

Seasonal weather outlook for SAARC region

(Sep-Nov, 2014)

Issued on Sep 7, 2014



Issued by:

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1. Introduction

A variety of methods including dynamical models, statistical methods, regional expert judgments and combination of them have been used to generate long-range weather forecast by the different climate prediction centers around the world. National Agromet Center (NAMC), Pakistan Meteorological Department adopts an ensemble approach to formulate seasonal weather outlook for south Asian countries included in South Asian Association for Regional Cooperation (SAARC) (on experimental basis), taking into consideration available products from major climate prediction centres by using Global Climate Models (GCMs).

This Climate Outlook may be somewhat different from those used by the national meteorological services in the region. Thus, this product may differ from the official forecasts issued in those countries. Regional weather (precipitation) outlook is predicted from ECHAM4 global climate models by using persisted sea surface temperature on 0000 Sep 01, 2014. Model's output then tuned by applying Regional Correction Factor (RCF). RCF has computed by comparison of Long Range Averages (LRA) with model's simulation for the period (2004-2012) on monthly basis. That might be somewhat different from actual weather because of time to time variation in Sea Surface Temperature (SST) during the season. Accuracy of Outlook seasonal weather mainly depend upon SST used in global climate models. Even with use of accurate SST, still is uncertainty in the climate forecast due to chaotic internal variability of the atmosphere. For further information concerning this and other guidance products, users are strongly advised to contact their National Meteorological Services.

Acknowledgement: *NAMC gratefully acknowledges, the International Research Institute (IRI) for climate and Society for providing access of dynamical prediction of Global Climate Model ECHAM4P5, developed and operated by European Center for Medium-Range Weather Forecasts model's simulations and hindcast data to support the formulation of seasonal weather outlook of Pakistan. Special acknowledge to Dr. M. Benno Blumenthal by providing guidance and assistance for using IRI climate software. All the output graphics have been prepared by using IRI climate software.*

Classification of average, below average and above average

- *Below Average (Blw. Ave) < -15 %,*
- *Average precipitation range (Ave) = -15 to +15 %,*
- *Above Average (Abv.Ave) > +15 %*

Note: Average precipitation is computed by using Global Precipitation Climatology Centre (GPCC) gridded data by resolution (0.5x0.5°) latitude by longitude

2. Synoptic situation

- Location of jet stream (U wind at 200 hPa) is at normal position with higher than normal intensity. The region may prevail above than normal winds strength. The movement of higher strength winds may cover wider area than normal over the region.
- A trough at 500 hPa is expected to be over upper and central parts of the country. As a result, weather system influenced by local weather phenomenon will have effects in these regions.
- Surface temperatures are expected to be on higher side than normal over central parts of the country as compared with normal (1981-2010). However, northern and southern parts may prevail normal surface temperature.
- North Atlantic Oscillation (NAO) is in negative phase (-1.68) and in increasing trend. As a result normal track of western disturbances will persist. <http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii.table>
- During August 2014, above-average sea surface temperatures (SST) continued across much of the equatorial Pacific. Most of the Niño indices warmed during the month with values of +0.5°C in Niño-4, +0.4°C in Niño-3.4, +0.4°C in Niño-3, and +0.8°C in Niño-1+2. Subsurface heat content anomalies (averaged between 180°-100°W) also increased during the month as above-average subsurface temperatures developed across the central and east-central equatorial Pacific. This warming is associated with the downwelling phase of an equatorial oceanic Kelvin wave triggered in July by low-level westerly wind anomalies. Westerly wind anomalies continued in the central and eastern part of the basin early in August, but weakened by the end of the month. Enhanced easterly upper-level wind anomalies have prevailed during much of the month, and the Southern Oscillation Index has been negative.
- Most of the models continue to predict El Niño to develop during September-November and to continue into early 2015. A majority of models and the multi-model averages favor a weak El Niño. At this time, the consensus of forecasters expects El Niño to emerge during September-October and to peak at weak strength during the late fall and early winter (3-month values of the Niño-3.4 index between 0.5°C and 0.9°C). The chance of El Niño is at 60-65% during the Northern Hemisphere fall and winter. (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)

Probability outlook: La Nina (0%), Neutral (57%) and El Nino (43 %) during May-Jun-Jul, 2014 season

- Arabian Sea Surface Temperatures are expected to be slightly above normal near western coastal belt of Pakistan.

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- Caspian Sea surface temperatures expected to be slightly above normal over southern half and below normal over upper half.
- Mediterranean Sea surface temperatures are normal to slightly above normal.
- Bay of Bengal Sea Surface Temperatures are close to normal.

3. Weather outlook Summary

“Average precipitation is expected during the season (SON)”

Synthesis of the latest model forecasts for Sep-Nov 2014 (SON), current synoptic situation and regional weather expert's judgment indicates that average to slightly below average precipitation is expected during the predicted season. Above normal maximum temperature will persist over all SAARC member countries during September. The night temperature will be on higher than normal over all SAARC member countries during October.

Seasonal weather outlook (Sep-Nov, 2014):

As a whole, average precipitation is likely to all over the region during the predicted season with below average during October and average during September and November. Below average precipitation is expected over India, Nepal and Bhutan. However average precipitation is expected over rest of the region.

Sri Lanka, southern Bangladesh and northern eastern states of India will receive good rain during the season. Western and eastern Coastal belt of India, extreme northeastern states of India, northern parts of Bangladesh, western parts of Sri Lanka and Nepal will significantly below average rainfall.

September, 2014: Average rainfall is expected in SAARC member countries as a whole with above average over Afghanistan and Pakistan, below average over Bhutan while average over India, Bangladesh, Sri Lanka and Nepal. Rainy spells will be focused over Odisha, Andhra Pradesh, Chhattisgarh, Jharkhand, Madhya Pradesh, West Bengal and Karnataka states of India, Southern districts of Bangladesh. Most parts of Bhutan, eastern parts of Nepal, western coastal belt of India will receive below normal rainfall, whereas, south eastern coastal belt of India will receive above normal rainfall during predicted month of September. Rest of the region will receive average rainfall.

Above normal day temperature will be expected all over the region with highest values over central parts of Pakistan, central and northeastern states of India. Highest above normal day temperature will be expected over Rajasthan ($> 2^{\circ}\text{C}$). However below normal day temperature will be expected over Karnataka and Tamil Nadu of Indian states.

October, 2014: Slightly below average rainfall is expected during October all over SAARC region. Extremely below average rainfall is expected over Pakistan and India, below average over Nepal and average over Afghanistan, Sri Lanka, Bangladesh and Bhutan. Intensity of

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precipitation will be higher over eastern belt of the region including eastern states of India, Sri Lanka and Bhutan. Below normal rainfall is expected over Sri Lanka, eastern and western coastal belt of India, and northeastern states of India. Rest of the region will receive normal rainfall during the month.

Night temperature will be above normal all over whole region with higher values over central parts with maximum ($> 2^{\circ}\text{C}$) over central Pakistan including Rajasthan of India.

November, 2014: Average rainfall is expected during November all over SAARC region with extremely below average over India (-78%), Bangladesh (-57%), Nepal (-66%) and Bhutan (-58%), below over Pakistan (-26%), average over Sri Lanka (-12%) and above average over Afghanistan (30%). Below average precipitation is expected over south eastern coastal belt of India and Sri Lanka.

Night temperature will be on higher than normal during November all over the region.

Country wise Seasonal prediction (September-November, 2014):

Afghanistan: No good rainy spell is expected during September and October. However, winter precipitation starts from early November with low intensity and increase intensity of precipitation with time.

Bangladesh: Rainy spell with same intensity will continue till end of September while it become decrease from start of October. November will be considered as dry month.

Bhutan: Rainy spell with same intensity will continue till mid of October in the country. After that intensity of rainy spell will decrease and become dry from November.

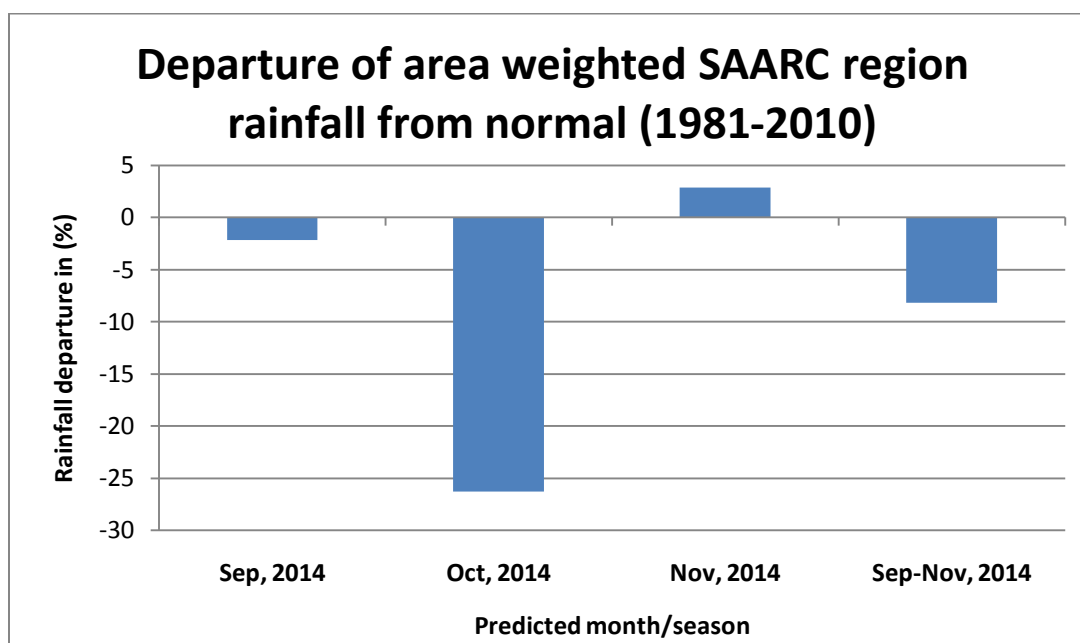
India: Rainy spell will same intensity will continue during mid of September and start to decrease till end of September. No chances of good rainy spell all over India during October and November. However, locally precipitation can't be ignored.

Nepal: Intensity of rainfall is start to decreasing from 10th of September till end of October. Dry weather is expected during November.

