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Consensus Statement on the Forecast for the Winter Season (December 2016 – February 2017) Precipitation and Temperature over South Asia

Summary

Below normal precipitation is likely during the Winter Season (December 2016 to February 2017) over northern most parts of the south Asia, Maldives & neighboring Lakshadweep, and northeastern parts of South Asia including northeast India, east Nepal, Bhutan, and northern parts of Myanmar. Normal precipitation is likely over the remaining parts of the region. During the season, normal to above normal temperatures are likely, over most parts of the region.

This consensus forecast outlook for the 2016/2017 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 border line La Nina conditions prevail in the Pacific Ocean. There is strong consensus among experts that the border line La Nina conditions to turn to cool ENSO neutral conditions during the winter season. It is recognized that in addition to 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 rainfall 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 intraseasonal variability pattern.

The consensus climate outlook for the 2016/2017 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. The key features of these conditions are as follows.

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. The strong El Nino event of 2015-2016 after peaking in December, 2015 started to weaken thereafter. In March 2016, conditions became warm neutral and further cooling of SSTs over equatorial Pacific thereafter resulted in the establishment of cool neutral ENSO conditions in June. Currently, the SST conditions over equatorial Pacific suggest border line La Nina conditions. However, some of the atmospheric conditions are indicating neutral ENSO conditions. The latest forecasts from global climate models indicate strong probability of cool neutral ENSO conditions to prevail during the winter season (DJF).

Currently the SST conditions over equatorial Indian Ocean suggest negative Indian Ocean Dipole (IOD) conditions. Forecast from global climate models indicate strong probability of neutral IOD conditions to establish during the winter season (DJF).

**Consensus Outlook for the Winter Season (December 2016 to February 2017)
Precipitation and Temperature over South Asia:**

A consensus outlook for the winter season precipitation 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 the statistical and dynamical models generated by various operational and research centres of the world.

There is unanimity among the experts that the prevailing border line La Nina conditions are likely to weaken and cool neutral ENSO conditions are likely to prevail over equatorial Pacific during the coming winter season. Therefore, SST anomaly conditions over Pacific may not have much impact on the climate of the region that is generally influenced by the strong day to day atmospheric variability observed in the region. The day to day atmospheric variability over the northern part of the region is caused by the western disturbances and that over the southern part is caused by the eastern waves. 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 El Nino 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 2016/2017 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 2016/2017 Winter Season, Below normal precipitation is likely over northern most parts of the south Asia, southern islands region of Maldives & Lakshadweep, and northeastern parts of South Asia including Northeast India, east Nepal, Bhutan, and Northern parts of Myanmar. Normal precipitation is likely over the remaining parts of the region. During the season, normal to above normal temperatures are likely, over most parts of the region.

