integrierte Interpretation und für Rückschlüsse auf die zugrunde liegenden biogeochemischen Prozesse.

Die deutsche Beteiligung an GEOTRACES konzentriert sich auf den Atlantik inklusive der sich anschließenden Polargebieten. Erste Pilotstudien sind derzeit in Vorbereitung. So sollen während Polarstern-Expedition ANT XXIII/1 viele TEI parallel, kontinuierlich und kontaminationsfrei im Oberflächenwasser beprobt und außerdem eine automatisierte Technik für eine vereinfachte 234Th-Beprobung getestet werden. Die Bestimmung ausgewählter TEI in der Drake-Passage findet während Polarstern-Expedition ANT XXIII/3 statt. Weitere Aktivitäten, darunter beantragte Arktis- und Antarktis-Expeditionen in Zusammenhang mit dem Internationalen Polarjahr, sind in Vorbereitung und werden vorgestellt.

P 21

Die Verteilung von 226Ra und Silikat und ihre Biogeochemie im Atlantischen Teil des Südozeans

HANFLAND, CLAUDIA & MICHIEL M. RUTGERS VAN DER LOEFF
Alfred-Wegner-Institut, Bremerhaven
chanfland@awi-bremerhaven.de

226Ra (Halbwertszeit 1600 Jahre) wird in der Ozeanchemie zu den biointermediären Elementen gezählt, das heißt, dass es im Oberflächenwasser durch Teilnahme an biologischen Prozessen abgereichert, aber nicht vollständig aufgebraucht ist. Aufgrund der Ähnlichkeit der vertikalen Verteilungsprofile von 226Ra und Silikat wurden silikathaltige Hartschaler wie Diatomeen häufig für die Abreicherung von 226Ra im Oberflächenwasser verantwortlich gemacht (Ku et al.

1970). Ein direkter Beweis für den Einbau von Radium in Diatomeenschalen konnte bisher jedoch nicht zweifelsfrei erbracht werden, weder durch Messungen an Planktonproben noch durch Akkumulationsexperimente.
Während der Expedition ANT XXVI/3 mit RV Polarstern wurde ein hochauflösender N-S-Schnitt im Oberflächenwasser durch den Antarktischen Zirkumpolarstrom in das Weddellmeer entlang 20° E auf 226Ra und Si beprobt. Die Daten bestätigen die bisher bekannten Verteilungsmuster dieser Elemente: eine starke Zunahme von Nord nach Süd für beide Parameter mit jeweils höchsten Konzentrationen im Bereich des aufsteigenden Zirkumpolaren Tiefenwassers im östlichen Weddellwirbel. Durch die hohe Auflösung konnte jedoch gezeigt werden, dass Variationen in der Si-Verteilung nicht mit vergleichbaren Änderungen in 226Ra-Aktivitäten einhergehen. Darüberhinaus liegen die Hauptgradienten für beide Elemente um etwa 200 km voneinander getrennt. Dies deutet auf eine Entkopplung zwischen beiden Parametern hin.
Auf der Basis dieses hochauflösenden Profils in Verbindung mit mineralogischen Überlegungen und Planktonverteilungen schlagen wir Acantharien vor, die diesen „Versatz" erklären könnten. Acantharien bauen SrSO4-haltige Skelette und haben aufgrund der chemischen Ähnlichkeit von Strontium und Barium einen entscheidenden Einfluß auf die Biogeochemie des Bariums im Meerwasser (Bernstein et al. 1998). Radium, als chemisches Homolog des Bariums, sollte in seiner Verteilung daher in ähnlichem Masse von Acantharien betroffen sein.
Die Verteilung von Acantharien im Südozean ist bislang nur unzureichend bekannt, nicht zuletzt, weil sich die SrSO4-haltigen Skelette bei gängigen Beprobungsmethoden schnell auflösen, was zu einer Unterschätzung dieser Gruppe in Planktonstudien führt. Bisherige Verteilungsmuster lassen jedoch auf eine generelle Zunahme der Acantharien von den polaren in die subtropischen Breiten schließen. Erste systematische Auszählungen ergeben für den offenen Antarktischen Zirkumpolarstrom Individuenzahlen bis zu 30 000 pro m3 (Henjes pers. com.). Eine quantitative Auswertung der Acantharienhäufigkeiten in Verbindung mit 226Ra-Bestimmung an Planktonmaterial wäre der nächste Schritt, um die Biogeochemie des Radiums im (südpolaren) Meerwasser besser zu verstehen.
References:
Bernstein, R.E., Byrne, R.H. & Schijf, J. (1998): Acantharians: a missing link in the oceanic biogeochemistry of barium. DSR I, 45: 491-505.
Ku, T.-L., Li, Y.M., Mathieu, G.G. & Wong, H.K. (1970): Radium in the Indian-Antarctic Ocean south of Australia. JGR, 75:5286-5292.

P 65

High-resolution simulations of the Arctic atmospheric boundary layer and air-sea interaction process

HEINEMANN, GÜNTHER & HEIKE HEBBINGHAUS
Meteorologisches Institut, University, Bonn
gheinemann@uni-bonn.de

Non-hydrostatic simulations using two mesoscale atmospheric models have been performed for the inner Arctic during April 2003. Sea ice coverage was taken from sea ice retrievals from MODIS satellite data (1-2km resolution). Sea ice concentrations are high for the inner Arctic, but heat and moisture fluxes in the pack ice are strongly modulated by open water fractions associated with leads. Leads have a small width of a few kilometers, but can extend over more than hundred kilometers. During April 2003, the aircraft-based experiment ABSIS (Arctic Boundary Layer and Sea Ice Study) took place in the frame of the German ACSYS project, and a

comprehensive data set was collected from a research aircraft, a helicopter-based turbulence probe, two ships with radiosondes and several surface-based measurements, allowing the comparison of boundary layer structures with model simulations. The operational model LM of the German Meteorological Service was applying to Arctic conditions (with a resolution of 8km), and a number of shortcomings were identified. However, the air-sea exchange and the boundary-layer structures depend more on the correct representation of the lower boundary conditions (that is, the sea-ice coverage). A major improvement for the LM simulations of boundary layer structures was achieved by taking the actual surface temperature field from MODIS satellite retrievals. In order to resolve lead structures in the simulations, high-resolution simulations were performed using the model FOOT3DK (university of Köln) nested in LM. FOOT3DK is run with resolutions of 2km and 500m, and a dynamic-thermodynamic sea ice model can be coupled to the atmospheric model. Comparisons with the ABSIS data set show a good agreement for the boundary layer structures and near-surface quantities.

S XII
Weddell Sea icebergs: 5 years of observations

HELLMER, HARTMUT & MICHAEL SCHODLOK
Alfred-Wegner-Institut, Bremerhaven
hhellmer@awi-bremerhaven.de

Since 1999, 52 icebergs have been tagged with GPS buoys in the Weddell Sea to enable monitoring of their position. The chosen icebergs were of small to medium size with a few icebergs larger than 10 km associated with the calving of icebergs A38 and A43 from the Ronne Ice Shelf. The majority of icebergs were tagged off Neumayer Station (8E,70S). It was found that smaller bergs with edges shorter than 200 m had the shortest life cycle (< 0.5 yr). Iceberg and thus freshwater export out of the Weddell Sea was found to be highly variable. In one year the majority of deployed buoys remained in the Weddell Sea, constituting about 40% of the NCEP P-E freshwater input, whereas in other years all of the tagged icebergs were exported. The observed drifts of icebergs and sea-ice showed a remarkably coherent motion in sea-ice concentrations above 86%. Differential kinematic parameters (DKP) during the course of coherent movement were low and deviations from the mean course associated with the passage of low-pressure system. The length scale of coherent movement was estimated to be less than 250 km; about half the value found for the Arctic Ocean.

S VI
The age structure of the continental crust of Oates Land and George V Land (Antarctica) – new insights into the position of the boundary between the East Antarctic Craton and the Ross-orogenic belt

HENJES-KUNST, FRIEDHELM (1), NORBERT ROLAND (1), ULI SCHÜSSLER (2) & MARTIN OLESCH (3)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) Institut für Mineralogie, University, Würzburg
(3) Geologie der Polargebiete, University, Bremen
henjes-kunst@bgr.de

The early Palaeozoic Ross-orogenic Wilson Terrane (WT) in Northern Victoria Land and Oates Land at the Pacific end of the Transantarctic Mountains (Antarctica) has been interpreted as the palaeo-Pacific active continental margin of the Palaeoproterozoic to Archaean Antarctic craton. It has been speculated that the boundary between these different crustal blocks lies close to the western margin of the WT in Oates Land. Recent age determinations on basement rocks from the easternmost Antarctic Craton, however, revealed early Palaeozoic ages for a prominent suite of granitoids in the area between Ninnis and Mertz glaciers in George V Land (Fanning & Oliver 2002). In order to constrain the age structure of the continental crust in that area, we have performed a geochemical, isotopic and geochronological study on igneous rocks and their country rocks from George V Land (eastern margin of the Antarctic Craton) to eastern Oates Land (eastern margin of the WT). Conventional U-Pb single-grain zircon dating of WT intrusives from Kavrayskiy Hills (eastern WT), Hornblende Bluffs, Exiles Nunataks, Berg Mountains, and Outrider Nunataks (westernmost WT) yielded formation ages within a narrow range of time of 504 Ma to 493 Ma. The age of igneous activity closely corresponds to the c. 500 Ma age of peak metamorphism of their country rocks (Henjes-Kunst et al. 2004). Sm-Nd isotope analysis yielded consistent results for the magmatic rocks of the WT. Two-stage Nd model ages scatter with only one exception (Exiles Nunataks granitoid: 1.2 Ga) between 1.6 and 1.9 Ga. There is no regional trend in isotopic signature evident. In their Nd isotope compositions, the igneous rocks cannot be distinguished from their metasedimentary country rocks (Nd model ages c. 1.4 – 2.2 Ga; Henjes-Kunst & Schüssler 2003). Granitic erratics of likely early Palaeozoic formation age from Horn and SCAR bluffs located to the west of the WT in eastern George V Land yielded Nd model ages of c.1.6 – 1.9 Ga. Two metasedimentary erratics sampled at SCAR Bluff gave c. 2.0 Ga model ages. Rapakivi-type granitoids from the area between the Ninnis and Mertz glaciers, George V Land which have recently been dated to c. 510 Ma (Fanning and Oliver 2002) show only slightly elevated Nd model ages in the range of c. 1.7 – 2.2 Ga. Three country rock samples yielded 2.0 – 2.1 Ga model ages. Metamorphic basement rocks and one granitic dyke collected at different sites to the west of the Mertz Glacier in George V Land yielded significantly elevated Nd model ages of on average 2.95 Ga. These values correspond to those of cratonic basement rocks investigated further to the west (Peucat et al. 1999). The results demonstrate that WT-type i.e. early Palaeozoic Ross-orogenic basement rocks and granitic intrusives extend for more than 700 km from the Rennick Glacier in Northern Victoria Land to east of the Mertz Glacier in George V Land while Palaeoproterozoic continental crust of the Antarctic Craton crops out directly west of the Mertz Glacier. Thus, the Mertz Glacier marks the position of the boundary between the East Antarctic Craton and the Ross-orogenic belt.

P 42

Early Palaeozoic metavolcanics of the Bowers Terrane (Northern Victoria Land, Antarctica) re-investigated: a trace element and Sm-Nd isotope study

HENJES-KUNST, FRIEDHELM & SOLVEIG ESTRADA
Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
henjes-kunst@bgr.de

The Sledgers Group metavolcanics of the Bowers Terrane (BT) in northern Victoria Land were interpreted by Weaver et al. (1984) as evidence of a Cambrian primitive island-arc, accreted to the western Wilson Terrane in the course of the early Palaeozoic Ross Orogeny. Wodzicki & Roberts (1986) argue for the presence of an additional MORB-type volcanic component within the Sledgers Group. Bassett et al. (2002) constrain a Middle Cambrian (c. 510 – 500 Ma) age for the BT volcanic suite. Thus, two magmatic arcs of nearly the same age but contrasting

geotectonic settings are present in Northern Victoria Land: the primitive volcanic arc of the BT and the active-continental magmatic arc of the Wilson Terrane (Henjes-Kunst et al., this vol.). We preformed a trace-element, Sm-Nd isotopic and geochronological study on BT volcanics in order to further elucidate the plate-tectonic setting of the BT volcanic arc. Conventional single-crystal dating of three zircons separated from one rhyolitic sample yielded 207Pb/206Pb ages of c. 560 Ma, 1064 Ma, and 2255 Ma which demonstrate the detrital origin of these grains. We found no evidence for magmatic zircons formed in the BT volcanics. Sm-Nd isotope analysis reveals the presence of two groups with distinct initial Epsilon-Nd values. The first group shows primitive Epsilon-Nd values of on average +5.9 (±0.7; n=22). Most sample of this group have flat REE to light REE-depleted pattern comparable to N-type MORB. Two samples of this group, however, show light-REE enriched pattern similar to E-type MORB. Strongly fractionated rhyolitic varieties within this group have Epsilon-Nd values close to +7 indicating that they are not contaminated by continental crust. The second group comprises samples with initial Epsilon-Nd values of on average +1.4 (±1.0; n=8). REE pattern are moderately to strongly enriched in the light REE comparable to E-type MORB to OIB. Both groups are spatially closely associated but do not occur together at the same locality. In primitive-mantle-normalized multielement-variation diagrams, group 1 and group 2 BT volcanics display variable depletion of compatible elements as compared to typical MORB which is typical for basalts formed in supra-subduction-zone settings. While normalized Nb and Ta abundances are close to those of N-type MORB, elevated values for Ba, Sr, Th, U, and in part the light REE result in negative troughs for Nb and Ta in the normalized-element pattern. This also characterizes supra-subduction-zone magmatites. Using the Al2O3/TiO2 ratio as an indicator for the relative position of a magmatic center in an intra-oceanic magmatic-arc system (e.g., Wallin & Metcalf 1998), group 1 and group 2 BT volcanics spread the whole range of compositions formed in primitive fore-arc via typical island-arc to back-arc (spreading center) settings. Highly-depleted Mg-rich boninites of fore-arc settings, however, have not been found in the BT. These results demonstrate that the BT volcanics were formed in a complex intra-oceanic magmatic-arc system similar to for instance the Cenozoic Izu-Bonin arc system (e.g., Taylor et al. 1992). The differences in degree of incompatible-element enrichment and in Nd-isotope composition indicate that compositionally distinct mantle sources were involved in magma generation and that these mantle components were probably mixed on a relatively small scale.

S II
German Contribution to the international ACSYS Project – the joint project

HENSE, ANDREAS
Meteorologisches Institut, University, Bonn
ahense@uni-bonn.de

The Arctic can be seen as part of a European "climate engine". Understanding arctic climate processes is therefore a necessity for the understanding of climate variability in Europe. While the first German ACSYS project 1997-1999 was strongly concentrating on observational studies, the second phase of the ACSYS project joined the german capacities in arctic climate modelling and observation because natural variability as well as model errors in the arctic tend to be large. A concise model validation is only possible, if dedicated experimental data are available. Based on this general view there have been three major aims of the joint program.

1. The measurement, the phenomenology and the modelling of atmospheric boundary layer (abl) processes with special emphasis upon the arctic temperature inversion and the modulation of abl processes through inhomogeneities of sea ice like leads and polynas.

Simulations using micro- and mesoscale atmospheric models will be performed to derive an upscaling parametrization for use in large scale models.

2. The systematic model study using a set of regional (atmospheric amd coupled) climate models for the Arctic during the period of joint experiment between Greenland and Spitsbergen in late winter 2002/03. The experiment will provide a high resolution data set for the validation of models especially for the abl processes in the inner arctic and around Greenland.
3. The analysis of large scale water and energy cycle variations over the arctic basin based on reanalysis data, ECHAM4-T42 forced with observed sea surface temperatures and sea ice distributions during the 20th century and the extension and analysis of the ACSYS Arctic Precipitation Data Archive. This part of the project will also provide the large scale information necessary for the more regional climate studies during the selected periods.

The talk will present especially results from the joint efforts of the project namely on analysis of the performance of state-of-the-art regional and global climate models in Arctic and on the development of advanced parametrizations for the ice – ocean – atmosphere interaction via turbulent fluxes.
(a program funded by the Federal Ministry of Education and Research)

P 69

The spatial-temporal variability of the Arctic hydrological cycle and the connection to large scale atmospheric circulation

HENSE, ANDREAS, REINHARD HAGENBROCK, ROBIN GIRMES & RITA GLOWIENKA-HENSE
Meteorologisches Institut, University, Bonn
ahense@uni-bonn.de

The understanding of the spatial-temporal variability of the hydrological cycle of the Arctic was one of the mean key issues of the international ACSYS program. Aim of this poster presentation is to show analyses of the influence of large scale atmospheric phenomena like the AO or NAO upon the hydrological cycle in view of the observed long period NAO/AO changes during the last 20 years. The analysis will be done jointly using a novel method for radiosonde data analysis, ERA-15 data on one hand and 20th century model simulations using the ECHAM4-T42 model forced with observed sea surface temperatures and sea ice distribution as well as results from the coupled atmosphere-ocean model ECHO-G.

On average the model simulations show a considerable degree in realism but also a large uncertainty due to the unstable feedbacks in the ice-ocean-atmosphere coupled system.

P 84

AWI aircraft operations in the last 20 years and future prospects

HERBER, ANDREAS, INGA BARTSCH, GERIT BIRNBAUM, HARTWIG GERNANDT, CHRISTIAN HAAS, JÖRG HARTMANN, CHRISTIAN HASS, HANS-WERNER JACOBI, WILFRIED JOKAT, PETER LEMKE, CHRISTOF LÜPKES, HEINRICH MILLER, ROLAND NEUBER, UWE NIXDORF, WOLFGANG RACK, OTTO SCHREMS & DANIEL STEINHAGE
Alfred-Wegner-Institut, Bremerhaven
Aherber@awi-bremerhaven.de

The Alfred Wegener Institute for Polar and Marine Research operates two ski equipped aircraft (Dornier 228/100) for scientific and logistic purposes in the Arctic and the Antarctic. Both are equipped with identical advanced navigation systems and can easily be adapted to different science programs. Aerogeophysical instrumentation and different atmospheric systems, including identical basic meteorology for both aircraft, are available and have been used in previous projects. In future, further systems for coastal research studies will be used by our aircraft, especially over the North Sea and Baltic Sea.

Actual aircraft operation is contracted out as is the oversight and maintenance of scientific equipment. The contract partners are presently the German Aerospace Center Oberpfaffenhofen and the Optimare Sensorsysteme AG Bremerhaven.

The overall aim of our past and future aircraft based research activities is to contribute to the understanding of processes and interdependencies relevant to the climate in the polar geosphere and atmosphere. The polar regions serve as an early indicator for changes on a global scale. Our airborne operations are a unique opportunity to improve our understanding of interactions between glaciological and geodynamical processes as well as between atmosphere, ocean and ice.

The main goal of Geophysics and Glaciology is to investigate the internal structure of the Antarctic and Greenland ice sheets, especially between deep ice core drilling sites. Use of radar will help to obtain the accumulation distribution in Antarctica and Greenland. Furthermore. questions on crustal structure of the Antarctic craton and adjacent plates, the geometry and dynamics of the Gondwana break-up and the opening of the North Atlantic are of special interest. Here, the combination of aeromagnetic/-gravity and marine magnetic/gravity activity is a great challenge.

The atmospheric activities focus on several topics. The first one is the observation of optical, physical, and chemical properties of aerosols and clouds to quantify aerosol and water vapour variability in polar regions. The second one is the measurement of methane emission from swamps and of other trace gases in polar regions emitted, e.g., by frostflowers. Thirdly, radiative and turbulent processes in the planetary boundary layer and their interaction with surface inhomogeneity due to melt ponds, ridges and leads in sea ice covered regions will be investigated.

P 76

Spätquartäre organische Reste in Oasen des Dronning-Maud-Landes, Ostantarktika

HERMICHEN, WOLF-DIETER (1) & ULRICH WAND (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) Alfred-Wegner-Institut, Bremerhaven
whermich@awi-potsdam.de

Der Kontinent Antarktika gilt als der kälteste und trockenste Großraum im System Erde. Seit etwa 30 Mill. Jahren wird Ostantarktika fast vollständig von einem 10 Mill. km2 großen Eisschild bedeckt. Neue Satellitendaten deuten auf komplexe Strukturen und Fliessverhalten des Eisschildes. Nur ca. 1% des Untergrundes sind gegenwärtig nicht vergletschert. Die Rekonstruktion der säkularen Änderungen des Eisvolumens für die verschiedenen

Drainagesysteme und der damit gekoppelten Schwankungen des Regionalklimas sind eine der Hauptaufgaben der modernen Antarktisforschung. Eine Möglichkeit dazu bietet die Untersuchung von Ablagerungen, die als "natürliche Archive" auf unvergletscherten Flächen lagern. Die eisfreien Gebiete Antarktikas ("Trockentäler" oder "Oasen") sind auch Lebensraum für einige spezialisierte Organismenarten. Unter günstigen Umständen können autochthone organische Reste in glazigenen oder limnischen Sedimenten über Jahrtausende konserviert werden.
Paläogeografische Untersuchungen an terrestrischen Sedimentserien wurden bisher vorwiegend im Transantarktischen Gebirge (Victorialand) durchgeführt. Sie lieferten für diesen pazifisch geprägten Raum fundamentale Einblicke in die Glazial- und Klimageschichte. Auf der Gegenseite des Kontinents, im atlantisch geprägten Dronning-Maud-Land (DML: 20°W – 45°E), ragen ebenfalls eine Reihe von Gebirgsmassiven durch die bis 3000 m mächtige Gletscherdecke. Sie haben Flächen von einigen Dutzend bis einigen Tausend Quadratkilometern, Höhen zwischen 100 und 3500 m ü. M. und Küstenentfernungen bis 500 km. Unter den rezenten klimatischen Bedingungen kommt es in geschützten Lagen bis etwa 1500 m ü.M. kurzzeitig zu Tauprozessen. In etlichen Oasen sind dadurch in Höhen bis etwa 1000 m ü. M. Schmelzwasser-Seen anzutreffen – Lebensraum für Algen, Wassermoose sowie benthische und planktonische Mikroorganismen. In einigen Gebirgsregionen mit Küstenentfernungen bis 450 km existieren Brutkolonien von Schneesturmvögeln, in denen sich im Laufe von Jahrtausenden mehrere Dezimeter mächtige Schichten stratifizierte ornithogene Sedimente (Guano, "Mumiyo") gebildet haben – ein weiterer Typ von Lebensraum für spezialisierte Organismen der Kältewüste.
Im vorliegenden Beitrag werden 14C-Alter und *13C-Werte von subfossilem organischem Material aus vier Arbeitsgebieten der Autoren im atlantischen Sektor Ostantarktikas (Shackleton Range, Heimefrontfjella, Schirmacheroase und Wohltatmassiv) zusammengestellt und interpretiert:
Subfossile benthische Süßwasser-Algen aus früheren Schmelzwasserseen weisen 14C-Alter bis 38 ka BP auf und reflektieren die Veränderlichkeit von Gletscherrand und Eismächtigkeiten.
Die an diesen Funden ermittelte *13C-Signaturen sind ein Proxy für den Gasaustausch zwischen Gewässer und freier Atmosphäre. Sie ermöglichen damit Aussagen zu den lokalen sommerlichen Temperatur- und Strahlungsbedingungen, welche die Entwicklung des Wasserkörpers und seiner Eisdecke bestimmen.
14C-Alter- und *13C-Tiefen-Profile und durch ornithogene Sedimente widerspiegeln die klimatisch gesteuerte Populationsdynamik in den Schneesturmvogel-Kolonien und reflektieren die biologische Produktivität ihrer marinen Nahrungsquellen im Südatlantik seit etwa 40.000 Jahren.

DFG

Polychaeten des tiefen Südozeans- eine Bestandsaufnahme

HILBIG, BRIGITTE
CeDAMar, University, Bochum
bhilbig@senckenberg.de

Während mehrerer Expeditionen in den atlantischen Sektor des Südozeans an Bord der „Polarstern“ wurden in den Jahren 1998 (Expedition EASIZ II, Fahrtleitung Prof. Dr. W. Arntz), 2002 (Expeditionen ANDEEP I und II, Fahrtleitung Prof. Dr. D. Fütterer) und 2005 (Expedition ANDEEP III, Fahrtleitung Dr. E. Fahrbach) unter anderem quantitative Bodenproben hinsichtlich der benthischen Polychaetengemeinschaften ausgewertet. Die resultierenden Daten sollen in einer Reihe von geplanten Publikationen mit denen anderer Makrobenthos-Taxa

kombiniert werden, um so sukzessive ein Bild der Makroinfauna der antarktischen Tiefsee zu erhalten. Die Hauptfragen sind:

1. Wie hoch ist die Biodiversität der Polychaeten –und letztendlich der ganzen Makroinfauna- im Untersuchungsgebiet?
2. Wie sind die Verbreitungsmuster der Polychaeten?

Mit den resultierenden Antworten können weitere Fragen mit beantwortet werden, wie:

3. Wie verändern sich die Gemeinschaften mit der Tiefe? Wie weit reichen die Schelf-Assoziationen? Gibt es eine echte abyssale Fauna, oder liegt hier eine mit zunehmender Tiefe immer ärmer werdende Schelffauna vor?
4. Gibt es regionale Unterschiede (β-Diversität)? Ist der Endemismus in der Tiefsee so hoch wie auf dem Schelf? Gibt es Überschneidungen mit angrenzenden Tiefseebecken?

Die Ergebnisse der ANDEEP-Expeditionen sind Teil von CeDAMar (Census of the Diversity of Abyssal Marine Life), das wiederum eines der Feldprojekte des weltweiten, multinationalen Projektes CoML (Census of Marine Life) ist. CoML hat sich zum Ziel gesetzt, in einem Zeitraum von 10 Jahren eine inzwischen riesige Lücke in der taxonomischen Expertise zu füllen und in verschiedenen Projekten weltweit Bestandsaufnahmen derVielfalt des Lebens im Meer zu fördern.

Von EASIZ II und ANDEEP I/II liegen erste Ergebnisse schon vor, während das Material von ANDEEP III noch an Bord ist. Es zeichnet sich ab, dass es eine abyssale Polychaeten-Gemeinschaft gibt, die sich von der des Kontinentalabhanges und des Schelfs deutlich unterscheidet, und zwar sowohl hinsichtlich Individuendichte und Artenreichtum als auch der Artenzusammensetzung. Mehrere noch unbeschriebene Arten sind auch aus anderen Tiefseegebieten des Atlantik und Pazifik bekannt, scheinen also sehr weite Verbreitungsareale zu haben. Der Endemismus ist folglich nicht so hoch wie auf dem Schelf, der im Gegensatz zu den Tiefseebecken von anderen Schelfgebieten der Erde völlig isoliert ist.

P 23

Investigating the variation in penguin responses to human activity on Macquarie Island

HOLMES, NICK (1) & MELISSA GIESE (2)
(1) School of Geography & Environmental Studies, University, Hobart, Australia
(2) Human Impacts Research Program, Australian Antarctic Division, Kingston, Australia
ndholmes@utas.edu.au

From 2001 – 2004, a project was undertaken on subantarctic Macquarie Island to investigate the variation in responses to human activity by King Aptenodytes patagonicus, Gentoo Pygoscelis papua and Royal Eudyptes schlegeli penguins breeding there. Experimental and observational studies were employed to empirically measure aspects of physiology, behaviour and reproductive success of subantarctic penguins exposed to pedestrian activity, with the overall aim of producing management oriented information for commercial tourism and Antarctic Treaty nations operations alike. This was achieved by determining 1) the most sensitive penguin breeding / moult phases to human activity, 2) the role of habituation in responses to human activity, 3) the effect of visitor group sizes in penguin responses to human activity, 4) comparative responses to human activity between species, and 5) testing the current minimum approach distance guidelines for visitation to penguins. Here we describe results and applications of these five studies from this larger project.

WS

Oil spills in Antarctic terrestrial environments – the impact on soil microorganisms

HUGHES, KEVIN (1), BETHAN STALLWOOD (2)
(1) British Antarctic Survey, Cambridge, UK
(2) University of Wales, Bangor, UK
k.hughes@bas.ac.uk

Oil spill is one of the greatest potential environmental threats in Antarctica as oil is the dominant fuel used by national and commercial Antarctic operators. The activities of many Antarctic national operators have already resulted in accidental oil spills in both the sea and terrestrial environments. Little is known about the response of Antarctic soil microorganisms to oil contamination.

In this study growth of fungi and bacteria from soils around Rothera Research Station (Adelaide Island, Antarctic Peninsula) was assessed in the presence of ten separate aromatic and aliphatic hydrocarbons [marine gas oil (MGO), dodecane, hexadecane, benzoic acid, p-hydroxybenzoic acid, toluene, phenol, biphenyl, naphthalene and m and p-xylenes with ethylbenzene]. Aromatic hydrocarbons inhibited soil microbial growth more than aliphatic hydrocarbons. Microorganisms isolated from high human impact sites were oil spills had occurred, were more tolerant of hydrocarbons than those from low impact sites. Fungal growth rates of *Phialocephala sp., Penicillium commune, Mortierella sp.*, two strains of *Trichoderma atroviridae* and *Phoma herbarum* were assessed in the presence of hydrocarbons. Generally, aromatic hydrocarbons inhibited or stopped growth, though growth rates increased with some aliphatic hydrocarbons. Dry weights measurement suggested that *Mortierella sp.* may be able to use dodecane as a carbon and energy source.

We also present data concerning the potential use of native Antarctic microorganisms in bioremediative clean up of terrestrial oil spills. Oil contaminated and pristine soils from Signy Island (South Orkney Islands, Antarctica) were examined for bacteria capable of oil degradation at low temperatures. Of the 300 isolates cultured, Pseudomonas strain ST41 grew on the widest range of hydrocarbons at 4 oC. ST41 was used in microcosm studies of low temperature bioremediation of oil-contaminated soils. Microcosm experiments showed that at 4 oC the levels of oil degradation increased, relative to the controls, with (1) the addition of ST41 to the existing soil microbial population (bioaugmentation), (2) the addition of nutrients (biostimulation) and to the greatest extent with (3) a combination of both treatments (bioaugmentation and biostimulation). Addition of water to oil contaminated soil (hydration) also enhanced oil degradation, although less than the other treatments. Analysis of the dominant species in the microcosms after 12 weeks, using temporal temperature gradient gel electrophoresis (TGGE), showed Pseudomonas species to be the dominant soil bacteria in both bioaugmented and biostimulated microcosms. Addition of water and nutrients may enhance oil degradation through the biostimulation of indigenous oil-degrading microbial populations within the soil. However, bioaugmentation with Antarctic bacteria capable of efficient low temperature hydrocarbon degradation may enhance the rate of bioremediation if applied soon after the spill. In the future, native soil bacteria could be of use in bioremediation technologies in Antarctica.

DFG

Tracer measurements in the western Weddell Sea – formation of Deep and Bottom Water and the contribution of Ice Shelf Water

HUHN, OLIVER (1), MONIKA RHEIN (1), BIRGIT KLEIN (1), MIKE SCHRÖDER (2) & MICHAEL SCHODLOK (2)
(1) Institut für Umweltphysik - Ozeanographie, University, Bremen
(2) Alfred-Wegener-Institut, Bremerhaven
ohuhn@physik.uni-bremen.de

The southwestern Weddell Sea is considered to be one of the few formation regions of deep and bottom water in the southern ocean. The analysis of tracer budgets (helium, neon, CFCs) gives insight into a) the processes that set the properties of the waters formed on the shelves and b) into the formation of deep and bottom water.
Helium trapped in air bubbles during the formation of glacial ice is released into the water by melting at the underside of the ice shelf. Because of the low solubility of helium in water, pure glacial melt water is supersaturated in helium by roughly 1400%. Thus, Helium isotope data allow to calculate the amount of Ice Shelf Water entrained in the deep and bottom water. CFCs enter the ocean by air sea gas exchange. As transient tracers they allow to study the spreading of water masses ventilated on time scales of the last 50 years. Due to their almost steady increase in the atmosphere they provide information about the last contact of the carrying water mass with the atmosphere and, thus, an age.
During the ISPOL cruise in late 2004 with RV POLARSTERN an extensive data set of CFCs and helium was obtained while drifting along the continental slope of the Antarctic Peninsula (68.3°S to 66.9°S) close to the formation region of the newly formed deep and bottom water. Measurements near the shelf break were carried out with a helicopter deployed CTD and water bottles, allowing to take water samples from the bottom near the shelf break. Additionally earlier repeated CFC and helium sections off the northern tip of the Antarctic Peninsula into the Weddell Basin and in front of the Ronne-Filchner Ice Shelf are used to distinguish between the different types of contributing water masses and their evolution found further downstream.

DFG

Detrital zircon ages of metasedimentary rocks from Dronning Maud Land and implications for the tectonic evolution of parts of East Antarctica

JACOBS, JOACHIM (1, 3), ANDREAS LÄUFER (2), MICHAEL K. WINGATE (3), KEITH SIRCOMB (3)
(1) Fachbereich Geowissenschaften, University, Bremen
(2) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(3) TSRC, University, Perth, Australia
jojacobs@uni-bremen.de

East Antarctica is dissected by a number of Late Neoproterozoic/Early Paleozoic mobile belts, of which the East African-Antarctic Orogen crosscuts Dronning Maud Land, separating the Kalahari-Grunehogna from the Indo-Antarctic craton. Although a number of possible suture zones have been discussed for the East African-Antarctic Orogen in the literature, none of them is particularly convincing. Therefore, detrital U-Th-Pb zircon ages are used in order to obtain proxies for the provenance of the sedimentary rocks and the relative proximity to the different cratonic fragments in the regions, such as the Kalahari-Grunehogna and the Indo-Antarctic cratons. For Rodinia reconstructions, several positions of the Kalahari-Grunehogna craton in

relation to either Laurentia, western Australia or other continental fragments have been suggested. Besides paleomagnetic data and structural correlations across craton margins, our new detrital zircon ages give independent information of possible neighbours of the Kalahari-Grunehogna craton in Rodinia.
Samples were collected from areas in western and central Dronning Maud Land. We studied more than 10 zircon samples using SHRIMP II at Curtin University (Perth, Australia). One sample of a Mesoproterozoic metasedimentary unit on the western side of western Australia was analysed for comparative purposes. A major problem of the zircon analyses was, that the metamorphic conditions in the central part of the East African-Antarctic Orogen were so high, that many of the zircons underwent severe lead-loss, resulting in very discordant and thus difficult to interpret age data. Other samples did not contain detrital grains and the zircons found, proved to be metamorphic rather than detrital zircons. The best samples that were analysed come from the marginal part of the East African-Antarctic Orogen, from western Dronning Maud, where the metamorphic conditions don't exceed amphibolite facies. Sample R1 from Ristinghortane shows a strong age maxima between c. 1000-1350 Ma (80 % of all analyses), with a few grains dating at c. 1600, 1850, 2700 and 3000 Ma. The youngest dated grains are surprisingly young at c. 950 Ma. This is younger than the main Mesoproterozoic metamorphism in the area, and the question therefore arises, whether this sample could possibly represent a molasse of the Maud Orogen. Sample S1-40 comes from Sivorgjella. The single grain age data fall into two broad age groups, a larger one between c. 1140 and 1350 Ma and a smaller second one between 1650 and 1850 Ma. The youngest grains are c. 1140 Ma old and are thus significantly older than the inferred Grenville-age metamorphism (1090-1060 Ma). Sample 2201B comes from Filchnerfjella in central DML. The major population of concordant detrital ages ranges between c. 1090 to 1220 Ma. Minor components are present at c. 1840, 1960 and 2350 Ma. The youngest concordant detrital age is c. 909 Ma old. The sample from western Australia (Northampton Complex) shows a broad distribution of detrital grains between c. 1000 and 1800 Ma, surprisingly with no Archean grains present (although the close proximity to the Yilgarn craton). Thus, the western Australian detrital zircon populations are quite different form those of Dronning Maud Land, probably refuting a close proximity of the two areas as a preliminary conclusion.

