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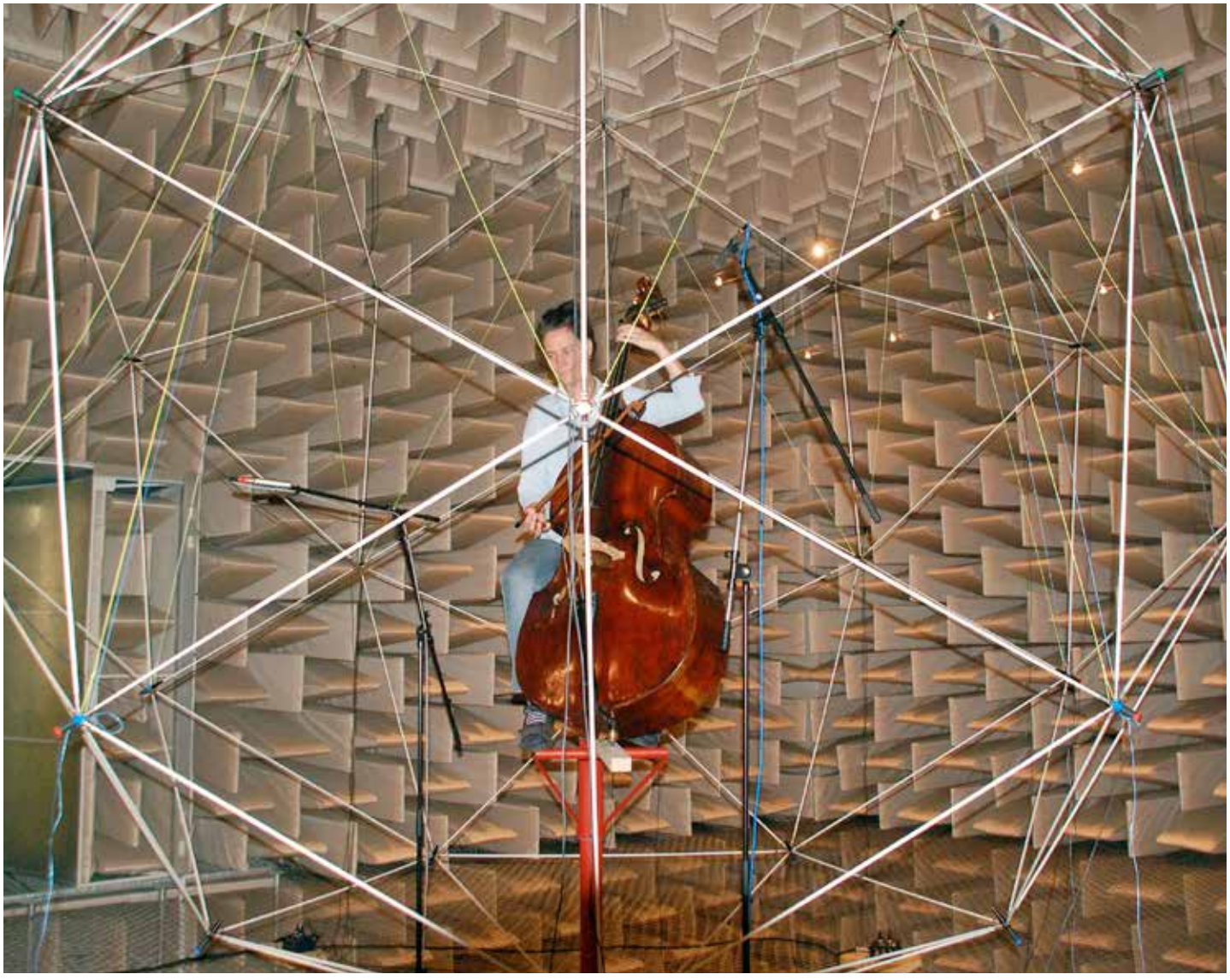
research
Magazine of the Deutsche Forschungsgemeinschaft

2/2013



Audio Communication: As Good as Being There | **Research Policy:** Response-Mode Funding | **Materials Research:** Nano- and Microscale Tailoring | **Pandemics:** Prepared for Anything | **Multi-Ethnicity:** Marxloh, Duisburg | **Biogeography:** The End of the Forest on Top of the World | **Climate Change:** Earth's Protective Ice Covering at Risk

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Cover: TU Berlin / Fachgebiet Audiokommunikation

The spatial acoustic emission of a musical instrument is recorded in an anechoic environment. These insights help lay the groundwork for acoustic environments.

Peter Strohschneider

Response-Mode Funding

Reflections on DFG funding policies: The DFG funds research in response to proposals by scientists – but also through contributing strategically to the development of priority areas. In both cases, the research objectives are defined from within the research system itself.

Fundamental discussions, whether within or outside the area of research, offer opportunities for both assessment and self-assessment. If such discussions are to be productive, then these opportunities for reflection must be seized upon. Reflective thinking involves taking a step back to reflect on one's own actions and experiences, or those of others, to rethink previous views or consider new ones. It does not always result in new insights, nor does it have to. The mere process of reflection and observation can serve to refine our position on a given topic or reshape it altogether.

With this in mind, the current debate on the future of the research system in Germany affords the DFG this very opportunity for critical reflection. How does the DFG enable and facilitate research development processes? What is the DFG's structural role in the German research system?

Each answer to these questions will be rooted in the core responsibility set out in the DFG's statutes, which is to promote all fields of science and the humanities in Germany. The DFG pursues this objective by funding curiosity-driven basic research – primarily at universities – at each phase of the research process, in projects of all sizes and across the whole spectrum of collaborative relationships between different research institutions. It is particularly important to encourage the dynamics inherent to scientific and scholarly research itself and to provide the opportunities in which they can unfold.

This is what sets the DFG apart from other research funding organisations: it funds research projects proposed by scientists and scholars in all fields of research directly. It goes without saying that the researchers or institutions submitting proposals must meet eligibility requirements, but the primary funding criterion is scientific quality. This curiosity-driven approach, and the organisation's dedication to the self-governance of science and the humanities in Germany, has often led to the DFG being described as a bottom-up funding organisation. This is characteristic of the DFG's general perception of itself but also of the way in which the DFG is perceived from the outside.

The DFG, however, has never practiced bottom-up funding strategies only. In fact, in 1952, almost immediately after its reestablishment following WWII, the DFG introduced a targeted funding mechanism called Priority Programmes. Priority Programmes were the first funding instrument used to stimulate and advance research in priority areas by publishing targeted calls for proposals.

The priority areas are defined by the DFG Senate, which is composed of elected members representing all areas of research. Suggestions thus derive from the communities themselves. The Senate also determines which research projects are then actually funded. This approach and these varied and direct links to the various research communities are still the defining features of the DFG's Priority Programmes today.

This first approach in strategic research funding, which initially addressed specific research questions, was refined over the decades that followed to include structural aspects. For example, the Collaborative Research Centres and Research Units programmes have the goal of helping universities develop research structures and establish priorities.

The international system evaluation undertaken in 1999 took this approach even further. It recommended that the DFG intensify strategic elements of its funding policy and activities. As a result, innovative changes were made to the programme portfolio and a restructuring of the review process, which included redefining roles and responsibilities, was initiated. Review board members were tasked with helping the DFG identify and set research priorities, a task which they continue to fulfil this day.

Illustration: bildschön / Marco Jentsch

Just over a decade ago, the DFG's strategic funding activities were expanded to include Research Centres, the most extensive format for DFG funding. Due to its success, it served as a model for the second funding line in Germany's Excellence Initiative. Here, too, research priorities are defined from the inside out and scientific quality again serves as the basis for eventual funding decisions. The most recently approved centre focusses on the topic of biodiversity research and is a joint venture involving the universities of Leipzig, Jena and Halle-Wittenberg.

These examples, and I could name many more, help to illustrate the DFG's funding policy: to fund research in response to proposals from researchers directly and through strategic contributions and instruments designed to advance research areas, also with respect to technical and structural aspects. Strategic funding initiatives are thus just as characteristic of the DFG as are its funding principles and funding activities.

Finally, and above all, both approaches are response-mode approaches. Researchers themselves must continue to drive research and research developments. And it is this aspect which defines the special role of the DFG within the German research system: to stimulate curiosity-driven research from the inside out on the basis of quality. Although research relevance often goes hand in hand with social, economic or political relevance, this need not always be the case. Research performance, which plays an essential role in today's knowledge society, is not possible without academic and research freedom.

Professor Dr. Peter Strohschneider
is President of the DFG.

Illustrations: DFG/Ausserhofer

Upholding Global Standards

The Global Research Council: meeting of the heads of 70 research funding and research organisations / Action plan on "Open Access" and the principles of "Good Scientific Practice" defined

The largest ever meeting of research funding and research organisations took place in Berlin at the end of May. Invited by the DFG and the Brazilian National Research Council (CNPq), representatives from the higher echelons of around 70 research funding organisations and research organisations in more than 50 countries plus a host of high-ranking representatives from science, science policy and science administration attended the second annual meeting of the Global Research Council (GRC).

The agenda focussed on discussing and agreeing on an action plan to implement open access to scientific publications and on the general principles of good scientific practice.

The outcomes were presented at a press conference by the DFG President, Professor Peter Strohschneider, who emphasised the significance of open access as a central paradigm of scientific communication. The delegates agreed that the open sharing of research results was also an opportunity to improve the quality of research. The action plan highlights ways in which the GRC member organisations can offer flexible support to this exchange of information. "We want to encourage and support researchers who want to share their findings with others under the open access arrangement and make them aware of the options," said Professor Strohschneider. Implementation of the action plan requires a number of very different players to interact, including universities, research organisations, libraries and publishers, in addition to the researchers.

The principles of good scientific practice demonstrate the responsibility that researchers and research institutions bear for the integrity

Group photo on the steps of the Konzerthaus on Gendarmenmarkt: The delegates to the GRC's second annual meeting represented no less than 80 % of the world's public, non-governmental research and research funding organisations. Right: Discussions in the Leibniz Room of the Berlin-Brandenburg Academy of Sciences and Humanities.

of their work. On the other hand, the funding organisations are also obliged to ensure that the research they fund fulfils the highest scientific criteria and complies with the standards of good scientific practice. Both documents had been in preparation at a number of regional conferences around the world since Autumn 2012. Topics at the next GRC annual meeting in May 2014 in Beijing will concern early career researchers and further consideration of open access.

www.dfg.de/en/service/press/press_releases/2013/press_release_no_17

A Trip to China Provides Important Research Impetus

Science policy talks in Beijing / Special fund for Research Training Groups announced

Illustration: DFG

At the beginning of June, representatives at the highest level of the DFG spent a week in Beijing with the aim of maintaining the long-standing good relations between Germany and China and of initiating further collaboration. President Professor Peter Strohschneider and Secretary General Dorothee Dzwonnek held a series of talks on science policy with their opposite numbers in Chinese partner organisations and with high-ranking makers of science policy. The visit to China was DFG President Professor Strohschneider's first major foreign trip since he took office in January and underlined the special importance that the DFG, Germany's central self-governing organisation for research, attaches to collaboration with China.

