

# Seasonal weather outlook for SAARC region

(Apr-Jun, 2015)

Issued on Apr 15, 2015



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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 Apr 01, 2015. 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 less intensity. The area of jet stream may be squeezed during Feb over northern of Afghanistan and Pakistan. Below normal strength of jet stream over west of the region.
- A ridge at 500 hPa is expected to be over central parts of the country. Slightly below normal trend is expected over northern and eastern parts of the region.
- Surface temperatures are expected to be on lower side than normal all over the region including Pakistan, India and surroundings.
- North Atlantic Oscillation (NAO) is in positive phase (1.79) and in increasing trend (higher than previous month). As a result, tracks of western disturbances would be on northern region of the country.  
<http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii.table>

### **ENSO Alert System Status: El Niño Advisory**

**Synopsis: There is an approximately 50-60% chance that El Niño conditions will continue through Northern Hemisphere summer 2015.**

During February 2015, El Niño conditions were observed as the above-average sea surface temperatures (SST) across the western and central equatorial Pacific became weakly coupled to the tropical atmosphere. The latest weekly Niño indices were +0.6°C in the Niño-3.4 region and +1.2°C in the Niño-4 region, and near zero in the Niño-3 and Niño-1+2 regions. Subsurface temperature anomalies increased associated with a downwelling oceanic Kelvin wave, which was reflected in positive subsurface anomalies across most of the Pacific. Consistent with weak coupling, the frequency and strength of low-level westerly wind anomalies increased over the equatorial Pacific during the last month and a half. At upper-levels, anomalous easterly winds persisted across the east-central Pacific. Also, the equatorial Southern Oscillation Index (EQSOI) remained negative for two consecutive months. Convection was enhanced over the western equatorial Pacific and near average around the Date Line. Overall, these features are consistent with borderline, weak El Niño conditions.

Compared to last month, several more models El Niño (3-month values of the Niño-3.4 index equal to or greater than 0.5°C) will continue throughout 2015. This is supported by the recent increase in subsurface temperatures and near-term model predictions of the continuation of low-level westerly wind anomalies across parts of the equatorial Pacific. However, model forecast skill tends to be lower during the Northern Hemisphere spring, which contributes to progressively lower probabilities of El Niño through the year. In summary, there is an approximately 50-60% chance that El Niño conditions will continue through Northern Hemisphere summer 2015 ([http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso\\_tab=enso-cpc\\_update](http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update))

## Seasonal weather outlook (Apr-Jun, 2015)

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*Probability outlook: La Nina (1%), Neutral (43%) and El Nino (56 %) during Apr-May-Jun, 2015 season*

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

***“Above average precipitation is expected during the season (AMJ)”***

Synthesis of the latest model forecasts for Apr-Jun 2015 (AMJ), current synoptic situation and regional weather expert’s judgment indicates that average to above average precipitation is expected during the predicted season with moderate higher than normal during June. Below normal maximum temperature will persist over western parts of SAARC member countries and higher than normal over eastern parts during April and May. Day temperature will be will be higher than normal all over the region during June.

#### ***Seasonal weather outlook (Apr-Jun, 2015):***

As a whole, above average precipitation is likely to all over the region during the predicted season with significantly higher than average during February and average to slightly above average during March and April. Above average precipitation is expected over western region including Afghanistan, Pakistan and India and Sri Lanka while average to slightly above average over Bangladesh, Bhutan and Nepal.

Afghanistan, northern parts of Pakistan Sri Lanka and northern eastern states of India, Bhutan and eastern provinces of Bangladesh will receive good precipitation during the season. Nepal and extreme northeastern states of India and Sri Lanka will receive less than normal precipitation

**April, 2014:** Average to slightly above average rainfall is expected in SAARC member countries as a whole with slightly below average over Nepal, Sri Lanka and extreme northeastern states of India. Central states of India will receive average rainfall. Moderate rainy spells will be focused over Afghanistan and Pakistan during first decade of April.

Slightly below normal day temperature will be expected all over central India, upper half of Afghanistan and Pakistan while below normal over lower half of Afghanistan and Pakistan.

## Seasonal weather outlook (Apr-Jun, 2015)

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**May, 2015:** Average precipitation is expected during May all over SAARC region. However, high than normal over India especially over central states of India, Pakistan and isolated places of Afghanistan and below normal over extreme northeastern states of India, Nepal, Sri Lanka and Bangladesh.

Night temperature will be normal all over whole region with higher values over central parts with maximum ( $> 1^{\circ}\text{C}$ ) over central Pakistan including Rajasthan of India.

**Jun, 2015:** Above average precipitation is expected all over the region with significantly higher over India, average over Pakistan, and below average over Bangladesh, Bhutan and Nepal. Intensity of precipitation will be higher over western as well as over eastern belt of the region including Afghanistan, northern parts of Pakistan and eastern coastal belt of India and its surroundings. Below average precipitation is expected over northeastern parts of India and Sri Lanka.

Day temperature will be on below normal over the region April and May while day temperature will abruptly increase from June.

### ***Country wise Seasonal prediction (April-Jun, 2015):***

**Afghanistan:** Moderate rainy spells are expected during April. Most of the parts will receive light to moderate rain during early predicted season. Rainy spell gradually decreases as time passes. Light rainy spells are expected during last decade of May as well.

**Bangladesh:** Almost very less amount of rain is expected during April. Moderate rainy spells will start from May and good amount of rain is expected during Jun. Moderate to heavy rainfall is expected during Last decade of Jun.

**Bhutan:** Less amount of rainfall is expected during April and May. Rainy spell with same intensity will start from early Jun and will continue till for whole month. Well amount of rainfall is expected during June.

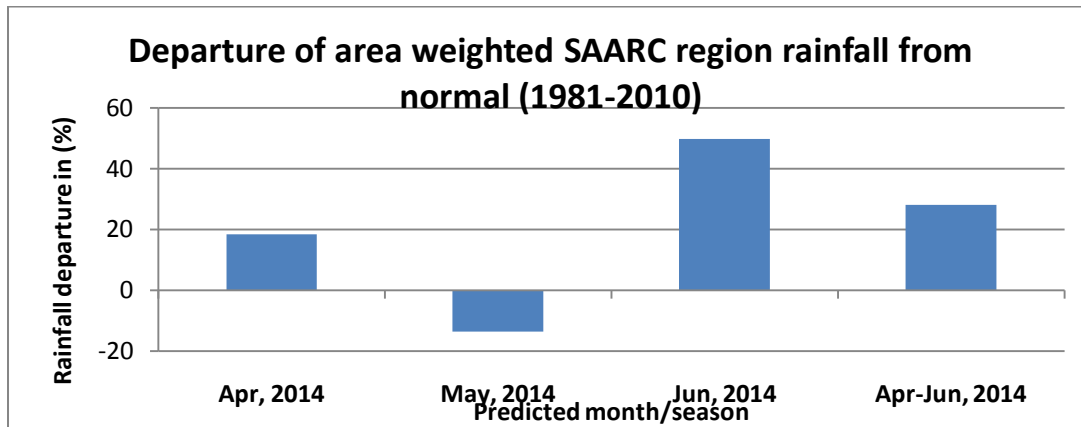
**India:** April is expected to be dry month all over the country. Light Rainy spell are expected during May. Light to moderate rainy spells are expected during last week May to till July.

**Nepal:** light to moderate precipitation spells are expected during first half of predicted months while moderate to heavy rainy spells during last half of the predicted month.

**Pakistan:** Well amount of rainfall is expected during first week of April and then dry spell start will persist till third week of Jun. Moderate rainy spell are expected during last week of June. Very less amount of rainfall is expected during May.

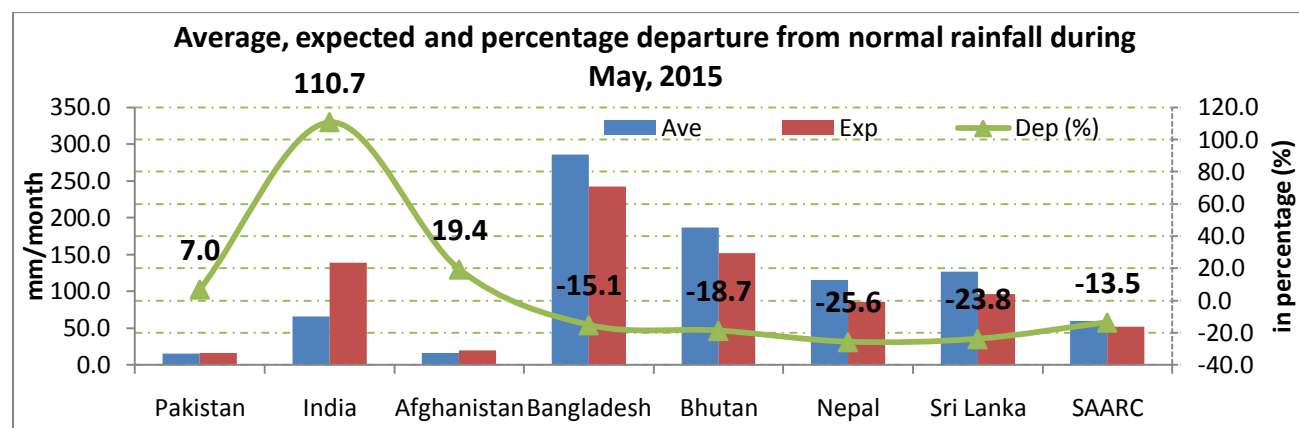
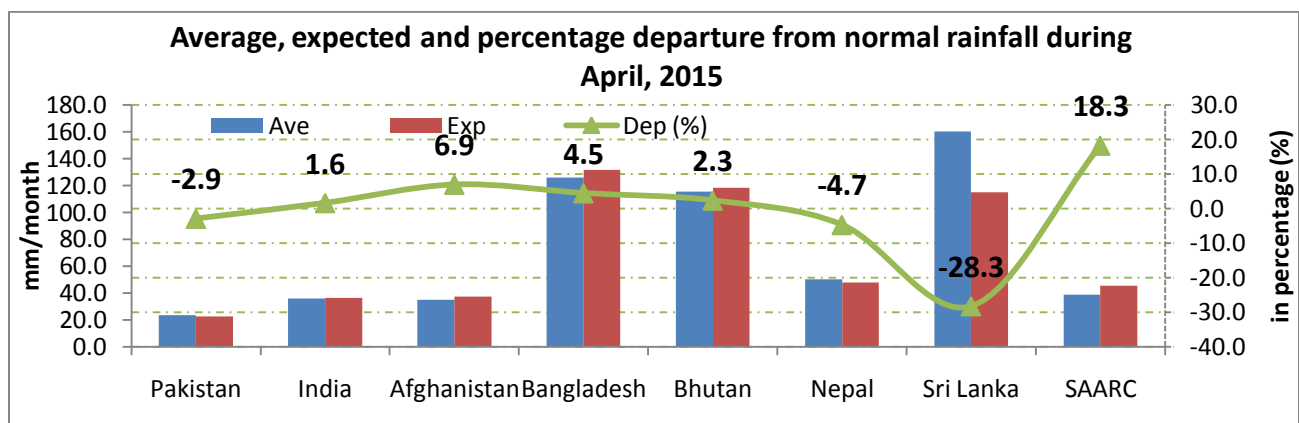
**Sri Lanka:** One or two light to moderate rainy spells are expected during last decade of April and mid-June. Rest period would be occasionally dry.

