

MoES Extended Range Prediction

with inputs from NCMRWF & IITM ERP Team

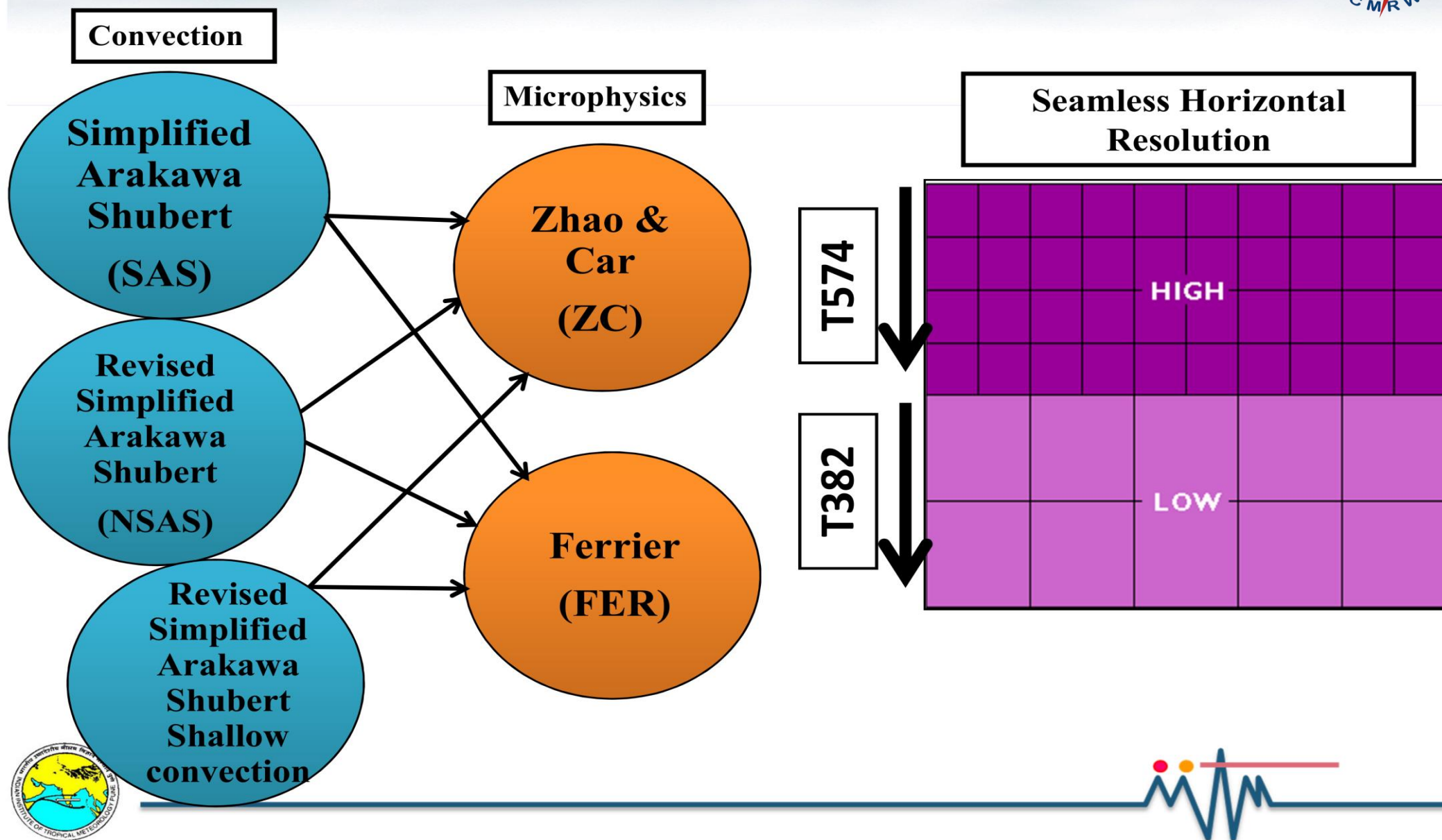
मानसून पर चर्चा

Monsoon Par Charcha

21st August 2024



Multi-physics framework



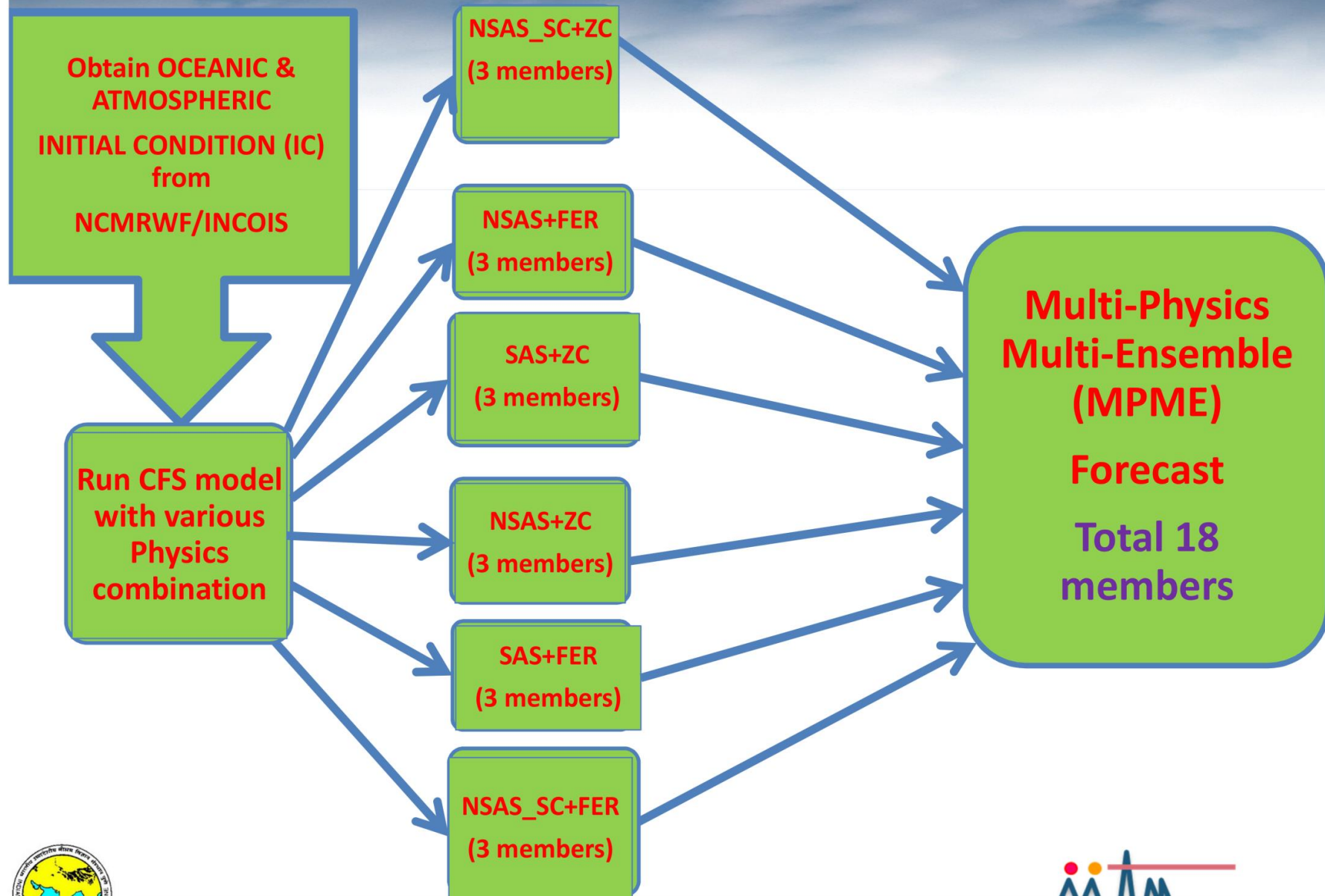


IITM
IMD/NCMRWF/INCOIS
ERP

**BASED ON INITIAL CONDITION:
17th August 2024**



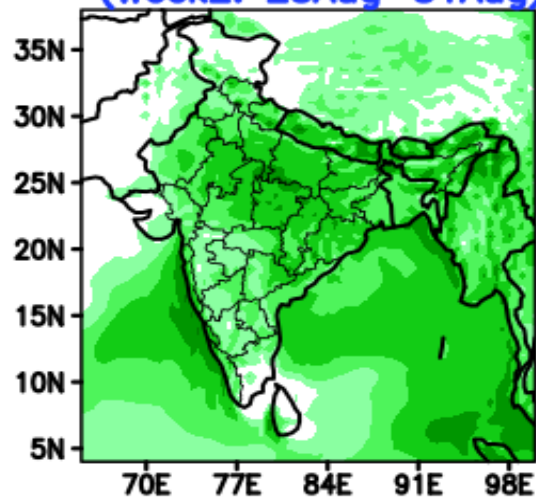
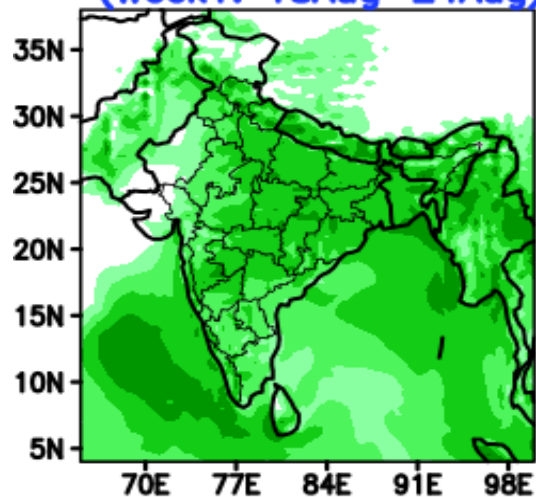
ERPv2 (Experimental setup)



MPME Actual Rainfall (mm/day) IC=20240817

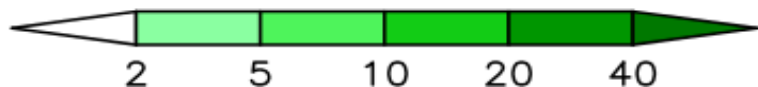
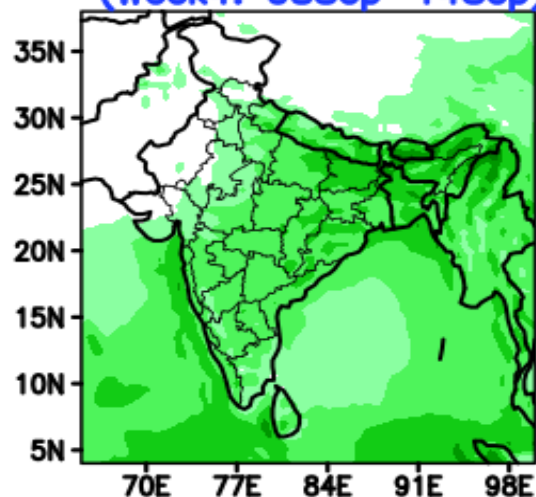
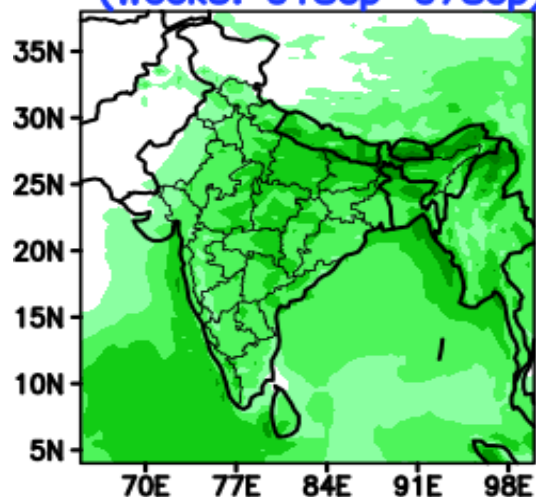
(Week1: 18Aug-24Aug)

(Week2: 25Aug-31Aug)



(Week3: 01Sep-07Sep)

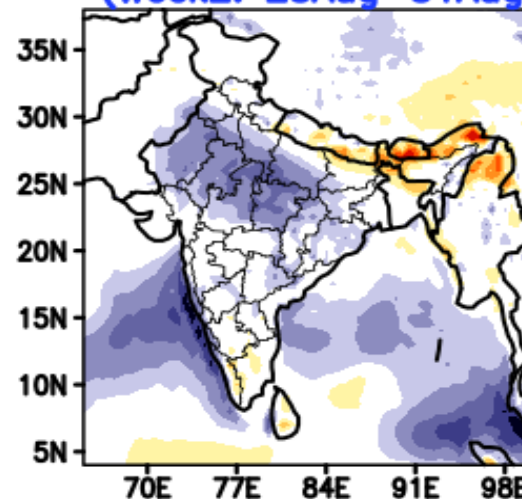
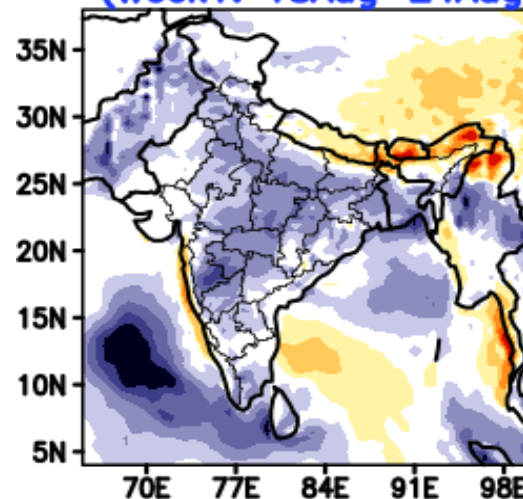
(Week4: 08Sep-14Sep)



MPME Rainfall Anomaly (mm/day) IC=20240817

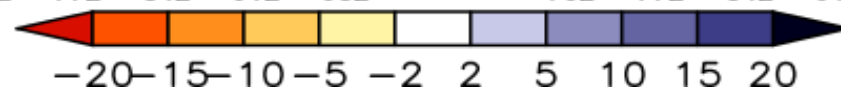
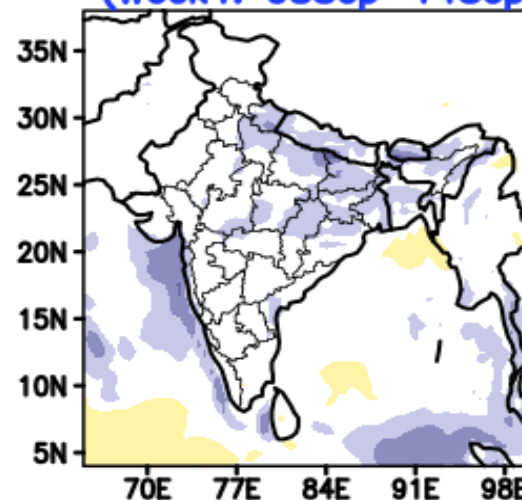
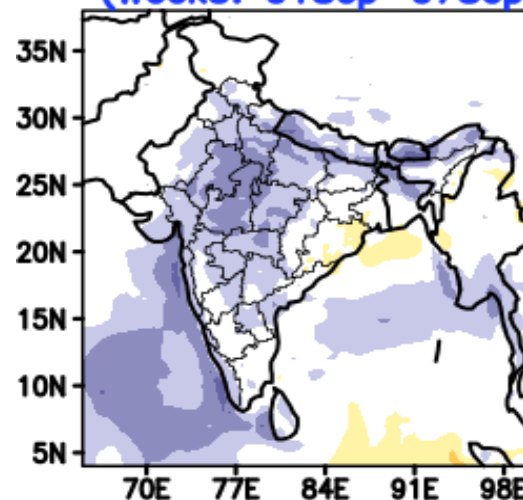
(Week1: 18Aug-24Aug)