Pakistan: Good rainy spells with higher intensity is expected during first decade (1-10) of September. Intensity of rainy spell will decrease in the rest of September

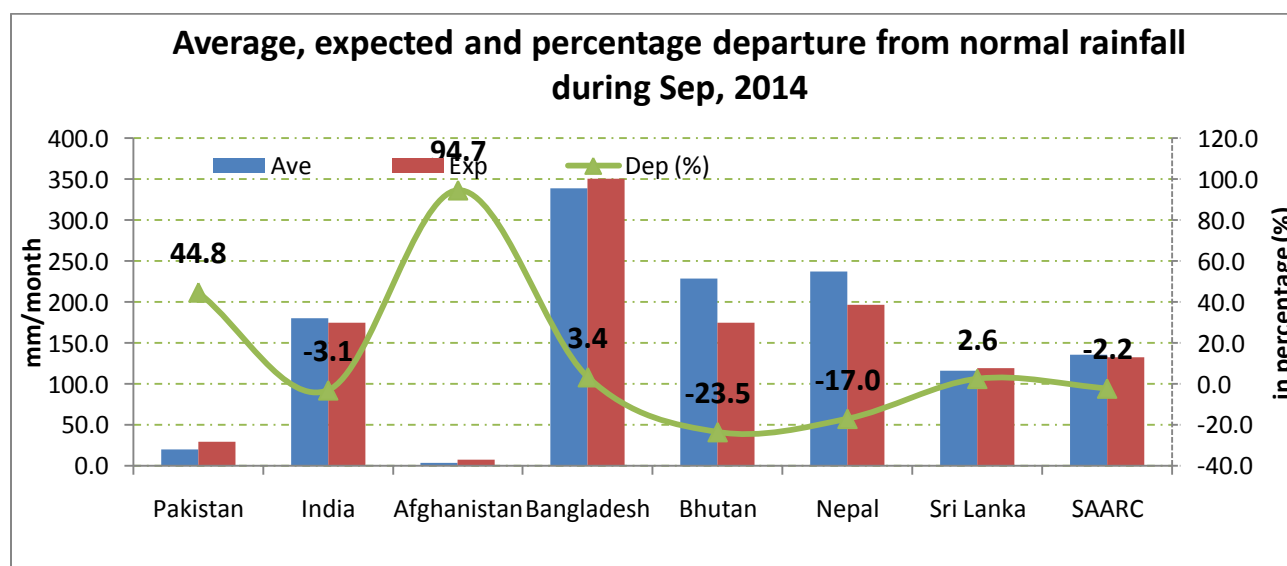
Sri Lanka: Three to four rainy spell with moderate to higher intensity are expected during October and November.

Seasonal weather outlook (Sep-Nov, 2014)

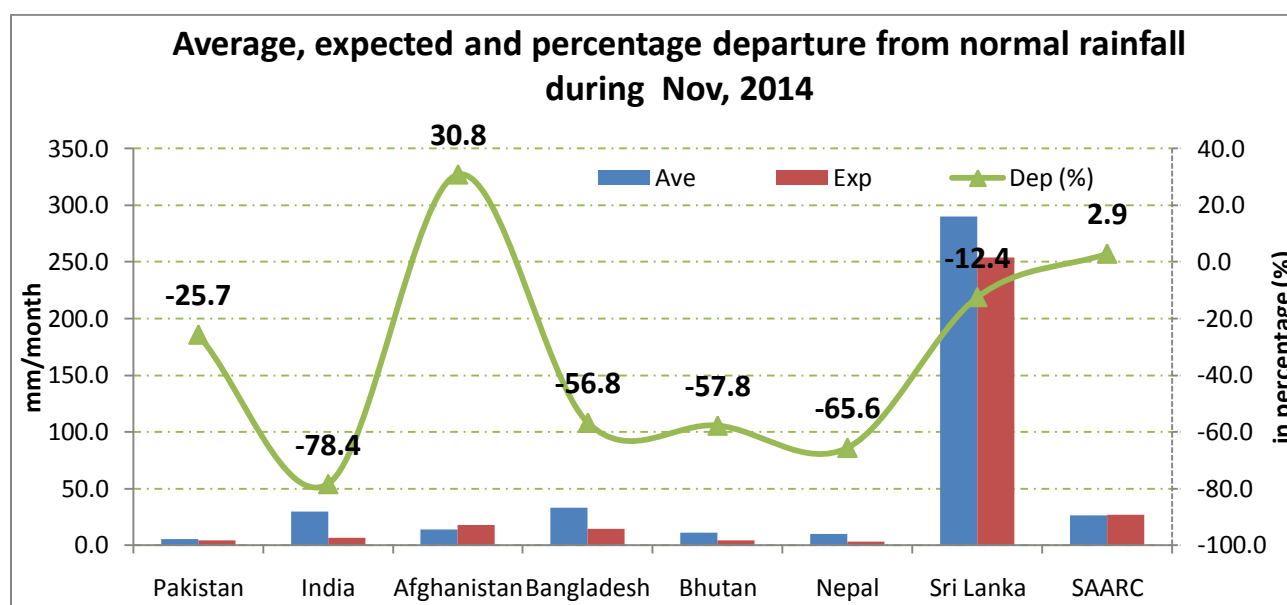
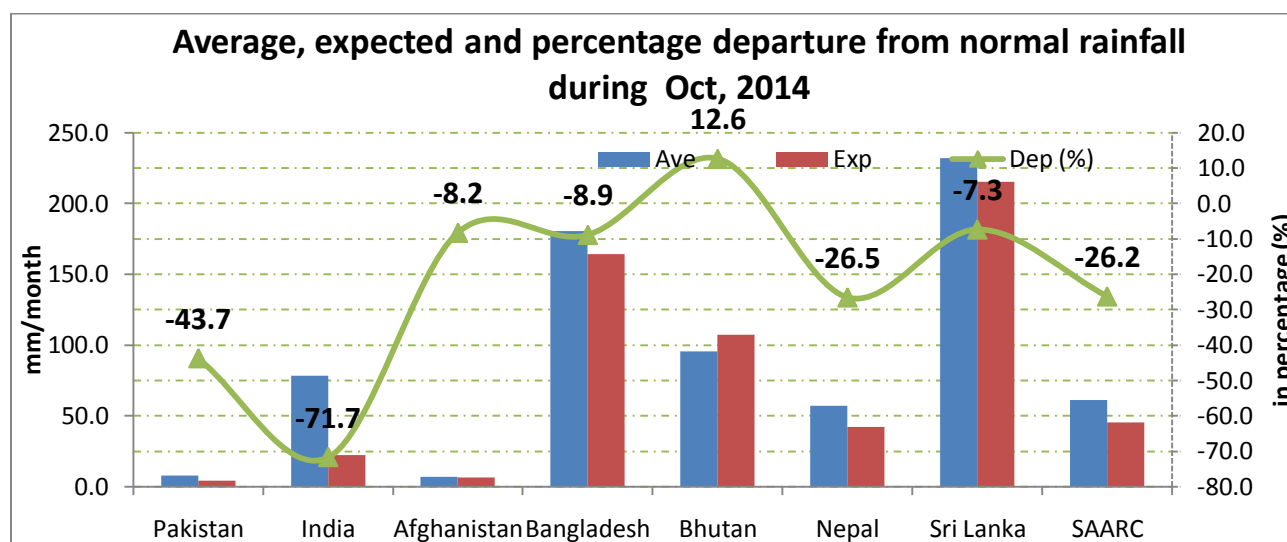


Note: Departure of Area-weighted rainfall of SAARC region has been computed by subtracting ECHAM predicted monthly/seasonally rainfall from GPCP of corresponding month/season.

4. Country wise monthly and seasonal quantitative outlook along with departure of precipitation from normal

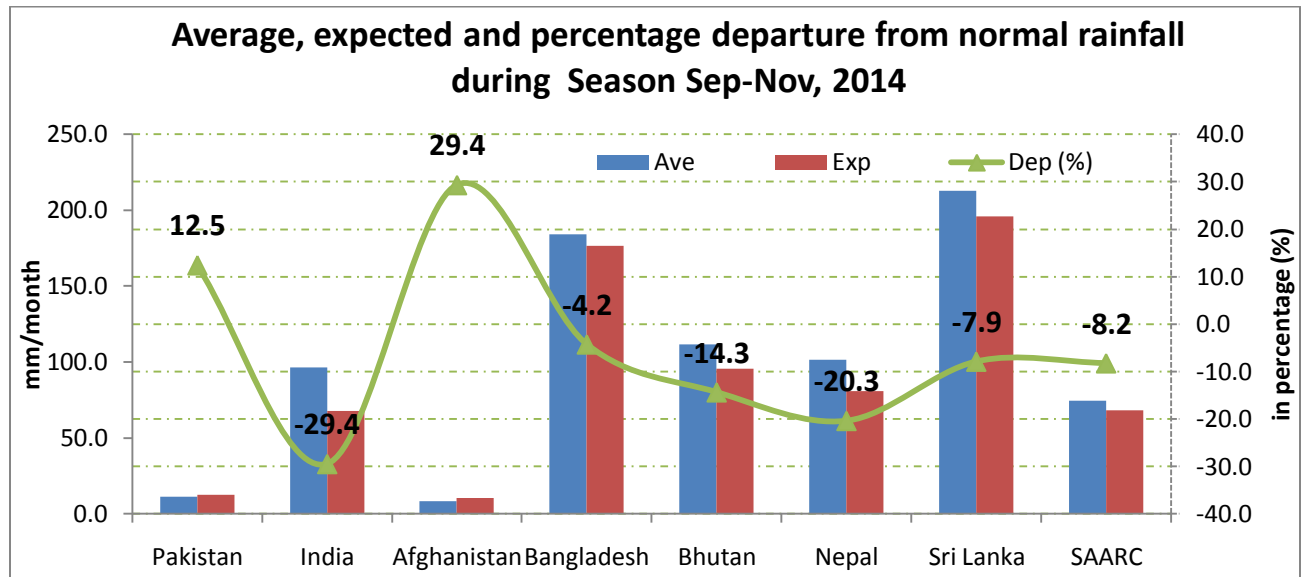


Seasonal weather outlook (Sep-Nov, 2014)



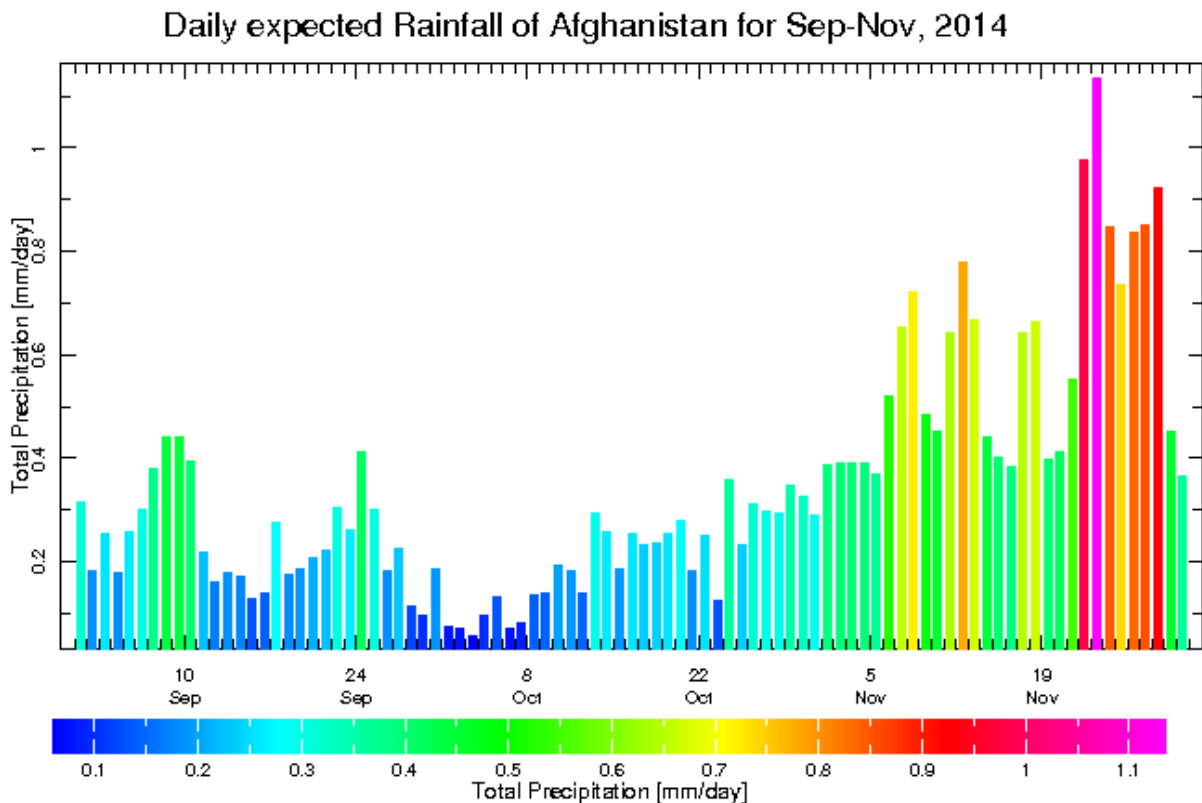
Note for quantitative graph: X axis indicates countries, left y axis stands for bar chart (blue for average and red for expected rainfall in mm/month) and right y axis stands for line chart (green) indicates departure of rainfall from normal in percentage. Average rainfall period is 1981-2010.

