EXPEDITION PROGRAM ANTARCTICA

(ANT – Land 2011/2012)

STATIONS AND FLIGHT MISSIONS

NEUMAYER STATION III

KOHNEN STATION

Flight Missions

DALLMANN LABORATORY

Other Activities

Coordination

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October 2011

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1. NEUMAYER STATION III

1.1 Summary

The season ANT-Land 2011/2012 is scheduled for the period from 08 November 2011 until 28 February 2012.
Most of personnel will be flown into the Antarctic and back via the air link from Cape Town within the frame of Dronning Maud Land Air Network (DROMLAN). Ship calls are scheduled for RV POLARSTERN end of December 2011, to supply the majority of freight and fuel for NEUMAYER STATION III and aircraft operations, furthermore for SA AGULHAS end of December 2011 and beginning of February 2012, for supply of additional fuel.

NEUMAYER STATION III has successfully run its wintering period.
The main logistic objectives of the season 2011/2012 on the Ekström Ice Shelf will be the technical operation of NEUMAYER STATION III. Logistics will focus on two periods of lifting of the station. Furthermore a construction team will be onsite for maintenance of the station facilities.

In parallel station facilities will be used to support the traverse to KOHNEN STATION, furthermore to operate the Basler BT-67 aircraft POLAR 6. The regular weather forecast service (AWI/DWD) will be provided to all aircraft operations within the Dronning Maud Land region, in particular as a contribution to DROMLAN.

LIMPICS field party (4 scientists) performing reflection seismic measurements will take place in the vicinity of KOHNEN STATION during the season 2011/2012.
Medical studies of the Berlin Centre for Space Medicine (ZWMB) will be continued and extended by the station staff during the winter period.

KOHNEN STATION will be visited (9 technicians) for maintenance work such as lifting up the station. The station will be reached by traverse, including supply goods. Furthermore the station acts as base for scientific field work within the frame of LIMPICS.

In total 68 scientists, engineers, technicians and visitors will be working or temporarily staying at NEUMAYER STATION III.

- Maintenance works (4)
- Logistic operations (8)
- Operation of scientific observatories (5)
- AWI scientific projects – field parties (1)
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- National and international visits (10)

1.2 Operation of observatories

1.2.1 Meteorological Observatory

Bernd Loose (AWI), Jölund Asseng (AWI), Thomas Schmidt (AWI)

The meteorological observatory program at Neumayer III is planned to be ongoing. It includes:

- 3-hourly routine synoptic observations,
- daily upper-air soundings,
- weekly ozone soundings,
- continuous surface radiation and mast measurements,
- satellite picture reception (HRPT)

The meteorological observatory provides the necessary support for the forecast service for DROMLAN, aircraft missions and field parties. The meteorological observatory acts as the DROMLAN weather forecast centre.

During the summer season 2011 / 2012 the following activities are planned:

- Exchange of some radiation sensors with newly calibrated ones.
- Repair and maintenance of all other equipment of the meteorological observatory as necessary.
- Training of the winterers.
- Heightening of the meteorological field facilities.
- Support of the observatory with expendable goods, spare parts and new equipment.
- Disposal of the observatory of old or defective equipment.
- Moving of the automatic weather station which was set up in January 2011 in the near neighbourhood of the meteorological mast to a location about 20 km in direction to the coast. Therefore, the AWS will be equipped with a solar panel and a wireless communication to the Neumayer station
- The scientific aim is a quantification of mesoscalic gradients.

1.2.2 Operational weather forecast service for DROMLAN

Hans-Joachim Möller (DWD), Harald Rentsch (DWD)

Since 2002/03 the meteorological observatory of the German Antarctic station Neumayer offers a detailed and individual weather forecast service for all activities in Dronning Maud Land. This service is performed in close cooperation between the Alfred-Wegener-Institute for Polar and Marine Research (AWI) and the German Weather Service (DWD).

During the summer season 2011/2012 several thousand forecasts will be performed for field parties, ships, stations and especially aircrafts. It is obvious, that this service will increase the safeness of the

ambiguous projects in the Dronning Maud Land. Furthermore, it will help to reduce weather induced idle times of expensive flight operations to a minimum

1.2.3 Geophysical observatory

Alfons Eckstaller (AWI), Meike Kühnel (AWI), Stefan Christmann (AWI), Marketa Pokorna (AWI), Antje Schlömer (AWI)

Period:	November 2011 – February 2012
Project:	Service works at remote seismographic stations
	Installation of a new geomagnetic recording system
Scientific leader:	Alfons Eckstaller (AWI)
Area:	Neumayer-III, Dronning Maud Land (DML)

Scientific activities reports

Seismology

The primary objective of the seismological observatory at Neumayer-III is to complement the worldwide network of seismographic monitoring stations in the southern hemisphere. This contribution is of special importance as this network is rather wide meshed in Antarctica. Local seismographic networks of changing size and shape have been operated at Neumayer stations since the very beginning. In its current design it comprises the seismic station VNA1 in the geophysics observatory and the two remote seismic broadband stations VNA2 and VNA3 on the Ice Rises Halvfar Ryggen and Søråsen. Still unique in Antarctica is the small aperture detection array with 15 vertical seismometers placed on three concentric rings with a total diameter of almost 2 km at station VNA2. This array is a powerful tool for monitoring seismic activities in a local to regional distance range. In addition to this local seismographic network at Neumayer-III we are operating some other seismographic broadband stations which complement our local network. These stations are designed to run autonomously. Because of difficulties to provide continuous 12V DC power at these very remote sites there is the risk of substantial recording gaps during winter when solar energy is not available. However, we are trying to minimize or to eliminate these gaps in the near future by a more sphisticated poewer supply. The additional remote stations are located at the Swedish summer camp SVEA, at Weigel Nunatak cloes to the travese track to Kohnen Station and at Kohnen Station itself. We apply for the permission of another year of operating this broadband station at Novolazarevskaya where continuous mains power from is provided.

One of the main tasks in austral season 2011/12 will be to solve the power problems during winter at the array site at station VNA2 on Halvfar Ryggen. For converting solar to electrical energy the container housing all electronics and power supply facilities is equipped with 12 high efficieny solar panels, each with a nominal power of 100 W. These modules alone are sufficient as long as there is enough daylight available. To span the dark austral winter we had installed 2 wind generators with 300

W nominal power each. However, both generators had been destroyed completely during severe storms early before winter 2011. The reason for this failure was that the electrical design of the generator was not sturdy enough for a long term brake operation during storms, when the generator is short-circuited to reduce rotor speed substantially. Thus, the generator overheated and all the windings burnt. In season 2011/2012 we will modify one repaired generated and mount shorter rotor blades to reduce power input from the wind. However, this will also reduce the generated electrical power for charging batteries. To overcome this deficiency we will replace one 300 W generator with a 1000 W generator keeping the original longer rotor blades. Additionally we want to install a simple but efficient battery heating system which will use excess power from solar panels and wind generators to keep the batteries well above colder ambient temperatures. Excess power should also be used to heat the interior of the container itself and thus reducing operation of the wind generators in short circuit brake mode. This should substantially increase the effectice capacity of the batteries which is very important at very low temperatures.

Remote station VNA3 on Søråsen ice rise should be serviced in 2011/2012 during the same service trip to station VNA2. Here we probably have only to dig out the electronics and battery boxes and the seismometer and to reinstall them again (annual snow accumulation here is approx. 3 meters). For the first time we want to install a modified 300 Watt windgenerator, eventually on a separate mast beside the antenna mast. This station should also be equipped with a battery heating system.

The autonomous seismographic station at Weigel Nunatak will be serviced by members of the traverse team going up to Kohnen Station. It should be prepared for another year of operation.

At Kohnen Station the seismographic station should be moved from the former clean air chemistry container inside the science trench at the ice core drilling site. Deep inside the science trench temperatures do not drop that low during winter compared to a site outside the trench and close to the surface. Power supply will come from a wind generator and 2 solar panels mounted on a mast directly above the science trench. Recording boxes and seismometer will be deployed extremely thermally insulated and "cold hardened' to survive -45 C. We also want to installl and test another battery heating system. This service works will eventually be done by members of the Kohnen team and the aero-geophysics team operating from Kohnen Station.

The seismic station at Svea can only be serviced if Polar-5 is available for transport. If everything worked without maijor failures it will only be necessary to change the CF cards for data retrieval. This can be accomplished within one day. If members of the Swedish Polar Secretary are working at Svea and the necessary logistics will be available we would like to improve the seismometer vault for better recording conditions.

The seismographic station at Troll will be removed by Norwegian colleagues and sent back to Neumayer. We will apply for the permission to operate the seismic station at Novolazarevskaya for another year. No service works should be necessary at the South African base Sanai-IV. The responsibility for the seismographic station there is now at CTBTO.

At the base some more software work has to be done due to the installation of new Antelope release 5.1. This will need substantial time because we have just been switsching over from Sun/Sparc - Solaris to MacOS operating system. Still numerous scripts have to be adopted to the new operating system.

Geomagnetism

The new Geomagnetic Observatory at Neumayer-III was built during January and February 2009. It comprises a rather new 3-component flux gate sensor with a high dynamic range and a new Overhauser proton-magnetometer for recording total intensity. With this instrumentation high quality geomagnetic field data can be sampled at a rate of 1 second. Calibrated recordings from March 2009 to April 2011 had been already transmitted to the World Data Center. We are applying to become a member of Intermagnet, an international geomagnetic cooperation.

To fulfill the requirements of Intermagnet we will install a second 3-component fluxgate system. This second system will also raise the redundancy. It will be a Danish FGE magnetometer from DTU, Copenhagen. This new instrument will be installed outside the insulated container but still inside the geomagnetic observarory. It will be mounted on top of a frozen in pillar (polypropylen sewage pipe) and be covered by a polystyrol casing. Orientation of the sensor is parallel to magnetic North, so the second horizontal component will directly measure the declination. On a second frozen in pillar a refurnished Catl Zeiss 020A theodolite will be mounted for manual determination of declination and inclination. Because these pillars are founded directly in the ice no small deflections from horizontal orientation should occur anymore by walking around. This was observed inside the insulated containment because its floor proved not be be stiff enough against minor bending. Thus DI-measurements showed always some small errors resulting from transient deflections from the horizontal. For this reason baseline values for calibrating the fluxgate data showed a higher scatter than expected.

Another objective in this context is the calibration of the second theodolite-gyro system. For determination of geographic North we use a Wild GAK-1 gyro which can be mounted on top of the theodolites. We have to determine the small misalignment between the gyro axis and the telescope axis to calibrate the gyro readings. This should also be carried out again for the first theodolite-gyro system.

Infrasound array I27DE

The entire geophysics team will support the annual service works at the infrasound array I27DE. The work to be done is mainly to dig out all 8 wind noise reducing porous hoses and their couplings which are layed out radially at each of the 9 single array array stations. Also the boxes with the sensor and the recording and communication electronics have to be reinstalled at a higher level and therefore assistance is needed. The masts for WLAN communication must also be set up again and new stay wires have to be installed. All other service works will be entirely done by the BGR team.

Participants

Name	First Name	Organization	Position/profession	Nationality
Eckstaller *	Alfons	AWI	Geophysicist	Germany
Schloemer	Antje	AWI	Geophysicist, winter 2011	Germany
Pokorna	Marketa	AWI	Geophysicist, winter 2011	Czech Rep.
Christmann	Stefan	AWI	Geophysicist, winter 2012	Germany
Kuehnel	Meike	AWI	Geophysicist, winter 2012	Germany

1.2.4 Air chemistry observatory

Rolf Weller (AWI) Kathrin Höppner (AWI), Lisa Kattner (AWI)

Period: 10 January 2012 – 24 February 2012
Cape Town: 10 January 2012
Cape Town: 24 February 2012

Area of activity: Neumayer Station 70°40.37'S, 08°12.26'W

Scientific activities report:

During the forthcoming summer campaign our activities at Neumayer III station will focus on the implementation of a new aerosol particle measuring device in the on-going routine program of the Air Chemistry Observatory at Neumayer Station, a so-called scanning mobility particle sizer (SMPS). This instrument will be capable to determine ultra-fine particle size distributions in the range between 2.5 nm and 150 nm to assess the contribution of particle new formation (nucleation) at this site. Furthermore, a broken nephelometer from the Finnish Meteorological Institute (FMI) has to be repaired or, in the worst case, has to be removed and send back to the FMI for overhaul. Finally, there will be the usual maintenance operation at the Air Chemistry Observatory as well as training of the new air chemistry over-winterer Kathrin Höppner.

