

Seasonal weather outlook for SAARC region

(Feb-Apr, 2015)

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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 Feb 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 Watch

Synopsis: There is an approximately 50-60% chance of El Niño within the late Northern Hemisphere winter and early spring, with ENSO-neutral slightly favored thereafter.

Equatorial sea surface temperatures (SST) remained above average in the western and central Pacific during January 2015 and cooled across the eastern Pacific. Accordingly, the latest weekly Niño indices were +0.5°C in the Niño-3.4 region and +0.9°C in the Niño-4 region, and closer to zero in the Niño-3 and Niño-1+2 regions. Subsurface temperature anomalies across the eastern half of the equatorial Pacific also averaged near zero during the month. However, an extensive area of positive subsurface anomalies persisted near the Date Line, while negative anomalies were prevalent closer to the surface east of 110°W. During the last couple of weeks of January, several aspects of the tropical Pacific atmosphere showed some movement toward El Niño. However, for the month as a whole, the equatorial low-level winds were mostly near average across the Pacific, while upper-level easterly anomalies continued in the east-central Pacific. Also, convection remained below average near the Date Line and enhanced in the western equatorial Pacific. While the tropical Pacific Ocean is at the borderline of El Niño, the overall atmosphere-ocean system remains ENSO-neutral.

Similar to last month, most models predict a weak El Niño (3-month values of the Niño-3.4 index between 0.5°C and 0.9°C) during the Northern Hemisphere late winter and spring. The forecaster consensus also favors Niño-3.4 SST index values in excess of 0.5°C within the coming season. However, climatologically, ocean-atmosphere coupling tends to weaken into the spring, which increases uncertainty over whether El Niño conditions will emerge. In summary, there is an approximately 50-60% chance of El Niño within the late Northern Hemisphere winter and early spring, with ENSO-neutral slightly favored thereafter. (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)

Seasonal weather outlook (Feb-Apr, 2015)

Probability outlook: La Nina (1%), Neutral (46%) and El Nino (53 %) during Feb-Mar-Apr, 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 (FMA)”

Synthesis of the latest model forecasts for Feb-Apr 2015 (FMA), current synoptic situation and regional weather expert’s judgment indicates that average to above average precipitation is expected during the predicted season with significantly higher than normal during February. Normal minimum temperature will persist over most of parts of SAARC member countries during February except above normal over extreme northern parts of the region.

Seasonal weather outlook (Feb-Apr, 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

February, 2014: Average to slightly above average rainfall is expected in SAARC member countries as a whole with slightly below average over western parts of 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 last decade of February. Frequent rainy spells will overcome the deficiency of rainfall during previous months.

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

March, 2015: Average precipitation is expected during March all over SAARC region except significantly higher than normal over India. Slightly above average precipitation is expected

Seasonal weather outlook (Feb-Apr, 2015)

over Bangladesh and Bhutan, and average over Nepal, Afghanistan and Pakistan. Intensity of precipitation will be higher over western as well over eastern belt of the region including Afghanistan, northern parts of Pakistan, northeastern states of India and its surroundings. Most of the region will receive above normal precipitation expected over Sri Lanka, Nepal and extreme northeastern parts of India

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.

April, 2015: Above average precipitation is expected all over the region with significantly higher over India, average to slightly above average over Pakistan and Afghanistan, and 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 normal during April all over the region.

Country wise Seasonal prediction (February-April, 2015):

Afghanistan: Moderate rainy spells are expected during February. Most of the parts will receive good rain during early predicted season. Rainy spell gradually decreases as time passes. Light rainy spells are expected during last decade of March as well.

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

Bhutan: Less amount of rainfall is expected during February. Rainy spell with same intensity will start from March and will continue till April. Well amount of rainfall is expected during April.

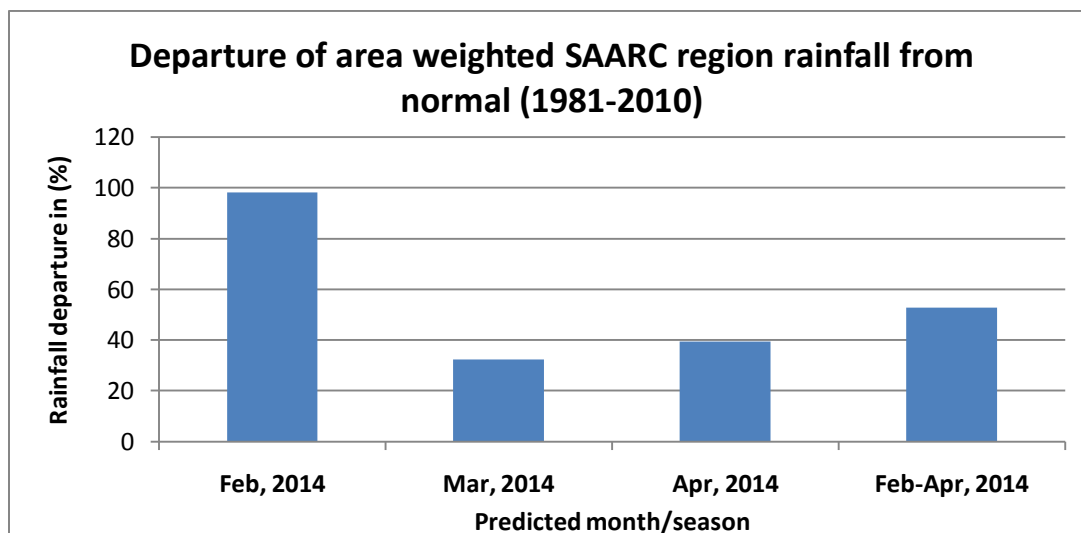
India: Light Rainy spell are expected during February. Light to moderate rainy spells are expected during last week February to 1st week of March. Three to four moderate to heavy rainy spells are expected during April.

Nepal: light to moderate precipitation spells are expected during first half of predicted months while light rainy spells during last half of the predicted month. Less amount of rainfall is expected during 2nd and 3rd week of March.

Pakistan: Well amount of rainfall is expected during last week of February and 1st week of March. Moderate rainy spell are expected during last week of March. Very less amount of rainfall is expected during April.

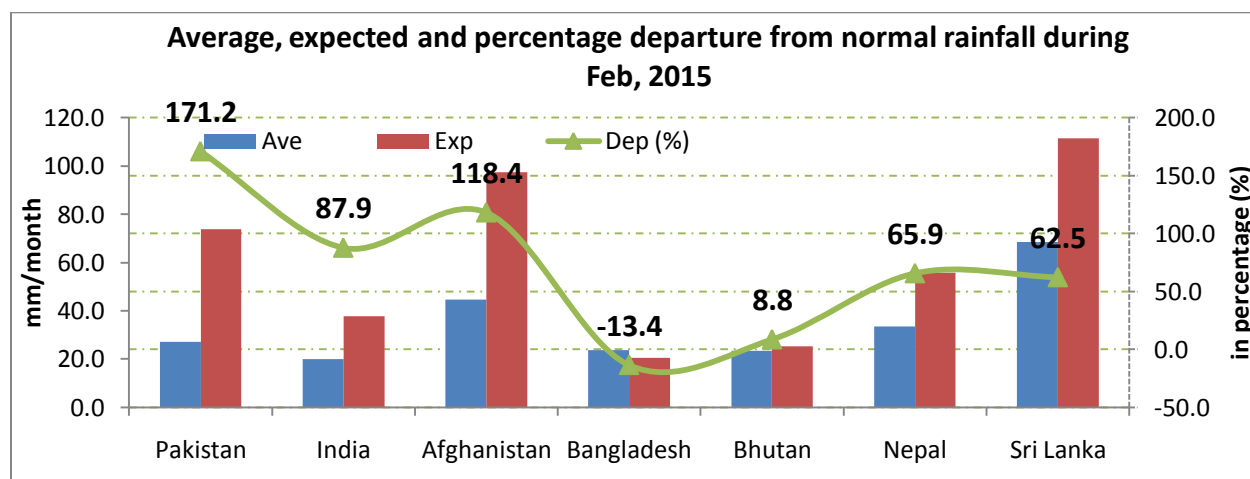
Seasonal weather outlook (Feb-Apr, 2015)

Sri Lanka: Less amount of rainfall is expected during February and March while moderate rainy spells expected to start during last decade of April.

