



Sixth Session of

South Asian Climate Outlook Forum (SASCOF-6)

Dhaka, Bangladesh, 19-22 April 2015

Consensus Statement

Summary

Below normal rainfall is most likely during the 2015 southwest monsoon season (June – September) over South Asia as a whole. Below-normal rainfall is likely over broad areas of western, central and southwestern parts of South Asia and some areas in the northeastern-most parts of the region. It is noteworthy that except southern part of islands of the region no other part of South Asia has above-normal rainfall as the most likely category.

This consensus outlook for the 2015 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 El Niño conditions are established over the Pacific Ocean and there is strong consensus among the experts about the possibility that these may continue during the southwest monsoon season. However, it is recognized that there is uncertainty about the intensity of the El Niño event. There is also consensus about the potential for adverse impacts of El Niño on the southwest monsoon rainfall over the region. However, other regional and global factors also can affect the monsoon rainfall patterns over the region.

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

Introduction:

The climate outlook for the 2015 southwest monsoon season (June to September) was prepared during the sixth session of the South Asian Climate Outlook Forum (SASCOF-6), held at Dhaka, Bangladesh from 21-22 April 2015 attended by experts from South Asian countries. It was preceded by a capacity building training workshop on seasonal prediction for the participants during 19-20 April 2015. 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:

ENSO 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 September 2014, the west and central equatorial Pacific has been unusually warmer than normal. Sea-surface temperatures (SSTs) in the east equatorial Pacific, which were close to normal or slightly below normal during January to mid-March, have also now become above-normal. Currently, the equatorial Pacific has now warmed up sufficiently to have just reached weak El Niño level. The subsurface as well as atmospheric conditions over the Pacific have also started to reflect patterns consistent with El Niño conditions. Latest forecasts indicate about a 70% probability for El Niño conditions to persist until the southwest monsoon season. There is also a possibility for El Niño conditions to strengthen further during the later part of the monsoon season. El Niño conditions are known typically to weaken the South Asian southwest monsoon circulation and adversely impact rainfall over the region. However, their impact on the regional rainfall distribution varies from year to year.

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, most areas of the equatorial Indian Ocean are unusually hot, with strongest warming in the southeast. The western part of the Indian Ocean is slightly colder than normal. Together, these conditions indicate the prevalence of a slightly negative Indian Ocean Dipole (IOD). The recent forecasts from coupled models suggest high probability for basin wide warming of Indian Ocean during the monsoon season leading to neutral IOD conditions.

Snow Cover over the Northern Hemisphere

From September to November, 2014 the snow-covered area averaged over the NH was significantly above normal. During the next 3 months (December 2014 to February 2015), it was more or less close to normal. In March, the snow-covered area averaged over the NH was significantly below normal and was the 7th lowest among the March months of the last 49 years. The NH snow cover during winter and spring has a negative relationship in general with the subsequent Asian summer monsoon.

Consensus Outlook for the 2015 Southwest Monsoon Rainfall over South Asia:

A consensus outlook for 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 strong consensus among the experts about the possibility of continuation of prevailing El Niño conditions in the equatorial Pacific during the southwest monsoon season. However, it is recognized that there is uncertainty in the intensity of the El Niño event. There is also consensus about the potential adverse impacts of El Niño on the monsoon rainfall over the region. Based on the historical data, it has been observed that during El Niño years, in general, most parts of the region except some northeastern areas of the region receive below normal rainfall. The impact is more over northwest and central parts of the region. However, It is important to note that El Niño is not the only factor that decides the

performance of Southwest monsoon over the region. 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 southwest monsoon rainfall over South Asia is shown in Fig. 1. The figure illustrates the most likely categories over the region, as well as the probabilities for each tercile category¹. The tercile probabilities were derived by synthesis of the available information and expert assessment.

