Issue 2|2016

CLIMATE AND ENVIRONMENT news

Newsletter of the KIT Climate and Environment Center

Editorial

The KIT Climate and Environment Center contributes to making climate change manageable by mankind. Of course, this is a big, long-term, and strategic task. But we have to act today and take concrete measures. This newsletter will present various approaches pursued by the KIT Climate and Environment Center.

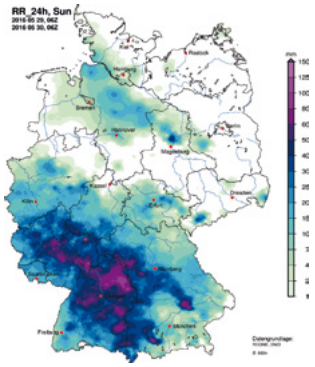
This summer, for example, our scientists analyzed the causes of the devastating weather disasters in South Germany, the objective being to find out how such disasters might be mitigated in the future. For taking the necessary precautions, medium-term climate prognoses have to be improved. We at KIT have a coordinating role in Germany - for adaptations to climate change being placed on a solid scientific foundation.

Professor Dr. Oliver Kraft
Vice President for Research

Weather Disasters Probably Will not Become More Frequent, but More Expensive

For the staff of CEDIM, the Center for Disaster Management and Risk Reduction Technology, the early summer of 2016 was a rather stressful time: For three weeks, very humid air in large parts of central Europe caused extreme rainfall. Braunsbach, Künzelsau, or Simbach are only three of the places, where sudden floods caused major devastation. CEDIM staff members went there to assess damage and to analyze the causes.

Bernhard Mühr, meteorologist of the Institute of Meteorology and Climate Research (IMK) and CEDIM staff member, explains: "The wind speeds were rather low. At the same time, the thunderstorm potential was high. Severe storms developed and hardly moved further." Still, CEDIM researchers did not find any long-term trend to extreme weather conditions: "The number of days with extreme events has not increased," PD Dr. Michael Kunz, CEDIM Spokesperson and Head of the "Atmospheric Risks" Group of IMK, says. "However, conditions necessary for extreme rainfall events, e.g. high temperature and moist air, become more abundant." Mühr also sees other reasons why the damage increases: "Settlement and industrial areas are expanding. Hence, the probability of these areas being affected by thunderstorms with strong rainfall or hail increases as well. In addition, our properties become more vulnerable. A house with solar thermal or photovoltaic panels on the roof is much more sensitive than a simple building constructed twenty years ago."



Amount of rainfall over 24 hours from May 29, 8 MEST, to May 30, 2016, 8 MEST. (map: Bernhard Mühr)

And what about warning systems? The German Weather Service is working hard on such systems. "Heavy thunderstorms and their impacts may only be assessed reliably after their formation," Mühr says. "Absolute protection against sudden flash floods is not possible," Kunz adds. The researchers think that it is important to make buildings more resistant and to sensitize the population.

Smog in Beijing: Awareness Has Changed

Participants of the scientific colloquium at the China University of Geosciences in Beijing. (Photo: KIT)

Beijing is notorious for disease-causing air pollution. Regularly, the Chinese capital disappears under a noxious smog bell. In addition, the city is exposed to large amounts of geogenic, e.g. natural, whirled up dusts. "Awareness of this situation has changed," says Professor Dr. Stefan Norra, Head of the Environmental Mineralogy and Environmental Systems Analysis Group of KIT's Institute of Applied Geosciences. "The citizens do no longer accept this situation. Pressure on politics increases." This is also due to the "modest" (as Norra puts it) contribution made by the geoecologist and his team: For more than ten years, he has been measuring air quality in Beijing together with Chinese partners.

On the occasion of this anniversary, a scientific colloquium on this topic was organized last December at the China University of Geosciences in Beijing. Norra's team, Chinese cooperation partners, and guests presented latest findings and discussed the state of the art. "Our conclusion: Together, we have achieved a great deal," Norra says. His group alone published numerous scientific articles in high-ranking journals and three doctoral theses. The composition of dust pollution and its sources are well-known.

