

Seasonal weather outlook

(Apr-Jun, 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 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, 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.

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 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.

Probability outlook: Normal to below normal intensity of jet stream is associated with below normal precipitation in 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.

Probability outlook: normal precipitation is likely to occur the country. Lower and central parts of the country may be getting good rain during April.

- 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 (1.45) and in increasing trend (lower 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>

Probability outlook: Below normal precipitation over all parts of the country will be expected. The focus of weather tracks may be towards northern parts of the country.

ENSO Alert System Status: **El Niño Advisory**

Synopsis: There is an approximately 50-60% chance that El Niño conditions will continue through Northern Hemisphere summer 2015.

During February 2015, El Niño conditions were observed as the above-average sea surface temperatures (SST) across the western and central equatorial Pacific became weakly coupled to the tropical atmosphere. The latest weekly Niño indices were +0.6°C in the Niño-3.4 region and +1.2°C in the Niño-4 region, and near zero in the Niño-3 and Niño-1+2 regions. Subsurface temperature anomalies increased associated with a downwelling oceanic Kelvin wave, which was reflected in positive subsurface anomalies across most of the Pacific. Consistent with weak coupling, the frequency and strength of low-level westerly wind anomalies increased over the equatorial Pacific during the last month and a half. At upper-levels, anomalous easterly winds persisted across the east-central Pacific. Also, the equatorial Southern Oscillation Index (EQSOI) remained negative for two consecutive months. Convection was enhanced over the western

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equatorial Pacific and near average around the Date Line. Overall, these features are consistent with borderline, weak El Niño conditions.

Compared to last month, several more models El Niño (3-month values of the Niño-3.4 index equal to or greater than 0.5°C) will continue throughout 2015. This is supported by the recent increase in subsurface temperatures and near-term model predictions of the continuation of low-level westerly wind anomalies across parts of the equatorial Pacific. However, model forecast skill tends to be lower during the Northern Hemisphere spring, which contributes to progressively lower probabilities of El Niño through the year. In summary, there is an approximately 50-60% chance that El Niño conditions will continue through Northern Hemisphere summer 2015 (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)

Probability outlook: La Nina (1%), Neutral (43%) and El Nino (56 %) during Apr-May-Jun, 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.

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

3. Seasonal Weather Outlook Summary (Apr-Jun, 2015)

Synthesis of the latest model forecasts for Apr-Jun, 2015 (AMJ), current synoptic situation and regional weather expert's judgment indicates that normal to slightly above normal precipitation is expected all over the country with average during Apr and May, and slightly above normal Jun. Slightly below average day temperature is likely to occur during April and May. However, day temperature will abruptly rise from early June and become above normal during June.

2.1. Weather outlook

“Slightly average precipitation is expected during the season all over the country with slightly normal temperature during whole predicted season.”

- I. Average precipitation is expected over the country during April all over the country.

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- II. Slightly average precipitation is expected over GB and FATA during April.
- III. Wet spells of precipitation is expected during first decade of April and then slight rain is expected for the rest of month.
- IV. Light rain is expected occasionally during May all over the country.
- V. Above average precipitation is expected during May over KP, AJK and FATA.
- VI. Monsoonal current will enter in the country during last week of June; as a result moderate rain is expected during last week of June.
- VII. Average precipitation is expected all over the country during Jun.
- VIII. Daily average temperature would be on lower side during April and May.

