

## CCES News 6

Important skills and know-how in the formulation, implementation, and management of large scale research projects have been developed by the 17 CCES research projects during the first phase that started in 2006. Within the ETH Domain, research consortia were formed that produced results of high scientific quality and societal relevance. CCES is therefore entering its second phase with optimism. Mostly building on research conducted during the first phase, a number of new projects will start in 2012. In addition, synthesis efforts of some projects of the first phase will produce results and insights of particular relevance for stakeholders outside the scientific community.

### News from the CCES office

#### CCES supports synthesis projects

Inter-, multi-, and transdisciplinary research is particularly demanding concerning project coordination, management, and integration as well as with respect to the interactions among project partners and with stakeholders outside the project. To support specific synthesis efforts, e.g. the provision of additional multidisciplinary analysis or interdisciplinary publications by project partners from different fields, and for the preparation of specific materials or the implementation of particular events for stakeholders outside the scientific community, additional synthesis funding has been approved by the CCES Steering Board in August 2011 to the five projects BigLink, ADAPT, MOUNTLAND, MAIOLICA, and GeneReach (a merger of the ENHANCE and the BioChange).

#### Report 'Energiezukunft Schweiz'



The conversion of the energy system is a crucial step towards a low-carbon society and decisive to achieve CO<sub>2</sub>-reduction objectives within the

scope of the future climate policy. In a public event at ETH Zurich, co-organized by CCES, on September 2, 2011, most recent developments in energy research were presented and challenges and scenarios for energy policy actions were discussed (see [www.cces.ethz.ch/energiegespraech](http://www.cces.ethz.ch/energiegespraech)). The report providing the scientific background and the underlying assumptions on the energy scenarios presented at that event are available now at [www.cces.ethz.ch/energiegespraech/Energiezukunft\\_Schweiz\\_20111115.pdf](http://www.cces.ethz.ch/energiegespraech/Energiezukunft_Schweiz_20111115.pdf).

### Scientific Events

#### Symposium on deep geothermal energy at the 9th Swiss geoscience meeting, 2011

The annual Swiss Geoscience Meeting 2011 was held November 11 to 13, 2011 at ETH Zurich. Convened by participants of the CCES project GEOTHERM, one of the sessions of this meeting was devoted to the topic of deep geothermal energy. In a structured series of short talks, a group of active researchers, policymakers, and industrial practitioners discussed the scientific principles and practical challenges for utilizing deep geothermal energy and its potential for electricity generation in Switzerland.

Although the session focused primarily on earth science questions, it also touched on the economic, engineering, and societal opportunities and risks. Invited talks for a more general audience were complemented by an open poster session, presenting results from current research. The complete program and the collected abstracts of this session can be found under [www.cces.ethz.ch/projects/nature/geotherm/meetings/Deep\\_Geothermal\\_Energy\\_Session\\_SGM-2011](http://www.cces.ethz.ch/projects/nature/geotherm/meetings/Deep_Geothermal_Energy_Session_SGM-2011).

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 The event was organized as part of the GEOTHERM project:  
[www.cces.ethz.ch/projects/nature/geotherm](http://www.cces.ethz.ch/projects/nature/geotherm)

### International Workshop 'Small Scale Radiocarbon Analysis'

An international meeting on small-scale and compound-specific radiocarbon ( $^{14}\text{C}$ ) analysis took place at ETH Zurich from September 13 to 16, 2011. New developments in accelerator mass spectrometry and in sample separation techniques have allowed to reduce sample sizes required for  $^{14}\text{C}$  analysis to a few micrograms carbon, and to analyze individual organic compounds extracted from complex matrices such as soils and sediments. These developments are opening new opportunities for the use of  $^{14}\text{C}$  in carbon cycle studies, soil sciences and paleoclimatology. The main goal of the workshop was to share existing knowledge and perspectives from different radiocarbon laboratories and scientific fields, and to discuss the state of the art and future analytical developments and applications. Further information is available at [www.ams.ethz.ch/workshop](http://www.ams.ethz.ch/workshop).

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The event was organized as part of the BigLink project:  
[www.cces.ethz.ch/projects/clench/BigLink](http://www.cces.ethz.ch/projects/clench/BigLink)

### Outreach

#### Climpol: Final public event of two transdisciplinary case studies

More than 60 people met on August 16, 2011 in Speicher (Canton of Appenzell Ausserrhoden) for a final discussion event about the results of the two transdisciplinary case studies (tdCS) within the ClimPol project, one addressing the energy strategies for the small rural municipality of Urnäsch, and the other one the energy concept of the whole canton. Three presentations by local experts followed, focusing on results from follow-up projects.



The mayor of Speicher, Peter Langenauer, welcomes more than 60 participants from the entire Canton to the event.  
Photo: M. Stauffacher, ETH Zurich

In the final panel discussion, the mayor of Urnäsch, Stefan Frischknecht, disclosed one concrete outcome of the first tdCS: Urnäsch introduces the «Energierstadt» label.

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The event was organized as part of the ClimPol project:  
[www.cces.ethz.ch/projects/clench/CLIMPOL](http://www.cces.ethz.ch/projects/clench/CLIMPOL)

### Education

#### Second edition of the CCES Winter School 'Science Meets Practice'

The second CCES Winter School 'Science meets practice' took place in January and February 2012. It was attended by a highly active and (self-)critical group of 25 PhD candidates and post-docs from Swiss and German research institutions. The CCES Winter School offers theoretical insights into interactions between science and practice, room for reflection outside the normal PhD working environment, and test fields for experiencing and implementing methods for an enhanced dialogue beyond the scientific community by real stakeholder meetings.



