

Seasonal weather outlook for SAARC region

(Jul-Sep, 2014)

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Issued by:

Dr. Khalid M Malik (Director)

**NATIONAL AGROMET CENTRE (NAMC)
PAKISTAN METEOROLOGICAL DEPARTMENT
SECTOR H-8/2, ISLAMABAD**

Phone: [+92-51-9250592](tel:+92-51-9250592) Email: dirnamc@yahoo.com
<http://namc.pmd.gov.pk/>

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 Jul 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 slightly higher than normal intensity over north. Most of the region including Pakistan, western Nepal and northern parts of India may prevail slightly above normal zonal winds at 200 hPa.
- A trough at 500 hPa is expected to be over west of the country. However a strong ridge may prevail over the country during the season which causes to reduce influence of monsoon over the country.
- Surface temperatures are expected to be on higher side than normal all over the country with higher values over central parts.. However, northern and southern parts may prevail normal surface temperature.
- North Atlantic Oscillation (NAO) is in negative phase (-0.97) during Jun. 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>
- The SST anomaly in the Nino3.4 region in recent weeks has been near the borderline of neutral and El Nino during the mid-May to mid-June period, 2014. For May the Nino3.4 SST anomaly was 0.45 C, indicative of neutral conditions but very close to the borderline of El Nino, and for Mar-May it was 0.16 C. It is predicted that for likelihood for a transition from neutral ENSO conditions to El Niño conditions during summer 2014, with probabilities of El Niño rising to 70% by Jun-Aug 2014, and to approximately 80% by northern autumn 2014. The latest set of model ENSO predictions, from mid-June. For all model types, the probability for neutral ENSO conditions is below 25% between Aug-Oct 2014 and Jan-Mar 2015, being between 30% and 39% during Jun-Aug and Jul-Sep, and again at the end of the forecast period in Feb-Apr 2015. Probabilities for El Niño rise to more than 75% during the very same times, Aug-Oct 2014 to Jan-Mar 2015. Probabilities for El Niño fall to about 60% by Feb-Apr 2015. No model predicts La Niña conditions for any of the 3-month periods between Jun-Aug 2014 and Feb-Apr 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)

Probability outlook: La Nina (1%), Neutral (26%) and El Nino (73 %) during May-Jun-Jul, 2014 season

- Arabian Sea Surface Temperatures are expected to be slightly above 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

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

Synthesis of the latest model forecasts for Jul-Sep 2014 (JAS), current synoptic situation and regional weather expert's judgment indicates that average precipitation is expected during the predicted season. Above normal maximum temperature will persist over central and western states of India, Pakistan and Nepal during July. The day temperature will be on higher than normal over central and southern parts of Pakistan (Sindh and southern Punjab), western and eastern states of India (Rajasthan, Asam). However, day temperature will be below normal over southern states of India (Karnataka, Andhra Pradesh)

Seasonal weather outlook (Jul-Sep, 2014):

As a whole, average precipitation is likely to all over the region during the predicted season with extremely above average during September. Below average precipitation is expected over Pakistan, India, Nepal, Bhutan and Bangladesh, average over Afghanistan and above normal over Sri Lanka.

Nepal, southern Bangladesh, northeastern parts of Pakistan and northern eastern states of India will receive good rain during the season. Central and eastern states of India, Nepal, Bhutan, northern districts of Bangladesh and northeastern Pakistan will receive significantly below average rainfall.

Chances of drought in western Pakistan are likely to dominate during predicted months.

July, 2014: Average rainfall is expected in SAARC member countries as a whole with extremely below average over Bhutan and Pakistan, below average over Afghanistan, Bangladesh and Nepal, and average over India and Sri Lanka. Rainy spells will be focused over Orissa, Jharkhand, Kerala and Karnataka states of India, Southern districts of Bangladesh. Bhutan, eastern parts of Nepal, Manipur, Nagaland and Mizoram of India state will receive below normal rainfall, whereas, Orissa state will receive above normal rainfall during predicted month of July. Rest of the region will receive average rainfall.

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

August, 2014: Average rainfall is expected during August all over SAARC region. Extremely below average rainfall is expected over Pakistan and Nepal, below average over India, Bangladesh and Bhutan, above average over Afghanistan, and extremely above average over Sri Lanka. Intensity of precipitation will be higher over Indian states of Maharashtra, Karnataka,

Seasonal weather outlook (Jul-Sep, 2014)

Orissa, west Bengal and southern parts of Bangladesh and Northeastern parts of Pakistan. Above normal rainfall is expected over Sri Lanka, southern districts of Bangladesh, Uttar Pradesh, Karnataka, Andhra Pradesh and Orissa of India while below normal over northeastern parts of India Nepal and Bhutan. Rest of the region will receive normal rainfall during the month.

Day temperature will be above normal over upper region of domain with maximum ($> 4^{\circ}\text{C}$) over central Pakistan including Rajasthan of India. However, lower region of the domain will be on below normal day temperature.

September, 2014: Extremely above average rainfall is expected during August all over SAARC region with extremely below average over India (-63%), below over Nepal (-23%), average over Pakistan (2%) and Bhutan (-12%), and above average over Bangladesh (16%) and Sri Lanka (39%) and Afghanistan (+66%). High intensity precipitation is expected over monsoon pron areas of all the countries. All the states of India except western states, Southern districts of Bangladesh, Sri Lanka and Bhutan will receive above normal rainfall during August.

Monsoon 2014 Prediction (July-August, 2014):

Current synoptic situation and its variation indicate uneven distribution of rainfall over monsoonal pron areas due to variations in sea surface temperatures of Arabian and Atlantic Oceans.

Afghanistan: July is likely to be less rain and 2-3 good rainy spell are expected during August in the country.

Bangladesh: Good rainy spells are expected in July and September, however August will be less rainy days.

Bhutan: Good rainy spells are expected in last week of July. Three to four rainy spells with higher intensity rainfall are expected during second and third week of August. Moderate rainy spell is also expected during first decade of September.

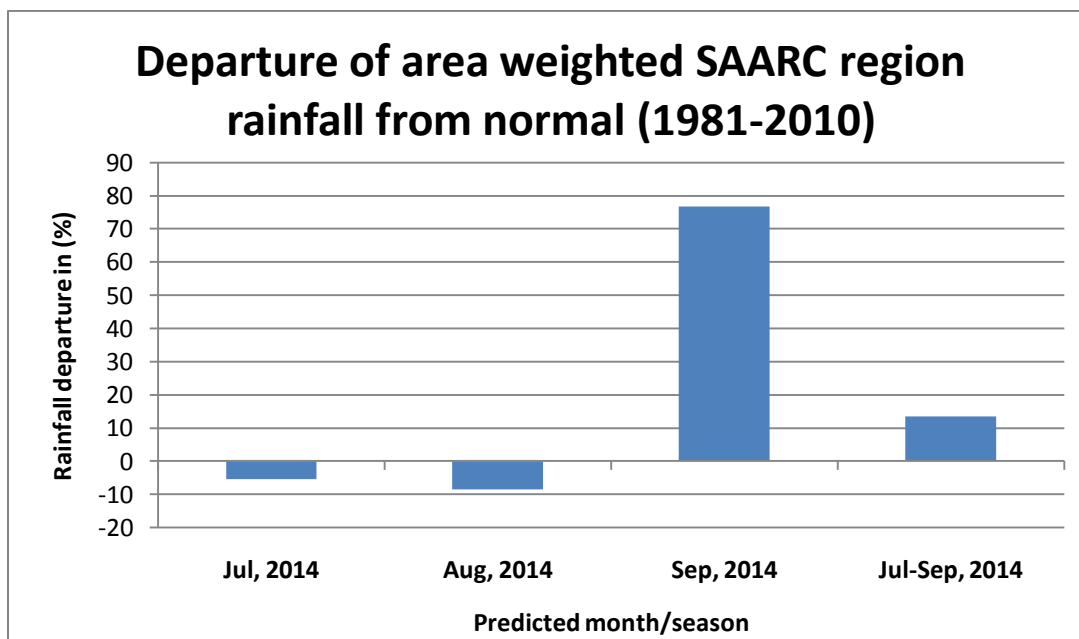
India: Maximum rainy spells are expected during July with higher intensity. Intensity of rainy spells will gradually decrease during August. Chances of flood in the country will be on higher side.

Nepal: Good rainy spells are expected from July to September with higher intensity except during third and fourth week of August

Pakistan: Good rainy spells with moderate intensity is expected during mid of July. However first decade of August will be wetter days. A chance of higher intensity rain is expected during first decade of August during current monsoon.

Seasonal weather outlook (Jul-Sep, 2014)

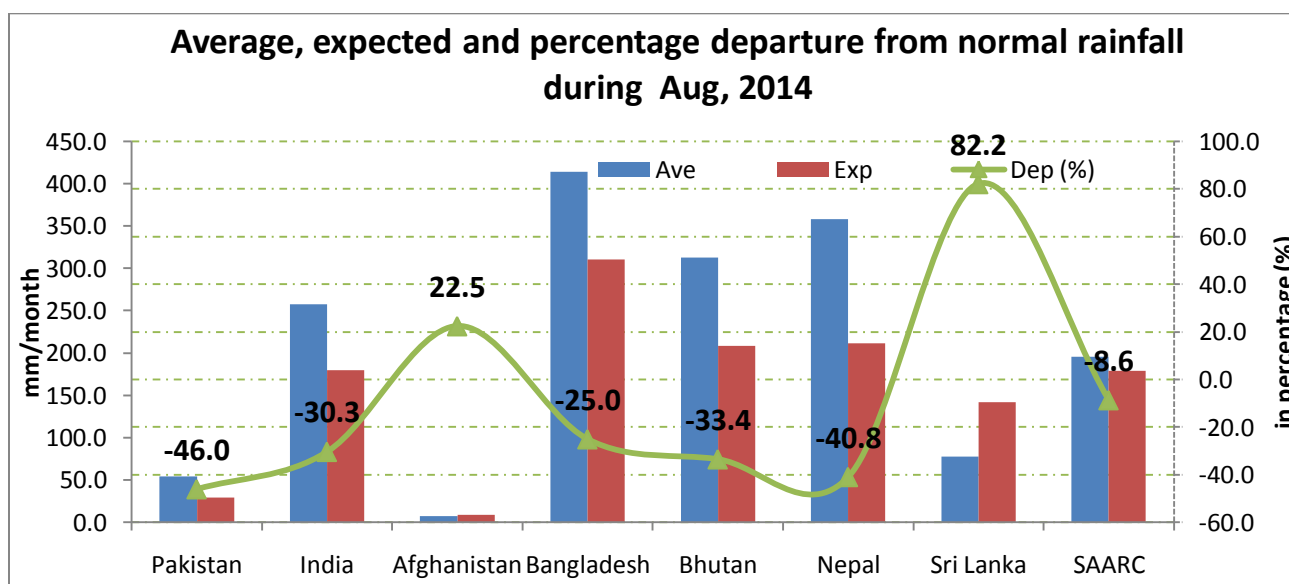
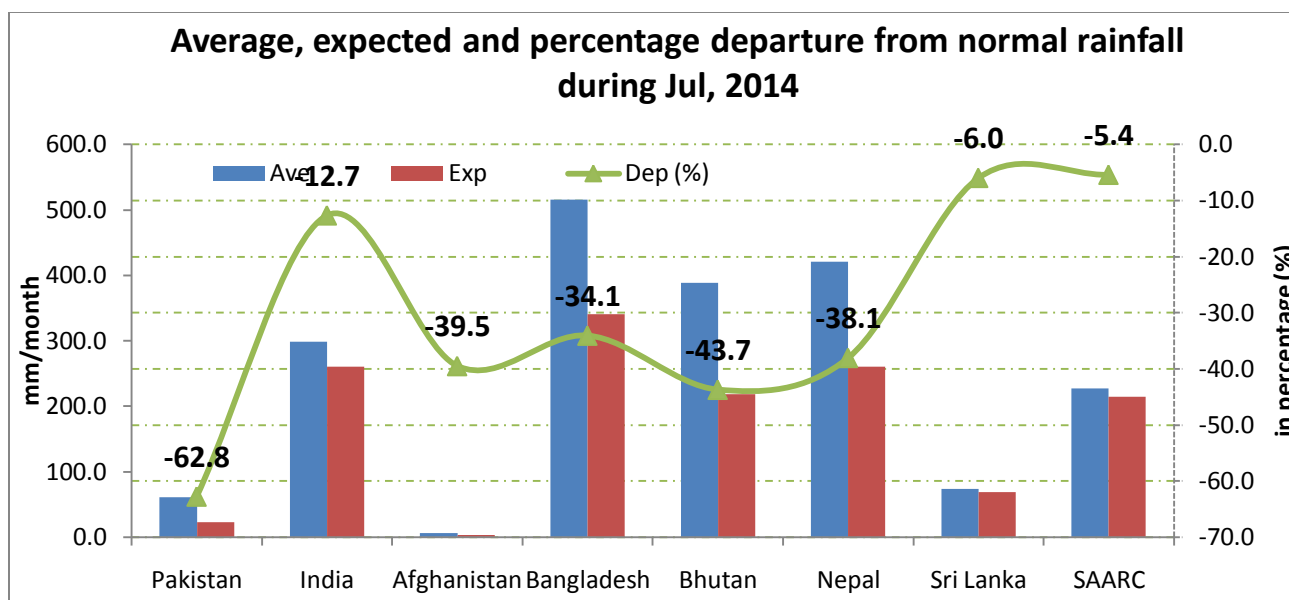
Sri Lanka: Less rainy spells are expected during July. However, rainy spell gradually increases from August and good rainy spells are expected during September.



