Seasonal weather outlook for SAARC region

(Dec, 2013-Feb, 2014)

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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 Dec 01, 2013. 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) < -10 %,*
- *Average precipitation range (Ave) = -10 to +10 %,*
- *Above Average (Abv.Ave) > +10 %*

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

2. Synoptic situation

- Location of jet stream (U wind at 200 hPa) is at normal position with higher intensity with bigger convergence areas of high winds towards the west. Intensity of jet stream will be slightly above normal during predicted period.
- A ridge at 500 hPa is expected to be at same position as normal with less intensity causing to de track the western disturbances towards north.
- Surface temperatures are expected to be on lower side than normal

- North Atlantic Oscillation (NAO) is in positive phase (0.9) and may cause to shift western disturbances towards north during coming months. Data source: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml

- Most of the set of dynamical and statistical model predictions issued during late October and early November 2013 predict neutral ENSO conditions through the rest of 2013 and into early 2014, with a warming tendency during northern spring and summer 2014. There is a possibility of development of weak El Nino conditions by the middle of 2014. In the most recent week, the SST anomaly in the Nino3.4 region was 0.0C^{o}. Data source: http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

Probability outlook: La Nina (3%), Neutral (96%) and El Nino (1 %) during Dec-Jan-Feb, 2014 season

- Arabian Sea Surface Temperatures are expected to be slightly above normal near the coast of Pakistan and normal over far from coast.
- Caspian Sea surface temperatures expected to be slightly below normal.
- Mediterranean Sea surface temperatures are normal to slightly above normal.

- Bay of Bengal Sea Surface Temperatures are normal.

1. *Summary (Dec, 2013-Feb, 2014)*

"Average precipitation is expected during the season (DJF)"

Synthesis of the latest model forecasts for Dec, 2013 to Feb 2014 (DJF), current synoptic situation and regional weather expert's judgment indicates that normal precipitation is expected during the predicted season. Above normal minimum temperature will persist almost all over the SAARC member countries with higher values over eastern states of India and extreme northern parts of Pakistan during early December while it will start decreasing from end of December. January will be colder month over Pakistan, Afghanistan and upper half of India whereas southern parts of India will have above normal night temperature. Neutral-ENSO conditions are expected to persist throughout the season.

Seasonal weather outlook:

As a whole, normal rainfall is likely all over the region during the season with below normal during February. Average precipitation is expected all over the SAARC member countries except Afghanistan with above normal and Sri Lanka with extremely below normal.

However, Chances of extreme weather during predicted months are very limited.

Meteorological drought condition will prevail over Sri Lanka which may reduce water level in the region.

Chances of drought in western Pakistan can not be ruled out during winter season.

December, 2013: Average rainfall is expected all over the region as a whole with significantly below average over Sri Lanka and slightly above over Afghanistan. However, below normal precipitation is expected over extreme southern coastal belt of India with slightly above normal over northeastern Afghanistan and northern parts of Pakistan. Intensity of precipitation will be higher over Sri Lanka, northern Afghanistan and northern parts of Pakistan and extreme southern coastal belt of India.

Above normal night temperature will be expected during December in the region with much higher values over eastern parts of the India.

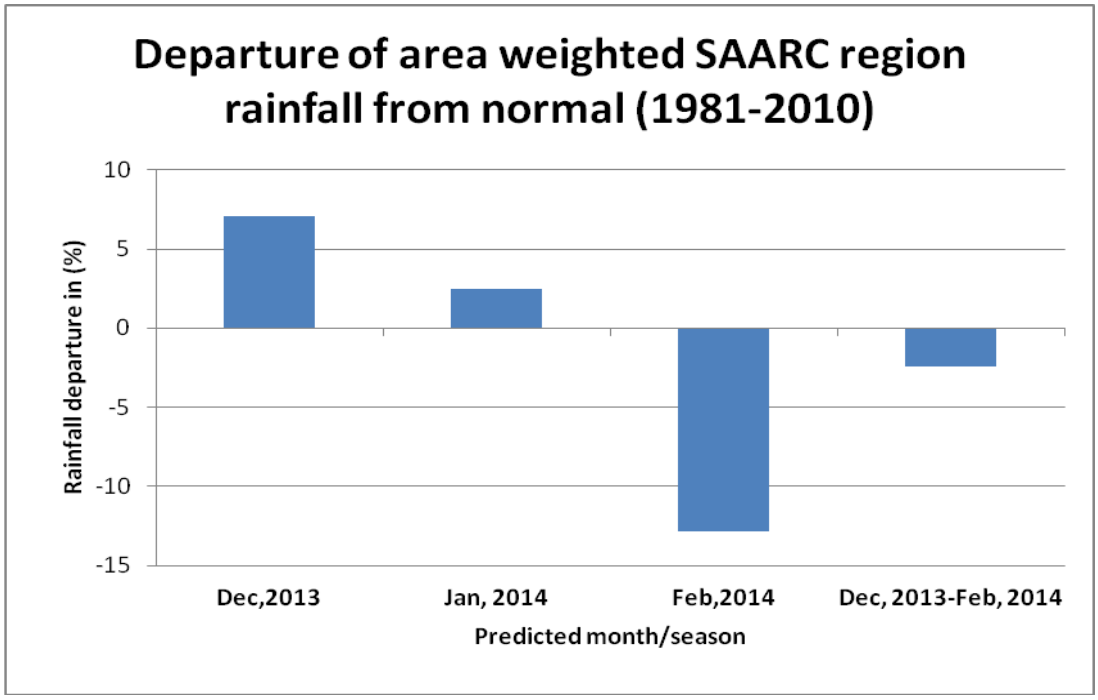
January, 2014: Average precipitation is expected during January all over whole SAARC region with significantly below average over Sri Lanka. Precipitation is expected over northern and eastern parts of Afghanistan, central east and upper parts of Pakistan and northeastern, northwestern parts of India. However, below normal precipitation is expected over Nepal, Bangladesh and most of Indian region.

Below normal night temperature will be expected over northern half of the region whereas above normal night temperature will be over southern half of the region.

February, 2014: As a whole below normal precipitation is expected all over the region with above normal over Afghanistan, average over Pakistan, Bangladesh, Bhutan, Nepal and India and extremely below over Sri Lanka. However, intensity of precipitation will be higher over Afghanistan, western parts of Nepal, northern parts of Pakistan and northeastern India. Below normal precipitation will be expected over northwestern India including Kashmir and Sri Lanka.

Above normal night temperature will be expected over extreme north and southern parts of the region whereas central parts will experience below normal night temperature during the February.

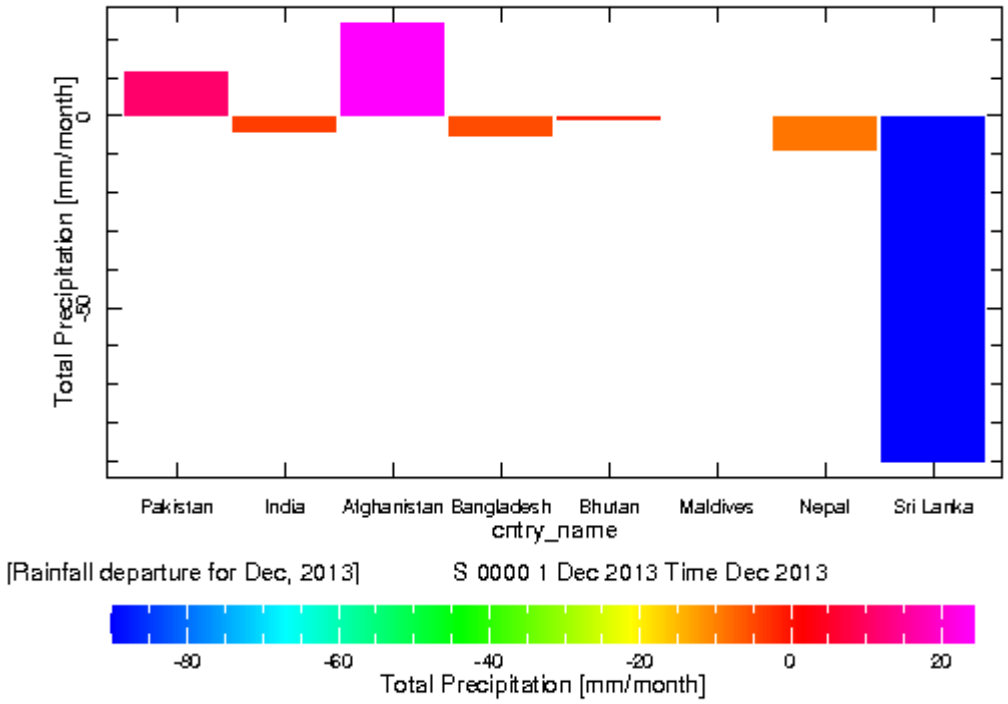
November-December: Above normal precipitation is expected over SAARC member countries. A chance of less dense fog in the region is expected. Normal weather phenomenon will be expected. Positive NAO indicates that weather pattern will be focused over northern region whereas southern parts will receiver less than normal precipitation. Chances of drought in the region are more in later stages during the predicted months.



