

Seasonal weather outlook

(Mar-May, 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 Mar 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 February.

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

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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 (41%) and El Nino (58 %) during Mar-Apr-May, 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 (Mar-May, 2015)

Synthesis of the latest model forecasts for Mar-May, 2015 (MAM), 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 March, and above normal during April and May. Slightly below average night temperature is likely to occur during March while above normal day temperature during April all over the country.

2.1. Weather outlook

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

- I. Average precipitation is expected over the country during March with higher deficit over central parts of the country including northern Punjab, northern KP and Kashmir.

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- II. Average precipitation is expected over Sindh and Baluchistan provinces during March.
- III. Above normal precipitation is expected over GB with good accumulation of snow fall over the northern parts of the country during March.
- IV. Two to three moderate rainy spells are expected over all parts of the country during March with good rains during mid of March.
- V. Above average precipitation is expected during April with higher values over southern Punjab and lower KP and Sindh. .
- VI. One to two spell of light to moderate are expected over the country during mid of April.
- VII. Average precipitation is expected all over the country during May.
- VIII. Daily average temperature would be on lower side during whole predicted months.

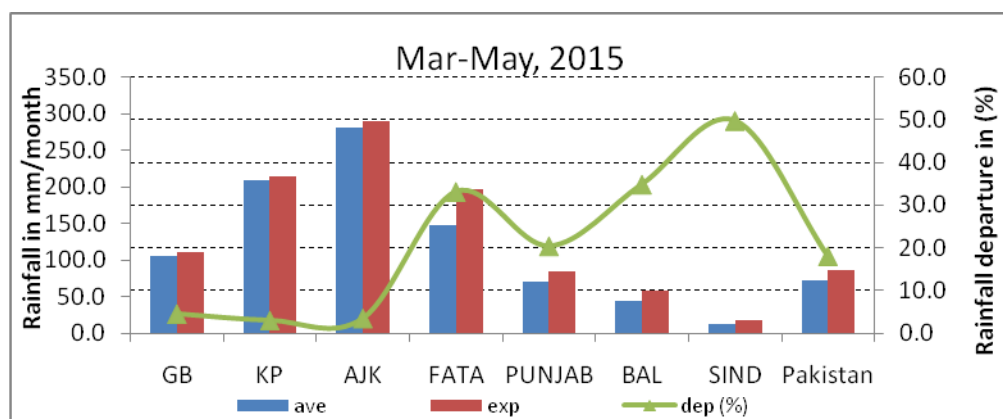
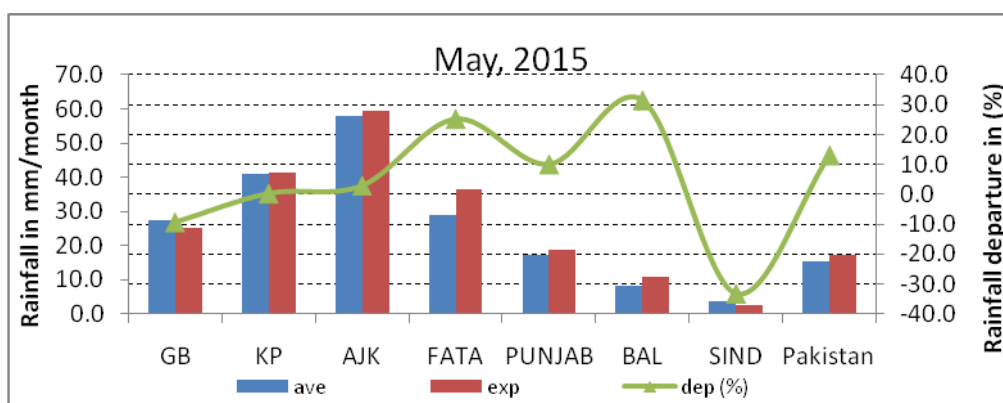
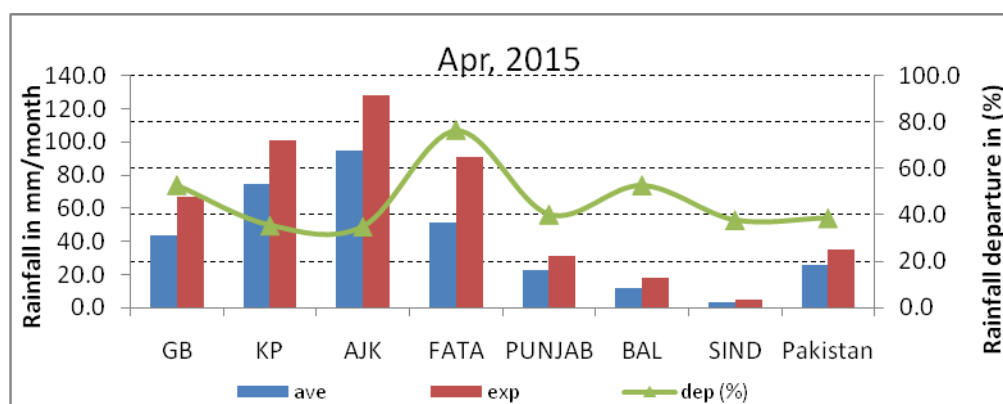
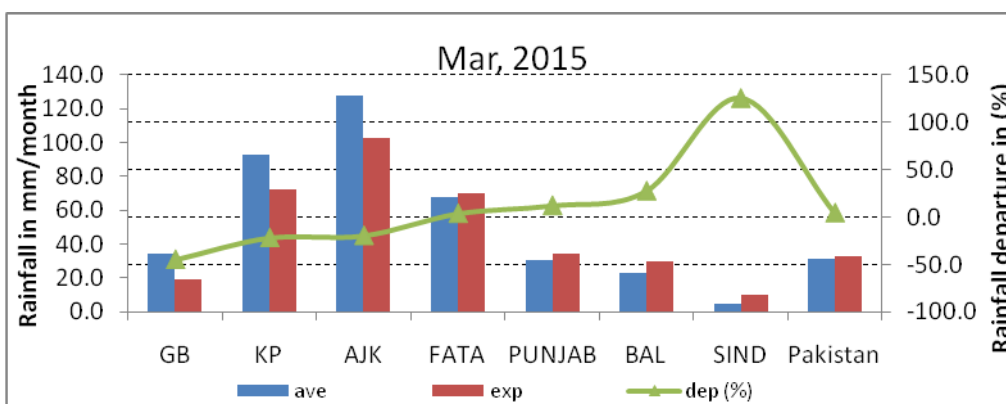
2.2. Monthly Quantitative Weather Forecast

