Rossby Centre Newsletter

No 2 – 2005 **June 2005**

The Rossby 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 Rossby Centre. This newsletter is published 2-4 times a year.

The following topics are covered in this Newsletter:

1. The Rossby Centre Day, October 6

The Rossby Centre Day is a forum for dialogue between climate modelling and researchers who either contribute to or use results of climate modelling/scenarios as well as policy-makers and decision-takers that need to deal with climate change. The first Rossby Centre Climate Modelling Day was held in 2004. It dealt with regional climate scenarios and climate impact research.

The next Rossby Centre Day will be held on October 6. It will provide a discussion arena for regional managing of climate change. We believe that this topic requires the attention of both climate and impact researchers, social sciences researchers and decision-makers who have the knowledge on and responsibility for systems, guidelines and operating practices, investments etc. These issues will be discussed at SMHI in Norrköping on October 6. We welcome participation by climate and social scientists, impact researchers and stakeholders. If you wish to participate or have questions, please send an e-mail to *Rossby.Data@smhi.se*.

More information can be found at:
http://www.smhi.se/sgn0106/if/rc/RCday.htm

2. New Swedish climate computing resource

In the Rossby Centre Newsletter No 1, 2004, we reported that the Swedish Knut and Alice Wallenberg foundation will fund a new dedicated climate computing resource, SweCLICS. This resource will be called Tornado and it is now being installed at the National Supercomputing Centre, NSC, in Linköping. Test use will start during the summer and full operations later this year. The scientific use of the resource will be shared by the Rossby Centre of SMHI and the Department of Meteorology at Stockholm University (MISU). Tornado is a cluster of 132 dual Intel EM64T 3.4 GHz processors with a combined peak performance of 1800 Gflops, which makes Tornado one of the fastest computing systems in Sweden. Tornado increases the Rossby Centre climate computing capacity by a factor of 8 compared to our present main computing resource.

An opening session will be held on the 23th of August at Linköping University.

3. Reruns of the latest regional climate scenarios

The recent regional climate scenarios (see the Rossby Centre Newsletter No 1, 2005) will be rerun during this summer and early autumn, with some improvements to the regional climate model RCA and increased archiving of results.

In contact with researchers variables have been requested which were not stored during the simulations due to data storage limitations. Since then, this has been resolved which opens for the possibility to rerun the simulations and complement the output. The extensive analysis of the simulations has also identified some

unnecessary deficiencies in the RCA diagnostic calculations of near-surface temperature, humidity, wind speed as well as the clear-sky short wave radiation reaching the surface. The diagnostic temperature and humidity values are sometimes unrealistic due to numerical problems in the case of strong spatial contrasts. The 10 m wind speed tends to be underestimated which is connected to the applied roughness length. The clear-sky short wave radiation reaching the surface is somewhat underestimated in RCA3 compared to observations and earlier versions of RCA.

Thus, the transient climate simulations will be rerun during the summer to complement missing output and to correct for the identified deficiencies. In addition to the transient climate simulations a simulation with boundary conditions from the ERA40 reanalysis will also be undertaken during the summer. This experiment, which will be used mainly for model evaluation, will cover the time period from around 1960 until present day.

Researchers who have received some of the results have been contacted and new results will be made available to them by early autumn.

4. Global modelling/ Regional stabilisation scenarios (GlobStab)

The global climate model CCSM3 (see the Rossby Centre Newsletter No 1, 2005) has now been installed and the first simulation is underway. This will be a so-called stabilisation scenario in which the increase of greenhouse gases in the atmosphere ceases in the future. How soon and at what level this could occur depends on the socio-economic driving forces of and decisions on emissions. Stabilisation thus limits the future emissions and in principle locks the cost of mitigation into place. Stabilisation also limits climate change and its impacts and in principle locks the cost of adaptation into place. Stabilisation scenarios thus have a concrete link to international climate negotiations and efforts to mitigate and manage climate change.