P 5
Condition and fitness dependence of the long call complex in Brown Skuas *Catharacta a. lonnbergi*

JANICKE, TIM, STEFFEN HAHN, MARKUS RITZ & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
tim.janicke@gmx.de

The function of bird song is closely linked to sexual selection. Individual variation in song characteristics affects reproductive success through mate choice and male–male competition. In Brown Skuas (*Catharacta antarctica lonnbergi*) the long call complex is the most visible and audible display of their behavioural repertoire, being performed to defend breeding and feeding territories as well as for greeting mates. Beside the acoustic component, long calling is typically associated with wing raising.
During the austral summer 2002/03, we investigated long calls of Brown Skuas at Potter Peninsula, King George Island, Antarctica. Acoustic parameters and wing patch size were measured of 23 females and 21 males. In addition, we collected data on body condition and

breeding performance, such as chick growth and breeding success. Moreover, data on breeding success of the four preceding seasons were included in the analysis.
Differences between individuals in acoustic parameters indicate a potential of long calling for individual recognition. However, we found no correlations between acoustic parameters and breeding success or chick growth in both sexes. Only in females, a good body condition was associated with higher call frequencies.
Overall, there were no correlations between acoustic parameters and wing patch size. In males, wing patch size was negatively correlated with body condition and mean breeding success. Contrary in females, no correlations with wing patch size have been found.
These results suggest that the long call complex in Brown Skuas includes information for individual recognition and potentials for body condition and fitness signalling in males and body condition signalling in females.
The project was supported by the Deutsche Forschungsgemeinschaft (PE 454/11).

S IV

Deep-Sea sponges of the Weddell Sea (Antarctica) and adjacent areas – preliminary results of ANDEEP I, II and III

JANUSSEN, DORTE (1) & OLE SECHER TENDAL (2)
(1) Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main
(2) Zoological Museum, University, Copenhagen, Denmark
Dorte.Janussen@senckenberg.de

The bathymetric distribution of Antarctic sponges is different from that along other continents. Many shallow shelf taxa extends to larger depths than is usual, and part of the deep-sea fauna ascends high up onto the slope and outer shelf. Most famous among Antarctic sponges are the giant and probably very old glass sponges of the family Rossellidae; thus, the largest *Rossella* spp. individuals are up to 2 m high and have been calculated to an age of about 1500 years (Gatti 2002). According to present knowledge, more than half of the Antarctic Hexactinellid species are endemic, and the genus Rossella sensu strictu, has, except for one species, been recorded only from the circumantarctic sea (Barthel & Tendal 1994).
During the ANDEEP I and II expeditions (26.01-4.04.2002), 49 sponge species were taken at depths of 800 - 5000 m, 29 Demospongiae (1 new sp., 11 new for Antarctic), 4 Calcarea (3 new spp., 3 new for Antarctic) and 16 Hexactinellida (5 new spp., 6 new for Antarctic). Several hexactinellid species were originally described only on the basis of a fragment, and our new material made redescriptions and revisions possible (Janussen 2003, Janussen et al. 2004). Most surprising were deep-sea Calcarea, for the first time in Antarctica collected from depths below 1000 m: 3 species from 1120 m, E of the Antarctic Peninsula, and 1 species from the abyssal Weddell Sea, 4065 m depth. The last mentioned is the second-deepest record of a calcarean sponge (Janussen et al 2003). The eurybathic shelf sponge fauna extends far down the slope, to 2500 m. Remarkably, a few specimens of a real deep-sea species (*Chondrocladia antarctica*) were found at a depth of only 800m. Thus, the slope may be characterized by a mixture of shallow and deep-sea elements.
The abyssal plain (4000-5000 m) sponge community is fundamentally different from that on the slope:
The slope sponges are almost exclusively shelf species, many endemic to the circumantarctic area, whereas the abyssal sponge community, comprising mainly predatory demosponges (family Cladorhizidae), shows affinity to the Atlantic fauna. During the recent ANDEEP III expedition (21.01.-06.04.05) to the deep Weddell Sea, the work from ANDEEP I and II on

Porifera was continued. According to our preliminary results, the catches contained new faunal elements mainly of the Demospongiae. Some first results are here summarized:
* All samples from the epibenthic sledge contained sponges. The special deep-sea sponges, e.g. Cladorhizidae and Calcarea were collected mainly by EBS.
* A general observation is that deep-sea samples poor in other megafauna are generally rich in sponges, and vice versa.
* The sponge fauna of the deep Weddell Sea differs significantly from that of the adjacent Scotia Sea and Cape Basin: The first is rich in Hexactinellida and larger eurybathic Demospongiae, whereas the latter comprises almost exclusively very small predatory sponges of the family Cladorhizidae.
* Calcareous sponges are a rare component of the Antarctic deep-sea fauna.
* Large Hexactinellida in abyssal samples indicates that Antarctic gigantism may also apply to the deep-sea.
* Considerable differences in fauna composition between stations either indicate great variation in habitat structure or insufficient sampling.

References:

Barthel, D. and Tendal, O. S., 1994, Antarctic Hexactinellida. Synopsis of the Antarctic benthos 6: 154 pp.

Gatti, S., 2002: The role of sponges in the High-Antarctic carbon and silicon cycling - a modelling approach. Berichte zur Polar- und Meeresforschung. No 434, 124 pp.

Janussen, D., 2003: First report on the deep sea Porifera from the northern Weddell Sea and the slope of the South Sandwich Trench.- Berichte zur Polarforschung, 470: 104-108.

Janussen, D., Rapp, H. T. & Tendal, O. S., 2003: A myth vanished: Calcareous sponges are alive and well at abyssal depths.- Deep-Sea Newsletter, 32: 17-19.

Janussen, D. Tabachnick, K. R.& Tendal, O. S., 2004 Deep-sea Hexactinellida (Porifera) of the Weddell Sea. Deep-Sea Research II, volume 51 (nrs 14-16): 1857-1883.

P 14

Sponges of the deep Weddell Sea (Antarctica); what does the distribution of taxa tell us?

JANUSSEN, DORTE (1) & OLE SECHER TENDAL (2)
(1) Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main
(2) Zoological Museum, University, Copenhagen, Denmark
Dorte.Janussen@senckenberg.de

During the ANDEEP I and II expeditions (26.01-4.04.2002), the Scotia Sea and Northern Weddell Sea, W of South Sandwich Islands were sampled. The sponge fauna collected showed remarkably high diversity, which seemed to be controlled mainly by the bathymetry. 49 sponge species, all together, were gathered at depths between 800 and 5000 m. Of these 10 species were new to science and 21 new to the Antarctic. Most new taxa (5 spp., 1 subgen.) described belong to the Hexactinellida; a group which is moderately diverse on the Antarctic shelf, and whose endemic species of the genus *Rossella* are famous for their high age and their gigantism. The diversity of Antarctic Hexactinellida increases significantly when the deep-sea species are documented. The same is true to the Calcarea, which is a rare sponge group in the Antarctic. The surprising finding of Antarctic deep-sea species, all of which seem to be new to science, contribute remarkably to the existing knowledge.

During the recent ANDEEP III expedition (21.01.-06.04.2005), larger scale transsects within following areas were sampled: Cape Basin - Atka Bay, Kapp Norwegia, central Weddell Sea,

Powell Basin and Drake Passage. The first evaluation of sponge taxa collected during ANDEEP III points towards some new conclusions compared with the results og sampling during ANDEEP I and II:

- The deep-sea sponge fauna of Kapp Norwegia and the Weddell Sea differs significantly from that of the adjacent areas (Powell Basin, Drake Passage, Scotia Sea and Cape Basin): The first is highly diverse, rich in Hexactinellida and larger eurybathic Demospongiae and yields also some Calcarea, whereas the latter comprises almost exclusively very small predatory sponges (family Cladorhizidae).
- Calcareous sponges are rare in the Antarctic; however they seem to be a constant component of the Antarctic deep-sea fauna.
- Antarctic gigantism of sponges is not restricted to the shelf areas.
- The Antarctic deep-sea is heavily undersampled. Thus it is currectly not possible to definitely state, whether we are dealing with local phenomena special for the Weddell Sea or with a general feature of the Antarctic Ocean.

S X

The impact of mass movement events in Lake El'gygytgyn, NE Siberia, on the pelagic lake sediment record

JUSCHUS, OLAF (1), MARTIN MELLES (1) & CATALINA GEBHARDT (2)
(1) Institut für Geophysik und Geologie, University, Leipzig
(2) Alfred-Wegner-Institut, Bremerhaven
juschus@uni-leipzig.de

The paleoclimatic and paleoenvironmental significance of sediment records from Lake El'gygytgyn, NE Siberia may depend on the impact of mass movement deposits. In order to investigate their genesis, composition, and distribution, a subrecent debris flow at the western lake slope was identified by 3.5 kHz echo sounding and penetrated by two sediment cores (Lz1039, Lz1041). The composition of these cores was compared to that of two long pelagic cores from the central lake (PG1351, Lz1024), where both shallow seismic data and the core composition exclude the existence debris flows.
The lower, more proximal part of the debris flow is stratified, reflecting an initial stage with sediment sliding and limited sediment mixture. Massive sediments directly above and in front of the stratified deposits indicate a second stage with turbulent transport. Both mass movements led to basal erosion of about 1 m thick underlying sediments along parts of the flow path. The debris flow initiated a suspension cloud in the whole lake whose deposition caused the formation of a graded subrecent turbidite, i.e. not only in front but also on top of the debris flow. Hence, the turbidite was not a product of a density-driven turbidity current, but of 'pelagic rain' following Stokes' Law. In consequence, it was not erosive. According to the results from the long cores, these conclusions are valid for the majority if not for all of the mass movement events that have taken place in Lake El`gygytgyn during the past 300 kyr. Given that one debris flow has produced one turbidite all over the lake, the total number of turbidites in this core (24) reflects the number of debris flows during the last 300 kyr. Altogether 19 turbidites were found in sediments deposited during warm periods. Only five turbidites were settled under cold climatic conditions. Turbidites contribute 12.6 % of the total lake sediment thickness at the pelagic coring site Lz1024.

WS

Human impacts in catchments and lakes of Schirmacher, Thala and Larsemann oases

KAUP, ENN
Institute of Geology, University, Tallinn, Estonia
kaup@gi.ee

Novolazarevskaya Station was constructed in 1961 in the Schirmacher Oasis. Since then unpurified sewage from the kitchen, sauna-laundry, power plant, and occasionally diesel fuel pollutions flowed into Lake Stancionnoye, which discharges through L. Glubokoye into epishelf L. Privalnoye. In 1980 the station moved onto catchment of L. Glubokoye and sewage found its way directly into this lake. More important, during 1961–76 most of station liquid & solid waste (food waste, faeces, refuse of hydrogen production, various oils & liquids in drums, etc.) were disposed of on the ice cover (permanent until 1979) of L. Glubokoye. This waste contributed much to O2-consuming organic matter and nutrients in the lake. The winter staff was 12-30 during 1961-84, increasing up to twice in summers.
During 1976–1977, Lakes Glubokoye and Stancionnoye showed up to 2 orders of magnitude higher levels of DRP and inorganic nitrogen, anaerobic conditions and anthropogenic meromixis, several times increased Chl a and an order of magnitude higher primary production of phytoplankton compared with natural lakes.
Molodezhnaya Station was established in Thala Hills in February 1962 and expanded until late 80s. A major part of it occupies the catchment of L. Lagernoye. L. Lagernoye drains into L. Glubokoye mostly every summer. Little is known about waste removal practices during the first decade but since early 70s most wastes were removed/discharged into Alasheev Bay. The staff grew from a dozen winterers in 1963 to 120-150 during 70s-80s when the summer staff reached sometimes a few hundred persons. In 90s a rapid decline followed with actual close-up in 1998. During 1967-68 the nutrient levels in Lakes Glubokoye and Lagernoye were more than order of magnitude higher than those in pristine freshwater lakes of East Antarctica. In December 1988 the nutrient levels in the stream draining the station's area and entering L. Lagernoye were much higher than in pristine streams into these lakes. A few measured primary productivities of phytoplankton in 1967-68 were 1-2 orders of magnitude higher than those of 1988.
Larsemann Hills could be considered pristine until 1986 when ANARE began to establish Law Base in February and later that year SAE began to build Progress I Station. That station was subsequently abandoned and Progress II was built. In 1987/88 CHINARE established Zhong Shan Station. These stations were set up on Broknes, a peninsula of ca 4 km2 in area. The winter population has varied between 12 and 40, number of mostly short-time summer visitors (also tourists) has reached several hundred. Direct discharge of wastes into most lakes has been very small but the active layer around the stations and in human impacted catchments contained increased salinities and nutrients.
Accordingly during 90s increased nutrient levels were found in streamflows draining stations' territories, in some lakes. The ecosystem of L. No Worries was profoundly changed under direct human impact. The use of wheeled and tracked vehicles has also involved rock crushing and increase of silt in runoff and has changed runoff patterns in all three oases. These human impacts and their consequences for lakes are discussed in detail.

P 2

Nest distribution of skuas on Barton and Weaver Peninsulas of the King George Island, the Antarctic

KIM, JEONG-HOON (1), JEONG-CHIL YOO (1), HOSUNG CHUNG (2) & JI HEE KIM (2)
(1) Korea Institute of Ornithology and Department of Biology, University, Seoul, Korea
(2) Korea Polar Research Institute, Ansan, Korea
stiltkim@hotmail.com

Nest distribution of skuas on Barton and Weaver peninsulas of the King George Island, Antarctica was examined during 2004-2005 austral summer. The breeding populations on the both peninsulas were composed of breeders of south polar skuas Catharacta maccormicki, brown skuas Catharacta antartica, and mixed breeding pairs of south polar and brown skuas. In the breeding population the south polar skua was dominant species. The skua nests were distributed contagiously along seashore in the both peninsulas. Nest density and species composition in the breeding population on Barton peninsula were similar to that on Weaver. The distance from a south polar skua nest to each neighboring nest of the south polar, brown skua or mixed breeding pairs of the both species was closer than that from brown skua or mixed species pair nests to the nests of other brown skuas or mixed breeding pairs of both species. Brown skuas built their nest the nearer side from seashore than those south polar skuas. Nests of mixed species pairs were distributed the closer side from seashore than that of south polar skua. South polar skua nests were located on the inside of the peninsular, compared with other ones. This is likely to be because the intra-specific competition for nest sites between brown skuas is more intensive than that of south polar skuas. This study shows that the nest distribution of skuas may be related to the intra- and/or inter-specific competition during the breeding season on Barton and Weaver peninsulas.

WS

A baseline survey for long-term monitoring of terrestrial vegetation around King Sejong Station, King George Island

KIM, JI HEE & HOSUNG CHUNG
Korea Polar Research Institute, Ansan, Korea
jhalgae@kopri.re.kr

As a baseline survey for long-term monitoring on environmental change around the Antarctic King Sejong Station, a vegetation map was made out in detail with GPS. The general features of the vegetation are corresponding with characteristics of other regions in King George Island. Every component in the map is represented by visually dominant species or genus. Species composition of the investigated vegetation was different among them according to the composition of substrata and altitudes. The remarkable point is the rapid expansion of *Deschampsia antarctica* Desv. population recorded around the station since January 2002. The maximum dispersal area was four times expanded after one year. Most of the clumps were formed on the stable and well-drained substrate, which consisted of moss carpet of *Sanionia georgico-uncinata* (65%) and *pebbles* (25%), while only a few young individuals were observed on the unstable and watertight silt-sandy area. The other native Antarctic phanerogam, *Colobanthus quitensis* (Kunth) Bartl. population was also recorded at that time. The population colonized a northern slope of Usnea community. We expect that dispersal of two flowering plants will be continuously and dynamically proceeded in this area. The continuous observations

are needed with establishment of database on environmental change of micro-habitats. Also, their dispersal and propagation in this area as peripheral region of Antarctica may be have important meaning related to global warming.

P 50
Eis-Platten-Tektonik

KLEINSCHMIDT, GEORG
Geologisch-Paläontologisches Institut, University, Frankfurt a.M.
kleinschmidt@em.uni-frankfurt.de

Am Rande von mehr als zehn Expeditionen und Reisen in die Antarktis (überwiegend von DFG, BGR und AWI unterstützt) konnten frappierende Analogien von Eis-Deformationsstrukturen mit dem tektonischen - vor allem dem plattentektonischen - Formenschatz beobachtet werden. Das antarktische Eis liefert Modelle

- für passive und aktive Kontinentalränder,
- für divergierende, konvergierende und aneinander vorbeigleitende Plattenränder,
- letztere auch mit kompressiver und dehnender Komponente (Transpression bzw. Transtension mit Pull-apart-Becken),
- für Subduktions-, Kollisions- und Strike-Slip-Orogene,
- für Randbecken ("back-arc basins") und Indenter mit seitlichem Ausweichen ("lateral escape"),
- für Bildung und Zerfall von Superkontinenten und
- für Bildung (Dispersion), Drift und Andocken (Integration) von Terranes.

P 3
South Polar Skua chick growth performance in relation to hatching date- timing of breeding or parental quality?

KOPP, MATTHIAS, MARKUS RITZ & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
koppi2000@gmx.de

A declining chick growth speed over the cause of the breeding season has been observed in many bird species. Two hypotheses have been evoked to explain this decline. The "timing of breeding" hypothesis suggests that chick growth speed decline is attributable to the date of egg laying. Environmental conditions, including food supply, are supposed to become worse with advancing season and cause decreasing chick growth speed. The "parental quality" hypothesis suggests that the seasonal decline results from the fact that young, inexperienced, or low quality birds breed later in the season. To evaluate the relative importance of timing of breeding and parental quality, egg exchange experiments were used to manipulate hatching date of South Polar Skuas *Catharacta maccormicki*. Three different experimental groups and a control group, each containing 20 nests, were created. "Delayed" breeders received clutches from the "early" hatching group. Chicks in these two groups hatched one week later and one week earlier, respectively. Group 3 was comprised of breeders with clutches that were swapped with clutches that hatched at the same date. The experiment took place on Potter Peninsula, King George Island, Antarctica in the austral summer 2004/05. Skua nests were visited every third or forth day

and tarsus, head, wing and mass of chicks was measured. This data were used to uncover the importance of the two hypotheses for declining chick growth speed.

P 62
Geophysikalische Arbeiten am See "Elgygytgyn", Sibirien

KOPSCH, CONRAD (1) & FRANK NIESSEN (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) Alfred-Wegner-Institut, Bremerhaven
ckopsch@awi-potsdam.de

Wenn man in Sibirien, insbesondere in Nord-Ost-Sibirien, geophysikalische Messungen durchführen möchte, dann muss man gewaltige Kompromisse eingehen, zwischen den technischen Möglichen und dem tatsächlich Machbaren. Die Logistik spielt hier die entscheidende Rolle, um in das unwegsame Gelände zu gelangen. Für solche Extremgebiete wurde eine spezielle Messplattform am Alfred-Wegener-Institut für Polar- und Meeresforschung entwickelt, die alles vereint, um komplexe geophysikalische Untersuchungen zu machen, wie seismische Vermessung, Bathymetrie und Geomagnetik. Eine solche komplexe Messung wird im Beitrag vorgestellt.

P 34
Small glacier and ice cap as indicators of current regional climate change

KOVALONOK, SVETLANA (1), VITALY CHIZHEVSKY (2), VLADIMIR GLOTOV (2) & GENNADI MILINEVSKY (1)
(1) Ukrainian Antarctic Center, Kyiv, Ukraine
(2) National University, Lviv, Ukraine
science@uac.gov.ua

The study of the ice caps of the small islands in the Argentine Islands Archipelago (Antarctic Peninsula) has shown that the small ice caps are rapidly retreating. The progressive retreat of the smaller ice caps on the Antarctic Peninsula is possibly due to the global climate conditions changing. The aim of monitoring is to study the dynamics of archipelago small ice caps as indicators of the regional warming up to 3.0°C in the Faraday/Vernadsky area during the last century. During 2002-2004 years the stereo photogrammetry and GPS surveying techniques are carried out for the detailed study of the Galindez, Winter, and Barchans Islands ice caps. The main objectives of the GPS and photogrammetry survey are producing the precision geodesic data for ice cap monitoring and the evolution model creation. Result of recent observations of the small ice cap of Galindez Island showed that compared with 1950 significant changes. Since 2000, Galindez ice cap has lost of 2-3 % of its volume. The general surface volume of southwestern side of the Galindez ice cap shows the lost of 23000 cubic meters in 2002-2003 and 28 000 cubic meters in 2003-2004. The error of the stereo photogrammetry survey techniques to measure the glacier surface elevation and volume of the initial calculation of the measurements is 03-0.5%. The measurements were produced by the method of vertical network and the digital relief model was created.

Several studies have shown that significant environmental changes are taking place on Galindez Island. These effects will act to decrease the amount of seasonal snow cover and lead to changes

in the relict ice cap. There was found that *Deschampsia antarctica* and *Colabanthus quitensis* are increasing in abundance on the island. The present observations taken together show a reduction in volume of around ten per cent of Galindez ice cap in eight years, suggesting that it will disappear within a century.

The creating cartographic models of the ice caps state, the distribution of temperature and precipitation are planed for Argentine Islands. The numerical analysis for the determination of the reaction velocity of the glacial environmental components on the climate changes will be provided on the base of these models. The main attention is to the influence climate condition changes on the time of ice cap "reaction". The information is treated with cartographic-statistic method support. This method gives possibility to consider the dynamic of the all ice caps characteristic for the Antarctic Peninsula small islands. The system base allows to provide the complex estimation of the natural conditions and to develop the mechanism state estimation and development of the glacial environment of the small island in Antarctic Peninsula area.

P 9

Sex associated morphological and biochemical markers of penguin *Pygoscelis papua*

KOZERETSKA, IRYNA, SVITLANA PAVLOVYCH, IGOR SIRENKO & VOLODYMYR BEZRUKOV
University, Kyiv, Ukraine
kozer@univ.kiev.ua

Statistical analysis of morphometrical indices of the Pygoscelis papua population from the Petermann Island has been carried out. The goal of the study was to create a discriminant function that could be applied for sex recognition using morphological indices. Only individuals with preliminary determined sex were taken for the investigation. Sex was determined measuring individual weight in 86 nesting couples: the individual that have higher weight in a couple was considered as a male. Stepwise algorithms of the discriminant analysis of the STATISTICA software (Borovikov, 1998) showed that the most significant indices, which may be used for sex discrimination, are the beak length (L) and thickness (H). Same results were obtained earlier for the Bird Island population of the same species (Williams, 1990). We have found however that the average values of those indices are lower for the Petermann Island population. The discriminant function D = 0.199754 ? L + 0.885555 ? H has been calculated by the method of Fisher (Afifi, Eysen, 1982). Threshold value of the discriminant function is equal to 23.06387 cm. An individual can be recognized as a female if the discriminant function value is lower than the threshold, otherwise it should be recognized as a male. For 147 individuals (85.5%) whose sex was preliminary determined the discriminant function gave correct sex recognition. We have performed also an analysis of proteins of blood serum and erythrocytes from 156 adult individuals from the same population by polyacrylamide gel electrophoresis. Any differences were not observed between the males and females in the loci of lactate dehydrogenase, malate dehydrogenase, prealbumins, albumins, postalbumins, pretransferrins, transferrins, posttransferrins and haemoglobins. The electrophoretic analysis of esterases showed that two of six fractions change their mobility in the gel in a sex dependent manner. They were defined as high and low mobility esterase fractions. It was found that 75% of the females have the low mobility fraction, while the high mobility fraction was observed for 71% of the males. Thus we can assume that two of six esterase loci are partially sex dependent. Two methods of the sex recognition, the discriminant function based on the morphological indices and the electrophoretic analysis of esterases, have given 64% coincidence of the results.

S VIII

Eine Expedition und ihr künstlerischer Chronist
David Paige (1901-1978) und die zweite Byrd Antarktisexpedition (1933-35)

KRAUSE, REINHARD A.
Alfred-Wegner-Institut, Bremerhaven
rkrause@awi-bremerhaven.de

Die deutsche Polarforschung des 20. Jahrhunderts kennt, im Gegensatz z.B. zu der britischen, keine künstlerischen Protagonisten. Die Deutschen haben keinen Wilson und keinen Marston, die mit ihren wunderbaren Arbeiten zur Popularisierung der Polarforschung beitrugen.
Das Alfred-Wegener-Institut hat die negative deutsche Tradition allerdings durchbrochen. Mehrfach wurden Maler als Expeditionsteilnehmer akzeptiert. Zuletzt war Gerhard Rießbeck, der bereits mit seiner Ausstellung - 41 Tage in der Grönlandsee - viel Erfolg hatte, auf der ANT XXII/3 an Bord POLARSTERN. Aber das Alfred-Wegener-Institut hat sich nicht nur durch die Förderung lebender Künstler einen Namen gemacht; es wurde zum Wiederentdecker eines 65 Jahre lang vergessenen amerikanischen Expeditionsmalers: David Paige, der die zweite Byrd Antarktisexpedition (1933-35) begleitete.
Richard E. Byrd, berühmt durch seinen Nordpol- (1926) und Atlantikflug (1927) war bereits in den Jahren 1928-30 in der Antarktis gewesen. Es wird ein Abriss der wissenschaftlich technischen Ausrichtung und der Ereignisse der Jahre 1928-35 gegeben und diese Darlegung mit Photos und mit den Bildern von Paige illustriert. Der besondere wissenschaftshistorische Reiz besteht aus deutscher Sicht in der zeitlichen Nähe zu den Grönlandexpeditionen Alfred Wegeners. Der Vortrag thematisiert diesen besonderen Aspekt indem er grundsätzliche wissenschaftliche Fragenstellungen und die technische und personelle Ausrüstung der Amerikaner und der Deutschen gegenüberstellt. Es wird nicht zuletzt auf den forschungs- und entwicklungspolitischen Hintergrund der 1930er Jahre eingegangen.

P 57

Ice core stratigraphy using dual energy x-ray absorptiometry (DEXA)

KROGER, CHRIS (1), JULIAN THOMSON (2), NANCY BERTLER (3) & UWE MORGENSTERN (1)
(1) Institute of Geological and Nuclear Sciences Lower Hutt, New Zealand
(2) Institute of Geology and Nuclear Sciences, Wellington, New Zealand
(3) Antarctic Research Centre, University, Wellington, New Zealand
c.kroger@gns.cri.nz

A new technique to obtain high resolution density data of ice cores is presented. A 54 m long ice core that was retrieved from the temperate Tasman Glacier in the Southern Alps of New Zealand was scanned using dual energy x-ray absorptiometry (DEXA). By applying this technique two images at two distinct mean x-ray energies were retrieved for each ice cores segment. The DEXA method is a true non-invasive technique, where the entire 54 m of ice core were scanned within 90 minutes. The core segments were scanned inside their protective plastic sleeves and scanned at room temperature, before the ice core segment was returned to its cooling container holding dry ice. The analysis was based on two different approaches: the use of single energy x-ray images and the use of both images at different energies. The first approach is capable of distinguishing layers of various densities inside the ice core. As the ice core is cylindrical and the distance travelled by the x-ray beam through the ice core influences the magnitude of x-ray attenuation, a shape model of the ice core was developed to account for the thickness variation.

The density can then be calculated according to the fundamental attenuation law and using suitable calibrations. Using two x-ray beams at different energies eliminates the need for precise knowledge of the thickness of the ice core though, as the ratio of the absorption values for each x-ray beam pair is roughly constant for constant density (i.e. independent of the distance from the centre of the ice core). The dual energy results show better structural resolution of the density layers inside the ice core, in particular for shallow ice core segments. Relative densities were calculated, using the volumetric density as the mean density. The mean grey value of the image is equal the mean density. Each image pixel was then normalized on the mean density. Absolute densities were obtained, but required the calibration of the system with suitable materials. Results were compared to the ice core stratigraphy obtained with traditional techniques using a bright white light behind the core segment. The x-ray analysis showed better detail for density variations, while the traditional technique identified dust layers better in preliminary results (before calibrations). The results were checked by integrating the densities along the core axis and comparing the result with the volumetric density of the ice core segment, calculated from the weight and approximate volume of the segment. Overall the results show that DEXA provides a useful, non-invasive tool of determining a well-resolved spatial density of the ice core.

P 67

Radiation and meteorological parameters of the BSRN-Station Ny-Ålesund between 1993-2002 and long-term variations

KUPFER, HEIKE (1) & ANDREAS HERBER (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) Alfred-Wegner-Institut, Bremerhaven
heike_kupfer@yahoo.de

The global Baseline Surface Radiation Network (BSRN) serves for the detection of climate change. Since 1992 the Koldewey-station Ny-Ålesund/Spitsbergen belongs to the BSRN. It contains measurements of radiation and meteorological parameters and synoptical observations (Norwegian Polar Institute NP). In this work the first extensive analysis of radiation and meteorologic data of this station is presented.

A comparison of the Koldewey data series with long-time means could be realized by the assistance of the NP and the Norwegian Meteorological Institute.

For such a trend analysis the long-time radiation data were available from 1974-1992 and the meteorological WMO normals 1931-60 and 1961-90. These long-time data series are required for secured statements about the climatic development in Ny-Ålesund.

In winter the differences between warm air masses from south and cold air masses from the north influence the weather in Ny-Ålesund. Cold and dry air is transported to Spitsbergen with high-pressure areas from the polar sea. The energy loss in winter is slightly less than the energy gain in summer. The yearly mean energy budget is positive with 1.4 W/m².

During the polar night, the temperature showed variations between 7°C and -35°C, while in the summer months the temperatures were constant about 5°C. The yearly mean temperature is -5.1°C. It is 0.7°C higher than the mean of the 1961–90 normal and 0,8°C lower than the mean of the 1931-60 normal. A significance of this temperature trend could not be found. The budget that decreased during the years 1974-2001 cannot be the reason of this slight temperature rise. Possible causes for the warming could be dynamic processes.

A clear temperature rise during the winter months of the latest years were found while especially the January average increased for 5.9°C. Between 1915 and the mid 1920ies an rise of the winter temperatures 8°C was observed. The decadical variations of the temperature trends are obvious since the 1930ies.

These rhythmic temperature trends may be based on the different extend of the Arctic Oscillation (AO). These phases alternate in irregular intervals reaching from a few days to some months. But when the phenomenon is watched over years and decades, there is always one of the states dominating, which may explain the decadic fluctuations of the temperature. This decadal variation of the phases of the AO is standing in significant relationship with the 11-year cycle of high and low intensity of solar activity.

An evaluation of the meteorologic and radiation parameters in the observation period of 8 and 9 years is too short for a detailed climatologic analysis. Nevertheless, with historic data, climatologic trends could be estimated.

Reference: KUPFER, H. (2003): Variationen der Strahlungsgrößen uns meteorologischen Parameter an der BSRN-Station Ny-Ålesund/Spitsbergen für den Zeitraum 1993-2002. Diploma thesis Fiedrich-Schiller-University Jena, Germany.

P 6

White blood cell count of *Catharacta maccormicki*

KURSA, MARYNA (1,2) & VLADIMIR BEZRUKOV (2)
(1) Ukrainian Antarctic Center, Kyiv, Ukraine
(2) National University, Kyiv, Ukraine
science@uac.gov.ua

The white blood cell (WBC) count in peripheral blood of adult South Polar Skua (*Catharacta maccormicki*) was carried out. The blood smears were prepared during the 2001/02 season near Ukrainian Antarctic Station Akademik Vernadsky at Galindez Island (Argentine Islands Archipelago). Blood smears were fixed in 96% ethanol, dried and delivered to Kyiv University. The slides were stained and scored under magnification 100x20. For each individual the number of WBC per 10.000 mature erythrocytes was scored.
The smears were analyzed for the total leukocyte number, WBC differential (percentage of heterophils, eosinophils, basophils, lymphocytes and monocytes), and ratio of heterophils to lymphocytes (H/L). These parameters are good and sensitive indicators of bird's general health. We evaluated also the level of genome instability of the same birds by estimation of micronuclei (MN) and other nuclear anomalies (NA) frequency in mature erythrocytes.
The average leukocytes frequency was 0,29 %. The average WBC differential was 590,5‰ heterophils, 12,6% eosinophils, 39,4% basophils, 39,4% monocytes and 381,1% lymphocytes. The average ratio of H/L was 1,9. The average rate of MN was 0,01‰. The average rate of total NA was 0,42‰.
The relation of WBC count and the level of genome instability will be discussed.

P 79

Properties, genesis and classification of gelisols in the Lena Delta

KUTZBACH, LARS (1) & EVA-MARIA PFEIFFER (2)
(1) Alfred Wegener Institut, Potsdam
(2) University, Hamburg
lkutzbach@awi-potsdam.de

Permafrost-affected soils (gelisols), which cover nearly one fourth of the terrestrial surfaces in the northern hemisphere, play a major role in the global carbon cycle. About 14% of the global soil carbon is stored in permafrost soils and sediments. Spatial distribution and genesis of soil types in arctic tundra landscapes provide a necessary basis for process studies on climate-relevant trace gas fluxes and up-scaling approaches on the balance of the global carbon budget. In summer 2001, the permafrost-affected alluvial soils of Samoylov Island, a typical island of the Lena Delta, were described, analysed, mapped and classified according to different international soil classification systems.