	Mar, 2015		Apr, 2015		May, 2015		Mar-May, 2015	
	ave	exp	ave	exp	ave	exp	ave	exp
GB	34.6	Blw. Ave	43.5	Abv. Ave	27.6	Ave	105.7	Ave
KP	92.5	Blw. Ave	74.7	Abv. Ave	41.1	Ave	208.3	Ave
AJK	127.5	Blw. Ave	94.9	Abv. Ave	57.8	Ave	280.2	Ave
FATA	67.4	Ave	51.5	Abv. Ave	29.0	Abv. Ave	147.8	Abv. Ave
PUNJAB	30.9	Ave	22.4	Abv. Ave	17.1	Ave	70.4	Abv. Ave
BALUCHISTAN	23.3	Abv. Ave	11.5	Abv. Ave	8.2	Abv. Ave	43.1	Abv. Ave
SIND	4.7	Abv. Ave	3.6	Abv. Ave	3.7	Blw. Ave	12.0	Abv. Ave
Pakistan	31.7	Ave	25.4	Abv. Ave	15.2	Ave	72.3	Abv. Ave

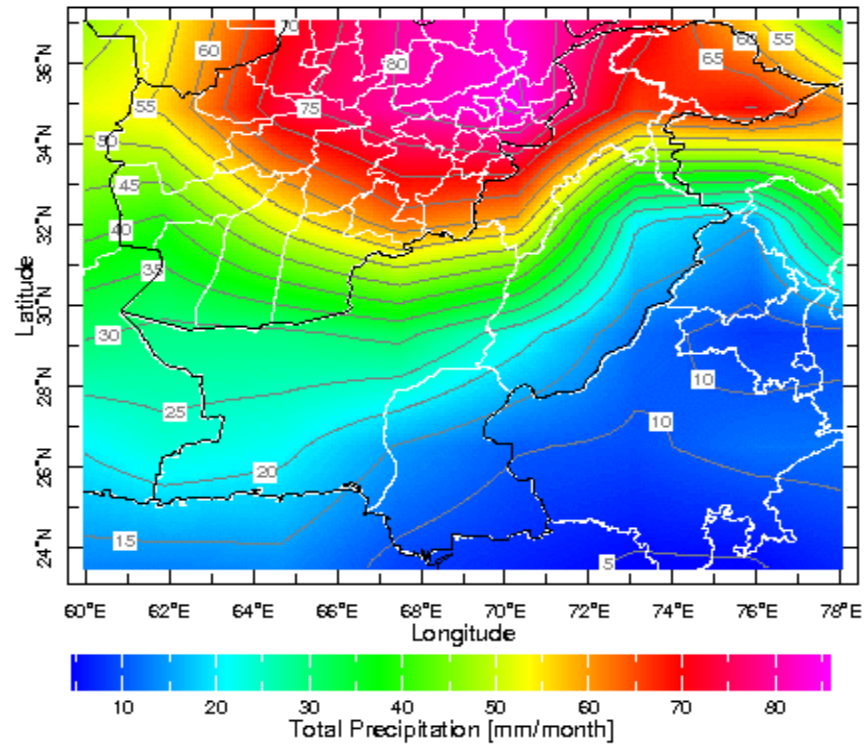
Ave.: average (1981-2010), **Exp.:** Expected rainfall, **Below Average** (Blw. Ave) < -15 %, **Average** precipitation range (Ave) = -15 to +15 %, **Above Average** (Abv.Ave) > +15 %

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 (Mar-May, 2015)



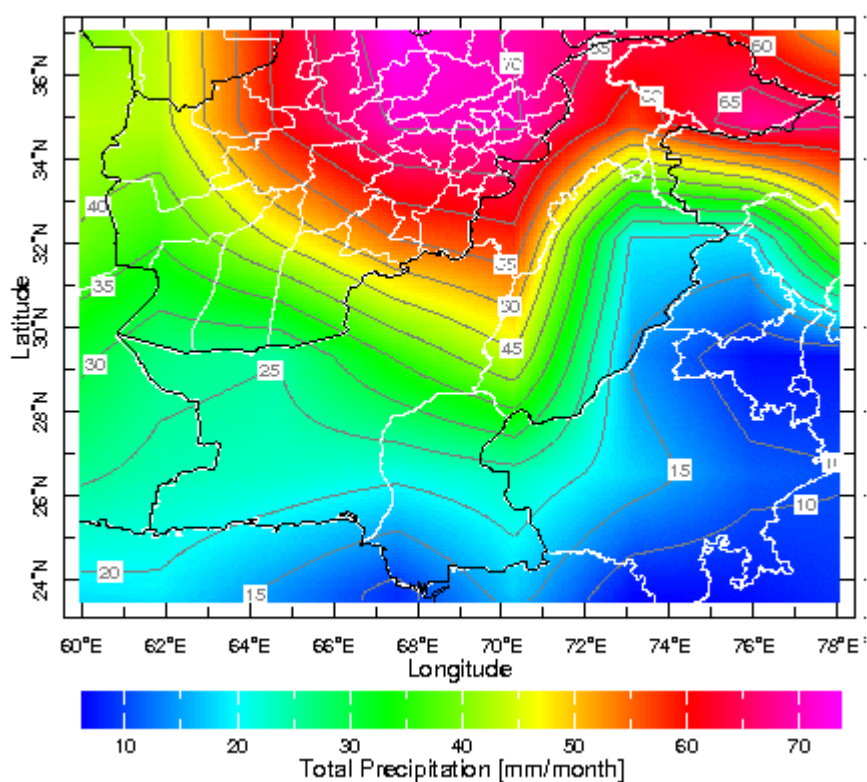
**3. Spatial distribution of expected rainfall during coming season (GCM-
Monthly expected Precipitation for Mar, 2015**