(Week2: 25Aug-31Aug)



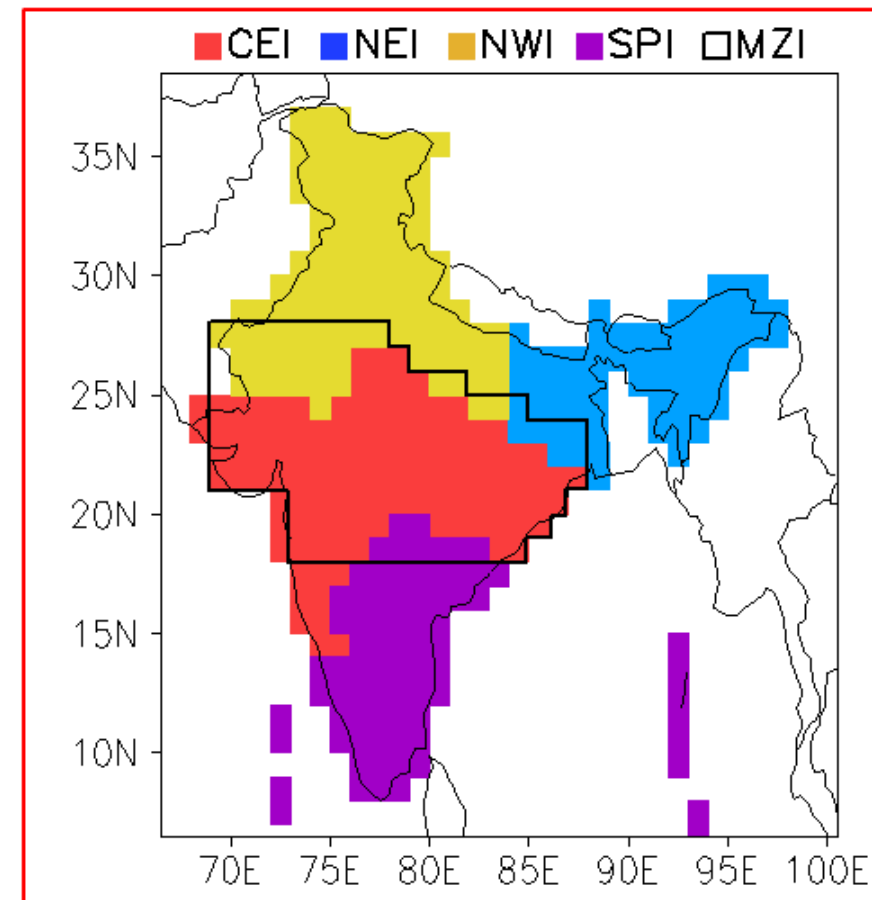
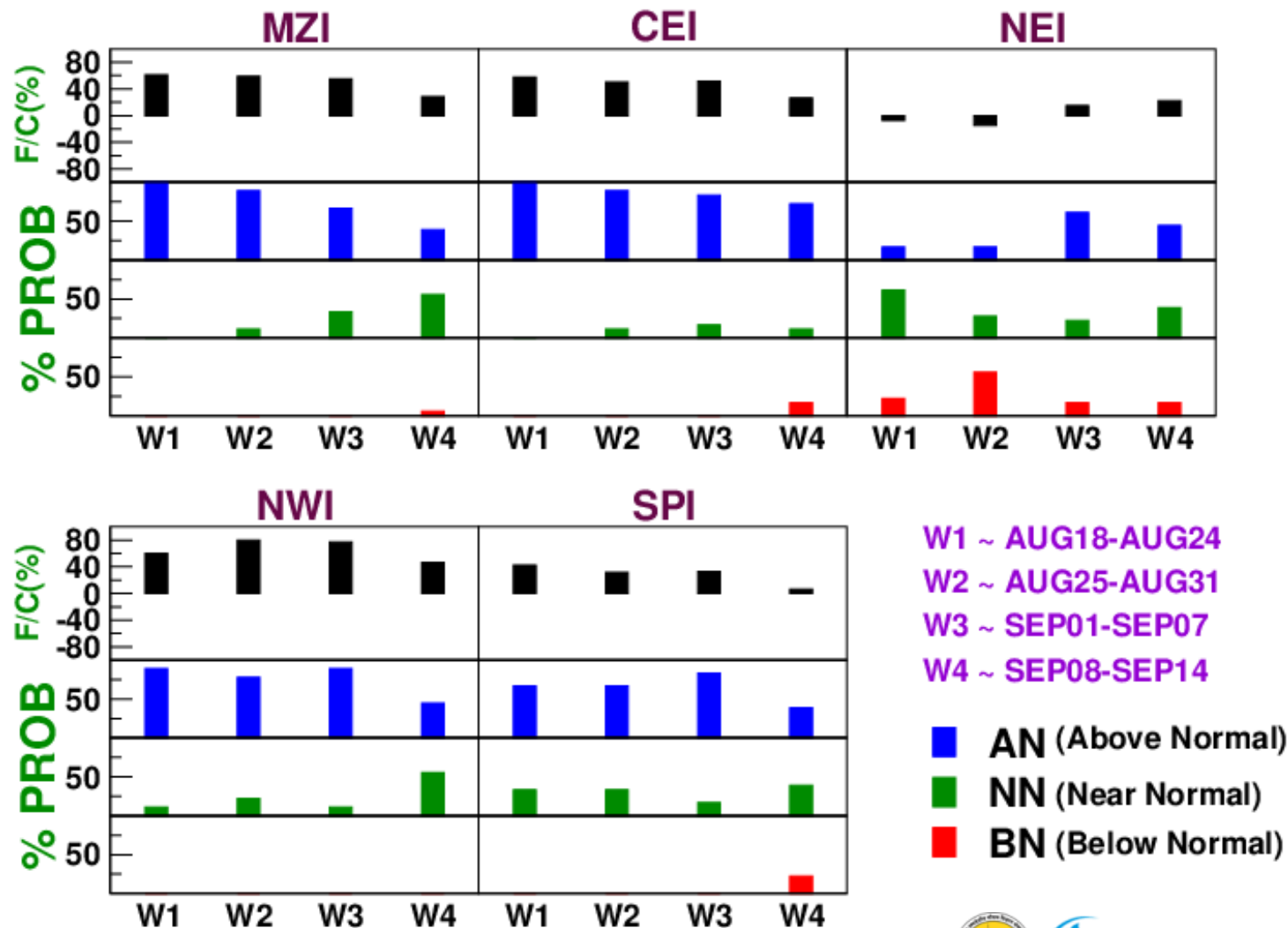
(Week3: 01Sep-07Sep)

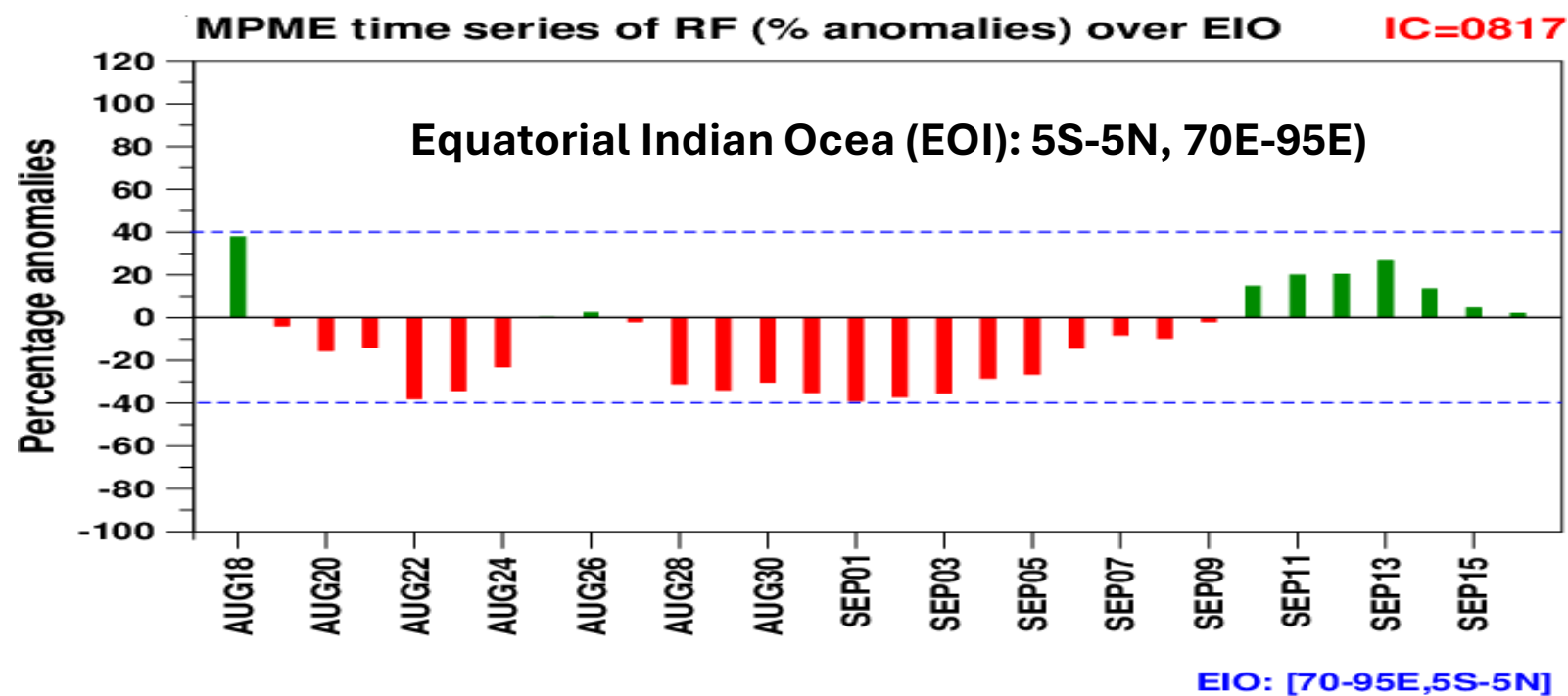
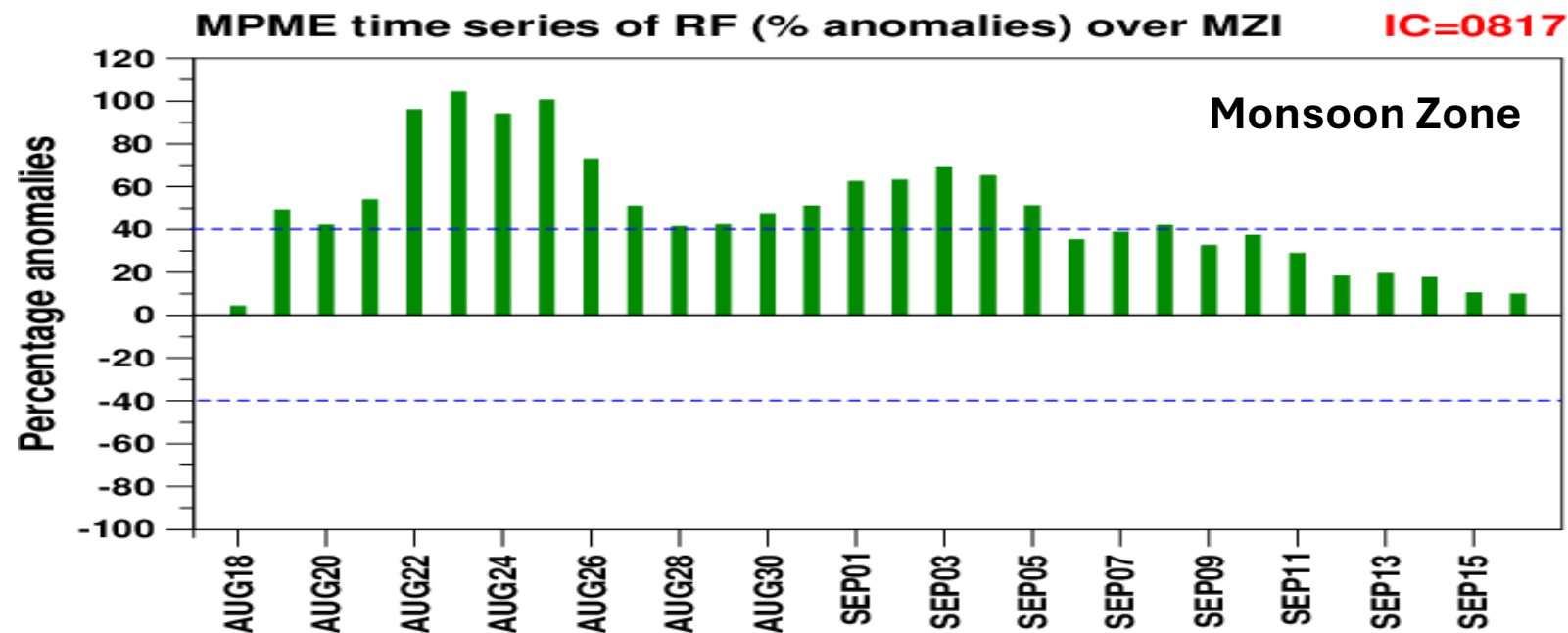
(Week4: 08Sep-14Sep)



Area averaged rainfall over homogeneous regions predicted by MME

Percentage Probability of Occurrence of Forecasted Rainfall





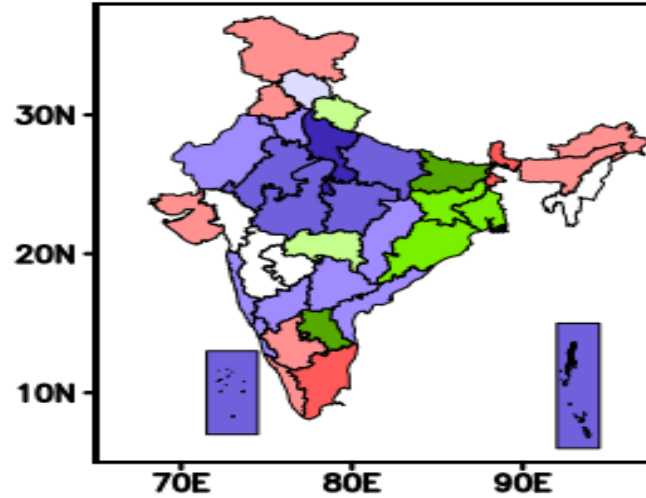
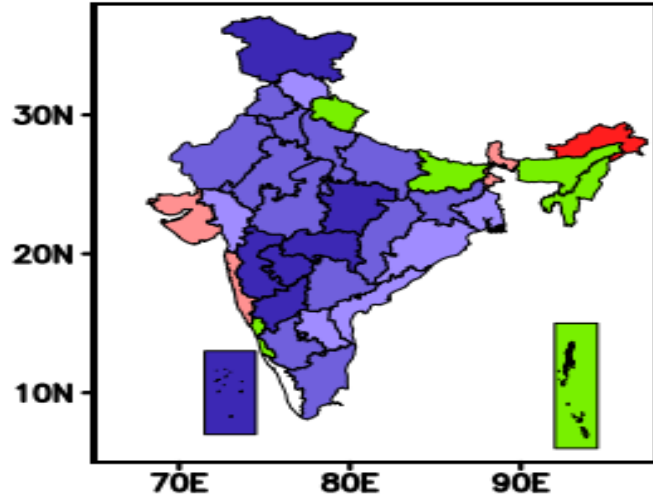
Time series of
Area Averaged
Rainfall
Predicted by
MPME

Subdivisionwise Categorical Rainfall Forecast (%Probability)



