

## Climate science\*

Environment is changing rapidly due to drastic increase in population and industrialization. This not only changes the short-term environment of an area, but also has long-term effect on the Earth system. The Earth system is very complex, hence it is difficult to understand and predict any change that is going to happen in the future. Also, the number of researchers working in this area is small, at least in developing countries like India. The reason behind this is the lack of expertise, institutions, infrastructure and understanding. Therefore, it is important for institutions working in the area to train researchers from different institutions and organizations with the purpose of capacity building. Towards this end a training programme on climate science was organized recently at the Divecha Centre for Climate Change (DCCC), Indian Institute of Science (IISc), Bangalore.

DCCC was established in January 2009 with the goal of interdisciplinary research and capacity building in the field of climate change and its implications. Forty-five participants from various backgrounds and organizations attended the programme. They included academicians, scientists, research scholars and students from premium research and operational organizations. The programme was coordinated by Govindasamy Bala (DCCC). J. Srinivasan (Chairman, DCCC) formally inaugurated the programme and informed about DCCC, the people working there, and the

aims and objectives of the training programme.

During the training, eleven resource persons from different organizations of India delivered lectures covering almost all the aspects of climate science, climate change, palaeoclimate, general circulation of the atmosphere, global carbon cycle, aerosol, glacier and remote sensing, monsoon, etc. The programme started with an overview of climate system and climate change by J. Srinivasan. He also gave tutorials in radiative transfer which further enhanced the understanding of the participants about the topic. On the second day, G. S. Bhat (Centre for Atmospheric Sciences (CAOS), IISc) talked about various techniques used for meteorological observations, as well as about the clouds and their importance in climate science. He also gave tutorials on clouds as well as meteorological observations. Prosenjeet Ghosh (DCCC) talked about palaeoclimate and different proxies used for determination of past climate. He gave exercises on palaeoclimate and also gave participants an opportunity to visit his laboratory. Bala talked about the general circulation of the atmosphere as well as the global carbon cycle with tutorial problem related to global carbon cycle and general circulation. S. K. Satheesh (DCCC) talked about the importance of aerosols in climate system and the associated problems. He gave practice questions related to the lecture and also took all the participants to his laboratory. A. V. Kulkarni (DCCC) talked about remote sensing of snow and ice and its implication as indicators of changing climate and gave tutorials on remote sensing. P. Mazumdar (Department of Civil Engineering, IISc) talked about the impacts of changing climate on water resources. D. Sankar (National Institute of Oceanography, Goa) talked about ocean dynamics

and sea level change in the north Indian Ocean. Somnath Baidaya Roy (IIT Delhi) talked about surface properties of land and impacts of land-use change on climate. Sulochana Gadgil (CAOS) gave an interactive lecture on the how and why of the monsoon system and its importance in global climate. Participants also attended a special lecture entitled 'Surveillance weather radars in the USA' by D. Zrnich (NOAA/National Severe Storms Laboratory, USA).

Every day after lectures are delivered in the morning session, exercises related to the lectures were discussed in the afternoon session. This made the participants learn the practical aspects of the science of changing climate. The participants were also given a chance to visit laboratories in different departments of IISc, and interact with the students, researchers and professors working in relation to climate science. Apart from the interactive lectures and presentations, the participants also had to present their current research work which gave them the opportunity to know about the research going on in different organizations across the country. A half-an-hour quiz with 10 questions from the lectures in the end of the programme was conducted. In that the top three participants were selected and given prizes in order to appreciate their efforts and understanding. The training programme provided a unique opportunity to share and learn the advances of climate science, the changes happening and their implications.

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