

Seasonal weather outlook

(Mar-May, 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 Mar 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 normal intensity and same areas of high winds towards the west. However, its movement trend is slightly towards central and southern regions over the country.

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

- A trough at 500 hPa is expected to be over central parts of the country. As a result, track of the western disturbances may be changed and tilted towards central and southward.

Probability outlook: Precipitation is likely to occur more frequently over central and southern parts of the country. Normal precipitation is expected all over the country.

- Surface temperatures are expected to be on higher side than normal over southern parts of the country as compared with normal (1981-2010). However, central and northern parts with normal temperature will be expected during March and coming months.
- North Atlantic Oscillation (NAO) is in positive phase (1.34) approaching towards positive 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.

- Nearly all model forecasts indicate the persistence of ENSO-neutral (Niño-3.4 index between -0.5°C and 0.5°C) through the Northern Hemisphere spring 2014, but afterwards, an increasing number of models suggest the possible onset of El Niño. Strong surface westerly winds in the western Pacific and the slight eastward shift of above-average temperatures in the subsurface western Pacific potentially portend warming in the coming months. However, the spring is also historically associated with lower forecast skill, so the chance of El Niño developing after the spring is not much different from ENSO-neutral. The consensus forecast is for ENSO-neutral to continue through the Northern Hemisphere spring 2014 (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/2014-february-quick-look/?enso_tab=enso-cpc_update)

Probability outlook: La Nina (3%), Neutral (79%) and El Nino (18 %) during Mar-Apr-May, 2014 season

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- Arabian Sea Surface Temperatures are expected to be slightly below 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 slightly below normal.

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

3. Seasonal Weather Outlook Summary (Mar-May, 2014)

Synthesis of the latest model forecasts for Mar-May, 2014 (MAM), current synoptic situation and regional weather expert's judgment indicates that slightly below average precipitation is expected all over the country with below normal during March and April and normal during May. Normal temperature is likely to occur during March and May while above normal day temperature will be expected during April over most part of the country. Neutral-ENSO 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 slightly higher day temperature than normal.”

- I. Below average precipitation is expected during predicted season.
- II. In March below average precipitation is expected all over the country with slightly above over extreme northern and southern parts of the country. Night temperatures are likely to be normal all over the country.
- III. In April average precipitation is expected over central parts, above normal over extremely northern parts and below normal over northern parts of the country. Surface temperature will be normal slightly above normal over southern and central parts of the country.
- IV. In May average precipitation is expected over the country with below normal over northern parts, normal over central parts and above normal over southern parts of the country. Day temperature will be on higher side than normal all over the country.

Seasonal weather outlook (Mar-May, 2014)

- V. Two to three rainy spells are expected during March during each decade. The focus of rainy spell will be towards central and southern parts of the country.
- VI. In April one to two rainy spell are expected in third decade and focus may be towards southern parts (Sindh) of the country.
- VII. Pollen allergy particle will be increased during March due to rise in temperature.
- VIII. Expected Minimum temperature will be normal all over the country during whole predicted months whereas April will be expected higher than normal over southern parts of the country.