1.2.5 Relocation of PALAOA - the Perennial Acoustic Observatory in the Antarctic Ocean

Lars Kindermann (AWI), Christian Göbel (AWI), Antje Schlömer (AWI), Lars Lehnert (AWI), Stefan Christmann (AWI)

Period:	November 2011 – February 2012
Project:	Service works and relocation of PALAOA
Scientific leader:	Lars Kindermann (AWI)
Area:	Neumayer-III

Since December 2005 the autonomous hydroacoustic observatory 20 km north of Neumayer III continuously records the underwater soundscape of the southern ocean. Close to the edge of the Eckström ice shelf a hydrophone array had been deployed into the water below the 100 m thick ice. Main purpose is the observation of marine mammals which produce underwater vocalisations, some of them are audible within a range of hundreds of kilometres. There is hardly a single minute during the year without the sound of some animals. Weddell, Ross, crabeater and leopard seals together with blue, fin, humpback, sperm, killer and probably Antarctic minke whales are present in the recordings. Additionally, a CTD collects oceanographic data from under the shelf ice and a GPS monitors the movement of the glacier itself.

Scientific Background

After several incidents of mass standings of whales after the use of (military) sonar during the last decades, the effects of anthropogenic noise to marine mammals are under worldwide investigation now. However, there are many open questions left; no agreement has been reached about even the order of magnitude of potentially dangerous sound levels which are still to be regulated internationally. Tenth of thousands of ships, oil exploration and increasing marine construction work have increased the background noise level of the worlds oceans significantly during the last century and the long term effects to the broader marine life remain unclear. To balance the interests of shipping and other marine industries and the navies with the requirements for natural conservation international agreements will have to be reached, based on hard scientific data. This unique observatory in the Antarctic ocean enables us to access the natural soundscape and its inhabitants in one of the last areas of the world which is mostly unaffected by human activities yet, providing important baseline data how the rest of the oceans may have sounded like in the times of sailing vessels. On the other hand, for a few days of each year the location is regularly visited by research vessels like Polarstern. This provides a repeated controlled exposure experiment, as we can directly monitor the reactions of the animals to this situation. The multi year long term data set collected so far is used in international collaborations to address several important questions within this context.

Field Work

The electronic recording equipment is hosted in a small container on a sledge at the "north pier". The observatory is operating autonomously and is powered by batteries which are charged mainly by solar and wind energy. A radio link connects the experiment to the AWI network, enabling remote operation from Bremerhaven and live data access. Necessary maintenance is performed on demand by the electronics officer of the Neumayer base. The Eckstöm ice shelf moves about 150 meters per year northwards and in the long term the same amount of ice breaks off. When PALAOA was constructed in 2005 at a distance of 1500 meters from the edge we expected a safe lifespan of 5 years. As the under ice instruments still deliver valuable data but are in no way accessible anymore we will try to extend the operation time of the current PALAOA setup as long as possible because redeploying new instruments would require a major logistic and financial effort. Due to a very large iceberg colliding with the "north pier" in 2010 and a major calving event in 2011 the distance from the container to the edge has shrunk to less then 500 meters now. Therefore it will be relocated about 300 m to the south east and the pole-mounted cable tracks connecting the hydrophones will have to be extended accordingly by the construction team.

1.3 SCIENTIFIC PROJECTS

1.3.1 LIMPICS ANT 2011/12 - Linking micro-physical properties to macro features in ice sheets with geophysical techniques ANTARCTICA 2011/12

Olaf Eisen (AWI), Anja Diez (AWI), Astrid Lamprecht (BAdW) , Christoph Meyer (BAdW)

Project summary

The projects aims at obtaining seismic data to deduce the distribution of the crystal orientation fabric (COF) and related acoustic properties in and below the ice sheet at Kohnen station, Dronning Maud Land, Antarctica. To this end a surface seismic survey will be perfomed near the EPICA DML borehole. Accompanied by already available airborne profiles, the seismic data allow deducing the state of anisotropy of the ice and sub-ice properties, which in turn will be used in ice-dynamic flow modeling of the ice sheet to improve model results.

State of the art

The flow of the Antarctic ice sheet is controlled by processes occurring at its surface, at its base, and by the spatial variation of temperature-dependent rheological properties within the ice. The internal structure of the ice sheet represents an integrated memory of the interaction of these processes and properties, knowledge of which has key implications for unraveling its history and predicting its future behavior. A particular property of ice is its anisotropy for a number of physical properties such as rheology, electromagnetic and seismic wave speed. Especially the resistance of ice to applied forces varies by four orders of magnitude, depending on if the force is applied parallel or perpendicular to the

ice crystal's c-axis, and strongly depends on temperature. The current demand for advanced modeling of ice sheets, for accurate reconstruction of their history and improved estimates of their response to climate change, require the incorporation of anisotropic properties of flow. The SCAR ISMASS committee recommended to improve the physical basis of next-generation models by incorporating crystal anisotropy (ISMASS Committee, 2004). The correlation between anisotropic fabric changes and climate transitions (Durand and others, 2006) emphasizes the valuable information carried by vertical and lateral fabric distributions. A reliable determination of COF over larger areas, as e.g. required for model validation, is not yet possible. Exploiting the reflection mechanisms for seismic and electromagnetic waves at layers of changing orientations of anisotropic ice crystals seems the most promising way, but still requires dedicated studies. Moreover, the properties of the boundary condition for modeling at the bed (e.g. sediments or solid rock) and deducing geologic history can best be analyses remotely by usage of seismic methods (Anandakrishnan, 2003).

State of the art and preliminary work

Based on the analysis of polarimetric radar data near Kohnen station, Eisen et al. (2007) showed that at least one radar reflector at the EPICA-DML site correlates with rapid changes in crystal orientation. They were able to deduce the orientation of the COF at depth based on the anisotropic backscattering properties. Drews et al. (2009) showed that the occurrence of the echo-free zone below 2100 m is related to microstructure and Drews et al. (2011) related COF and air-bubble shape to radar backscatter anisotropy in depth ranges from 200 to 2100 m depth. Their data set shows anisotropic bulk scattering, which is shifted in phase by 90° above and below about 900 m depth. A recent seismic study at Halvfarryggen, DML, Antarctica, shows that a number of internal seismic reflections are present, which most likely stem from abrupt changes in COF, which are also expected at Kohnen.

Project topic and goals

The projects goal is to obtain the first seismic explosive data at Kohnen to deduce the distribution of the COF as a function of depth and compare it to the in-situ deep ice-core data and radar analysis for future applications; furthermore, to deduce the properties of the bed underneath the ice sheet. To this end and explosive seismic survey in AVO (amplitude variation with offset) configuration along two perpendicular profiles will be deployed. This is complemented by several profiling surveys with p- and s-wave microvibrators (ELVIS) to investigate the shallow seismic structure in high resolution and deduce elastic properties. Parallel to surface measurements, deployment of a borehole seismometer is considered to obtain vertical seismic profiling (VSP) and reflections from underneath the bed in higher resolution. The data acquisition will be continued in 2012/13 (separate project proposal).

Deliverables

- Deduction of COF evolution with depth from AVO seismic data set parallel and perpendicular to flow in vicinity of EDML ice core
- Seismic properties from VSP profile for reference with AVO data

- Shallow elastic properties (<500 m depth) and density distribution along microvibroseismic profiles around Kohnen parallel and perpendicular to flow

Deduction of bed properties (sediments, rock, composition, consolidation, saturation)

The expedition aims at performing a seismic reflection survey from the surface at the Halfvarryggen ice dome, a candidate for the upcoming IPICS 2k/40k ice cores. At ice domes the internal structure imaged with radar data often indicates upwarping internal layers, so-called isochrone arches or Raymond bumps. Modeling studies indicate that the crystal orientation fabric (COF) at larger depths at ice domes should be highly anisotropic. As changes in COF also change the impedance contrast such changes are also detectable with seismic methods, as shown during the LIMPICS ANT 2009/10 expedition. Scientific goals therefore are to map internal seismic reflection horizons in a 2D grid centered on Halfvarryggen, which will later be compared to radar reflection horizons map the ice-bed interface and image the upper tens of meters of the underlying bedrock. In addition to these scientific goals the expedition will test improved drilling devices and the operational application of a vibroseis truck, in preparation for a seismic study at Kohnen Station in 2011/12.

1.3.2 TILT@CF -TILTmeter measurements at the Calving Front of Ekstroemisen

Angelika Humbert , Johannes Lohse (Universität Hamburg), Daniel Steinhage (AWI)
Co-operation partner
Prof. Dr.-Ing. habil. Ralf Müller (Technische Universität Kaiserslautern)

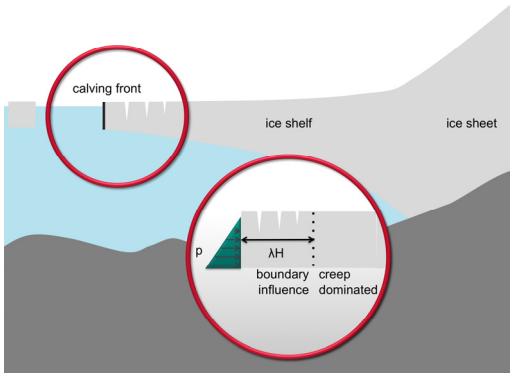
Project description

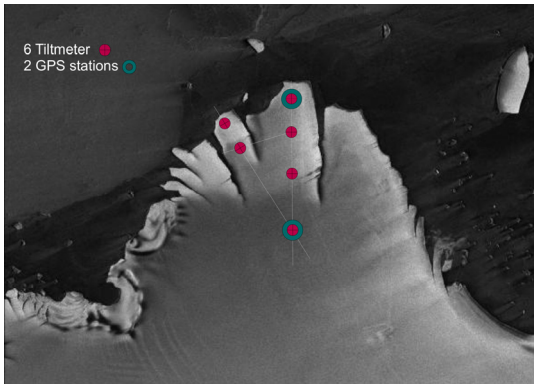
The estimation of bending stresses in the ice shelf at the calving front is required to understand the mechanism of calving. Tiltmeter and GPS observations of the vertical displacement allow to analyze the effect of the tides and the hydrostatic stress at the ice front and helps to evaluate the distance (λH in Figure 1) at which the ice response transforms from a boundary dominated elastic (solid nature) to creep dominated (nature of a viscous fluid) response. During this project measurements will be performed north of Neumayer station on two of the inlets (Fig. 2). The combination of GPS and tiltmeter measurements will be used to estimate the bending of the plate at the ice front over several tidal cycles, including spring and neap tides. Two GPS stations will act as reference stations for the absolute vertical movement.

High frequency of acquisition of the GPS data will be used to estimate if the creep of the ice shelf is continuous or of stick-slip nature as proposed by some authors (Brunt et al., 2010) and if that depends on the distance from the calving front. Furthermore, we will be able to assess the contribution of different factors to the fracture propagation leading finally to calving and compare this to the findings of Nixdorf (1998) and Bassis et al. (2007).

The proposed observations and analysis will serve as data source for the DFG founded project ‘On mechanisms of calving from Antarctic ice shelves’ by Angelika Humbert and Ralf Müller, which is part of a bundle project ‘Analysis of calving from Antarctic ice shelves’ together with Christine Wesche, AWI, that is proposed for funding and will start in fall 2011. During this project, numerical simulations

using a visco-elastic model and a thermo-mechanical creep flow model (e.g. Humbert, 2007) will be compared to the observed displacement of the ice shelf surface.





1.4 National and international visits and inspections

1.4.1 National inspection

In January a national inspection team of the Hemholtz Association (HGF) and the Federal Ministry of Education and Research (BMBF) will visit Neumayer Station III.

Members of the inspection team are Prof. Dr. Jürgen Mlynek (HGF), Dr. Karl-Eugen Huthmacher (BMBF), Prof. Dr. Karin Lochte (AWI), Dr. Uwe Nixdorf (AWI).

Prof. Mlynek and Dr. Huthmacher will thus have the opportunity to get a general idea of the scientific and logistic facts in view of decisions to come.

1.5 Scientific projects during wintering

1.5.1 Human Physiology at Neumayer – Campaign 2012

Alexander Stahn, Mathias Steinach, Hanns.Christian Gunga (ZWMB Berlin, Charite), Eberhard Kohlberg (AWI), participants wintering team 2012 (AWI)

For more than five years the Alfred Wegener Institute for Polar and Marine Research (AWI) has now been closely cooperating with the Center for Space Medicine Berlin (ZWMB). The aim of this partnership is the field based investigation of changes in human physiology under extreme environmental conditions such as altered circadian rhythms, isolation, confinement and cold. These studies are of very remarkable character, because they do not correspond to an artificial laboratory situation, but imply the chance to monitor human performance under real life conditions. In particular, this project is of importance to space medicine because overwintering in the Antartic has various analogies to a long-term space travel such as isolation, confinement and extreme environmental conditions and the derived knowledge from this research could have important implications for space

medicine, space physiology and living and travelling in extreme environments. Furthermore, some of this research could also have significant impact for basic research under terrestrial conditions and even the clinical setting and as new mechanisms underlying the regulation of the human body could be detected.
During the overwintering campaign 2012 the following experiments are planned:

- Circadian Rhythm (ZIRKA),
- Metabolic Rate (MR),
- SenseWear (SW),
- Body Composition (BIA),
- Autonomous Nervous System (ANS),
- Biomarkers (BM), and
- Cognitive Function (CF).