Seasonal weather outlook (Sep-Nov, 2014)



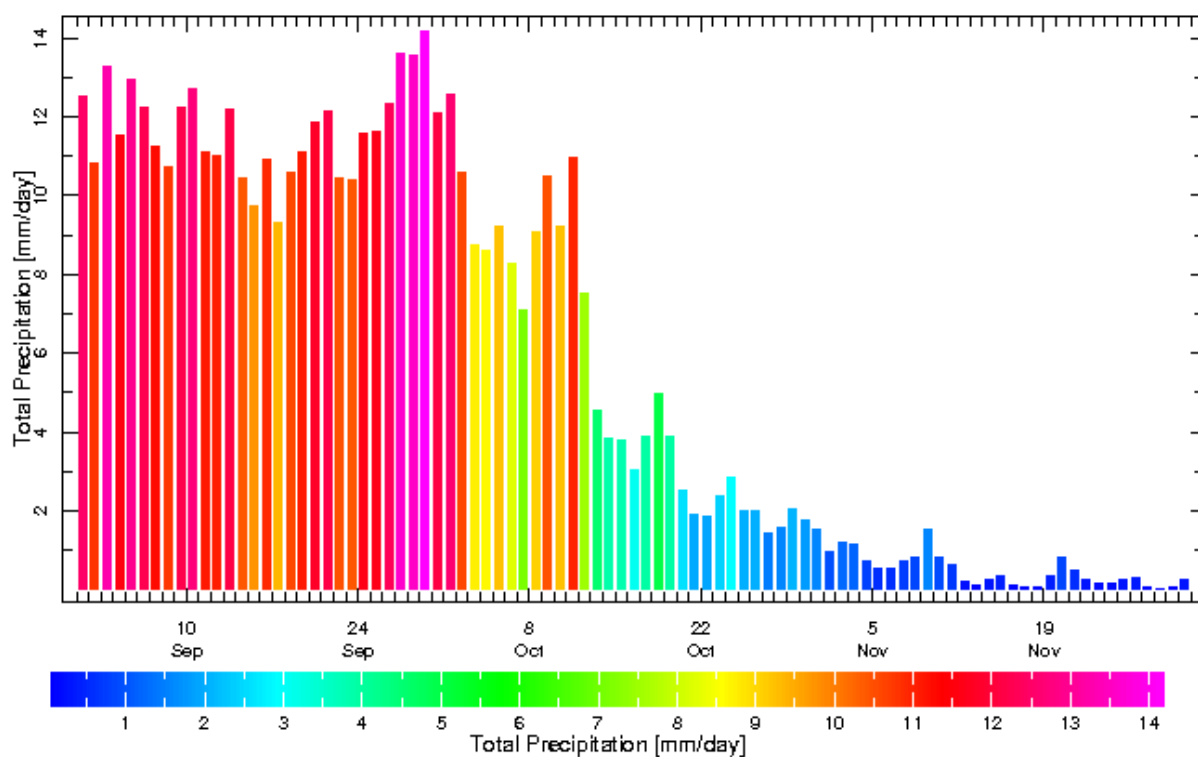
5. Daily country wise precipitation prediction for coming months (Jul-Sep, 2014)

Note for daily weather prediction: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

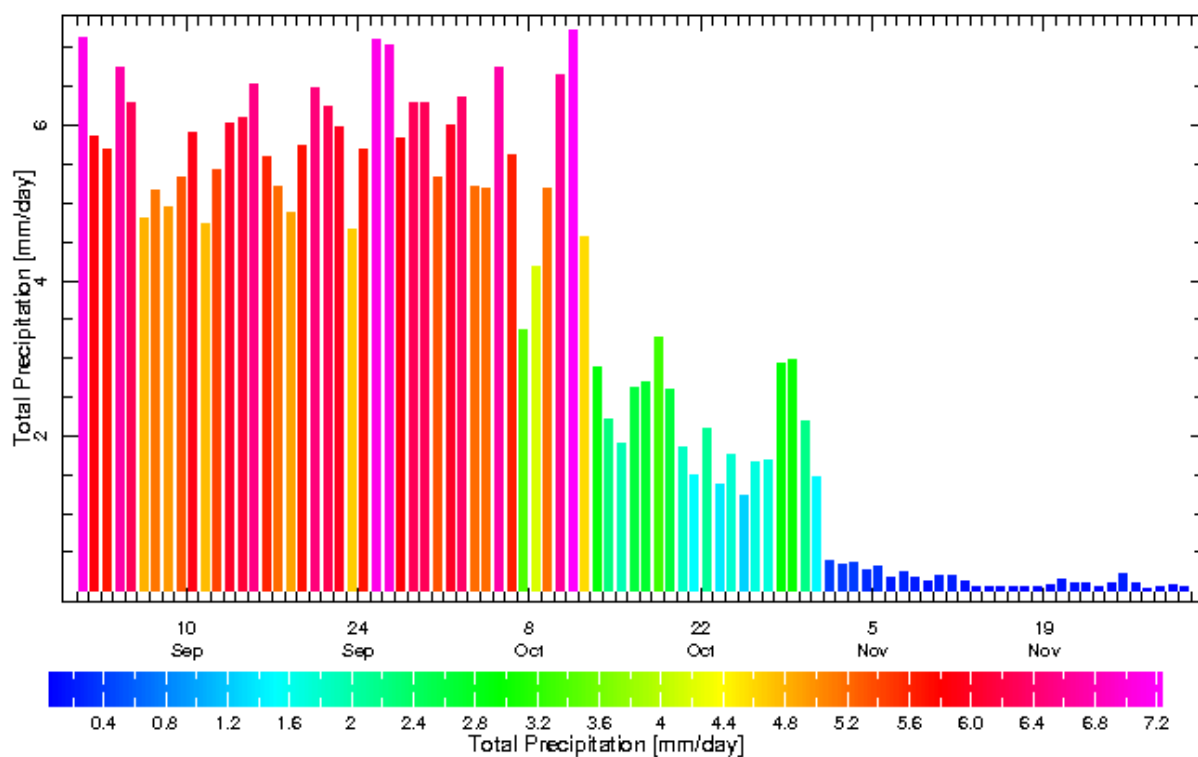


Seasonal weather outlook (Sep-Nov, 2014)

