The Helmholtz Regional Climate Initiative REKLIM
from a Polar Perspective
– a Preface –

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One of the great challenges of humankind is global climate change, the mitigation of CO2 emissions at the lowest possible level and, at the same time, the adaptation to its current and future impacts. The Working Group 1 (WG1) contribution to the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC 2013) presented clear conclusions that warming of the climate system is unequivocal, owing to increasing atmospheric greenhouse gas concentrations, decreasing Arctic sea ice cover and diminishing amounts of snow and land ice, sea level rise and many more consequences. It is extremely likely (95 percent certainty), that human influence has been the dominant cause of the observed warming since the mid-20th century (IPCC 2013).

Although the ability to project climate change on the global scale and its potential impacts under different representative concentration pathways (equivalent to future anthropogenic greenhouse gas emission scenarios) has significantly increased in recent years, one of the remaining great challenges is to understand and project the regional and local patterns of global climate change, and especially to assess societal impacts and consequences. This is what the HELMHOLTZ CLIMATE INITIATIVE REKLIM (Regional Climate Change) focuses on.

Since October 2009 experts of nine German Centres of the HELMHOLTZ ASSOCIATION, most of them in the research field “Earth and Environment”, have been working together on eight interdisciplinary research topics. In cooperation with nine university partners, the Helmholtz Centres combine their expertise in regional climate change research. Regional observations and process studies coupled with model simulations aim at improving regional and global climate models, providing a more solid basis for climate-related decision support. Hence, REKLIM is contributing to the strengthening of multidisciplinary regional climate research in Germany and internationally.

REKLIM addresses the following research topics:
Topic 1: Coupled modelling of the regional Earth systems.
Topic 2: Sea level changes, from global, regional to local scales.
Topic 3: Regional climate changes in the Arctic: Forcing and long-term effects at the land-ocean interface.
Topic 4: The land surface in the climate system.
Topic 5: Chemistry-climate interactions on global to regional scales.
Topic 6: Modelling and understanding extreme meteorological events.
Topic 7: Risk analysis and risk management for integrated climate strategies.
Topic 8: Abrupt climate change derived from proxy data.

The HELMHOLTZ CLIMATE INITIATIVE REKLIM also puts a focus on knowledge transfer processes as well as on dialogue processes between science and society, which is an increasingly important aspect of modern science. To achieve this goal a range of activities was established that are adapted to the needs and requirements of the various target groups as well as to the according scientific basis involved. Particular emphasis is placed on the joint development and implementation of ideas between science and society.

Via the HELMHOLTZ REGIONAL CLIMATE OFFICES and the CLIMATE SERVICE CENTRE GERMANY (GERICS) policymakers and other decision makers are supported in assessing risks and opportunities and designing mitigation and adaptation strategies based on results obtained from the REKLIM research network.

In conclusion of the first five year funding period and in order to foster the international collaboration on regional climate change research, the HELMHOLTZ CLIMATE INITIATIVE REKLIM organised the international symposium “Our climate – Our Future, regional perspectives on a global challenge”, which took place in Berlin, Germany, 6–9 October 2014 (Fig. 1). The conference served as a forum for scientists from all over the world to present and discuss new results from regional climate research in the context of the REKLIM research topics.

The conference was divided into two parts:
The first part was a three-day international scientific conference held during 6–8 October, 2014. The scientific programme offered a broad and interdisciplinary range of current national and international research activities in the field of regional climate change research and addressed the eight topics of REKLIM in eight sessions (REKLIM CONFERENCE).

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The second part consisted of a public outreach event on “Regional climate change – causes and effects” on 9 October, 2014, which focused on the dialogue between scientists and decision makers from the fields of politics, administration, economics and associations.

More than 320 participants from 28 countries attended the REKLIM international conference (Fig. 2). During the scientific conference, 135 oral presentations and 99 posters were presented. An overview of the conference programme and the corresponding abstracts is given in Lemke et al. (2014). Eight internationally renowned keynote speakers presented overview talks related to the different REKLIM research topics:

Topic 1: René Laprise (Université du Québec à Montréal)  
Limited area domain atmospheric energetics.

Topic 2: Jason Box (Geological Survey of Denmark and Greenland) Darkening Greenland ice: integrating a spectrum of climate change processes.

Topic 3: Larry Hinzman (International Arctic research Centre, University of Alaska Fairbanks) NGEE: The Study of the Interaction of Atmospheric, Hydrologic, Geomorphic and Ecosystem Processes on the Alaskan Arctic Coastal Plain.

Topic 4: Martyn Chipperfield (University of Leeds, School of Earth and Environment) Composition Climate Interactions from Global to Local Scales.

Topic 5: Mark Pelling (Department of Geography, King’s College London) Transformative adaptation.

Topic 6: Stefan Brönnimann (Oeschger Center, University of Bern) Extreme Events: Reenacting past winter storms.

Topic 7: Edouard Davin (Institute for Atmospheric and Climate Science, ETH Zürich) Role of land surface processes and land use change at the regional scale.

Topic 8: Helge Arz (Leibniz Institute for Baltic Sea Research Warnemünde) Environmental changes in the Black Sea region during the last ~140 kyrs.

The German Society of Polar Research and the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI) offered to publish a conference volume of all papers related to the Arctic and Antarctic realms, as well as to all aspects on polar climate. The POLARFORSCHUNG (Polar Research) editors and the scientific steering committee (see authors of this contribution) of the conference welcomed original papers, scientific review articles and extended abstracts from natural as well as societal and...
historical sciences, dealing with polar and subpolar regions in
the context of the REKLIM conference. All submitted articles
were peer-reviewed and are published in digital and printed
version.