## Seasonal weather outlook (Apr-Jun, 2015)

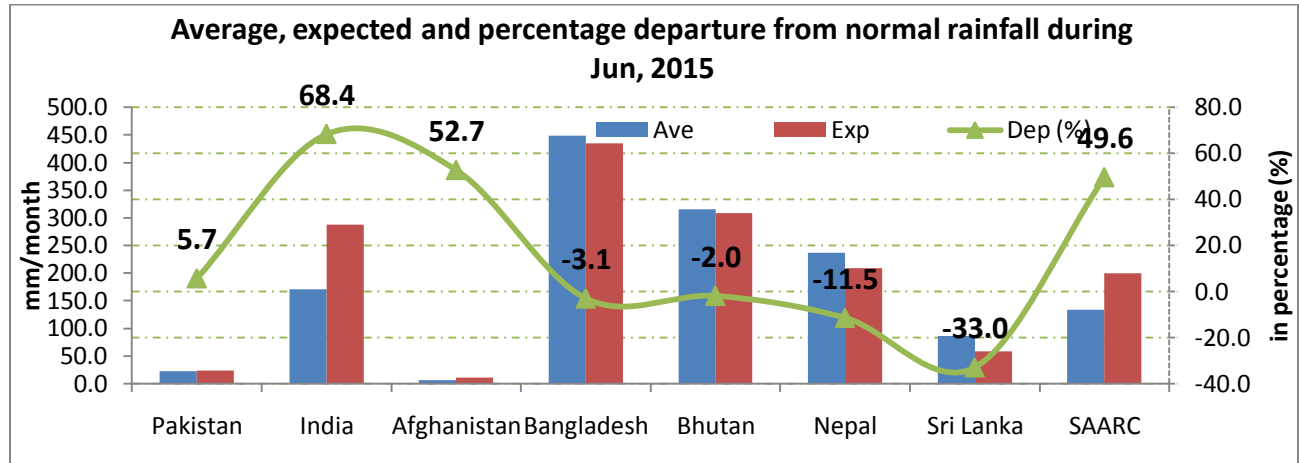


Note: Departure of Area-weighted rainfall of SAARC region has been computed by subtracting Climatology rainfall of the month from ECHAM predicted monthly/seasonally rainfall of corresponding month/season.

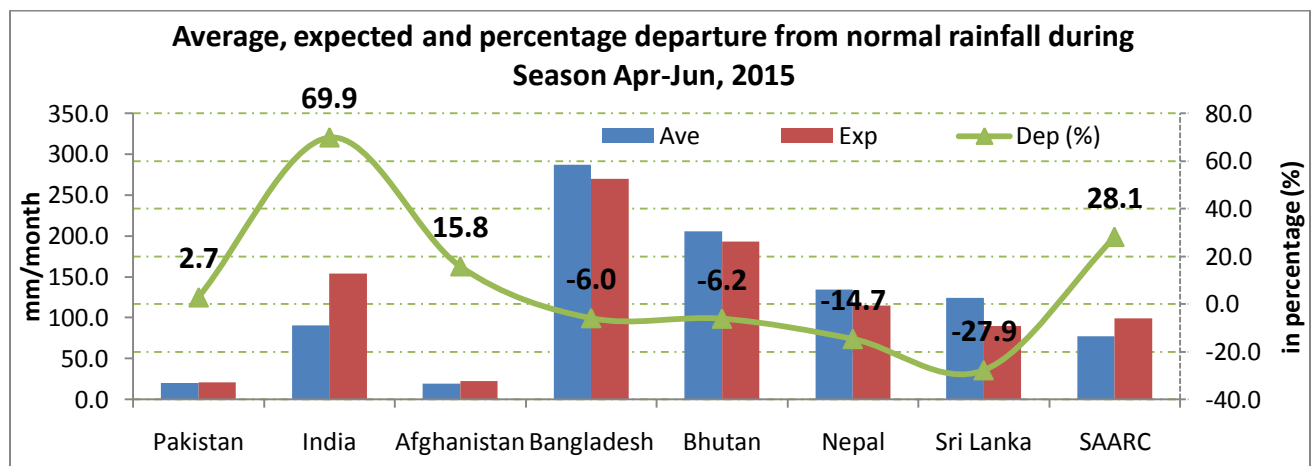
### 4. Country wise monthly and seasonal quantitative outlook along with departure of precipitation from normal



## Seasonal weather outlook (Apr-Jun, 2015)



*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.*

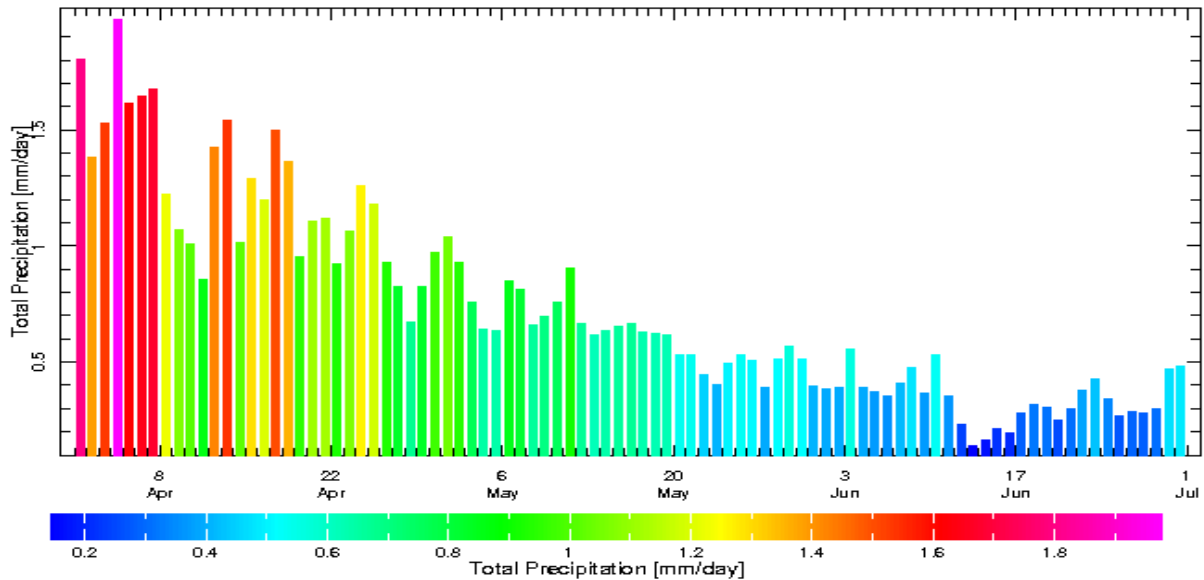


## Seasonal weather outlook (Apr-Jun, 2015)

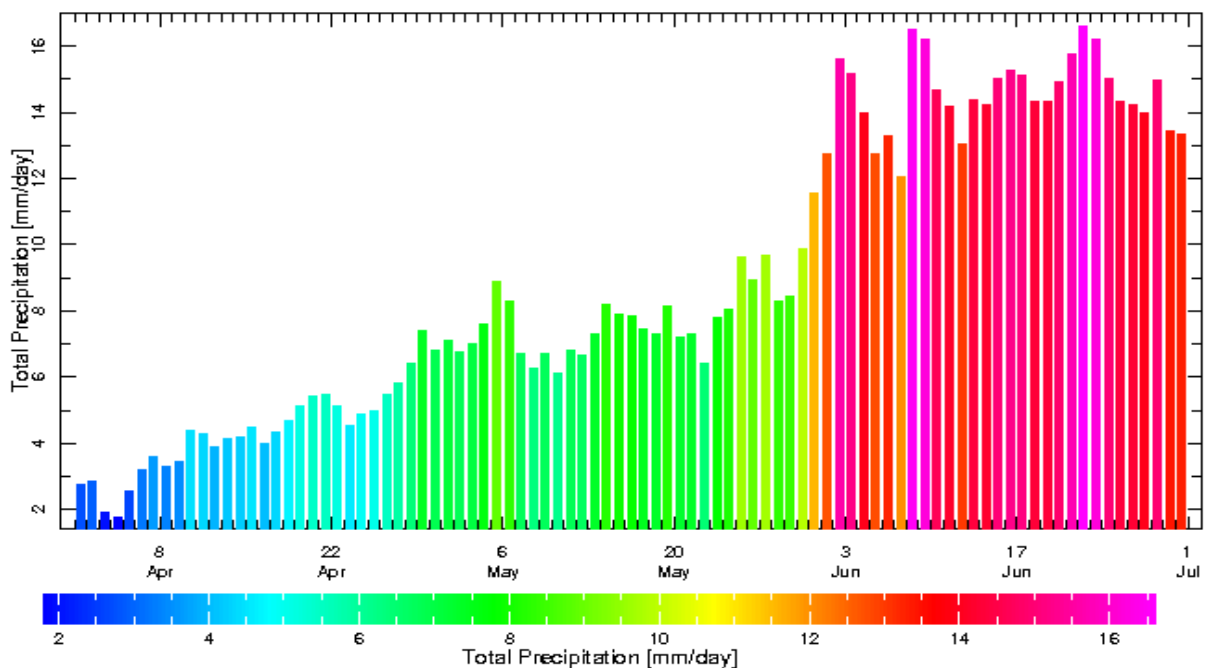
### 5. Daily country wise precipitation prediction for coming months (Apr-Jun, 2015)