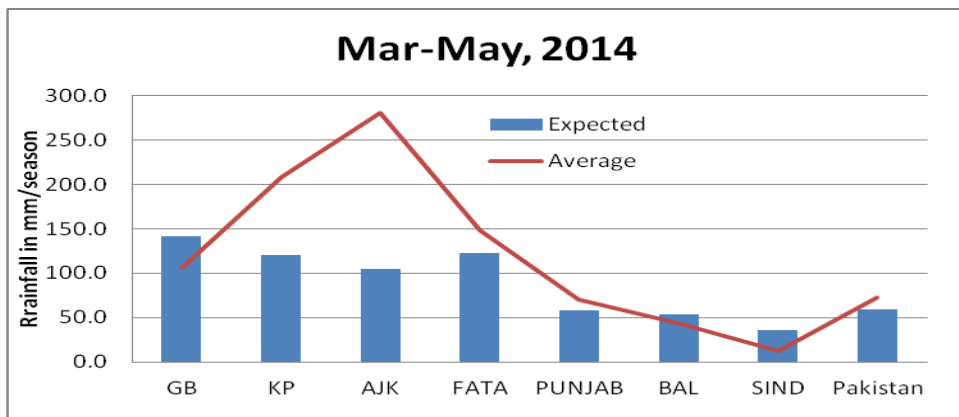
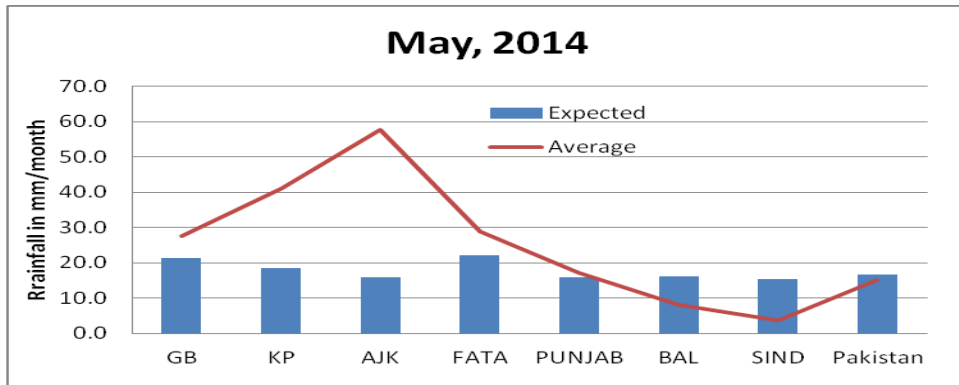
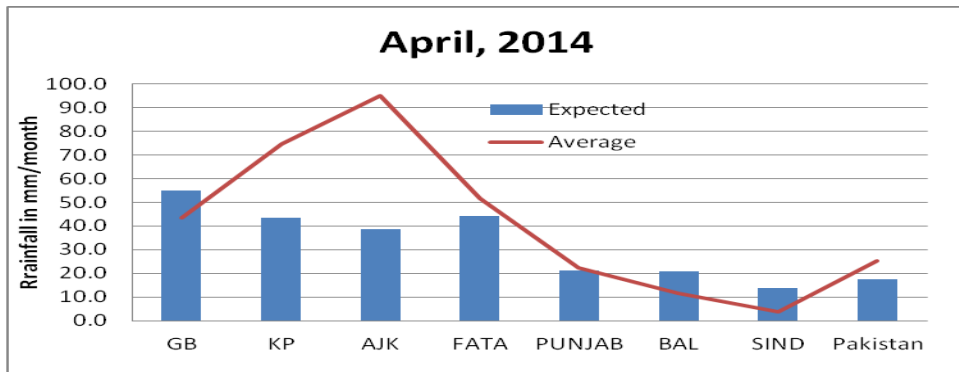
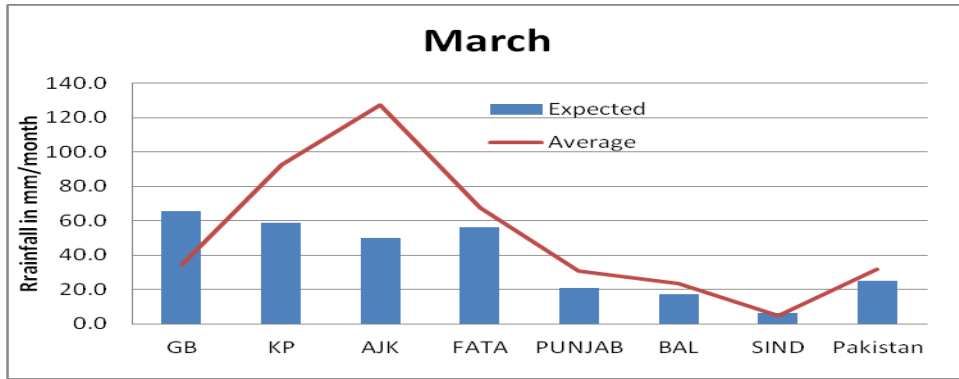
3.2. Monthly Quantitative Weather Forecast