Investigation Site Lena Delta: Largest delta in the Arctic (32,000 km^2), 72°23' N, 126°29' E, arctic continental climate, mean temperature –10.2°C, mean precipitation 140 mm, continuous permafrost, river terraces and recent floodplains and subarctic tundra vegetation.

Landscape and Soil Units of Samoylov Island: The island has a size of 7.5 km^2 and is composed of two geomorphological units. The western part (3.4 km^2) represents a modern floodplain, which is flooded annually in early summer by the Lena River. The floodplain is characterised by very diverse soil types: Typic Psammorthels were found on elevated sand ridges while Typic Aquorthels, Ruptic-Histic Aquorthels or Fluvaquentic Fibristels were developed in former river channels and depressed areas. The vegetation cover on wet sites is dominated by *Arctophila fulva, Eriophorum angusti-folium* and *Carex aquatilis* and on dry sites of sandy ridges close to the beach by *Deschampsia caespitosa*, *Poa alpigena*, *Alopecurus alpinus* and *Tanacetum bipinnatum.*

The eastern part (4.1 km^2) is build up by sediments of a Late-Holocene river terrace and is only flooded in parts during extreme flooding events. It is characterised by polygonal-patterned ground with ice-wedge growth. A prominent microrelief is developed with depressed wet centre (*Carex aquatilis*, *Carex rariflora*, *Limprichtia revolvens*, *Meesia longiseta)* and elevated moist rim (*C. aquatilis*, *Dryas octopetala*, *Salix glauca*, *Hylocomium splendens).* The surface is composed of a mosaic of lakes and a soil complex of Glacic Aquiturbels (polygon rim: water level: 45 cm below soil surface, thaw depth: 47 cm, distinctly oxic in the top soil, reduced conditions below, ice wedge at 70 cm, cryoturbated) and Typic Historthels (polygon centre: high water level: 5 cm below surface, thaw depth: 31 cm, waterlogged, predominantly reducing conditions, peat accumulation, dense root mat).

Conclusions: The permafrost soils of the Lena Delta are well characterized by the Soil Taxonomy (Gelisols, USDA 1999) and the World Reference Base for Soil Resources (Cryosols, FAO 1998). According to the new Russian Soil Classification System (Shishov et al. 2001, Stolbovoi V and I Savin. 2002) the soils have to be classified as Alluvial soils (= Entisols, US Soil Taxonomy) which is not satisfactory for the special soil-ecological permafrost-landscape of the Lena Delta. The older Russian classification (Elovskaya 1987) takes into account the strong influence of cryogenic processes on the permafrost-affected soils of the delta. In general, an international accepted harmonisation between the different systems and the main diagnostic horizons should be developed. Such a classification system, based on a profile genesis with better defined qualitative and quantitative characteristics, could also be used for applied questions such as global carbon balance of the Artic region.

References: Elovskaya LG. 1987. Classification and diagnostics of Yakutian permafrost soils. Yakutsk, Sakha (in Russian). FAO (Food and Agriculture Organization of the United Nations). 1998. World Reference Base For Soil Resources. World Soil Resources Reports 84. Rom, Italy., Shishov LL, Tonkonogov VD, Lebedeva I and Gerasimova MI. 2001. Russian Soil Classification System. Moscow. Stolbovoi V and I Savin. 2002. Maps of soil characteristics. In Stolbovoi V and I McCallum (eds) Land resources of Russia. Laxenburg, Austria. USDA (US Department of Agriculture). 1999. Keys to Soil taxonomy. 8th ed. Lincoln, NB, USA.

S V

The Russian - German joint studies of the Barents Sea: a little known case of the international cooperation

LAJUS, JULIA A.
St. Petersburg Branch of the Institute for the History of Science and Technology, Russian Academy of Sciences, and Centre for Environmental and Technological History, University, St. Petersburg
jalajus@yahoo.com

The middle of 1920s is known for the fruitful Russian - German co-operation in many scientific fields. However, the joint studies in the Barents Sea still remain a very little known episode in the history of this co-operation in spite of the existence of diverse archival sources. The cooperation became possible after 1925 due to the special chapter in the newly accepted Soviet – German Treaty on Navigation. The new cooperation was driven by scientists. Long-standing relations of Russian naturalists with Germany formed most important prerequisite for them to be striving for joint work. On the preparing stage of the cooperation in 1926 a large diverse of opinions among Russian scientists was shown: from demands to close the Arctic seas from the eyes of foreign scientists to the recognition of the necessity of wide international co-operation. This controversy is in the focus of this paper.
The cooperation was supported by N. Knipowitsch, Russian oceanographer who had the positive experience of the international cooperation in oceanography being an active member of the International Council for the Exploration of the Sea (ICES) in 1902 -1914. His strategy was to use the joint studies for making a new attempt to return the Soviet Union to ICES simultaneously with Germany, which left the Council in the war times as well. In the end of 1926 Knipowitsch went to Germany, where he met with the chairman of the Deutsche Wissenschaftliche Kommission fur Meeresforshung C. Heinrici, director of the Biologische Anstalt Helgoland W. Mielck, oceanographers G. Schott and B. Schulz, ichthyologists E. Ehrenbaum, Fr. Heincke and H. Lubbert. After discussions the plan for joint studies of the Barents Sea was elaborated.
The summer 1927 was the culmination of joint research activity. Several Soviet expeditions made simultaneous research far to the north, including the exclusive section between Novaya Zemlia and Franz Josef Land. From German side the research were conducted under the leadership of G. Schott and B. Schulz from the board of one of the best German research vessels «Poseidon». However, most of the materials remained unpublished in Russia and the joint Soviet - German activity in the Barents Sea was cut down soon. Part of the German materials was published. The Barents Sea studies are mentioned in the biography of Bruno Schults as a top not only of his personal career but even of the activity of the Deutsche Wissenschaftliche Commission für Meeresforshung in general.

P 33

Chaos makers and regulators in Antarctic tourism

LAMERS, MACHIEL & BAS AMELUNG
International Centre for Integrative Studies, University, Maastricht, NL
machiel.lamers@icis.unimaas.nl

Tourism in Antarctica has grown exponentially over the last decade, diversifying into several modes of transport and activities. Faced with this rapid growth, authorities express concern, and search for ways to control tourism development and stimulate self-regulation by the industry. This focus on management and control has strong roots in academic literature. The dominant paradigm in tourism studies holds that tourism development can be managed top-down quite effectively.

This paradigm of controllability is challenged by recent theoretical developments based on the chaos/complexity paradigm, according to which tourism development is driven by discrete individuals' actions ('chaos makers'), surprises, and positive feedback, rather than by marginal change, predictability and negative feedback. Antarctica being no exception, the history of Antarctic tourism has been deeply influenced by a number of 'chaos makers', such as the pioneering tourism entrepreneurs Lars Eric Lindblad and Gilles Kershaw.

With our paper, we aim to demonstrate the added value of complementing the control perspective on Antarctic tourism development with a chaos perspective. We will reinterpret the development of Antarctic tourism, using typical concepts from chaos theory such as the "butterfly effect", "self-organisation" and "lock-in". Furthermore, we will discuss the interplay between chaos makers and regulators, and analyse this relationship's dynamics. Based on our findings, we will outline a new policy-making paradigm that anticipates, rather than responds to, chaotic developments in tourism. This paradigm is meant to complement the mechanism of self-regulation, which is inherently reactive.

DFG

Schelfeis-Ozean Wechselwirkungen und ihre Rolle im globalen Klimasystem

LANGE, MANFRED A. (1), KLAUS GROSFELD (2) & MALTE THOMA (1)
(1) Institut für Geophysik, University, Münster
(2) Department of Geosciences / MARUM, University, Bremen
langema@uni-muenster.de

Die Kryosphäre repräsentiert eine wesentliche Komponente des globalen Klimasystems. Auf der einen Seite haben Veränderungen der Schnee- und Eisoberflächen direkten Einfluss auf das regionale bis globale Strahlungsgleichgewicht der Erde. Andererseits bedingt die relativ geringe Differenz zwischen Oberflächentemperaturen und der Schmelztemperatur von Schnee und Eis, dass schon Erwärmungen von nur wenigen Grad Celsius signifikante Änderungen in der räumlichen Ausdehnung, der Dynamik und der Massenbilanz von polarem Meereis, von Gletschern und Eiskappen sowie der großen Eisschilde haben. Die Kryosphäre spielt damit eine Doppelrolle im Klimasystem und nimmt nicht nur Einfluss auf dessen Veränderung sondern ist zugleich sensibler Indikator für den sich abspielenden globalen Klimawandel. Neben des Einflusses der Kryosphäre auf den Strahlungshaushalt ist auch ihre Funktion für die Bildung oder die Veränderung globaler ozeanischer Wassermassen von Bedeutung. Hier spielen die

antarktischen Schelfeise eine besonders wichtige Rolle. Schmelz- und Gefriervorgänge an der Unterseite der großen Schelfeise leisten einen erheblichen Beitrag zur Bildung des Antarktischen Bodenwassers und beeinflussen damit maßgeblich den Weltozean. Diese Prozesse haben aber auch erheblichen Einfluss auf die Dynamik der Schelfeise und damit auf den Massenhaushalt ihrer Einzugsgebiete. Um diese Prozesse zu verstehen bedarf es eines Ansatzes, der sowohl die Wechselwirkungen zwischen Ozean und Schelfeis als auch die damit einhergehenden Änderungen im Fließregime der Schelfeise gemeinsam erfasst und beschreibt. Diesem Ziel dienen numerische Modelle, die einerseits die Prozesse in der Schelfeiskaverne sowie dem an das Schelfeis angrenzenden Ozean als auch andererseits die Eisdynamik der Schelfeise selbst quantitativ beschreiben. Die Kopplung dieser Modelle ermöglicht die oben angesprochene Integration der maßgeblichen Prozesse und erlaubt Abschätzungen über die Wirkungen globaler Klimaveränderungen auf die Wassermassenbildung sowie die Dynamik und den Massenhaushalt von Schelfeisen. In unseren Arbeiten haben wir uns bisher auf Untersuchungen westantarktischer Schelfeise konzentriert und hier vor allem das Larsen-, das Filchner-Ronne-, das Brunt- und das Riiser-Larsen Schelfeis behandelt. Zuvor jedoch haben wir anhand von Schelfeisen mit idealisierten Geometrien die Funktionstüchtigkeit unserer Modelle überprüft. Mit dem vorliegenden Beitrag werden einige wichtige Ergebnisse unserer Modellierungsarbeiten dargestellt und Implikationen für die Wechselwirkungen zwischen Kryosphäre und globalem Klimasystem aufgezeigt.

P 43

Geological map of the Ebbe Glacier Quadrangle (Victoria Land, Antarctica) 1 : 250 000

LÄUFER, ANDREAS (1), FRANK LISKER (2), GEORG KLEINSCHMIDT (3) & FRIEDHELM HENJES-KUNST (1)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) Fachbereich Geowissenschaften, University, Bremen
(3) Geologisch-Paläontologisches Institut, University, Frankfurt a. Main
a.laeufer@bgr.de

The Ebbe Glacier Quadrangle of northern Victoria Land (NVL) covers the southern ANARE Mountains, the north-western Admirality Mountains, and the largest part of the Concorde Mountains S of the Pennell Coast of the Southern Ocean, roughly halfway between Cape Adare in the E and the Rennick Glacier in the W. It is published within the frame of the German-Italian Geological Antarctic Mapping Programme (GIGAMAP) co-ordinated by the German Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) and the Italian Programma Nazionale di Ricerche in Antartide (PNRA). Most rocks exposed in the map area belong to the Robertson Bay Terrane, the easternmost of the three Ross-orogenic lithotectonic units of NVL. It consists of a very thick, regularly folded, monotonous turbidite succession of the Late Cambrian to Early Ordovician Robertson Bay Group. The only rocks belonging to the Bowers Terrane further W are sedimentary units of the Leap Year Group cropping out in the very SW of the map area. Regional metamorphism of the Robertson Bay Group is mainly very low-grade but reaches low-grade conditions close to the boundary to the Bowers Terrane The Robertson Bay Group is intruded and contact-metamorphosed by two granitoid bodies of the Devonian-Carboniferous I-type and subordinate S-type Admirality Intrusives. These intrusions are clearly visible in an aeromagnetic map of the quadrangle most likely due to a high magnetite content. In particular, a large magnetic high over the Admirality Mountains may represent a large intrusive body at greater depth. Based on radiometric dating, two major events can be distinguished on the map sheet: (1) the Ross event (Early Palaeozoic) and (2) the Admirality event (Devonian-

Carboniferous). The present structural architecture of the Ebbe Glacier Quadrangle, on the other hand, is dominated by Cenozoic, regionally distributed and partitioned brittle NNW-SSE directed intraplate right-lateral tectonics that has affected NVL since 50-40 Ma. Although Gondwana cover rocks deposited in the extensive Transantarctic Basin (i.e., Beacon Supergroup) are not known from the immediate Ebbe Glacier Quadrangle, thermochronological (fission track) analyses suggest that these rocks also occupied parts or even the whole area of the map. In general, the thermal and denudational history of the Ebbe Glacier Quadrangle and its surroundings is similar to the one postulated for the Rennick Graben further W and the Transantarctic Mountains. Major denudation in three episodes commenced at ~125 Ma, ~95 Ma and ~50 Ma, which can be correlated to major regional tectonic events. (1) Early Cretaceous Gondwana break-up between Antarctica and Australia and formation of the Pacific passive continental margin, (2) Late Cretaceous major extension between E- and W-Antarctica, and (3) Cenozoic rifting of the West Antarctic Rift System associated with rejuvenated faulting, magmatism, and deformation within the neighbouring Victoria Land Basin.
Further contributions to this work came from: Detlef Damaske (BGR, Hannover), Federico Rossetti (Univ. Rome), Giovanni Capponi (Univ. Genova).

DFG

Brittle Structural Architecture of the Lambert Glacier Region (E Antarctica): implications from PCMEGA (2002/03)

LÄUFER, ANDREAS L. (1) & GLEN PHILLIPS (2)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) University, Melbourne, Australia
a.laeufer@bgr.de

The Lambert Glacier is located within one of the major crustal structures in E Antarctica, the Lambert Graben. Its present structural architecture is thought to be linked to the break-up of Gondwana and the separation of India and Antarctica starting at ca. 130 Ma, but still older rifting events are assumed. Phanerozoic Lambert rifting is interpreted to be the main reason for uplift and erosion of the southern Prince Charles Mountains (PCMs), the only region in Antarctica where outcrops are accessable that far inland. Furthermore, the subglacial Lake Vostok is thought to be located in a rift arm branching off the Lambert Graben. We present data to illustrate changes in palaeostress states and kinematics from the Lambert Graben in the southern PCMs. They indicate at least two, possibly three brittle deformation events involving extensional and strike-slip/oblique-slip faulting. N-S to NE-SW trending dextral-transtensional and subordinate conjugate sinistral faults are probably responsible for 50-60 km dextral offsets of the metamorphic zonation in the basement along the eastern shoulder of the Lambert Graben and are tentatively interpreted to be related to the Cretaceous break-up of Gondwana in this sector. We also observed abundant faults indicating large-scale E-W to WNW-ESE directed extension with σ_3 coinciding with the ones computed for the strike-slip/transtensional system. Since clear overprinting criteria were not found, we consider this extension to be either coeval to or older (i.e. Late Palaeozoic) than the strike-slip/transtensional event. Possible hints to a rather two-phase story may come from (i) differences in mineralogy and scale of slickenline coatings in the same rock types and (ii) fission track data suggesting considerable Late Palaeozoic uplift and denudation followed by a Late Mesozoic phase (Lisker, pers. comm.). A still older E-W to NE-SW contractional event is indicated by reverse faults and folds overprinted by the large-scale extensional faults. Their age is most likely pan-African based on detrital zircon and first Ar-Ar mica dating. These structures correlate to probably pan-African top-E ductile reverse shear zones

in the northern Mawson Escarpment. The youngest faults observed in the study area caused reversal and inversion of the pristine extensional and strike-slip/transtensional systems and locally tilting of blocks. Related structures are compatible with NNW-SSE to NW-SE directed contraction and coeval NE-SW directed extension. The faults parallel the orientation of tributary glaciers of the Lambert system and thus play a geomorphologic role in the southern PCMs: WSW-ENE oriented glaciers run parallel to dextral faults whereas WNW-ESE to NW-SE trending glaciers are parallel to normal and dextral-transtensional faults. Subice topography shows that these faults also parallel the Gamburtsev Subglacial Mountains front and may roughly be projected into the Lake Vostok area suggesting that the lake could in fact be located within fault strands related to the Lambert Graben. The age of this system is uncertain. It post-dates presumably Cretaceous dextral-transtension and could thus be Cenozoic. Nevertheless, the final separation of India and Antarctica must have caused the development of a new stress field, which is responsible for the formation of the youngest fault structures in the southern PCMs.

P 63

Frostblumen und ihre Wechselwirkungen mit der Atmosphäre

LEHMANN, SANDRA & HANS-WERNER JACOBI
Alfred-Wegner-Institut, Bremerhaven
slehmann@awi-bremerhaven.de

In jüngster Zeit zog das Phänomen der Frostblumen erneut das wissenschaftliche Interesse auf sich. Frostblumen sind ca. 2 bis 6 cm große dendritische oder nadelförmige Eiskristalle, die bei der Bildung von Meereis entstehen. Beim Gefrieren des Meerwassers entsteht auf der Oberfläche des Eises eine wenige Millimeter dicke Salzlake. Aus dieser verdunstet Wasser und bildet eine flache übersättigte Dampfschicht. Erste Kristalle können sich durch spontanes Gefrieren des Wasserdampfes an Oberflächenrauhigkeiten bilden. Sie saugen das sie umgebende Salzwasser auf und können so den drei- bis sechsfache des Salzgehaltes des Meerwassers erreichen. Zu den aufgenommenen Verbindungen gehört auch Bromid, welches durch photochemische Reaktionen als Bromradikal von den Frostblumen an die Atmosphäre abgegeben und das bodennahe Ozon angreifen kann. Außerdem sind Frostblumen möglicherweise in den Winterhalbjahren in den Küstenregionen der Antarktis eine wichtige Quelle für seesalzhaltige Aerosole und somit von großer Bedeutung für die Interpretation von Firn- und Eiskernprofilen aus diesen Gebieten. Die chemischen und physikalischen Eigenschaften der Frostblumen sind daher hinsichtlich der Wechselwirkung mit der Atmosphäre und des Einflusses auf die Chemie der Atmosphäre von Interesse. Jedoch existieren bisher kaum Feld- oder Labormessungen. Unser Ziel ist es daher, ein Laborexperiment zu etablieren, in dem wir systematisch Frostblumen erzeugen können. Dabei soll das Wachstum, die chemische Zusammensetzung und die Lebensdauer der Frostblumen in Abhängigkeit von Temperatur, Windgeschwindigkeit und chemischer Zusammensetzung des Meerwassers untersucht werden.

P 66

The Heidelberg Observational Program of greenhouse gases and their isotopic properties at the German GAW station Neumayer (Antarctica)

LEVIN, INGEBORG (1), ROLF WELLER (2), CHRISTEL FACKLAM (1) & SAMUEL HAMMER (1)
(1) Institut für Umweltphysik, University, Heidelberg
(2) Alfred-Wegner-Instritut, Bremerhaven
Ingeborg.Levin@iup.uni-heidelberg.de

Long-term observations of atmospheric greenhouse gases (CO2, CH4, N2O, SF6, H2O), as well as of carbon monoxide and 222Radon have been performed at the German Antarctic Neumayer station as part of the WMO Global Atmosphere Watch (GAW) program - for many of these species since more than 10 years. While long-lived trace gases are monitored also at other coastal Antarctic sites, we established at Neumayer also a number of unique high precision records of their isotopic composition, such as 14CO2, as well as stable isotopes in H2O, CH4 and N2O which, for Antarctica, are only available at Neumayer. These isotope data, as well as the observed stable isotope ratios of CO2, provide important supplementary information of global atmospheric greenhouse gases budgets and their secular changes. The respective long-term records will be presented, and, where possible, compared to observations from other Antarctic and Southern Hemispheric sites. The seasonal cycles and inter-annual variability of the trace species, and their isotopic composition will be discussed - also in terms of changes in global or Southern Hemispheric sources and sinks.

S XI

Temperature-dependence of Methane oxidation rates in permafrost soils of the Lena Delta, Siberia

LIEBNER, SUSANNE & DIRK WAGNER
Alfred-Wegner-Institut, Potsdam
sliebner@awi-potsdam.de

Wet tundra environments of the Siberian Artic are considerable natural sources of methane, a climate relevant trace gas. The Arctic is observed to warm more rapidly and to a greater extend than the rest of the earth surface. It is suggested, that the tundra in Alaska and Russia has changed from a net sink to a net source of atmospheric carbon. The potential impact on the Arctic carbon reservoirs is highly influenced by changes in microbial processes like methanogenesis and methane oxidation. Methanogenesis describes the terminal step in the anaerobic degradation of organic matter and is undertaken by methanogenic Archaea. The emission rates of the biologically produced methane from arctic Permafrost soils are highly divergent. Seasonal methane emission from low-centred polygons, which are characteristic for the micro-relief of the Lena Delta, ranged between 53.2 ± 8.7 mg d-1 m-2 for the depressed polygon centre and 4.7 ± 2.5 mg d-1 m-2 for the polygon rim. The amount of methane released is mainly controlled by obligatorily aerobic or micro-aerophilic - and -Proteobacteria, the methane oxidising bacteria (MOB).
In Arctic environments, biological processes are controlled by seasonal freezing and thawing, which leads to an extreme temperature regime in the upper active layer of the permafrost. Therefore, methane oxidation rates in dependence of the temperature were determined via the conversion of 14CH4 to 14CO2. First results for samples of a polygon rim and of a floodplain soil of Samoylov Island (N 72°22, E 126°28, Lena Delta, Siberia) indicate a shift in the

temperature optimum of the methanotrophic activity with depth. MOB in the upper soil layers appeared to have their highest activity at temperatures of 21 °C. Contrarily to that, in deeper horizons close to the permafrost table the maximum methane oxidation rates were determined at 4 °C. These results contradict the idea of a 'community of survivors' in permafrost soils. They rather indicate the existence of very specialised methanotrophic communities within their environment of Siberian permafrost soils.
Further research on the temperature-dependence of the methanotrophic activities will be undertaken for samples of a polygon centre. In addition, it is planned to study the structure and the dynamic of the methanotrophic communities in Siberian permafrost soils using culture independent techniques.

DFG
The Antarctic Gondwana basins

LISKER, FRANK
Fachbereich Geowissenschaften, University Bremen
flisker@uni-bremen.de

The late Paleozoic and early Mesozoic geological evolution of the Gondwana supercontinent was characterized by the formation of a system of enormous sedimentary basins. Some of them still belong to the largest basins preserved in Africa, India, Australia, and South America. Despite its central position within Gondwana, direct evidence of intracontinental basin formation is scarce in Antarctica. Either such basins never evolved there, or the relatively soft Gondwana sediments were particularly subjected to erosion, and/ or the respective rocks are buried below the Antarctic ice shield.
Remnants of the most famous Antarctic Gondwana deposits crop out at scattered locations in northern Victoria Land (Transantarctic/ Beacon Basin) and Mc.Robertson Land (Lambert Graben). However, the poor outcrop conditions do not allow to analyze these basins on the basis of traditional, sedimentological and paleontological methods. Alternatively, low-temperature thermochronological techniques, complemented by geophysical and structural methods and morphological observation need to be applied to obtain crucial information about extension, depth, geometry, and genesis of these basins. Apatite fission-track analysis of basement rocks and basin infill indicates that the Transantarctic Basin and the Lambert Graben were both extensive Gondwana basins with a similar timing of deposition, but have quite a diverse shape and were formed by distinctively different mechanisms.
The Transantarctic Basin was formed as a broad coastal basin along the Panthalassan margin of Gondwana, roughly parallel to the course of the present Transantarctic Mountains. Between Devonian and Triassic times, most of the area between the southern Ross Sea and northern Victoria Land was covered by a thick pile of continental Beacon sediments. The regional fission-track pattern suggests that the northern segment of the ancient basin margin was defined by the USARP Mountains, and therefore, the Transantarctic Basin ranged almost 1000 km into the continental interior.
In contrast, fission-track data from Mc.Robertson Land show that the shoulders of the Lambert Graben were exhumed contemporaneously with the sedimentation within trough. Therefore, the Lambert Graben cannot be considered as a relic of a broad and shallow intracontinental basin, superimposed by the development of a young graben structure due to the Gondwana breakup. Instead, it represents a narrow rift that already existed during the late Paleozoic (Carboniferous-Triassic), and was reactivated in Cretaceous times.

P 82

Deutsche Marinewetterstationen auf Spitzbergen (1941-1945) - Ein Fall für den polaren Denkmalschutz

LÜDECKE, CORNELIA
Schwerpunkt Geschichte der Naturwissenschaften, Mathematik und Technik, University, Hamburg
C.Luedecke@lrz.uni-muenchen.de

Während des 2. Weltkrieges hatte die deutsche Kriegsmarine mehrere Wetterstationen auf Spitzbergen installiert. Die erste Station ("Knospe") wurde im Lilliehöökfjord (1941-1942) eingerichtet und unter dem Deckname "Nußbaum" (1942-1943) wiederbesetzt. Es folgte die Station "Kreuzritter" im Liefdefjord (1943-1944). Sowohl „Nußbaum" als auch „Kreuzritter" wurden nach ihrer Entdeckung von den Alliierten vollständig zerstört. Heute sind nur noch Trümmerhaufen erkennbar. Hingegen steht die Station "Haudegen" heute noch, die von 1944 bis 1945 im Rijpfjord (Nordausland) operierte. Sie wurde aus sechs vorgefertigten Modulen, den sogenannten Knoespelwürfeln mit den Maßen 3 x 3 x 2,20 m³, errichtet, die unter Weglassung von Wänden zu größeren Einheiten zusammengesetzt werden konnten, so daß sich schließlich eine Grundfläche von 6 x 9 m² ergab. Mit zusätzlichen Holzbrettern, die ursprünglich für eine weitere Unterkunftshütte im Falle einer Überwinterung des Transportschiffes gedacht war, konnte noch ein Schuppen für die Wasserstofflaschen zum Füllen der Wetterballone und eine Sauna gebaut werden. Im Winter wurde die Station völlig unter einer Schneedecke versteckt. Damit der Wettertrupp im Sommer 1945 nicht entdeckt wurde, zog er sich in eine sogenannte Sommerstation zurück, die zuvor in höheren Regionen an der Küste eingerichtet worden war. Die völlig einsame Lage im Nordosten Spitzbergens hat die Zerstörung der Stationsgebäude verhindert, da sie nach dem Verlassen als Notunterkunft für Schiffbrüchige dienen sollten. Nach sechs Jahrzehnten haben Wettereinflüsse und verschiedene Besucher wie Fischer, Touristen und Eisbären die Hütte ziemlich angegriffen. Die Lebensmittel wurden geplündert, die Ausrüstung über die ganze Gegend verteilt oder gestohlen und das Innere der Hütte teilweise verwüstet. Heute ist das Dach undicht und einige Hartfaserplatten der Außenwände sind zerbrochen. Durch glaslose Fenster und zerstörte Türen weht der Wind, während zerfledderte Bücher am Boden der Messe die Dielen durchfeuchten.
Die Station repräsentiert in ihre Art Containerbauweise eine moderne vorgefertigte Hütte, wie sie später andere Länder in modifizierter Form während des Internationalen Geophysikalischen Jahres (1957-1958) verwendeten. Nun müssen dringend Maßnahmen ergriffen werden, damit sich der Erhaltungszustand der Gebäude nicht verschlechtert. Außerdem muß in Zusammenarbeit von deutschen und norwegischen Behörden ein Denkmalschutzkonzept zur Konservierung der Station entwickelt werden, denn „Haudegen" ist die einzige erhaltene deutsche Überwinterungsstation in der Arktis und damit von großem kulturellem Interesse.

S VIII

Holzkajaks für Polarexpeditionen – Eine technische Entwicklung um 1900

LÜDECKE, CORNELIA (1) & ERKI TAMMIKSAAR (2)
(1) Schwerpunkt Geschichte der Naturwissenschaften, Mathematik und Technik, University, Hamburg
(2) Karl Ernst von Baer Museum, Tartu, Estonia
C.Luedecke@lrz.uni-muenchen.de

Die Entwicklung von wasserdichten Leim, den Christian Wilhelm Luther (1857–1914) in Estland (damals russische Ostseeprovinzen Russlands) entwickelt hatte und 1896 patentieren ließ, nutzte der deutschstämmige Bootsbauingenieur Carl Mühlenthal aus St. Petersburg zur Entwicklung eines Kajaks aus Furnierholz, das sich an kanadische Vorbildern das von Mühlenthal entworfene und in seiner Firma gebaute Holzkajak erhielt während der Weltausstellung 1900 in Paris die höchste Auszeichnung, d.h. das Ehrendiplom.

Dieses Holzkajak schien für Polarexpeditionen, die seit Nansen's „Fram"-Expedition (1893-1896) einen großen Auftrieb bekommen hatten, sehr gut geeignet zu sein. Insbesondere konnte Baron Eduard Toll (1858–1902) aus St. Petersburg dafür interessiert werden, der gerade seine „Sarja"-Expedition zu den Neusibirischen Inseln vorbereitete. Toll berichtete seinen Duzfreund Erich von Drygalski (1865–1949) von den sensationellen Fähigkeiten dieses Holzkajaks.

Diese Bootsentwicklung geschah zu einem sehr günstigen Zeitpunkt, wollten doch nach der Jahrhundertwende mehrere Expeditionen sowohl in die Arktis als auch zur völlig unbekannten Antarktis aufbrechen. Für Fahrten zwischen Eisschollen erschienen die neuen Holzkajaks in Einer oder Zweierversion vorteilhafter, als die mit imprägniertem Leinen bezogenen Nansenkajaks, da sie sich als sind fester, erheblich leichter und stabiler erwiesen.

Nansen erschien die Kajakfrage von „größter Wichtigkeit für Polarexpeditionen". Er glaubte allerdings nicht, daß dieselbe Haltbarkeit und das Gewicht wie die von Segeltuch gefertigten hätten. Auch seien sie wohl schwerer zu reparieren.

Drygalski, der durch seine Grönlandexpeditionen (1891 und 1892–93) von den Grönländern die Kajakfahrt erlernt hatte bestellte insgesamt 16 Zweier und 3 Einerkajaks. Auf seine Empfehlung hin bestellte auch die britische Expedition unter Robert Falcon Scott (1868–1912) zwei Zweierkajaks. Auch Otto Nordenskjöld (1869–1928), der sich ebenfalls an der internationalen magnetischen und meteorologische Kooperation in der Antarktis (1901–1903) beteiligen wollte, wurde von Drygalski über die Kajaks informiert.

Leider konnten die Holzkajaks nicht für Forschungszwecke wie Erkundungsfahrten zwischen Eisschollen eingesetzt werden, weil das Expeditionsschiff ein Jahr lang im Meereis festgesetzt war. Aber während der Weihnachtszeit konnten sie zur Freizeitbeschäftigung für Fahrten auf dem künstlichen Titicacasee vor dem Bug des „Gauss" verwendet werden. Im Zweierkajak werden Stechpaddel verwendet, während im Einerkajak nach dem Grönländischem Vorbild Paddel eingesetzt werden. Später entwickelte der Zimmermann zur Fortbewegung ein sogenanntes Räderkajak, mit dem die Hände für andere Aufgaben frei wurden.

Nach den Erfahrungen der Expeditionsphase um 1900 wurde das Holzkajak bei späteren Expeditionen in die Arktis durch das zusammenlegbare Faltboot verdrängt.

P 64

The effect of sea ice on the atmospheric boundary layer in Arctic regions

LÜPKES, CHRISTOF & VLADIMIR GRYANIK
Alfred-Wegner-Institut, Bremerhaven
cluepkes@awi-bremerhaven.de

The fluxes of energy and momentum over the Arctic sea ice covered ocean are strongly influenced by the inhomogeneous sea ice cover. Open water exists e.g., in the marginal sea ice zones and very often even in the inner Arctic in leads and polynjas. During winter, the large differences between the near-surface air temperature and the surface temperature of open water cause very strong heat fluxes from the ocean to the atmosphere. Also, roughness elements like ridges and floe edges have a large influence on the near-surface transport of momentum from the atmospheric boundary layer (ABL) to sea ice.

This poster presents investigations of the effect of surface inhomogeneity on the Arctic ABL, carried out in a subproject of the German contribution to the international ACSYS project. A nonhydrostatic mesoscale model (METRAS) was applied to several scenarios differing by the sea ice concentration, by the roughness of sea ice, and by the meteorological forcing. For a realistic representation of the effects of inhomogeneity, new parameterizations of the surface roughness, suitable for models of different scales, and of convection over leads for microscale models have been developed and applied to the model METRAS. It is shown by the model runs that besides surface fluxes, the entire boundary layer structure is significantly influenced by both types of surface inhomogeneities and that they might be relevant for climate processes.

P 71

The Arctic Precipitation Data Archives APDA - Some results from the new gridded Arctic climatology

MÄCHEL, HERMANN & BRUNO RUDOLF
German Weather Service, Global Precipitation Climatology Centre (GPCC), Offenbach
bruno.rudolf@dwd.de

One of the key issues of the international ACSYS program was the understanding of the spatial-temporal variability of the hydrological cycle of the Arctic. For this purpose a new gridded precipitation data set was created. With an equal area grid and a grid spacing of 100 km this data set covers the whole Arctic drainage basin.
For the interpolation of all available monthly precipitation totals (provided by national weather services and free data sources) the "Spheremap" software, according to Willmott and Legates, is used. These gridded monthly precipitation totals can also be used to validate regional climate models.
This poster presentation will include some results of the new gridded Arctic precipitation data set for the period 1950-2000. These results will show comparisons with other gridded precipitation data sets for selected grid points to illustrate the differences between these data sets and the improvements in the new APDA data set. Furthermore the presentation is focused on comparisons of area averaged precipitation and runoff for certain drainage basins to examine changes and variability in the hydrological cycle of these basins and to check for consistency.

