Eighteenth Session of
South Asian Climate Outlook Forum (SASCOF-18)
23 November 2020
(Held online due to CoViD-19 pandemic)

Consensus Statement on the Forecast for the December 2020 to February 2021Season Rainfall and Temperature over South Asia

Summary

Above normal Precipitation is likely during the winter season (December 2020 to February 2021) over some areas of the southern part of the region including eastern part of the peninsular Indian subcontinent, south eastern part of the region and islands. Below normal precipitation is likely over some areas of northwestern part of the region, some areas along the foot hills of Himalayas and northeastern most part of south Asia. Normal precipitation is likely over remaining parts of the region.

During the season, above normal minimum temperatures are likely over most parts of the region. However, below normal minimum temperatures are likely over some areas of northern most and central parts of the region and Normal minimum temperatures are likely over southern parts of South Asia. Below normal maximum temperatures are likely over western half of the Peninsular India and neighboring west central parts of the region. Normal maximum temperatures are likely over southern parts of the region including some areas of southeast India, south Myanmar, Sri Lanka and islands. Above Normal Maximum Temperature are likely over remaining parts of the region.

This consensus climate outlook for the December 2020 to February 2021 season over South Asia has been developed 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 moderate La Niña conditions are prevailing in the tropical Pacific Ocean and neutral Indian Ocean Dipole (IOD) conditions are prevailing over the Indian Ocean. These parameters, which are known to influence the climate variability over South Asia are likely to continue at their current level during the DJF 2021 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:

During the winter season (December to January), Northern parts of South Asia receive good amount of precipitation in the form of both snow and rain falls. Southern part of the region consisting of southeastern part of India, Sri Lanka and Maldives also receive good amount of rainfall during the season. Most of the remaining areas of the region generally receive very little precipitation during the season. It is recognized that the seasonal predictability of the region during the season is limited to some extent by the strong day to day atmospheric variability. The day to day atmospheric variability over the northern (southern) part the region is caused by the passage of disturbances in the mid latitude westerlies (tropical easterlies). The seasonal predictability over southern part of the region is also limited by the eastward moving Madden Julian Oscillation (MJO), which represents the major global scale intra-seasonal variability pattern.

The climate outlook for the December 2020 to February 2021(DJF 2020-21) season was finalized during the eighteenth session of the South Asian Climate Outlook Forum (SASCOF-18) held on 23rdNovember2020 via video conferencing in the backdrop of the current extraordinary circumstances of Covid-19 pandemic prevailing in the world. The session was attended by experts representing the National Meteorological and Hydrological Services (NMHSs) of all the nine South Asian countries as well as those representing several global and regional climate agencies including WMO Regional Climate Centre (RCC) Pune, Indian Institute of Tropical Meteorology (IITM), Met Office (UKMO) and Regional Integrated Multi-hazard Early-warning System (RIMES) etc. The online forum deliberated on various observed and emerging climate forcing 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 forcing are briefly discussed below.

ENSO Conditions over the Pacific Ocean

The El Niño/Southern Oscillation (ENSO) is one of the global scale climate phenomena having significant influence on the year-to-year variability of the winter precipitation as well as the surface temperatures over South Asia. The cool ENSO

neutral conditions observed over the equatorial Pacific Ocean in the beginning of the year turned in to weak La Niña conditions by the end of August 2020. Currently, the SST conditions over equatorial Pacific suggest moderate La Niña conditions. Atmospheric conditions are also indicating La Niña conditions. The latest forecasts from global climate models indicate strong probability for La Niña conditions likely to continue during the winter season (DJF).

Conditions over the Indian Ocean

In addition to ENSO conditions over the Pacific, other factors such as Indian Ocean sea surface temperatures have some influence on the climate variability of the region. Currently the SST conditions over equatorial Indian Ocean suggest neutral Indian Ocean Dipole (IOD) conditions. Forecast from global climate models indicate strong probability of neutral IOD conditions to persist during the winter season (DJF).

Consensus Outlook for the December 2020 to February 2021 Season Rainfall and Temperature (Minimum & Maximum) 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.

During the season, the climate of the region is also generally get influenced by the strong day to day atmospheric variability. Therefore, it is recognized that there is large uncertainty in the prediction of winter precipitation over the region. It was also recognized that SSTs over Pacific is not the only factor that decides the performance of winter season climate over the region. Other relevant climate drivers such as the state of the Indian Ocean Dipole (IOD), the Tropical Atlantic SST etc. are also important. 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. There is unanimity among the experts that the prevailing weak La Niña conditions in the equatorial Pacific Ocean and Neutral Indian Ocean Dipole conditions over Indian Ocean are likely to continue during the winter season. However, the impact of La Niña on the winter season precipitation over northern Part of the South Asia is not very clear particularly due to strong day to day atmospheric variability over the region.