More than 70 authors in 14 papers contributed to this special
issue, providing a wide range of current understanding and
knowledge about the different aspects of regional climate
change, its causes, impacts and challenges. Mainly themes
from topics 1, 2, 3 and 8 were covered by papers, ranging
from modelling of the regional climate system (NIKIEMA et
al., NIEDERDREK and MIKOLAJEWICZ, MADSEN et al. a,b), to
general process understanding (BODORODSKY et al., KONRAD
et al., LOHMANN et al., STEPANEK et al.), from data analysis
(MULLER, LÜDECKE et al.) to the development of databases
and associated web-based infrastructures, making scien-
tific knowledge and data available for research and the wider
public (DVORKINOV et al., ELGER et al., HAAS et al., GROS Feld
et al.). The order of the papers is organized according to their
contextual contribution to the conference topics.

Herewith we thank all contributors to this conference volume.
Their abiding patience is most appreciated. Twenty-three
reviewers from eight countries contributed substantially to the
quality of this special issue. Their efforts have been invaluable
to improving the scientific content and integrity of the papers.
Several agencies and governments supported the data acqui-
sition and analysis, including the arrangement of the confer-
ence. Here, especially the HELMHOLTZ ASSOCIATION needs to
be mentioned, which fostered the initiation and funding of the
HELMHOLTZ CLIMATE INITIATIVE REKLIM.

REKLIM media project

In addition to the exchange and discussion of the scientific
community during the conference, REKLIM aimed at opening
the international REKLIM conference to the German
general public. Special attention was given to raise awareness
for the discussion of regional climate change’s causes and
effects among those being most affected in future: the “Young
Generation”. For them it is important to recognize that their
participation in the public discussion of climate change and
its consequences is crucial because the embracing needs for
measures of climate protection and adaptation will constitute
an important component for their own future. Therefore, the
REKLIM coordination office and the CLIMATE OFFICE FOR
POLAR REGIONS AND SEA LEVEL RISE at the Alfred Wegener
Institute initiated for this REKLIM conference in particular an
accompanying interdisciplinary media project together with the
DEKRA HOCHSCHULE FÜR MEDIEN BERLIN (University of
Applied Science, Media). Target group of this media project
was the adolescent generation at the age of 16–30 years.

REKLIM scientists and DEKRA students from three different
units (television and film, journalism, and media manage-
ment) created a multimedia and INTERACTIVE INTERNET MEDIA
PLATFORM to convey the topic of “Regional Climate Change”
into everyday life and to make results of climate change
research available to the broader public. One of the objectives
of the platform is to stress the need for adaption and mitigation
measures to be taken, urgently. More than 80 students were
involved before and at the REKLIM conference and trans-
posed scientific contents cinematically and journalistical-
ly into cross-media approaches for the young audience. In their
own design and production the students worked on different
aspects of regional climate change research in the context of
REKLIM and came up with a variety of media products (e.g.,
a blog, five documentary films, three viral videos and daily
reports from the conference). For example, the documentary
film “VERNAGT” addresses the fact of melting and retreating
alpine glaciers, using the example of the Vernagtferner
Glacier in the Oetztal Alps, Austria, which is under investiga-
tion for more than 400 years. Since more than 50 years the
COMMISSION FOR GLACIOLOGY OF THE BAVARIAN ACADEMY
OF SCIENCE AND HUMANITY, Munich, Germany, investigates the
mass balance of this glacier with increasing temporal resolu-
tion, revealing a consistent pattern of the mass loss of the
Vernagtferner over more than 30 years. The research on the
glacier and its connection to climate change impacts is docu-
mented in this film in a personal perspective of the scienti-
fic head of the commission (Fig. 3). The students played
two important roles in the media project: transforming the
scientific content into artistic films, journalistic and young
language with their impartial perspective on climate research
issues and at the same time involving the scientists with their
exact science and precise description into their work. There-
fore, an important dialogue and learning process between the
various disciplines arose with the REKLIM MEDIA PROJECT,
contributing to the increasingly important need for knowledge
transfer processes between science and society.

The success of the project cannot be described in just one
dimension. Looking at the general perception, more than
16,400 views of around 7,000 visitors of the website (as of
13 December 2014) document a clear success. For evaluating
the quantitative success of these numbers it has to be con-
sidered that the project webpage was built from scratch and
went online shortly before the conference on 1 October 2014.
Moreover, the produced viral videos were viewed more than
2,000 times and the documentaries about 1,600 times. Mean-
while, requests for the re-use of documentary films by envi-
ronmental organizations and research institutions have been
received. The interdisciplinary REKLIM MEDIA PROJECT

Fig. 3: Scene at the filming of the documentary “VERNAGT”, describing long-
term observation and scientific work on the Vernagtferner Glacier, Oetztal
Alps, Austria (photo: DEKRA).

Abb. 3: Szene während der Dreharbeiten zum Dokumentarfilm „VERNAGT“,
der die Langzeitbeobachtungen und wissenschaftlichen Arbeiten auf dem Ver-
ntagferner in den Ötztaler Alpen beschreibt (Foto: DEKRA).
as a best practice example was already adopted once for a national conference (IPCC AR5 Pre-Briefing “Konferenz des Deutschen Klimakonsortiums im Auswärtigen Amt” on 12 November, 2015) and for an international conference (International Conference on Permafrost (ICOP) in Potsdam, Germany, 20–24 June, 2016) as accompanying social media coverage. A new dimension of publically relevant knowledge transfer and dialogue between science and society was thus generated within REKLIM.

Further information on the conference, the REKLIM climate initiative and the current research activities can be found in English at <www.reklim.de/en.html> or German at <www.reklim.de>.

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