The programme for the trip included a visit to a DFG partner organisation, the National Natural Science Foundation of China (NSFC), and the first meeting with the NSFC President Professor Yang Wei (6th from the right next to Professor Strohschneider and Ms. Dzwonnek in our photo), a meeting with the Chinese Minister for Research, Professor Wan Gang, and talks with the directors of the Chinese Academy of Sciences (CAS) and the Chinese Academy of Social Sciences (CASS). During the visit to the Chinese Ministry of Education, Vice President Hao Ping announced plans for a special fund for more Chinese-German Research Training Groups. The DFG Executive Board declared itself very pleased at the end of the trip. "I was particularly impressed by the friendly atmosphere in which all our meetings and discussions took place," said Professor Strohschneider.

www.dfg.de/en/service/press/press_releases/2013/press_release_no_19

Stefan Weinzierl

As Good as Being There

From the concert hall to virtual performances, creating a spatially authentic listening experience requires a great deal of technology and even more measurements and simulations. By building a large database of spatial acoustic data, researchers hope to create the perfect signal chain – and thus optimise the quality of audio transmissions.

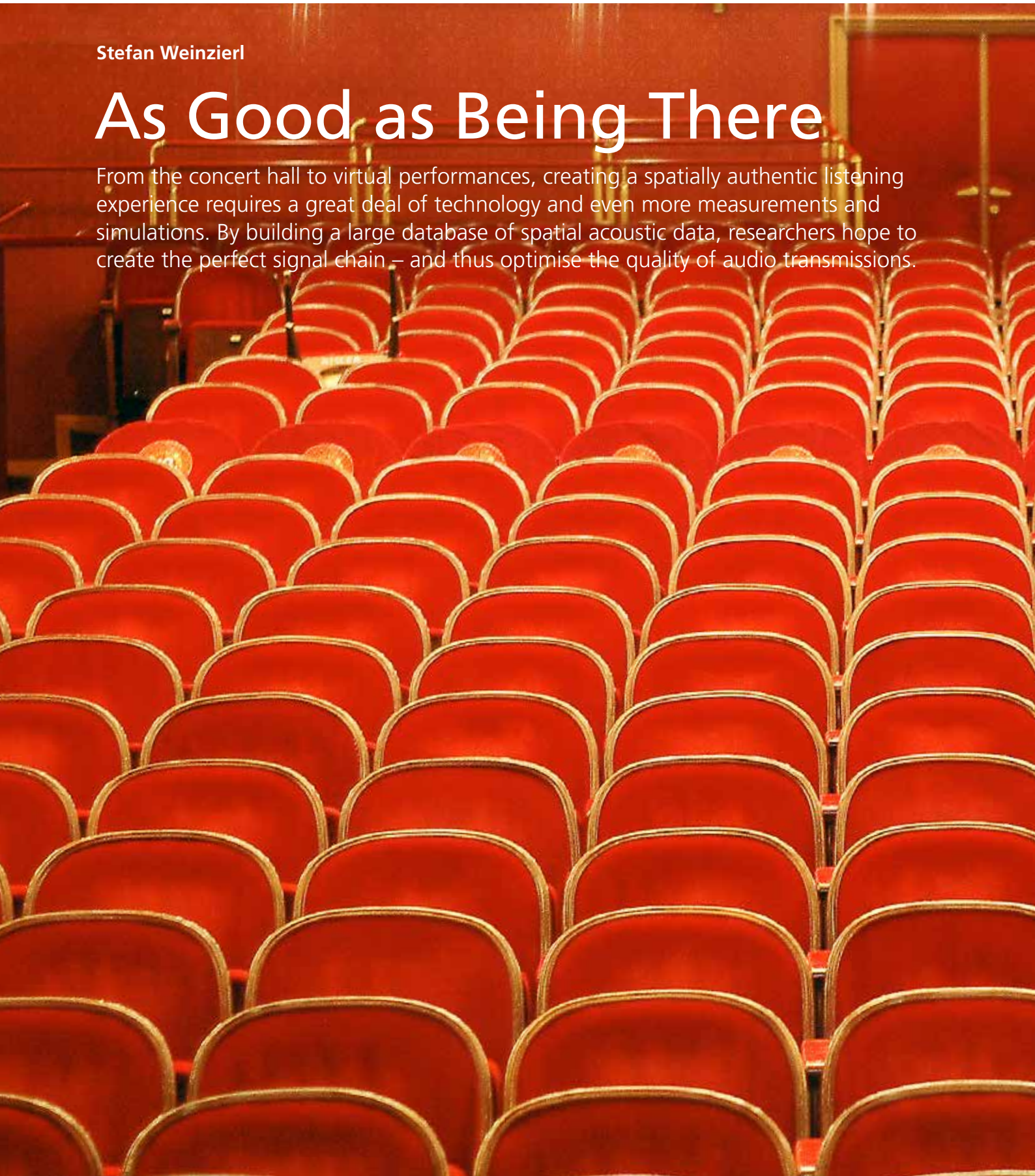


Illustration: TU Berlin / Fachgebiet Audiokommunikation

How do you bring a concert hall to a listener in another location? It might seem a strange question, but that is precisely the challenge faced by virtual acoustics. This field is concerned with recording sound in one place and reproducing it exactly as it originally sounded in another place. The challenge is not only to reproduce the content – be it a speech or a concert – but to retain the impression of space. It is this which allows the listener to identify the location of a sound source in the room or to assess the size of the room without being able to see it.

As well as reproducing natural sound events, such as the performance of an orchestra, which actually took place in a real space, this type of simulation also opens up new possibilities. For example, one might listen to a particular artist playing a piece in a concert hall which he or she has never visited, or in a place that does not even exist yet. All this is virtual acoustics, a field of engineering with a wide range of possible applications. Today, basic questions relating to the human perception of sound, particularly the spatial perception of speech and music, are increasingly being analysed in simulated environments. Virtual acoustics is also used to predict the characteristics of new concert halls, to analyse historical locations, and to study musicological questions relating to performance spaces. Simulation technologies also form the basis for future audio playback techniques in the studio, the cinema, computer games and virtual reality systems such as flight simulators for pilot training. They also present new possibilities in contemporary music and media art, in which simulation technologies are already considered a musical instrument in their own right.

But there are still many unanswered questions in virtual acoustics: How detailed does the model of a particular space have to be in order to base a simulation on it? How many microphones are needed to record a three-dimensional sound field and where should they be positioned? And what effect do these factors have on the quality of simulation? The Simulation and Evaluation of Acoustical Environments Research Unit (SEACEN), set up by DFG in April 2011, is concerned with all these aspects, from the modelling and mapping of spaces to audio playback. The questions are as varied as the skills and knowledge needed to answer them, which is why the Research Unit brings together physicists, mathemati-

Doing the groundwork: the spatial acoustic emission of a musical instrument is recorded in an anechoic environment.

Illustration: TU Berlin / Fachgebiet Audiokommunikation

Each performance venue has its own unique acoustics: a view of the historic concert hall at Esterházy Palace in Eisenstadt, Austria.

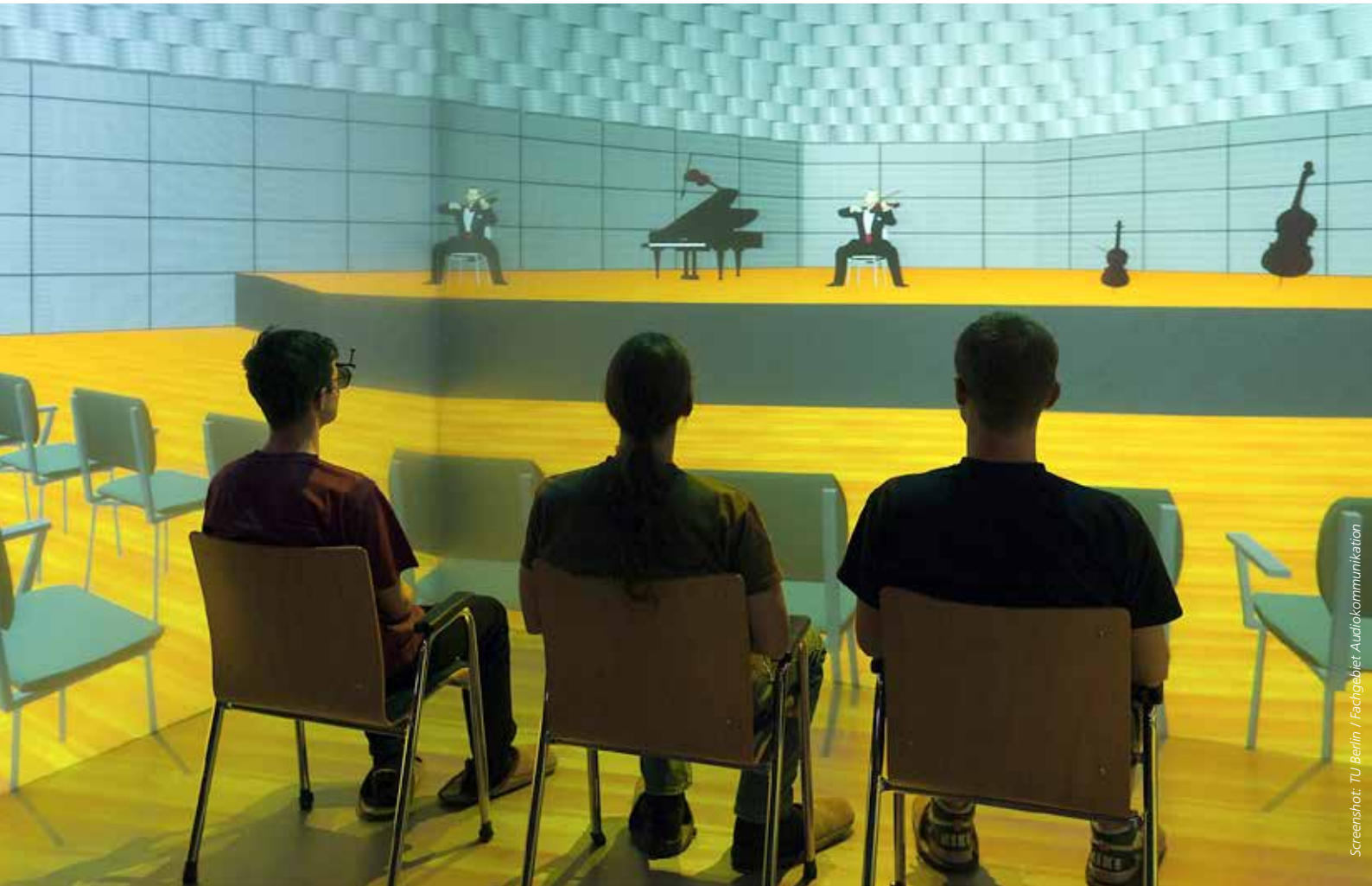
cians, psychologists and experts in digital signal processing. As well as seven scientific partners from Germany, the team also includes researchers from Israel and the Netherlands – because before we can transport the listener into a virtual world, a lot of groundwork needs to be done. First we need to map the space itself, or simulate it using a computer model. To simulate a concert, for example, a musician or group of musicians sits on a virtual stage and their sound field within the space is modelled. An instrument does not simply project sound forwards, towards the audience; the sound is also reflected by the walls, floor and ceiling and partially absorbed by the walls depending on what they are made of. The sound reaches the listener both directly and indirectly with a slight time delay, overlapping in very complex ways to create a spatial sound experience.