The outlook for the 2020/21 winter season precipitation and Temperature (Minimum & Maximum) over South Asia is shown in **Fig.1a-c.** 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 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 winter season December 2020 to February 2021 (DJF 2020-21) season, above normal Precipitation likely over some areas of the southern part of the region including eastern part of the peninsular Indian subcontinent, south eastern part of the region and islands. Below normal precipitation is likely over some areas of northwestern part of the region, some areas along the foot hills of Himalayas and northeastern most part of south Asia. Normal precipitation is likely over remaining parts of the region.

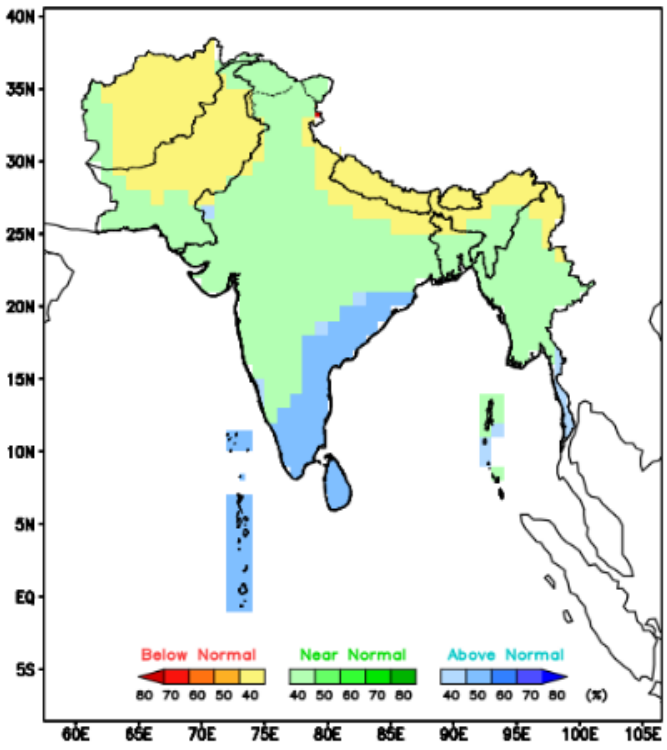

Fig.1a. Consensus outlook for the winter season (December 2020 to February 2021) precipitation over South Asia.

[1]Tercile categories have equal climatological probabilities, of 33.33% each

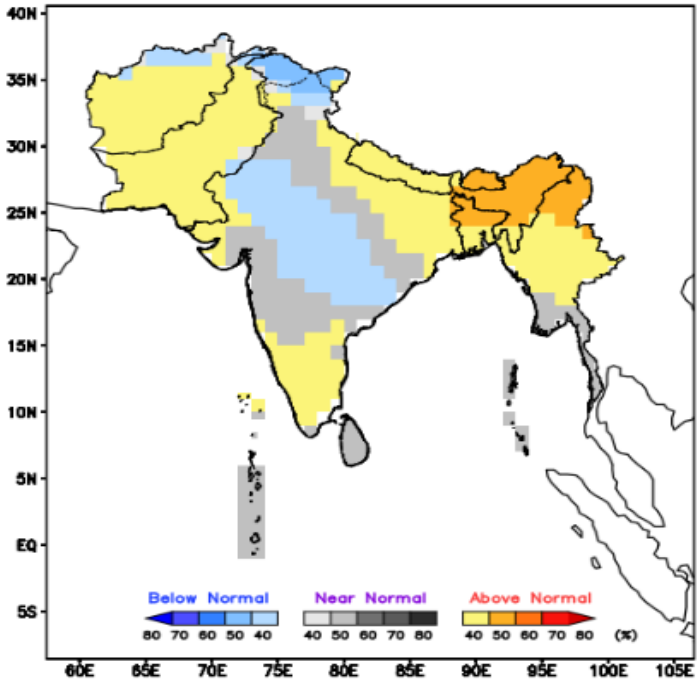

Fig.1b. Consensus outlook for the winter season (December 2020 to February 2021) Minimum Temperature and over South Asia.

