Seasonal weather outlook

(Apr-Jun, 2014)

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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 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 Apr 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 less than normal intensity. The region may prevail less than normal winds strength. The movement of higher strength winds may cover wider area than normal over the region.

Probability outlook: Below normal intensity of jet stream is associated with below normal precipitation in the region and it seems that weather systems will be focused towards central parts of the country.

- A ridge at 500 hPa is expected to be over central parts of the country. As a result, western disturbances may be de tracked from normal path.

Probability outlook: Precipitation is likely to occur less than normal precipitation over the region.

- Surface temperatures are expected to be on higher side than normal over central parts of the country as compared with normal (1981-2010). However, northern and southern parts may prevail normal surface temperature.

- North Atlantic Oscillation (NAO) is in positive phase (0.8) approaching towards neutral phase. 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: Normal precipitation over all parts of the country will be expected. The focus of weather tracks may be towards central of the country.

- The model predictions of ENSO for this summer and beyond are relatively unchanged from last month. Almost all the models indicate that ENSO-neutral (Niño-3.4 index between -0.5°C and 0.5°C) will persist through the rest of the Northern Hemisphere spring 2014. While all models predict warming in the tropical Pacific, there is considerable uncertainty as to whether El Niño will develop during the summer or fall. If westerly winds continue to emerge in the western equatorial Pacific, the development of El Niño would become more likely. However, the lower forecast skill during the spring and overall propensity for cooler conditions over the last decade still justify significant probabilities for ENSO-neutral. The consensus forecast is for ENSO-neutral to continue through the Northern Hemisphere spring 2014, with about a 50% chance of El Niño developing during the summer or fall (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)

Probability outlook: La Nina (4%), Neutral (68%) and El Nino (28 %) during Apr-May-Jun, 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 (Apr-Jun, 2014)*

Synthesis of the latest model forecasts for Apr-Jun, 2014 (AMJ), current synoptic situation and regional weather expert's judgment indicates that normal precipitation is expected all over the country with below normal during April and normal during May and June. Normal temperature is likely to occur during April while below normal day temperature will be expected during May over most part of the country. Neutral-ENSO condition is expected to persist throughout the predicted period.

3.1. Weather outlook

"Average precipitation is expected during the season all over the country with normal day temperature."

I. Average precipitation is expected during predicted season.

II. In April, below average precipitation is expected all over the country with average over extreme northern and southern parts of the country. Day temperatures are likely to be above normal all over the country with higher value over central parts of the country.

III. In May, slightly above average precipitation is expected over central parts, below normal over extremely northern and southern parts of the country. Surface temperature will be normal slightly all over the country.

IV. In June, slightly above average precipitation is expected over the country except over Punjab and Sind. Average precipitation is expected over Punjab and Sind. Day temperature will be normal all over the country.

V. Two to three rainy spells are expected during April with light rainy spells over isolated place during second decade (11-20 April).

VI. In May, one to two rainy spell are expected in whole month and focus may be towards southern parts (Sindh) of the country.

VII. The period of Pollen allergy particle will be enhanced during current year. The counting will be on higher side till second week of April.

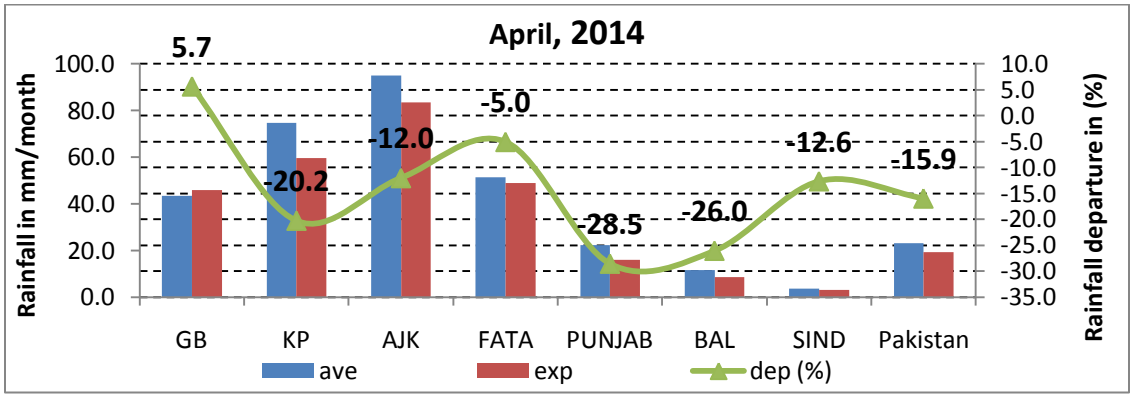
VIII. Expected Maximum temperature will be normal all over the country during whole predicted months whereas April will be expected higher than normal over central parts of the country.

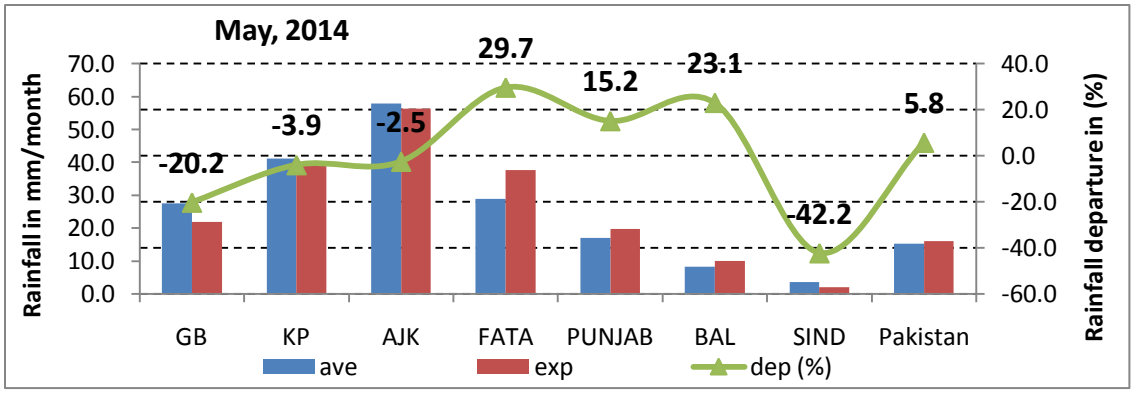
3.2. Monthly Quantitative Weather Forecast

