SOUTH ASIA HYDROMET FORUM

RIMES

WISER
Weather and Climate Information Services

Ministry of Earth Sciences
Govt. of India

WMO

In collaboration with:
Maldives Meteorological Service

Supported by:
UK International Development
Partnership | Progress | Prosperity

Met Office

CLIMATE SERVICES USER FORUM (CSUF)

29-30 April 2026 | Malé, Maldives

Join our Communities of Practice!
Scan the QR code or go to https://knowledgehub.sahf.info/

S2S Forecast Products

from

NCMRWF Coupled Model

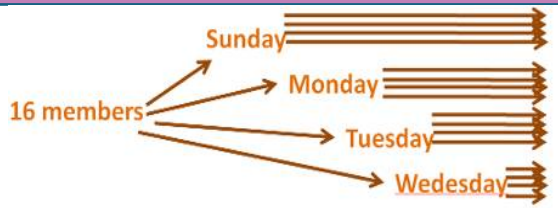
Ankur Gupta
ankur@ncmrwf.gov.in

Seamless Coupled Modeling System for forecasting at Days-to-Season

- **2017:** Daily → 15-day forecast
- **2018:** Every week → Four weeks of forecast (16 members)
- **2019:** Evert month → Seasonal forecast (55 members)
- **2023**: Regional Coupled Model

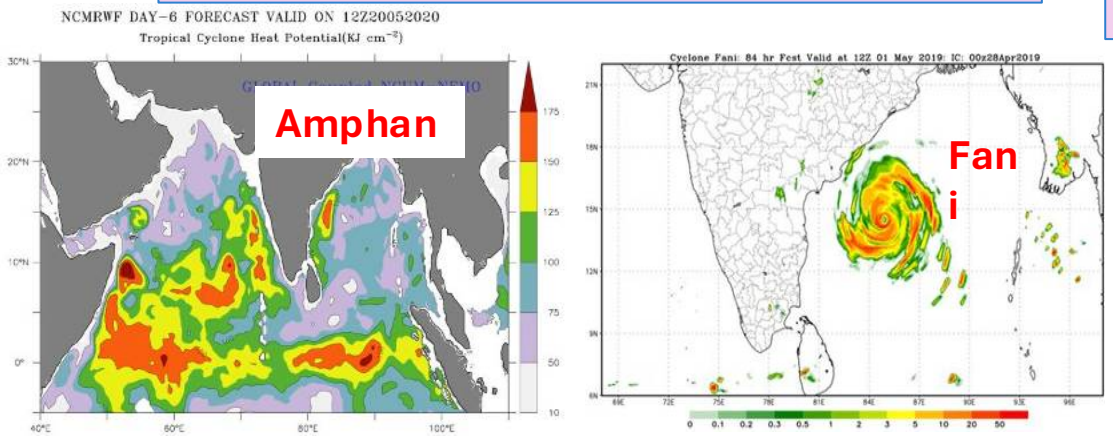
60 km Atmosphere. 25 km Ocean | 23 years (1993-2015) of hindcasts for skill analyssis and generating probability distribution | **Ensemble Strategy**: lagged ICs + stochastic physics

Extended Range Prediction is done using **ocean-atmosphere coupled dynamical model**. The Extended Range forecasting system consists of 16 members forecast with physical perturbations. This system is run weekly and issues 4-week outlook

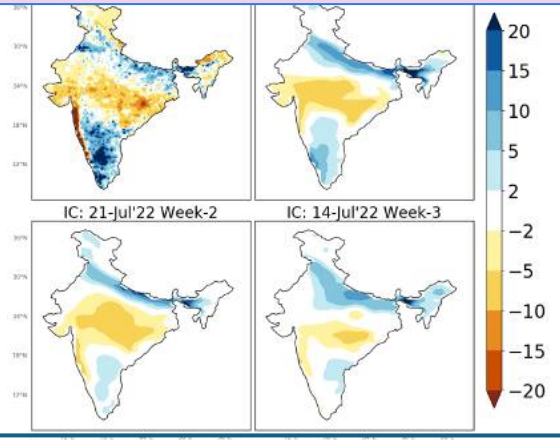


Forecast Preparation Date:
Thursday
Validity: Friday-Thursday
Upto 4-weeks

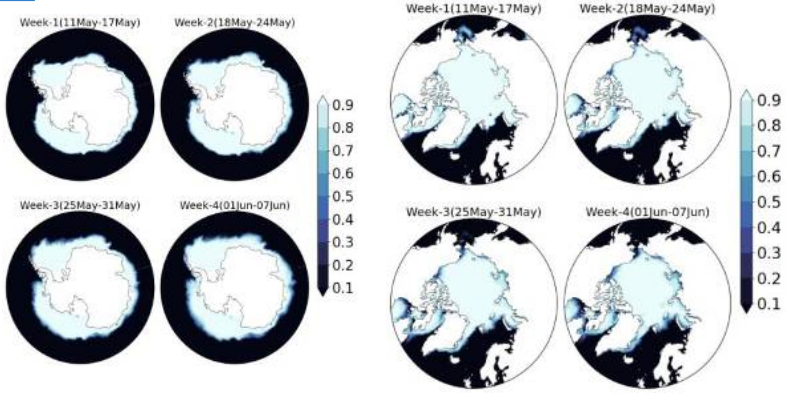
Medium Range Guidance for Tropical Cyclones



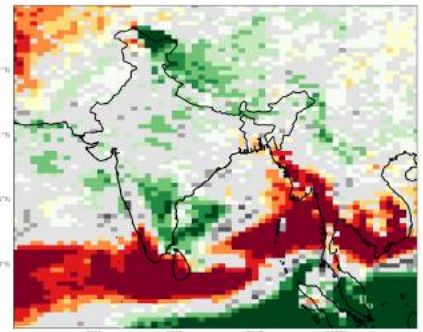
Forecasts of Active and Break phases of Monsoon



Weekly forecast of Seaice in polar regions

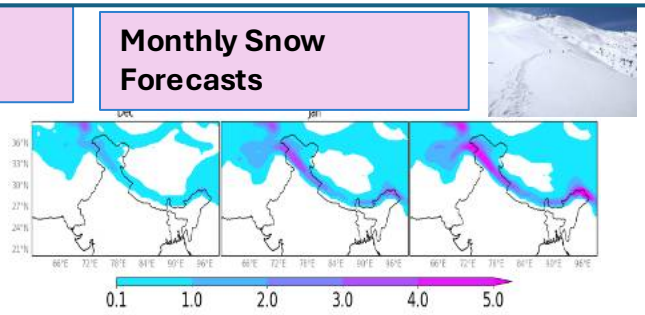


Seasonal Forecasts of Indian Monsoons



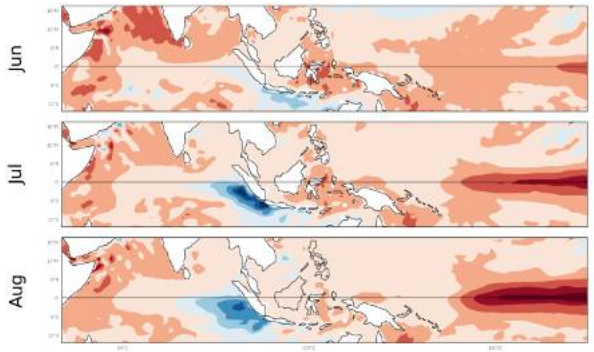
JAS 2022 forecast, May IC

Monthly Snow Forecasts



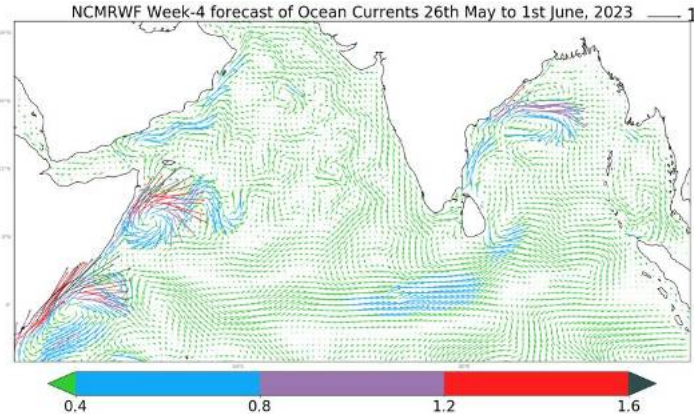
Forecast IC: November 2022

Monthly ENSO and IOD forecasts



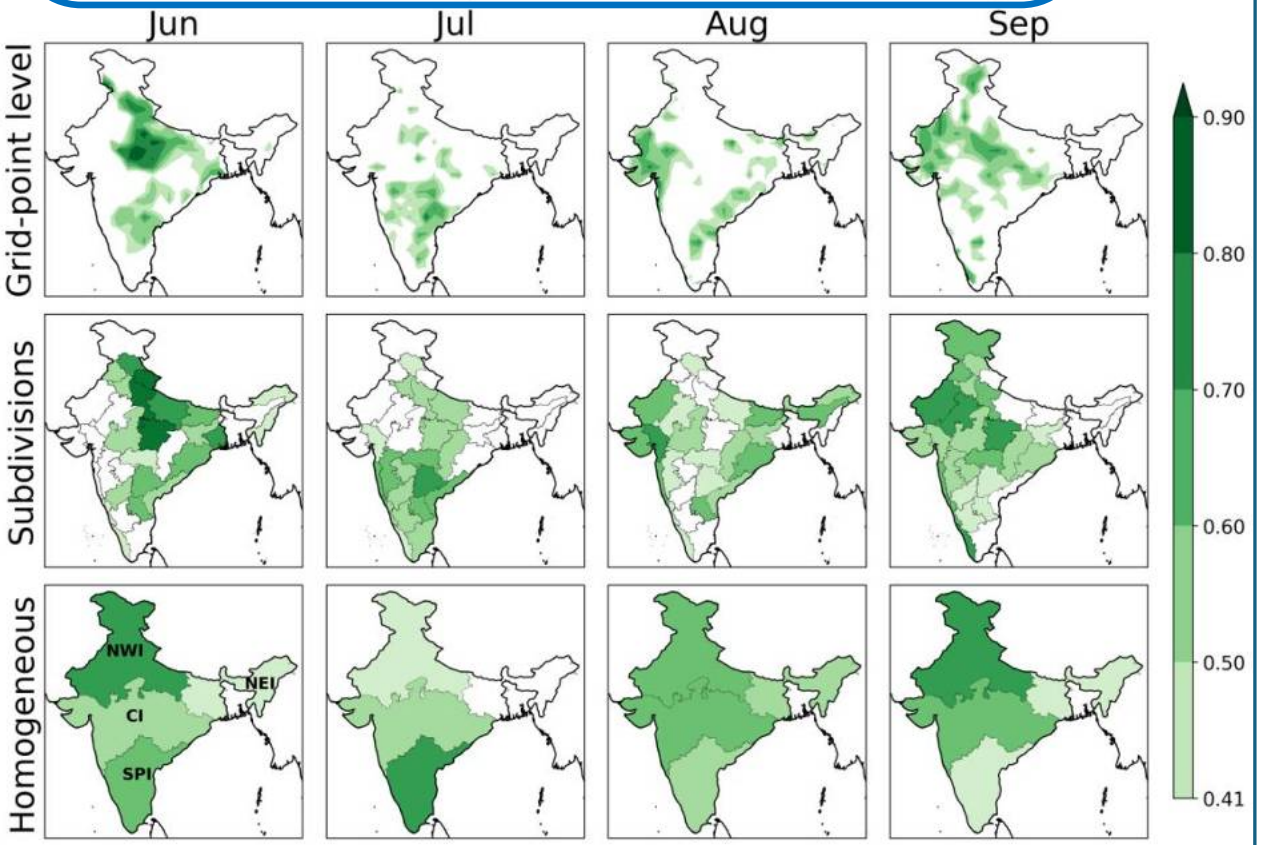
Forecast IC: May 2023

Weekly forecasts of Ocean Currents

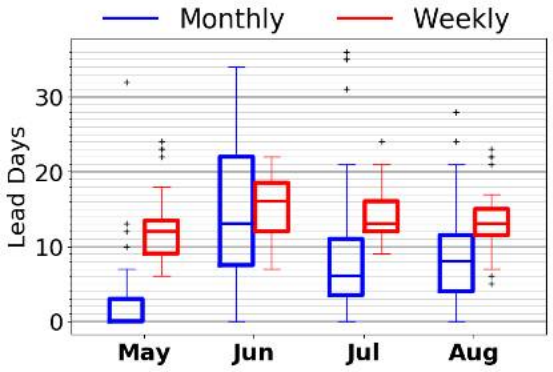


Skill of monthly-mean rainfall

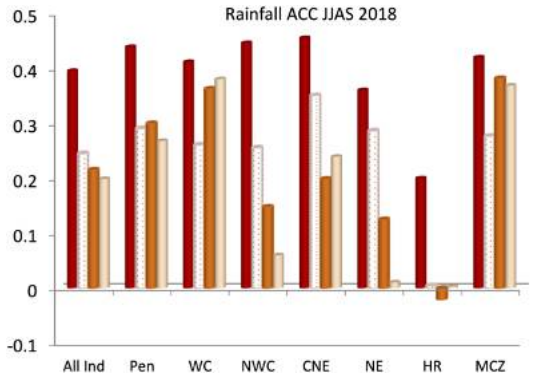
- The weekly skill is useful at 7-days of leadtimes at met-subdivisions. For strong signal weekly-mean rainfall is good even at 14 days of leadtimes
- The monthly-mean skill is useful at ~5-7 days of leadtimes for homogeneous regions. Less confidences in monthly-mean prediction at subdivisional level



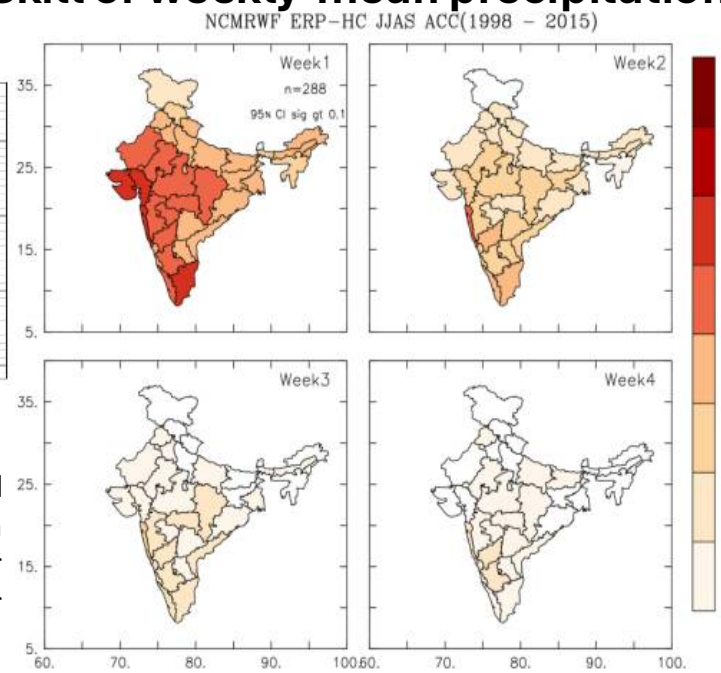
Predictability

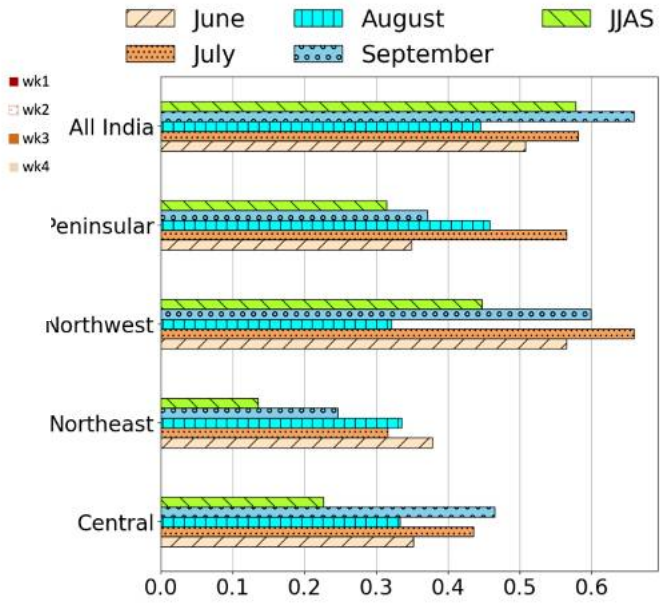


Large variations in skill of subdivisional rainfall prevents a common confidence level. Monthly skill over homogeneous regions is higher than/comparable with seasonal skill



