WMO Third Pole RCC Network (In Demonstration Phase)

Third Pole Climate Forum

3rd Third Pole Climate Forum (TPCF-3) Consensus Statement (TPCF-3)

New Delhi, 3-5 June 2025

State of the Climate for December 2024 to April 2025 and the Seasonal Outlook for June to September 2025

Background and Contributing Institutions

The Third Pole Regional Climate Centre Network (TPRCC-Network), focusing on the unique climate and cryosphere challenges of the Third Pole (TP) region, was established to deliver tailored regional climate services. The Network consists of three Nodes and their consortium members (list attached as Annex-I) distributed geographically and functionally: the Northern Node (led by China), the Southern Node (led by India), and the Western Node (led by Pakistan), with China taking the overall coordinating role. Broad collaborations have been established with GCW, GEWEX, ICIMOD, MRI, TPE, and UNESCAP to enhance the Network's effectiveness. The TPRCC-Network plays a pivotal role in promoting regional climate cooperation, supporting stakeholders in climate adaptation, and aiding decision-making across the region. Products and services are developed and disseminated through the TPRCC-Network web portal (http://www.rccra2.org/tp-rcc/), ensuring seamless access to climate information. Regular updates, seasonal climate bulletins, and consensus statements published during biannual climate forums, maintain a steady flow of information and engagement.

The 3rd Consensus Statement (CS-3) integrates the state of the climate for December 2024 to April 2025 and the seasonal outlook for June to September 2025. Developed using regional expertise, it synthesizes observational data, historical trends, current climate conditions, and seasonal prediction. The Statement provides a comprehensive overview of surface air temperature (SAT), precipitation, snow cover, and high-impact events observed during the preceding season while presenting an outlook for SAT and precipitation for the upcoming season. To facilitate the understanding of this CS, the developing details are provided in Annex-II.

The CS-3 was produced and mutually agreed upon during the 3rd Third Pole Climate Forum (TPCF-3), which was held on 3–5 June 2025 and hosted by the India Meteorological Department (IMD). The content and graphics were prepared collaboratively by the China Meteorological Administration (CMA), IMD and the Pakistan Meteorological Department (PMD) with support from the Technical Team on Seasonal Prediction (TT-SP) in developing objective methods for long-range forecast (LRF) products. Guidance from WMO and contributions from all consortium members and partners are gratefully acknowledged.

Highlights

- From December 2024 to February 2025, the northern Third Pole (TP) region and most of the Third Pole core region (TPCR[1]) experienced notably warmer conditions, with positive SAT anomalies locally exceeding +4 ℃. The southern TP consistently recorded large precipitation deficits during the winter, and this pronounced dryness persisted into March and April, particularly across the southwestern sector.

- From December 2024 to April 2025, the observed mean snow cover extent (SCE) in the TP region was 6.1% higher than the 2005—2020 average, with apparent sub-seasonal and sub-regional discrepancies although March SCE for the TP region as a whole ranking as the fourth highest on record.

- Persistent higher temperatures and substantial precipitation deficits during winter 2024/2025 resulted in extreme drought conditions across the northwestern parts of TP region, adversely affecting agricultural productivity. Extreme high temperatures observed in the western and southern TPCR during April and May further contribute to the ongoing droughts in those areas. Meanwhile, western China experienced recurrent heavy snowfalls and cold air outbreaks during the past winter, affecting local transportation severely. Since March 2025, frequent sand and dust events, including severe sandstorms, have affected Mongolia and the northern China.

- The above-normal SAT is expected across most parts of the TP region. The strongest warming signals are concentrated over the Karakoram region, with anomalies gradually decreasing eastward. The highest probabilities are expected over the central and southern TPCR, and the southwestern and northeastern TP region.

- The precipitation outlook for JJAS 2025 indicates notable spatial variability across the TP region. Above-normal precipitation is predicted over the southwestern TP region, particularly along the Hindu Kush Himalayan (HKH) region. This pattern is consistent in the deterministic and tercile probabilistic forecasts.