The stabilisation scenario builds on the historic forcing for the period between 1870 and 2000. This is followed by forcing according to one of the SRES scenarios of IPCC, such as B1 or B2. When greenhouse gases have increased to a given level some time during the 21st Century, such as 450 or 550 ppmv in terms of carbon dioxide or carbon dioxide equivalents, further increases are suppressed. This would correspond to some successful international implementation of emission controls and reductions. Due to the slowness of the climate system, climate will then slowly adjust to the accumulated forcing. This will be studied by continuing the simulation until about year 2200. Thus, GlobStab will investigate the delay in the response to the forcing as well as the asymptotic final climate state. A regional climate change simulation using the Rossby Centre RCA model will then be performed to provide regional stakeholders and impact researchers more information on climate change under a stabilisation scenario. A description of GlobStab can be found at:

http://www.smhi.se/sgn0106/if/rc/projects/GlobStab.html

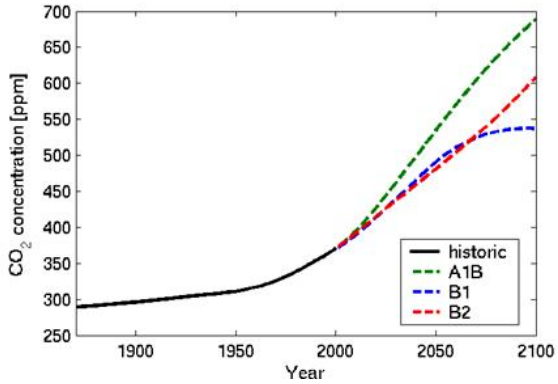

Figure 1. CO_2 concentrations according to historical changes until about 2000 and thereafter following three of the IPCC SRES scenarios. The SRES scenarios describe how the emissions of CO_2 and other anthropogenic climate forcing might develop according various plausible global socio-economic futures. The SRES scenarios as such extend up to the year of 2100 and do not lead into a stabilisation.

5. Simulations of the past regional climate

Information on how the climate system works and evaluation of climate models is sought by different ways. One of these is the study of past climates that varied and changed due to natural factors. Even though the contemporary climate change is believed to predominantly be due to anthropogenic factors, it nevertheless includes also a natural component that needs to be understood. In addition, the application of climate models on probing the future naturally benefits from, among other things, their documented ability to simulate the past.

The Rossby Centre participates in a project on the past 2000 years of regional climate together

with Stockholm University. The study is commissioned by SKB (Swedish Nuclear Fuel and Waste Management Co). Using the RCA model, 600 years of regional climate simulations will be drawn from the latest 1000 years. Only towards the end of this period are instrumental climate observations available to any greater extent. Experimental information of earlier times is available through the interpretation of so-called proxy data, such as tree rings and sediments. In addition to providing more information on the regional climate, the project demonstrates the complementary use of these methods and adds value to the application of climate models and scenarios.

The RCA simulations will be conducted during the summer. For more information, please contact us at *Rossby.Data@smhi.se*

6. The European Researchers' Night on September 23

The European Researchers' Night on September 23 is an awareness-raising initiative of the European Commission. The idea is that students, teachers, parents, businesses, research organisations, public authorities and foundations discuss the profession and contribution to society of a researcher. Especially the meeting between young people and researchers, with the theme of "Research is fun". The Research Department of SMHI will organise one of the events, to be held at SMHI premises in Norrköping. The researchers at the Rossby Centre will participate with glimpses of researchers everyday life.

More detailed information will be announced on SMHI WebPages (*http://www.smhi.se/*) in August where also registrations can be made.

7. Subscriptions and cancellations of subscriptions

This issue of the Rossby Centre electronic newsletter is sent as a blind copy to provide email address privacy. Should you not wish to receive further copies of this newsletter, please send an e-mail to *Rossby.Data@smhi.se*

Comments and suggestions as to the scope, content and forms of the Rossby Centre electronic newsletter are welcome. Feedback can be provided via the email address mentioned above.

8. Basics of the Rossby Centre

The Centre was built up within SWECLIM, the Swedish Regional Climate Modelling Programme, 1996-2003. 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. In 2003-2005, the Rossby Centre is partly funded by SMHI, Naturvårdsverket (the Swedish EPA), Statens energimyndighet (the Swedish Energy Agency) and Mistra (the Foundation for Strategic Environmental Research). 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 in English and can be found via *http://www.smhi.se* (click on "Forskning" [on the Swedish version] and "Research" [on the English version] at the top of the page, after which the link to Rossby Centre appears on the list to the left of the page that opens.)