Skill of weekly-mean precipitation

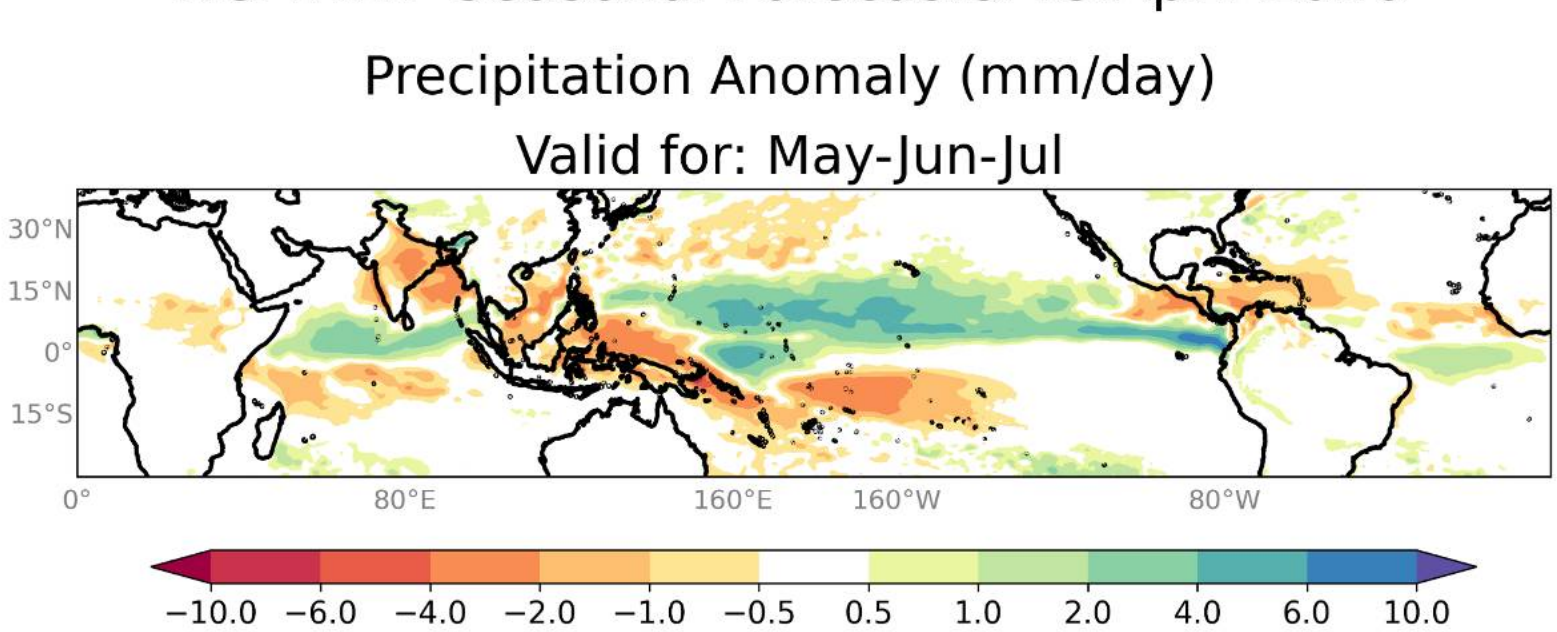




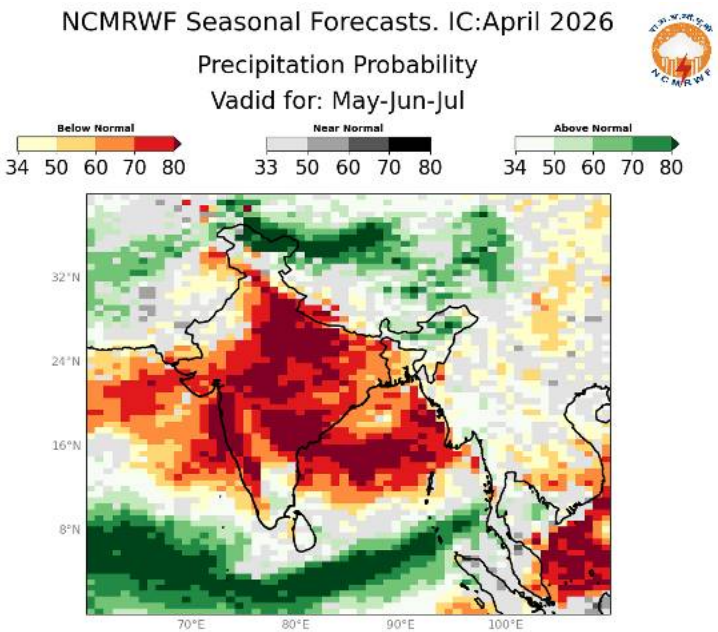
Skill of monthly-mean and seasonal mean rainfall.

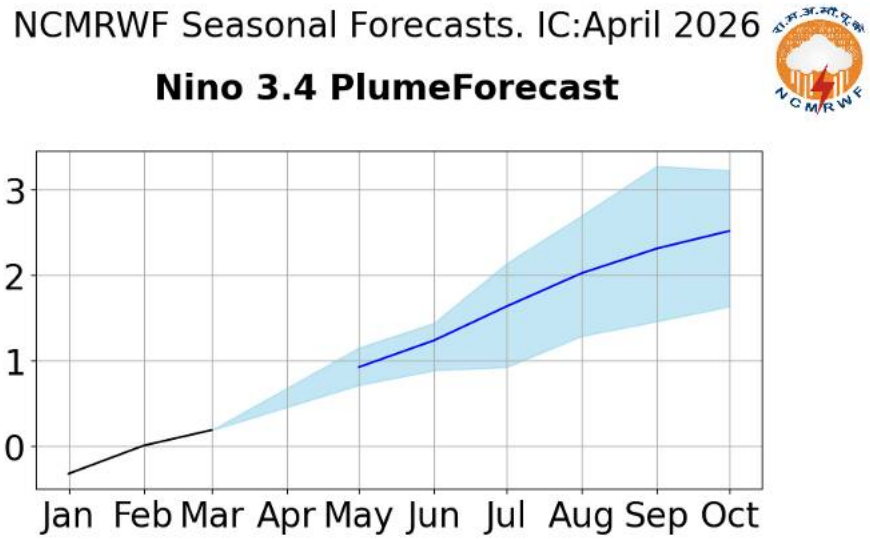
17th day ICs

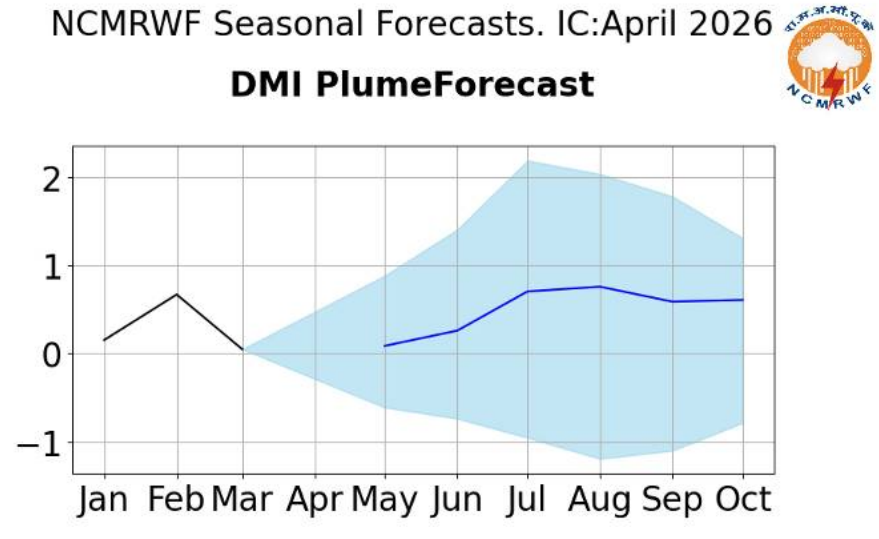
Gupta et al. 2024. QJRMS. https://rmets.onlinelibrary.wiley.com/doi/full/10.1002/qj.4741



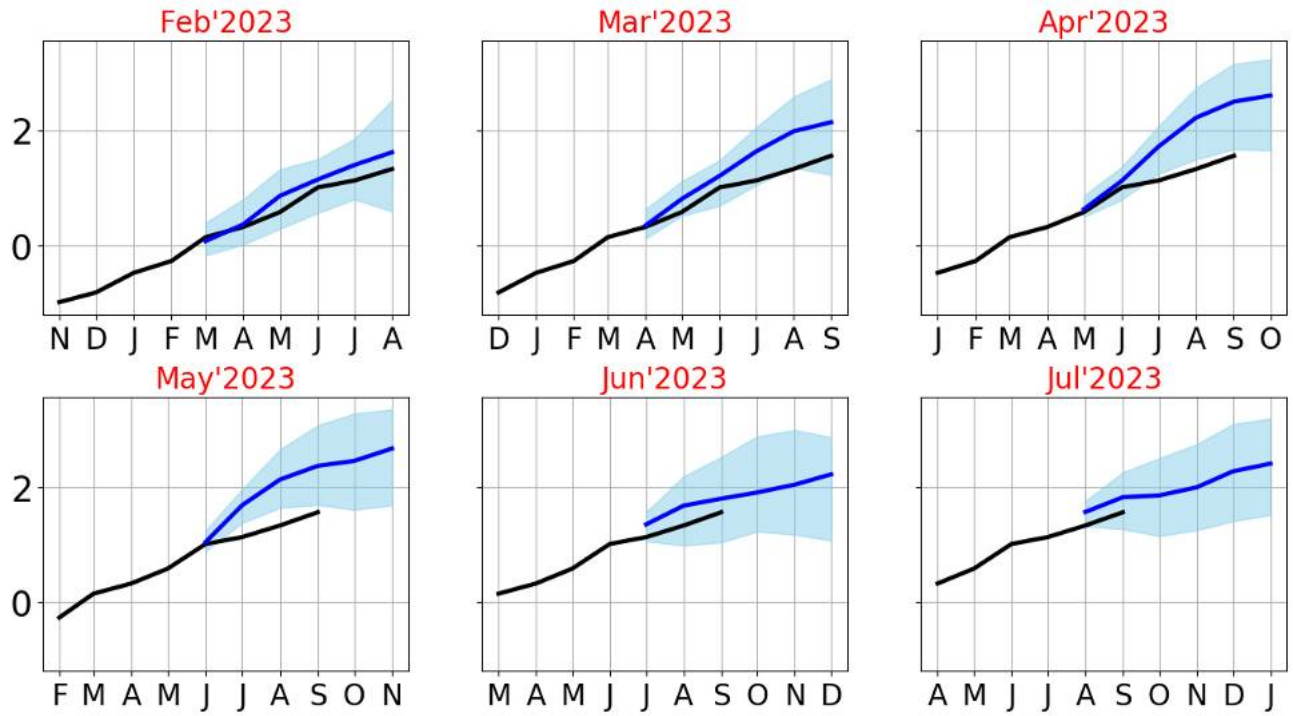
2026 Forecasts





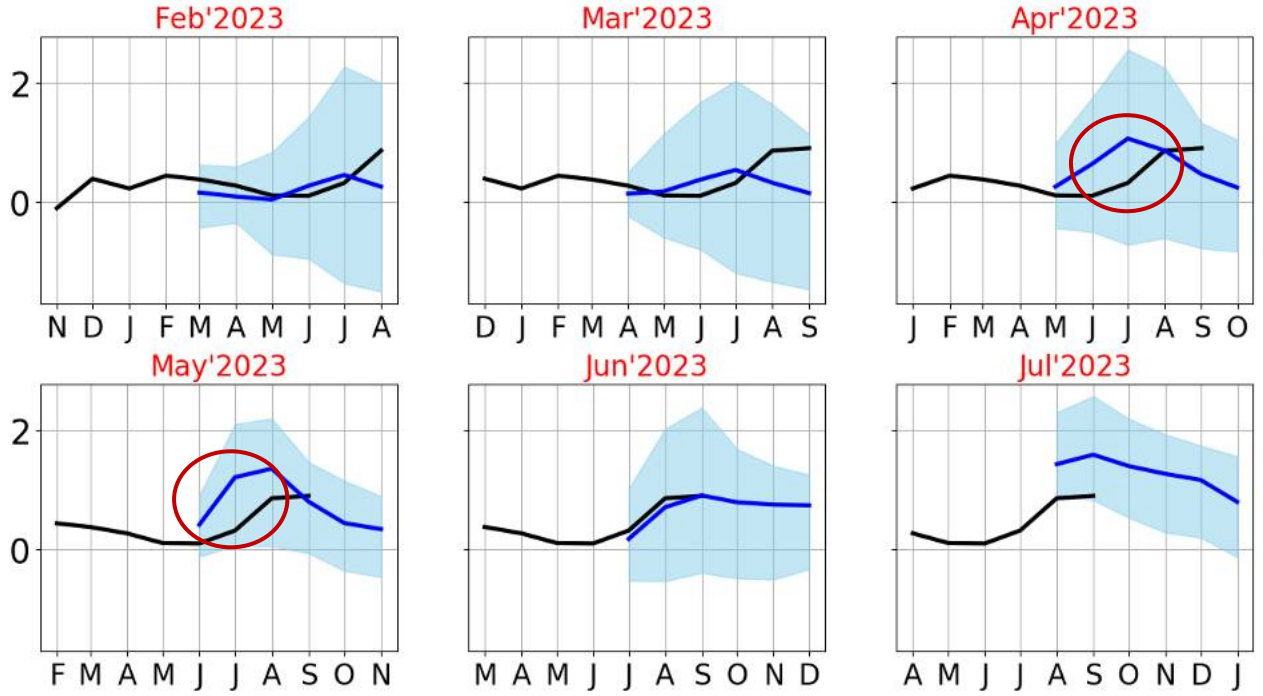


Verification of ENSO and IOD indices



Nino 3.4

DMI



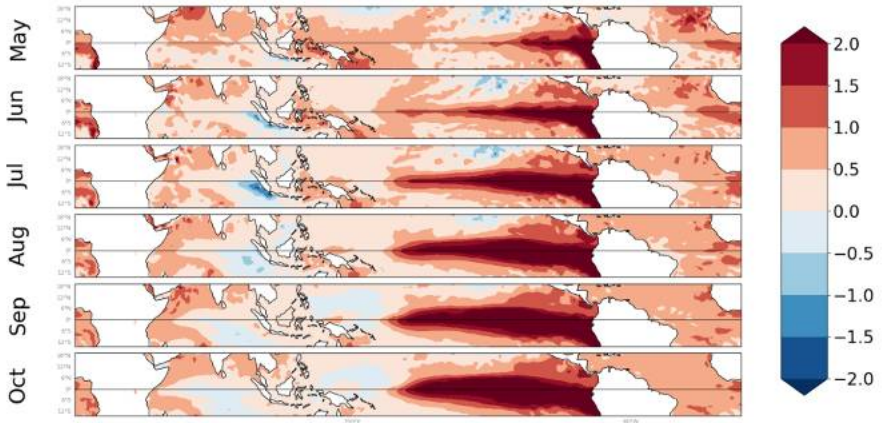
ENSO (ONI) were:
MJJ: 0.8, JJA: 1.1, JAS: 1.3, ASO: 1.6, SON: 1.8
El-Nino could force +ve IOD, but seasonality of IOD is important. +ve IOD appeared only in August.