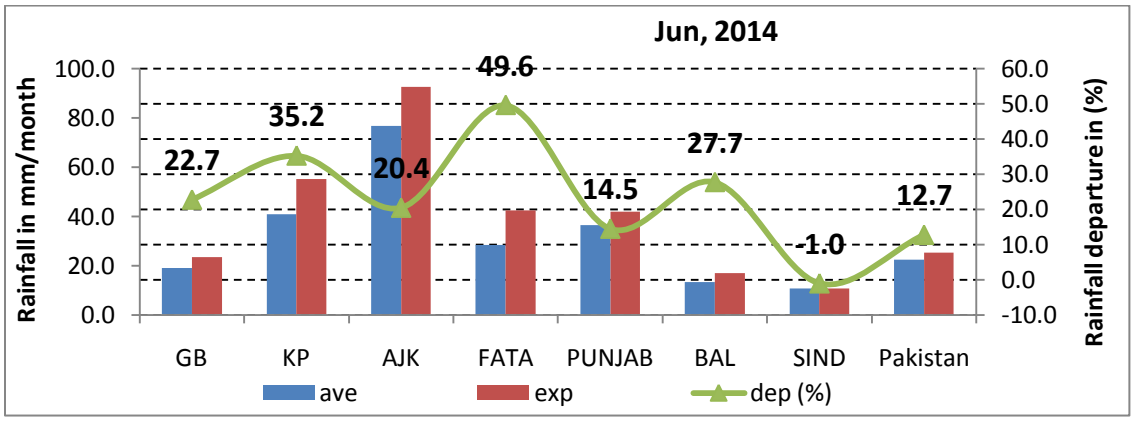
	Apr, 2014		May, 2014		Jun, 2014		Apr-Jun, 2014	
	Ave	Exp	Ave	Exp	Ave	Exp	Ave	Exp
GB	43.5	Ave	27.6	Blw. Ave	19.0	Abv. Ave	90.1	Ave
KP	74.7	Blw. Ave	41.1	Ave	40.8	Abv. Ave	156.6	Ave
AJK	94.9	Ave	57.8	Ave	76.8	Abv. Ave	229.5	Ave
FATA	51.5	Ave	29.0	Abv. Ave	28.3	Abv. Ave	108.8	Abv. Ave
PUNJAB	22.4	Blw. Ave	17.1	Abv. Ave	36.5	Ave	76.1	Ave
BALUCHISTAN	11.5	Blw. Ave	8.2	Abv. Ave	13.4	Abv. Ave	33.1	Ave
SIND	3.6	Ave	3.7	Blw. Ave	10.8	Ave	18.1	Ave
	Precipitation is in mm/month							
Pakistan	23.1	Blw. Ave	15.2	Ave	22.5	Ave	60.8	Ave

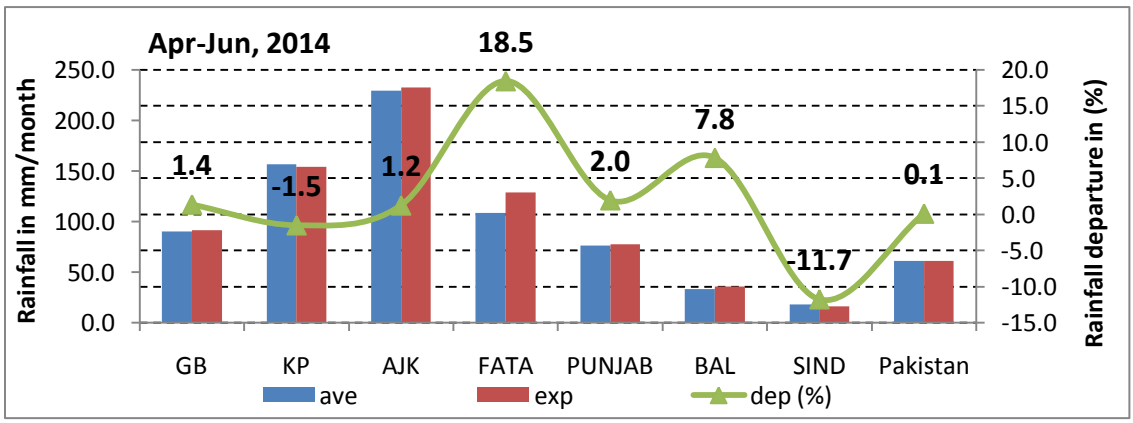
Ave.: *average (1981-2010),* ***Exp.****: Expected rainfall,* ***Below Average*** *(Blw. Ave) < -15 %,* ***Average*** *precipitation range (Ave) = -15 to +15 %,,* ***Above Average*** *(Abv.Ave) > +15 %*

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

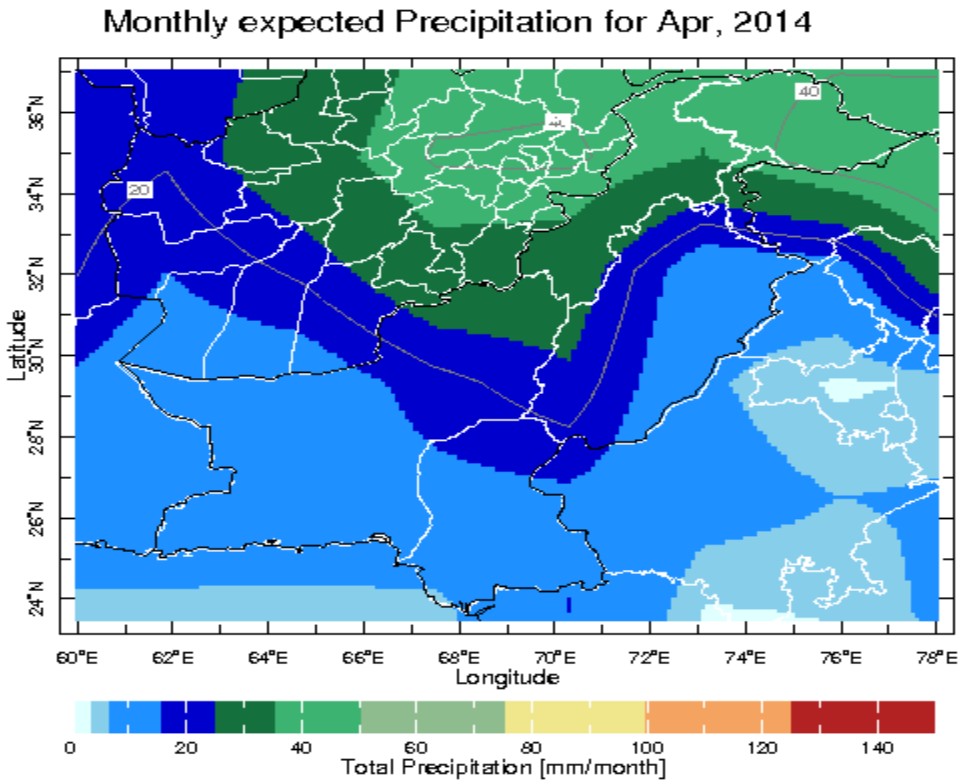

April, 2014
Rainfall in mm/month
Rainfall departure in (%)
100.0
80.0
60.0
40.0
20.0
0.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
-25.0
-30.0
-35.0
5.7
-20.2
-12.0
-5.0
-28.5
-26.0
-12.6
-15.9
GB
KP
AJK
FATA
PUNJAB
BAL
SIND
Pakistan
ave
exp
dep (%)