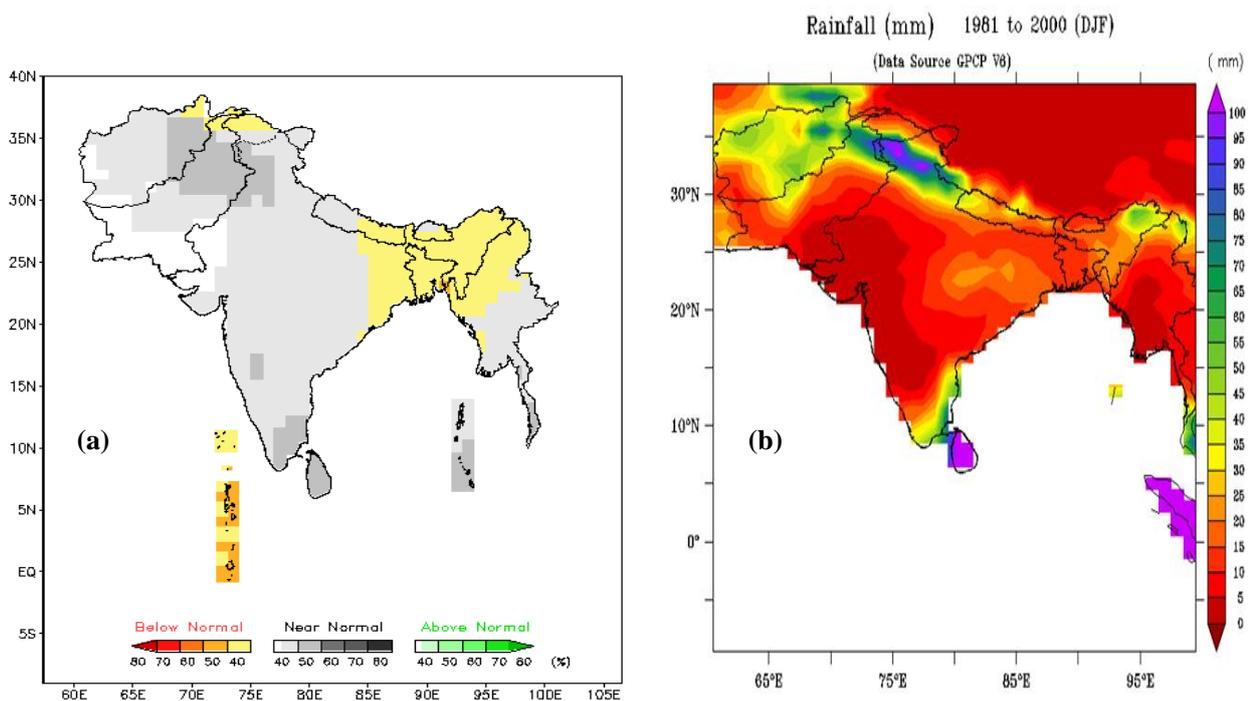


Fig.1. (a) Consensus outlook for the winter season (December 2016 to February 2017) precipitation over South Asia. **(b)** The mean GPCP precipitation (in mm) for the winter season during the period 1981-2000 (source: NOAA ESRL Physical Science Division).

Verification of the Consensus Forecast for the 2015/16 Winter Season Precipitation

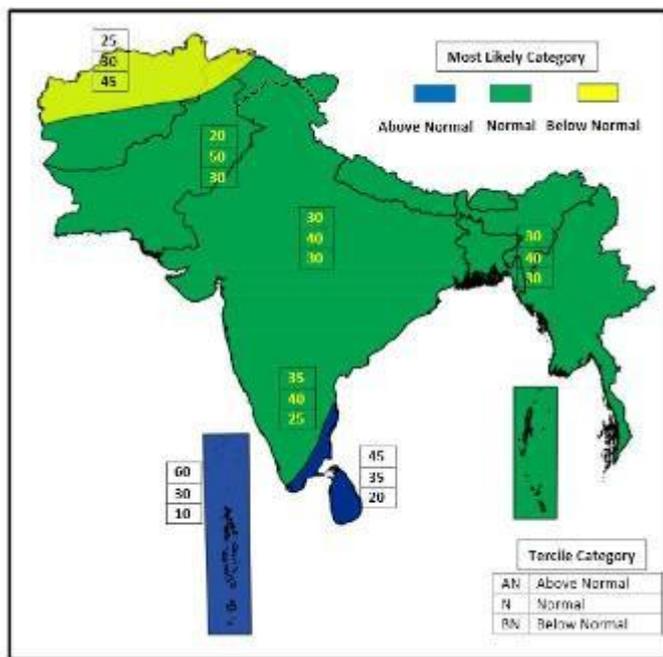


Fig.2. Consensus forecast map of the 2015/16 winter precipitation over South Asia.

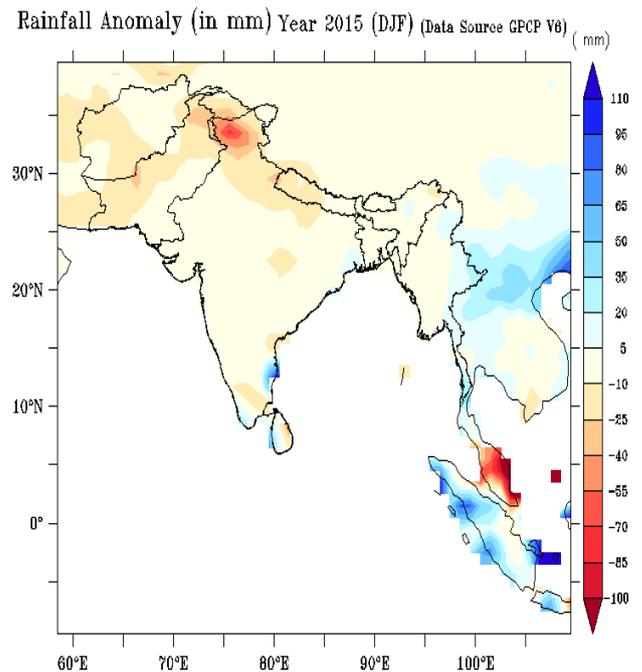


Fig.3. The observed GPCP precipitation anomaly during the 2015/16 Winter Season over South Asia.

The consensus outlook map (Fig.2) for the winter season (December 2015 to February 2016), had indicated above normal precipitation over southern parts of South Asia including Sri Lanka, Maldives and neighboring Lakshadweep Island region. Below normal precipitation was indicated over the northernmost part of south Asia and normal precipitation was indicated over other areas of the region. As seen, the observed precipitation anomaly map (Fig.3) also suggests above normal precipitation over some areas of southeastern parts of India and neighboring Sri Lanka, below normal precipitation over northern part (though it extends into southern areas) and normal precipitation over most of the remaining areas. Thus overall, the consensus forecast for the 2015/2016 winter season precipitation was able to indicate the large scale features of the observed precipitation anomaly pattern.