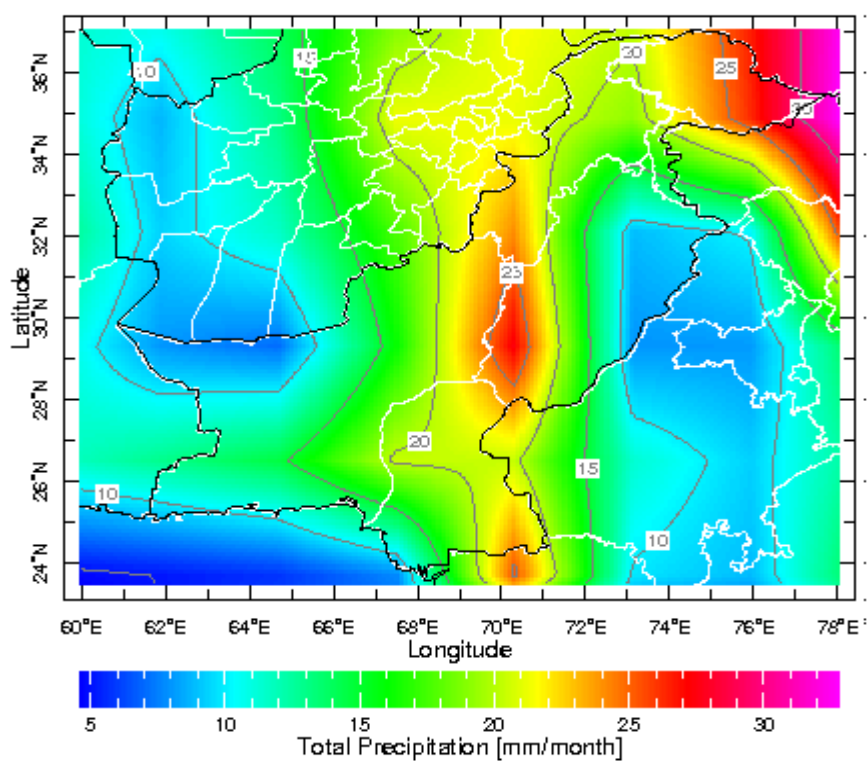
ECHAM)

Seasonal weather outlook (Mar-May, 2015)

Monthly expected Precipitation for Apr, 2015

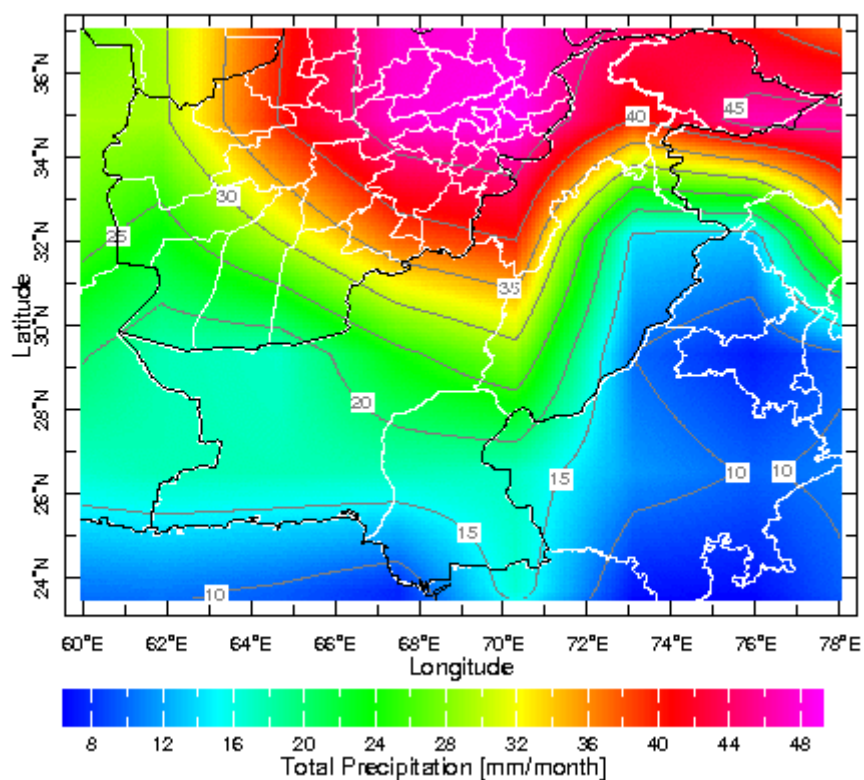


Monthly expected Precipitation for May, 2015



Seasonal weather outlook (Mar-May, 2015)