The outlook suggests that during the 2015 southwest monsoon season (June – September), below-normal rainfall is most likely over South Asia as a whole. Below-normal rainfall is likely over broad areas of western, central and southwestern parts of South Asia and some areas in the northeastern-most parts of the region. Normal rainfall is likely over broad areas of northern and eastern parts of the region. The southernmost small islands of the region are likely to receive above normal rainfall, while the rest of the small islands within South Asia are likely to experience below normal to normal rainfall.

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

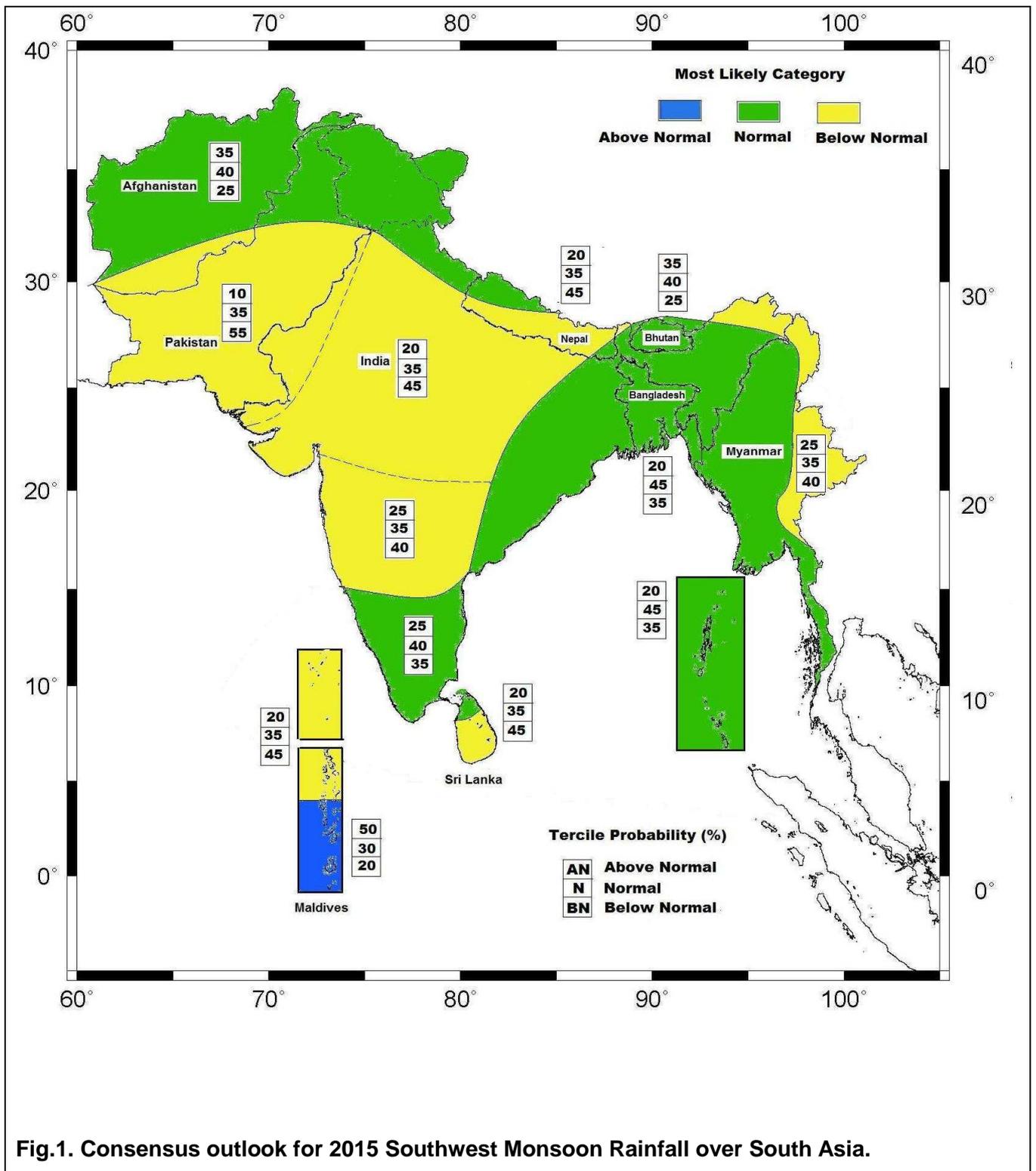


Fig.1. Consensus outlook for 2015 Southwest Monsoon Rainfall over South Asia.

