

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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Fig. 1: Banner of the REKLIM international conference “Our Climate - Our Future: Regional Perspectives on a Global Challenge”, which took place from 6–9 October 2014 in Berlin, Germany.

Abb. 1: Banner der internationalen REKLIM-Konferenz “Our Climate – Our Future: Regional Perspectives on a Global Challenge”, die vom 6.–9. Oktober 2014 in Berlin, Deutschland, veranstaltet wurde.

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 POLAR-FORSCHUNG (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



Fig. 2: Group picture of the participants of the REKLIM international conference 2014, Berlin, Germany (photo: AWI).

Abb. 2: Gruppenfoto der Teilnehmer an der internationalen REKLIM-Konferenz 2014 in Berlin, Deutschland (Foto: AWI).

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 (NIKIÉMA et al., NIEDERDRECK and MIKOLAJEWICZ, MADSEN et al. a,b), to general process understanding (BOGORODSKI et al., KONRAD et al., LOHMANN et al., STEPANEK et al.), from data analysis (MÜLLER, LÜDECKE et al.) to the development of databases and associated web-based infrastructures, making scientific knowledge and data available for research and the wider public (DVORNIKOV et al., ELGER et al., HAAS et al., GROSFELD 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 acquisition and analysis, including the arrangement of the conference. 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 management) 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 adaptation and mitigation measures to be taken, urgently. More than 80 students were involved before and at the REKLIM conference and transposed scientific contents cinematically and journalistically 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 investigation 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 resolution, 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 documented in this film in a personal perspective of the scientific 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. Therefore, 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 considered 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. Meanwhile, requests for the re-use of documentary films by environmental 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 Vernagtferner 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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