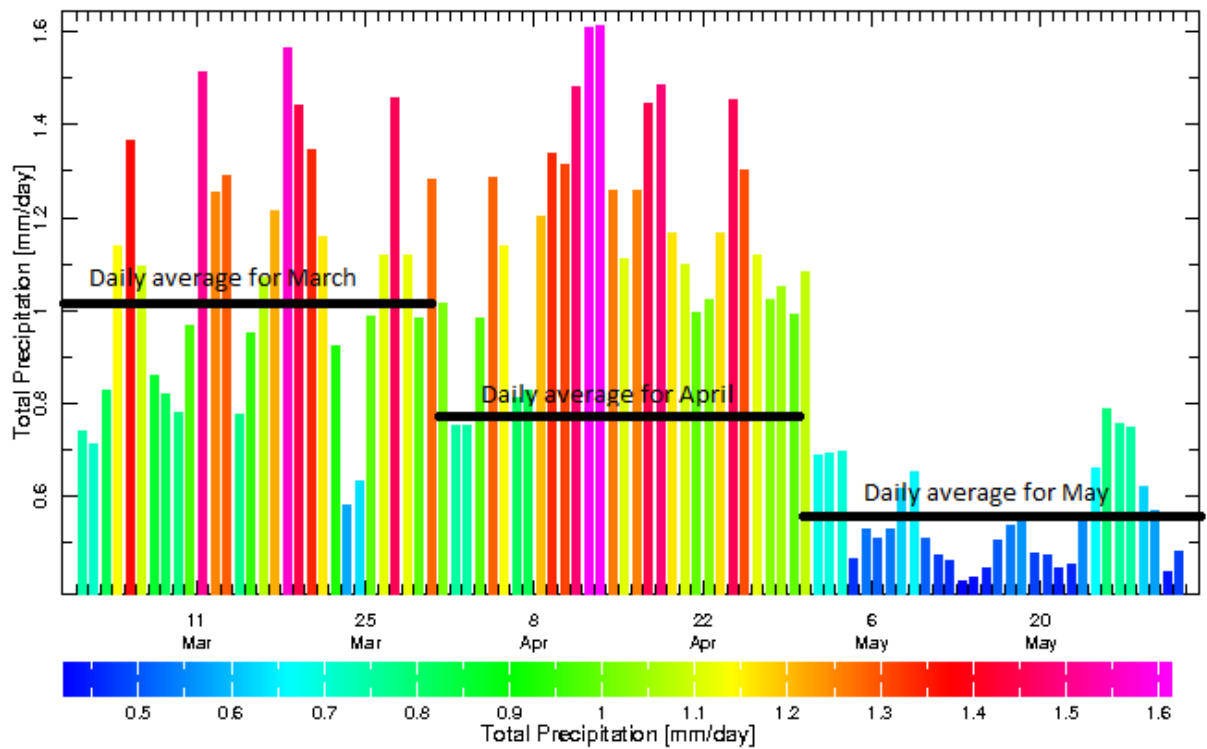
Seasonal Precipitation Outlook (Mar-May, 2015)



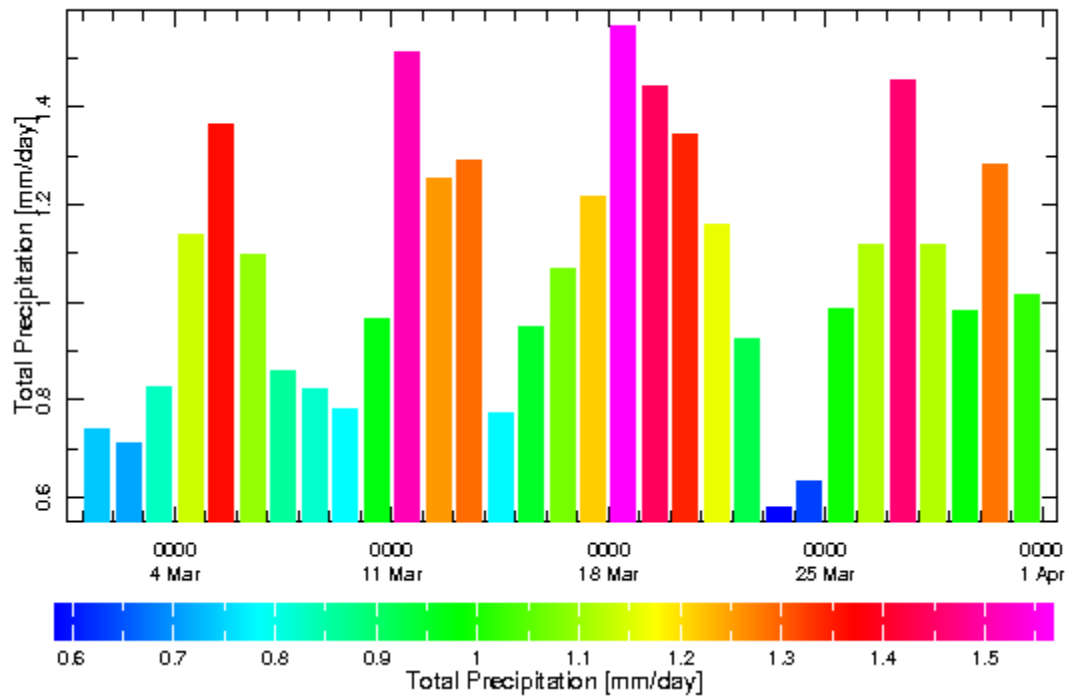
4. Expected daily rainfall

Seasonal weather outlook (Mar-May, 2015)