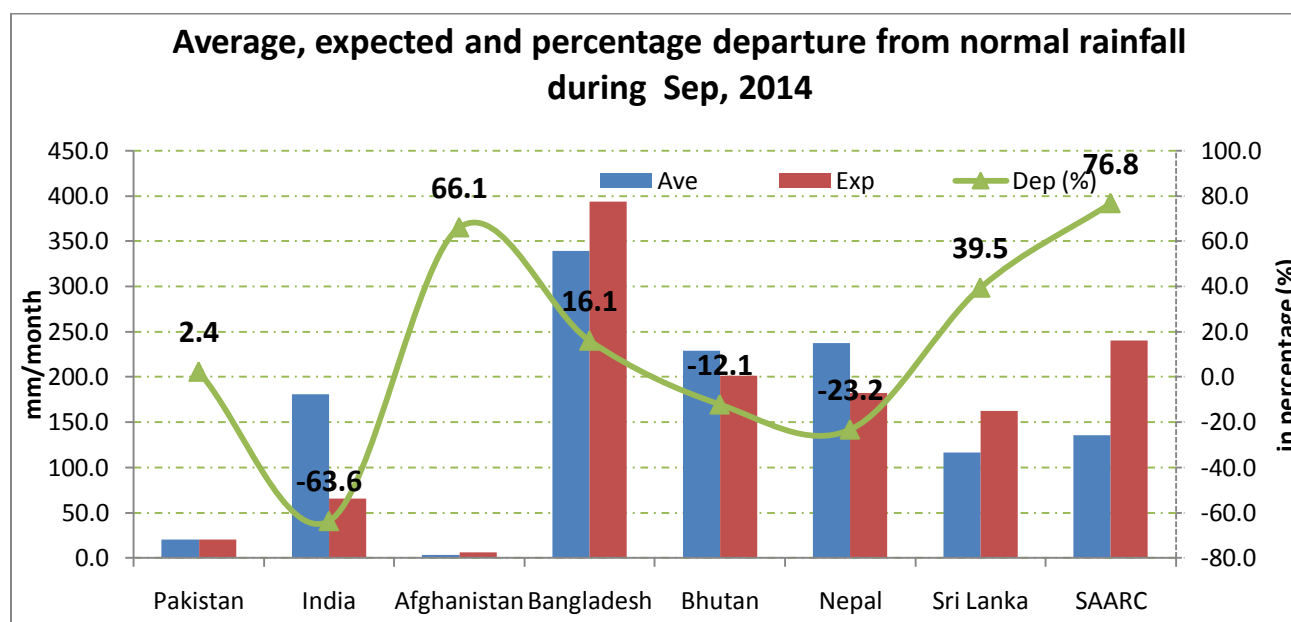
Note: Departure of Area-weighted rainfall of SAARC region has been computed by subtracting ECHAM predicted monthly/seasonally rainfall from GPCC of corresponding month/season.

Seasonal weather outlook (Jul-Sep, 2014)

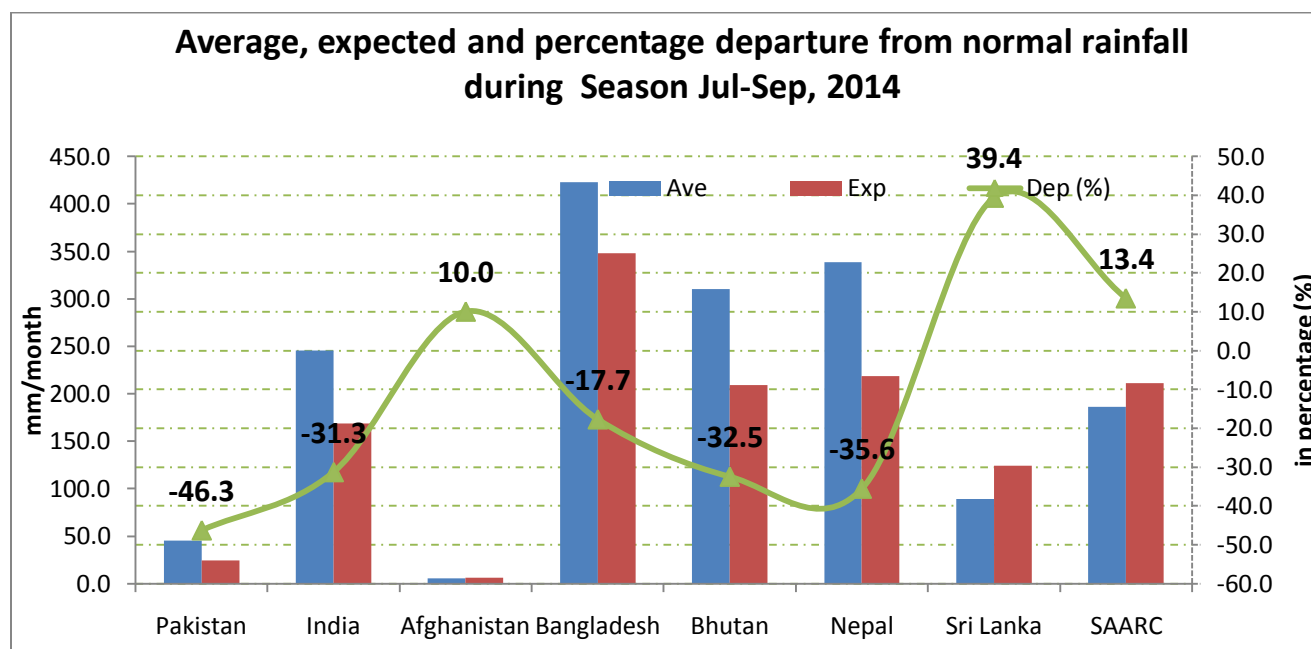
4. Country wise monthly and seasonal quantitative outlook along with departure of precipitation from normal



Seasonal weather outlook (Jul-Sep, 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.

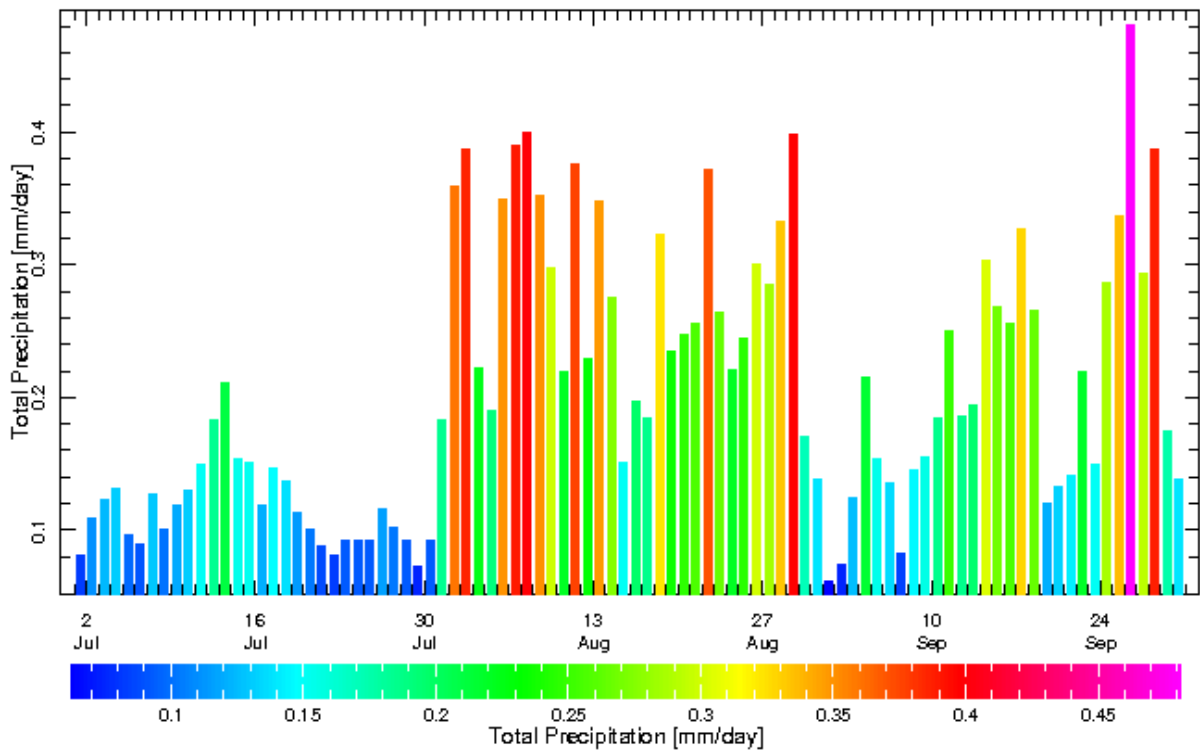


Seasonal weather outlook (Jul-Sep, 2014)