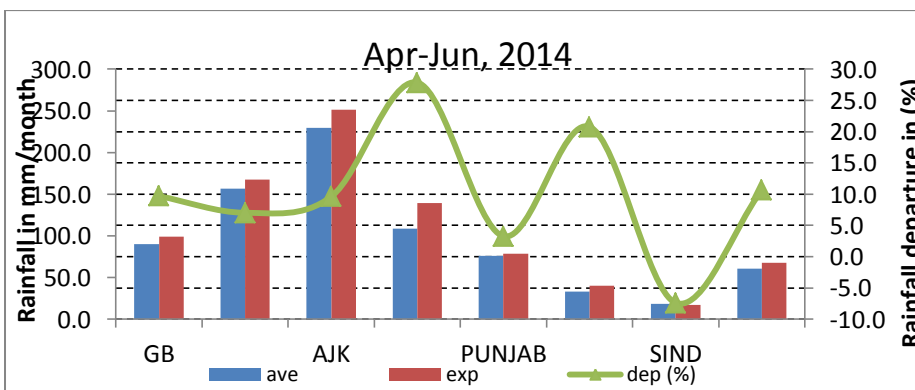
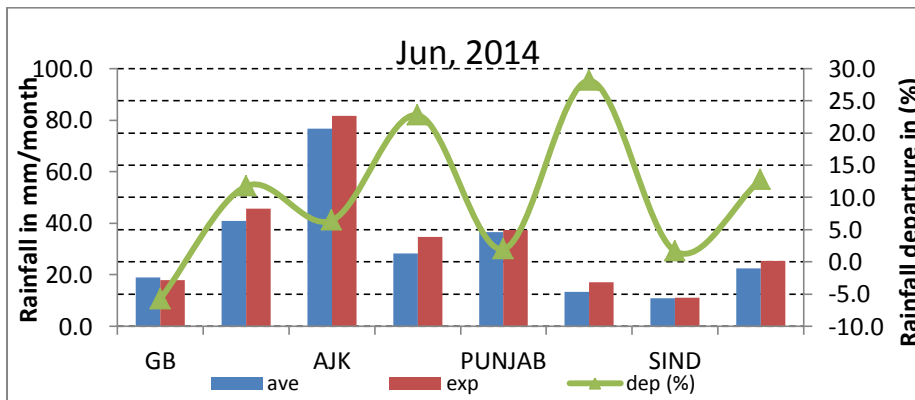
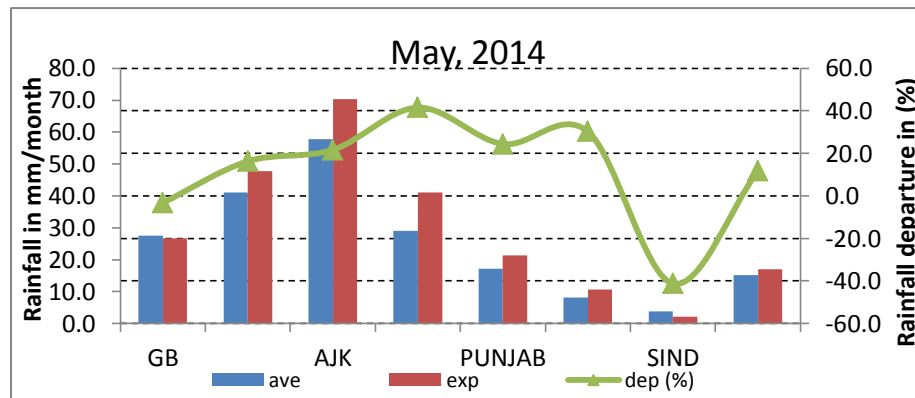
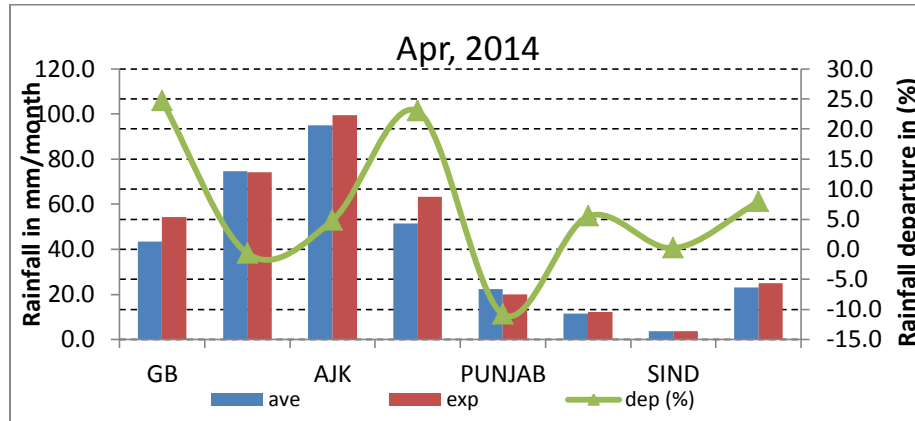
2.2. Monthly Quantitative Weather Forecast

	Apr, 2015		May, 2015		Jun, 2015		Apr-Jun, 2015	
	ave	exp	ave	exp	ave	exp	ave	exp
GB	43.5	Abv. Ave	27.6	Ave	19.0	Ave	90.1	Ave
KP	74.7	Ave	41.1	Abv. Ave	40.8	Ave	156.6	Ave
AJK	94.9	Ave	57.8	Abv. Ave	76.8	Ave	229.5	Ave
FATA	51.5	Abv. Ave	29.0	Abv. Ave	28.3	Abv. Ave	108.8	Abv. Ave
PUNJAB	22.4	Ave	17.1	Abv. Ave	36.5	Ave	76.1	Ave
BALUCHISTAN	11.5	Ave	8.2	Abv. Ave	13.4	Abv. Ave	33.1	Abv. Ave
SIND	3.6	Ave	3.7	Blw. Ave	10.8	Ave	18.1	Ave
Pakistan	23.1	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°) latitude by longitude. Ensembles of different climate models are used for computation of expected precipitation over the region.