	Mar, 2014		Apr, 2014		May, 2014		Mar-May, 2014	
	ave	exp	ave	exp	ave	exp	ave	exp
GB	34.6	Abv. Ave	43.5	Abv. Ave	27.6	Blw. Ave	105.7	Abv. Ave
KP	92.5	Blw. Ave	74.7	Blw. Ave	41.1	Blw. Ave	208.3	Blw. Ave
AJK	127.5	Blw. Ave	94.9	Blw. Ave	57.8	Blw. Ave	280.2	Blw. Ave
FATA	67.4	Blw. Ave	51.5	Ave	29.0	Blw. Ave	147.8	Blw. Ave
PUNJAB	30.9	Blw. Ave	22.4	Ave	17.1	Ave	70.4	Blw. Ave
BALUCHISTAN	23.3	Blw. Ave	11.5	Abv. Ave	8.2	Abv. Ave	43.1	Abv. Ave
SIND	4.7	Abv. Ave	3.6	Abv. Ave	3.7	Abv. Ave	12.0	Abv. Ave
Precipitation is in mm/month								
Pakistan	31.7	Blw. Ave	25.4	Blw. Ave	15.2	Ave	72.3	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.

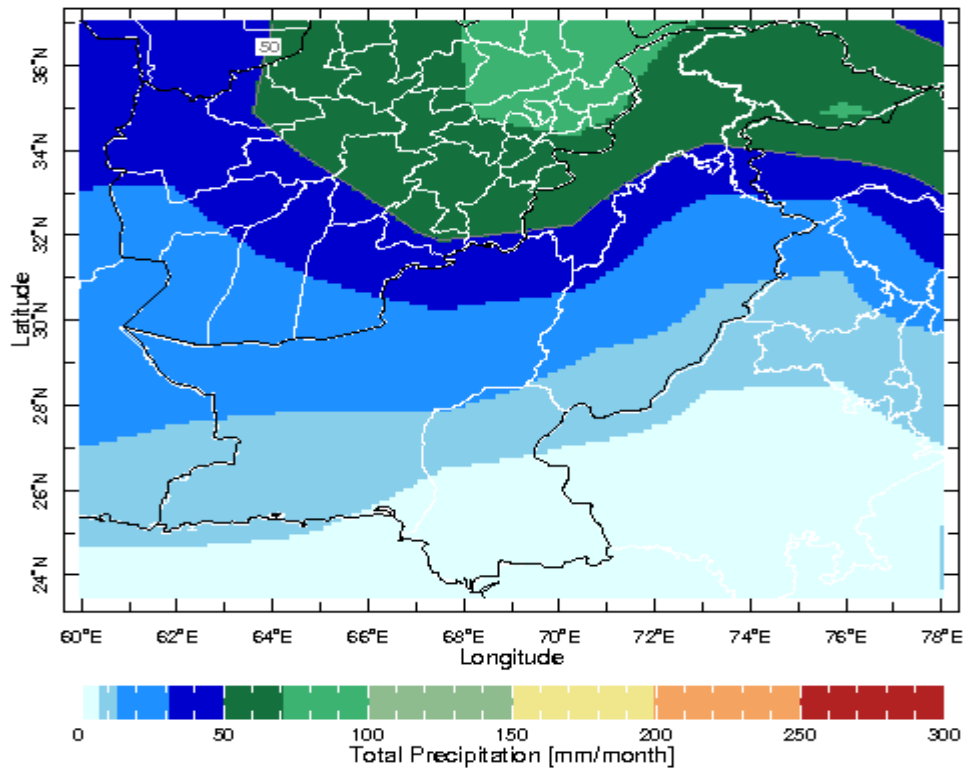
Seasonal weather outlook (Mar-May, 2014)