S XI

Die Permafrostabfolgen von Kap Mamontov Klyk – Rekonstruktion der spätquartären Umwelt- und Klimabedingungen der Nordsibirischen Arktis

MAGENS, DIANA (1), HANNO MEYER (1), LUTZ SCHIRRMEISTER (1), ALEXANDER YU. DEREVIAGIN (2) & HANS-W. HUBBERTEN (1)
(1) Alfred-Wegener-Institut für Polar- und Meeresforschung, Potsdam
(2) Faculty of Geology, University, Moscow, Russia
dmagens@awi-potsdam.de

Am Kap Mamontov Klyk (73°36' N; 117°10' E) wurden Untersuchungen zur Rekonstruktion der Paläoklima- und Paläo-Umweltbedingungen in Nordsibirien durchgeführt. Das untersuchte Küstenkliff ist Teil der Lena-Anabar-Tiefebene und wird zum Norden hin durch die Laptev See begrenzt. Es ist aus eisreichen, dauergefrorenen Sedimenten aufgebaut, die eine komplizierte Ablagerungsgeschichte und Kryolithologie widerspiegeln. Sedimente und Eiskeile verschiedener Generationen wurden über das gesamte vertikale Profil des Aufschlusses beprobt. Für Informationen über die Ablagerungsbedingungen wurden die Sedimentproben korngrößenanalytisch und auf C- und N-Gehalte untersucht. Die Eiskeilproben wurden hydrochemisch und isotopengeochemisch ($\delta^{18}O$ und δD) analysiert. Die Isotopenzusammensetzung von Eiskeilen kann als Klimaindikator genutzt werden, da Eiskeile von meteorischem Wasser (Winterschnee) gespeist werden, das im Frühjahr als Schmelzwasser in Frostspalten eindringt und dort als Eisader gefriert.

Der Küstenaufschluss kann sedimentologisch in vier Einheiten untergliedert werden: Die älteste Einheit bilden 4 m mächtige Sande mit Eis-Sand-Keilen. Darüber folgt eine 5 m mächtige Torf-Sand-Wechselfolge mit kleinen Eiskeilen. Als Haupteinheit folgt darauf der 9-20 m mächtige spätpleistozäne Eiskomplex mit großen syngenetischen Eiskeilen und siltig-sandigem Sediment. Ein 2 m mächtiger holozäner Horizont aus torfreichen, siltigen Sedimenten überlagert teilweise den Eiskomplex. Zwei weitere holozäne Subeinheiten können unterschieden werden: Thermo-Erosionstäler und die Flussaue. Erste Interpretationen zeigen, dass sich die Ablagerungsbedingungen von einem eher fluvial geprägten Regime zu alluvialen Verhältnissen während des Spätpleistozäns hin zu einer von Thermoerosionserscheinungen geprägten Umwelt im Holozän verändert haben.

Erste Ergebnisse zeigen, dass das Untersuchungsgebiet aktuell von relativ hohen Wintertemperaturen bestimmt ist, die während des gesamten Holozäns nicht erreicht wurden. Grundlage für diese Annahme ist die Isotopenzusammensetzung rezenter Eiskeile: die schwerste im Vergleich zu allen Eiskeilen des Profils (-21,9 ‰ $\delta^{18}O$). Während des gesamten Holozäns herrschten generell ähnliche, wenn auch leicht kältere Winterbedingungen. Pleistozäne Eiskeile lassen sich hingegen von holozänen Eiskeilen klar unterscheiden, da sie im Mittel ~5 ‰ niedrigere $\delta^{18}O$-Werte aufweisen - ein Indikator für deutlich kältere Wintertemperaturen. Die Eiskeile des Eiskomplexes bilden in ihren Isotopenzusammensetzungen zwei Cluster. Während das eine Cluster auf Phasen mit sehr niedrigen Wintertemperaturen deutet ($\delta^{18}O$ im Mittel um -32 bis -30 ‰), zeigt das andere Cluster weniger kalte Bedingungen ($\delta^{18}O$ im Mittel um -27 ‰ am Top des Eiskomplexes) und könnte den generellen Erwärmungstrend zum Holozän widerspiegeln. Die Eiskeile des Torf-Sand-Komplexes zeigen eine extreme Variabilität in der Isotopenzusammensetzung ($\delta^{18}O$ = -30 bis -22 ‰). Ob es sich hierbei allein um Wintertemperaturen-Schwankungen handelt, wird noch im Detail untersucht. Die liegenden Sande repräsentieren eine Phase, die durch niedrige Temperaturen und eine geringe Klimavariabilität während der Wintermonate charakterisiert ist ($\delta^{18}O$ um -29,5‰).

P 49

Late Pleistocene and Holocene Environmental Changes in NW Spitsbergen – evidence from lake sediments

MÄUSBACHER, ROLAND, KLAAS V. D. BORG, GERHARD DAUT, ERNST KROEMER, JENS MÜLLER & JOHN WALLNER
Institute of Geography, University, Jena
crm@geogr.uni-jena.de

Late Pleistocene and Holocene Environmental Changes in NW Spitsbergen – evidence from lake sediments: - Subbottom profiling and coring in the two proglacial lakes Varfluesjoen and Vogtvatnet (NW-Spitsbergen, Andréeland) show a continuous record of lacustrine sediments underlain by marine sediments and finally till/bedrock forming the base. The sediment source for the marine sedimentation in the lake basins is primarily found in the inner fjord areas of Wood- and Wijdefjord whereas the lacustrine sedimentation is fed by the local tributary.

According to ^{14}C data, sedimentation in the lake basins starts around 12.0 ka BP in both investigated lakes. The separation of the lake basins from the Fjords, marked by the marine – lacustrine boundary in the sediments, happened around 9.7 ka BP in Varfluesjoen and around 7.9 ka BP in Vogtvatnet. This difference in time is explained by different elevations of the basin thresholds. According to this difference of the two near by situated lakes an approx. relative uplift rate of 1,7 cm/a can be calculated for this timespan for the northern Andréeland area.

^{14}C data show that the sedimentation in the lake basins starts after deglaciation at 12.0 ka BP. The sedimentary record shows in both lakes at least one prominent glacier readvance around 8.0 ka BP and several younger minor glacier fluctuations. Older Late Glacial readvances of the glaciers where not detected in the lake basins. Further marine ingressions after separation from the fjordsystem where only detected in Vogtvatnet, indicating only minor changes in relative sea level since the Boreal.

S I

Die Paläoumweltgeschichte des Nordpolarmeeres seit dem Miozän: Neue Ergebnisse aus ODP/IODP Bohrungen

MATTHIESSEN, JENS, RÜDIGER STEIN & LEG 302 SCIENCE PARTY
Alfred-Wegner-Institut, Bremerhaven
jmatthiessen@AWI-Bremerhaven.DE

Durch Bohrungen, die im Rahmen des internationalen ODP/IODP Programmes im Jahre 1993 und 2004 ("ACEX") durchgeführt wurden, wurden erstmals ungestörte Sedimentkerne gewonnen, die die Entwicklung der Paläoumweltbedingungen im Nordpolarmeer seit dem frühen Miozän nahezu kontinuierlich dokumentieren. Bisher standen überwiegend kurze (<10m) Sedimentkerne zur Verfügung, die ausschließlich das jüngste Quartär umfassen und einen detaillierten Einblick in die Paläozeanographie und die Vereisungsgeschichte der letzten 200000 Jahre geben. Damit fehlten bisher für das globale Klimaverständnis wichtige Erkenntnisse aus den hohen nördlichen Breiten über die paläozeanographische Entwicklung des Nordpolarmeeres während der globalen Abkühlung im Neogen und Quartär, während des Beginns der Hauptvereisungen auf der nördlichen Hemisphäre und den Glazial-/Interglazialzyklen im Pleistozän. Insbesondere die Entstehung und zeitliche Veränderlichkeit der arktischen

Packeisdecke ist weitgehend unbekannt. Im diesem Vortrag werden die ersten Ergebnisse zur Paläozeanographie des Nordpolarmeeres und der Entwicklung der kontinentalen Vereisungen seit dem Miozän vorgestellt, die durch Untersuchungen an den Bohrungen auf dem Yermak Plateau und dem Lomonosov-Rücken gewonnen wurden.

P 47

Bestimmung von hochgenauen, GPS-basierten Höhenänderungen im Bereich der Antarktischen Halbinsel

MAYER, MICHAEL & BERNHARD HECK
Geodätisches Institut, University, Karlsruhe
mmayer@gik.uni-karlsruhe.de

Unter der Schirmherrschaft des SCAR (Scientific Committee on Antarctic Research) und gefördert durch das Bundesministerium für Bildung und Forschung in den Jahren 1995 und 1998 wurden umfangreiche GPS-Messungen im geodynamisch hochaktiven Bereich der Antarktischen Halbinsel durchgeführt. Hierdurch wurde der Anstoß zur Untersuchung der verschiedenen Einflussfaktoren auf GPS-Beobachtungen gegeben, die mit dem Ziel ausgeführt wurden, sowohl horizontale als auch vertikale Bewegungen aufzudecken.
Es werden die Ergebnisse aktueller Arbeiten zur Gewährleistung einer hochgenauen Lösung v.a. die Höhenkomponente betreffend vorgestellt, ebenso die daraus resultierenden Höhenänderungsraten.

P 45

Kooperationen zwischen dem Geodätischen Institut der Universität Karlsruhe (TH) und dem Ukrainian Antarctic Centre

MAYER, MICHAEL (1), BERNHARD HECK (1), GENNADI MILINEVSKY (2) & RUDOLF GREKU (3)
(1) Geodätisches Institut, University, Karlsruhe
(2) Ukrainian Antarctic Center, Kiew, Ukraine
(3) Institute of Geological Sciences, National Academy of Sciences, Kiew, Ukraine
mmayer@gik.uni-karlsruhe.de

Begründet durch Aufenthalte von Mitarbeitern des GIK (Geodätisches Institut, Universität Karlsruhe (TH)) auf der Ukrainischen Station Vernadsky der Antarktischen Halbinsel entwickelte sich eine fruchtbare Zusammenarbeit sowohl im logistischen und organisatorischen Bereich als auch - v.a. forciert durch gegenseitigen Datenaustausch – auf wissenschaftlichem Sektor. Das präsentierte Poster stellt aktuelle Arbeiten des GIK vor, die Daten, die innerhalb der antarktischen Sommermonate Januar und Februar der Jahre 1998-2004 erfasst wurden, nutzen. Im Speziellen werden aktuelle Resultate vorgestellt, die einerseits auf GPS-Beobachtungen andererseits auf meteorologischen Oberflächendaten basieren. Diese Arbeit ist integriert in einen Forschungsschwerpunkt des GIK, der in der Verbesserung der geotektonischen Modellbildung für den Bereich der Antarktischen Halbinsel unter Verwendung von satellitengeodätischen Methoden (GPS) besteht. Dabei ist es sowohl notwendig die GPS-Modellbildung stetig zu validieren, was bspw. durch meteorologische Beobachtungen erfolgen kann, als auch bisher unberücksichtigte GPS-Beobachtungen zur Stützung und Verbesserung existenter Bewegungsmodelle zu verwenden.

WS
Environmental impacts of polar tourism

MAYER, MICHAELA
Maritime Institute of the University of Applied Science, Bremen
mayer@maritimes-institut.de

Polar tourism has increased during the last decades rapidly. This presentation shows the development of polar tourism in numbers, growing infrastructure, cumulative impacts and future trends. Polar tourism has already caused some environmental changes, and further changes are expected when tourism keeps growing or accidents will happen. The capability of environmental impact of different touristic activities will be evaluated. The talk will also point out management recommendations for a co-existence of tourism and environment.
The presentation will be the draft of the chapter "Impacts of tourism in Polar regions" for the new book of the series "Alerts from ... Polar regions" by Dr. J.Lozán. It is open to suggestions for improvement for the book contribution.

S X
International continental deep drilling in the El'gygytgyn Crater, Northeastern Siberia - past activities and future prospects

MELLES, MARTIN (1), OLAF JUSCHUS (1), FRANK NIESSEN (2) & GEORG SCHWAMBORN (3)
(1) Institut für Geophysik und Geologie, University Leipzig
(2) Alfred-Wegner-Institut, Bremerhaven
(3) Alfred-Wegner-Institut, Potsdam
melles@rz.uni-leipzig.de

Lake El'gygytgyn, located in central Chukotka, NE Russia, is a 3.6 million year old impact crater lake with a diameter of 12 km and a water depth of 170 m. During the last years the sedimentary record of the lake has become a major focus of multi-disciplinary multi-national paleoclimatic research and is now a world-class target for deep drilling. A full-length sediment core would yield a complete record of Arctic climate evolution, back one million years prior to the first major glaciation of the Northern Hemisphere. Geomorphological evidence from the catchment suggests that the crater was never glaciated during the entire Late Cenozoic. A 12.9 m long sediment core retrieved from the deepest part of the lake in 1998 revealed a basal age of approx. 250 ka, confirmed the lack of glacial erosion, and underlined the sensitivity of this lacustrine environment to reflect high-resolution climatic change. A 16.7 m long sediment core taken in 2003 confirms the reproducibility of the record and dates to nearly 300 ka. The first single channel seismic survey in 2000 and multi-channel seismic surveys in 2003 have now been processed, suggesting a depth-velocity model of brecciated bedrock overlain by a suevite layer, in turn overlain by two undisturbed lacustrine sedimentary units up to 400 m in thickness. The expedition in 2003 included modern process studies, geomorphic and permafrost studies of lake and river terrace stratigraphies, additional lake sediment coring and some of the first permafrost coring. Two workshops in 2001 and 2004 provided the scientific framework for the synthesis of all available data.
In Jan 2005 a full proposal was submitted to the International Continental Drilling Program (ICDP). The proposal requests funds for a major drilling campaign in the El'gygytgyn Crater in spring 2007. Our goal is to collect the longest most unprecedented record of climate change in the terrestrial arctic for comparison with lower latitude marine and terrestrial archives of

hemispheric and global climate evolution. Coring objectives include replicate cores of 630 m length to retrieve a continuous paleoclimate record from the deepest part of the lake and into the underlying impact breccias and bedrock. Studies of the impact rocks offers the planetary community with the opportunity to study a well preserved crater uniquely found in igneous rocks like those on Mars. One additional core to ca. 200 m into permafrost from the adjacent catchment will allow us to test ideas about arctic permafrost history and sediment supply to the lake since the time of impact.

P 74

Geowissenschaftliche Anwendungen eines neuen Forschungsflugzeuges in der Antarktis

MEYER, UWE (1), DANIEL STEINHAGE (2), MIRKO SCHEINERT (3), UWE CASTEN (4), GERT BOEDECKER (5) & JÖRN LAUTERJUNG (6)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) Alfred-Wegner-Institut, Bremerhaven
(3) University, Dresden
(4) Institut für Geologie, Mineralogie und Geophysik, University, Bochum
(5) Bayerische Kommission für die Internationale Erdmessung, Bayerische Akademie der Wissenschaften, München
(6) GeoForschungsZentrum, Potsdam
mikro@ipg.geo.tu-dresden.de

Für die Atmosphärenforschung und Erdbeobachtung wird in Deutschland derzeit ein Forschungsflugzeug konzipiert, das die Bezeichnung "High Altitude and Long Range Research Aircraft" (HALO) trägt. Dabei soll die wissenschaftliche Nutzung auf eine breite interdisziplinäre Basis gestellt werden. HALO soll deshalb folgenden Anforderungen genügen: Reichweite bis 8000 km für interkontinentale Einsätze, Gipfelflughöhe bis 15 km zum Erreichen der oberen Troposphäre bzw. der unteren Stratosphäre, Nutzlast bis 3 Tonnen bei entsprechender Nutzfläche zum Einrüsten komplementärer Instrumentierung.

HALO wurde primär durch die Atmosphären- und Klimaforschung initiiert.Aufgrund der genannten Basisanforderungen stellt HALO aber auch für die geowissenschaften eine äußerst attraktive Plattform dar. Der Beitrag soll den gegenwärtigen Stand des Projektes HALO umreißen. Aus der Sicht der Geowissenschaften wird die notwendige Basisinstrumentierung diskutiert, die u.a. Fluggravimeter, Radar- und Altimetersysteme umfassen soll. Aufgrund der extrem langen Reichweite ist HALO insbesondere für wissenschaftliche Projekte in ausgedehnten unzugänglichen Gebieten wie der Antarktis geeignet. Die Herausforderungen und Möglichkeiten eines solchen Einsatzes werden aufgezeigt.

P 68

Antarctic Peninsula troposphere-stratosphere-ionosphere coupling and conjugate events investigation

MILINEVSKY, GENNADI, ALEXANDER BILOGOLOVKIN & ASEN GRITSAI
Ukrainian Antarctic Center, Kyiv, Ukraine
science@uac.gov.ua

Researches of troposphere-stratosphere-ionosphere coupling are based on the idea of the strong influence of the long- and short-term solar activity variations on the polar terrestrial climate and the asymmetry in the energy deposition from the magnetosphere into the polar ionospheres. The study of upper atmosphere in both hemispheres is necessary to better understand various physical mechanisms responsible for the energy transfer from the Sun into atmosphere and ionosphere as well as reverse flux from troposphere to geospace.

The solution of the problem of energy exchange between neutral atmosphere and geospace plasma is need in study the natural troposphere energy sources (strong weather fronts, cyclones) and industrial electro-magnetic (EM) pollution from Earth surface to geospace. A corresponding work must promote modeling space weather on satellite heights and earthquake prediction using ionosphere parameters changes. A determinative significance of Antarctic Peninsula is caused by following features: (1) Antarctic Peninsula is situated near an extremely cyclonic active region - Drake Passage, (2) only this region in Antarctica is magnetically conjugated to industrial area in Northern hemisphere, and (3) this region contains many Antarctic stations which are good equipped by devices to study weather and climate, ozone layer, ionosphere and magnetic field.

Last years weather observations at Vernadsky station show that up to 60 atmospheric strong weather fronts swept over Antarctic Peninsula during year. Therefore this region is the most appropriate to study ionosphere impact of troposphere induced atmospheric gravity and planetary waves (AGW, PW). These features produced the scientific goal of the project APTIC (Antarctic Peninsula troposphere-ionosphere coupling) which serve to explore the response of the ionosphere to strong weather systems sweeping the Antarctic Peninsula sector and identify energy transfer mechanisms.

Main scientific objectives of the project are (1) study of the traveling ionosphere disturbances (TID) within F2-layer heights; (2) study of macroscale atmosphere wavelike processes: tides, planetary waves and their image in ozone layer; (3) study of the impact of troposphere disturbances to ozone layer and ionosphere; (4) search the possible influence of sharp changes and longtime trend in ozone layer to troposphere and climate; (5) study of the spatial-temporal structure of frontal weather systems, their moving velocity and direction; (6) search of the time variations (shift) in the geomagnetic substorm development using long-distance chain (Frei-Palmer-Vernadsky-Rothera).

The results of research of the energy exchange processes between lower (troposphere) and upper atmosphere and EM impact of weather front (cyclone) on ionosphere over Antarctic Peninsula as well as in conjugate region (East coast of the USA) are discussed. Multipositional study of the powered atmosphere cyclone fronts on Antarctic Peninsula to ionosphere, magnetosphere and conjugate region using three (and more in future) automatic meteo-magnetic receivers is a new direction of research.

P 29

Environmental study of the Vernadsky Antarctic station area: approaches and application

MILINEVSKY, GENNADI (1), ALEXEJ ANDREEV, ALEXANDER ANDREEV & SERGEY SHNJUKOV
(1) Ukrainian Antarctic Center, Kyiv, Ukraine
(2) National University, Kyiv Ukraine
science@uac.gov.ua

Vernadsky Station area is a typical region of human activity in Antarctica. There are three kinds of suitable objects for its environmental pollution study: (1) plants, (2) dispersed sediments, (3) samples of biological origin. All of them are well explored, but the results are ambiguous. Therefore their application requires a new precision approach which must be based on a simple analytical package (XRF and XRD in our version).

Validity of the objects of the first type (moss and lichen samples) was investigated during step-by-step dry ashing experiment within the range of 100–1000 °C. Each step includes the weight loss (LOI) and element (Sr, Cu, Zn, Pb, Br etc.) content determination. Some important conclusions were derived from these data: (1) in all samples LOI increases with a minor element loss up to rational temperature of ashing (500 700 °C), (2) at this temperature a rapid loss of Br is occurred, (3) LOI values obtained at a higher temperatures are stable in a case of each sample but vary within the wide range (94.0-98.8 %) among the different ones, (4) element concentrations in the final ashes are on the crust clarke level. These results and XRD data testify to pollution of the samples by the natural dust mineral component (similar to sediments' constituents) that substantially defines whole-plant geochemistry.

As applied to objects of the second type a new technique for environmental geochemical investigations was designed. It uses the data on major element and mineralogical composition of sediments to calculate their individual trace element background level for each sample. As a result it allows eliminating the natural background variations caused by abmodality of sediment's lithology. The identity of the role of "lithological" factor for the objects of both types clear the way for their further joint application based on this approach.

The third object investigation is in the fields of toxicological studies of heavy metals concentration in samples of biological origin: samples of penguins' guano, feathers and remains. The XRF - a multi-element method of analysis with common detection limit 1 – 10 mkg/g for element with atomic number above 20 was used. The further development of investigations in this direction let us to understand the processes of elements migration in Antarctic ecosystem and to ascertain the genotype-dependant heavy metals accumulation in gentoo. The monitoring on the gentoo population state and their breeding dynamics at the Galindez Island and Petermann Island was established. Long-termed data on the most south population are important to keep vigilant watch on the possible changing their number as an indicator of the state ecological system of Antarctica. Data obtained during the project realization now are under importing to regional GIS and will be one of corner stones for development program of long termed ecological monitoring (LTEM) of Ukraine in the Antarctic Peninsula area.

The work was supported by grant INTAS-2001-0517

S VI

The Livingston Island Paradoxon: terrane tectonics at the north-western margin of the Antarctic Peninsula

MILLER HUBERT (1) & CHRISTO PIMPIREV (2)
(1) Department für Geo- und Umweltwissenschaften, Sektion Geologie, University, München
(2) Faculty of Geology and Geography, University, Sofia, Bulgaria
h.miller@lmu.de

Livingston Island, part of the South Shetland Islands, is known for two particular stratigraphic units:

- The **Miers Bluff Formation** on Hurd Peninsula, a siliciclastic, turbiditic series of formerly supposed Triassic age, comparable with the Trinity Peninsula Group of the Antarctic Peninsula. Since long time, most of the Miers Bluff Formation was being recognized as the overturned limb of a great fold. Pelitic parts are sometimes folded in m-scale. The Miers Bluff Formation shows incipient metamorphism, fossil evidence was scarce and not favourable for stratigraphic evidence.
- The **Byers Group** on Byers Peninsula, a Late Jurassic to Early Cretaceous sedimentary and volcaniclastic succession of firstly deep, then shallow marine, and later continental facies. Strata dip gently, normal faults are the most prominent structures.

The lithologic and tectonic similarity of the Miers Bluff Formation to the mostly Triassic Trinity Peninsula Group easily allowed to consider the Miers Bluff Formation simply as an older basement to the younger Byers Group rocks. However, the findings of Late Jurassic and Late Cretaceous fossils within rocks of the Miers Bluff Formation destroyed this simple scheme. Both units are separated by only a small bay and by the central ice field of Livingston Island. No contact is visible. Nevertheless, facies and deformation style are completely different, whereas the age is the same. This means that the fault tentatively recognised between both units is of much higher importance than a simple normal fault.

Vaughan & Storey (2000) have mapped shear zones in southern parts of the Antarctic Peninsula, which define several "domains". We suppose that a similar domain boundary separates the Byers Group and the Miers Bluff Formation, adding a new aspect to the tectonic puzzle of the South Shetland and Elephant Islands.

Vaughan, A.P.M. & Storey, B.C. (2000): The eastern Palmer Land shear zone: a new terrane accretion model for the Mesozoic development of the Antarctic Peninsula. - J. Geol. Soc. London, 157: 1243-1256.

S XII

Schelfeismodellierung unter der Berücksichtigung von Scherbrüchen durch Eisströme

MOHRHOLZ, CHRIS-OLIVER & MARTIN A. LANGE
Institut für Geophysik, University, Münster
crmoho@earth.uni-muenster.de

In weiten Bereichen kann das Fließverhalten von Schelfeisen durch gängige Ansätze der Glazialgeophysik beschrieben werden. Um das komplexe Verhalten von Eisströmen und deren Einflüsse auf das Fließregime von Schelfeisen zu beschreiben, müssen jedoch weitere Überlegungen in eine Modellierung einfließen. So ist zu beobachten, dass sich in Bereichen mit hohen Geschwindigkeitsgradienten nahe der Aufsetzzone Scherbrüche bilden. Ihr Verlauf kann in schnell fließenden Gebieten bis zur Eisfront verfolgt werden und unterteilt ein Schelfeisgebiet in unterschiedliche Fließregime. Da aufgrund der schwierigen Zugänglichkeit solcher Gebiete so gut wie keine in situ Messdaten vorliegen, wird in unserer Arbeit eine numerische Möglichkeit aufgezeigt, Scherbruchzonen für die Schelfeismodellierung zu berücksichtigen. Durch diese Umsetzung ist es uns möglich die Berechnung des horizontalen Geschwindigkeitsfeldes einzelner Schelfeisbereiche von einander zu separieren. Vorgestellt wird eine Studie über die numerische Umsetzung an idealisierten Eiskörpergeometrien und Anwendung in realen Schelfeisregionen.

P 48

Morphometrische Klassifikation und räumliche Verteilung von Seen im Lena-Delta, NE-Sibirien (GIS- und Fernerkundungsanalysen)

MORGENSTERN, ANNE (1), GUIDO GROSSE (1), LUTZ SCHIRRMEISTER (1) & HARTMUT ASCHE (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) University, Potsdam
amorgen@awi-potsdam.de

Das Lena-Delta in der nordsibirischen Laptevsee ist mit einer Fläche von ungefähr 32.000 km² das größte Delta in der Arktis. Es befindet sich in der Zone des kontinuierlichen Permafrosts, ist aber auch von weitverbreitetem Thermokarst gekennzeichnet. Seit vielen Jahren gilt das Interesse russischer, in jüngerer Zeit auch deutscher Wissenschaftler (z.B. im Rahmen des vom BMBF geförderten Deutsch-Russischen Forschungsprojekts „System Laptev Sea 2000") der Untersuchung verschiedenster bio- und geowissenschaftlicher Fragestellungen in diesem Gebiet als Schnittstelle zwischen sibirischem Festland und der Laptevsee. Das Lena-Delta ist deutlich in einen aktiven Bereich im Osten sowie einen passiven im Westen unterteilt. Weiterhin wird eine Gliederung in drei Hauptterrassen vorgenommen, die sich in verschiedenen Zeitabschnitten seit dem Spätpleistozän herausgebildet haben. Dabei sind die erste und zweite Terrasse (Früh- bis Spätholzän) durch fluviatile Schüttungen der Lena enstanden. Die dritte Terrasse besteht aus Überresten einer spätpleistozänen Akkumulationsebene, die von der holozänen Deltaentwicklung umschlossen wurden. Als prägendes Landschaftselement treten neben ca. 800 Kanälen zahlreiche Seen im Delta auf. Diese haben für die Rekonstruktion der Umweltgeschichte des Gebietes, aber auch für die heutige Geomorphologie und Ökologie des Deltas große Bedeutung. Die Seen haben offensichtlich unterschiedliche Genesen, z.B. durch Thermokarst oder die Bildung von Totarmen. Viele Seen weisen eine deutliche Orientierung ihrer Längsachsen auf, was besonders auf der zweiten Terrasse deutlich wird. Für eine generelle Quantifizierung verschiedener Seentypen und die Untersuchung möglicher Genesevorstellungen wurden die Seen mit Methoden der Fernerkundung und räumlich-statistischer Analyse untersucht. Diese Ergebnisse sind weiterhin für die Bilanzierung von Methanemissionen im Lena-Delta von Bedeutung, da die verschiedenen Seentypen in unterschiedlichem Maße dazu beitragen. In diese Untersuchung wurden alle Seen >20 ha (über 2.600 Seen) einbezogen. Ihre Gesamtfläche beträgt ca. 1.865 km², was einem Anteil an der Deltafläche von etwa 6 % entspricht. Die Untersuchungen erfolgten in einem Geographischen Informationssystem (GIS) auf der Grundlage von LANDSAT-7 ETM+-Satellitendaten. Dies ermöglichte eine effektive Bearbeitung des ausgedehnten Untersuchungsgebietes. Die analysierten Parameter betreffen zum einen die Morphometrie der Seen wie Länge, Breite, Umfang, verschiedene Formindizes und Orientierung der Längsachse und zum anderen ihre räumliche Verteilung im Deltagebiet. Letzteres umfasst neben der geographischen Lage z.B. auch die Zugehörigkeit zu den geologisch-geomorphologischen Einheiten des Deltas. Darauf aufbauend wurde untersucht, ob es Abhängigkeiten der einzelnen Parameter untereinander gibt, um die Morphogenese der Seen genauer zu erklären. Ein besonderer Schwerpunkt der Analyse lag auf der Orientierung der Seen. Das Phänomen der orientierten Seen, welches in vielen arktischen Küstenebenen beobachtet wird, konnte bisher trotz jahrzehntelanger Forschung nicht vollständig geklärt werden. Es bestehen verschiedene Theorien über die Gründe der Orientierung, am häufigsten wird Wind als Hauptursache angenommen. Um diese Hypothese für das Untersuchungsgebiet zu testen, wurden die morphometrischen Daten mit regionalen Klimadaten verknüpft.

S XI

Microbial Life under Extreme Environments of Permafrost: Tolerance Limits of Methanogenic Archaea as Keystone Organisms for the Investigation of Extraterrestrial Life

MOROZOVA, DARIA & DIRK WAGNER
Alfred-Wegner-Institut, Potsdam
dmorozova@awi-potsdam.de

Extraterrestrial Permafrost is a common phenomenon within the solar system and the main centre of extraterrestrial research in Astrobiology, with focus on searching for extraterrestrial life. Mars is considered as one of the most similar planets to Earth of our solar system, even if it is characterized by extreme coldness and dryness today. When living conditions on Mars were similar to that on early Earth, the evolution of microorganisms had already started on Earth. Prokaryotic microfossils, found in early Archaean rocks, implies that the earliest life forms between 3.5 – 3.8 Ga ago. Therefore it is legitimate to assume that life also emerged on early Mars as on early Earth.
The newest ESA Mission to Mars (Mars Express) determined water on Mars, which is fundamental requirement for life initiation. Further investigations for the first time demonstrated the presence of methane in Mars atmosphere, which could be only of active volcanic or biological origin. This finding may have important implications for the possibility that microbial life could exist on Mars.
Martian life, if present, must have adapted to drastically changing environmental conditions. One possibility of survival might be subsurface lithoautotrophic ecosystems, comparable to permafrost on Earth, in which microorganisms have survived for million years.
Methanogenic Archaea, which colonised terrestrial permafrost, are highly specialized organisms from the view point of metabolism. The capability these organisms to lithoautotrophic growth, whereby methane is gained by the oxidation of hydrogen and carbon dioxide is the only carbon source under strictly anaerobic conditions, tolerance to low temperatures and survival under extreme conditions of permafrost for several millions of years make methanogens to one of the most suitable keystone organism for the investigation of possible Martian life.
The goal of this work was to examine the tolerances of these organisms under unfavourable life conditions of terrestrial or extraterrestrial permafrost. The borders of growth influenced by desiccation, temperature extremes and high salt concentration were analyzed for the organisms in pure cultures as well in their natural environment of Siberian permafrost.
The investigation area is situated on Samojlov Island in the Lena Delta, Siberia. The influence of high salt concentrations in combination with low incubation temperatures was determined. Methanogenic Archaea revealed methane production under in situ conditions (at temperatures between 0 and 2°C) and salt concentration up to 6 mol with a rate about 0.02-0.09 nmol CH4 h-1 g-1. Further laboratory tests with isolated cultures confirm those results. Incubation of pure cultures with different salt concentration (from 0,1 to 6 mol) showed a significant methane production rate even at salt concentration 6 mol (0.6-1.3 nmol CH4 h-1).The ascendancy of temperature on the experiments was also analyzed. Methanogenic Archaea showed better adaptation to high salt concentration at low temperatures,with methane production rate 0.9-1.3 nmol CH4 h-1 as at incubation temperature 28°C (0.59-0.7 nmol CH4 h-1). Consideration of methanogenic Archaea natural environments makes those results conclusive.

P 19

Late Pleistocene and early Holocene vegetation and climate history in the Verkhoyansk Mountains (Yakutia)

MÜLLER, STEFANIE (1), ANDREI ANDREEV (1), BERNHARD DIEKMANN (1) & WOLFGANG ZECH (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) Lehrstuhl Bodenkunde und Bodengeographie, University, Bayreuth
smueller@awi-potsdam.de

Despite increased paleoenvironmental studies in Northern Yakutia (ANDREEV et al. 2002 and references therein), little is known of past climatic and environmental fluctuations during the Middle and Late Weichselian (Karginsky interstadial and Sartan stage). New pollen and radiocarbon data from the Verkhoyansk Mountains document the Late Pleistocene and early Holocene environmental history of the area.
The climate of the region is extreme continental and arid. In Yakutsk the absolute minimum temperature reaches -64°C, absolute maximum +38°C, and annual precipitation is 180-250 mm. But more than 350-400 mm vapors from June to September (GAVRILOVA 1973). Today larch (*Larix dahurica*) forest (taiga) with herbs dominate the vegetation. Few other trees (*Betula pendula, Pinus sylvestris, Picea obovata*) and shrubs (*Alnus fruticosa, Pinus pumila, Betula nana*) also grow in the area. The samples came from a site at the Tumara River valley (63'N, 130'W).
The pollen spectra show that open tundra-like Poaceae and Cyperaceae associations with some other herbs (Caryophyllaceae, Ranunculaceae, and Asteraceae) dominated the area about 50-40 14C ka ago. Steppe-like communities with Artemisia, Cichoriaceae, Thalictrum, and rare shrubby tundra communities with Salix and Betula sect. Nanae were also present in the vegetation cover. An increase of Chenopodiaceae pollen and Equisetum spore contents, which are mainly pioneer species on disturbed soils, and the presence of charcoal particles in the sediments dated ca 48-50 14C ka most likely reflect fire activity at that time.
Higher content of Salix pollen, Polypodiaceae and Lycopodium spores during ca 48-30 14C ka may reflect climate conditions warmer and wetter than during the previous interval. A find of Linum perenne pollen grains indicate the existence of dry steppe habitats in the area as well. The presence of this species reflects that temperatures were at least 12.5°C during the growing season. This relatively warm interval corresponds well with the Karginsky Interstadial (Stage 3) recorded in Siberia.
Spores of *Selaginella rupestris*, an indicator of very dry environment, are common in the spectra at around 23 14C ka. A decrease of pollen and spores concentration reflects further deterioration of environmental conditions. A decrease of Salix pollen content and the presence of Artemisia, Cichoriaceae, Thalictrum pollen and an increase of the charcoal particle content also point to rather dry climate conditions. This relatively cold and dry interval corresponds well with the Sartan stadial (Stage 2) recorded in Northern Eurasia. During the Last Glacial Maximum (14C dated at about 19 ka BP) pollen concentration significantly decreased. Many pollen taxa completely disappeared from the spectra pointing to an extremely severe environment.
Higher tree pollen contents (mostly Salix and Betula sect. Albae) at the Late Glacial/early Holocene transition (10-9 14C ka) reflect rather favorable climate conditions for the development of taiga vegetation during that interval. This data are in good agreement with other early Holocene pollen records from Northern Yakutia (e.g. PISARIC 2001, ANDREEV 2002).