Daily expected Rainfall of Bangladesh for Sep-Nov, 2014

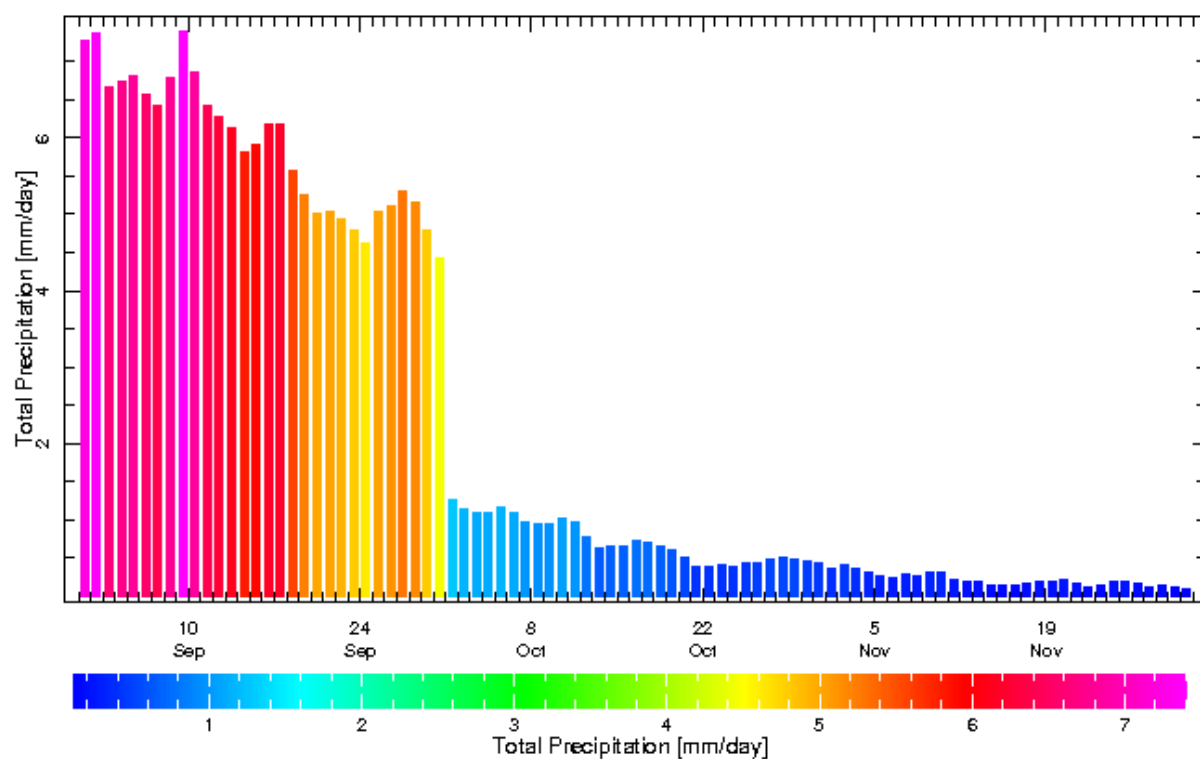


Daily expected Rainfall of Bhutan for Sep-Nov, 2014

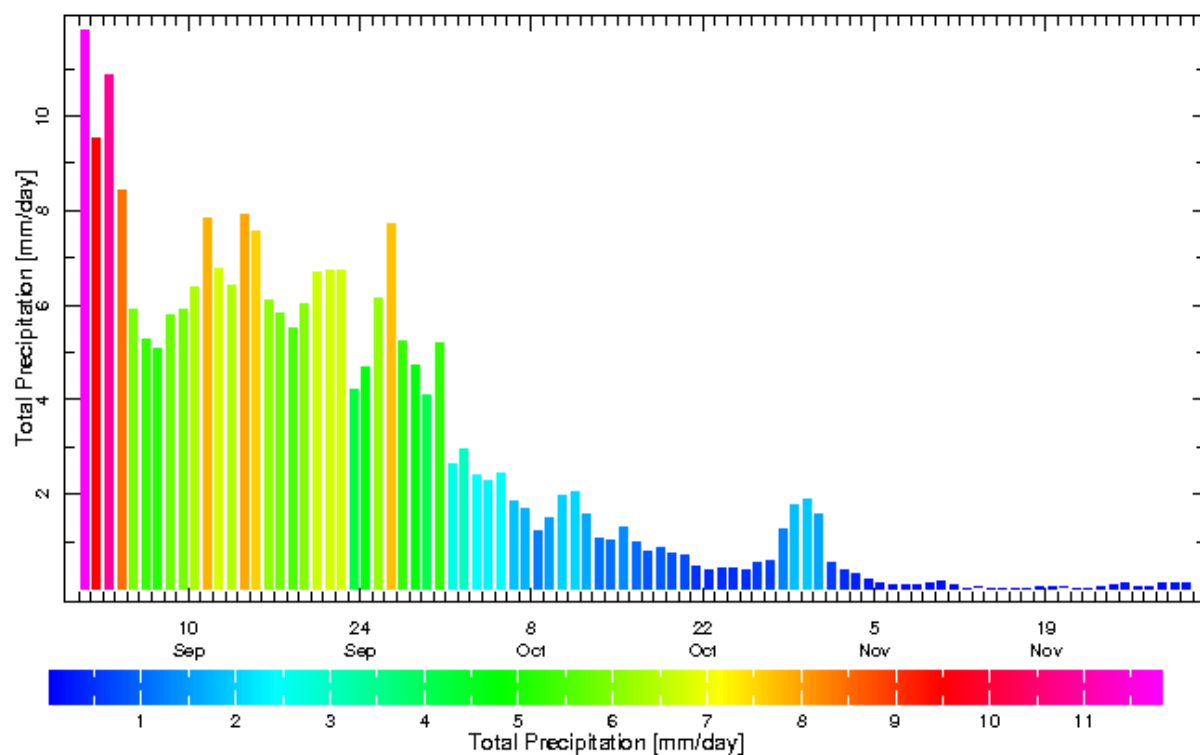


Seasonal weather outlook (Sep-Nov, 2014)

Daily expected Rainfall of India for Sep-Nov, 2014

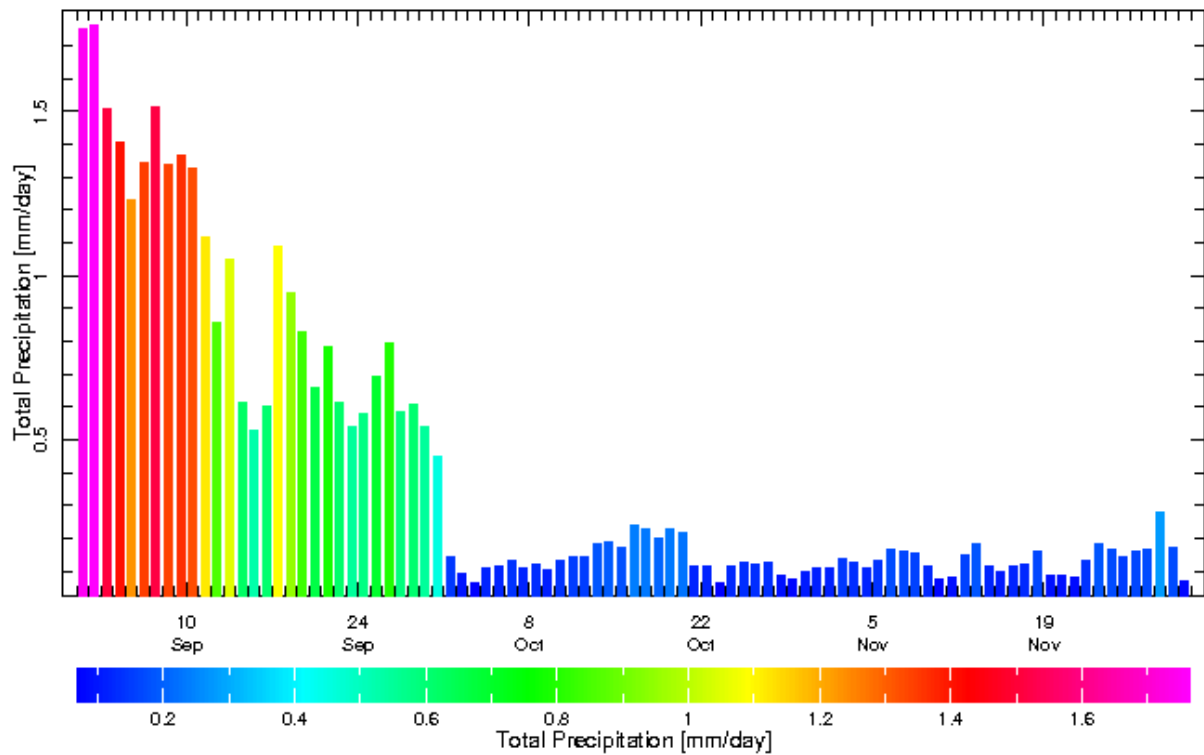


Daily expected Rainfall of Nepal for Sep-Nov, 2014

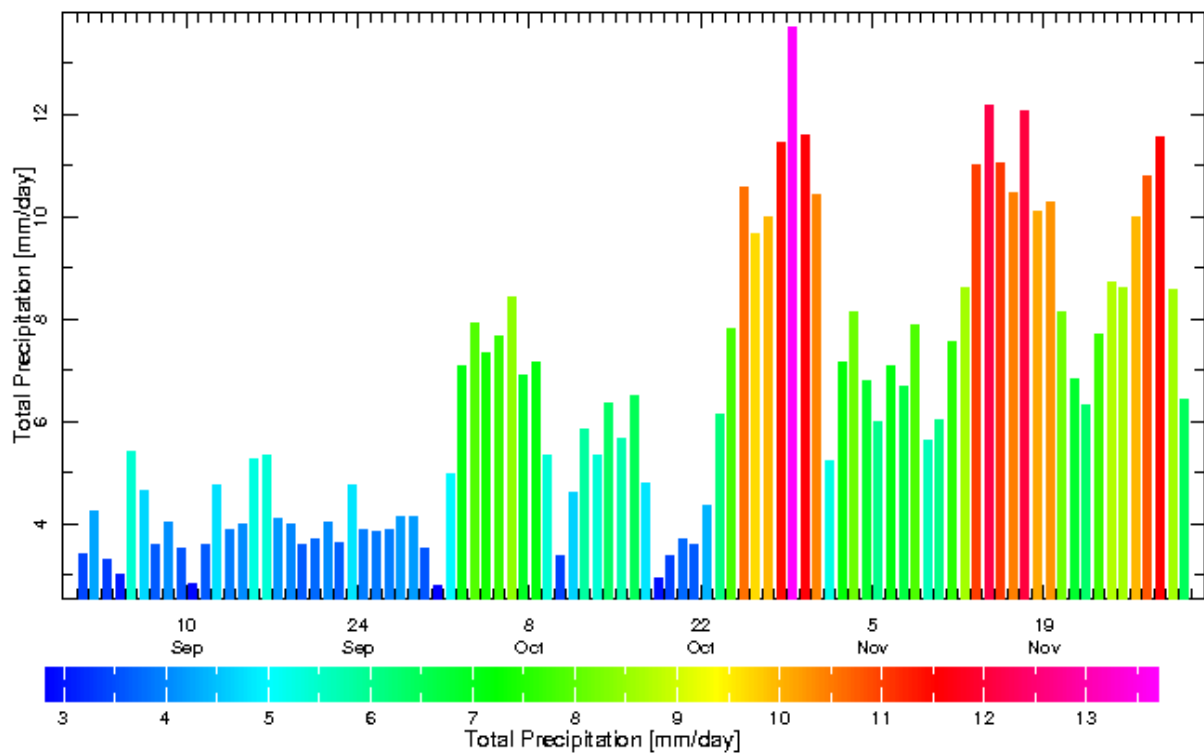


Seasonal weather outlook (Sep-Nov, 2014)

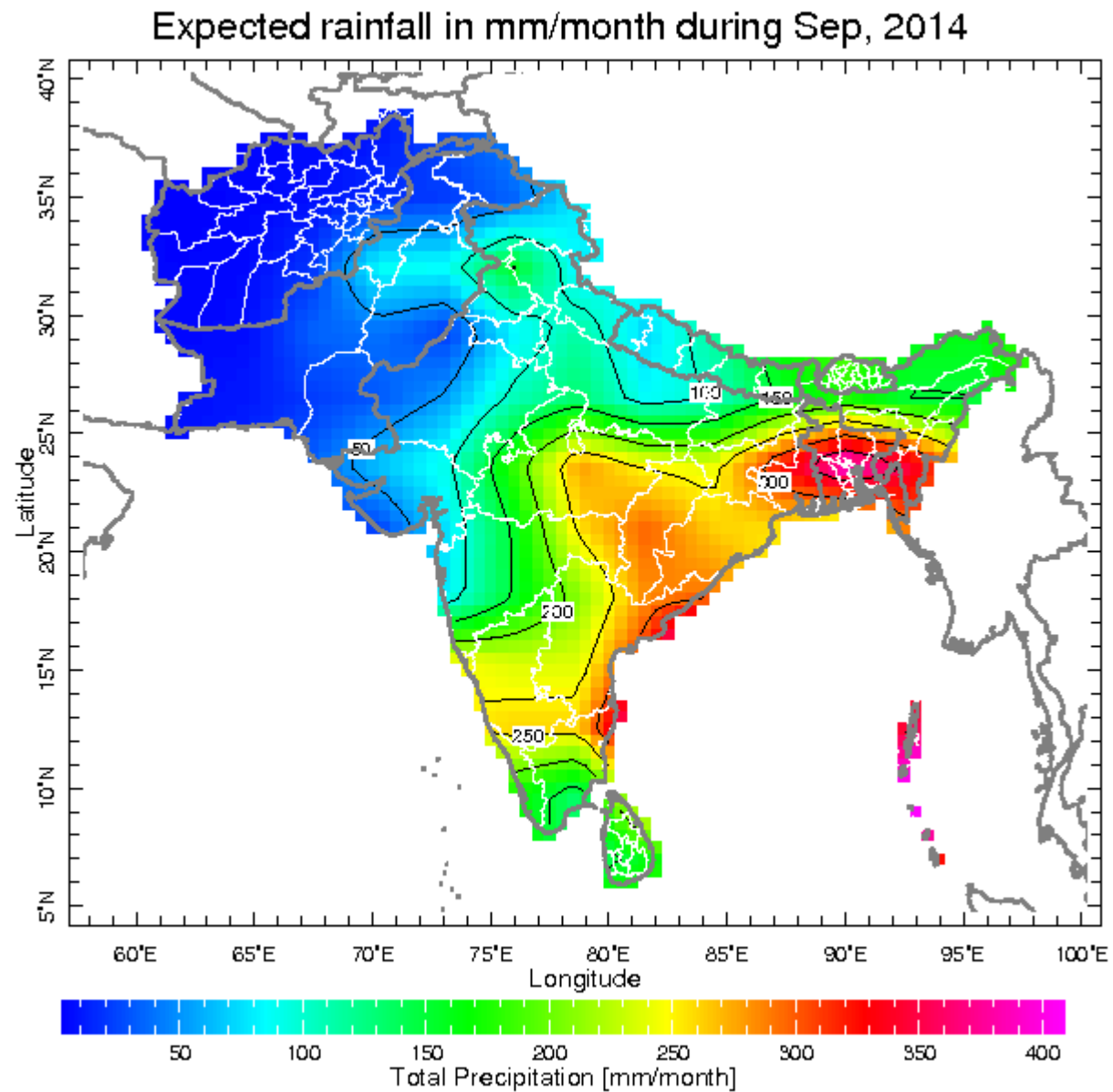
Daily expected Rainfall of Pakistan for Sep-Nov, 2014