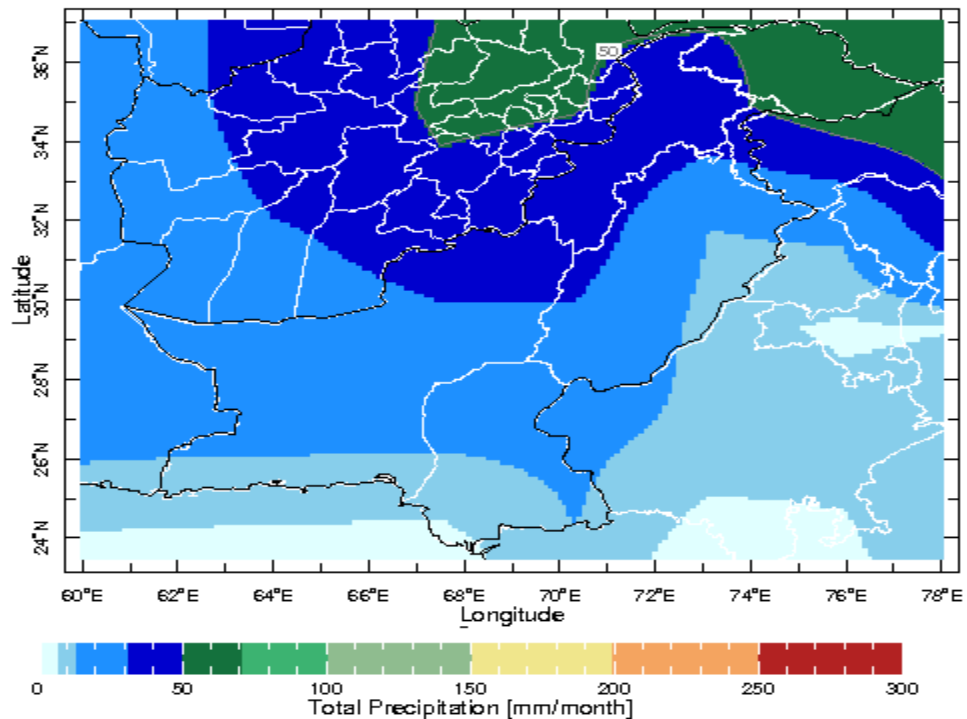
Seasonal weather outlook (Mar-May, 2014)