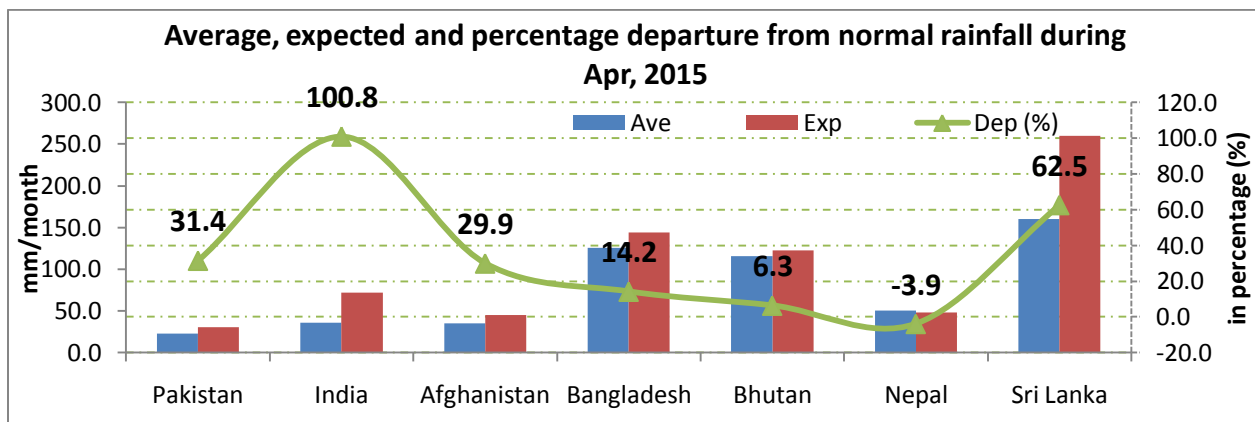
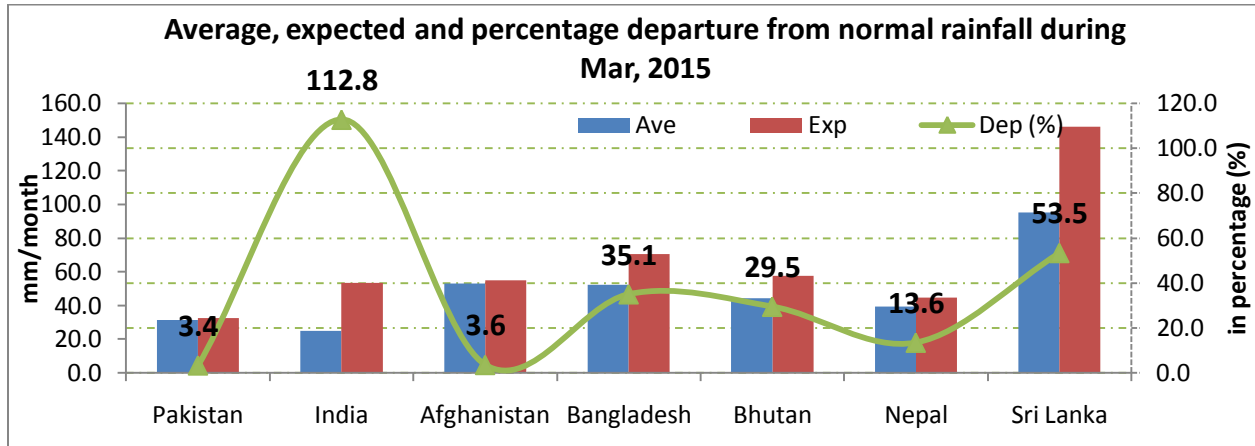


Note: Departure of Area-weighted rainfall of SAARC region has been computed by subtracting Climatology rainfall of the month from ECHAM predicted monthly/seasonally rainfall of corresponding month/season.

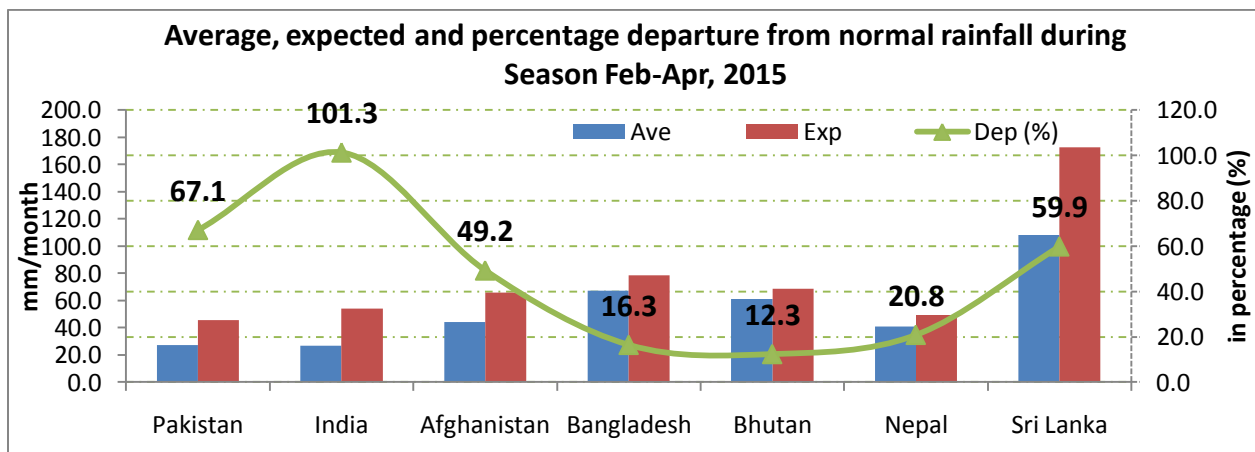
4. Country wise monthly and seasonal quantitative outlook along with departure of precipitation from normal



Seasonal weather outlook (Feb-Apr, 2015)



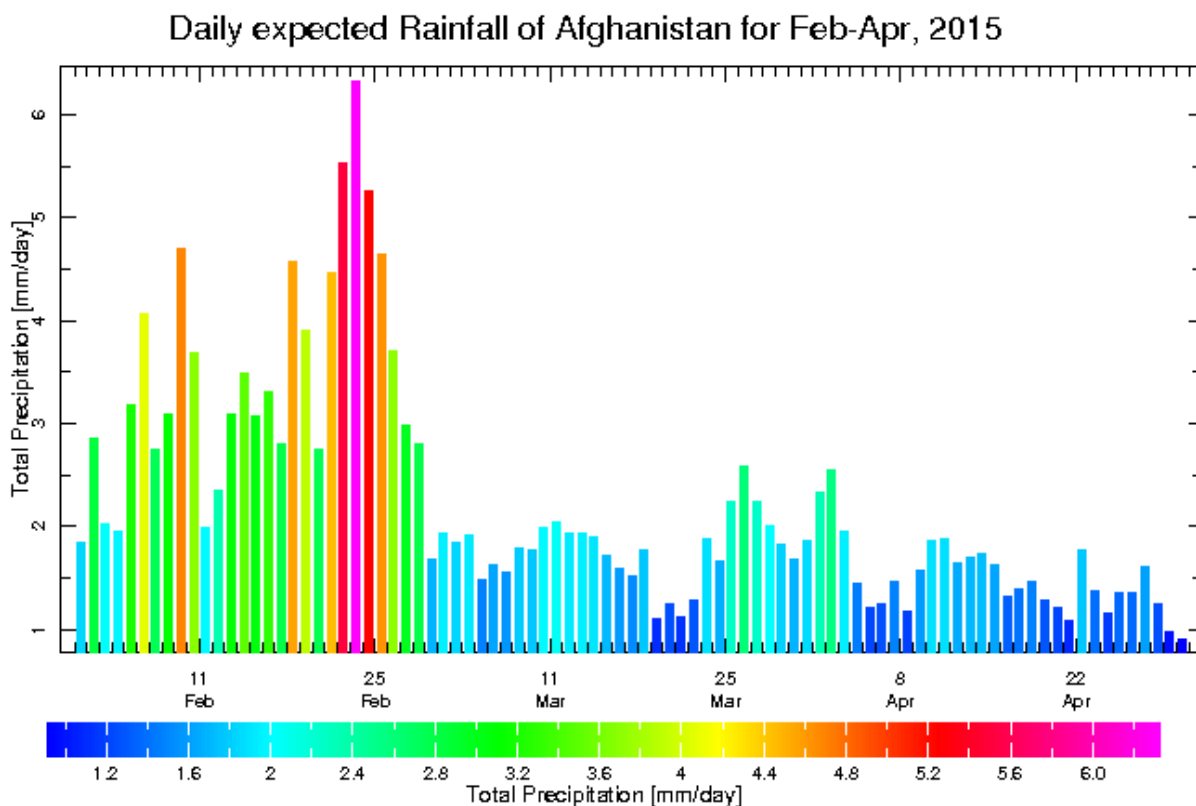
Note for quantitative graph: X axis indicates countries, left y axis stands for bar chart (blue for average and red for expected rainfall in mm/month) and right y axis stands for line chart (green) indicates departure of rainfall from normal in percentage. Average rainfall period is 1981-2010.