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

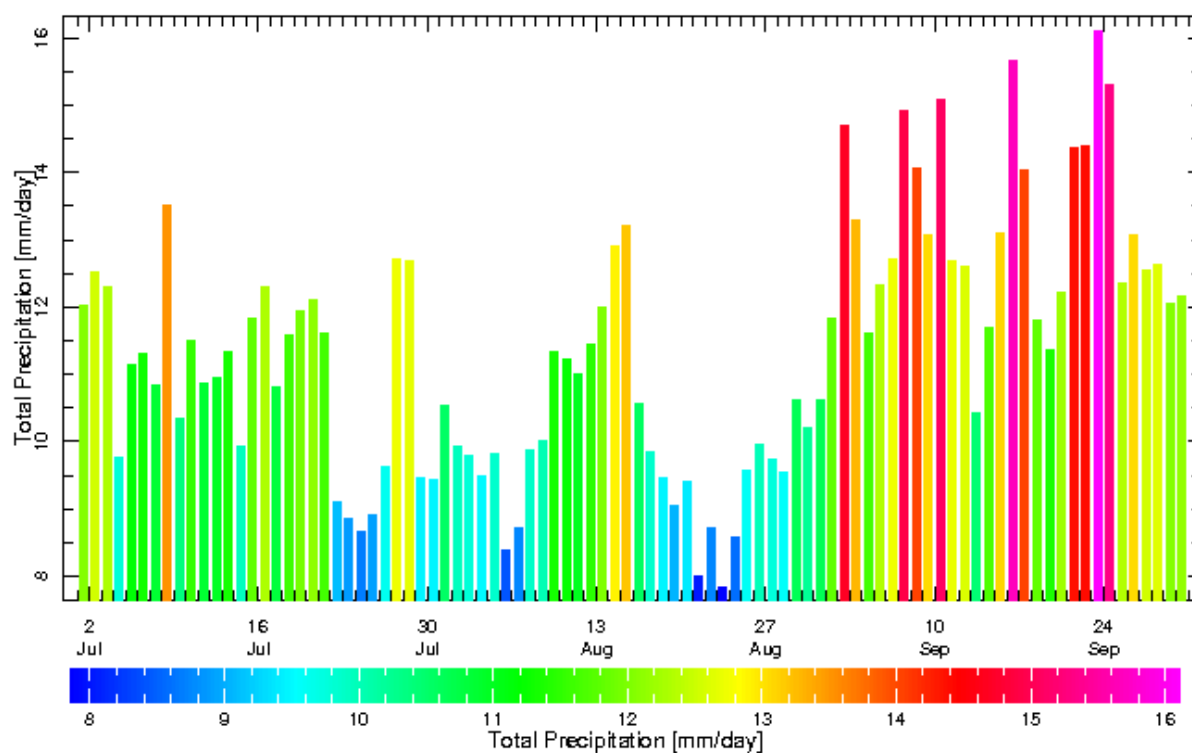
Note for daily weather prediction: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

Daily expected Rainfall of Afghanistan for Jul-Sep, 2014

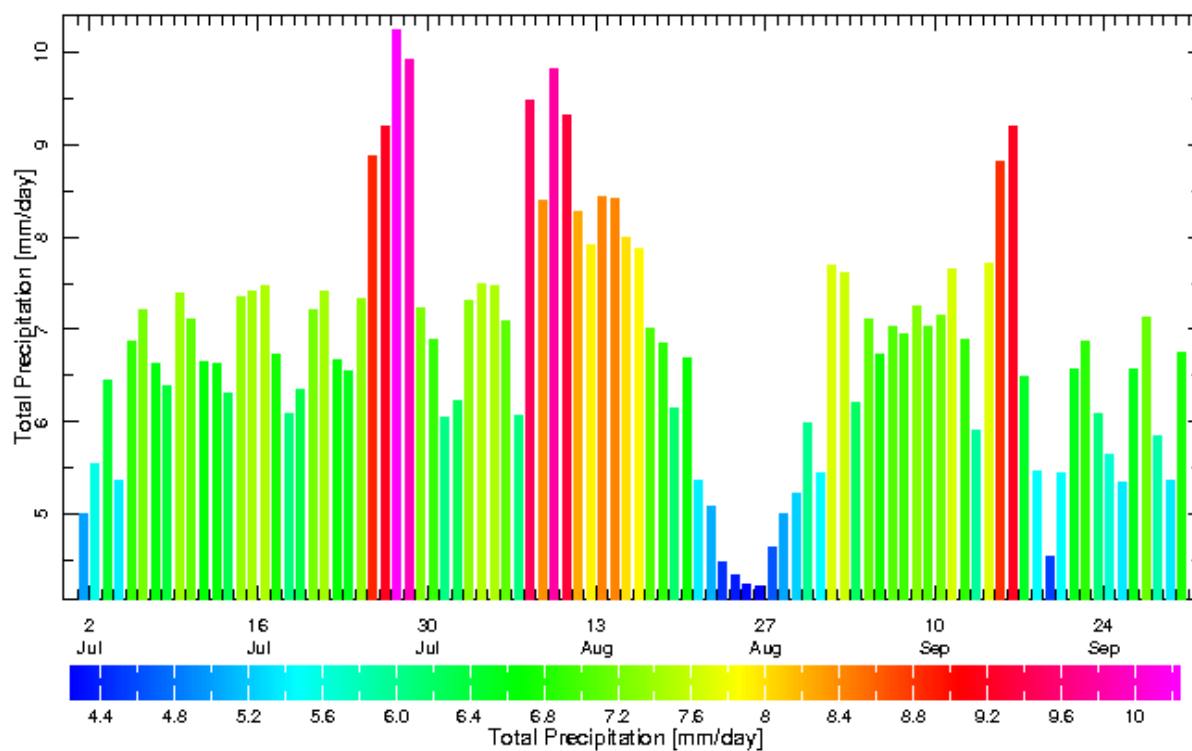


Seasonal weather outlook (Jul-Sep, 2014)

Daily expected Rainfall of Bangladesh for Jul-Sep, 2014

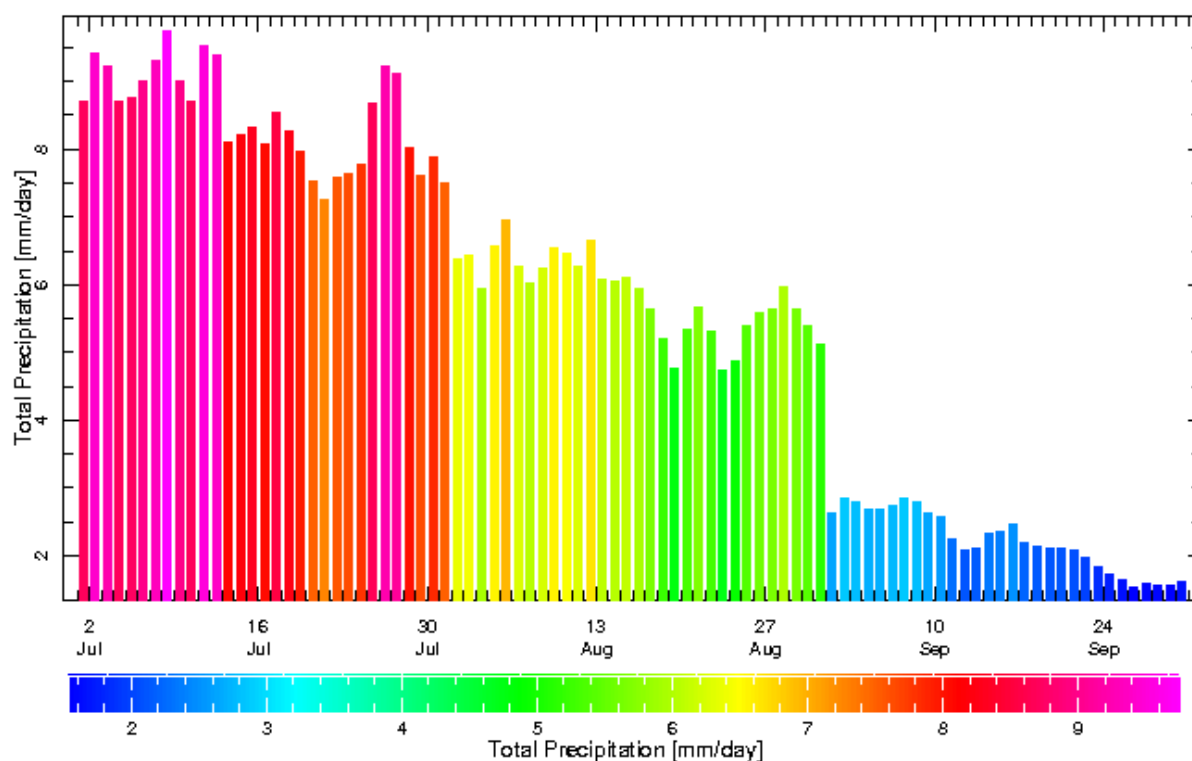


Daily expected Rainfall of Bhutan for Jul-Sep, 2014

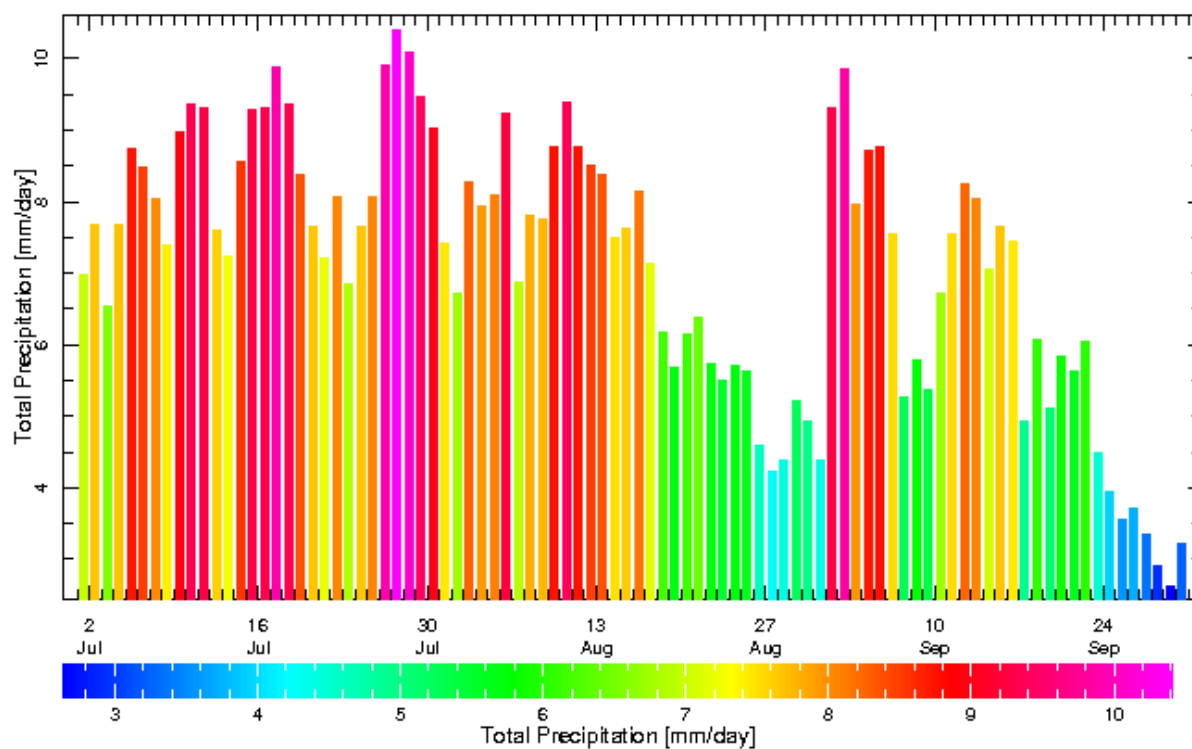


Seasonal weather outlook (Jul-Sep, 2014)

