El Niño/Southern Oscillation (ENSO) conditions continued to be in the border line between weak La Nina and ENSO neutral conditions. ENSO-neutral conditions are likely to return during later part of the Northern Hemisphere spring and thereafter slowly turn to weak El Nino conditions around the middle of 2014 coinciding with the southwest monsoon season over the region. There are approximately equal chances for neutral or weak El Niño conditions during later part of the southwest monsoon season.

During the season April to June, wetter than normal conditions are likely over most parts of India, Afghanistan, north Pakistan, Sri Lanka and Bangladesh. However, during the season May to July, normal to drier than normal conditions are likely, over most parts of south Asia except extreme north India, adjoining north Pakistan and north Afghanistan.

The temperatures during the seasons April to June and May to July are likely to be normal to warmer than normal over most parts of South Asia. Normal to cooler than normal conditions are likely over areas along the Himalayas.

• On the monthly scale, most of the countries of the region are likely to experience normal to wetter than normal conditions during the first 3 months and drier than normal conditions in July.
• On monthly scale the temperatures are mostly to be normal to warmer than normal over the countries except Nepal during the next four months from April to June.
1. Important Global Climate Factors

1.1 Sea Surface Temperatures over the Pacific Ocean

The monthly SST anomalies for the February, 2014 (Fig.1) indicate colder than normal sea surface temperatures (SST) over the equatorial eastern and central Pacific Ocean and warmer than normal SSTs over the western Pacific. Weak cold anomalies were observed in the far eastern Pacific south of the equator and along the coast of Peru, while strong cold anomalies were observed over the central Pacific. In addition, warm SST anomalies prevailed over the western Pacific to the west of the date line and around the South Pacific Convergence Zone (SPCZ). The ENSO-neutral conditions that prevailed during most part of the 2013 (Fig.2) turned to border line between weak La Nina and ENSO neutral conditions during February and early part of March, 2014. However, the latest forecasts from a majority of the dynamical and statistical models favor return of ENSO neutral conditions during Northern Hemisphere spring with a warming tendency from the later spring onwards leading to development of weak El Niño around the middle of 2014 coinciding with the southwest monsoon season over south Asia. There are approximately equal chances for neutral or weak El Niño conditions during later part of the summer. However, ENSO predictions made at this time for the period beyond May have typically low skills.

1.2 Sea Surface Temperatures over Indian Ocean

The SST conditions over Indian Ocean during February, 2014 were nearly same as that observed during January, 2013 with cooler than normal SSTs over the Arabian Sea, Bay of Bengal and western equatorial Indian Ocean and warmer than normal SSTs over most areas of tropical southern Indian Ocean (Fig.1). The weak negative Indian Ocean Dipole (IOD) conditions that prevailed during the previous monsoon season (June-September, 2013) weakened further and currently neutral IOD conditions are prevailing (Fig.3). The assessment of latest forecasts from various coupled models suggests likely continuation of the prevailing neutral IOD conditions into second quarter of 2014.

![SST anomaly map](image)

**Fig. 1:** SST anomalies (°C) for the month of February, 2014. The anomalies were computed using a base period of 1981-2010.
Fig.2: Time series of area-averaged sea surface temperature (SST) anomalies (°C) in the Niño regions during the last one year (Source: Climate Prediction Centre, NCEP, NOAA).

Fig.3: The time series of the Dipole Mode Index (DMI) upto March, 2014 representing Indian Ocean Dipole (IOD) conditions (Source: Intergovernmental Oceanographic Commission (IOC)).
1.3. **Convection (OLR) Anomaly Pattern over the Asia Pacific Region**

The suppressed convection over the eastern and central equatorial Pacific seen in the previous month (January, 2014) as indicated by the positive outgoing long wave radiation (OLR) anomalies continued during February, 2014 (Fig. 4). However, during February, 2014, enhanced convective activity was observed over the western Pacific as indicated by negative OLR anomalies. Suppressed convection was also observed over maritime continent and equatorial Indian Ocean including the Bay of Bengal. On the other hand, enhanced convection was observed over the southern Arabian Sea and most parts of Indian land mass.

![OLR anomalies for the month of February, 2014 (Source NOAA).](image)

**Fig.4:** OLR anomalies for the month of February, 2014 (Source NOAA).

1.4. **Snow Cover Area over the Northern Hemisphere (NH)**

As the winter further progressed, Snow cover over the Northern hemisphere increased marginally in February compared to January, 2014. Slight increase in the NH snow cover area was observed during February, 2014 compared to previous month with NH, Eurasia and North America recording increase in the snow cover area. February, 2014 snow cover over NH (46.81 million Sq. km) was higher than its average of 30 years (1981-2010) by 1.21 million Sq. Km and that over Eurasia was (28.89 million Sq. km) higher than its average by 0.417 million Sq. km. The February, 2014 snow cover areas over NH and Eurasia were also slightly higher than that in the corresponding month last year.