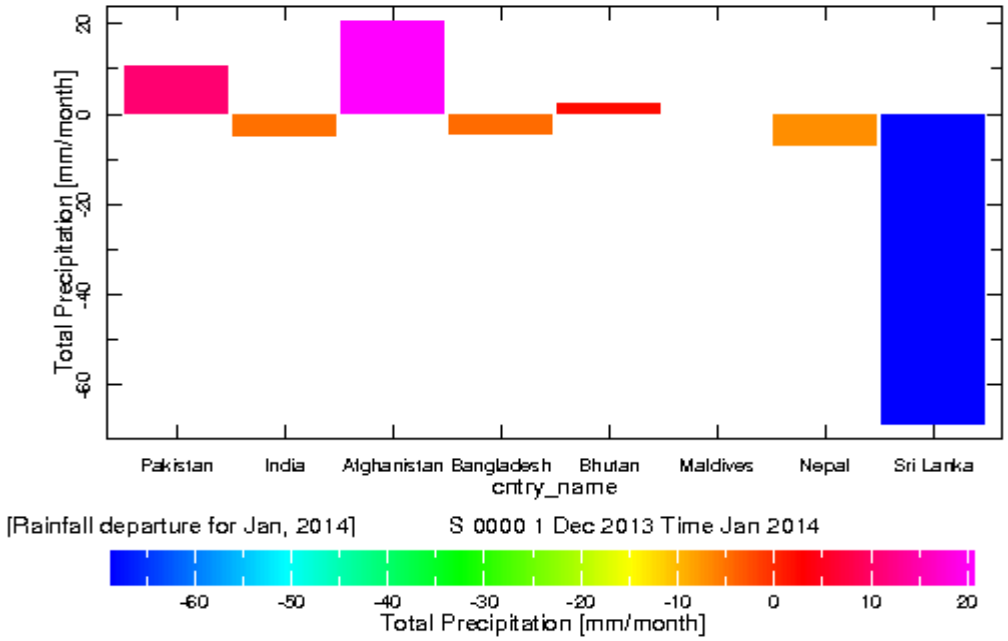
Note: Departure of Area-weighted rainfall of SAARC region has been computed by subtracting ECHAM predicted monthly/seasonally rainfall from GPCC of corresponding month/season.

3. Country wise monthly and seasonal departure of precipitation from normal

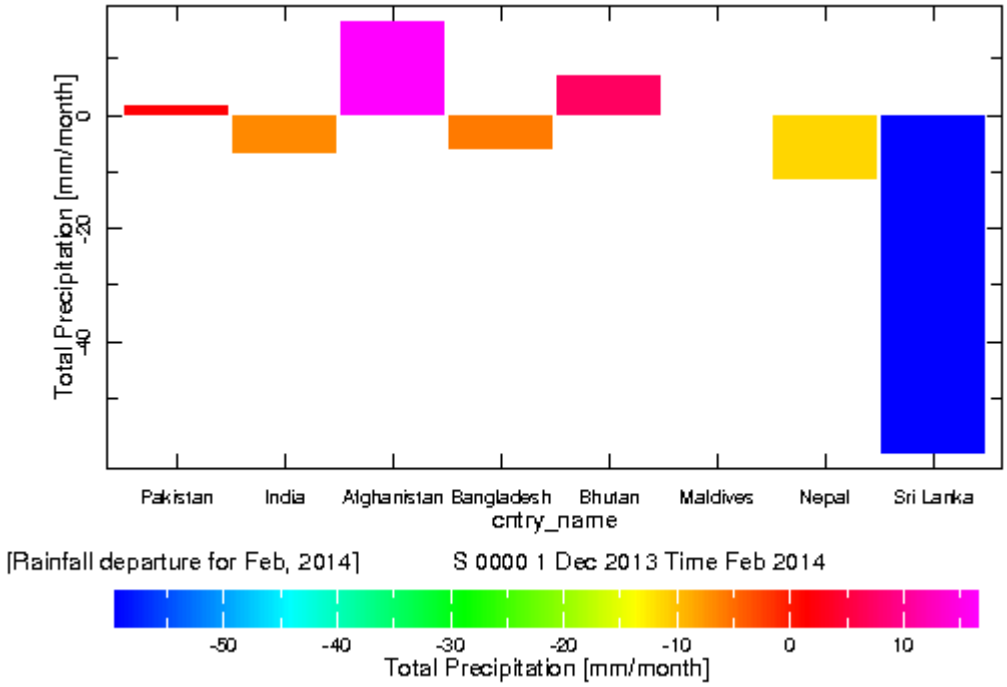
a. Monthly (Dec, 2013)



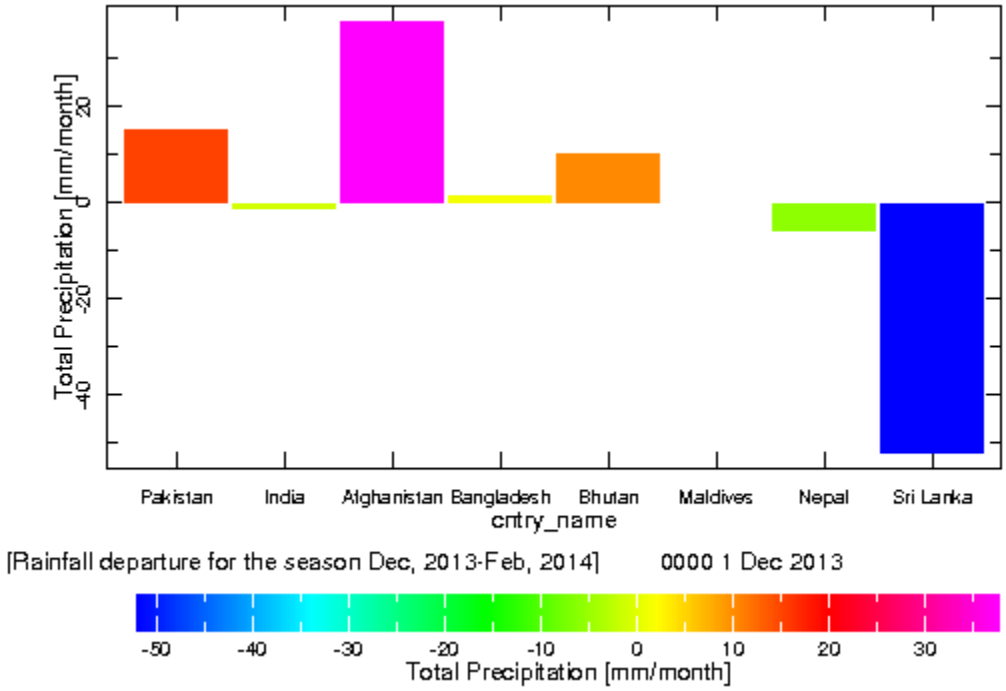
Monthly (Jan, 2014)



b. Monthly (Feb, 2014)



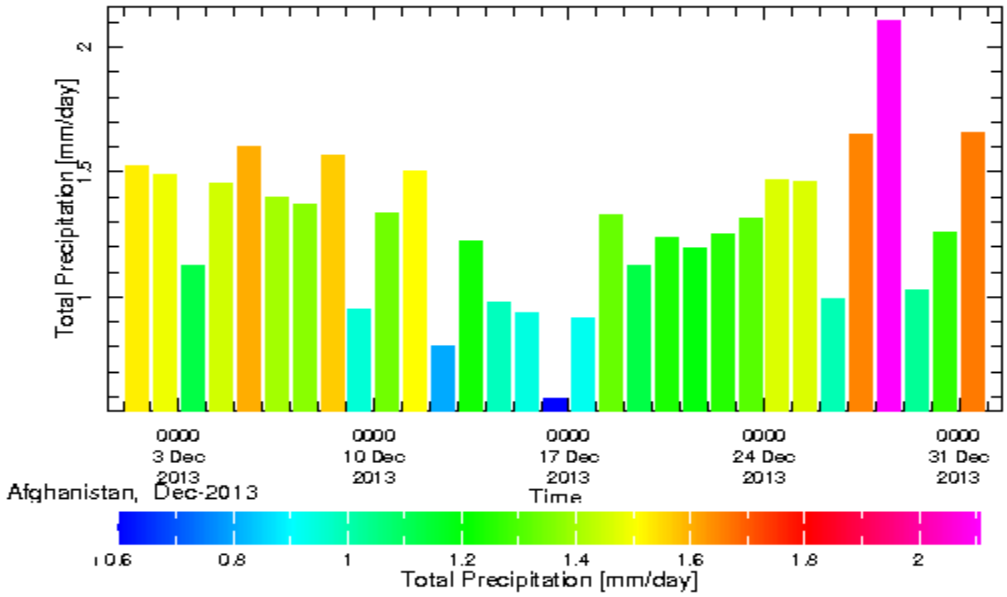
c. Seasonally (Dec, 2013-Feb, 2014)



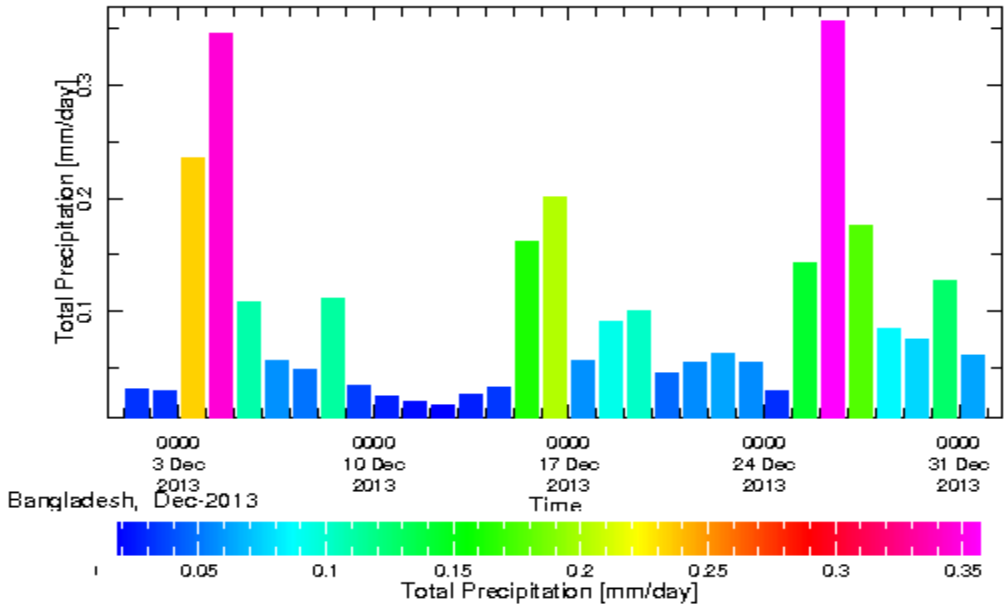
4. *Daily country wise precipitation predictrion for current month (December, 2013)*