[1] TPCR refers to the region with altitude above 2000 m within the TPRCC-Network domain, i.e. the region within black contour in Figures 1-4,6-8 in the Consensus Statement.

Climate Summary for December 2024 – April 2025

Temperature

During the winter (DJF, the same below) of 2024/2025, Surface Air Temperature (SAT) anomalies across the Third Pole (TP) region exhibited a sandwich-like pattern. The northern TP and the majority of the Third Pole core region (TPCR) experienced above-normal SAT (with respect to the 1991-2020 average). In particular, the southern and central TPCR recorded significantly warmer conditions, with SAT anomalies locally exceeding +3 ℃ to +4 ℃. In contrast, most areas along approximately 35 °N to 45 °N recorded below-normal SATs, with negative anomalies in some locations exceeding –3 ℃ (Figure 1).

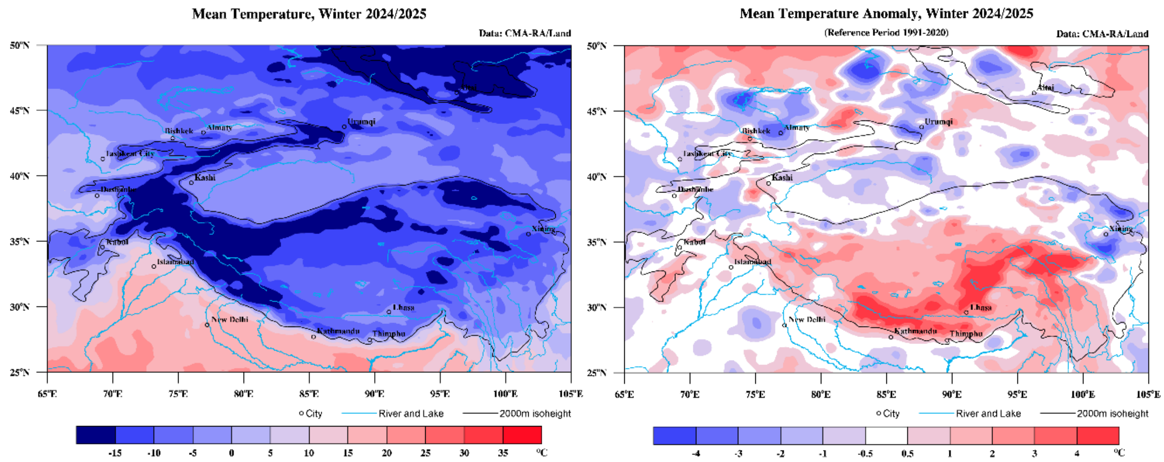

Figure 1 Seasonal mean surface air temperature (left) and anomalies in winter (DJF) 2024/2025 (relative to 1991-2020, right).

Data source: CMA-RA/Land

In March, the SAT anomaly in TP region featured a distinct "high-low-high" distribution pattern stretching from the southwestern and south to the northeastern of the TP. SATs were above-normal in the southwestern TP region, as well as in the southern and central TPCR. Notably, the southern TPCR recorded temperature anomalies of +4 ℃ or greater. In contrast, the central and eastern TP experienced comparatively cooler conditions, with the eastern and southeastern areas exhibiting negative anomalies and some areas recorded SAT up to 3 ℃ below normal. Conversely, the northwestern TP experienced SATs higher than normal (Figure 2).

In April, SATs were predominantly above normal across most of the TP, with the central, western, and northern areas exhibiting especially pronounced positive anomalies, in some places up to +4 ℃ above the 1991–2020 average. However, certain southern and southeastern sub-regions remained cooler than normal.