On this basis, measures against air pollution can be taken. Such measures are also subject of Norra's research. He cooperates closely with municipalities in Germany and industry partners: "We are executing pilot projects, e.g. in Reutlingen, where we study the dust filtration capacity of green walls in cooperation with the Green City Solutions company and the city." Green walls are covered by plants and moss and, according to Norra, remove a certain amount of fine dust from the air: "Even smallest filtration capacities may improve the well-being of the urban population. Now, filtration capacities have to be optimized for these and other methods, e.g. permanently humidified facades, being attractive for use in Beijing and other big cities. They might help better cope with smog situations."

MORE INFORMATION:
www.water-sign.de
www.img.kit.edu/3952_4129.php

Tracing the Causes of Stratus Clouds

In June and July this year, the measurement campaign took place for the project DACCIWA – Dynamics-Aerosol-Chemistry-Cloud Interactions in West Africa. Researchers of Toulouse University and KIT, in cooperation with local scientists, studied atmospheric processes that are highly relevant to cloud formation above West Africa. "We are interested in stratus clouds, a type of fog that frequently develops above large areas of West Africa during the nights" says Dr. Norbert Kalthoff, head of the working group of KIT's Institute of Meteorology and Climate Research that is involved in DACCIWA. Only little is known about the causes of stratus clouds, although they have a strong influence on the radiation budget of the atmosphere and, hence, are climate-relevant.

The three measurement stations, from which the international consortium of researchers analyzed air layers above West Africa, were located in Ghana, Benin, and Nigeria. The headquarter of the KIT researchers was set up in Savé, Benin. "Our remote sensing methods yielded precise data on temperature, air humidity, wind, turbulence in the atmosphere, and the occurrence of aerosols, finest exhaust gas particles from transport and industry," Kalthoff says. Measurements were made with instruments on the ground as well as with radiosondes launched on balloons. "With this, we succeeded in directly measuring an air column above our station," Kalthoff adds. "For measurements of a larger area, research aircraft of the DLR as well as of French and British partners were used."

The results of the DACCIWA campaign will now be incorporated in climate models. "Although stratus clouds occur over large areas, they are not simulated correctly by climate models," Norbert Kalthoff explains. "This is mainly due to the fact that stratus clouds are difficult to measure with satellites. They are very homogeneous and have a temperature similar to that of the Earth's surface." The high-tech equipment of DACCIWA now makes the difference to satellites.

MORE INFORMATION:
www.imk-tro.kit.edu/english/5877_6386.php

MiKliP Project: Climate Researchers Want to Prognosticate the Near Future

Reliable weather forecasts cover periods not longer than two weeks, meteorologists say. Climate researchers work on climate projections for several decades to come. The MiKlip (German acronym of Medium-term Climate Prediction) project operates in-between. The project is funded by the BMBF and coordinated by the Max Planck Institute for Meteorology in Hamburg. Within the framework of this project, about 150 scientists from 25 German institutes work on developing an earth system model for decadal climate prediction. KIT coordinates the work of nine regional modeling groups.

"With one year lead time, we want to make statements as to whether springtime in a region will be rather humid in the next years or whether more winter storms will occur," Professor Dr. Christoph Kottmeier, Head of the Troposphere Research Division of the Institute of Meteorology and Climate Research (IMK-TRO), explains.

For this purpose, scientists feed climate models with data measured in the past decades. Then, they determine agreement of model calculations with the real climate development in the predicted period. In this way, they find out where modifications are required to improve the predictions. "Initial states of the oceans and ice regions in the world play a central role," Kottmeier says. "It is important to acquire them as precisely as possible and to input the corresponding data into the models, if you want to make reliable predictions."

Within the framework of MiKlip, Kottmeier and his team focus on the regionalization of predictions. "We consider all Europe and Africa and in particular central Europe and increasingly resolve the global model. In partial regions, e.g. in the area of Karlsruhe, we go down to a resolution of seven kilometers."

The first funding phase of the project has already been completed. MiKlip 2 started

While individual thunderstorms cannot be predicted, it is possible to predict how conditions will change. (Photo: Christoph Kottmeier)

in November 2015 and is scheduled for a duration of another four years. At the end of the project duration, it is planned to hand the prediction model over to the German Weather Service. Then, regular predictions will be made available to the German public.