Daily expected Precipitation for Mar-May, 2015

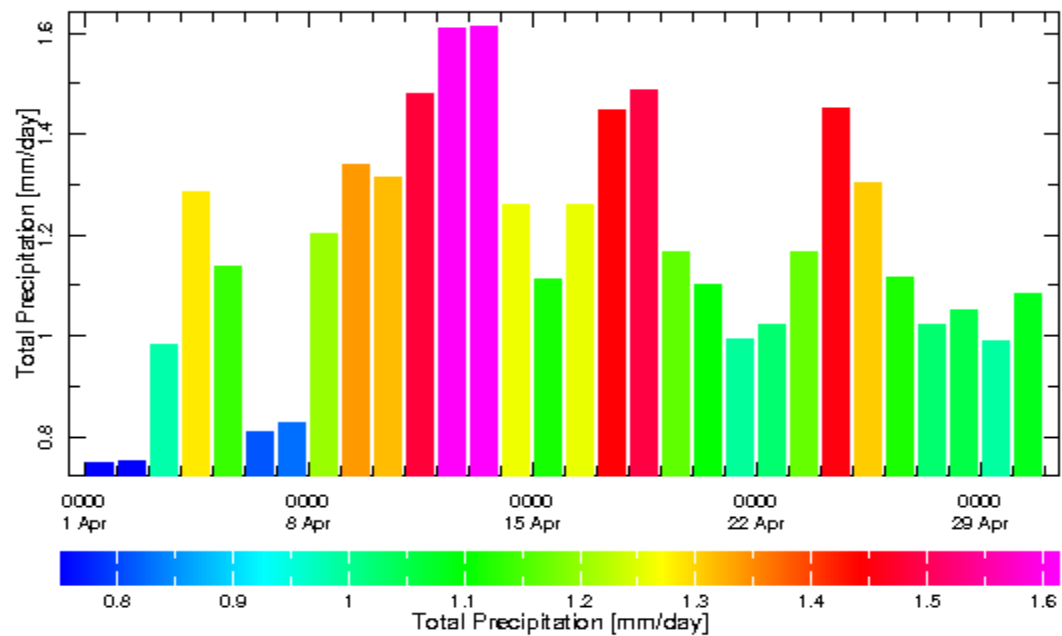


Daily expected Precipitation for Mar, 2015

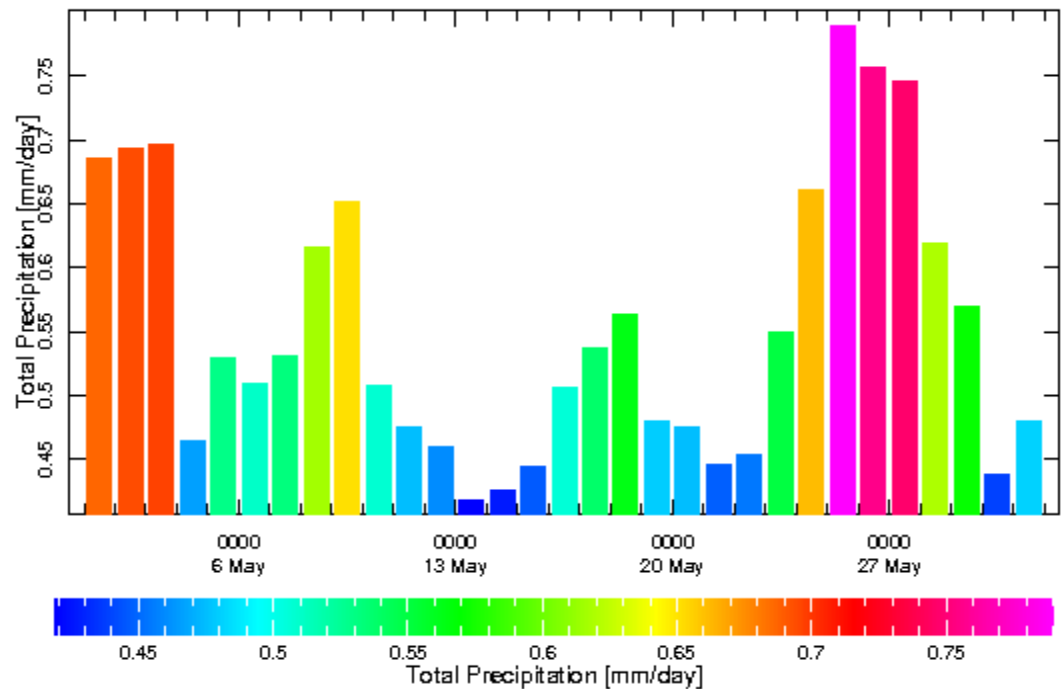


Seasonal weather outlook (Mar-May, 2015)

Daily expected Precipitation for Apr, 2015



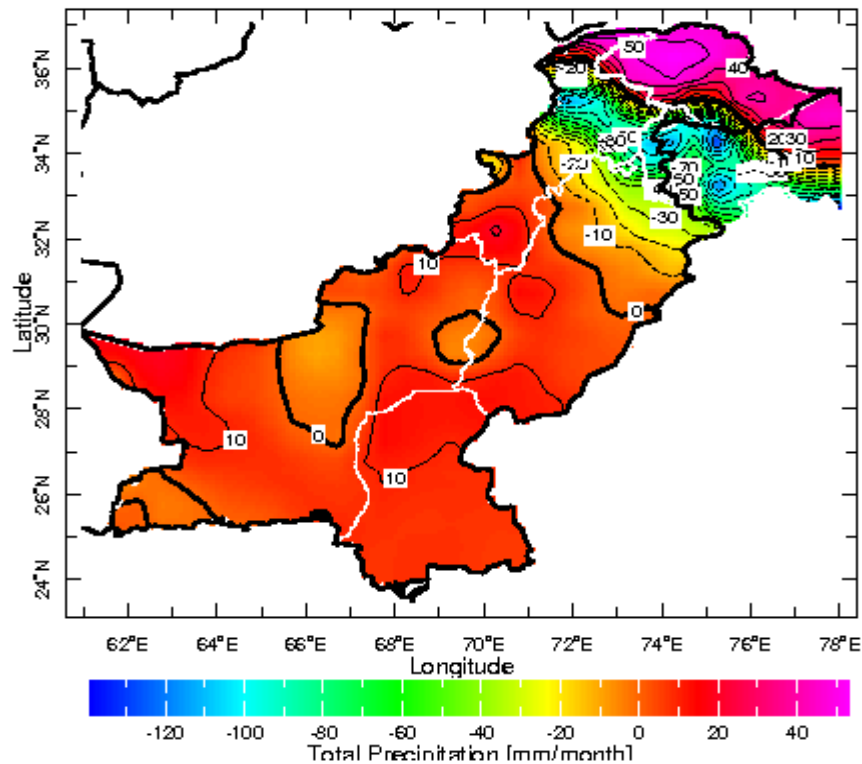
Daily expected Precipitation for May, 2015



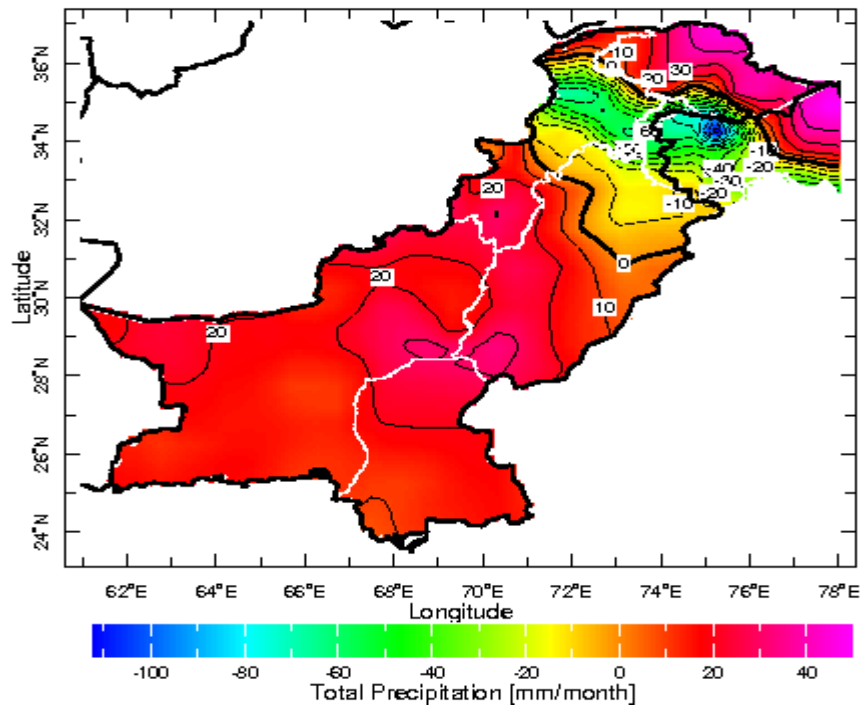
Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