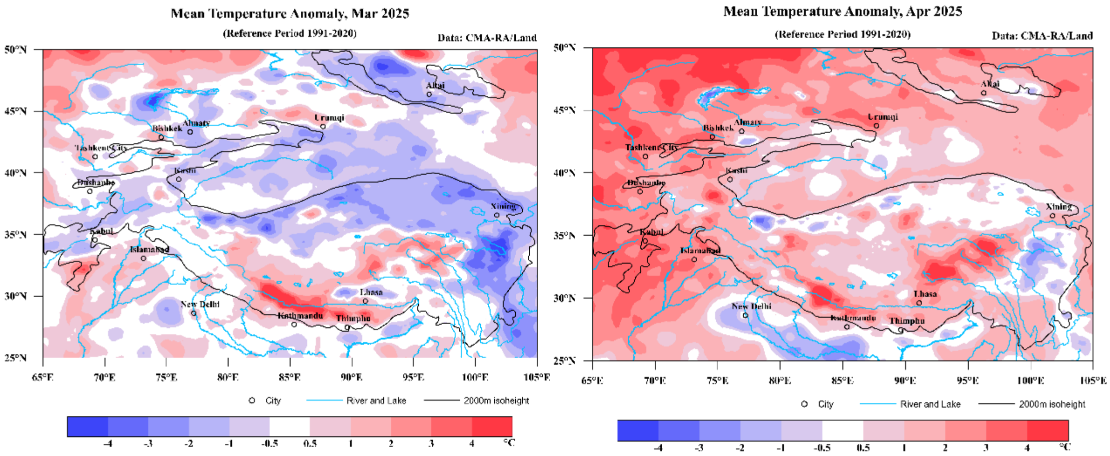

Figure 2 Monthly mean surface air temperature anomalies (relative to 1991-2020) in March (left) and April (right) of 2025.

Data source: CMA-RA/Land

Precipitation

During the winter of 2024/2025, seasonal precipitation anomalies across the TP region exhibited a pronounced west–east pattern characterized by alternating dry and wet phases. This pattern manifested as drier conditions in the western and central sectors, interspersed with localized areas of above-normal precipitation to the east. Notably, the southern TP experienced substantial precipitation deficits, with reductions ranging from 20% to 80% compared to normal (Figure 3).

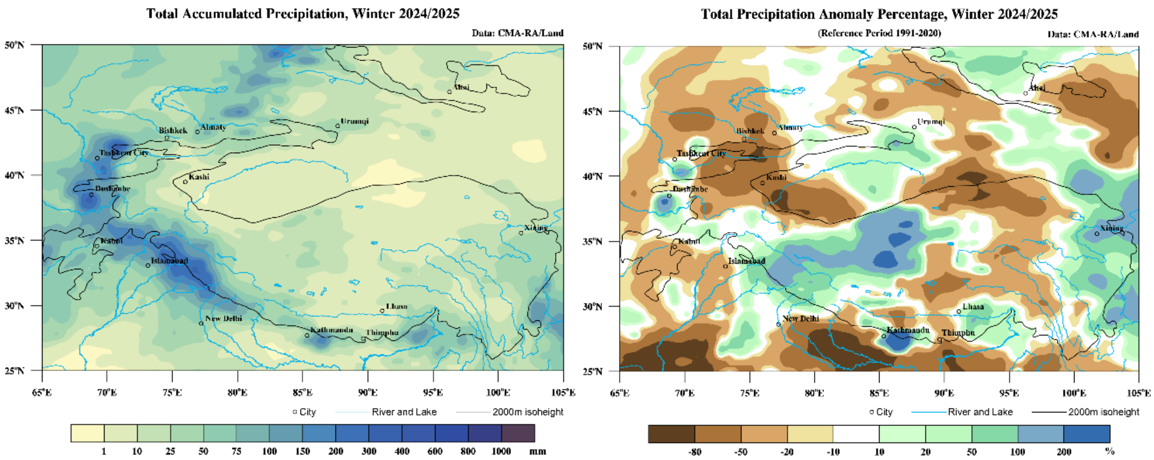

Figure 3 Seasonal precipitation totals (left) and anomalies by percentage in winter (DJF) 2024/2025 (relative to 1991-2020, right). Data source: CMA-RA/Land

In March and April, spatial contrasts in precipitation persisted across the region. The southern, western, northern, and eastern sectors of the TP all experienced reduced precipitation, with particularly pronounced deficits observed in the southwestern, northeastern, and eastern sub-regions—precipitation in the southwestern TP consistently remained at less than 20% of normal (Figure 4). In contrast, most areas of the TPCR recorded above-normal precipitation during this period.