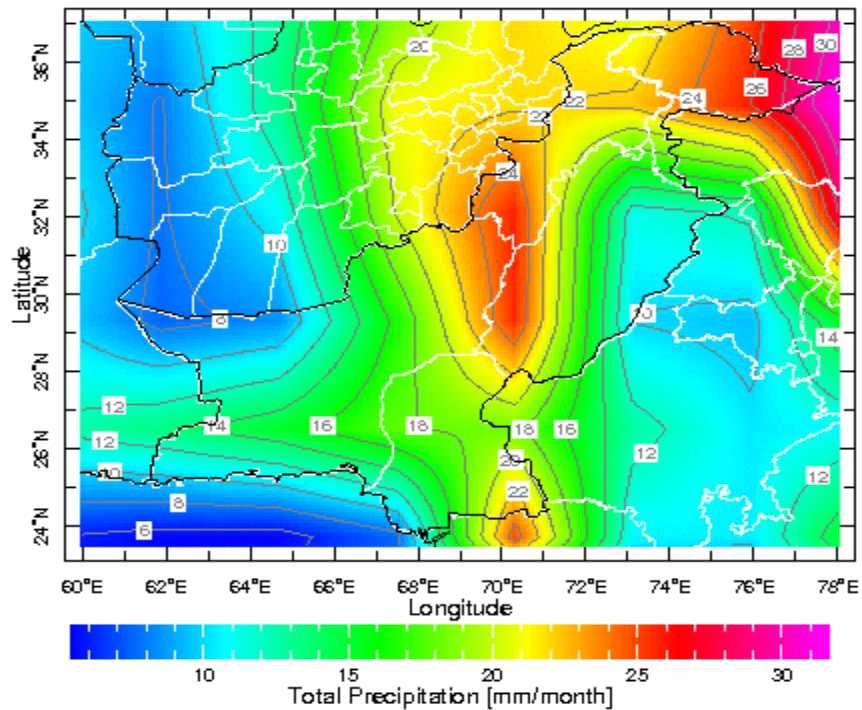
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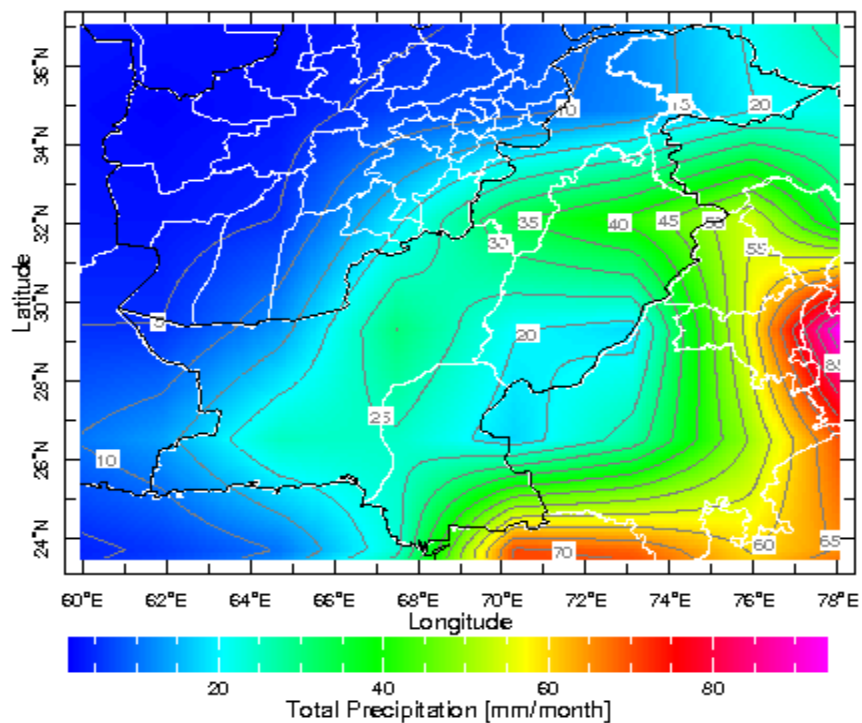
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3. Spatial distribution of expected rainfall during coming season (GCM-ECHAM)

Monthly expected Precipitation for May, 2015



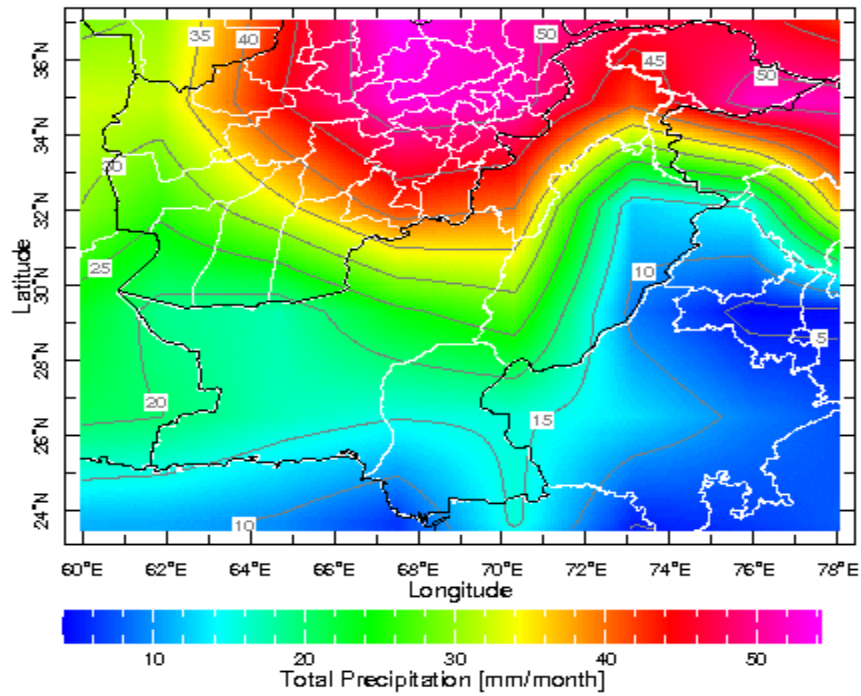
Monthly expected Precipitation for Jun, 2015



4.

