



Twelfth Session of  
**South Asian Climate Outlook Forum (SASCOF-12)**

*Pune, India, 19-20 April 2018*

**Consensus Statement**

**Summary**

Normal rainfall is most likely during the 2018 southwest monsoon season (June – September) over most parts of South Asia. However, above normal rainfall is likely over some areas of east central India and southeastern parts of the region. Below-normal rainfall is likely over some areas of southern, northwestern and northeastern parts of South Asia.

This consensus outlook for the 2018 southwest monsoon rainfall over South Asia has been developed through an expert assessment of the prevailing global climate conditions and forecasts from different climate models from around the world. Currently weak La Niña conditions are prevailing over the Pacific Ocean and there is a strong consensus among the experts about the possibility of La Niña conditions turning to ENSO neutral conditions during the beginning of southwest monsoon season. Some global models are also indicating a possibility of setting of El Niño conditions during the last part of the monsoon season or thereafter. It is recognized that there is large uncertainty in the forecasts done at this time of the year particularly regarding the time of the transition from La Niña to ENSO neutral conditions or setting of the El Niño conditions thereafter. However, other regional and global factors can also influence the monsoon rainfall patterns over the region.

For more information and further updates on the southwest monsoon outlook on the national scale, the respective National Meteorological and Hydrological Services (NMHSs) may be consulted.

## **Introduction:**

The climate outlook for the 2018 southwest monsoon season (June to September) was prepared during the twelfth session of the South Asian Climate Outlook Forum (SASCOF-12), held at Pune, India from 19-20 April 2018 attended by experts from South Asian countries. It was preceded by a capacity building training workshop on Climate Data Base Management System and seasonal prediction for the participants during 13-18 April 2018. The Forum deliberated on various observed and emerging climatic features that are known to influence the performance of the southwest monsoon, such as the El Niño-Southern Oscillation (ENSO) conditions over the equatorial Pacific, Indian Ocean Dipole (IOD) conditions over the Indian Ocean, winter and spring Northern Hemisphere (NH) snow cover and land surface temperature anomalies. The key features of these conditions are as follows:

### **La Niña Conditions over the Pacific Ocean**

The El Niño-Southern Oscillation (ENSO) is one of the global scale climate phenomena that have significant influence on the year-to-year variability of the monsoon over South Asia. Since early November 2017, the Sea Surface Temperatures (SSTs) across much of east central equatorial Pacific have been cooler than normal indicating weak to moderate La Niña conditions. Since the beginning of February, many of the atmospheric indicators of La Niña started returning to ENSO-neutral conditions. Currently weak La Niña conditions are prevailing in the equatorial Pacific Ocean. Latest forecasts from global models indicate transition of La Niña conditions to ENSO-neutral by the beginning of monsoon season and the neutral conditions to continue at least till the end of the southwest monsoon season. However, few global models are also indicating a possibility for development of weak El Niño conditions during the last part of the monsoon season. It is recognized that though La Niña (El Niño) conditions are known typically to strengthen (weaken) the South Asian southwest monsoon circulation and influence the rainfall over the region, there is large uncertainty in their impact on the regional rainfall distribution during one year to another.

## **Conditions over the Indian Ocean**

In addition to ENSO conditions over the Pacific, other factors such as Indian Ocean SSTs have some influence on the South Asian southwest monsoon. At present, neutral Indian Ocean Dipole (IOD) conditions prevail in the equatorial Indian Ocean. The recent climate model forecasts indicate a possibility of development of negative IOD conditions during the middle of the monsoon season. In general negative (positive) IOD is associated with the weaker (stronger) than normal monsoon over south Asia. However, it is recognized that the IOD – monsoon association is relatively much weaker compared to that of the inverse ENSO- Monsoon association.