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.*

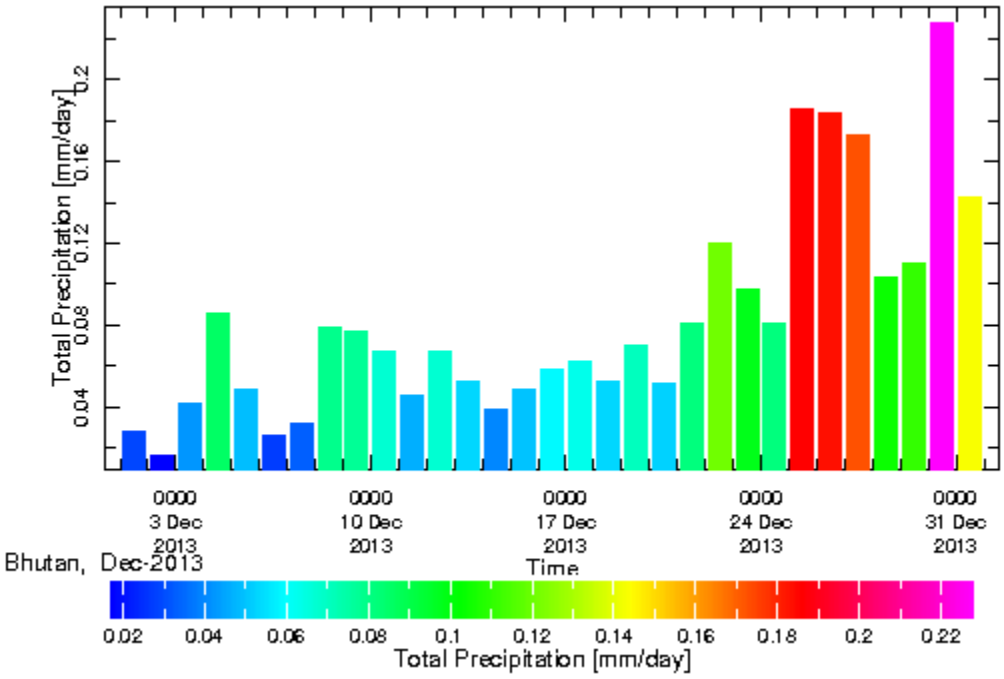
Afghanistan



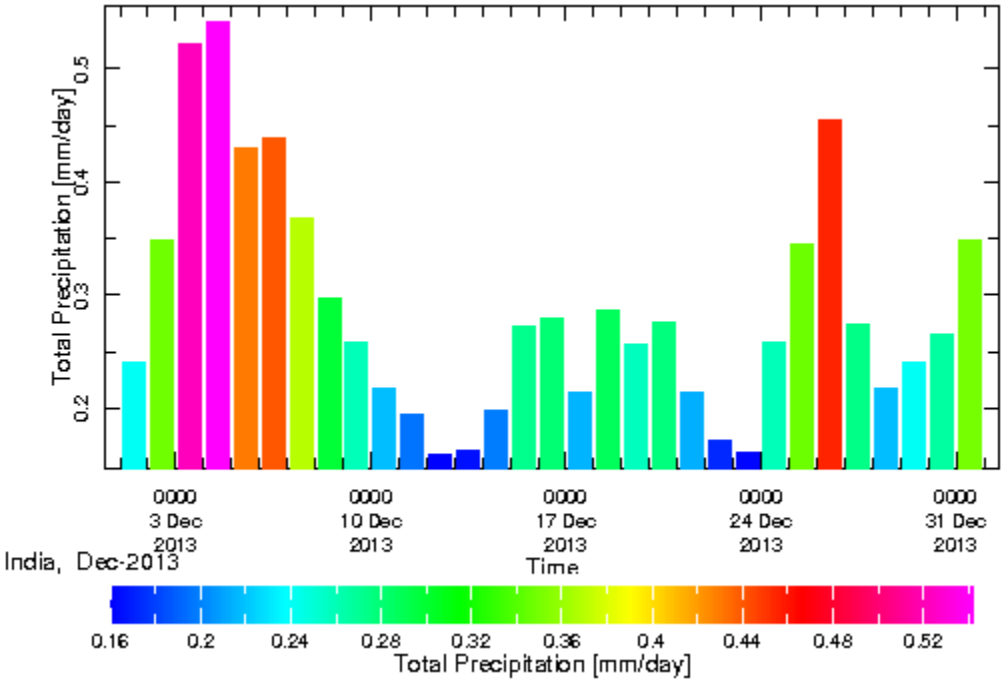
Bangladesh



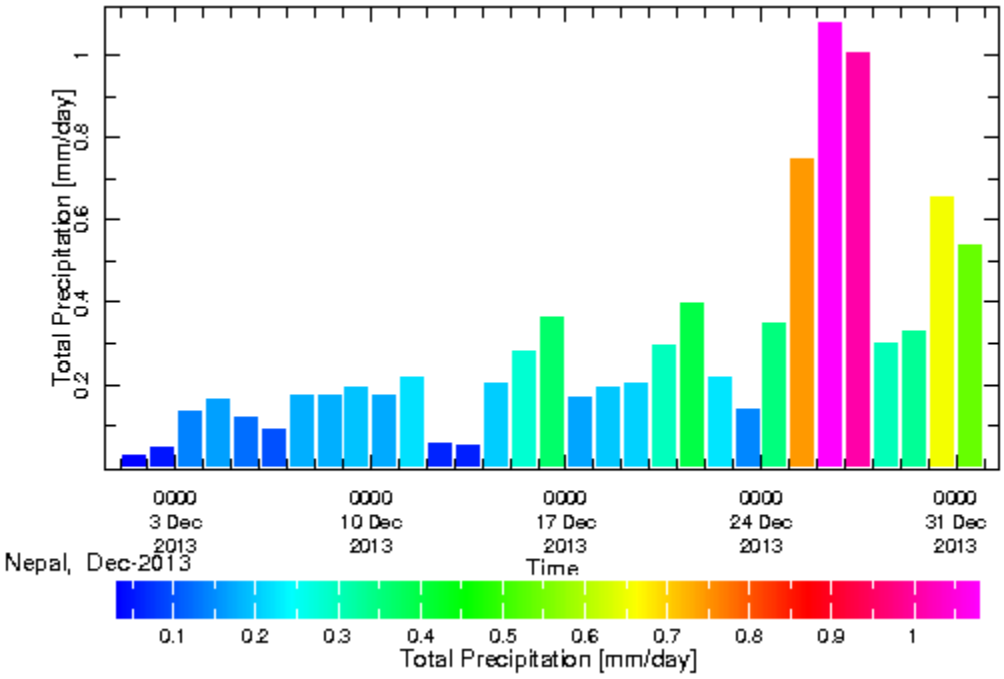
Bhutan



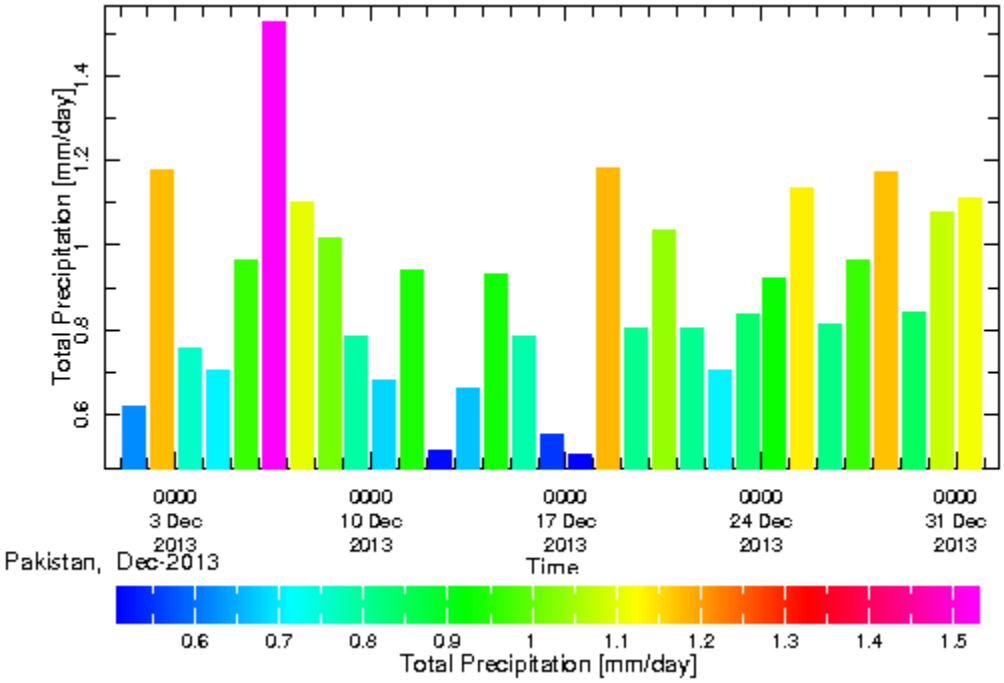
India



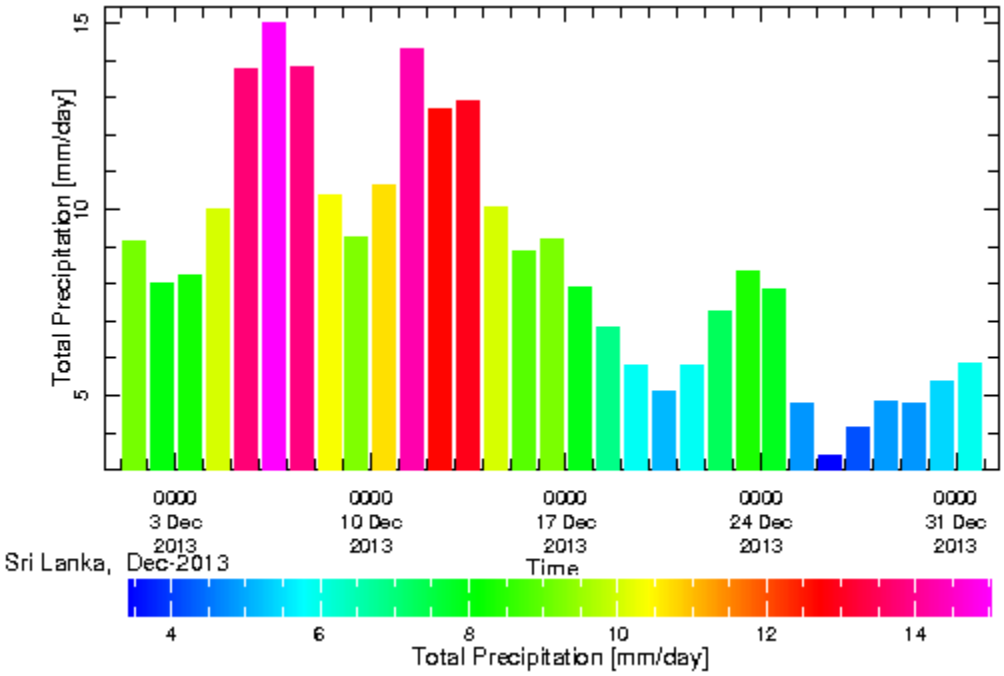
