

# C2SM-NEWSLETTER

Center for Climate Systems Modeling  
No. 1, March 2010

## A Spotlight on the Center for Climate Systems Modeling

*Christoph Schär – C2SM chairman*

You are reading the first newsletter of the Center for Climate Systems Modeling (C2SM). The prime goal of this center is to increase our understanding and sharpen our predictive capability of climate variations and changes on a wide range of time scales. The center is motivated by the recent development and use of climate models, which have rapidly grown in societal importance, computational complexity and scientific rigor. This development has been most remarkable.

I recently stumbled over an old paper from Syukuro Manabe. It was published in 1969 and presents the first atmospheric model with an interactive representation of the hydrological cycle. Earlier models used prescribed distributions of relative humidity, while Manabe represented the key elements of the hydrological cycle, including water vapor, snow and soil moisture in an interactive fashion (but still prescribed the distribution of clouds).

From today's perspective, the model was of outstanding simplicity: it had a coarse horizontal resolution of about 500 km, and it employed three idealized rectangular continents with a size of 60° longitude x 135° latitude. Despite this idealized setting, the paper concluded that the distribution of simulated precipitation was in "excellent qualitative agreement with observations." We may smile at this sentence today, but back then the paper was a major scientific breakthrough. Some of Manabe's ideas are still used in today's climate models, albeit in an improved fashion. >> [page 2](#)



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If numerical simulation is nowadays increasingly seen as a third methodological pillar of the natural sciences (the first two being theory and experiment / observation), papers like the one by Manabe have paved the way.

As part of this development, climate models also exhibit a rapidly increasing level of interdisciplinarity. Today, they represent the atmospheric, hydrological, oceanographic, cryospheric, terrestrial and even extraterrestrial components of our environment. At the same time, they rely on governing principles and techniques from a rapidly growing set of disciplines, including mathematics, physics, chemistry, biology, information technology, computational sciences and even economy. Climate models can thus be seen as ideal interdisciplinary tools, as they force us to define the interfaces between different components and processes, to understand the interactions relevant for the whole system, to accurately represent this multi-scale and multi-component system in a computer language, and to validate and further improve these systems using observations from our environment.

The development of climate models has also been intimately tied to the computer revolution. When I was a PhD student, I used many months of computing time on one of the first supercomputers. It occupied a large computer hall at the ETH Rechenzentrum, and required a cellar underneath to house its cooling equipment. Today, all laptop computers that you can find on the market have more computational power than the supercomputers from 30 years ago. The rapid progress in this area is still ongoing, and the increasing technical complexity of high-performance computing architectures continues to represent a major challenge.

Last but not least, climate models have matured from pure curiosity-driven scientific tools to decisive elements in the debate about climate change and sustainable development. Indeed, climate models have become key drivers in this debate about one of the most pressing societal and economic issues currently facing humankind. The provision of accurate projections of future climates, water resources and extreme events at all relevant scales, together with an assessment in terms of economic, societal and environmental impacts, is becoming crucial for our society.

It is my firm belief that the past development will continue. In another 40 years we will look back at today's models, and will be stunned as when studying Manabe's paper today. The width of our community will continue to grow, and many more scientific fields will become involved – in

one of the most fascinating objects of science, and one of the most daring challenges of our time.

I am also convinced that an organization like C2SM is urgently needed: to help us confronting these challenges, to further and coordinate the future development and use of these models, to run the next-generation models efficiently on the next-generation supercomputer architectures, to establish an interdisciplinary community with the relevant expertise, and to reach out to governmental agencies and to the public.

