

Seasonal weather outlook

(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 its seasonal weather outlook for Pakistan (on experimental basis), taking into consideration available products from major climate prediction centres and different Global Climate Models (GCMs).

Regional weather (precipitation and temperature) outlook is predicted from different 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.

Acknowledgement: *NAMC is 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. Output maps have been prepared by using IRI climate software.*

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.

Probability outlook: Above normal intensity of jet stream is associated with above normal precipitation in the region and scenario indicates that average rainfall will be in the country. The weather system will be focused towards northern region.

- 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.

Probability outlook: Rainfall may be below normal over the country with significantly below normal over southern parts of 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>

Probability outlook: Weather system approaching from west will be focused over central and northern parts of the country.

- 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)

Seasonal weather outlook (Jul-Sep, 2014)

Probability outlook: La Nina (1%), Neutral (26%) and El Nino (73 %) during Jul-Aug-Sep, 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.

Probability outlook: Sea Surface Temperature trend is going towards normal leads to normal rainfall over the region.

3. Seasonal Weather Outlook Summary (Jul-Sep, 2014)

Synthesis of the latest model forecasts for Jun-Aug, 2014 (JAS), current synoptic situation and regional weather expert's judgment indicates that below normal precipitation is expected all over the country with extremely below average during July, below normal during August and normal during September. Above average day temperature is likely to occur during whole predicted month all over the country. The months of July and August likely to prevail much higher day temperature ($> 4^{\circ}\text{C}$) over central parts of the country. A neutral lead to El Nina condition is expected to persist throughout the predicted period.

3.1. Weather outlook

"Below average precipitation is expected during the season all over the country with above normal day temperature."

- I. Below average precipitation is expected during predicted season.
- II. In Jul, significantly below average precipitation is expected all over the country except GB. Day temperatures are likely to be above normal all over the country with higher value over southern Punjab.
- III. First phase (July) of monsoon is expected dry all over the country
- IV. Two to three rainy spells are expected during July with moderate intensity.

Seasonal weather outlook (Jul-Sep, 2014)

- V. Very limited chances of flash flooding in the country.
- VI. Very limited chances of monsoon rainfall over southern parts during July.
- VII. Below normal rainfall is expected during the month of August.
- VIII. One rainy spell is expected over southern parts of the country during August.
- IX. Above normal day temperature are expected during August causes more discharge will be expected in rivers of the country.
- X. Month of Ramadan will be hot and less than normal rain will be expected.
- XI. Two to three rainy spells are expected during August with moderate to higher intensity during first (1-10th) and last week of August.
- XII. Normal rainfall is expected during the month of September.
- XIII. Rainy tracks will be towards upper parts and southern parts of the country during September.
- XIV. Two to three rainy spell with moderate intensity are expected during first and third week of September.
- XV. Expected Maximum temperature will be above normal during whole predicted month with higher values will be during August. Day temperature will be much higher (about 5 °C) from normal.

Seasonal weather outlook (Jul-Sep, 2014)

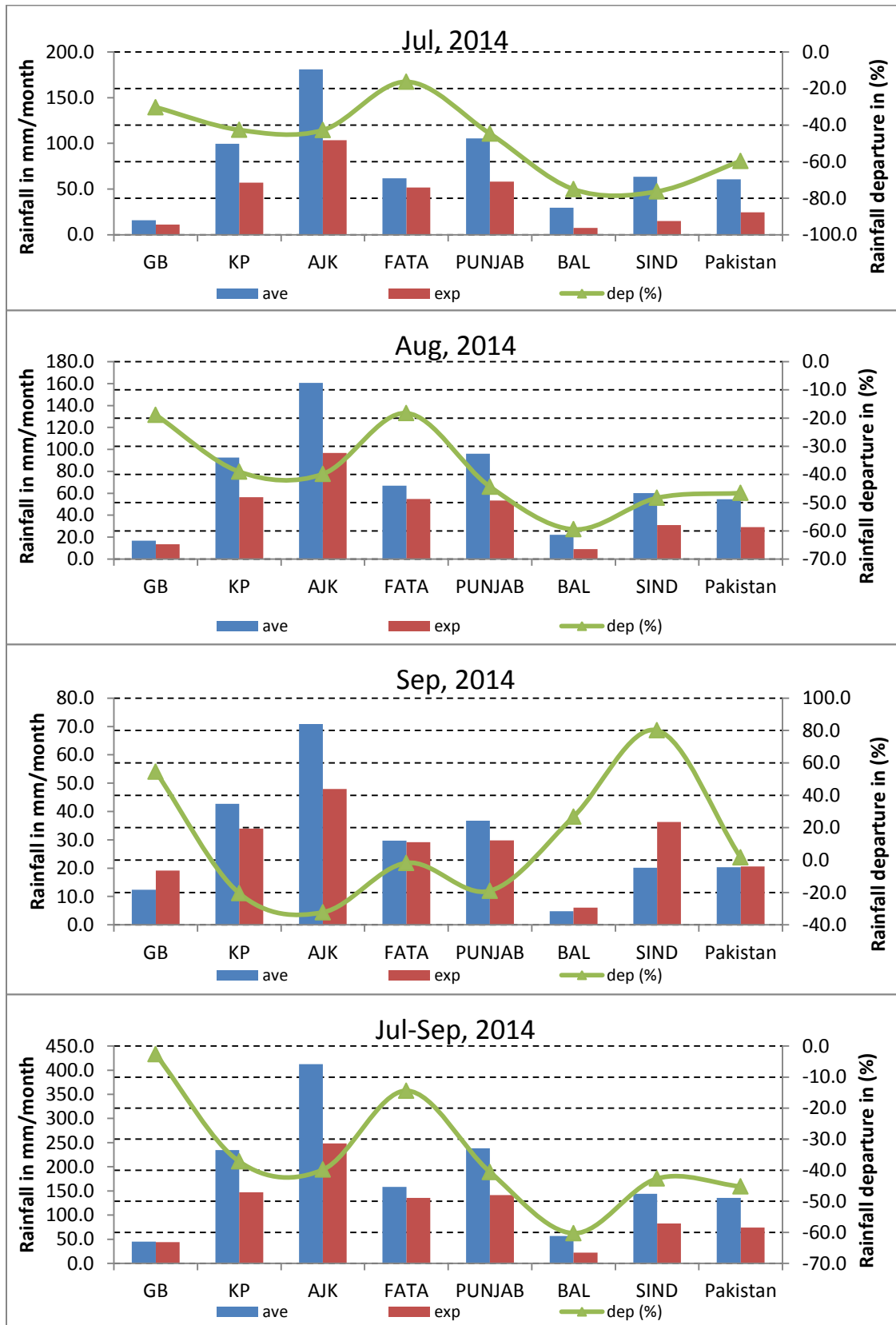
3.2. Monthly Quantitative Weather Forecast