MORE INFORMATION:
www.imk-tro.kit.edu/5877_6409.php
www.fona-miklip.de

Cost-benefit Analysis of a Flood Barrier

What if? This was the central question of a coast protection project pursued by scientists of KIT's Institute for Water and River Basin Management (IWG) about ten years ago. The researchers conducted an economic feasibility study and determined whether the damage to be expected after a flood would justify the costs of construction of a flood barrier in the area of the Greifswalder Bodden.

In 2008, Dr. Werner Buck, Dr. Andreas Kron, and Andrea Wetzel of IWG presented their final report which tipped the scales in favor of the construction of the barrier near Greifswald. Commissioning of the barrier in spring this year completed the project as a whole. "When we started the project, we had no solid database as to which damage has to be expected in case of floods with different water levels," Andreas Kron explains. "For this reason, we looked at the buildings potentially affected and had typical buildings inspected by experts to estimate potential damage." The results of this "what if" study can be transferred to similar projects in similar regions, in parts at least.

Data evaluation revealed that the damage prevented in case of a flood by far exceeds the construction and operation costs of the barrier over the postulated operation period of 80 years. For the calculations, floods with different water levels near Greifswald were considered. Probabilities of flood events were determined statistically on the basis of historic data. "When planning flood protection measures, it must be noted that eventually there will be an event, during which the barrier will be overflown and will no longer work," Kron says. To evaluate this remaining risk, the researchers also considered flood scenarios with barrier overflows.

In addition, the researchers considered scenarios for future area use in the flood-endangered area. "We determined building development in the area in case of the construction of the barrier and in case of the barrier not being constructed," Kron

Andreas Kron consults a damage estimation expert. (Photo: IWG)

explains. In their cost-benefit analysis, the KIT engineers focused on the monetary damage in case of a flood. Data on non-monetary damage, i.e. hazards to health and life, were provided by other partners.

MORE INFORMATION:
http://iwk.iwg.kit.edu

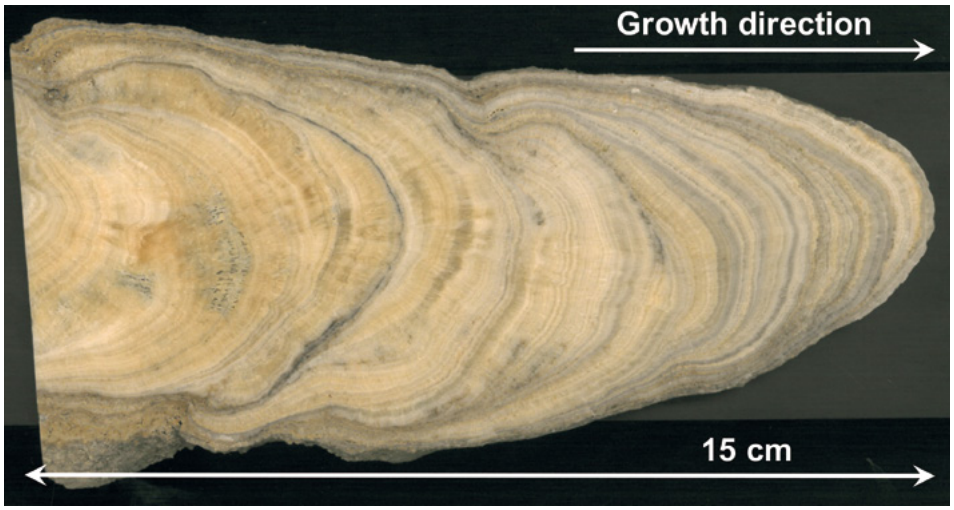
The Memory of Dripstones – Researchers Reconstruct Climate Extremes Using Stalagmites

What does a dripstone in a Franconian cave have in common with a historic manuscript from the Nuremberg archives? From both, information can be derived about the climate of the past. Professor Dr. Thomas Neumann, Dr. Elisabeth Eiche, Philipp Holz, and Arno Hartmann of the Institute of Applied Geosciences (KIT) and researchers of Heidelberg University cooperate in a project to study extreme climate events of the historic past. The cooperation project of one year duration is called CheckExtrema. It started in early 2016 and is funded by the Heidelberg Karlsruhe Research Partnership (HEiKA).