Verification of consensus outlook statement of 2014:

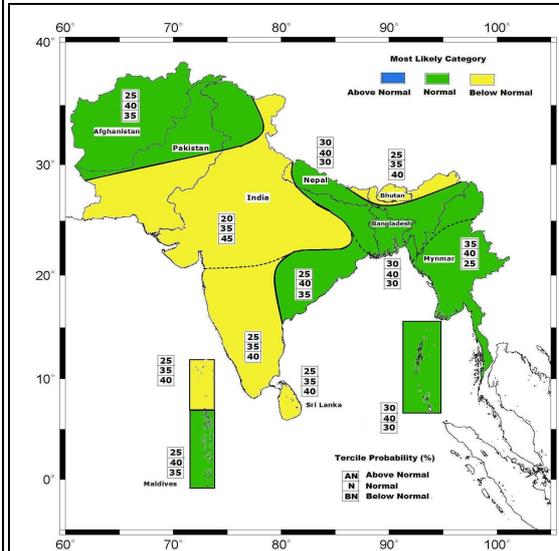


Fig.2 Consensus outlook map of SASCOP5 for 2014 Southwest Monsoon Rainfall over South Asia.

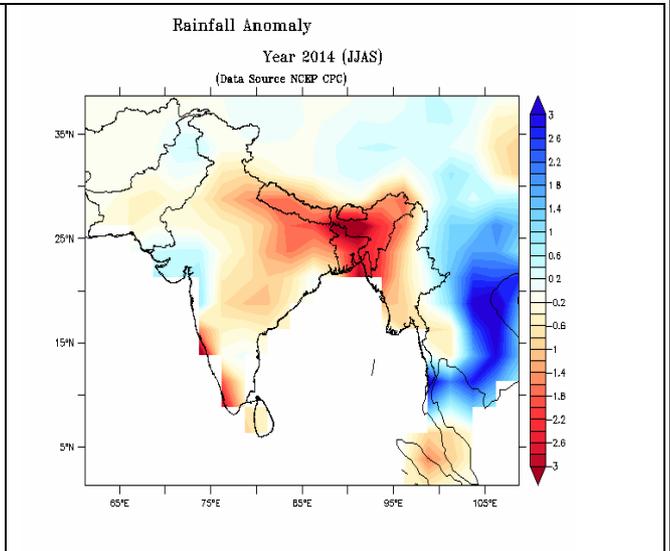


Fig.3 The observed rainfall anomaly during 2014 Southwest Monsoon Season over South Asia.

The consensus outlook map (Fig.2) for the southwest monsoon season (June to September) of 2014, developed in the fifth session of the South Asian Climate Outlook Forum (SASCOP-5) had indicated that southwest monsoon rainfall over South Asia as a whole during 2014 was most likely to be below normal to normal. The observed rainfall over the region as a whole during the 2014 southwest monsoon was below normal in general agreement with the forecast as shown in Figure.3. However, there were some differences between the spatial distributions of the observed and forecasted 2014 southwest monsoon rainfall over the region.

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 4th session was held in 2013 at Kathmandu, Nepal. The fifth session of SASCOF was held last year (2014) again at Pune, India. 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.

