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Introduction to the TAC special issue: The RegCNET network

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With 1 Figure

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Summary

Fostering climate research in economically developing nations (EDNs) is especially important because the welfare and economies of these nations are particularly dependent on climate and its variability. A critical factor that undermines the advancement of research in EDNs is that many EDN scientists are confronted with scientific isolation and lack of exposure to state-of-the-art research methodologies. One of the means to ameliorate this problem is to build “south–south” (i.e. EDN–EDN) and “north–south” (i.e. EDN–EAN, or economically advanced nations) research partnerships, which become more effective when they are based on collaborative projects where the participants share their respective expertise. This is the central paradigm underlying the formation of the REGIONAL Climate research NETWORK, or RegCNET.

The RegCNET was established during the “First ICTP workshop on the Theory and Use of Regional Climate Models”, held at the Abdus Salam International Centre for Theoretical Physics (ICTP), in Trieste, Italy, on 26 May–6 June, 2003. The workshop was part of the ICTP educational program and was attended by over 70 participants from nearly 30 countries, most of them EDNs. The papers presented in this special issue of Theoretical and Applied Climatology (TAC-SI) are the outcome of the RegCNET activities initiated at this workshop.

The first step in the creation of the RegCNET was the identification of a suitable research area

that would be broad enough to allow the involvement of a wide scientific community and yet focused enough to provide a unifying theme across the network. The theme identified for the RegCNET was regional climate variability, predictability and change. This is a theme of particular interest to scientists in both EDNs and EANs, with the notable added value that the use of advanced research methodologies and the knowledge of specific local environmental issues can strongly benefit from each other. The use of common research tools can further enhance interactions across the network, and within the context of the RegCNET a central research tool was identified as the latest version of the ICTP regional climate model RegCM3 (Pal et al., 2006, see below).

The next step in the establishment of the RegCNET was to design an operating structure (depicted in Fig. 1). In this structure, the ICTP acts as a coordinating and facilitating hub for the network, where this role is carried out through a number of activities. First of all, the ICTP maintains a RegCNET website and email list. This provides a means for the RegCNET community to exchange experiences and information, ask and answer questions, discuss scientific issues, etc.

An additional coordinating role of ICTP consists of facilitating collaborative projects across the

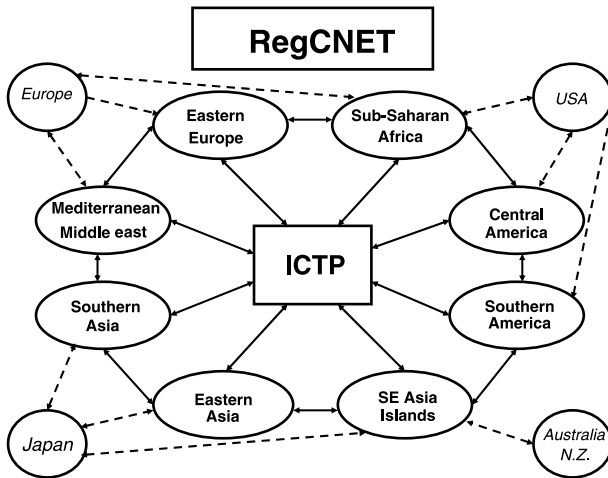


Fig. 1. Schematic depiction of the structure of the RegCNET

network through: 1) The development and maintenance of models and datasets for use by the network participants along with the provision of related technical and computational support; 2) Scientific advice and/or supervision to young scientists; 3) Hosting of scientific visitors from EDNs for periods of up to several months to work on specific projects; 4) Facilitation of south-south and north-south project collaboration among scientists. In this regard, it is important to emphasize that the RegCNET projects are designed and led by EDN scientists.

The third coordinating activity of the ICTP consists of the organization or co-sponsorship of regular workshops, either at the ICTP or abroad. These have the twofold purpose of 1) providing the RegCNET a forum to more directly share progress and plans for future developments; and 2) offering theoretical and hands-on sessions on the structure and use of the modeling and analysis tools employed by the RegCNET. Since the first workshop in 2003, additional ones have been organized within the context of RegCNET: Islamabad, Pakistan (February 2004); ICTP (June 2004); Alexandria, Egypt (May 2005); Accra, Ghana (June 2005). Several others are currently being planned.

As Fig. 1 shows, the network is composed of a number of regional sub-networks of EDN scientists. Following the basic strategy of the RegCNET, links within and across the sub-networks are built through collaborative research projects. Finally, leading scientists, mostly from

EANs, enter the network by collaborating in the network projects either directly or by providing support through discussion and scientific advice.