There are basically two different approaches to simulation: we can simulate an entire room in which the listener can move about freely (sound field synthesis) or simulate the sound at one particular listening position, the listener's eardrums being stimulated through headphones just as they would be in a real space (binaural technology). Both approaches have their pros and cons in terms of technical and perception-related considerations. Wave field synthesis, a special technique in sound field synthesis, uses a large number of loudspeakers to create an extensive sound field by adjusting each individual system as required.

The Technical University of Berlin (TU Berlin) is home to what is currently the world's largest wave field synthesis system, which controls over 2700 loudspeakers with 832 different signals in order to simulate and reproduce real spaces. Because wave field synthesis simulates a space within a space, so to speak, one of the limitations of this technique is the acoustic impact of the playback space – the space in which the loudspeakers are located. The simulated space must also be sufficiently well encoded in order to be able to reproduce it. One or two microphones, which might be adequate for a normal recording session, will not do the job. In order to map all the sound information in three dimensions, a vast quantity of data must be recorded. To do this, we use a microphone array – a large number of microphones arranged in a given shape, such as a sphere. This data can then be used to encode and simulate a complete sound field.

Unlike methods requiring large numbers of loudspeakers, binaural synthesis needs just a single set of headphones. The sound is produced next to the listener's ears, creating an experience which is just like sitting in a concert hall. However, before it can be played back over the headphones, the data first has to be properly encoded. Again, a normal microphone will not suffice because the sound we perceive is always slightly modified by the body, particularly the shape of the ears and head, which specifically influences sounds depending on the direction from which they come. So for recording purposes engineers use a dummy head or complete head and torso simulator with miniature microphones fitted in the ear canal. Newer systems feature a motor in the neck joint of the binaural robot which can move the head freely about. To prevent the orchestra from

A virtual experience: simulation of a musical performance in the Cave Automatic Virtual Environment at RWTH Aachen University.



Screenshot: TU Berlin / Fachgebiet Audiokommunikation

The binarual robot FABIAN's head movements are controlled by computer. Microphones fitted in the auditory canals of the robot's ears record the acoustic signature of the room.

appearing to move during playback when the listener moves his head, the head movements are recorded and the playback signals adjusted accordingly, enabling the listener to experience a fixed virtual sound field. Due to the vast amount of data involved, both of these methods require very powerful computers.

The SEACEN Research Unit now benefits from close collaboration in that all partners now work with the same data from the same locations, be they computer-simulated or actual measurements. So far the team has recorded data at seven major concert halls and performance venues, including the Gewandhaus in Leipzig, the Konzerthaus in Berlin and the basilica at Eberbach Abbey in the Rheingau. The measured and simulated data is stored in a shared database. The quality of the complete signal chain of the different simulation processes, from recording to playback, is analysed on the basis of the work of individual working groups specialising in different areas of virtual acoustics. The team is also developing suitable quality criteria and test methods for virtual environments. To do this, a common language must first be devised – a comprehensive and precisely defined vocabulary that allows a spatial sound impression to be described in words.

Because acoustics are only ever one aspect of our sensory experience, it is logical to take into account the interaction of sound with other sensory impressions, particularly the visual. It was with this in mind that an audiovisual 3D laboratory was set up in order to study how vision influences hearing. We know that a red car is perceived as being louder than a blue one. But how does it behave within a given space? What happens when sound and vision no longer correlate? To what extent is acoustic perception in a concert hall determined by its visual appearance? These are also questions that the Research Unit is seeking to answer.

Professor Dr. Stefan Weinzierl
is the head of the Audio Communication Group at TU Berlin and the speaker for the DFG Research Unit SEACEN.

Contact: TU Berlin, Institut für Sprache und Kommunikation / Fachgebiet Audiokommunikation, Einsteinufer 17, 10587 Berlin, Germany

The wave field synthesis system at TU Berlin is open to the public during the annual open evening. Visitors will be able to listen to the acoustic resynthesis of an organ concert in Cologne Cathedral which will reproduce not only the sound of the organ but also the spatial acoustics of this great building.

Website of the SEACEN project:
www.seacen.tu-berlin.de/menue/seacen/parameter/en/

Audio samples from the Audio Communication Department are available at:
www.ak.tu-berlin.de/menue/forschung/demonstrationen/parameter/en/

Heike Emmerich

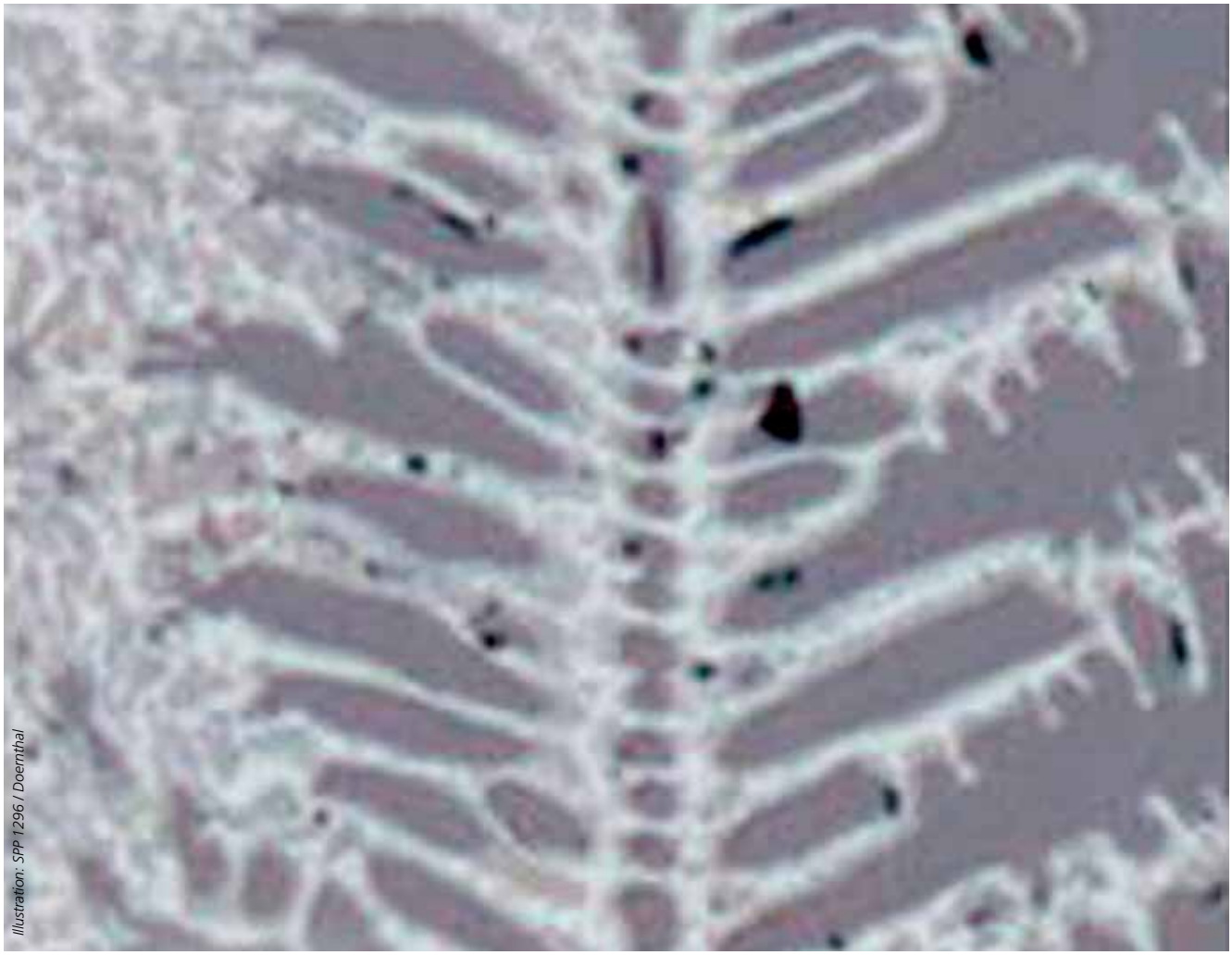


Illustration: SPP 1296 / Doernthal

Nano- and Microscale Tailoring

Developing novel metallic materials with improved properties requires structuring at the smallest scale. Material engineers and natural scientists are combining their methods to open up new routes for innovative applications in microsystems engineering.

Nano- to microscopic structures inside a material or on its surface govern whether a material is elastic or brittle, at which temperatures and stresses microcracking is imminent or which optoelectronic properties are achievable. Fabricating novel materials with e.g. defined mechanical or optoelectronic characteristics requires a detailed knowledge and understanding of how these nano- to microscopic structures arise during material development. In other words, this knowledge is essential in order to tailor materials to a specific purpose within the wide range of applications in microsystems engineering and microelectronics.

But why are materials with better or innovative properties necessary in the first place? Our everyday experience can be of assistance here: who wouldn't want their kids to be able to play football near the unbreakable window panes in the house next door, to drop a beautiful new porcelain plate without

it smashing to pieces when it hits the floor, and to store their entire collection of favourite music files on a single, compact data storage medium before they go on holiday? Our desires and expectations are varied – in everyday life and in science.

These imaginary scenarios of everyday life are, in principle, similar to the challenges facing material scientists. Tailoring of materials is of everyday importance and is also of great economic interest because even moderate advances in materials engineering are often linked to a huge economic potential. Let's take the metal sheets used for vehicle bodies as an example: if it were possible to use lighter weight body sheeting to reduce the car weight by only seven percent, this would lower the fuel consumption by almost half a litre per 100 kilometres travelled; this would give average annual savings of 300 Euro. A very attractive vision!

With a view to goals such as learning how to quantitatively forecast nano- to microscopic structuring of materials means to be able to understand how in its first development step – which is typically a solidification step – a solid material arises from a metallic melt. Solidification involves the formation of tiny crystallites at different locations inside the material that grow until they intermesh. The structure of a metal is characterised on the microscopic scale by the intermeshed crystallites, known as grains. Just imagine that the crystallites are like snowflakes, but with four arms instead of six. They develop analogously to the snowflakes by nucleation.

