Twenty-ninth Session of South Asian Climate Outlook Forum (SASCOF-29) and Climate Services User Forum (CSUF)

25-26 and 30 September 2024 (held online)

SASCOF-29 Outlook for the 2024 October to December Season Rainfall and Temperature over South Asia

Summary

Normal to above-normal rainfall is likely over most parts of South Asia during 2024 October to December (OND) season, particularly covering the south and eastern parts as well as a few isolated areas over northwestern parts. Below-normal rainfall is likely over the northwestern and northern parts of South Asia as well as over the small islands in the southwestern parts of South Asia.

During the season, normal to above-normal maximum and minimum temperatures are likely over most parts of South Asia. However, normal to below-normal maximum temperatures are likely over some central and south eastern parts of South Asia.

This consensus climate outlook for the 2024 OND season over South Asia has been prepared through an expert assessment of the prevailing global climate conditions influencing the South Asian climate and seasonal forecasts from different climate models around the world. Currently, neutral El Nino-Southern Oscillation (ENSO) and neutral Indian Ocean Dipole (IOD) conditions are observed over the equatorial Pacific and Indian Ocean. These parameters are known to influence climate variability in South Asia. Latest forecasts from many global climate models indicate an enhanced probability of development of the La Niña conditions and a likelihood of neutral IOD conditions for the next OND season. Careful consideration is also given to other regional and global factors, as well as the intra-seasonal variability of the region that can affect the rainfall and temperature patterns over the region. For more information and further updates on the seasonal climate outlook on national scale, the respective National Meteorological and Hydrological Services (NMHSs) may be consulted.

Introduction:

The southern parts of South Asia receive significant amount of rainfall during the October to December (OND) season, which is critical for agricultural operations. The re-establishment of a northeasterly trade-wind regime over South Asia associated with the southward movement of the Inter-Tropical Convergence Zone (ITCZ) ushers in the Northeast monsoon, bringing much-needed rainfall to the southern parts of India, Sri Lanka, and Maldives. The October to November period in Sri Lanka is known as the second Inter Monsoon (SIM) season. It has been recognized that there is a moderate seasonal predictability for the northeast monsoon circulation over the region as the seasonal variability is strongly influenced by the slowly varying boundary forcings, such as sea surface temperatures (SSTs). However, the predictability is somewhat limited due to the strong day-to-day atmospheric variability caused by the passage of the synoptic scale weather systems such as easterly waves, lows, depressions, cyclones, etc. The seasonal predictability of the northeast monsoon over the region is also influenced by the Madden-Julian Oscillation (MJO), which represents the major global scale intra-seasonal variability pattern.

The climate outlook for the 2024 October to December season was finalized during the twenty-ninth session of the South Asian Climate Outlook Forum (SASCOF-29) held from 25-26 September 2024 via video conferencing. The session was attended by experts representing the National Meteorological and Hydrological Services (NMHSs) of all nine South Asian countries as well as those representing several global and regional climate agencies, including World Meteorological Organization (WMO), WMO Regional Climate Centre (RCC) Pune, Indian Institute of Tropical Meteorology (IITM), Met Office (UKMO), International Research Institute for Climate and Society (IRI), Regional Integrated Multi-hazard Early-warning System (RIMES), Japan Meteorological Agency (JMA), WMO Global Producing Centres for Seasonal Prediction (GPCs-SP), etc. The online forum deliberated on various observed and emerging climate forcings that are known to influence the climate variability of the region such as the El Niño/Southern Oscillation (ENSO) conditions over the equatorial Pacific, Indian Ocean Dipole (IOD) conditions over the Indian Ocean, etc. The key features of these climate forcings are briefly discussed below.

Conditions over the Pacific Ocean

The ENSO is one of the global scale climate forgings that significantly influences the year-to-year variability of the northeast monsoon rainfall and the surface temperatures over the South Asia. At present, the sea surface temperatures are below average in the eastern equatorial Pacific Ocean. Currently, neutral ENSO conditions are observed over the equatorial Pacific. Latest forecasts from many climate models indicate an enhanced probability of La Niña conditions during the upcoming OND season.

Conditions over the Indian Ocean

In addition to ENSO conditions over the Pacific, other factors, such as Indian Ocean sea surface temperatures, influence the region's climate variability. Above-average sea surface temperatures (SSTs) are currently seen across most of the Indian Ocean. Currently, neutral Indian Ocean Dipole (IOD) conditions prevail over the Indian Ocean. The latest model forecast indicates that the neutral IOD conditions will likely continue for the next OND season.