Seasonal weather outlook (Feb-Apr, 2015)

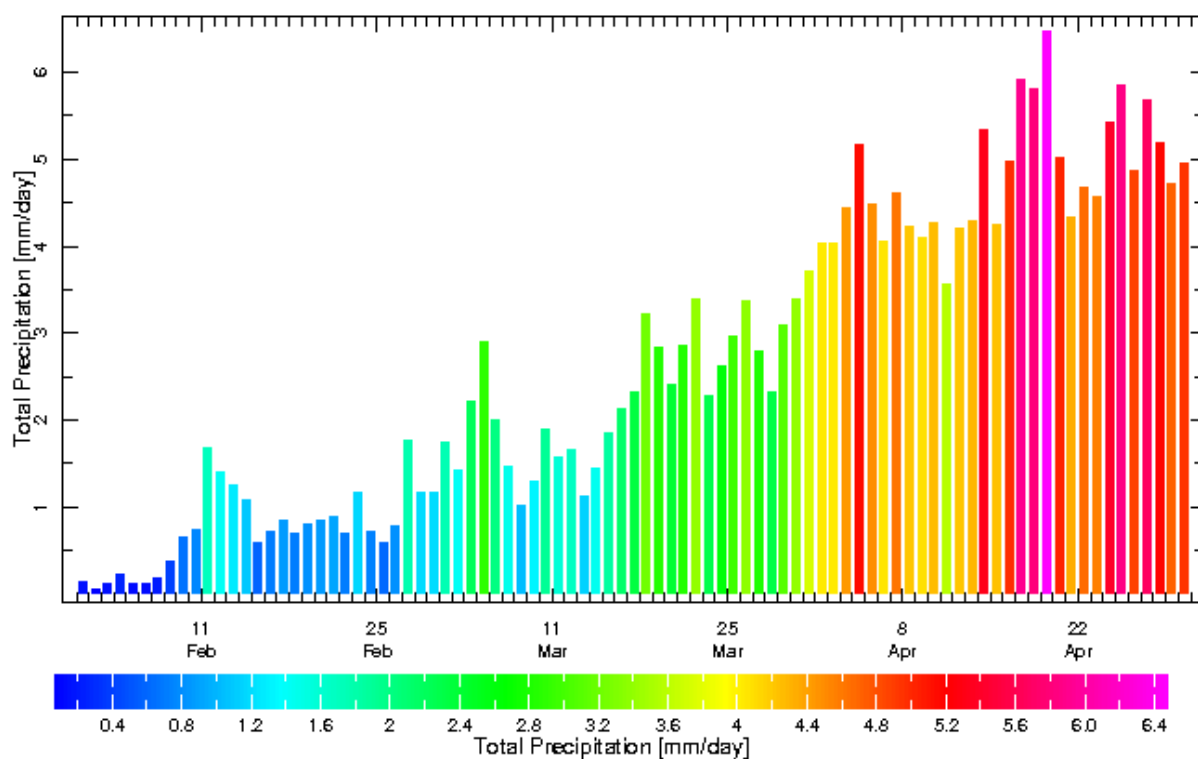
5. Daily country wise precipitation prediction for coming months (Feb-Apr, 2015)

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.

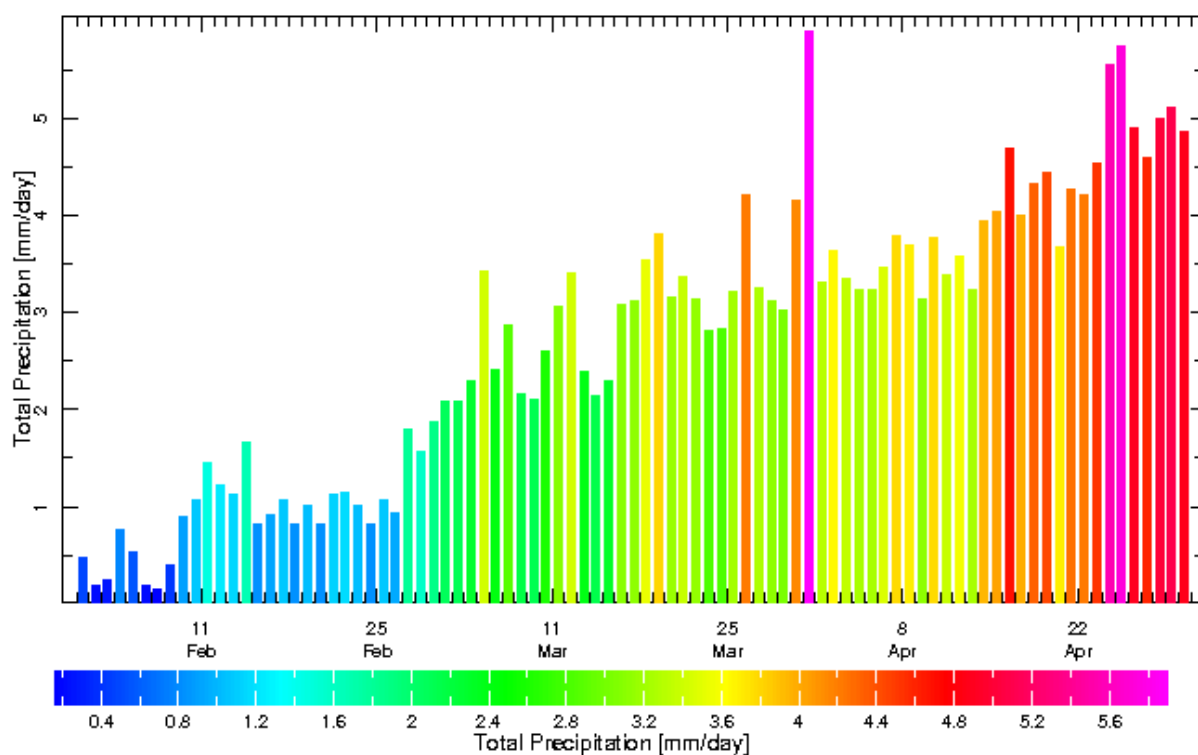


Seasonal weather outlook (Feb-Apr, 2015)