For the snowflake, nucleation means that when the atmospheric

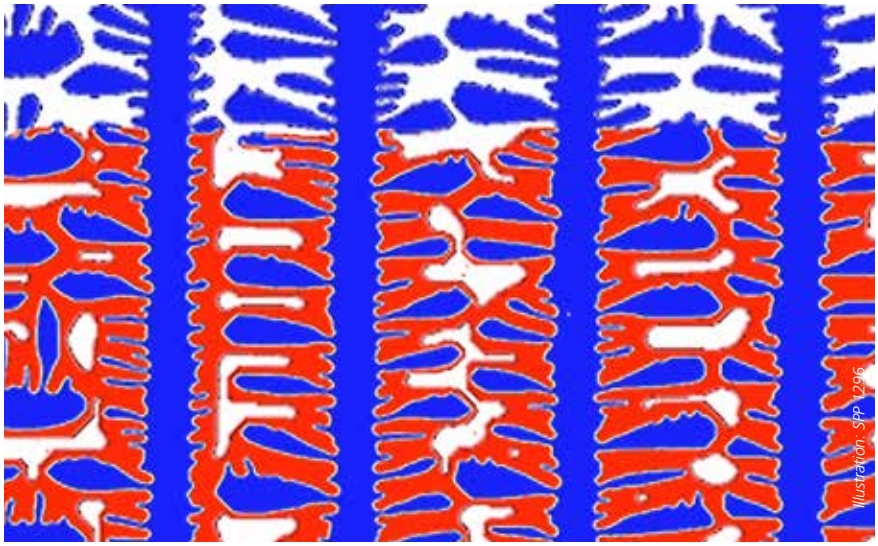


Illustration: SPP 1296

Left: Microstructural development in a special type of metal known as a peritectic system. Above: Simulation of peritectic nucleation and structure formation. Below: Ideas for "bio-inspired material design" are provided by Lobelia teleki, *a native of Africa.*

Illustration: www.mendosa.com/fitnessblog/?p=2897

temperature drops below the freezing point of water, fluctuation causes several water molecules to collide so that mutual aggregation is energetically more favourable than disaggregation. This means that the gain in binding energy within the molecular aggregate must be greater than the energy holding together the surface enveloping the snowflake, which has to be exerted in order to form the nucleus. The nuclei in a metallic material are formed following the same principles.

This description is, however, very rudimentary. For example, it does not take account of the fact that nucleation occurs preferentially on the walls of the solidifying sample or on foreign particles or even on added "seed crystals" inside it. This lowers the initial surface area of the nucleus being formed as well as the necessary nucleation energy. This is known as heterogeneous nucleation. It goes without saying that only the basic principles have been addressed. There are still many questions, for example, the exact size and shape of the initial nucleus. Or how does a microstructure with a certain size and design successively develop from this nucleus under specific solidification conditions?

Tackling these issues is in itself a huge and all-encompassing task. Ultimately, nucleation and subsequent microstructural growth are processes that take place on several size scales, but whose underlying principles are mutually linked. It is thus obvious to envisage the colliding molecules and atoms atomistically and also to describe them atomistically in order to study them using a computer-based simulation approach. The nucleus growth rate is decisively governed by how well the heat of solidification due to the gain in binding energy during crystallisation can be transported away from the crystal by the melt. This transport takes place well above the atomistic scale, and has to be described by large-scale simulation models.

To achieve the most precise and quantitative understanding of heterogeneous nucleation and initial microstructural development, it is absolutely essential that atomistic model descriptions, like most of those developed in the sciences, are coupled as seamlessly as possible to large-scale models used in material engineering. Such a coupling is the aim of interdisciplinary collaboration between natural scientists and material engineers in the DFG Priority Programme 1296 "Heterogeneous Nucleation and Microstructure Formation: Steps Towards a System- and Scale-bridging Understanding". This requires advances in simulation development as well as experimental comparisons.

Thus the Priority Programme will focus on experimental investigations of metals as well as colloids. Colloids consist of particles that are finely dispersed in another medium, the dispersion medium. Examples include milk and fog. Colloids have the advantage that they are predominantly transparent. Thus nucleation inside a colloid – unlike metals – can be easily observed under an optical microscope. Furthermore, they are regarded as model systems for metals, which suggests that they should be studied parallel to metallic systems to achieve a

Crystal growth depicted by a computer simulation and a physical model.

Illustration: SPP 1296

comprehensive and scale-bridging experimental picture of heterogeneous nucleation and subsequent microstructure formation. And this is indeed the starting point for the parallel development of the likewise scale-bridging computer simulations being pursued in the Priority Programme.

Thus the influence of shape and size of seed crystals on the nucleation rate for any solidification conditions was studied systematically for the first time. Other contributions relate to understanding possible nucleation and subsequent grain development scenarios in a special type of metals known as peritectics. Peritectic transformations are found during initial solidification of steel and are still regarded as being under insufficient control.

Illustration: Reinhard Nitze / http://dailymacro.yakohl.com/de/pop.php?pid=1180

Fascinating snowflake – the nucleation processes taking place in snowflakes are similar to those producing microscopic structures in materials.

In symposia of the Priority Programme and in the two summer schools held so far, attention was focussed on whether and how the nucleation scenarios identified in colloids and metals could be applied to other systems, for example, biological systems. During the first summer school, Professor Lindsay Greer (Cambridge) demonstrated that seed crystals in biological systems – where they are known as nucleation agents – could be vital to survival. This is exemplified by the Afro-alpine plant *Lobelia teleki*, which grows in the Mount Kenya region where it is exposed to a temperature cycle of –10 to 10 °C. It uses a nucleation agent in its water-filled system of veins to ensure that its temperature never drops significantly below –0.5 °C. The plant achieves this by using the liberated heat of solidification when heterogeneous nucleation starts after the ambient temperature drops at night. But the most remarkable fact is that the underlying physical principles are analogous to those used intentionally to influence the microstructure in industrially relevant technical metals by the addition of seed crystals.

This example is not an isolated case. It demonstrates how material sciences and biology can be profitably combined to achieve "bio-inspired material design". In the case of *Lobelia teleki*, methodologies from the material sciences provide an initial detailed understanding of why the plant does not freeze at ambient temperatures below –0.15 °C. By the same token, the plant inspires us to consider other analogous technical applications in materials processing. Specific tailoring of materials is an equally important challenge and future-oriented task. Both the expected results and those obtained so far provide detailed and comprehensible information. They will contribute to a fundamental broadening of the perspectives.

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www.spp1296.uni-bayreuth.de/en

Janina Treude

Illustration: DFG/Treude

30 % of Marxloh's 18,000 inhabitants are migrants – some people see the district as a social ghetto, others as an example of a multicultural community.

Marxloh, Duisburg

Media stereotypes and views from the inside: Ethnologist Anna Caroline Cöster is studying the social reality of a disadvantaged multi-ethnic district.

When Anna Caroline Cöster first visited the Marxloh district of Duisburg in 2008, she discovered a colourful, open and friendly neighbourhood. The young ethnologist had come to this multicultural part of the city for the opening of the DITIB-Merkez mosque, one of the largest mosques in Germany. She had previously studied Islam as part of her dissertation, but the visit to Marxloh got her thinking in a new direction. Where was the "parallel society" so often described in the media? "I had the impression that the residents were not given enough scope to show their view of their neighbourhood. I suddenly knew I wanted to change that situation," explains the 30-year-old researcher from Frankfurt an der Oder on a walk through the district.

She began doing some research and soon realised that there were few quantitative analyses of the makeup of Marxloh's population. "But I wanted to know what it's like to live in a neighbourhood with such a negative stigma," says Cöster. In her DFG-funded project, "Duisburg-Marxloh. Impacts of Cultural Heterogeneity on the Everyday Lives of Women and Girls", she seeks to shed light on the neighbourhood from an inside perspective. The innovative aspect of the project is not the method of participatory observation, but the fact that this is combined with a qualitative approach which focusses on women in an ethnically heterogeneous area of the city. "Women have unused potential that can be valuable to society as a whole," she stresses.

Cöster spent six months – from August 2012 to January 2013 – living in a small apartment not far from the busy Weseler Straße in Marxloh, which is full of Turkish bridal fashion shops. With her long, dark brown hair, she does not stand out when she shops for vegetables at the market or talks to friends over a Turkish tea. Often she was even taken for a Turk. "I realised for the first time how alien you must feel when you arrive in a foreign country, even if you are received in a friendly manner." However, her experiences were not all positive. While working on her dissertation she attracted the hostility of a small group of extremists and was personally harassed and insulted. The experience left its mark, to the extent that she does not wish her photo to appear in the magazine.

After these experiences, her new project was even more like jumping in at the deep end. Cöster established contacts with Entwicklungsgesellschaft Duisburg (an agency for urban renewal), Turkish organisations and youth services. Local residents were rarely distrustful, and many were willing to be interviewed. "It's a fascinating place. The interviews generated more and more interesting aspects. It was like a domino effect," Cöster recalls.

She conscientiously recorded her impressions and experiences

in a research diary. It soon became clear that the supposedly Turkish-dominated district was far more complex than it perhaps at first appeared. Marxloh is home to Turks, Bulgarians and Romanians as well as a small number of Germans. Cöster observed the women from a variety of viewpoints: role within the family, ethnic groups, social background, educational opportunities and employment. Many girls perform better at school than boys, but have a much harder time finding a job. They often become pregnant at a young age. Domestic violence is also a problem, but because of feelings of shame, it is rarely talked about. For some women it is by no means easy even to finish school. They explain that they don't have the time to take language classes. Their role is that of mother and housewife, and they don't devote much time or care to themselves. They do not participate in sports and few are aware of the importance of proper nutrition. They lack a sense of personal identity.

While men represent the family in external matters, the women stay at home. Cöster also has direct experience of the conflicts between Turks and newly arrived Romanians and Bulgarians. The balance of power is shifting as Turkish residents, many of whom are now homeowners, rent out accommodation in poor condition to new arrivals who are powerless to do anything about it.

Cöster has experienced all of this first-hand. She is a part of her research environment and immersed in the lives of her interviewees. Sitting at her desk in her small flat, she can look out of the window straight on to the street. "In spite of the hardship faced by many people here, I'm continually struck by how open and hospitable they are," she says. There have been many moving moments. Through her contact with local women, she says, she can now see the situation more clearly. But the large amount of data is difficult to analyse and evaluate, so she has chosen to use typical case studies which she plans to publish in anonymised form in her book. In this way she can give the people of Marxloh a voice and take a different look at the multi-ethnic relationship structure in this neighbourhood. "My expectations of life in Marxloh have been fully met – I'm now a woman in Marxloh myself. I experience for myself how they live here," she says. She has seen the poor amenities and difficult living conditions for herself – Marxloh has only one supermarket. If you want to buy clothes, eat an ice cream or go to the cinema, you have to take a train into the city centre – a journey of almost half an hour. And that's if you have the money for the fare in the first place. The bridal fashion "hub" provides a positive contrast: people come here from far and wide to buy clothes for entire wedding parties. It's a ray of hope for Marxloh, as are the other positive sides of the neighbourhood.