WS

Mapping of traffic activities on Fildes Peninsula and Ardley Island – methods and results

MUSTAFA, OSAMA, CHRISTINA BÜßER, HANS-ULRICH PETER & SIMONE PFEIFFER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
com@uni-jena.de

To assess the human impact on the environment of Fildes Peninsula and Ardley Island, human activities have to be quantified. The most obvious human impacts on Fildes and Ardey are traffic activities. Therefore land, air and sea traffic around the Fildes Peninsula was monitored during both field seasons from December to March by measuring frequencies and localities.

Land traffic occurs in summer mainly on marked driveways between the stations but sometimes off-road too. There are heavy vehicles used for fuel and cargo transports or construction work as well as cars used by station personnel and visitors. The spatial extent of land traffic was mapped by GPS-measurement of vehicle tracks while the frequency of traffic was assessed by counting.

The airstrip 'Tte. R. Marsh' is one of the most important air-traffic junctions in the Antarctic. Therefore it attracts a huge number of logistic and tourist flight operations of aeroplanes and helicopters. The air-traffic routes where monitored by help of a Range-Finder-GPS-System. A number of overflights of ASPA 150 'Ardley Island' by aeroplanes and helicopters were observed below the altitude of 300 m contrary to the guidelines of the Management Plan of ASPA 150.

Because of King-George-Islands position near the tip of the Antarctic Peninsula and the existence of four permanent stations at Fildes as well as the airstrip, many ships visit the Maxwell Bay in summer. Supply vessels made up the majority of more than fifty entrances to the bay during each summer season, followed by tourist vessels, research and military ships and yachts. The anchorage grounds were measured by help of a Range-Finder-GPS-System too.

P 35

Environmental monitoring in the Antarctic by using a Rangefinder-GPS-System for positioning of distant and fast moving objects

MUSTAFA, OSAMA (1), DORIS BERTGES (2), MARTIN BERTGES (2) & HANS-ULRICH PETER (1)
(1) Polar & Bird Ecology Group, Institute of Ecology, University, Jena
(2) Vermessungstechnik, Neunkirchen a. P.
com@uni-jena.de

In the frame of the research project "Risk assessment for the Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas" ship anchorages and flight operations close to an ASPA were observed by using a combined System of GPS, rangefinder and mapping software. The poster shows first fieldwork results and experiences.
A GPS receiver gives the possibility to get absolute coordinates for objects on any position on or above earth's surface. It is only necessary to take the antenna of the receiver to that object. But in some cases this is not possible, because the object is inaccessible. Using a laser rangefinder relative coordinates of a visible, but distant object can be determined. To get absolute coordinates it is necessary to set this relative coordinates against the position of the instrument.

Our system combines a single frequency GPS receiver (Novatel smart antenna™), a laser rangefinder with binoculars, inclinometer, digital compass and data interface (Leica Vector™ Aero), and a software for mapping (Esri ArcPad™ with special application by Dr. Bertges) or logging (Dr. Bertges NmeaLog), that allows absolute positioning and continuously tracking of distant and fast moving objects.

P 78

Diversity of periglacial environment and changes in geomorphological zonality of the oases in the King George Island

NAGY, BALÁZS, BALÁZS KOHÁN, & ÉVAN BUGYA
Department of Physical Geography, Univerity, Budapest, Hungary
nagy.balazs@antarctica.hu

Spatial regularities of periglacial forms and processes, the evolution of ice-free surfaces were the focus of geomorphological investigations in the oases of King George Island during the austral summers of 1998, 2003 and 2005. The characteristics of the oasis located between Admirality Bay and Warsawa Icefield and the oases of Barton Peninsula were compared using GIS methods. In these closely located areas significant differences were revealed considering the occurrence of periglacial environment and the location of periglacial processes. A very distinct – though in some places mosaic-like – geomorphological zonality evolved in the oasis near Admirality Bay. Borderlines of zones proved to be in a definable movement. The permafrost has become segregated and intensive fluvial evolution has started to take place in that older oasis. The presence of ice-cored moraines and rock glacier evolution are indicators of recent deglaciation, therefore are highly significant.
On the Barton Peninsula apart from gravitational mass movements the dominant processes of surface evolution are formation of stone circles and polygons. The permafrost is continuous, the active periglacial processes appear from the coastal marine beaches to the highest ice-free surfaces – without characteristic zonality. Most of the differences can be explained by the younger deglaciation and the aspect of the westerly exposed Barton Peninsula, where a cooler, windier oasis exists.
Diversity of forms and processes make oases to be such different environments that their characteristics and processes can often be interpreted only as local complex of phenomena. Regional conclusion can only be made with the synthesis of different oases'.

P 77

Recent sedimentation, weathering and patterned ground in the oases of the King George Island

NAGY, BALÁZS (1), GERGELY SURÁNYI (2), TIBOR NÉMETH (3), ZOLTAN SZALAI (4) & ÉVAN BUGYA (1)
(1) Department of Physical Geography, University, Budapest, Hungary
(2) Department of Geophysics, University, Budapest, Hungary
(3) Geochemical Laboratory, Hungarian Academy of Sciences, Budapest, Hungary
(4) Geographical Research Institute, Hungarian Academy of Sciences, Budapest, Hungary
nagy.balazs@antarctica.hu

The investigations of the surface sediments of the King George Island's oases focused on the speed and rate of sedimentation, the activity of chemical weathering and the connections of these processes with the formations of patterned ground.
The research areas are ice-free surfaces with different location, evolution and recent geomorphological characteristics: the Barton Peninsula and the oasis between the Admirality Bay and the Warsaw Icefield. The samples were taken during the Hungarian field research activities in 1998, 2003 and 2005. The sample sites are located on three different surface types: plain surfaces (raised marine beaches, plateaus) with poligonal pattern or without any pattern, gentle slopes with periglacial mass movements, small hollows and basins (temporary lake-basins). These surfaces do not have – not even the immediate vicinity of ice cap-margin – recent morainic characteristics.
On the Barton Peninsula the average, well weathered sediment thickness is 50 cm, the area has well developed stone circle and polygon systems. These surfaces are dominated by high content of clayey material. The wet hollows also have fine sediments. The hollows have special attention because of high sedimentation rate, the polygonal surfaces bear significance because of strong recent chemical weathering which indicates that it might be postglacial clay-evolution on previous interglacial sediments. The active layer thickness is 40-60 cm, and all of the plain surfaces are covered by polygonal forms.
The older oasis in the margin of the Admirality Bay – divided into distinct geomorphological zones – has extended, 1-3 m thick sediment coat. The active layer thickness is 100-200 cm, but the permafrost is discontinuous. The source region and circulation of sediment particles were detected by trace-element analyses, as well as the development stages of the polygonal forms. The patterned grounds occur only in areas where the postglacial sedimentation and weathering produced fine, clayey material. The wide and extent raised marine beaches in the altitude of 50-60 meters are without stone circles and polygons, the clay originates from the weathering of glacial sediments (tillits) and many of these relatively warm and dry terraces lost their ice content already.

P 85

The French-German Arctic Research Base in Ny-Ålesund, Spitsbergen

NEUBER, ROLAND (1) & FRANCK DELBART (2)
(1) Alfred-Wegner-Institut Potsdam
(2) IPEV, Gestion des VCAT, Plouzané/France
neuber@awi-potsdam.de

The German Alfred-Wegener-Institut (AWI) and the French Institut Polair Paul Emil Victor (IPEV) have merged their research stations on Svalbard into a joint Arctic Research Base, located in Ny-Ålesund, Spitsbergen (79°N, 12°E). This merger comprises

- Joint announcements of research opportunities
- Joint evaluation of research proposals by a French-German Advisory Board
- Establishment of joint research projects
- Common utilisation of personnel, logistics, and instrumentation
- Common project administration and on-site management
- Joint representation of the base
- Streamlining of logistical and funding matters

The Joint French-German Arctic Research Base has a two-fold task. It is a general platform for short, medium, and long term research projects in the fields of Atmospheric Sciences, Geo-

Sciences, Marine, and Terrestrial Biology. On the other hand, it comprises a state of the art, dedicated atmospheric observatory for Arctic meteorology, atmospheric chemistry and stratospheric monitoring (ozone layer and related research). Beside passive and active remote sensing instrumentation, a modern balloon launch facility is included. The available scientific instrumentation from Alfred-Wegener-Institut, Institut Français Polair Paul Emil Victor, and Univ. of Bremen allows determining type and concentration of trace gases in the troposphere and stratosphere, as well as atmospheric aerosols. Regular meteorological balloon soundings measure the vertical distribution of temperature, water vapour pressure and ozone concentration. In addition the Joint French-German Arctic Research Base offers a range of research facilities and laboratories for scientists in the disciplines of biology, chemistry, geophysics, and atmosphere physics. The station comprises several buildings, offering accommodation for up to 16 people, laboratories and offices. In addition an external clean air station (Corbel-Station) is available outside from the village of Ny-Ålesund. There is one scientist as station leader and one engineer permanently at the station, which are supported by additional personnel from AWI and IPEV during peak periods.

Details of the base are available from http://www.ipev.fr/awipev

The new International Arctic Marine Laboratory in Ny-Ålesund is available for scientific use since June 2005. It is a state-of-the-art laboratory for research in marine ecology, physiology, biochemistry, as well as some physical sciences like oceanography, marine geology and ice physics. The laboratory is constructed with smaller rooms and laboratories with equipment for different purposes. See http://www.kingsbay.no/english/marine_lab.htm

Project proposals from Germany for the French-German Arctic Research Base are welcome until October 2005 for the season April 2006 – March 2007.
For more information visit
http://www.awi-potsdam.de/www-pot/koldewey/practical_info.html
or contact awipev@awi-potsdam.de

S XII
"Superimposed ice" formation on summer sea ice

NICOLAUS, MARCEL (1), CHRISTIAN HAAS (1), SASCHA WILLMES (2) & ANJA BATZKE (3)
(1) Alfred-Wegner-Institut, Bremerhaven
(2) University, Trier
(3) Institut für Chemie und Biologie des Meeres, University, Oldenburg
mnicolaus@awi-bremerhaven.de

Sea ice plays a key role within the global climate system. It covers ~ 7% of the Earth surface and possesses the strongest seasonal cycle. A snow cover on top even amplifies the importance of sea ice in the coupled atmosphere-ice-ocean system, because it dominates surface properties, exchange processes, and the (surface) energy balance (incl. albedo).
Several observations of summer sea ice and its snow cover revealed the formation of "superimposed ice" and a gap layer underneath in both polar regions during the spring/summer transition. These features were found to be associated with high standing stocks of algae and may prolong the live time of the ice cover due to a different melting (point) temperature of the (fresh) "superimposed ice" compared to the (salty) sea ice. The formation of superimposed ice

may also be regarded as a concurrent process to the characteristic occurrence of melt ponds on summer Arctic sea ice.
Field measurements on Arctic and Antarctic sea ice were performed during summer to describe snow metamorphism, melt processes and the re-freezing of melt water within the snow cover and on top of the original sea ice surface. The presentation is focused on results from Ice Station Polarstern (ISPOL), an Antarctic drift station during austral spring/summer 2004/05, where several snow and sea ice parameters, e.g., thickness, temperature, density, stratigraphy, and wetness, as well as additional meteorological data were measured. Crystallographic ice lab analyses allow the derivation of micro-scale properties as grain size, density, and porosity of "superimposed ice".
The formation and layer thickness of "superimposed ice" may be quantified from our field measurements in combination with numerical studies. A one-dimensional snow cover model (SNTHERM) was modified for sea ice purposes and forced with different meteorological data sets. From this, our observations may be extended to larger/regional scales, and the role of superimposed ice, as part of the atmosphere-sea ice-ocean system, may be derived for both polar regions.

S X
Seismic investigation of 3.6 Mio year old impact crater Lake El'gygytgyn, NE Siberia: Brecciated bedrock, central uplift and up to 370m of lacustrine sediments

NIESSEN, FRANK (1), CATALINA GEBHARDT (1) & CONRAD KOPSCH (2)
(1) Alfred-Wegner-Institut, Bremerhaven
(2) Alfred-Wegener-Institute, Potsdam
fniessen@awi-bremerhaven.de

Long (>100ka) records of climatic change from terrestrial environments in Siberia are rare but essential to improve our understanding of the Arctic's role in global climate dynamics. North-east Siberia provides a key area to study climatic teleconnections between the North Pacific oceanic system, climatic pattern over NE Russia, the Arctic Ocean and other climate forcing areas such as the North Atlantic and the Tropics. Lake El'gygytgyn, located in central Chukotka, NE Russia, was formed 3.6 million years ago by a meteorite impact and apparently escaped continental scale glaciations during the entire Quaternary. If so a full-length sediment core would yield a complete record of Arctic climate evolution, back one million years prior to the first major glaciation of the Northern Hemisphere. In order to test the potential of the lake for deep drilling, seismic investigations were carried out during two expedtions in 2000 and 2003 including single-channel, multi-channel and sonobuoy techniques.

Raytracing of the sonobuoy refraction data reveals a four-layer model of the lake that is interpreted as follows: (a) upper sedimentary unit, consisting of lacustrine muds with velocities of around 1500 m/s and a thickness of about 170 m, (b) lower sedimentary unit, consisting of lacustrine muds with velocities of around 1650 m/s and a thickness between 80 and 200 m, (c) fallback breccia with velocities of about 3000 m/s and a thickness between 50 and 300 m and (d) brecciated bedrock with velocities of > 3600 m/s. The brecciated bedrock forms a central uplift structure which is almost levelled by the overlying fallback breccia. The lower sedimentary unit drapes the smooth topography of the fallback breccia, whereas the upper sedimentary unit is almost flat.

Reflection seismic data indicate that the upper sedimentary unit is characterized by well stratified sediments, whereas the lower sedimentary unit is more massive. The upper well-stratified sediment unit appears undisturbed apart from intercalation with debris flows near the slopes. Based on extrapolation of sedimentation rates the entire Quaternary and possibly parts of the late Tertiary record are within the 170m thick unit one and the earliest history of the lake is in unit two. There is no evidence of glacial erosion in the sedimentary record. High-resolution 3.5 kHz profiles indicate sharp termination lobes of non-erosive debris flows in distal areas.

The character of the sediment fill suggests a high potential of the record for paleoclimate studies and deep drilling would offers opportunities of impact studies of the brecciated bedrock. The lake has been recognised as potential deep drilling location by the International Continental Drilling Program (ICDP).

P 44

Two ANDRILL Projects ready for deep drilling in the McMurdo Sound (Antarctica) in 2006 and 2007

NIESSEN, FRANK (1), MCMURDO ANDRILL SCIENCE IMPLEMENTATION COMMITTEE (2) & UWE NIXDORF (1)
(1) Alfred-Wegner-Institut, Bremerhaven
(2) ANDRILL Science Management Office, University, Lincoln, Nebraska, USA
fniessen@awi-bremerhaven.de

The McMurdo Sound region (Antarctica) lies at the juncture between components of the West Antarctic Rift system (Victoria Land Basin - VLB), the Transantarctic Mountains (TAM) and the Erebus Volcanic Province. Fault- and flexure-related subsidence associated with rifting and volcanic loading has provided accommodation space adjacent to the rising TAM. McMurdo Sound is also one of a limited number of locations that have been influenced by three significant components of the Antarctic cryospheric system: East Antarctic Ice Sheet (EAIS), Ross Ice Shelf/West Antarctic Ice Sheet (WAIS), and Ross Embayment sea-ice. The successful review of the ANDRILL International Science Proposal (AISP) allows ANDRILL to proceed with plans to drill two sites in the McMurdo Sound region in 2006 and 2007. The participating countries (share) of these two projects are Germany (6.5%), Italy (18.5%), New Zealand (25%) and the USA (50%). Several scientists and technicians from Germany were involved in pre-site surveys of the ANDRILL program and are expected to participate in the two drilling projects.

McMurdo Ice Shelf Project
The ANDRILL program will drill a stratigraphic hole from a platform located on the McMurdo-Ross Ice Shelf (MIS) c. 12 km east of Hut Point Peninsula, Ross Island, in the austral summer of 2006. The primary target for the MIS site is a body of Plio-Pleistocene glacimarine terrigenous, volcanic, and biogenic sediment that has accumulated in a flexural moat basin that surrounds the Ross Island volcanic complex. It is proposed that a single 1000 m deep drillcore be recovered from the bathymetric and depocentral axis of the moat in 900 m of water depth. A shallow sub-sea-floor core sampling effort at the MIS drillsite in 2003 recovered ~1 m of sediment, which revealed a deglacial record from 18 ka comprising diamicton, passing upwards into alternating layers of biosilicious and terrigenous mud. Based on the interpretation of the core material and seismic facies the upper c.400 m of the sedimentary succession is expected to be fine-grained mud with interbedded tephra. The underlying seismic stratigraphic units have a higher amplitude seismic character and may be more glacigenic in character.

Southern McMurdo Sound Project
The ANDRILL Program will drill in Southern McMurdo Sound (SMS) in 2007 to obtain new information on Neogene climate and cryospheric history. Target strata are middle Miocene to Quaternary in age, and span several key steps in the evolution of Antarctic climate. Two drillholes will recover a composite thickness of ~1000 m of strata that lie stratigraphically above the lower Miocene section recovered at the top of the nearby CIROS-1 drillcore, and above the interval recovered by the Cape Roberts Project. The recovery of expanded middle and upper Miocene sections is anticipated, which are interrupted by regional erosion in McMurdo Sound by glacier ice. Antarctic records from middle Miocene are significant because they can test interpretations derived from global proxy records that invoke a change from a warm climatic optimum (~17 Ma) to the onset of major cooling (~14 Ma) and the formation of a quasi-permanent ice sheet on East Antarctica.

P 51

New grounding-line module for deriving improved mass-balance estimates of ice sheet/ice shelf system

OELKE, CHRISTOPH, THOMAS KLEINER & MANFRED A. LANGE
Institut für Geophysik, University, Muenster
coelke@uni-muenster.de

Despite recent advances in the understanding of polar ice sheets, their current mass balance is still unknown. The major obstacle for mass budget studies is poor coverage by in-situ measurements. The state of the balance is assessed by estimating the individual mass balance terms (accumulation and ablation.) Accumulation rates have been measured from stakes and shallow ice cores, but these are logistically demanding and only exist for a limited number of locations. Accumulation distributions have also been determined by atmospheric moisture flux convergence analysis from meteorological data, remotely-sensed brightness temperatures of dry snow or a combination of several methods. Considerable uncertainty for determining the mass balance results from the difficulty to define the position of the grounding line, its ice thickness, and the need for assumptions about the vertical distribution of ice velocity. The grounding line is a natural boundary for calculating ice discharge because the entire ice volume that crosses it eventually melts into the ocean.
Flow modeling of big natural ice bodies is based on geometry, flow movement and temperature distribution as described by the laws of mass, energy, and momentum conservation. A numerical formulation of the partial differential equations expressing these conservation laws, in conjunction with a formulation of stress-strain relationships governing the rheological behavior of the ice (flow law), comprises the basis of the numerical ice flow model.
Of special importance is the ability to model the transition between an ice regime with large basal shear stress (inland ice) and a regime with no basal shear stress and vertically constant velocities (ice shelf.) In order to be able to model this transition region realistically, we solve the equations for momentum and energy three-dimensionally on a horizontally regular, and vertically shape-following grid (sigma coordinates) using finite differences. All relevant stress terms are taken into account (i.e., vertical resistive stress to include bridging effects that are important for grounding line flow dynamics.) This gounding-line module links the components of an existing finite-difference thermo-mechanical ice sheet/ice shelf model (Sandhäger, 2000). Combining 3-D modeling of ice flow in grounding-line regions and remotely-sensed forcing in

adjacent inland-ice and shelf-ice areas is expected to provide more realistic mass balances estimates.
The behavior of ice sheets is controlled by the dynamics of the grounding line zones, and areas of concentrated flow in outlet glaciers and ice streams. We derive estimates of ice topography from a combination of laser and radar satellite altimeter data, and ice velocity by means of SAR repeat pass interferometry, such as tandem mission interferometry. Cryosat SIRAL altimeter data will lead to considerable improvements in spatial resolution for key ice areas, mainly the steep-slope grounding line regions.

P 75

Paläoklimatische Untersuchungen an den obersten 56 Metern eines Eiskerns von der Eiskappe Akademii Nauk (Severnaya Zemlya)

OPEL, THOMAS (1, 2), DIEDRICH FRITZSCHE (1), RAINER SCHÜTT (1), WILFRIED ENDLICHER (2) & HANS-WOLFGANG HUBBERTEN (1)
(1) Alfred-Wegener-Institut, Potsdam
(2) Geographisches Institut, University, Berlin
topel@awi-potsdam.de

Untersuchungsgegenstand der Arbeit waren die obersten 56 Meter eines Eiskerns von der Eiskappe Akademii Nauk auf Severnaya Zemlya in der zentralen russischen Arktis. Dieser wurde im Rahmen eines deutsch-russischen Kooperationsprojektes unter Führung des Alfred-Wegener-Instituts 1999-2001 erbohrt.

Eine Besonderheit dieser Eiskappe sind die oberflächlichen Schmelzvorgänge im Sommer, in deren Folge Schmelzwasser in die Firnschichten bis in Tiefen von mehreren Metern infiltriert und dort wieder gefriert. Dabei werden die isotopische und chemische Zusammensetzung des Eises beeinflusst. Trotzdem sind in großen Abschnitten noch $\delta^{18}O$-Jahreszyklen erhalten geblieben, die neben vulkanischen und radioaktiven Referenzhorizonten zur Datierung genutzt wurden. Der hier dargestellte Eiskernabschnitt überdeckt danach etwa die letzten 120 Jahre.

Anhand von Vergleichen mit Daten einer meteorologischen Station in etwa 150 km Entfernung wurde festgestellt, dass von den im Eiskern enthaltenen Temperaturproxies die Aussagekraft und zeitliche Auflösung von $\delta^{18}O$ deutlich höher sind als die des Infiltrationseisanteils.

Für die letzten 120 Jahre ließen sich anhand der $\delta^{18}O$-Daten bedeutende Temperaturränderungen feststellen, wobei das absolute Temperaturmaxium Ende der 1930er Jahre erreicht wurde. Das stimmt mit den Aufzeichnungen anderer arktischer meteorologischer Stationen, Daten anderer arktischer Eiskerne von Spitzbergen und Franz-Josef-Land und Baumringdaten von der Taymir-Halbinsel überein.

Der Eiskern von Akademii Nauk besitzt ein großes Potential als hoch aufgelöstes Klima- und Umweltarchiv.

S IV

Long-term studies of coastal terrestrial lichen habitats in the Antarctic

OTT, SIEGLINDE (1) & PETER CONVEY (2)
(1) Botanisches Institut, University, Düsseldorf
(2) British Antarctic Survey, NERC, Cambridge, UK
otts@uni-duesseldorf.de

The lichen and bryophyte floras and their ecological associations in Antarctic coastal sites have been described previously and in some detail. However, detailed studies of their long-term processes of growth and development under defined environmental conditions are lacking. Studies of lichen growth, in particular, require extended periods. Lichens are characteristically slow-growing organisms, a feature that appears to be intensified at Antarctic locations. Our studies have taken place near to the southern boundary of the maritime Antarctic (Ryder Bay, Adelaide Island, c. 68°S). At appropriate locations, permanent quadrats (15x15cm) on rock faces colonised by different lichen species have been monitored to quantify the growth of lichen species over a period of 8 years. We present here data for several different macro- and crustose lichen species generated from this long-term experimental monitoring. Macrolichens, such as *Umbilicaria antarctica*, show considerably greater growth rates than crustose lichens. Our results give fundamental information on the growth rate of epilithic lichens in the southern maritime Antarctic, additionally providing a baseline for the recognition and interpretation of the consequences of environmental change in this area in future decades.

S III

Inkohlungsuntersuchungen des Tertiärs und seines Liegenden in Grönland und Jakutien und deren Vergleich

PAECH, HANS-JÜRGEN
Potsdam
hans.paech@t-online.de

Die ehemalige maximale Wärmebelastung eines Sedimentkörpers kann durch die Inkohlung der darin enthaltenen organischen Substanz abgeschätzt werden, die mit steigender Erwärmung flüchtige Bestandteile verliert und der relative Anteil an kohliger Substanz zunimmt. Dabei verbessern sich die optischen Reflexionseigenschaften, die zur Inkohlungsbestimmung genutzt werden können. Wegen der besseren Vergleichbarkeit der Ergebnisse wird die Inkohlung an dem Mazeral „Vitrinit" durch die Reflexion [Rr in %] von Licht gleicher Wellenlänge gemessen. Rr schwankt zwischen 0,2 bis 6% (von Torf über Braunkohle bis Anthrazit). Meist wird die Inkohlung mit der Versenkungstiefe erklärt. Im Vortrag wird aber zusätzlich auf die tektonische Position Bezug genommen. Die Proben stammen von den BGR-Expeditionen CASE 1 bis CASE 3. Dankenswerterweise führte Joachim KOCH (BGR) die Vitrinitreflexionsmessungen durch. In Jakutien ist Tertiär weit verbreitet (PAECH et al. 1998). Es können zwei Beckentypen unterschieden werden. Von den tertiären Intramontanbecken mit ausgedehnten Braunkohlevorkommen zeigt das Uyandina-Becken Inkohlung unter Rr 0,3%. Die in der Literatur beschriebene Faltung dieser Schichten konnte nicht bestätigt werden, vielmehr handelt es sich bei den Schichtverstellungen um lokale Pressung entlang von Abschiebungen. Dagegen ist das Zyryanka-Becken vor dem Moma-Gebirge in seiner Vorlandposition in die tertiäre Faltung (Pliozän) einbezogen. Die Inkohlung nimmt im Tertiär auf eine stratigraphische Teufe

von mehr als 2 km nur Rr von etwa 0,3 bis 0,4% zu. In der liegenden Kreide kommen Werte von Rr über 0,5% vor. Dieser Inkohlungssprung ist durch eine Aufschiebung bedingt.
In Nordgrönland (PAECH 1999) zeigt das Tertiär der Princess Thyra Ø stark schwankende Inkohlungswerte um 0,5% ohne erkennbaren Trend innerhalb der aufgeschlossenen 300 m. Dagegen sind die Werte für die liegende Kreide mit nur einer Ausnahme immer über Rr 2%, sogar bis 5% reichend. Auch bei Steilstellung lässt sich hier eine Zunahme der Inkohlung zum stratigraphisch Älteren erkennen. Trotzdem muss auch damit gerechnet werden, dass die Inkohlung durch gleich alten Magmatismus lokal erhöht ist.
Für den Vergleich zu Spitzbergen wird auf die veröffentlichten Ergebnisse zurückgegriffen (PAECH & KOCH 2001).

PAECH, H.-J. (1999): The Tertiary and Cretaceous of Spitsbergen and North Greenland: its Alpine Signature. -- Polarforschung 69, 107-115 (erschienen 2001).
PAECH, H.-J., A.V.PROKOP'EV; W.V.GOSEN, O.V.GRINENKO, L.I.SMETANNIKOVA & I.BELOLJUBSKIJ (1998): New results on the Moma rift and coeval structures in Yakutia. -- Polarforschung 68, 59-63 (erschienen 2000).
PAECH, H.-J. & KOCH, J. (2001): Coalification in post-Caledonian sediments in Spitsbergen.-- Geologisches Jahrbuch B 91, 507-534.

S V

4000 Jahre Kulturlandschaft in Westgrönland

PASDA, CLEMENS
Bereich für Ur- und Frühgeschichte, University, Jena
clemens.pasda@uni-jena.de

Die archäologischen Untersuchungen des Dänischen Nationalmuseums (Abt. SILA) und der Universität Jena (Urgeschichte) belegen zahlreiche unterschiedliche Fundstellentypen im Inland von Westgrönland. Durch die Verbindung von archäologischen Ergebnissen mit historischen und ethnohistorischen Quellen kann gezeigt werden, wie arktische Jäger/Sammler ´Landschaft´ durch Aktion und materielle Kultur erfahren und bewerten.

S

Unter Pinguinen und Robben – 25 Jahre zoologische Forschung auf King George Island

PETER, HANS-ULRICH
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
Hans-Ulrich.Peter@uni-jena.de

Während der 25. Sowjetischen Antarktisexpedition arbeiteten von Dezember 1979 bis Februar 1980 erstmals (ost)deutsche Zoologen und Ökologen auf der Insel King George in der Umgebung der Station „Bellingshausen".
Der Dia-Vortrag berichtet einführend kurz über die Geschichte der in den folgenden 25 Jahren stattgefundenen Expeditionen, die seit 1993 nicht nur zur Fildes Peninsula, sondern auch zur Potter Peninsula in die Umgebung des deutsch-argentischen Dallmann-Labors führen.
Nach einer Übersicht über die Landschaft und Vegetation werden die im Gebiet vorkommenden Vögel und Säuger und ihre Biologie kurz vorgestellt. Insgesamt konnten 13 Arten als Brutvögel im SW von King George Island nachgewiesen werden. Dazu gehören drei Pinguinarten (Zügel-, Adelie- und Eselspinguin), 4 Röhrennasen (Südlicher Riesensturmvogel, Kapsturmvogel,

Buntfußsturmschwalbe, Schwarzbauchmeerläufer), Südpolar- und Braune Skua, Scheidenschnabel, Blauaugenscharbe, Antarktisseeschwalbe und Dominikanermöwe.
Zu den Durchzüglern und Gastvögeln gehören u.a. Kaiser-, Königs- und Goldschopfpinguin, Wanderalbatros, Russalbatros, Mollymauk, Schnee- und Antarktissturmvogel, Kuhreiher, Schwarzhalsschwan, Weißbürzelstrandläufer, Küstenseeschwalbe und Chile-Skua.
Bis auf die Rossrobbe können alle antarktische Robbenarten im Gebiet beobachtet werden. Die Südlichen See-Elefanten haben Wurfplätze sowohl auf Potter als auch auf Fildes. Die Anzahl der Krabbenfresser hängt im Winter und Frühjahr insbesondere von der Eissituation ab. Zu den häufigen Robben gehört auch die Weddellrobbe, deren Wurfplätze nicht auf dem Meereis, sondern auch auf flachen Küstenbereichen zu finden sind.
Der See-Leopard gehört zu den seltenen Arten im Gebiet; er ist im Sommer insbesondere in der Umgebung der Pinguinkolonien zu beobachten. Die Bestände des Antarktischen Seebären waren schon im 19. Jahrhundert durch die Robbenschläger nahezu ausgerottet und haben sich erst nach dem totalen Schutz in den letzten Jahrzehnten des 20.Jahrhunderts wieder erholt.
Anhand von Beispielen werden die Forschungsvorhaben der letzten 20 Jahre illustriert. Während in den 80er Jahren die Bestandesentwicklung der Warmblüter im Rahmen des internationalen BIOMASS-Programms im Zentrum des Interesses stand, sind die Forschungen in den letzten 15 Jahren breiter angelegt. Dazu kamen intensive ornitho-ökologische Forschungen u.a. zur Nahrungs- und Fortpflanzungsökologie sowie zur Life History der Arten. Selbst molekularbiologische Methoden haben Einzug gehalten, so zum Beispiel zur Untersuchung des Artstatus der Raubmöwen oder zur Vaterschafts- und Geschlechtsbestimmung verschiedener Vogelarten.
Die Fotos zeigen die breite Palette der Geländearbeiten, vielfach in Kooperation mit Kollegen der russischen, chinesischen, chilenischen, südkoreanischen und argentinischen Stationen. Neben der eigentlichen Arbeit wird das Leben in den Antarktisstationen vorgestellt.

WS
Biological data and risk assessment (Fildes Pensinsula and Ardley Island)

PETER, HANS-ULRICH, CHRISTINA BÜßER, OSAMA MUSTAFA & SIMONE PFEIFFER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
Hans-Ulrich.Peter@uni-jena.de

On Fildes Peninsula and Ardley Island bird breeding sites of penguins, skuas, Antarctic terns, kelp gulls, southern giant petrels, sheathbills, cape petrels and storm petrels were mapped in the two last seasons by using GPS/GIS. Of particular interest were changes in breeding pair numbers, nest sites and the distribution of selected bird species in relation to near-by human activities.
The breeding success of selected species was recorded to obtain long-term data sets for the analysis of human impacts.
The breeding pair numbers of skuas *(Catharacta maccormicki, C. antarctica lonnbergi* and mixed pairs) reflect beside anthropogenic influences natural fluctuations caused by variable food availability and weather conditions. During the last two decades the breeding pair number of Southern Giant Petrels *(Macronectes giganteus)* shows high fluctuations in breeding pair number and breeding success, correlated with station construction, visitor activities and helicopter flights. For the Antarctic Specially Protected Area Ardley Island and small islands around Fildes Peninsula the influence of flight activities will be discussed.

Furthermore, summer counts at seal resting sites were carried out, and winter station personnel of the Russian base collected records of seal breeding sites in order to gain information on inter-annual variation.
In 2004/05, a vegetation mapping was initiated to assign sensitive areas on Fildes Peninsula and Ardley Island. According to a literature review, dominant flowering plants, moss and lichen associations have been used for the classification.
The GPS/GIS data on waste, fossil, wildlife breeding and resting sites, the spatial and temporal extent of human activities were analysed. The results are the basis for an environmental risk assessment in order to develop a proposal for the management package.