Daily expected Rainfall of Bangladesh for Feb-Apr, 2015

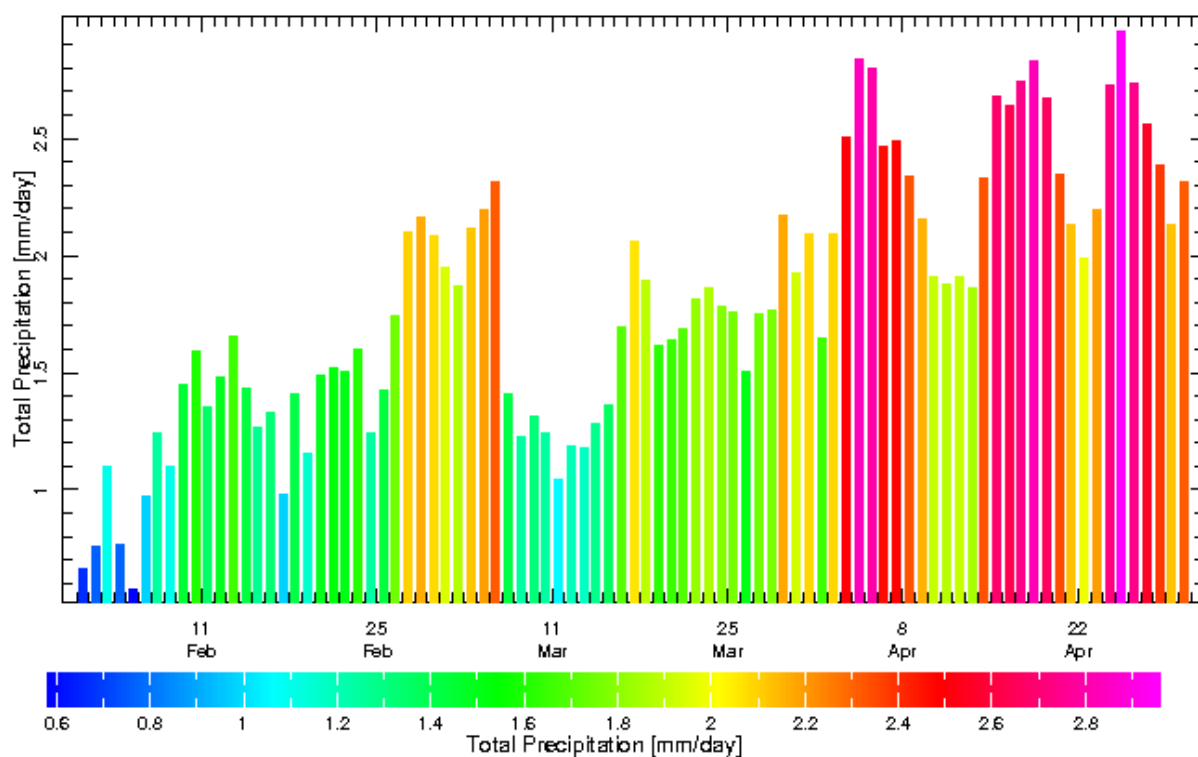


Daily expected Rainfall of Bhutan for Feb-Apr, 2015

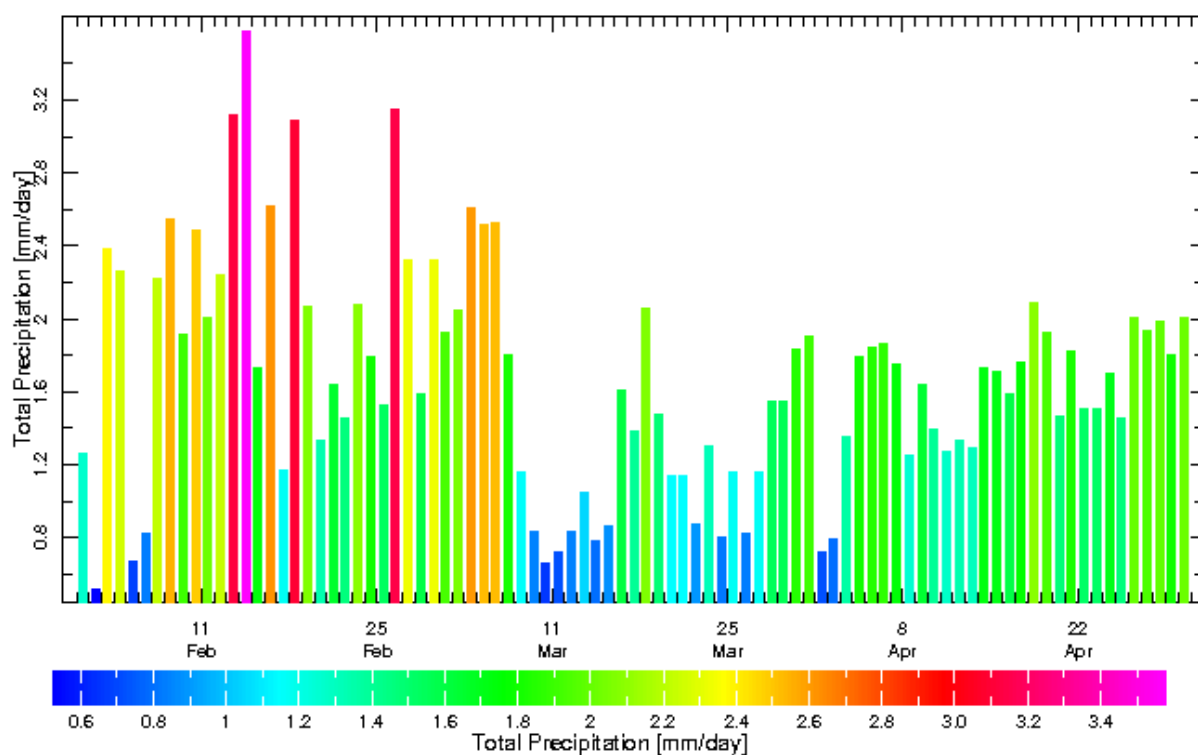


Seasonal weather outlook (Feb-Apr, 2015)

Daily expected Rainfall of India for Feb-Apr, 2015

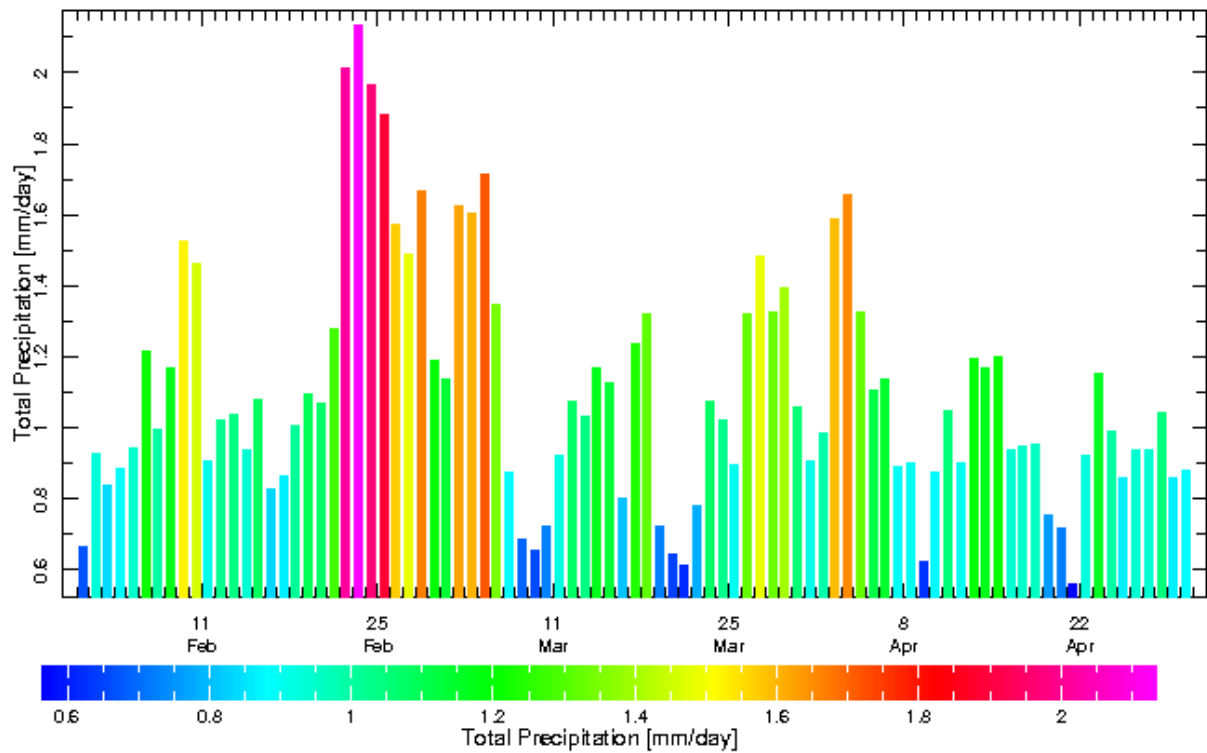


Daily expected Rainfall of Nepal for Feb-Apr, 2015

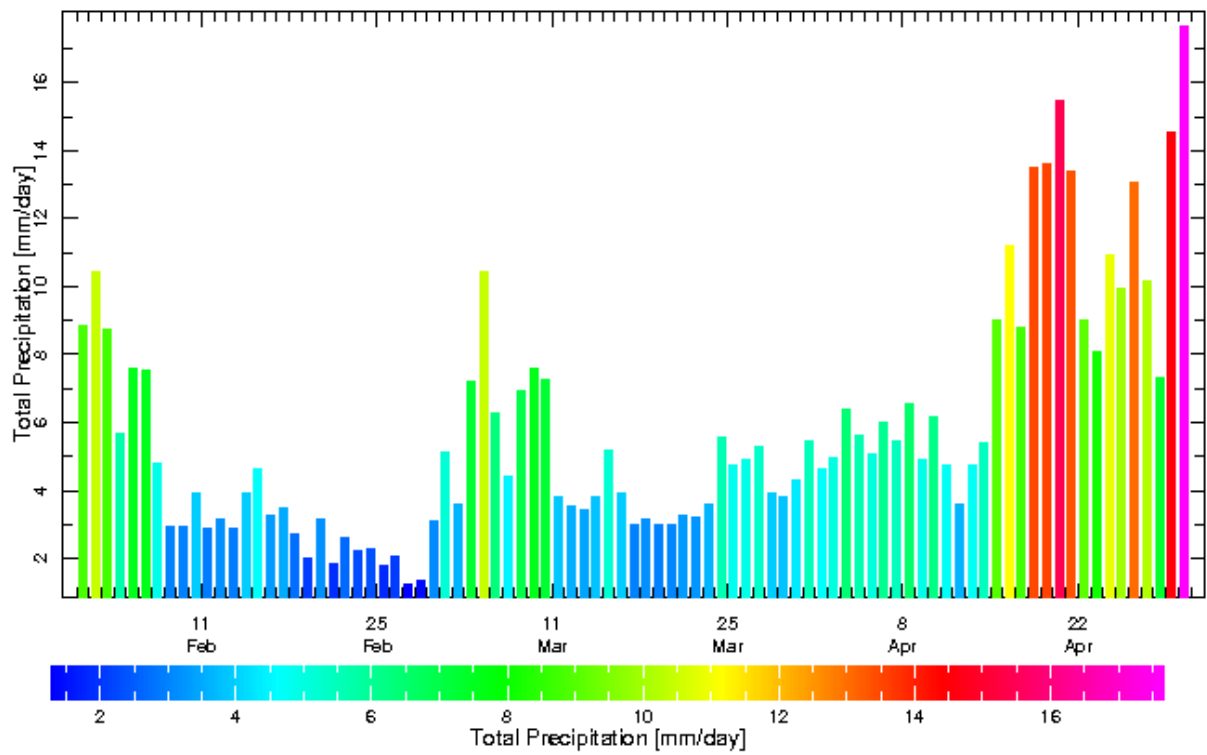


Seasonal weather outlook (Feb-Apr, 2015)