What is it about? Extreme climate events, such as extended droughts or heavy floods leave traces in a society. In the worst case, they can make it collapse or they may strengthen the community. "These interactions are not yet understood sufficiently, also because basic knowledge on the occurrence of extreme climate events is lacking and historic findings are hardly linked with scientific knowledge," Neumann explains. He coordinates the project on the part of KIT.

CheckExtrema wants to close this knowledge gap by using stalagmites, dripstones growing upwards from the ground, as geological climate archives. While growing, their chemical structure changes as a function of environmental conditions. "So far, stalagmites have not been applied as frequently as ice cores or marine sediments," Neumann says. "But they have the big advantage of being datable with a precision of about ten years. Moreover, terrestrial climate archives in the form of dripstones can be found at many places on earth."

Installation of a monitoring station in the zoolite cave by doctoral students Philipp Holz and Arno Hartmann. (Photo: KIT/AGW)



The stalagmite slice reveals individual growth layers with typical growth rates of 10 to 100 µm per year. Visible differences are caused by the drip rate and composition of the dripping water as well as by variable mineral growth and inclusion of particles. (Photo: KIT/AGW)

Scientists compare the results of stalagmite studies with medieval scripts from historical archives, in particular with the minutes of the municipal council of Nuremberg. "Big floods, droughts, or other tragedies in society are reported in these minutes, especially when they ended up in construction activities and financial burdens, an example being the new construction of a bridge after a flood," Neumann says.

First, the scientists have to date the stalagmites. This is done by means of the uranium-thorium method. Via the decay rate of the uranium incorporated in the structure during stalagmite growth, the age of the dripstone can be determined. Last March, Neumann and his team explored the zoolite and devil's caves in Franconian Switzerland and took core samples of stalagmites for age determination. At the same time, they installed systems for continuous measurements of CO_2 concentration in air, air pressure, humidity, temperature, and drip rate.

Having determined the age, the growth rate of the stalagmite is calculated and chemical and isotopic compositions are analyzed precisely. The composition of various oxygen isotopes allows conclusions to be drawn with respect to the amount of precipitation at the time of stalagmite formation. By comparing the results with historical data, the researchers want to find out which stalagmite signatures are related to which extreme events.

"If we can interpret the signatures, we can go back further in time and track down climatic extremes thousands of years ago, at times before the earliest written records," Neumann says.
The CheckExtrema project focuses on two years, 1595 and 1784. For both years, major climate events are known. Upon the eruption of the Laki craters on Iceland in 1783/84, large parts of Europe suffered from cold winters and heavy spring floods, also in Nuremberg.

(Photo: Private)

Dr. Kirsten Hennrich

Dr. Kirsten Hennrich, Head of the Office of the KIT Climate and Environment Center, took over presidency of the EU network "ENERO" (European Network of Environmental Research Organisations) for a period of two years. ENERO is a network of environmental research institutions from thirteen countries. Cooperation is aimed at actively shaping the political environment: "New research issues have to make their way into politics and into the funding programs of the EU," Hennrich says. "In ENERO, we want to work for this." Hennrich plans to link the strategic vision of the network more closely with operative implementation. "I want our ideas to better find their way through EU bureaucracy and to enhance our visibility."

(Photo: Private)

Professor Dr. Christoph Hilgers

In April 2016, Professor Dr. Christoph Hilgers was appointed Head of the Structural Geology and Tectonics Unit of the Institute of Applied Geosciences of KIT. In parallel, Hilgers accepted a W3 professorship for structural geology. "I am highly fascinated by the interdisciplinarity at KIT," Hilgers says, who lectured and conducted research at RWTH Aachen before he came to Karlsruhe. "Engineering and computer sciences are rather important to me." Work of Hilgers concentrates on reservoir geology. "The question of how geothermal water, petroleum, natural gas or chemical substances move in the rock and how energy can be stored underground is largely unanswered. The interdisciplinary approach pursued by KIT offers rather good opportunities to change this situation."