SW, BIA, ANS, and BM have made a long-standing contribution to the understanding of changes in body composition, energy balance, and regulation of the cardiovascular and hormonal system during overwintering in the Antartic. Except for BM, requiring a small venous blood sample, all of these experiments are non-invasive, require minimal to moderate time, and are easy to operate. These experiments have been successfully completed and are presently being analysed. Previous campaigns have shown diametrically adverse effects of overwintering on body compostion in men and women. In addition, Vitamin D as an example of the experiment BM, affecting the remodelling of bone, neuromuscular function and inflammation, have been shown to be decreased to detrimental levels in 2010 and 2011. In addition, both body composition and vitamin D seem to be significantly affected by the dark phase during the Antartic winter. Similar results have been previously shown for other biomarkers (e.g. erythropoietin) during the campaign 2009. While the decrease in vitamin D could have been expected due to its light-sensitive synthesis, the degradation far exceeded of what would have been expected. Given the field-physiologic character of these studies, however, it remains to be determined whether these results can be replicated in other overwintering crews. It is therefore of crucial importance to continue all of these experiments. Furthermore, given the increasing role of hormones and proteins in the understanding of body composition and cell proliferation, differentiation and apoptosis, it is intended to promote the means to increase the number of biomarkers being investigated during overwintering at Neumayer.
Since 2011 the test battery was complemented by the experiments ZIRKA, MR and CF. ZIRKA promises to provide innovative and leading insights into the understanding of circadian rhythm. The experiment employs a hardware that allows a non-invasive core body temperature measurement for 36 h, allowing the characterization of the circadian timing system. This technology is presently used on the International Space Station (ISS) for monitoring exercise-induced heat stress and will be used to

determine circadian rhythm in astronauts next year (ISS-project Circadian Rhythms). In addition, the technology has also been used successfully during the Mars500 experiment. The hardware has been now refurbished to meet the specific needs at Neumayer Station. The recording system is now smaller, connection cables are more robust, the recording device is less energy-consuming, the data download has been improved, and the device is smaller, lighter, more robust and much easier to operate. In addition, a special bag has been manufactured increase crew compliance. The knowledge of this experiment is expected not only to provide significant knowledge on the impact of isolation, confinement and altered day/night cycle on the circadian timing system, but also has significant practical implications by helping to improve physical exercise, rest- and work shifts as well as fostering adequate workplace illumination in the sense of occupational healthcare in future overwintering missions. In addition, these measurements will be of crucial importance for the ISS-project circadian rhythm and can serve as “reference data” during isolation under terrestrial conditions. Presently, Concordia Station has also asked to use the technology for replacing rather invasive techniques for long-term temperature profiling.

The overwintering 2011 was also complemented by two additional projects: MR and CF. Both projects will be continued. MR is intended to provide an excellent addition to the experiment SW as MR provides a measure of resting metabolic rate based on spirometry and gas analysis. Thus, the MR will be used to validate some of the data generated by SW-device (other indices provided by SW are presently also validated in another validation study being conducted in the laboratory).

CF aims at monitoring cognitive function during overwintering at Neumayer Station. Research from polar stations such as McMurdo station has shown that cognitive performance can be substantially affected during overwintering. For the first, a computer-based test battery has also now been employed that has been validated for tracking cognitive performance under extreme environmental conditions. Since cognitive function will excellently complement ZIRKA as well as BM and BIA – there seem to be close associations between circadian rhythm, cognitive performance, body composition, metabolic rate and even physical activity, it is clearly intended to carry out the experiments ZIRKA, SW, MR, BIA, BM and CF in 2012. It is specifically the respective influences of each of these experiments and their synergistic impact that will powerfully contribute to the understanding of human physiology in extreme environments as well as the clinical setting.

In addition to changes in hardware and software, for the first time a detailed, comprehensive documentation of each single experiment will be provided to implement successfully the entire project. Thus, Neumayer station will be provided with a new PC included all the required software, abundant supply of consumables, new equipment, and a step-by-step guide that allows a more convenient and less time-consuming implementation of all experiments. Furthermore, all crew members were invited to the ZWMB for baseline testing in body composition and BM as well as to introduce all of the experiments and provide a better understanding of the background and objectives of the project. Finally, some of the experiments will also be carried out at the South African National Antarctic Expedition (SANAE) base. This is the success of the collaborative efforts between the South African

National Antarctic Programme (SANAP), the South African Dept. of Environmental Affairs, Stellenbosch University, the Alfred Wegener Institute for Polar and Marine Research (AWI), and the Center for Space Medicine Berlin at the Charité University Medicine Berlin. This partnership will not only enhance the number of subjects being monitored in the Antarctic, but also allow promote comparisons between different environmental conditions in the Antarctic (e.g. Neumayer at sea level vs. SANAE at 846 m above sea level) as well as between different nations, cultures, and teams. Given the real-world character and exciting research opportunities, the cooperation with SANAE and Neumayer will continue and extend to take a central research focus at the ZWMB of the Charité University Medicine Berlin.

2. AWI FLIGHT MISSIONS AND DROMLAN

2.1 Summary

AWI has coordinated the air transport of personnel and freight to NEUMAYER STATION III within the frame of DROMLAN, which is organized by 11 national operators. DROMLAN performs 12 flights from Cape Town to NOVO Airbase (Russia) / TROLL (Norway) and back with aircraft Iljushin IL-76TD. Feeder flights to the NEUMAYER STATION will be performed with Basler (BT-67) aircraft. Feeder flights activities in the frame of the DROMLAN cooperation will be supported by POLAR 6.

Airborne Geophysics – CryoVEx ANT, GEA, WEGAS offshore, WEGAS, and DoCo – with POLAR 6 in Antarctica
(AWI, FIELAX, KBA)

In 2011/12 AWI's new research aircraft POLAR 6, a Basler BT-67 on skis, will be used for up to four different geophysical and glaciological projects. Furthermore logistic flights within DROMLAN and for the support of the maintenance of the remote observatories of the Neumayer Station are planned. In total are approximately 442 flight hours planned within a period of 111 days from beginning of November 2011 until mid of February 2012, including the ferry to and from Antarctica.

For logistic reasons POLAR 6 will be based at the beginning of the forthcoming season at Novo airfield and move during the season to several other stations: Progress, Casey, Davis, Neumayer, Kohnen, Princess Elisabeth. The team for CryoVEx ANT and WEGAS offshore consists of 1 scientist, respectively 2 for GEA, WEGAS, DoCo, 2 engineers for the scientific system, and a complete flight crew of 2 pilots and an engineer
The scientific equipment for the four missions will be flown in from Cape Town, South Africa, on two different DROMLAN Iljushin flights. A preliminary schedule of POLAR 6 for the season is given in table aero.tab1.

In addition to the airborne measurements are also glaciological studies planned in the vicinity of Neumayer III station. The fieldwork comprises GPS and tilt meter measurements. These activities are related to the CryoVEx ANT project. Furthermore the automatic weather station of the University Utrecht on Halvfarryggen will be maintained.

Table aero.tab 2.1: Preliminary schedule of POLAR 6.

Begin	End	Project
31/Oct	15/Nov	Ferry Bremerhaven – Novo airbase
		DROMLAN or logistic support NM III observatories
16/Nov	19/Dec	CryoVEx ANT & WEGAS offshore (Novo, Neumayer, Casey, Davis)
		DROMLAN or logistic support NM III observatories or GEEA
23/Dec	29/Dec	DoCo (Neumayer, Progress/Zhongshan, Novo, Princess Elisabeth)
30/Dec	10/Jan	WEGAS (Kohnen, Neumayer) ETA at Kohnen: 30/Dec
13/Jan	04/Feb	GEA (camp Crown Bay, Princess Elisabeth)
07/Feb	10/Feb	DROMLAN or logistic support NM III observatories
11/Feb	19/Feb	Ferry Neumayer - Calgary

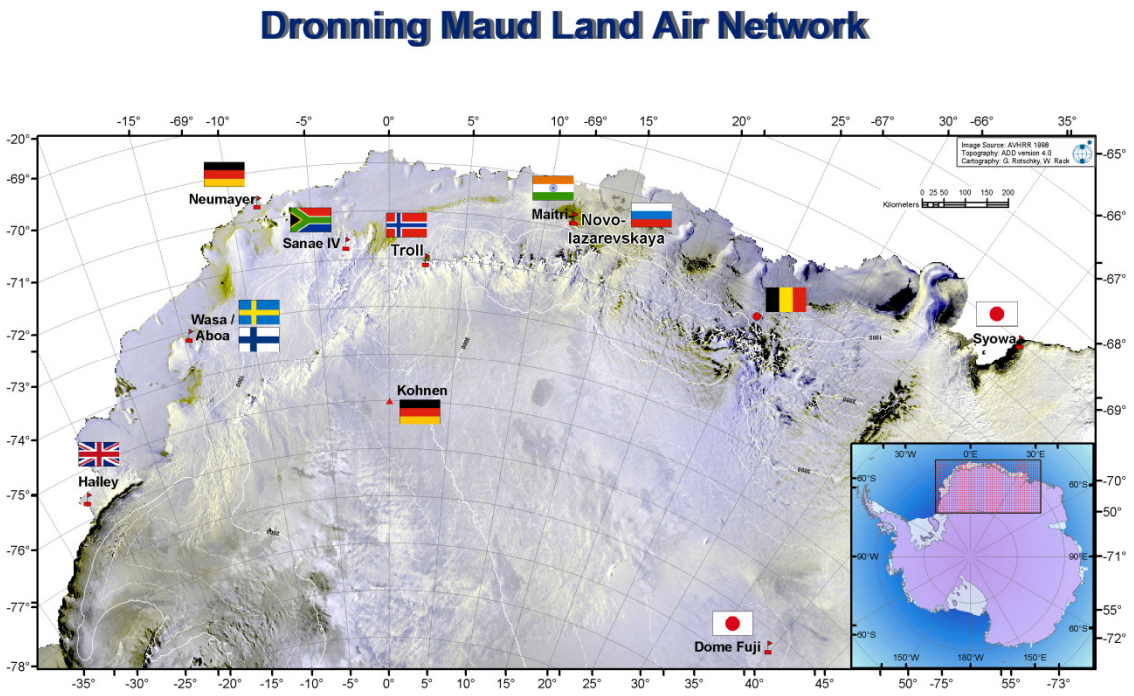
2.2 Dronning Maud Land Air Network (DROMLAN)

The aim of DROMLAN is to provide an intercontinental air-link from Cape Town to destinations within Dronning Maud Land (DML) to any member country of COMNAP and SCAR in science related activities, including logistics. This regularly operated air-link improves the accessibility and extends the time period for summer season activities. DROMLAN has been established as an international project by Belgium, Finland, Germany, India, Japan, Norway, Russia, South Africa, Sweden, The Netherlands, and UK.

Each summer season runways are prepared at NOVO Airbase close to the Russian station NOVOLAZAREVSKAYA and at the Norwegian station TROLL for landing of heavy aircraft. The runway at NOVO Airbase consists of compacted snow and is elevated about 500 m a.s.l. Because of surface melting this runway cannot be used for intercontinental flights from mid December until mid January. The runway at TROLL STATION consists of blue ice at an elevation of about 1300 m a.s.l. Because of higher altitude this runway is operational for greater aircraft during the whole summer period. NOVO Airbase is operated by Antarctic Logistics Centre International (ALCI, Cape Town) in charge of the Russian Antarctic expedition (RAE).

Figure 2-1: Overview map of Dronning Maud Land Air Network.

The Norwegian Antarctic Research Expedition (NARE) maintains the runway at TROLL. The weather forecast for intercontinental and internal flight operations is organized at NEUMAYER STATION (AWI,



DWD). This service covers the region between HALLEY and SYOWA for all intercontinental and internal flights in the scope of DROMLAN.

Since the establishment of DROMLAN, the Antarctic Logistics Centre International (ALCI) as the logistic operator of the Russian Antarctic Expedition (RAE) organises and performs intercontinental flights with cargo aircraft Iljushin (IL-76TD) between Cape Town and NOVO Airbase every summer season. Internal feeder flights are performed with ski-equipped aircraft Basler (BT-67). The map shows destinations within Dronning Maud Land. DROMLAN members coordinate the feeder flights with ALCI and provide necessary services, fuel and facilities at their stations.

The number of flight missions depends on logistic and scientific requirements of the national programs. Every season DROMLAN generally aims to perform 12 intercontinental flights with connecting flights to various destinations.

In season 2011/2012, for DROMLAN altogether 12 intercontinental flights are scheduled with IL-76TD, between 3 Nov. 2011 and 28 Feb 2012.

The IL-76TD flights running via Novo Airbase and Troll are arranged by ALCI.

At TROLL runway flight management is arranged by NARE. Pre-flight assistance in Cape Town will be provided by ALCI for all DROMLAN intercontinental flights.
This season scientists, technicians and other personnel from 11 DROMLAN members are going to join the intercontinental flights. In total - including support personnel, pilots and others for NOVO Airbase - 364 persons will fly into Antarctica and 331 persons back. About 61 tons of airfreight have to be carried in and about 26 tons out.