**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.

Daily expected Rainfall of Afghanistan for Apr-Jun, 2015



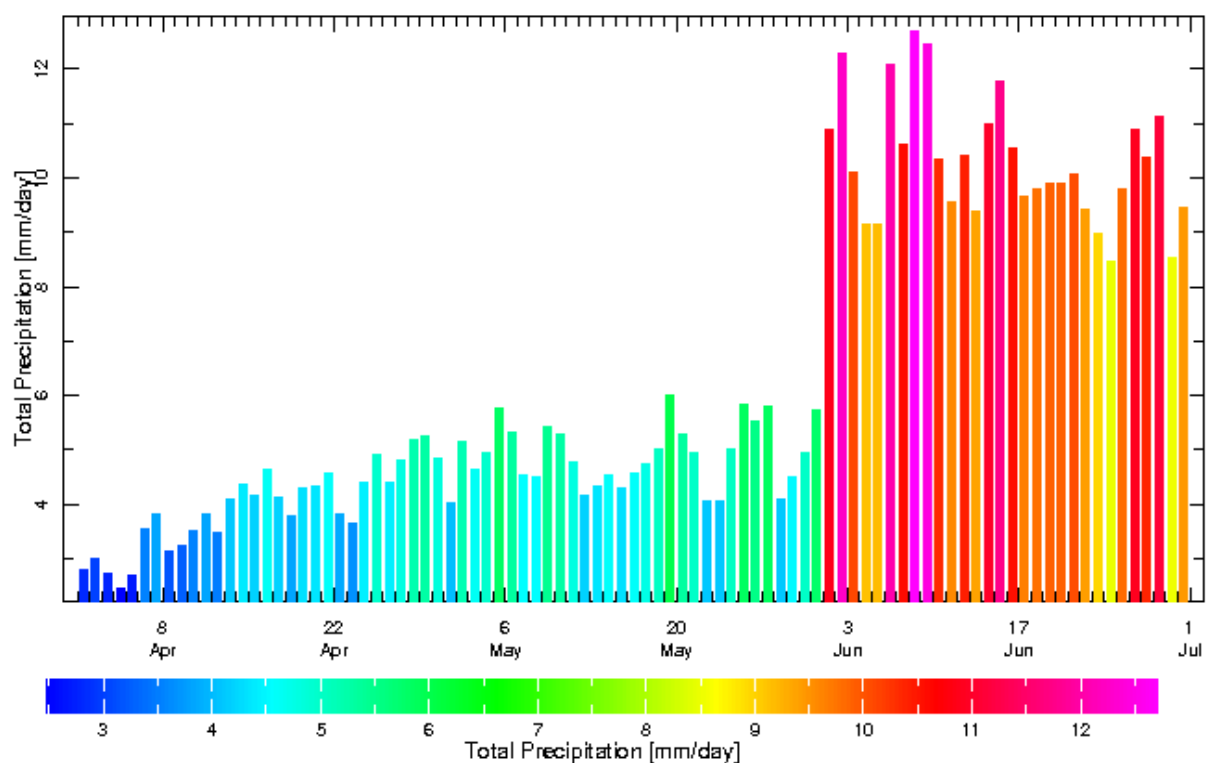
Daily expected Rainfall of Bhangladesh for Apr-Jun, 2015



