

## Research for Protecting the Arctic



AWI researchers measuring the thickness of the ice during the 26th Arctic expedition aboard the Polarstern.  
Photo: Stefan Hendricks/AWI

*The Arctic is a key region that has been placed at the centre of political and economic interest due to climate change and geopolitical developments. The protection and sustainable development of this unique habitat present major challenges and lead to questions for the solution of which polar research provides a knowledge base.*

Changes that coincide with the above average warming of the northern-most regions, such as the fast decline of seasonal sea ice, the melting of the Greenland ice cap or the expansion of the hole in the ozone layer above the northern hemisphere, have an effect far beyond the Arctic region. The Arctic is connected to the rest of the world via the atmosphere and ocean currents and plays an important part in the formation of the global climate. New results demonstrate that the reduced summer minimum Arctic sea ice extent increases the probability of cold winters in Central Europe, as could be witnessed in the past few years.

Given the increase of human activities in the Arctic, for instance, the opening up of new shipping routes and exploitation of resources, the protection and sustainable development of the Arctic as a biosphere

constitute a task of high priority. To this end, improved scientific observations and forecasts are an urgent requirement. Previous research, in particular the many projects in the context of the International Polar Year (IPY) 2007/2008, has provided a solid basis for this.

The Helmholtz Association will likewise continue to give new impulses for Arctic research, for example, by way of the scheduled further development of an ocean and deep sea observatory located in the Fram Strait between Spitsbergen and Greenland, where the main exchange of water between the northern Atlantic and the Arctic takes place. High resolution measurements and observations at this marine „artery“ will allow for improved deductions regarding the characteristics and developments in the entire Arctic Ocean. The challenge faced now is to further improve Arctic research on both a national and international level. „From Knowledge to Action“: This is also the motto of the IPY Conference that will take place in Montreal in April 2012.

*Prof. Dr Karin Lochte,  
Director of the Alfred Wegener Institute for  
Polar and Marine Research*

### Dear Readers,



These past few days saw the decision in favour of a step-by-step merger of the well-respected Charité in Berlin and the Max Delbrück Centre (MDC). A university

hospital, the Charité is a joint institution run by two universities in Berlin. The MDC is a member of the Helmholtz Association and ranks amongst the top 20 international molecular biology research institutions. The MDC and the Charité will considerably intensify their research cooperation as early as 2013. Divisions from both institutions could be consolidated already one year later. The advantages are obvious: This even closer cooperation results in real added value especially in the field of translational research. The intended partnership indicates also on an international level that Germany intends to further expand its activities in the field of translational medicine dealing with chronic common diseases with the objective of further improving its health services.

*Yours faithfully, Jürgen Mlynek, President*

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## In Brief

### Helmholtz Participation in Clusters of Excellence

Five more Clusters of Excellence will receive funding of up to 40 million Euro each over the course of the next five years. The three new Clusters of Excellence incorporating contributions from Helmholtz centres focus on the topics of bioeconomics, electromobility and immunotherapy. The Helmholtz Centre for Environmental Research - UFZ is a partner in the **BioEconomy Cluster**, which is to exploit the potential of using biomass for the production of materials, chemicals and energy sources. Combined production processes and cascaded utilisation of raw materials are to allow for sustainable value creation. The Karlsruhe Institute of Technology (KIT) and the German Aerospace Centre (DLR) take part in the Cluster of Excellence **Electromobility South-West**. They collaborate with industry partners in providing new solutions for electromobility and develop low-emission and cost-efficient products enabling sustainable mobility. The German Cancer Research Centre (DKFZ) is involved in the cluster for **Individualised ImmuneIntervention (CI3)** located in the Rhine-Main region. Some 100 partners work on efficient active agents for immunotherapy featuring a low degree of side effects and diagnostic products for the treatment of cancer, autoimmune diseases and infections. The objective is to bundle the existing expertise in the Rhine-Main cluster region and develop it to an international top level standard. Including the awardees from the third round, a total of fifteen Clusters of Excellence now receive funding totalling 600 million Euro. Helmholtz Association centres are involved in nine of these fifteen Clusters of Excellence. [www.helmholtz.de/spitzencluster](http://www.helmholtz.de/spitzencluster)