## **Snow Cover over the Northern Hemisphere**

The snow-covered area averaged over the NH was normal during December 2017 to February 2018. However, the snow-covered area averaged over the NH in March was above normal and was the 22<sup>nd</sup> highest among the March months of the last 52 years. The NH snow cover during winter and spring has a negative relationship in general with the subsequent Asian summer monsoon. (data source: <https://climate.rutgers.edu/snowcover/> )

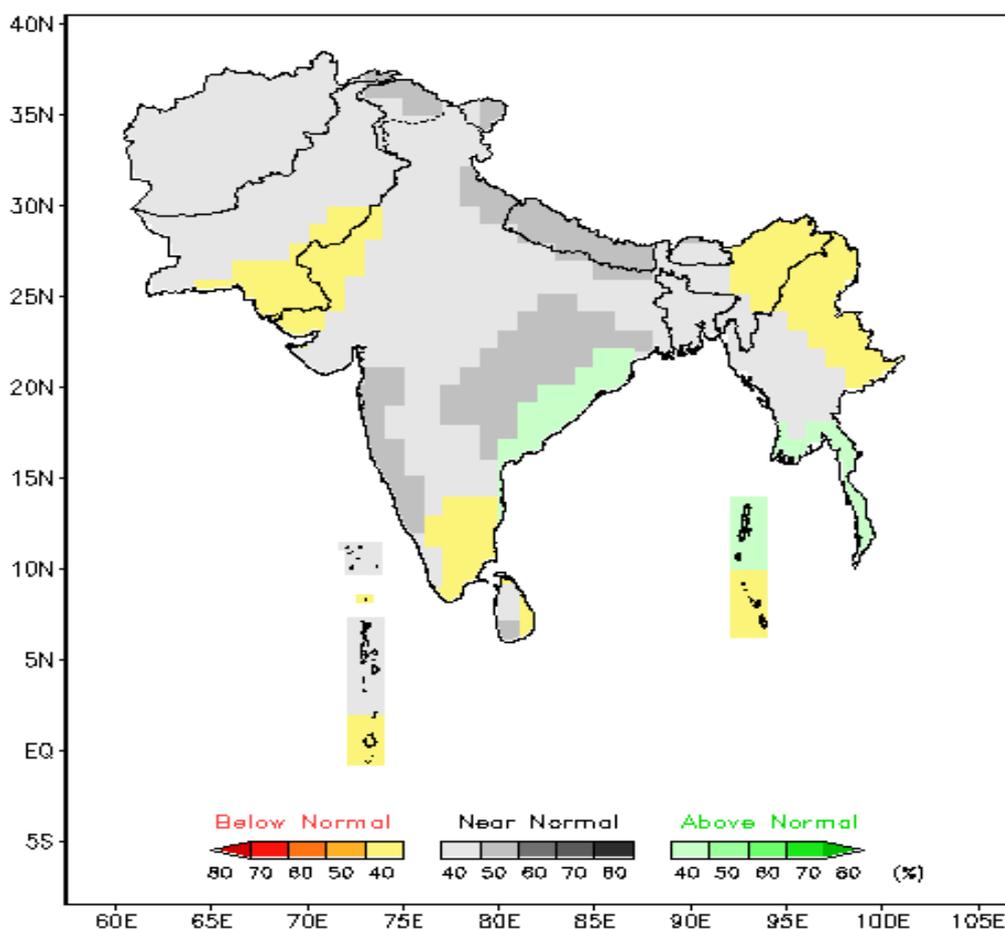
## **Consensus Outlook for the 2018 Southwest Monsoon Rainfall over South Asia:**

A consensus outlook for the Southwest monsoon season rainfall over South Asia was prepared based on the expert assessment of prevailing large-scale global climate indicators mentioned above, experimental models developed during capacity-building workshops conducted for the South Asian countries in association with the previous and the current SASCOF sessions, and experimental as well as operational long-range forecasts based on statistical and dynamical models generated by various operational and research centres of the world.

