

Rosby Centre Newsletter

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The Rosby Centre is the regional climate modelling research unit of the Swedish Meteorological and Hydrological Institute, SMHI. This Newsletter aims to provide useful

information to stakeholders on climate change research and results of the Rosby Centre. This newsletter is published 2-4 times a year.

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1. Report from the BACC Conference in Göteborg – BALTEX Assessment of Climate Change for the Baltic Sea basin

Some 100 participants were on hand in Göteborg in May when the main findings from the BACC Project were presented. These findings summarize currently available knowledge concerning observed climate change, future climate change, and effects on terrestrial, marine and freshwater ecosystems in the Baltic Sea basin. The conference concluded with a panel discussion between leading climate researchers, politicians and journalists. They discussed issues of climate change related to the Baltic Sea basin and means to improve the dialogue between scientists, decision makers and the general public.

The BACC Project is a joint venture of the BALTEX (Baltic Sea Experiment) Program and HELCOM (Baltic Marine Environment Protection Commission), and as such serves as a dialogue between the scientific community and environmental policy makers. The findings will be published in detail in a book to be released by Springer in late 2006 or early 2007. More than 80 co-authors from 12 countries have contributed on a voluntary basis. More detail on BACC can be found at www.gkss.de/BACC.

An excerpt from the BACC Conference press release

The climate in the Baltic Sea basin has changed during the past century, and current research shows that the area will likely continue to get warmer. In the past century there has been a marked increase of temperature of more than 0.7°C, with consequences such as shorter ice seasons. This is larger than the global mean temperature increase of 0.5°C. No robust link to an anthropogenic warming and the increased levels of greenhouse gases on regional scales has been established, although it is plausible that at least part of the recent warming in the Baltic Sea basin is related to the steadily increasing atmospheric concentrations of greenhouse gases.

The observed changes in temperature in the past have been associated with consistent changes in terrestrial ecosystems, such as earlier spring phenological phases, northward species shifts and increased growth and vigour of vegetation. These trends are expected to continue into the future. ... For the water body of the Baltic Sea, a tendency towards lower salinity could be expected, which is thought to have a major influence on Baltic Sea fauna.

2. Report from the CE-meeting in Reykjavik

A European Conference on Impacts of Climate Change on Renewable Energy Sources, in Reykjavik 5-9 June 2006, ended the Nordic research project on Climate and Energy. The

objective of the project is a comprehensive assessment of the impacts of climate change on renewable energy sources in the Nordic countries, the Baltic States and Northwest

Russia. Specifically, the project is aimed at showing how the various energy sources can interact in a changing society during the next several decades.

At the conference around 50 presentations were made about climate scenarios, snow and glaciers, wind energy, hydrological models,

statistical analysis, renewable energy sources and impact studies, and energy systems. The participants were from twelve countries although predominantly from the Nordic countries. More information can be found at www.os.is/eurenew2006/

3. Support to the Commission on Climate and Vulnerability

The Commission on Climate and Vulnerability (Klimat- och sårbarhetsutredningen) has been appointed by the Swedish Government to survey the society's vulnerability to climate change and investigate the ability to adapt. The areas of special interest are infrastructure (roads, railways, telecommunication etc), housing, energy and water resources, the agricultural sector and forestry, human health as well as biological variety. The mark-setting bases for the work are global climate scenarios from IPCC and the regional climate modelling at Rosby Centre. The Commission has established working groups with representatives from authorities at different levels and representatives from business sectors, scientific institutions as well as different organisations.

Rosby Centre has been asked to deliver a vast amount of material, describing projected changes in climate on the Scandinavian and

European scale. Discussions on the desired material were held with the working groups and finalized in April. Since then more than 2000 maps have been produced and delivered. Additional studies are needed to fulfil the needs of the working groups and will be performed during autumn 2006.

The material produced at the Research Department at SMHI for the working groups of the Commission will be presented in a workshop 22 August at SMHI arranged in cooperation between SMHI and the Commission. The programme includes short presentations and an "exhibition" session concluding with a discussion. The arrangement is open but mainly directed to the participants in the working groups and will be in Swedish. The programme (in Swedish) is found at www.smhi.se/sgn0106/if/rc/program_060822.pdf

4. The Rosby Centre Day on 4 October

The Rosby Centre Day 2006 will be devoted to the IPCC working process. This is very timely as the next IPCC major assessment is expected to be released in 2007. IPCC is often mentioned in the public debate but its history, working process and comprehensive reports

are seldom presented. Presentations from persons involved in the IPCC process will be made. So far, invitations have been accepted by Jens Hesselbjerg Christensen, Rik Leemans, Bert Bolin and Marianne Lilliesköld.