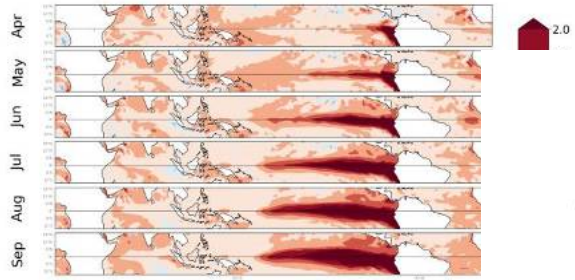
April IC

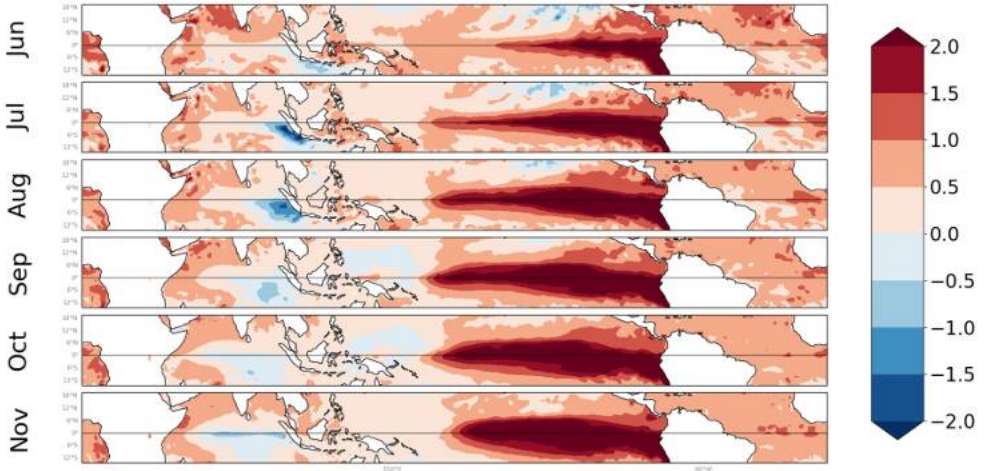
2023 Monsoon Forecast

March IC

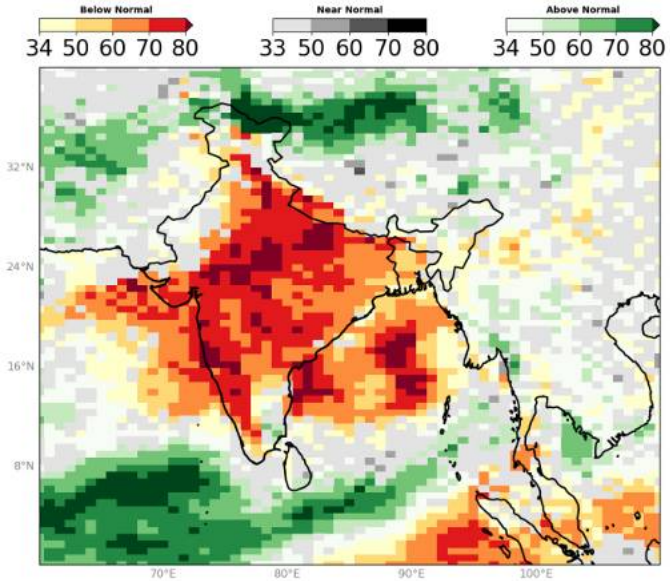
May IC



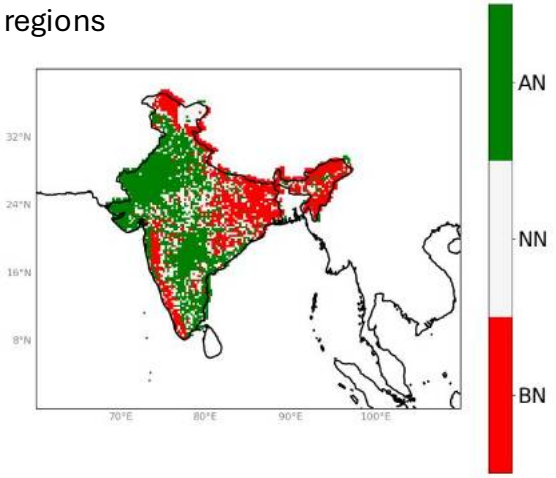




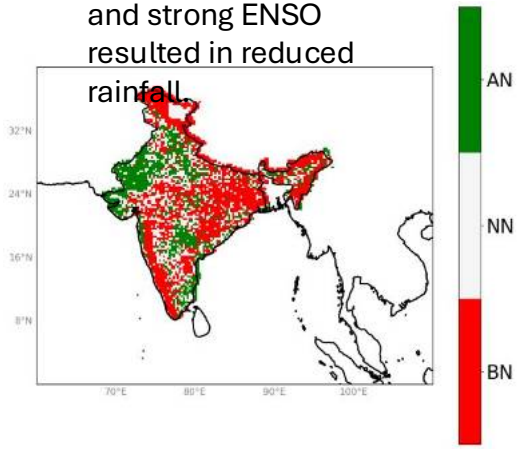
MJJ from April IC



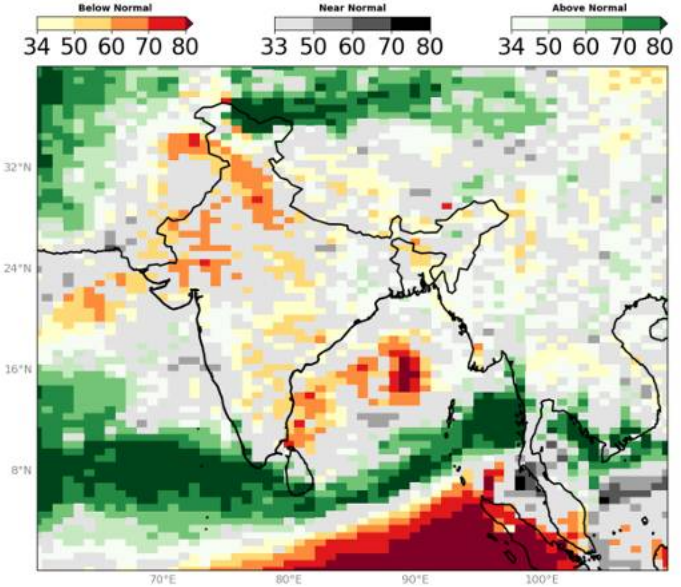
Model forecasting reduced rainfall due to strong ENSO in forecasts. But, MJJ ENSO was much weaker than forecasted and rainfall was AN in many regions



Model forecasting normal rainfall even in presence of ENSO due to strong IOD. But, JJA IOD was much weaker and strong ENSO resulted in reduced rainfall.



