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WMO Regional Climate Centre
Pune, India**

**Consensus Statement on the Forecast Outlook for the
Winter Season (December 2018 – February 2019)
Precipitation and Temperatures over South Asia**

Summary

Above normal precipitation is likely during the Winter Season (December 2018 to February 2019) over some areas of northern part of south Asia including north Afghanistan, north Pakistan, north India and some areas of north Myanmar. Below normal precipitation is likely over some Southern parts of the region consisting of southeastern part of India, Sri Lanka and Maldives. Remaining parts of the region including Bangladesh, Bhutan, Nepal are likely to experience normal precipitation. During the season, normal to slightly above normal temperatures are likely over most parts of the region.

This consensus forecast outlook for the 2018/2019 winter season precipitation and temperature over South Asia have been developed through an expert assessment of the prevailing global climate conditions and forecasts from different climate models from around the world. Currently warm ENSO neutral conditions are prevailing in the Pacific Ocean. There is strong consensus among experts that weak El Niño conditions are likely to develop and continue through the winter season. It is recognized that in addition to sea surface temperature (SST) conditions over equatorial Pacific, other regional and global factors can also affect the precipitation and temperature patterns over the region.

For more information and further updates on the northeast monsoon 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 fall. Southern part of the region consisting of southeastern part of India, Sri Lanka and Maldives also receive good amount of precipitation during the season. Most of the remaining areas of the region are generally receive very little precipitation during the season or remain dry. It is recognized that the seasonal predictability of the region during the winter season is limited 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 intraseasonal variability pattern.

The consensus climate outlook for the 2018/2019 winter season was prepared through exchange of expert assessment among a team of experts from all the countries of South Asia. The expert team discussed various observed and emerging climatic features that are known to influence the climate 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. Experimental as well as operational long-range forecasts based on the statistical and dynamical models generated by various operational and research centres of the world as Met Office, UK, JMA, NCEP, WMO GPCs of LRF, WMO lead center for LRF MME, Seoul, Korea etc. were also considered.

ENSO and IOD Conditions

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. Warm ENSO neutral conditions are prevailing since mid-August, 2018. Currently, Equatorial sea surface temperatures (SSTs) are above average across most of the Pacific Ocean. The latest forecasts from global climate models indicate strong probability of weak El Niño conditions to develop and continue through the winter season.

The current SST conditions over equatorial Indian Ocean suggest positive Indian Ocean Dipole (IOD) conditions. Forecast from global climate models indicate strong probability of conditions to turn to neutral IOD conditions and persist during the winter season (DJF).

Consensus Outlook for the Winter Season (December 2018 to February 2019) Precipitation and Temperature over South Asia:

There is unanimity among the experts that weak to moderate El Niño conditions are likely to form during the winter season and continue through the spring season. 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 recognised that SSTs over Pacific is not the only factor that decides the performance of winter monsoon 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 rainfall over the region. However, the impact of possible weak to moderate El Niño 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 2018/2019 winter season precipitation over South Asia is shown in Fig.1. The figure illustrates the most likely tercile category¹ 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 by synthesis of the available information and expert assessment. It was derived from an initial set of gridded objective forecasts and modified through a consensus building discussion of climate experts.

The outlook suggests that during the 2018/2019 Winter Season, northern part of south Asia consisting of north Afghanistan, north Pakistan, north India and neighboring Himalayan regions along with some areas of north Myanmar are likely to receive above normal rainfall. Southern parts of the region consisting of southeastern part of India, Sri Lanka and Maldives are likely to experience below normal precipitation during the 2018/19 Winter Season. Remaining parts of the region including Bangladesh, Bhutan, Nepal are likely to experience normal precipitation.

During the season, normal to slightly above normal temperatures are likely over most parts of the region.