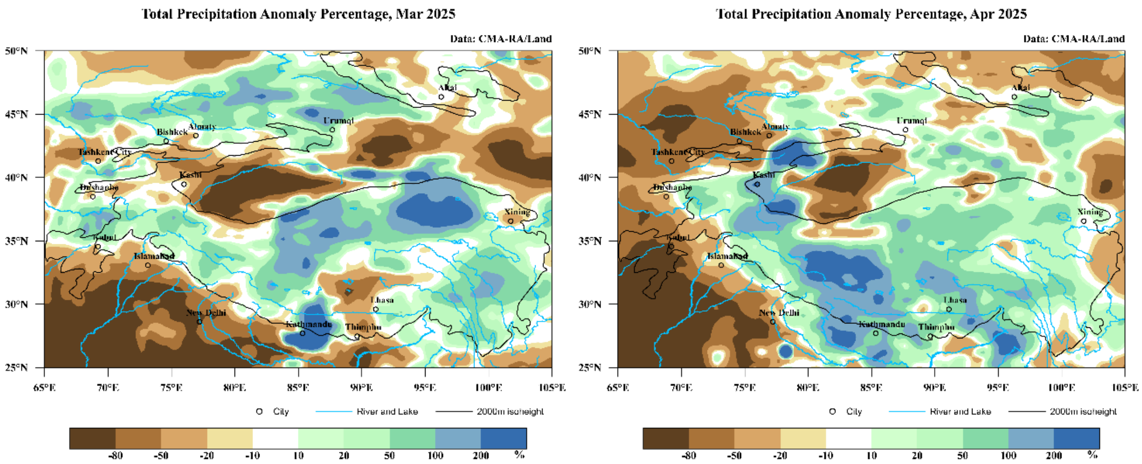

Figure 4 Monthly precipitation anomalies by percentage (relative to 1991-2020) in March (left) and April (right) of 2025.

Data source: CMA-RA/Land

Snow Cover

Over the past 21years, 2005—2025, there's no significant linear trend for mean snow cover extent (SCE) during the cold season (Dec. to Apr.) in the TP region, though with obvious inter-annual fluctuation. From December 2024 to April 2025, the observed mean SCE was 1030.7×10^3 km^2, 6.1% higher than the 2005—2020 average (971.0×10^3 km^2). For the winter of 2024/2025, the mean SCE was 1348.9×10^3 km^2, which was 8.7% higher than the 2005—2020 average. While in March and April 2025, the mean SCE in TP region was 1197.4×10^3 km^2 and 545.8×10^3 km^2, respectively, representing a 19.0% increase and a 3.8% decrease from the normal. The March SCE ranked as the fourth highest on record (Figure 5).

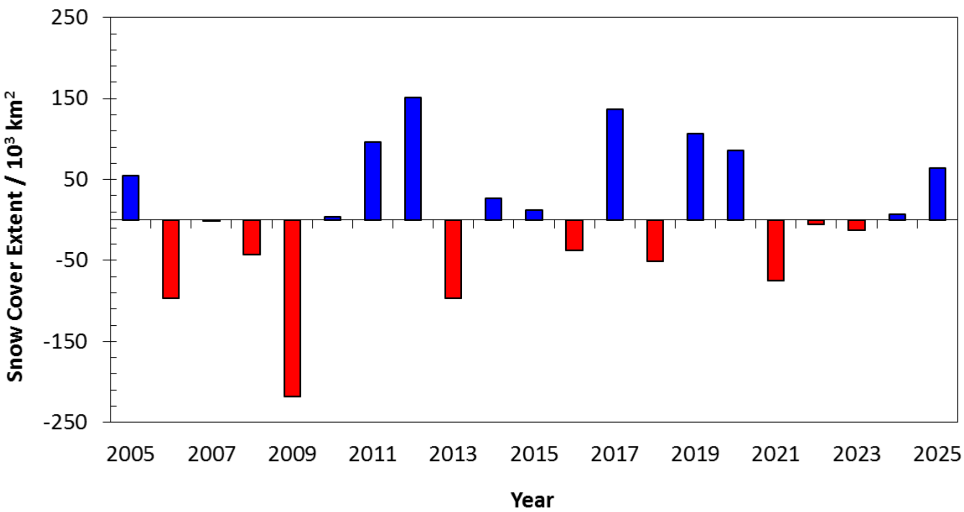

Figure 5 The mean Snow Cover Extent anomalies (relative to 2005-2020) for the period from December to April in 2005-2025.

