

Research For Seasonal Prediction of Indian Monsoon

Our analysis of simulation/prediction of the Indian summer monsoon rainfall by the several state of the art coupled models has unraveled one of the major factors leading to large errors and thereby suggested the way forward in improvement of the models for prediction of the monsoon. We find that EQUINOO–ISMR link is opposite to the observations in all the models except for the ECMWF model.

Recent studies have suggested that, atmospheric models are inherently incapable of simulating the observed non-linear relationship between rainfall and local SST over warm oceans. However, we have shown that the atmospheric models are not inherently incapable of simulation of the relationship since it's simulation by CGCMs and AGCMs is generally realistic except for a shift to colder/warmer SSTs in case of a cold/warm bias in the coupled version.

Studies on extension of wavenumber frequency spectrum analysis beyond OLR and wind, quantification of the spatial and temporal scales of northward propagation of convection over the Indian monsoon region using the space-time wavelet technique, objective derivation of the propagations of meso-scale and synoptic scale cloud systems have contributed to deeper understanding of the subseasonal variation and would be useful in assessing the skill of high resolution models.

Sensitivity studies of atmospheric models for cumulus parameterization suggest that an important parameter is the convective relaxation time-scale. This time-scale has a large impact on the fraction of deep convective precipitation and hence the vertical profile of moist heating and also the mean seasonal rainfall. We have proposed a linear cloud-type dependent relaxation parameter which leads to improved simulations of rainfall over most parts of the tropics.