5. A planning Workshop on the next generation of Swedish climate and climate impact studies

The Foundation for Strategic Environmental Research, Mistra (www.mistra.org), has recently initiated a discussion on a Swedish research programme on the next generation of climate and climate impact studies, building on the previous Swedish regional climate modelling programme (SWECLIM) in 1996-2003. A few key concepts are Earth System Modelling, Integrated Assessment Modelling as well as Adaptation and Mitigation Strategies.

We foresee a role for physical climate system studies, carbon cycle and ecosystem science, supercomputing expertise, a wide range of impact research, economical valuation of climate impacts and possible adaptation and mitigation measures as well as an active user involvement and outreach components. The foreseen programme will be global in its scope,

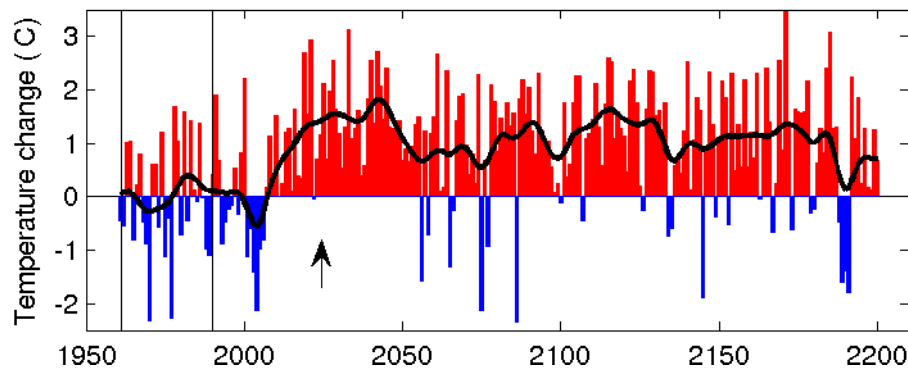
although a special attention will be given to Northern Europe and some other regions of the world, e.g. Africa.

A Workshop, commissioned by Mistra, will be held on 24-25 August with the purpose to lay the ground for further planning of the new Swedish climate modelling research programme. Invitations to participate in the workshop have been sent to representatives from different sectors in society as well as researchers. European expertises from climate research centres have been invited to contribute with their knowledge and experience of similar research efforts. The workshop is organized by Rosby Centre and MISU (the Department of Meteorology at Stockholm University). For those interested in contributing to the workshop please contact Rosby.data@smhi.se

6. Stabilisation experiment

The CCSM3 global climate model simulation and the regionalisation with RCA have been completed for the stabilisation experiment (see RC newsletter No 3, 2005). Analysis of the results is in progress and the findings will be presented in a report later this year. As an example we present here the evolution of the average annual temperature over Sweden. There is a clear positive trend as long as CO₂

increases. After the CO₂ stabilisation occurs, the temperature rise levels out. The new average temperature is about 1 degree warmer than the control period 1960-1991. The variability at annual and longer timescales remains large, but in the future simulation, it occurs around the generally warmer climate under the higher CO₂ concentration.



2m annual average temperature over Sweden relative to the 1961-1990 period with the black line showing 10-year running mean. The arrow marks the year when the equivalent CO₂ concentration reaches 450 ppm after which it is held constant.

7. Modelling the Arctic

Within the EU project DAMOCLES, RC has continued the development of RCA, RCO and the coupled version RCAO in an Arctic model domain. Atmosphere and ocean components in standalone mode can now be run stably for decades (up to 45 years), while the coupled version has been run for 15-year periods. Sensitivity experiments cover the effects of sea ice parameters and heat flux formulations. An envisaged medium-term goal is to perform 40-year long coupled experiments. These would enable comparative studies on different climate periods and allow for predictability tests. The possibility for the latter has been demonstrated with two 15-year long coupled runs with slightly

different initial conditions but otherwise identical setups.