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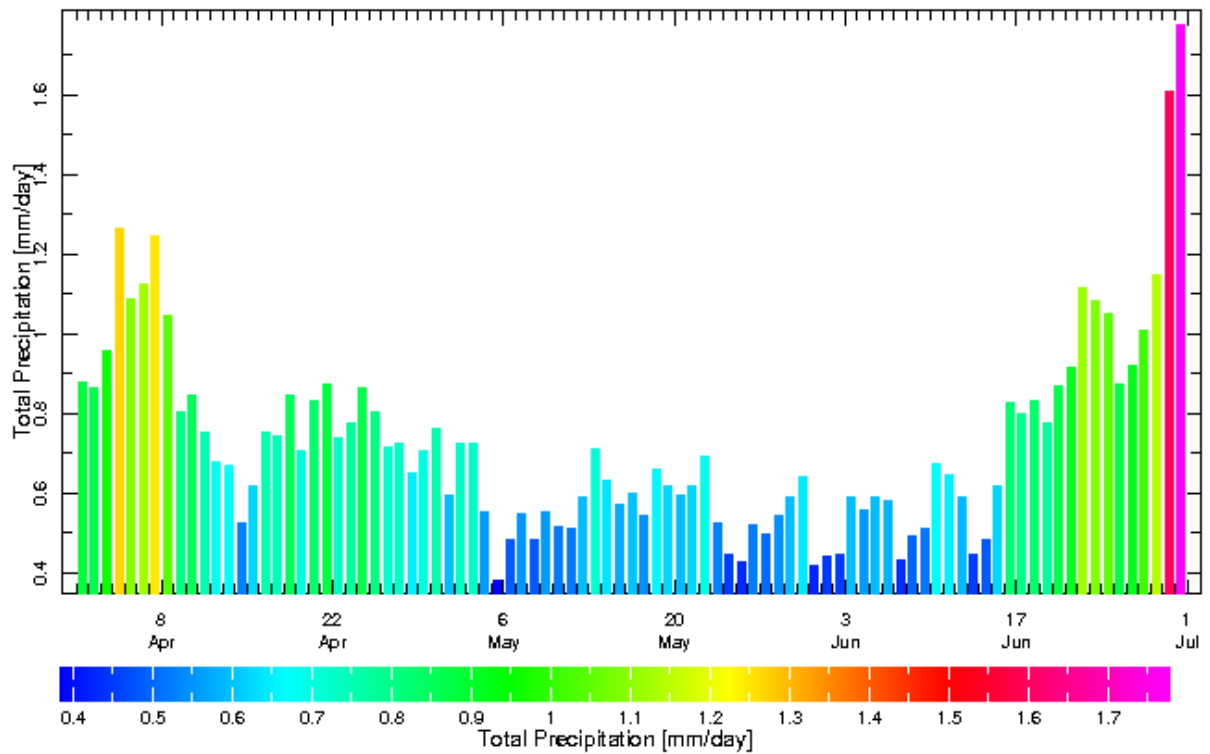
Monthly expected Precipitation for Apr, 2015



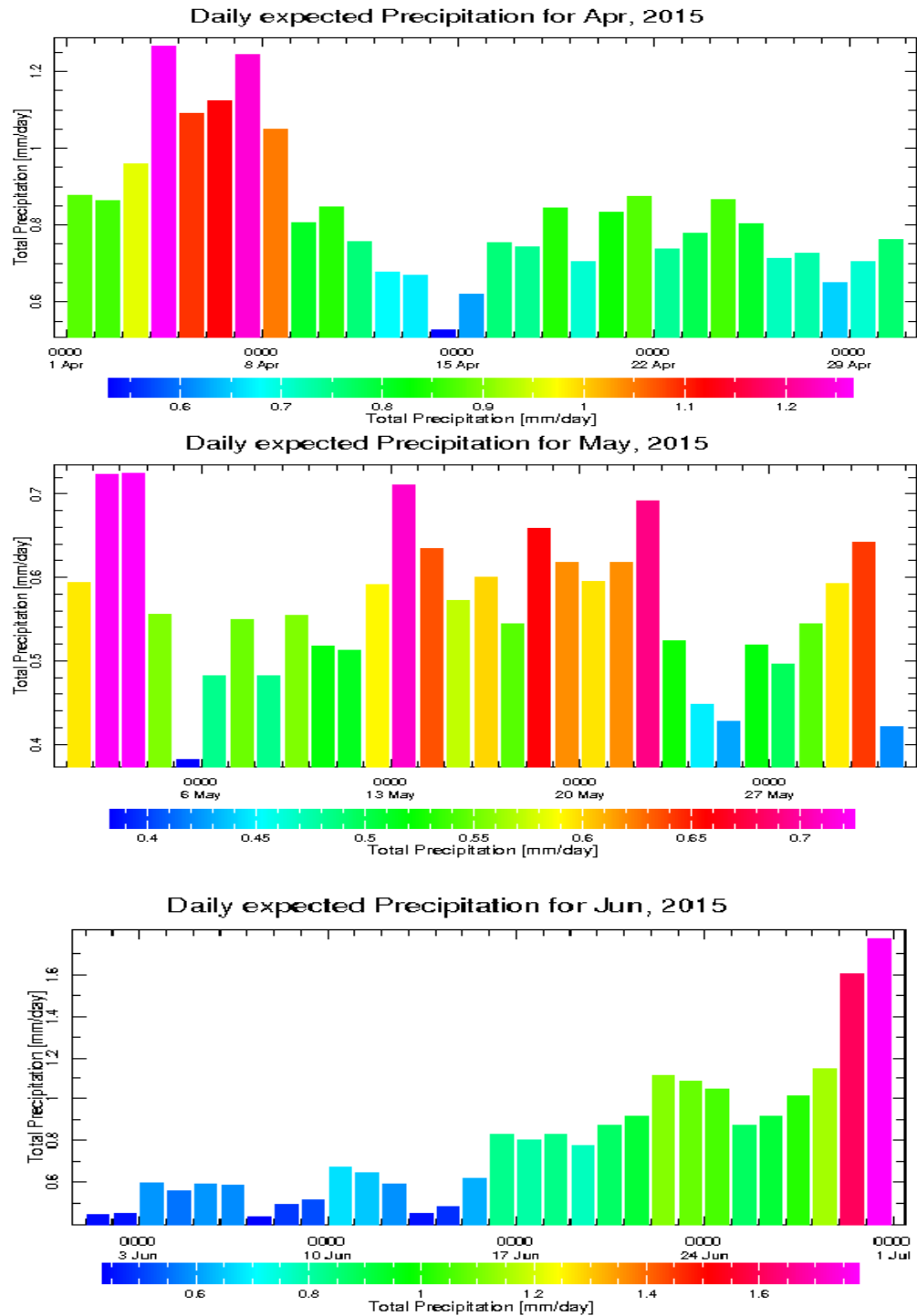
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6. Expected daily rainfall