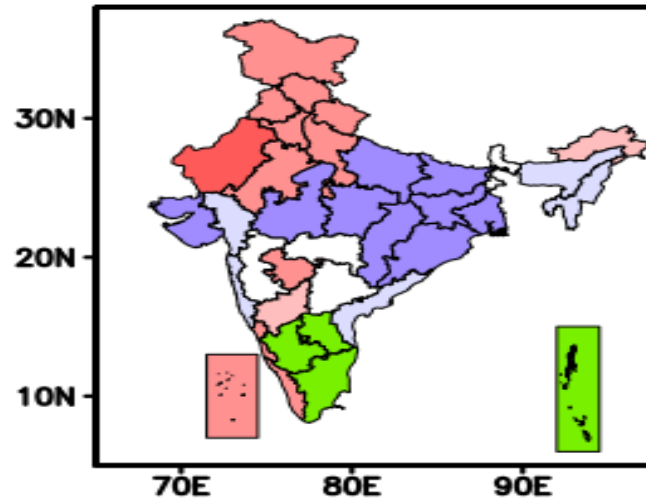
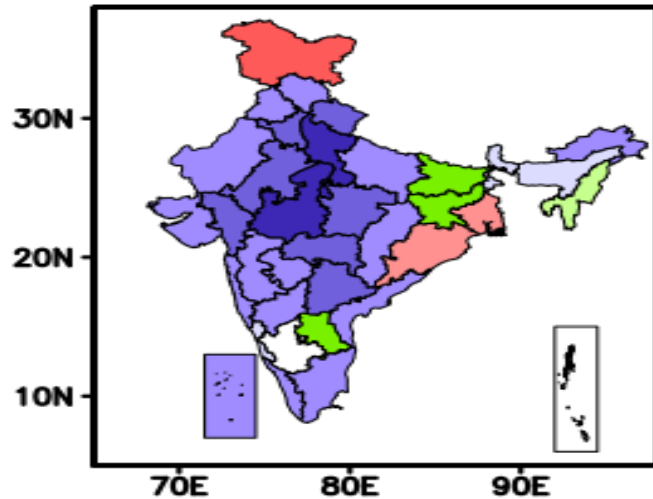
AUG18–AUG24 (WK1) IC:0817

AUG25–AUG31 (WK2)

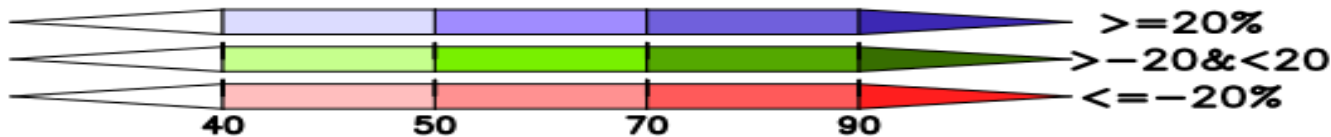


SEP01–SEP07 (WK3)

SEP08–SEP14 (WK4)

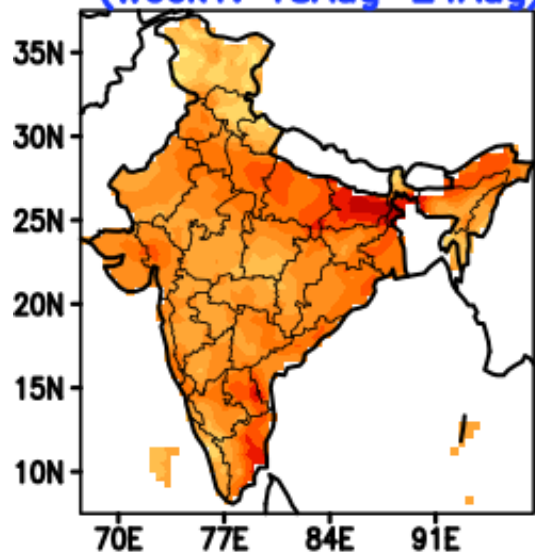


Probability (%) of
Categorical Rainfall
Forecast over Met.
subdivisions

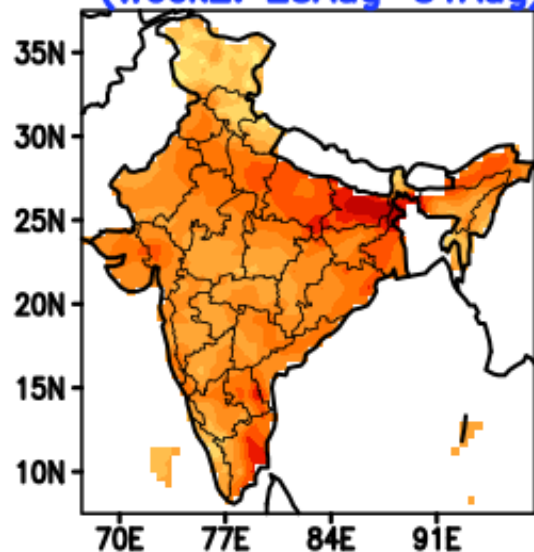


Maximum Temperature Actual (°C) IC=20240817

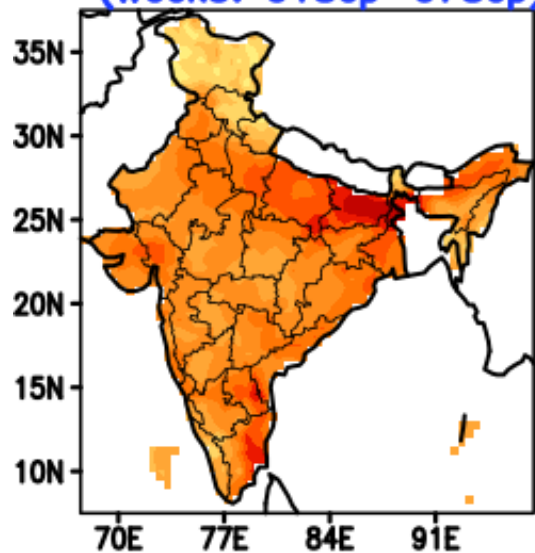
(Week1: 18Aug-24Aug)



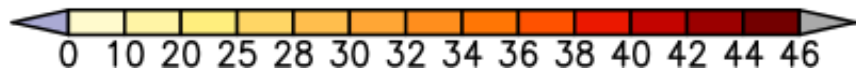
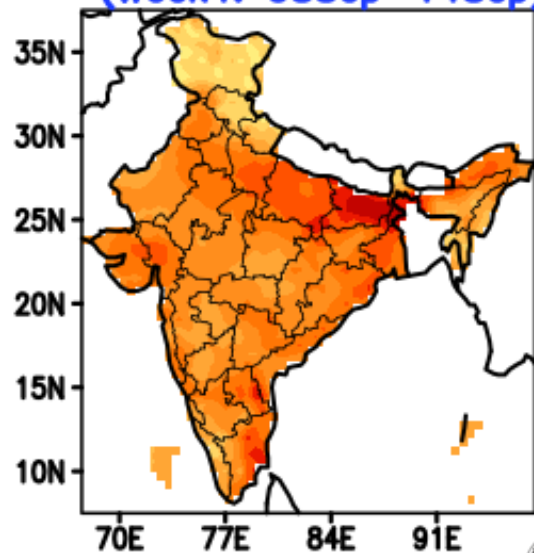
(Week2: 25Aug-31Aug)



(Week3: 01Sep-07Sep)

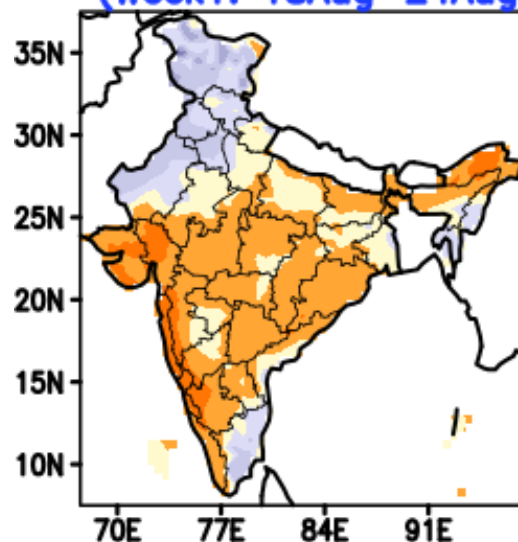


(Week4: 08Sep-14Sep)

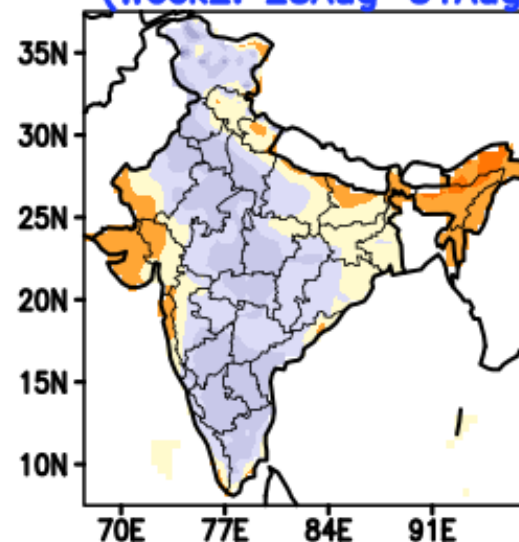


Maximum Temperature Anomaly (°C) IC=20240817

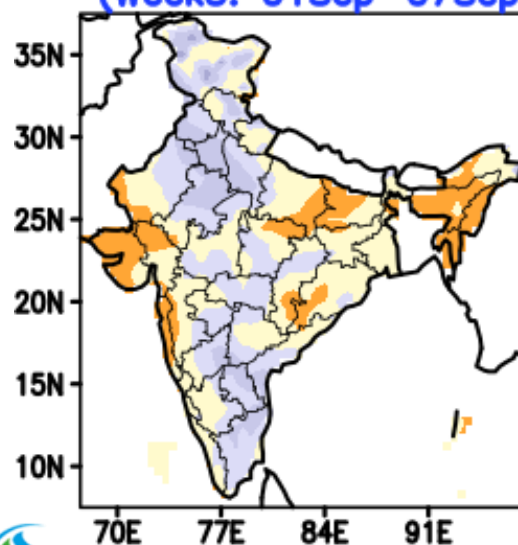
(Week1: 18Aug-24Aug)



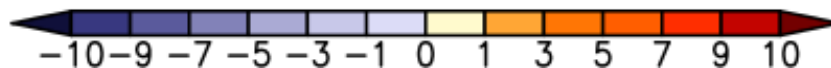
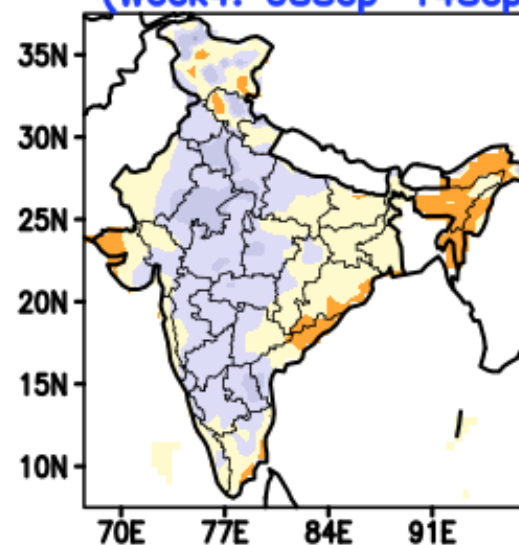
(Week2: 25Aug-31Aug)



(Week3: 01Sep-07Sep)



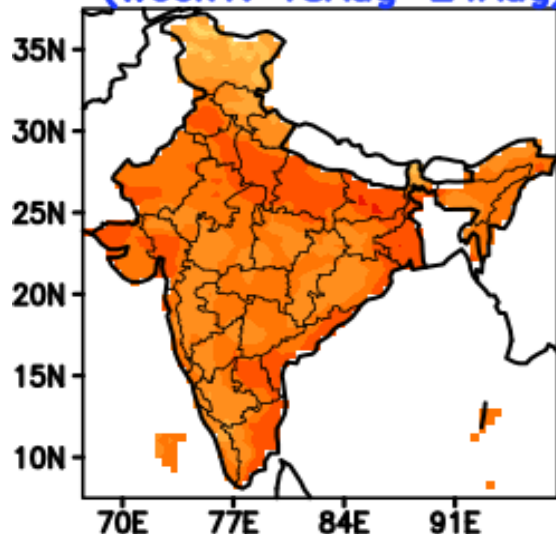
(Week4: 08Sep-14Sep)



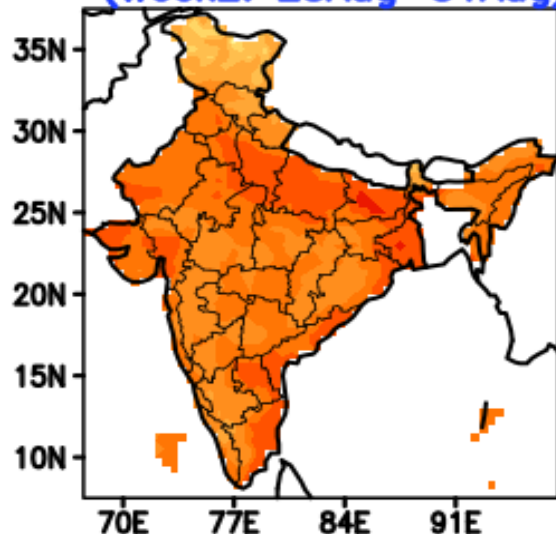
Minimum Temperature Actual (°C) IC=20240817 Minimum Temperature Anomaly (°C) IC=20240817



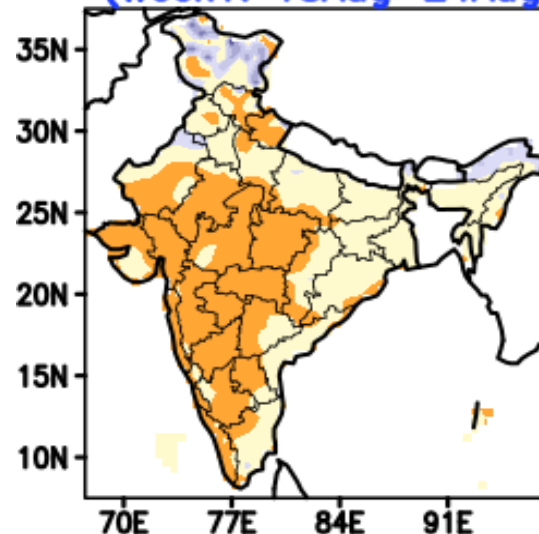
(Week1: 18Aug–24Aug)



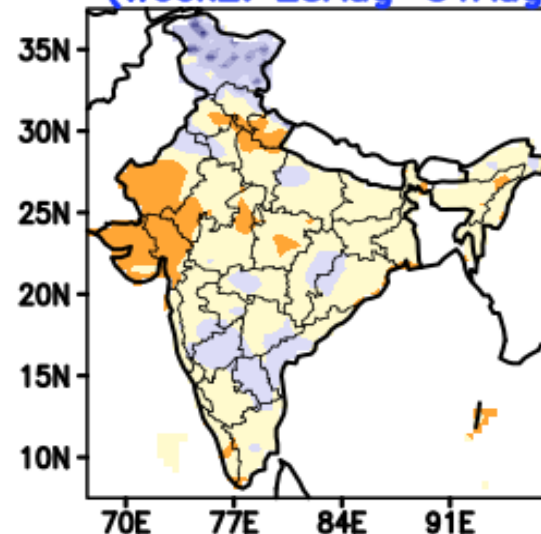
(Week2: 25Aug–31Aug)



