Numerical Simulation of Anomalous south Asian Summer Monsoon of 2009 using ICTP RegCM3

SATYABAN BISHOYI RATNA^{1*}, MOETASIM ASHFAQ² AND AKSHARA KAGINALKAR¹

¹Center for Development of Advanced Computing, Pune University Campus, Pune India

²Department of Environmental Earth System Science, Stanford University, Stanford, CA, USA *E-mail:satyaban14@gmail.com, Contact number: +91-9422356326

In this study, we use Abdus Salam International Center for Physics Regional Climate Model (RegCM3) to investigate the ability of a mixed-physics multi-ensemble regional climate modeling framework in simulating South Asian summer monsoon anomalies in 2009. Using NCEP/NCAR reanalysis and OISST data as atmospheric lateral- and lower-boundary conditions, we generate eight RegCM3 simulations in total, which differ in terms of their convective parameterizations or land-surface physics. All simulations use a grid centered at 11.5°N and 80.00°E, and consists of 240 points in the latitude direction and 300 points in the longitude direction. Grid points are separated by 30 km in the horizontal and distributed through 23 levels in the vertical. Each simulation is initialized on 1st Nov 2008 and integrated up to 1st Oct 2009. Our results show that compared to any conventional single RegCM3 realization, mixed-physics ensemble approach reduces the errors in RegCM3simulated intra-seasonal precipitation and temperature distributions. As a result, RegCM3 is able to simulate severe deficiency of summer monsoon rainfall in the months of June, August and September, and associated temperature anomalies. Similarly, wind patterns in the upper- and lower-levels and anomalies in the monsoon onset over land compare well with observations. These results suggest that mixed-physics ensemble approach can reduce model-based internal errors in a regional climate model simulation, which may lead to improvements in processbased seasonal predictions.

Key words: Indian summer monsoon, RegCM3

References

- [1] India Meteorological Department, End of Sea. Rep., pp12 (2009).
- [2] J. S. Pal et al., Bull. Am. Meteorol. Soc., 88, 1395-1409 (2007).
- [3] M. Ashfaq, Y. Shi, W.-w, Tung, R. J. Trapp, X. Gao, J. S. Pal, N. S. Diffenbaugh, *Geophys. Res. Lett.*, 36, L01704 (2009).