Table 2.2: DROMLAN intercontinental flight activities and AWI share.

DROMLAN intercontinental transport			**AWI share**	
Aircraft – number of flights	Persons in / out	Cargo (ton) in / out	Persons in / out	Cargo (ton) in / out
IL-76TD – 12 flights	364 / 331	61 / 26	81/ 79	9.5 / 5.1

The three BT-67 POLAR 6 (C-GHGF), LIDIA (C-GEAI), and MIA (C-GEAJ) will carry out the feeder flights in Dronning Maud Land. ALCI coordinates and performs feeder flights according to the requirements for DROMLAN as well as for RAE activities at the Russian stations PROGRESS and VOSTOK.

2.3 DROMLAN operations for AWI

Altogether 81 scientists and technicians with about 9.5 tons of cargo will be carried from Cape Town to NEUMAYER STATION III, and 79 persons with about 5.1 tons of cargo back to Cape Town.

The following aircraft will perform logistic tasks of AWI personnel and cargo:
Iljushin (IL-76-TD) operated by ALCI for DROMLAN
Basler (BT-67) 2 operated by ALCI (LIDIA and MIA) for feeder flights in the scope of DROMLAN and 1 (POLAR 6, AWI) for scientific and logistic tasks
The detailed flight schedules are shown in chapter 5.

2.4 Logistic flight missions of POLAR 6

Logistic flights (approximately 35 flight hours):
Logistic flights are planned only for the support of the maintenance of the external observatories of the Neumayer III Station.

2.5 Scientific surveys with POLAR 6

In 2011/12 AWI's research aircraft POLAR 6, will be used for up to five different geophysical and glaciological projects. The team for CryoVEx ANT consists of 1 scientist, respectively 2 for GEA, WEGAS, and DoCo, 2 engineers for the scientific system, and a complete flight crew of 2 pilots and 1 engineer

The instrumentation of POLAR 6 varies for the four missions:

CryoVEx ANT: ASIRAS, laser scanner, laser altimeter, nadir video, 50 Hz and 1 Hz geodetic GPS receiver, basic meteorology (temperature, humidity, wind, pressure).

DoCo: I Ice thickness radar, laser scanner, laser altimeter, nadir video, 50 Hz and 1 Hz geodetic GPS receiver, basic meteorology (temperature, humidity, wind, pressure).

GEA: Ice thickness radar, gravity meter, magnetics, laser scanner, laser altimeter, nadir video, 50 Hz and 1 Hz geodetic GPS receiver, basic meteorology (temperature, humidity, wind, pressure).

WEGAS: Ice thickness radar, FMCW radar, gravity meter, magnetics, laser scanner, laser altimeter, nadir video, 50 Hz and 1 Hz geodetic GPS receiver, basic meteorology (temperature, humidity, wind, pressure).

WEGAS offshore: Gravity meter, magnetics, laser scanner, laser altimeter, nadir video, 50 Hz and 1 Hz geodetic GPS receiver, basic meteorology (temperature, humidity, wind, pressure).

On ground several GPS reference and magnetic base stations will be set up during the surveys near the station from which POLAR 6 will be operated and during WEGAS also on the polar plateau.

2.5.1 CryoVEx ANT (approximately 65 flight hours):

Aim of CryoVEx ANT is to perform altimeter measurement above designated test areas in the vicinity of the Schirmacher Oasis, Law Dome, near Kohnen and Neumayer. Parallel to the airborne survey a ground-based survey by the Institute for Planetary Geodesy of the Technical University Dresden is carried out in the blue ice area near the Schirmacher Oasis and by the Univeristy of Tasmania (Australia) on Law Dome. These activities are part of the CryoSat Cal/Val programme and the focus is on surface roughness and morphology of blue ice areas, high and law accumulation regions in order to derive information, which will help to evaluate CryoSat-2 data. The flight pattern comprises single flight tracks along survey profiles of the team of the TU Dresden as well as small grids above planned crossover points of CryoSat-2. The areas of interest are shown as dark grey shaded circles in figure aero.fig1. This is a joint activity between AWI, ESA, TU Dresden, and U Tasmania.

2.5.2 DoCo East Antarctica (approximately 30 flight hours):

The project Dome Connections in East Antarctica (DoCo) aims for radar sections connecting deep ice core drill sites in East Antarctica mainly following the ice divides between them (Dome Fuji, Dome A region, Vostok, Dome C, Talos Dome, see also figure aero.fig1) supporting interpretation of the deep ice cores. The ice divides between Kohnen and Dome Fuji with POLAR 2 as well as between Talos Dome – Dome – Vostok – Dome A with POLAR 5 have been mapped in the past. The larger endurance of POLAR 5 and POLAR 6 compared to POLAR 2 and the possibility to refuel at the former AGAP-N camp allows now to complete the survey and map the ice divide between Dome A and Dome F. The profiles will allow for the first time an independent correlation of the cores by tracing internal layers, isochrones, along the ice divides between the deep ice core drill sites. This survey will be conducted within 4-5 days in December 2011. The map in aero.fig1 shows the planned profile and those already flown.

2.5.3 GEA (up to 100 flight hours):

The intension of this short mission is to map small-scale magnetic anomalies of the western Sør Rondane in support of future geological mapping activities of BGR in this region. The survey shall link the geological studies and future planned overview mapping activities. The line spacing will be 5 km and the length of the lines 200 km. It is planned to operate POLAR 6 for this mission from the unloading site of the Belgium Antarctic Programme at Crown Bay and from Princess Elisabeth station. It is planned to set up magnetic and GPS reference at the unloading site as well as at the station.

2.5.4 WEGAS (up to 50 flight hours):

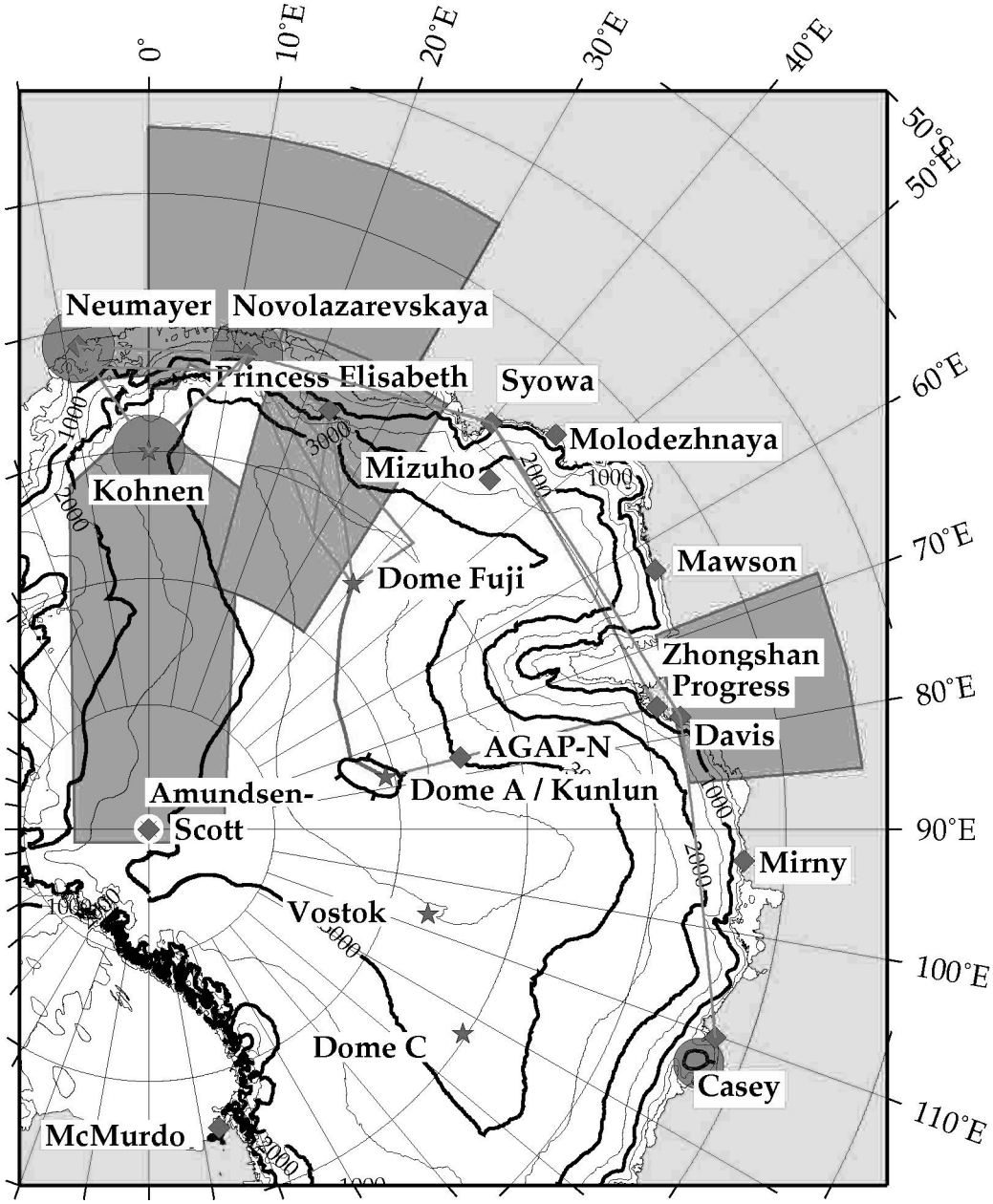
It is planned to carry out 8-10 survey flights for the WEGAS project operating from Kohnen station. The aim is to extent the investigated area of the earlier VISA and WEGAS surveys further South. The line spacing will be 10 km and the flight level 11500 ft. The WEGAS data set will serve as a reference for satellite based magnetic and gravity field measurements, e.g. GRACE.

WEGAS offshore (up to 55 flight hours):

It is planned to carry out several offshore survey flights in a region North of the Australian base Davis to investigate tectonic structures of the sea floor in order to study the Gondwana break-up in this region.

Logistic flights (approximately 35 flight hours):

Logistic flights are planned only for the support of the maintenance of the external observatories of the Neumayer III Station.



Map showing the areas of investigation as dark grey regions, from east to west: WEGAS, GEA offshore GEA, WEGAS offshore. The target areas for CryoVEx ANT are pointed out by four dark grey filled circles at Neumayer, Kohnen, Novolazarevskaya, and Casey. The main profile of DoCo is shown as bold grey line along the ice divide between Dome A and Dome Fuji. The straight grey lines indicate ferry lines of CryoVEx ANT and DoCo.

Acronyms:

CryoVEx ANT	**Cryo**Sat **V**alidation **Ex**periment in **Ant**arctica
DoCo	**Do**me **Co**nnection East Antarctica (East Antarctica)
DROMLAN	**Dro**nning **M**aud **L**and **A**ir **N**etwork

GEA	**G**eodynamic evolution of **E**ast **A**ntarctica
GPS	**g**lobal **p**ositioning **s**ystem
GRACE	**G**ravity **R**ecovery **a**nd **C**limate **E**xperiment
VISA	**V**erdichtung und **I**nterpretation von **Sa**tellitendaten zur Bestimmung von Magnetfeld, Schwerefeld, Eismassenhaushalt und Krustenstruktur in der Antarktis unter Nutzung flugzeuggestützter und bodengebundener Messungen
WEGAS	**W**est-**E**ast **G**ondwana **A**malgamation and its **S**eparation

3. KING GEORGE ISLAND

3.1 Summary

The transport of personnel and cargo to King Georg Island (KGI) needs close coordination and assistance by various national programs and commercial operators. That includes aircraft and ship transportation. Transport is organised by Dirección National del Antártico (DNA) and performed by Argentinean aircraft and vessels.
Furthermore, main cargo from AWI will be transported by the support of MV Polar Pioneer, from Poland directly to Potter Cove.5

3.2 DALLMANN Laboratory

The DALLMANN Laboratory at Base Jubany (Argentina) will be opened at the end of November 2010. It is operated in cooperation with the Instituto Antártico Argentino (IAA) and placed at the Argentinean station Jubany. During the season 2011/12 up to 15 German scientists (6 scientific groups) will work at the Potter Cove and the station area. The planned scientific activities of AWI focus coastal biological projects, furthermore glaciological and sedimentological projects.
In order to perform all planned scientific works up to 4.7 tons of cargo have to be shipped by sea.
Begin of November MV Polar Pioneer is scheduled to call at King George Island deliver cargo and to drop the first scientists. Station will be closed end of March 2012.