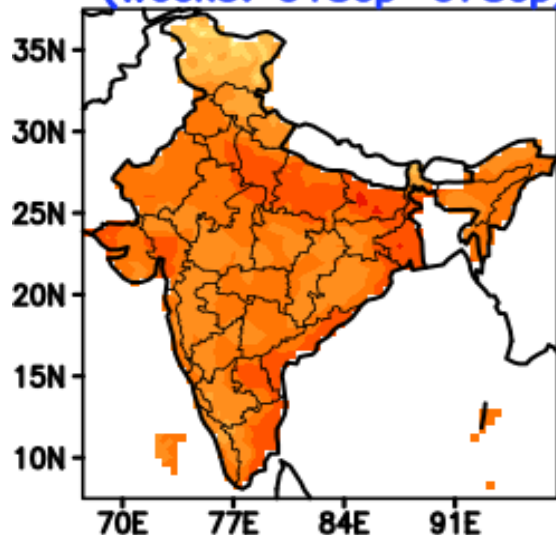
(Week1: 18Aug–24Aug)



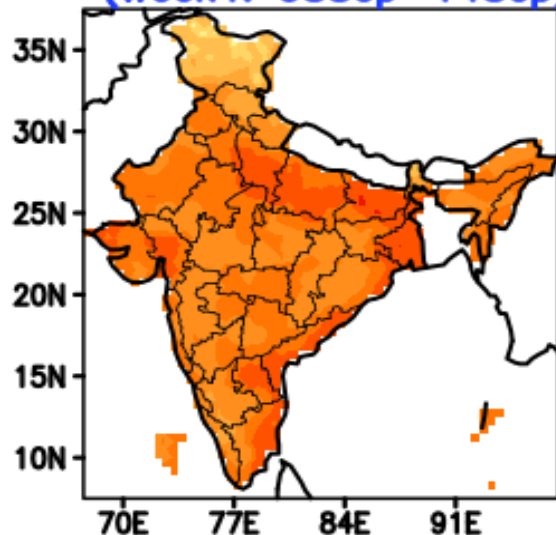
(Week2: 25Aug–31Aug)



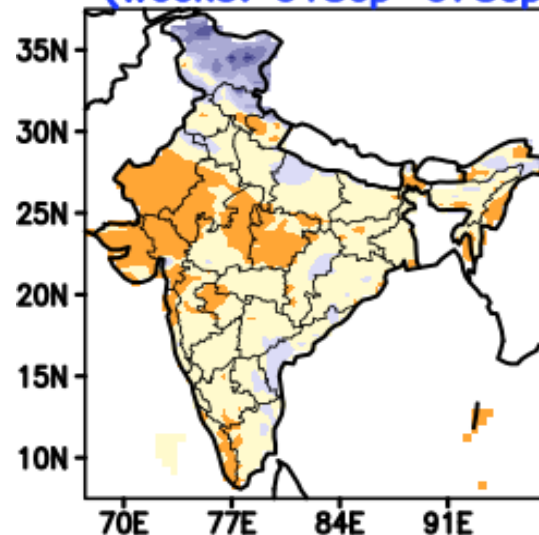
(Week3: 01Sep–07Sep)



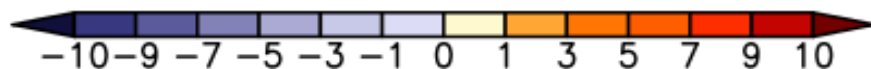
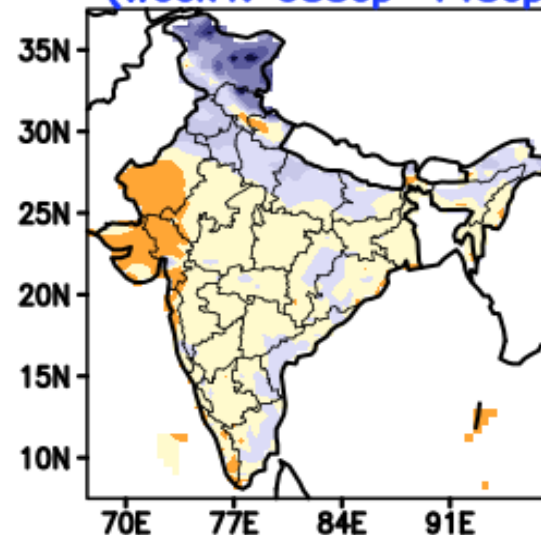
(Week4: 08Sep–14Sep)



(Week3: 01Sep–07Sep)



(Week4: 08Sep–14Sep)



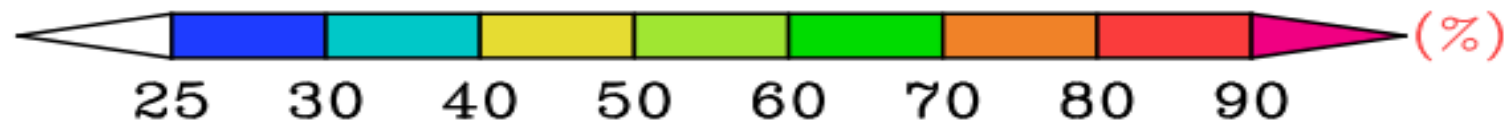
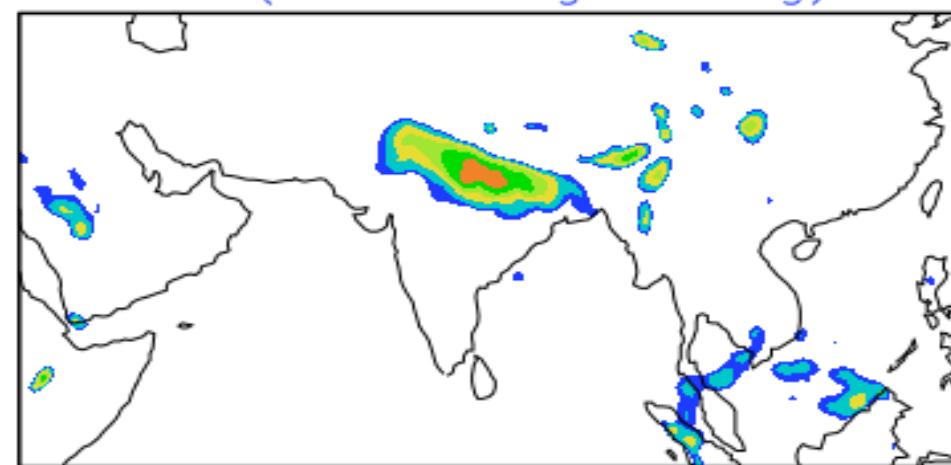
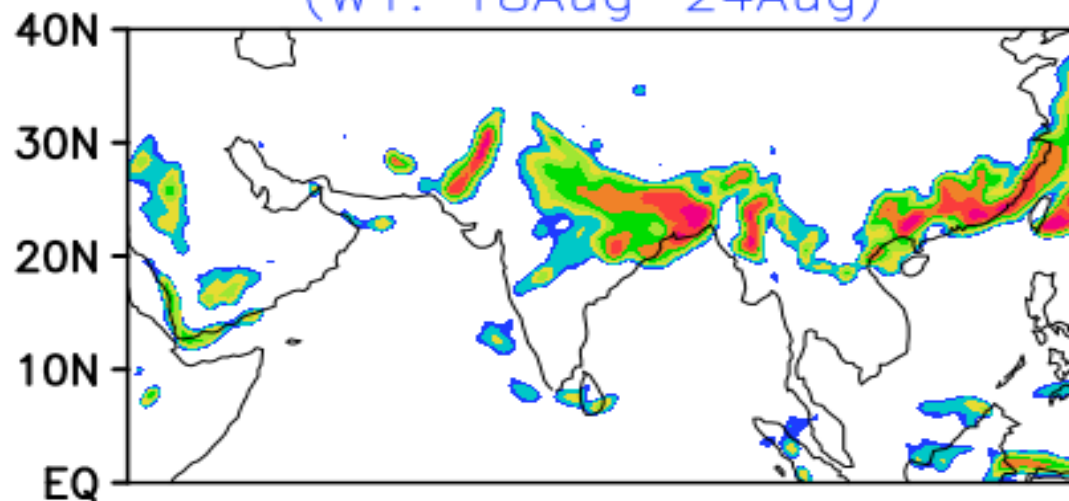


Cyclogenesis & Evolution Probability (%) from MPME-IGPP

Initial Condition : 20240817

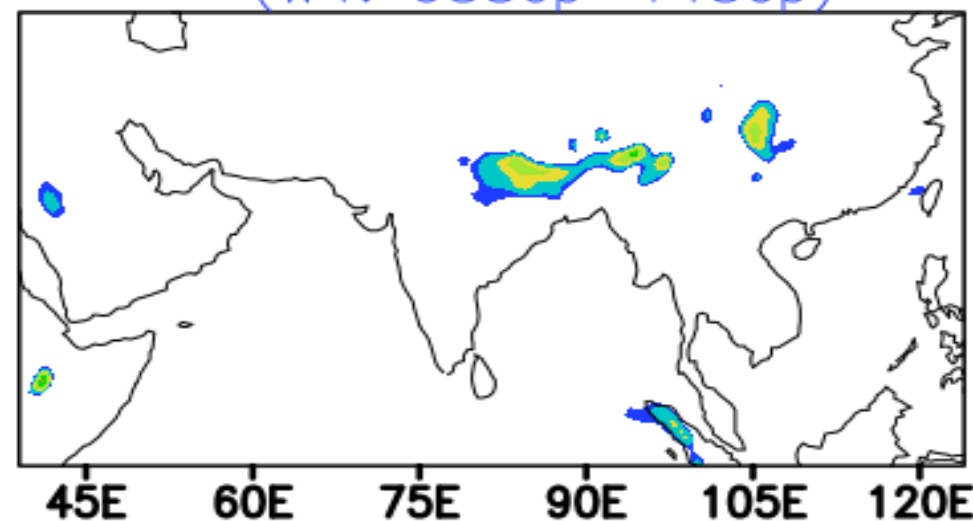
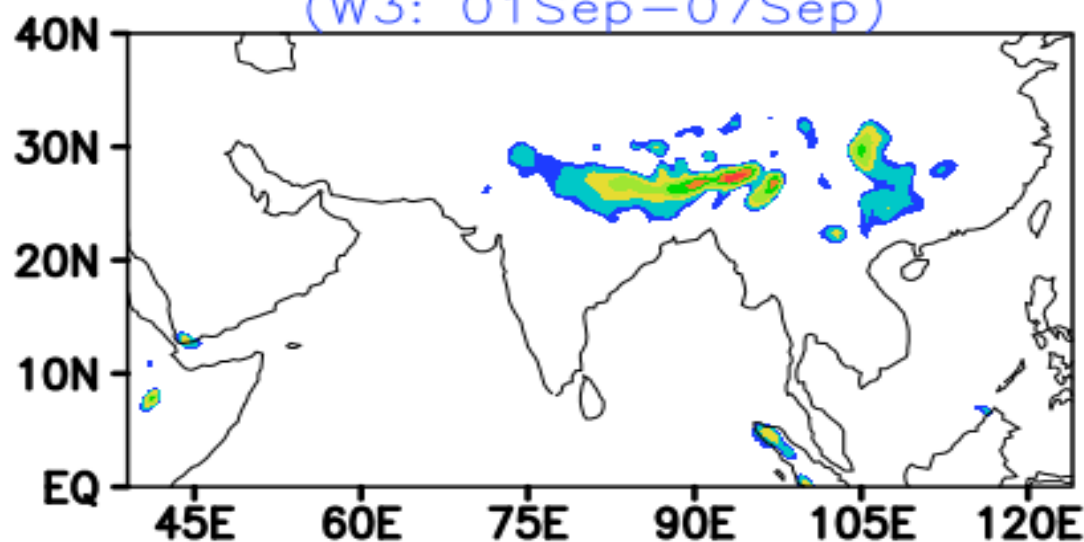
(W1: 18Aug–24Aug)

(W2: 25Aug–31Aug)



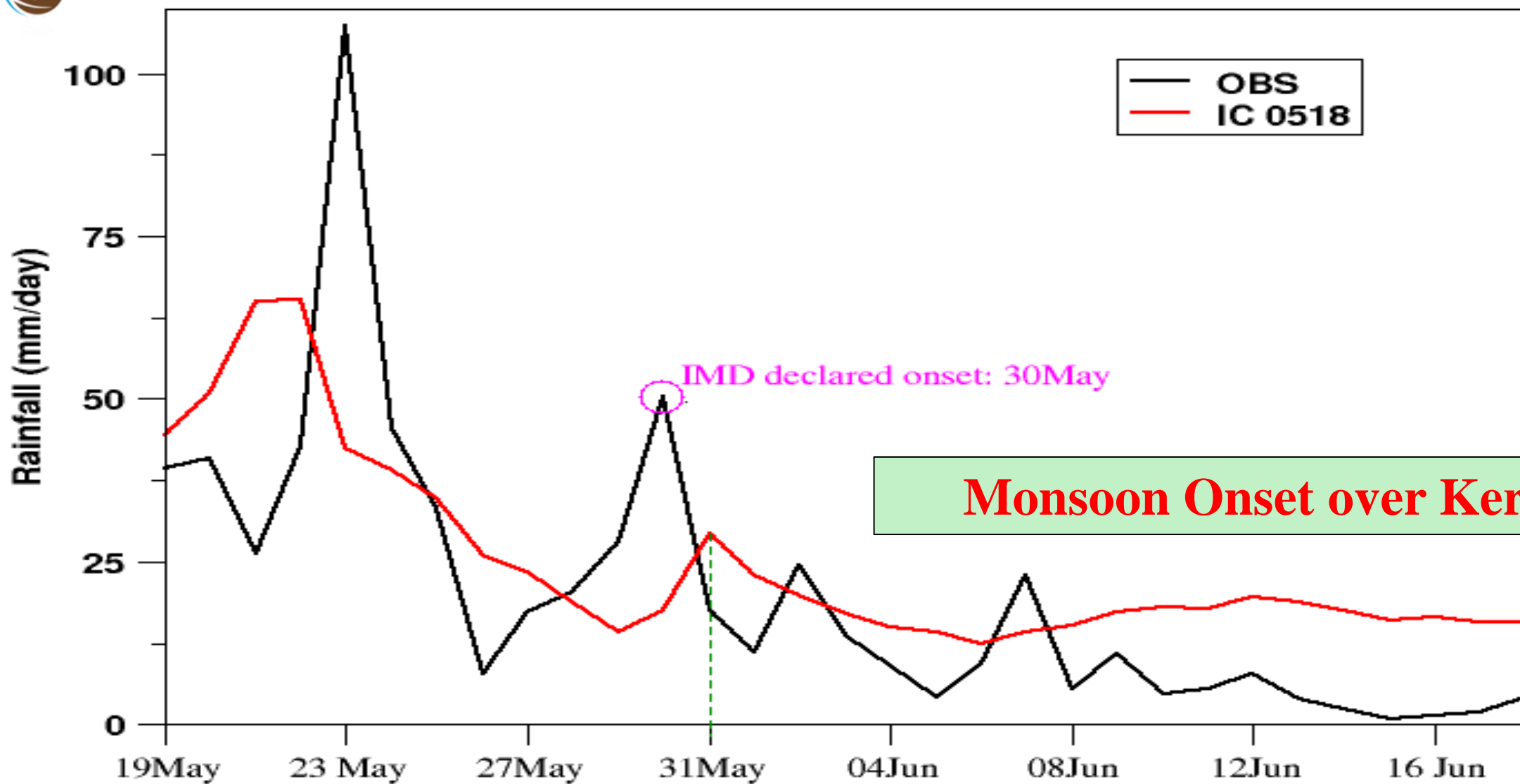
(W3: 01Sep–07Sep)