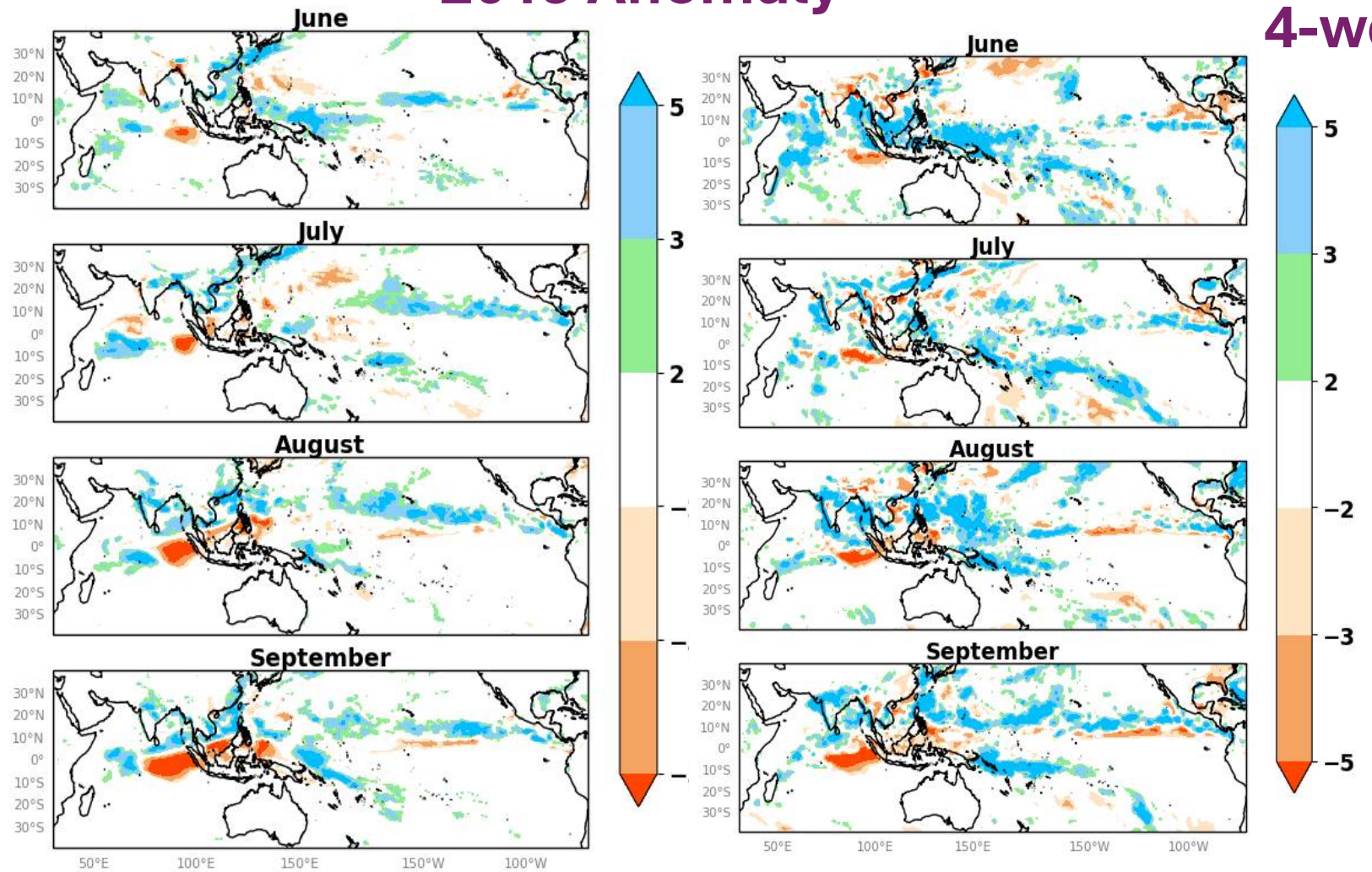
JJA from May IC



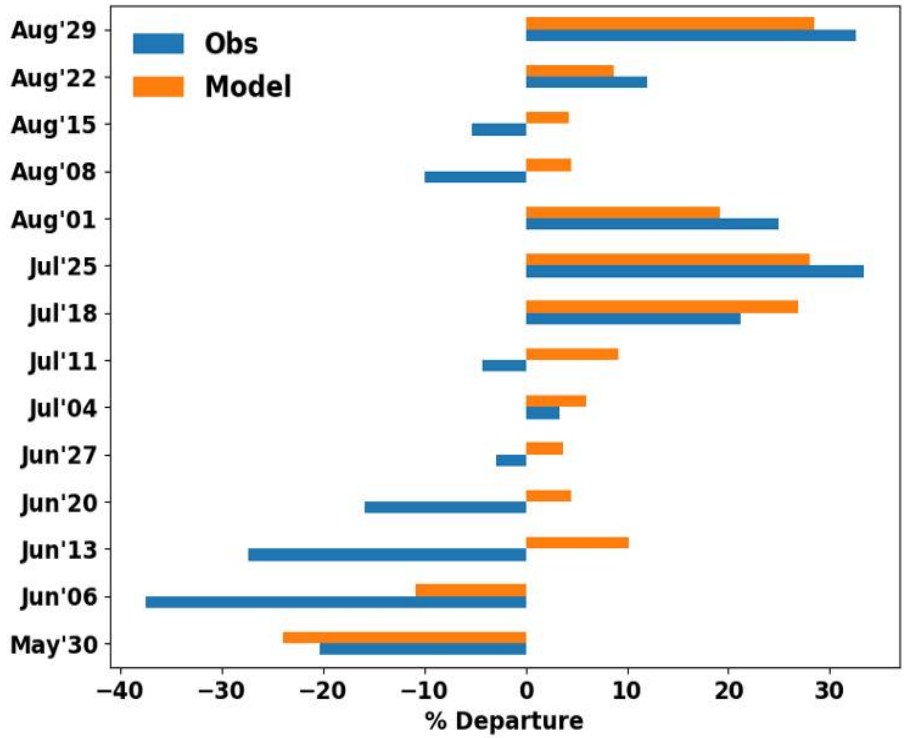
2019 Anomaly

Model

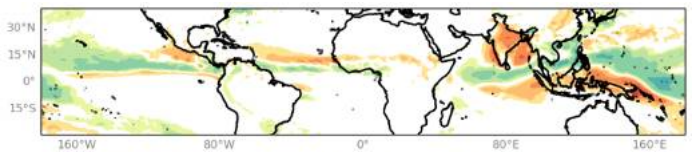
Observations

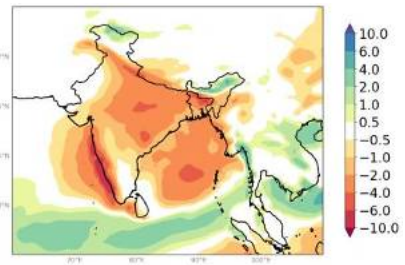


2019 forecast of 4-week average departures



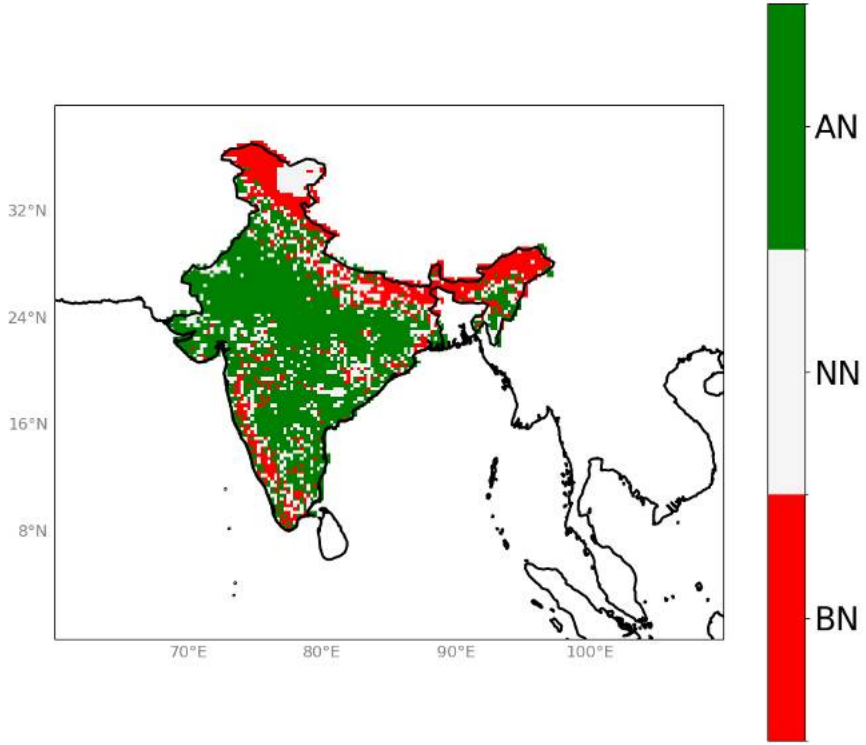
May IC: JJA Forecast

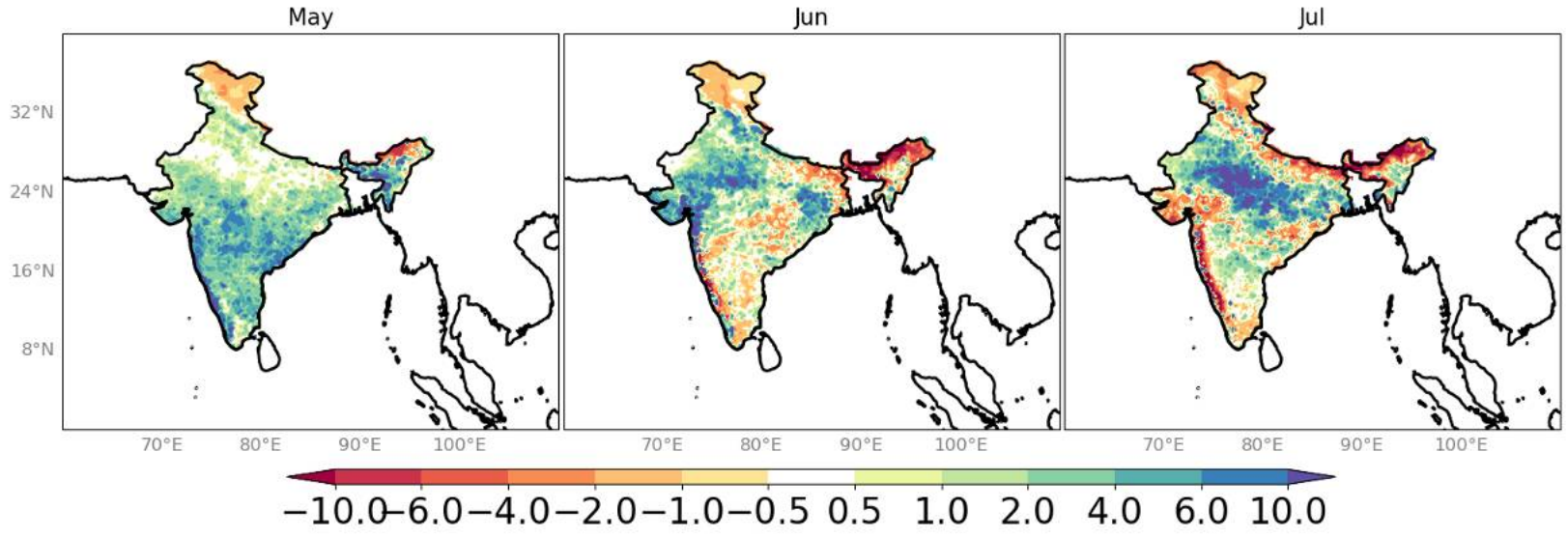


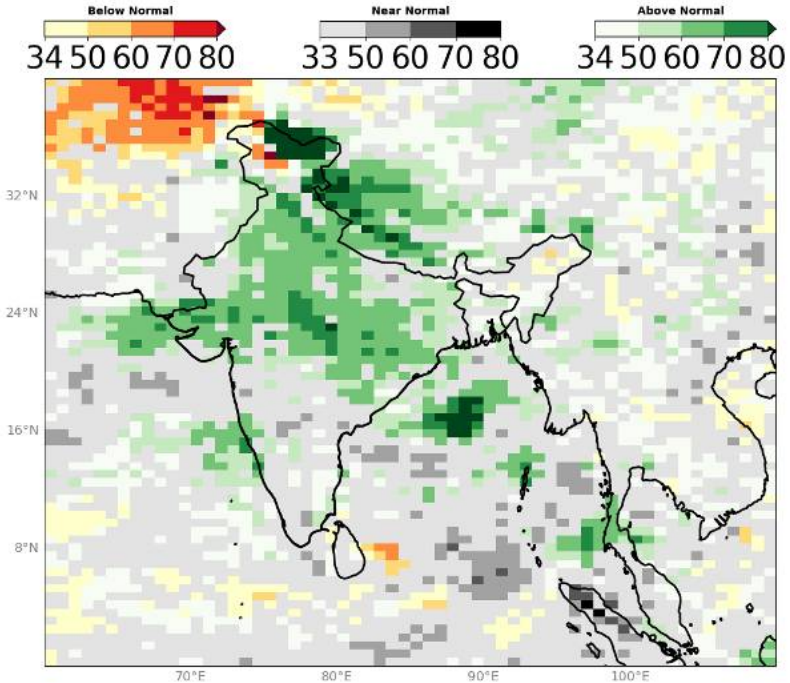


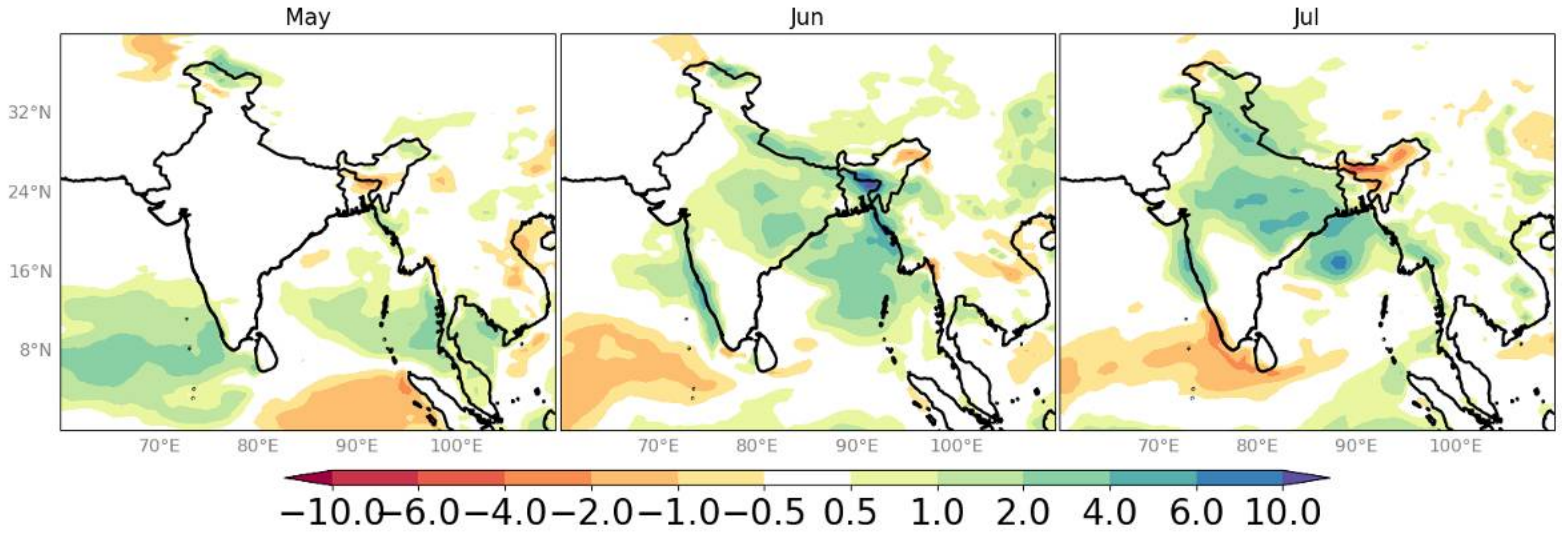
- 2019: El-Nino (ONI) reduced from 0.5 in MJJ to 0.3 in JJA which may have triggered early IOD. But in model (May IC) it persisted.
- Most models predicted below average for ISMR
- With the realistic forecast of IOD in NCMRWF model, the variation of monthly-mean rainfall during the entire season was correctly captured.