3.2.1 Planned scientific projects

3.2.1.1 "Geochemical characterization and fate of the dissolved and particulate load of glacial melt waters of the Potter Cove watershed, King George Island (Western Antarctic Pensinsula)"

D. Monien, B. Schnetger, H.-J. Brumsack
Institute for Chemistry and Biology of the Marine Environment, Oldenburg University

The Western Antarctic Peninsula (WAP) belongs to those regions, which are characterized by rapid regional warming and gradual glacier retreat. Since the late 1960s a reduction of sea ice and a dramatic retreat of glaciers is reported at the WAP that has even accelerated in the last decade. First biological and geophysical investigations at Potter Cove and Maxwell Bay (King George Island) showed that these changes directly affect the coastal ecosystem by the increasing amounts of turbid melt waters. However, the chemistry of the dissolved and particulate load of melt waters draining from retreating glaciers into Potter Cove is still poorly known. It has been suggested that the input of nutrients (N, P, Si), micro-nutrients (e.g. Fe, Cu, Ni, Zn) and suspended matter into Potter Cove may have an impact on biological processes in this semi-enclosed bay and even on the fertility of the whole Southern Ocean. Goals of this project are the geochemical characterization, quantification and transformation of the dissolved nutrient, major and minor ion composition as well as the particulate matter of glacial melt water draining into Potter Cove. Furthermore, besides the quantification of the particle flux and the nutrients, major element and trace metal input on different time scales into the cove, we intend to get assessment of the transfer of geochemical proxies from glacier retreat into sedimentary archives. The results of this research may contribute to the better understanding of the impact of global climate change on marine ecosystems at the WAP in future.
This study is part of the EU-project IMCOAST with partners from Belgium, the Netherlands, Spain, Poland and Germany and has collaborators from Argentina.

3.2.1.2 Sources and reaction pathways of soluble Fe from the Western Antarctic Peninsula to the Southern Ocean

The objective of this study is to reveal sources and mechanisms responsible for high supply of soluble Fe in regions close to ocean islands in the otherwise HPLC Southern Ocean with the common effect of stimulating plankton growth. The focus of this study will be on King George Island (KGI), Western Antarctic Peninsula. Fe isotopes from glacial outwash material, shelf sediments and porewaters, and transects of water column profiles together with full diagenetic inorganic geochemical profiling will be used to fingerprint Fe sources and supply pathways. In the light of rapid glacier retreat on KGI due to global warming and enhanced outwash of glacially eroded material, three possible reaction pathways will be investigated: 1) early diagenetic recycling of Fe and diffusion out of sediments fuelled by high productivity; 2) accumulation and resuspension of solid reactive Fe phases (including diagenetic Fe-oxyhydroxides) in surface sediments; 3) direct dissolution of reactive Fe minerals and Fe-rich silicates

from glacial outwash. In order to address the dynamics of Fe supply pathways and a potential relationship to climate change, high outwash regions (Potter Cove, Maxwell Bay) will be compared with a low outwash region in another field trip next year (Admiralty Bay).

This study is part of the DFG-funded SPP 1158 Antarctic Research and a group of investigators collaborating under the heading "The geochemical response of sedimentary archives to rapid recent glacier retreat at the Western Antarctic Peninsula (WAP): from source to sink" by Hans Brumsack from the University of Oldenburg and "Rapid climate change at the Western Antarctic Peninsula: Chemical flux change and environmental consequences" by Doris Abele, Dorothee Wilhelms-Dick and Thomas Brey from AWI Bremerhaven. The project is also associated with the IMCOAST project.

3.2.1.3 The Coastal Depositional Environment In KGI Fjord And Bay Systems, IMCOAST WP-3 (IP4)

H.C. Hass, N. Wittenberg, A.-C. Wölfl (AWI); S. Lindhorst, I. Schutter (Uni Hamburg)
Joint with project PolarBeach (S. Lindhorst)

Objectives

Goal of the proposed project is to assess the impact of recent and subrecent climate change on the coastal depositional environment of Potter Cove and Maxwell Bay (King George Island, West Antarctic Peninsula, WAP). Specifically, we want to assess the impact of climate-change controlled glacier-melting processes on the near-shore (Potter Cove) and shallow-coastal (Maxwell Bay) marine depositional environments during the Late Holocene (using long sediment cores and shallow seismics), at present (via the compilation of thematic maps on e.g. sediment distribution and bedforms), and in the near future (interpreting the project results). The second goal is to reconstruct the late Holocene climate development of the WAP on the basis of sediment cores obtained from marine areas off King George Island outside the ice scouring zone since the immediate glacier-affected zones rarely carry undisturbed sedimentary records. A pilot study revealed high temporal resolution (up to 1cm/y) in a sediment core from Maxwell Bay. Special emphasis is placed upon the warm phases of the past millennium (in particular the Medieval Warm Period) as analogues to the present one. Course and characteristics of warm phases of the past are instrumental in evaluating the significance of the present climate trend and will aid in establishing a prognosis for the near future environmental development.

Preliminary schedule of actions

Acoustic measurements including RoxAnn seafloor classification system, sidescan sonar, and shallow seismics as well as seafloor surface sampling will be carried out from zodiacs. A 200 m grid will be draped over the working area Potter Cove and the adjacent shallow areas north and south of the fjord mouth (Fig. 1).

Profiling work will be on grid lines, sediment sampling will be carried out at grid nodes. Navigation in centimeter precision will be accomplished using a dGPS. All data will be geo-referenced and stored in a GIS database. The actual density of profiling and sampling will be adjusted to the atmospheric conditions during the coming field campaign. In this campaign we aim at taking c. 200 seafloor

samples, measuring about 80 nm of RoxAnn/sidescan sonar transects and about 15 nm of shallow seismic transects to supplement data and measurements from the first campaign in 2010. We aim at deploying RoxAnn and sidescan sonar synchronously during the campaign. The shallow seismics must be run separately due to the heavy weight and the power consumption of the instruments. The seafloor samples will be taken separately from the zodiac using the electric winch constructed for this project. All laboratory analyses will be carried out in the home laboratories.

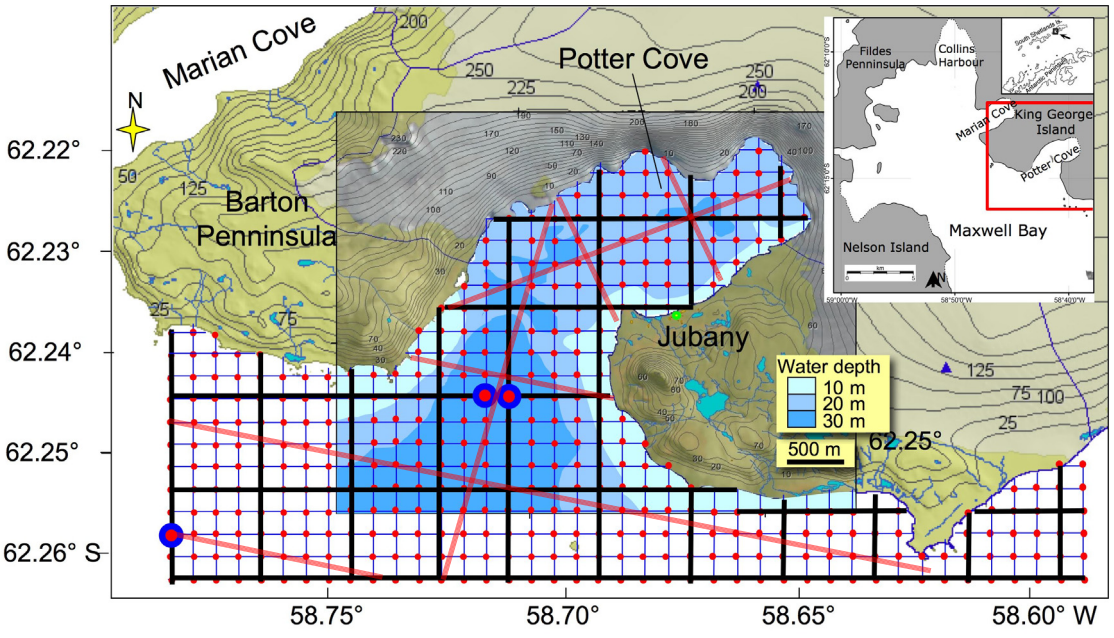


Fig. 1: Overview map showing the 200 m grid (light blue lines: potential acoustic transects), the grid nodes (red dots: potential sampling locations), potential shallow seismic transects (bold black and light red lines), and locations of 3 sediment cores taken during RV "Polarstern" Expedition ANTXXIII/4 in 2006. Locations shown here are of two field campaigns.

3.2.1.4 Fe and Mn in Antarctic bivalves: Indicators of change in near-shore biogeochemistry?

Our project focuses on the biogeochemistry of the Antarctic soft-shell clam *Laternula elliptica*. Investigations of shells, tissues and hemolymph are used to establish biochemical proxies for the application of *Laternula elliptica* as an environmental archive. Shell samples (expedition 2010) of *L. elliptica* showed a coexistence of three different calcium carbonate polymorphs (aragonite, calcite, vaterite) which compromises the applicability of the shell as environmental archive. Annual growth layers continue through different polymorphs and trace metal incorporation depends on the polymorph (Poigner et al. 2010).

Different cells of the bivalve mantle tissue seem responsible for the mineralization of different polymorphs in the shell. To verify this hypothesis mantle tissues and shells will be sampled for later genetic and mineralogical analysis (mappings). Live bivalves will further be treated with a fluorescent

marker to visualize mineralization of different polymorphs in the shell to check for possible polymorph transitions.

Further investigations will address high iron concentrations determined in hem lymph of *in situ* collected material in 2010. Additional samples will be taken to determine under which biogeochemical conditions of the sedimentary habitat high amounts of iron are assimilated. Comparisons with geochemical data (water, sediment) of Potter Cove will support the interpretation of metal assimilation and chemical pathways in *L. elliptica*.

This study forms part of the project *Rapid Climate Change at the Western Antarctic Peninsula: Chemical Flux Change and Environmental Consequences* funded by the German Science Foundation (DFG grant AB 124/11-1).It is carried out in close cooperation with the projects *The geochemical response of sedimentary archives to rapid recent glacier retreat at the Western Antarctic Peninsula (WAP): from source to sink* by Hans Brumsack from the University of Oldenburg and *Sources and reaction pathways of soluble Fe from the Western Antarctic Peninsula to the Southern Ocean* by Michael Staubwasser from the University of Cologne. Further it is associated to the IMCOAST project.

Poigner, H., Nehrke, G., Brey, T., Abele, D., Wilhelms Dick, D.(2011).Coexistence of three calcium carbonate polymorphs in the shell of the Antarctic clam Laternula elliptica: Consequences for trace metal incorporation. European Geophysical Union General Assembly 2011, General Assembly 2011, 3rd - 8th April 2011, Vienna, Austria.

3.2.1.5 Polar beach-ridges as climate archives (Quaternary of King George Island, South Shetland Islands, Antarctica) (PolarBeach)

S. Lindhorst (GPI)*, C.H. Hass (AWI), I. Schutter (GPI), J. Ludwig (GPI), C. Betzler (GPI)
* Geological and Palaeontological Institute (GPI)
Joined with project IMCOAST WP-3 (IP4) (Christian Hass)

Objectives

The potential of polar beach-ridges as archives of climate variations will be tested. The new approach of the planned investigations is to decipher the internal beach-ridge architecture using geophysical and sedimentological data in an integrated approach. Controlling factors on beach-ridge development are waves, sea-level, and sediment supply. As all of these react on climatic changes, the sediments of beach ridges bear the potential to host a valuable record of even short climate changes. Ground-penetrating radar (GPR), sedimentological data, geological mapping, GPS levelling, and radiocarbon dating will provide a solid database for our interpretations, and allow for a sequence-stratigraphic interpretation. A new process-oriented model for the genesis of polar beach ridges will be established that also allows predicting changes under the recent global warming regime. For this purpose, beach-ridge systems along the coasts of Maxwell Bay and adjacent Potter Cove (King George Island, South Shetland Islands, Fig. 1) will be investigated. The focus of the proposed study is on the younger Holocene sediments, but older beach systems will be incorporated for comparison if present.

Preliminary schedule of actions

The backbone of our studies is the GPR survey, which will allow us to document the following features: unconformities, changes in thickness of sediment packages, and depositional geometries such as cross beddings or dipping strata. Subsurface changes in lithology will be mapped by integrated interpretation using core data and the approach of radarfacies interpretation. The GPR data will be instrumental to reveal the sedimentary architecture of the investigated beach ridges and to decipher phases of beach erosion as well progradation. Erosional unconformities, caused by severe storms can be detected, and exact sampling locations can be chosen with regard to stratigraphic position. Mapping will provide spatial information like changes in ridge orientation, erosional scarps, and the contact between beach and bedrock. These data will be correlated with subsurface geometries and helps to interpret the geometries observed in the GPR data witch regard to lateral changes. Levelling provides information on uplifted beaches and will allow for a stratigraphic correlation between distinct beach-ridges and the different working areas. Furthermore, levelling along the GPR profiles during GPR data collection will provide information on terrain morphology, which are essential to correct geometric distortions in the GPR data. Sedimentological investigations will provide lithological and granulometrical data on surface and subsurface sediments. These are essential to ground-truth GPR data, to interpret observed beach-ridge architecture, and to provide information on hydrodynamic conditions (e.g. storm vs. fair weather) during deposition. Furthermore, datable material will be provided through shallow coring.