(W4: 08Sep–14Sep)





Observed and model rainfall (average over 74-78E, 8-12N)



MOK: 30th May 2024 (IMD)

Model indicated onset on 31st May based on 18th May IC



Subdued rainfall during the target weeks

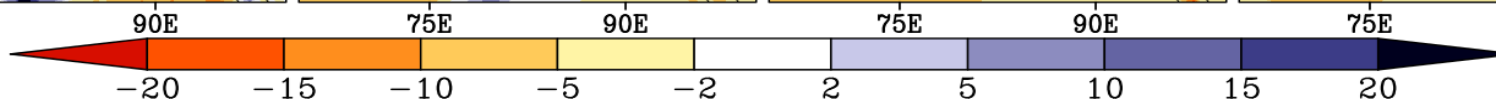
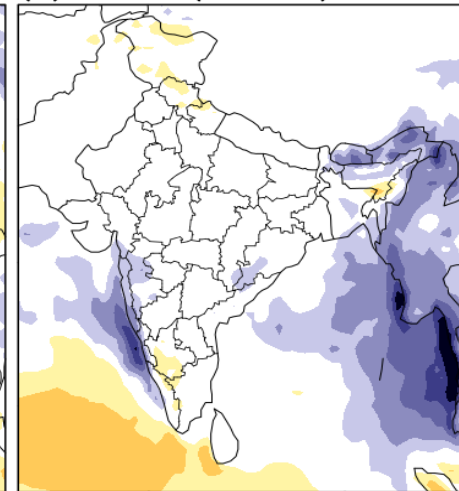
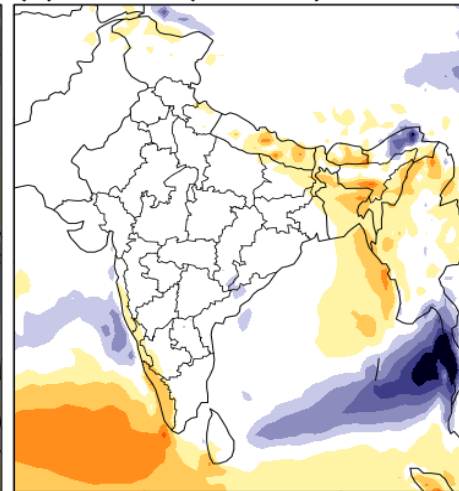
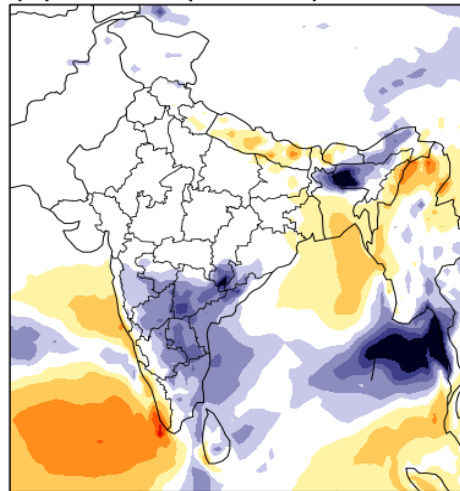
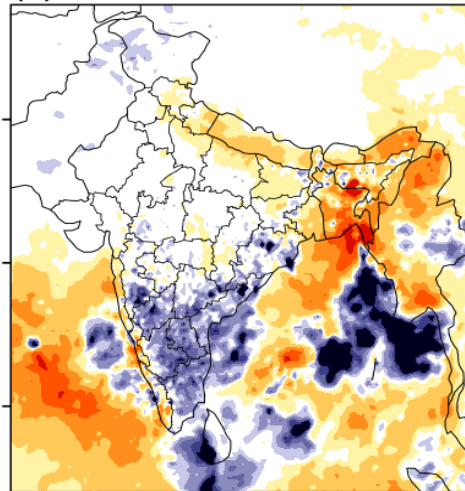
02Jun - 08Jun

(a) OBSERVED

(b) MPME (IC:0601)

(c) MPME (IC:0525)

(d) MPME (IC:0518)



2-8 June

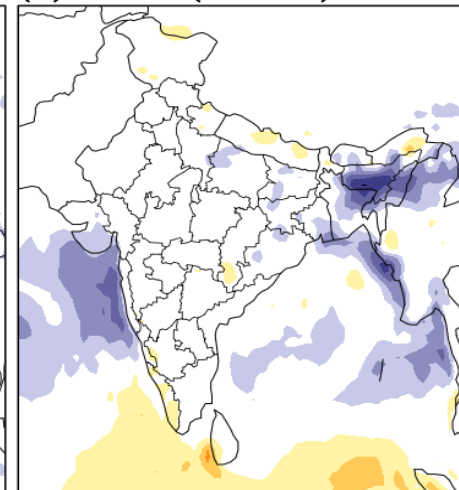
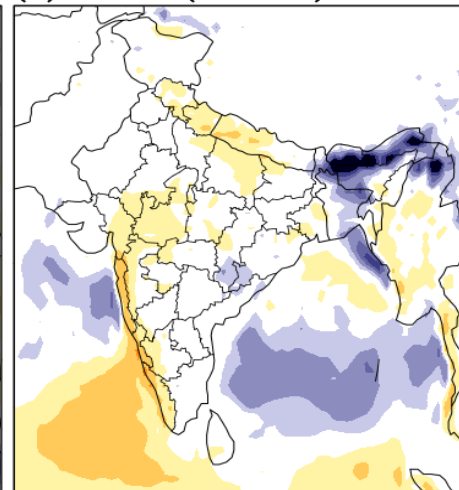
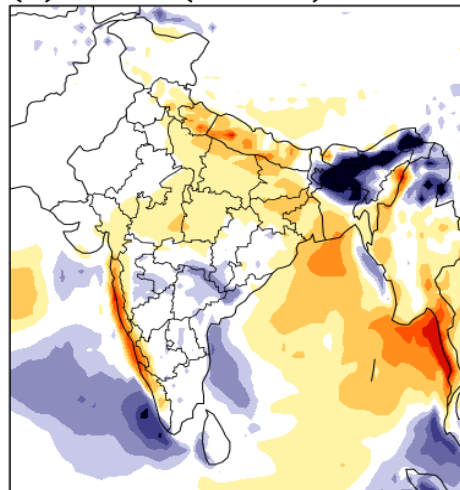
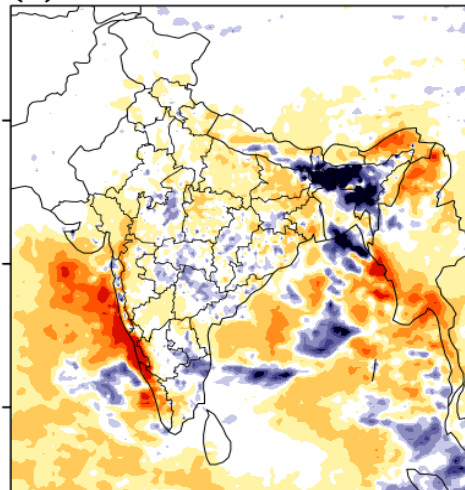
16Jun - 22Jun

(a) OBSERVED

(b) MPME (IC:0615)

(c) MPME (IC:0608)

(d) MPME (IC:0601)



16-22 June



Active phase during the target weeks

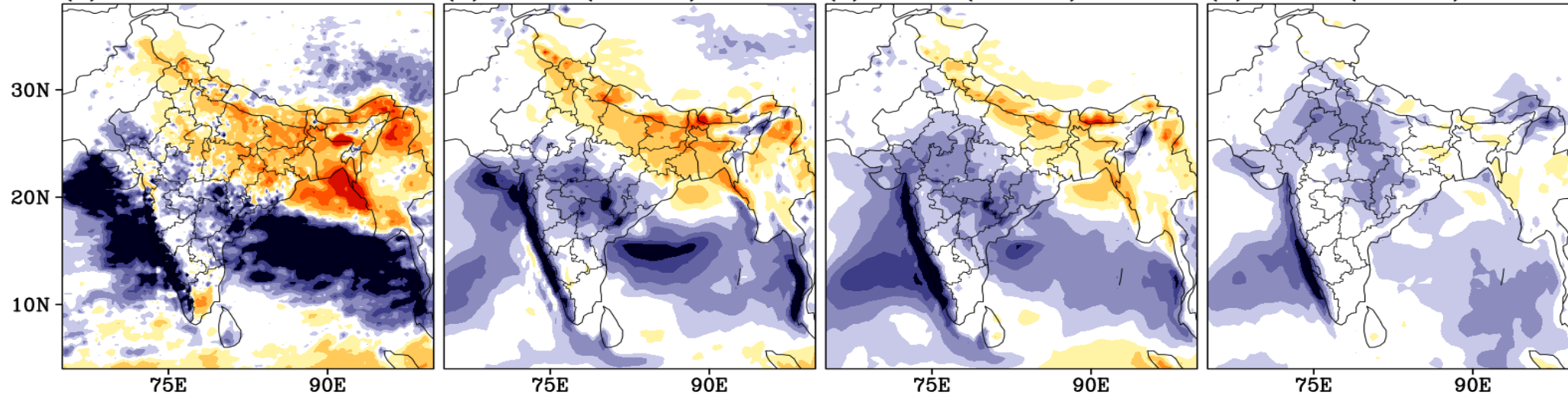
14Jul - 20Jul

(a) OBSERVED

(b) MPME (IC:0713)

(c) MPME (IC:0706)

(d) MPME (IC:0629)



Revival

14-20 July

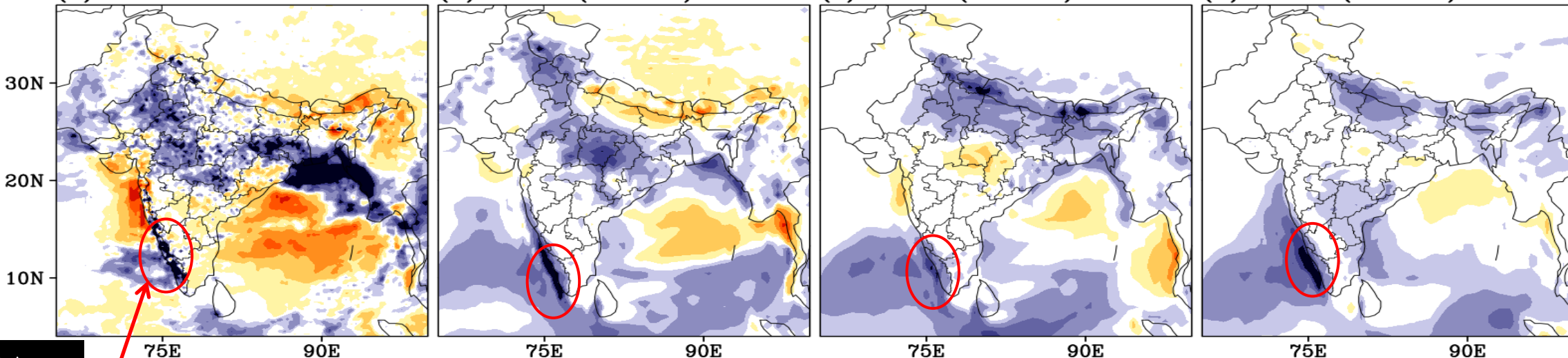
28Jul - 03Aug

(a) OBSERVED

(b) MPME (IC:0727)

(c) MPME (IC:0720)

(d) MPME (IC:0713)



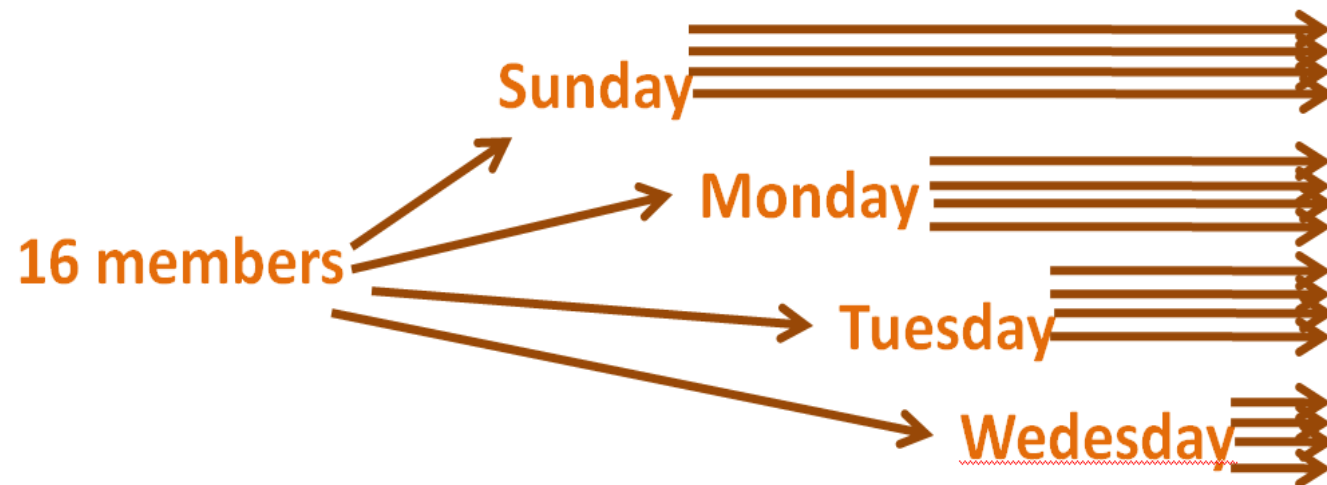
28Jul-03Aug

Waynad incident: 29-30 July



NCMRWF ERPS

- 2018: Up to 4-week forecasts, every week
- NCMRWF Coupled Model Runs with 60 km (NCUM) and 25 km (NEMO)
- **Model Climatology** 23 years (1993-2015) Hindcast data used
- **Ensemble Strategy:** lagged ICs + stochastic physics
- **7 members hindcast.** Hindcasts initialized on 1st, 9th, 17th & 25th of each month.
- **16 members forecast ERP:** 4 members per day. 4-startdates.