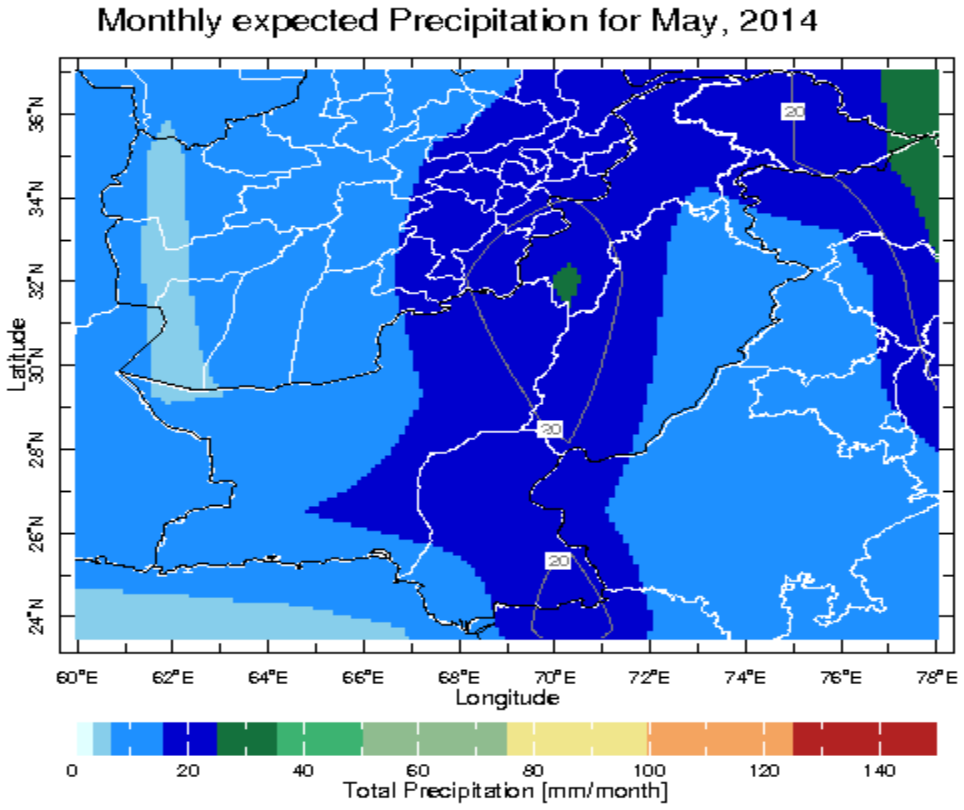

May, 2014
Rainfall in mm/month
Rainfall departure in (%)
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
40.0
20.0
0.0
-20.0
-40.0
-60.0
-20.2
-3.9
-2.5
29.7
15.2
23.1
-42.2
5.8
GB
KP
AJK
FATA
PUNJAB
BAL
SIND
Pakistan
ave
exp
dep (%)


Jun, 2014
Rainfall in mm/month
Rainfall departure in (%)
100.0
80.0
60.0
40.0
20.0
0.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
22.7
35.2
20.4
49.6
14.5
27.7
-1.0
12.7
GB
KP
AJK
FATA
PUNJAB
BAL
SIND
Pakistan
ave
exp
dep (%)

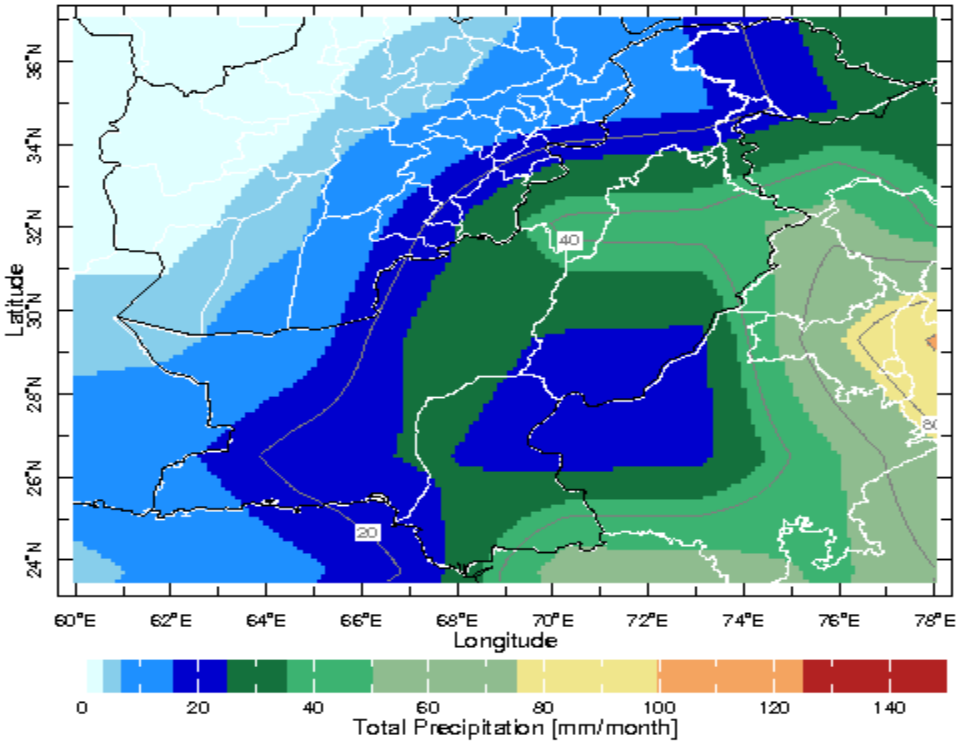

Apr-Jun, 2014
Rainfall in mm/month
Rainfall departure in (%)
250.0
200.0
150.0
100.0
50.0
0.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
1.4
-1.5
1.2
18.5
2.0
7.8
-11.7
0.1
GB
KP
AJK
FATA
PUNJAB
BAL
SIND
Pakistan
ave
exp
dep (%)