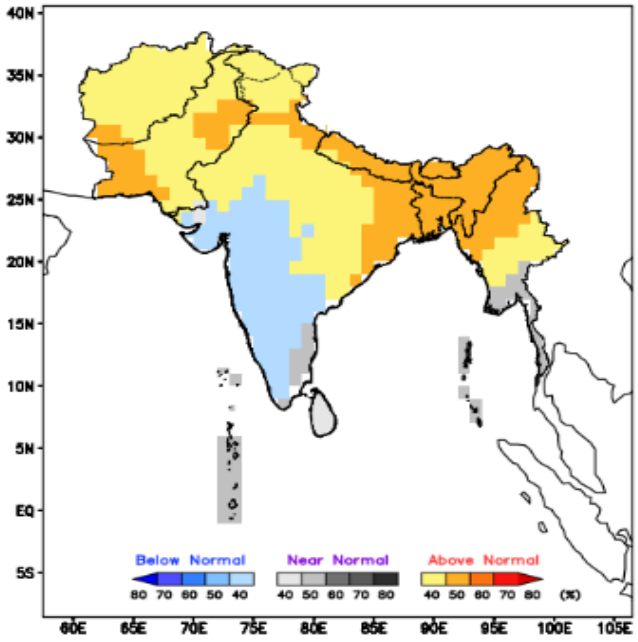

Fig.1c. Consensus outlook for the winter season (December 2020 to February 2021) Maximum Temperature and over South Asia.

---

[1]Tercile categories have equal climatological probabilities, of 33.33% each.

Consensus outlook on minimum temperatures for December 2020 to February 2021 season indicate that above normal minimum temperatures are likely over most parts of the region. However, below normal minimum temperatures are likely over some areas of northern most and central parts of the region and Normal minimum temperatures are likely over southern parts of South Asia.

Consensus outlook on maximum temperatures for December 2020 to February 2021 season suggests that below normal maximum temperatures are likely over western half of the Peninsular India and neighboring west central parts of the region. Normal maximum temperatures are likely over southern parts of the region including some areas of southeast India, south Myanmar, Sri Lanka and islands. Above Normal Maximum Temperature are likely over remaining parts of the region.

As the rainfall and Temperature during the winter season depicts strong intra-seasonal variability, it is advised to watch the extended range forecasts along with updated seasonal forecasts for better decision making. The extended range forecasts for rainfall, temperature, cyclone genesis, MJO etc. over the region can be obtained from RCC, Pune website (http://rcc.imdpune.gov.in/exrange.html). These forecasts are updated every week.

Verification of consensus outlook for 2019 October to December season

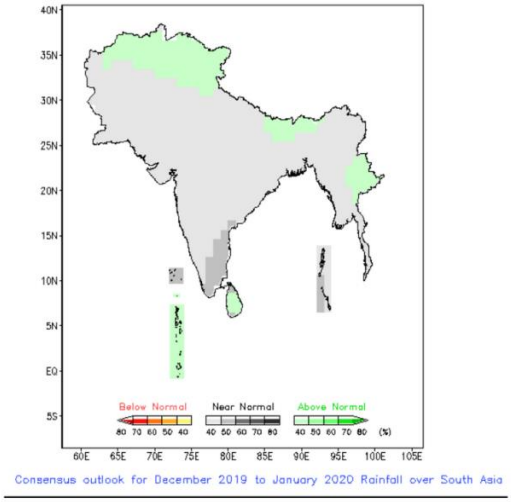

Fig 2. Consensus outlook map for DJF 2019-2020 winter season precipitation over South Asia

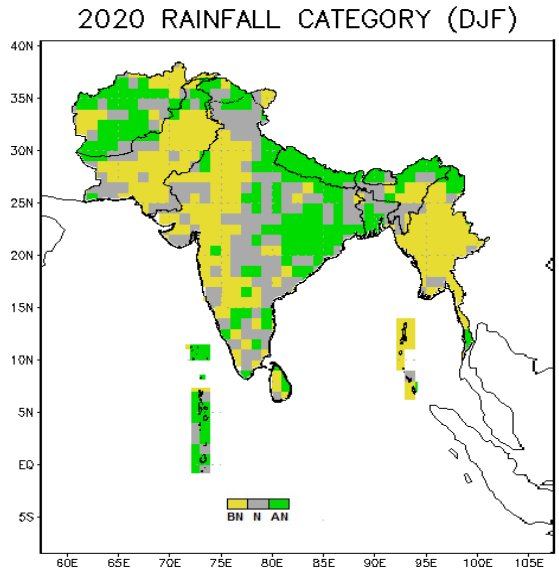

Fig 3. Observed precipitation distribution during 2019-2020 winter season over South Asia expressed as the grid point rainfall tercile categories. (*Data Source: RCC, IMD, Pune)

Fig.2 shows the outlook for the 2019-2020 winter season (December to February) which suggested above normal rainfall over some parts of northern India, northern Pakistan, northern Afghanistan, most parts of Bhutan, Maldives and Sri Lanka and some parts of East Nepal and East Myanmar. The rainfall forecast was Normal in remaining areas of South Asia. Fig.3 shows the observed precipitation distribution during the 2019-2020 winter season expressed in terms of tercile categories. It is seen that the above normal rainfall observed over the northern Afghanistan, Maldives, and some parts of northern India, Bhutan, Nepal and Sri Lanka matched well with the forecast. However, the observed areas of the below normal rainfall over most parts of Pakistan, Myanmar, western parts of India forecast were normal.