Nepal



Pakistan

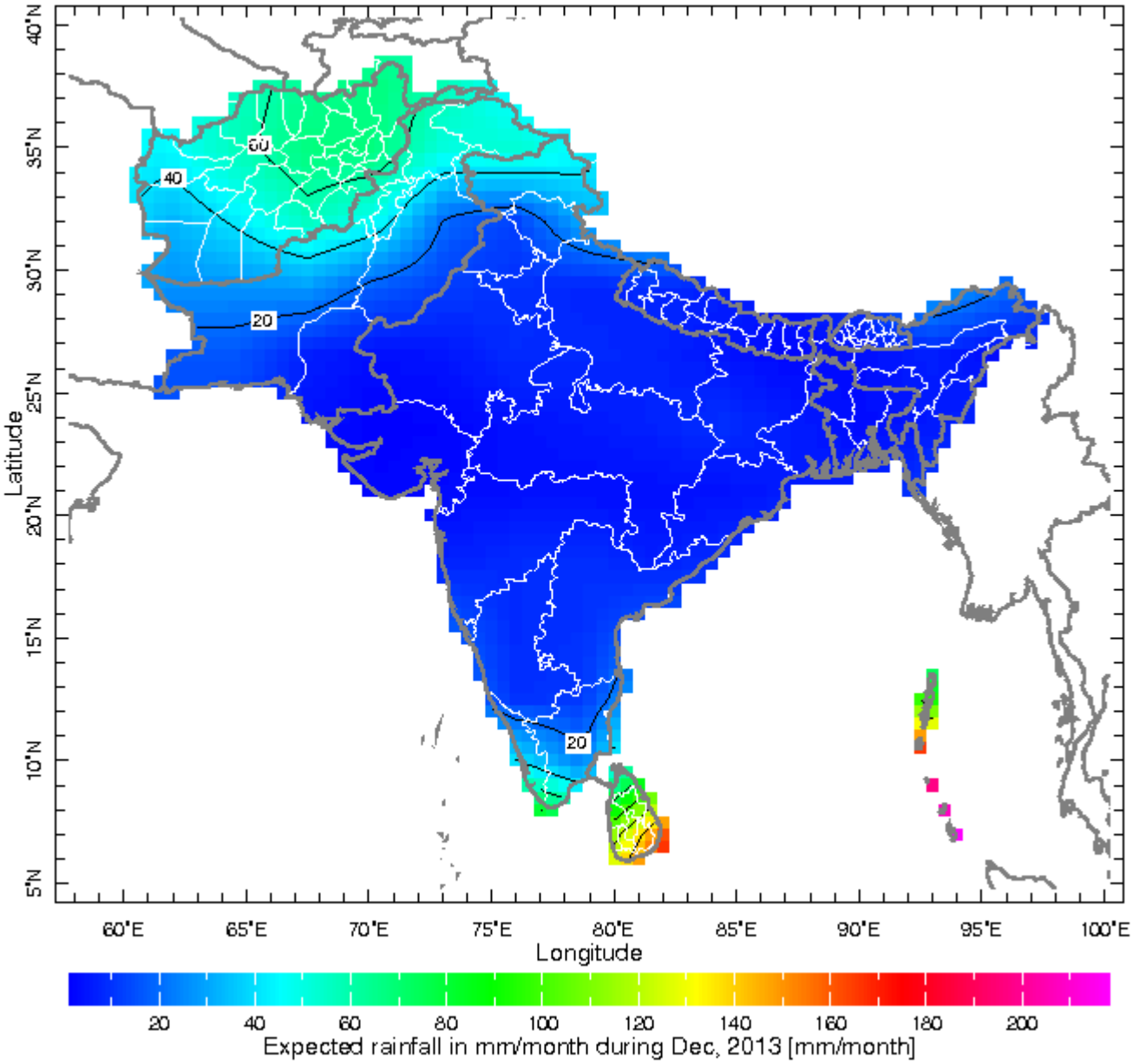


Sri Lanka

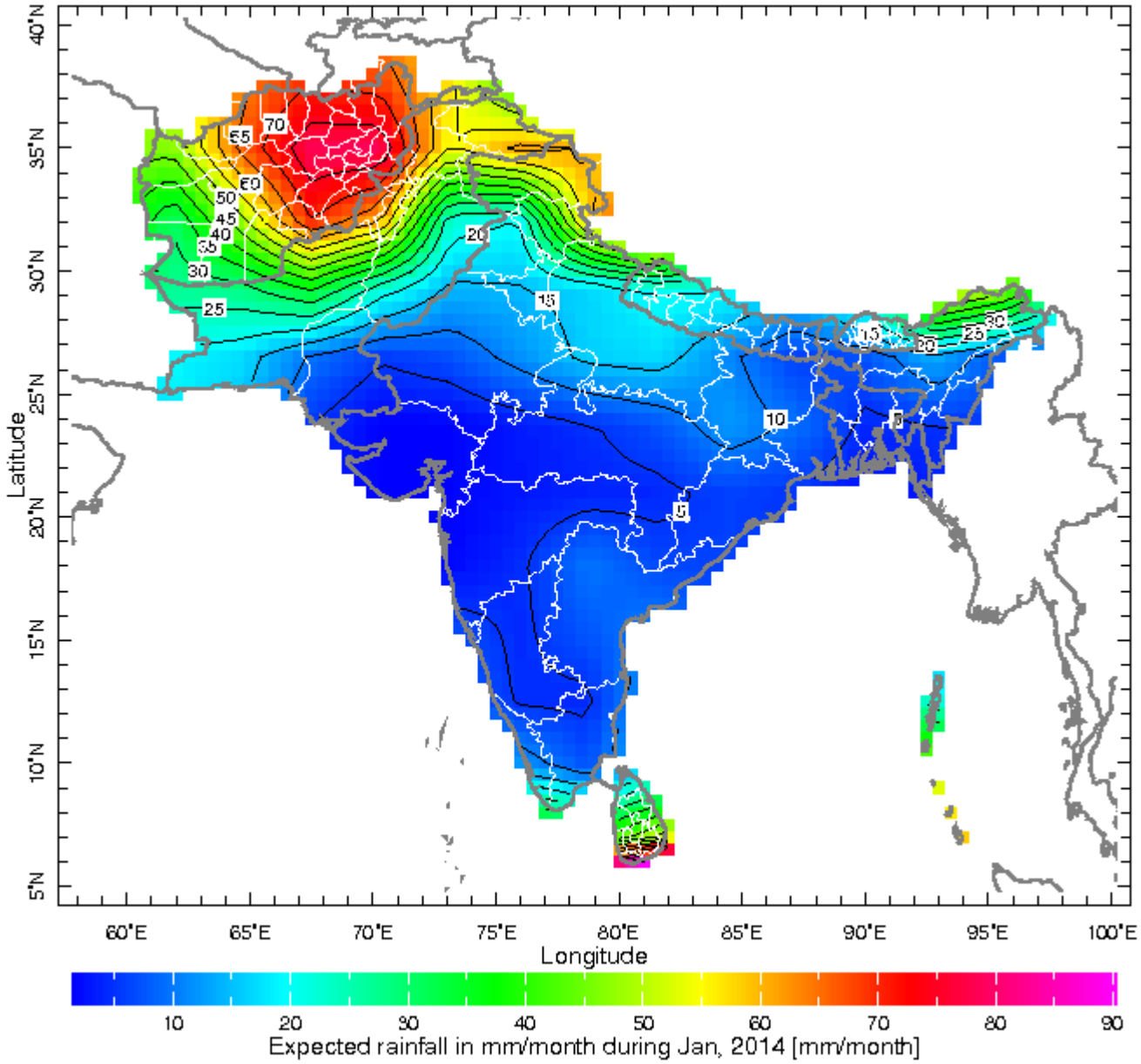

Total Precipitation [mm/day]
15
10
5
0000
3 Dec
2013
0000
10 Dec
2013
0000
17 Dec
2013
0000
24 Dec
2013
0000
31 Dec
2013
Sri Lanka, Dec-2013
Time
4
6
8
10
12
14
Total Precipitation [mm/day]

