From the Editor's Desk

As we draw towards the end of the first decade of the 21st century, the concern towards environment and climate appears to overshadow the achievements in modern science and it is therefore very appropriate that we bring this issue on "Climate Change, challenges and opportunities for India" guest edited by two of our experts in climate science, Professor Raghu Murtugudde and Professor Debasis Sengupta. The issue starts with an article by Professor Roddam Narasimha on "The Recent National Initiatives in Earth Science" followed by articles which concern remote sensing, harvesting solar energy, India's resource potential and societal benefits. I am sure the readers will enjoy the discussions on controversial topics concerning Himalayan glacier features and on behalf of all the editorial members I congratulate both the guest editors for their efforts and initiative to bring this thought provoking issue almost on time. The year 2011 promises to bring more areas of relevance and I request the readers to continue their patronage to our journal and I am sure they will not be disappointed.

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Editorial

A Regional Earth System Perspective for India

This special issue is focused on aspects of climate change research in India. It covers scientific questions such as the controversial issue of the impact of climate change on Himalayan glaciers, offers perspectives on sustained observations including the potential societal benefits of an Earth observing system, and reviews aspects of land use, alternative energy and mineral resources. As India continues to be a full partner in the global climate negotiations under the Intergovernmental Panel on Climate Change (IPCC), it was deemed an important focus. Unfortunately, attempts to attract essays on some other important issues such as food security and Earth system science education did not materialize.

A critical aspect of dealing with climate change is the inescapable naked truth that much of India continues to reel under the impact of climate variability on livelihood, food, water, energy and transport. No matter what the uncertainties are in the projections of climate change, one must not lose sight of the fact that climate change will project on the modes of natural climate variability. The dominant modes of monsoon variability continue to challenge the ability to make reliable predictions across spatio-temporal scales, crucial for decision-making for agriculture and water management. Recent advances in dynamic forecasting offer some hope. Subseasonal to interannual forecasts are still struggling to demonstrate consistent skill, but the IPCC has nonetheless gone ahead with centennial scale projections employing more and more sophisticated approaches to Earth System modeling.

While controversies have arisen about some of the projections and the *modus operandi* of the IPCC, the need for regional and local predictions at time-scales that affect policy is being recognized, driving focused efforts in decadal Earth system forecasts. Whereas enhanced expenditure on research in Earth system science is expected to continue, India will greatly benefit by exploring the concept of regional Earth system prediction. The IPCC framework is driving towards higher and higher model resolution along with the inclusion of more details of the Earth system. The "Global Earth Observing System of Systems" will complement global modeling for improved forecasts. But the regional specificities can only be ignored with great peril to the credibility of global projections, and dynamic downscaling with regional observational systems offer a way forward for various goals such as sustainable development, adaptive management of resources, and participatory decision-making for environmental stewardship.

For a country like India whose lifeline is the monsoons, it is instructive to look at the projections of two IPCC models. Models continue to improve in their representation of global and regional temperature

Figure 1: Seasonal Temperature changes over India for 2050 compared to 1990 as projected by two IPCC model simulations. Though both models project overall warming over much of the country, the patterns are not identical.