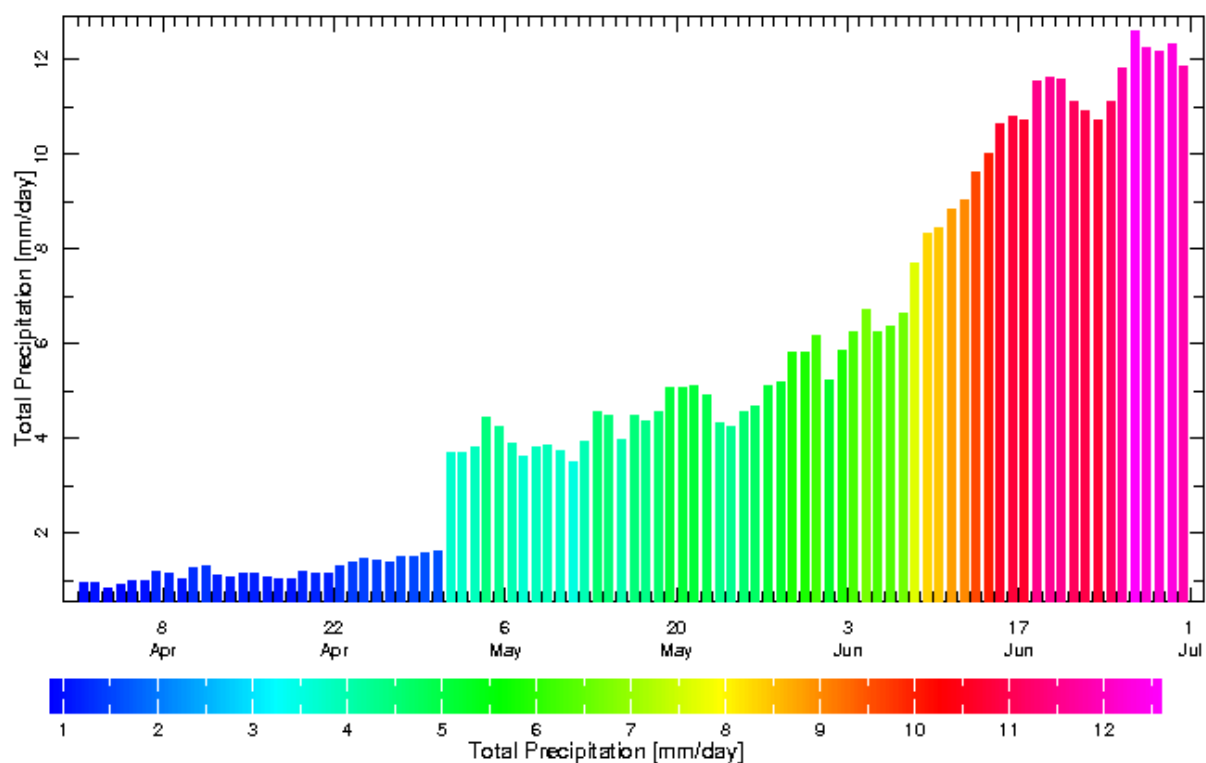


## Seasonal weather outlook (Apr-Jun, 2015)

Daily expected Rainfall of Bhutan for Apr-Jun, 2015

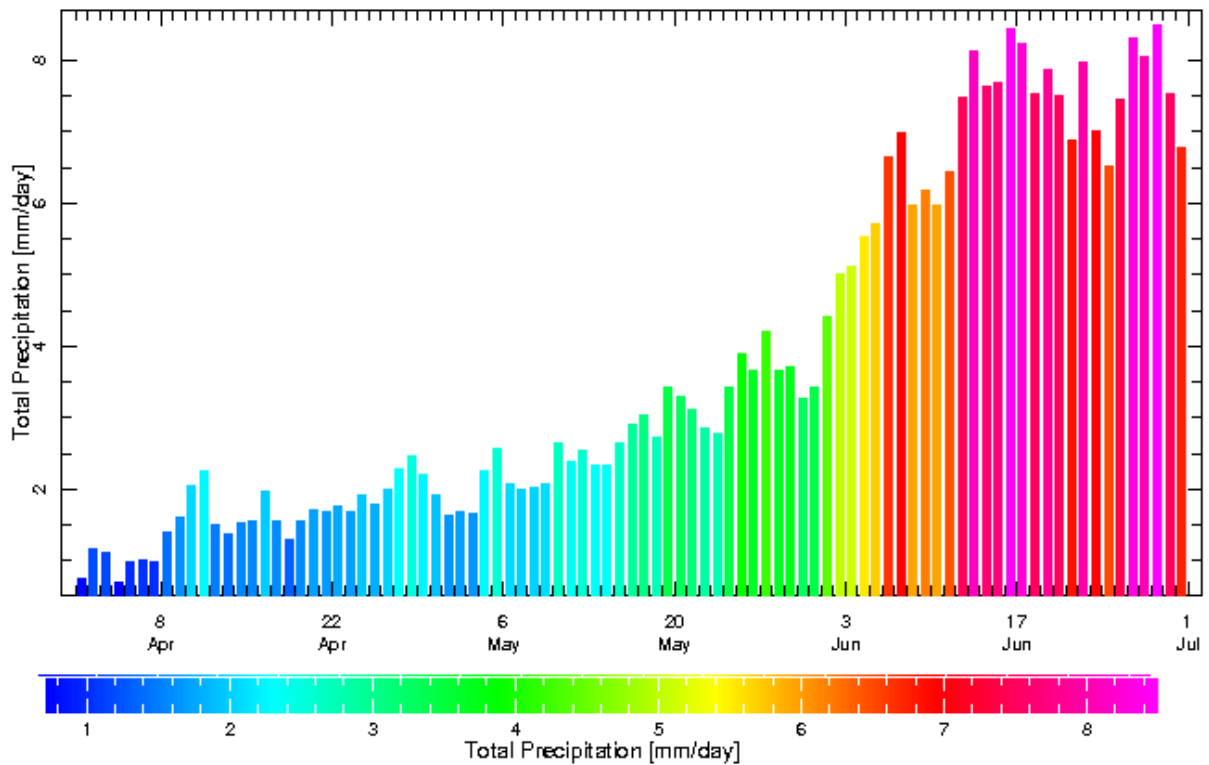


Daily expected Rainfall of India for Apr-Jun, 2015

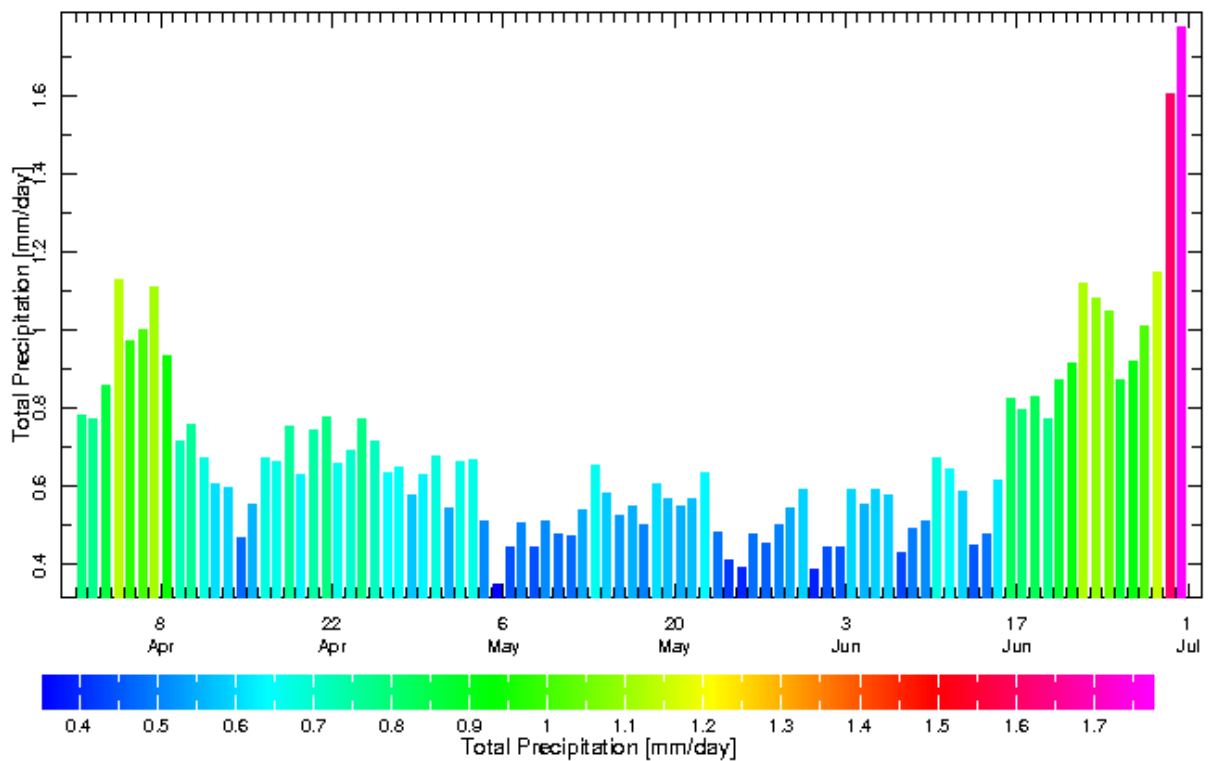


## Seasonal weather outlook (Apr-Jun, 2015)

Daily expected Rainfall of Nepal for Apr-Jun, 2015