There is a strong consensus among the experts about the possibility of decay of prevailing La Niña conditions in the equatorial Pacific during the beginning of southwest monsoon season. Other relevant climate drivers such as the state of the Indian Ocean Dipole, the Tropical Atlantic SST, Eurasian land heating etc. are also important. The relative impact of all these parameters needs to be considered to determine the expected state of the monsoon over the region.

The outlook for the southwest monsoon rainfall over South Asia is shown in Fig. 1. The figure illustrates grid wise most likely tercile category<sup>1</sup> 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.

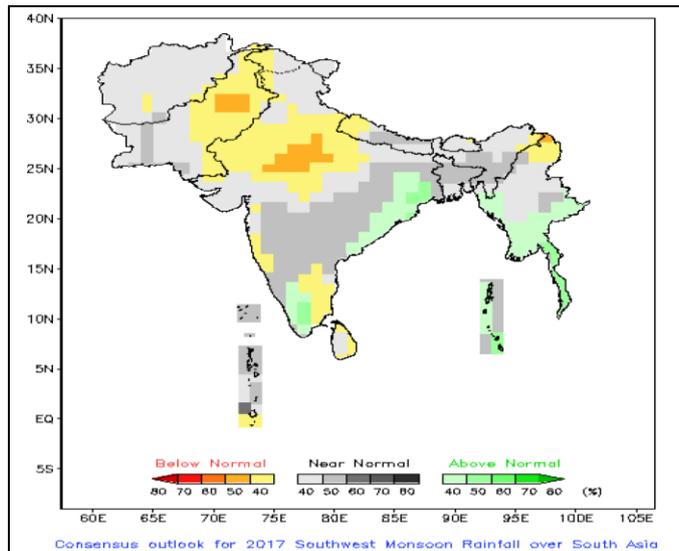
The outlook suggests that most parts of South Asia are likely to experience normal rainfall during the 2018 southwest monsoon season (June – September). However, some areas of east central India and southeastern parts of the region are likely to experience above normal rainfall and some areas of southern, northwestern and northeastern parts of South Asia are likely to experience below-normal rainfall.



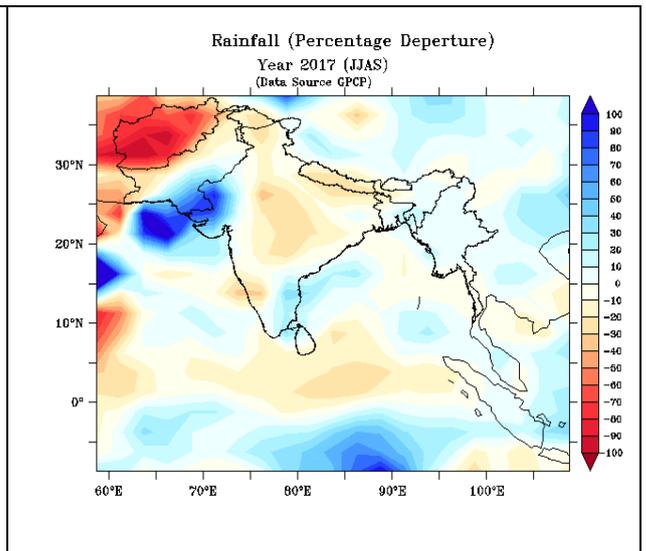
**Fig.1. Probability of the most likely category for the 2018 Southwest Monsoon Rainfall over South Asia based on this consensus statement. The consensus-based probability forecast map was prepared based on model forecasts at global as well as national levels synthesized through subjective expert assessment.**

<sup>1</sup>Tercile categories have equal climatological probabilities, of 33.33% each.

## Verification of consensus outlook statement of 2017:



**Fig.2 Consensus outlook map of SASCOP10 for 2017 Southwest Monsoon Rainfall over South Asia.**



**Fig.3\* The observed rainfall anomaly during 2017 Southwest Monsoon Season over South Asia.**

The outlook for the 2017 southwest monsoon season (June to September) suggested normal rainfall over much of South Asia. Below-normal rainfall was forecasted over broad areas of north-western, central and south-eastern parts of South Asia and above-normal rainfall was forecasted over broad areas of eastern and the south-western parts of the region. Normal rainfall was forecasted over the remaining areas.