In January 2013 Cöster presented her first findings at Viadrina European University in Frankfurt an der Oder. She has plenty of ideas that could change life in Marxloh, for example through new integration projects. Integration, she believes, is a two-sided process, and until now such events have not brought the different ethnic groups together. Yet the women, in particular, have a lot of things in common: through their children, for instance, who dance and play football together. Cöster believes that helping people to see this common ground, instead of only the differences, is one of the keys to improving the social situation.

Visitors from near and far came to the opening of the Merkez mosque in October 2008.

Illustration: Ina Fassbender / Corbis

Janina Treude
was a trainee in the DFG Press and Public Relations Office until March 2013.

Meike Wolf

Illustration: Jelena Katkova / istockphoto.de

Prepared for Anything

From prevention to preparedness: Cultural anthropologists are re-examining pandemics as globalised and globalising diseases. Viral infections such as SARS need to be understood in a wider context, beyond a purely medical dimension.

Swine flu, avian flu, AIDS, SARS, Ebola – viruses circulate all over the world and their deadly effects do not respect national borders. The assumption that infectious diseases are a problem of the past, from the days of industrialisation when cholera and typhus epidemics raged in the cities of Europe, is clearly refuted by the statistical data. Today, no less than five infectious diseases are among the most common causes of death worldwide: respiratory and diarrheal diseases, malaria, tuberculosis and AIDS. The viruses that cause these diseases present healthcare professionals and policymakers with enormous challenges. They have also attracted the attention of cultural anthropologists, who – in simplified terms – are interested in the relationship between human and non-human organisms.

At the present time, particular attention is being paid to new viruses and the associated infections. These include highly contagious pathogens such as the SARS virus as well as new forms of the influenza virus, for example the 2009 "swine flu" – the first flu pandemic

in over 40 years. When a human or animal first encounters a virus such as this, its immune system has no specific immune response so it is easy for the virus to spread throughout the body and from there infect other individuals. If the virus succeeds in spreading from one region to other countries, or even across the world, it is described as a pandemic.

Pandemics are not a modern phenomenon; they have always existed. What is new, however, is the speed and intensity with which viruses can now spread all over the globe. The spread of infection is also promoted by other factors: the living and working conditions, consumer habits and mobility patterns of our globalised age often provide excellent conditions for viruses to infect a large number of hosts, as US human geographer Bruce Braun emphasises. Mass animal breeding methods, international travel, overcrowded cities, changed bird migration routes and excessive use of antibiotics – all have contributed to environments which provide an ideal home for viruses. From a cultural-anthropological viewpoint, human and viral lifeforms have a close relationship of mutual influence.

An example of the rapid spread of a virus is SARS (Severe Acute Respiratory Syndrome), a serious influenza-like infection of the respiratory tract caused by a coronavirus. It was first observed in November 2002 in the southern Chinese province of Guangdong. Just four months later the first cases appeared in Hong Kong, from where the virus spread through air passengers to Vietnam, Taiwan, Toronto and Frankfurt. In the space of a few weeks SARS reached 29 countries and infected over 8000 people.

It highlighted for the first time the globalised aspect and the dangers of a new infectious disease and – from a medical perspective – the need for international cooperation in pandemic control. As far as influenza is concerned, the general assumption in healthcare institutions at national and supranational level is that the next pandemic will be inevitable. The question is not whether the next pandemic virus will spread, but when.

The national pandemic plan drawn up and published by the Robert Koch Institute in 2007 states: "In the event of a future pandemic, model calculations show that 100,000 people could die from influenza within a few weeks in Germany alone. Although the exact timing and extent of a future influenza pandemic cannot be predicted, many experts believe that there are signs indicating that a pandemic may not be far away. […] The 2003 SARS epidemic only gave an idea of what could happen in the event of an influenza pandemic: the spread of a new type of virus throughout the world within a matter of days, extreme pressure on the public healthcare system and medical supplies, and considerable risk to public order and the functioning of the entire economy." The UK Department of Health makes it even clearer in its 2005 pandemic contingency plan: "There is currently rising

Free and no appointment required – temporary huts were erected in central Stockholm during the swine flu pandemic.

Illustration: Meike Wolf

concern that a new influenza virus with pandemic potential will emerge and spread, and a further pandemic can be expected. When that will be is not known, but the consequences, when it does, will be serious."

Given this paradigmatic certainty that the next pandemic will happen sooner or later, preparedness recommendations are being formulated at regional level (for example by the Office of Health in Frankfurt and the Resilience Forum in London), national level (the Robert Koch Institute in Germany and the UK Health Protection Agency) and supranational level (WHO and the European Centre for Disease Control). These recommendations are integrated in pandemic contingency plans designed to protect the population against infection and safeguard the necessary technical infrastructure should the need arise. They include the distribution of information about the disease and how it is transmitted, infection control measures such as the closure of childcare facilities, additional hospital beds and vaccination programmes. The control of travel, a ban on large gatherings and the stockpiling of food also part of these "preparedness" measures.

"Simulate a pandemic" – an interactive exhibit at the "Human-Microbe" exhibition, which educates people about the dangers and consequences of serious waves of infection.

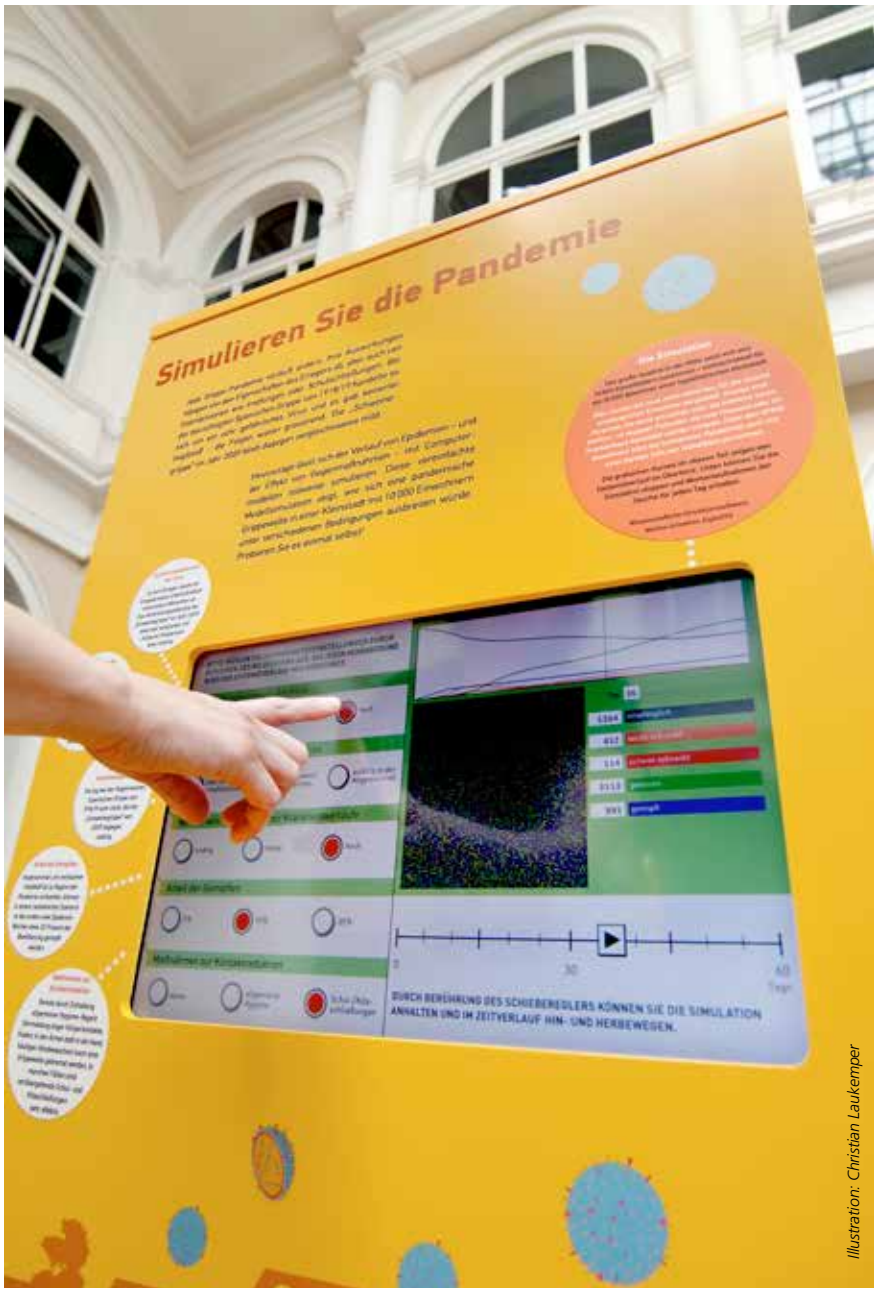

Illustration: Christian Laukemper

This type of contingency planning follows a proactive logic that appeals to citizens' responsible and rational action. For example, members of the public are instructed to use disposable handkerchiefs, ventilate rooms frequently, look after sick neighbours and consult medical information. Behavioural standards such as this make pandemic preparedness planning fascinating to cultural anthropologists, who examine the reorganisation of the relationship between state and individual action where public order and safety is at stake.

Preparedness precautions involve close cooperation between very different and spatially distributed actors and institutions which maintain complex forms of contact and information flow. Within these networks circulates a multitude of material and non-material flows: samples of new

Illustration: Meike Wolf

Regular handwashing is one of the most important precautions to reduce the risk of infection.

viral strains, experts, wild geese, vaccines, mathematical calculations and computer-aided flu activity maps of the latest cases in Europe.

Influenza is a globalised and globalising disease, and this fact is of relevance to both biomedicine and the social sciences. It not only spreads within global networks, it also gives rise to new, cross-border expert and surveillance systems. This makes it an important area of research for cultural anthropologists with respect to globalisation. We can currently observe how new forms of prevention are being developed in pandemic planning, migrating from medicine to other social contexts.

The responses sought and found in reaction to the assumed threat situation (the next pandemic) are no longer limited to the world of medicine or the social state. In what is historically speaking a new phenomenon, they also encompass complete technological systems which are of dual importance: firstly their protection is a key objective of pandemic preparedness, and secondly they are themselves an integral part of the process of monitoring and control.

As part of the research project "From Prevention to Preparedness – A Cultural-Anthropological Study of the Globalisation of Influenza", researchers are analysing the new, globalised forms of infection prevention and surveillance from a theoretical perspective as well as carrying out empirical fieldwork. The focus is on two European cities which represent hubs in the spread and containment of a possible pandemic virus: London and Frankfurt am Main. By means of participatory observation and expert interviews, the research team is tracking the influenza virus through various institutions: from virological research laboratories to large hospitals, from company vaccination clinics to public health departments, from the WHO to the duck population in the local park and state healthcare institutions.

By talking to the experts who work in these institutions, they are studying the regulating effect of pandemic preparedness on the actions of humans and microorganisms, what assumptions are being made about the human body and our cities, what regional differences or similarities (perhaps European in scope) are in evidence – and above all, how these measures will affect day-to-day life in Frankfurt and London. Because what the experts know for sure is that the next pandemic will not leave these cities unscathed.