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

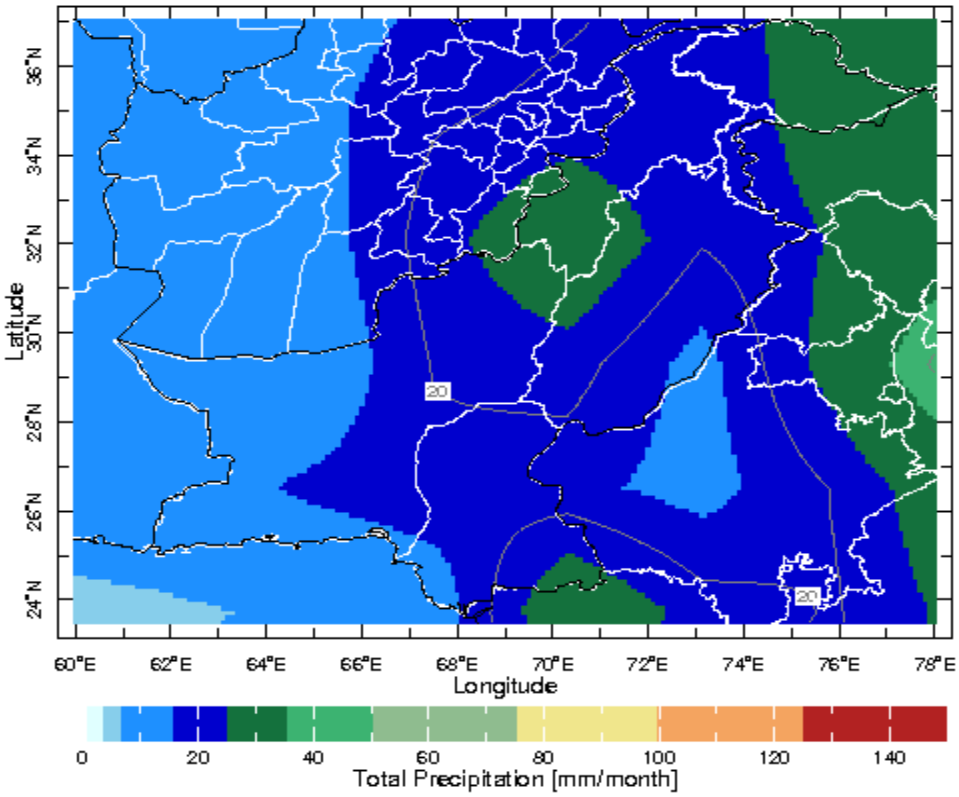




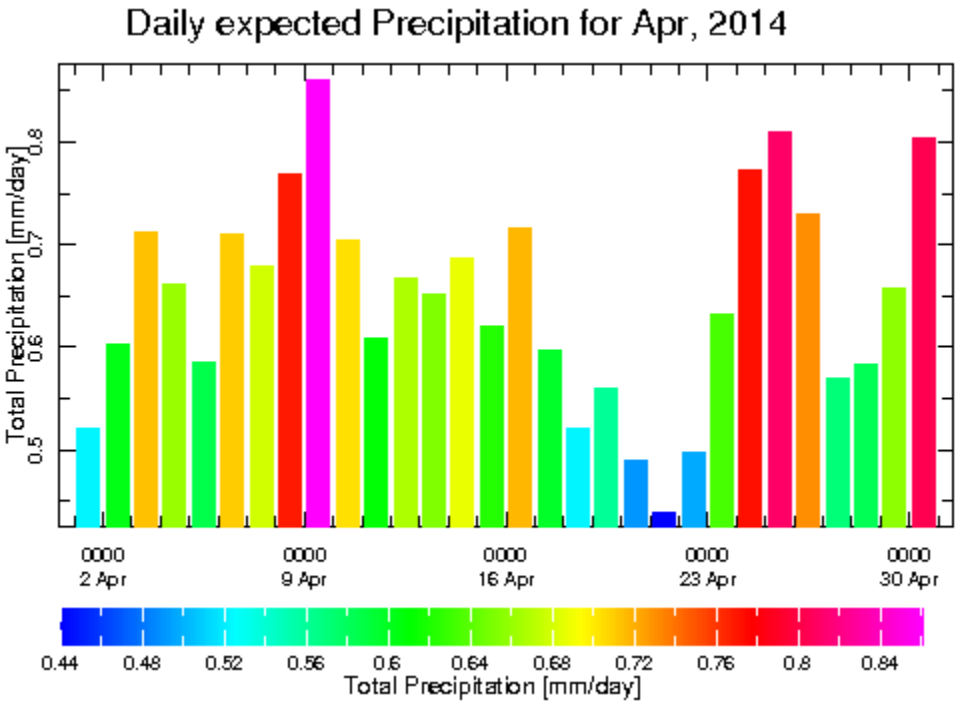
Monthly expected Precipitation for Jun, 2014