Work will be concentrated on key areas along the coast of Potter Peninsula (Fig. 1). Working area was identified based on freely available satellite images and with regard to the results of the previous field season. Correlation between the working areas will be based on dGPS levelling.

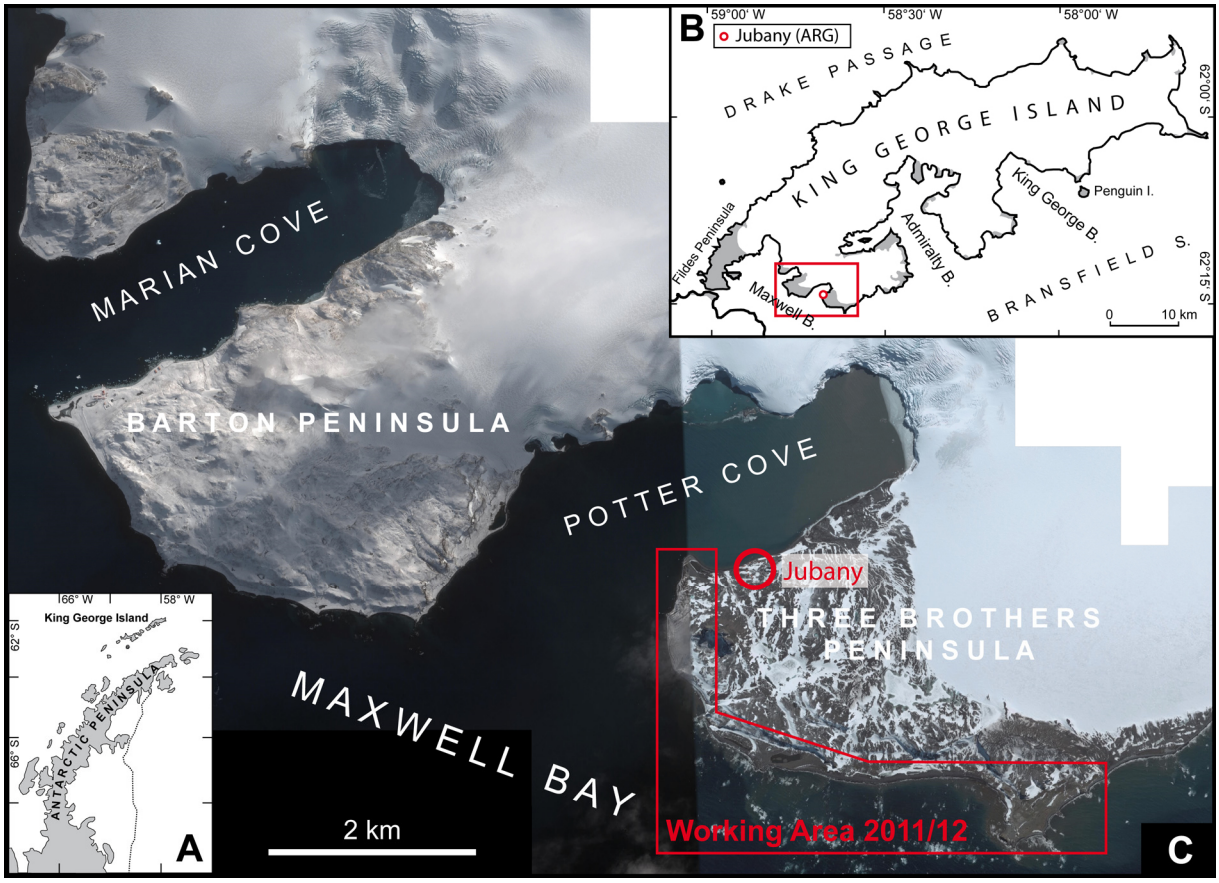


Fig. 1: Study area along the coast of Potter Peninsula. Satellite image is from Google Earth and composed of images obtained during different seasons.

4. OTHER ACTIVITIES

4.1 AWI activities at other stations and locations

4.1.1 Research within the German-South African Year of Science 2012

J. Plötz, H. Bornemann (AWI)

Two scientists of the AWI participate in the South African National Antarctic Programme (SANAP) in synchrony with the German-South African Year of Science 2012. The Mammal Research Institute (MRI) at the University of Pretoria (UP) is in charge of the logistic coordination of a collaborative project between seal researchers of the AWI, the MRI and the National Institute of Polar Research (NIPR, Japan). The field work will be carried out during the SANAP Marion Island relief voyage of *SA Agulhas* at Marion Island Research Base from April to May 2012. Marion Island (46°54'S, 37°45'O) is located ca 1800 km south-east of South Africa, and 2300 km north of Antarctica's Lutzow-Holm Bay.

The closest landfall apart from proximate (20 km) Prince Edward Island is Ile aux Cochons of the Crozet Island group, 950 km to the east.

Foraging ecology of southern elephant seals of Marion Island

J. Plötz, H. Bornemann (AWI), M.N. Bester, C. Tosh, P.J.N. de Bruyn, R.R. Reisinger, T. McIntyre (MRI), Y. Naito, A. Takahashi (NIPR)

Scientific background: About 150 deployments of ARGOS satellite transmitters on southern elephant seals of both sexes and different ages have been carried out at Marion Island since 1999 to obtain information on the seals' diving activities and seasonal movements to their foraging areas. The majority of movements were oriented in westerly direction tipping up to 20°W. Seals ranged also north of Marion Island to South Africa, south to and below the Antarctic Polar Front towards the eastern Weddell Sea coast, and up to 60°E between Iles Crozet and Iles Kerguelen. The seals spent most of their time in ice free waters over the deep environment of the southern Indian Ocean, the South Atlantic, and the respective sectors of the Southern Ocean. Areas of increased forage effort were distributed throughout their entire areas, indicating mostly opportunistic foraging, though some of the targeted areas appeared to be associated with bathymetric features like seafloor ridges and fracture zones. Foraging areas of males and females overlapped substantially. Their use of depths however was segregated with males diving to deeper depths than females. Though diel dive strategies varied conversely at certain areas, both sexes generally dived to deeper depths during daytime, when compared to night-time dives. Recent findings demonstrate that the seals' foraging is impacted by variations in water temperature.

Objectives:

Southern elephant seals undertake wide ranging movements in search of food. Variations in their foraging ranges and feeding habitats are therefore an important source of information about environmental variability integrated over a wide range of spatial and temporal scales. The factors contributing to oceanic areas of enhanced food availability are largely unexplored. What makes certain areas in the Southern Ocean better for foraging than others, what is the spatial and temporal stability of these feeding spots, what are the dominant oceanographic features, and are foraging grounds of elephant seals predictable? Repeated deployments of CTD-combined ARGOS satellite-relayed dive loggers on the same individuals can help to answer these questions. About twenty individual seals of both sexes have been instrumented repeatedly at Marion Island since 2005. Two of these seals hold concatenated tracks over five consecutive years. Our pool of long-term deployments still needs to be enlarged for a comprehensive interpretation. New instrumentations will therefore concentrate on individuals with a known tracking history.

Satellite derived tracking and diving data reveal information on broad-scale foraging patterns. Their interpretation is based on the assumption that dives with u- and w-shaped profiles represent foraging during the bottom period of the dives, and that extended bottom times are indicative for areas with an increased forage effort. These areas may be considered inhabiting an enriched meso-pelagic fauna. A

new type of a mandible accelerometer logger (MAC) developed at the NIPR in Japan allows testing of the aforementioned assumptions by detecting discrete feeding events during the seals' dives. The MAC yields a fine-scaled pattern of mandible movements and concurrent dive depths that can be related to mouth openings or respectively prey ingestions. By comparing the different feeding areas, this approach allows a better understanding of where and when feeding actually takes place.

Work at Marion Island:

Southern elephant seals will be instrumented with both mandible accelerometer units and CTD-combined ARGOS satellite-relayed dive loggers. For the purpose of instrumentation, the field team will check the haul out sites of the seals along the rocky shore on a weekly schedule in order to register arrival or respectively presence of suited males, in particular of those with a known tracking history. The deployments will take place when the seals will have completed their annual moult. The devices will be glued to the new fur of anaesthetized seals using quick setting epoxy resin. The proper instrumentation of the seals will be controlled until the seals are going to leave for their winter foraging migration. The units shall be recollected when the animals will have returned to the beaches during their forthcoming breeding our moulting season. The retrieved instruments can be redeployed. The remoteness of Marion Island from other land masses maximises the likelihood of successful retrievals. The South African long-term mark-resighting programme on southern elephant seals at Marion Island, which has a continuity of almost 30 years, allows for ideal selection of suited seals. Both aspects optimize the preconditions for a successful field campaign.

4.1.2: Current environmental situation of the Fildes Pensinsula Region Population Ecology and Migration of Antarctic Skuas

Hans-Ulrich Peter, Michel Stelter, Tobias Guetter (Friedrich-Schiller-Universität, Jena)

Period:	November 2011 – March 2012
Area of Activity:	Fildes Peninsula (Bellingshausen Station, Russia)
Scientific leader:	Hans-Ulrich Peter (Friedrich-Schiller-Universität, Jena)

International / National cooperation

Russian Antarctic Expedition , AARI, St.Petersburg: (for Bellingshausen Station)

British Antarctic Survey (joint datalogger-project for skuas)

Alfred Wegener Institute for Polar and Marine Research, Germany (Logistics)

Project summary

Aim of the project “Current environmental situation and management proposals for the Fildes Peninsula Region” is the continuation of an updated standardized assessment of fauna and flora of the Fildes Peninsula and Ardley Island with focus on birds and seals. Any considerable environmental changes will be analyzed to keep the scientific data base up to date and usable during the process of

discussion on international level about an anticipated ASMA. Within this project the monitoring of penguins (Pygoscelis spec.) and Southern Giant Petrels (Macronectes giganteus) will be continued.
The first aim of the project "Population ecology and migration of Antarctic Skuas" on Fildes Peninsula is the continuation of the long-term project on the population ecology of both skua species and hybrid pairs. In the season 2009/10 in cooperation with BAS GLS-Loggers were attached on breeding birds to investigate the winter migration of both species. In January and February 2012 the last loggers were removed and the data processed.

List of participants

Name	First Name	Institute	Profession	Country
Dr. Peter	Hans-Ulrich	Polar & Bird Ecology Group, Jena	Project leader	Germany
Stelter	Michel	"	Master Student	"
Guetter	Tobias	"	Diploma Student	"

4.1.3 GEA 2 - Geodynamic Evolution of East Antarctica

Detlef Damaske, Andreas Läufer (BGR)

Period: December 2011 – February 2012

Area of activity: Sør Rondane (eastern Dronning Maud Land) and Nunataks to the east towards Novolazarevskaja (30°E to 10°E,71°S to 73°S) (Princess Elisabeth (Belgium), Novolazarevskaja, Russia).

International / National cooperation

Belgium Antarctic Research Expedition (BELARE) and
Alfred Wegener Institute (AWI)

Project Summary

In 2011/2012 (mid-December 2011 to early February 2012) BGR will conduct the land expedition "GEA 2" to Sør Rondane in eastern Dronning Maud Land in cooperation with the Belgium Antarctic Research Expedition (BELARE) and Alfred Wegener Institute (AWI). Main base for both mainly helicopter-supported geological/ground-geophysical investigations and an aerogeophysical survey with the Polar-6 (AWI) will be the Belgium Princess Elisabeth Station (PES) and a temporary field camp at Crown Bay used for annual resupply of PES. An additional small geological project of ca. 1 week is planned at Steingarden located some 200 km south of Novolazarevskaya (RUS). Main aim of GEA is the study of geological and tectonic features of East Antarctica related to the Grenvillian and pan-African orogenic cycles and to break-up and fragmentation of the Gondwana supercontinent as

well as the long-term landscape evolution of Dronning Maud Land. Used aircraft for the project: 2 Helicopter, 1 BT 67 (Polar-6).