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National Pandemic Plan:
www.rki.de/DE/Content/InfAZ/I/Influenza/Influenzapandemieplan.html

Georg Miehe and Lars Opgenoorth

The End of the Forest on Top of the World

In the Tibetan Plateau and the Himalayas, biogeographers are studying the highest stands of trees and forest in the northern hemisphere. Their interdisciplinary research reveals in detail the extent of the impact of human activity and climate on the natural environment.

Boundaries, whether natural or man-made, have always fascinated people and given them food for thought. For scientists, boundaries are often fixed points that help them to define and characterise systems. But in many cases they provide only a snapshot of a particular point in time, shift position or change over time, or only exist in the mind of the observer. Forest boundaries and tree lines are examples of these supposed fixed points that biogeographers use to better understand and characterise forest ecosystems. The term "boundary" needs to be used with care, as natural forests do not usually come to an abrupt end but transform gradually into areas of sparser or stunted growth and bush.

Most natural forest boundaries are climate-dependent, marking either alpine or polar cold limits or drought limits. We should note that the term "cold limit" is some-

what misleading, as the limiting factor is not so much the absolute cold in winter as the limitation of heat sums in summer. In other words, a tree needs a certain minimum temperature sum in order to sustain the essential physiological processes of a given growing period – from leaf shoots to seed production.

However, forest boundaries provide excellent opportunities to observe the effects of climate fluctuations on ecosystems. By studying boundary zones and fringe areas we can formulate and study key scientific questions such as: How do vegetation zones shift as a result of climate change? How does climate change affect the productivity of forest ecosystems? And how has the climate changed in the past? The dynamics of natural forest boundaries are also interesting because high-altitude forests in particular perform essential functions within their own ecosystems, for example providing protection against avalanches and erosion and regulating the water balance. Forest ecosystems in boundary zones are also extremely fragile: once a forest has been thinned or removed, it can take between tens and thousands of years to reverse processes such as erosion and changes in the microclimate and water balance. Thus, shifts in forest boundaries always have far-reaching consequences for humans and the environment.

The highest forest and tree lines and also the highest human settlements in the northern hemisphere can be found on the Tibetan Plateau and in the Himalayas. Some stands of Tibetan juniper trees are found at altitudes as high as 4900 metres. Scientists disagree as to whether the forest boundaries are natural or whether the Tibetan Plateau, for example, is an example of a man-made landscape. While we have become accustomed to the idea that human beings have dramatically altered the face of the earth with modern technology, even scientists often underestimate the influence of traditional farming and herding cultures in remote areas on the fringes of the inhabited world.

We tend to think of regions such as the Gobi-Altai, the Himalayas and the Tibetan Plateau as wilderness rather than ancient landscapes shaped by human activity. Ever since man first learned to control fire, one spark has been enough to burn down large areas of forest. And since the process of domestication, it has required only a few people and their livestock to keep an area permanently treeless. These two phenomena have caused forest boundaries to shift and altered the states of entire ecosystems – a process that continues today.

The reconstruction of this environmental history is a complex task which can only be achieved using a variety of research methods as it is very difficult to tell from past environmental signals whether a forest boundary was created by climate events or by human activity. Through a number of DFG-funded projects, we have been able to discover some of the human impact on these high-altitude regions. Forest stands in areas with a normal climate (not water

Left: The forest of Reting is a place of pilgrimage for Tibetans and the largest surviving sacred forest in the country. Below: Herdsmen carry hand-cut timber down to the valley.

Illustration: Opgenoorth

supply areas or heat islands) provided the first clues. Areas of this type were found and documented in the south and north-east of the Tibetan Plateau and in areas such as the Gobi-Altai and the Ethiopian Highlands.

Numerous areas show no thinning with altitude and no stunted growth, but end abruptly. They testify to the fact that these forest boundaries must have been created by factors other than climate. In Tibet, their survival is due to the fact that in Buddhist tradition juniper forests are considered sacred and are therefore never completely cut down, especially near monasteries. A second clue was provided by experimental fencing and planting, which showed that vegetation was able to develop in the absence of the pressure caused by grazing. In experiments carried out near Lhasa over a period of more than ten years it was shown that juniper trees were able to retain their ability to germinate and survive without artificial irrigation or heat, at least for the period of the study. Again, this demonstrates that today's treeless slopes in southern Tibet are not climatic in origin.

In addition to extant evidence, the results and methods of palaeoecology also help us to reconstruct environmental history. Pollen, macrofossil and charcoal analysis reveals that the forests still covered larger areas than today until the late Holocene (about 5700 years ago), and more fire events led to a vegetation change from forest and grassland to the sedge meadows and semi-deserts of today. To establish whether these fire events became more frequent as a result of human activity systematic charcoal analyses will be needed in the area in the future.

Nevertheless, archaeological finds indicate that human activity increased at around the same time as the number of fires. Another piece of the jigsaw is supplied by geomorphology research, for example in the Kyichu valley near Lhasa. Here, even the inexpert eye can spot the heavily eroded slopes. Systematic dating efforts show that this erosion also happened in the mid- to late Holocene.

Phylogenetic analysis of juniper forests provides an even deeper insight into the history of the Tibetan forests and their boundaries. Previously it was assumed that during the last ice age, the forests of Tibet had no chance of survival on the Tibetan Plateau and only clung on in the deep gorges of the Mekong and the Yangtze or the flood plain of the Brahmaputra. For many years scientists even considered the possibility that 18,000 years ago, upland Asia might have been

Ancient and recent DNA from juniper trees is analysed to reconstruct the history of Tibet's forests. Below right: Even when the annual rings of trees from dry high-altitude forests are extremely thin, dendrochronological analysis often yields a wealth of data.

Illustrations: AG Opgenoorth

During fieldwork a road blockade is used for pressing plant samples.

entirely covered by a huge sheet of ice.

But phylogenetic analysis of juniper trees revealed a completely different picture. Throughout the modern distribution range we find so-called private haplotypes, in other words genetic diversity only found in this particular population. It is unreasonable to assume that this diversity could have arisen during the short (in evolutionary terms) period of the Holocene, which means there must have been at least small groups of trees in the distribution area during the glacial maximum (about 18,000 to 21,000 years ago). In some places the valley floors in these regions are located at altitudes of over 4000 metres. So this research demonstrates the existence of the world's highest ice-age forest boundaries.

Using these distribution limits, it was then possible to calculate the maximum temperature depressions of Southern Tibet for the period of the Last Glacial Maximum (LGM). Summer temperatures were only 3–4 °C colder than today. Unlike previous techniques, this method did not use fossils to work out former limits and temperature depressions, but the forests of today and the historical information contained in their genes. The calculated temperatures have now been confirmed by studying ground beetles and herbaceous plants in Tibet. Their current distribution and evolutionary history provide clues as to distribution thresholds during the Last Glacial Maximum. Ground beetles have the advantage that they have always been entirely unaffected by human activity.

In Tibet today, closed forest belts are only found at altitudes of up to around 3900 metres. Given the existence of trees during the ice age and the calculated temperature drops, this is clearly not a natural cold limit. The numerous pieces of the puzzle from various scientific disciplines, brought together in DFG projects, paint a complex picture of a man-made landscape with human-influenced plant populations in the shape of sedge meadows and steppes that were useful for rearing livestock. But like the remaining forests, these man-made populations are now under pressure. A high density of livestock tears up the humus layer, creates sedge meadows like golf courses, and turns steppes into semi-deserts – promoting continued erosion.

When one considers that up to two billion people depend on water from Tibet and the Himalayas through the great Asian rivers, one realises that these environmental changes could have far-reaching consequences. We still have a chance to mitigate these processes through reforestation programmes and modified forms of agriculture. But in restoring the old forest boundaries we also need a change of awareness – and a shift in the boundaries in the heads of decision-makers.

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Lars Kaleschke and Lars Kutzbach

The Earth's Protective Covering of Ice at Risk

On the surface of the Arctic Ocean floats a thin layer of sea ice that keeps heat locked into the water. Marine scientists, atmospheric researchers, geochemists and soil scientists are examining the impacts of climate change on this fragile ice. Consider this scenario: If the ice melts, the permafrost soils of Siberia and Alaska could heat up and release additional greenhouse gases.