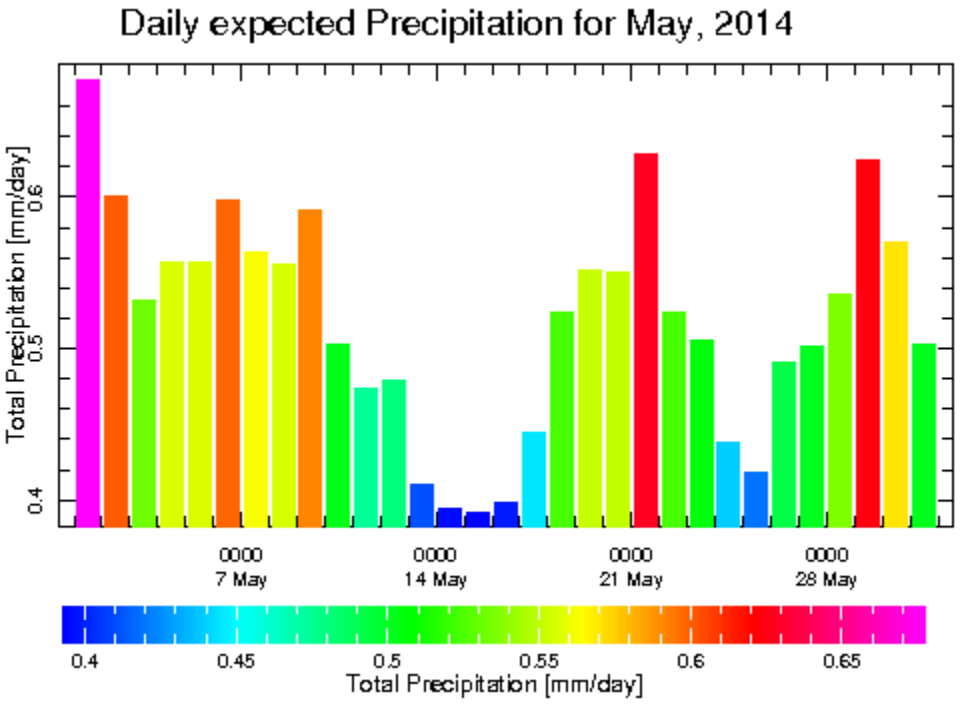


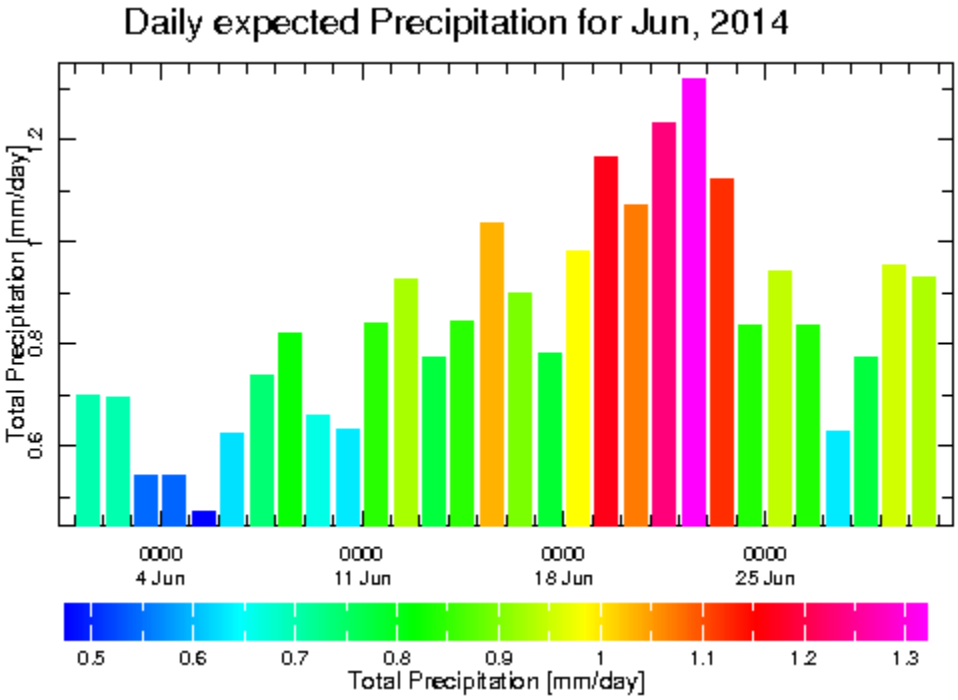
Seasonal Precipitation Outlook (Apr-Jun,2014)