Forecast Preparation Date:

Thursday



Validity: Friday-Thursday
Upto 4-weeks



Extended Range Forecasts NCMRWF Coupled Model Runs

Issued on 15 Aug 2024

NCMRWF Extended Range Forecasts: 20240815

Precipitation (mm/day)

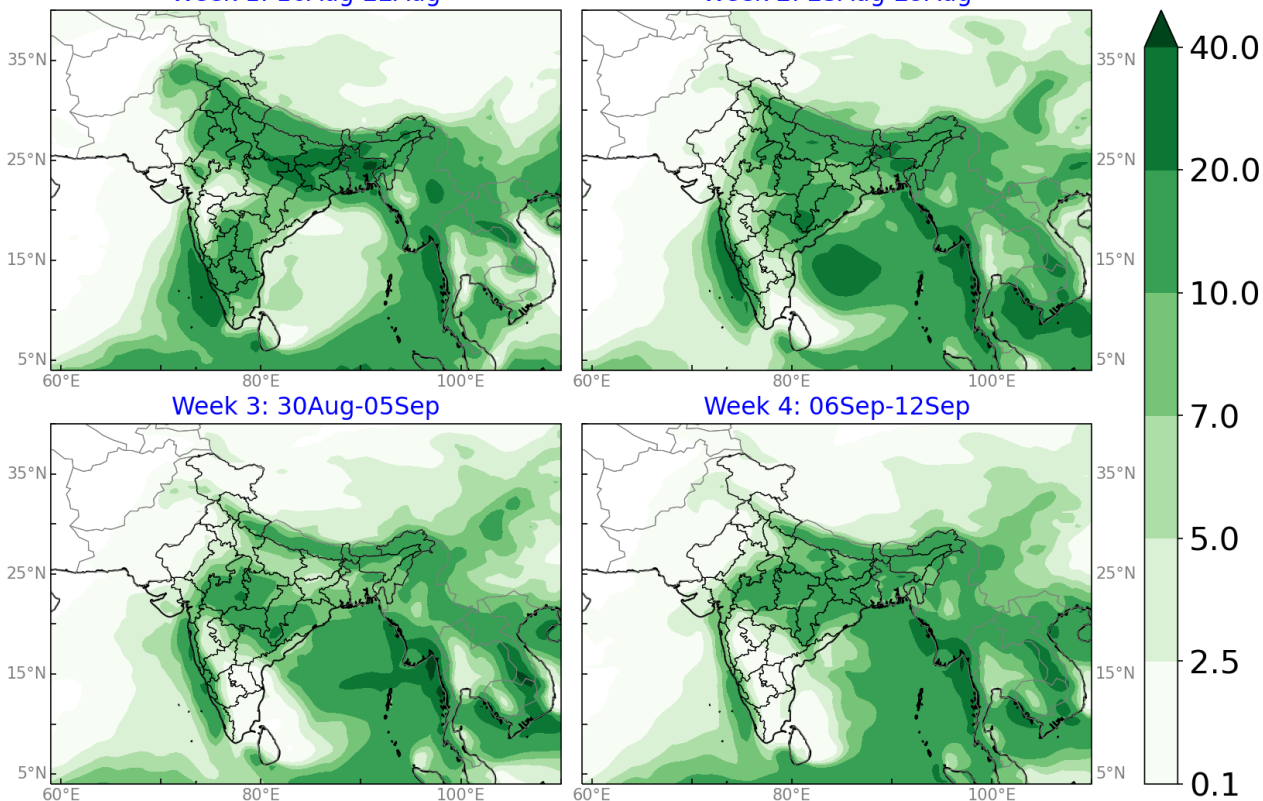


Week 1: 16Aug-22Aug

Week 2: 23Aug-29Aug

Week 3: 30Aug-05Sep

Week 4: 06Sep-12Sep



NCMRWF Extended Range Forecasts: 20240815

Precipitation Anomaly (mm/day)

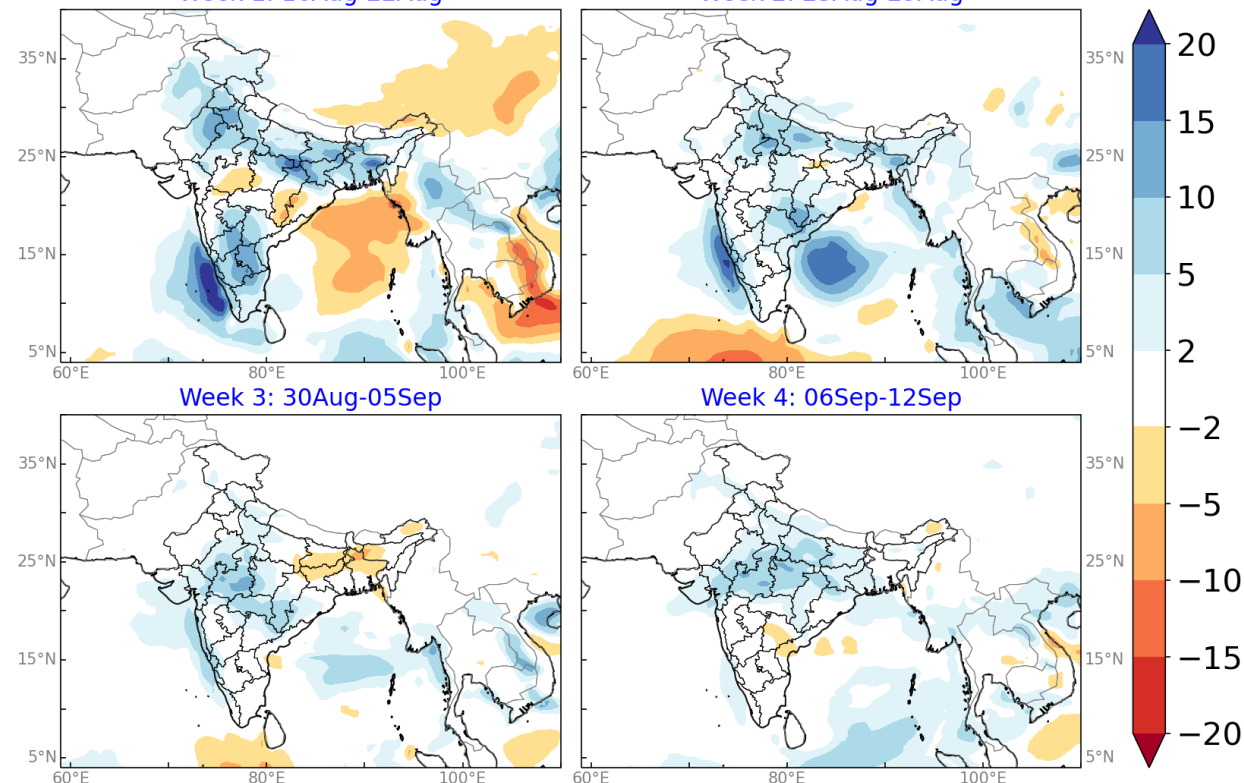


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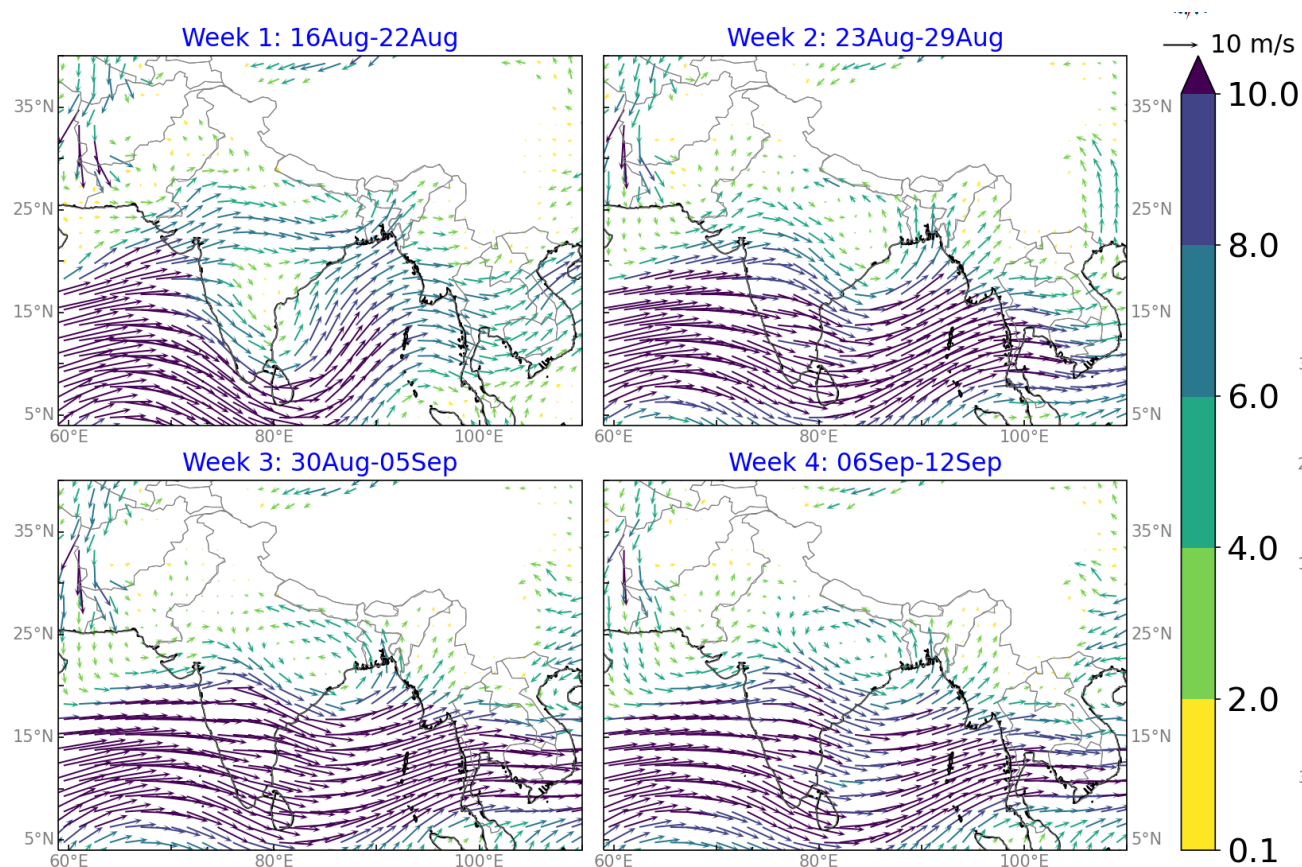




Extended Range Forecasts NCMRWF Coupled Model Runs

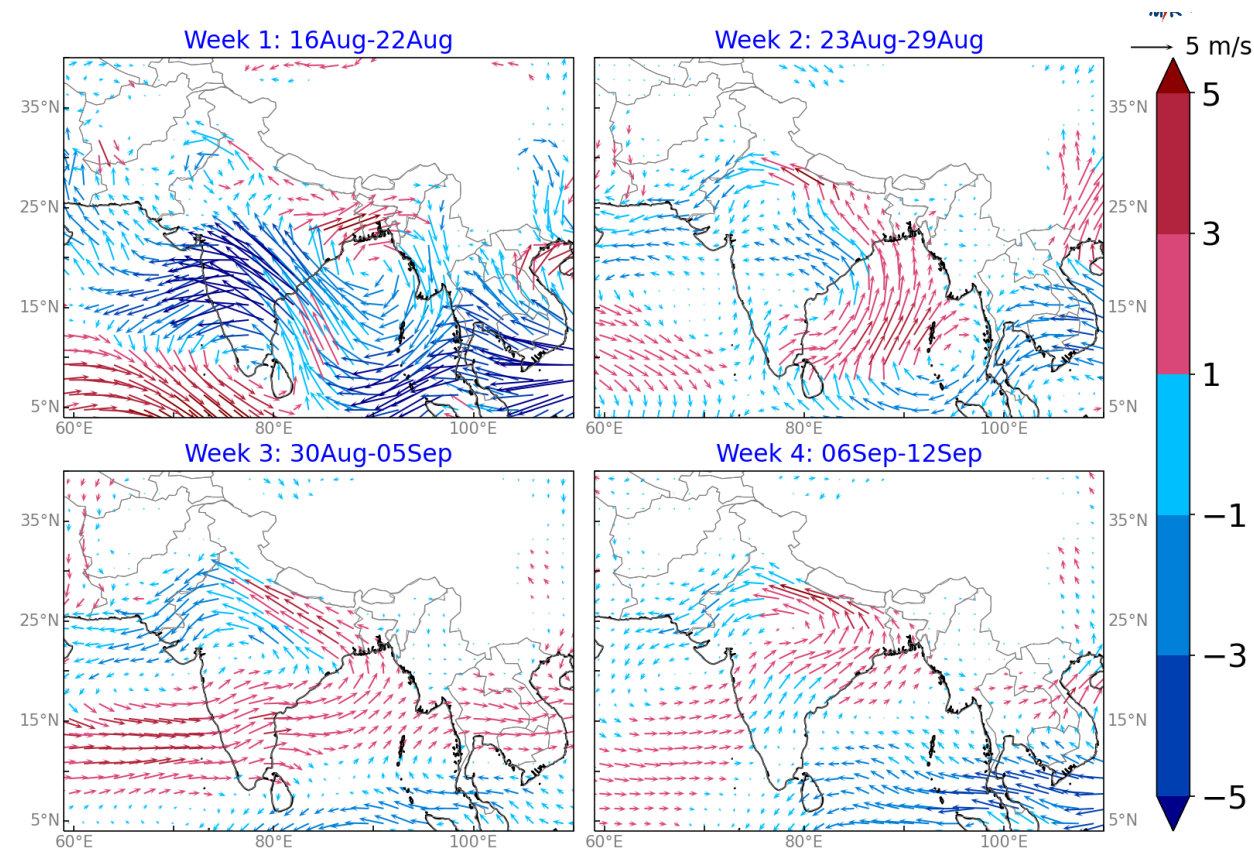
Issued on 15 Aug 2024

850 hPa winds (m/s)



Full-field and anomalies of Winds at 700 hPa, 500 hPa and 200hPa are also prepared

850 hPa wind anomaly (m/s)





Extended Range Forecasts NCMRWF Coupled Model Runs

Issued on 15 Aug 2024



NCMRWF Extended Range Forecasts: 20240815 Tmax Anomaly (deg C)

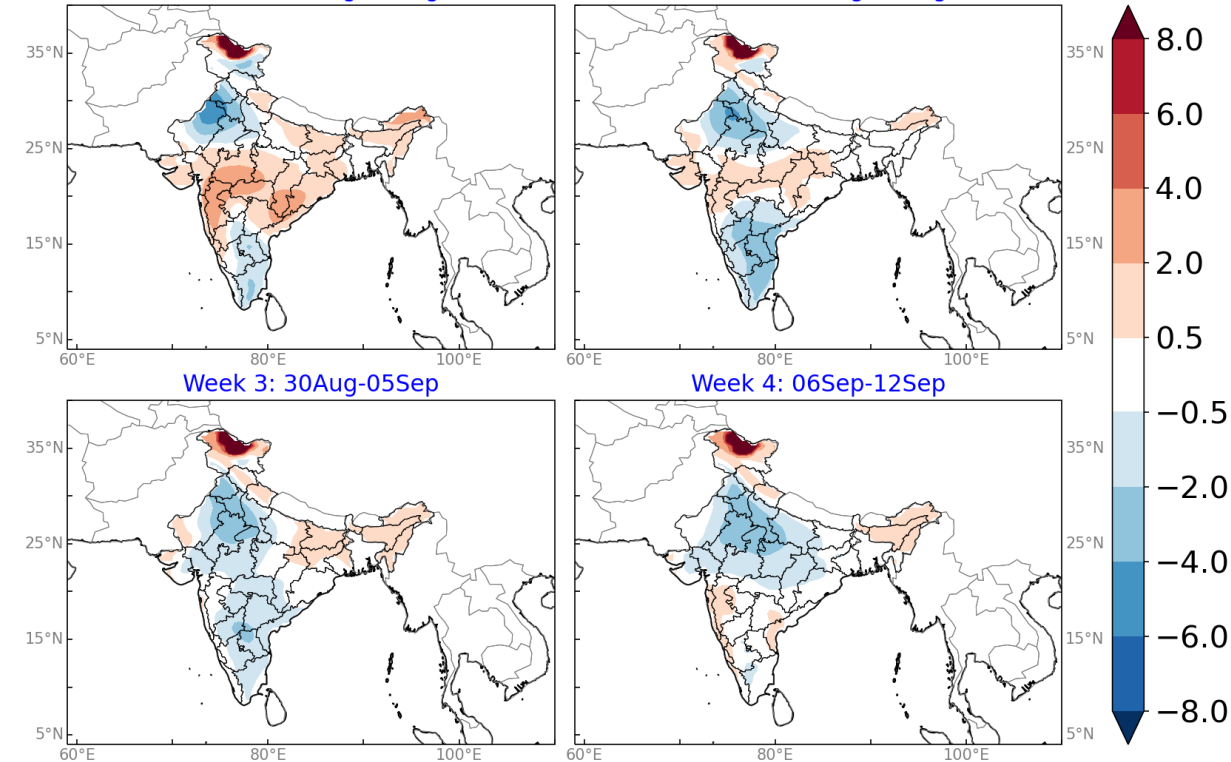


Week 1: 16Aug-22Aug

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Week 3: 30Aug-05Sep

Week 4: 06Sep-12Sep



NCMRWF Extended Range Forecasts: 20240815 Tmin Anomaly (deg C)