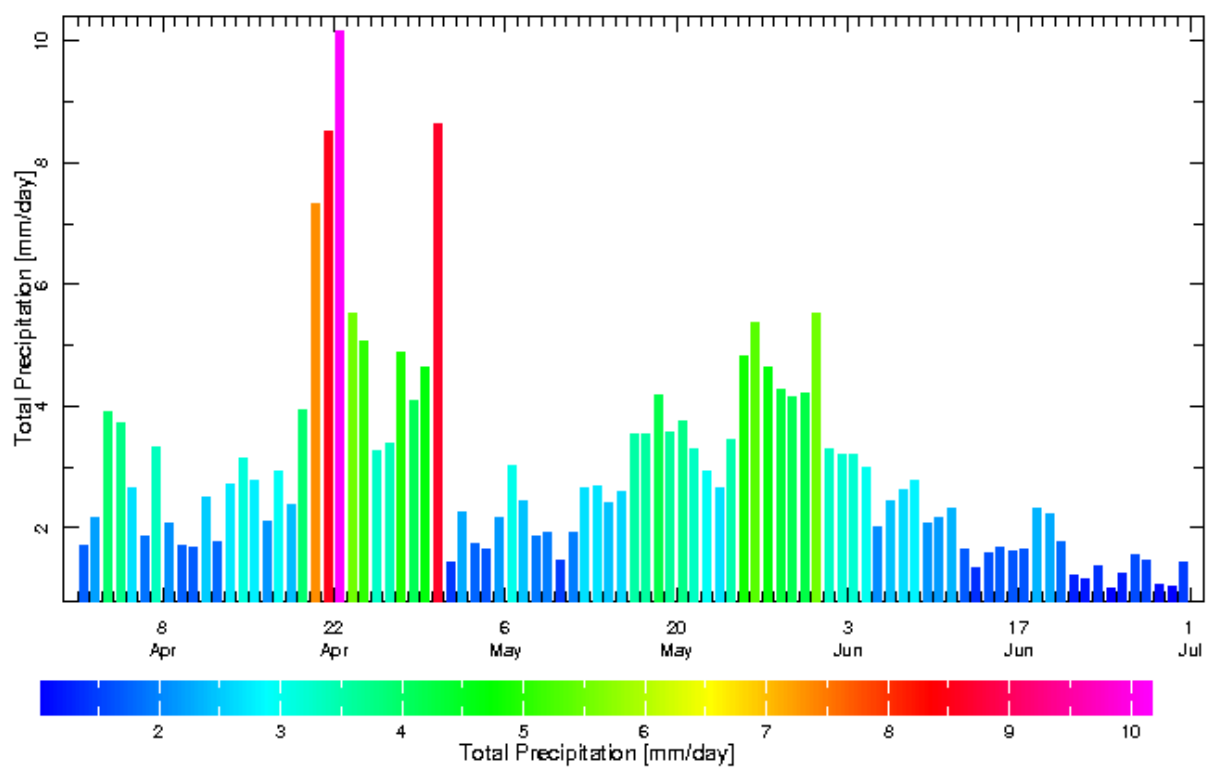


Daily expected Rainfall of Pakistan for Apr-Jun, 2015

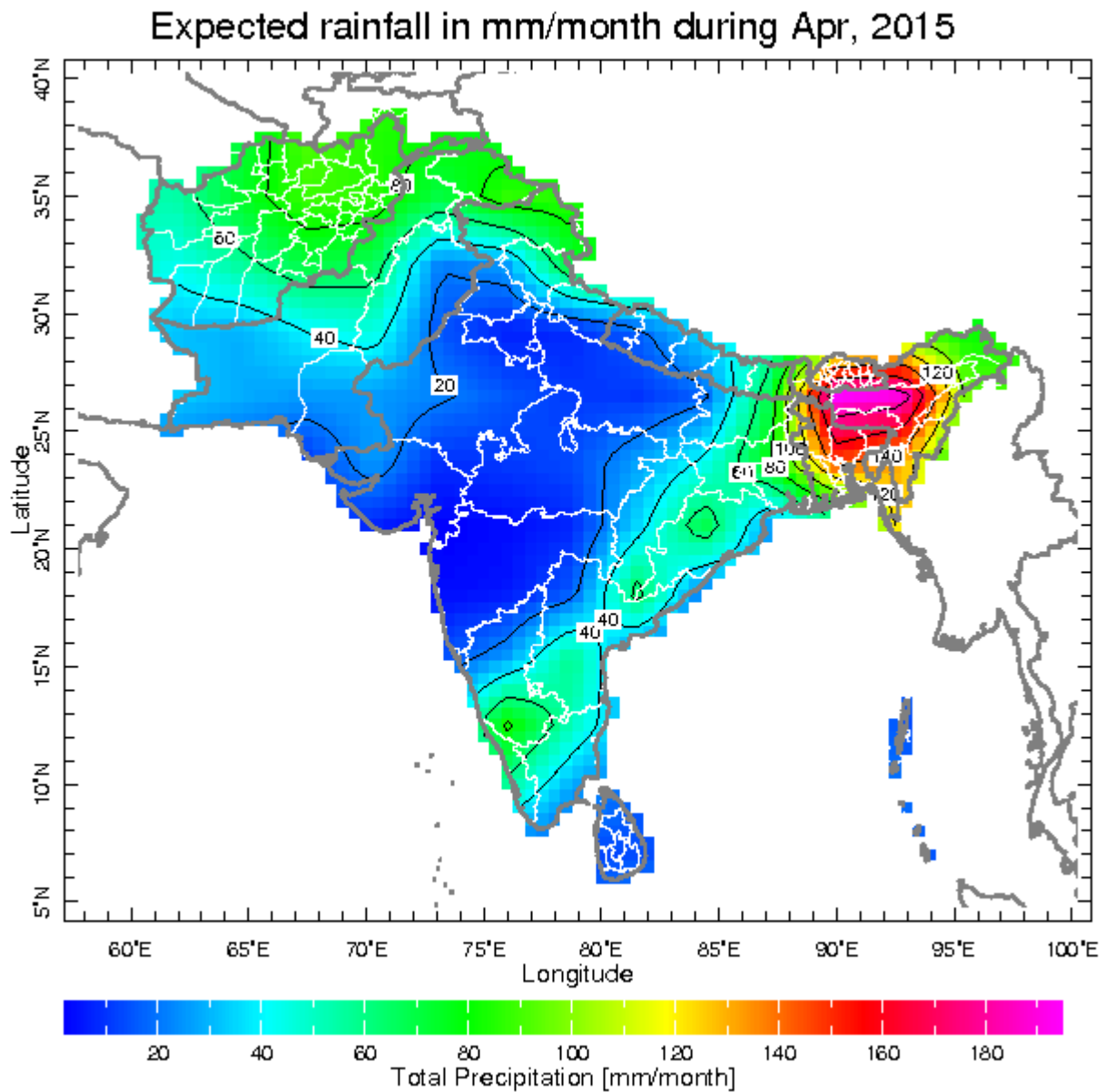


## Seasonal weather outlook (Apr-Jun, 2015)

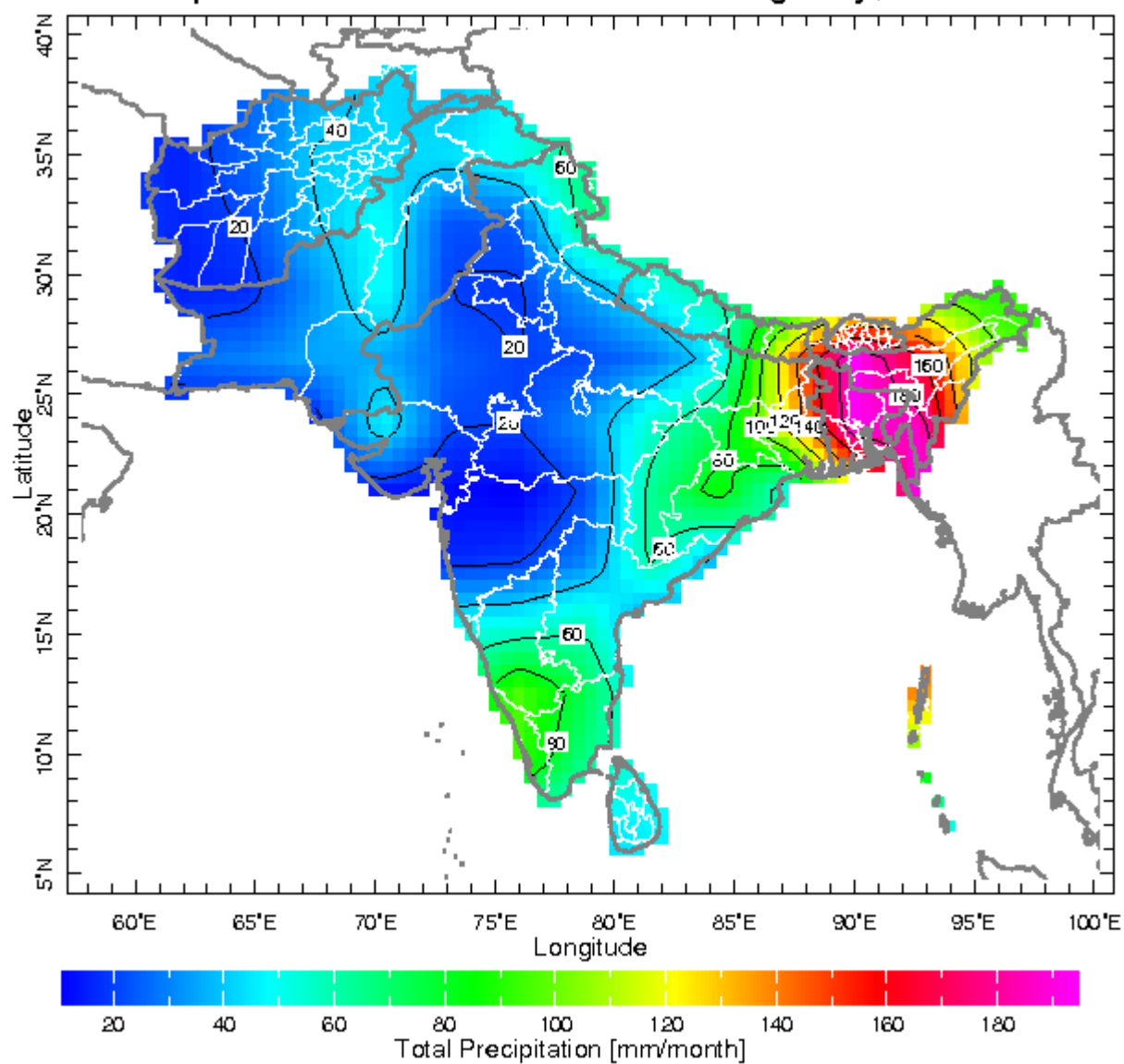
Daily expected Rainfall of Sri Lanka for Apr-Jun, 2015



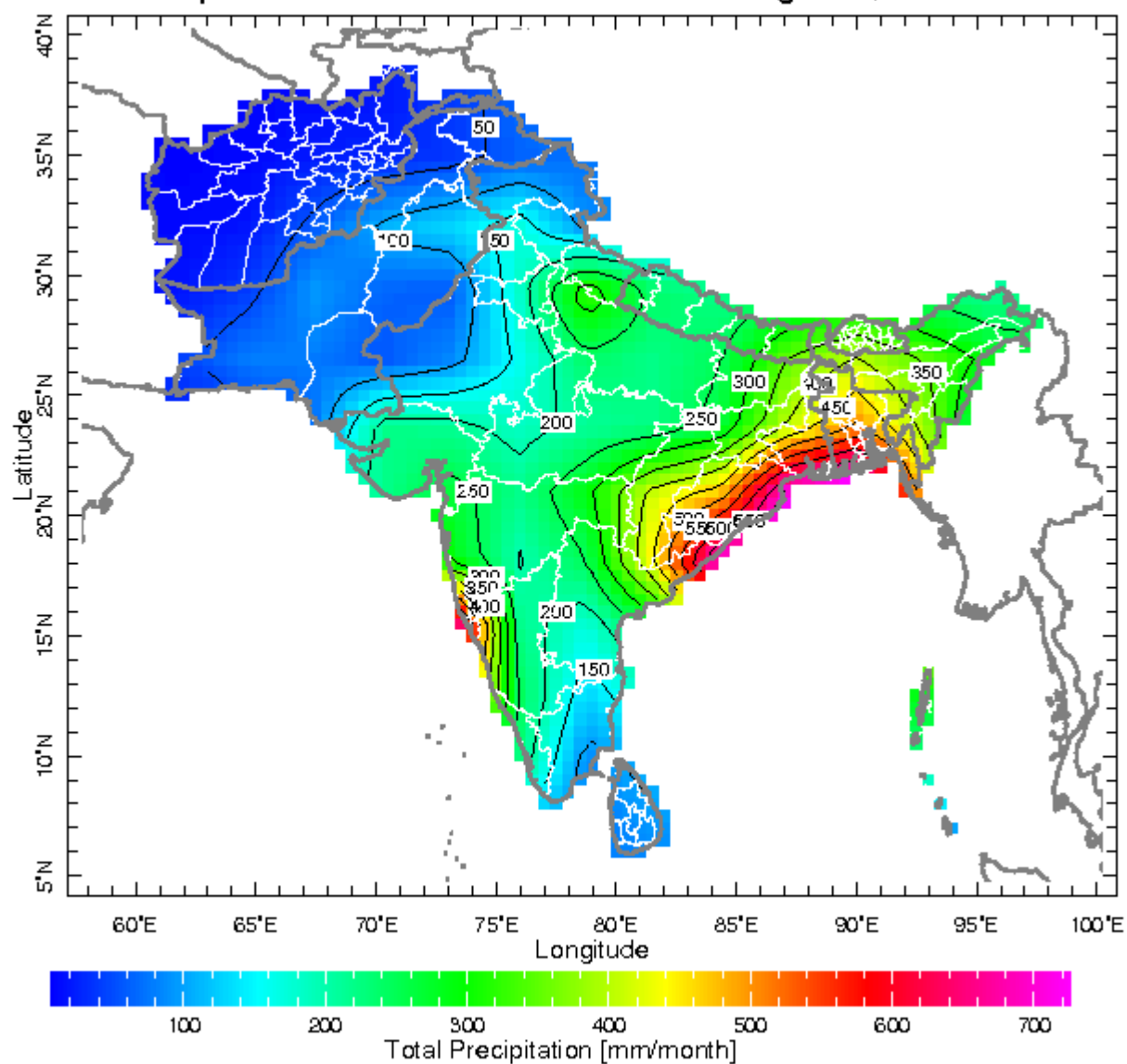
**6. Spatial distribution of expected precipitation during coming season (GCM-ECHAM)**