	Jul, 2014		Aug, 2014		Sep, 2014		Jul-Sep, 2014	
	Ave	Exp	Ave	Exp	Ave	Exp	Ave	Exp
GB	15.9	Blw. Ave	16.8	Blw. Ave	12.4	Abv. Ave	45.1	Ave
KP	99.5	Blw. Ave	92.5	Blw. Ave	42.7	Blw. Ave	234.7	Blw. Ave
AJK	181.0	Blw. Ave	160.7	Blw. Ave	70.9	Blw. Ave	412.5	Blw. Ave
FATA	61.7	Blw. Ave	67.0	Blw. Ave	29.7	Ave	158.4	Ave
PUNJAB	105.3	Blw. Ave	96.1	Blw. Ave	36.8	Blw. Ave	238.2	Blw. Ave
BALUCHISTAN	29.5	Blw. Ave	22.2	Blw. Ave	4.8	Abv. Ave	56.5	Blw. Ave
SIND	63.5	Blw. Ave	60.2	Blw. Ave	20.2	Abv. Ave	143.9	Blw. Ave
Precipitation is in mm/month								
Pakistan	60.7	Blw. Ave	54.5	Blw. Ave	20.3	Ave	135.5	Blw. Ave

Ave.: average (1981-2010), **Exp.:** Expected rainfall, **Below Average** (Blw. Ave) < -15 %, **Average** precipitation range (Ave) = -15 to +15 %, **Above Average** (Abv.Ave) > +15 %

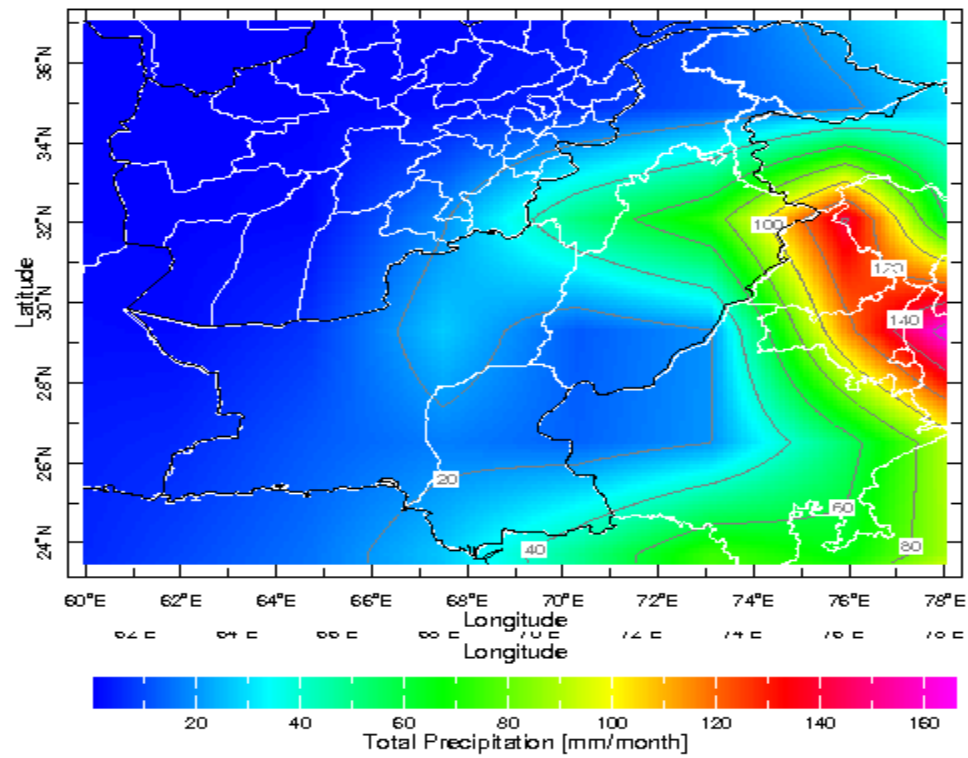
Note: Average precipitation is computed by using Global Precipitation Climatology Centre (GPCC) gridded data by resolution (0.5x0.5°) latitude by longitude. Ensembles of different climate models are used for computation of expected precipitation over the region.

Seasonal weather outlook (Jul-Sep, 2014)