MJJ 2025, April IC

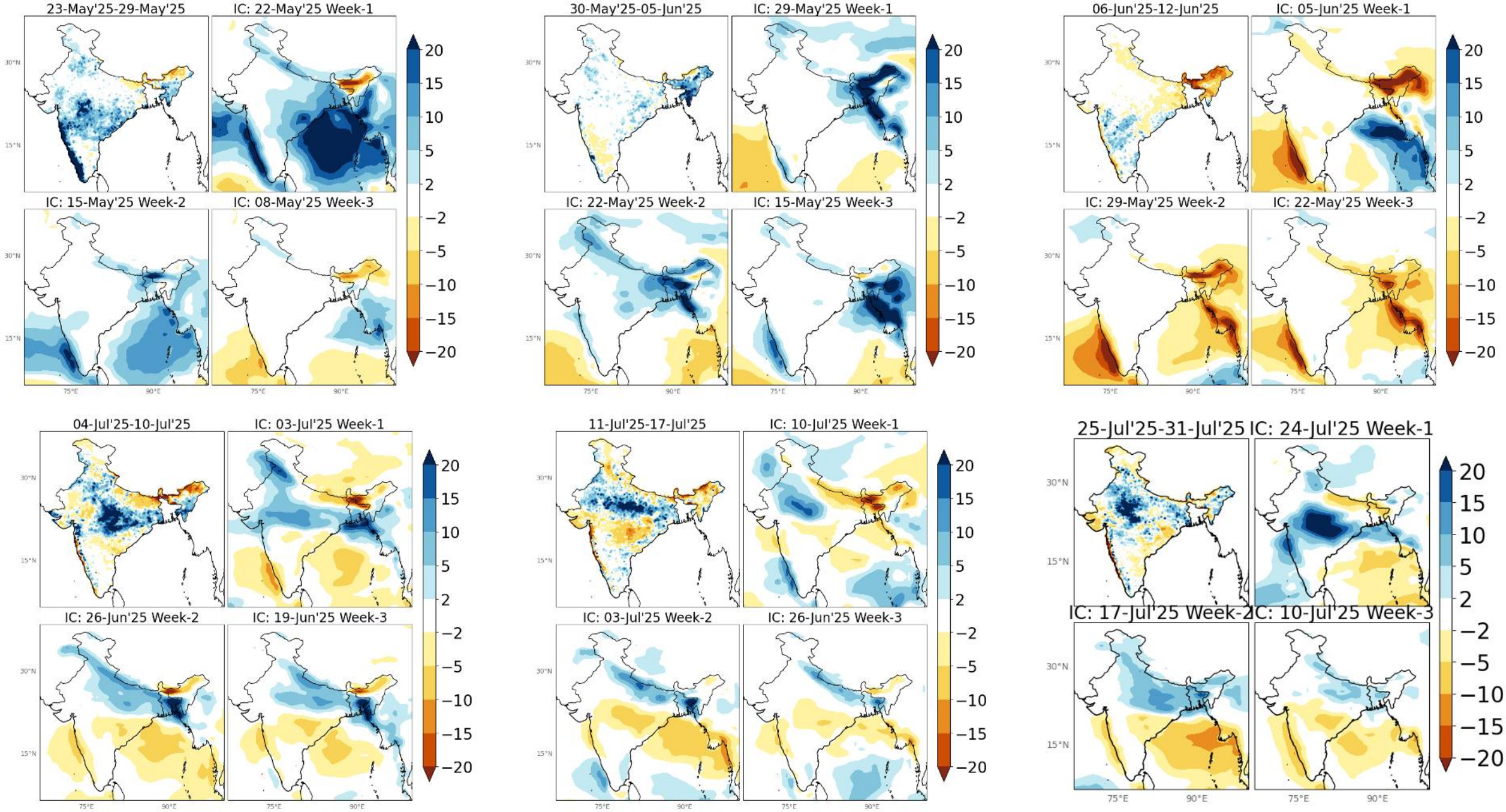


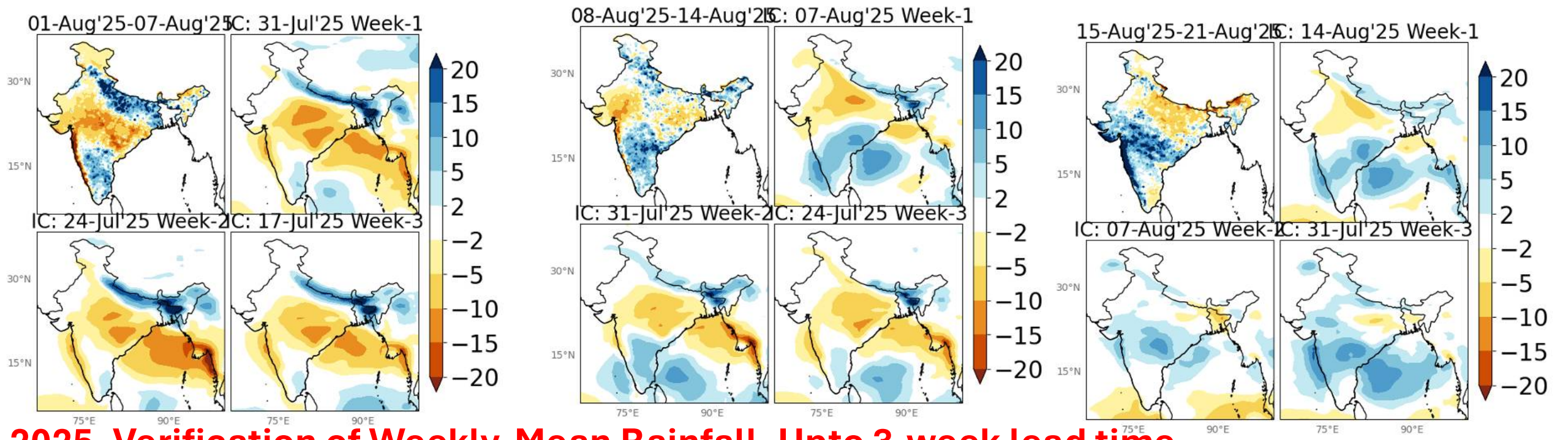




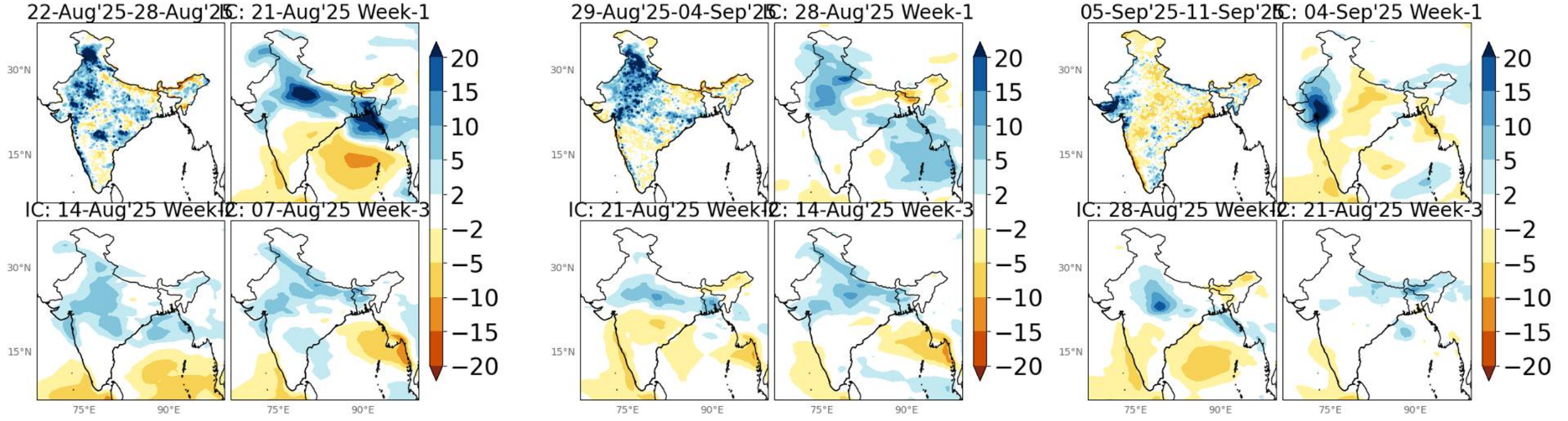


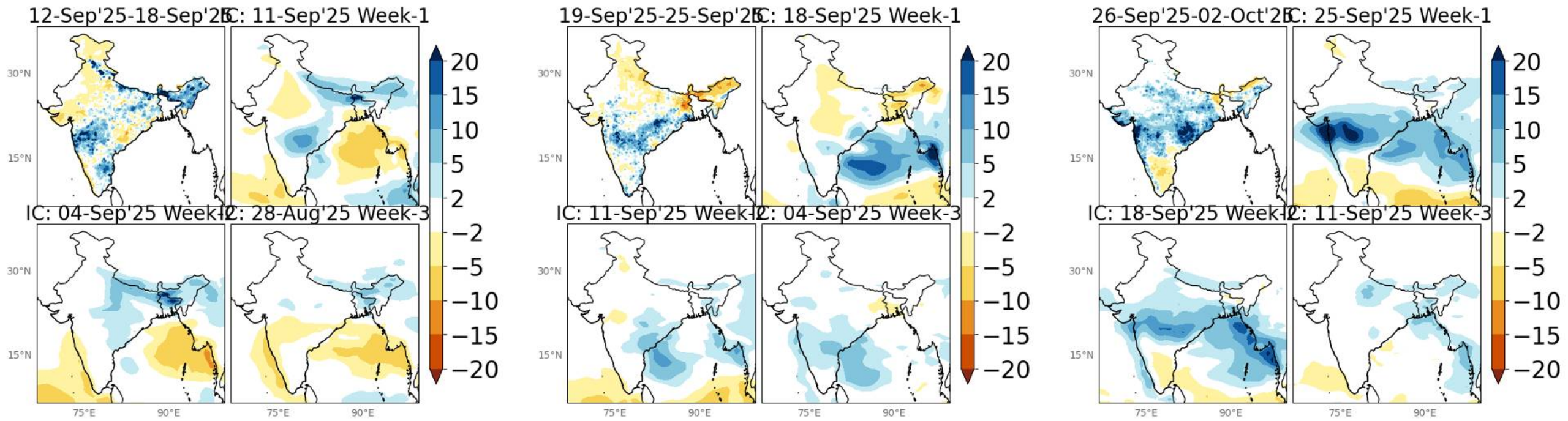
2025. Verification of Weekly-Mean Rainfall. Upto 3-week lead time



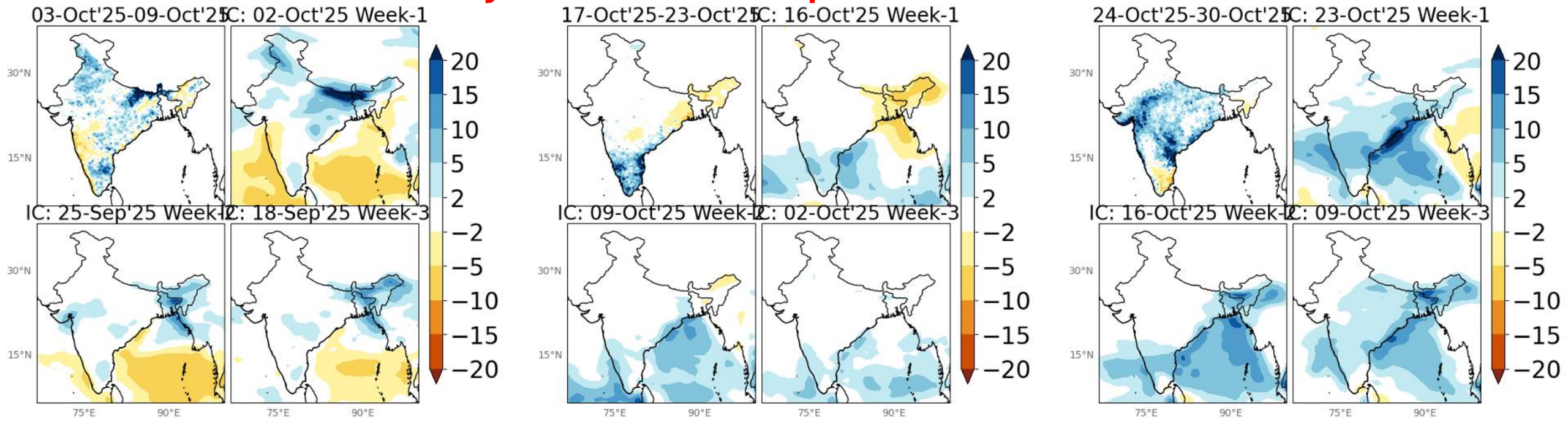


2025. Verification of Weekly-Mean Rainfall. Upto 3-week lead time



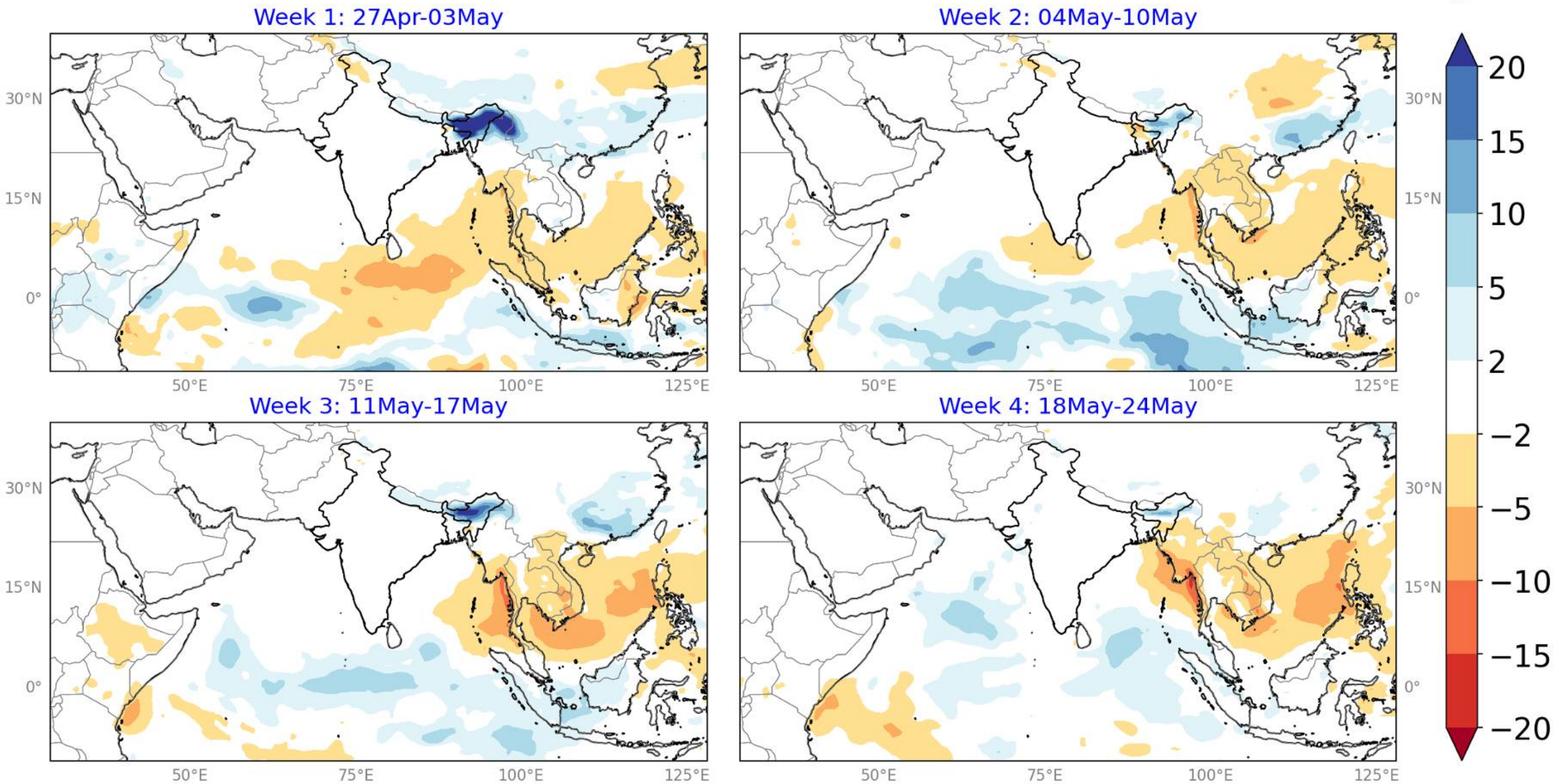


2025. Verification of Weekly-Mean Rainfall. Upto 3-week lead time



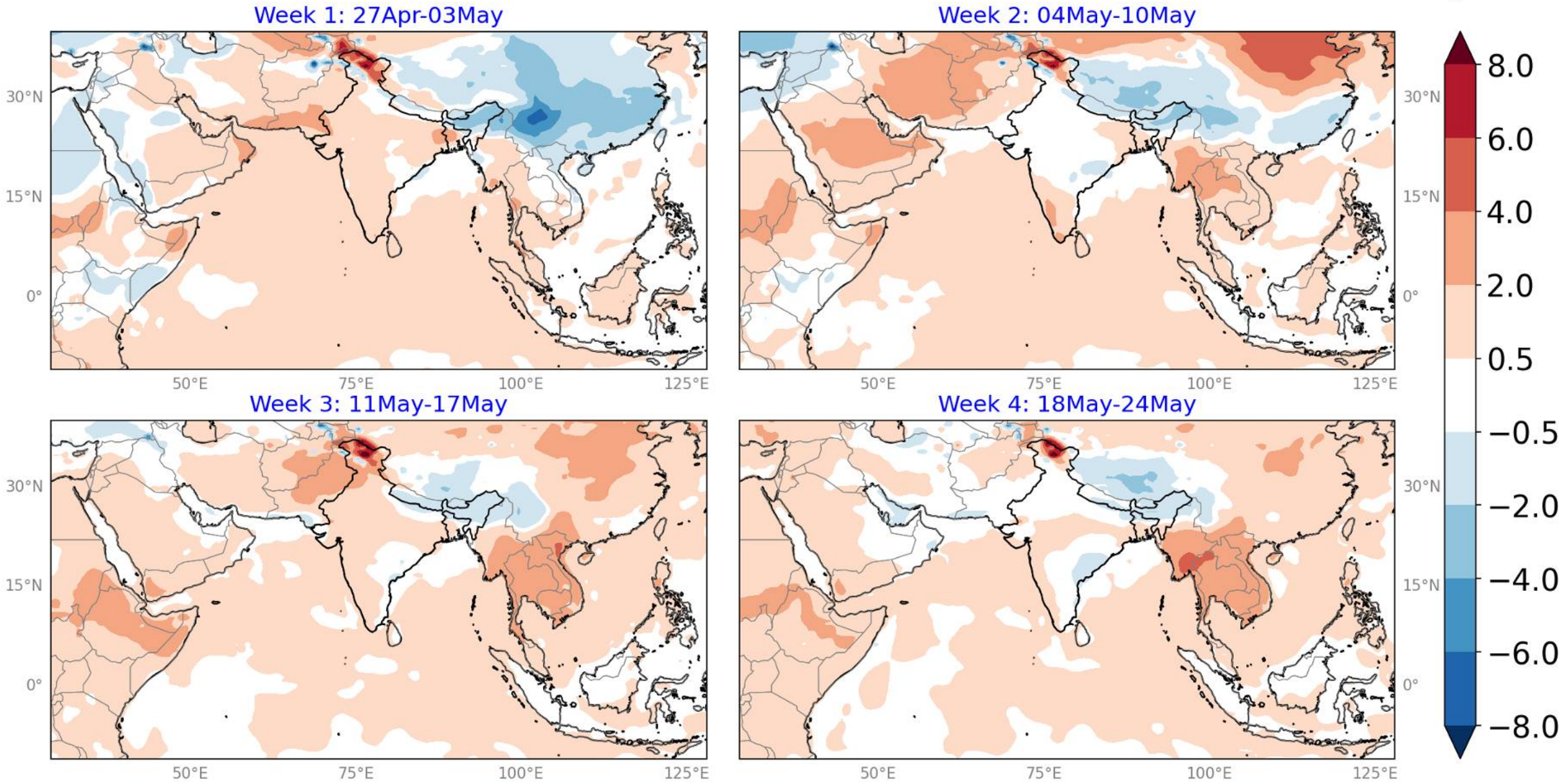
NCMRWF Extended Range Forecasts: 20260426