SASCOF Outlook for the 2024 October to December Season Rainfall over South Asia:

A consensus outlook for October to December season rainfall over South Asia has been prepared based on the expert assessment of prevailing large-scale global climate indicators mentioned above and experimental as well as operational long-range forecasts based on statistical and dynamical models generated by various operational and research centers of the world. There is unanimity among the experts that the La Niña conditions in the equatorial Pacific Ocean are likely to develop during the upcoming OND season, and the neutral Indian Ocean Dipole conditions over the Indian Ocean are likely to continue during the October to December season. The relative impact of all these parameters needs to be considered to determine the expected state of the climate over the region during the season.

The outlook for the 2024 October to December season rainfall over South Asia is shown in **Fig.1a**. The figure illustrates the most likely tercile category[1] as well as its probability for each of the 1° latitude x 1° longitude spatial grid boxes over the region. The dotted area shown in the map climatologically receives very low rainfall

and experiences dry weather during the OND season. The box-wise tercile probabilities were derived using an objective approach from an initial set of gridded forecasts from multiple GCMs and consolidated through a consensus-building discussion among climate experts.

The outlook suggests that during the 2024 October to December (OND) season, normal to above-normal rainfall is likely over most parts of South Asia during 2024 October to December (OND) season, particularly covering the south and eastern parts as well as a few isolated areas over northwestern parts. Below-normal rainfall is likely over the northwestern and northern parts of South Asia as well as over the small islands in the southwestern parts of South Asia. The remaining part of the region is likely to experience climatological probability for seasonal rainfall.

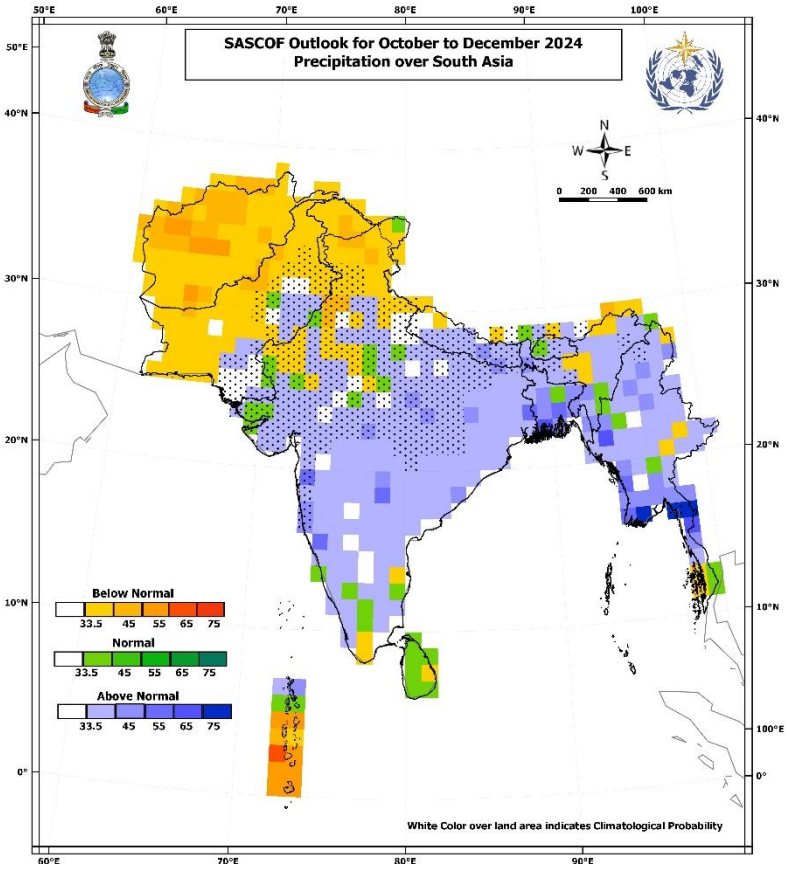

Fig.1a. Outlook for 2024 October to December season Rainfall over South Asia. The dotted area shown in the map climatologically receives very low rainfall and experiences dry weather during the OND season.

Tercile categories have equal climatological probabilities of 33.33% each

The consensus outlook for the 2024 October to December maximum and minimum temperature over South Asia is shown in **Fig.1b and 1c**. Normal to above-

normal maximum and minimum temperatures are likely over most parts of South Asia. However, normal to below-normal maximum temperatures are likely over some central and south eastern parts of South Asia.