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

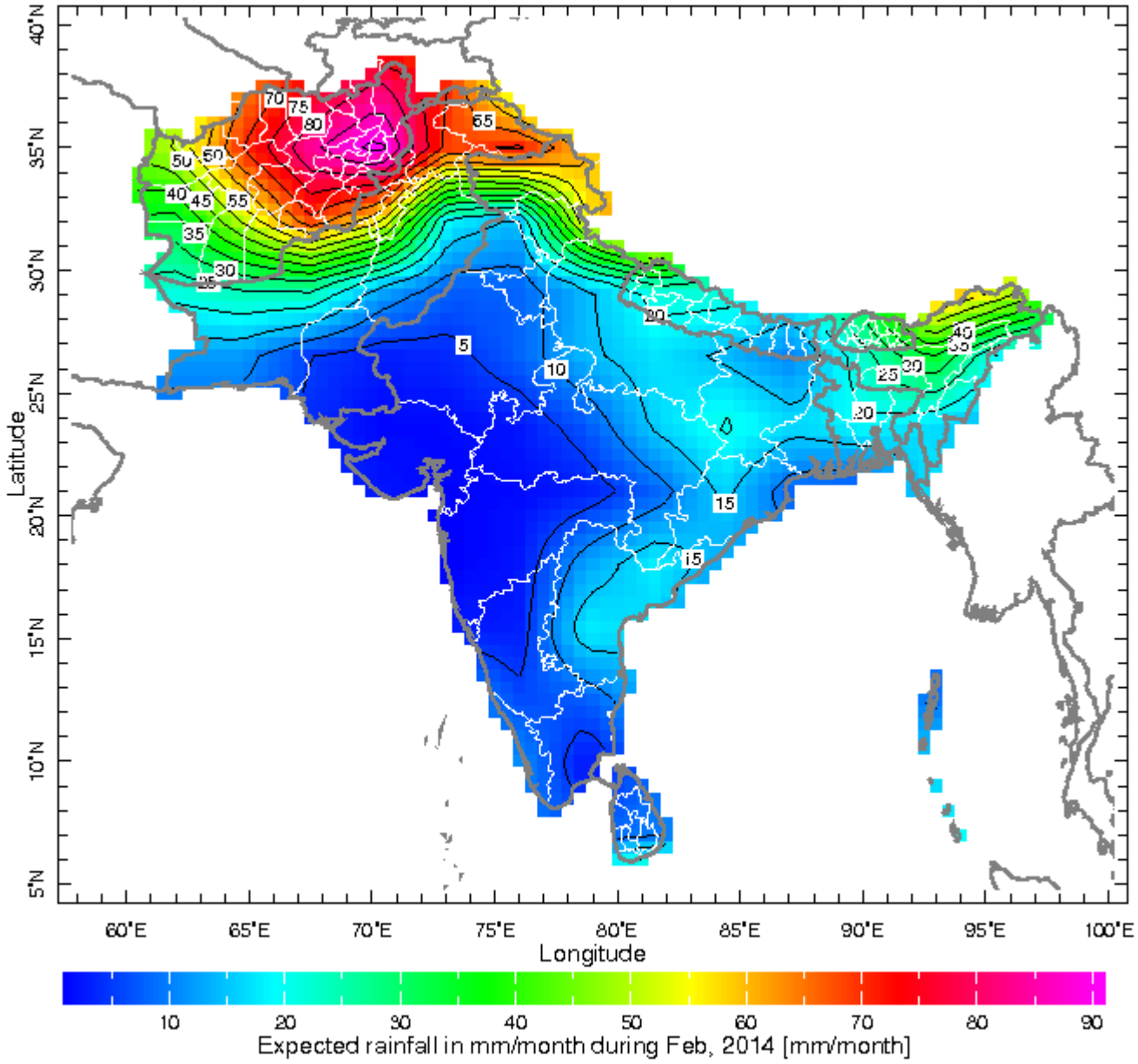
Dec, 2013



Jan, 2014


40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
Latitude
60°E
65°E
70°E
75°E
80°E
85°E
90°E
95°E
100°E
Longitude
70
55
60
50
45
40
35
30
25
20
15
10
5
10
20
30
40
50
60
70
80
90
Expected rainfall in mm/month during Jan, 2014 [mm/month]

Feb, 2014


40°N
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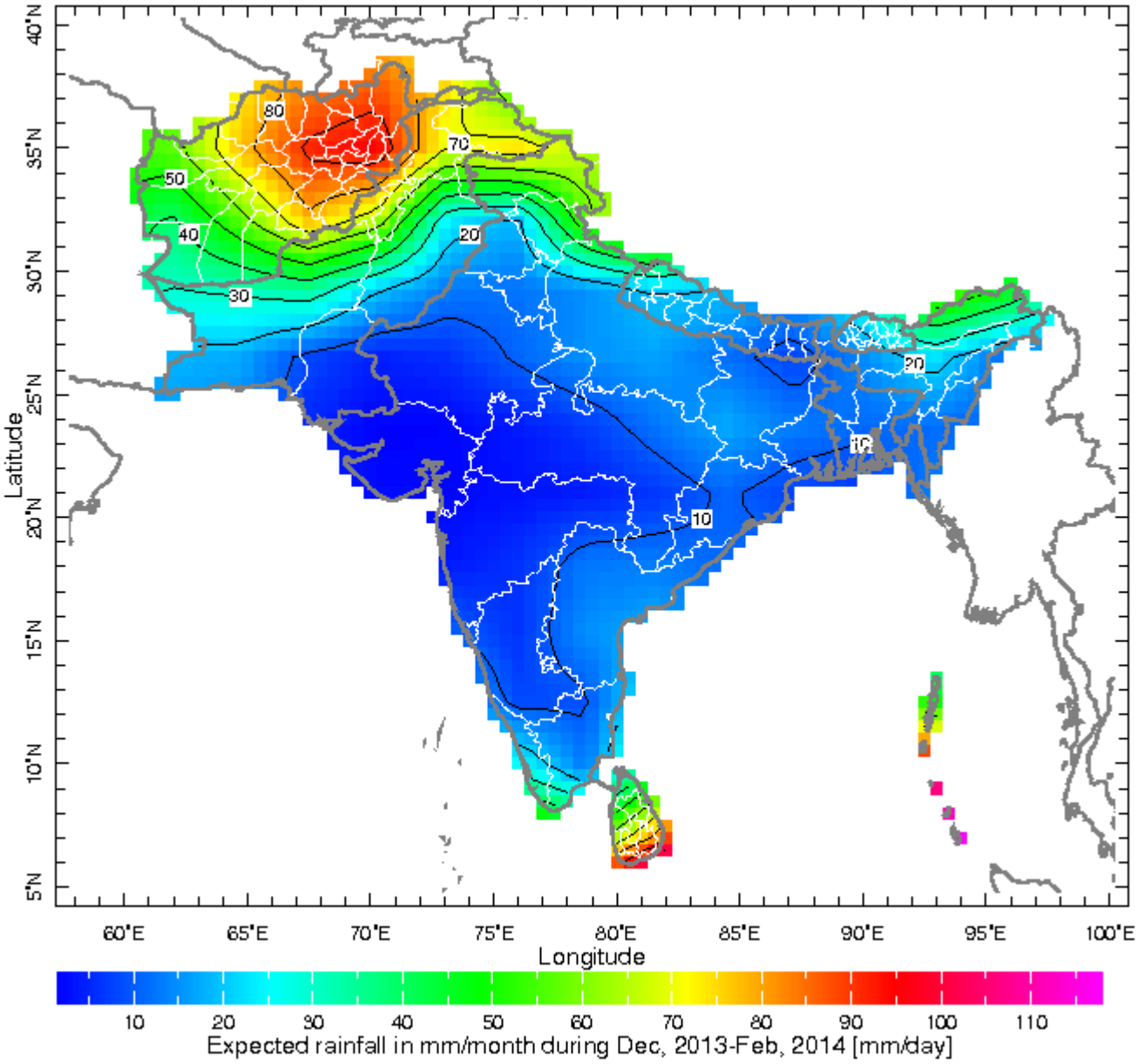
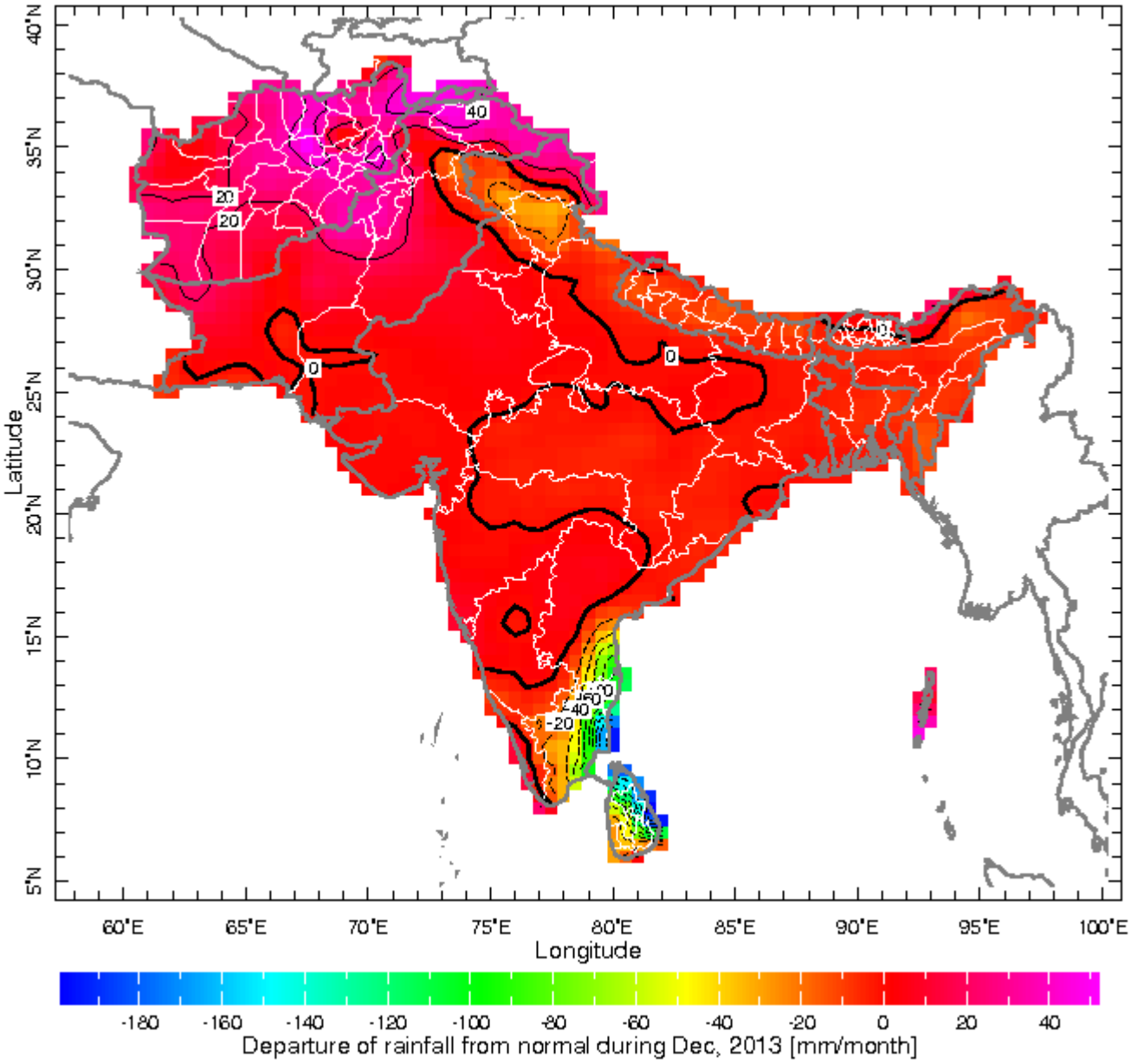
10°N
5°N
Latitude
60°E
65°E
70°E
75°E
80°E
85°E
90°E
95°E
100°E
Longitude
10
20
30
40
50
60
70
80
90
Expected rainfall in mm/month during Feb, 2014 [mm/month]