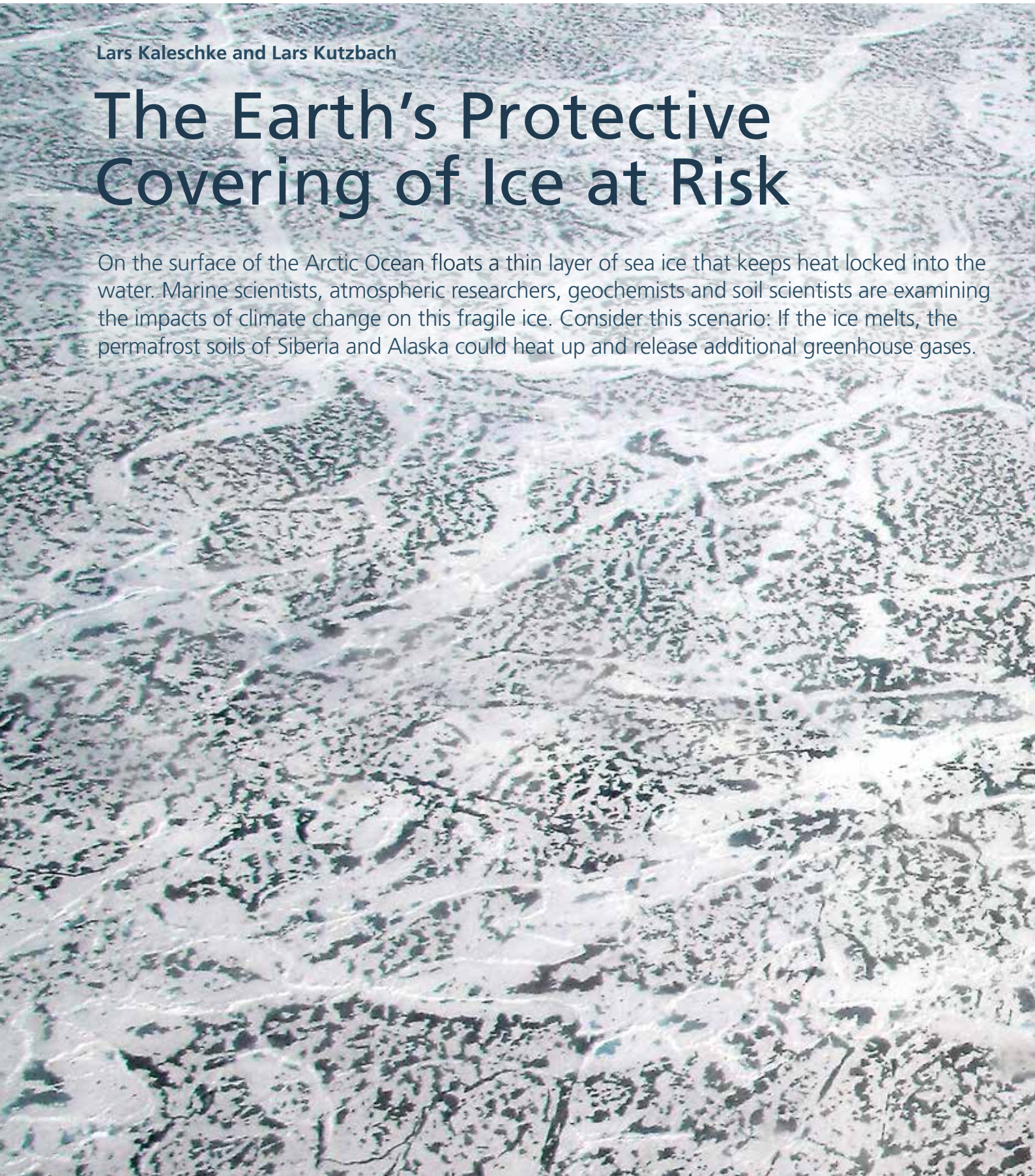
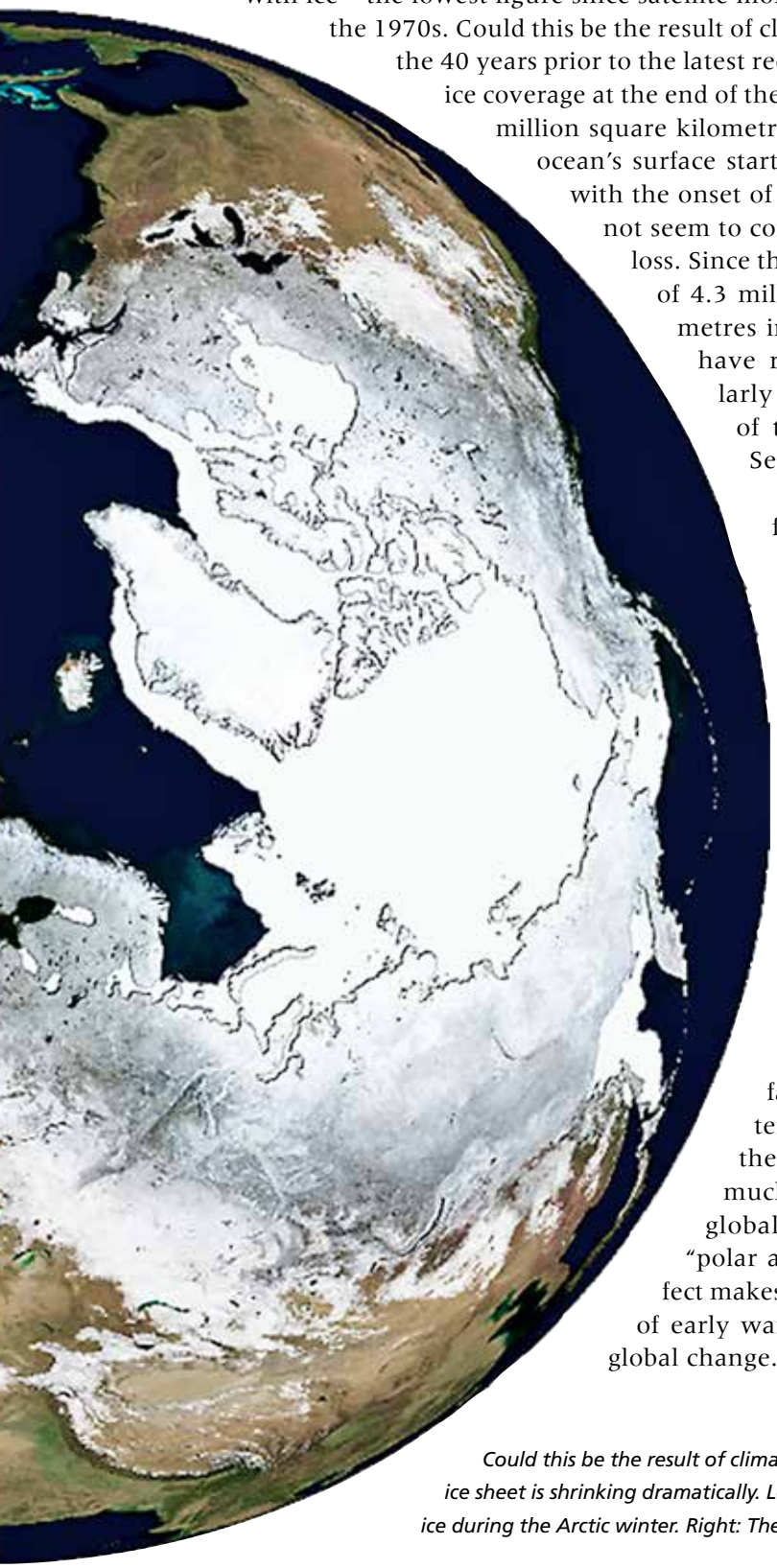


Illustration: UHH / KlimaCampus / Stefan Kern

In September 2012 the Arctic ice hit the headlines with a new record low. Just 3.4 million square kilometres of the Arctic Ocean was covered with ice – the lowest figure since satellite monitoring began in the 1970s. Could this be the result of climate change? In the 40 years prior to the latest record, the average ice coverage at the end of the summer was 6.7 million square kilometres. Although the ocean's surface starts to freeze again with the onset of winter, this does not seem to compensate for the loss. Since the first record low of 4.3 million square kilometres in 2007, satellites have recorded a similarly extreme retreat of the sea ice each September.



Could this be the result of climate change? The polar ice sheet is shrinking dramatically. Left: The extent of the ice during the Arctic winter. Right: The situation in summer.

Alarmingly, the follow-on effects are if anything making the situation worse. Where the ice has melted completely, huge open areas of water are appearing. These reflect less light, are darker, and therefore absorb more heat – making the ice disappear even faster. Air and water temperatures in the Arctic are rising much faster than the global average. This "polar amplification" effect makes the region a sort of early warning system for global change.

For some years the University of Hamburg has been involved, together with European and American colleagues, in Sea Ice Outlook, an annual forecast of the likely September minimum extent of the Arctic Sea ice. The aim of this venture is to demonstrate different methods such as the analysis of satellite data and model calculations in order to predict developments as accurately as possible. We want to answer questions such as: What factors determine how much ice remains? What is the role of the temperature curve, the size of the ice sheet at the beginning of the summer and the thickness of the ice?

In summer the Arctic Sea ice acts like a thermostat, keeping the temperature constant at freezing point. This is because a lot of heat is needed to break down the crystal structure of the ice and melt it. In winter the covering of ice insulates the relatively warm ocean against the frozen temperatures of the polar air layers, preventing heat from escaping into the atmosphere. Yet the atmosphere in the Arctic is in fact getting warmer, especially in autumn and winter. One possible theory is that the ice is getting thinner. Satellite data also shows that it is moving faster. This causes more channels to form in the ice, which have a crucial effect on the balance of heat. In winter the temperature difference between the ocean and the atmosphere may be up to 40 °C, and warm air is sucked up through these gaps as if in a chimney. These channels therefore have the effect of heating up the air – a phenomenon that has been confirmed by field experiments in the Arctic.

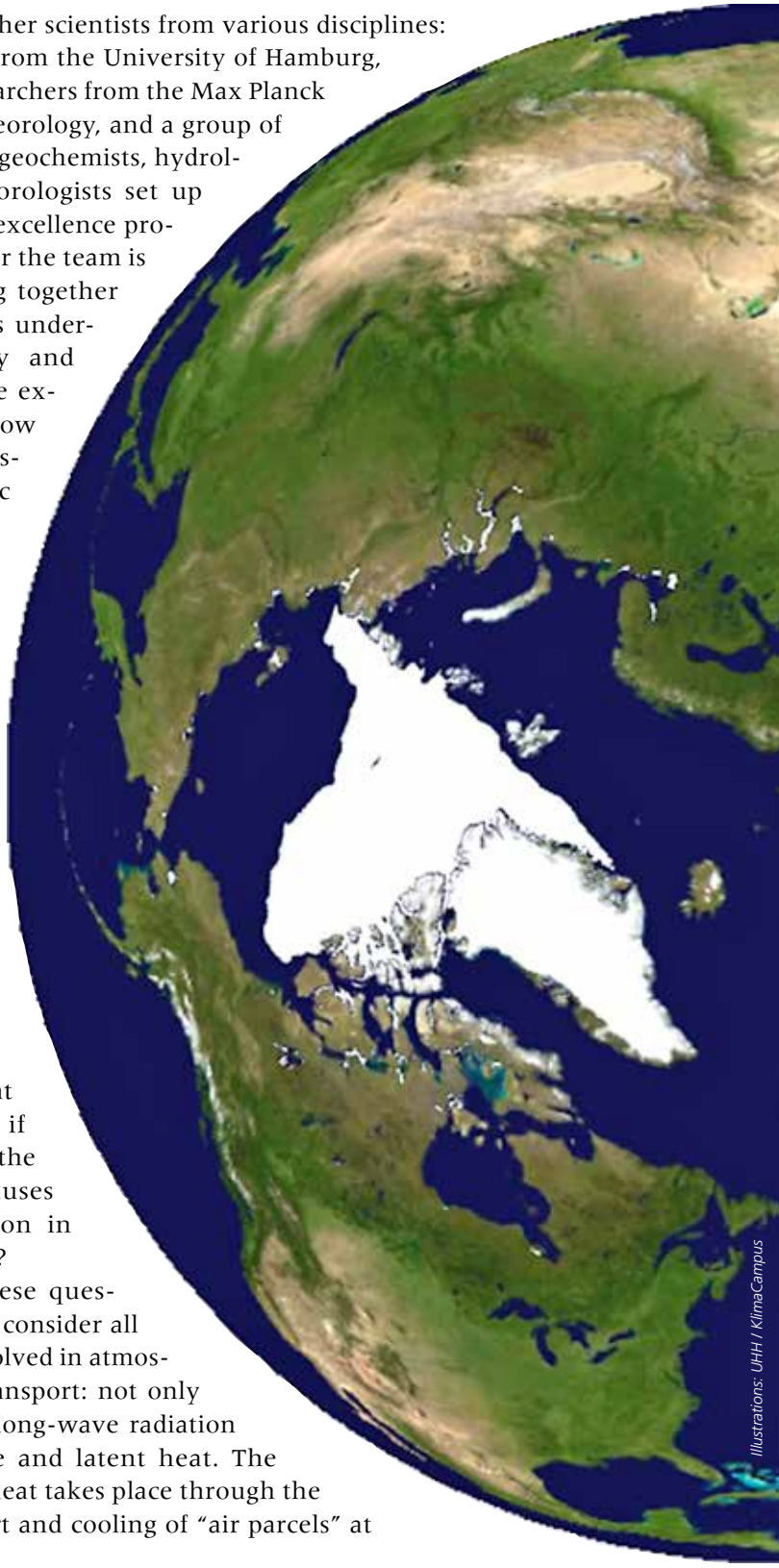
So future developments will be shaped not only by the fact that the area of ice is shrinking, but also by the fact that it is getting thinner and more penetrable and thus losing some of its insulating function. That is why it is so important to systematically record the state of the ice. Satellites can only measure how far the ice protrudes above the water's surface. Like an iceberg, six sevenths of the volume is below the surface and only one seventh above it. This is our only means of calculating the total thickness.