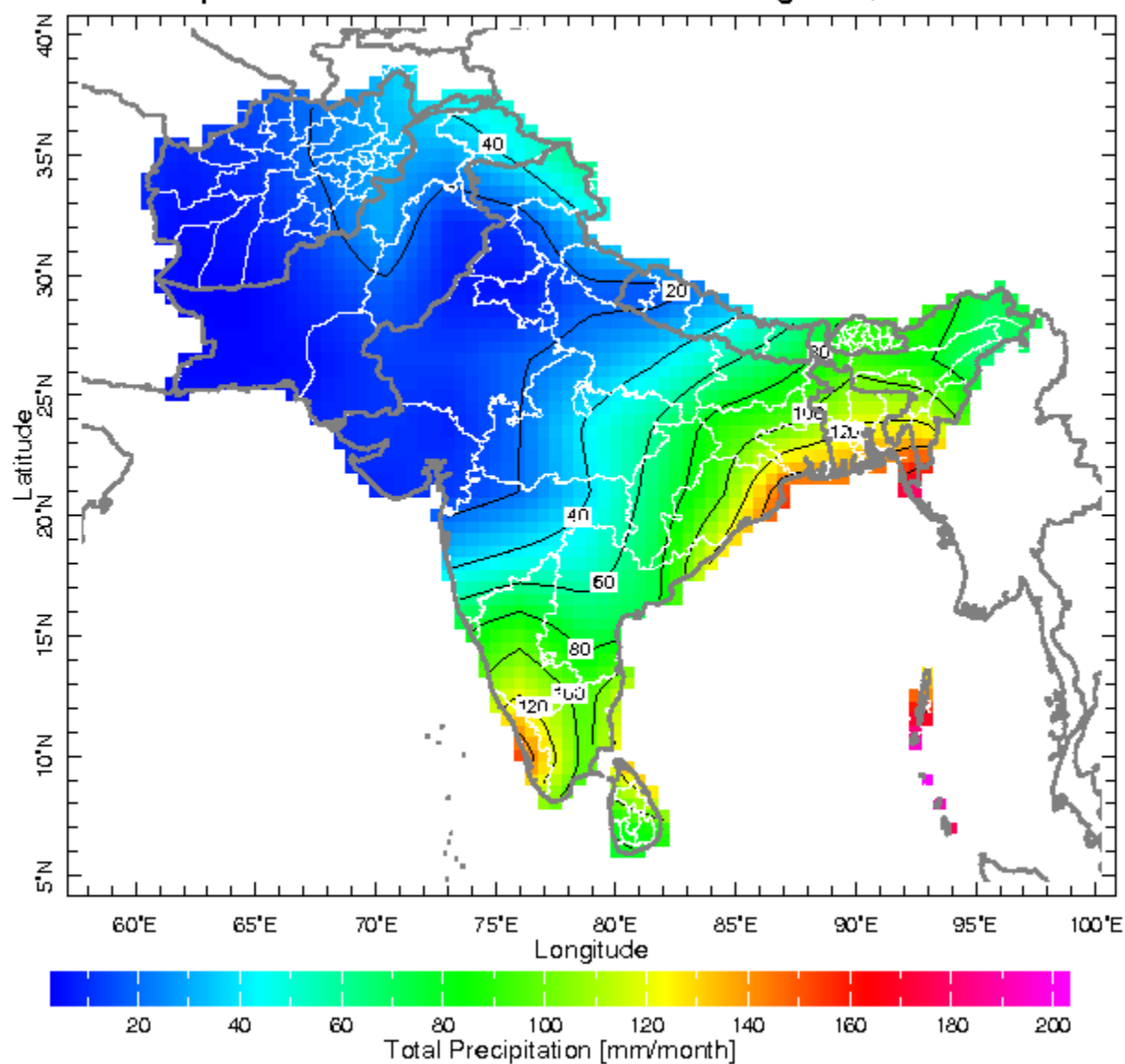
Daily expected Rainfall of Sri Lanka for Sep-Nov, 2014