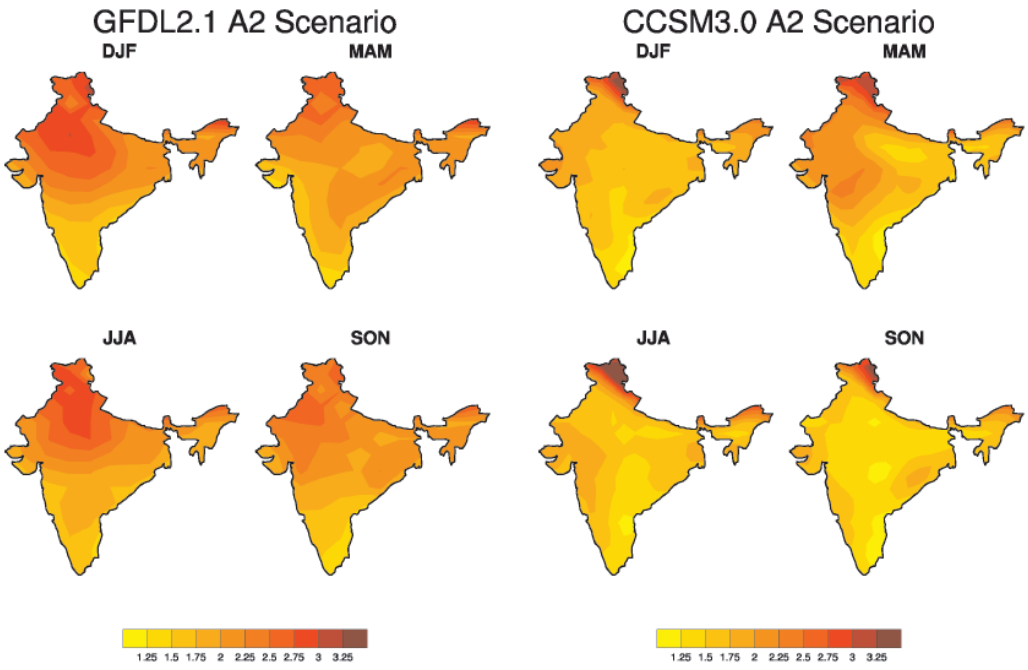
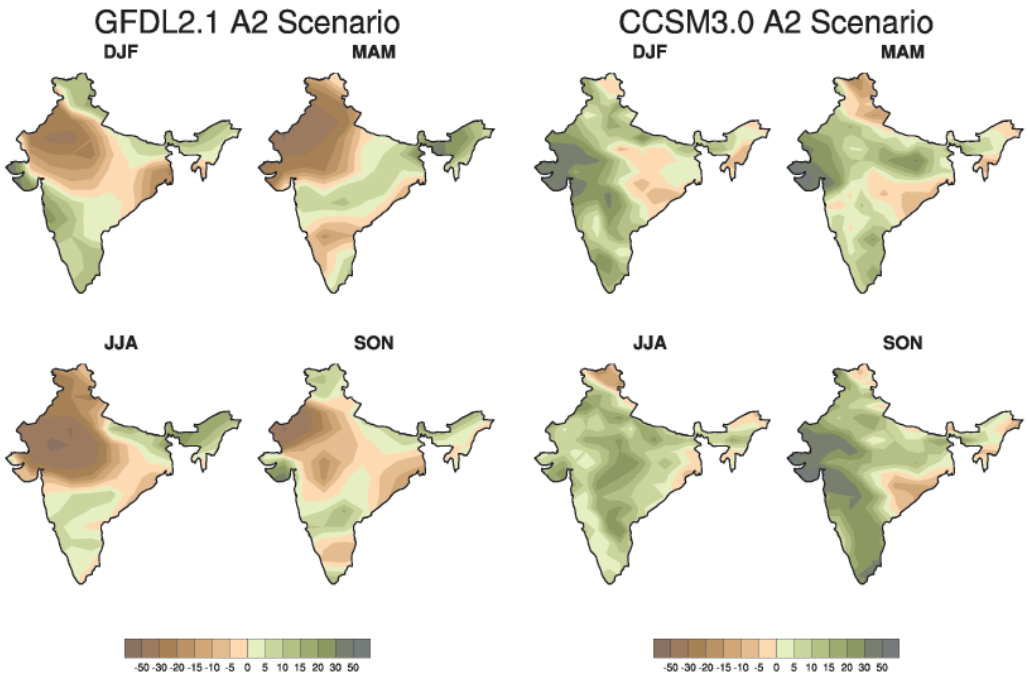


Figure 2: Same as Figure 1 except for precipitation. Inter-model differences and uncertainties in model simulations of precipitation tend to be much larger than those for temperatures.



trends, climate modes such as El Niño-Southern Oscillation, and even the mean monsoon. But Figures 1 and 2 show that the inter-model differences in projected changes in monsoon rainfall are too high to assist even in no-regret decision making. The concept of regional Earth system prediction must thus be a high priority as a research agenda for leading academic institutions and government laboratories. This will reduce the burden of investing in computational and human resources for global modeling and focus instead on Earth System predictions from days to decades for interactive decision-making.

Acknowledgements

R. M. gratefully acknowledges the support and hospitality of the Divecha Center for Climate Change and its chairman Prof. J. Srinivasan. Interactions with colleagues at the Center for Atmospheric and Oceanic Sciences and the broader community at I.I.Sc. (especially the coffee table crowd) have been invaluable and memorable. Prof. Siddharth's servings of fruit with every lunch also made this a very healthy sabbatical.

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Guest Editors