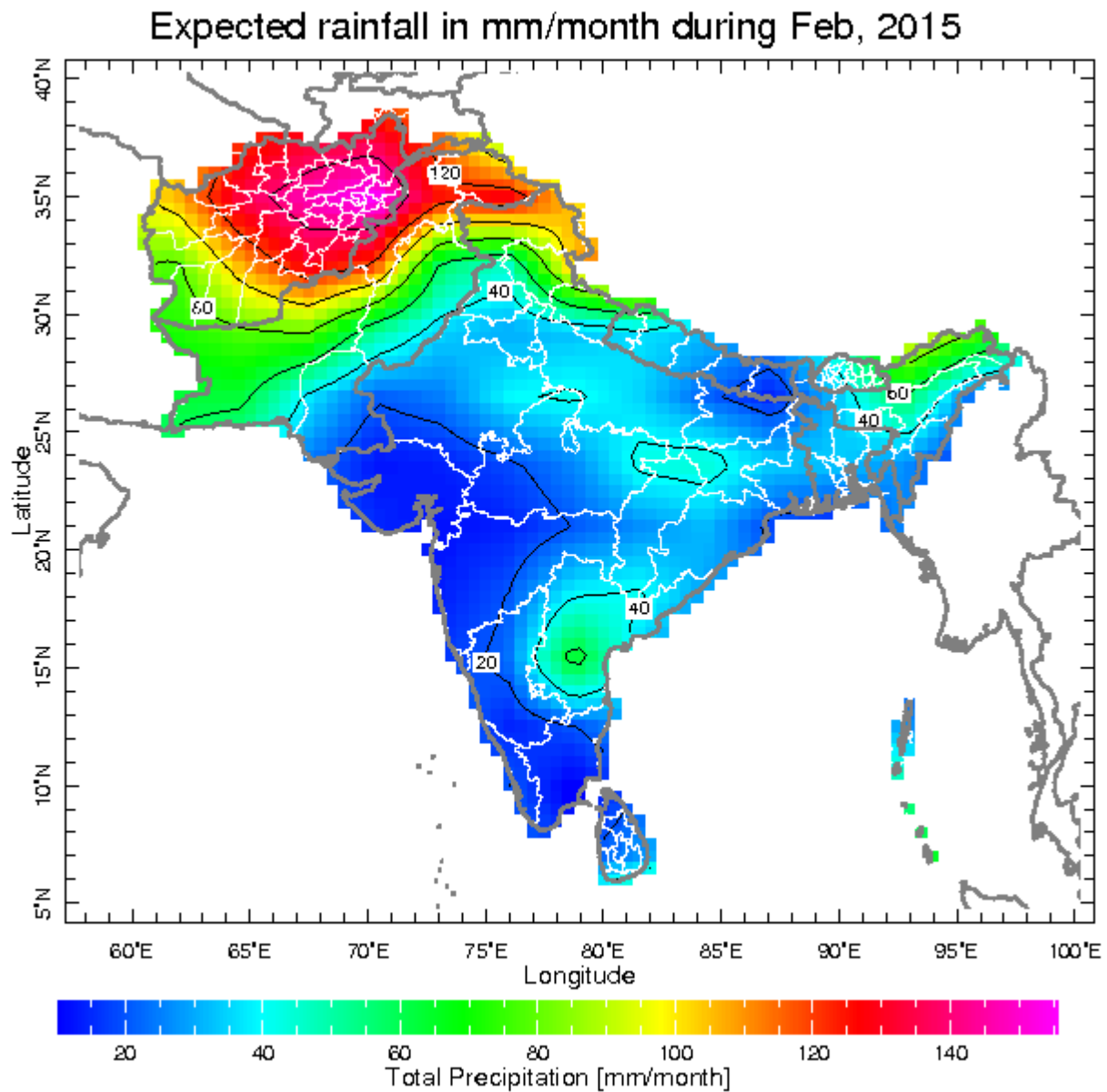
Daily expected Rainfall of Pakistan for Feb-Apr, 2015



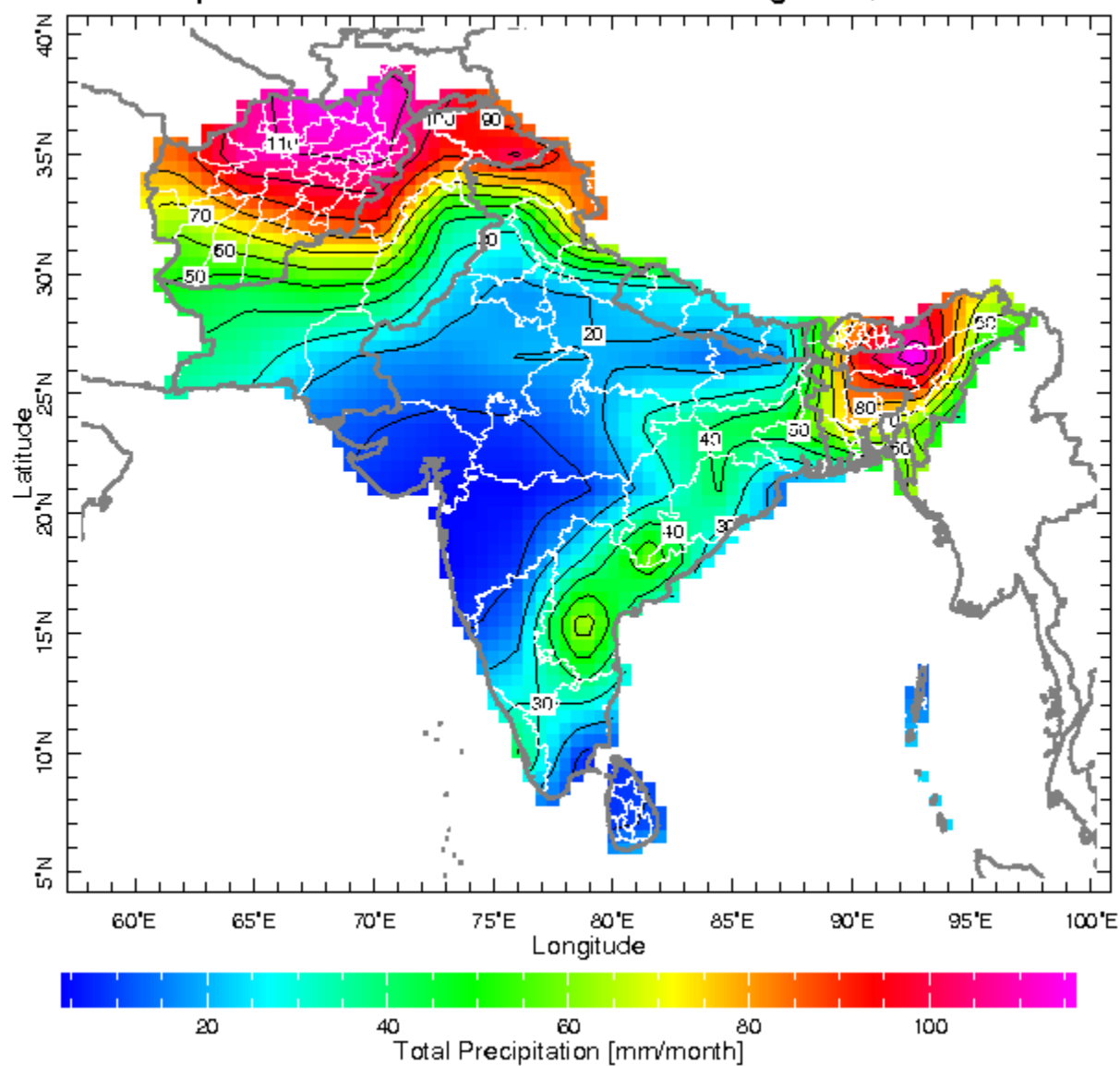
Daily expected Rainfall of Sri Lanka for Feb-Apr, 2015



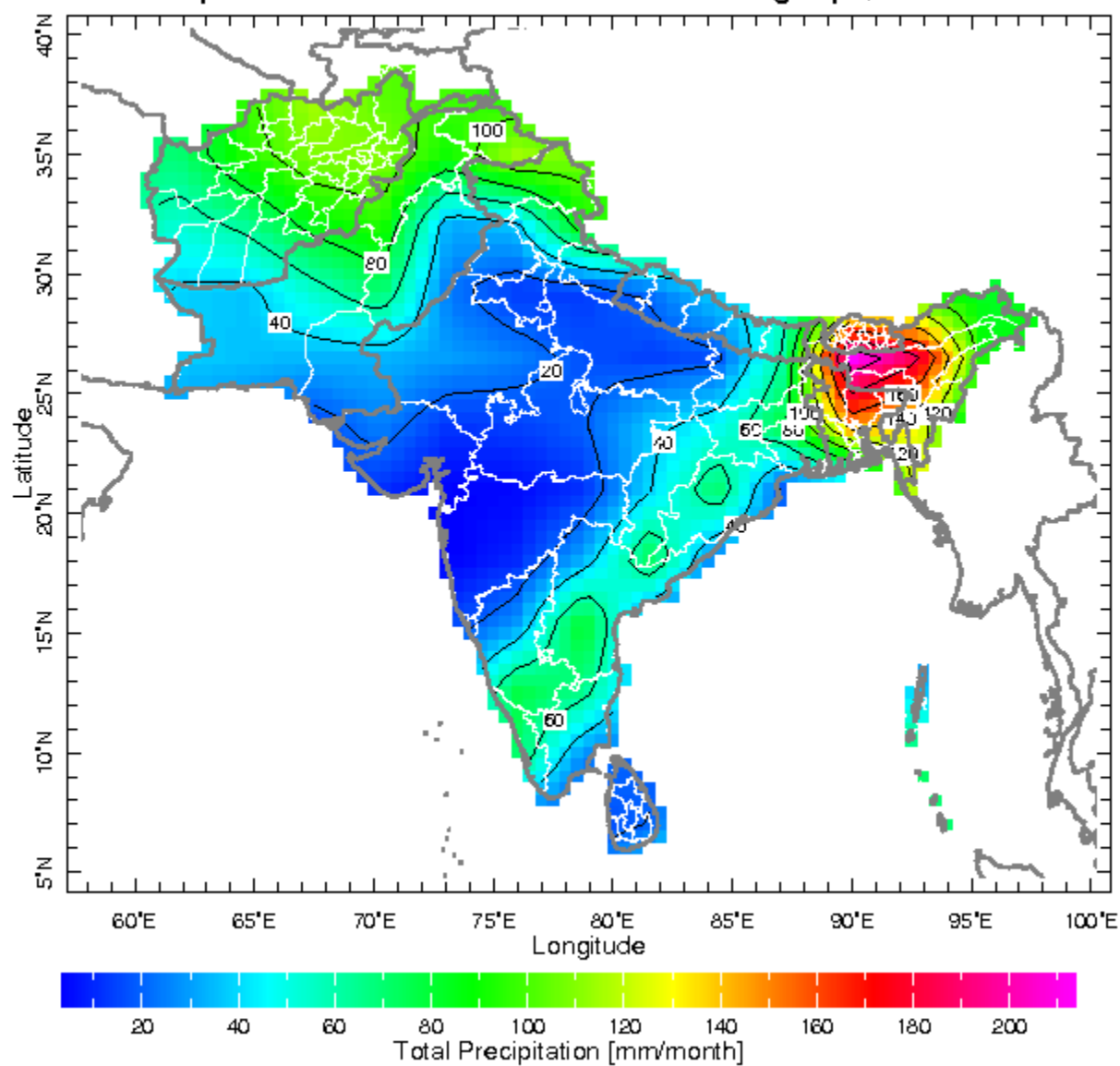
6. Spatial distribution of expected precipitation during coming season (GCM-ECHAM)