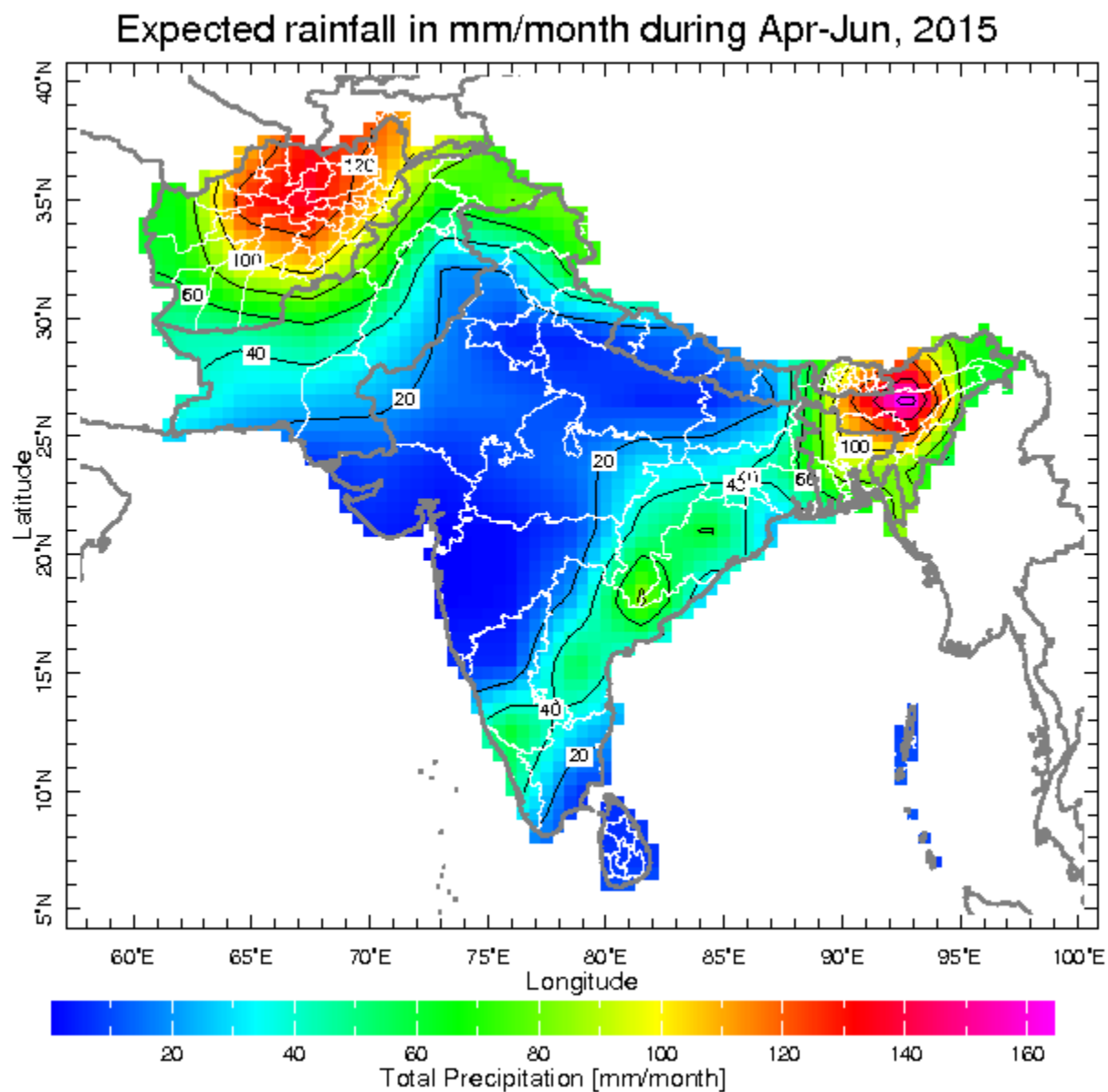


Expected rainfall in mm/month during May, 2015



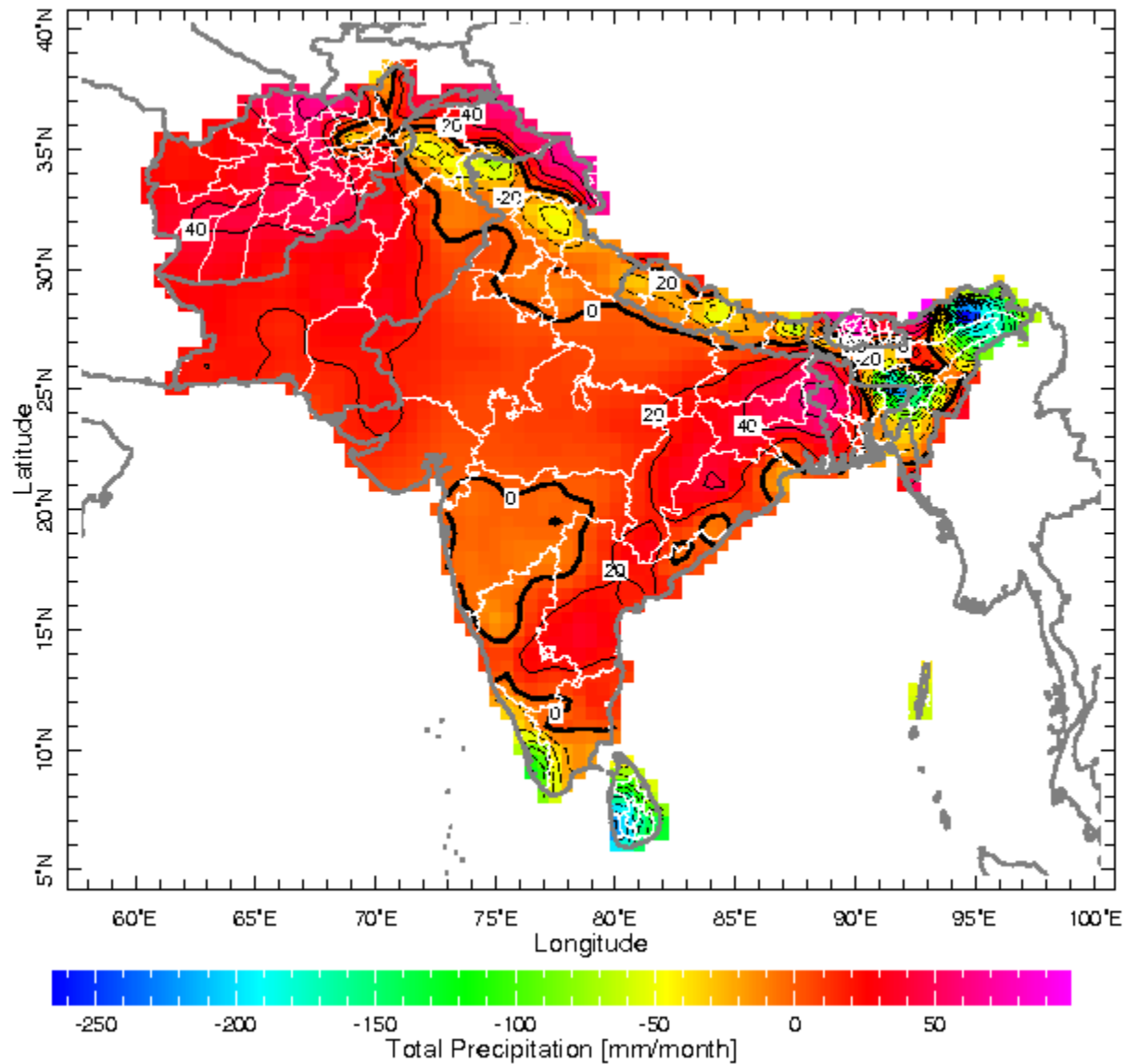
Expected rainfall in mm/month during Jun, 2015





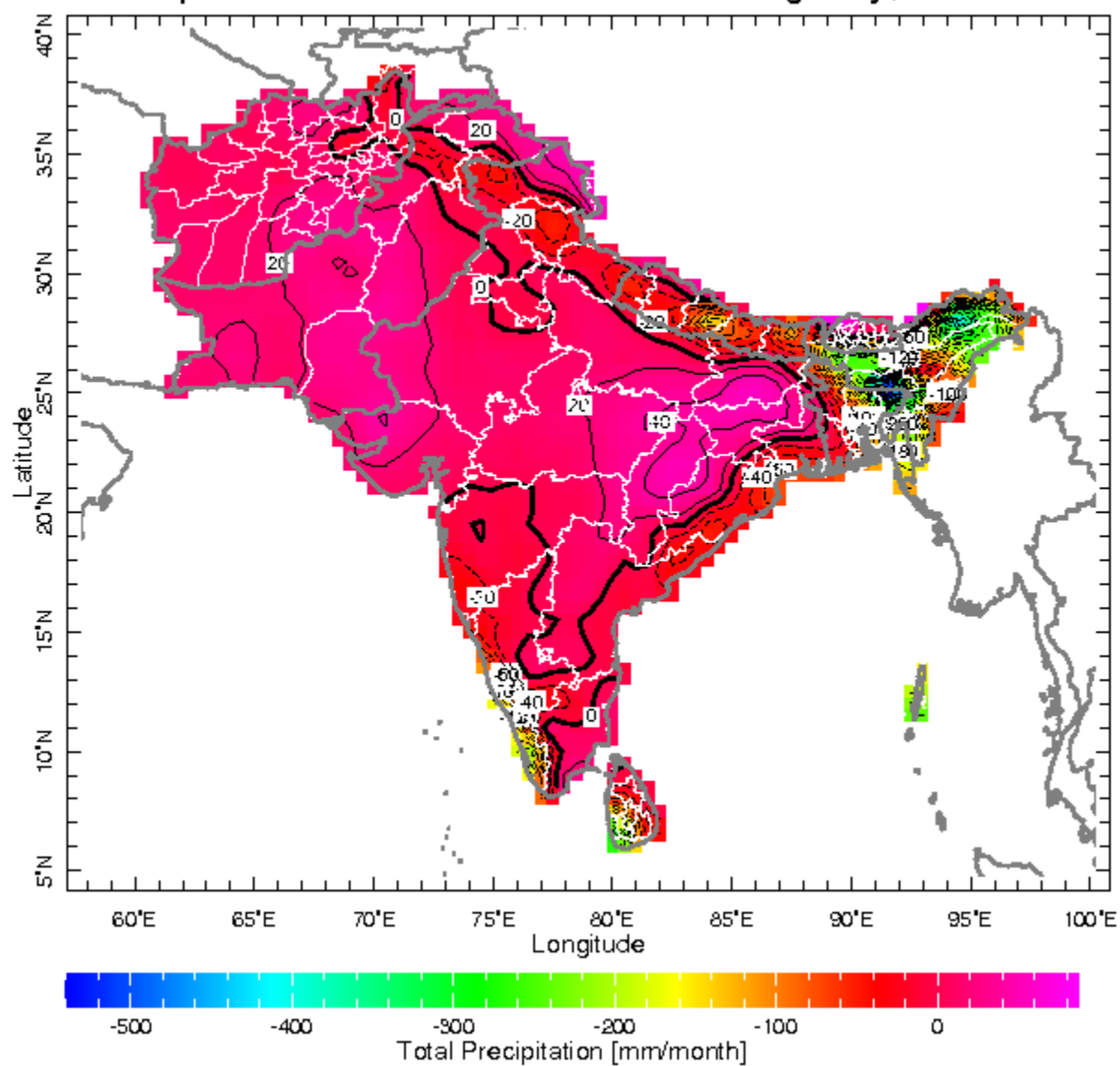
**7. Monthly departure from normal (precipitation) during coming season**