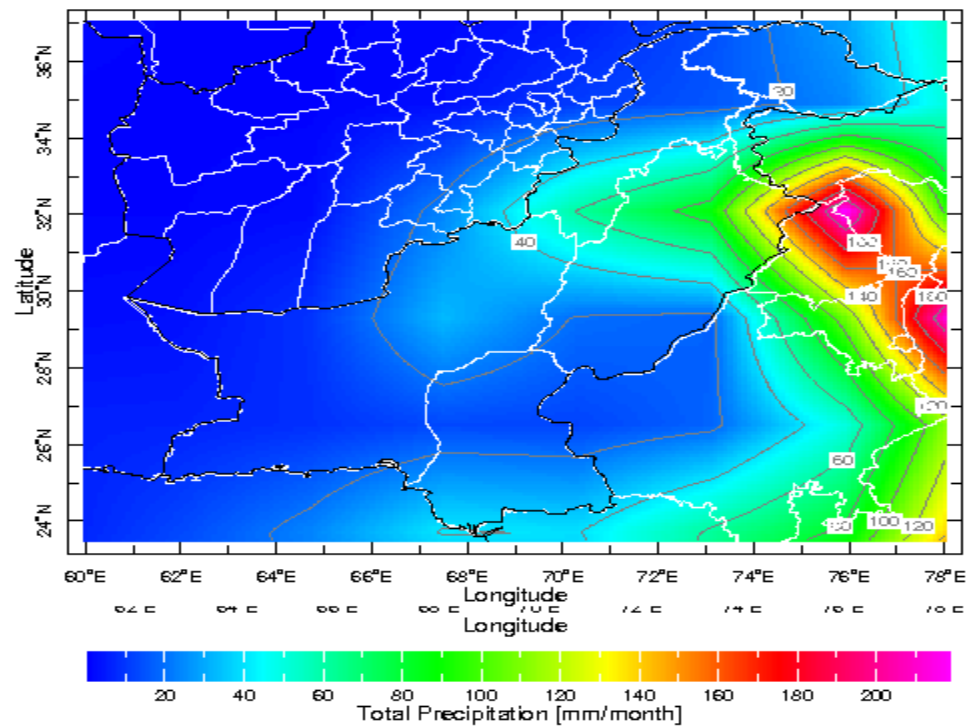


4. Spatial distribution of expected rainfall during coming season (GCM-ECHAM)

Monthly expected Precipitation for Jul, 2014

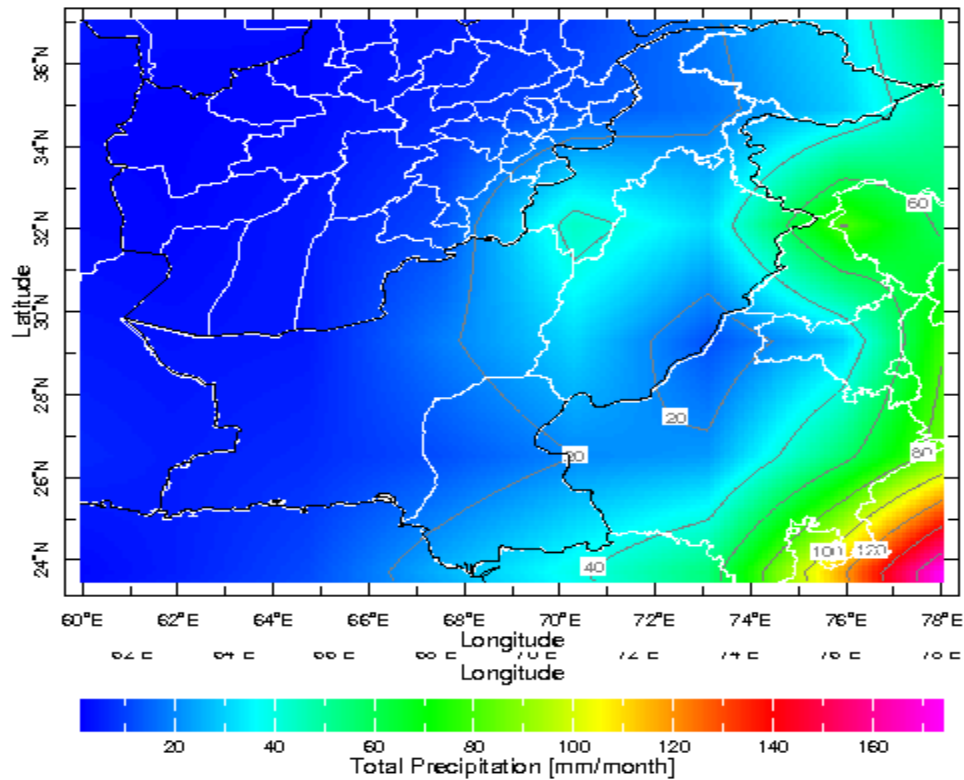


Monthly expected Precipitation for Aug, 2014

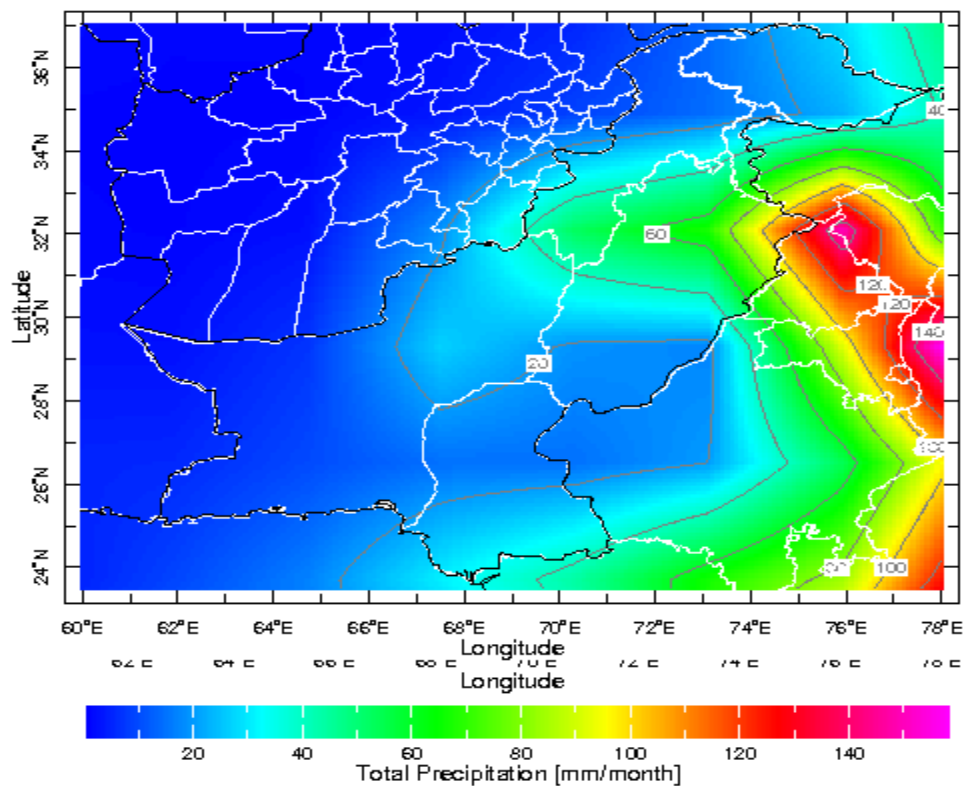


Seasonal weather outlook (Jul-Sep, 2014)