5. Expected daily rainfall

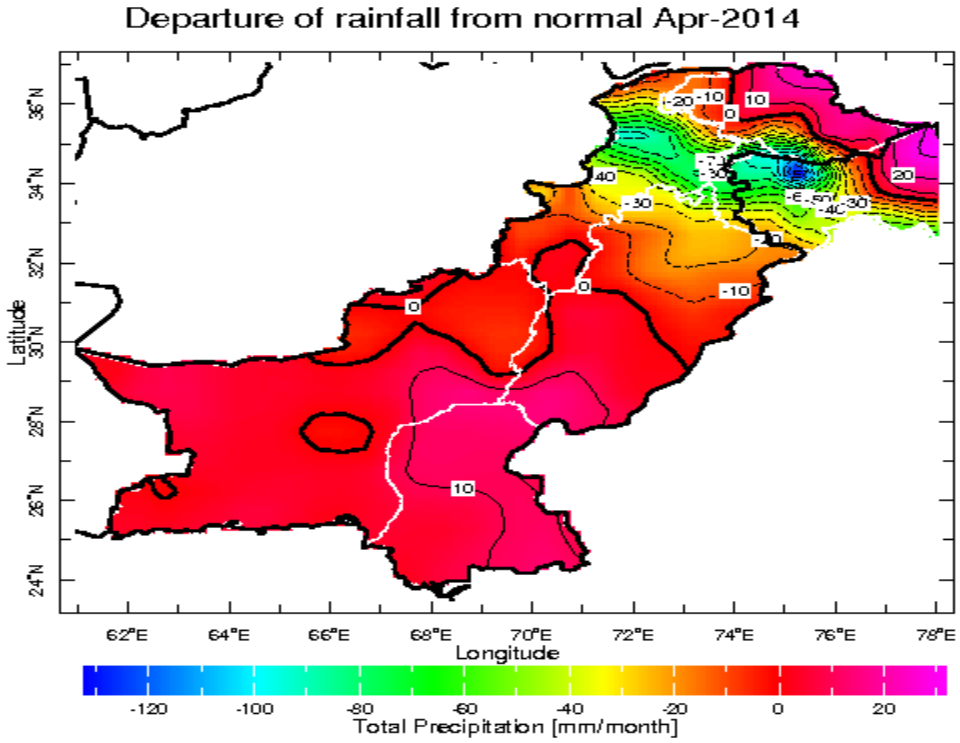




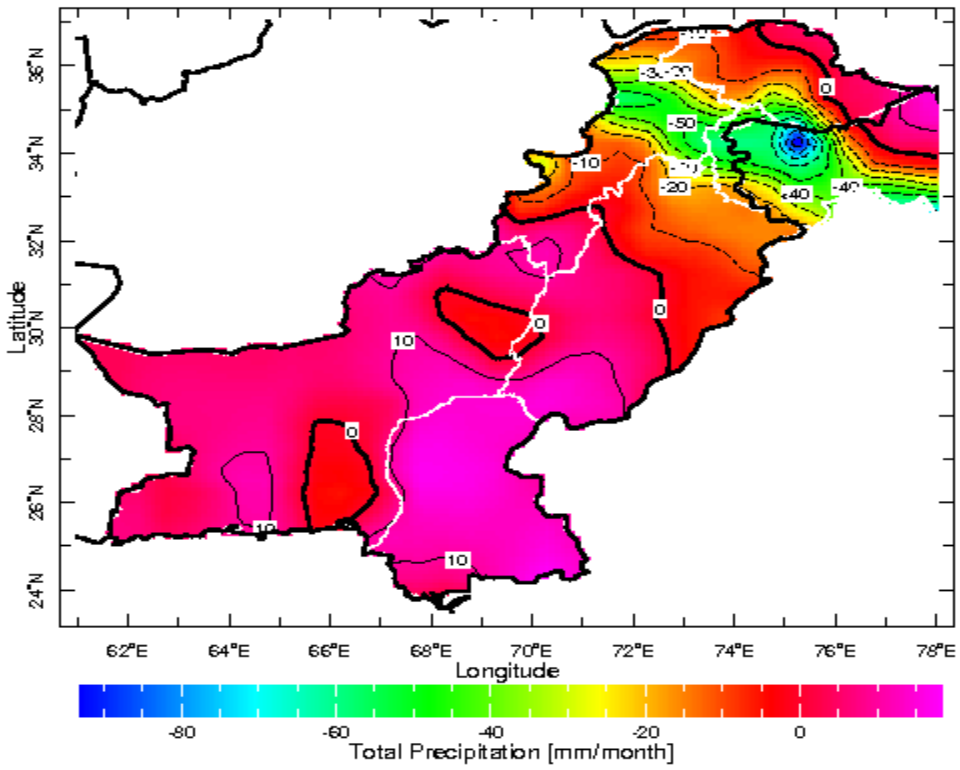


Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

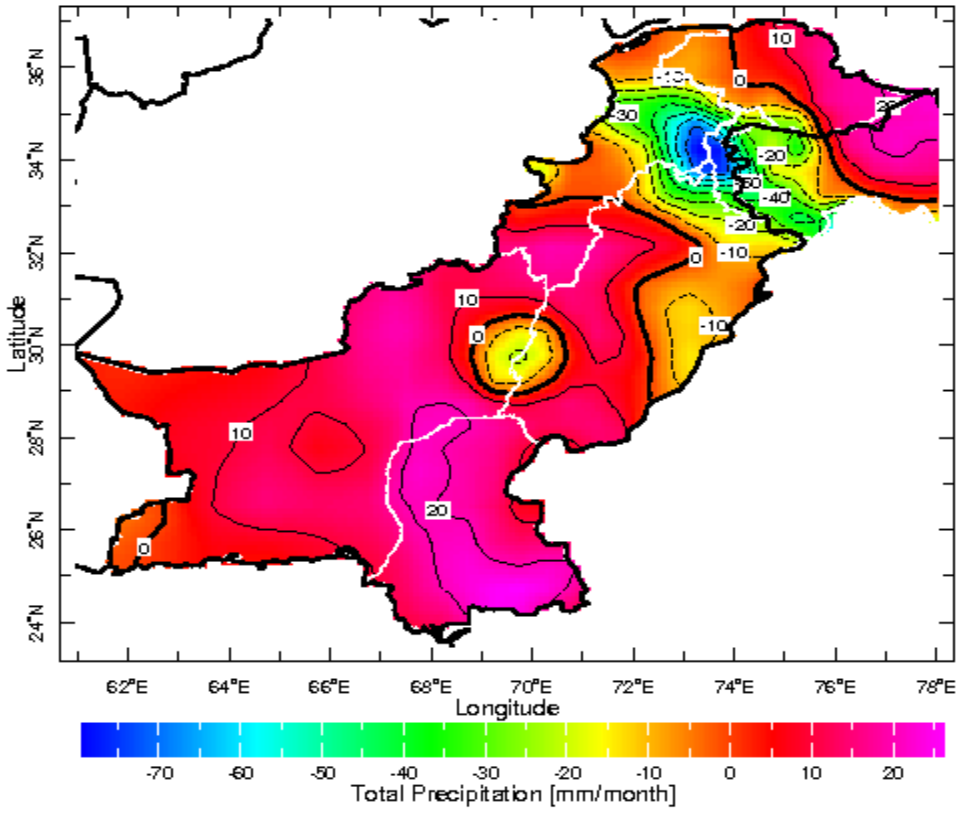
6. *Monthly departure from normal (precipitation) during coming season*