Daily expected Precipitation for Apr-Jun, 2015



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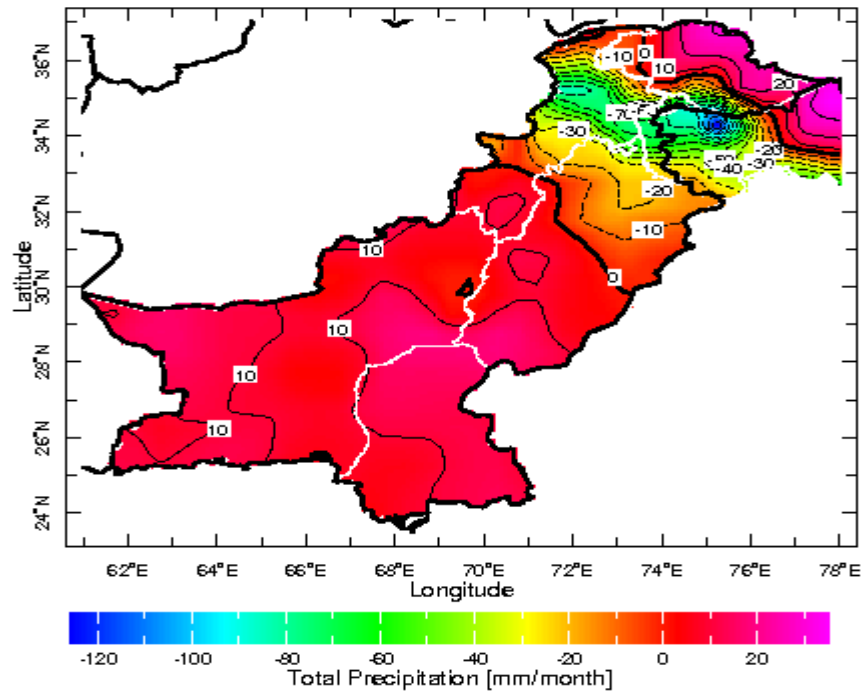


Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

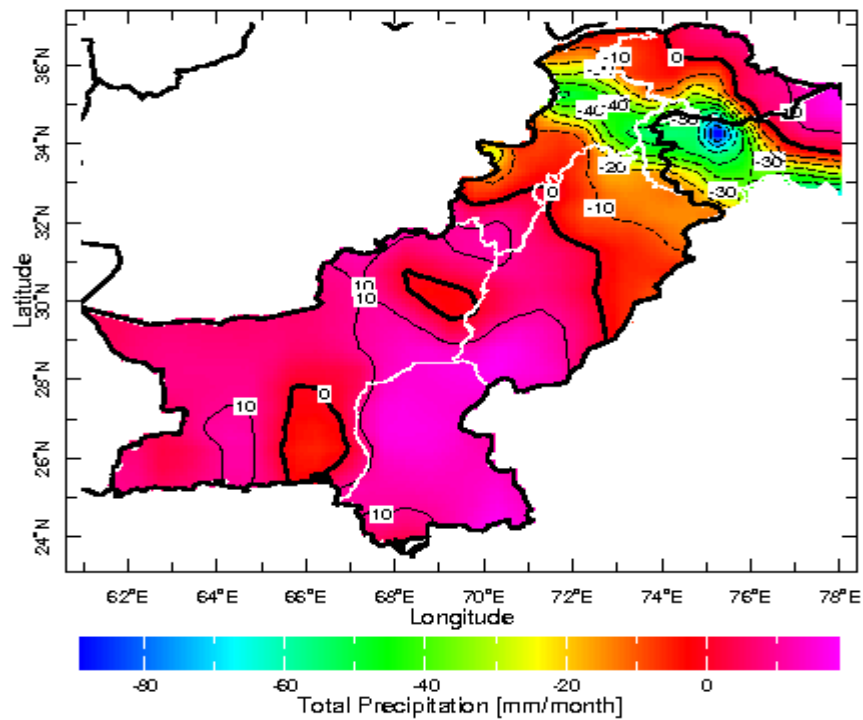
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7. Monthly departure from normal (precipitation) during coming season