As shown in the Fig. 3, the observed rainfall over most part of the region during the 2017 southwest monsoon season was normal in general agreement with the forecast (Fig.2). However, there were some differences between the spatial distributions of the observed and forecasted 2017 southwest monsoon rainfall over the region. Above normal was observed over some areas of western, southeastern and north-eastern parts of the region. Below-normal rainfall was observed over the northwestern parts of the region. Normal rainfall was observed over the remaining parts of the region. Thus the large scale spatial distribution of the observed rainfall was close to the forecasted rainfall pattern over the region.

(\* Data source: <https://iridl.ldeo.columbia.edu/SOURCES/.NASA/.GPCP/.V2p3/.CDR/>)

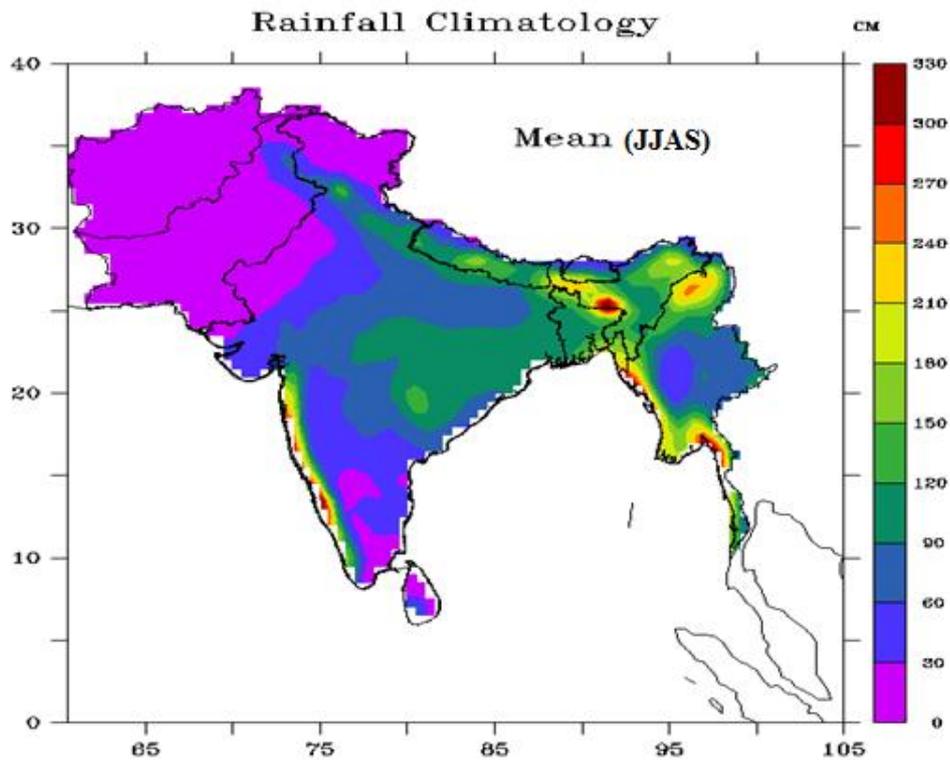
## Background of SASCOF

Climate predictions are of substantial benefit to many parts of the world in risk management and adaptation to the impacts of climate variability and change, and it is considered useful for countries having common climatological characteristics to come together and collaboratively assess the available prediction information to develop consensus outlooks. Recognizing this, regional climate outlook forums (RCOFs) were conceived with an overarching responsibility to produce and disseminate a joint assessment of the state of the regional climate for the upcoming season. Built into the RCOF process is a regional networking of the climate service providers and user sector representatives. In Asia, China has been coordinating the 'Forum on Regional Climate Monitoring, Assessment and Prediction for Regional Association II' (FOCRA II) since 2005, covering the entire Asian continent.