1.5. **Madden and Julian Oscillation (MJO)**

During February, 2014 the MJO was mostly either active over western Pacific (Phases 6 to 7) or weak in magnitude (its amplitude below the threshold value of 1). During the first half of March, 2014 the MJO was located over the western hemisphere and Africa (Phases 8 and 1) and subsequently the MJO has entered to western equatorial Indian Ocean (Phase 2).
2. **Seasonal Outlook for South Asia**

The outlook was prepared based on the forecast from the India Meteorological Department (IMD)’s seasonal forecast model (SFM). The model is a hydrostatic global spectral model with a triangular truncation of 62 (T62) spherical harmonics (horizontal resolution of about 250 km) and a vertical sigma coordinate system of 28 layers. The ensemble simulations were carried out for 31 year period from 1982 to 2012 to prepare the model climatology. Each forecast was initialized using atmospheric conditions for first 10 days of March, and run continuously for next five months. The forecasted SSTs from the Coupled model, NCEP Climate Forecast System version 2 (CFSv2) were used as the boundary conditions.

2.1. **Precipitation Anomaly**

The seasonal forecasts for precipitation anomalies for the seasons April to June (AMJ) and May to July (AMJ) of 2014 are given in the Fig.5a and 5b respectively. The AMJ precipitation anomalies indicate normal to wetter than normal conditions are likely over most parts of central India & northern India, Afghanistan, north Pakistan, Sri Lanka, Bangladesh and adjoining northeast India (Fig. 5a). At the same time, normal to drier than normal conditions are likely over most of the remaining areas of the south Asia. During the MJJ season, normal to wetter than normal conditions are likely over some areas of northern part of south Asia consisting of extreme north India, adjoining north Pakistan and north Afghanistan. However, normal to drier than normal conditions are likely, over the remaining parts of south Asia (Fig. 5b) with large negative anomalies over southern, eastern and northeastern parts of India, Sri Lanka, Bangladesh, Bhutan and eastern parts of Nepal. It may be mentioned that the large negative anomalies during MJJ is the result of large negative rainfall anomalies forecasted for the month of July. As the uncertainty in the forecast increases with the forecast lead time, the relatively large drier than normal conditions forecasted for July, 2014 should be taken with a caution.

2.2. **Temperature Anomaly**

The forecast temperature anomaly during April to June (AMJ) season (Fig. 6a) and May to July (AMJ) season (Fig. 6b) indicate positive temperature anomalies are likely over most parts of south Asian countries with relatively warmer stronger over Pakistan, Afghanistan, parts of northwest India and southern peninsular India during AMJ and MJJ. Normal to slightly negative temperature anomalies are likely areas along the Himalayas.

![Fig.5: Seasonal forecasts of precipitation anomalies (mm/day) for a) AMJ and b) MJJ (right) based on Initial conditions of March 2014.](image-url)
3. Forecast Outlook for the Country Averaged Monthly Precipitation and Temperature Anomalies

The model forecast for monthly precipitation and temperature for the next four months (from April to July) averaged over the 8 south Asian countries viz., Afghanistan, Bangladesh, Bhutan, India, Myanmar, Nepal, Pakistan and Sri Lanka is shown in the Figures 7 & 8 respectively. The monthly rainfall anomaly is expressed as percentage departure from long period model average (LPMA) and monthly temperature anomaly is expressed in degree Celsius.

In April wetter than normal conditions are likely over Afghanistan, Pakistan, India and Nepal. On the other hand drier than normal conditions are likely over Bangladesh, Bhutan, Myanmar and Sri Lanka. All the countries except Pakistan and Nepal in May and except Bangladesh, Bhutan and Nepal in June are likely to experience wetter than normal conditions. In July, all the countries except Pakistan are likely to experience normal to drier than normal conditions (Fig. 7).

The country averaged monthly mean temperature anomalies show that all the countries except Nepal are likely to experience normal to warmer than normal conditions during the next four months. Relatively higher warmer anomalies are expected in Afghanistan and Pakistan during April and May and in most of the countries except Nepal in July (Fig. 8).
Fig. 7: Monthly rainfall departures (%) averaged over south Asian countries during April to July, 2014.

Fig. 8: Monthly temperature anomaly (°C) averaged over south Asian countries during April to July, 2014.
Background

Since 1995, The India Meteorological Department (IMD) has been providing various climate related services to the country, through its National Climate Centre (NCC) situated in Pune. The centre has been carrying out many India specific climate related activities like Climate Monitoring and Analysis, Climate Research and Climate Prediction (Seasonal Forecasts). IMD has also been generating experimental dynamical forecasts for the southwest monsoon rainfall using the seasonal forecast model (SFM) of the Experimental Climate Prediction Center (ECPC), USA. Till 2010, the model forecasts were prepared using persistence sea surface temperature (SST) anomaly method. From 2011 onwards, the model forecasts were prepared using both persistence SST anomaly method and predicted SST method. In the latter method, global SST forecasts from NCEP coupled forecasting system (CFS) version 2 model was used as boundary forcing for the SFM model. For generating the forecasts, ten ensemble member forecasts were obtained using the initial conditions corresponding to 00Z from 1st to 10th of each month on which the forecast was prepared. As part of taking up the role of Regional Climate Centre for the south Asian region, IMD now prepares global monthly and seasonal forecasts in each month throughout the calendar year. Model simulations are generated for the next 5 months. However, for the monsoon season (June to September), the forecast are generated for ‘0’ month lag to ‘5 months’ lag. NCC is now in the RCC demonstration phase.

As a part of RCC activities, NCC, Pune has now started preparing seasonal climate forecast outlook for rainfall and temperature over south Asia and will be issued at the end of every month. The present outlook is the first one and is valid for the next four months.