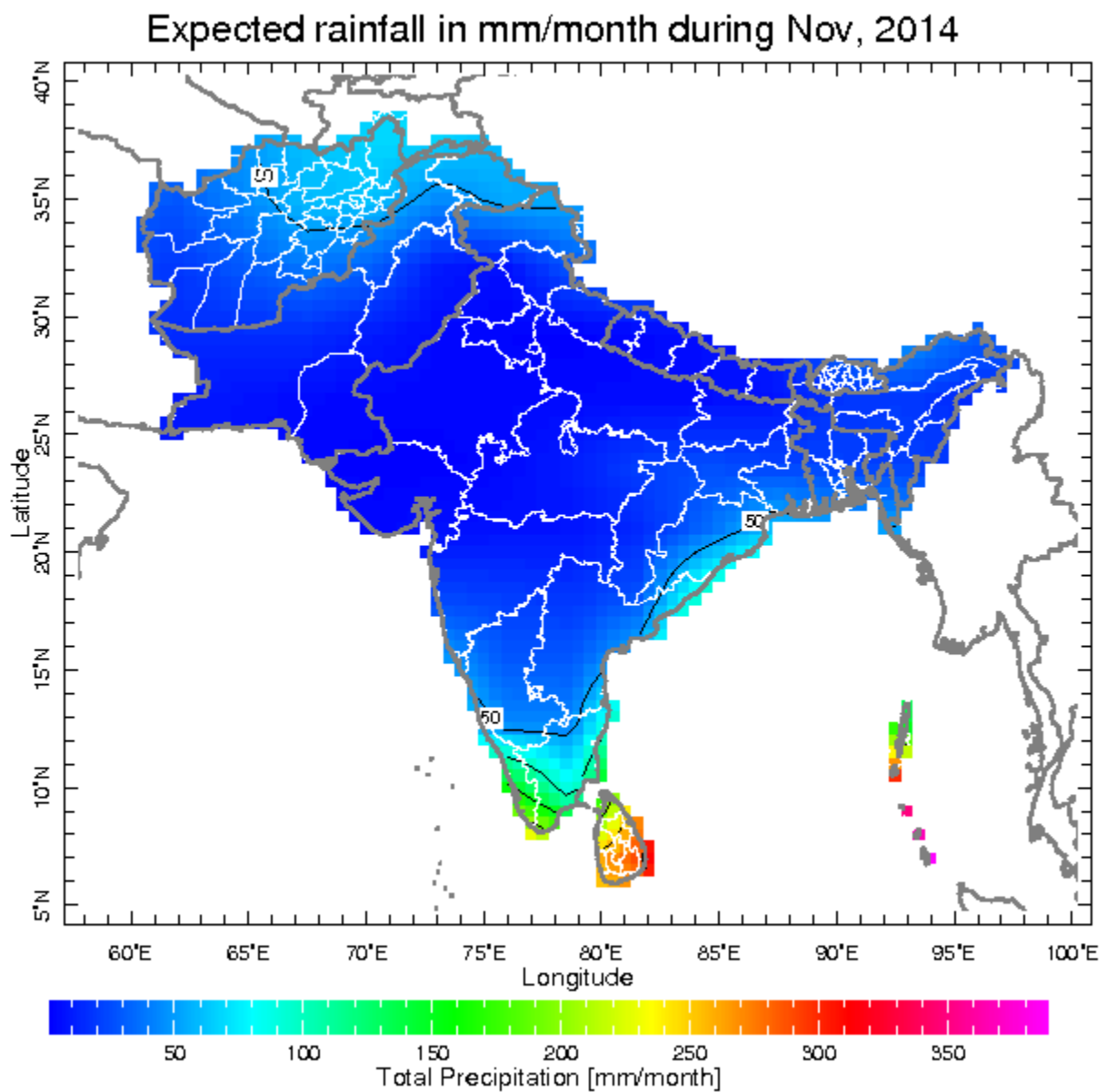


5. Spatial distribution of expected precipitation during coming season (GCM-ECHAM)

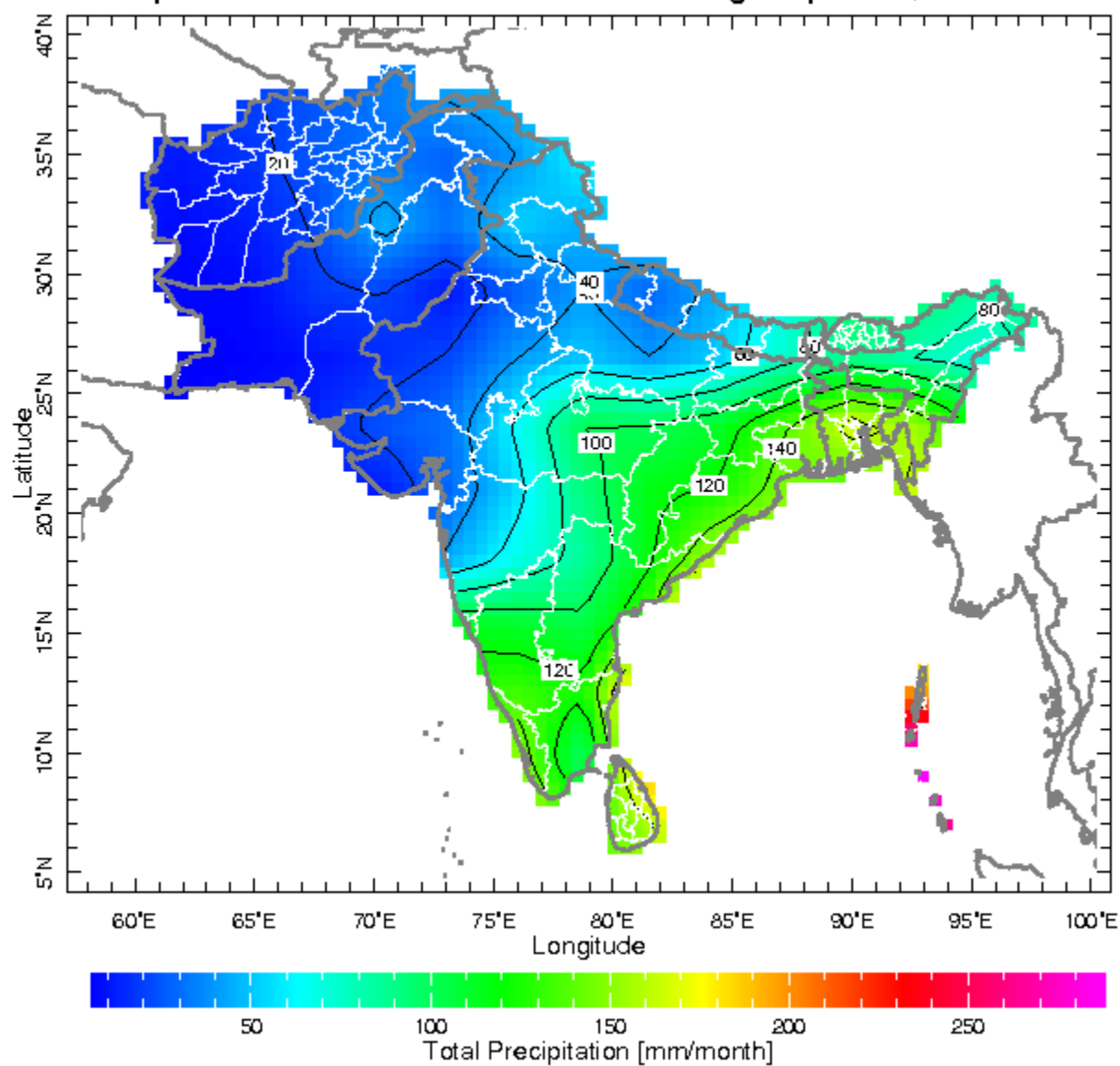


Expected rainfall in mm/month during Oct, 2014



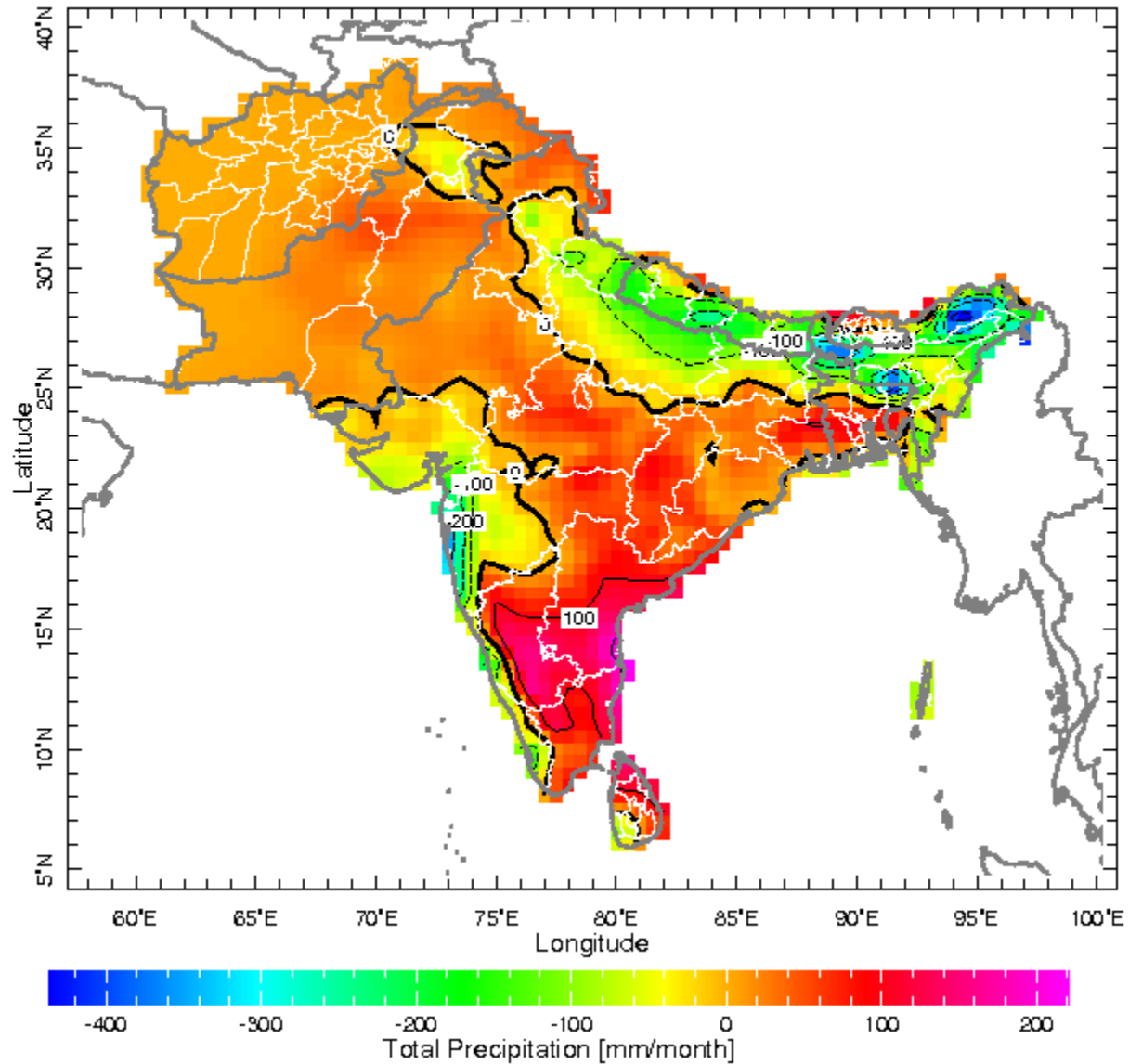


Expected rainfall in mm/month during Sep-Nov, 2014