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

Departure of rainfall from normal Mar-2015

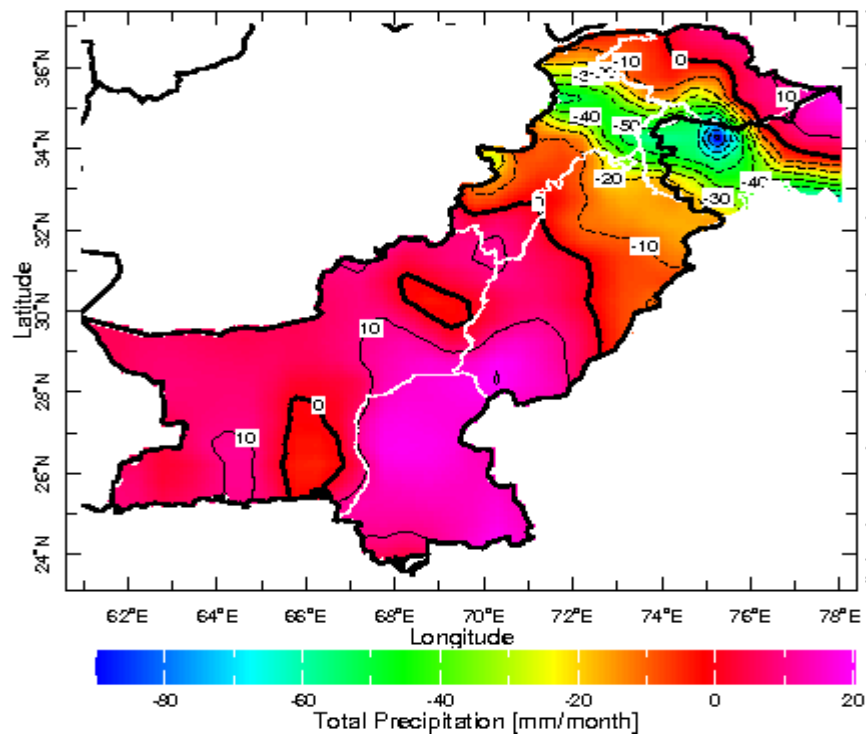


Departure of rainfall from normal Apr-2015

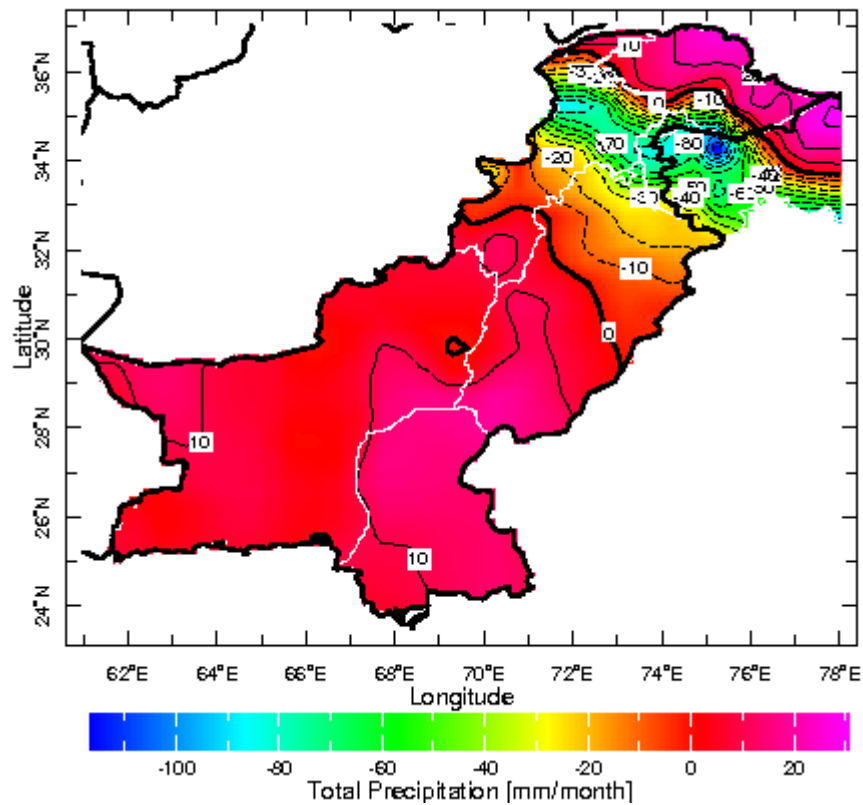


Seasonal weather outlook (Mar-May, 2015)