The philosophical approach of RegCNET is thus to foster research through synergistic collaboration on specific projects of mutual interest for scientists with a wide range of experience. This approach attempts to tap into institutional or personal scientific needs and interests across the groups participating to the network.

As mentioned, the papers appearing in this special issue of TAC (or TAC-SI) are the result of the kick-off activities of the RegCNET. During the ICTP 2003 workshop, a number of collaborative projects were proposed and discussed by participants from all the regions represented in Fig. 1. The projects were carried out during the following year and their progress was reviewed in the follow up ICTP 2004 workshop (see above). The projects with the most advanced progress were then finalized into the papers included in the TAC-SI.

From the list of TAC-SI papers (see the index of the issue) it is evident that they cover a wide range of specific topics within the broad area of regional climate variability and change and a number of points are particularly illustrative of the RegCNET approach:

- 1) Papers in the TAC-SI cover all regions of the RegCNET (see Fig. 1). This is an especially important result of the kick-off activities, since a pointed effort was made to establish a broad involvement throughout the network.
- 2) The lead authorship of most papers is by scientists from EDNs. In addition, most papers include co-authorship by scientists from different EDNs or from both EANs and EDNs. This illustrates the South-South and North-South partnership approach underlying the RegCNET.
- 3) The topics covered in the TAC-SI are wide ranging: climate variability, climate change, process studies, model analysis and testing, paleoclimate. At the same time, the topics are regionally specific and employ a variety of both observational and modeling tools (e.g. global and regional models, statistical downscaling, reanalyses of observations). This is illustrative of the RegCNET philosophy in that knowledge

of regional and local processes is integrated with broad expertise on advanced research methods.

- 4) A number of papers make use of the RegCM3 (Pal et al., 2006), which was released during the 2003 ICTP kick-off workshop. This is the third generation of a modeling framework originally developed by Dickinson et al. (1989) and Giorgi and Bates (1989) (RegCM1), and later upgraded as described by Giorgi et al. (1993a, b) (RegCM2). As mentioned, the RegCM3 provides a means to unify the RegCNET community.

Note that participation in the projects was mostly based on personal scientific interest, without specific funding and within a context of many other commitments and responsibilities taken by scientists in their own institutions. This demonstrates the enthusiasm and personal dedication generated by the RegCNET, which was key for the completion of the projects.

All the points above are very encouraging signs of the successful establishment of the RegCNET, a success confirmed by the steady growth of the RegCNET community that, from a starting size of about 70, has now reached a size of over 250. Despite this successful start, however, a number of problems were encountered that need to be addressed in the follow up activities of the RegCNET.

The first consists of the wide range of working environments found in different regions. Scientists in many EDNs are still confronted with lack of computing resources and data storage systems, instability of network connections, problems with the installation of key softwares such as operating systems and language compilers, frequent occurrence of power outages. The recent development of low cost, high performance Personal Computer and disk storage technology has tremendously improved the computing environment of the EDN scientific community, however the magnitude of these problems is highly variable across different countries and thus their solution often requires individual approaches.

A strategy adopted to address this problem within the framework of the RegCNET is to develop modeling and analysis tools (such as the RegCM3 model and its pre and post-processors) that are user-friendly and easily portable on dif-

ferent computing platforms, especially PC-based environments. We also included in the program of the RegCNET workshops specific sessions on the installation of needed software packages. Finally, plans are in place to conduct more RegCNET training and progress workshops on site in different regions. For example, the experience with the Islamabad 2004 workshop demonstrated that such type of activities can be very effective in revealing and addressing infrastructure problems locally faced by scientists.

Another main problem is that of funding for EDN scientists. In most instances the work presented in the TAC-SI was conducted on the scientist's own time, in some cases also building on the interest of the scientist's institution. However, it would be important to be able to provide EDN scientists with funding specifically aimed at RegCNET activities, including both research and training programs. In this regard, the contribution of scientists from EANs is essential to place the RegCNET activities within the framework of international research projects. Coordination with international programs, such as sponsored by the European Union or the World Meteorological Organization, would certainly strengthen the network. We are thus currently investigating the possibility of obtaining funding from different sources to co-sponsor the RegCNET.

As a concluding remark, the completion of the TAC-SI was a remarkably successful achievement, especially given that most projects were identified, developed and completed in a relatively short length of time (about 18 months), often in very difficult conditions. This success was built on the enthusiasm, commitment and collaborative spirit shown by the authors of the TAC-SI papers, as well as the entire group of RegCNET participants. We thus hope the TAC-SI will contribute to providing the basis for a long term growth of the RegCNET which will help to foster climate research and partnerships in EDNs.

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