(Photo: Private)

Professor Dr. Stefan Emeis

On March 17, 2016, Professor Dr. Stefan Emeis was granted the Reinhard-Süring plaque by the German Meteorological Society (DMG). DMG honors the long work of the scientist of the Atmospheric Environmental Research Division of the Institute of Meteorology and Climate Research (IMK-IFU) for the scientific exchange of meteorologists: Since 1992, Emeis has played an important role in the further development of the Meteorological Journal (MZ), DMG's publication medium. In addition, he is honored for his work in the DMG committees of Environmental Meteorology and History of Meteorology.

The Meteorological Journal has a long history: It was established as early as in 1866 by the Austrian Meteorological Society (ÖGM). From 1886, it was issued by ÖGM and DMG. This tradition was suspended temporarily in 1945. In 1992, the Meteorological Societies of Germany, Austria, and then also Switzerland, tried a new start. Emeis became the responsible editor of the MZ and accompanied its transition from the traditional way of scientific publishing to a new, internet-based form of publishing. "Initially, the authors submitted their contributions on paper and sent them by ordinary mail," he remembers. "As the editor, I was responsible for organizing the review process, for sending copies of the papers to reviewers, and for making them observe the deadlines."

Today, the review process, of course, takes place via the internet. As for many other journals, the payment mode has changed. "In the 1990s, the readers paid for the issue," Emeis says. "In line with the Open Access policy, the authors now have to pay." Emeis has been working for the MZ to this date. "For some time, I focused on book reviews. But then, I was asked to be the deputy editor and have been editor in chief since 2013."

The Süring plaque of the DMG is named after one of the most important meteorologists of the 20th century. Reinhard Süring also was editor of the MZ in the 1930s and 1940s.

KIT Climate and Environment Center

Scientific Spokesperson:	Professor Dr. Frank Schilling
Deputy Scientific Spokesperson:	Professor Dr. Thomas Leisner
Spokesperson of Topic 1:	**Atmosphere and Climate:** Professor Dr. Thomas Leisner
Spokesperson of Topic 2:	**Water:** Professor Dr.-Ing. Franz Nestmann
Spokesperson of Topic 3:	**Georesources:** Professor Dr. Philipp Blum
Spokesperson of Topic 4:	**Ecosystems:** Professor Dr. Hans Peter Schmid
Spokesperson of Topic 5:	**Urban Systems and Material Flow Management:** Professor Dr. Stefan Emeis
Spokesperson of Topic 6:	**Natural Hazards and Risk Management:** PD Dr. Michael Kunz

Water Power and the Energy Market: Destruction of Green Energy

By Professor Dr.-Ing. Dr. h.c.mult. Franz Nestmann

Water power to store energy - Häusern pumped-storage power plant in the southern Black Forest. (Photo: Schluchseewerk AG)

Water power is the secret star of regenerative energy sources: The mountainous south of Germany in particular provides many opportunities to use rivers and lakes for supplying households and industry with power. More than 7,000 hydropower plants of various sizes exist in Germany. Even when considering strict ecological criteria, many more locations can be found, which are suited for the use of water power to produce electricity. However, our secret star is not paid the attention it deserves. In competition with other environmentally friendly energy sources, such as wind power or photovoltaics, the percentage share of water power in the energy mix has decreased. But that's not all: Many a water power plant, and here I mean pumped-storage power plants, today even destroys energy. Hardly anybody is aware of this fact. How did this unacceptable situation develop? And what can be done against it?

For thousands of years, man has used water power. This always proved to be rather advantageous, because water mostly is available in sufficient and constant amount, in our part of the world at least. And due to its high density, it potentially is very rich in energy: A height of fall of 10 m and a flow rate of 1 m³/s results in 1000 kWh of power within a period of twelve hours. The same potential, but associated with severe impacts on the environment, is reached by 123 kg of hard coal, 70 l of petroleum, or 0.5 m³ of firewood.

Thanks to this high efficiency, water power significantly shaped the territory of Germany and Central Europe in the past. Mill creeks and mills were characteristic elements of hydropower use in mountain valleys. In the late 19th century, water power was increasingly applied to produce electricity. Big water power plants were developed and built. Engineers constantly improved weir systems and dams of high mountain reservoirs and river power plants. Turbines were further developed and optimized. Today, the best suited high-performance paddle wheel can be designed for any purpose on the computer. Thanks to this progress, no other regenerative energy source can compete with water power in terms of efficiency.