Participants:

Name	First Name	Organization	Position/profession	Nationality
Damaske	Detlef	BGR	Geophysicist	Germany
Läufer	Andreas	BGR	Structural Geologist	Germany
Jacobs	Joachim	University of Bergen	Geologist	Norway
Lisker	Frank	University of Bremen	Thermochronologist	Germany
Ehlburg	Marlina	University of Ghent	Petrologist	Belgium
Ruppel	Antonia	BGR	Structural Geologist/ Geophysicist	Germany
Lucka	Nicole	University of Bremen	Thermochronologist	Germany
Estrada	Solveig	BGR	Petrologist	Germany

5. LOGISTICS, SCHEDULES, PARTICIPANTS

5.1 DROMLAN flight schedules

5.1.1 Feeder flights (planning stage: October 2011)

in / out by	date	ID	route	pax in	pax out
DROMLAN flight - Iljushin 76TD	02-03 Nov 2011	D1	Cape Town - NOVO - Cape Town	0	0
DROMLAN flight - Iljushin 76TD	07-08 Nov 2011	D2	Cape Town - NOVO - Cape Town	8	0
DROMLAN flight - Iljushin 76TD	15-17 Nov 2011	D3	Cape Town - NOVO - Cape Town	3	0
DROMLAN flight - Iljushin 76TD	22-24 Nov 2011	D4	Cape Town - NOVO - Cape Town	1	0
DROMLAN flight - Iljushin 76TD	29 Nov-03 Dec 2011	D5	Cape Town - NOVO - Cape Town	9	0
DROMLAN flight - Iljushin 76TD	06-10 Dec 2011	D6	Cape Town - NOVO - Cape Town	8	2
DROMLAN flight - Iljushin 76TD	19-21 Dec 2011	D7	Cape Town – NOVO – Cape Town	15	4
DROMLAN flight - Iljushin 76TD	10-13 Jan 201	D8	Cape Town - TROLL - Cape Town	29	13
DROMLAN flight - Iljushin 76TD	30 Jan-01 Feb 2012	D9	Cape Town – NOVO – Cape Town	6	20
DROMLAN flight - Iljushin 76TD	06-09 Feb 2012	D10	Cape Town - NOVO - Cape Town	0	16
DROMLAN flight - Iljushin 76TD	20-21 Feb 2012	D11	Cape Town - NOVO - Cape Town	0	17
DROMLAN flight - Iljushin 76TD	27-28 Feb 2012	D12	Cape Town - NOVO - Cape Town	0	5
POLAR 6 (BT-67)	15 Nov 2011 – 19 Feb 2012	P6	ETA / ETD/ NOVO	3	3
			DROMLAN Pax in / out:	**79**	**77**
Total number of participants:	**71**		**Total pax movements (flight)**	**82**	**80**
Ships Transportation					
RV Polarstern		PS	**Cape Town – Atca Bay –Cape Town**	**2**	**3**
SA Agulhas		SAA	**Cape Town – Atca Bay /Penguin Bukta – Cape Town**	**0**	**1**
Total number of participants:				**84**	**84**

5.2 Travel schedule for participants, DML

surname	given name	activity	institution	profession	nation		in	out
Neumayer Station III: Season								
Coordination season 2011/2012								
Kohlberg	Eberhard	Coordinator logistics	AWI-LOG	Physician	Germany		D6	D12
						Total:	**1**	**1**
Flight weather forecast (DROMLAN								
Rentsch	Harald	DROMLAN weather forecast	DWD	Meteorologist	Germany		D2	D8
Möller	Hans-Joachim	DROMLAN weather forecast	DWD	Meteorologist	Germany		D8	D12
						Total:	**2**	**2**
Coordination technical operation								
Matz	Thomas	Technical supervision	AWI-LOG	Engineer	Germany		D2	D6
Heuck	Hinnerk	Technical inspector	RFL	Engineer	Germany		D2	D12
Hirsekorn	Marius	Technical inspection	AWI-logistics	Captain	Germany		PS	D8
Pluder	Andreas	Technical inspection	RFL	Engineer	Germany		PS	D8
						Total:	**4**	**4**
Safety-related inspection								
Schädlich	Bernd	Surveyor, technical inspection	NN Engineering	Engineer	Germany		D5	D6
						Total:	**1**	**1**
Working group logistics								

Quirandt	Katharina	Housekeeping	RFL	Service	Germany		D2	D11
Fröhlich	Mike	Cook	RFL	Cook	Germany		D5	D11
Falkenberg	Falk	Leader	RFL	Technician	Germany		D2	D9
Nittka	Dirk	Technician	RFL	Technician			D2	D9
Rhau	Lars-Peter	Technician	RFL	Technician			D2	D9
						Total:	**5**	**5**
Scientific-technical operation								
Riess	Felix	Technical inspector WTB	RFL	Engineer	Germany		D6	D12
						Total:	**1**	**1**
Supervision observatories								
Loose	Bernd	Meteorological observatory	AWI	Scientist	Germany		D8	D11
Weller	Rolf	Airchemistry observatory	AWI	Scientist	Germany		D8	D12
Eckstaller	Alfons	Geophysical observatory	AWI	Scientist	Germany		D7	D11
Grasse	Torsten	I27DE - Infrasound Array	BGR	Engineer	Germany		D8	D11
Hoffmann	Mathias	I27DE - Infrasound Array	BGR	Engineer	Germany		D8	D11
						Total:	**5**	**5**
Scientific projects at station and beyond								
AFIN (Meereis)								
kein Personal von AWI		Observatorien - Üwis						
ANS, CHOICE (Medizin)			ZWMB Charite Berlin					
kein Personal von ZWMB		Physician NM III, Kohlberg						
Neutron Monitor, Muon Telescope			DESY, Zeuthen					
kein Personal von DESY								

TILT@CF		Coordinator Daniel Steinhage						
Lohse	Johannes		Uni Hamburg, AWI	Wissenschaftler			D6	D10
						Total:	**1**	**1**
Technical measures								
v. Borstel	Jörg	Warranty works	ARGE	Technician	Germany		D8	D10
Tegge	Holger	Warranty works	ARGE	Technician	Germany		D8	D10
v. Hassel	Ralf	Warranty works	ARGE	Technician	Germany		D8	D10
Eder	Pitt	Warranty works					D8	D10
Himsel	Stefan	Warranty works					D8	D9
Kurfiss	Christian	Warranty works	ARGE	Technician	Germany		D8	D9
						Total:	**6**	**6**
Superior evaluation and certification								
Behrends	Detlef	Technical inspection ARGE	ARGE		Germany		D9	D10
NN	NN	Technical inspection, logistics	AWI		Germany		D9	D10
Gernandt	Hartwig	Technical inspection, logistics	AWI		Germany		D9	D10
Janson	Marcus	Technical inspection, logistics	AWI		Germany		D9	D10
Meyer	Hans-Jürgen	Technical inspection	KSF	Engineer	Germany		D9	D10
						Total:	**5**	**5**
Winter staff exchange and briefing								
(Winter staff 2011								
Geissler	Harald	Station leader, physician	AWI-LOG	Physician	Germany		2011	D9
Schlömer	Antje	Geophysics	AWI-LOG	Scientist	Germany		2011	D11
Pokorna	Marketa	Geophysics	AWI-LOG	Scientist			2011	D11

Kattner	Lisa	Air chemistry	AWI-LOG	Scientist	Germany		2011	D11
Asseng	Jölund	Meteorology	AWI-LOG	Scientist			2011	D11
Mehl	Hans-Joachim	Station engineer	RFL	Engineer	Germany		2011	D9
Zahnd	Fabian	Electrician	RFL	Engineer	Germany		2011	D9
Göbel	Christian	IT, radiooperator	RFL	Engineer	Germany		2011	D9
Hombeck	Dirk	Cook	RFL	Cook	Germany		2011	D11
						Total:	**0**	**9**
Winter staff 2012								
Möbius	Christoph	Station leader, physician	AWI-LOG	Physician	Germany		D8	2012
Christmann	Stefan	Geophysics	AWI-LOG	Scientist	Germany		D7	2012
Kühnel	Meike	Geophysics	AWI-LOG	Scientist	Switzerland		D7	2012
Höppner	Kathrin	Air chemistry	AWI-LOG	Scientist	Germany		D8	2012
Schmidt	Thomas	Meteorology	AWI-LOG	Scientist	Germany		D8	2012
Behrendt	Chris	Station engineer	RFL	Engineer	Germany		D5	2012
v. Helms	Jens	Electrician	RFL	Engineer	Germany		D2	2012
Lehnert	Lars	IT, radiooperator	RFL	Engineer	Germany		D7	2012
Peter	Dirk	Cook	RFL	Cook	Netherlands		D5	2012
						Total:	**9**	**0**
Kohnen-Station								
Technical operation and supply								
Drücker	Cord	Technical team logistics, leader	AWI-LOG	Technician	Germany		D5	D11
Hombeck	Dirk	Technical team logistics	RFL	Koch	Germany		Üwi	Üwi
Schubert	Holger	Technical team logistics	RFL	Technician	Germany		D5	D11
Köhler	Jens	Technical team logistics	RFL	Technician	Germany		D5	D11

Raabe	Konrad	Technical team logistics	RFL	Physician	Germany		D5	D11
Preiß	Johannes	Technical team logistics	Kaessbohrer GmbH	Technician	Germany		D4	D11
Schulz	Harry	Technical team logistics	RFL	Technician	Germany		D5	D11
Göbel	Christian	Technical team logistics					Üwi	Üwi
							8	**8**
Scientific projects								
Borehole-Logging								
Miller	Heinz	Projektleiter	AWI	Wissenschaftler	Austria		D8	D9
Hilmarson	Sverrir		AWI	Techniker	Iceland		D7	D9
						Total:	**2**	**2**
LIMPICS								
Eisen	Olaf	Coordinator	AWI	Scientist			D8	D9
Lambrecht	Astrid	Wissenschaftler					D8	D9
Maier	Christoph	Wissenschaftler					D8	D9
Diez	Anja	Wissenschaftlerin					D8	D9
						Total:	**4**	**4**
Scientific flight missions Polar 6								
CryoVExANT								
Helm	Veit	Coordinator	AWI	Scientist	Germany		D3	D7
Kässbohrer	Johannes	CryoVEx ANT	Fa. FIELAX	Engineer	Germany		D3	D7
Nehring	Franziska	CryoVEx ANT	Fa. FIELAX	Engineer	Germany		D3	D7
Nörtersheuser	Philipp	CryoVEx ANT	SEA	Engineer	Germany		D6	D7
WEGAS/DoCo								
Steinhage	Daniel	Coordinator	AWI	Scientist	Germany		D6	D10
Konrad	Christian	WEGAS	AWI-LOG	Engineer			D7	D10

Müller	Christian	WEGAS	Fa. Fielax	Engineer			D7	D10
Mieth	Matthias	WEGAS	AWI	Scientist	Germany		D7	D10
						Total:	**8**	**8**
Polar 6 crew								
Emberley	Dean	Crew	KBA	Chief pilot	Canada		P6	D7
Sipko	Jon	Crew	KBA	Co pilot	Canada		P6	D7
Hudon	Roger	Crew	KBA	Engineer	Canada		P6	P6
Krueger	Keith	Crew	KBA	Chief pilot	Canada		D7	P6
Bayes	John	Crew	KBA	Co pilot	Canada		D7	P6
						Total:	**5**	**5**
Scientific projects in DML								
GEA II Princess Elizabeth Station (BELARE)								
Läufer	Andreas	Coordinator	BGR	Scientist	Germany		D7	D9
Damaske	Detlef	GEA II, PE Station, BELARE	BGR	Scientist	Germany		D7	SA Agulhas
Lisker	Frank	GEA II, PE Station, BELARE	Uni Bremen	Scientist	Germany		D7	D9
Jacobs	Joachim	GEA II, PE Station, BELARE	Uni Bergen	Scientist	Germany		D7	D10
Ehlburg	Marlina	GEA II, PE Station, BELARE	Uni Gent	Scientist	Germany		D7	D9
Estrada	Solveig	GEA II, PE Station, BELARE	BGR	Scientist	Germany		D9	D10
Ruppel	Antonia	GEA II, PE Station, BELARE	BGR	Scientist	Germany		D7	D9
Lucka	Nicole	GEA II, PE Station, BELARE	BGR	Scientist	Germany		D7	D9
						Total:	**8**	**8**
National and international visits/Media								
Visit at Neumayer Station III and Kohnen Station								
Nixdorf	Uwe	Team leader	AWI-LOG	Head of logistics	Germany		D8	D8
Mlynek	Jürgen	VIP Inspection	HGF	Director	Germany		D8	D8

Huthmacher	Karl Eugen	VIP Inspection	BMBF		Germany		D8	D8
Lochte	Karin	VIP Inspection	AWI	Director	Germany		D8	D8
NN	NN	VIP Inspection					D8	D8
NN	NN	VIP Inspection					D8	D8
NN	NN	VIP Inspection					D8	D8
NN	NN	VIP Inspection					D8	D8
NN	NN	VIP Inspection					D8	D8
NN	NN	VIP Inspection					D8	D8
						Total:	**10**	**10**
Medien (Media)								
NN	NN	Media					D6	PS
NN	NN	Media					D6	PS
NN	NN	Media					D6	PS
						Total:	**3**	**3**
DROMLAN intercontinental total							**86**	**86**

