



Seventh WMO International Workshop on Monsoon (IWM-7)

22-26 March, 2022, IMD, MoES, New Delhi, India

The Skill Of Subseasonal To Seasonal Forecast Models In Predicting The Eddy Forcing Associated With Extratropical-tropical Interaction

Abstract ID-137

Mahesh Kalshetti^{1,3}, Rajib Chattopadhyay^{1,2}, Kieran Hunt⁴, R Phani¹,
Susmitha Joseph¹, DR Pattanaik², AK Sahai¹

¹Indian Institute of Tropical Meteorology, MoES, Pune, India, ²India Meteorological Department, India, ³Department of Atmospheric and Space Sciences, Savitribai Phule Pune University, Pune, India, ⁴University of Reading, United Kingdom

Presented by: Mahesh Kalshetti

maheshpkalshetti@gmail.com

Objective of the paper : Eddy forcing are known to cause explosive development of extratropical extreme events. To identify and address the critical factors responsible for E2T interactions in the real-time rainfall forecast and various aspects of monsoon intraseasonal variabilities with the help of dynamical modeling.

Data, Methodology, Results & Summary

Data and methodology: Wind, Temperature, Geopotential Height observation from ERA5 reanalysis, Rainfall observation from TRMM. Model- IITM-ERPAS (T382 & T126, L64, ensemble members -16).

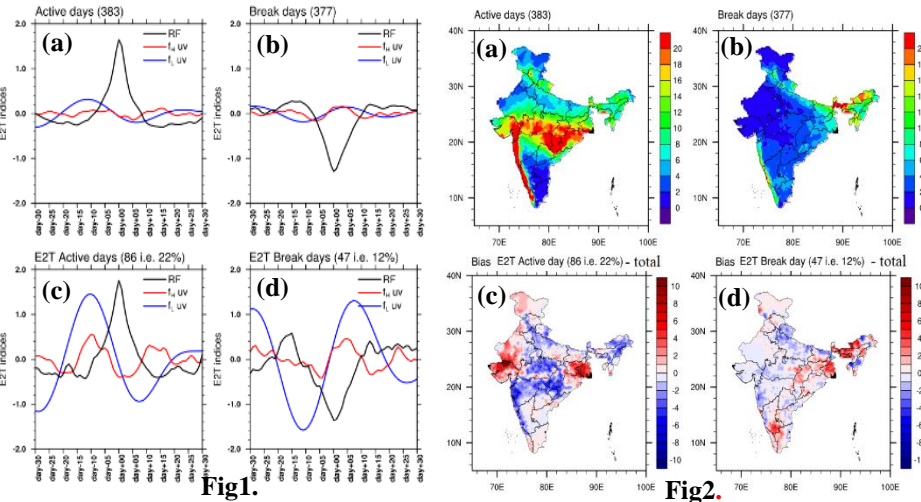
Study Area: North India and Monsoon Core zone (JJAS, 1989-2019).

Methodology: The eddy transport indices used from Kalshetti et al. 2020.

$$E = \left(\overline{v'^2} - \overline{u'^2}, -\overline{u'v'}, \frac{f}{\partial\theta/\partial p} \overline{v'\theta'} \sim \overline{v'T'} \right)$$

E-vector formalism (Hoskins et al. 1983) adopted to study the three-dimensional structure of transient eddies from different S2S models. The E-vector gives the direction of eddy propagation and eddy forcing.

Results :



Standardised rainfall above 2 & EMF f_L less than -1

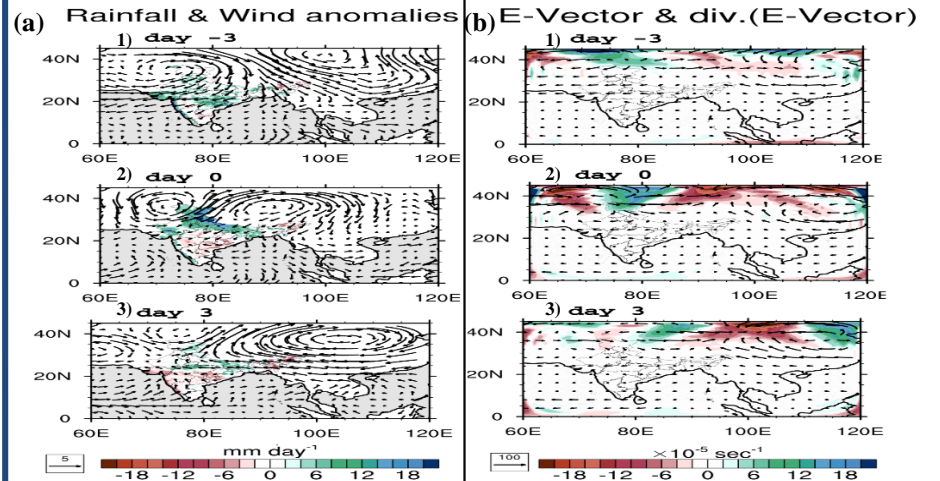


Fig3.

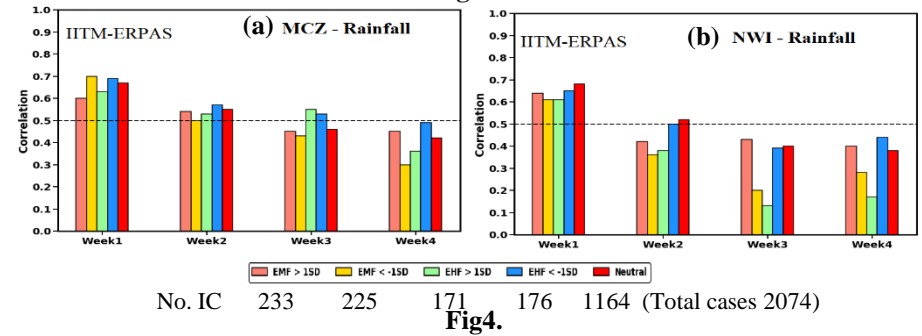


Fig4.

Summary

- For the first time E-vector diagnostics tool used for the defining the E2T monsoonal interaction. Also, active and break spell rainfall patterns associated with extratropical forcing are presented for the first time. Observation depicts EMF index could act as 13 days lead precursor for predicting tropical phenomenon such as onset of Active/Break. Extratropical originated transient can influence anomalous extreme rainfall.
- A rare +2 σ North Indian rainfall composite suggest upper tropospheric eastward migrating forcing induces southward upper level anticyclonic forcing, which further up heals preexisting monsoon surge. The skill of S2S forecast over MCZ is not always robust when there are no extratropical transient eddies. The S2S skills would improve if extratropical transient eddies are better simulated.