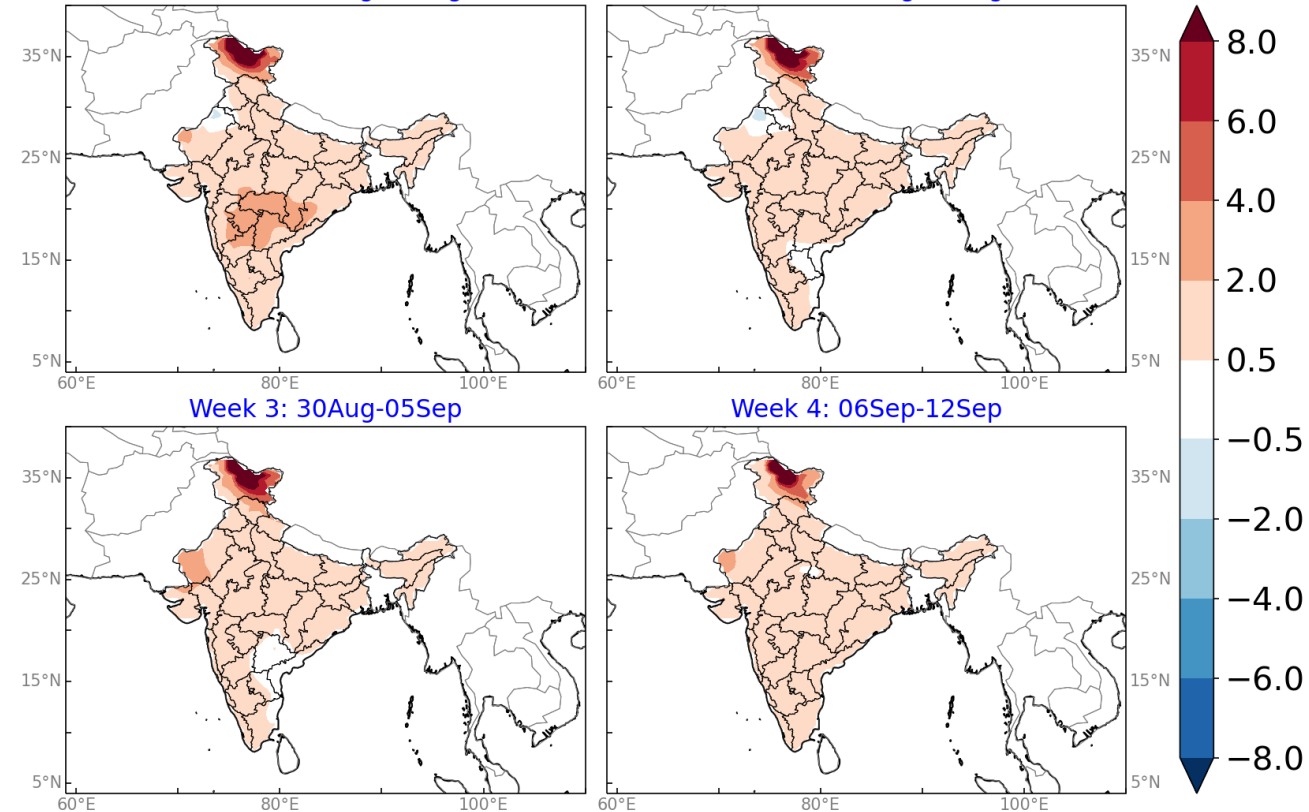


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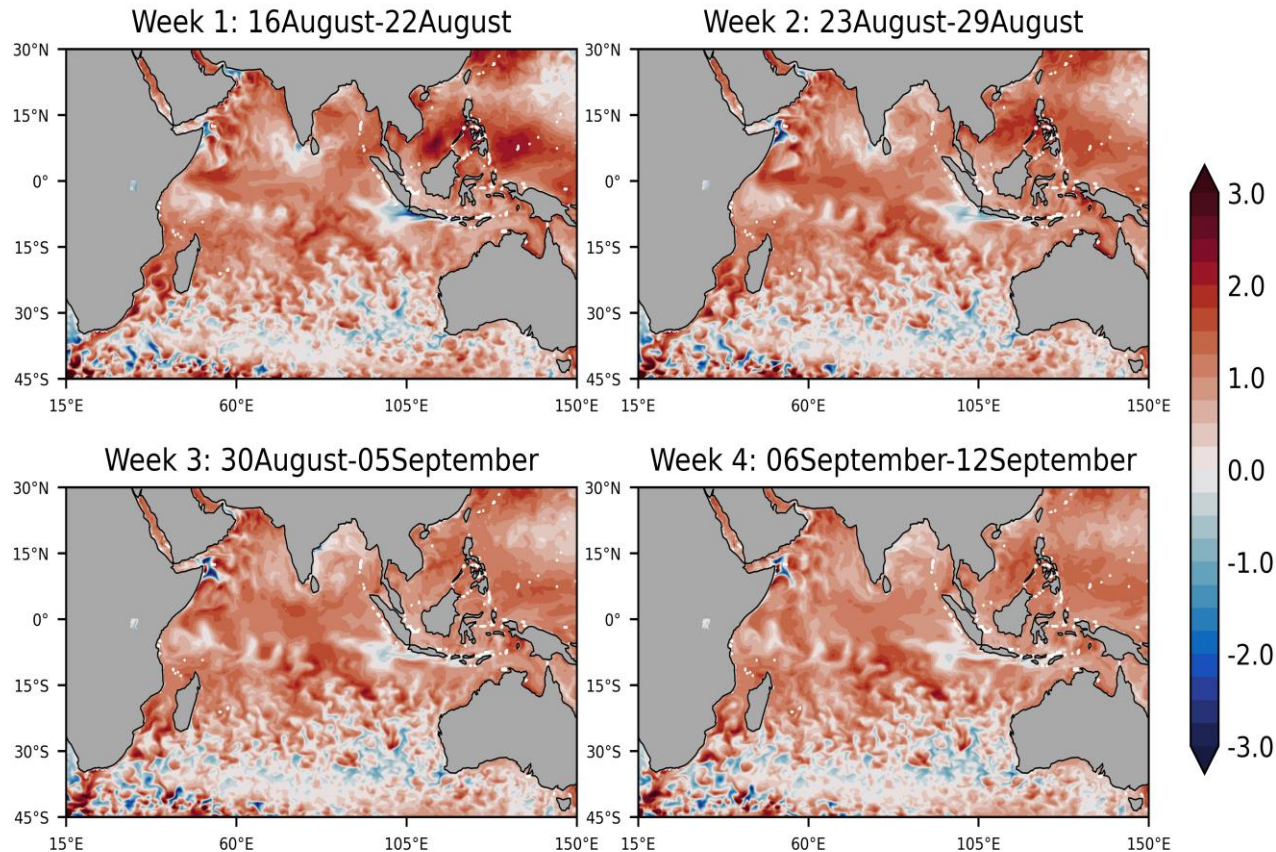


Extended Range Polar & Ocean Forecasts: NEMO/ORCA25

Issued on 15 Aug 2024



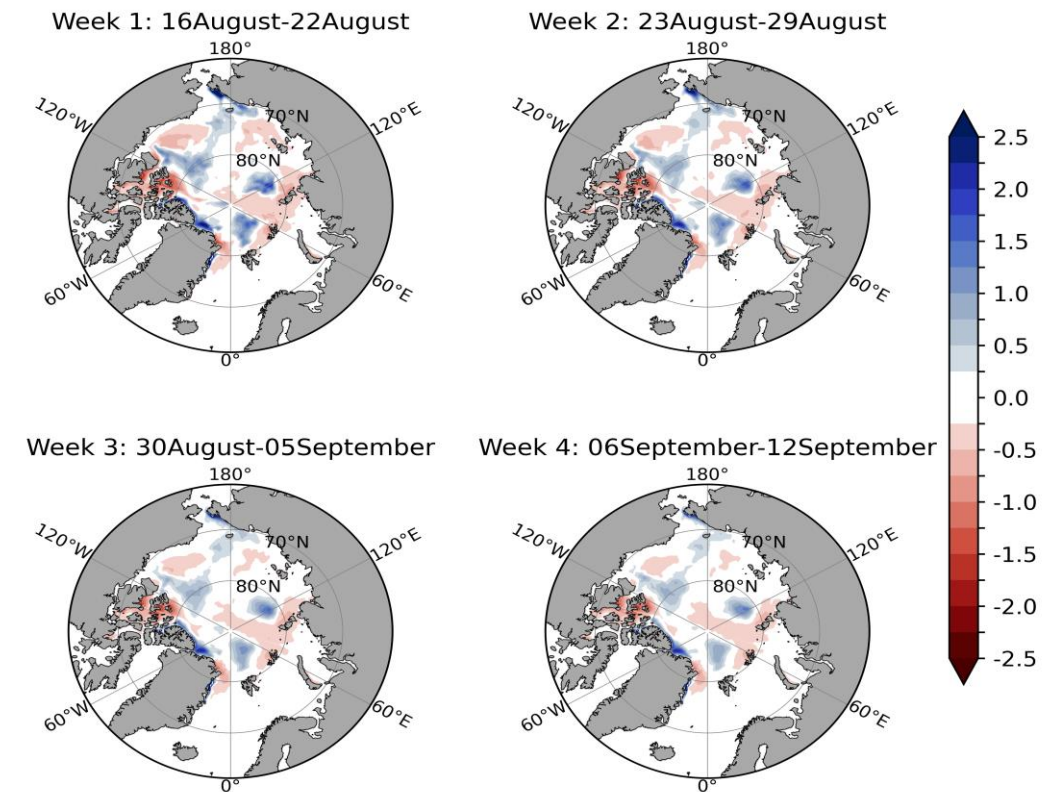
NCMRWF CNCUM Extended Range Forecast Issued on 15Aug2024
Sea Surface Temperature ($^{\circ}\text{C}$) Anomaly



Indian Ocean Products: Full fields and anomaly

- SST, SSS, MLD, SSH & Ocean Currents

NCMRWF CNCUM Extended Range Forecast Issued on 15Aug2024
Sea Ice Thickness (m) Anomaly



Polar Products: Over Both Arctic and Antarctic

- Sea Ice Thickness
- Sea Ice Area/concentration
- Sea Ice Velocity



Monthly (4-week mean) outlook based on NCMRWF ERP

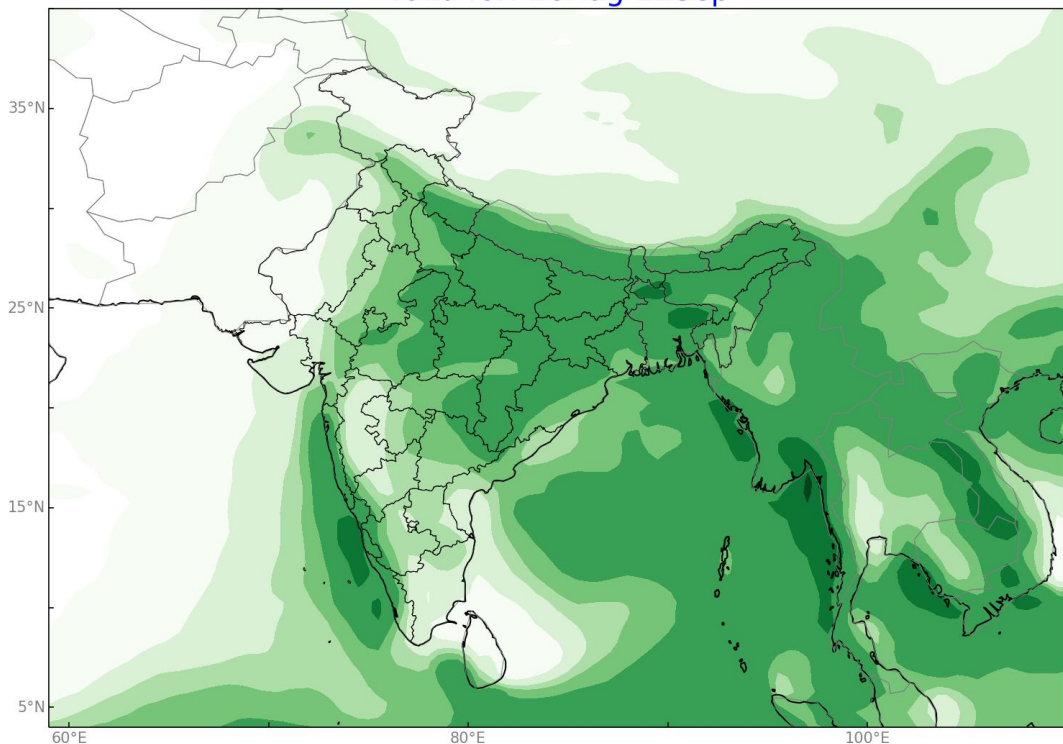
Issued on 15 Aug 2024



NCMRWF Extended Range Forecasts: 20240815

Precipitation (mm/day)

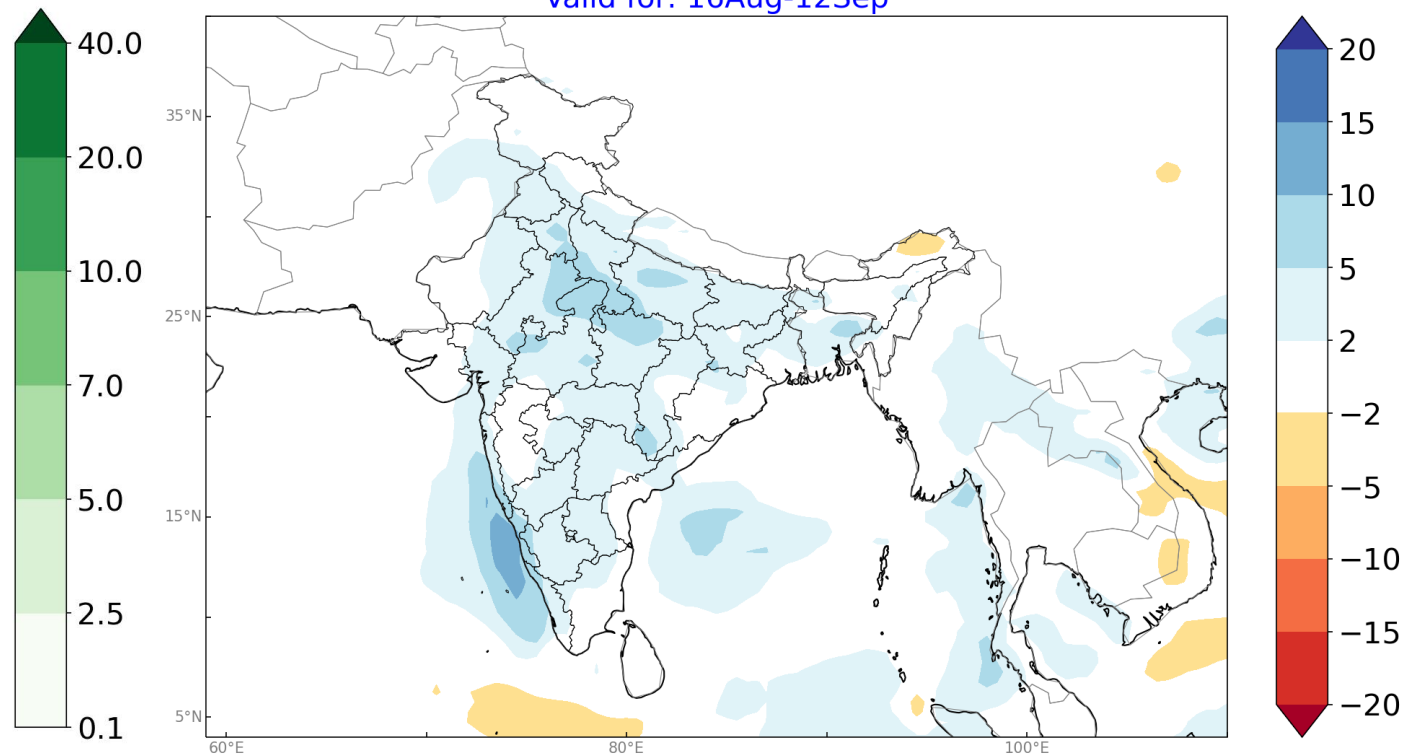
Valid for: 16Aug-12Sep



NCMRWF Extended Range Forecasts: 20240815

Precipitation Anomaly (mm/day)