**Departure of rainfall from normal during Apr, 2015**

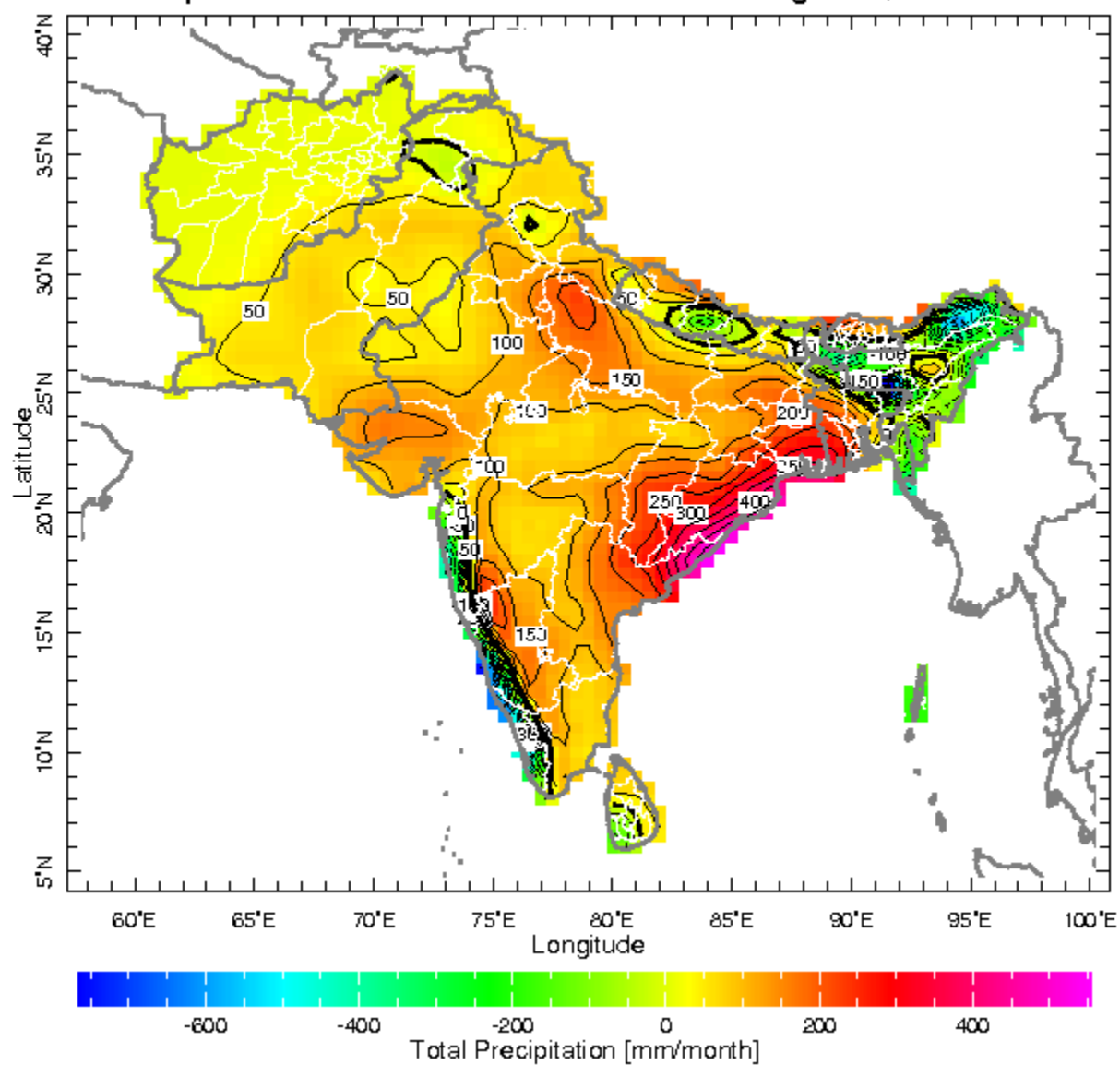


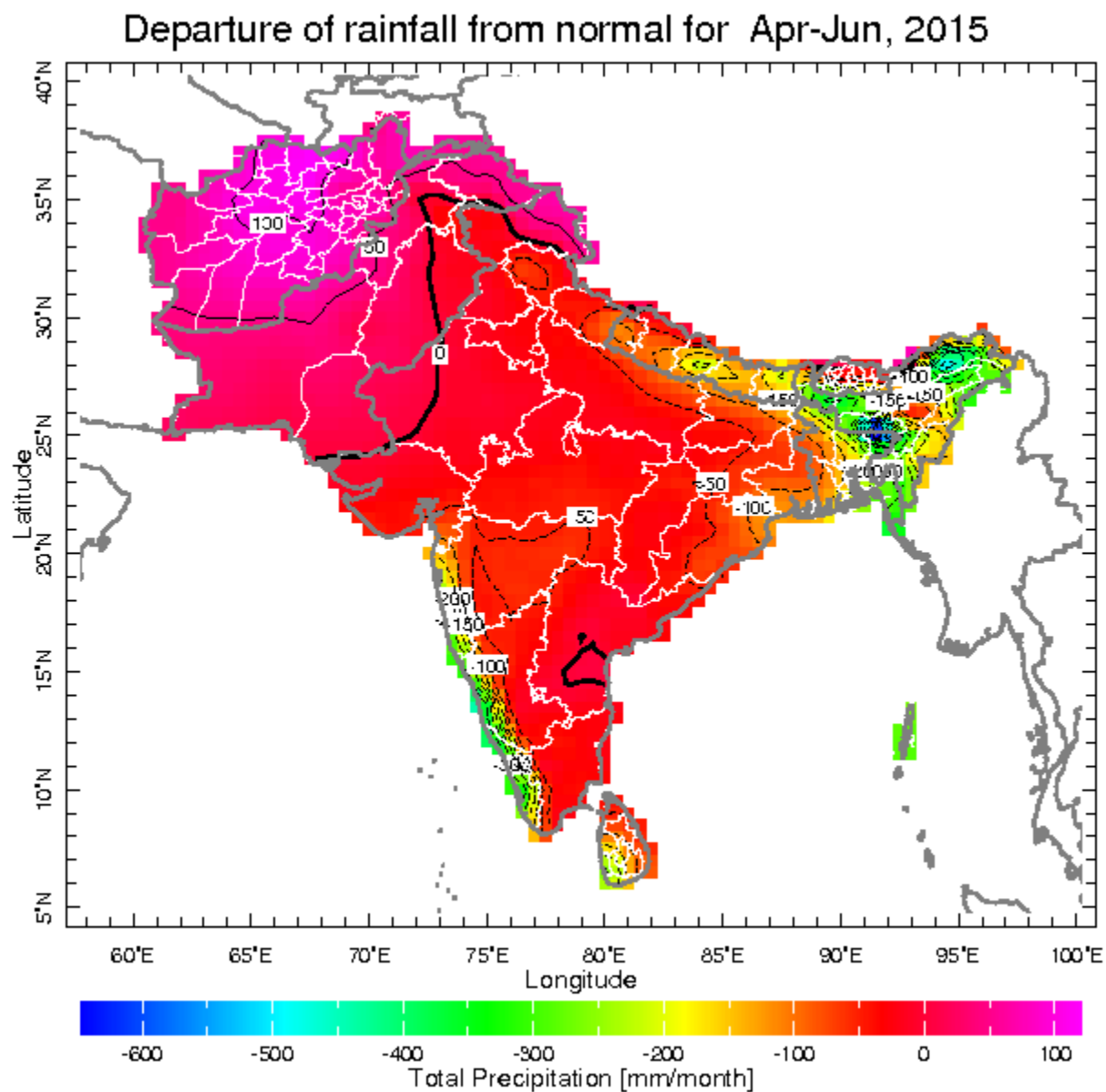


Departure of rainfall from normal during May, 2015

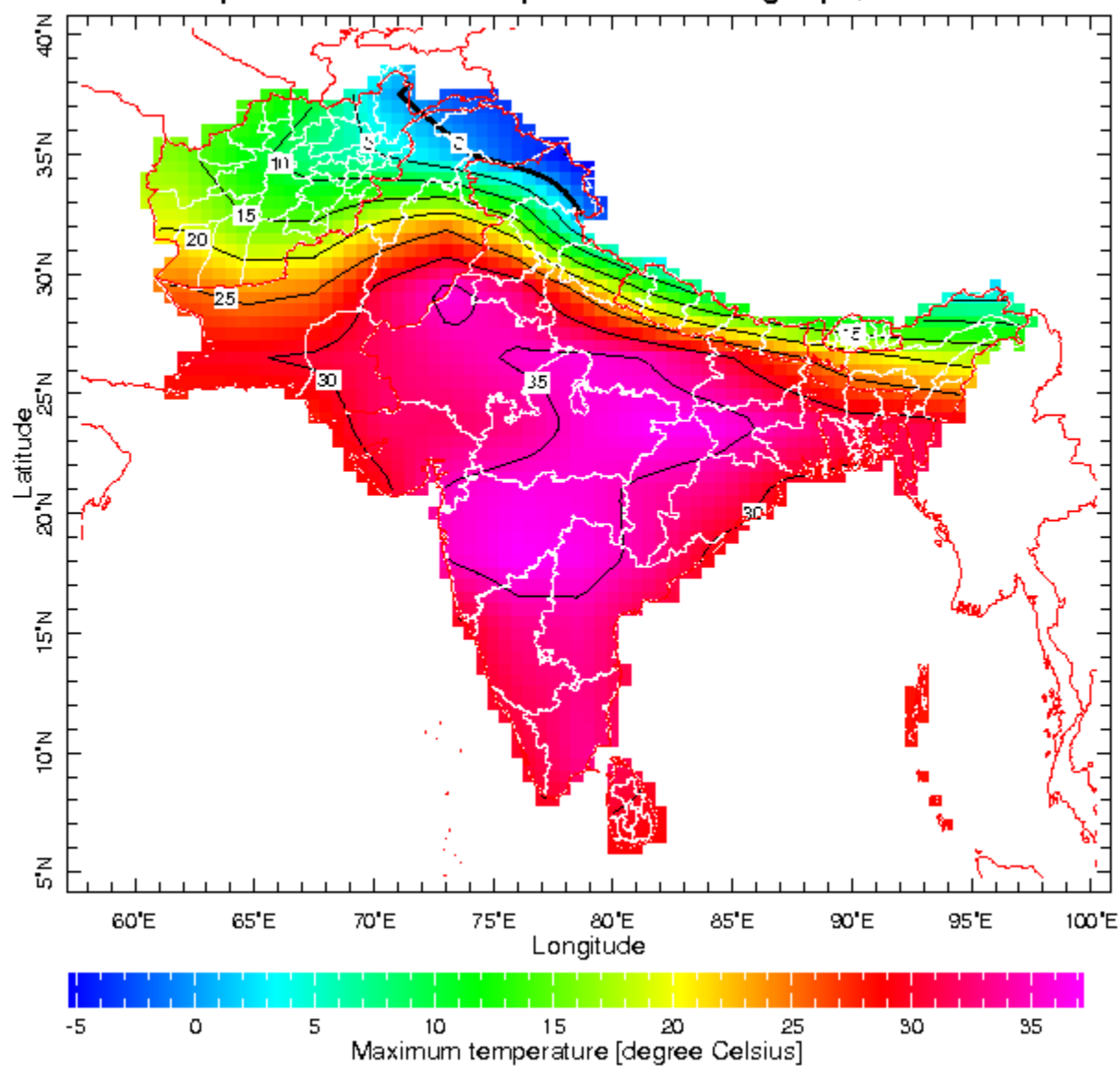


Departure of rainfall from normal during Jun, 2015

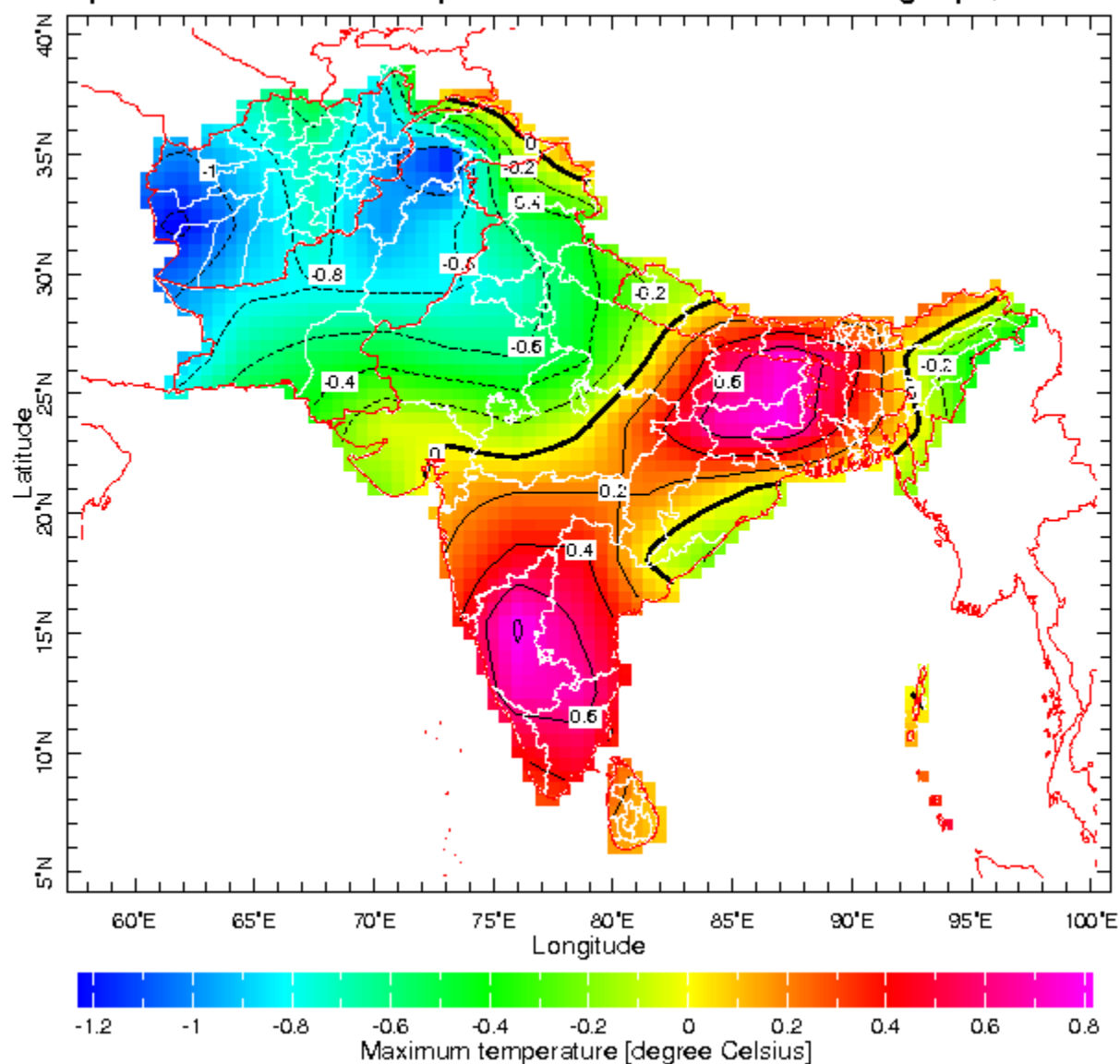




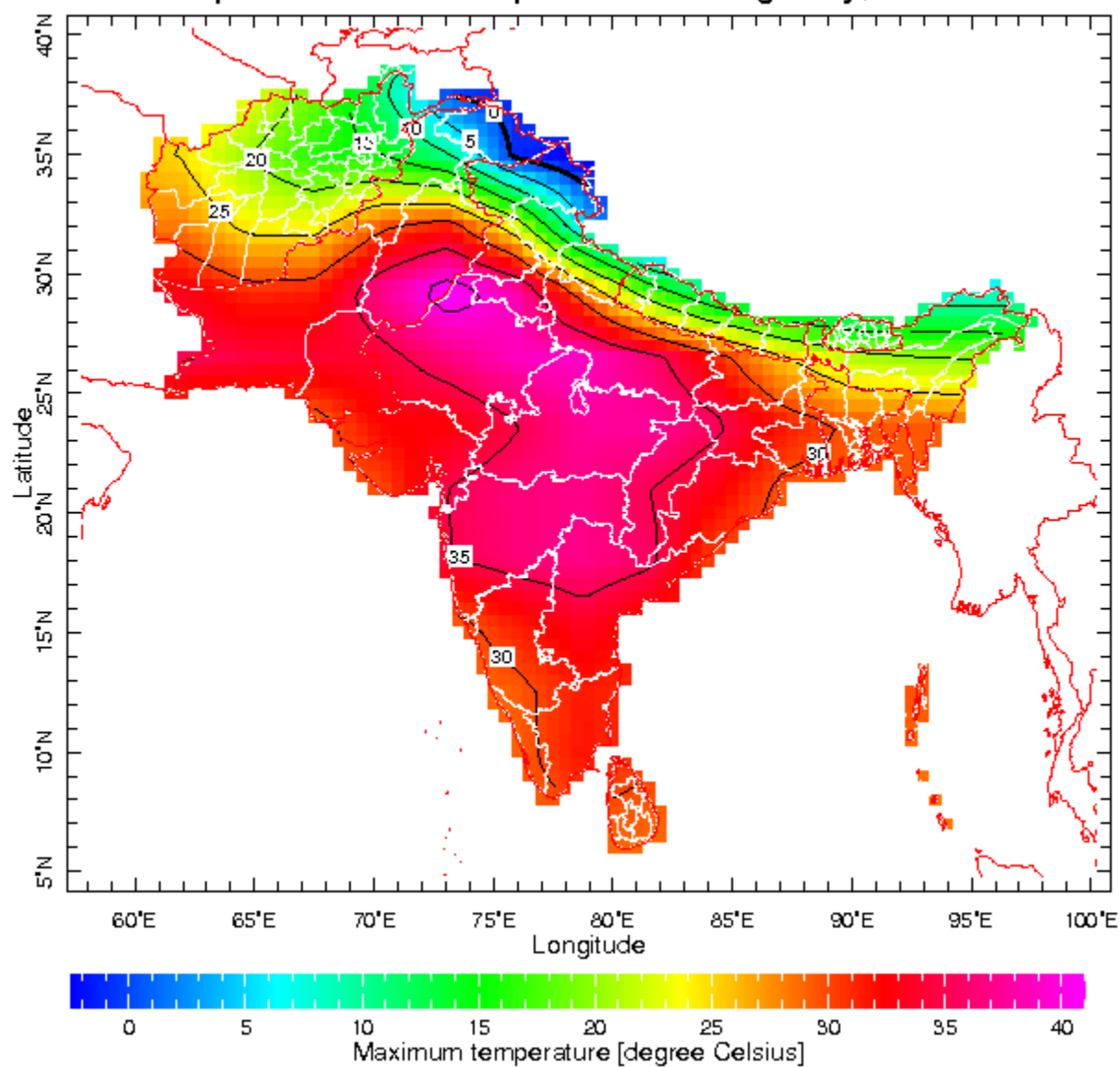
Expected Max. Temperature during Apr,2015