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

Monthly expected Precipitation for Mar, 2014

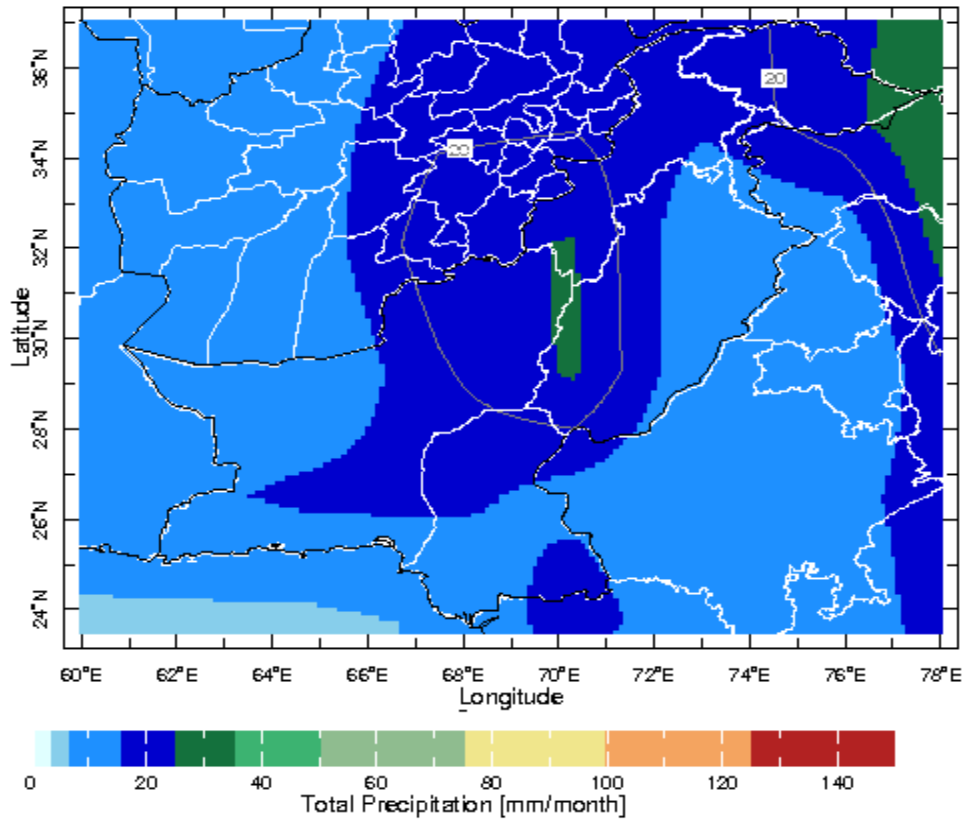


Monthly expected Precipitation for Apr, 2014

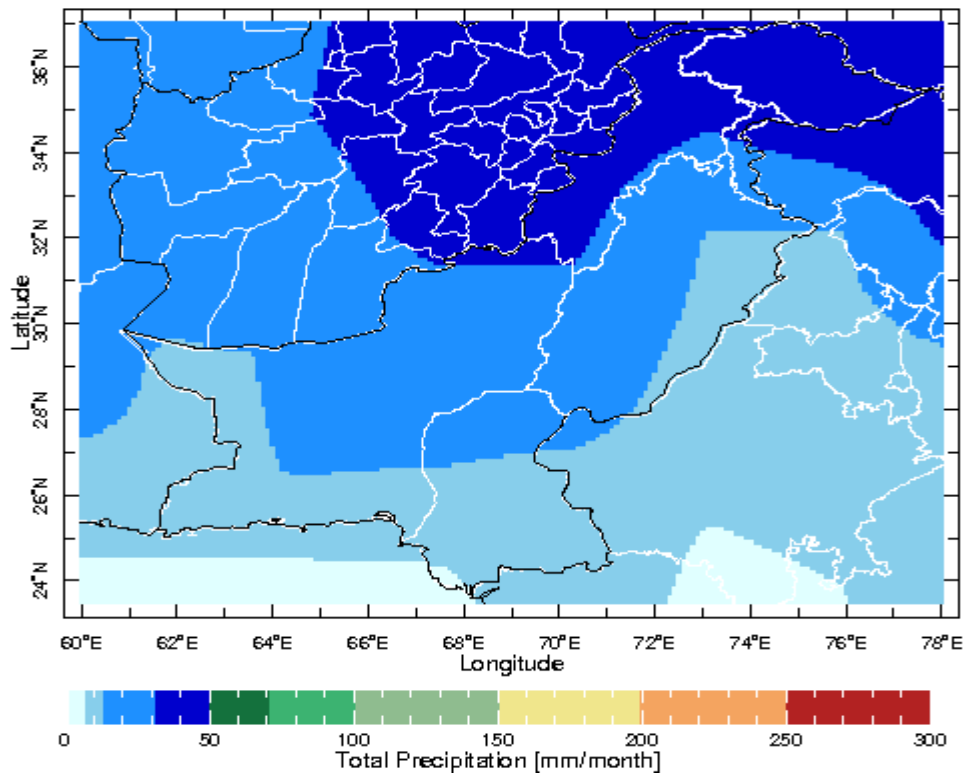


Seasonal weather outlook (Mar-May, 2014)