Daily expected Rainfall of India for Jul-Sep, 2014

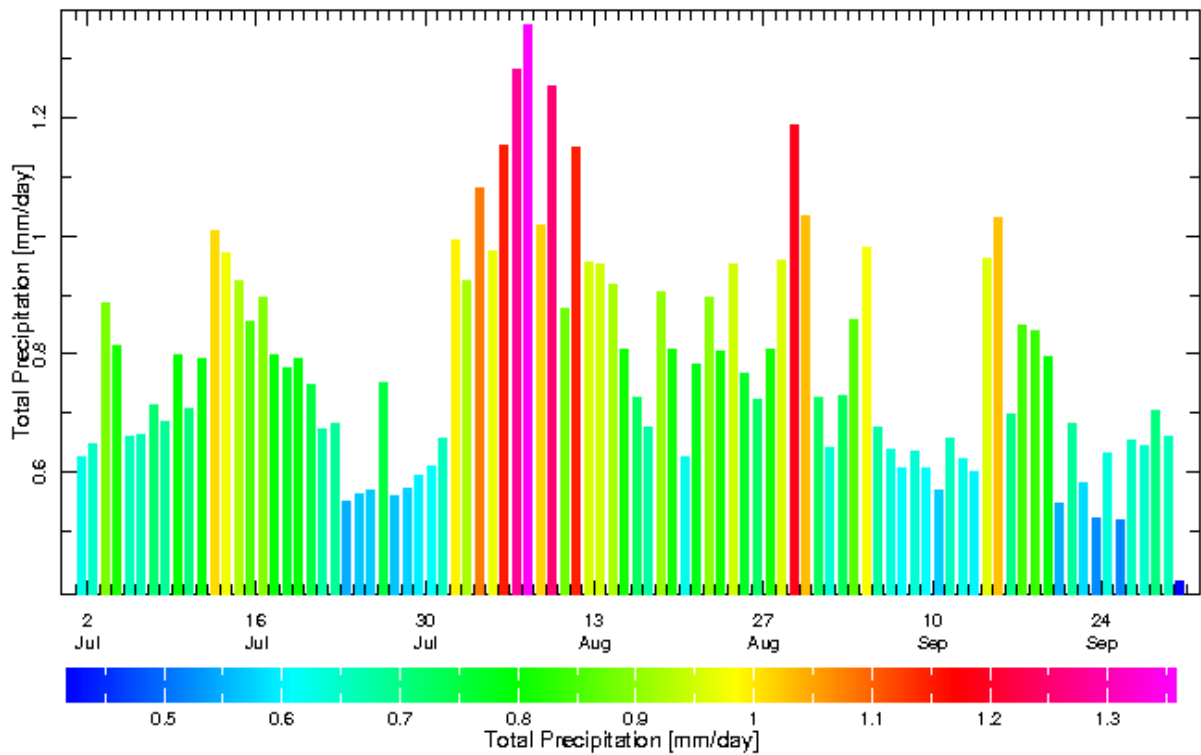


Daily expected Rainfall of Nepal for Jul-Sep, 2014

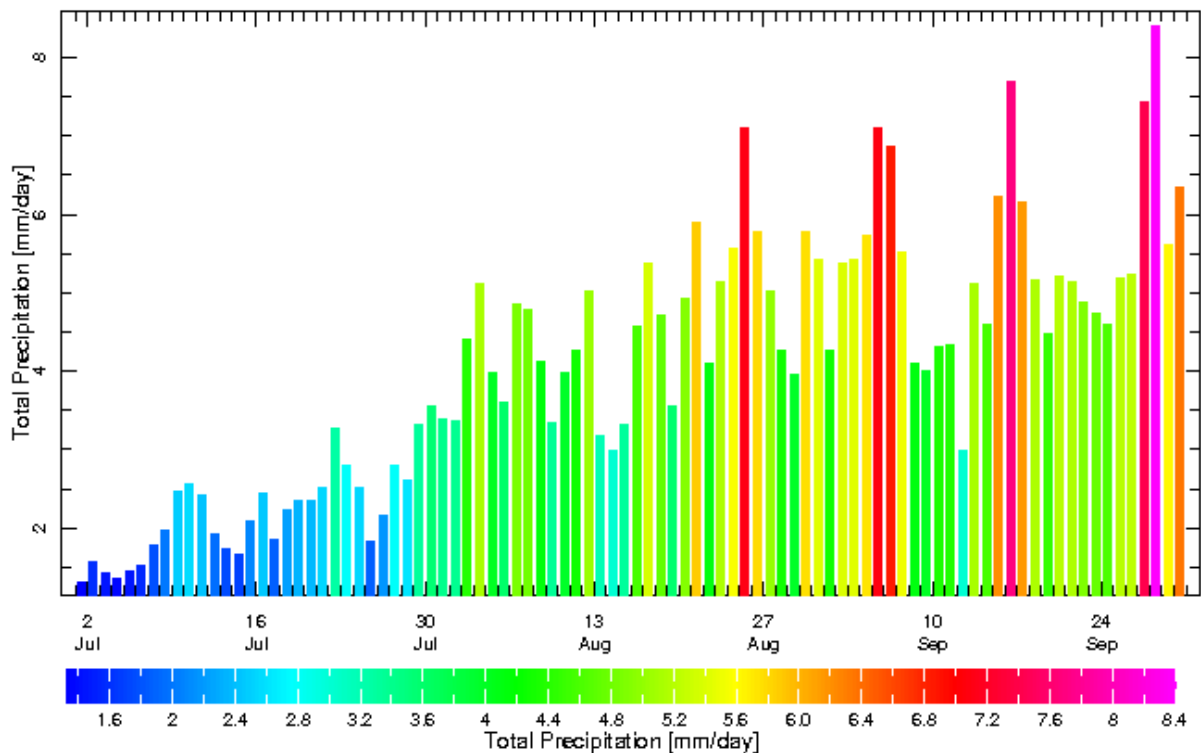


Seasonal weather outlook (Jul-Sep, 2014)

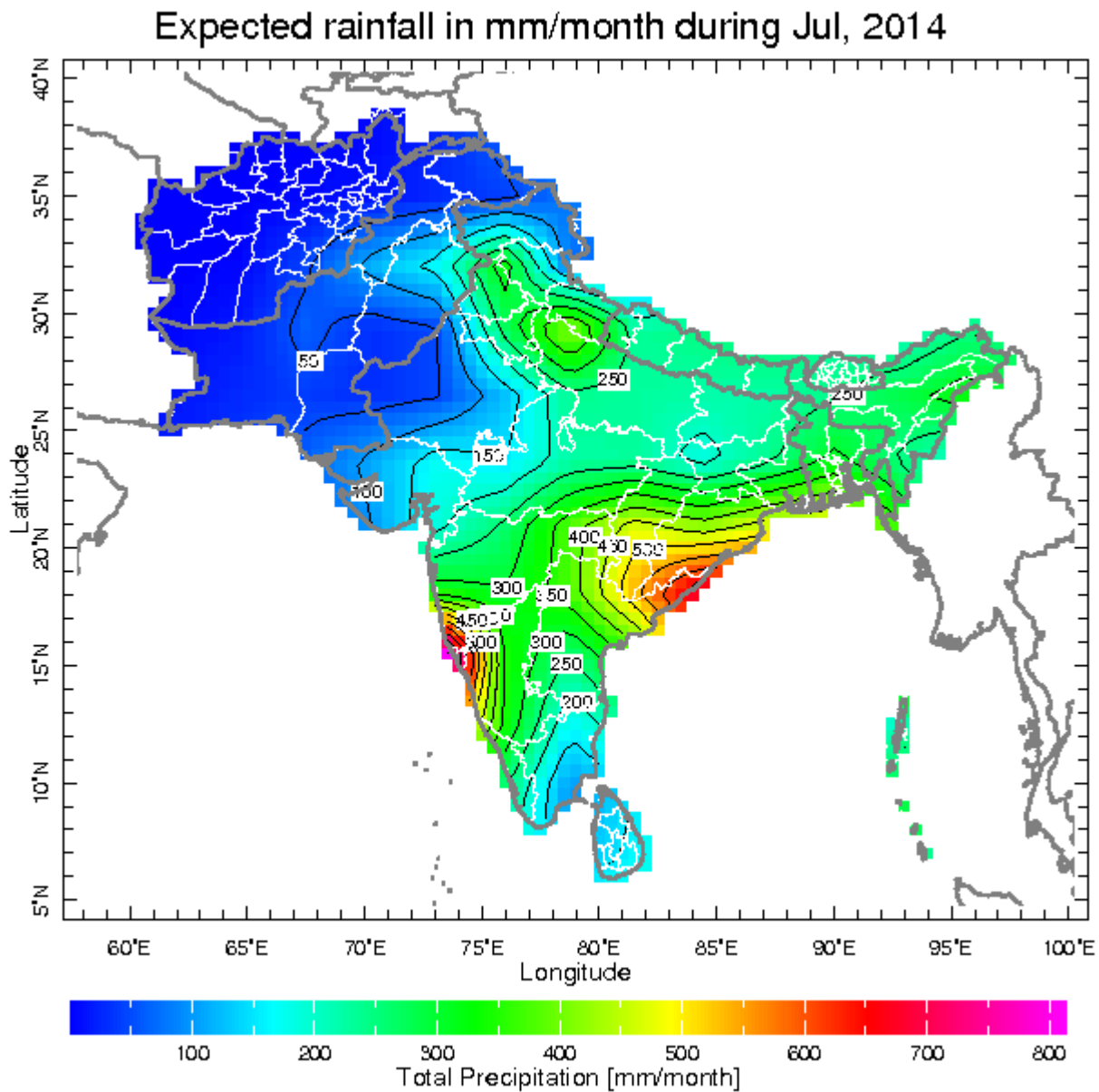
Daily expected Rainfall of Pakistan for Jul-Sep, 2014