P 25

Risk assessment for Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas

PETER, HANS-ULRICH, CHRISTINA BÜßER, UWE GRUNEWALD, TIMO KAHL, OSAMA MUSTAFA, SIMONE PFEIFFER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
Hans-Ulrich.Peter@uni-jena.de

The Fildes Peninsula and Ardley Island, in the south-western part of King George Island, South Shetland Islands, are intensively used for scientific, logistic and tourism-related activities. Since 1968, six nations (Argentina, Brazil, Chile, China, Russia and Uruguay) have constructed research stations and field huts in the area. Since 1980 there is a hard runway for inter- and intra-continental flights of Hercules C-130 and smaller aircrafts, in order to transport cargo, station personnel, and visitors. Supply, research and tourist vessels anchor frequently in Maxwell Bay. Ship-based tourism and overflights occur on a regular basis, and a combination of air and ship-based tourism continues developing. Several non-governmental or touristic activities of a diverse spectrum have taken place in recent years, which will certainly continue increasing.
Most of the human activities occur in the breeding and moulting period of birds and seals, leading to a conflict of interest between nature conservation, science, logistics and tourism. The following assessments have been carried out during the last two field seasons (2003/04 and 2004/05) to record the spatial and temporal extent of human activities:

The historical and actual waste grounds of Fildes Peninsula and Ardley Island were mapped and classified. In this context hazardous material, large quantities of wood, plastic and metal and other objects were found not only close to human infrastructure but also further afield. Stranded material was most common, followed by deposits and wind-drifted material. The majority of waste was classified as originating from earlier years. Furthermore, actual oil leakage and entry of organic material were documented. The mapping of waste ground included the assessment of present management techniques at all stations on site.

Furthermore, major construction activities were noted. These included for instance the establishment of a church by Russia in 2003/04 or the construction of an aircraft parking area at the existing runway by Chile in 2004/2005. This involved also the establishment of new vehicle and pedestrian lanes. As a consequence of these activities local environmental impacts on vegetation, breeding habitats and behaviour of birds were recorded.

Beyond, most land, air and sea traffic around the Fildes Peninsula was assessed for the first time during both field seasons from December to March by measuring frequencies and localities. This assessment included:

- The registering of road traffic between the stations. Road traffic consisted of heavy vehicles used for fuel and cargo transports or construction work as well as cars used by station personnel

and visitors. Whereas land traffic occurred, during summer, on a daily basis on existing roads between stations, off-road drives have been recorded very seldom.

- The registering of air-traffic routes and altitudes of aeroplanes and helicopters of various types. Some aircraft over-flights of ASPA 150 *Ardley Island* were observed below the altitude of 300 m contrary to the guidelines of the Management Plan of ASPA 150.
- The registering of ship movements in Maxwell Bay. Supply vessels made up the majority of more than fifty entrances to the bay during each summer season, followed by tourist vessels, research and military ships and yachts.

In 2003/04, a peninsula-wide survey of geological-paleontological sites was conducted to update published fossil data and look for a possible adjustment of the boundary of the existing ASPA 125.

The GPS/GIS data on waste, fossil, wildlife breeding and resting sites, the spatial and temporal extent of human activities were analysed (especially in terms of important management consequences). The results will be the basis for an environmental risk assessment in order to develop a proposal for the management package.

WS

Management plan drafts for the southwestern part of King George Island

PFEIFFER, SIMONE, CHRISTINA BÜßER, OSAMA MUSTAFA & HANS-ULRICH PETER
Polar & Bird Ecology Group, Institute of Ecology, University, Jena
Simone.Pfeiffer@uni-jena.de

This talk aims to present management drafts of the research project "Risk assessment for the Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas". All biological and environmental field data were the basis for the environmental risk assessment in order to develop an comprehensive management package for the Fildes Peninsula region. This includes the establishment of a new Antarctic Specially Managed Area to avoid or reduce the risk of interference and minimise environmental impacts and to enhance planning and co-ordination of the existing and future. The existing ASPA 150 *Ardley Island* and ASPA 125 *Fildes Peninsula* require a revision of their management plans before December 2005. Additionally, a zoning system ought to be included in the management package. This could support specific management measures by restricting or reducing access to sensitive wildlife concentrations and facilitate logistic and management activities within station areas. A Code of Conduct will outline all management activities within the ASMA. It will give detailed information on the access to the area, activities, installations, waste management, scientific practise and environmental issues. The high number of stations and the growing tourism activities within the Fildes Peninsula region require a revision of monitoring and control mechanisms. Recommendations to spatial and temporal area use could help to minimise cumulative effects on wildlife. The results of a questionnaire filled out by station members and visitors will be incorporated into these guidelines. Recommendations for flight routes and heights for aeroplanes and helicopters should be revised under consideration of recent scientific investigation in wildlife concentrations. If necessary, further recommendations for shipping operations, land vehicle use and maintenance of roads and paths could also be developed. A regular and comprehensive monitoring of set indicators will be required to assess anthropogenic activities and their impacts on the local ecosystem in the long term.

P 26

Environmental risk assessment of ASPA 150 Ardley Island (King George Island, South Shetlands)

PFEIFFER, SIMONE (1), ELKE BÖHM (1), CHRISTINA BÜßER (1), IGOR CHUPIN (3), MARCELLO FLORES (2), CLAUDIA GODOY (2), OSAMA MUSTAFA (1) & HANS-ULRICH PETER (1)
(1) Polar & Bird Ecology Group, Institut of Ecology, University, Jena
(2) Instituto Antartico Chileno, Punta Arenas, Chile
(3) Zoological Museum, University, Barnaul, Russia
Simone.Pfeiffer@uni-jena.de

Due to its high species diversity, Ardley Island has been designated as a Site of Special Scientific Interest, SSSI 33 in 1991 (now Antarctic Specially Protected Area, ASPA 150). The island holds 12 breeding bird species and very diverse lichen and moss communities. Besides intensive scientific research on penguins, skuas and Southern Giant Petrels, vegetation, and terrestrial sediments have been studied over the last 25 years. For station personnel and tourists a visitor zone has been established in the northern part of Ardley. The existing management plan requires a revision before December 2005. In this context new scientific data and an environmental risk assessment can provide a useful contribution.
Within the research project 'Risk assessment for Fildes Peninsula and Ardley Island and the development of management plans for designation as Antarctic Specially Protected or Managed Areas' we recorded the distribution and abundance of breeding birds, seals and the vegetation of Ardley Island. In addition, the distribution of waste and the temporal and spatial area use by humans (science, logistics, tourism) were documented in recent years. In an environmental risk assessment this data are evaluated in terms of actual and possible impacts.

S IV

Recent research on Arctic benthos: common notions need to be revised

PIEPENBURG, DIETER
Institut für Polarökologie, University, Kiel
Akademie der Wissenschaften und der Literatur Mainz
dpiepenburg@ipoe.uni-kiel.de

Increased public awareness of the global climate significance of polar regions and the opening of the Russian Arctic to foreign researchers has led to a pronounced intensification of benthic research in Arctic seas. The wealth of information gathered in these efforts has markedly enhanced our knowledge on the Arctic benthos. While some scientific concepts have been corroborated by the novel findings (e.g., low endemism and high faunistic affinity to northern Atlantic assemblages), other common notions have become in need to be revised, particularly with regard to the often-cited differences between Arctic seas and the Southern Ocean. It has been demonstrated that benthos assemblages vary broadly in diversity between Arctic regions and that, hence, the idea of a consistently poor Arctic benthos–being in stark contrast to the rich Antarctic bottom fauna–is an undue overgeneralization. In terms of biogeographic diversity, both Arctic and Antarctic waters seem to be characterized by intermediate species richness. Levels of disturbance–a major ecological agent known to heavily affect benthic diversity and community structure–have been assumed to be relatively high in the Arctic but exceptionally low in the Southern Ocean. The discovery of the great role of iceberg scouring in Antarctic shelf ecosystems, which has largely been overlooked in the past, calls for a reconsideration of this

notion. The novel data clearly demonstrate that there are marked differences in geographical and environmental setting, impact of fluvial run-off, pelagic production regime, strength of pelago-benthic coupling and, hence, food supply to the benthos among the various Arctic seas, impeding the large-scale generalization of local and regional findings. Field evidence points to the great significance of meso-scale features in hydrography and ice cover (marginal ice zones, polynyas, and gyres) as 'hot spots' of tight pelago-benthic coupling and, hence, high benthic biomass. In contrast, the importance of terrigenic organic matter discharged to the Arctic seas through fluvial run-off as an additional food source for the benthos is still under debate. Studies on the partitioning of energy flow through benthic communities strongly suggest that megafauna has to be adequately considered in overall benthic energy budgets and models of carbon cycling, particularly in Arctic shelf systems dominated by abundant brittle star populations. Much progress has been made in the scientific exploration of the deep ice-covered Arctic Ocean. There is now evidence that it is one order of magnitude more productive than previously thought. Therefore, the significance of shelf-basin interactions, i.e. the importance of excess organic carbon exported from productive shelves to the deep ocean, is still debated and, hence, a major topic of on-going research. Another high-priority theme of current/future projects are the ecological consequences of the rapid warming in the Arctic. Higher water temperatures, increased fluvial run-off and reduced ice cover will give rise to severe ecosystem changes propagating through all trophic levels. It is hypothesized that there would be a shift in the relative importance of marine biota in the overall carbon and energy flux, ultimately resulting in a switch from a 'sea-ice algae–benthos' to a 'phytoplankton–zooplankton' dominance.

P 37

Korrelation phanerozoischer Sedimentbecken und tektonischer Ereignisse in Svalbard (Barentsschelf), Nord-Grönland und auf der Ellesmere-Insel (kanadische Arktis)

PIEPJOHN, KARSTEN
Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
K.Piepjohn@bgr.de

Die Korrelation und der Vergleich der großen Sedimentbecken und der tektonischen Ereignisse auf (i) Pearya, einem Terrane im äußersten Norden der Ellesmere-Insel, (ii) auf der Ellesmere-Insel, (iii) in Nord-Grönland und (iv) auf Spitzbergen zeigen exemplarisch die Abfolge der verschiedenen Phasen getrennter und gemeinsamer Entwicklung der beteiligten Kontinentabschnitte vom jüngeren Neo-Proterozoikum bis heute.

Bis ins Oberdevon hinein verläuft die erdgeschichtliche Entwicklung zwischen Pearya/Spitzbergen einerseits und der Ellesmere-Insel/Nord-Grönland andererseits unabhängig voneinander:

Die Ablagerung vendischer Diamiktite (Tillite) und mächtiger Sedimentserien auf Spitzbergen und Pearya deuten eine enge Verwandtschaft im oberen Neo-Proterozoikum und Alt-Paläozoikum. Gestützt wird dieser Befund durch die Deformation und Metamorphose der kaledonischen Orogenese im Ordovizium in beiden Bereichen. Eine weitere Gemeinsamkeit sind die Intrusionen post-tektonischer Granite im Devon.

Im Gegensatz dazu bilden die Ellesmere-Insel und Nord-Grönland zur gleichen Zeit den passiven nördlichen Kontinentalrand Laurentias, der durch die Ablagerung kilometer-mächtiger Sedimente des Franklin-Beckens gekennzeichnet wird. Dieses mehrere 1000 km lange Becken

wird in einen Tiefwasser-Bereich mit feinklastischen Beckenablagerungen im Norden und einen Schelf-Bereich mit klastischen und karbonatischen Sedimenten im Süden gegliedert.

Die ellesmerische bzw. svalbardische Deformation an der Grenze Oberdevon/Unterkarbon führt in allen Gebieten zu kompressiven Bewegungen, die auf der Ellesmere-Insel und in Nord-Grönland stellenweise zu einer metamorphen Überprägung des Franklin-Beckens führen. Während diese tektonische Phase in Pearya nicht gesichert ist, werden auf der Ellesmere-Insel und in Nord-Grönland die Sedimente des Franklin-Beckens über bedeutenden Abscherhorizonten im kilometer-Maßstab verfaltet. In Spitzbergen werden sowohl das kaledonische Grundgebirge als auch das post-kaledonische Old Red-Molassebecken intensiv deformiert.

Nach der ellesmerischen Deformation und der Annäherung Spitzbergens/Pearyas an den Nordrand Laurentias verläuft die Entwicklung in allen vier Gebieten überwiegend identisch ab: die Entwicklung von Sverdrup Becken, Wandel-See Becken und Spitzbergen Becken wird ab dem Visé (Unterkarbon) mit einer Phase großräumiger Blocktektonik mit der Bildung störungsbegrenzter Becken und der Sedimentation von Red-Beds und Evaporiten eingeleitet. Anschließend setzt im Oberdevon arktisweit eine karbonatische Sedimentation ein, die bis ins Perm hinein andauert. Das Mesozoikum wird in allen vier Bereichen von klastischen, teils terrestrischen, teils flachmarinen Sedimenten gekennzeichnet.

Mit der plattentektonischen Umstrukturierung des arktischen Raums während des Zerfalls des laurasischen Kontinents und der Öffnung des Arktischen Ozeans und des Nordatlantiks werden alle Gebiete von den Auswirkungen der Eurekan-Deformation bzw. des Westspitzbergen Fold-and-Thrust Belts betroffen. Diese intrakontinentale Deformation fand unmittelbar vor der Trennung von Grönland und Spitzbergen statt und bildete das letzte Ereignis, das alle Gebiete gemeinsam beeinflusst hat. Seit dem Ende dieser Deformation im ausgehenden Eozän laufen die Entwicklungen in Pearya, auf der Ellesmere-Insel und Grönland einerseits und Spitzbergen anderseits wieder getrennt ab.

P 38

Post-Paläozäner Vulkanismus im Süden der Ellesmere-Insel (Nunavut, Kanada)

PIEPJOHN, KARSTEN (1), WERNER VON GOSEN (2), SOLVEIG ESTRADA (1), LUTZ REINHARDT (1) & HARALD ANDRULEIT (1)
(1) Bundesanstalt für Geowissenschaften und Rohstoffe, Hannover
(2) Institut für Geologie und Mineralogie, University, Erlangen
K.Piepjohn@bgr.de

Im Sommer 2004 führte die BGR die Expedition CASE 8 (Circum-Arctic Structural Events) in den Süden der Ellesmere-Insel (kanadische Arktis) durch. Das Expeditionsgebiet lag innerhalb eines breiten Gürtels karbonatischer und klastischer Sedimentfolgen des paläozoischen Franklin-Beckens zwischen dem Kanadischen Schild im Osten und dem tertiären Eureka-Faltengürtel im Westen. Auf dem verfalteten Paläozoikum liegen winkeldiskordant unverfestigte tertiäre Sedimente eines ursprünglich zusammenhängenden Beckens, das durch tektonische Bewegungen später in ein Flickwerk isolierter Tertiär-Vorkommen zerlegt wurde.
Ziel der Expedition waren strukturgeologische Untersuchungen entlang der Vendom Fiord Fault Zone, einer NNE-SSW streichenden, über 70 km breiten Störungszone, die durch ein überwiegend dextrales, transpressives tektonisches Regime gekennzeichnet ist. Das Alter dieser

lateralen Tektonik kann mit Paläozän oder jünger angegeben werden, da die unverfestigten Sedimente der paläozänen Becken von den Störungen betroffen und stellenweise erheblich deformiert sind.
In einigen der tertiären Vorkommen fallen flache, gelblich und rötlich verfärbte Hügel mit Durchmessern bis zu 130 m auf, in denen die tertiären Sedimente durch thermale Aktivitäten gefrittet und verfestigt worden sind. Im Zentrum der Hügel befinden sich kleine, nur dm-messende Vorkommen dunkelgrauer, teils massiger, teils blasenreicher Vulkanite. In einigen Bereichen ist noch zu erkennen, dass die Laven in Form kleiner Gänge in die benachbarten tertiären Tone und Silte eingedrungen sind und diese teilweise als Xenolithe aufgenommen haben. Wo die Lava subaerisch ausgetreten ist, sind an der Oberfläche Stricklava-ähnliche Strukturen entstanden, die noch völlig unverwittert sind. Nach ersten Laboruntersuchungen bestehen die Laven zu 80% aus Eisenoxiden (Hämatit, Magnetit).
Austrittstellen der Lava und die begleitende thermale Überprägung der um die Schlote liegenden tertiären Lockersedimente sind zwischen Vendom Fiord und Makinson Inlet über ein immerhin 7.000 qkm großes Gebiet verteilt. Möglicherweise ist sogar mit einer weit größeren Verbreitung dieser Vulkanite zu rechnen: da die Kalksteine des Franklin-Beckens im Gegensatz zu den tertiären Lockersedimenten nicht von den thermalen Aktivitäten geprägt wurden, sind die Austrittstellen dort schwer zu entdecklen.
Bei den meisten Störungen der Vendom Fiord Fault Zone handelt es sich um Lateralstörungen, die die ganze Erdkruste durchschlagen, womit eine Wegsamkeit für das Aufsteigen des Magmas an die Erdoberfläche gewährleistet ist. Auf jeden Fall durchschlagen die Vulkanite paläozäne Sedimente, wonach diese vulkanische Phase auf jeden Fall Eozän oder jünger sein muß. Der frische Erhaltungszustand der Lava, der dem der Lava z.B. auf Lanzarote entspricht, ist jedoch ein Indiz dafür, dass diese Laven vielleicht sogar erst in subrezenter Zeit gefördert wurden. Damit wären sie die jüngsten Vulkanite in der kanadischen Arktis, eventuell sogar in ganz Nordamerika östlich der Rocky Mountains.

S III

New data on the stratigraphy and palynological assessments of the Upper Jurassic – Lower Cretaceous sediments in the area of Lake Hazen, Ellesmere Island, Canadian Arctic

PIMPIREV, CHRISTO & POLINA PAVLISHINA
Department of Geology and Palaeontology, University, Sofia, Bulgaria
polar@gea.uni-sofia.bg

The scope of the present contribution is to give new stratigraphical and sedimentological data and especially to present palynological evidences for the Upper Jurassic – Lower Cretaceous age of the sediments outcropping along the northeastern shore of Lake Hazen, Ellesmere Island. Diverse and well preserved dinoflagellate cyst, spore and pollen assemblages are documented from three sedimentological sections exposed from Hazen Camp to 1.5 km southeast along the Hazen lake shore. Two distinct dinoflagellate cyst associations are recognized. The older, termed the *Gonyaulacysta dualis – Gonyaulacysta jurassica* association defines Oxfordian age for the middle part of the succession, while the younger – the *Tanyosphaeridium magneticum* association suggests Valanginian age for its upper part. The associations are correlated to the existing dinocyst zonations for the Arctic and Boreal Realms. Trends in the geographic distribution of selected species are discussed based on this comparison.
The sedimentological and palynological data give ground for paleoenvironmental interpretations. The sediments from the lower part of the succession are deposited in turbidite marine paleoenvironment with ammonite finding. The sedimentation in the middle part started in

continental paleoenvironment with abundant coal seams. The palynofacies is dominated by terrestrial material, represented by spores, pollen, cuticle sheets and well preserved woody phytoclasts. Upwards it changed to brakish and marine with rich and diverse dinocyst associations, dominated by Gonyaulacysta representatives considered to be more typical of middle shelf environments. The paleoenvironments in the upper part changed gradually from marine with abundant dinocysts to brakish with prevailing terrestrial palynomorphs.
The palynological data suggest a breaking of sedimentation at the end of Jurassic in the depositional basin.

S X
Posteruptive Entwicklung des 1977 eruptierten Ukinrek Ostmaares (SW-Alaska)

PIRRUNG, MICHAEL (1), GEORG BÜCHEL (1) & VOLKER LORENZ (2)
(1) Institut für Geowissenschaften, University, Jena
(2) Institut für Geologie, University, Würzburg
Michael.Pirrung@uni-jena.de

Zwischen dem Becharof See und dem Stratovulkan Mt. Peulik, östliche Alaska Peninsula, eruptierten zwischen dem 30.3. und 9.4.1977 das Ukinrek Westmaar und Ostmaar. Die syn- und posteruptive Entwicklung der Krater ist durch Aufnahmen von Buschpiloten und Mitarbeitern des US Geological Survey hervorragend dokumentiert. Vermessungen des Kraters erfolgten im August 1977 (Self et al., 1980) und im Juli 2004 (Pirrung et al., subm.).
Das West- und Ostmaar hatten im August 1977 einen mittleren Durchmesser von 136 bzw. 306 m bei einer max. Tiefe von 32 bzw. 71 m. Kurz nach dem Ende der Eruptionen betrug die max. Tiefe des Ostmaares ca. 89 m. Das Ostmaar hatte im Juli 2004 einen mittleren Durchmesser von 346 m und eine max. Tiefe von 61 m. Das Durchmesser:Tiefe-Verhältnis, das für Altersabschätzungen von Trockenmaaren angewendet werden kann, änderte sich im Ostmaar von 3.4 im August 1977 zu 5.6 im Juli 2004. Bereits 6 Tage nach Ende der Eruptionen existierte im Ostmaar ein See, dessen Wassserspiegel bis August 1981 um ca. 45 m und seither um weitere 16 m angestiegen ist. Das Niveau des Kraterbodens im Ostmaar stieg in 27 Jahren um ca. 26 m an während sich das Niveau des Kraterrandes im Mittel um 2 m verringerte. Die max. posteruptive Sedimentmächtigkeit im Kraterzentrum beträgt vermutlich über 40 m, da der Betrag der posteruptiven Kompaktion auf mindestens 15 m geschätzt werden kann. Die mittlere Sedimentationsrate im Kraterzentrum verringerte sich von ca. 8 m a-1 zwischen August 1977 und August 1981 (Büchel & Lorenz, 1993) auf ca. 0.4 m a-1 zwischen August 1981 und Juli 2004. Proximale Kratersedimente bestehen aus Schutthalden, die mit ca. 35° Hangneigung relativ steil einfallen. Die wichtigsten Sedimentationsprozesse auf den Kraterinnenhängen sind Bergstürze und debris flows sowie äolischer Transport. Distale Seesedimente konnten im Juli 2004 in zwei etwa 20 cm langen Kernen beprobt werden. Sie bestehen aus rein minerogenen laminierten und gradierten Sand- und Siltlagen. Diese wurden durch Turbidite, Staubeintrag und vermutlich während des Winterhalbjahres durch feinkörnige Hintergrundsedimentation unter Eisbedeckung gebildet. Die morphologischen Veränderungen und Sedimentationsprozesse während der frühen posteruptiven Maarentwicklung können an den Ukinrek Maaren beispielhaft studiert werden. Diese liegen nur wenige 10er km südlich des kontinentalen Permafrostbereiches in SW-Alaska. Damit können Sedimentkerne z.B. aus pleistozänen Trockenmaaren der Eifel, die unter periglazialen Bedingungen entstanden sind, besser interpretiert werden. Auch für die frühe Entwicklung tertiärer fossilreicher Maarkrater, wie z.B. das Eckfelder Maar in der Eifel oder die

Grube Messel bei Darmstadt, lassen sich Hinweise auf die Erosions- und Sedimentationsprozesse ableiten.

Referenzen

Büchel, G. & Lorenz, V. (1993): Syn- and posteruptive mechanism of the Alaskan Ukinrek Maars in 1977. Lecture Notes Earth Sciences, 49: 15-60.

Pirrung, M., Büchel, G. & Lorenz, V. (subm.): Posteruptive development of the Ukinrek East Maar erupted in 1977 A.D. (Southwest Alaska). J. Sedimentol.

Self, S., Kienle, J. & Huot, J.P. (1980): Ukinrek Maars, Alaska II. Deposits and formation of the 1977 craters. J.Volcanol. Geoth. Res., 7: 39-65.

P 10

Fledging behaviour of Gentoo penguins (*Pygoscelis papua*) at Admirality Bay, King George Island, Antarctica

POLITO, MICHAEL, WAYNE Z. TRIVELPIECE & SUSAN G. TRIVELPIECE
Antarctic Ecosystem Research Division, La Jolla, Cal/USA
polito_mike@yahoo.com

Gentoo penguins breed on subantarctic islands and on the Antarctic Peninsula. Though adults can be found throughout most of the year on their breeding colonies and seem to be relatively sedentary, the factors involving the fledging and dispersal of chicks from the breeding colonies have yet to be illustrated. This study aimed to describe the age, relative fitness, and behaviour of gentoo chicks fledging from colonies along the western shores of Admirality Bay, King George Island during the 2004-2005 austral summer. To determine the exact age at fledging of *P. papua* chicks, we attached 36 radio transmitters to each sibling from 18 nests, and used a radio receiver, data logger and unidirectional antenna to monitor the presence and absence of these instrumented chicks. Half of these individuals were used to ascertain their relative fitness at fledging, and were captured and weighed every three to five days until fledging. The other half was used as a control to determine if these regular captures had an effect on the timing of fledging. Also during this time, daily, supplemental observations were taken to ground truth the radio telemetry data as well as to describe any patterns of intracolony location, parental associations and feedings during this transition period to independence. Preliminary analysis of the radio telemetry data has shown that all individuals dispersed by 15 to 16 weeks of age. A more detailed analysis of the radio telemetry, fitness, and behavioural data is now in progress.

WS

Environmental activities of the Russian Antarctic Expedition

POMELOV, VICTOR (1) & MARIA GAVRILO (2)
(1) Russian Antarctic Expedition, AARI, St.-Petersburg, Russia
(2) Department of Polar Geography, AARI, St.-Petersburg, Russia
pom@aari.nw.ru

The following topics will be presented and discussed.
Legislation background both international and Russian
Sub-program Study and Research of the Antarctic within the framework of Russian Federal Scientific Program The World Ocean as a scientific background for the environmental activity of the RAE.

Environmental Impact Assessment for the Russian Antarctic Expedition – one of the major project within the Sub-program Study and Research of the Antarctic
Current environmental projects – examples from different Russian Antarctic bases.

WS
Albatross and Prion Islands, South Georgia: a management challenge

PONCET, SALLY
South Georgia Environmental Baseline Survey, Beaver Island, Falkland Islands
sallyponcet@horizon.co.fk

Albatross Island and Prion Island are two of South Georgia's most popular visitor sites. They are also islands of exceptionally high conservation value, being rat-free and containing large numbers of vulnerable seabird species including five species of albatross and petrel (wandering albatross *Diomedea exulans*, light-mantled sooty albatross *Phoebetria palpebrata*, southern giant petrel *Macronectes giganteus*, northern giant petrel *Macronectes halli* and white-chinned petrel *Procellaria aequinoctialis*) which are protected under the Agreement for Conservation of Albatrosses and Petrels (ACAP).

Visitors land at the islands to see nesting wandering albatrosses. In a 5 year period (1999 to 2003) the number of people landing from cruise ships at Albatross Island increased from 572 to 1,323 and from 1,029 to 1,123 at Prion. Cruise ship visits to Albatross Island increased from 11 to 23, and from 11 to 13 at Prion. This is a combined increase of 53% in the number of people landing to see wandering albatross, and a 64% increase in the number of visits. In 2002-03 alone, visitor numbers went up by 23% and visits by 33%.

In 1999, a monitoring programme was developed for Albatross and Prion Islands to investigate the interactions between visitors, fur seals and wandering albatrosses. The main focus of the research is the annual monitoring of changes in numbers of breeding pairs and nest distribution of wanderers. Vegetation surveys are undertaken every three years to record the impact of fur seals on plant communities. Monitoring of visitor levels and activities is carried out annually. Since 1999, breeding pairs of wandering albatrosses on the two islands have declined by 25%, a similar rate of decline recorded by the British Antarctic Survey for the Bird Island wandering albatross population. This decline is attributed to low recruitment of new breeders as a result of young birds killed in illegal and high seas longlining fisheries around the world. Although there appears to be no direct causal relationship between the population decline in wandering albatross and the increase in visitors at Albatross Island, the results indicate that nest distribution may be influenced by disturbance from fur seals and possibly visitors. Interactions between fur seals, visitors and wandering albatross have been observed, where visitor pressure on fur seals in proximity to fledgling wanderers has caused the birds to move away from their nest area in response to disturbance from seals and to some extent from people. Localised trampling by visitors of fragile plant communities (outside the areas impacted by fur seals) are visible on both islands, and on Prion Island has resulted in the formation of deep mud holes, divots and several subsidiary tracks around the damaged areas.

In response to the requirement to manage visitor impacts, Albatross Island was closed to visitors in 2004-05. This resulted in a doubling of the number of visitors to Prion Island (over 2,000 visitors and 27 visits) and significant trampling impacts. The construction of a boardwalk is being considered as the next step towards minimizing visitor disturbance on the island.

Within the framework of ACAP, there is the requirement to maintain and enhance favourable conservation status for albatrosses and petrels by implementing appropriate measures that widely apply the precautionary rule, including the reduction of disturbance to habitats, prevention of habitat degradation and the assessment of the potential impact of any proposed programmes and projects on the birds. The future management of Prion Island and its population of wandering albatrosses will present managers with the task of ensuring that management decisions that with the potential to open up the island to further increases in visitor-induced disturbance are compatible with the aims and requirements of ACAP.

S V
Arctic coastal processes

RACHOLD, VOLKER
Alfred-Wegner-Institut, Postsdam
vrachold@awi-potsdam.de

The coastal zone is the interface through which land-ocean exchanges in the Arctic are mediated and it is the site of most high-latitude human activities. The coastal margin represents a complex interface of numerous processes and states, and this zone is extremely vulnerable to predicted environmental changes, such as decreased sea ice extent and thickness, sea level rise, increasing storm frequency, biodiversity destabilization, and anthropogenic stressors. These coasts are typically permafrost-dominated and exhibit rapid erosion with serious implications for ecosystems and communities, e.g. infrastructure damage, loss of housing, damage to hunting and fishing grounds, etc. (see Arctic Climate Impact Assessment (ACIA) - key finding #5).
Changes in the coastal zone will not only affect regional biological and human systems, but are also likely to exert influence on the global system though the degradation of coastal and offshore permafrost, which can lead to the release of greenhouse gases (GHG). Fluxes of sediment, carbon, and nutrients resulting from coastal erosion play an important role in the material budget of the Arctic Ocean.
This presentation gives an overview of the processes involved in Arctic coastal dynamics and summarizes the results of ongoing international circum-Arctic coastal activities, such as the IASC (International Arctic Science Committee) / IPA (International Permafrost Association) project Arctic Coastal Dynamics (ACD). An outlook on future activities which are currently underway within the framework of the 2nd International Conference on Arctic Research Planning (ICARP II), the second phase of the IGBP-LOICZ (International Geosphere-Biosphere Program - Land-Ocean Interactions in the Coastal Zone) program and the International Polar Year (IPY) 2007/2008 will be provided.

P 83
Soziale Bedingungen während der Überwinterung auf Station Eismitte in Grönland 1930/31

RACK, URSULA
Alfred-Wegner-Institut, Bremerhaven
urack@awi-bremerhaven.de

Alfred Wegeners Expedition 1930/31 errichtete neben zwei Küstenstationen gleichzeitig auch eine Station am grönländischen Inlandeis auf über 3000m Seehöhe, die so genannte Station Eismitte. Drei Männer, Dr. Georgi, Dr. Sorge und Dr. Loewe, überwinterten auf dieser Station. Von diesen Überwinterern existieren noch die Tagebücher, die hier gegenüber gestellt werden, um die sozialen Gegebenheiten auf Station Eismitte darzustellen. Außer Georgis Tagebuch („Im Eis vergraben") wurden nur Teile dieser Tagebücher, vornehmlich wissenschaftliche Ergebnisse, bislang veröffentlicht.
Aufgrund von Pannen, widrigen Umständen und schlechten Wetterverhältnissen war die Überwinterungsstation nur unzureichend ausgerüstet, was zum Teil jedoch durch Erfinderreichtum ausgeglichen werden konnte. Auf das Überwinterungshaus musste gänzlich verzichtet und auf Firn- und Eishöhlen ausgewichen werden. Besonders erschwerend erwies sich das Fehlen medizinischer Ausrüstung, die beispielsweise bei einer Zehenamputation dringend benötigt worden wäre, und das Fehlen von Heizmaterial.
Neben der täglichen Routine war die Freizeitgestaltung ein wesentlicher sozialer Aspekt. Lesen sowie philosophische und gesellschaftliche Gespräche und das Begehen persönlicher Jahrestage waren ein wichtiger Bestandteil des friedlichen Zusammenlebens während der etwa zehnmonatigen Überwinterung.
Diese Arbeit stellt einen Teilaspekt einer sozialhistorischen Studie dar, in der die sozialen Bedingungen auf deutschen Polarexpeditionen zwischen 1868 und 1939 untersucht werden.

S IX

Hybridisation between South Polar Skua (*Catharacta maccormicki*) and Brown Skua (*C. antarctica lonnbergi*) in the Antarctic Peninsula region

RITZ, MARKUS, STEFFEN HAHN, TIM JANICKE & HANS-ULRICH PETER
Polar and Bird Ecology Group, Institute of Ecology, University, Jena
Markus.Ritz@uni-jena.de

Hybridisation between South Polar Skua (*C. maccormicki*) and Brown Skua (*C. antarctica lonnbergi*) in the area of the Antarctic Peninsula is known at least since the beginning of the last century but no survey has been done so far. We review information on the species composition of skua colonies of more then ten pairs in the Antarctic Peninsula region, and the incidence of mixed pairs. Morphometrics, population size and breeding success were examined in detail at King George Island. The northward distribution of South Polar Skuas extended to King George Island (62°11'S 59°00'W), with a small outlying population on Signy Island (60°45'S 45°36'W), whereas Brown Skuas did not breed further south than Anvers Island archipelago (64°46'S 64°03'W). Across the 500km hybrid zone, the proportion of South Polar Skua pairs increases to the south but varied due to availability of terrestrial resources.
Skua population sizes at Potter Peninsula / King George Island did not show a trend between 1994 and 2004. Breeding pair numbers fluctuated stronger in mixed pairs compared with pure species pairs. Breeding success of Brown Skua pairs showed lower fluctuations than in mixed pairs and South Polar Skua pairs.
Body size distribution of sympatric skuas from King George Island is clearly bimodal but overlaps considerably and hybrids can not be identified using conventional methods. A protocol using the molecular method AFLP was developed to allow objective species determination and the identification of hybrids. 14 polymorphic loci from 5 primer combinations assigned nearly all individuals to species and identified most hybrids. The method is used to get deeper insights into the skua hybrid zone.

WS

Experiences with the McMurdo Dry Valleys ASMA

ROPER-GEE, REBECCA (1) & PAMELA TOSCHIK (2)
(1) Antarctica New Zealand, Christchurch, New Zealand
(2) National Science Foundation's Office of Polar Programs, Arlington/USA
R.Ropergee@antarcticanz.govt.nz

An area of of ice-free land totalling 15,000 km^2 was designated as Specially Managed Area (ASMA) 2, McMurdo Dry Valleys, in 2004, following a joint proposal by New Zealand and the Unites States. The valleys are the largest expanse of ice-free ground in Antarctica, representing a quarter of the 0.3% of Antarctica which is ice-free. Cold desert soils millions of years old, unusual biological communities, special geological features and minerals and spectacular scenery are among the values protected.