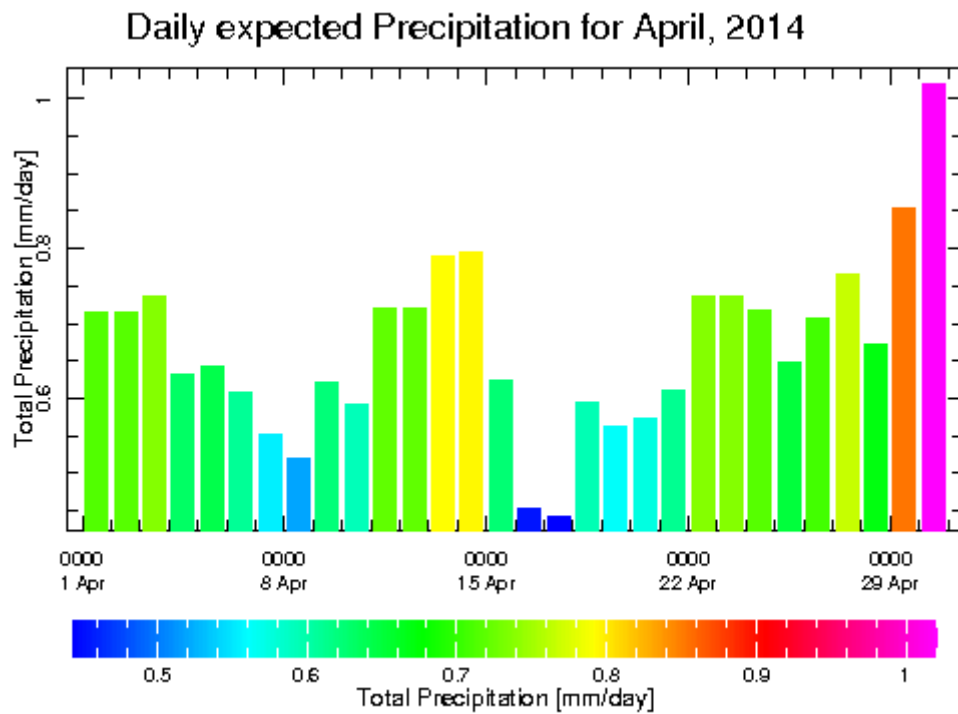
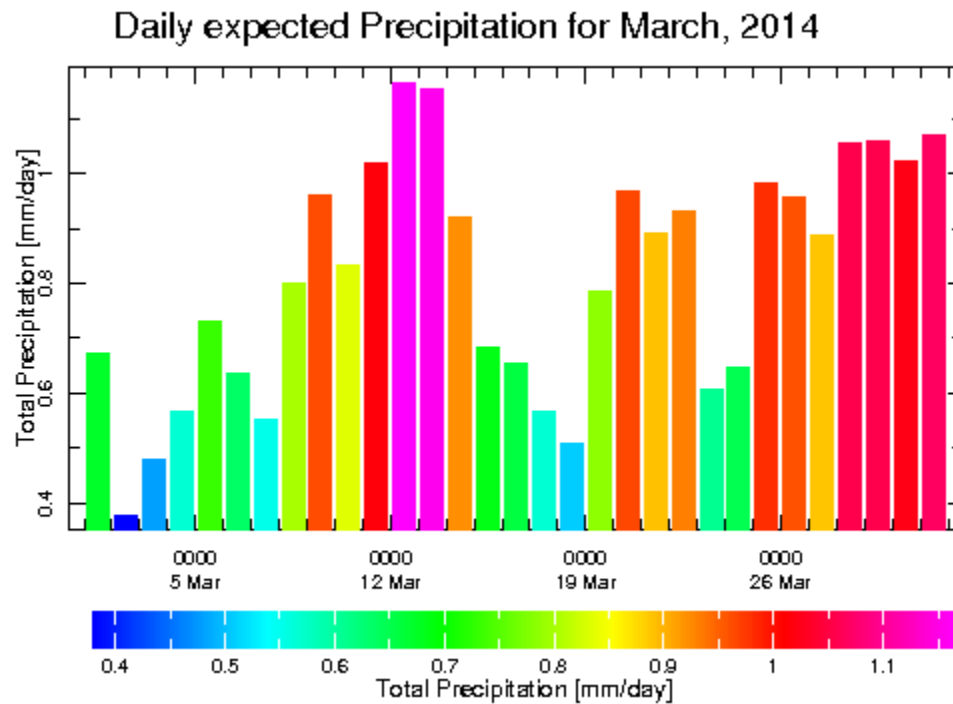
Monthly expected Precipitation for May, 2014



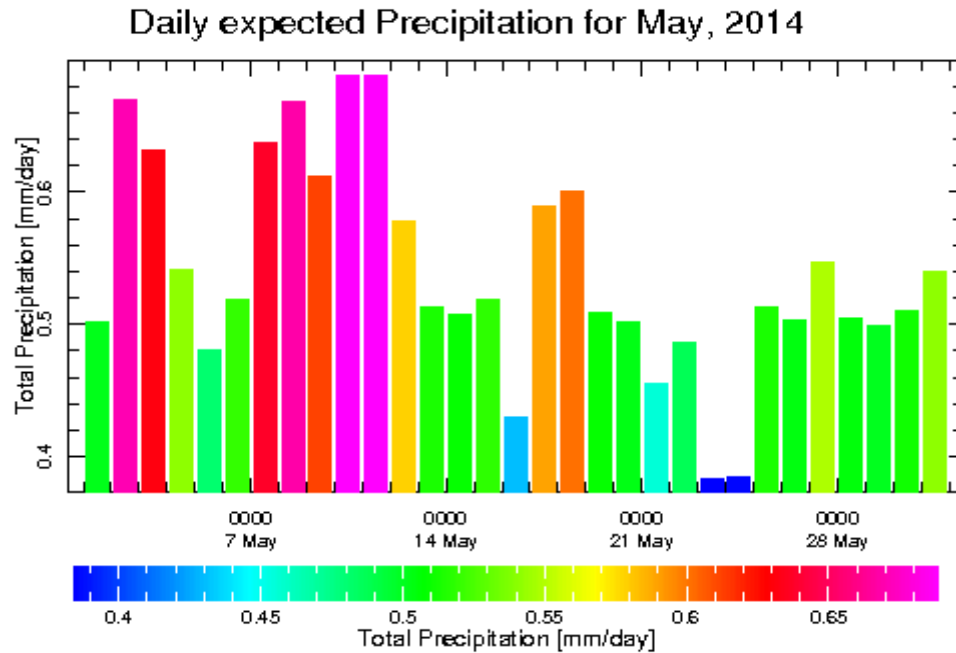
Seasonal Precipitation Outlook (Mar-May, 2014)