Monthly expected Precipitation for Sep, 2014

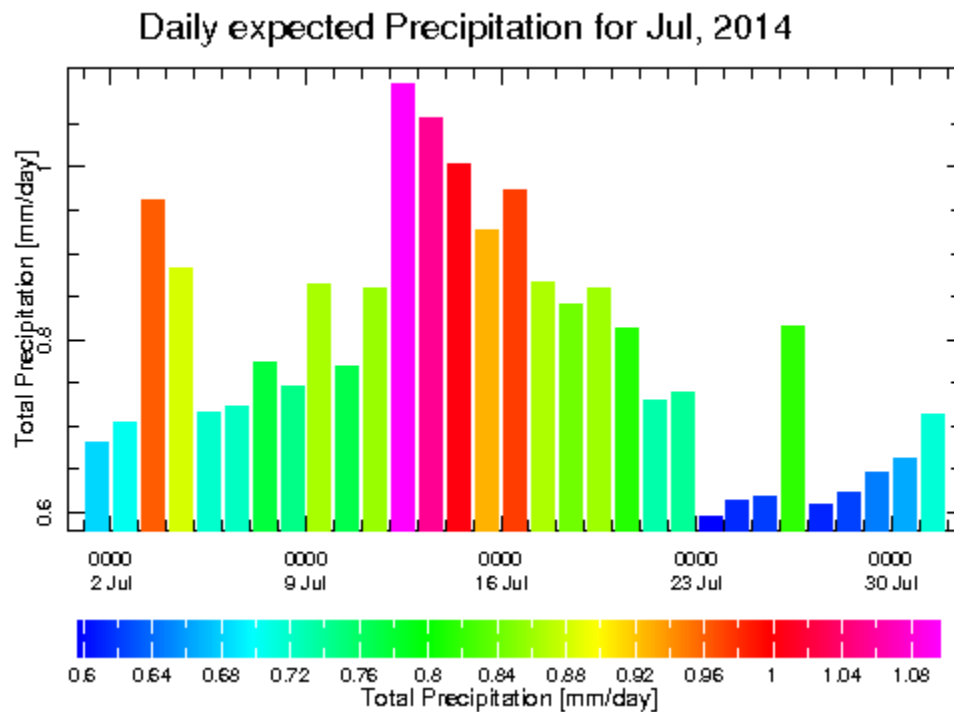
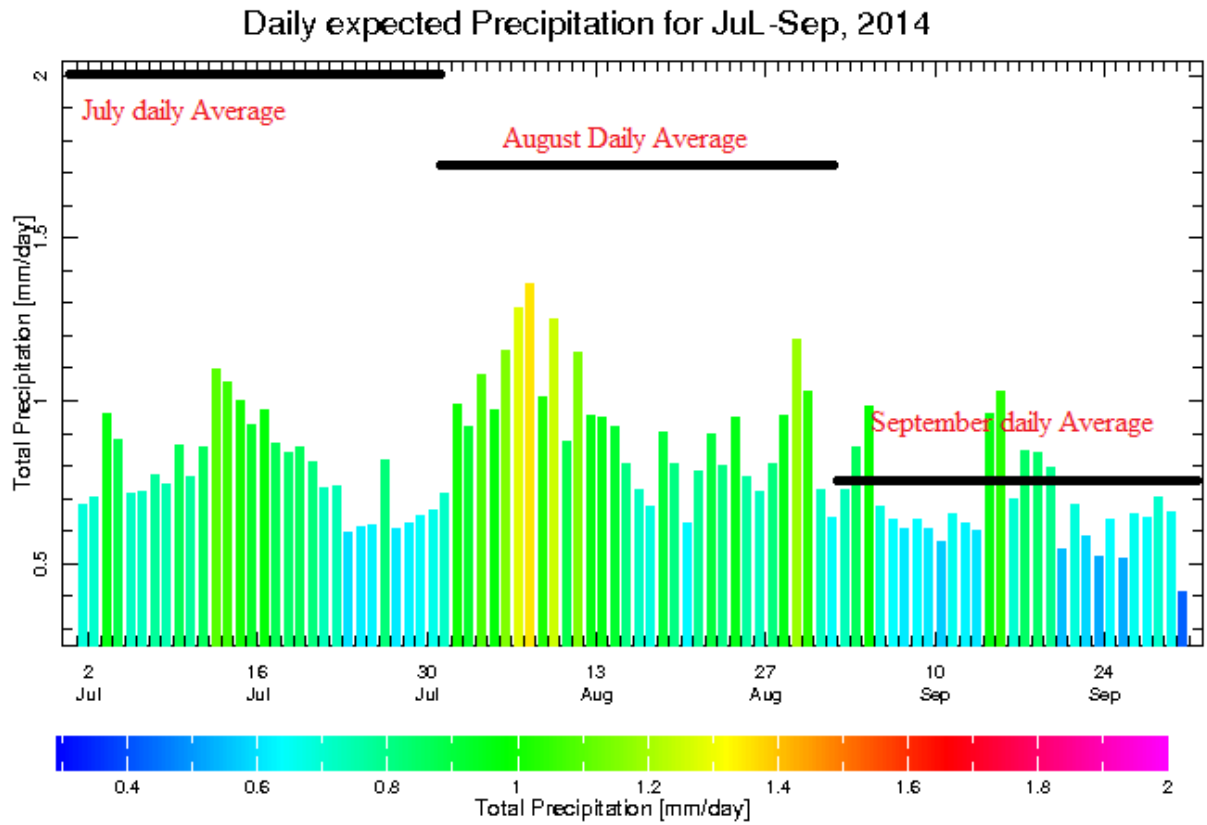


Seasonal Precipitation Outlook (Jul-Sep, 2014)