Data source: 4 km IMS/NSIDC

Spatially, the number of snow cover days (NSCD) in the past winter exceeded 80 days in the northern TP region and the western TPCR, and were around 10-20 days higher than normal in some areas. In the northern and eastern TPCR where there were also large NSCD, positive anomalies of more than 20 days dominated the area. In contrast, in the middle and southern part of TPCR where NSCD is less than 10 days, the negative anomalies of exceeding –10 days were prevalent. Compared with winter, the negative anomalies for NSCD in March shrank in both range and amplitude across the TP region, while the positive anomalies extended to the southeastern part of TPCR, resulting in an overall higher SCE than normal for the month. However, in April, negative anomalies extended northward, dominating the northern TP region and the middle part and south edge of TPCR (Figure 6).

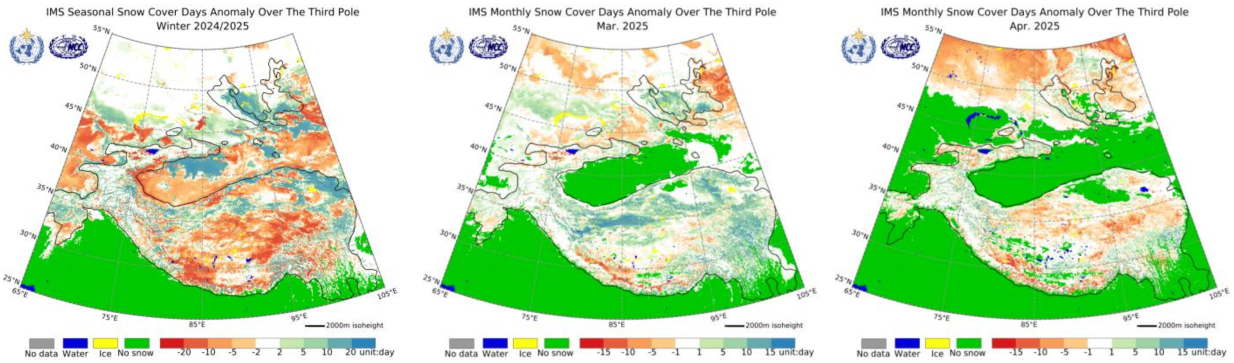

Figure 6 The Number of Snow Cover Days anomalies (relative to 2005-2020) for the winter (DJF) 2024/2025 (left), March 2025 (middle) and April 2025 (right). Data source: 4 km IMS/NSIDC

High-impact Climate Events

Heavy snow and cold air activity

During the past winter, many areas in northwest China, have been continuously hit by strong winds and heavy snowfall, especially in Xinjiang Province. From 2 to 3 December 2024, heavy snowfall occurred in the northwest of Xinjiang, China, significantly disrupting transportation and daily lives. On 8 December, Urumqi was hit by the strongest snowfall ever since December 1981, causing warehouse collapses, several roads closure, eight flights cancellation and many trains delays. On 19 December, 60 cm-depth snow, caused by snow drift (level 12) occurred on some sections of the road, with extremely low visibility, causing great inconvenience to people's travel. From 8 to12 December, Gansu Province was hit by blizzard; the maximum snow depth reached 15 cm in part of the region. In January 2025, three notable cold air activities led to low-temperature stress and snow-related disasters in the southern part of Southwest China. From 23 to 27 January 2025, the temperature in Yunnan Province dropped by 8 to 12℃. As a result of cold air activity, localized hail and wind damage were reported in Yunnan and Guizhou, affecting nearly 1,000 people.