5. Expected daily rainfall

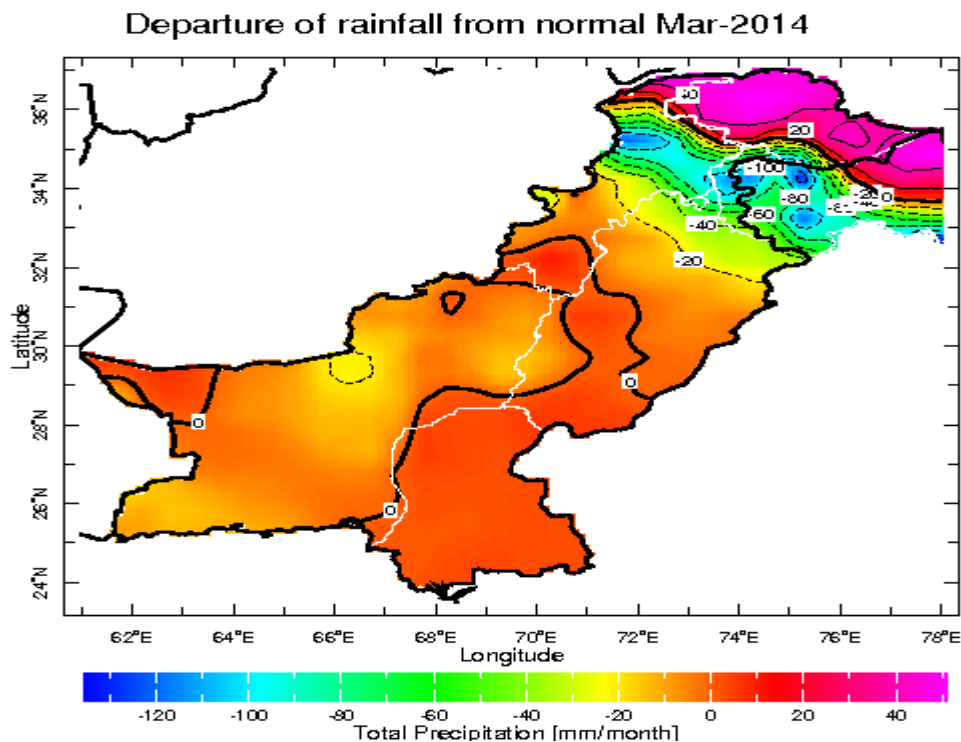


Seasonal weather outlook (Mar-May, 2014)