Asia is a large continent with large differences in the climatological settings on sub-regional scales. Therefore, WMO's Regional Association II (Asia) recommended sub-regional RCOFs devoted to specific needs of groups of countries having similar climatic characteristics. Implementation of the South Asian Climate Outlook Forum (SASCOF) in 2010 is a step in that direction with specific focus on the climate information needs of nations affected by the Asian southwest monsoon climate. The first three sessions of the SASCOF were held at Pune, India and its 4<sup>th</sup> session was held in 2013 at Kathmandu, Nepal. The fifth session of SASCOF was held last year (2014) again at Pune, India.

SASCOF-6 was held during 21–22 April 2015 in Dhaka, Bangladesh along with Climate Service User Forum (CSUF) for water sector. SASCOF-7, which was the first Forum that focused on the winter season, was held in Chennai, India during 14–15 Oct 2015, in conjunction with the first CSUF-Agriculture. SASCOF-8 was held during 25-26 April 2016 in Colombo, Sri Lanka. CSUF-Water and CSUF-Health was organized in parallel sessions during 27-28 April. In addition, a joint CSUF session was held with SASCOF on 26 April 2016. SASCOF-8 was also preceded by a Capacity Building Training Workshop on Seasonal Prediction for the operational climate experts of the South Asian countries during 19-23 April 2016. The Training Workshop was focused on operationalizing the long-range forecasts. SASCOF-9 was held in Nay Pyi Taw, Myanmar during 27-29 September 2016, in conjunction with the second CSUF-Agriculture. SASCOF-10 was held in Thimphu, Bhutan during 24-26 April 2017 and SASCOF-11 was held in Male, Maldives during 25-27 September 2017.

The long-term historical patterns of the southwest monsoon rainfall over South Asia (Fig.4), characterized by remarkable spatial variability, provide the general reference points at the respective locations for the rainfall anomalies indicated in the outlook.



**Fig.4 Rainfall Climatology for the period 1951-2007 over South Asia**  
 (Source: APHRODITE's Water Resources Home page,  
<http://www.chiku.ac.jp/precip/english/index.html>)

The SASCOF-12 and associated training workshop on Climate Data base Management and seasonal prediction were hosted by India Meteorological Department (IMD) and Indian Institute of Tropical Meteorology (IITM). World Meteorological Organization (WMO) and Regional Integrated Multi-hazard Early-warning System (RIMES) co-sponsored the event. These events also form part of the activity of WMO Regional Climate Centre (RCC) for South Asia at IMD, Pune.

The training workshop was attended by participants from 6 South Asian countries, namely, Bangladesh, Bhutan, India, Maldives, Myanmar and Sri Lanka. Experts from IMD, Indian Institute of Tropical Meteorology (IITM), International Research Institute for Climate and Society (IRI), USA and Japan Meteorological Agency (JMA) contributed to the training workshop as resource persons.

The SASCOF-12 (19-20 April 2018) session was attended by the above experts as well as experts from WMO and Regional Integrated Multi-hazard Early-warning System (RIMES). In addition, experts from various user sectors of India such as government, health, media, agriculture, water resources etc. took active part in the deliberations for assessing the available forecast information and for finalizing the consensus outlook for the southwest monsoon rainfall over South Asia. For preparing the consensus forecasts, the forecast products from various centers such as IMD, IITM, JMA, China Meteorological Administration (CMA), WMO's Lead Centre for Long Range Forecasting - Multi-Model Ensemble (WMO LC-LRFMME), National Centres for Environmental Prediction (NCEP), USA, Météo France, Met Office UK, European Centre for Medium Weather Forecasting (ECMWF), Canadian Meteorological Centre (CMC), Bureau of Meteorology, Australia, International Research Institute for Climate and Society (IRI), USA, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), APCC, and CPTEC, Brazil etc. were also considered.