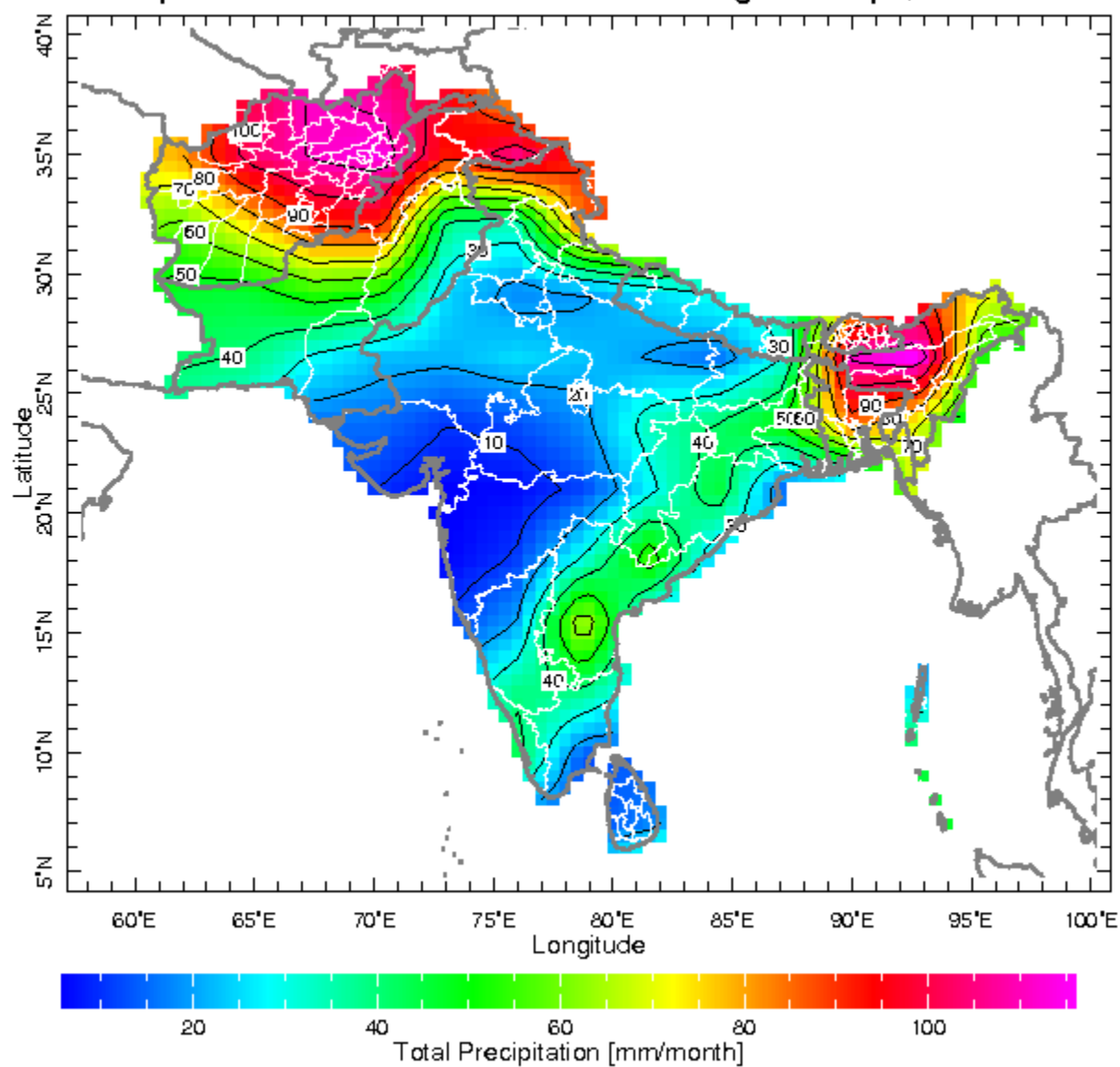
Expected rainfall in mm/month during Mar, 2015