### Instruct Assists Structural Biology

Fifteen research institutions from eight countries have joined forces in the „Instruct“ initiative to facilitate access to high-tech infrastructures for researchers all across Europe. The Helmholtz Centre for Infection Research (HZI) is one of these institutions. The key focus of Instruct lies in the field of structural biology dealing with, amongst other things, the identification and analysis ▶

## Climate Research News



An elephant seal with a satellite transmitter on its head. The transmitter transmits for a period of up to one year. However, the device falls off with the animal's next change of coat. Photo: Joachim Plötz/AWI

*Over the course of the past couple of weeks, Helmholtz centres have published new results from the field of climate research, which we present here in brief: The news range from concrete prognoses for the North German coastline to observations made in the ocean between South Africa and the Antarctic, where elephant seals seem to have to dive down deeper and deeper in order to find food.*

### North German Coasts

In future, the coastal protected areas in Northern Germany would have to be extended by approximately ten per cent, if they are to effectively protect the population against storm surges. This is the result of analyses conducted at the Helmholtz Centre Geesthacht (HZG). The Norddeutsches Klimabüro (Northern German Climate Office) at the HZG now has developed a website providing information regarding the interplay between storm surges, climate change and the need for coastal protection and allowing for the targeted assessment of potential hazards per individual location.

### Colder Winters

In future, Central European winters could become significantly colder, as due to climate change the summer minimum Arctic sea ice extent continuously decreases. This has the effect of the air above the Arctic Ocean warming up more in autumn and winter than was the case in previous years. „These increased temperatures can be verified for the Arctic regions“, reports Ralf Jaiser from the Alfred Wegener Institute. And this has an effect on the patterns of circulation and barometric pressure, so that cold Arctic air can advance well across Europe.

### Gulf Stream Rapidly Warming

The Gulf Stream likewise has changed

over the course of the past century. Data and simulations revealed, that ocean currents, such as the Gulf Stream, have increased in temperature two to three times faster than the remaining parts of the ocean. „We looked at a total of eight different sets of global observation data regarding temperature and simulated also the ocean currents“, explains Prof. Dr Martin Visbeck, co-author of the study conducted at the GEOMAR | Helmholtz Centre for Ocean Research Kiel. In order to understand how these processes work and to distinguish climate-related trends from natural fluctuations, long-term observations of the western boundary currents now are required. „Such warming trends have also other long-term consequences, for example, the reduced absorption of carbon dioxide, which in turn further intensifies global warming. Here we need to pay great attention if we want to avoid severe long-term consequences“, summarises Visbeck.

### Elephant Seals Dive Deeper

Global warming has its effects also on elephant seals living on islands in the southern ocean between South Africa and the Antarctic. Due to the rising temperatures in the oceans, squids and fish seem to have retreated to greater depths, for the elephant seals tend to dive increasingly deeper when hunting for food. This was observed by experts from the AWI in cooperation with South African colleagues. Now, they intend to verify their assumptions with the aid of a new sensor registering the food intake of these animals while they are under water. *arö*

You can find all sources pertaining to this information under [www.helmholtz.de/en/hermann](http://www.helmholtz.de/en/hermann)

## Solar Energy Advances



Working groups from the Helmholtz Centre Berlin have improved the efficiency of solar cells. Photo: HZB

*In the past few weeks, Helmholtz centres have announced concrete technical advances in the fields of solar thermal energy and photovoltaics. The degree of efficiency as regards silicon and CIS solar cells could be increased. Now, a Helmholtz Energy Alliance significantly strengthens the research for innovative combinations of materials in the production of solar cells.*

In January, the first solar **thermal power station** was put into operation in **Southeast Asia**, with an output to the grid of five megawatt. This is the first parabolic trough power plant to generate the steam for driving the turbines directly within the parabolic troughs. Researchers from the DLR were involved in developing the facility and in its overall conception.

### Silicon Solar Cell Turbo Power

Scientists from the University of Sydney and the Helmholtz Centre Berlin have developed and run laboratory tests on a kind of „solar cell turbo“ in order to utilise light in a more efficient manner: Two low-energy photons, which normally have no effect within the solar cell, are merged to form one high-energy photon, which then can contribute towards generating energy. This merging is effected by the application of organic molecules. „We

are thus the first to demonstrate an efficiency gain in a solar cell by photochemical up-conversion“, says project head Dr Klaus Lips from the HZB Institute for Silicon Photovoltaics.