5.3 Travel schedule for participants, KGI

Name	First Name	Institute	Profession	Duration of Stay
Asendorf	Sanja	Uni Oldenburg	Scientist	Dec11 – Jan 12
Boelen	Peter	Uni Groningen	Scientist	Jan-Feb 12
Braeckman	Ulrike	Uni Gent	Scientist	Mar 12
Falk	Ulrike	Uni Bonn	Scientist	Nov 11-Feb 12
Gieseke	Hilke	Uni Bonn	Scientist	Dec 11-Jan 12
Gütter	Tobias	Uni Jena	Student	Nov 11-Feb 12
Hansen	René	-	Scientist	
Hass	Christian	AWI	Scientist	Nov-Dec 11
Henkel	Susann	Uni Köln	Scientist	Jan-Mar 12
Kasten	Sabine	AWI	Scientist	Jan-Feb 12
Kohlberg	Eberhard	AWI	Logistic	Mar 12
Ludwig	Juliane	Uni HH	Student	Nov-Dec 11
März	Jöran	Uni Oldenburg	Scientist	Dec11-Feb 12
Mengedoht	Dirk	AWI	Logistic	Nov 11 and Mar 12
Menz	Gunter	Uni Bonn	Scientist	Jan-Feb 12
Pearson	Emma	Uni Newcastle	Scientist	
Peter	Hans-Ulrich	Uni Jena	Scientist	Dec-Feb 12
Poigner	Harald	AWI	Scientist	Feb-Mar 12
Roberts	Stephen	BAS	Scientist	
Schutter	Ilona	Uni HH	Student	Nov-Dec 11
Staubwasser	Michael	Uni Köln	Scientist	Feb-Mar 12
Stelter	Michel	Uni Jena	Student	Nov 11-Feb 12
Vanreusel	Ann	Uni Gent	Scientist	Mar 12
Visser	Ronald	Uni Groningen	Scientist	Jan-Feb 12
Wittenberg	Nina	AWI	Scientist	Nov-Dec 11
Wölfl	Anne-Cathrin	AWI	Scientist	Oct 11-Jan 12

5.4 Participants

5.4.1 DML

Name	First Name	Institute	Profession	Nationality
Asseng	Jölund	AWI	Scientist	Germany
Bayes	John	KBA	Co pilot	Canada
Behrends	Detlef	ARGE	Engineer	Germany
Behrendt	Chris	RFL	Engineer	Germany
Christmann	Stefan	AWI	Scientist	Germany
Damaske	Detlef	BGR	Scientist	Germany
Diez	Anja	AWI	Scientist	Germany
Drücker	Cord	AWI	Technician	Germany
Eckstaller	Alfons	AWI	Scientist	Germany
Eder	Pitt	ARGE	Technician	Germany
Ehlburg	Marlina	Uni Gent	Scientist	Germany
Eisen	Olaf	Uni Heidelberg	Scientist	Germany
Emberley	Dean	KBA	Chief pilot	Canada
Estrada	Solveig	BGR	Scientist	Germany
Falkenberg	Falk	RFL	Technician	Germany
Fröhlich	Mike	RFL	Cook	Germany
Geissler	Harald	AWI	Physician	Germany
Gernandt	Hartwig	AWI	Scientist	Germany
Göbel	Christian	RFL	Engineer	Germany
Grasse	Torsten	BGR	Engineer	Germany
Helm	Veit	AWI	Scientist	Germany
Heuck	Hinnerk	RFL	Engineer	Germany
Hilmarson	Sverrir	AWI	Techniker	Iceland
Himsel	Stefan	Enercon	Engineer	Germany
Hirsekorn	Marius	AWI	Captain	Germany
Hoffmann	Mathias	BGR	Engineer	Germany
Hombeck	Dirk	RFL	Cook	Germany
Höppner	Kathrin	AWI	Scientist	Germany
Hudon	Roger	KBA	Engineer	Canada

Huthmacher	Karl Eugen	BMBF	Scientist	Germany
Jacobs	Joachim	Uni Bergen	Scientist	Germany
Janson	Marcus	AWI	Engineer	Germany
Kässbohrer	Johannes	FIELAX	Engineer	Germany
Kattner	Lisa	AWI	Scientist	Germany
Kohlberg	Eberhard	AWI	Physician	Germany
Köhler	Jens	RFL	Technician	Germany
Konrad	Christian	AWI	Engineer	Austria
Krueger	Keith	KBA	Cief pilot	Canada
Kühnel	Meike	AWI	Scientist	Switzerland
Kurfiss	Christian	Enercon	Technician	Germany
Lambrecht	Astrid	BAdW	Scientist	Germany
Läufer	Andreas	BGR	Scientist	Germany
Lehnert	Lars	RFL	Engineer	Germany
Lisker	Frank	Uni Bremen	Scientist	Germany
Lochte	Karin	AWI	Scientist	Germany
Lohse	Johannes	Uni Hamburg	Scientist	Germany
Loose	Bernd	AWI	Scientist	Germany
Lucka	Nicole	BGR	Scientist	Germany
Maier	Christoph	BAdW	Scientist	Germany
Matz	Thomas	AWI	Engineer	Germany
Mehl	Hans-Joachim	RFL	Engineer	Germany
Meyer	Hans-Jürgen	KSF	Engineer	Germany
Mieth	Matthias	AWI	Scientist	Germany
Miller	Heinz	AWI	Scientist	Austria
Mlynek	Jürgen	HGF	Scientist	Germany
Möbius	Christoph	AWI	Physician	Germany
Möller	Hans-Joachim	DWD	Meteorologist	Germany
Müller	Christian	FIELAX	Engineer	Germany
Nehring	Franziska	FIELAX	Engineer	Germany
Nittka	Dirk	RFL	Technician	Germany
Nixdorf	Uwe	AWI	Scientist	Germany
NN	NN	AWI	Engineer	Germany

NN	NN		VIP inspection	Germany
NN	NN		VIP inspection	Germany
NN	NN		VIP inspection	Germany
NN	NN		VIP inspection	Germany
Lehmann	Stefan		journalist	Germany
Varga	Martin		journalist	Germany
Steuer	Thomas		photographer	Germany
Nörtersheuser	Philipp	SEA	Engineer	Germany
Peter	Dirk	RFL	Cook	Netherlands
Pluder	Andreas	RFL	Engineer	Germany
Pokorna	Marketa	AWI	Scientist	Czech Republic
Preiß	Johannes	Kaessbohrer GmbH	Technician	Germany
Quirandt	Katharina	RFL	Service	Germany
Raabe	Konrad	RFL	Physician	Germany
Rentsch	Harald	DWD	Meteorologist	Germany
Rhau	Lars-Peter	RFL	Technician	Germany
Riess	Felix	RFL	Engineer	Germany
Ruppel	Antonia	BGR	Scientist	Germany
Schädlich	Bernd	NN Engineering	Engineer	Germany
Schlömer	Antje	AWI	Scientist	Germany
Schmidt	Thomas	AWI	Scientist	Germany
Schubert	Holger	RFL	Technician	Germany
Schulz	Harry	RFL	Technician	Germany
Sipko	Jon	KBA	Co pilot	Canada
Steinhage	Daniel	AWI	Scientist	Germany
Tegge	Holger	ARGE	Technician	Germany
v. Borstel	Jörg	ARGE	Technician	Germany
v. Hassel	Ralf	ARGE	Technician	Germany
v. Helms	Jens	RFL	Engineer	Germany
Weller	Rolf	AWI	Scientist	Germany
Zahnd	Fabian	RFL	Engineer	Germany

5.4.2 KGI

Name	First Name	Institute	Profession	Nationality
Asendorf	Sanja	Uni Oldenburg	Scientist	Germany
Boelen	Peter	Uni Groningen	Scientist	Netherlands
Braeckman	Ulrike	Uni Gent	Scientist	Belgium
Falk	Ulrike	Uni Bonn	Scientist	Germany
Gieseke	Hilke	Uni Bonn	Scientist	Germany
Gütter	Tobias	Uni Jena	Student	Germany
Hansen	René	-	Scientist	-
Hass	Christian	AWI	Scientist	Germany
Henkel	Susann	Uni Köln	Scientist	Germany
Kasten	Sabine	AWI	Scientist	Germany
Kohlberg	Eberhard	AWI	Logistic	Germany
Ludwig	Juliane	Uni HH	Student	Germany
März	Jöran	Uni Oldenburg	Scientist	Germany
Mengedoht	Dirk	AWI	Logistic	Germany
Menz	Gunter	Uni Bonn	Scientist	Germany
Pearson	Emma	Uni Newcastle	Scientist	Great Britain
Peter	Hans-Ulrich	Uni Jena	Scientist	Germany
Poigner	Harald	AWI	Scientist	Austria
Roberts	Stephen	BAS	Scientist	Great Britain
Schutter	Ilona	Uni HH	Student	Germany
Staubwasser	Michael	Uni Köln	Scientist	Germany
Stelter	Michel	Uni Jena	Student	Germany
Vanreusel	Ann	Uni Gent	Scientist	Belgium
Visser	Ronald	Uni Groningen	Scientist	Netherlands
Wittenberg	Nina	AWI	Scientist	Germany
Wölfl	Anne-Cathrin	AWI	Scientist	Germany

6. PARTICIPATING INSTITUTIONS

6.1 Institute/Company Address

ALCI	Antarctic Logistics Centre Intl. (Pty.) Ltd. 97, Keerom Street Cape Town 8001 Republic of South Africa
ARGE	J.H.K. Engineering GmbH & Co. KG Labradorstr. 5 27572 Bremerhaven Germany KAEFER Isoliertechnik GmbH & Co. KG Riodemannstr. 3 27572 Bremerhaven Germany
AWI	Alfred-Wegener-Institute for Polar and Marine Research Postfach 12 02 61 27515 Bremerhaven Germany
BMBF	Bundesministerium für Bildung und Forschung Dienstsitz Bonn Heinemannstraße 2 53175 Bonn Germany
BGR	Federal Institute for Geosciences and Natural Resources Stilleweg 2 30655 Hannover Germany
DNA	Dirección National del Antártico Cerrito 1248 1010 Buenos Aires Argentina
DEA	Department of Environmental Affairs Directorate: Antarctica and Islands P.O. Box 8172, Roggebaai 8012 Cape Town 9012 Republic of South Africa

DWD	Deutscher Wetterdienst Bernhard-Nocht Str. 76 20359 Hamburg Germany
FACH	Fuerza Aero de Chile, División Antártica Tarpaca No. 1129, 2°Piso Santiago de Chile Chile
FAU	Fuerza Aero de Uruguay Av. 8 de Octubre 2958 Montevideo 11600 Uruguay
FIELAX	Fielax Gesellschaft für wissenschaftliche Datenverarbeitung mbH Schleusenstraße 14 27568 Bremerhaven Germany
HGF	Helmholtz Gemeinschaft Geschäftsstelle Berlin Anna-Louisa-Karsch-Straße 2 10178 Berlin Germany
IAA	Instituto Antártico Argentino Cerrito 1248 1010 Buenos Aires Argentina
IAU	Instituto Antártico Uruguayo Av. 8 de Octubre 2958 Montevideo 11600 Uruguay
ICBM	Institut für Chemie und Biologie des Meeres AG Mikrobiogeochemie Carl-von-Ossietzky-Str. 9-11 Postfach 2503 26111 Oldenburg, Germany

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Kässbohrer	Kässbohrer Geländefahrzeug AG Kässbohrerstr. 11 88471 Laupheim Germany
Kenn Borek Air Ltd.	Kenn Borek Air Ltd. 209 McTravish Rd NE Calgary, AB, CA, T2E 7G5 Canada
Laeisz	Reederei F. Laeisz GmbH Brückenstr. 25 27568 Bremerhaven Germany
RAE	Russian Antarctic Expedition 38, Bering St. 199397 St. Petersburg Russia
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University of Bonn	University of Bonn Walter-Flex-Str. 3 53113 Bonn Germany
University of Ghent	University of Ghent Sint-Pietersnieuwstraat 25 B-9000 Ghent Belgium
University of Hamburg	University of Hamburg Edmund-Siemers-Allee 1 20146 Hamburg Germany

University of Heidelberg	Ruprecht-Karls-Universität Heidelberg Grabengasse 1 69117 Heidelberg Germany
University of Jena	AG Polar- und Ornithoökologie Institut für Ökologie Dornburger Str. 159 07743 Jena Germany
ZWMB	Zentrum für Weltraummedizin Charité Berlin Thielallee 71 14195 Berlin Germany

6.2 DROMLAN – Partners

AWI	Alfred Wegener Institute for Polar and Marine Research, Germany
AARI	Arctic and Antarctic Research Institute, Russian Antarctic Expedition, Russia
BAS	British Antarctic Survey, UK
BELARE	Belgian Antarctic Research Expedition, Belgium
FIMR	Finnish Institute of Marine Research, Finland
NCAOR	National Centre for Antarctic and Ocean Research, India
NIPR	National Institute of Polar Research, Japan
NPI	Norwegian Polar Institute, Norway
NWO	Netherlands Organisation for Scientific Research, The Netherlands
DEA	Department of Environmental Affairs, Directorate: Antarctica and Islands, South Africa
SPRS	Swedish Polar Research Secretariat, Sweden

6.3 DROMSHIP – Partners

AWI	Alfred Wegener Institute for Polar and Marine Research, Germany
BELARE	Belgian Antarctic Research Expedition, Belgium
FIMR	Finnish Institute of Marine Research, Finland
NPI	Norwegian Polar Institute, Norway
SPRS	Swedish Polar Research Secretariat, Sweden