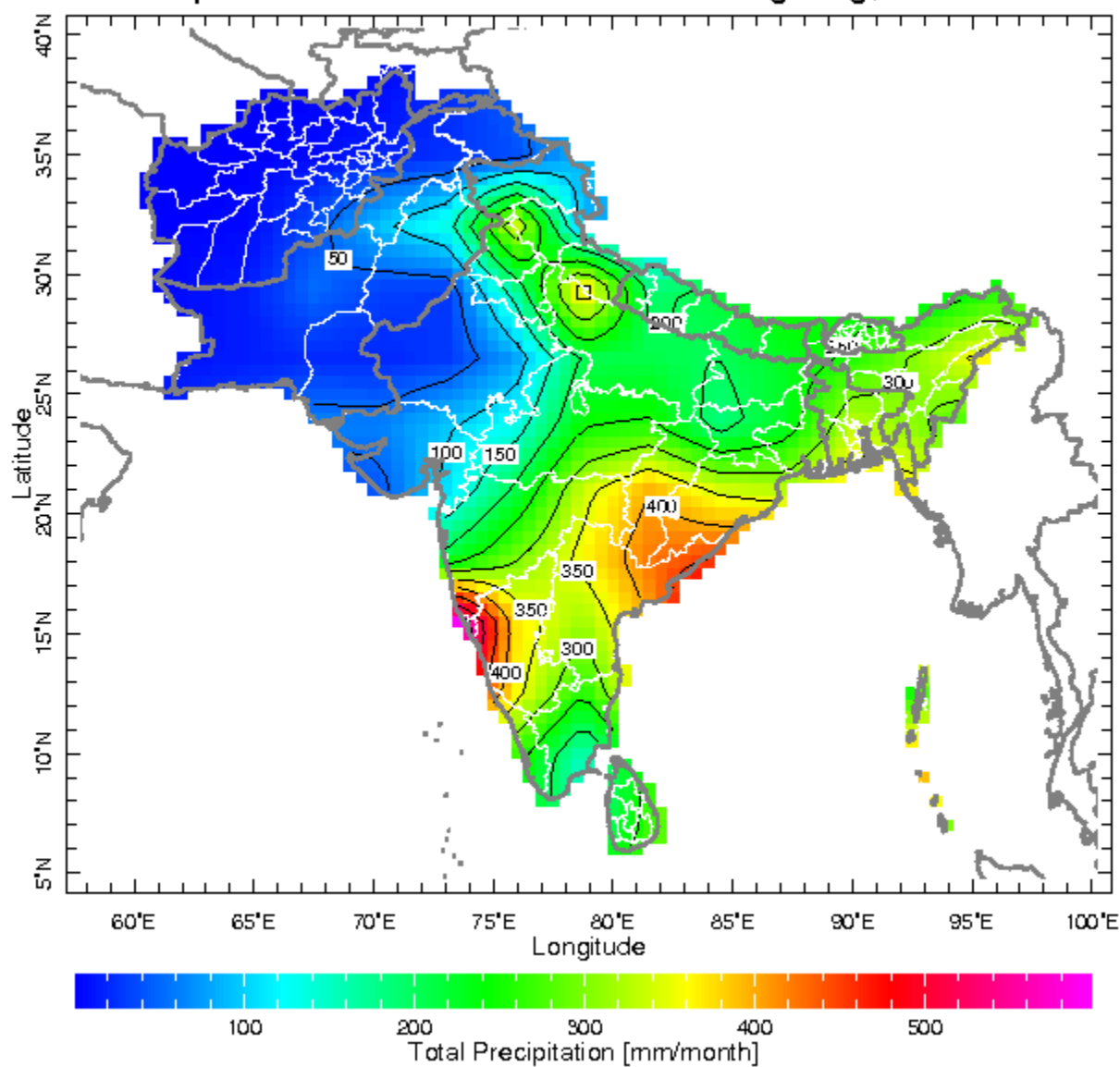
Daily expected Rainfall of Sri Lanka for Jul-Sep, 2014



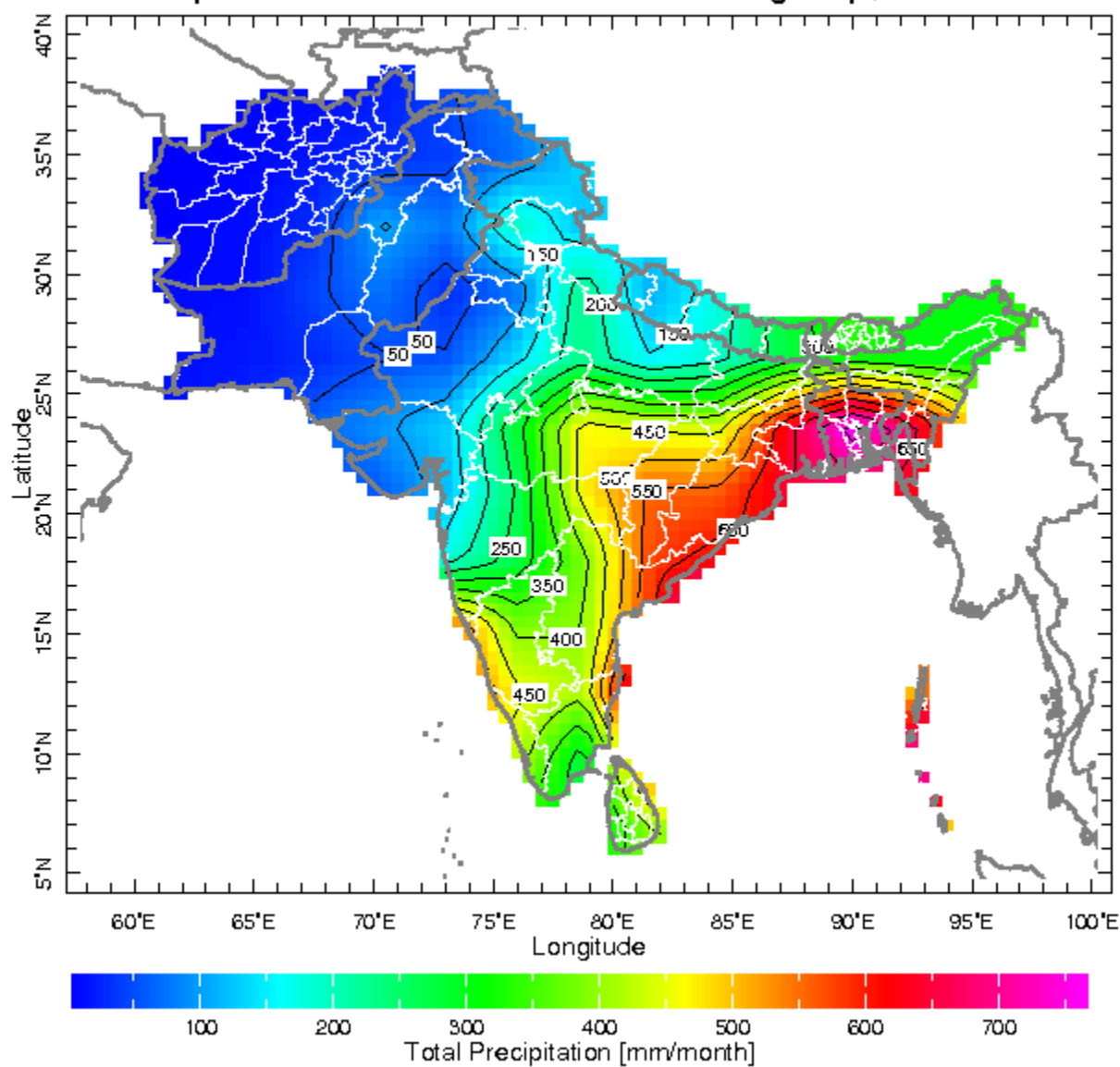
5. Spatial distribution of expected precipitation during coming season (GCM-ECHAM)