### New Solar Cell Architectures

The „back-contact heterojunction solar cell“ developed at the HZB achieves 20.2 per cent efficiency. In 2011, the maximum efficiency rate was only 15 to 16 per cent. This novel type of solar cell was likewise conceived at the HZB Institute for Silicon Photovoltaics.

### CIS Modules More Environmentally Friendly

Using the ILGAR process, that was developed at the HZB, scientists from the HZB Institute for „Heterogeneous Materials Systems“ produce CIS thin film solar cells without having to use the heavy metal cadmium. They achieved very good rates of efficiency of about 16 per cent.

### Energy Alliance Hybrid Solar Cells

The research on hybrid solar cells combining inorganic and organic materials is funded with five million Euro per annum for a period of three years in the context of a Helmholtz Energy Alliance. The partners involved in the alliance include the Helmholtz centres HZB and Research Centre Jülich, the Humboldt University Berlin, the Freie Universität Berlin and the University of Potsdam. The Competence Centre Thin-Film- and Nanotechnology for Photovoltaics Berlin PVcomB is an associate partner in the alliance. *arö*

You can find all sources pertaining to this information under [www.helmholtz.de/en/hermann](http://www.helmholtz.de/en/hermann)

## Helmholtz in Vancouver

„Flattening the World: Building a Global Knowledge Society“ – this was this year’s theme of the American Association for the Advancement of Science (AAAS) Annual Meeting in Vancouver in February. In about 170 symposiums, workshops and poster sessions, more than 11,500 participants and journalists from 60 countries discussed the challenges we face in the 21st century. The focal topics were Energy, Water and Food, respectively, Health.

The Helmholtz Association is the AAAS’s only German partnering organisation. The topic of the traditional Helmholtz press

breakfast on 18 February was „Transatlantic Cooperations“. Helmholtz President Jürgen Mlynek and Indira Samarasekera, President of the University of Alberta, discussed the added value of international cooperations during a panel debate in front of an audience of 120 journalists and provided insights into the Helmholtz Alberta Initiative (HAI). The initiative currently focuses on the research fields of Earth and Environment as well as Energy. The cooperation now is being successively extended to include other fields, in particular to include research in the wider field of health. *Janine Tychsen*

of the three-dimensional structures of biomolecules. The 3D structure allows for deductions regarding the function of molecules, for instance, also with regards to diseases and their mechanisms. [www.structuralbiology.eu](http://www.structuralbiology.eu)

### National Science Communication Institute at the KIT

Many scientists seek to enter into a dialogue with the public. For the most part, however, researchers tend to be autodidacts in this field. So far, students and young scientists are hard pressed to find opportunities for continuing education as regards science communication. This is why the Klaus Tschira Foundation decided to establish the Nationales Institut für Wissenschaftskommunikation (NaWik - National Science Communication Institute) at the Karlsruhe Institute of Technology (KIT). The new institute is to take up its teaching activities in October 2012 and is to receive funds of up to ten million Euro over the course of the next five years from the foundation.

### Jülich Photovoltaics Facility

The Photovoltaics Technical Centre has been officially opened at the Research Centre Jülich. With 560 square metres of floor space, the laboratory provides state-of-the-art facilities for the testing and further development of thin-film solar modules made from silicon. The new building costing 2.1 million Euro is equipped with chemical and experimental facilities and physical measurement laboratories.

### 113 Magnets for FAIR

The GSI Helmholtz Centre for Heavy Ion Research in Darmstadt has commissioned the Babcock Noell GmbH with the production of 113 superconducting high-tech magnets for its accelerator facility FAIR. The magnets weighing several tonnes are required for the central ring accelerator SIS100, the heart of the FAIR facility. For the purpose of the experiments conducted at FAIR, the ring accelerator accelerates charged particles almost to the speed of light. The magnets now commissioned are to keep the ions on a steady circular path. Babcock Noell will construct a separate production line at its site in Würzburg for producing the magnets and the superconducting cable.

