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On Winning the Race for Predicting the Indian Summer Monsoon Rainfall¹

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Skillful prediction of Indian summer monsoon rainfall (ISMR) one season in advance remains a “grand challenge” for the climate science community even though such forecasts have tremendous socio-economic implications over the region. Continued poor skill of the ocean-atmosphere coupled models in predicting ISMR is an enigma in the backdrop when these models have high skill in predicting seasonal mean rainfall over the rest of the Tropics. Here, I provide an overview of the fundamental processes responsible for limited skill of climate models and outline a framework for achieving the limit on potential predictability within a reasonable time frame. I also show that monsoon intra-seasonal oscillations (MISO) act as building blocks of the Asian monsoon and provide a bridge between the two problems, the potential predictability limit and the simulation of seasonal mean climate. The correlation between observed ISMR and ensemble mean of predicted ISMR (R) can still be used as a metric for forecast verification. Estimate of potential limit of predictability of Asian monsoon indicates that the highest achievable R is about 0.75. Improvements in climate models and data assimilation over the past one decade has slowly improved R from near zero a decade ago to about 0.4 currently. The race for achieving useful prediction can be won, if we can push this skill up to about 0.7. It requires focused research in improving simulations of MISO, monsoon seasonal cycle and ENSO-monsoon relationship by the climate models. In order to achieve this goal by 2015-16 timeframe, IITM is leading a Program called Monsoon Mission supported by the Ministry of Earth Sciences, Govt. of India (MoES). As improvement in skill of forecasts can come only if R & D is carried out on an operational modeling system, the Climate Forecast System of National Centre for Environmental Prediction (NCEP) of NOAA, U.S.A has been selected as our base system. The Mission envisages building partnership between operational forecasting agency and National and International R & D Organizations to work on improving modeling system. MoES has provided substantial funding to the Mission to fund proposals from International R & D Organizations to work with Indian Organizations in this Mission to achieve this goal. The conceptual framework and the roadmap for the Mission will be highlighted.

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