Departure of rainfall from normal May-2015

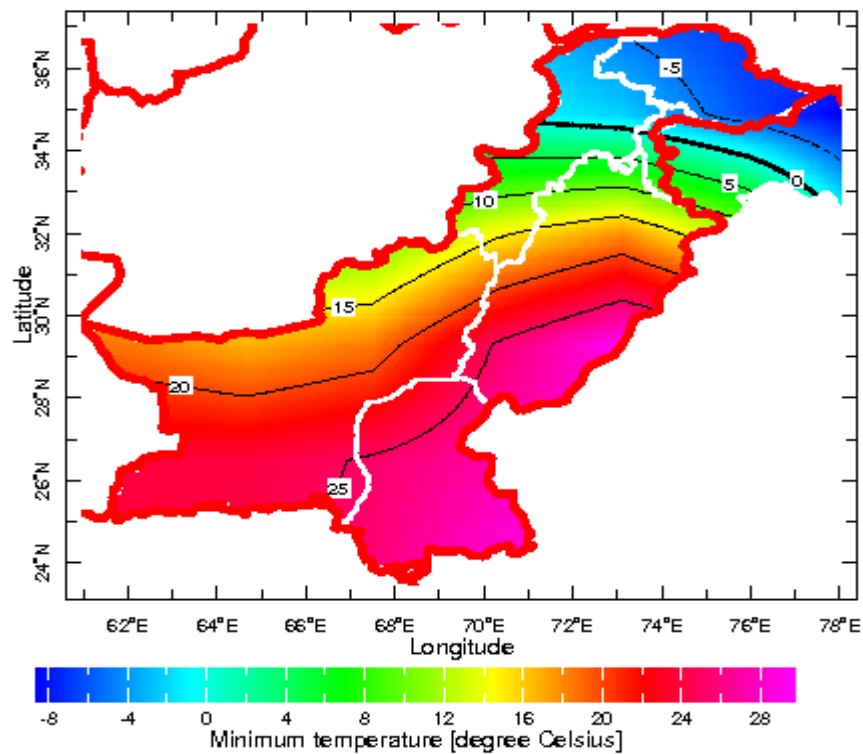


Departure of rainfall from normal (Mar-May,2015)