During the 2024/2025 winter season, several notable weather events were observed in the mountainous and foothill areas of Kazakhstan, particularly in the Turkestan and Almaty regions. On 15 December 2024, the Shuyldak meteorological station (Turkestan Region) recorded an intense snowfall with a total precipitation of 22.2 mm over 11 hours and 20 minutes (03:40 to 15:00). Over the subsequent three days, persistently unfavorable weather conditions prevailed across southern, mountainous, and foothill parts of the region, characterized by mixed precipitation (rain and snow), occasional heavy precipitation, icy conditions, and drifting snow.

Caused by last winter's heavy snowfall, Mongolia experienced Dzud events, leading to the loss of 3,053,437 livestock.

Extreme drought

During the winter season, central and northern India experienced persistent precipitation deficits. In February, the national rainfall deficit reached 70%, with the principal wheat-producing regions registering decreases in monthly rainfall. The average temperature across India in February 2025 was 1.34 ℃ above the normal, marking the warmest February in 125 years. Under conditions of higher temperatures and severe rainfall shortages, extreme drought developed in the northwestern India, posing substantial challenges to agricultural production and crop growth.

Frequently sand-dust weather events

Since March, Mongolia and northern China have experienced frequent episodes of sand and dust storms. Notably, a severe sandstorm occurred in Mongolia on 9 March 2025. According to statistics, northern China was affected by a total of 13 sand-dust weather events from early March onward, including 2 episodes classified as sandstorms and 3 as severe sandstorms.

Extreme high temperatures

Since April, the maximum temperature in the southeast of Pakistan and the southwest of India has remained above 40 ℃. In late May, India and Pakistan experienced continuous high temperatures. The continuous extreme high temperatures and frequent power outages have seriously affected people's daily lives, "affecting millions of people in India and Pakistan", as reported by the Global Times. About 1,000 to 1,200 patients visited the emergency department of public hospitals in Karachi, Pakistan every day due to high temperatures and some schools have announced early vacations to prevent students from suffering from heatstroke.

Spring frost event

From 20:00 on 16 April to 08:00 on 17 April 2025, frosts were observed in the eastern and foothill areas of Almaty Region, located in the southeastern part of Kazakhstan, with air temperatures dropping to –1 to –3 ℃.From December 2024 to April 2025, Mongolia has experienced 8 severe wind events, resulting in the collapse of 37 houses and the death of 4434 livestock. Additionally, 137 wildfires occurred in forested area, causing one human fatality, the loss of 1063 livestock and the destruction of six vehicles.

Seasonal outlook for JJAS 2025

Temperature

For JJAS 2025, positive surface air temperature (SAT) anomalies are predicted across most of the TP region (Figure 7). The most significant warming is expected over the Karakoram region, with anomalies gradually decreasing eastward along the TPCR. Similarly, the tercile-based probabilistic temperature outlook (Figure 7) indicates an increased likelihood of above-normal temperatures across the TP region. The highest probabilities are predicted over the central and southern TPCR, as well as the southwestern and northeastern TP region.