In the past decades, water power plants and in particular pumped-storage power plants largely contributed to the stability of our energy system by producing and storing electricity. The demand for energy is known to fluctuate considerably in the course of the day. Pumped-storage power plants can compensate these fluctuations very well. In times of low demand, these power plants have the big advantage that their generators can reverse operations within about half a minute. Instead of being driven by water for electricity production, connected motors extract electric power from the grid and pump the water uphill – energy is stored in the lake or reservoir.

The advantages of this extremely rapid switchability of pumped-storage power plants from the "generator" mode into the "pump" mode are manifold: Water is an extremely efficient energy storage system – no battery could compete with a water reservoir until today. Pumped-storage power plants are ideally suited for meeting peak demands. In addition, they can reliably balance frequency fluctuations in case of blackouts in interconnected grids. This is very important to our European integrated grid, where the grid frequency is to deviate from the 50 Hertz standard by about 0.05 Hertz only.

And still: The European electricity market and the energy market in general has reversed all these advantages of pumped-storage power plants. Due to the numerous competing suppliers on the market, it is no longer possible to plan in the long term who is to cover the peaks and where and when energy has to be stored with the help of e.g. pumped-storage power plants. Prices of electricity are extremely volatile. It may even happen that two electricity suppliers use the same pumped-storage power plant for different purposes. One utility company makes the turbines run in the generator mode, whereas the other company operating the power plant uses another downpipe to pump water uphill. In this way, green energy is destroyed efficiently.

But what can be done? I am afraid that a short-term solution is not in sight. Politics is called upon to ensure stability on the market in the long term, a market, where realistic prices for energy can be enforced. We need a policy to prevent cheapskates from increasing energy destruction, to make ecologically reasonable energy production methods profitable, to use them efficiently and jointly, and to increase attractiveness for investors. Science is required to provide design criteria for water power plants, which do not only consider technical efficiency, but also ecological and environmental requirements. If this will not be done, the environment and future generations will pay the price.

Outstanding Doctoral, Master's, and Diploma Theses

At the annual conference of the KIT Climate and Environment Center on July 25, the winners of the 36th 2015 Sparkasse Environmental Award were honored. The award donated by the Environment Foundation of Sparkasse Karlsruhe and Karlsruhe Institute of Technology went to Natascha Savic (influence of biodiesel fuel compositions on the morphology and microstructure of diesel soot particles), Matthias Leschok (mycelium-responsive architecture), and Laure Cuny (transport of nanoparticles in water-saturated porous media – influence of refractory organic matter and visualization by magnetic resonance imaging (MRI)) in the category of diploma and master's theses as well as to Dr.-Ing. Georg Lieser (synthesis and characterization of lithium metal fluorides as positive electrode materials for lithium-ion batteries) and Dr.-Ing. Stephan Hilgert (analysis of the spatial-temporal heterogeneity of methane emissions from reservoirs with the help of correlation of hydroacoustic and sediment parameters) in the category of doctoral theses.

From the left: Dr. Karl-Friedrich Ziegahn (KIT), Dr. Eva Lohse (German Association of Cities and Towns), and Professor Frank Schilling (KIT) at the KIT Environment Lecture. (Photo: A. Drollinger)

Urban Solutions for Global Challenges

On the occasion of the annual KIT Environment Lecture on July 12 at Karlsruhe Palace, Dr. Eva Lohse, President of the German Association of Cities and Towns, spoke about the contribution of German cities to the Habitat III Conference of the United Nations. Dr. Eva Lohse pointed out that global challenges cannot be mastered without the cities: "In the future, cities will continue to be places of knowledge, creativity, production, and integration and, hence, they will continue to drive economic and social development." Her lecture provided insight into the work of the German Association of Cities and Towns. It represents the interests of its members not only on the federal and state, but also on the international levels. Lohse described what urban solutions for global challenges might be like.