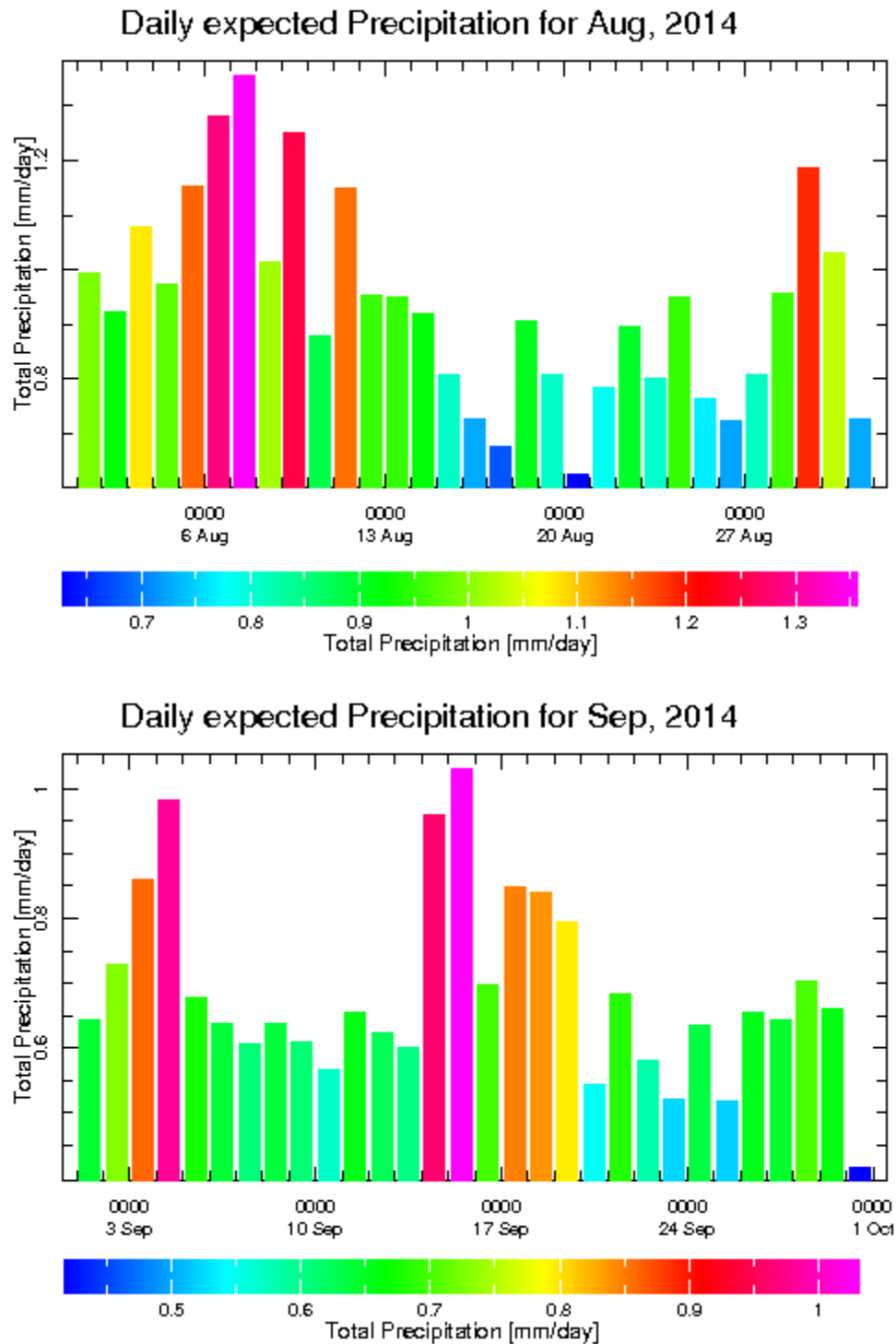


Seasonal weather outlook (Jul-Sep, 2014)

5. Expected daily rainfall

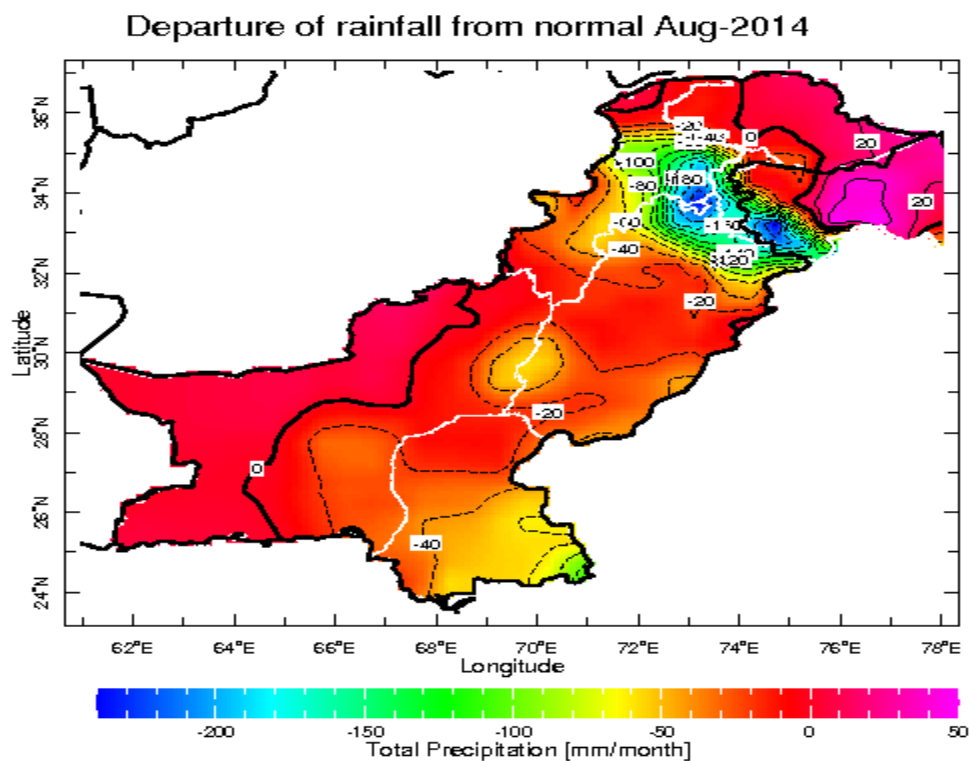
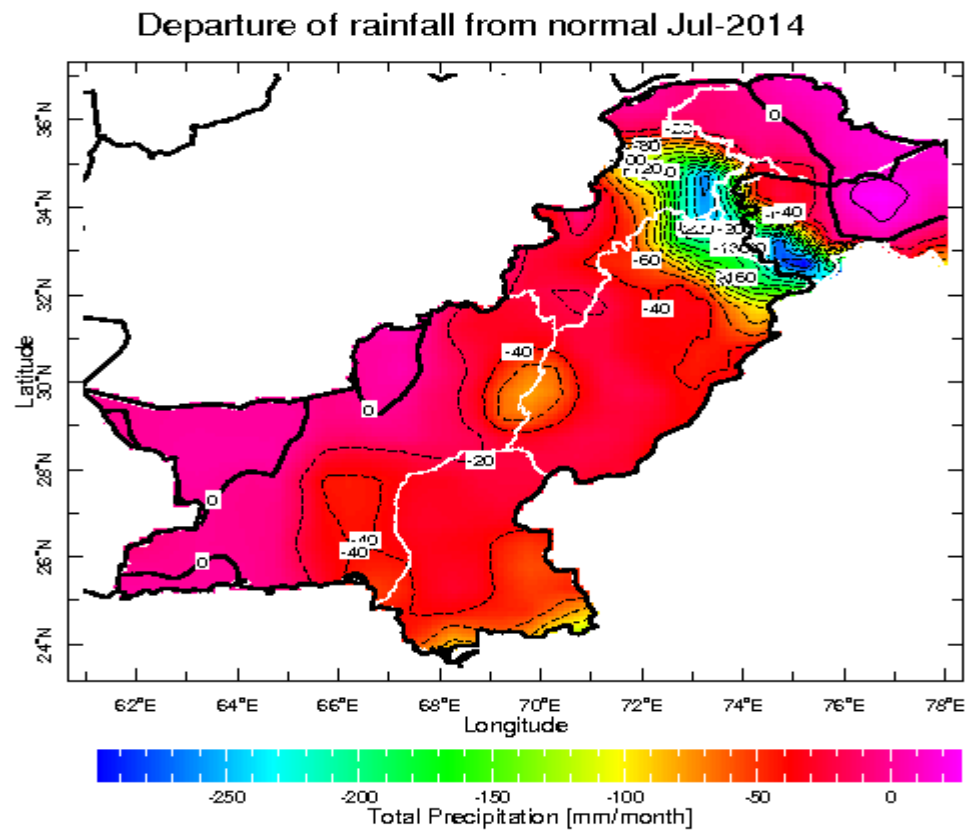


Seasonal weather outlook (Jul-Sep, 2014)