A distinctly different year-to-year variability in sea ice extent indicates an important role of internal Arctic feedback mechanisms. Strong feedbacks have also been found when varying the atmospheric long wave downward radiation. The system responds with large trends in the Arctic sea ice extent which cannot be caused by the triggering radiation changes only.

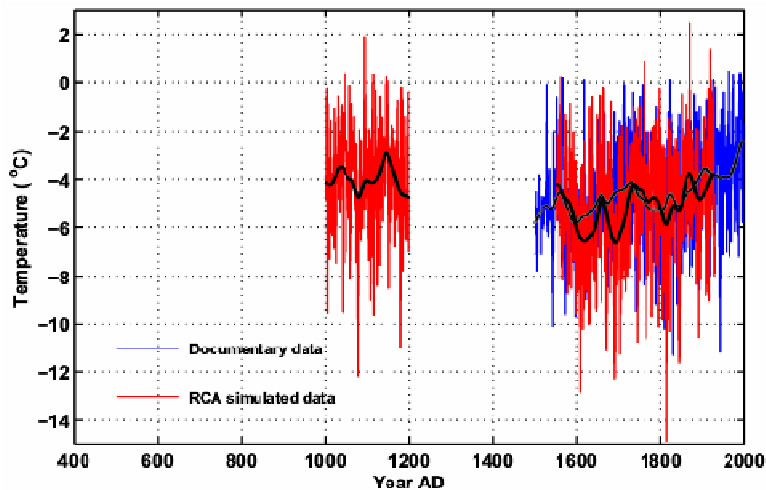
Regional feedbacks involving clouds cover play a role. Forthcoming experiments will focus on developing the capability for longer stable coupled model simulations.

8. Scandinavia millennium climate

The Rossby Centre has participated in a study on the past 1000 years of the regional climate together with Stockholm University (see Newsletter No 2 and 3, 2005). The project has been a combination of climate modelling and climate reconstructions based on observed and proxy climate data. The new version of the Rossby Centre regional climate model, RCA3, has been used to downscale 600 years, divided over three time periods of a 1000 year-simulation with the ECHO-G global climate model. These periods cover a relatively warm period earlier during the past millennium and a cold period in the middle centuries, followed by a warming starting in the 19th century (see

figure). RCA3 has also been evaluated against observations that are available for the early 20th century, the regional simulation showing considerable improvement compared to the global one. The overall simulation has been compared to meteorological observations for the last centuries and to different proxy records.

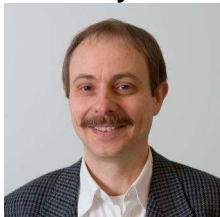
Recently, a final report summarizing the study has been written and a preliminary version submitted to SKB (Swedish Nuclear Fuel and Waste Management Co) who commissioned the study.



Reconstructed and simulated temperature climate for Tallinn, Estonia. The reconstruction builds on ice break-up data from Tallinn Harbour.

The figure was produced by Anders Moberg at Stockholm University.

9. Rossby Centre Staff news



Markus Meier, research oceanographer at the Rossby Centre since 1997, has been appointed Head of the Oceanographic Research Unit at the SMHI Research Division. He has been responsible for the development of a 3D-coupled ice ocean model for the Baltic Sea and for the Arctic Ocean (RCO). Markus starts his new position on 1 July but will also work on the Rossby Centre during the autumn to some extent.



Frida Brantvall is employed at the Rossby Centre for a five-month period to develop tools for a better handling of the huge amounts of model data that are constantly generated at the Rossby Centre. Frida holds a Master of Science in Media Technology and Engineering at the Linköping University.

10. Basics of the Rossby Centre

The Rossby Centre works on regional climate model development and evaluation as well as model applications on process studies, climate system studies, climate change research and impact studies. The Rossby Centre is also involved in a number of EU-funded and other projects on climate modelling and other

aspects of climate and climate change research.

Rossby Centre homepages are mainly in English and are found via www.smhi.se (Click on "Forskning"/"Research" at the top of the page and thereafter at the Rossby Centre link in the left panel.)

11. Subscription and cancellation of subscription

The Rossby Centre newsletter is sent as an email blind copy to those who wish to receive a text version. The full version is reached via the Rossby Centre homepages (see item 9) under "Newsletter".

Comments and suggestions as to the scope, content and forms of the newsletter are welcome. Feedback can be provided via rossby.data@smhi.se.