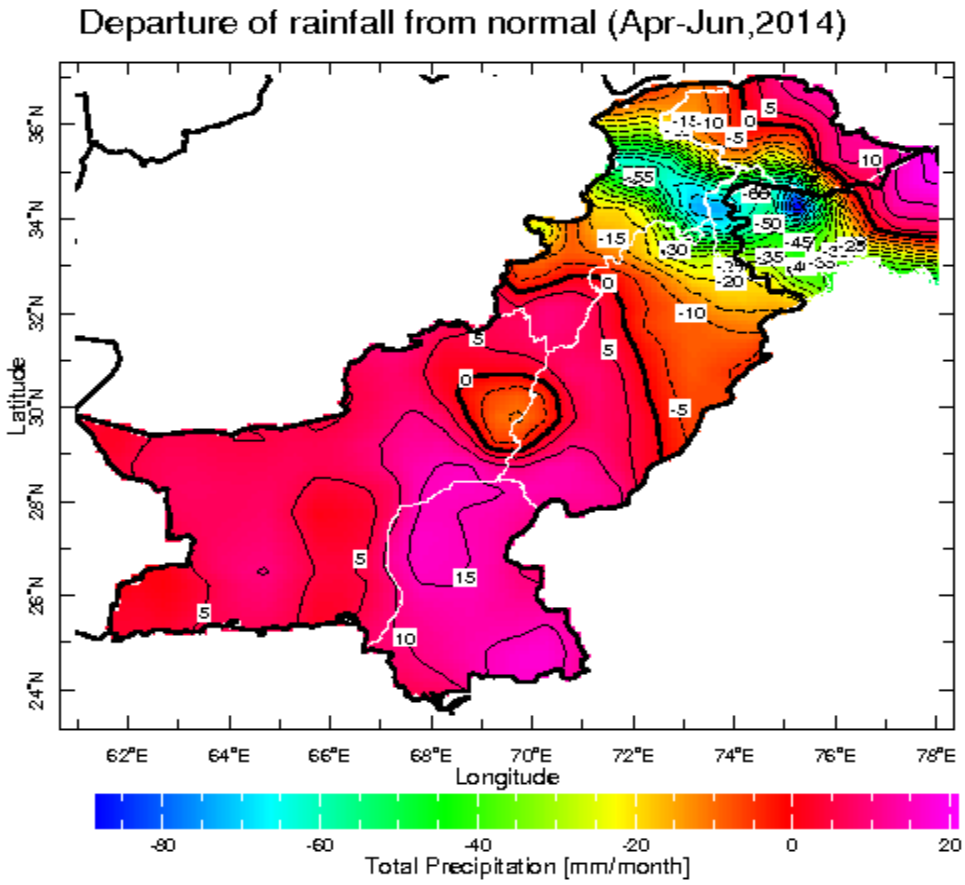


Departure of rainfall from normal May-2014

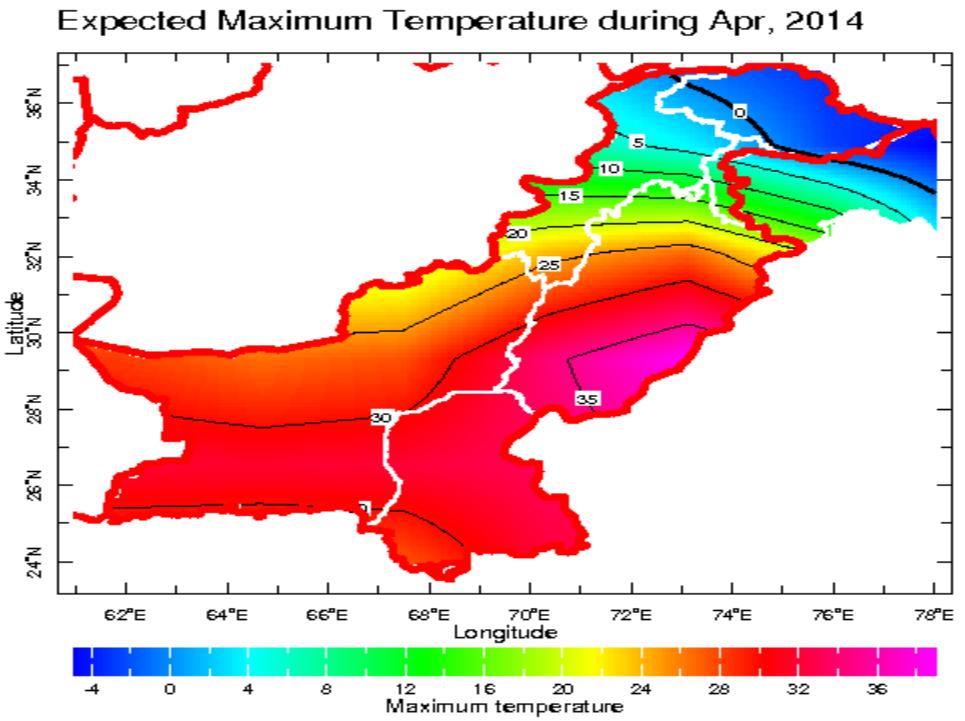


Departure of rainfall from normal Jun-2014

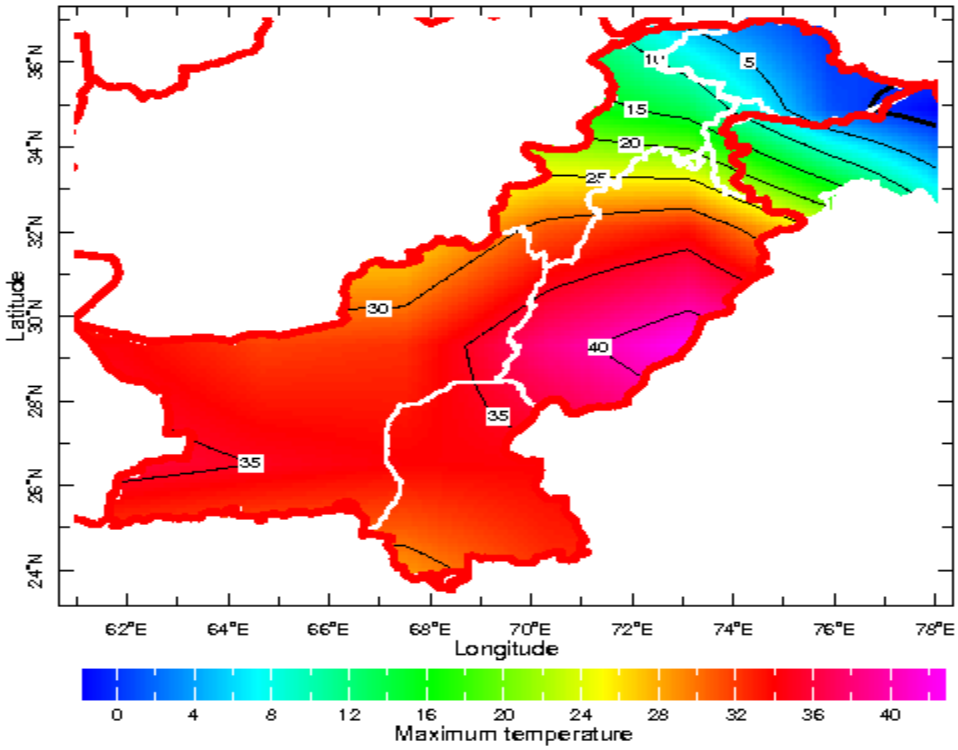




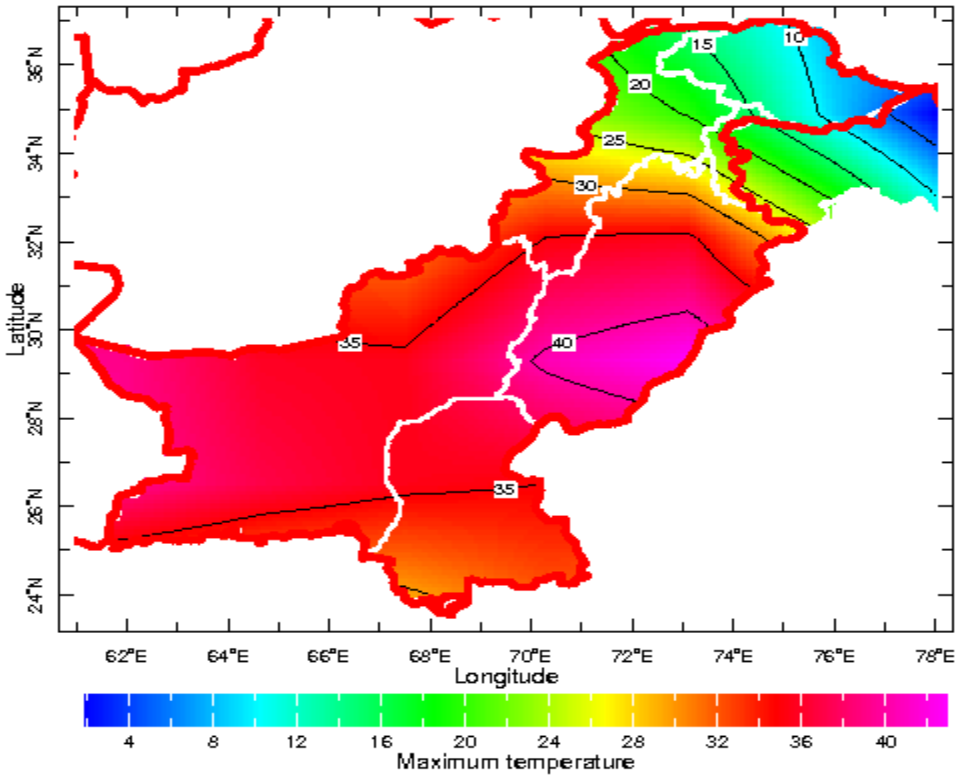
7. Spatial distribution of expected maximum temperature during