The pressures managed are science and support, a small amount of public awareness activity and tourism. The need for systematic method of management of the area was first articulated at a workshop in 1995. The activities with potential for impacts and the relative sensitivity of ecosystem types was considered, as set out in Table 1. This work provided an important basis for development of the ASMA Management Plan.

Table 1: Environmental impact matrix for activities in the McMurdo Dry Valleys [1]

	Terrestrial			Aquatic			Glacial		
Activity	Mountain tops	Plateau	Slopes	Valley floor	Moss beds	Streams	Lakes	Accumulation	Ablation
Helicopter landings	M-H	L-M	H	L-M	H-X	H-X	L-M	L-M	L-M
Tent camp	H	L-M	M	L-M	X	X	M-X	L	M
Semi permanent camp	X	H-X	X	M-X	X	X	X	X	X
Fuel cache	M-H	L-M	M	L-M	X	X	H-X	X	X
Walking	M-H	M-H	L-H	L-M	M-X	M-X	L	L	L
ATVs	X	X	X	X	X	X	L-M	X	X
Diving							M-X		
Research plots	M	L-M	L-M	L-M	M-X	M-X	H	L-M	L-M
Isotope addition	H-X	H-X	H-X	H-X	H-X	H-X	H-X	H-X	H-X
Small collections	L	L	L	L	L-M	L-M	L	L	L
Blasting	H-X	H-X	H-X	M-X	X	X	X	X	X
Soil pits	H-X	M-X	M-X	M-X	M-X	M-X			
Hand coring	L-H	L-M	L-M	L-M	M-X	L-H	L-M	L-M	L-M
Power coring	M-X	M-X	M-X	M-X	H-X	H-X	H-X	M-X	M-X

Notes: L = low impact, M = moderate impact, h = high impact, x = unacceptable impact. More than one symbol indicates that classification would depend on the scale and exact location of the activity.

The Management Plan for the ASMA includes establishes Facilities Zones, a Tourism Zone and Special Features, and provides:

- an Environmental Code of Conduct for the McMurdo Dry Valleys for all visitors;
- Guidelines for the Conduct of Scientific Research;
- Guidelines for Facilities Zones;
- Guidelines for the Tourism Zone; and
- Guidelines for Special Features.

[1] Vicnent, W. F. (ed). 1996. *Environmental Management of a Cold Desert Ecosystem: the McMurdo Dry Valleys.* Desert Research Institute, University of Nevada, USA.

A Management Group has been established by the national programmes active in the Area (United States, New Zealand and Italy) to:
- oversee coordination of activities in the ASMA;
- ensure effective communication among those parties active in the Area;
- minimize the duplication of activities;
- evaluate the effectiveness of management activities;
- consider and coordinate establishment of new Facilities Zones;
- consider proposals for new designated helicopter landing sites;
- circulate tour operators' visit schedules; and
- maintain and make available reports of activities in the Area.

The Group operates largely by email and met for the first time in March 2005, when it reviewed the first season of implementation for the ASMA. A key lesson was the need to properly define all boundaries – the Special Features had been identified by point coordinates only and this has not been sufficient. There is also a need for further information about the nature of the sites and the protection they require. This may involve research and field work staged over a number of years. A monitoring and inspection programme is also to be developed.

Among the positives is that the ASMA is already developing further, with two new Special Features proposed and plans to improve guidance for camps. New Zealand and the United States have introduced training programmes for visitors to the Dry Valleys, and these are to be further developed with joint training materials including handbooks, posters and a video. Timely, targeted exchange of information is an important function of the group and essential for coordination. To facilitate this, plan documents, notifications of activities, visit records, reports, maps and articles are to be placed on a website for the ASMA (www.mcmurdodryvalleys.aq).

S VII
Abschätzung der physikalisch-morphologischen Eigenschaften sowie Akkumulation der polaren Schneebedeckung

ROTSCHKY, GERIT, WOLFGANG RACK & HANS OERTER
Alfred-Wegner-Institut, Bremerhaven
grotschky@awi-bremerhaven.de

Durch die Kombination verschiedener satellitengestützter aktiver Mikrowellensensoren, in erster Linie niedrig auflösendes Scatterometer und hochauflösendes SAR, soll ein Beitrag zur präziseren Abschätzung von Schneeeigenschaften sowie der räumlichen Variation der Akkumulation polarer Eisschilde geleistet werden. Scatterometer erlauben die Erfassung der Rückstreueigenschaften einer Oberfläche mit umfangreicher Blick- und Einfallswinkelgeometrie. Durch Ableitung bestimmter Parameter können Regionen gleicher Rückstreueigenschaften abgegrenzt werden. Innerhalb gewisser Schneedeckenklassen ist es möglich, Akkumulationsraten durch einfache lineare Regression aus SAR-Daten zu parametrisieren und dadurch zu einer flächenhaften, hochaufgelösten Abschätzung der Massenbilanz einer Region zu gelangen. Voraussetzung hierfür sind Bodenreferenzdaten, welche in Form von Schneepegelmessungen, Schneeschachtstudien, Firnkernbohrungen und Bodenradarmessungen (GPR) zur Verfügung stehen. Die Ergebnisse werden verglichen mit einer aktuellen Akkumulationskarte für Dronning Maud Land, Antarktis, interpoliert aus ca. 120 Firnkerndaten, woraus sich die Repräsentativität derartiger Punktmessungen für den vorliegenden Raum bewerten lässt.

P 1

Antarctic seabirds: status, population and demography in Admirality Bay, King George Island *

SANDER, MARTIN, TATIANA C. BAYS, SABRINA R. BALBÃO, ANA P.B. CARNEIRO, ERLI S. COSTA, NICOLAS E. MASCARELLO, TATIANA D. OLIVA & CESAR R. SANTOS
Universidade do Vale do Rio dos Sinos, São Leopoldo, Brazil
sander@bios.unisinos.br

About bird populations two main questions have attempted to answer by researches on Antarctic seabirds: why do number in the area change from time to time, and why are numbers of a particular species higher in some areas than others? The Admirality Bay, is located in the King George Island is consider and Antarctic Specially Managed Area (ASMA). Has 131 km² of total surface; however only 19 Km² represent areas free from ice were 13 seabirds species use for nesting.
Admirality Bay is an area of environmental, historical, scientific, and aesthetic values. It keeps remains from the sealing and whaling periods back in the 19th and early 20th centuries. Five nations: Poland, Brazil, United States, Peru and Ecuador, have active research activities in the area. They operate two permanent stations (Poland and Brazil); one permanent summer station (Peru) and two permanent summer camps (USA and Ecuador). The Area includes one ASPA (N° 128 - former SSSI N° 8) on the west coast of Admirality Bay and a Historical Monument (N° 51: a grave) at the Polish Station. The area of Admirality Bay is visited by scientific expeditions and tourists. Won't be presented information on the birds of the areas SSSI 8 and Point Thomas. Population parameters and the demography aspects of the seabirds breeding species will be presented in an individual way and in sensibility categories. Also the direct registrations of the impacts of the human activity and their consequences should be presented on the community of birds in the Admirality Bay in the future.

* PROANTAR NET-2 sponsors: MMA/CNPq/SeCIRM

P 46

Regionale Geoidbestimmung in der Antarktis

SCHEINERT, MIRKO, JAN MÜLLER & REINHARD DIETRICH
Institut für Planetare Geodäsie, University, Dresden
mikro@ipg.geo.tu-dresden.de

Die neuen Satellitenmissionen CHAMP und GRACE (sowie GOCE ab 2006) liefern Beobachtungsdaten für die globale Bestimmung des Schwerefeldes der Erde mit bisher nicht erreichter Genauigkeit und Homogenität.Hochauflösende Schwerefeldmodelle werden darüberhinaus aus einer Kombination mit terrestrischen Schweredaten gewonnen. Im Bereich der Antarktis ist der Beitrag zur globalen Schwerefeldbestimmung aus den folgenden zwei wesentlichen Gründen problematisch: Zum einen kommt es aufgrund der Satellitenbahnen zu einem polaren Datenloch, zum anderen die Erfassung terrestrischer Schweredaten in der Antarktis bisher sehr lückenhaft.
Hier setzt das geodätische Verfahren der regionalen Geoidbestimmung an. Liegen - wenn auch regional begrenzt - Schweredaten vor, können diese genutzt werden, um die Schwerefeldinformation aus globalen Modellen zu verbessern. Bisherige Ergebnisse bei der Anwendung dieser Methode sollen vorgestellt werden. Es wird gezeigt, wie Schweredaten länger

zurückliegender und moderner Beobachtungskampagne in der Antarktis für diese Aufgabe genutzt werden. Insbesondere das Verfahren der Fluggravimetrie liefert hierbei wertvolle Information und ist auch für zukünftige Kampagnen die am meisten erfolgversprechende Methode. Weiterhin soll der Beitrag die Verbindung zu den Aufgaben der Internationalen Assoziation für Geodäsie (IAG) erläutern, deren Projekt "Antarktisches Geoid" durch den Erstautor geleitet wird. Neben der Lösung der geodätischen Aufgabe der Bestimmung des äußeren Schwerefeldes im Bereich der Antarktis soll aufgezeigt werden, wie ein verbessertes antarktisches Geoid auch zur Beantwortung geophysikalischer und glaziologischer Fragestellungen beitragen kann.

P 60

Validierung und Interpretation von Satellitendaten in Dronning-Maud-Land, Ostantarktis, mit Hilfe von geodätischen, geophysikalischen und glaziologischen Methoden -- Beobachtungskampagnen 2003-2005 und erste Ergebnisse

SCHEINERT, MIRKO (1), LUTZ EBERLEIN (1), ANDREAS GROH (1), LISSY HENNIG (1), WOLFGANG RACK (2), HELGARD ANSCHÜTZ (2), BETTINA BAYER (2), YANNIK BEHR (2), MARTIN HORWATH (1), JAN MÜLLER (1), SWEN ROEMER (1), SVEN RIEDEL (2), DANIEL STEINHAGE (2), REINHARD DIETRICH (1), WILFRIED JOKAT (2) & HEINZ MILLER (2)
(1) Institut für Planetare Geodäsie, University, Dresden
(2) Alfred-Wegener-Institut, Bremerhaven
mikro@ipg.geo.tu-dresden.de

Die TU Dresden und das AWI Bremerhaven bearbeiten gemeinsam das durch die DFG im Rahmen des Programms "Geotechnologien" geförderte Forschungsprojekt VISA.
Die Zielstellung dieses Projektes umfaßt die Validierung, Verdichtung und Interpretation von Satellitendaten zur Bestimmung von Magnetfeld, Schwerefeld, Eismassenhaushalt und Krustenstruktur im Bereich des Dronning-Maud-Landes, Ostantarktis. Eine besonders auch für weitere interdisziplinäre Untersuchungen wichtige Größe ist der Massenhaushalt des antarktischen Eisschildes, der nur durch eine Kombination der verschiedenen Verfahren abgeleitet werden kann. Dazu wurden in den Antarktissaisons 2003/04 und 2004/05 flugzeuggestützte und terrestrische Beobachtungen durchgeführt. Die angewendeten geodätischen, geophysikalischen und glaziologischen Methoden werden beschrieben, um Höhen bzw. Höhenänderungen, Schwere und Akkumulationsmuster zu erfassen, aber auch um Aussagen über die Krustendynamik mittels seismischer sowie GPS-Beobachtungen auf Fels zu erhalten. Dabei wird insbesondere auf die Beobachtungskampagne 2004/05 im Gebiet des westlichen Dronning-Maud-Landes (Heimefrontfjella) eingegangen. Erste Ergebnisse der Analysen aus den verschiedenen Teilprojekten werden vorgestellt.

S XI

Bilanzierung von Methanemissionen in Tundragebieten am Beispiel des Lena Deltas, Nordsibirien, auf der Basis von Fernerkundungsdaten und Geländeuntersuchungen

SCHNEIDER, JULIA (1, 2), ARNO KLEBER (2) & DIRK WAGNER (1)
(1) Alfred-Wegener-Institut, Potsdam
(2) Institut für Geographie, University, Dresden
schneider.jul@web.de

Methan gehört neben Kohlendioxid und Distickstoffoxid zu den wichtigsten klimarelevanten Spurengasen, hat ein höheres relatives Treibhauspotential als Kohlendioxid und trägt zu etwa 19 % zur globalen Klimaerwärmung bei. Feuchtgebiete der subarktischen und arktischen Breiten nördlich 60° N zählen zu den wichtigsten natürlichen Methanquellen. Nach Schätzungen beträgt die Methanemission der arktischen und subarktischen Feuchtgebiete zwischen 14 und 42 Tg/a oder 2,6 bis 7,0 % der gesamten globalen Methanemission. Die Unsicherheiten basieren auf der Tatsache, dass nur eine geringe Anzahl vor allem von Langzeituntersuchungen zu den Methanemissionen in arktischen Ökosystemen, besonders in den Tundren Sibiriens, bislang durchgeführt wurden.
Im Rahmen des BMBF-Verbundvorhabens Russisch-Deutsche Zusammenarbeit „System-Laptev-See 2000" finden im Gebiet des Lena Deltas bereits seit 1998 Studien zu den Methanflüssen statt. Es wurden zahlreiche direkte Messungen durchgeführt.
Ein Upscaling der Methanemissionen basiert oftmals auf einer Multiplikation der durchschnittlichen Methanemissionswerte der einzelnen Standorte und der Fläche der Ökosysteme oder der Fläche der Feuchtgebiete im globalen Maßstab. Die kleinräumige Variabilität der Einflussfaktoren auf die zugrunde liegenden mikrobiellen Prozesse der Methanogenese und Methanotrophie wird bisher nicht berücksichtigt.
Die Fernerkundung mit optischen Sensoren ist ein direktes Beobachtungsverfahren der Erdoberfläche. Die multispektralen Daten des LANDSAT-7 ETM+ Sensors sind für die Klassifizierung der Vegetation, Hydrologie, Geologie und Böden gut geeignet. Die genannten Faktoren sind maßgeblich bestimmend für die Bildung und Freisetzung von Methan in der sibirischen Tundra. Es wurden zehn Oberflächenbedeckungsklassen in Abhängigkeit von der Vegetation und Hydrologie sowie ihre Flächenanteile an der Gesamtfläche des Lena Deltas (29.000 km²) bestimmt. Die Klassen „Feuchte, von Seggen und Moosen dominierte Tundra" und „Nasse, von Seggen und Moosen dominierte Tundra" sowie die „Trockene bis feuchte, von Zwergstrauch dominierte Tundra" verfügen über ein sehr hohes Methanemissionspotential und bedecken 34,8 % der Gesamtfläche des Lena Deltas oder 10100 km². Hinzu kommen die Klassen „Gewässer" (30,6 %) und „Flachwasser" (5,5 %) mit erhöhtem Methanemissionspotential. Diesen Klassen werden die gewonnenen Felddaten zugeordnet, das erlaubt eine Abschätzung der Methanemissionen des Lena Deltas in engem Zusammenhang mit den Einflussfaktoren und den Anteil des Lena Deltas an der globalen Methanemission.

P 81

Gefrorene Hangsedimente als Archive Holozäner Umwelt- und Klimaänderungen im Umfeld des El´gygytgyn- Impaktkraters, Tschukotka

SCHWAMBORN, GEORG (1), GRIGORIJ FEDOROV (2), HANNO MEYER (1) & LUTZ SCHIRRMEISTER (1)
(1) Alfred-Wegener-Institut, Potsdam
(2) Arctic and Antarctic Research Institute, St. Petersburg, Russia
gschwamborn@awi-potsdam.de

Permafrostsedimente und Grundeisvorkommen wie z.B. Eiskeile, Segregations- und Textureis dienen als wertvolle Indikatoren Holozän-zeitlicher Umweltdynamik im Umfeld des El´gygytgyn-Impaktkraters, Tschukotka. Nach einer Georadar-Vorerkundung wurden Sedimentstratigraphien zweier Hangfussformationen beprobt und auf ihre Alter, die mineralogische Zusammensetzung, die Zusammensetzung der stabilen Sauerstoffisotope im Grundeis und die Quarzkornformen und -oberflächen untersucht. Komplementär wurden Eiskeilformationen beprobt und sauerstoff-isotopisch analysiert. Entlang den Sedimentsequenzen

markieren deutliche Maxima und Minima in den Sediment-Eigenschaften Umweltbedingungen, die mit einer relativ warmen und humiden Periode im Frühholozän bzw. mit einsetzender Trockenheit im Spätholozän in Verbindung gebracht werden. Diese Befunde werden durch die Interpretation der sich verändernden Eiskeilmorphologie unterstützt. Das resultierende Sedimentationsmodell illustriert eine warmzeitliche, solifluktionale Terrassenformation an einem kontinentalen Permafroststandort.

S IX

Breeding performance of tundra waders in response to rodent abundance and weather from Taimyr to Chukotka

SOLOVIEV, MIKHAIL (1), CLIVE MINTON (2) & PAVEL TOMKOVICH (1)
(1) Department of Vertebrate Zoology, University, Moscow, Russia
(2) Australasian Wader Studies Group, Beaumaris, Australia
soloviev@soil.msu.ru

Nesting success, rodent abundance and summer temperatures across wader breeding ranges in eastern Siberia were analysed for four Arctic waders in conjunction with the data on proportions of juveniles on the non-breeding grounds in South East Australia in 1979-2003 with view of revealing response of wader populations to varying environmental conditions during breeding season. The effect of temperature on juvenile proportion was increasing in a series Sharp-tailed Sandpiper *Calidris acuminata* – Curlew Sandpiper *C. ferruginea* – Red-necked Stint *C. ruficollis* – Turnstone *Arenaria interpres*, which to some extent corresponds to increasing severity of their breeding environment. Juvenile proportions on non-breeding grounds increased with increase of rodent abundance across breeding range in Sharp-tailed Sandpiper and Red-necked Stint, but not in Turnstone and Curlew Sandpiper. Nesting success measured within breeding ranges depended on July temperature only in Turnstone, but did not depend significantly on rodent abundance in the studied species. Thus, breeding performance of Arctic waders at a level of the flyway populations depends on air temperature and rodent abundance during summer, but relative role of the above environmental factors differs among species. Mean July temperature was increasing from 1979-2003 across the breeding range of the Red-necked Stint, while juvenile proportions were increasing not only in this species, but also in Sharp-tailed Sandpiper during this period.

P 72

Investigations of the hydrological components of the Greenland ice shield using the regional atmospheric model REMO

SOOD, ABHA & PETER LEMKE
Alfred-Wegner-Institut, Bremerhaven
assod@awi-bremerhaven.de

Numerical simulations of regional climate model (REMO) are used to determine the mass balance of the Greenland ice sheet, and the contributions to the fresh water flux into the neighbouring oceans. For this purpose the parameterisation of the thermal and hydrological processes on land and on ice sheets is improved or newly developed and implemented in the model. The reference run and the improved simulations will be compared and validated. A 10-year run (1986-1995) is then performed for interannual variability and comparison with available satellite data.

P 61

Charakteristika des Eis-Fels-Übergangs abgeleitet aus flugzeuggestützten EMR-Messungen um NorthGRIP

STEINHAGE, DANIEL, UWE NIXDORF & HEINZ MILLER
Alfred-Wegner-Institut, Bremerhaven
dsteinhage@awi-bremerhaven.de

Seit 1994 werden vom Alfred-Wegener-Institut (AWI) flugzeuggestützte Eisdickenmessungen mit dem elektromagnetischen Reflexionsverfahren in den Polarregionen durchgeführt. Mit der mit Ski ausgerüsteten Polar2, eine zweimotorige Do228-101, wurde im Sommer 1996 die erste Messkampagne vom Camp der Eiskerntiefbohrung NorthGRIP (75,1°N; 42,3°W) aus geflogen. Weitere Meßkampagnen vervollständigen die engmaschige Kartierung der näheren Umgebung von NorthGRIP sowie etwas gröber der in Nordosten angrenzenden Einzugsgebiete der Auslaßgletscher Nioghalvfjerdensfjorden, Zachariae Isstrøm und Storsstrømmen. Dabei wurden neben dem EMR-System zwei geodätische GPS-Empfänger, ein Laseraltimeter sowie ein Magnetometersystem eingesetzt.

Im Fokus der EMR-Meßflüge in der Umgebung von NorthGRIP, hier wurde eine 200 km x 200 km große Fläche um die Eiskerntiefbohrung kartiert, stand die innere Struktur des Eisschilds und das subglaziale Relief, um wertvolle Hinweise für die Interpretation des Eiskerns zu erhalten. Bei den Messungen zwischen NorthGRIP und Station Nord (81,7°N; 17.8°W) stand die Bestimmung der Eismächtigkeitsverteilung als wichtige Eingangsgröße für Massenbilanzstudien im Vordergrund. In beiden Fällen wurden lediglich die Laufzeitmessungen der EMR-Profile ausgewertet. Darüber hinaus können weitere Informationen über den Eis-Fels-Übergang aus den Amplituden der an der Eisunterseite reflektierten elektromagnetischen Wellen abgeleitet werden. Insbesondere hat das in der NorthGRIP Eiskerntiefbohrung festgestellte basale Schmelzen des Eisschilds großen Einfluss auf die Reflektivität des Untergrunds. Dieses ist im Hinblick auf Untersuchungen zum Verlauf der Auslaßgletscher von großem Interesse, wie auch zum Ausdehnungsbereich des östlich von NorthGRIP gelegenen nordostgrönländischen Eisstroms NEGIS (NorthEast Greenland Ice Stream), dem einzigen mit den großen westantarktischen Eisströmen vergleichbaren in Grönland.
Das Poster wird einen Überblick über die aus den Aero-EMR-Messungen abgeleiteten Charakteristika des nordöstlichen grönländischen Eisschilds geben.

P 55

Höhenänderung, Fließgeschwindigkeit und Deformation im westlichen Randbereich des grönländischen Inlandeises zwischen 1991 und 2004

STOBER, MANFRED
Hochschule für Technik, Stuttgart
manfred.stober@hft-stuttgart.de

Einleitung und Zielsetzung:
Seit 1991 bis nunmehr 2004 werden an der Station „Swiss-Camp" terrestrische geodätische Messungen zur Bestimmung von Höhenänderung, Fließgeschwindigkeit und Deformation des grönländischen Inlandeises durchgeführt. Das Untersuchungsgebiet befindet sich auf dem Inlandeis (Breite = 69° 34' N, Länge 49° 19.3' W) ca. 80 km nord-östlich des Küstenortes Ilulissat (Jakobshavn) in der Höhe der Gleichgewichtslinie (ca. 1150 m). Im Jahr 2004 wurde das

Testgebiet erweitert durch eine neue Deformationsfigur (ST2) in 1000 m Höhe, die mit Pegeln vermarkt und erstmals vermessen wurde.
Ziel der Untersuchungen ist es, die Veränderung der Eismassen durch unmittelbare terrestrische geodätische Messung der Eisoberfläche zu erfassen. Durch Einbeziehung des neuen Messgebietes ST2 kann künftig der Einfluss der Höhenlage im Ablationsgebiet näher untersucht werden.
Ergebnisse:
Die Fließgeschwindigkeit (horizontal) beträgt im Durchschnitt 0,318 m/d, mit geringer Tendenz zu zunehmender Geschwindigkeit im Lauf der Jahre. Die Fließrichtung (Azimut = 260,2 gon) zeigt den zu erwartenden Abfluß in Richtung Jakobshavn Isbrae, dem schnellsten Gletscher der grönländischen Westküste. Da dieser als Einzugsgebiet immerhin schon ca. 4,0 – 6,5 % der gesamten grönländischen Eismasse umfasst (WEIDICK 1995, ECHELMEYER et al. 1991, PELTO&HUGHES 1989), kommt dem Untersuchungsgebiet eine hohe Bedeutung zu.
Die wichtigsten Ergebnisse folgen aber aus den Höhenmessungen. Aus Eishöhen des Gebietes in verschiedenen Jahren ergibt sich im Zeitraum 1991 – 2002 im Durchschnitt eine jährliche Höhenabnahme von –0,22 m/a. Dieselbe Höhenabnahme folgt aus dem Vergleich flächenhafter topographischer Aufnahmen und digitaler Geländemodelle der Eisoberfläche. Die Höhenabnahme an dieser Stelle bestätigt und validiert damit die Ergebnisse aus flugzeuggestützter Laser-Altimetrie (KRABILL et al. 2000).
Der Zeitraum 2002-2004 zeigt allerdings stark abweichende Werte: Die Höhenabnahme beträgt neuerdings –0,8 m/Jahr und ist somit viermal stärker als der langfristige Trend! Die im selben Zeitraum gemessene Lufttemperatur zeigt ebenfalls abnormale Erwärmung.
Auch die Analyse der Strainraten (aus der Verformung des Deformationsnetzes) weisen auf eine Änderung seit 2002 hin. Während vorher nahezu einheitliche Werte zwischen den Kampagnen auftraten, haben sich jetzt die Verzerrungsraten signifikant verändert. Eine Ursache hierfür ist nicht eindeutig festzustellen.
Nutzung als Validierungsgebiete für Fernerkundung:
Die beiden Testgebiete „Swiss-Camp“ und „ST2“ sind zwar flächenmäßig klein, ca. jeweils 4 km^2. Da sie aber sehr genau terrestrisch vermessen sind, können sie als ground control für Fernerkundungsverfahren (z.B. ICESat, CryoSat, ERS1/2) empfohlen werden. Die größeren Höhenunterschiede und eine unregelmäßige Topographie, wie sie vor allem bei ST2 herrschen, stellen bei den Fernerkundungsverfahren Fehlerquellen dar, die es zu überprüfen gilt. Hierzu wird bei CryoSat auf Level-2-Daten zurückzugreifen sein. Typisch für die Randzone sind auch der unregelmäßige Niederschlag, der die Eindringtiefe der CryoSat-Signale beeinflusst. Eine Validierungsmöglichkeit ergibt sich hierbei durch Einbeziehung der Level-1-Daten.

P 8
DNA markers for studing Gentoo Penguins at Antarctic Peninsula

TELEGEEV, GENNADY D. (1), ALEVTINA S. LEGEYDA (1, 4), MYKHAYLO V. DYBKOV (1), ALEXEY S. SAVOV (2), BOYKO VACHEV (3) & VOLODYMYR F. BEZRUKOV (4)
(1) Institute of Molecular Biology and Genetics of NAS, Kyiv, Ukraine
(2) Medical University, Sofia, Bulgaria
(3) Institute for Nuclear Research and Nuclear Energy, Sofia, Bulgaria
(4) National University, Kyiv, Ukraine
g.d.telegeev@imbg.org.ua

The understanding of the molecular, physiological and behavioral mechanisms, which help Antarctic organisms to be adapted to extreme polar conditions, provides penetration into

evolutional and biological principles of animal's development and survival. The study of high polymorphic DNA markers will be helpful for the determination of the levels of genetic and phenotypic variability and for evaluation of the genetic structure in investigated species of gentoo penguins. It is sometimes difficult to determine the sex of monomorphic seabirds species, though knowledge is very important for basis research such as molecular ecology and development biology. Penguins show little sex-linked size and plumage dimorphism. The first objective of our work was to evaluate the sex in gentoo penguins as well as PCR efficiency to do this. The blood samples were collected at Petermann, Livingstin and Wiencke Islands by the members of Bulgarian and Ukrainian Antarctic expeditions during summers 2002-2004. It was analyzed 233 probes (146 from Piterman Island and 87 from Livingston Island). Female/male index for population of Piterman Island was 0,337 and 0,39 for Livingston Island. The second goal was to estimate the possibility survival using RAPD (random amplified polymorphic DNA) for studying penguin's populations. DNA samples were analyzed using three primers OPA-10, OPP-12, OPM-02 (Operon Technologie, Alameda, USA) producing 25 scorable bands, 10 of which were polymorphic.Amplified DNA fragments of 150-1500 bp were scored as present (1) or absent (0) in RAPD fingerprints. The calculation of the similarity index (index Czekanowski) S » 0,9 did not revealed significant level of polymorphism between two observed penguins groups (Piterman and Wiencke Islands), suggesting that they penetrate into the same population. The taxonomic status of Pygoscelis papua penguins still is not clear. In present study it was also carried out the investigation of 102 penguins from the population nearly Bulgarian Antarctic Base "St. Kliment Ohridski" and 159 penguins from the population close to Ukrainian base "Akademik Vernadsky". DNA analyses include study of 3 microsatellite polymorphic markers – RM3, AM12, RM6. The results obtained from the screening of the samples revealed that the markers AM12 and RM6 are monomorphic. The size of the allele of RM6 is 168 bp., the allele of AM12 still is not determined. For the marker RM3 it was observed only two alleles one with size of 221 bp and another with size of 217 bp. The calculation of Fst value did not revealed significant genetic distances between two investigated populations of Pygoscelis papua, and couldn't confirm that they belong to different subspecies. Results of this work will be used for analysis of population penguins at Petermann, Livingston and Wiencke Islands and help to clarify the phylogenetic and taxonomic status of Pygoscelis papua.

P 27

Measurements of atmospheric mercury species in polar regions

TEMME, CHRISTIAN (1), RALF EBINGHAUS (1) & JÜRGEN W. EINAX (2)
(1) Institute for Coastal Research / Physical and Chemical Analysis, GKSS Research Centre, Geesthacht
(2) Institut für Anorganische und Analytische Chemie, University, Jena
christian.temme@gkss.de

Mercury and many of its compounds behave exceptionally in the environment due to their volatility and capability for methylation, in contrast with most of the other heavy metals. Long-range atmospheric transport, formation of toxic methylmercury compounds and their bioaccumulation in the aquatic food chain have made it subject of global research activities including polar regions.
Hg-species play a key role in the deposition mechanism of atmospheric mercury.
In our work we present concentration data of different atmospheric mercury species and indications for a variety of dynamic species transformations of atmospheric mercury during polar spring and summer.

The first continuous high-time-resolution measurements of total gaseous mercury (TGM) in the Antarctic covering a 12-months period were carried out at the German Antarctic research station Neumayer (70o39'S, 8o15'W) between January 2000 and February 2001. It was reported that Atmospheric Mercury Depletion Events (AMDEs) occur in the Antarctic after polar sunrise, as shown for Arctic sites before. AMDEs in the north and south polar regions are strongly correlated with tropospheric ozone depletions. Polar mercury and ozone depletions coincide with simultaneous increases in tropospheric BrO? mixing ratios during spring as shown by differential optical absorption spectroscopy measurements from the ground and from satellite borne instruments.
The measurements reported here comprise a comprehensive dataset of different atmospheric mercury species in Antarctica from Australian summer 2000/01. TGM concentrations measured during the time period December 23, 2000 to February 5, 2001 represent typical southern hemispheric background values with a mean of 1.1 ± 0.3 ng m-3. However, TGM concentrations during sunlit summer period varied more than during the dark winter months and depletions with concentrations < 0.3 ng m-3 were observed. Concentrations of Reactive Gaseous Mercury (RGM) varied between 5 pg m-3 to maximum levels of more than 300 pg m-3. These peak concentrations exceed even those found in the vicinity of strong anthropogenic sources such as coal-fired power plants and waste incinerators.
First results from an international field study in Ny Ålesund, Spitzbergen (78o55'N, 11o90' E) are also presented in this poster, showing that strong AMDEs occurred during Arctic springtime 2003. RGM concentrations increased to more than 250 pg m-3 during several AMDEs which were also associated with ground-level ozone depletions. A possible explanation for mercury depletion events may involve chemical or photochemical oxidation of Hg0 to Hg2+ [resulting either in particle-associated mercury (Total Particulate-Phase Mercury: TPM) and/or reactive gaseous mercury (RGM) species] and significantly enhanced deposition fluxes of mercury leading to unequivocally increased input of atmospheric mercury into the polar ecosystem.

P 13
Meiofauna studies in a shallow Antarctic bay - species, models and diversity

VEIT-KÖHLER, GRITTA
DZMB - Forschungsinstitut Senckenberg, Wilhemshaven
gveit-koehler@senckenberg.de

The shallow water system of Potter Cove, King George Island, Antarctica has been the target area of a large variety of biological investigations carried out by scientists accommodated at the argentinian Jubany base and the affiliated german Dallmann laboratory. As far as the meiofauna is concerned, until now ecological studies on higher taxon level as well as detailed studies on benthic foraminiferans and harpacticoid copepods have been performed.

A first investigation on benthic copepods from Potter Cove showed abundances and biomass being positively correlated with several sediment-related factors such as mass and quality of organic material and concentration of chloroplastic pigments as well as their decomposition products. Physical disturbances negatively influence harpacticoid copepods, therefore abundances increase with depth.

As taxonomy is essential for sound ecological work, the description of so far unknown species should always be an additional aim when sampling in these remote areas. So the largest benthic harpacticoids of the zone, which were only found at the calm deeper sites of Potter Cove, have

been described: *Pseudotachidius jubanyensis* Veit-Köhler and Willen, 1999 and *Scottopsyllus (S.) praecipuus* Veit-Köhler, 2000. Recently a further harpacticoid species *Alteutha potter* Veit-Köhler and Fuentes, in press has been found to be common in the Potter Cove plankton.

Reproductive strategies of polar invertebrates are always intriguing but in the case of slowly developing, in low densities occurring benthic copepods not at all measurable in the field. So a highly significant multiple model for the estimation of embryonal development time and generation time of copepods had to be calculated, making use of a multiple linear regression on the base of a large-scale collection of literature data. Obviously the development times of polar harpacticoids are much longer than expected.

The first species-level investigation of the harpacticoid copepod assemblage for the Antarctic has been carried out in Potter Cove in order to determine the role of biotic and abiotic sediment parameters for the presence and abundance of the harpacticoid species. Special attention is paid to sound statistics, therefore an until now for shallow polar waters never realized complete set of samples per station has been investigated. More than 30 species of harpacticoid copepods could be identified until now. They belong to the following families and genera: Tisbidae (*Tisbe spec., Scutellidium spec.*), Peltidiidae (*Eupelte spec.*), Adenopleurellidae, Cletodidae, Thalestridae, Pseudotachidiidae (Paranannopinae gen. nov., spec. nov., *Idomene spec.*), Idyanthidae, Ameiridae, Argestidae (Argestidae gen. spec., *Eurycletodes spec.*), Miraciidae (Diosaccinae gen. nov, spec. nov.), Ectinosomatidae (*Pseudobradya spec., Bradya spec., Ectinosoma spec.*), and the already described Paramesochridae (*Scottopsyllus (S.) praecipuus*) and Pseudotachidiidae (*Pseudotachidius jubanyensis*).