Dec, 2013-Feb, 2014

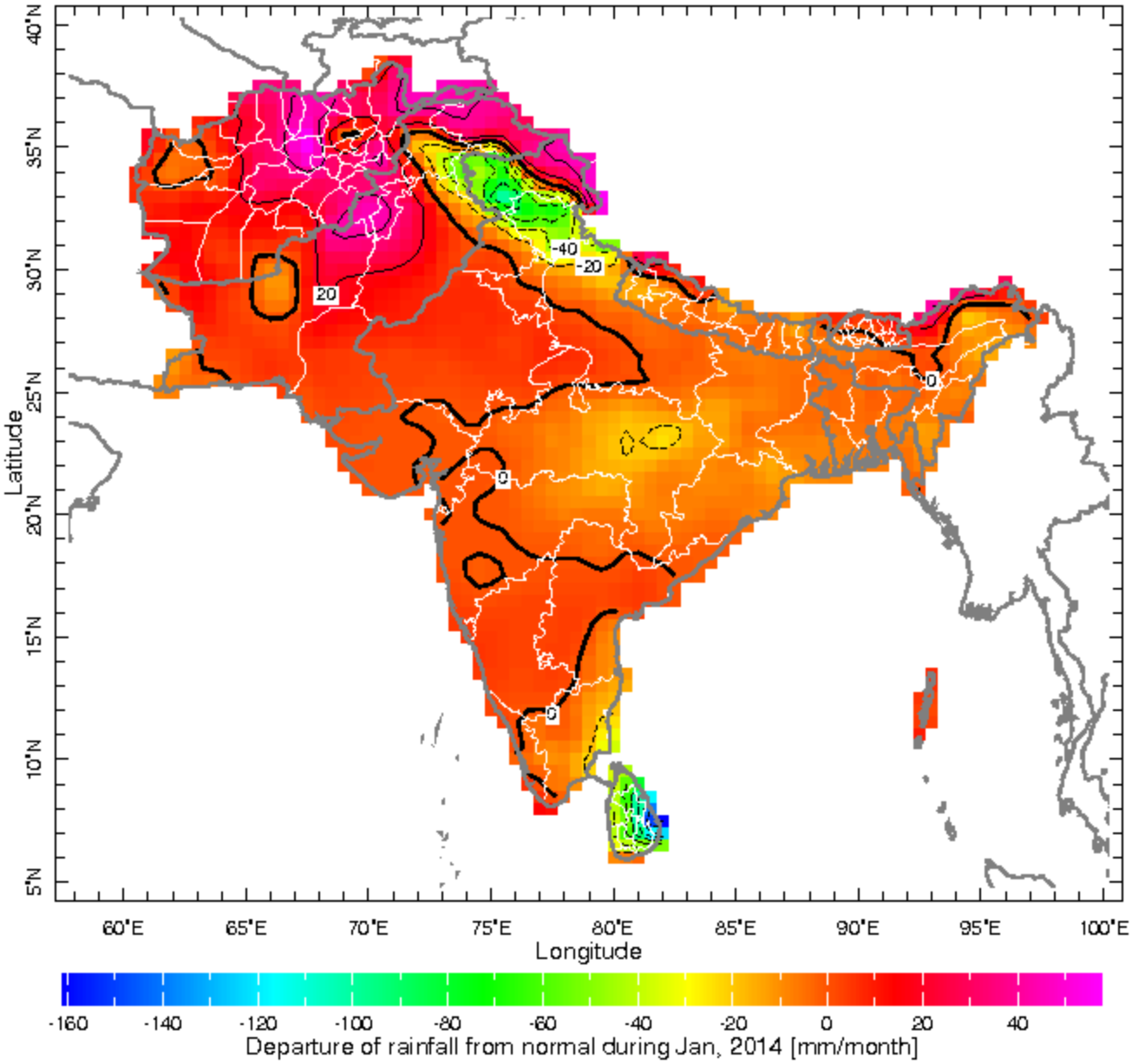


6. Monthly departure from normal (precipitation) during coming season

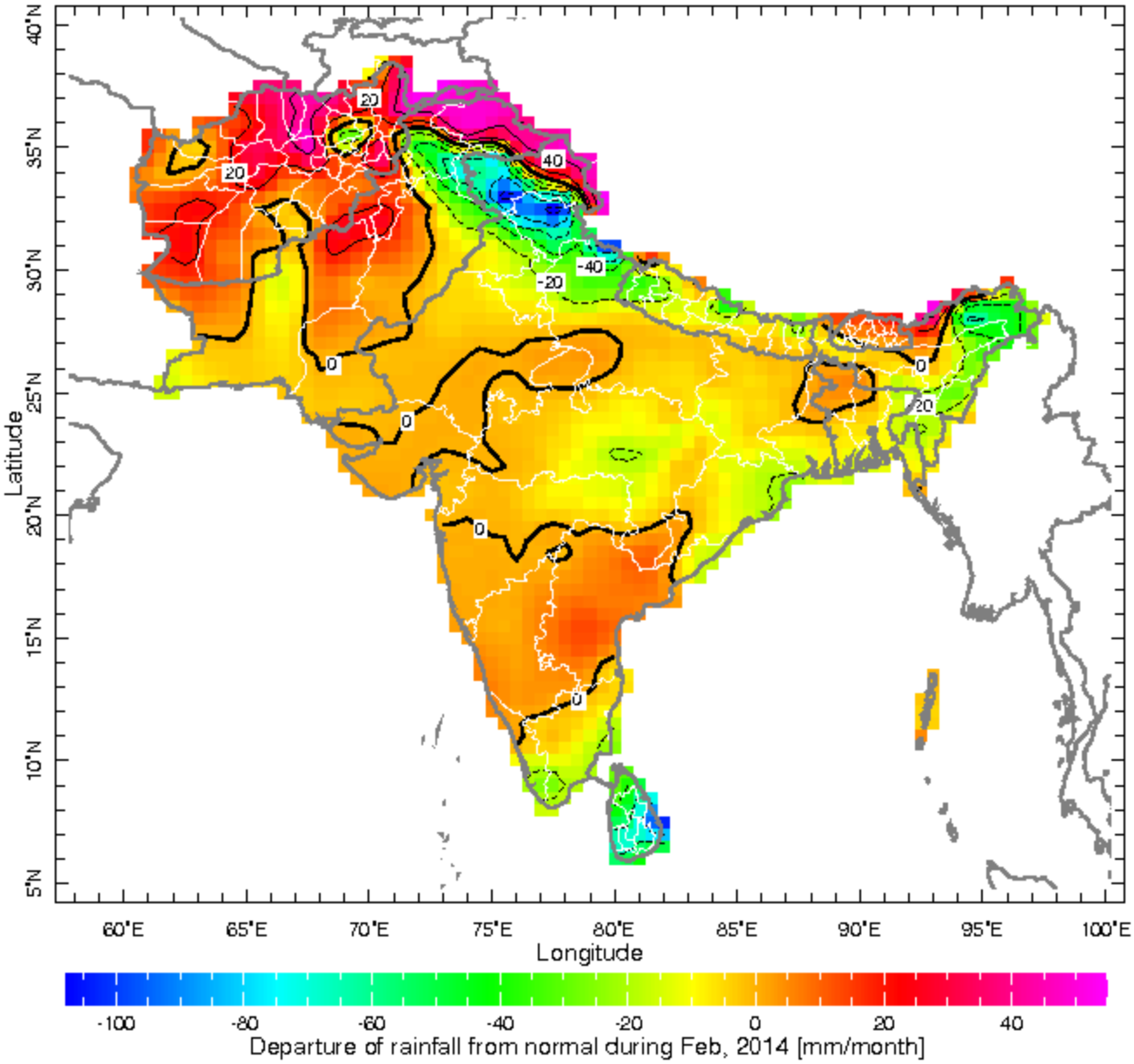
Dec, 2013



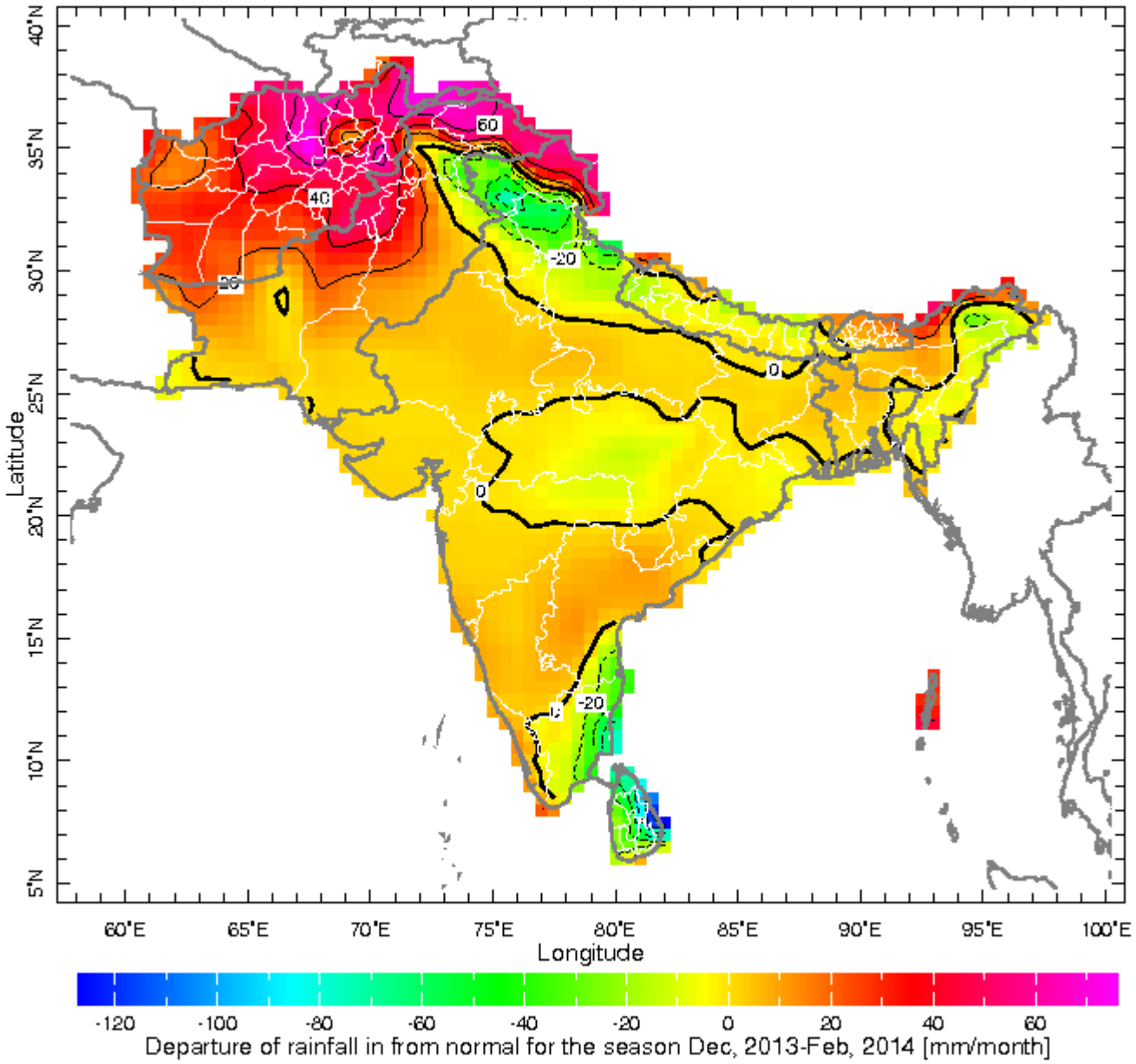
Jan, 2013


40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
Latitude
60°E
65°E
70°E
75°E
80°E
85°E
90°E
95°E
100°E
Longitude
-40
-20
20
0
-160