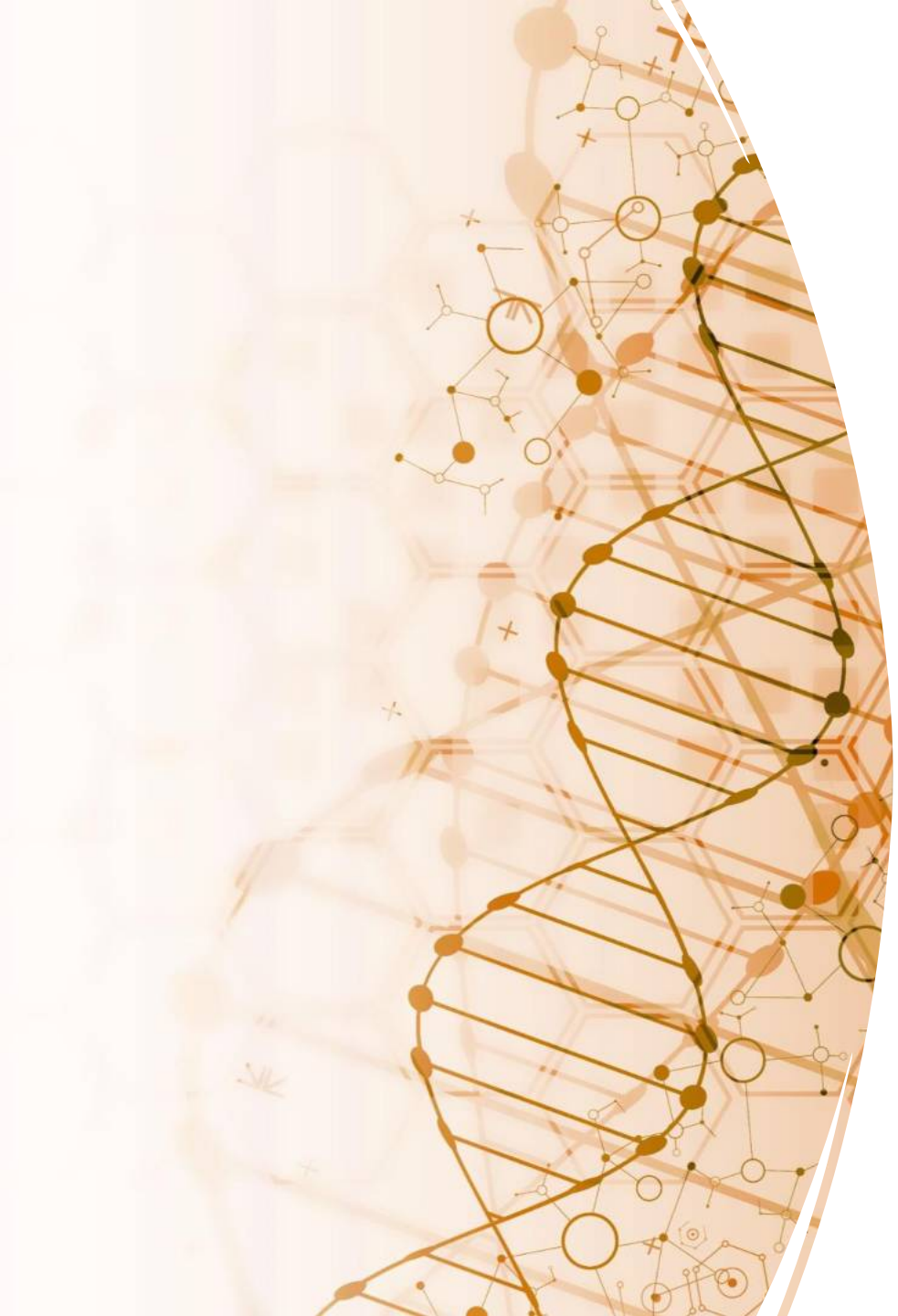
Precipitation Anomaly (mm/day)



NCMRWF Extended Range Forecasts: 20260426

Tmax Anomaly (deg C)





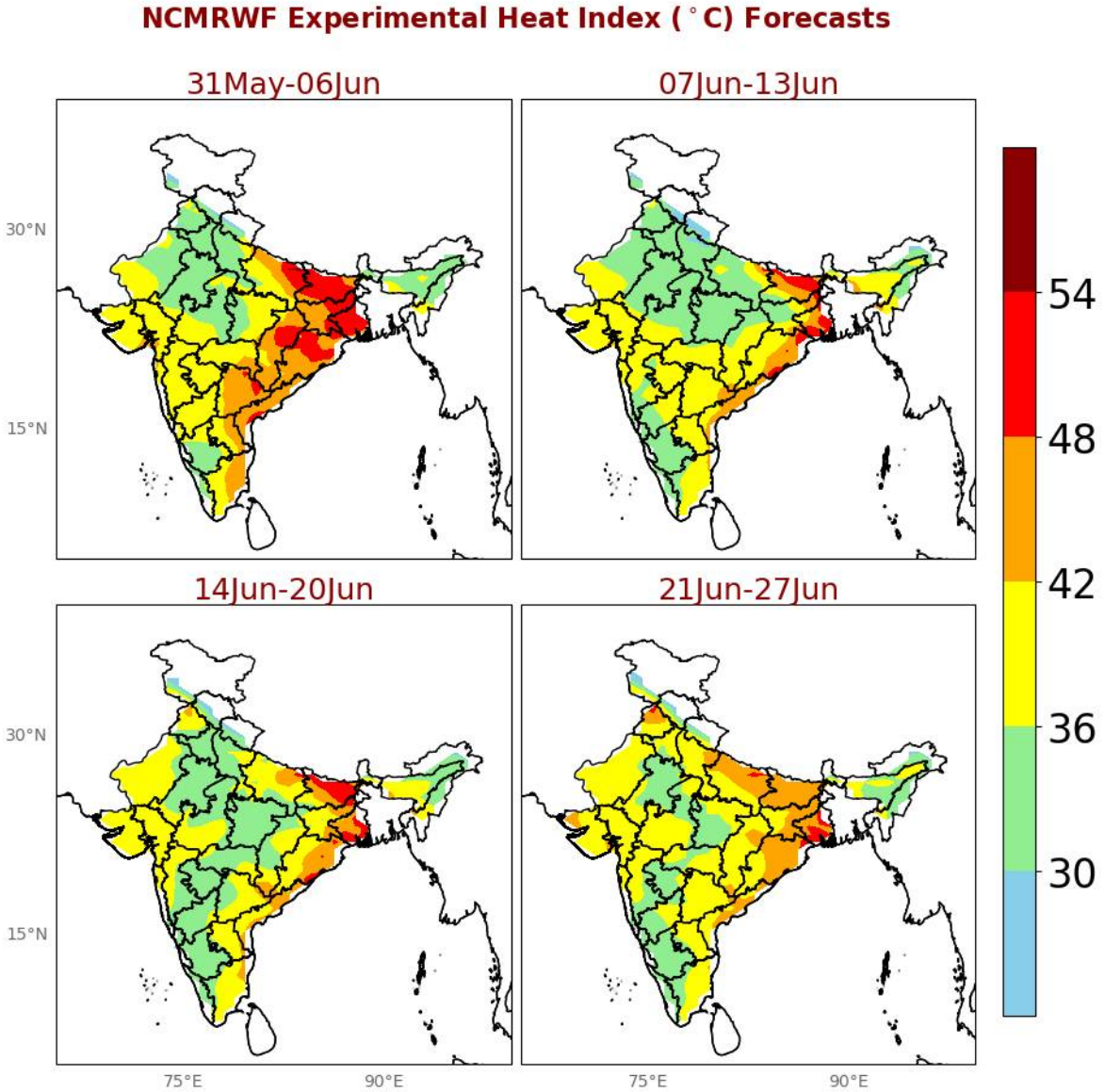
HEAT INDEX: Extended Range Prediction

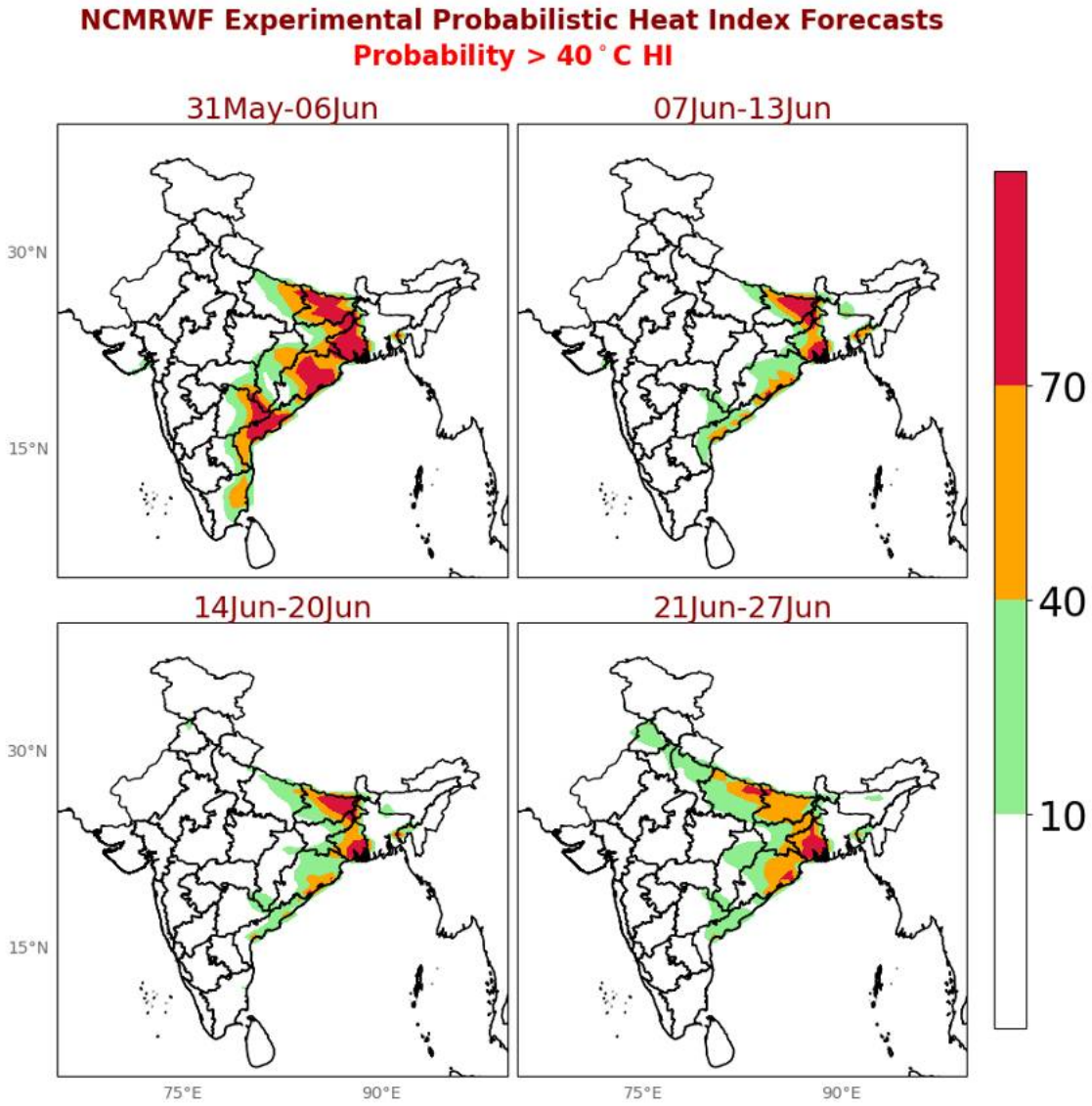
Prepared on April 24th 2025

Heat Index Calculation

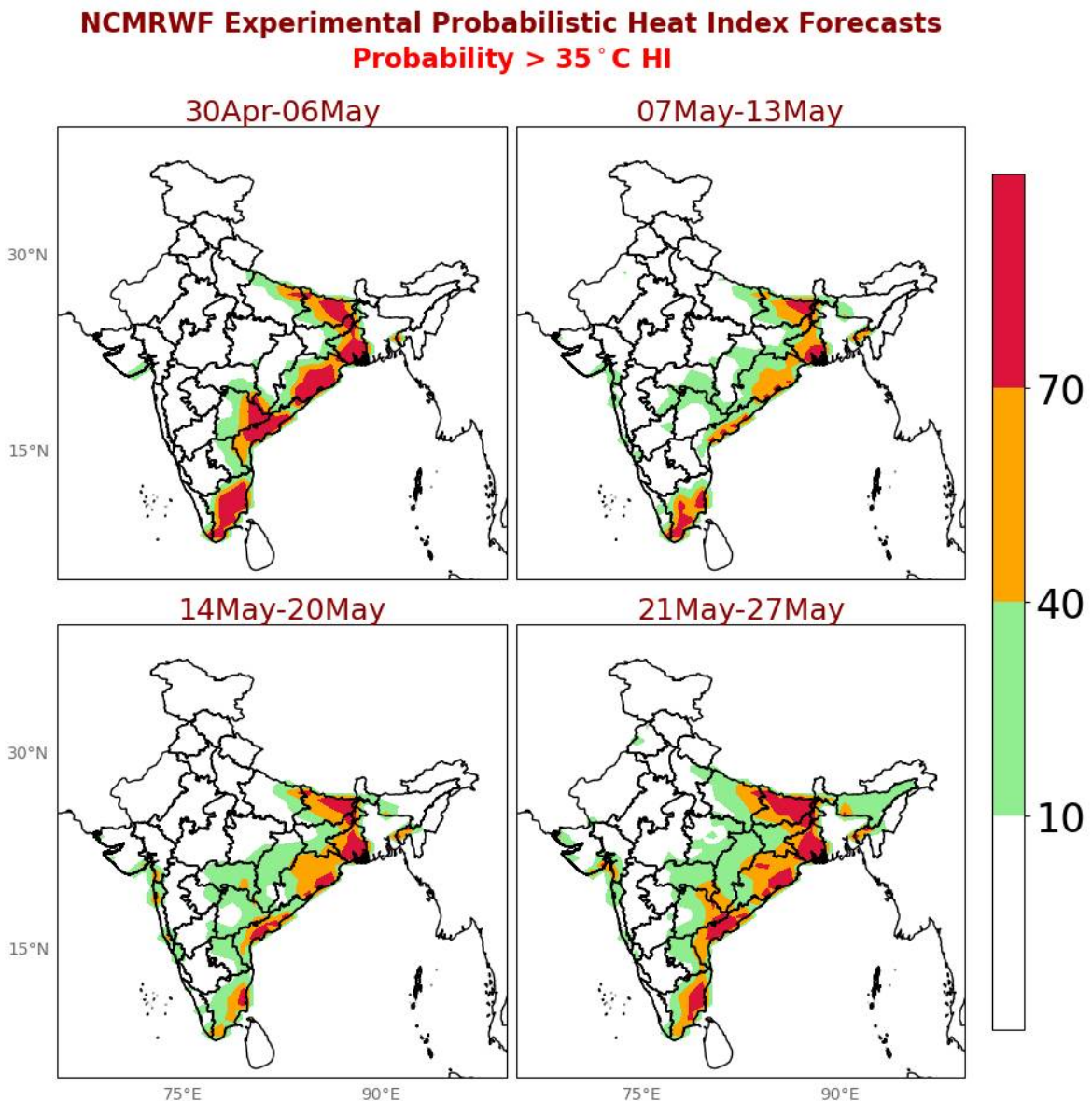
- Heat Index Calculation was based on work by R.G. Steadman and published in 1979 under the title "The Assessment of Sultriness, Parts 1 and 2.
- https://journals.ametsoc.org/view/journals/apme/18/7/1520-0450_1979_018_0861_taospi_2_0_co_2.xml
- ("https://doi.org/10.1175/1520-0450(1979)018%3C0861:TAOSPI%3E2.0.CO;2)
- Heat Index is calculated using hourly forecast fields of relative humidity (RH) and temperature (T) of NCMRWF Extended Range Prediction.
- NCMRWF ERP system is based on 60 km NCUM and 25 km NEMO with 16 ensemble members initialized during IC: 20th – 23rd April 2025.
- Weekly mean of Daily Heat Index (HI) maxima during 25th April to 22nd May 2025 are plotted.
- Probabilistic forecasts are showing probability of exceedance at >35 ^{o}C, 40 ^{o}C, and 45 ^{o}C thresholds.

