NCAP-COALESCE
CarbOnaceous AerosoL Emissions, Source apportionment & ClimatE impacts
Understanding scientific complexities related to carbonaceous aerosols focussing on issues underlying their origin and fate, and their role as drivers of regional climate change over India.

Research BRIEFS

Monsoon rainfall over India in June and link with northwest tropical pacific
June ISMR and link with northwest tropical pacific

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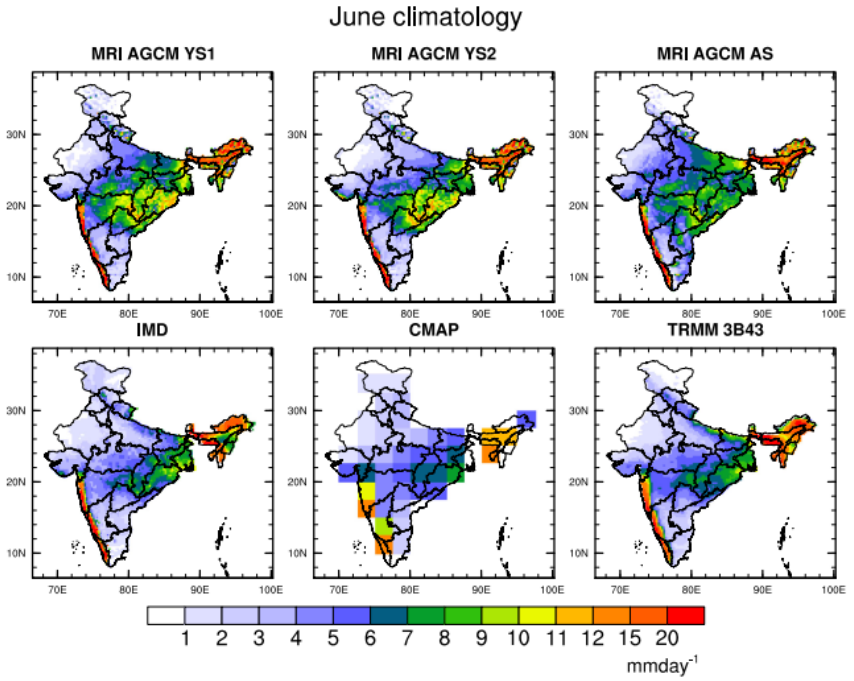

Figure 1:
Mean rainfall over India in June from three MRI multi-physics ensemble simulations (top panels) and observations based on IMD, CMAP and 3B43 rainfall datasets (bottom panels)

Key highlights:

- Ultra-high-resolution atmospheric general circulation model (AGCM) are used to investigate the factors responsible for the inter-annual variation of all India rainfall
- The subtropical-westerly jet and Rossby waves propagation influences the June rainfall.
- MRI YS1 simulation is one of the closest to the observation in simulating all India rainfall-ENSO relationship.

Summary of your Research:

Recent years have witnessed large inter-annual variation of all-India rainfall (AIR) in June, with intermittent large deficits and excesses. Variability of June AIR is found to have the strongest link with variation of rainfall over northwest tropical Pacific (NWTP), with AIR deficit (excess) associated with enhancement (suppression) of NWTP rainfall.

This association is investigated using high-resolution Meteorological Research Institute model and the analysis of the variation of NWTP rainfall shows that it is associated with a change in the latitudinal position of subtropical westerly jet over the region stretching from West of Tibetan Plateau (WTP) to NWTP and the phase of Rossby wave steered in it with centres over NWTP and WTP.

In years with large rainfall excess/deficit, the strong link between AIR and NWTP rainfall exists through differences in Rossby wave phase steered in the jet. The positive phase of the WTP-NWTP pattern, with troughs over WTP and west of NWTP, tends to be associated with increased rainfall over NWTP and decreased AIR. This scenario is reversed in the opposite phase. Thus, the teleconnection between NWTP rainfall and AIR is a manifestation of the difference in the phase of Rossby wave between excess and deficit years, with centres over WTP and NWTP. This brings out the importance of prediction of phase of Rossby waves over WTP and NWTP in advance, for prediction of June rainfall over India.

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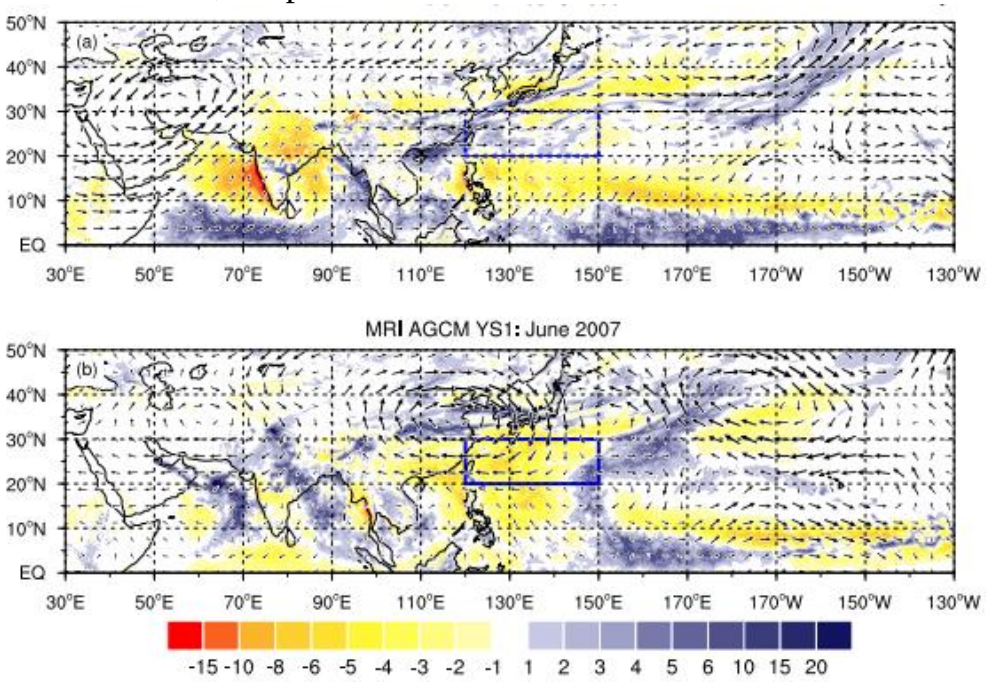

Figure 2: Simulated anomalies of precipitation (shaded) and wind vectors at 300 hPa for **a** June 1993 (third panel) and **b** June 2007 (bottom panel). Boxes indicate NWTP region

Take away/conclusion :

- In this paper, we investigate the simulations of the variability of AIR in June by a state-of-the-art AGCM at very high resolution of about 20 km, with a focus on the characteristics of the teleconnection between AIR and NWTP rainfall in June
- A large excess/deficit in June rainfall, the strong link between AIR in June with rainfall over NWTP in the simulation exists through the meridional meandering of the subtropical westerly jet stream and the differences in the phase of the Rossby wave steered in it .

Research Article citation

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Link:
https://link.springer.com/article/10.1007/s00704-018-2440-6

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