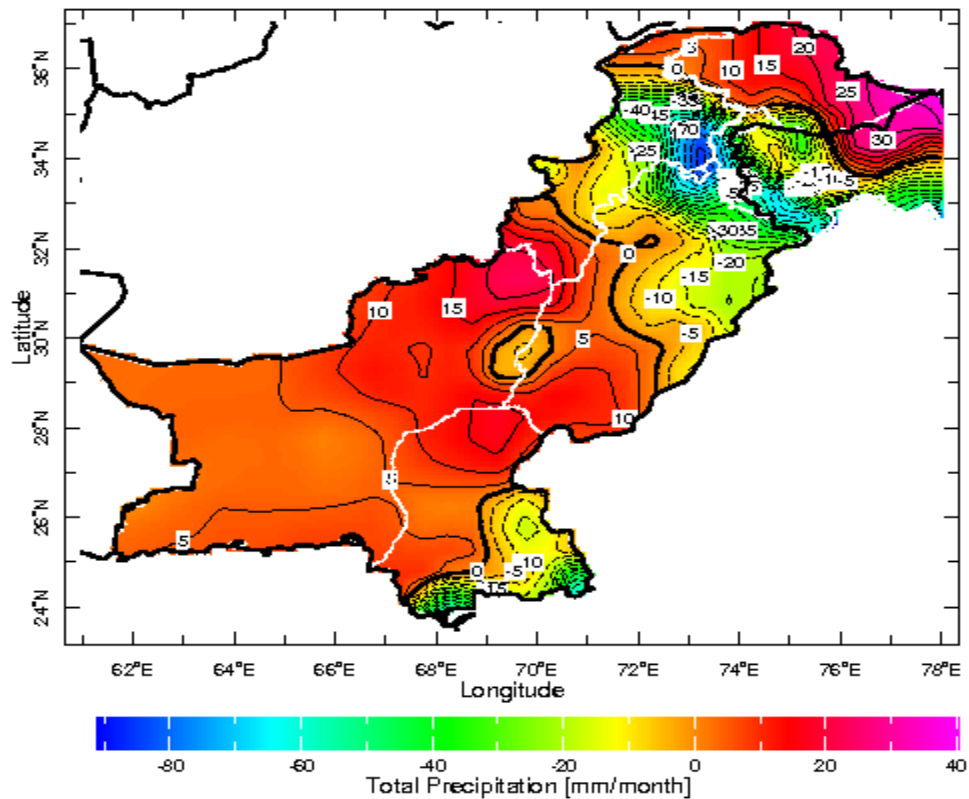
Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

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

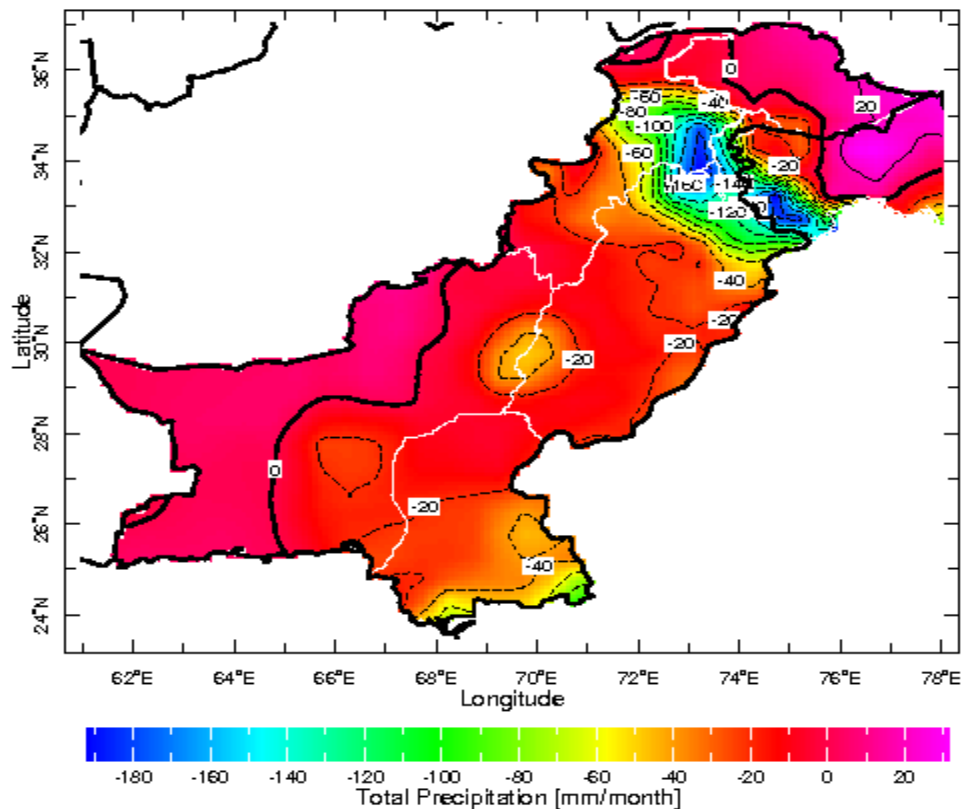


Seasonal weather outlook (Jul-Sep, 2014)

Departure of rainfall from normal Sep-2014

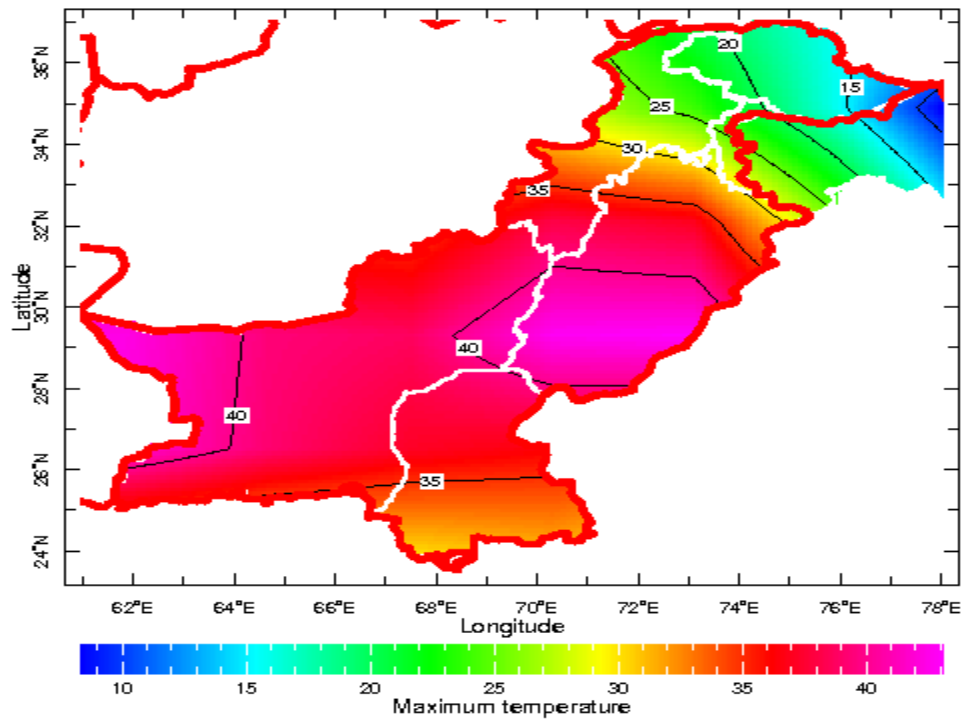


Departure of rainfall from normal (Jul-Sep, 2014)