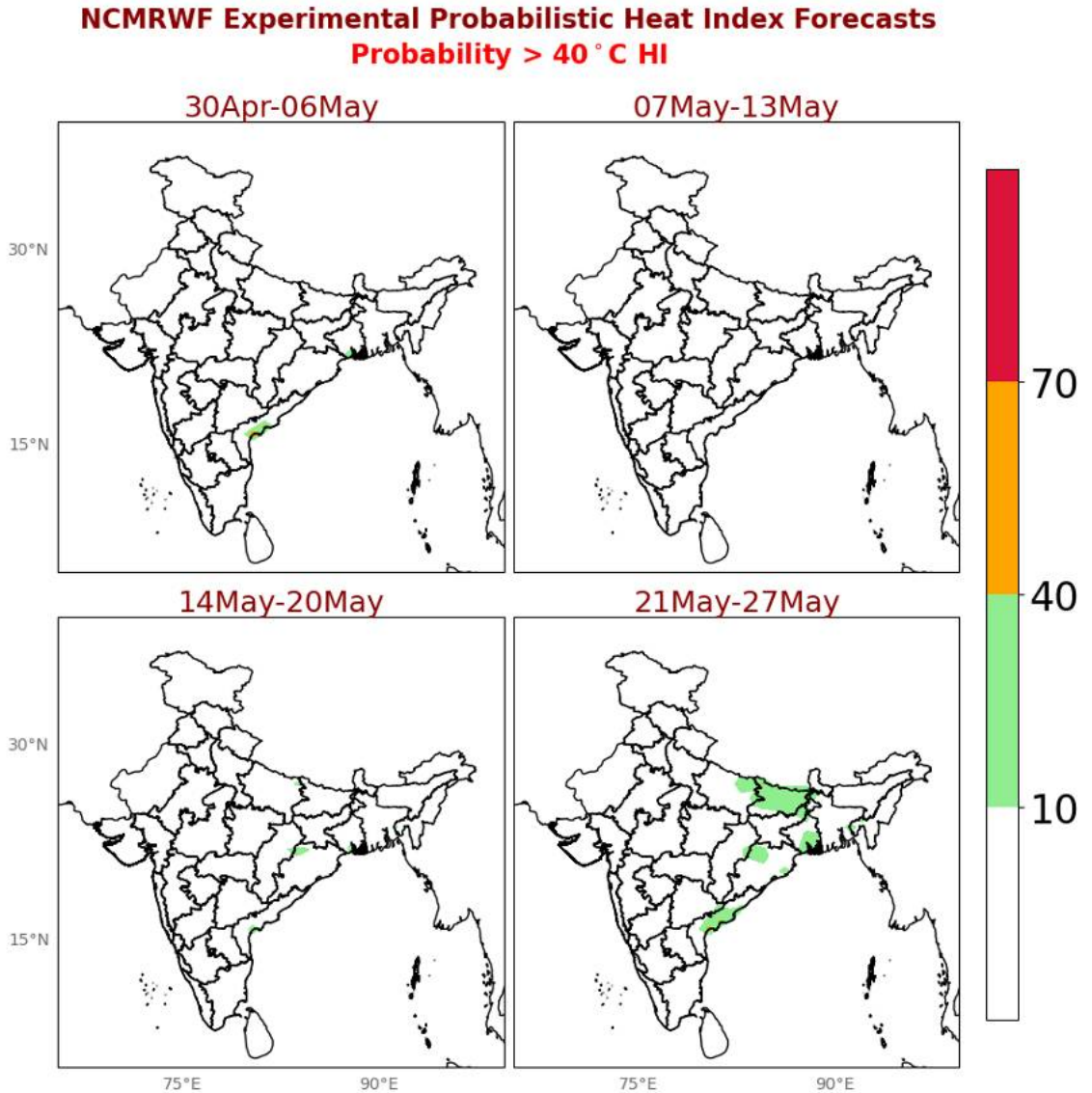
2024


NCMRWF Experimental Heat Index (°C) Forecasts
31May-06Jun
07Jun-13Jun
14Jun-20Jun
21Jun-27Jun
30°N
15°N
75°E
90°E
54
48
42
36
30


NCMRWF Experimental Probabilistic Heat Index Forecasts
Probability > 40°C HI
31May-06Jun
07Jun-13Jun
14Jun-20Jun
21Jun-27Jun
30°N
15°N
75°E
90°E
70
40
10

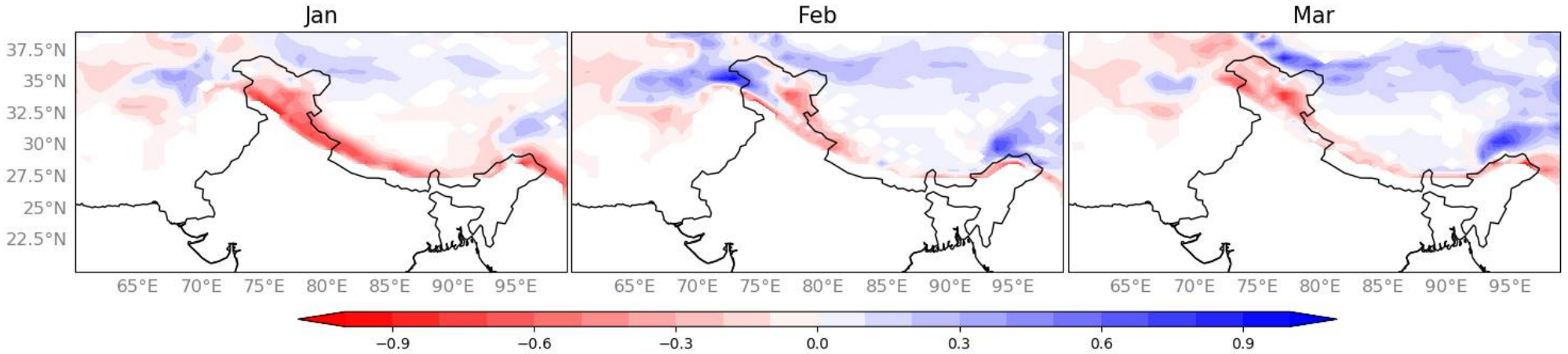
2026


NCMRWF Experimental Probabilistic Heat Index Forecasts
Probability > 35°C HI
30Apr-06May
07May-13May
14May-20May
21May-27May
30°N
15°N
75°E
90°E
70
40
10

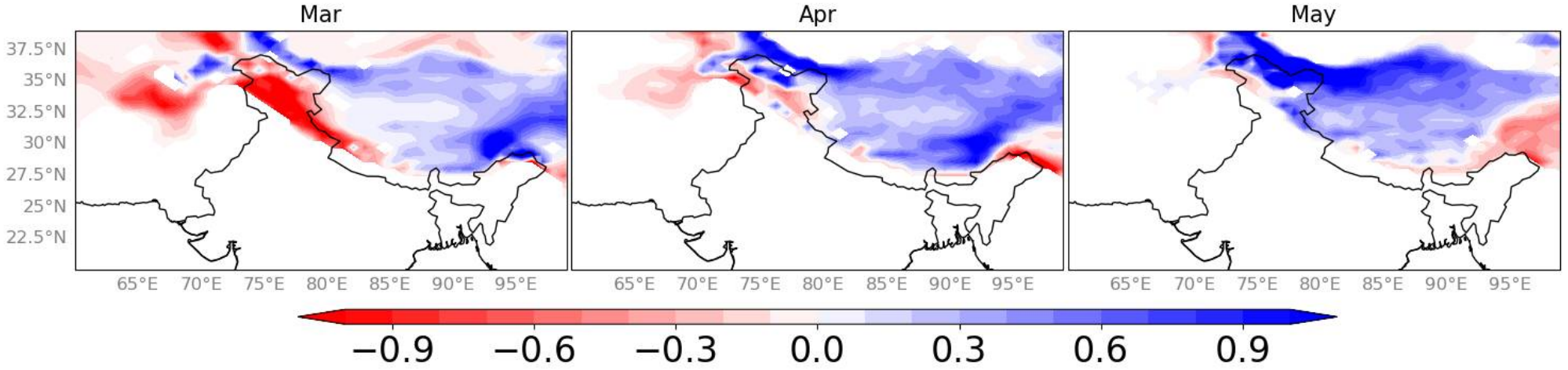

NCMRWF Experimental Probabilistic Heat Index Forecasts
Probability > 40°C HI
30Apr-06May
07May-13May
14May-20May
21May-27May
30°N
15°N
75°E
90°E
70
40
10