The winners of the 2015 Sparkasse Environmental Award (front row, from the left) Georg Lieser, Stephan Hilgert, Laure Cuny, Matthias Leschok, Natascha Savic, and (second row, from the left) Oliver Kraft (KIT), Michael Huber (Sparkasse Karlsruhe Ettlingen), Michael Hoffmann (KIT), Thomas Leisner (KIT), Klaus Stapf (City of Karlsruhe), (third row, from the left) Markus Delay, Petra von Both, Harald Horn, Harald Saathoff (all KIT), (rear) Stephan Fuchs (KIT). (Photo: A. Drollinger)

Symposium on the Perception and Evaluation of Soils by Society

Without soils, no terrestrial life is possible. To emphasize the significance of soils, KIT, together with the German Soil Science Society, organized a symposium and workshop on October 6 and 7, 2016. The related topics were discussed and ideas and new initiatives were developed. The event was aimed at helping soil receive the due attention of our society.

6th REKLIM Regional Conference on October 05, 2016, in Karlsruhe

From fundamentals to adaptation: The "Regional Climate Changes" (REKLIM) research alliance of the Helmholtz Association organized the sixth regional conference in Karlsruhe this year. Presentations and the panel discussion focused on the topics of "Challenges of Climate Modeling" and "Extreme Events."

GRACE Goes into Extra Time

The KIT Climate and Environment Center and the GRACE staff have every reason to be pleased: In July, it was officially announced that the graduate school will be funded for another five years by the Helmholtz Association (HGF). "Of course, this is very positive for us," Andreas Schenk, scientific coordinator of the graduate school, says. "We do not consider extended funding a delayed expiry, but a mandate for us to establish GRACE in the long term at KIT and to acquire new sources of funding."

For this purpose, the goals of the graduate school are planned to be refocused in the next weeks. "Internationalization of doctoral students will certainly remain a central element of GRACE. Our technical courses and summer schools will remain, as they provide doctoral students with the opportunity to think outside of the box and to network in the international research community." Schenk regrets, however, that the limited resources will not allow for granting any more full scholarships.

In the coming funding phase, the graduate school will be financed largely from built-up reserves. "Prudent budget management in the past years now pays off," Schenk says. "We will be able to support doctoral students for another five years." HGF will provide additional funds in particular for supporting the international mobility of doctoral researchers.

Internationality has long become daily reality in GRACE, which is also reflected by this year's summer school on "Water, Energy, & Environment." It was initiated mainly by Professor Dr.-Ing. Franz Nestmann of the Institute for Water and River Basin Management and, for the first time, organized in cooperation with IUCES, the International University Consortium in Earth Science.

The consortium of eleven universities from seven countries established in 2012 wants to strengthen international cooperation in earth, hydrological, and environmental sciences. Six representatives of the China University of Geosciences (CUG), Wuhan, took part in the summer school under this cooperation. IUCES-related activities are coordinated by Professor Dr. Nico Goldscheider of the KIT Institute of Applied Geosciences.

MORE INFORMATION:
www.grace.kit.edu/english
www.iuces.com/indexone.shtml

Forest Fires: Climate Change Is One Cause Only

The question of whether climate change causes an increasing abundance and larger extent of forest and savannah fires is being discussed controversially after recent fires in Canada. Scientists of KIT, the University of Lund in Sweden, as well as of the National Research Center for Atmospheric Research in Colorado (USA) recently proved, however, that the influence of demographic development on fires in ecosystems is just as strong. In May, they presented their results in the journal "nature climate change." Almut Arneth, Professor of the Atmospheric Environmental Research Division of KIT's Institute of Meteorology and Climate Research and her colleagues carried out a global model study to analyze the impacts of factors, such as climate change, vegetation growth, and man, on fires. They found that the effects of climate change are weakened in models considering demographic factors. Arneth: "This is due to the fact that man largely suppresses wildfires. With increasing population density, the number of spreading fires decreases." This mainly applies to Africa and parts of Asia and South America. In regions suffering from rural depopulation, the number of fires increases.

According to Arneth, however, this does not mean that the risk of fires for man will decrease in the future: In settlements built in fire-susceptible regions, for instance, the risk of suffering damage due to fire is rising with increasing population density. The results of the study may contribute to improving fire management strategies.

The number of forest fires often decreases with increasing population density. (Photo: Dreamstime)

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