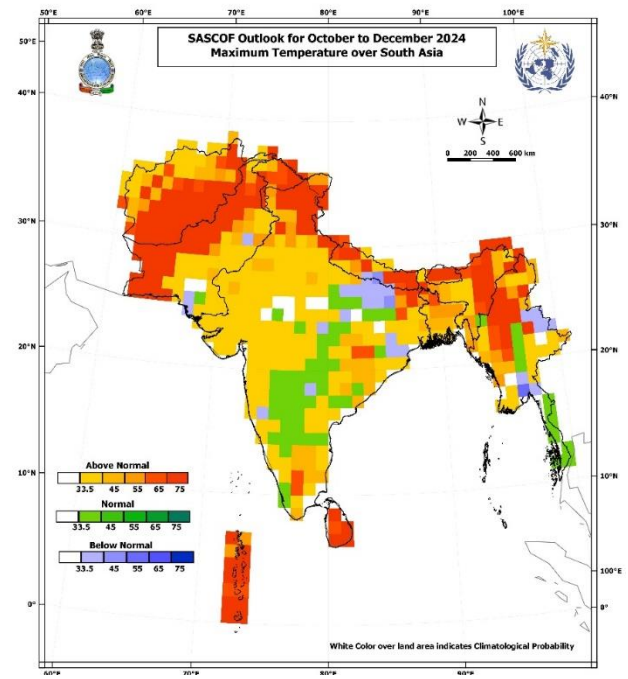

Fig.1b. Outlook of the probability of the most likely category for the 2024 October to December season maximum temperature over South Asia.

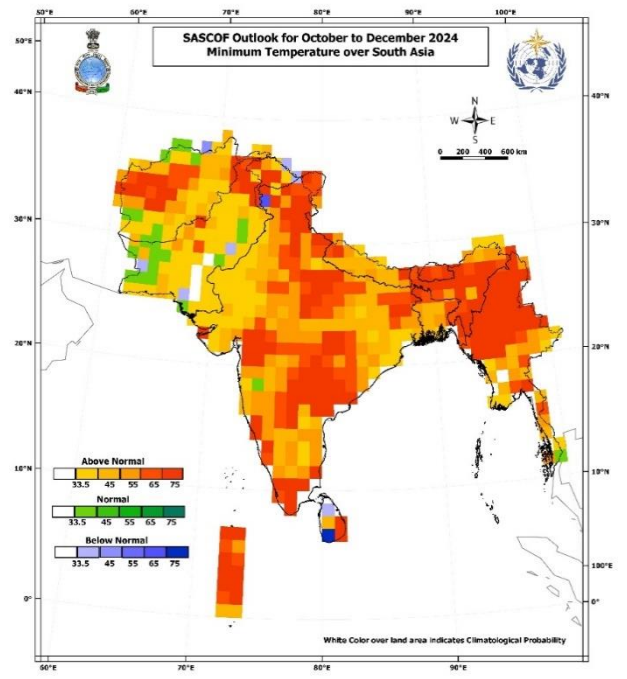

Fig.1c. Outlook of the probability of the most likely category for the 2024 October to December season minimum temperature over South Asia.

Verification of consensus outlook for the 2023 October to December season

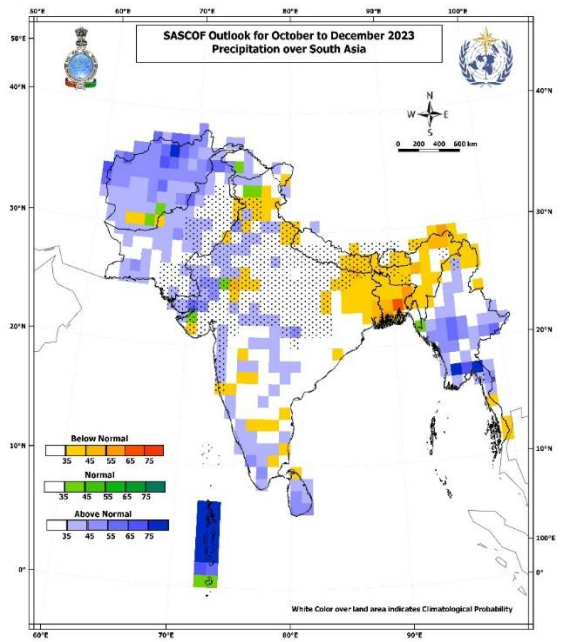

Fig 2. Consensus outlook map of SASCOF-26 for 2023 October to December Rainfall over South Asia

