AS Horizons

CIRCE: European Research Project on Climate Change and Impact in the Mediterranean Environment

Hans von Storch

Climate change could pose serious questions on the sustainability of the whole development process in the Mediterranean. Regional water resources are already under significant economic and demographic pressure. Increased severity of weather extremes and land-use change may be added to the existing problems of desertification, scarcity of water and food production, bringing new challenges to human health, ecosystems, and national economies.

Thus, the project CIRCE has been set up to deal with the particular features of the Mediterranean area and to fit the climate research according to the needs of the Mediterranean population. CIRCE is a European project, funded under the Sixth Framework Programme (FP6). It is coordinated by Istituto Nazionale di Vulcanologia e Geofisica (INGV), Italy, and led by Antonio Navarra from INGV and Laurence Tubiana from IDDRI- Institut du Développement Durable et des Relations Internationales, France.

CIRCE runs climate change simulations in the Mediterranean area to properly understand not only the changes in temperature, radiative fluxes, precipitation, humidity, wind conditions, cloudiness, aerosol presence, ocean waves, sea-level rise, and the regional water cycle, but also extreme events such as intense precipitation or floods), nutrient discharges into the sea and sensitivity to water stress. Thanks to the integrated approach of CIRCE, the project produces a regionally disintegrated assessment of the various expected changes.

The main objectives of CIRCE are to describe and to quantify the possible and plausible physical impacts of climate change in the Mediterranean through a comprehensive set of data. These impacts will then be used to assess the consequences of possible climate change for human society and ecosystems. In particular, CIRCE will study economically meaningful variables such as productivity changes, variation of resource stocks, and shifts in technology and demand patterns so as to describe better how climate changes may affect our future lives.

In order to test its ability to envisage the impacts and assess strategies of mitigation, CIRCE has foreseen a number of case studies. A risk-based approach will be used to try to identify, with the involvement of local institutions, experts and citizens, the strengths and weaknesses of potential adaptation strategies.

The final product of CIRCE will be a "Regional Assessment of Climate Change in the Mediterranean" (RACCM), a decision support system tool used for the adaptation and mitigation strategies that are specifically tailored for the Mediterranean environment.

Web page: http://www.circeproject.eu

Supercomputers Going Green?

Michel dos Santos Mesquita

Supercomputers have become an important asset in atmospheric/climate research: for example, they can run fine-scale regional models such as WRF, GCMs or aid deliver weather forecasting in time. They have become ubiquitous and essential for the everyday scientific work. However, they consume 30 times more electricity than older scientific computers [*Grier*, 2008]. Increased costs in electricity may have a huge impact on smaller climate centers. The question is: are there greener supercomputers?

In the age of computers, machines are smaller and faster. According to *Grier* [2008], the big scientific processors used nowadays are 300 times more efficient (per watt) than were computers 15 years ago. But in spite of using less energy, they are faster and thus, they consume more. However, there is still hope! A new type of supercomputer produced by SiCortex uses a new approach to save energy when processing [*Paulson*, 2008]. It was purchased by Purdue University and the US Argonne National Laboratory. Purdue is using the SC5832 in various scientific disciplines including climate research. According to the SiCortex website, the SC5832 offers 5,832 1.4GFlops 64-bit processors (dissipating 900 milliwatts of power per processor). In addition to that, it has 8 Terabytes of system memory and, best of all, it fits in a single cabinet and only needs around 20 kilowatts of wall power.

SC5832 at the Argonne National Laboratory

According to Halvor Utby, System Engineer at the Bergen Center for Computational Science (Norway), power and cooling costs are always considered when buying a new supercomputer. He also added that "a computer like this one (the SC5832) would help reduce energy costs... without knowing too much about how this computer performs, my guess from the specs is that it will perform well in climate research... it is hard to say exactly without a benchmark at hand." Utby also pointed out that, since its clock frequency is lower than in other supercomputers, the job might run longer than on a supercomputer with higher clock frequency; it depends on the scalability of the application.

The SiCortex and industry experts have also developed an index to measure how green supercomputers are: the Green Computing Performance Index (GCPI). It analyzes the computing performance (per kWatt) across industry-standard benchmarks. This initiative and many others to come will help boost atmospheric/climate research towards "greener environments." Yes, supercomputers can go green!.

References

Grier, D. A. (2008), Click Here to Empty Trash, *Computer, 41*(9), 6-8.

Paulson, L. D. (2008), Supercomputers Get Energy-Efficient, *Computer, 41*(9), 19-20.

SiCortex SC5832 and GCPI websites:

http://sicortex.com/products/high_capability_system_sc5832

http://sicortex.com/green_index