Departure of Max. Temperature from normal during Apr, 2015

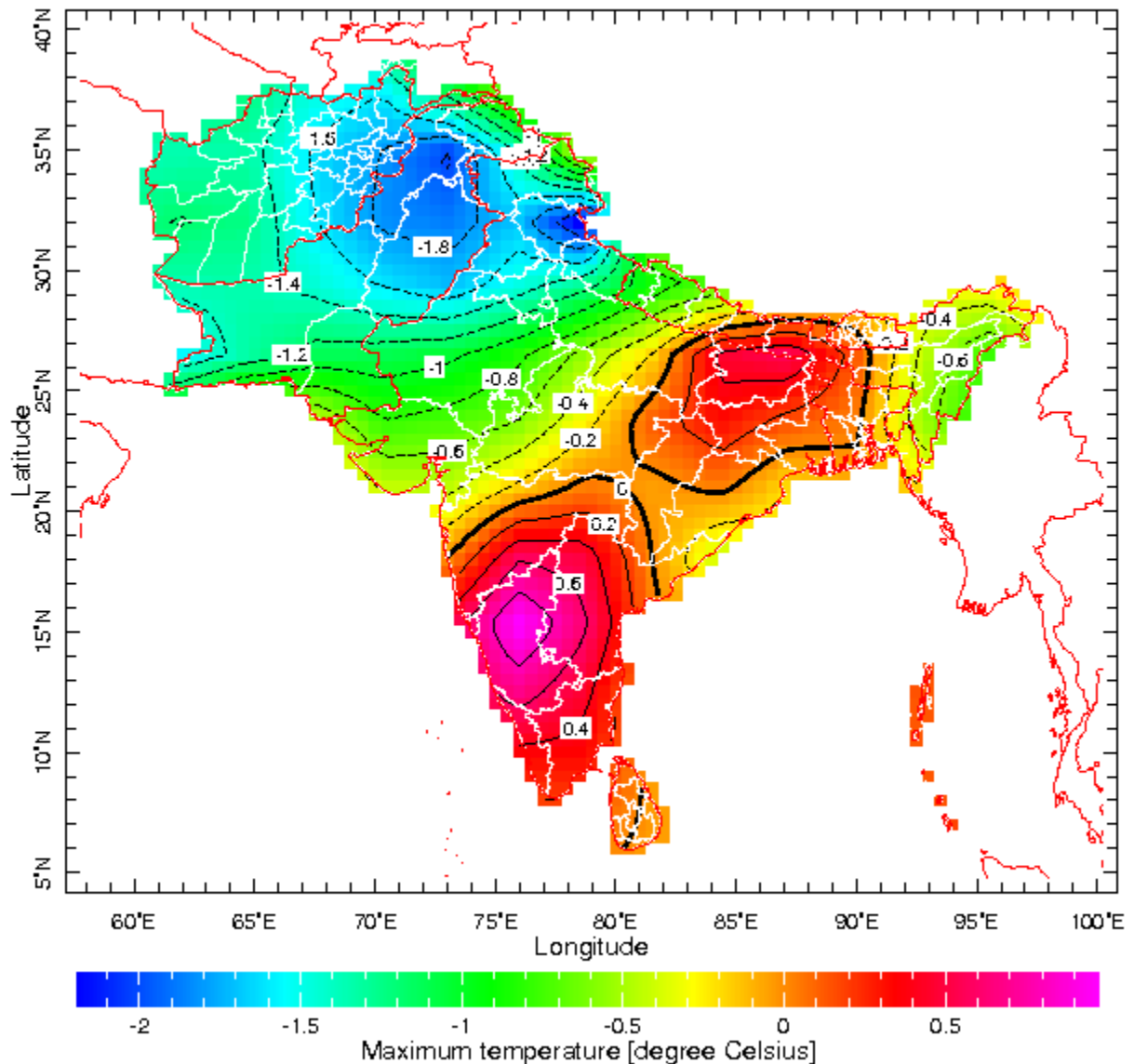


Expected Max. Temperature during May, 2015



## Seasonal weather outlook (Apr-Jun, 2015)

Departure of Max. Temperature from normal during May, 2015



*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 10<sup>th</sup> 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/>*