But for regions where the ice is thin, this method is not precise enough. Yet these are the areas where heat exchange is most noticeable. This is why new methods are being developed and tested to measure the thickness of the ice using natural microwave radiation. Data is supplied by the new SMOS satellite mission of the European Space Agency (ESA).

Cracks, channels and meltwater pools aren't just of interest to marine scientists. After all, oceans and ice are not isolated systems. Heat lost from the sea stays in the atmosphere as warm air. If this warm air drifts horizontally as a result of atmospheric circulation, then adjacent land masses will heat up too. Crucially, what has always been permanently frozen soil around the Arctic Ocean could begin to thaw and exacerbate the situation. Regions with permafrost – Siberia, Alaska and large areas of Canada – harbour vast quantities of organic carbon, more than twice the global amount stored in plants. If the permafrost thaws, the previously frozen organic substance could be broken down by microorganisms to produce the greenhouse gases methane and carbon dioxide.

The Cluster of Excellence for Climate Research in Hamburg brings together scientists from various disciplines: oceanographers from the University of Hamburg, atmospheric researchers from the Max Planck Institute for Meteorology, and a group of soil scientists, biogeochemists, hydrologists and meteorologists set up specially for the excellence programme. Together the team is gradually piecing together the exact process undergone by energy and heat. What is the extent of energy flow out of an increasingly open Arctic Sea? Is it significant enough to trigger long-term changes in the vast permafrost regions of Siberia? How much heat is transported to adjacent land masses through the "air bridge" between ocean and atmosphere, and under what conditions? What will happen if moister air from the Arctic Ocean causes more precipitation in permafrost areas?

To answer these questions we need to consider all the elements involved in atmospheric energy transport: not only short-wave and long-wave radiation but also sensible and latent heat. The flow of sensible heat takes place through the heating, transport and cooling of "air parcels" at



Illustrations: UHH / KlimaCampus

Illustration: UHH / KlimaCampus

Lab work is essential when oceanographers, atmospheric researchers, hydrologists and geochemists work together. Below: Research vessel in the Arctic. During the snowmelt the sea ice is dotted with characteristic pools.

Illustration: UHH / KlimaCampus / Stefan Kern

different points on the earth's surface. The flow of latent heat corresponds to the energy used up when moisture in the air evaporates. The heat is transported in the air and later released when the moisture condenses in colder layers of the atmosphere. If this happens over land, the additional heat could encourage further thawing.

It seems obvious, therefore, that the retreat of the sea ice is a driver of continental warming. Indeed, some Arctic permafrost soils are already thawing to a greater depth in summer and the thaw is beginning earlier in the year. Alaska has a comparatively good measurement network, but so far there is no global monitoring programme. Instead there are indications provided by climate models, supported by individual measurements. At the same time we can observe that for the last 30 years the major Siberian rivers have been carrying more and more water – more than can be explained by precipitation. But further developments are impossible to assess at the present time. Before we can create climate models to simulate the seasonal thawing and freezing of the soils and thus the fluctuations in the water and carbon cycles, we must first understand and quantify many individual processes.

Since 2009 a group of researchers from KlimaCampus in Hamburg, together with colleagues from the Alfred Wegener Institute for Polar and Marine Research and Russian partners, has made an annual summer trip to Siberia. One of the pieces of equipment used by the team is an eddy covariance system. Set up in the middle of the tundra, every 30 minutes it measures how much carbon dioxide and methane is released from and absorbed by the soil. This data allows us to work out whether the system is currently functioning as a source or sink for greenhouse gases. In 2010, one of our colleagues even spent part of the winter in Siberia


Illustration: UHH / KlimaCampus

Understanding the water and carbon cycles in the Arctic involves taking measurements over long periods.

with just two Russian rangers for company. In ice-cold winds and temperatures as low as –30 °C, he maintained the equipment and took regular core soil samples. It was an extremely tough job, but well worth it. For the first time we were able to demonstrate that the production of carbon dioxide continues even when the soil has re-frozen to several decimetres down. Previously it was assumed that all biological and biogeochemical processes came to a halt during autumn and winter and that the Siberian tundra effectively stopped releasing climate gases. We now know that this is not the case. In fact, the soil continues to "breathe" to a small degree, but nonetheless measurably, far into November. Previous model calculations, which assumed a value of zero for this process, must now be modified.

Another important finding was that, although the very cold permafrost regions of Siberia release carbon dioxide and methane at night and during the winter due to soil and plant respiration, overall they still function as growing carbon sinks. The comparatively warm permafrost frequently found in Alaska behaves differently. Here more noticeable thawing has been observed, and we have demonstrated that the sink reverts to a carbon source.

Permafrost soils do not consist only of sediment; they also contain a lot of ice with a large heat-absorbing capacity. For this reason it takes a lot of energy to thaw the soil and convert the ice into liquid water. In this sense permafrost absorbs the impacts of climate change by buffering some of the heating effect. However, if the thaw threshold is exceeded and sustained heating takes place, the heat-absorbing capacity of the permafrost may be exhausted. In this event, significant changes would be likely and very difficult to reverse.

Our aim is to analyse and quantify all these interactions in order to develop an effective model of regional heat transport in the Arctic and of the permafrost. This is inextricably linked with the Arctic ecosystem, which is as complex as it is sensitive. Researchers in all disciplines – glaciology, oceanography, atmospheric science, biology, soil science and biogeochemistry – must work hand in hand to advance our knowledge.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www.klimacampus.de/clisap+M563a176f1a5.html?&L=1

The Deutsche Forschungsgemeinschaft

The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) is the central self-governing organisation responsible for promoting research in Germany. According to its statutes, the DFG serves all branches of science and the humanities. The DFG supports and coordinates research projects in all scientific disciplines, in particular in the areas of basic and applied research. Particular attention is paid to promoting young researchers. Researchers who work at a university or research institution in Germany are eligible to apply for DFG funding. Proposals will be peer reviewed. The final assessment will be carried out by review boards, the members of which are elected by researchers in Germany in their individual subject areas every four years.

The DFG distinguishes between the following programmes for research funding: In the *Individual Grants Programme,* any researcher can apply for financial assistance for an individual research project. *Priority Programmes* allow researchers from various research institutions and laboratories to cooperate within the framework of a set topic or project for a defined period of time, each working at his/her respective research institution. A *Research Unit* is a longer-term collaboration between several researchers who generally work together on a research topic at a single location. In *Central Research Facilities* there is a particular concentration of personnel and equipment that is required to provide scientific and technical services.

Collaborative Research Centres are long-term university research centres in which scientists and academics pursue ambitious joint interdisciplinary research undertakings. They are generally established for a period of twelve years. In addition to the classic Collaborative Research Centres, which are concentrated at one location and open to all subject areas, the DFG also offers several programme variations. *CRC/Transregios* allow various locations to cooperate on one topical focus. *Cultural Studies Research Centres* are designed to support the transition in the humanities to an integrated cultural studies paradigm. *Transfer Units* serve to transfer the findings of basic research produced by Collaborative Research Centres into the realm of practical application by promoting cooperation between research institutes and users.

DFG Research Centres are an important strategic funding instrument. They concentrate scientific research competence in particularly innovative fields and create temporary, internationally visible research priorities at research universities.

Research Training Groups are university training programmes established for a specific time period to support young researchers by actively involving them in research work. This focusses on a coherent, topically defined, research and study programme. Research Training Groups are designed to promote the early independence of doctoral students and intensify international exchange. They are open to international participants. In *International Research Training Groups,* a jointly structured doctoral programme is offered by German and foreign universities. Other funding opportunities for qualified young researchers are offered by the *Heisenberg Programme* and the *Emmy Noether Programme.* In so called *Reinhart Koselleck Projects,* the DFG supports especially innovative research undertakings by outstanding scientists and academics.

The *Excellence Initiative* aims to promote top-level research and improve the quality of German universities and research institutions in the long term. Funding is provided for graduate schools, clusters of excellence and institutional strategies.

The DFG also funds and initiates measures to promote scientific libraries, equips computer centres with computing hardware, provides instrumentation for research purposes and conducts peer reviews on proposals for scientific instrumentation. On an international level, the DFG has assumed the role of Scientific Representative to international organisations, coordinates and funds the German contribution towards large-scale international research programmes, and supports international scientific relations.

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The legal status of the DFG is that of an association under private law. Its member organisations include research universities, major non-university research institutions, such as the Max Planck Society, the Fraunhofer Society and the Leibniz Association, the Academies of Sciences and Humanities and a number of scientific associations. In order to meet its responsibilities, the DFG receives funding from the German federal government and the federal states, as well as an annual contribution from the Donors' Association for the Promotion of Sciences and Humanities in Germany.

Impressum

german research is published by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation);
Publisher: WILEY-VCH Verlag GmbH & Co. KGaA, P.O. Box 10 11 61, D-69541 Weinheim;
Annual subscription price: €73.00 (Europe), US $78.00 (all other countries) including postage and handling charges.
Prices are exclusive of VAT and subject to change.
Address of editorial staff: DFG, Press and Public Relations Office, Kennedyallee 40, 53175 Bonn;
postmaster@dfg.de; www.dfg.de

Editor-in-chief: Marco Finetti (responsible for content)
Publishing Executive Editor: Dr. Rembert Unterstell
Copy Editors: Stephanie Henseler, Angela Kügler-Seifert
Translation: SciTech Communications GmbH, Heidelberg; oneword GmbH, Böblingen
Printed by: Bonner Universitäts-Buchdruckerei (BUB);
printed on chlorine-free bleached paper with 50 % recycling fibres.

ISSN 0172-1518

Illustration: DFG / Seidel

Opening an exhibition with photos from the Antarctic in the middle of June is a "cool" idea. With the latest event in the "WissenSchafftKunst" series at the DFG Head Office in Bonn-Bad Godesberg falling on the hottest day of the year to date, some of the visitors, possibly including the woman pictured above, wanted to beat the heat. The show is entitled "Expedition through Endless Ice" and brings two apparent opposites together: curiosity-driven research and its artistic interpretation. Photographer Thomas Steuer accompanied an expedition on the research vessel *Polarstern* for six weeks and visited the Neumayer Station III. The images that resulted from this journey illustrate the work undertaken by the researchers in the vast expanse of the Antarctic, but they are also more than just a documentary: snow and ice become abstract structures on the large-format photos and research equipment reveals a sculptural beauty. The exhibition was opened by Dorothee Dzwonnek, the Secretary General of the DFG, and will be shown until mid-October.