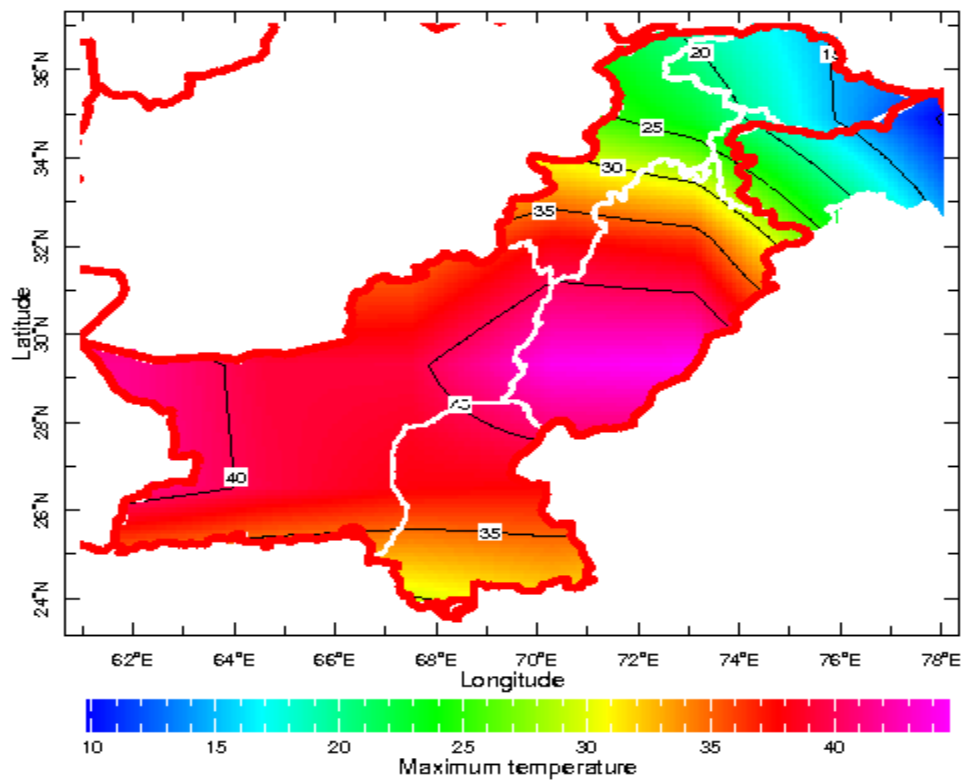


7. Spatial distribution of expected maximum temperature during

Expected Maximum Temperature during Jul, 2014

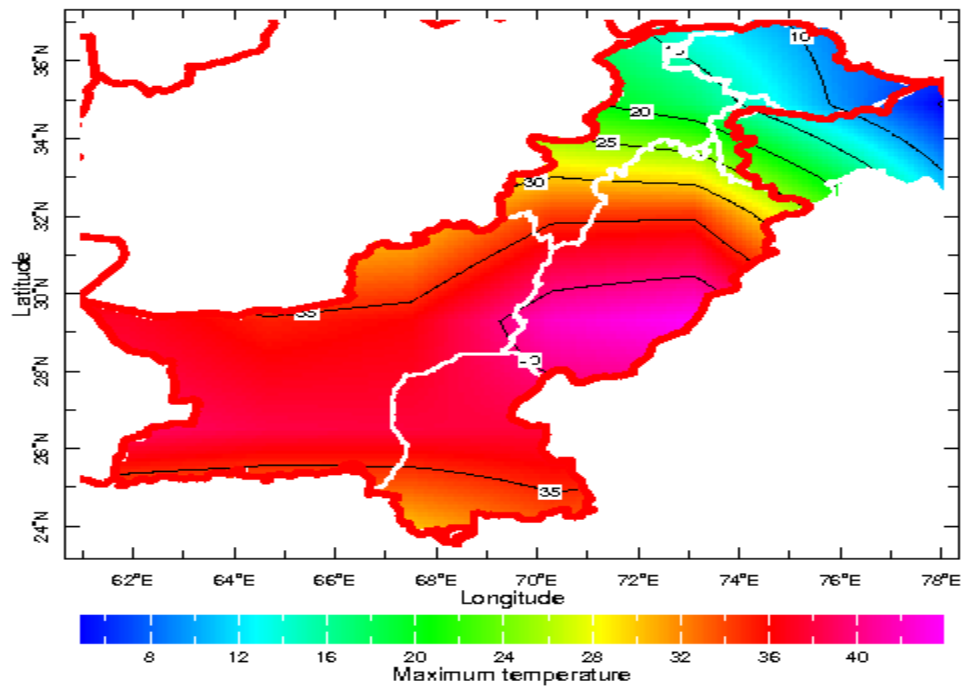


Expected Maximum Temperature during Aug, 2014



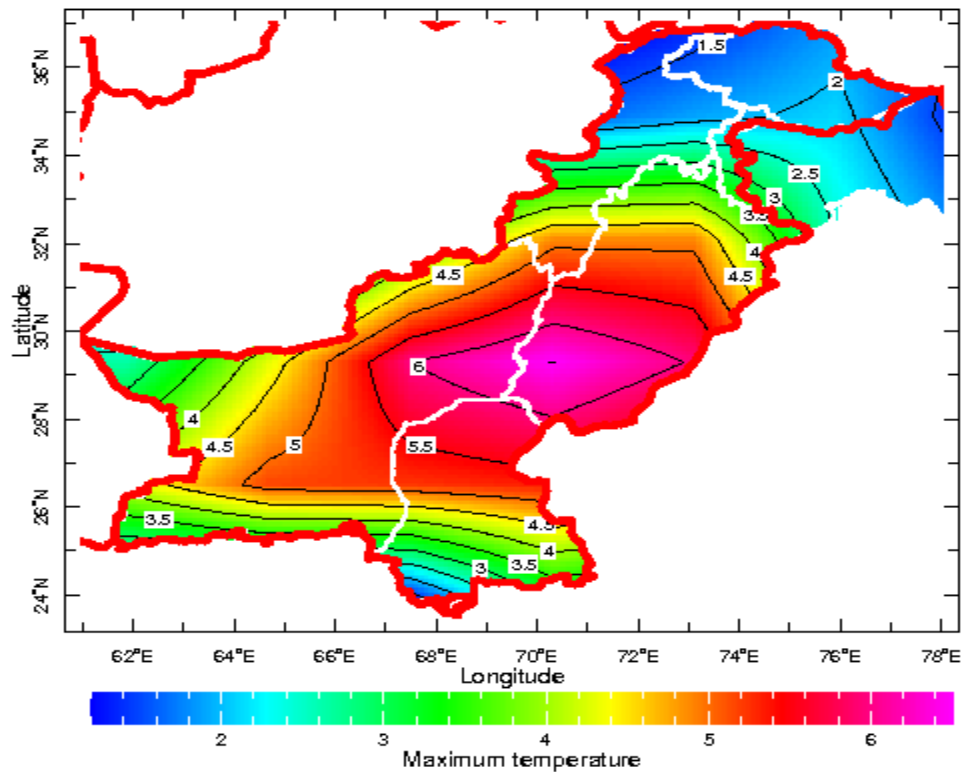
Seasonal weather outlook (Jul-Sep, 2014)