Expected rainfall in mm/month during Apr, 2015

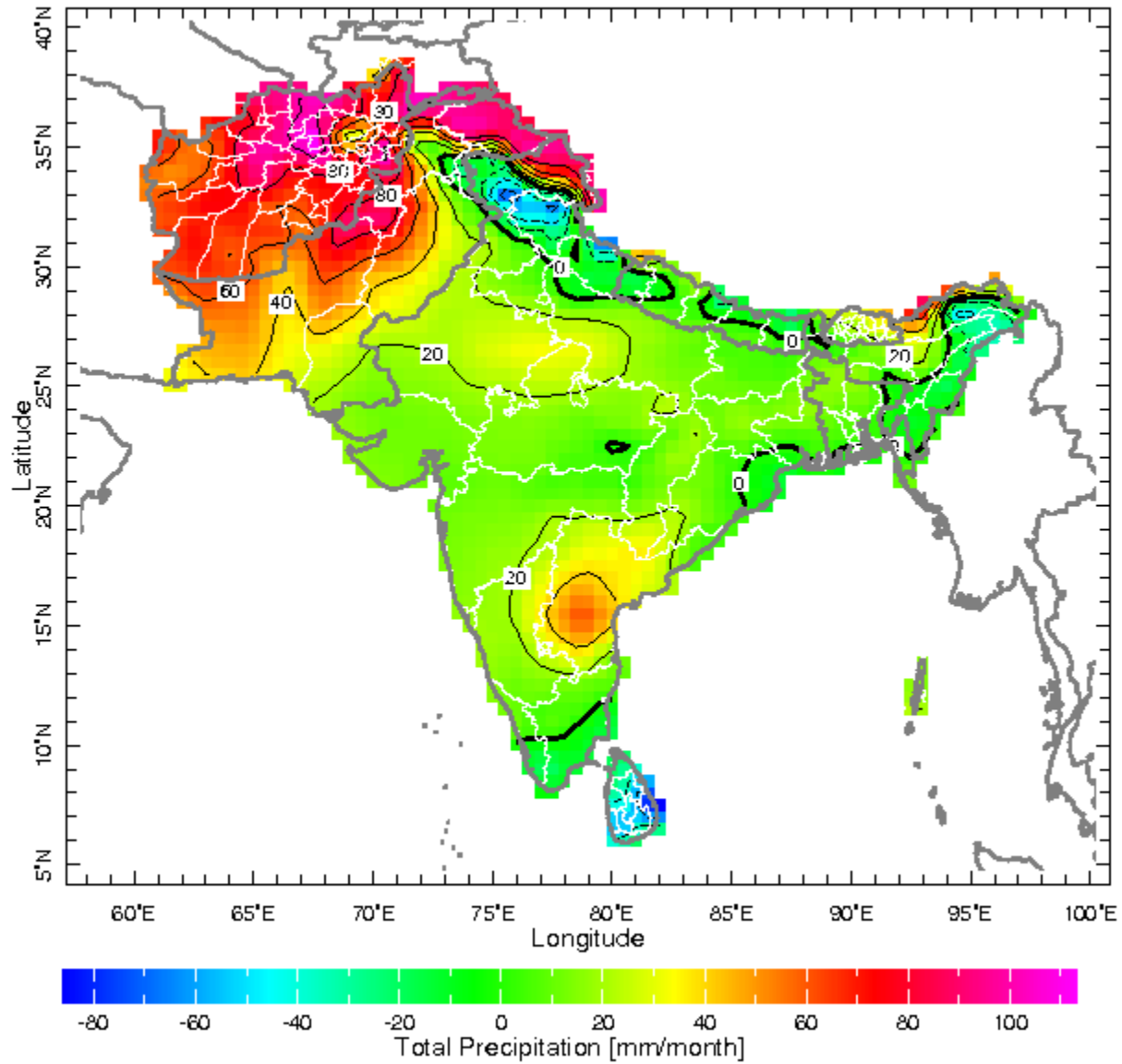


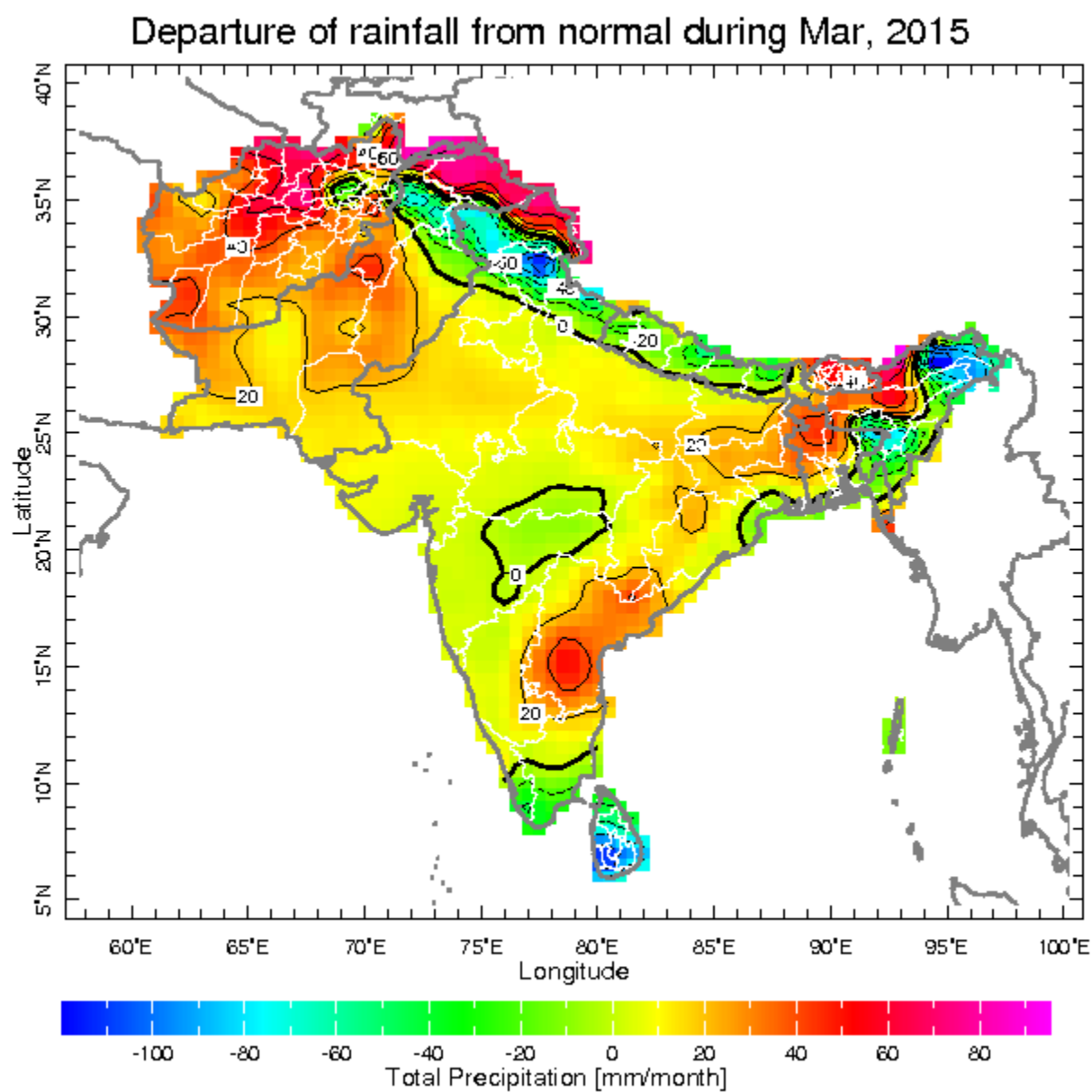
Expected rainfall in mm/month during Feb-Apr, 2015



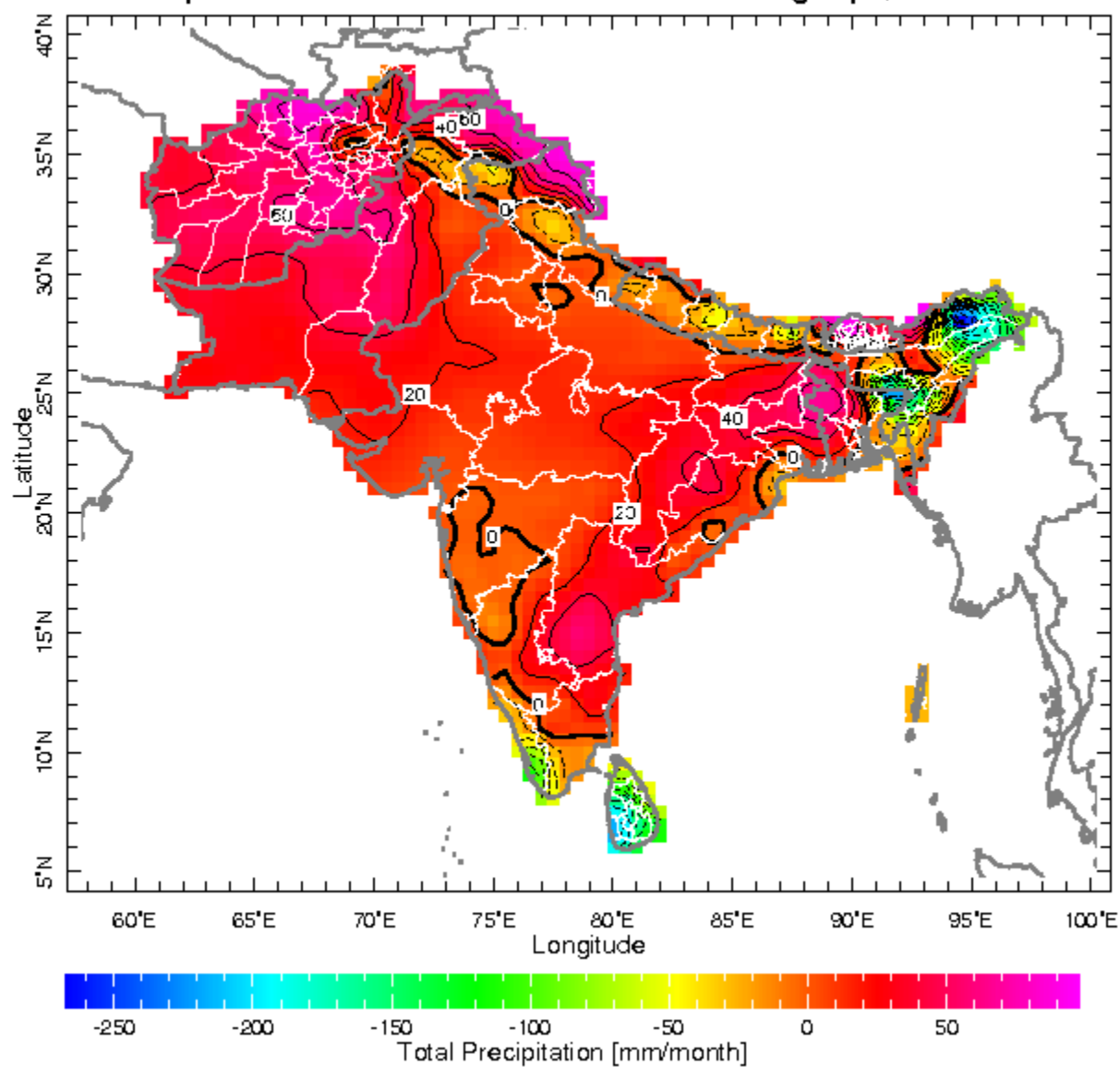
7. Monthly departure from normal (precipitation) during coming season