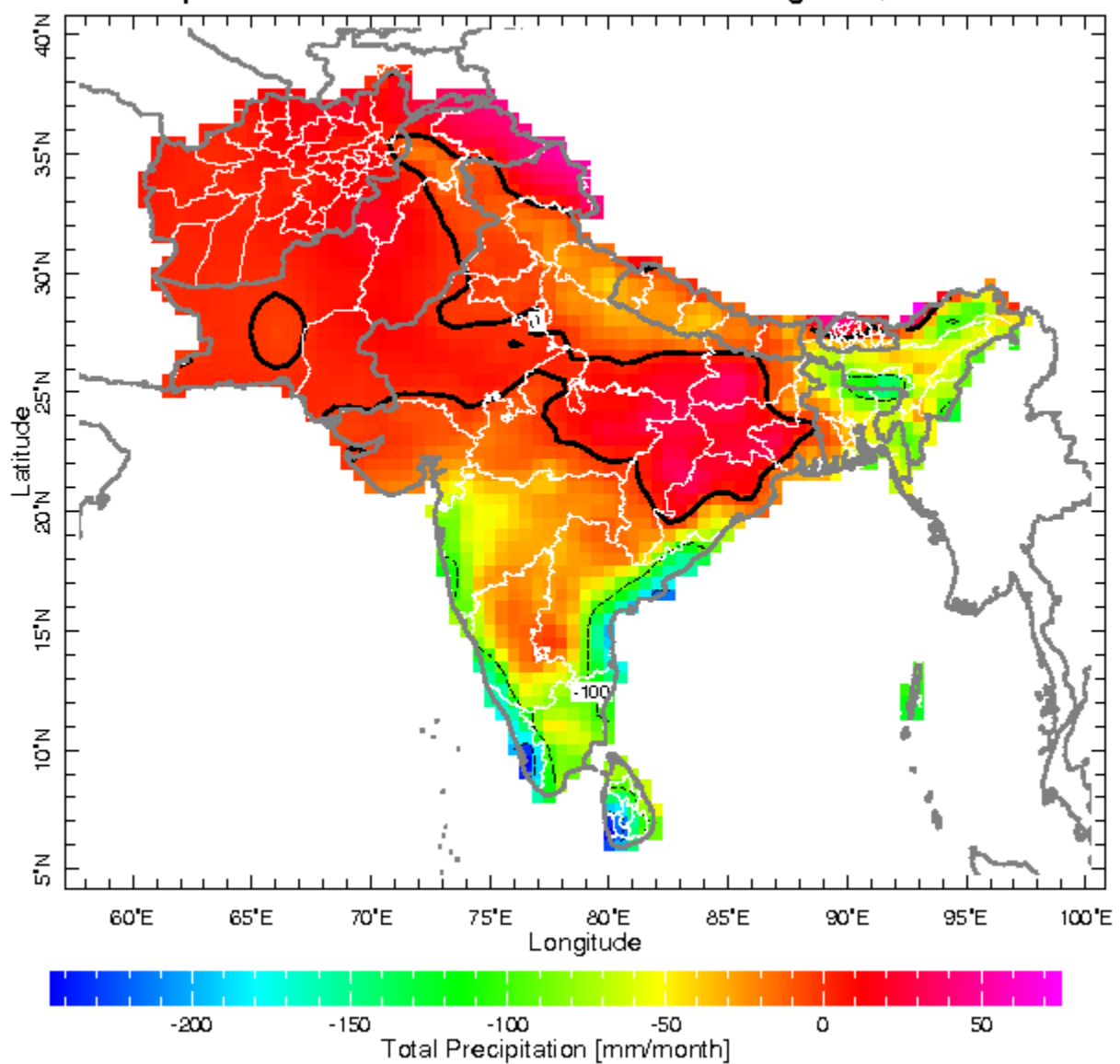


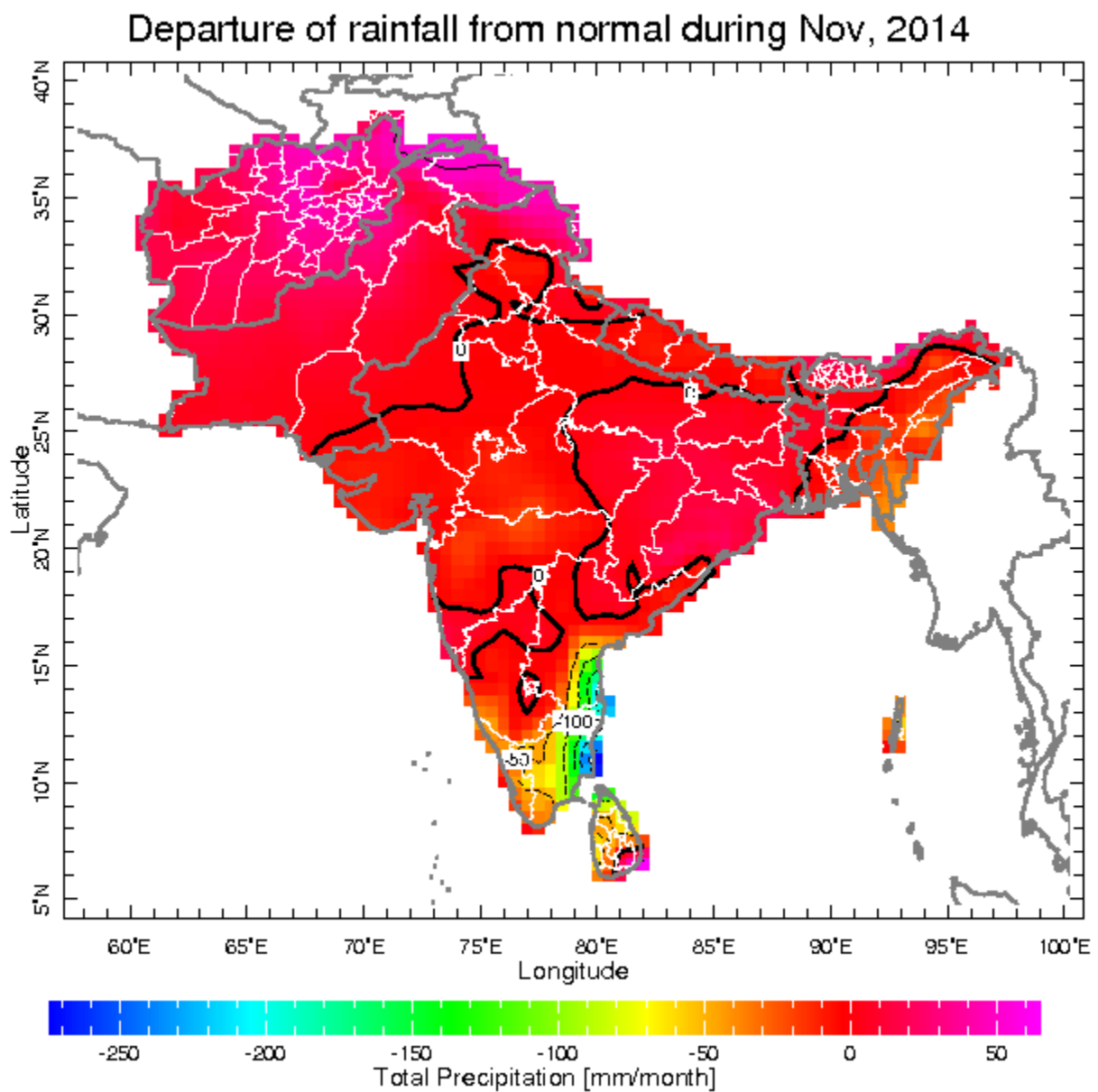
6. Monthly departure from normal (precipitation) during coming season

Departure of rainfall from normal during Sep, 2014

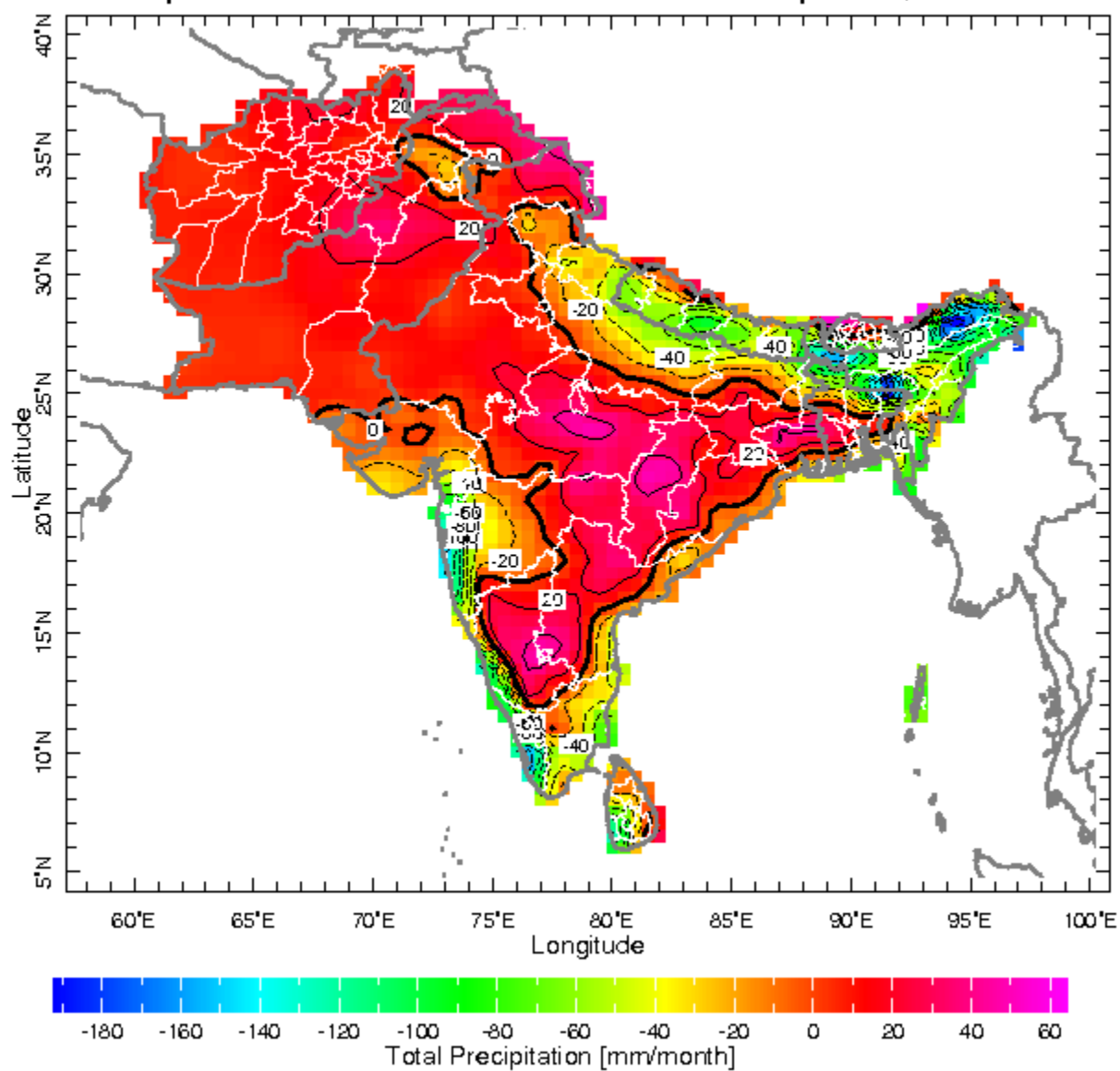


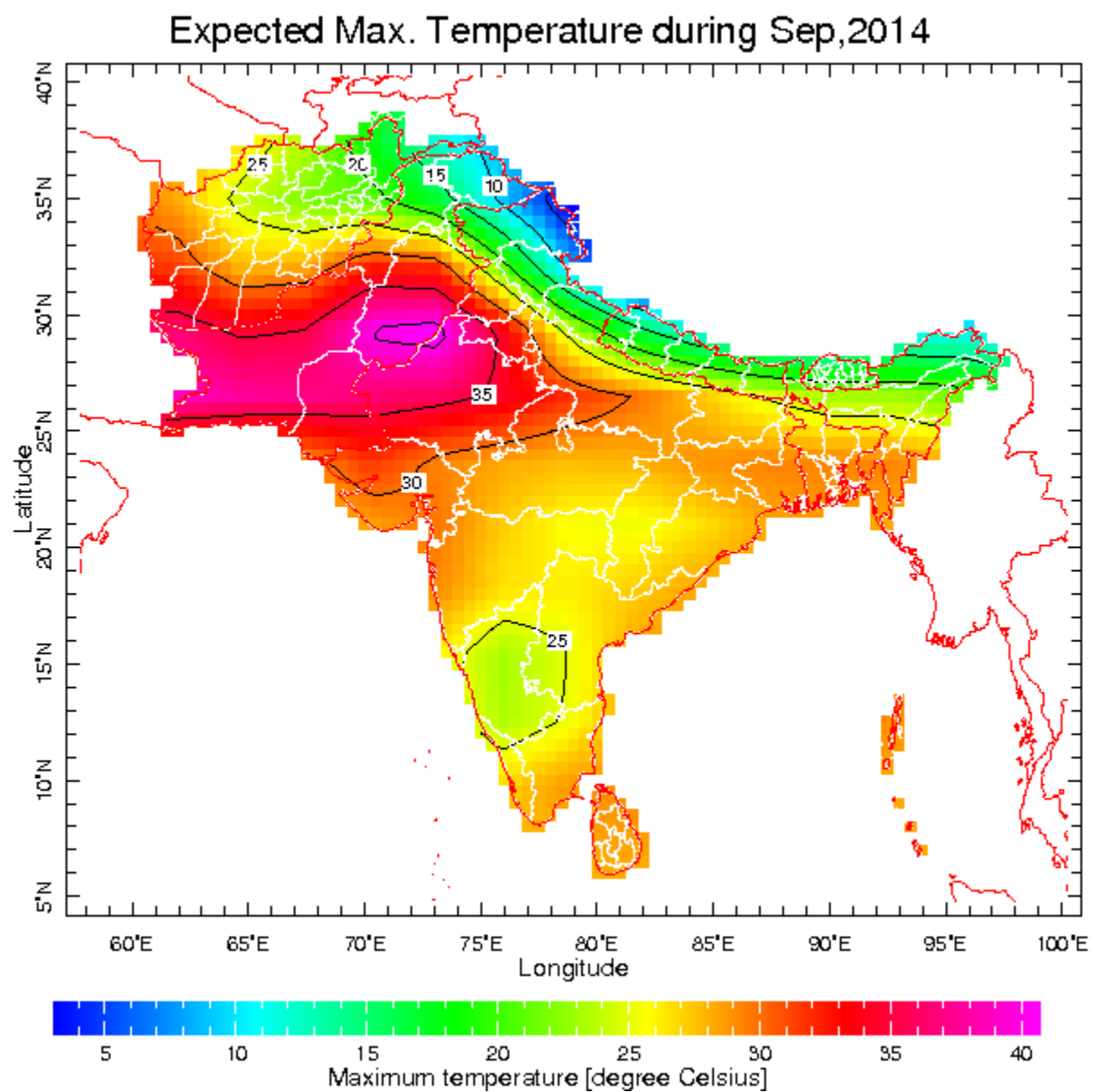
Departure of rainfall from normal during Oct, 2014