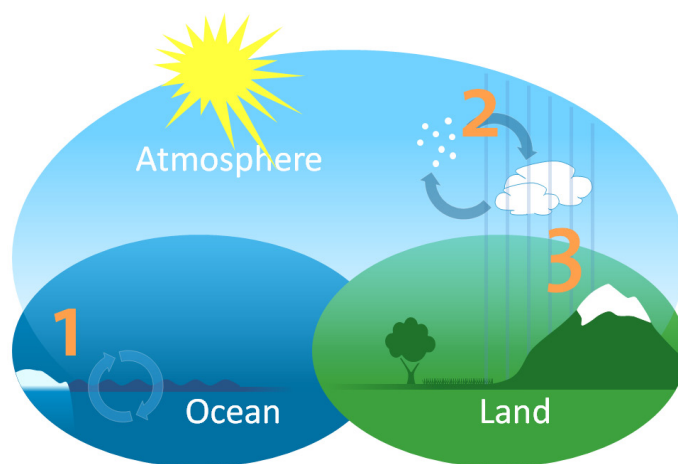
» [www.c2sm.ethz.ch](http://www.c2sm.ethz.ch)

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## C2SM – Current status

**As of 1 February 2010, C2SM is fully staffed with four PhD students, three scientific programmers and one executive director.**

While the executive director oversees the overall development of the Center and keeps a close interaction with the Steering Committee, the PhD students and the scientific programmers focus on specific research and development projects.



Research projects of PhD students funded by C2SM: (1) Oceanic CO<sub>2</sub> uptake and stabilizing atmospheric CO<sub>2</sub>, (2) Chemistry-aerosol-cloud interactions, (3) Cloud-resolving climate simulations.

The PhD students concentrate on projects which aim at improving the understanding of the climate system in a broad sense. Their research deal with the role of small eddies on the oceanic CO<sub>2</sub> uptake, chemistry-aerosol-cloud interactions, and the development of cloud-resolving climate simulations. >> [page 3](#)

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The three scientific programmers focus on specific areas, which are global and regional climate modeling and the analysis of climate datasets. They work in particular towards facilitating the refinement of a hierarchy of climate models and the collection, management, and dissemination of climate datasets within the C2SM community and to the public. (ib)

» [www.c2sm.ethz.ch/people](http://www.c2sm.ethz.ch/people)

## “Climate Knowledge and Innovation Community”

**A new international program offers an excellent opportunity to turn research knowledge into innovative products addressing the various challenges of climate change.**

A pan-European consortium of sixteen partners, including ETH Zurich has won the bid for a research, innovation and education initiative of the European Institute of Innovation and Technology (EIT).

With €120 million requested from the EIT, the partners themselves planned to contribute roughly five times that amount so that eventually a total of up to €750 million will be spent over the next four years on a range of innovation and education programs.

The “Climate Knowledge and Innovation Community” (Climate-KIC) will foster interactions between European research, education and business innovation. The aim is to create a generation of climate change entrepreneurs with multidisciplinary skills to address climate adaptation and mitigation. These entrepreneurs will develop sustainable approaches to coping with climate change, accounting for economic, environmental and social components.

The program will focus on four themes:

- Assessing climate change and managing its drivers
- Transitioning to resilient low carbon cities
- Adaptive water management
- Zero carbon production systems.

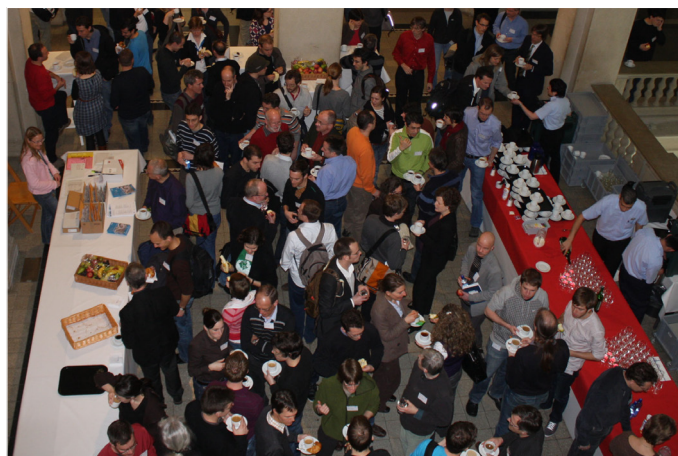
“The actual work is still ahead of us”, said C2SM co-chairman Professor Nicolas Gruber (leader of the proposal development at ETH Zurich and member of the interim executive committee) at an information event early February. The call for first projects will start in April 2010. (tc)