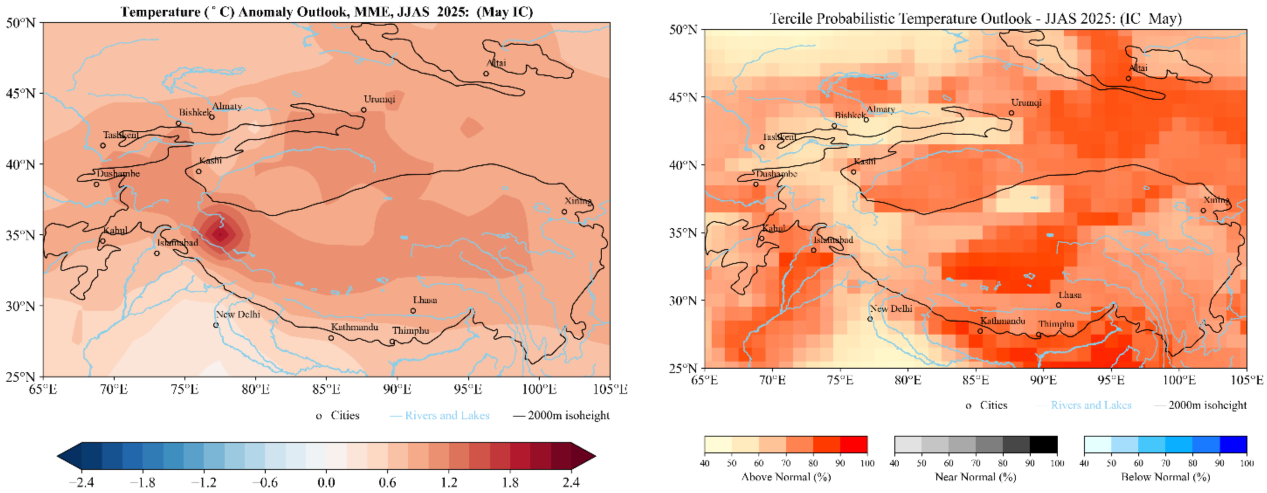

Figure 7 Surface Air Temperature anomaly (left) and probabilistic outlook (right), JJAS 2025 for TP region

Precipitation

The precipitation outlook for JJAS 2025 indicates notable spatial variability across the TP region. Above-normal precipitation is predicted over the southwestern TP region, particularly along the Hindu Kush Himalayan (HKH) region. In contrast, below-normal precipitation is predicted over much of the northwestern TP region and some isolated areas of the southeastern TP region during the forecast season. These patterns are consistently highlighted in both the deterministic and tercile-based probabilistic forecasts (Figure 8).

Compared to the drier-than-normal condition observed over the southwestern part of the TP region from December 2024 to April 2025, the JJAS 2025 outlook indicates a significant positive precipitation anomaly in these regions.

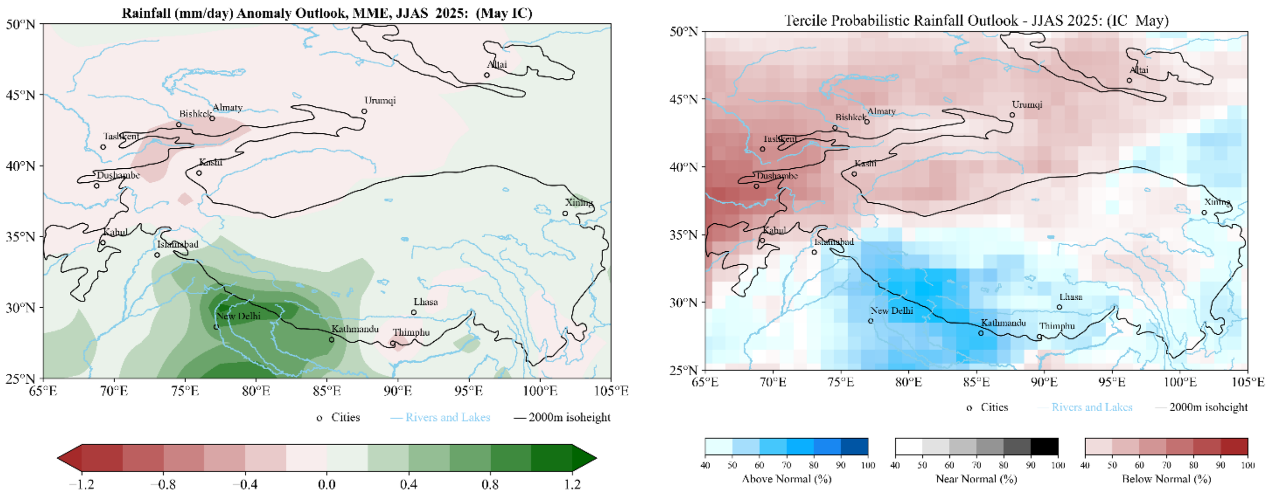

Figure 8 Precipitation anomaly (left) and probabilistic outlook (right), JJAS 2025 for TP region