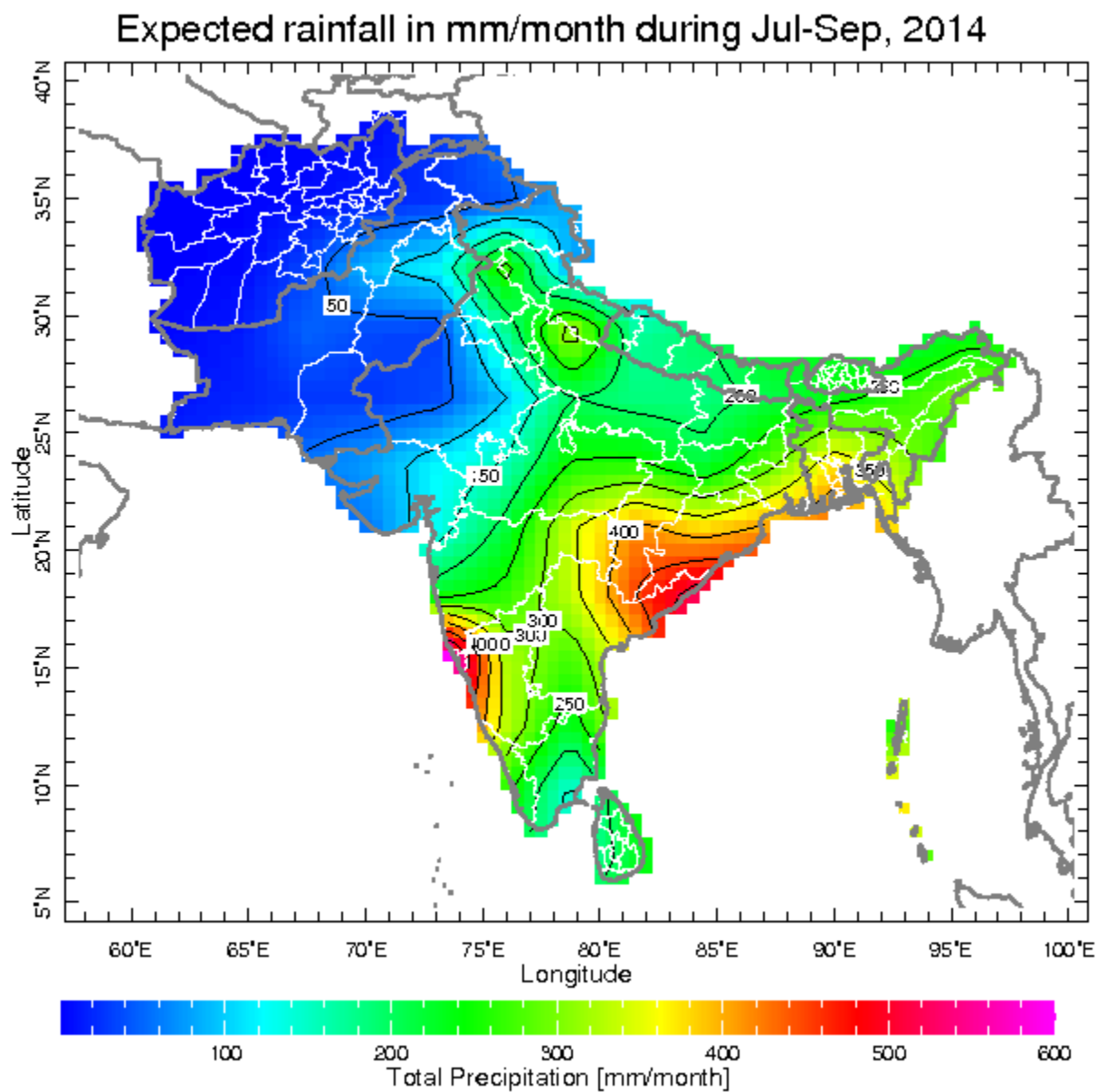


Expected rainfall in mm/month during Aug, 2014



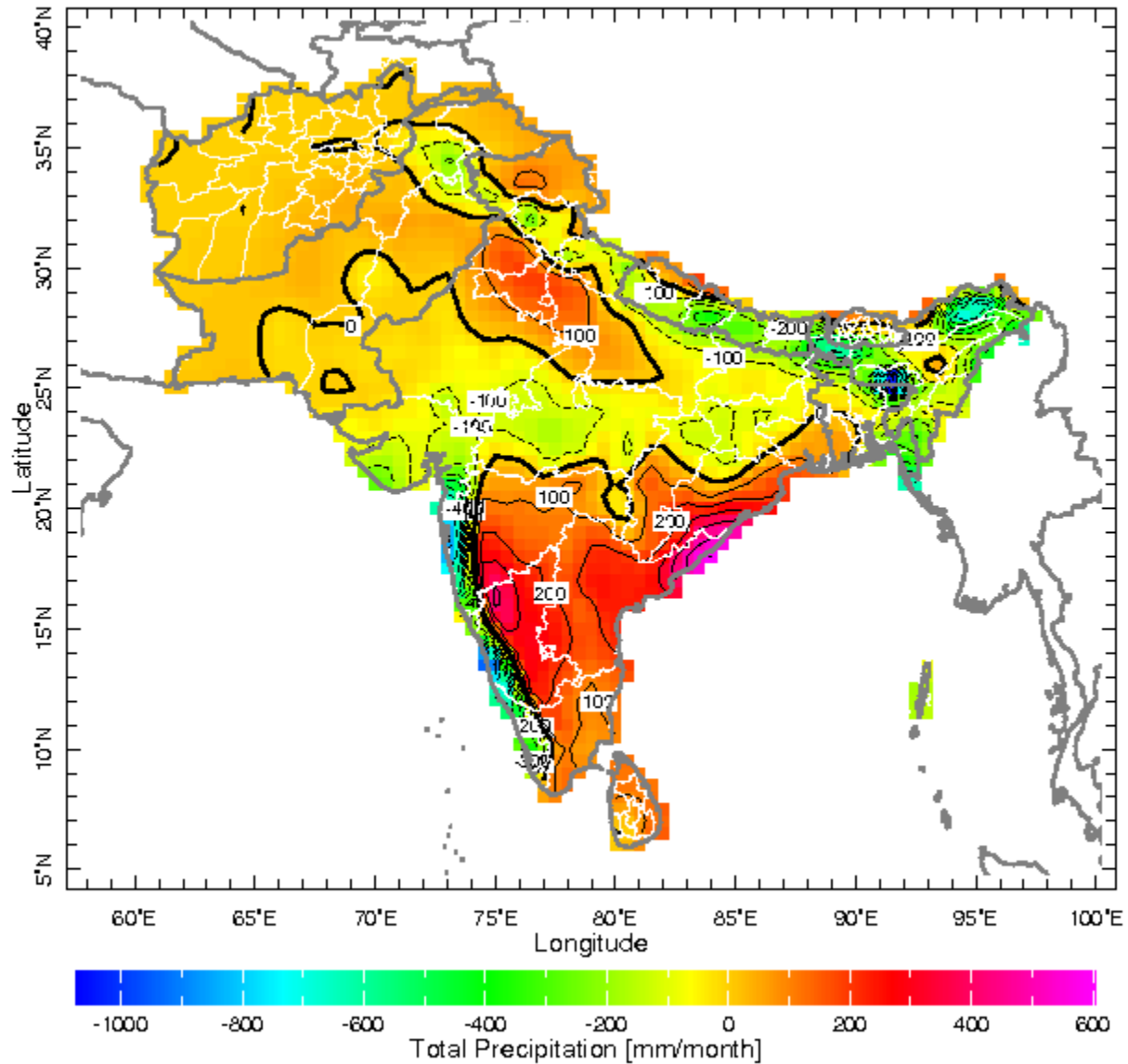
Expected rainfall in mm/month during Sep, 2014



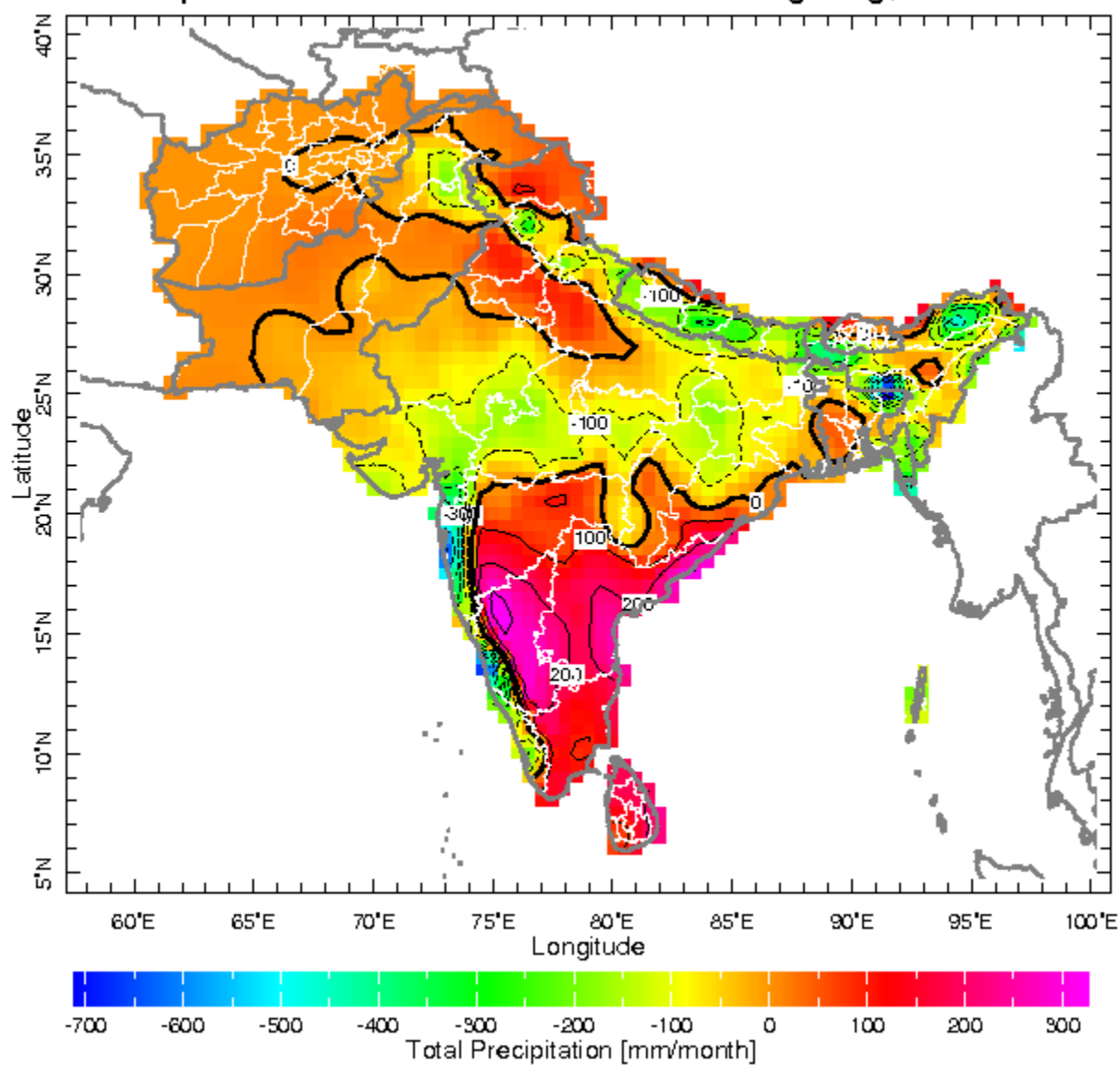


6. *Monthly departure from normal (precipitation) during coming season*

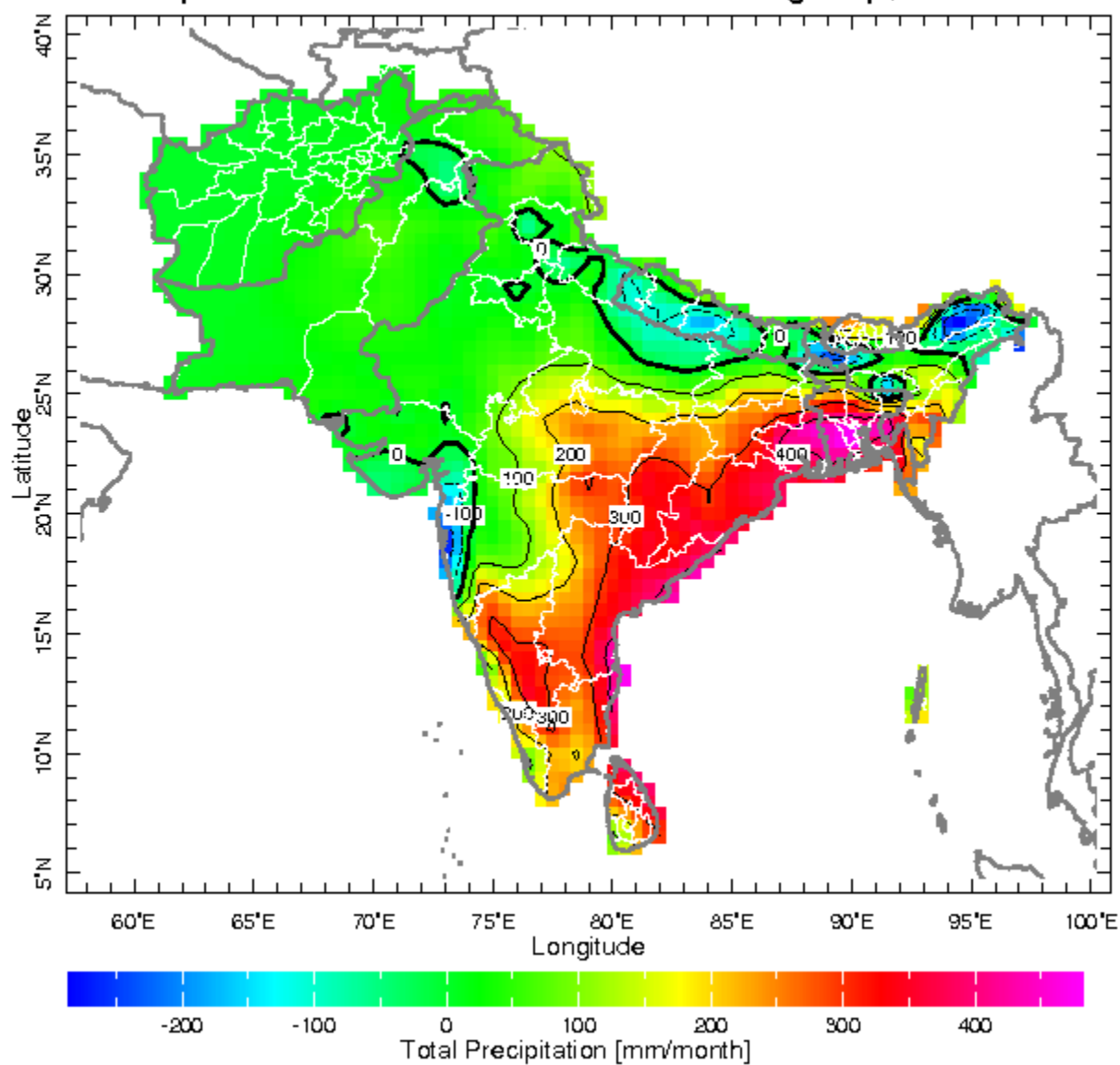
Departure of rainfall from normal during Jul, 2014