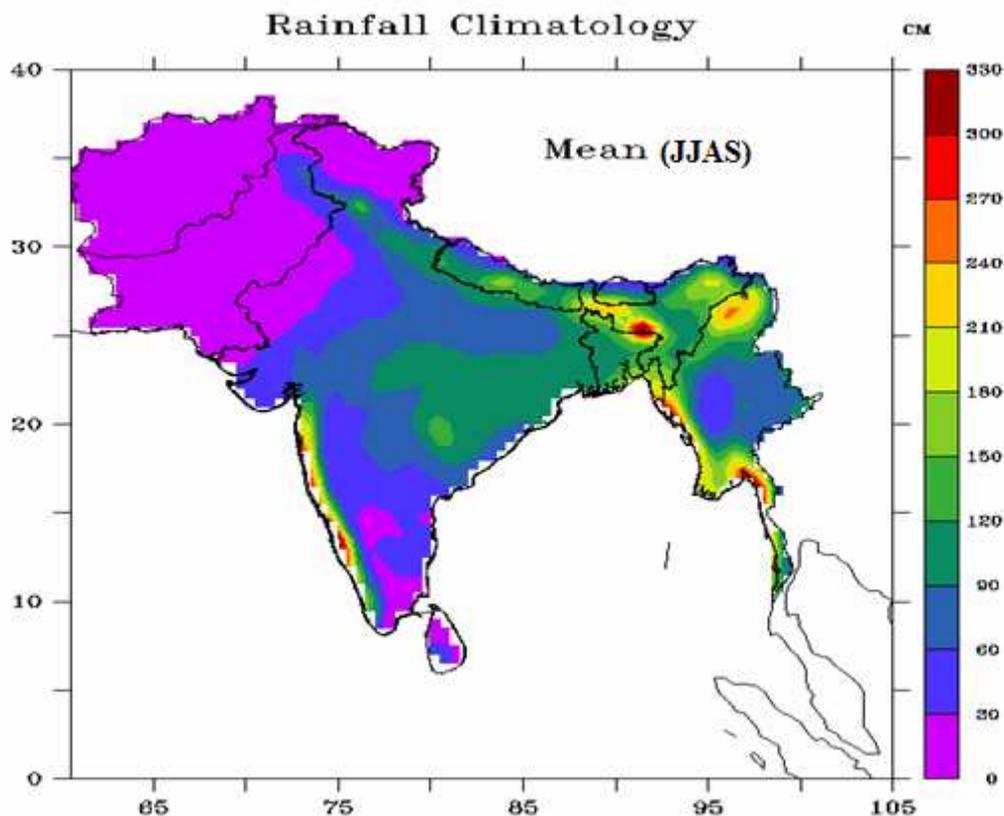


Fig.4 Rainfall Climatology for the period 1951-2007 over South Asia
(Source: APHRODITE's Water Resources Home page, <http://www.chiku.ac.jp/precip/>)

The SASCOF-6 and associated training workshop on seasonal prediction were hosted by the Bangladesh Meteorological Department (BMD) with the technical co-ordination by India Meteorological Department (IMD). World Meteorological Organization (WMO) co-sponsored the events under a project funded by the Department of the Environment, Government of Canada, for the implementation of the Global Framework for Climate Services (GFCS). These events also form part of the demonstration phase for a WMO Regional Climate Centre (RCC) for South Asia, currently under implementation by IMD.

The training workshop was attended by participants from 9 South Asian countries, namely, Afghanistan, Bangladesh, Bhutan, India, Maldives, Myanmar, Nepal, Pakistan, and Sri Lanka. Experts from IMD, Indian Institute of Tropical Meteorology (IITM), International Research Institute for Climate and Society (IRI), USA, Korea Meteorological Administration (KMA) and APEC Climate Center (APCC), Korea contributed to the training workshop as resource persons.

The SASCOF-6 (21-22 April 2015) session was attended by the above experts as well as experts from WMO, Japan Meteorological Agency (JMA), SAARC Meteorological Research Centre (SMRC), International Commission on Irrigation and Drainage (ICID), Global Water Partnership (GWP), Bureau of Meteorology, Australia, Regional Integrated Multi-hazard Early-warning System (RIMES), and water resource sector of various South Asian countries. In addition, experts from various user sectors of Bangladesh 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, 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, WMO's Lead Centre for Long Range Forecasting - Multi-Model Ensemble (WMO LC-LRFMME), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), APCC, JMA, CMA and CPTEC, Brazil etc. were also considered.