Though at first sight, the large-scale features of precipitation for 2019/20 winter season could not be forecasted correctly, the outlook was successful in correctly indicating above normal rainfall over southern and northern parts of the region. On the whole, it can be concluded that the consensus rainfall outlook for winter 2019/20 season was accurate in many areas particularly those where climatologically good rainfall is received the season.

Climatological Information of Rainfall and Temperature (Maximum & Minimum) over South Asia during December to February Season.

The long-term historical patterns of the rainfall over South Asia during December to February 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.

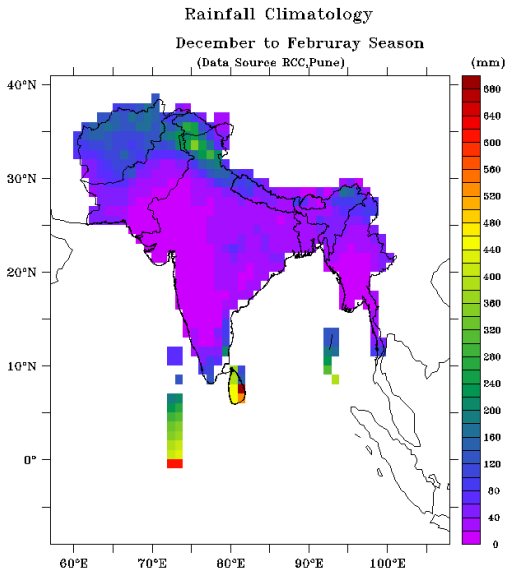

Fig.4 (a)Rainfall climatology for the period 1982-2019 for December to February Season over South Asia

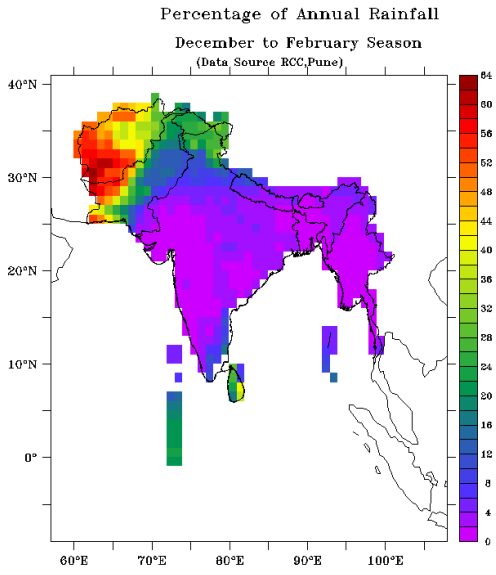

Fig.4 (b) Percentage of annual rainfall for December to February Season over South Asia.

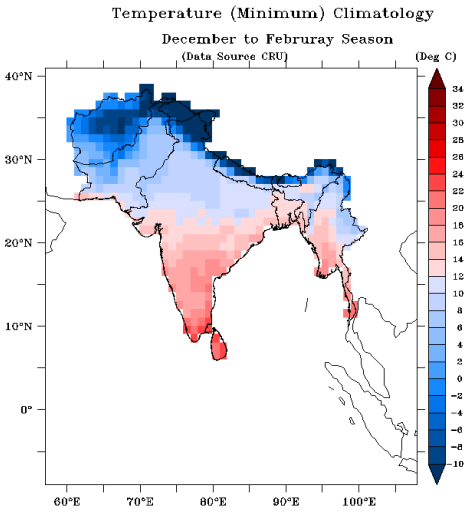

Fig.5 (a) Minimum Temperature climatology for the period 1982-2019 for December to February Season over South Asia

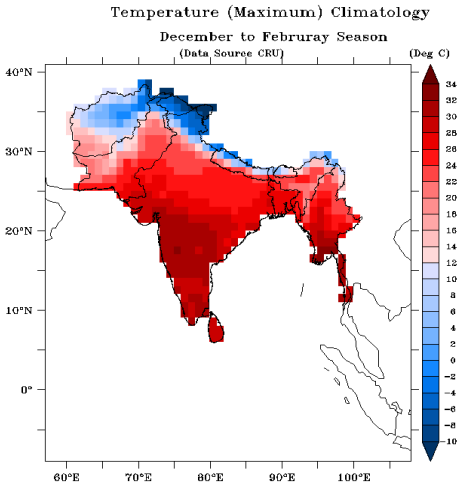

Fig.5 (b) Maximum Temperature climatology for the period 1982-2019 for December to February Season over South Asia

The long-term historical patterns of the Temperature (Minimum and Maximum) over South Asia during December to February Season (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.