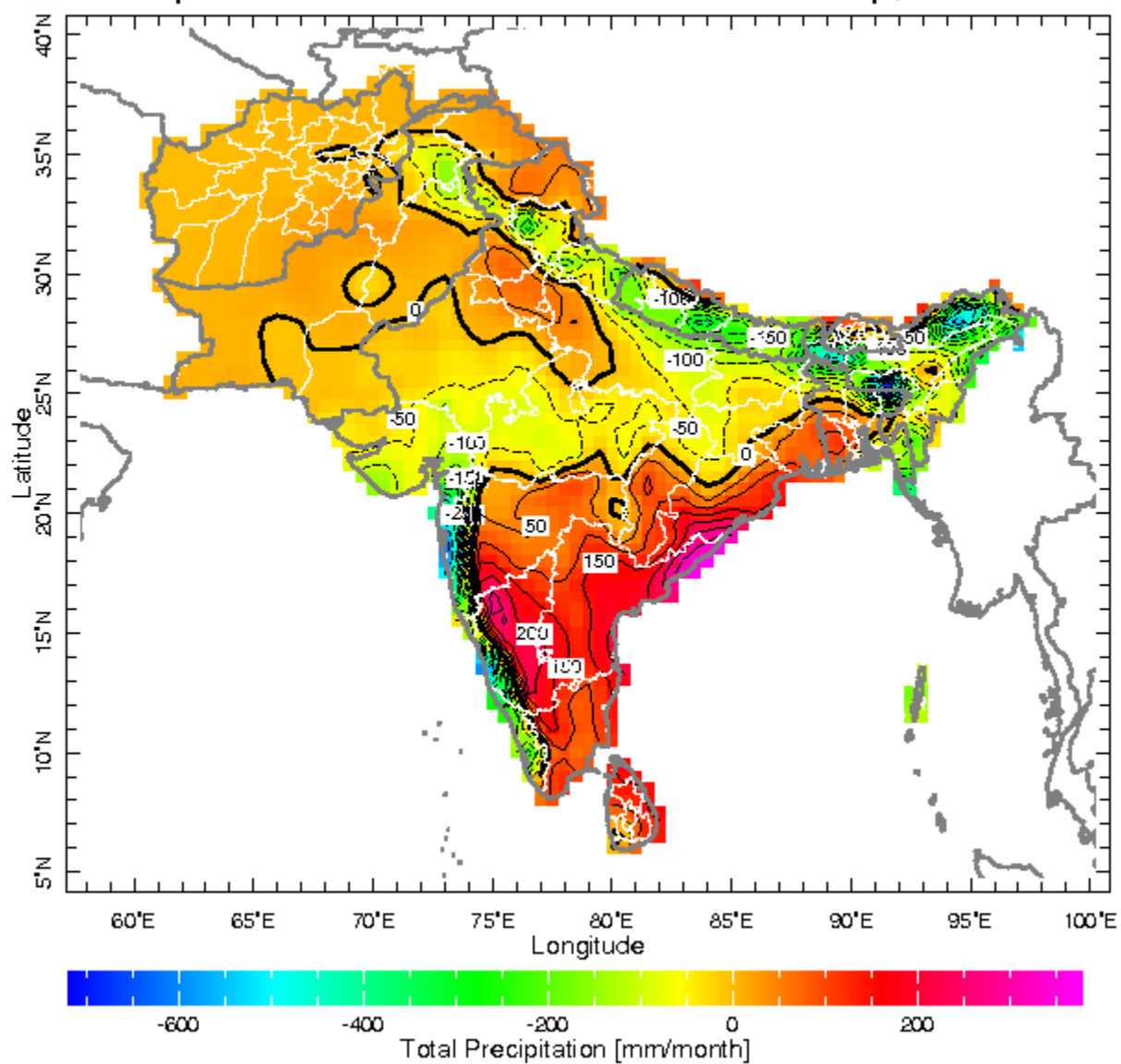
Departure of rainfall from normal during Aug, 2014