WS

Mycobiota of the Antarctic Polar Stations area on the King George Island

VLASOV, DMITRY & VYCHESLAV KRYLENKOV
Biological Research Institute, St. Petersburg, Russia
Dmitry.Vlasov@mail.ru

The structure and composition of microbial communities are the indicators of the anthropogenic influence degree on the Antarctic ecosystems. The main aim of the work is to study the fungal diversity in the inhabiting and working zones of polar stations as well as natural ecosystems on the King George Island. The material has been collected in the period of 49 Russian Antarctic Expedition season works. Microbiological analyses of air environment (indoor and outdoor) have been made by the sedimentation method (using the artificial nutrient media – Chapek, Saburo, potato-glucose agar). The samples of natural damaged rocks (basalt and quartz), preliminary soil (under the glues and lichens) as well as building materials (concrete, metal and wooden constructions with attributes of biodeterioration) have been analyzed by complex of mycological methods. More than 70 samples of different substrates were collected on the Russian, Chinese, Korean, Uruguayan, Chilean and Czech Republic (Nelson Island) Polar Stations and some biomonitoring stations on the King George, Ardley and Nelson Islands.
As result, microscopic fungi (micromycetes) of different taxonomic and ecological groups were isolated from the collected samples. More than 25 species of micromycetes were found out in the air environment of the inhabiting and working zones of polar stations. The dominant group was formed by species of Aspergillus, Penicillium, Cladosporium. The number of CFU (colonies forming units) was from 20 to 350 CFU on 1 m^3 of indoor air. The widespread species of fungi

capable to develop on the different substrates in varying environment have been revealed. Some of them can be reason of people health worsening.
Fungal species as well as bacteria have been detected in the samples of damaged concrete and metal constructions. It was shown that the microorganisms take part in the deterioration processes of anthropogenic materials in the polar stations environment. The species of Alternaria, Cladosporium, Exophiala and Phoma were typical inhabitants on destroying materials.
The main components of the Antarctic lithobiotic communities are the lichens. The dominant species on the rocks in the King George Island is *Usnea aurantiaco-atra* (Jacq.). The processes of preliminary soil formation are connected with the accumulation of lichens and glues biomass. But the micromycetes also play important role in processes of the natural rocks transformation. They were revealed in the samples of the basalts and quartz. Black colored micromycetes of genera Cladosporium, Phialophora, Exophiala as well as microcolonial yeast-like fungi have been isolated from destroying rock substrates more often. But Penicillium spp. were dominant in the samples of preliminary soil (under the glues and lichens talus). The number of micromycetes (on the average) was 400 CFU on the 1 gram of soil. The localization of microbial colonies on the rocky substrates has been studied by the method of scanning electron microscopy.
We are very grateful to O.S. Saharov and V.V. Lukin for the help in the works organization.

S VIII

Nutzung des SCAR Composite Gazetteer für großmaßstäbige Anwendungen - eine Pilotstudie

Using the SCAR Composite Gazetteer place-names for large scale applications – a pilot study

VOGT, STEFFEN
Institut für Physische Geographie, University Freiburg
steffen.vogt@geographie.uni-freiburg.de

Named locations are an easy way to describe or identify real world locations, much more intuitive to use than for example geographic coordinates. The SCAR Composite Gazetteer of Antarctica (SCAR CGA) is a priceless resource for named locations in Antarctica and a crucial component of the emerging Antarctic Spatial Data Infrastructure (AntSDI). A gazetteer is a directory of place-names each of which is associated with information regarding position. Thus each place name in the gazetteer can be related to an identifiable place in the real world. The SCAR CGA is a compilation of Antarctic place-names officially recognized by SCAR member countries. It contains more than 34 000 place-names. Each name is associated with geographic coordinates describing its position.
In terms of large scale applications for various reasons many coordinates listed in the SCAR CGA can be regarded as only approximate. In case of multiple names for one feature often coordinates for the very same feature but originating from different countries vary considerably. This is not only confusing but can even be dangerous in case of SAR activities.
In a pilot study the accurate topographic SCAR KGIS data base has been used to to solve the 'One pair of coordinates per SCAR CGA feature' problem inherent to the SCAR CGA and to relocate many place-names to more accurate positions. Based on the pilot study data set a hierarchical structure for Antarctic place-names is proposed to enable e.g. more intelligent search algorithms.
There are more than 1000 officially registered place-names on King George Island providing names for approximately 620 geographic features. Many locations are named by two or more

countries. Sometimes the names differ only by the generic part of the name, sometimes the same geographic feature has been given entirely different names by different countries. In addition to the officially registered names there are many more unofficial names used in maps, charts, or publications.
To identify the named features on King George Island that are listed in the SCAR CGA we drew on maps, sketches and gazetteer descriptions from the respective naming countries that show or describe locations of place-names. To relocate the reference point(s) for the named feature to a single and more accurate position we used the SCAR KGIS data base, an orthorectified satellite image and additional maps.
A hierarchy for the place-names has been introduced to allow for automatic, scale depended representation of names and for more advanced search algorithms build on place-names. The parent-child relationships are classified into a restricted set of relationship types to make the gazetteer a semantically richer resource. The differences and possible advantages to other proposed hierarchies for Antarctic place-names are discussed.
It is planned to provide the pilot study data set as an OGC compliant web service (OGC WFS-G). In an open standards based environment the gazetteer then will be interoperable with value adding services such as geocoders, catalogue services with search-and-retrieval based on place-names, and the like. That way the pilot study on King George Island might serve as a demonstrator project of the potential use of the SCAR CGA in the Antarctic Spatial Data Infrastructure.

P 15

Responses of the pelagic tunicate *Salpa thompsoni* to an iron induced phytoplankton bloom in the Southern Ocean

VON HARBOU, LENA (1), ILKA PEEKEN (2) & ULRICH BATHMANN (1)
(1) Alfred-Wegner-Institut, Bremerhaven
(2) Leibniz-Institut für Meereswissenschaften, University, Kiel
lharbou@awi-bremerhaven.de

The pelagic tunicate *Salpa thompsoni* is an important member of Southern Ocean mesozooplankton. In the last decades, its distribution has extended southward with the declining ice coverage in certain Antarctic regions (Loeb et al 1997, Atkinson et al 2004). They especially proliferate in areas with Chlorophyll a concentrations below 1 µg L-1 (Perissinotto et al 1998) as higher particles loads seemingly harm salp feeding (Harbison et al 1986). During the European Iron Fertilisation EXperiment (EIFEX, 21.01. – 25.03.2004), an eddy in the Southern Polar Frontal Zone was fertilized twice with Fe(II)SO4 to follow the build-up and fate of an iron induced bloom and the various pathways of fixed carbon. The fertilized waters ("in-patch") of the eddy reached maximum chlorophyll (Chl a) concentrations of ca. 2.9 ug L-1 from surface down to 80 m and spread over ca. 500 km2 at the end of the experiment. Salp abundance and size decreased generally over time following their seasonal cycle but they disappeared earlier in fertilized waters. Gut fluorescence of salps was high indicating a strong grazing impact of salps in both areas at the beginning of the experiment. Furthermore, salps from in-patch stations showed significantly higher gut fluorescence than salps from out-patch stations with 0.69 ug and 0.28 ug Chl a Ind-1 with 3 cm body length, respectively. Microscopy and HPLC analysis revealed that the phytoplankton composition of adjacent waters down to 500 m was reflected in the salp guts and changed with the developing bloom. However, salps generally showed a higher phaeopigment to Chl a ratio than found in the water masses due to digestion. Although production rates of fecal pellets did not alter with Chl a concentrations and ranged between 0.5 to 1.0 fecal pellet Ind-1h-1 for in- and out-patch stations, the ratio of Phaeopigments to Chl a was significantly lower in guts and fecal pellets from in-patch compared to out-patch animals

supposing a less effective digestion at higher food supply. In this study, we could show the impact of a changing diet on individual salps and discern effects on the salp population. These findings will help to understand the salp distribution especially in the Southern polar sea and their possible impact on the Antarctic food web and downward fluxes.

S XI

Methane fluxes, microbial activities and community structures in a wet tundra of the Lena Delta

WAGNER, DIRK (1), ANDREAS GATTINGER (2), ANDRÈ LIPSKI (3) & MICHAEL SCHLOTER (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) GSF-National Research Center for Environment andHealth, Nerherberg
(3) Abteilung Mikrobiologie, University, Osnabrück
dwagner@awi-potsdam.de

Wet tundra environments of the Arctic are natural sources of the climate relevant trace gas methane. The underlying biogeochemical processes are not yet well understood. The field investigations were carried out on the island Samoylov (N 72°, E 126°) located in the Lena Delta, Siberia. The study site represented an area of typical polygonal patterned grounds with ice-wedges, which were considered for analyses of methane fluxes, organic matter quality and microbial communities.
The mean flux rate of the depression was 53.2 ± ?8.7 mg CH4 m-2 d-1, whereas the mean flux rate of the dryer rim part of the polygon was 4.7 ± 2.5 CH4 m-2 d-1. The quantity of dissolved organic matter (DOM), which represents an important C pool for microbial communities, correlated significant with the total concentrations of phospholipid fatty acids and ether lipids (PLFA and PLEL) a measure for microbial biomass. Although permafrost soils represent a large carbon pool, it was shown, that the reduced quality of organic matter leads to a substrate limitation of the microbial metabolism. This is an important finding for modelling and calculating trace gas fluxes from permafrost environments, because the known models are consider only the total carbon amount.
It can be concluded by the presented results firstly that microbial communities in permafrost environments are composed by members of all three domains of life at numbers comparable to temperate soil ecosystems and secondly that the permafrost microorganisms are well adapted to the extreme temperature gradient of their environment.

WS

Impact of station garbage on the diet of Antarctic skuas in Fildes Peninsula of King George Island

WANG, ZIPAN (1), HANS-ULRICH PETER (2) & ANNE FROEHLICH (2)
(1) Polar Research Institute of China, State Oceanic Administration, Shanghai, China
(2) Polar & Bird Ecology Group, Institute of Ecology, University, Jena
wangzipan2000@yahoo.com.cn

The diet of South Polar and Brown skuas *C. maccormicki* and *C. s. lonnbergi* was investigated from 2001-03 on Fildes Peninsula, King George Island, Antarctica. The results show that percentage of natural food in their food structure was 63.4% for Brown skua and 77.8% for South Polar skua. Meanwhile the components of the food from station waste were 36.6% and

22.3% respectively. Also the diet of two groups of Brown skua around the eastern and the western coast differs: the proportion of station garbage in food component was 29.41% and 1.85% respectively. The latter used more natural food linking small seabirds colonies as well as seal habitats near their nests. It indicates that foraging of skuas near Great Wall station was dependent both of natural resources and station garbage. Management of waste material and treatment technique in the stations should be improved for the benefit of Antarctic environmental protection.

WS

Environmental studies of human impacts on the vicinity of Cmte. Ferraz Station (Brasil), Admirality Bay, King George Island

WEBER, ROLF R. (1), CRISTINA E. ALVAREZ (2), ANTONIO P. BATISTA (3), MÁRCIA C. BICEGO (1), ELISABETE S. BRAGA (1), LÚCIA S. CAMPOS (4), THAIS N. CORBISIER (1), NORBERTO DANI (5), ROBERTO F. C. FONTES (1), ROSANE G. ITO (1), ROSALINDA C. MONTONE (1), PHAN V. NGAN (1), VIVIAN H. PELLIZARI (6), MARTIN SANDER (7) & CARLOS E. SCHAEFER (8)
(1) Oceanographic Institute, University, São Paulo, Brazil
(2) Universidade Federal do Espirito Santo, Vitória, Brazil
(3) Universidade Luterana do Brasil, Santa Cruz do Sul, Brazil
(4)Universidade Federal, Rio de Janeiro, Brazil
(5) Universidade Federal, Rio Grande do Sul, Brazil
(6) Institute of Biological Sciences, University, São Paulo, Brazil
(7) Universidade do Vale do Rio dos Sinos, Porto Alegre, Brazil
(8) Universidade Federal, Viçosa, Brazil
rorweber@usp.br

Although specific environmental studies of possible human impacts near the Antarctic Cmte Ferraz Station have been done since 1989, no integrated interdiciplinary study of the area as a whole had been performed for the ASMA of Admirality Bay. In June of 2002 the Ministry of Environment and National Research Council of Brazil funded for 3 years a research network for assessing the human impacts in the area. The research team includes botanists, zoologists (bird ecology), architects, soil scientists, microbiologists and oceanographers. A broad study of the environmental condition of this region will allow a full evaluation of the impact of human activity generated by scientists, tourists and support personnel from the stations, and impact from current and past logistic operations. The network is constituted by 15 research groups from 8 Brazilian Institutions suming up 53PhDs. The groups will carry out multidisciplinary studies of a series of biotic and abiotic parameters, aiming at the management and implementation of a strategy for environmental management. The Brazilian scientific community has studied, along 20 years, various aspects of Admirality Bay and its terrestrial surrounding. This has resulted in a set of biotic and abiotic data that needs evaluation so that environmental monitoring of the bay can be implemented in an efficient and effective manner.
The integrated knowledge of the environment will allow the elaboration of a plan for organization and usage of the Antarctic Brazilian Station "Comandante Ferraz". This will be done in accordance to its support capacity and technological developments for the Brazilian buildings in Antarctica, and coherent with the needs, logistics, and the Madrid Protocol, in parallel with the environmental management of activities developed by Brazil in the region.
Results and Conclusion
The Cmte Ferraz Antarctic Station hosts 48 persons in summer (november- march) and 12 in winter (april-november. After 2 years the research network data shows that there are local

limited impacts, caused mainly due the normal operation of the research station. Potential sources are the use of petroleum and derivatives by the supply ship, local research vessel Skua, outboard marine engines, diesel generators; garbage; the incinerator; sewage discharges all year around; human locomotion on land on foot or with snow motorbikes. SIG database is being implemented as welll as planning for the maintenance and better usage of the buildings of Ferraz Station. Al list of possible reliable biological indicators of human induced impacts is being developed by the network members. There are no significant tourism activites near Ferraz Station.

DFG

Ökologie der arktischen und antarktischen Untereis-Amphipoden

WERNER, IRIS & RUPERT KRAPP
Institut für Polarökologie, University, Kiel
iwerner@ipoe.uni-kiel.de

Die Unterseite von arktischem Packeis ist von einigen Amphipodenarten besiedelt, die eine zirkumpolare Verbreitung haben und in diesem Habitat endemisch sind. Artenzusammensetzung und Abundanz hängen von verschiedenen abiotischen (Alter, Herkunft und Morphologie des Eises, Temperatur und Salzgehalt des Untereiswassers) und biotischen (v.a. Nahrungsangebot) ab und können daher ausgeprägte räumliche und saisonale Schwankungen aufweisen. Die dominanten und autochthonen Arten *Apherusa glacialis*, *Onisimus glacialis*, *O. nanseni* und *Gammarus wilkitzkii* verbringen ihren gesamten Lebenszyklus in diesem Habitat und haben artspezifische Überwinterungsstrategien (Nahrungsspektren, Lipidspeicherung) entwickelt. Auf Grund ihrer Energie sparenden, an der Eisunterseite hängenden Lebensweise weisen die arktischen Untereis-Amphipoden niedrige spezifische Stoffwechselraten (Ingestion, Respiration) auf. Die Ernährungsweisen unterscheiden sich zwischen den Arten, aber alle Untereis-Amphipoden gelten als wichtige Bindeglieder in der Nahrungskette zwischen dem Meereis und dem Pelagial und tragen somit zum Energiefluss zwischen den beiden Ökosystemen bei. Im antarktischen Packeis kommen Amphipoden der Gattungen Eusirus und Cheirimedon vor, über deren Lebensweise aber noch nicht viel bekannt ist.

Durch den Abbau stratosphärischen Ozons sind v.a. Organismen in den Polargebieten erhöhter und potentiell schädlicher UV-Strahlung ausgesetzt. Im Rahmen unseres laufenden DFG-Projektes "Einfluss und Bedeutung abiotischer Parameter (Strömung, Licht/UV) auf die kleinräumige Verbreitung von Meereislebensgemeinschaften in Arktis und Antarktis" wird das Untereis-Habitat beider Polargebiete in Bezug auf die dort herrschenden Strahlungsbedingungen untersucht. Dazu wurden auf mehreren Expeditionen sowohl atmosphärische Oberflächenwerte sowie Wasser- und Untereiswerte der UV-A und UV-B Einstrahlung mit Hilfe eines RAMSES Spektroradiometers gemessen. Simultane PAR-Messungen mit LI-COR Sensoren ($2\pi/4\pi$) dienten dabei als Referenz. Es konnten Messungen unter unterschiedlichen Eistypen und –dicken durchgeführt werden. Diese Werte werden mit Abundanzen der Amphipoden verglichen werden, um eventuell strahlungsabhängige Verteilungen der Organismen zu erkennen. Alle Untereismessungen sowie das Sammeln von Amphipoden für verschiedene Analysen sowie für Lebendexperimente wurden mittels Forschungstauchereinsatzes durchgeführt. Das gewonnene Probenmaterial wird nach einer taxonomischen Aufarbeitung hauptsächlich für zwei biochemische Analysemethoden verwendet: (1) zur Bestimmung von Gehalt, Zusammensetzung und den absorbierenden Eigenschaften der Pigmente, mit dem Focus auf den Mykosporin-artigen Aminosäuren, die als UV-absorbierende Komponenten, also einer Art Schutzschild, auch von

anderen polaren Zooplankton- und Benthosorganismen bekannt sind, und (2) der Gesamtgehalt von Antioxidantien durch die so genannte TOSC-Methode (Total Oxyradical Scavenging Capacity). Diese Analyse ermittelt für spezifische Oxyradikale wie Peroxyl, Hydroxyl oder Peroxynitrit die Kapazität aller spezifischen Antioxidantien im Gewebe der Organismen. Da UV-Einstrahlung als mögliche Ursache von Oxyradikalstress gilt, soll diese Methode einen Index der UV-Belastung auf die Untereis-Amphipoden geben. Es gilt dabei die Hypothese, dass UV-Einstrahlung Oxyradikale induzieren kann, entweder direkt im betroffenen Organismus oder indirekt, also im umgebenden Wasser. Entsprechende Experimente sind in Kühlaquarien mit dem dominanten arktischen Untereis-Amphipoden *Gammarus wilkitzkii* durchgeführt worden. Im Rahmen des Vortrags werden aktuelle Ergebnisse unserer Forschung und des laufenden Projektes vorgestellt.

P 18

Holocene vegetation history of the Verkhoyansk Mountains Foreland, North-Eastern Siberia

WERNER, KIRSTIN (1), ANDREI ANDREEV (1), BERNHARD DIEKMANN (1) & WOLFGANG ZECH (2)
(1) Alfred-Wegner-Institut, Potsdam
(2) Lehrstuhl Bodenkunde und Bodengeographie, University, Bayreuth
kwerner@awi-potsdam.de

A studied profile from the western foreland of the Verkhoyansk Mountains (65°N, 125°E) provides a high-resolution record of the Holocene vegetation and climate history in north-eastern Siberia between 12.6 and 6.0 cal ka ago. The organic-rich sediments accumulated in a fluvial depositional environment in an oxbow lake between ca 12.6 and 7 cal ka. Peat accumulation started ca. 7 cal ka. The pollen spectra show that larch (Larix dahurica) with shrubs (Betula sect. Nanae and Alnus fruticosa) dominated the vegetation at about 12.6 cal ka (pollen zone (PZ) 1). Picea obovata was probably also present in the vegetation. Poaceae and Cyperaceae associations dominated open habitats. Macroremains of Larix dahurica (cones, seeds, needles and short shoots) from the lower part of the profile are consistent with the pollen record.
An increase in the abundance of Artemisia, Chenopodiaceae and Caryophyllaceae pollen in the upper layer (PZ3) shows that steppe-like plant communities were common in the vegetation during the PZ3 interval. The climate was drier than during the previous intervals but the presence of Larix and Pinus pumila pollen points to relatively warm conditions, possibly related to the late Preboreal period.
The decline of Artemisia pollen and the increase of Cyperaceae and Picea pollen contents in the lower part of the PZ4 (probably at the beginning of the Boreal period) indicates climate conditions warmer and wetter than during the earlier interval. Founds of pollen of Myriophyllum (an indicator of nutrient-poor water bodies) in the upper part of PZ3 and in the lower part of PZ4 point to the oxbow lake environment. However, founds of remains of insects (Donacia sp. and Saldidae sp.) preferring open water bodies and lake shore vegetation as well as seeds of Menyanthes trifoliata (an indicator of nutrient-poor mires and forested mires) in the middle part of the PZ4 may reflect the gradual transition from oxbow lake to the mire environment.
A remarkable increase of Ericales pollen and Sphagnum spores content in the uppermost peat layer (PZ5) reflects a fully established peatland environment after 7 cal ka also documented by the presence of Sphagnum leaves among the plant macrofossils. Climate was relatively warm and wet during this time. The uppermost peat layer contains numerous charcoal particles and Epilobium pollen evidenced a fire event. After this fire, the peatland surface apparently was

destroyed and local accumulation stopped. Today larch forest with few other trees (Betula pendula, Picea obovata) and shrubs (Alnus fruticosa, Pinus pumila, Betula nana) dominate the vegetation of this area.

S VII

Auswertung und Interpretation der Oberflächentopographie und -geschwindigkeit des Eisschildes in Dronning Maud Land, Antarktis

WESCHE, CHRISTINE, OLAF EISEN, DANIEL STEINHAGE, WOLFGANG RACK & HANS OERTER
Alfred-Wegner-Institut, Bremerhaven
cwesche@awi-bremerhaven.de

Ein Gebiet im Umkreis der Kohnen Station (Dronning Maud Land, Antarktis) wurde mit Hilfe der Kombination von GPS und flugzeuggestützten Altimetermessungen hinsichtlich der Oberflächentopographie und -geschwindigkeit untersucht. Die Topographie der Oberfläche wurde durch die Verknüpfung zweier kinematischer GPS-Messmethoden ermittelt. Das bodengestützte kinematische GPS liefert ein kleinräumiges sehr hochaufgelöstes Höhenmodell (Abstand der Datenpunkte rund 3 m) in der näheren Umgebung der Kohnen Station (0°W/O und 75°S). Das untersuchte Messfeld erstreckt sich zwischen 0,5°W bis 0,8°O und 75,2°S bis 75,85°S. Die weitere Umgebung zwischen 3°W und 3°O und 74,5°S und 75,5°S wurde mit flugzeuggestützten GPS- und Radaraltimetermessungen untersucht. Die Geschwindigkeit des Flugzeuges ergab einen Abstand der Datenpunkte von rund 100 m. Die Genauigkeit der Radaraltimeterdaten wird durch die Eindringtiefe des Radarsignals und den Roll- und Nickwinkel des Flugzeugs beeinflusst.

Die Fliesseigenschaften des Eisschildes an der Oberfläche wurde an 15 Messpunkten ermittelt. Hierzu wurde deren Lage und jährliche Positionsänderung im zweidimensionalen Raum in mehreren Messkampagnen mit statischen GPS-Messung bestimmt. Durch die Verbindung der berechneten Geschwindigkeiten mit der hochaufgelösten Oberflächentopographie kann die Lage der Eisscheide bestimmt werden. Bisher war die Lage der Eisscheide nur auf Basis eines ERS1-Höhenmodells (Auflösung 5 km x 5 km) bekannt. Die genaue Lage der Eisscheide geht in die numerische Modellierung der Eisdynamik im Umfeld der Eiskerntiefbohrung an der Kohnen Station des European Project for Ice Coring in Antarctica (EPICA) ein.

P 12

Species composition and structure of the ciliate community in the Antarctic benthos and endopagial (Sea Ice)

WILBERT, NORBERT
Zoologisches Institut, University, Bonn
wilbert@uni-bonn.de

During the Antarctic summer in the years 2000, 2002 and 2004 a thorough study was made of the ecology and systematics of the ciliates in tidepools at Potter Cove on King George Island. The species composition found here, comprising 38 species in 30 genera, is remarkably sparse in comparison to other marine benthic communities. This finding can be ascribed in part to the relative uniformity of the tidepool biotope, but also derives from the extreme abiotic circumstances on site, "Eisschliff" and freezing of the pools at ebb tide.

The investigation show that the biocenotic principles of Thienemann also apply to the benthic ciliate community in the Antarctic habitat, implying that tide pools are not an extreme habitat for ciliates

P 58
Temporal and spatial variability of surface processes on summer sea ice

WILLMES, SASCHA (1), JÖRG BAREISS (1) & CHRISTIAN HAAS (2)
(1) University, Trier
(2) Alfred Wegener Institut, Bremerhaven
sascha.willmes@web.de

The surface changes occurring at the transition from winter to summer conditions on Arctic and Antarctic sea ice are essential for boundary exchange processes, sea ice mass balance, planetary albedo and feedback mechanisms. This makes the onset and duration of summer melt critical parameters for climate studies.
Passive microwave satellite sensors provide nearly 30 years of almost continuous sea ice brightness temperature data that allow a monitoring of summer surface processes. The seasonal cycle of remotely sensed surface conditions reveals large temporal and spatial variability. Moreover, Arctic and Antarctic sea ice turn out to have different, and sometimes even opposite satellite signal changes during the spring and summer period.
The poster is focussed on the presentation of summer specific and melt related features in the time series of satellite data from different sensors. Surface processes are identified, their strength and duration are mapped over large sea ice regions and compared with other regions.
Field measurements from an Antarctic drift station in the Weddell Sea 2004/05 (ISPOL) are also presented and related to the satellite-derived information.

S III
The Yermak Slide - New constraints on extend and age

WINKELMANN, DANIEL, RÜDIGER STEIN, WILFRIED JOKAT & FRANK NIESSEN
Alfred-Wegner-Institut, Bremerhaven
dwinkelmann@awi-bremerhaven.de

Based on new high resolution acoustic, seismik and detailed bathymetric data, the geometry of the submarine Yermak Slide has been revised. The megaslide can be compared in size and extend to the Storegga Slide off Mid-Norway. We present first details of its internal structure revealing evidence of at least one main slide event repeatedly followed by minor events. First dating results of carfully selected core material point towards a pre-LGM age of the main slide event. Geometry and internal physical appearance point to a tectonically induced partial shelf collapse. The area affected by the megaslide exceeds 10000 square kilometres, the involved sedimentary material 2400 kubic kilometres.

P 24

Are there anthropogenic signals in long term population data of Adélie penguins at Casey, East Antarctica?

WOEHLER, ERIC J. (1) & MARTIN J. RIDDLE (2)
(1) School of Mathematics and Physics, University, Hobart, Australia
(2) Australian Antarctic Division, Hobart, Australia
Eric.Woehler@aad.gov.au

Long term data on breeding populations of Adélie penguins *Pygoscelis adeliae* from the Casey area, East Antarctica, were examined for evidence of anthropogenic effects in population size, breeding success and population trends. Data are available from two localities, Whitney Point (inside ASPA 136), approximately 3.5km north of Casey, and from Shirley Island (within Casey Station Limits, approx 1km west of Casey, and downwind of the station). The data from Whitney Point extend from 1959 to the present, while the data from Shirley Island extend from 1969 to the present. Detailed annual monitoring of breeding population sizes and breeding success per colony commenced in 1989/90, and have continued since then.

Trends in the breeding populations differed significantly between the two sites, with the population at Whitney Point increasing at approximately 4% annually over the period 1959 - present, while the population on Shirley Island increased at a much lower rate, approximately 1% annually since 1969. Annual breeding success was significantly different between the two sites, with breeding success typically 20% lower on Shirley Island compared to Whitney Point. In addition, the distribution of colonies on Shirley Island has shifted since the colonies were first mapped in 1968, with a westward shift in the distribution of breeding birds.

Anthropogenic factors that may be contributing to these differences include the significantly higher numbers of human visitors to the colonies on Shirley Island, more noise caused by the close proximity of Shirley Island to Casey station and potentially increased exposure to exhaust from the power generators and to sewage effluent discharged from the station.

S

In der Antarktis auf Shackletons Spuren

WOLSKI, HENRYK
Berlin
henryk@best.net.pl

Im Jahre 2000 war Henryk Wolski Mitglied der Expedition „Shackleton 2000". Diese Unternehmung im Südpolarmeer wurde von Arved Fuchs initiiert, mit dem Henryk Wolski schon seit einigen Jahren in den Polargebieten zusammengearbeitet hat.
Im Rahmen des Projektes Shackleton 2000 ging es darum, die abenteuerliche Fahrt des bekannten britischen Polarforschers Sir Ernest Shackleton von der einsamen Insel Elephant Island nach Südgeorgien nachzuvollziehen. Ernest Shackleton hatte 1914 diese Fahrt in einem offenen Rettungsboot, der James Caird, gewagt, da es die einzige Möglichkeit war, seine Männer und sich endgültig zu retten und nach Europa zurückzubringen, nachdem ihr Expeditionsschiff Endurance im Eis des Weddellmeeres gesunken war. Über die Erfahrungen die während der Expedition im Jahre 2000 von den Beteiligten gemacht wurden, berichtet der Vortrag von Henryk Wolski.

Doch wer war Ernest Shackleton eigentlich?
Er wurde am 15. Februar 1874 Kilkea in Irland geboren, wuchs jedoch in Großbritannien auf, wo er auch die Schule besuchte. Bereits im Alter von 16 Jahren entschied er sich, zur See zu fahren. Der englische Offizier der Handelsmarine nahm 1901-1904 an Robert Scotts Antarktis-Expedition teil. Er begleitete Scott, als dieser einen Vorstoß nach Victorialand unternahm. 1908/1909 führte er mit der Nimrod eine eigene Antarktisexpedition durch. Im McMurdo-Sund schlug er sein Basislager auf. Einige seiner Expeditionsmitglieder bestiegen den Vulkan Mount Erebus, dessen Gipfel sie im März 1908 erreichten. Einer anderen Gruppe gelang es, im Januar 1909 den magnetischen Pol zu erreichen, dem zunächst der britische Polarforscher James Clark Ross in der Mitte des 19. Jahrhunderts sehr nahe gekommen war. Shackleton selbst brach Ende Oktober 1908 mit seinen Begleitern J. B. Adams, E. Marshall und F. Wild auf, um den Südpol zu erreichen. Am 9. Januar 1909 erreichten sie ihren südlichsten Punkt auf 88° 23' S bei 162 O. Nur 175 km vom Pol entfernt mussten sie umkehren und trafen Ende Februar 1909 wieder im Basislager ein, 1914-1917 unternahm Shackleton eine weitere Expedition in die Antarktis. Dabei entdeckte er im Januar 1915 die Cairdküste des Weddellmeers. Kurz darauf wurde sein Schiff, die Endurance, bei 76° 34' S und 31° 30' W im Eis eingeschlossen und sank nach neunmonatiger Drift im Eis am 27. Oktober 1915. Shackleton und seine Gefährten setzten die Drift auf einer Eisscholle fort. Im April 1915 erreichten sie die Packeisgrenze und setzten anschließend ihren Weg in den offenen Rettungsbooten der Endurance fort, die sie noch hatten abbergen können. So erreichten sie schließlich Elephant lsland. In einem der drei offenen Rettungsboote fuhr Shackleton mit 5 Begleitern nach Südgeorgien, das er am 10. Mai 1916 erreichte. Nach mehreren fehlgeschlagenen Rettungsversuchen konnte Shackleton schließlich am 30. August 1916 mit der Yelcho, einem Schiff der chilenischen Marine, seine 22 Kameraden von Elephant Island abholen und nach Punta Arenas bringen. Nur wenig später schiffte sich Shackleton in Neuseeland auf der Aurora ein, um eine Gruppe von 10 weiteren Expeditionsteilnehmern, die auf der gegenüberliegenden Seite der Antarktis darauf gewartet hatten, dass er die Antarktis durchqueren würde, abzubergen. Sieben von ihnen konnte Shackleton retten. Kapitän Macintosh und zwei weitere Expeditionsmitglieder der Aurora waren ums Leben gekommen. 1921 brach Shackleton abermals zu einer Antarktis-Expedition auf. Er starb jedoch zu Beginn des Unternehmens in Grytviken auf Südgeorgien, wo er auch begraben wurde.

S XI

Community size, structure and properties of methane oxidizing bacteria in Siberian tundra soils

ZIMMERMANN, UTA, CHRISTIAN KNOBLAUCH & EVA-MARIA PFEIFFER
Institut für Bodenkunde, University, Hamburg
u.zimmermann@ifb.uni-hamburg.de

Arctic wetland soils are substantial natural sources of the climate relevant trace gas methane. Biological methane oxidation is an important control of methane emissions from these environments. The natural occurrence and activity of methane oxidizing bacteria (MOB) largely depends on temperature and the availability of methane, oxygen and nutrients. The present study evaluated the significance and properties of methane oxidizing bacteria in different water saturated soils of the North-Eastern Siberian tundra by analyses of PLFA (phospholipid fatty acid) biomarker content and batch incubation experiments.

In completely waterlogged peaty soils potential methane oxidation was highest (87 nmol h-1 dw-1) in densely rooted horizons. This indicates that oxygen transport through the roots of the

dominant vascular plant species Carex aquatilis into the waterlogged soil is an important control of methane oxidation. Methane oxidation was saturated at O2 concentrations above 0.5 %, indicating an adaptation to microaerophilic conditions. Highest activities were found around 28°C, much higher than in situ temperatures in the Arctic soils. At 0°C, activities reached 4 to 9 % of maximal rates.

Investigations of methane oxidation activity in perennially frozen paleosoils and sediments showed that methane oxidizers partly survived for several thousands of years under these extreme conditions and could be activated after permafrost thawing.

In all analysed tundra soils, only PLFA biomarkers specific for "Type I"-MOB could be detected, suggesting the dominance of these organisms. Concentrations of "Type I"- biomarkers strongly decreased with soil depth, as did the potential activities. However, in subsoil horizons without measurable activities, still a substantial content of MOB-biomarkers (0.8 nmol g-1 dw-1) was present. This indicates the occurrence of inactive cells or spores that may be reactivated under changing environmental conditions. PLFA analyses furthermore revealed varying concentrations of MOB-biomarkers in the diverse soils investigated. Highest concentrations were found in a silty peat soil (45.3 nmol g-1 dw-1), compared to other soils with less organic or more sandy substrates (6.1 to 9.4 nmol g-1 dw-1), demonstrating varying population sizes of methane oxidizing bacteria in different water saturated tundra soils.