-140
-120
-100
-80
-60
-40
-20
0
20
40
Departure of rainfall from normal during Jan, 2014 [mm/month]

Feb, 2014

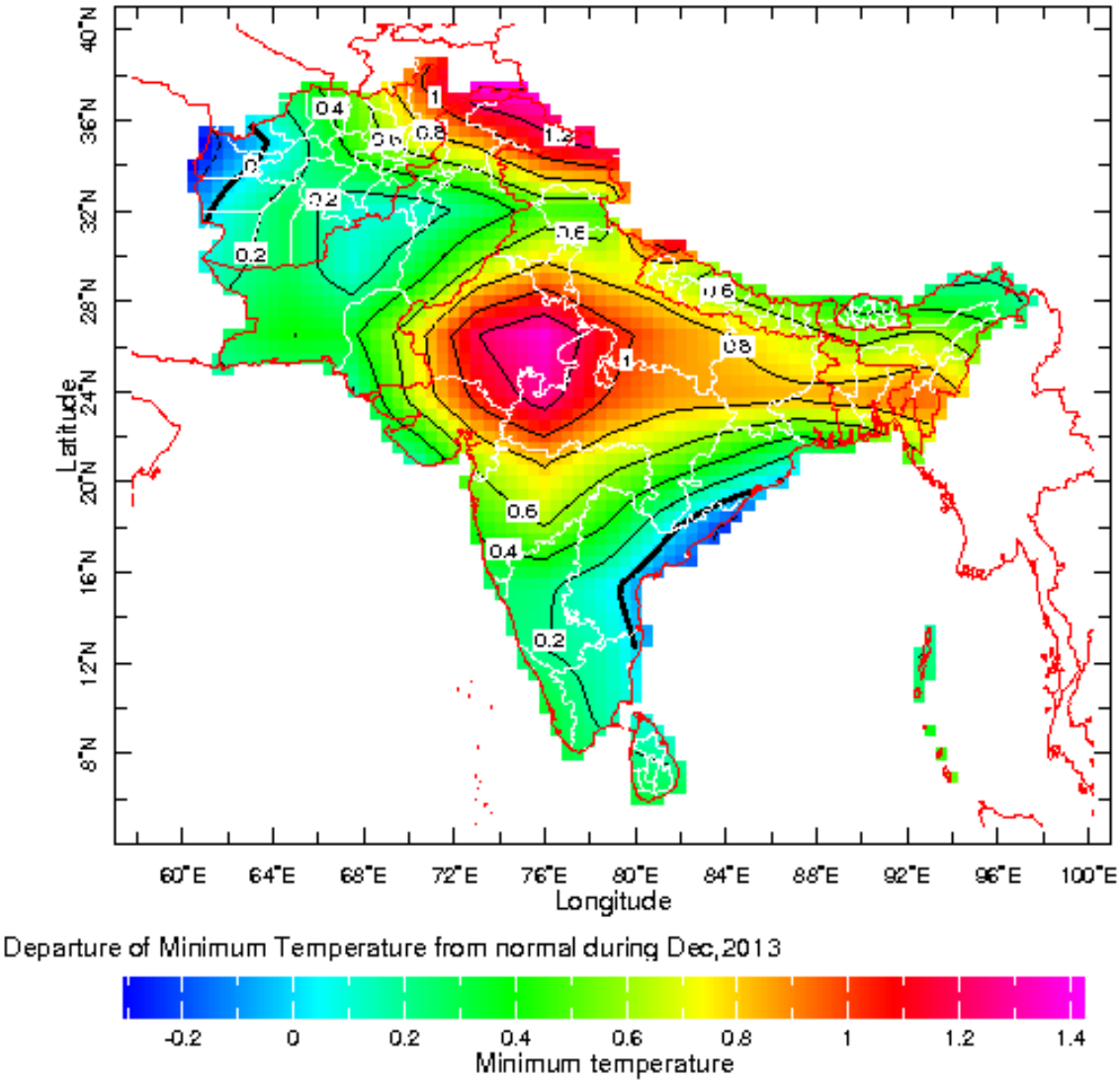

40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
Latitude
60°E
65°E
70°E
75°E
80°E
85°E
90°E
95°E
100°E
Longitude
20
40
-40
-20
0
-100
-80
-60
-40
-20
0
20
40
Departure of rainfall from normal during Feb, 2014 [mm/month]