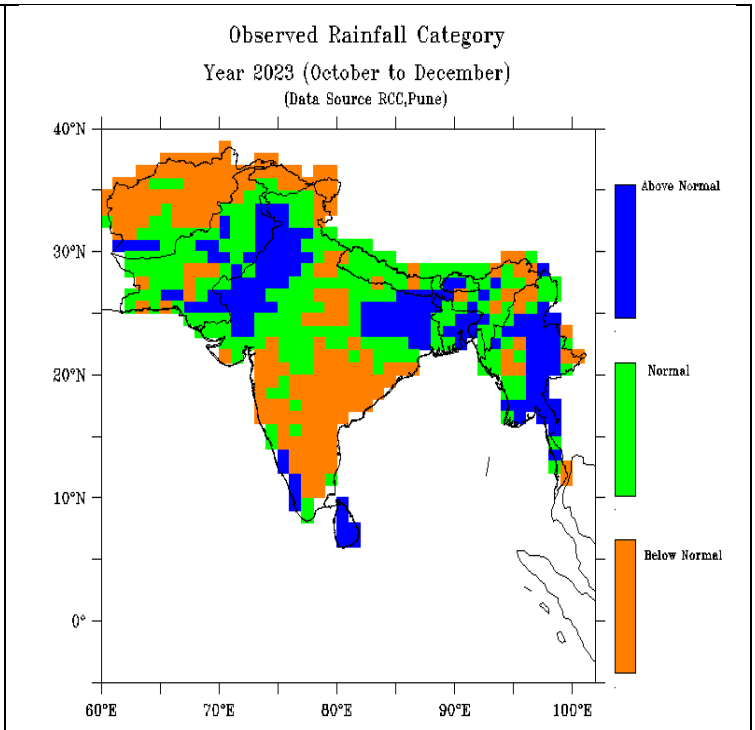

Fig 3. Observed rainfall distribution during 2023 October to December Season over South Asia expressed as grid point rainfall tercile categories. Data Source: RCC,IMD, Pune

The consensus forecast outlook map (Fig.2) for the 2023 October to December season showed above-normal rainfall over the southern parts of South Asia, including the islands where it receives climatologically a good amount of rainfall during the season. Above-normal rainfall is also forecasted over the northwestern and northern parts of South Asia and southeastern parts of South Asia, which normally receive very low rainfall during the OND season. Below-normal rainfall is predicted in some regions in northeastern South Asia. Normal or climatological probability is predicted over remaining part of the region is predicted for the seasonal rainfall.

Fig. 3 shows the observed rainfall distribution during the 2023 October to December Season expressed in terms of tercile categories. Most of the northwestern and southeastern parts of the South Asia region received normal to above-normal rainfall during the 2023 October to December season. The islands in southern South

Asia also received above-normal rainfall during the season. Below normal rainfall is mainly received over most parts of the southern and some parts of the northwestern parts of the South Asia region.

From the above Figures 2 & 3, It can be seen that the SASCOF-23 outlook matches very well with observation in many regions of South Asia.

The long-term historical patterns of the rainfall over South Asia during the October to December Season (Fig.4 a & b), characterized by remarkable spatial variability, provide the general reference points at the respective locations for the rainfall anomalies indicated in the outlook.

The long-term historical patterns of the Temperature (Minimum and Maximum) over South Asia during October to December (Fig.5 a & b), characterized by large spatial variability, provide the general reference points at the respective locations for the temperature anomalies indicated in the outlook.

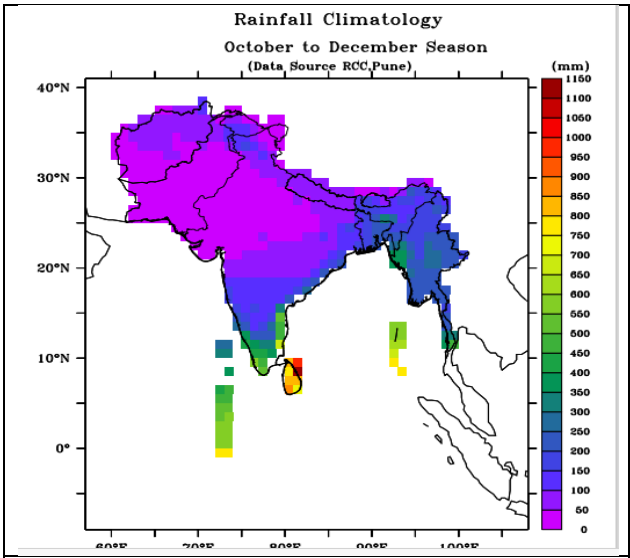

Fig.4 (a) Rainfall climatology for the period 1982-2020 for October to December Season over South Asia

