

Boreal summer sub-seasonal variability of the South Asian monsoon in the Met Office GloSea5 initialized coupled model

Jayakumar, A., A. G. Turner, S. J. Johnson, E. N. Rajagopal, Saji Mohandas, and A. K. Mitra
Climate Dynamics

Abstract: Boreal summer sub-seasonal variability in the Asian monsoon, otherwise known as the monsoon intra-seasonal oscillation (MISO), is one of the dominant modes of intraseasonal variability in the tropics, with large impacts on total monsoon rainfall and India's agricultural production. However, our understanding of the mechanisms involved in MISO is incomplete and its simulation in various numerical models is often flawed. In this study, we focus on the objective evaluation of the fidelity of MISO simulation in the Met Office Global Seasonal forecast system version 5 (GloSea5), an initialized coupled model. We analyze a series of nine-member hindcasts from GloSea5 over 1996–2009 during the peak monsoon period (July–August) over the South-Asian monsoon domain focusing on aspects of the time-mean background state and air–sea interaction processes pertinent to MISO. Dominant modes during this period are evident in power spectrum analysis, but propagation and evolution characteristics of the MISO are not realistic. We find that simulated air–sea interactions in the central Indian Ocean are not supportive of MISO initiation in that region, likely a result of the low surface wind variance there. As a consequence, the expected near-quadrature phase relationship between SST and convection is not represented properly over the central equatorial Indian Ocean, and northward propagation from the equator is poorly simulated. This may reinforce the equatorial rainfall mean state bias in GloSea5.

Keywords: Monsoon intra-seasonal oscillation, Met Office Global Seasonal forecast, SST