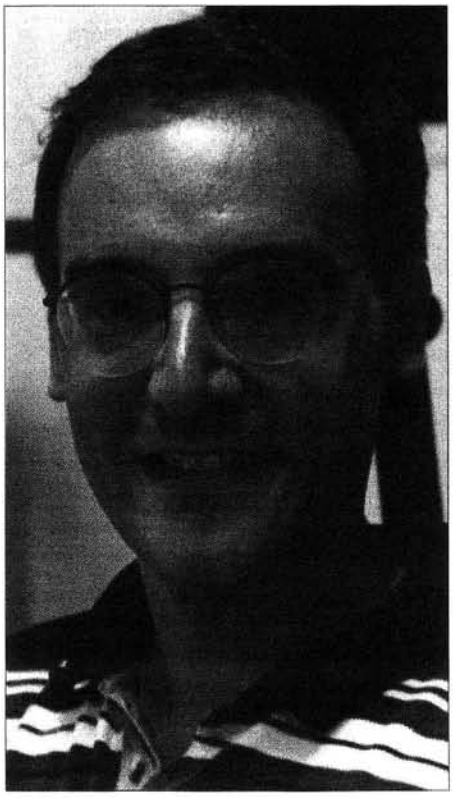
Changes in climate for the developing world

Filippo Giorgi, Head of the Physics of Weather and Climate Group, International Centre for Theoretical Physics, Trieste, Italy

The Italian city of Trieste, nestled between the Adriatic Sea and the hills separating Italy from Slovenia, is a beautiful place to conduct research in physics, writes *Siân James*. In May 1998 the Italian-born physicist Filippo Giorgi arrived at Trieste's International Centre for Theoretical Physics (ICTP) after spending more than 10 years at the National Center for Atmospheric Research (NCAR) in Boulder, USA. Giorgi moved to Trieste to accept the position of Head of ICTP's new Physics of Weather and Climate group.



Giorgi's research focuses on the numerical modelling of climate and climate change brought about by human activities and land usage. He is eager to clarify the difference between weather prediction, which is concerned with what happens on a day-to-day basis, and climate studies, which look at the statistical properties of the atmosphere over years, centuries or longer. "A good sort of lay definition is that weather tells you what sort of clothes you should wear today, while climate tells you what sort of clothes you should buy – not accounting for fashion, of course." A climate system includes not just the atmosphere, but also factors such as oceans, land use and chemistry. Giorgi believes, "A climate system model is one of the most complicated systems studied in science." He explained, "To carry out climate research, computers are essential. There is very little that you can do with just a pen and paper."

At NCAR, Giorgi became involved in an approach to climate modelling known as Local Area Models (LAMs). These models concentrate on the climate of a particular region and can provide more information about the individual features of the region than global models. Focusing on one region allows details such as the effects of pollution or deforestation in a certain area to be included in the models.

The modelling of a global climate system, known as a General Circulation Model, requires powerful supercomputers and this means that the research is restricted to about ten research groups in the world. An advantage of the LAM approach to modelling climate systems is that supercomputers are not required. The majority of Giorgi's research is carried out using a Sun Server 3500 with four CPUs. The use of workstations makes this area of science more affordable for researchers in developing countries. This is of particular interest to the International Centre of Theoretical Physics (ICTP), which was set up in 1964 by the Pakistani Nobel Laureate Abdus Salam. Salam's vision was to establish a centre to equip scientists from developing countries with the access to facilities and teaching that they might lack in their home countries.

The centre's recent move from purely theoretical physics towards applied science such as climate studies provides added benefits to developing countries. Giorgi pointed out, "In fact it is developing countries that are often the most vulnerable to environmental and climatic problems." He hopes that his research will not only contribute to the research goals of the centre but also provide valuable insight into the causes of the climatic effects that often devastate countries of the developing world.

Countries vulnerable to climatic problems will also benefit from Giorgi's involvement with the Intergovernmental Panel on Climate Change (IPCC). This panel meets every five years and the main focus of their next report will be regional climate. In the 1995 report, the IPCC concluded for the first time that humans do affect global warming. "I expect that the next report will support this conclusion," said Giorgi.

The group at ICTP is very different from what Giorgi was used to at NCAR. "NCAR is probably the biggest lab in the world for climate research with more than a thousand people in total and big supercomputers." In contrast, his new group at ICTP will have between seven and ten researchers and he is responsible for building up the research and the group's reputation.

"The professional reason why I moved from NCAR to ICTP was the opportunity to work with a new group and develop something pretty much from scratch. I also believe that the research we are doing is very appropriate to the ICTP's goals of fostering research in developing countries," reflected Giorgi.

The group intends to continue the study of high-resolution models of the atmosphere. Giorgi plans to study the interactions between climate and atmospheric chemistry, with a view to understanding the effects of pollution. He also hopes to extend methods of predicting seasonal weather behaviour. In line with the aims of ICTP, the Physics of Weather and Climate Group will host colloquia and schools to teach scientists from the developing world the physics and techniques of climate modelling.

"Going from a permanent position at NCAR to ICTP is a big challenge for me, but I am very happy here and optimistic about the development of this group." □

Curriculum Vitae

1986
PhD at the USA's Georgia Institute of Technology, School of Geophysical Sciences

1987–98
National Center for Atmospheric Research, Boulder, Colorado, USA

1995
Intergovernmental Panel on Climate Change

1998
Head of Physics of Weather and Climate group, International Centre for Theoretical Physics, Trieste, Italy

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