Departure of rainfall from normal Apr-2015

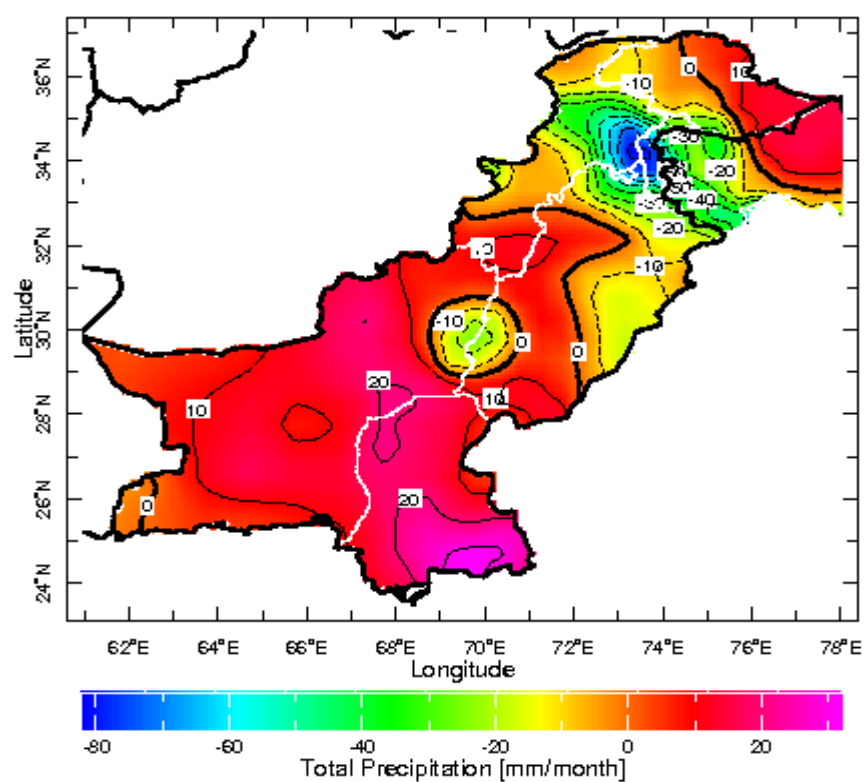


Departure of rainfall from normal May-2015

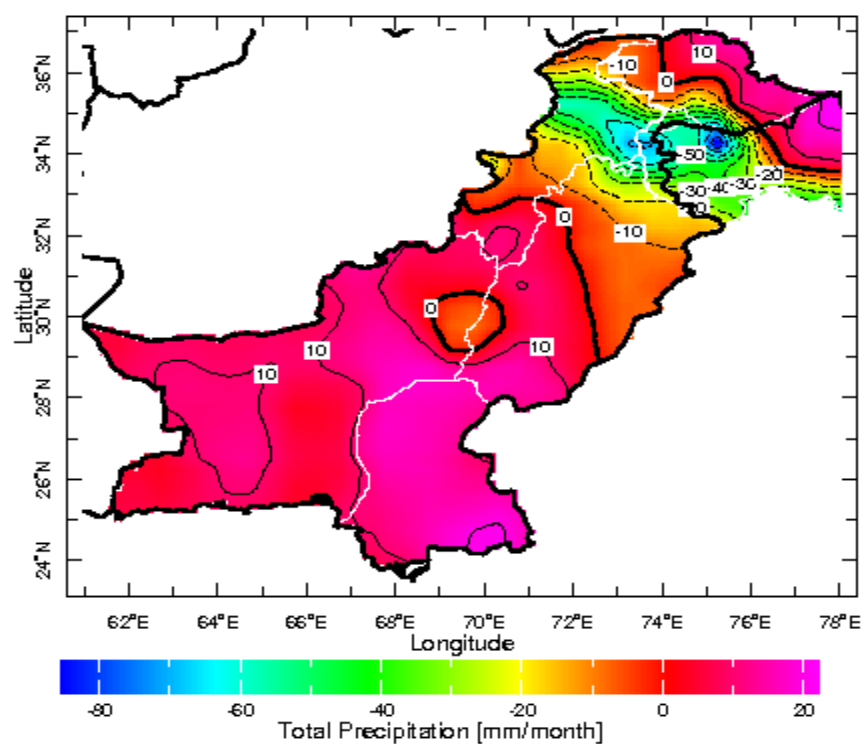


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Departure of rainfall from normal Jun-2015

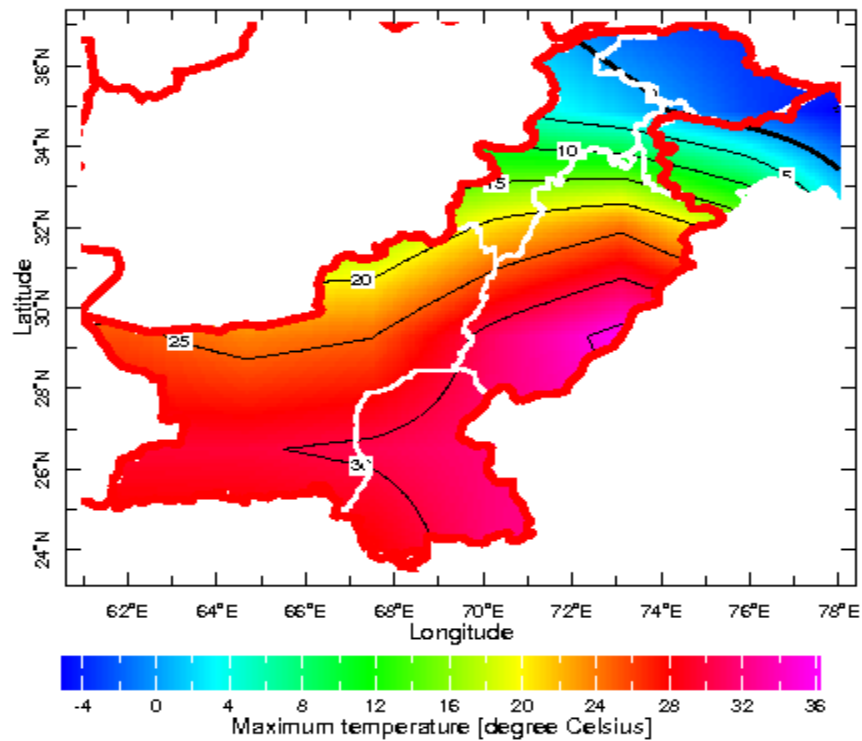


Departure of rainfall from normal (Apr-Jun,2015)