» [www.climate-kic-proposal.org](http://www.climate-kic-proposal.org)

## Swiss Climate Scenarios CH2011

**The “Swiss Climate Scenarios CH2011” initiative will provide updated climate scenarios for Switzerland. The final release is planned for early 2011, an intermediate product can be expected in April 2010.**

Over the last decade, climate change scenarios have become of prime interest, mainly to conduct impact studies and to tackle climate adaptation. A large community, ranging from governmental bodies to the economic sector, needs to rely on scientifically sound climate change scenarios. The scenarios currently available at scales relevant for Switzerland need to be updated and extended. This will be done in the “Swiss Climate Scenarios CH2011” initiative developed under the auspices of ETH Zürich, MeteoSwiss, Agroscope Reckenholz Tänikon, OcCC, NCCR-Climatic, and C2SM.



Social networking was an integrative part of the Climate Change Workshop.

A first milestone for the CH2011 initiative was the “Climate Change Scenario Workshop” held in Zurich on 2 March. About 200 individuals attended the workshop, illustrating the strong interest in climate scenarios. A major objective of this one-day event was to discuss the scientific methods for developing climate scenarios. International speakers also shared their experiences with similar initiatives in other European countries. Finally, the Swiss Climate Scenarios CH2011 initiative was presented in detail.

More information about the new initiative can be found on our homepage. (ib, tc)

» [www.c2sm.ethz.ch/news/scen\\_workshop/presentations](http://www.c2sm.ethz.ch/news/scen_workshop/presentations)  
» [www.c2sm.ethz.ch/services/CH2011](http://www.c2sm.ethz.ch/services/CH2011)

# Agenda

## Monday Seminars – Climate & Environmental Physics

March – May 2010 (Mondays)

University Bern, Sidlerstrasse 5, Bern

» [www.climate.unibe.ch/?L1=courses&L2=seminar](http://www.climate.unibe.ch/?L1=courses&L2=seminar)

## Kolloquium – IAC ETH Zurich

March - May 2010 (Mondays)

ETH Zentrum, Universitätstrasse 6, Zürich

» [www.iac.ethz.ch/events/?type=a](http://www.iac.ethz.ch/events/?type=a)

## „Klimawelt 2010“ – Messe

Friday – Sunday, 9 – 11 April 2010

Hauptbahnhof, Haupthalle, Zürich

» [www.klimawelt2010zuerich.messe.ag](http://www.klimawelt2010zuerich.messe.ag)

## 11th Swiss Global Change Day

Tuesday, 20 April 2010

Freies Gymnasium, Beaulieustr. 55, Bern

» [www.proclim.ch/sgcd.html](http://www.proclim.ch/sgcd.html)

## 18th International Symposium „Transport and Air Pollution“

Tuesday/Wednesday, 18 - 19 May 2010

Empa, Ueberlandstrasse 129, Dübendorf

» [www.empa.ch/tap2010](http://www.empa.ch/tap2010)

## International Disaster and Risk Conference 2010

Sunday - Thursday, 30 May - 3 June 2010

Davos

» [www.davos2010.org](http://www.davos2010.org)

## ACP Symposium 2010

Tuesday - Thursday, 8 – 10 June 2010

Hotel Interlaken, Höhweg 74, Interlaken

» [acp.scnat.ch/e/news/events/2010/venue](http://acp.scnat.ch/e/news/events/2010/venue)

## Updates & Further events

» [www.c2sm.ethz.ch/news](http://www.c2sm.ethz.ch/news)

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Materials Science & Technology