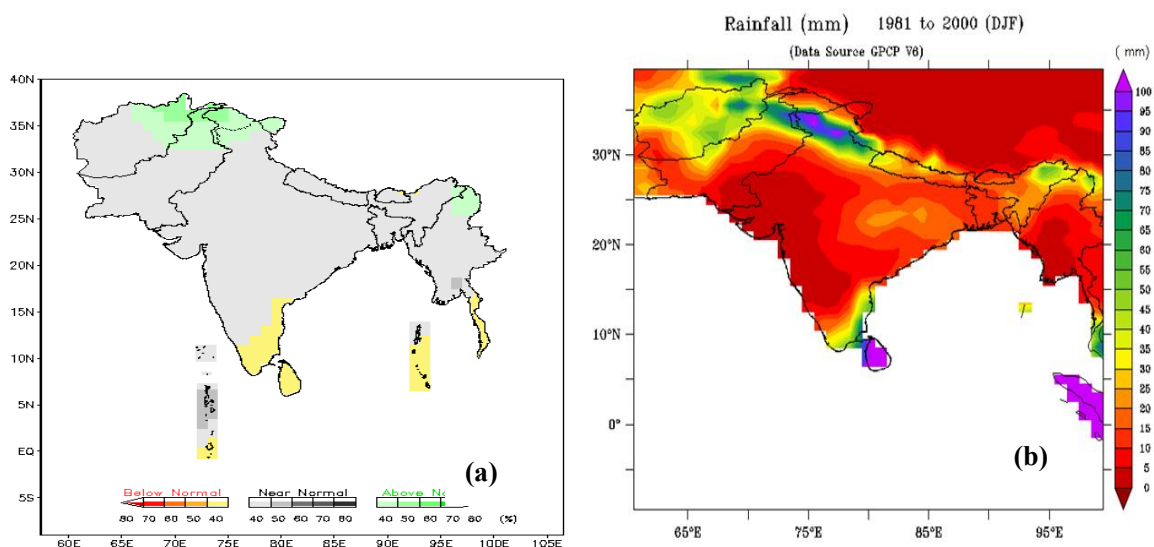


Fig.1. (a) Consensus outlook for the winter season (December 2018 to February 2019) precipitation over South Asia. **(b)** The mean GPCP precipitation (in mm) for the winter season during the period 1981-2000 (source: NOAA ESRL Physical Science Division).

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

Verification of the Consensus Forecast for the 2017/18 Winter Season Precipitation

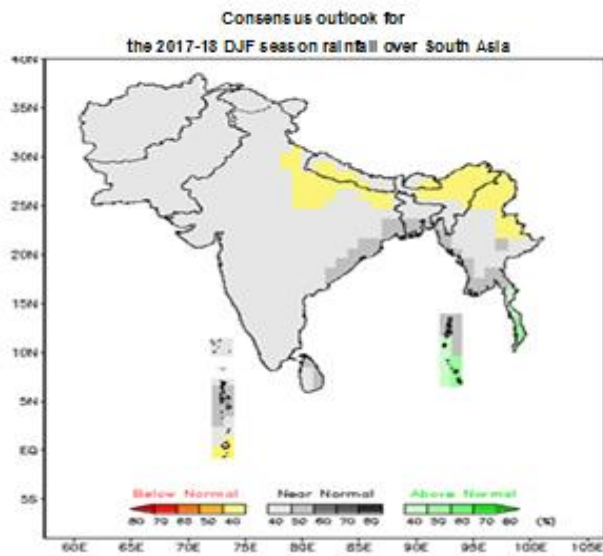


Fig.2. Consensus forecast map of the 2017/18 winter precipitation over South Asia.

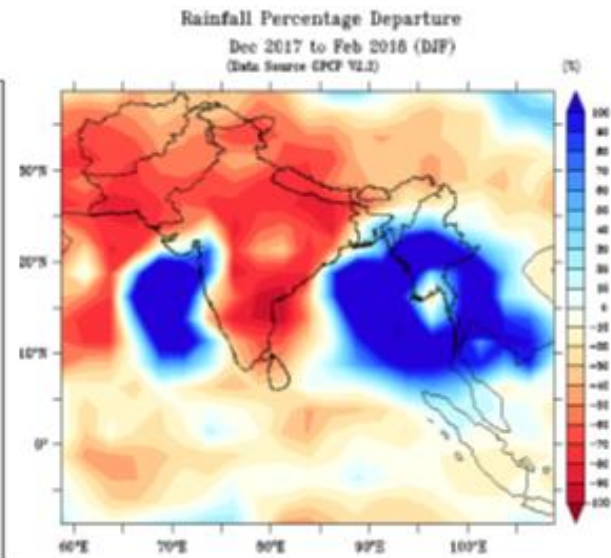


Fig.3. The observed GPCP precipitation anomaly during the 2017/18 Winter Season over South Asia.

As shown in the consensus outlook map (Fig.2) for the winter season (December 2017 to February 2018), below normal precipitation was forecasted in some areas of northeastern part of south Asia including northeast India, Nepal, Bhutan and north Myanmar, above normal precipitation was forecasted over some southeastern parts of the region are likely to experience and normal precipitation was forecasted in the remaining parts of the region. As seen, the observed precipitation anomaly map (Fig.3) suggests above normal eastern part of the Bay of Bengal and neighboring areas of northeast India and most parts of the Myanmar. Above normal rainfall was also experienced eastern part of Arabian Sea and neighboring western parts of India. Northern South Asia & southern parts of the region consisting of southeastern part of India, Sri Lanka and Maldives which generally receive good amount of precipitation during the season experienced slightly below normal rainfall whereas the consensus forecasts was indicating normal rainfall.