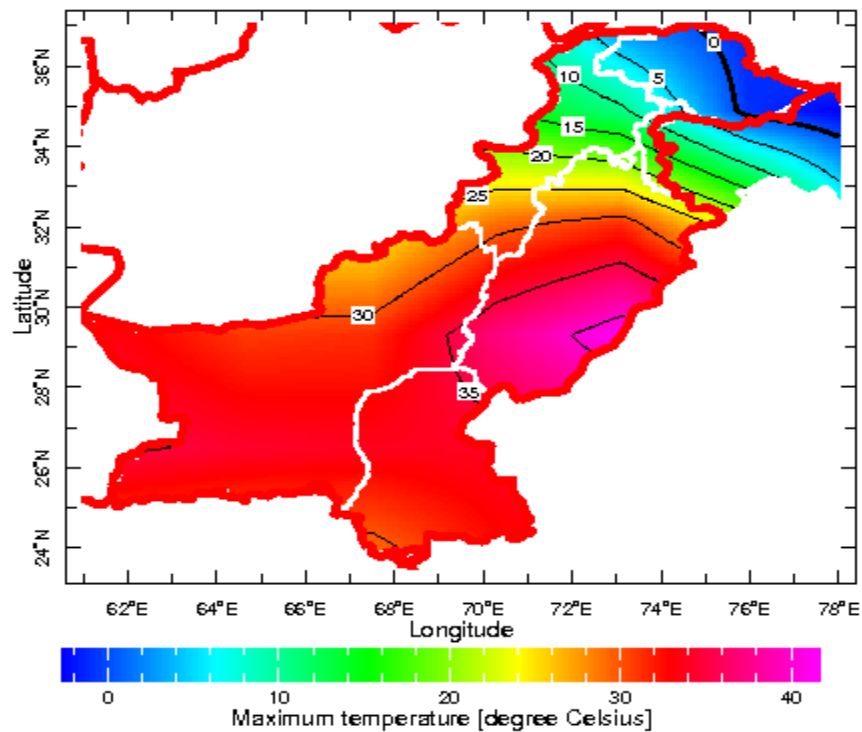


8. Spatial distribution of expected minimum/maximum temperature

Expected Maximum Temperature during Apr, 2015

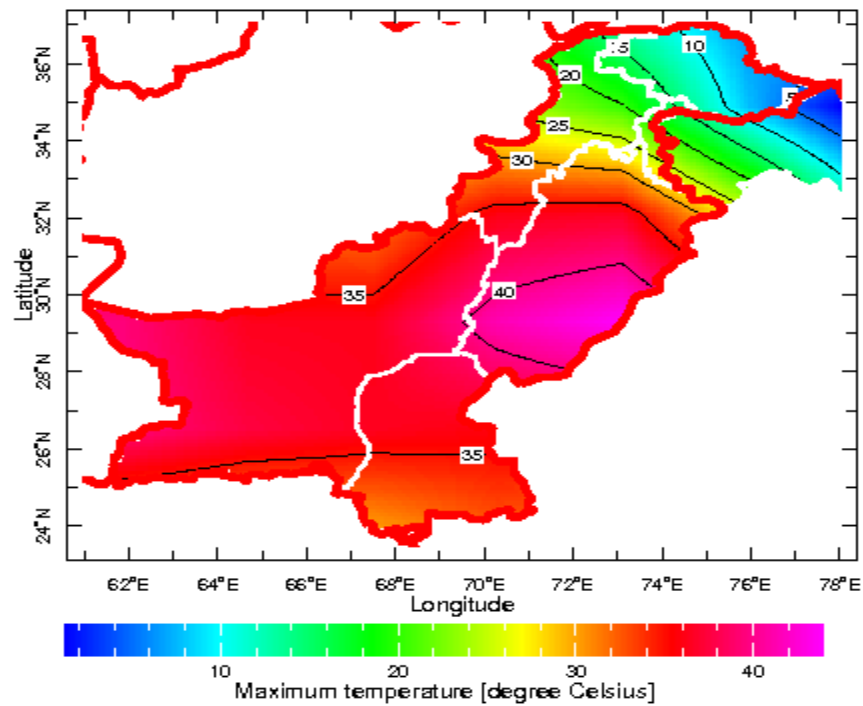


Expected Maximum Temperature during May, 2015



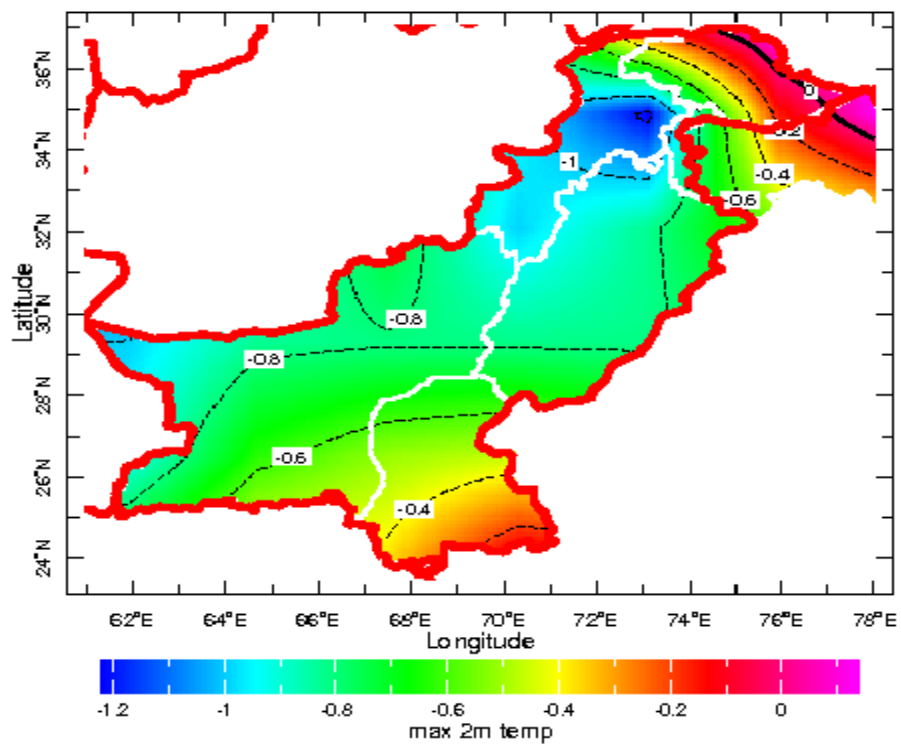
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Expected Maximum Temperature during Jun, 2015



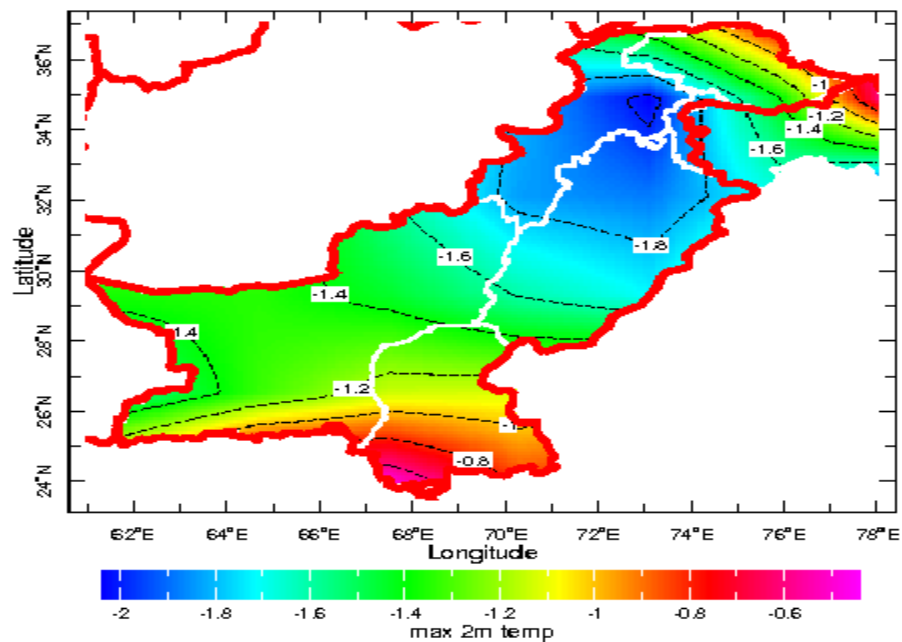
9. Departure of expected minimum/maximum temperature from normal