2026
Snow Forecasts

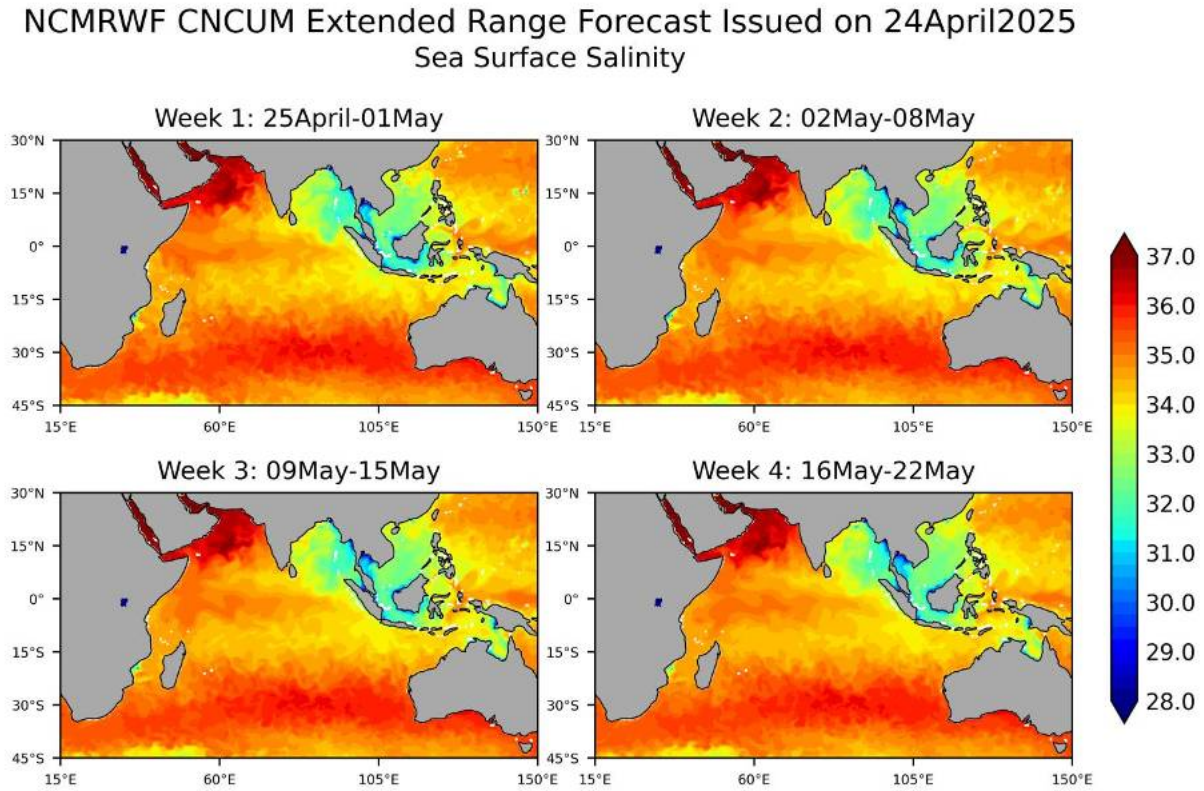
IC: December

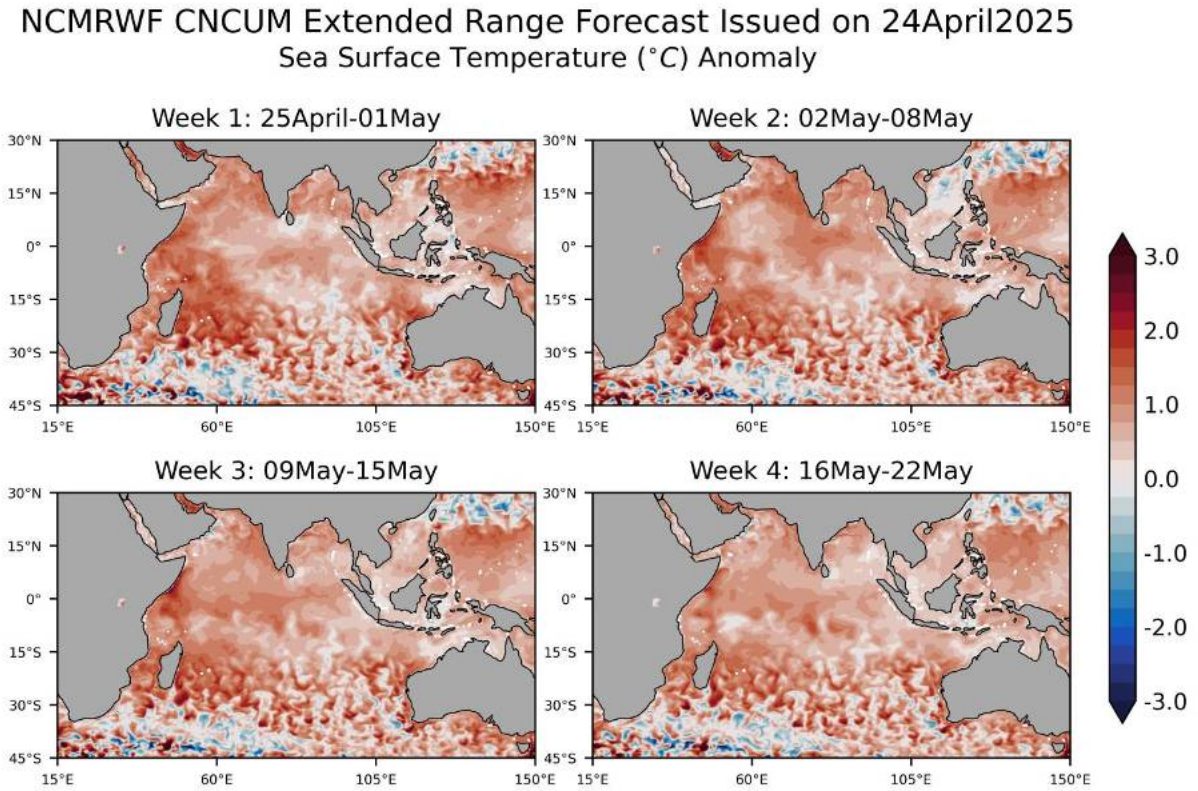


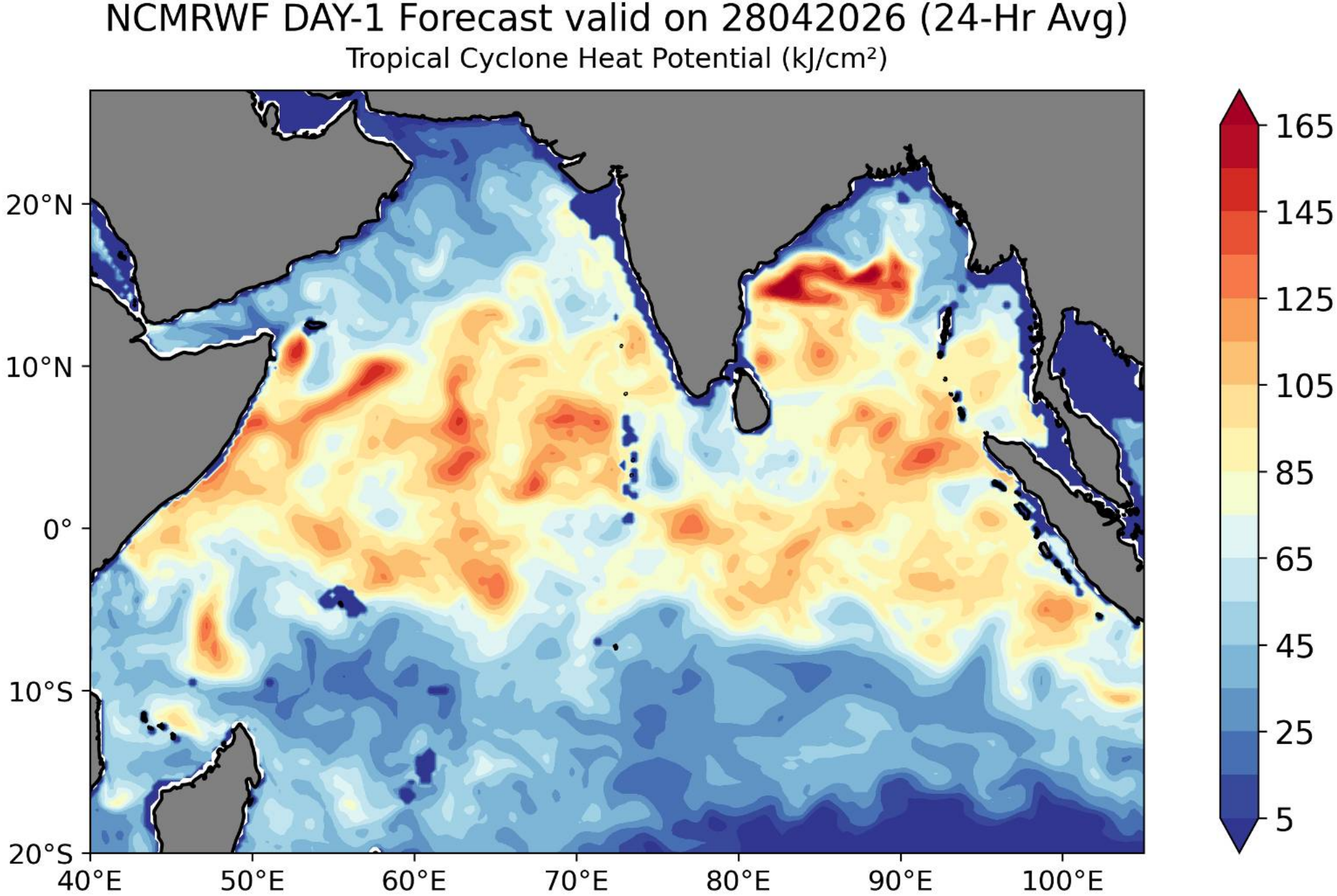
IC: February



Subseasonal Ocean Forecasts

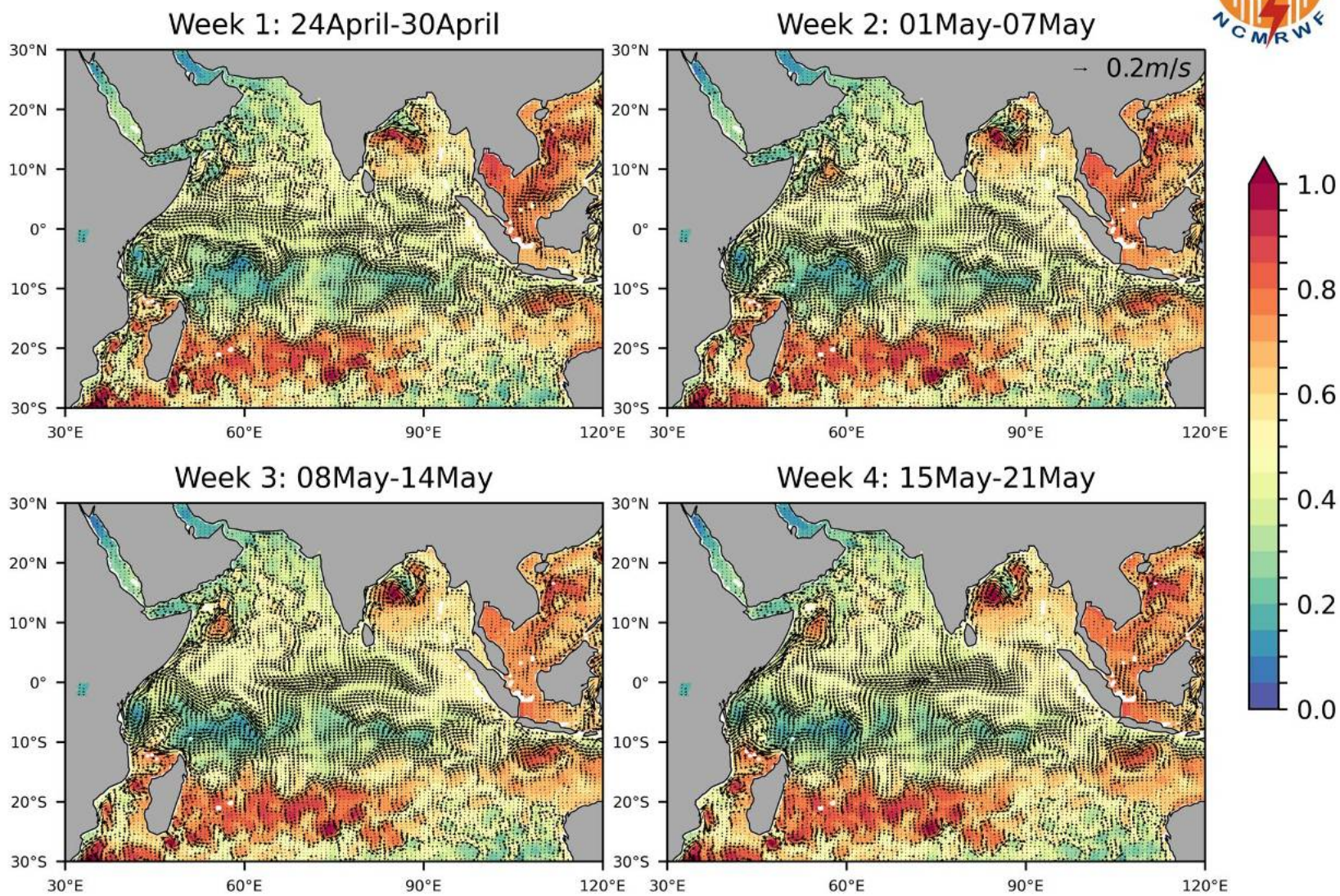





NCMRWF DAY-1 Forecast valid on 28042026 (24-Hr Avg)
Tropical Cyclone Heat Potential (kJ/cm²)
20°N
10°N
0°
10°S
20°S
40°E
50°E
60°E
70°E
80°E
90°E
100°E
165
145
125
105
85
65
45
25
5

NCMRWF CNCUM Extended Range Forecast Issued on 23April2026

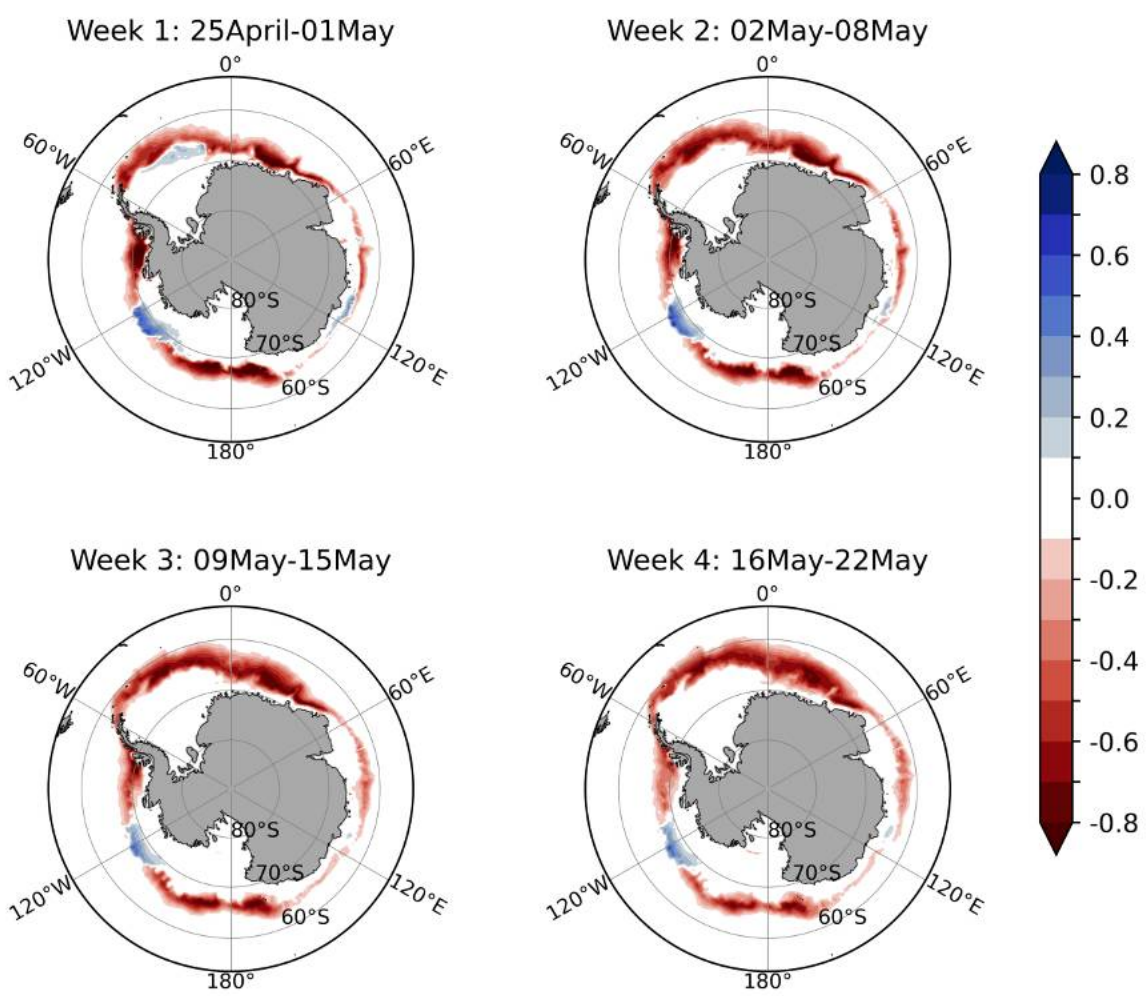
Ocean Currents (m/s) and SSH (m)



Polar Regions

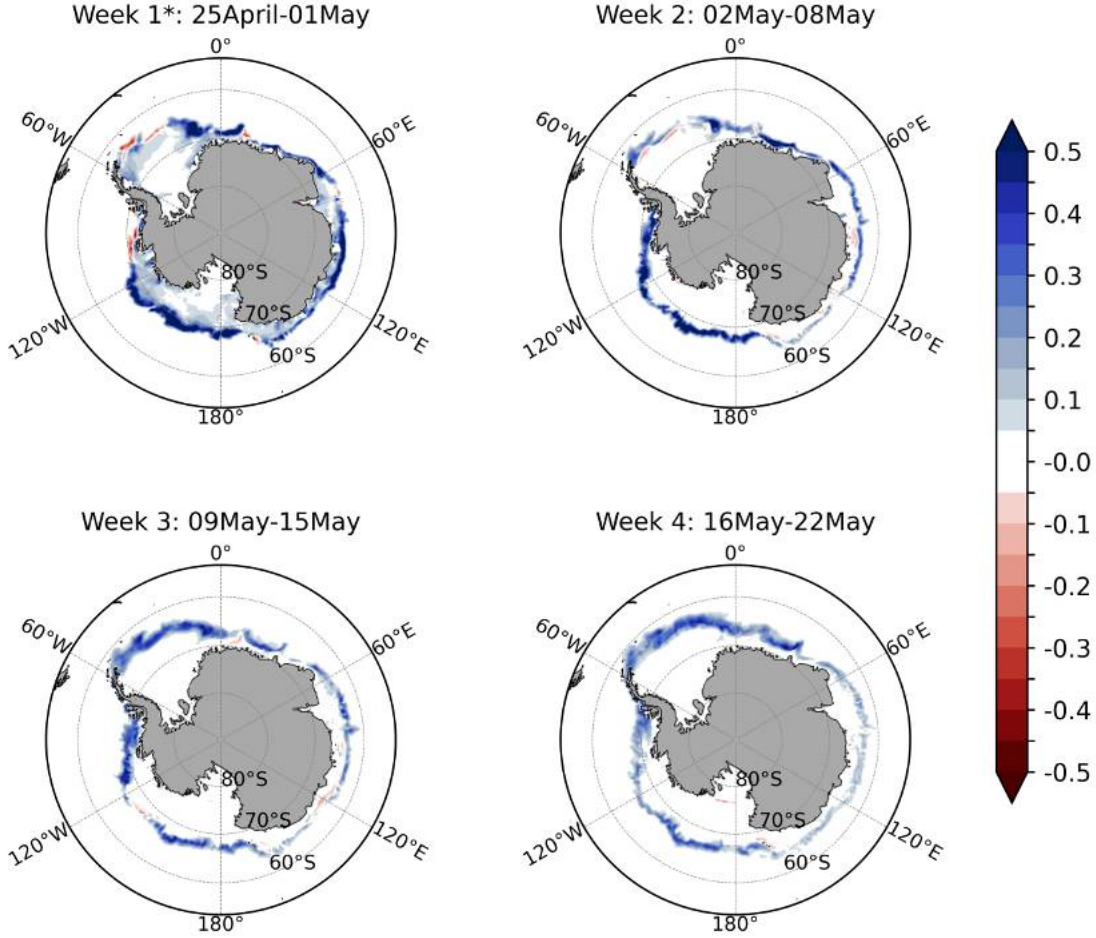
NCMRWF CNCUM Extended Range Forecast Issued on 24April2025

Sea Ice Concentration (in Fraction) Anomaly



NCMRWF CNCUM Extended Range Forecast - 24April2025

Sea Ice Concentration (in Fraction) Tendency (current-previous week)



* Estimated from model analysis

Thank You ...

ankur@ncmrwf.gov.in

All Products Available at:
https://nwp.ncmrwf.gov.in/forecast-dashboard