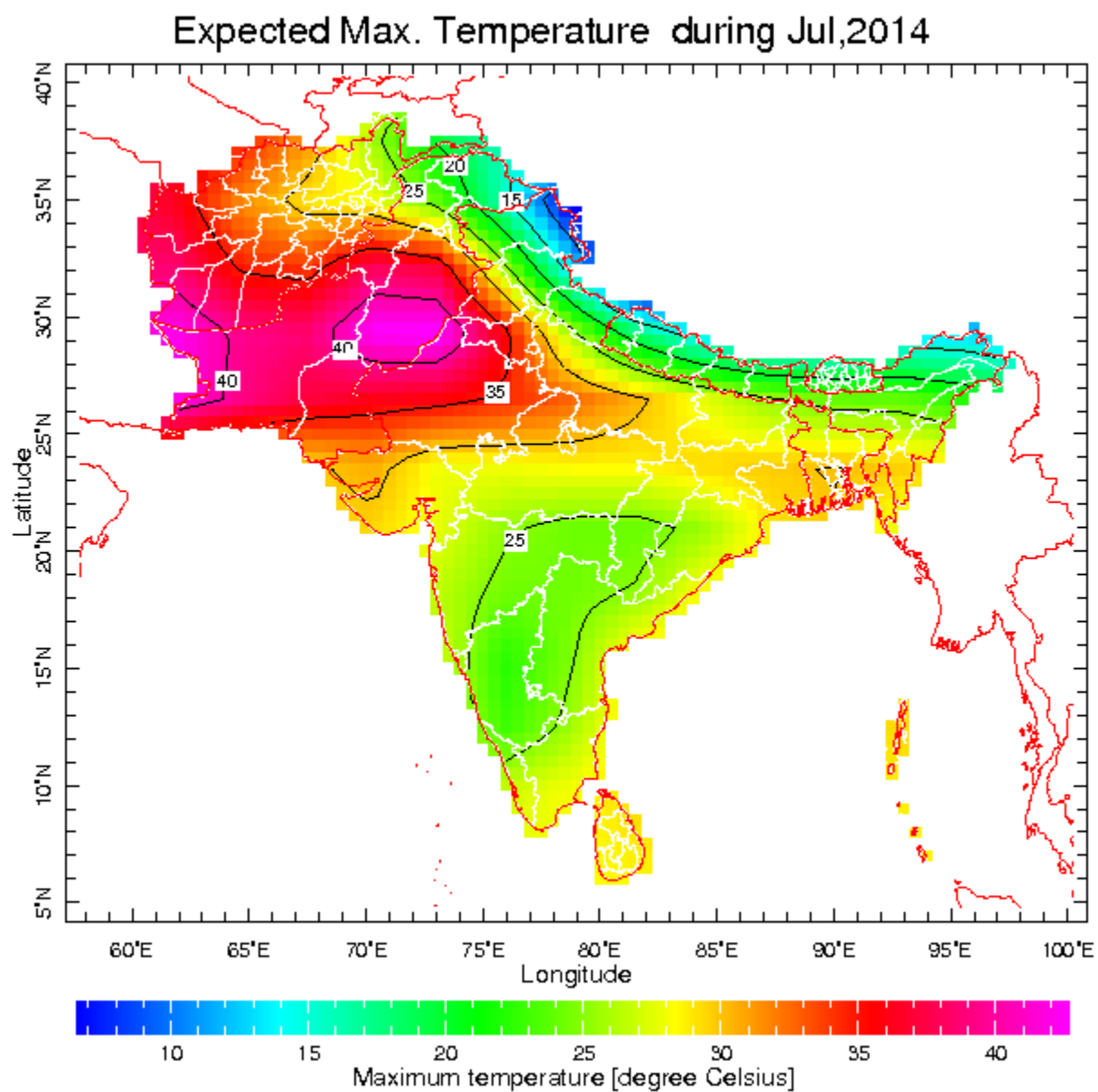


Departure of rainfall from normal during Sep, 2014

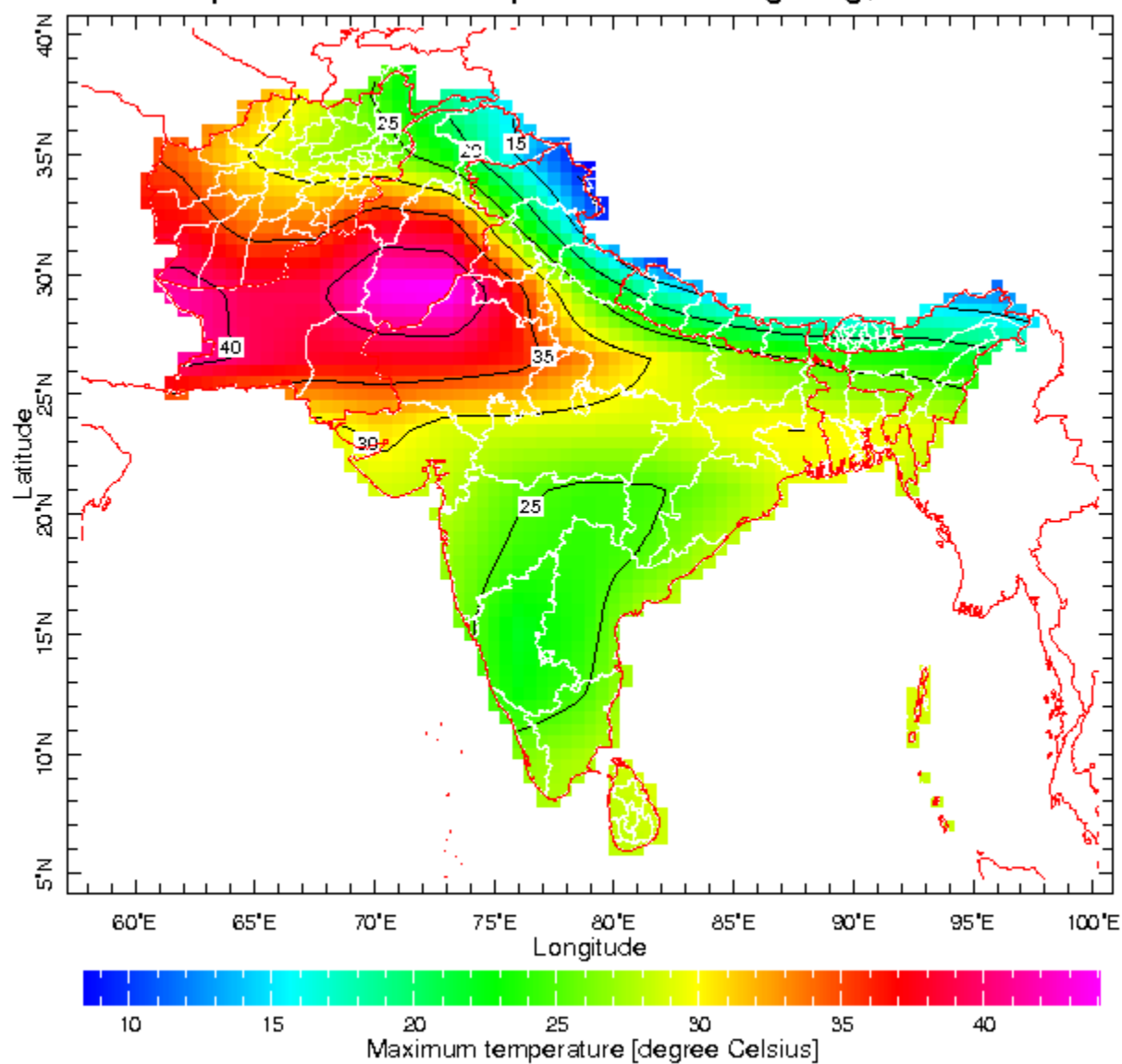


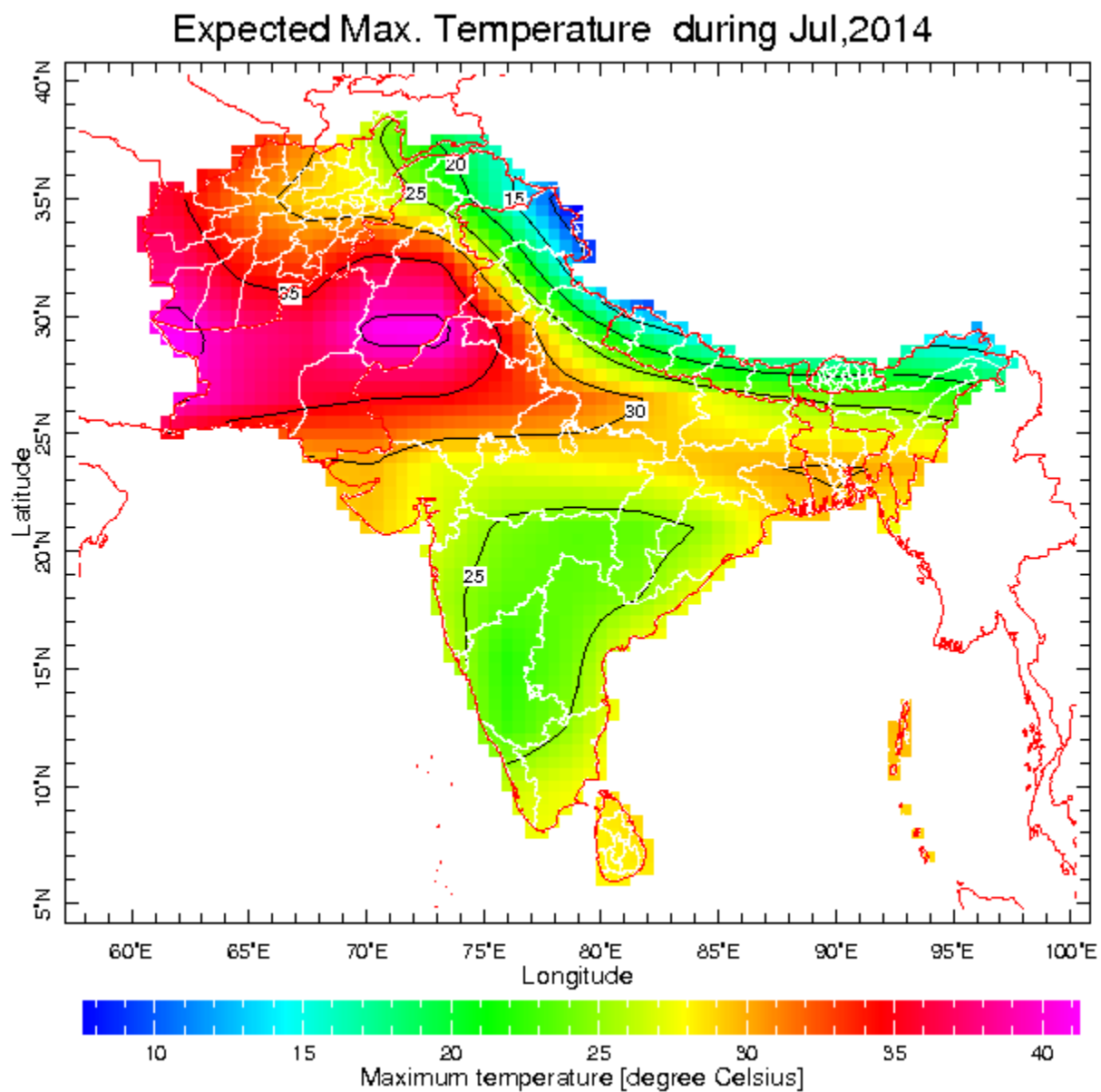
Departure of rainfall from normal for Jul-Sep, 2014



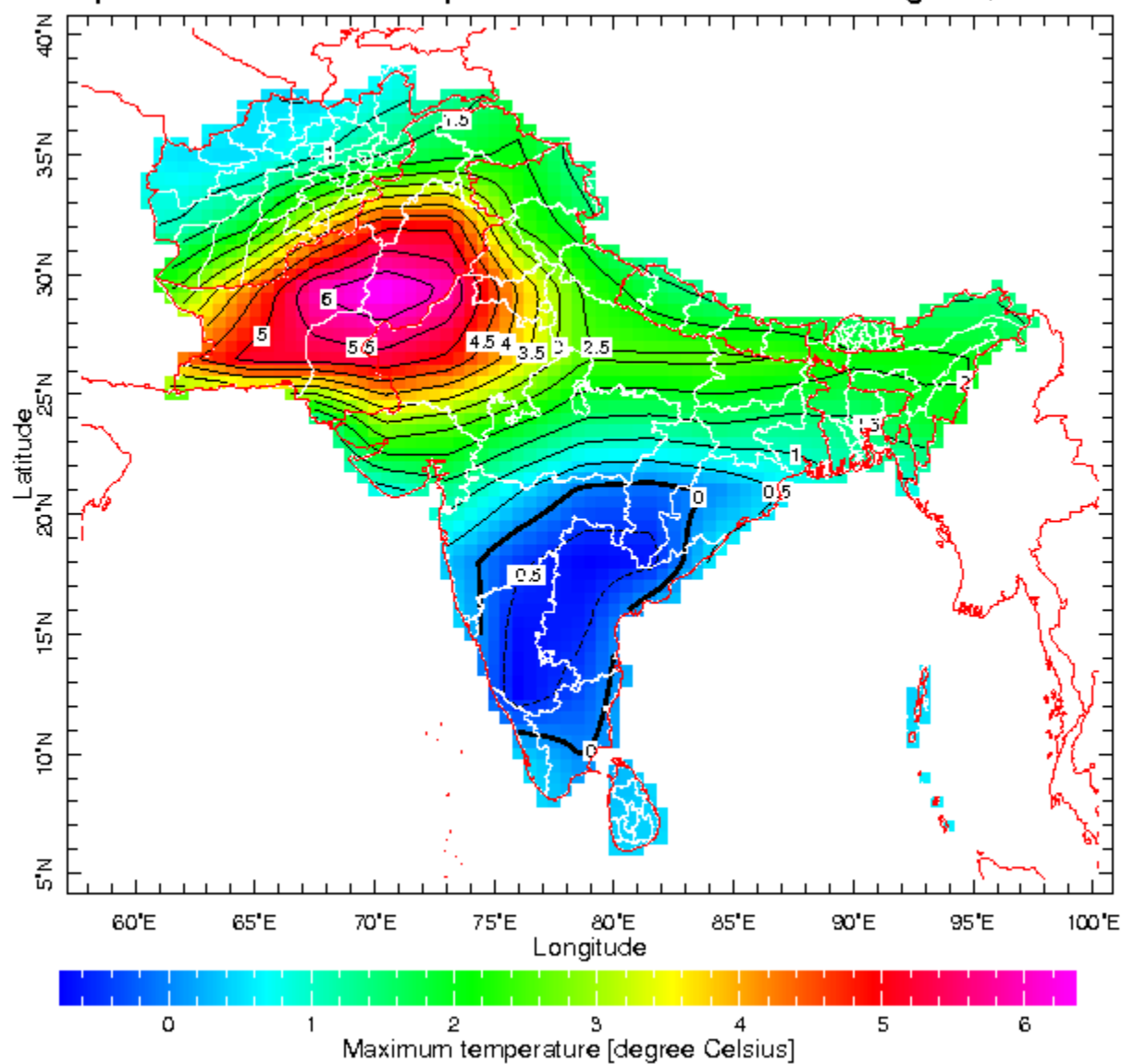


Expected Max. Temperature during Aug, 2014



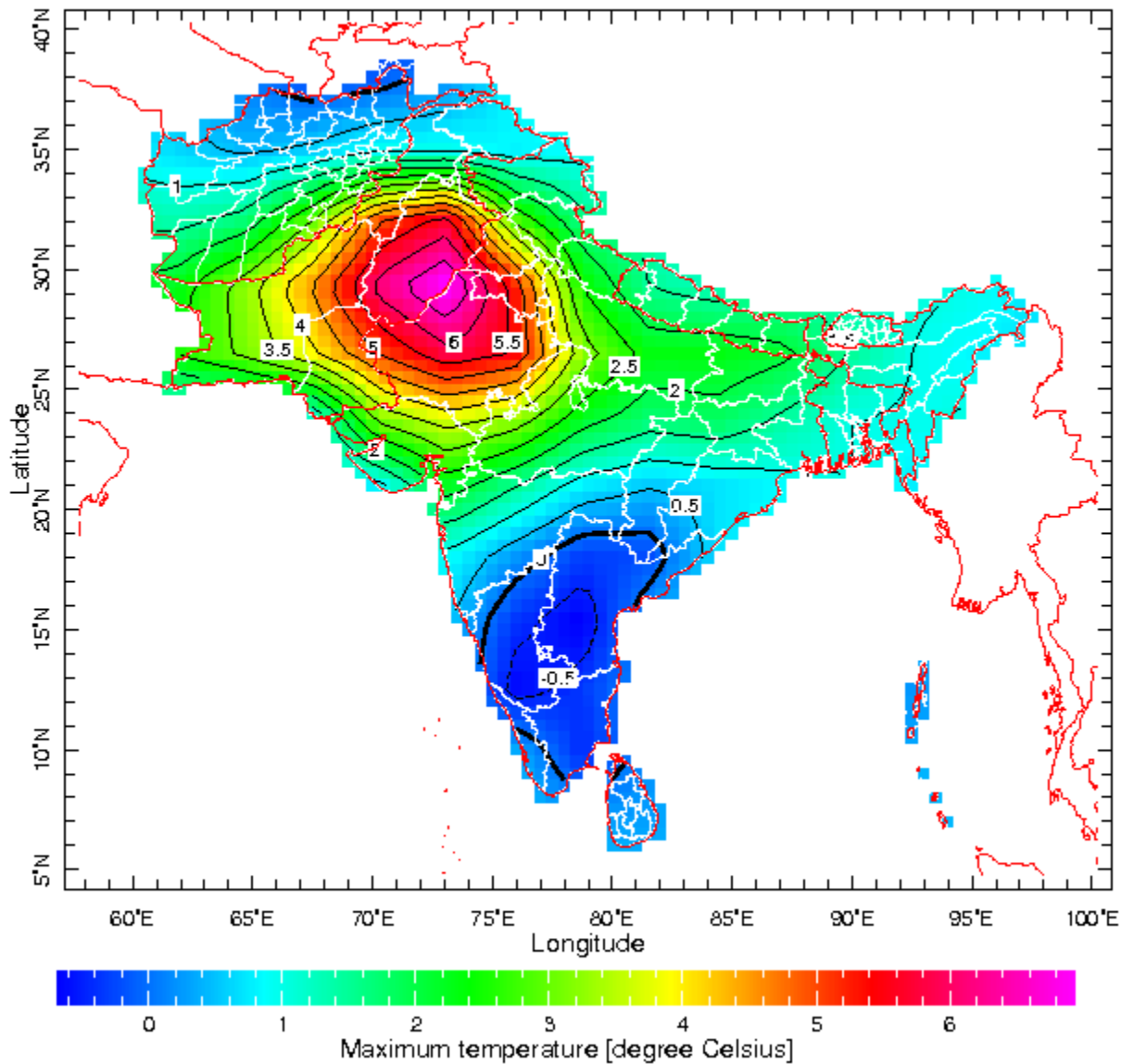


Departure of Max. Temperature from normal during Jul, 2014



Seasonal weather outlook (Jul-Sep, 2014)

Departure of Max. Temperature from normal during Aug, 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/>