Expected Dep. of Max. Temp. from normal, Apr-2015

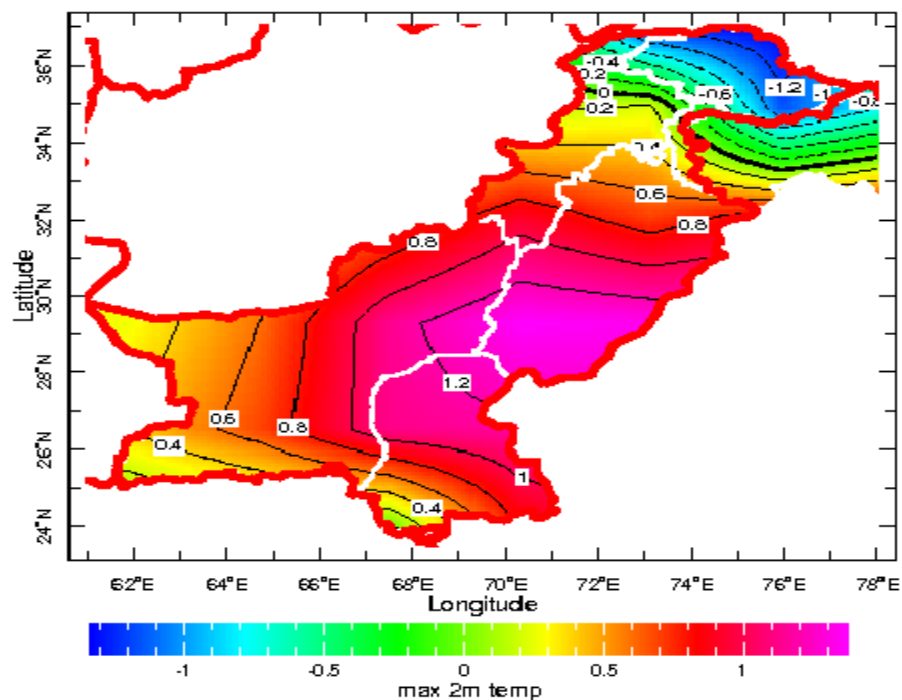


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Expected Dep. of Max. Temp. from normal, May-2015



Expected Dep. of Max. Temp. from normal, Jun-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 issues 10th of every month with three months in advance weather outlook. Lastest seasonal weather summary can be download from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>