Dec, 2013-Feb, 2014

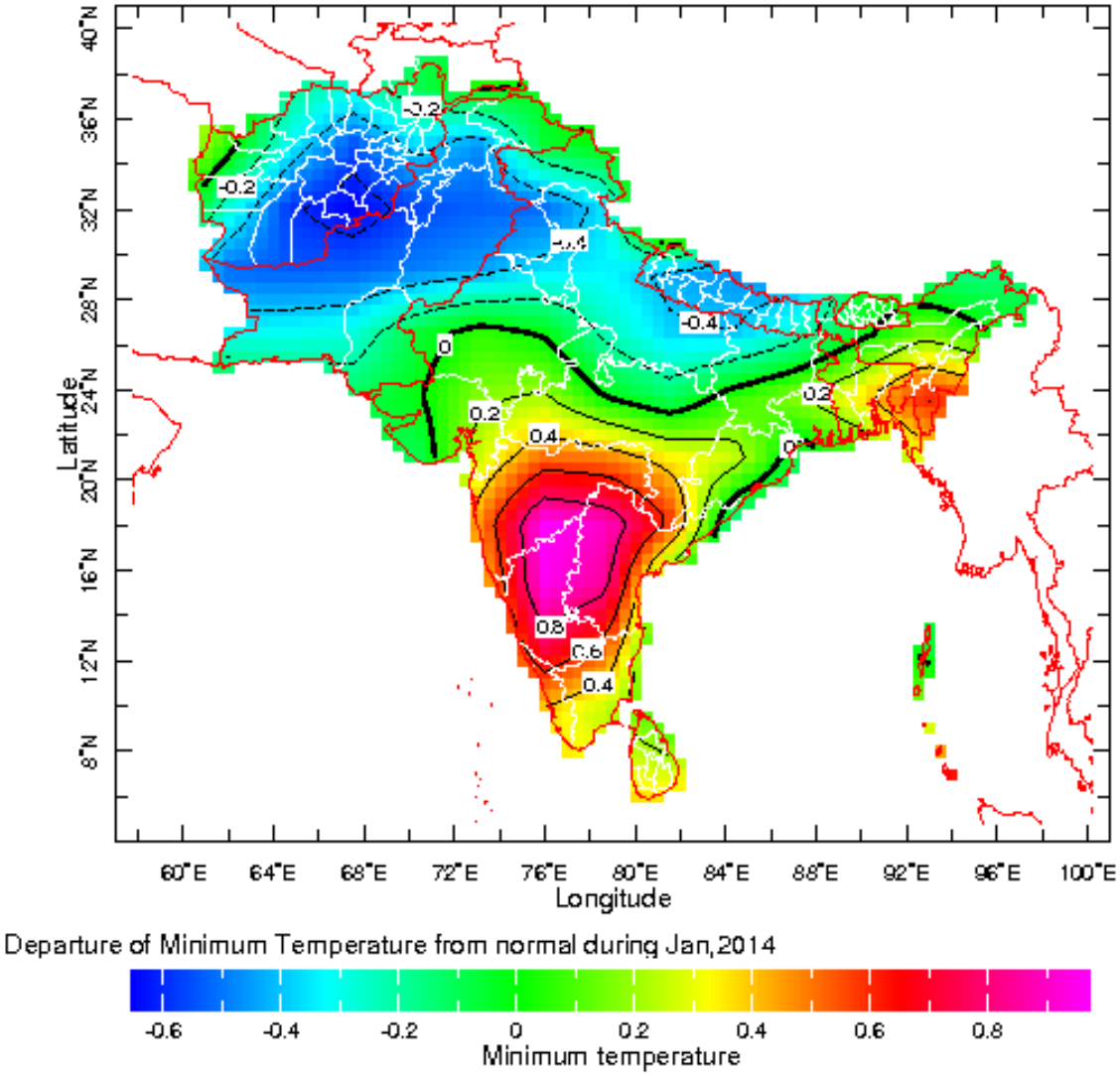


Departure of Minimum temperature from Normal during

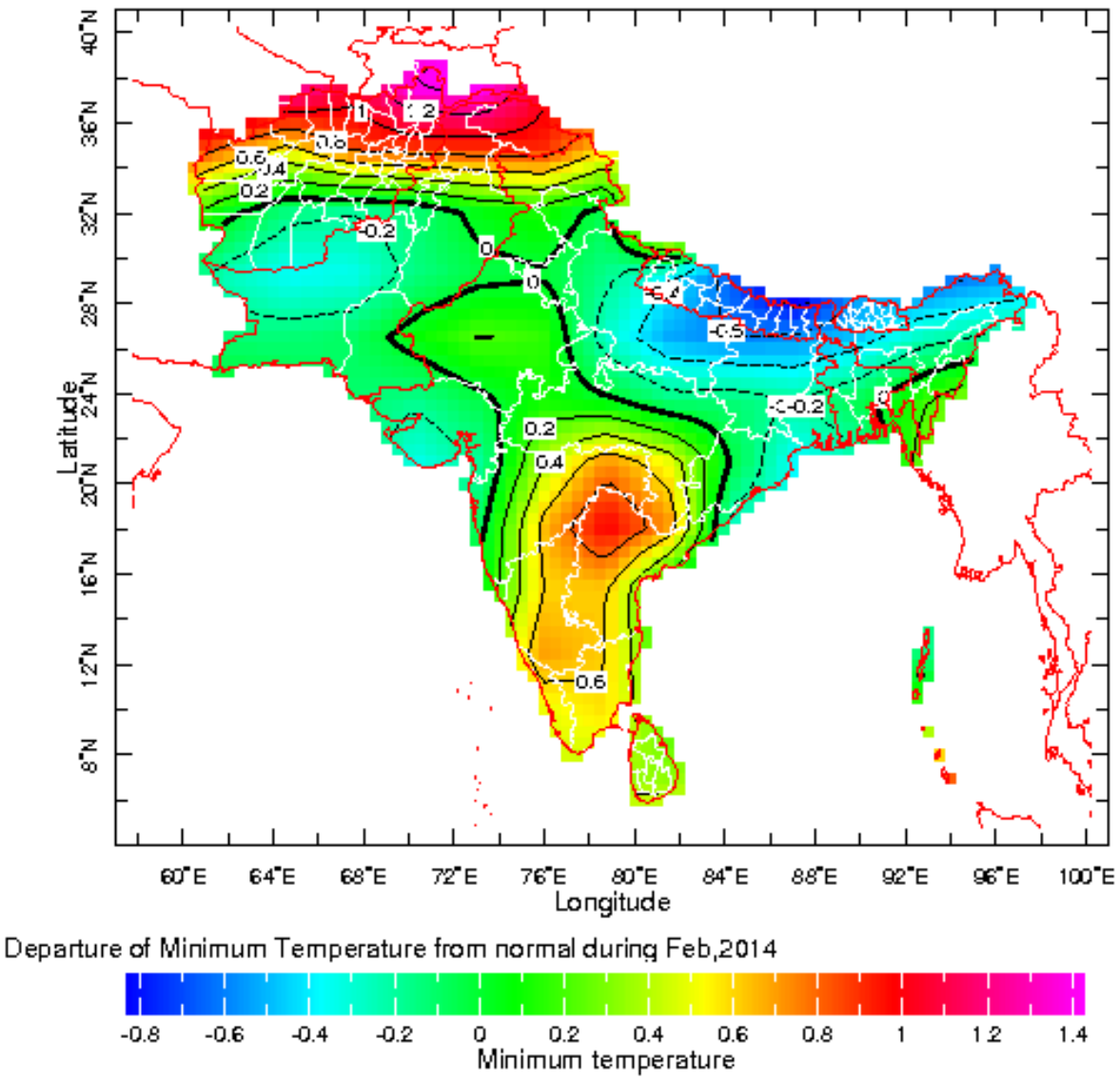
December, 2013



Jan,2014


40°N
36°N
32°N
28°N
24°N
20°N
16°N
12°N
8°N
Latitude
60°E
64°E
68°E
72°E
76°E
80°E
84°E
88°E
92°E
96°E
100°E
Longitude
-0.2
-0.4
0
0.2
0.4
0.6
0.8
Departure of Minimum Temperature from normal during Jan,2014
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
Minimum temperature

Feb, 2014



Note: Research wing of NAMC is regularly monitoring variation in synopitc situation of the globe and using different global climate models regional weather prediction data for prepration of this weather outlook. Seasonal weather outlook for SAARC region will be issues 10th of every month with three months in advance weather outlook. Lastest seasonal weather summay can be download from NAMC web site mentioned below: http://namc.pmd.gov.pk/