Expected Maximum Temperature during May, 2014

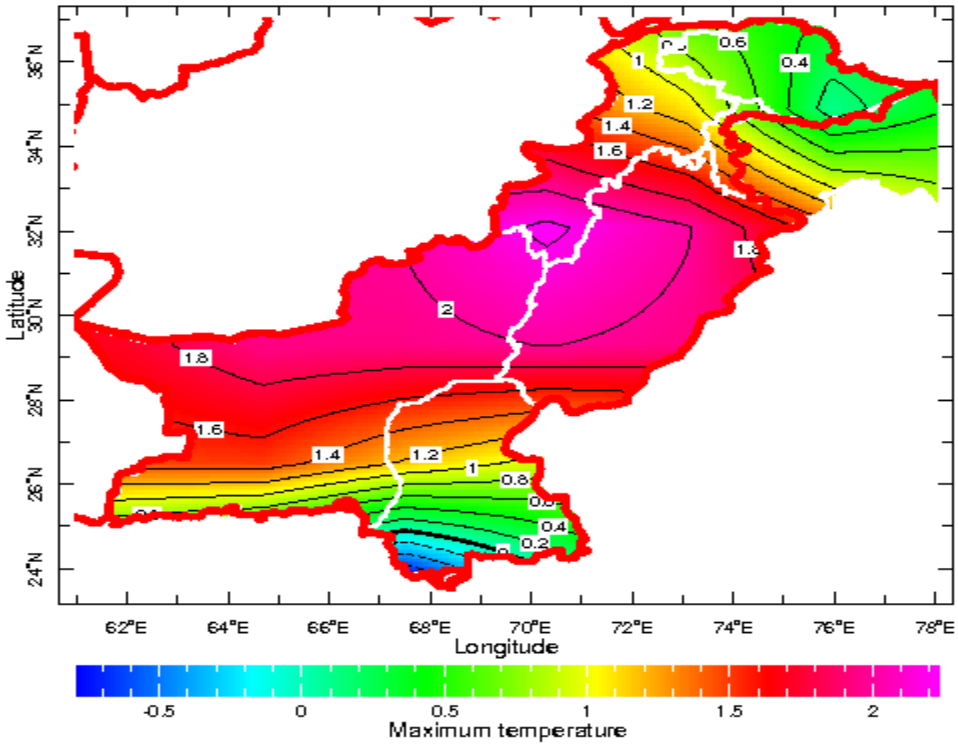


Expected Maximum Temperature during Jun, 2014

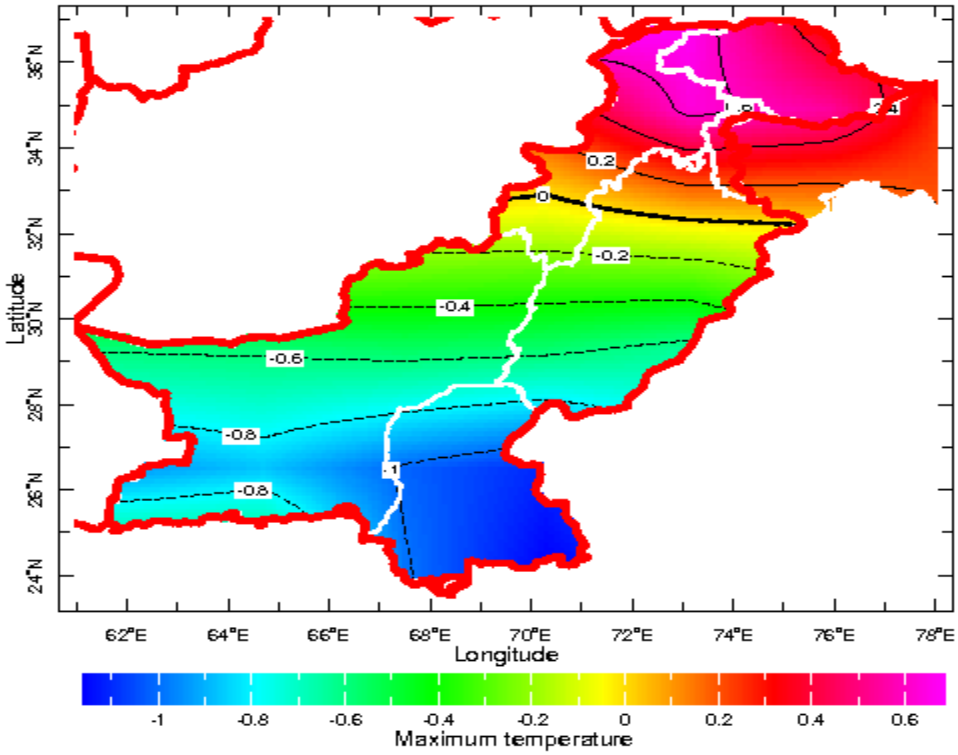


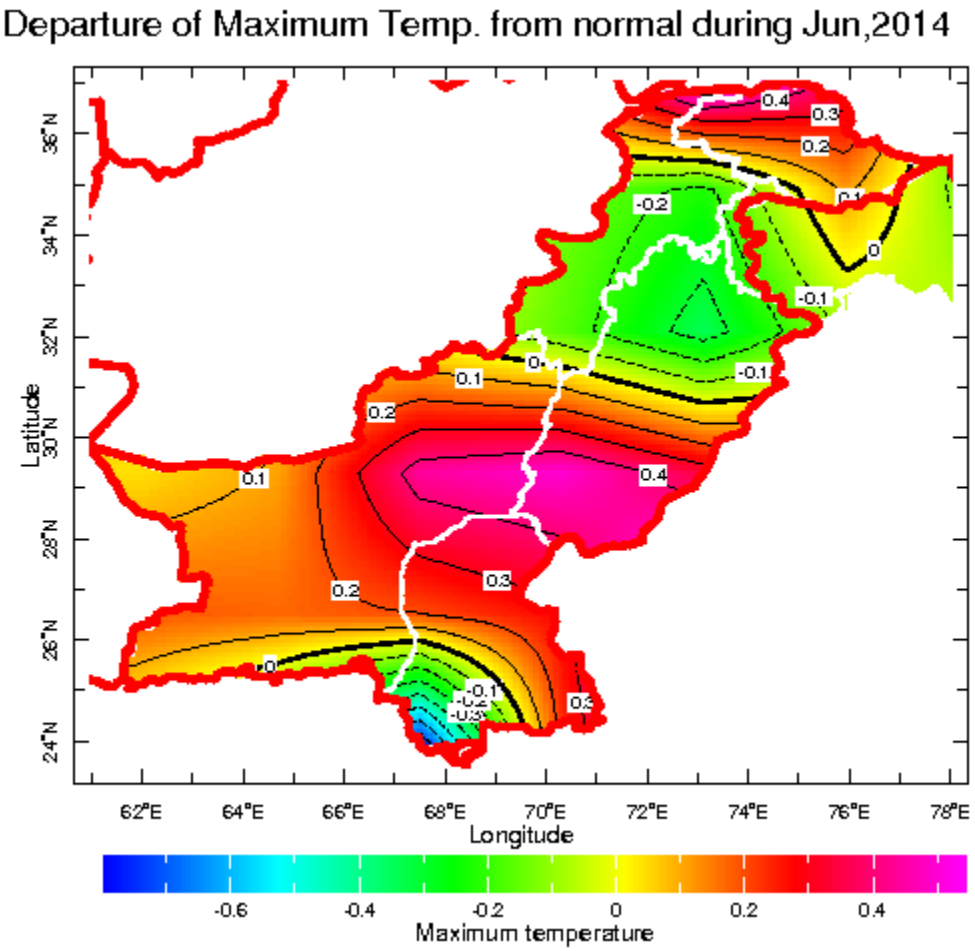
8. *Departure of expected maximum temperature from normal*

Departure of Maximum Temp. from normal during Apr,2014



Departure of Maximum Temp. from normal during May,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 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/