Departure of rainfall from normal during Feb, 2015

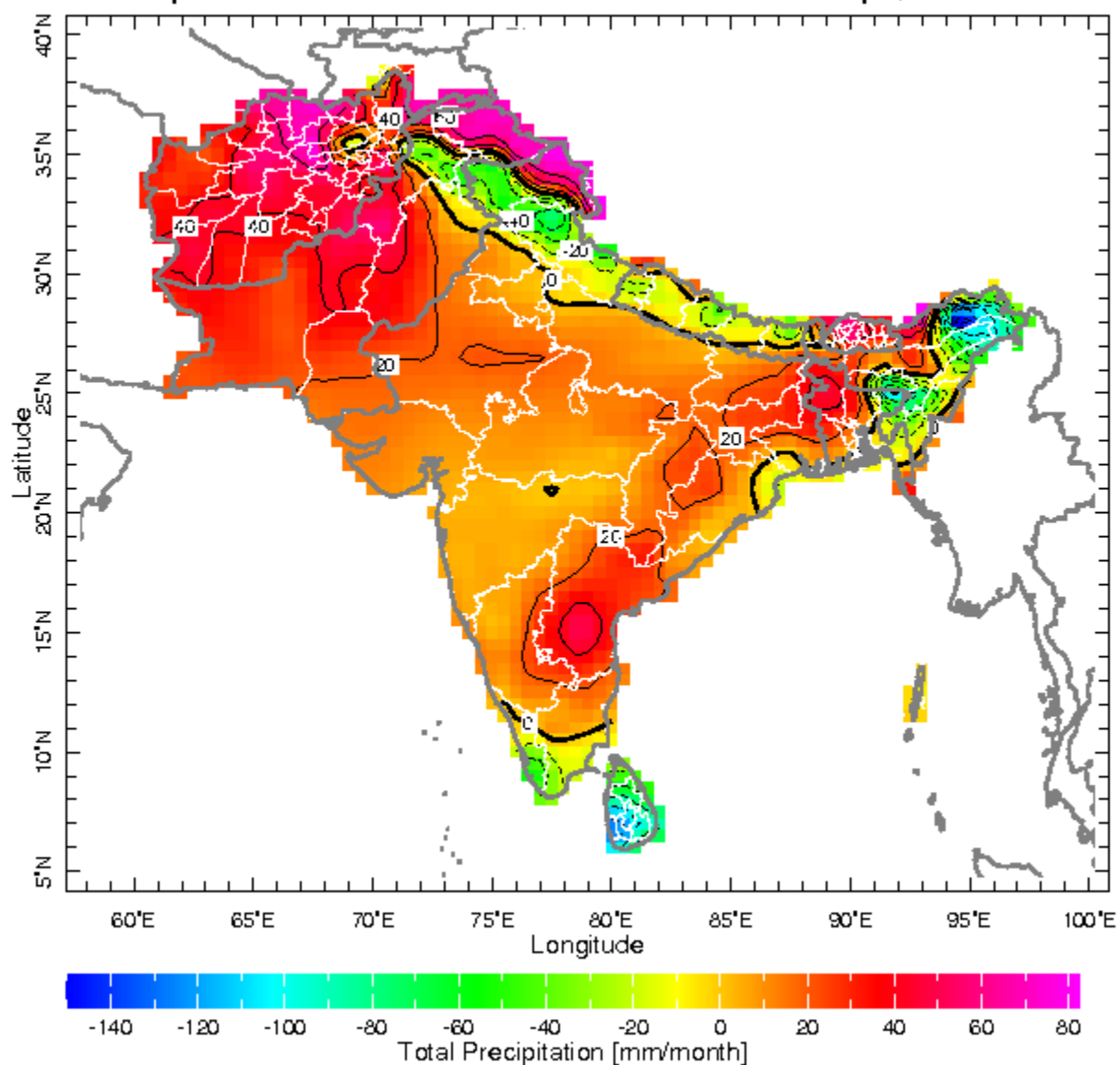




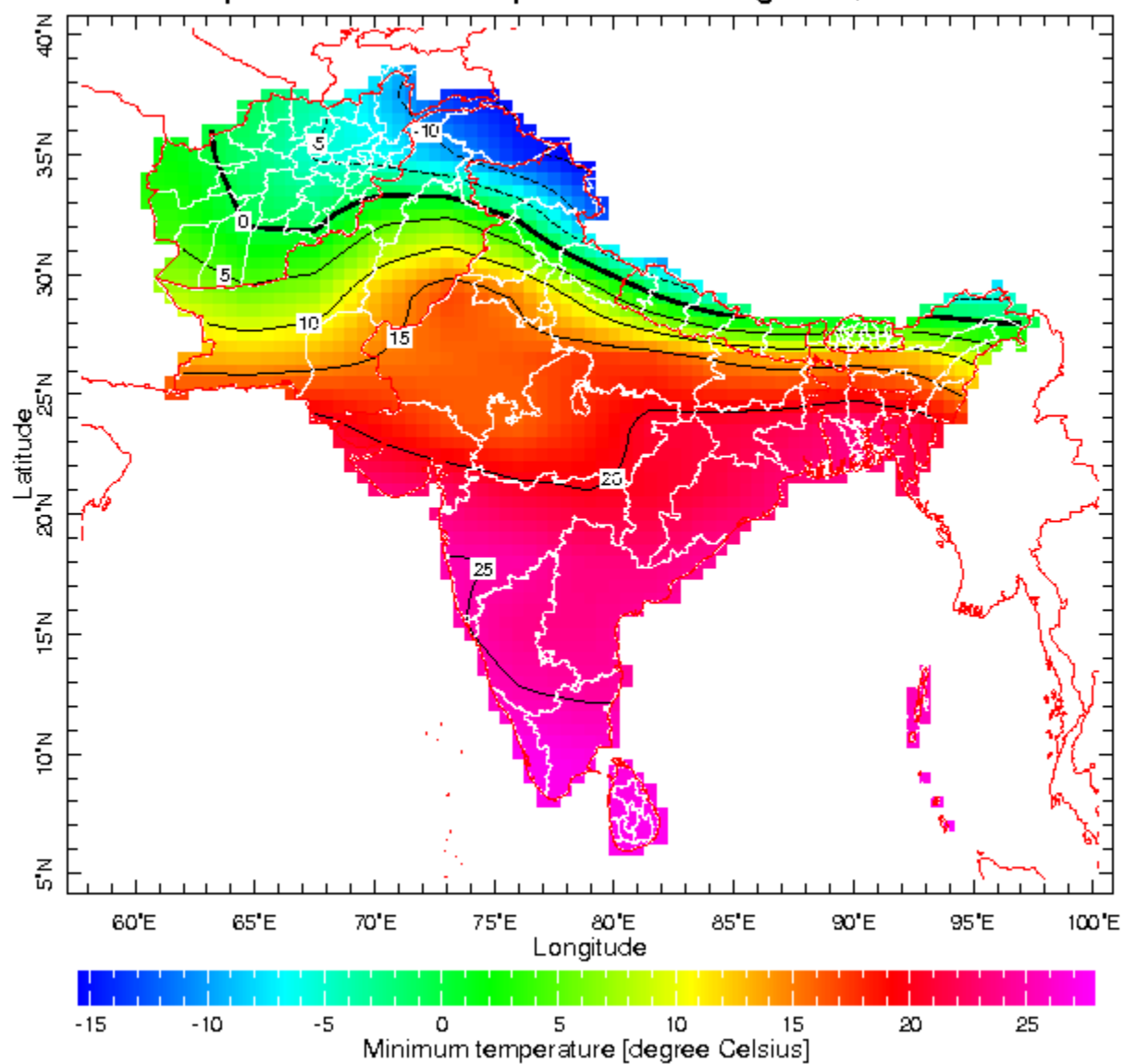
Departure of rainfall from normal during Apr, 2015



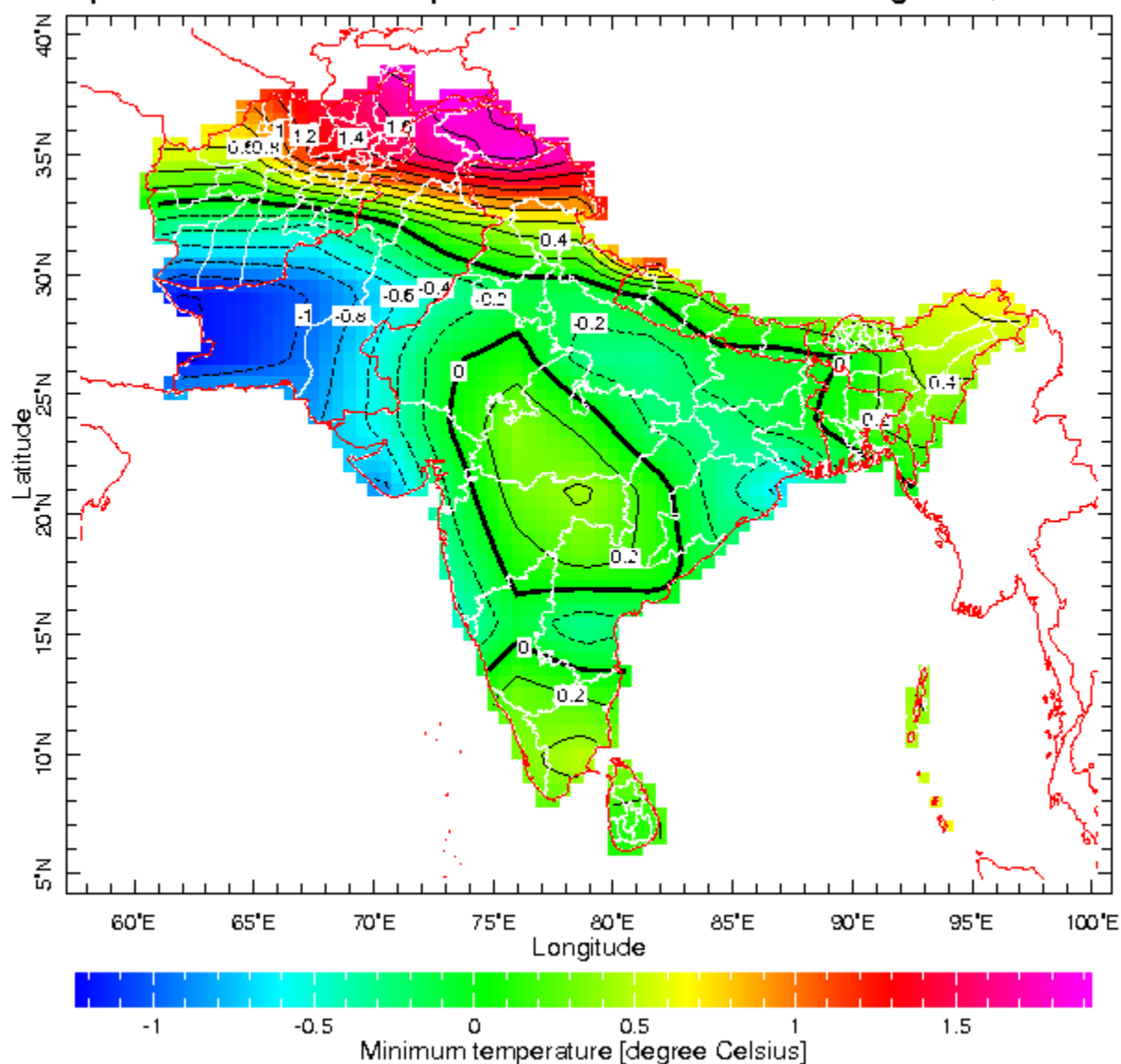
Departure of rainfall from normal for Feb-Apr, 2015



Expected Min. Temperature during Feb, 2015



Departure of Min. Temperature from normal during Feb, 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 10th of every month with three months in advance weather outlook. Latest seasonal weather summary can be download from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>