## Awards

The physicist Prof. Dr Hilbert von Löhneysen from the KIT receives this year's Hector Research Award and now joins the group of „Hector Fellows“. The Hector Foundation II thus honours seminal achievements in the natural sciences. Hilbert von Löhneysen researches quantum effects in metals and has discovered a new type of quantum phase transitions. In doing so, he managed to contact individual molecules and measure the electrical current running through these molecules. The award is endowed with 150,000 Euro.

Prof. Dr Dorothea Wagner and Prof. Dr Peter Sanders from the KIT have developed a route planner in cooperation with Prof. Dr Hannah Bast from the University of Freiburg. For their „Next Generation Route Planning“ they now received the Google Focused Research Award endowed with one million US Dollar. They have developed specific algorithms for calculating routes and taking into consideration various means of transport, such as car, railway, bus, aeroplanes and ships, yet also bicycle and pedestrian paths. The system adapts to the current traffic situation in real time. Future route planners are to take into consideration not only the journey time but also travel expenses or environmental impact.

The Helmholtz Alliance Astroparticle Physics funds three retired scientists in the capacity of Senior Fellows and thus allows for the continued inclusion of their knowledge to on-going research. Prof. Dr Peter L. Biermann (Max Planck Institute for Radio Astronomy), Prof. Dr Hans Otto Klages (KIT) and Prof. Dr Ernst Otten (University of Mainz) each are awarded a Senior Fellowship. This award includes a sum of money for free disposal, funds for travel and funding opportunities for scientific projects from out of the alliance's funds.

## New Spokespersons for Helmholtz Juniors

The meeting of the Helmholtz Juniors, the official representation of currently more than 5,400 doctoral students working at the Helmholtz Association's eighteen centres, took place at the KIT at the end of January. Marlene Bamberg, DLR, and Martin Seilmayer, HZDR, were elected as new spokespersons. The Helmholtz Juniors are committed to the intensified networking between doctoral students within the Helmholtz Association. „We want to further extend the opportunities for exchange“, said Marlene Bamberg. In Martin Seilmayer's opinion, one of the most important tasks is to further improve working conditions during the promotion period. This is one of the reasons why the Helmholtz Juniors regularly organise surveys regarding the working situation of doctoral students at the Helmholtz centres. The results of the last survey revealed considerable differences between the individual centres as regards the forms of contract and graduate colleges. The support for and integration of doctoral students from abroad was evaluated as largely positive. The complete results will be published in the near future.



From left to right, upper row: R. Klages, M. Seilmayer, L. Schmidt, M. Gätjen, T. Krings, S. Pfersdorf, M. Bamberg, L. Noack. Second row: S. Finkeldei, V. Tlapák, C. Walther, E. Zillner, A. Maier. Third row: F. Frieß, B. George, A. Möller, D. Jose. Fourth row: G. Baires, A. Migdoll, U. Scholz. Not pictured: Ines Thronicker, Antje Wegner, Holger Hain.

Photo: Holger Hain

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### Further Information:

[www.helmholtz.de/juniors](http://www.helmholtz.de/juniors)

## Calls for Tender

The Innovation Award, donated by Roche Diagnostics Germany, is to honour the achievements of young scientists in the field of medical research. The appraisal takes place on the basis of work published in the years 2009 to 2012. The award is endowed with 10,000 Euro. The cut-off date for applications is 1 May 2012. [www.helmholtz.de/innovationspreis-hochschulmedizin-2012](http://www.helmholtz.de/innovationspreis-hochschulmedizin-2012)

In 2012, the UFZ competition „Wissenschaft verstehen“ (Understanding Science) includes for the first time the cooperation partner „Spektrum der Wissenschaft“ (German issue of Scientific

American magazine). The competition is addressed at doctoral students and post-docs working in the field of environmental research, who present their doctoral thesis in a popular science manner. The closing date for applications is 31 May 2012. [www.ufz.de/wissenschaft-verstehen](http://www.ufz.de/wissenschaft-verstehen)

The first prize of the „School Meets Science“ 2012 award donated by the Robert Bosch Foundation is endowed with 50,000 Euro. The award goes to teams of scientists and teachers in recognition of innovative school projects. [www.helmholtz.de/schule-trifft-wissenschaft-2012](http://www.helmholtz.de/schule-trifft-wissenschaft-2012)

## Imprint

### Hermann

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### Note to the media:

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