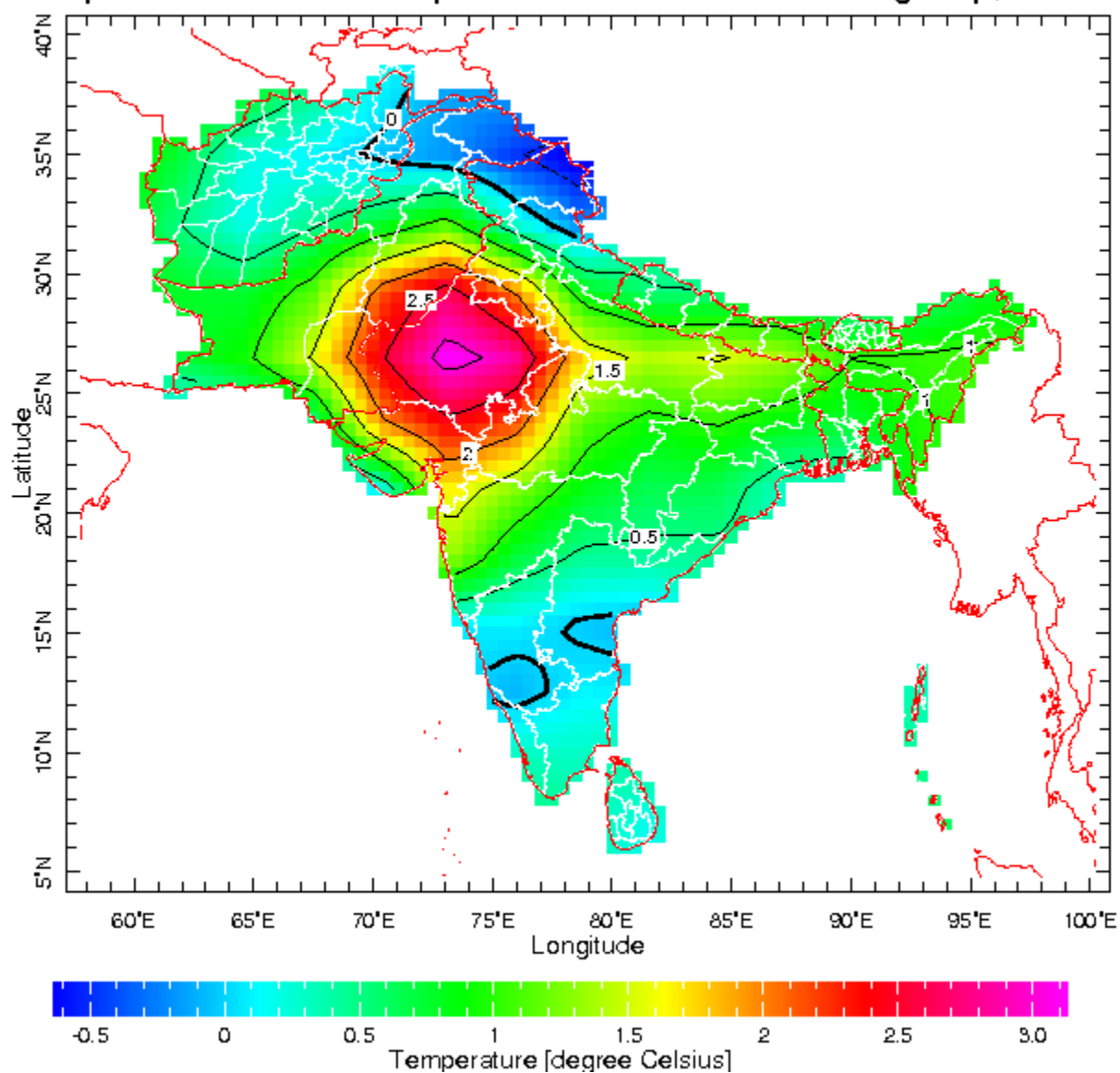


Departure of rainfall from normal for Sep-Nov, 2014

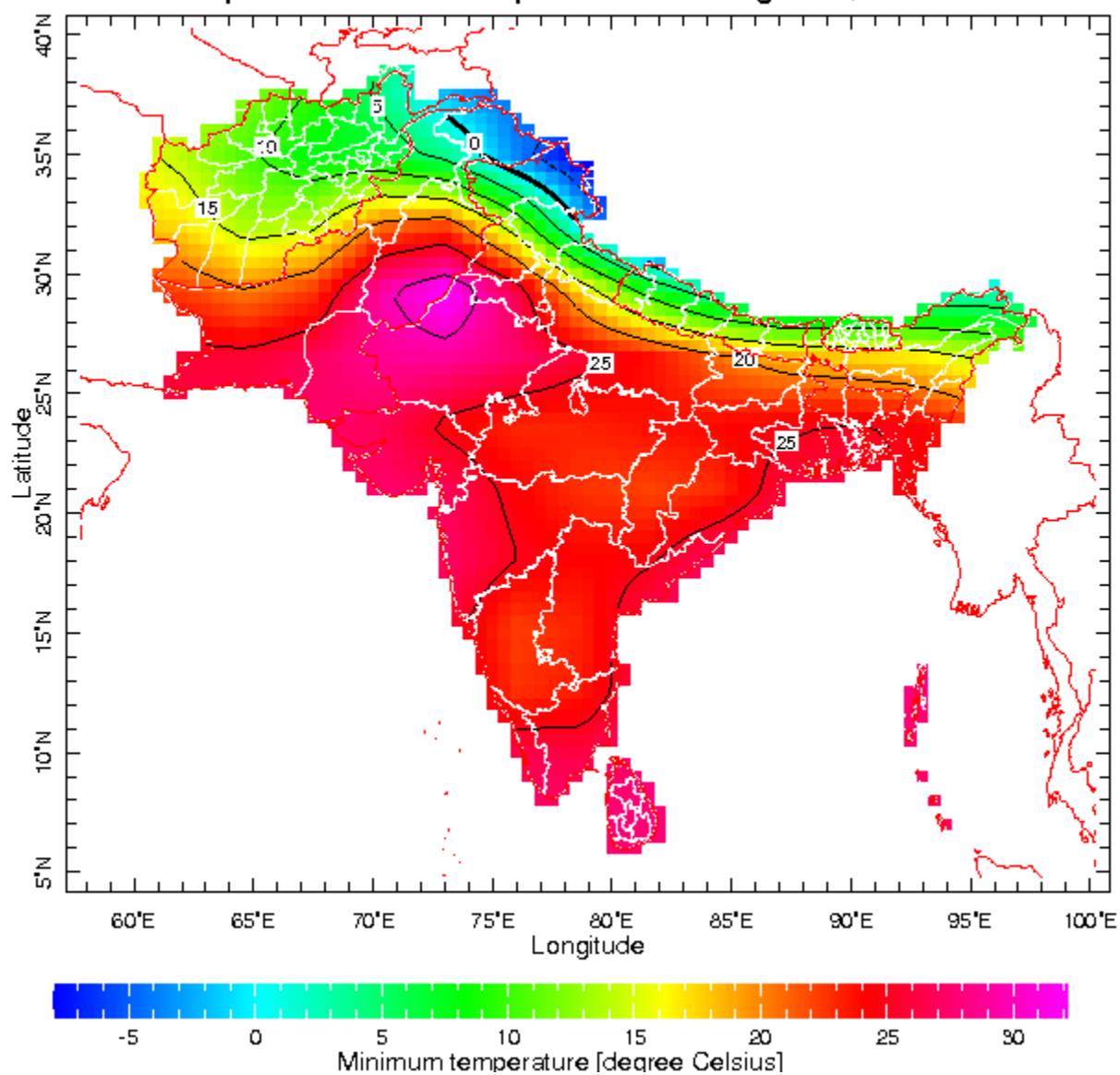




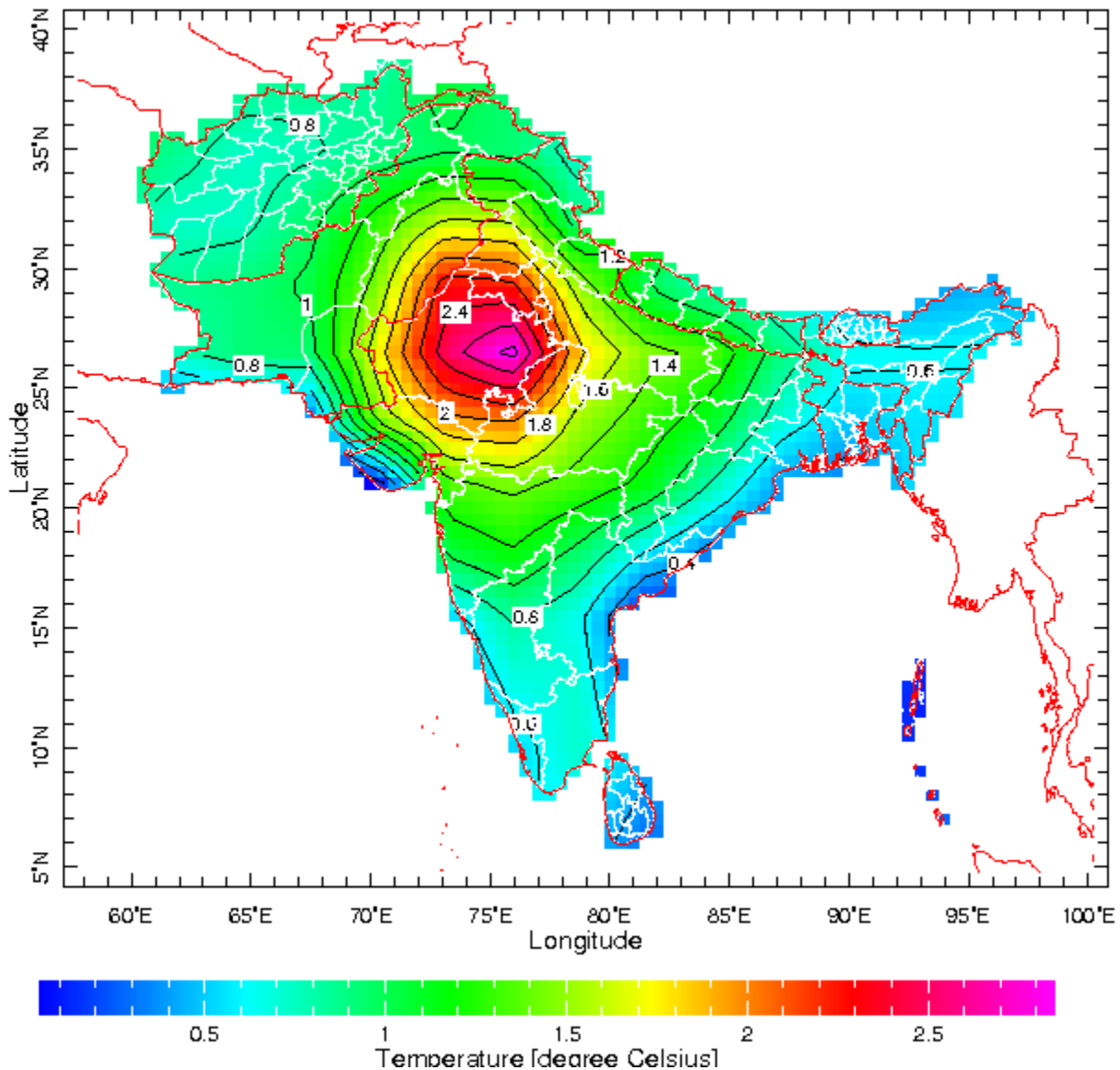
Departure of Max. Temperature from normal during Sep, 2014



Expected Min. Temperature during Oct,2014



Departure of Min. Temperature from normal during Oct, 2014



Note: Research wing of NAMC is regularly monitoring variation in synoptic situation of the globe and using different global climate models regional weather prediction data for preparation of this weather outlook. Seasonal weather outlook for SAARC region will be issued 10th of every month with three months in advance weather outlook. Latest seasonal weather summary can be downloaded from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>