Participants and lecturers of the second CCES Winter School in Männedorf, near Zurich. Photo: C. Zingerli, CCES

The dense and intensive program was run at Boldern, Männedorf near Zurich by a team of experienced and cross-referencing lecturers who provided food for thought and supported the participants during individual and group exercises as well as during the implementation of real stakeholder meetings on the energy topic.

The participants carried out a stakeholder consultation about energy scenarios (organized as an exploration course) and organized a collaborative stakeholder workshop focusing on the energy strategy of a community like Männedorf.

In order to communicate with the public at large, the participants also generated information products that can be accessed via the CCES website ([www.cces.ethz.ch/winterschool](http://www.cces.ethz.ch/winterschool)). In line with the successful first edition, the feedback of the second CCES Winter School reveals that there is a strong demand for and benefit from this kind of methodological and transferrable skills course. CCES is therefore planning to offer the Winter School again in 2013.

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Photos: C. Zingerli, CCES

## Research

### Understanding groundwater formation dynamics as a prerequisite to safeguard future drinking water supply

Alterations in the amount and the distribution of rainfall such as more extreme events and longer periods of droughts and, consequently, in the levels of surface- and groundwater reservoirs, are among the anticipated effects of man-made climate change. Therefore, understanding the interactions of hydrological processes is a necessary prerequisite for the development of strategies and measures for the successful mitigation and adaptation to the adverse effects of anthropogenic climate change.

In the CCES-funded multi-disciplinary RECORD-project, we investigated coupled hydrological and ecological dynamics in a channelized and restored river section of the River Thur in the northeastern part of Switzerland with physical, chemical, and biological experiments as well as modeling. Among many other research results, it was shown that bank filtration is a spatially and temporally varying process. Shortest travel times of freshly infiltrated river water were measured in the restored river sections where natural banks and a pronounced river bed morphology exist. This causes a potential conflict with the drinking water production in the groundwater wells nearby, since Swiss law states that the water has to be in the subsurface for more than ten days before it can be pumped for drinking water purposes. Due to the fact that it is difficult and labor intensive to measure the travel times of infiltrated river-water in the subsurface for different hydraulic conditions, it is prohibited to revitalize river sections

in Switzerland when drinking water production wells are in the vicinity of river corridors.

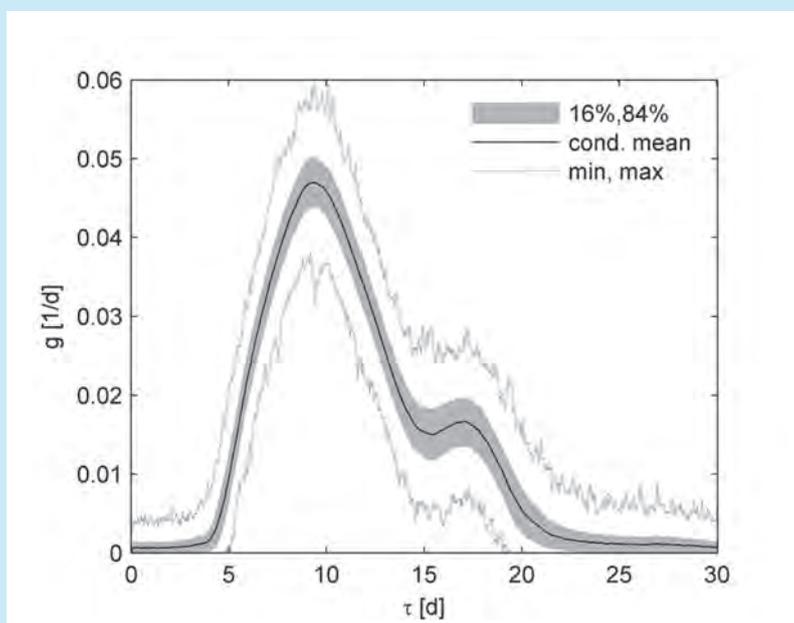
We developed methods to calculate travel-time distributions of infiltrated river-water in the groundwater (between the river and adjacent groundwater wells) by analyzing time series of natural tracers, namely electrical conductivity and temperature, over longer periods of time. Furthermore, we are able to estimate the mixing ratios in the water production wells. Thus, time series of natural tracers greatly simplify the work that was done earlier, using artificial color or salt tracer tests for many different hydraulic conditions to obtain the same information.

Keeping in mind that about 25 to 30% of the drinking water in Switzerland is obtained from riverbank filtration, our method will help to conveniently predict the vulnerability of drinking water production in the wells close to the rivers. Thus, it will assist in the assessment of the reliability of the water supply and help to make decisions for upgrading the drinking water treatment system as well as for extending enhanced wastewater treatment, particularly in areas where a considerable portion of river water is treated wastewater. Overall, the method shall provide the water managers with a scientific basis for a sustainable management of riverbank filtration systems.

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The event was organized as part of the RECORD project: [www.cces.ethz.ch/projects/nature/Record](http://www.cces.ethz.ch/projects/nature/Record)



Travel-time distribution in days between the River Thur and a drinking water production well in the river corridor over the course of one year also showing the uncertainties.

Source: Eawag, T. Vogt, 2011