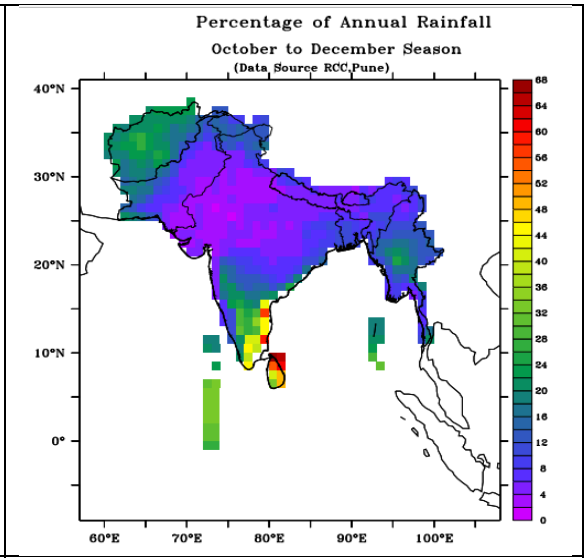

Fig.4 (b) Percentage of annual rainfall for October to December Season over South Asia.

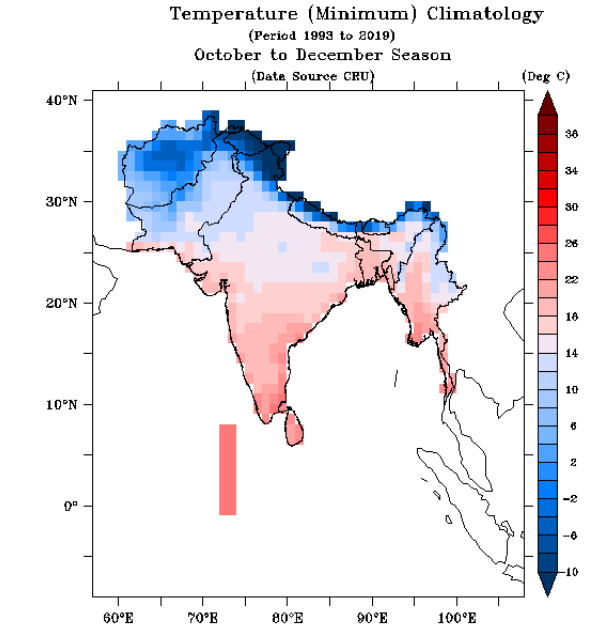

Fig.5 (a) Minimum Temperature climatology for the period 1990-2020 for October to December Season over South Asia

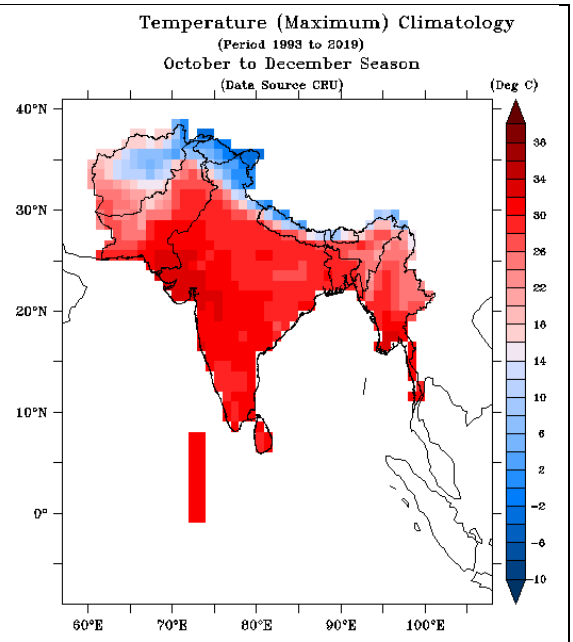

Fig.5 (b) Maximum Temperature climatology for the period 1990-2020 for October to December Season over South Asia