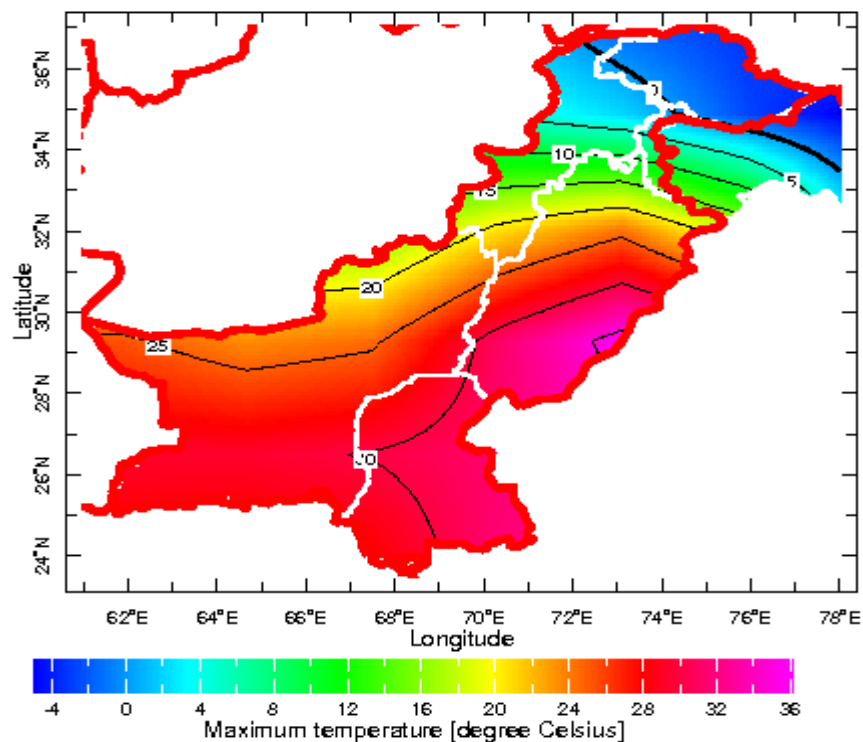


6. Spatial distribution of expected minimum/maximum temperature

Expected Minimum Temperature during Mar, 2015

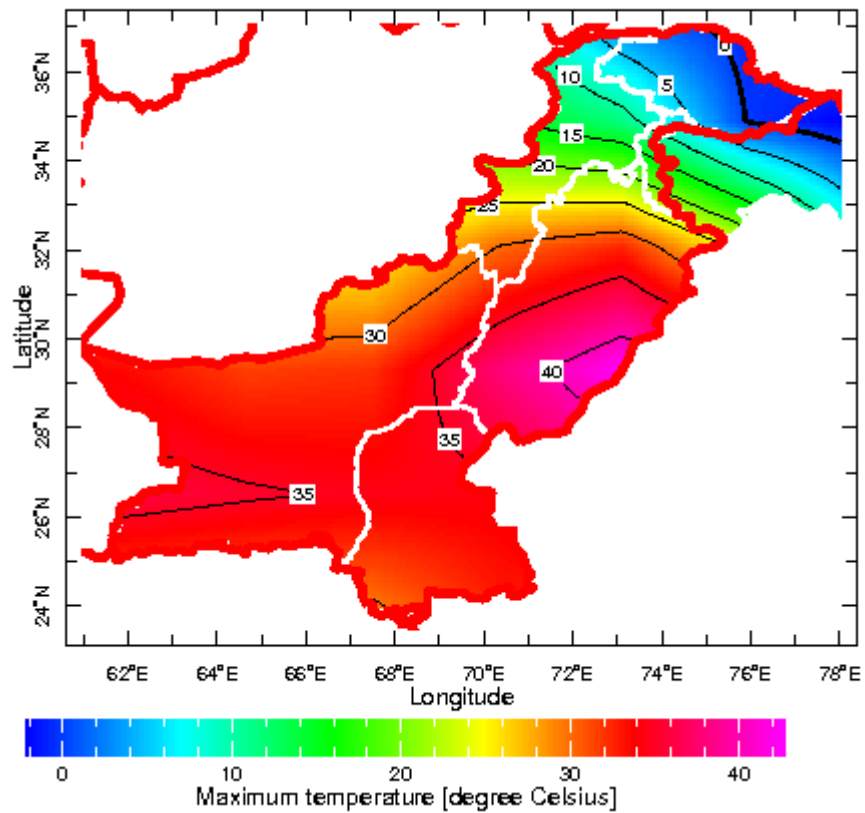


Expected Maximum Temperature during Apr, 2015



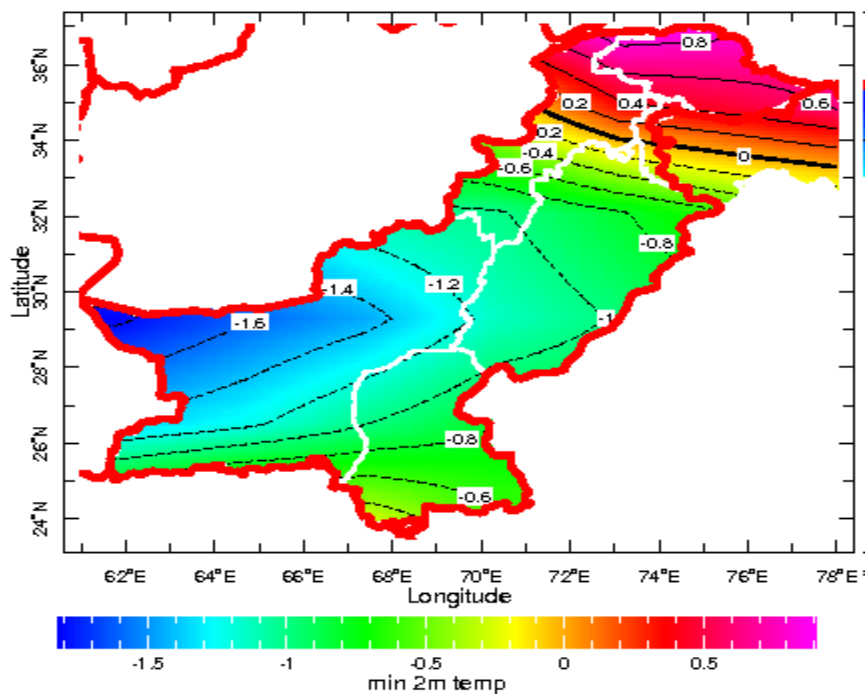
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Expected Maximum Temperature during May, 2015



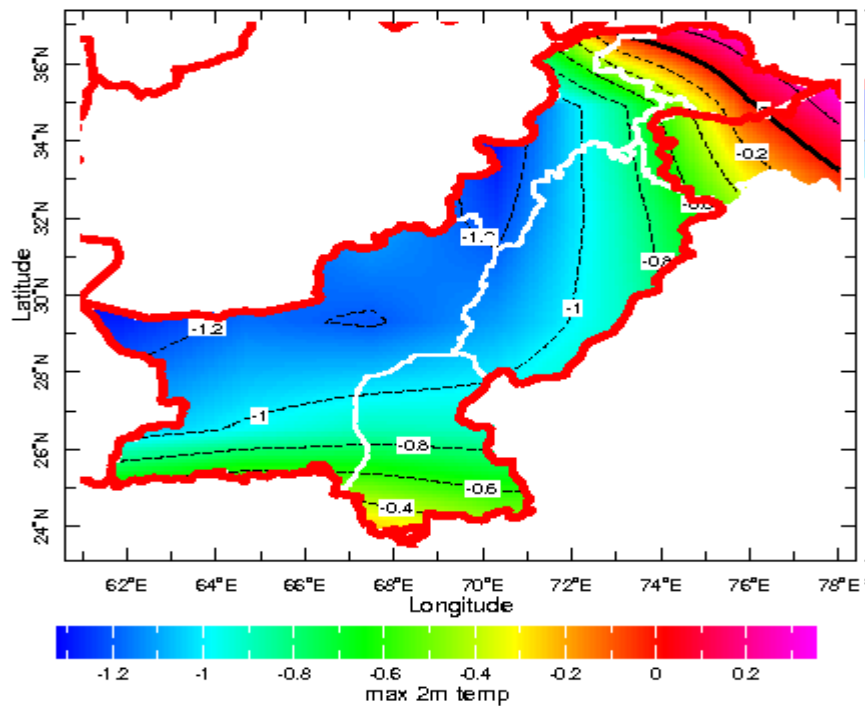
7. Departure of expected minimum/maximum temperature from normal

Expected Dep. of Min. Temp. from normal, Mar-2015

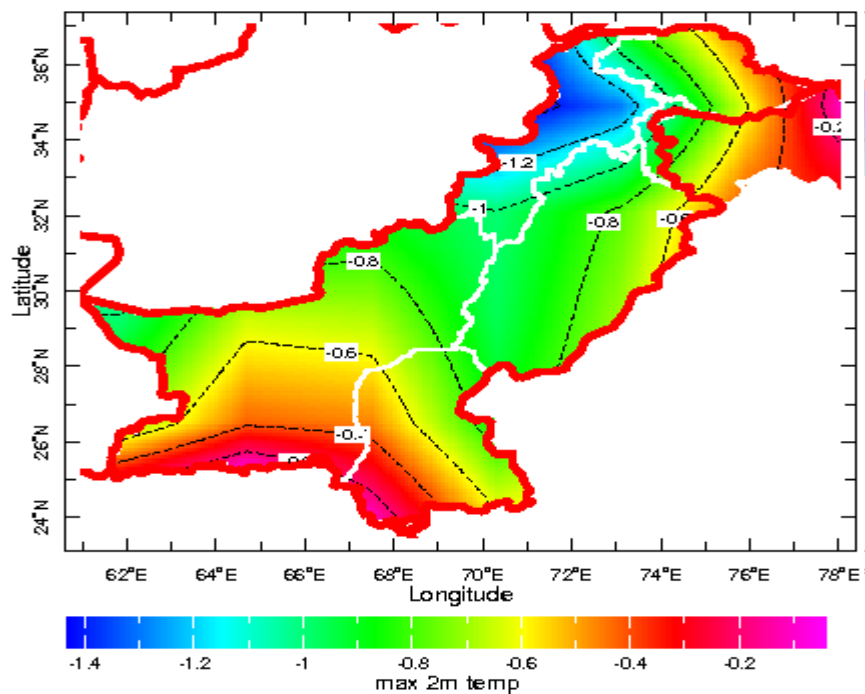


Seasonal weather outlook (Mar-May, 2015)

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



Expected Dep. of Max. Temp. from normal, May-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. Latest seasonal weather summary can be download from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>