Valid for: 16Aug-12Sep





Monthly (4-week mean) outlook based on NCMRWF ERP

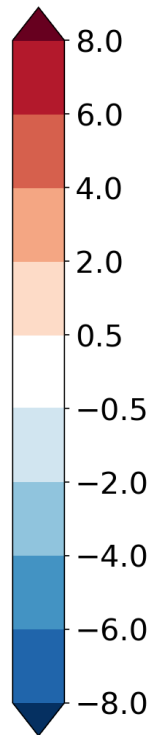
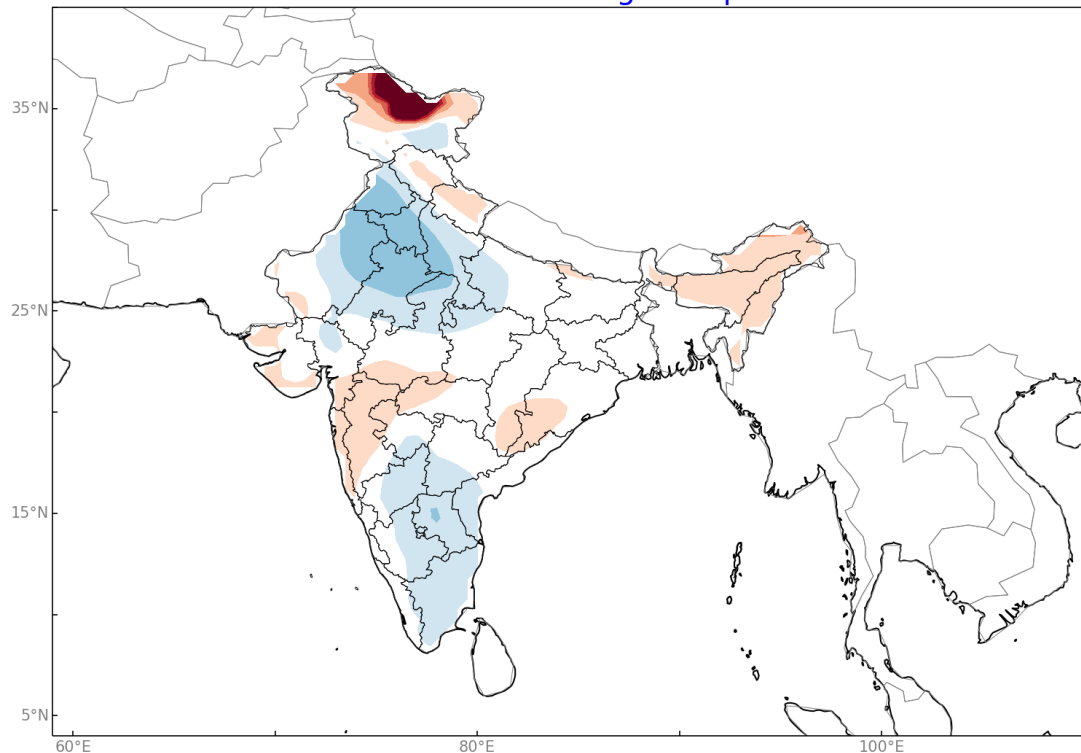
Issued on 15 Aug 2024



NCMRWF Extended Range Forecasts: 20240815

Tmax Anomaly (deg C)

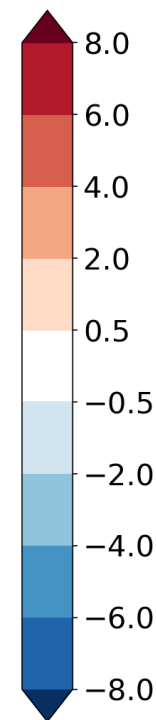
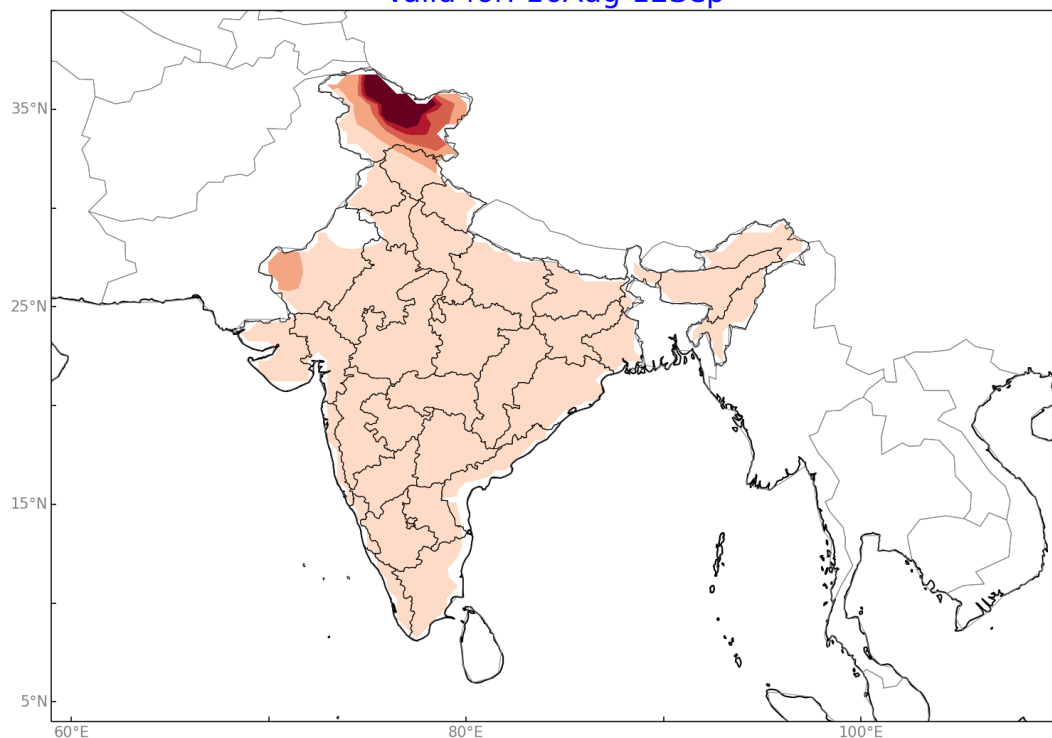
Valid for: 16Aug-12Sep



NCMRWF Extended Range Forecasts: 20240815

Tmin Anomaly (deg C)

Valid for: 16Aug-12Sep

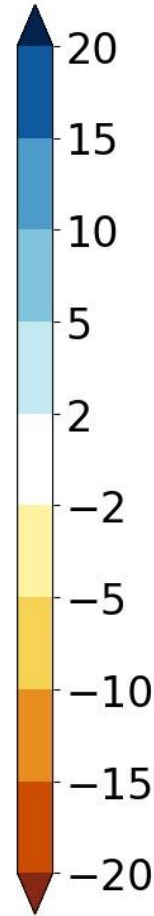
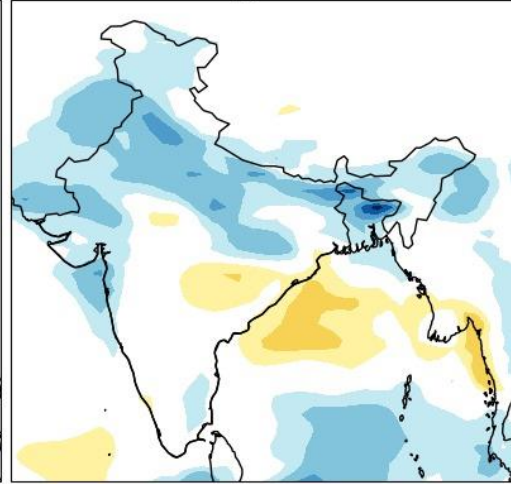
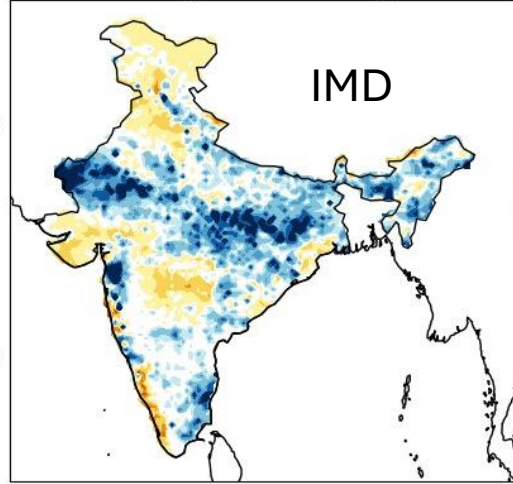




NCMRWF- ERP Verification

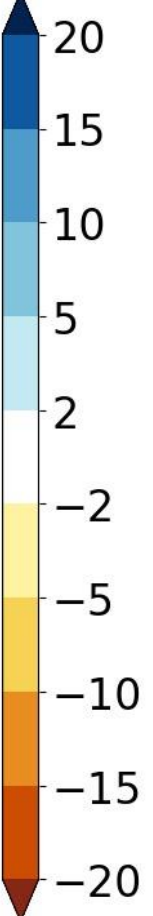
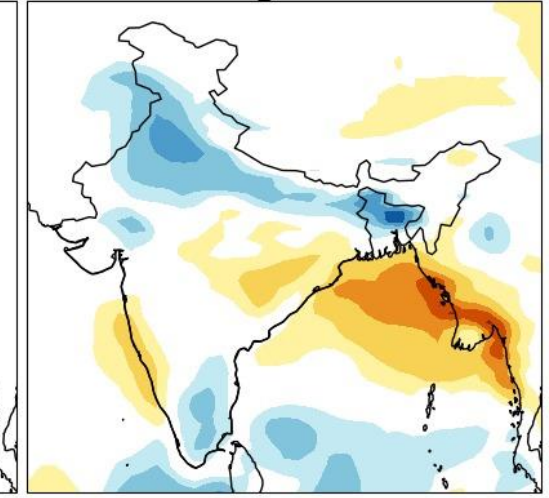
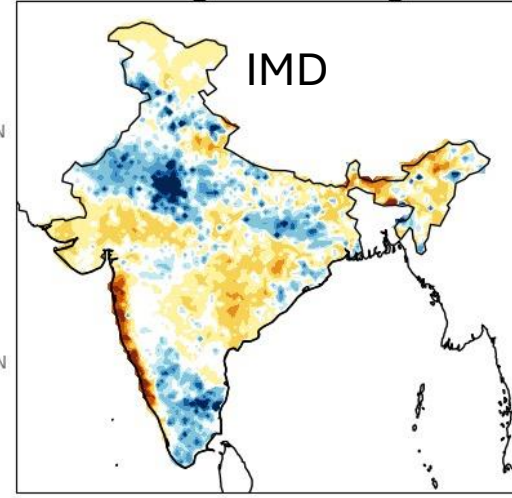
02-Aug'24-08-Aug'24

IC: 01-Aug'24 Week-1



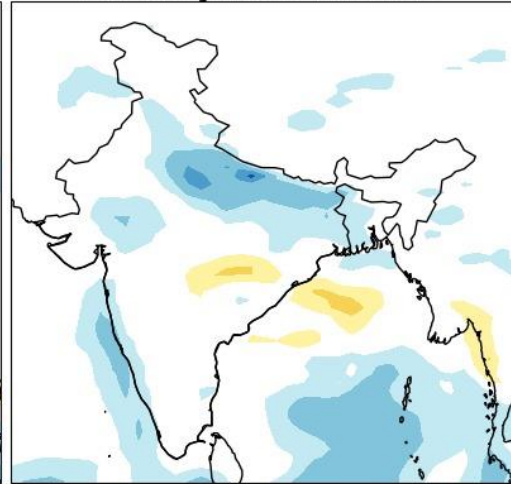
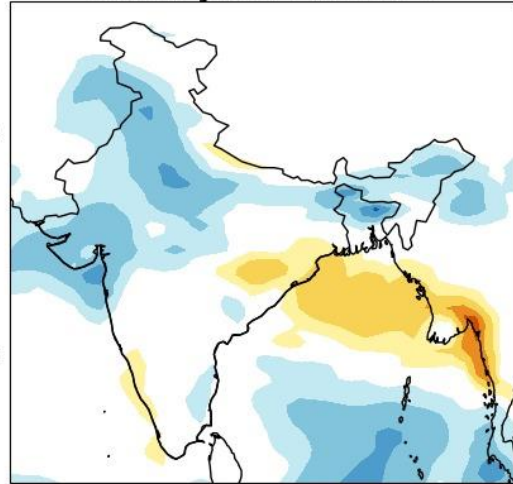
09-Aug'24-15-Aug'24

IC: 08-Aug'24 Week-1



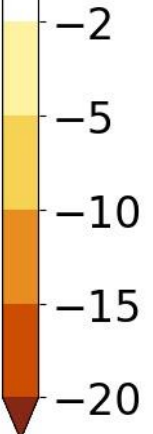
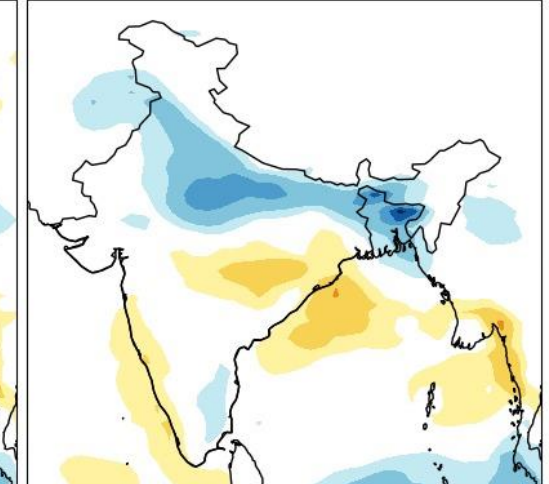
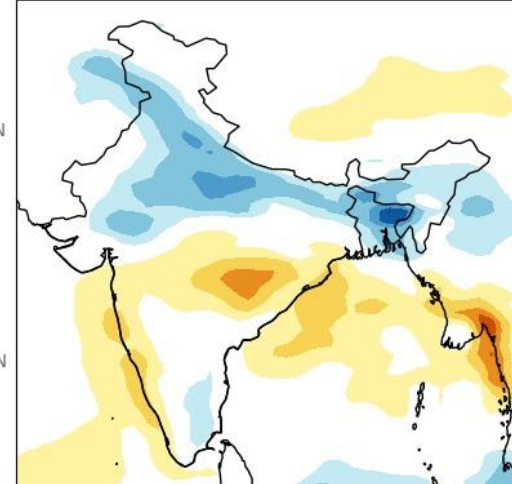
IC: 25-Jul'24 Week-2

IC: 18-Jul'24 Week-3



IC: 01-Aug'24 Week-2

IC: 25-Jul'24 Week-3





Thanks