Annex-I

Third Pole Regional Climate Centre Network (TPRCC-Network) Overview

A WMO Regional Climate Centre (RCC) Network comprises a group of specialized centers collectively fulfilling all mandatory functions required of an RCC. Each center in the network is referred to as a "Node," with specific responsibilities aligned to its expertise. The details for the Third Pole Regional Climate Centre Network (TPRCC-Network) are as follows:

The Northern Node

> **Function**: Climate Monitoring
> **Lead**: National Climate Centre, China Meteorological Administration (NCC/CMA), China
> **Consortium Members**: Bhutan, Kazakhstan, Mongolia, Nepal, Pakistan

The Southern Node

> **Function**: Operational Data Services
> **Lead**: India Meteorological Department (IMD), India
> **Consortium Members**: Bangladesh, Bhutan, Myanmar, Nepal

The Western Node

> **Function**: Long-Range Forecasting
> **Lead**: Pakistan Meteorological Department (PMD), Pakistan
> **Consortium Members**: Afghanistan, China, Tajikistan, Uzbekistan

Annex-II

Understanding the Consensus Statement

The probabilistic and deterministic outlooks of surface air temperature and precipitation for the TP region are based on the outputs of eight global seasonal prediction models with optimal skill over the region. These models are combined using the multi-model ensemble (MME) technique to generate operational forecast for rainfall and temperature. The basic idea of MME is to avoid inherent model errors and minimize uncertainties by using independent and skillful models. The probabilistic outlook is based on the combined ensembles from all participating models and represents a consensus forecast across the entire ensemble system.

In terms of model skill (i.e., the ability of a climate model to predict seasonal climate), a multi-model ensemble (MME) approach merges information from all individual models. This provides a forecast with higher confidence in regions where different model outputs are consistent, and lower confidence where models show less agreement. Ensemble means are calculated from the outputs of the individual models using a simple composite method (SCM). The ensemble mean anomaly forecasts for each individual model is calculated using their own climatology obtained from the hindcast. The anomaly for each model is based on the reference period (1991 – 2010) of the model's climatology. Ensemble mean anomaly is calculated from those of the individual models using SCM. The MME approach is a well-recognized methodology for providing the most reliable objective forecasts.

Snow cover products were produced using 4-km daily data of the IMS released by the NSIDC (https://nsidc.org/home). The number of snow cover days within a specific period was determined by counting the days with recorded snow cover. To calculate the SCE for each grid cell in a certain period, the following two-step methodology was employed: (1) calculate the snow cover fraction for each grid cell by dividing the number of days with snow cover by the total number of days in the period, and (2) multiply the snow cover fraction by grid cell area (16 km²) to obtain SCE for individual grid cells. The regional SCE for the period was determined by summing the SCEs of all grid cells within the domain of the TPRCC-Network.

Acronyms

1. BCC – Beijing Climate Centre
2. CMA – China Meteorological Administration
3. CMME - China Multi-Model Ensemble
4. DJF – December, January, February
5. GCW – Global Cryosphere Watch
6. GEWEX – Global Energy and Water EXchanges
7. ICIMOD – International Centre for Integrated Mountain Development
8. IMD – India Meteorological Department
9. IMS – Interactive Multisensor Snow and Ice Mapping System
10. JJAS – June, July, August, September
11. LRF – Long-Range Forecast
12. MME – Multi-Model Ensemble
13. MRI – Mountain Research Initiative
14. NSCD – Number of Snow Cover Days
15. NSIDC – National Snow and Ice Data Center
16. PMD – Pakistan Meteorological Department
17. SAT – Surface Air Temperature
18. SCE – Snow Cover Extent
19. SCM – Simple Composite Method
20. TP – Third Pole
21. TPCR – Third Pole Core Region
22. TPE – Third Pole Environment Programme
23. TPRCC-Network - Third Pole Regional Climate Centre Network
24. TT-SP – Technical Team on Seasonal Prediction
25. UNESCAP – United Nations Economic and Social Commission for Asia and the Pacific
26. WMO – World Meteorological Organization