Expected Maximum Temperature during Sep, 2014



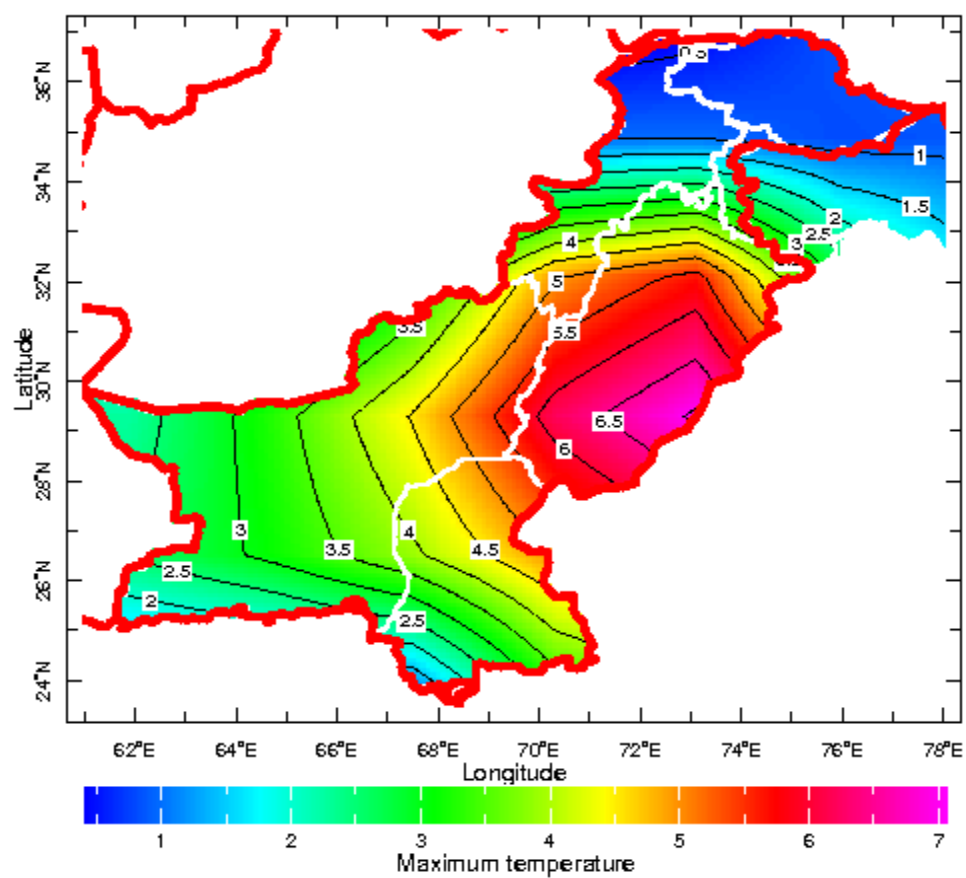
8. Departure of expected maximum temperature from normal

Expected Dep. of Max. Temp. from normal during Jul, 2014



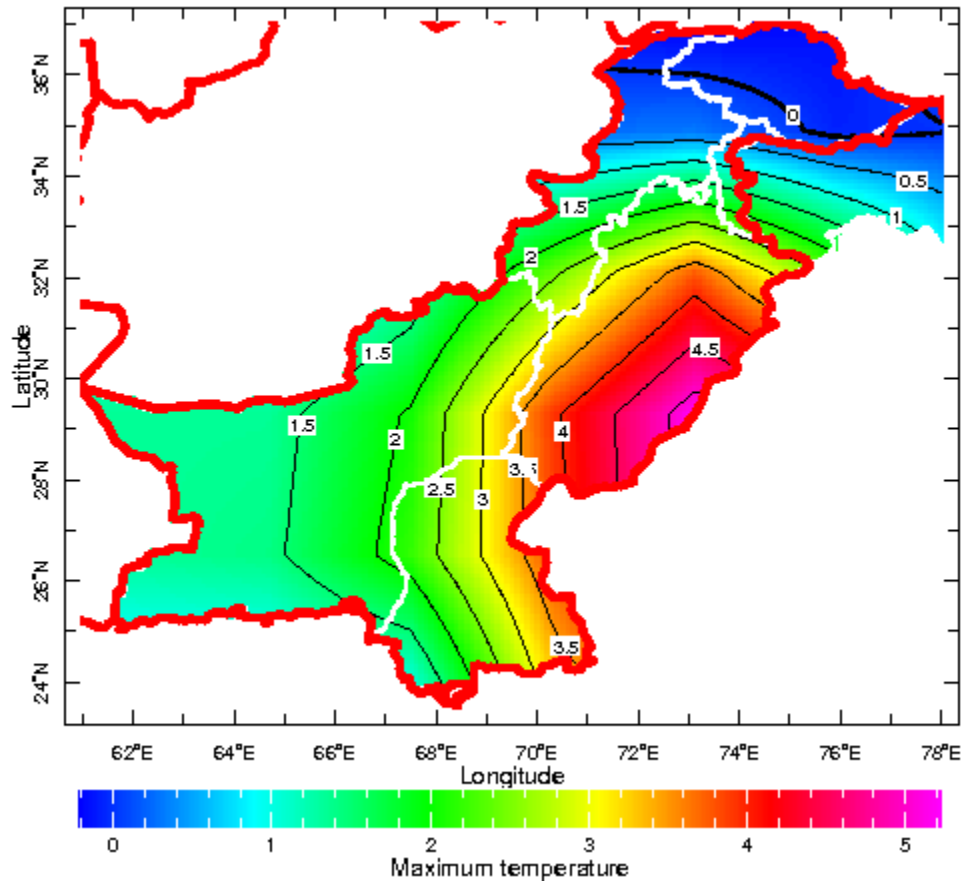
Seasonal weather outlook (Jul-Sep, 2014)

Expected Dep. of Max. Temp. from normal during Aug, 2014



Seasonal weather outlook (Jul-Sep, 2014)

Expected Dep. of Max. Temp. from normal during Sep, 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 issues 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/>