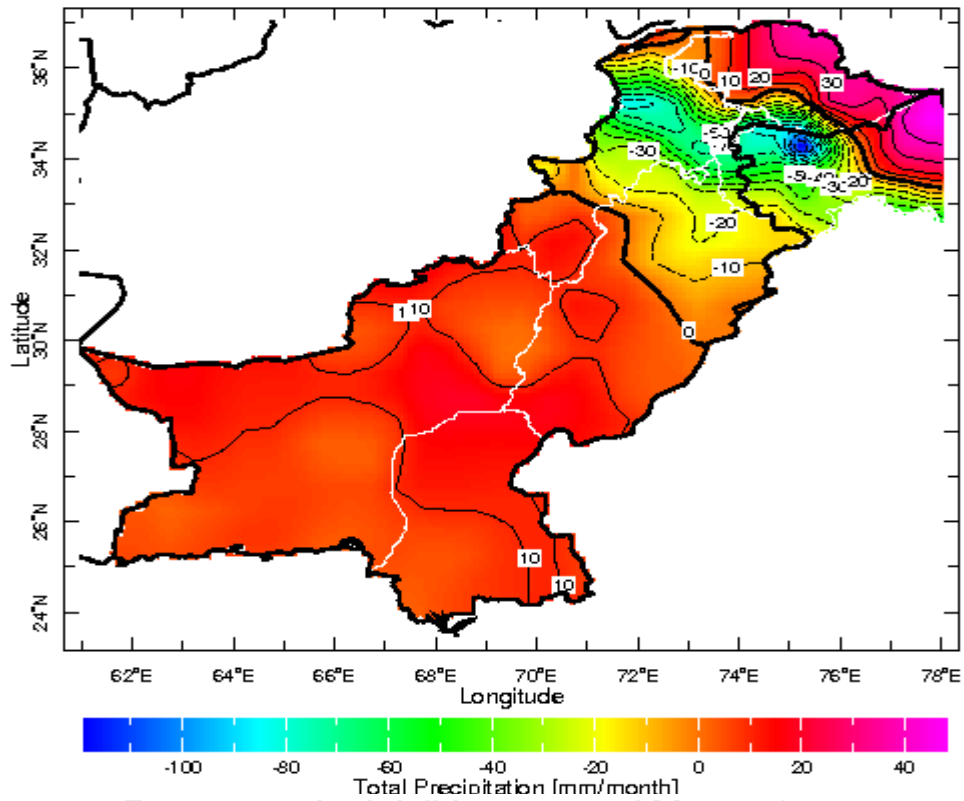
Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

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

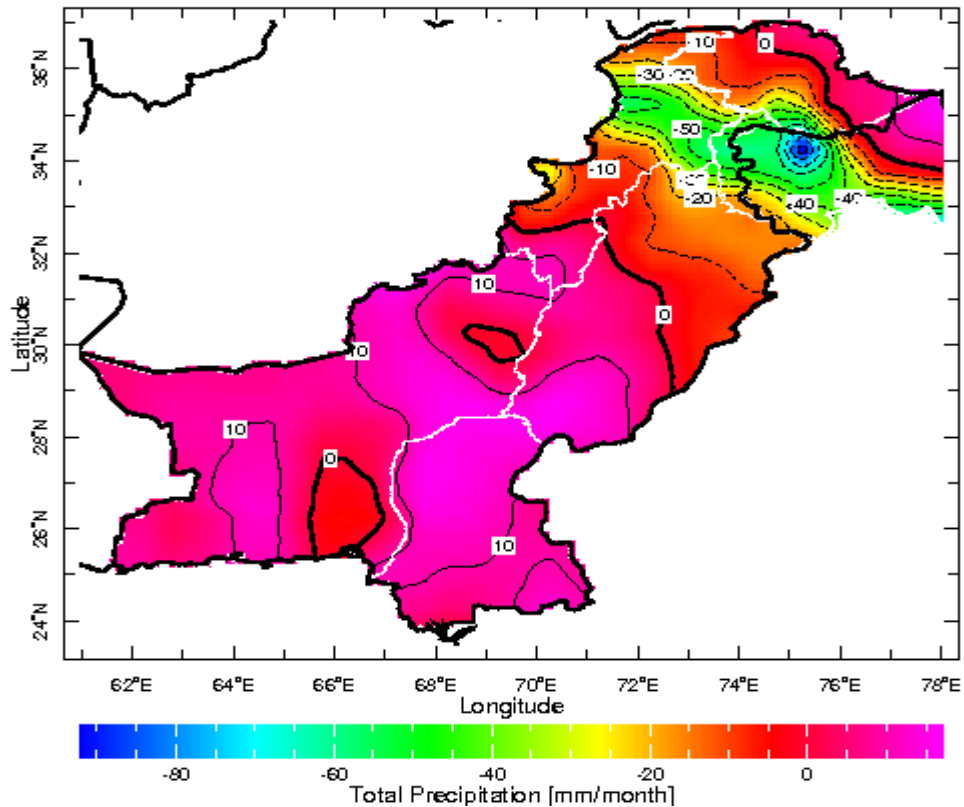


Seasonal weather outlook (Mar-May, 2014)

Departure of rainfall from normal Apr-2014

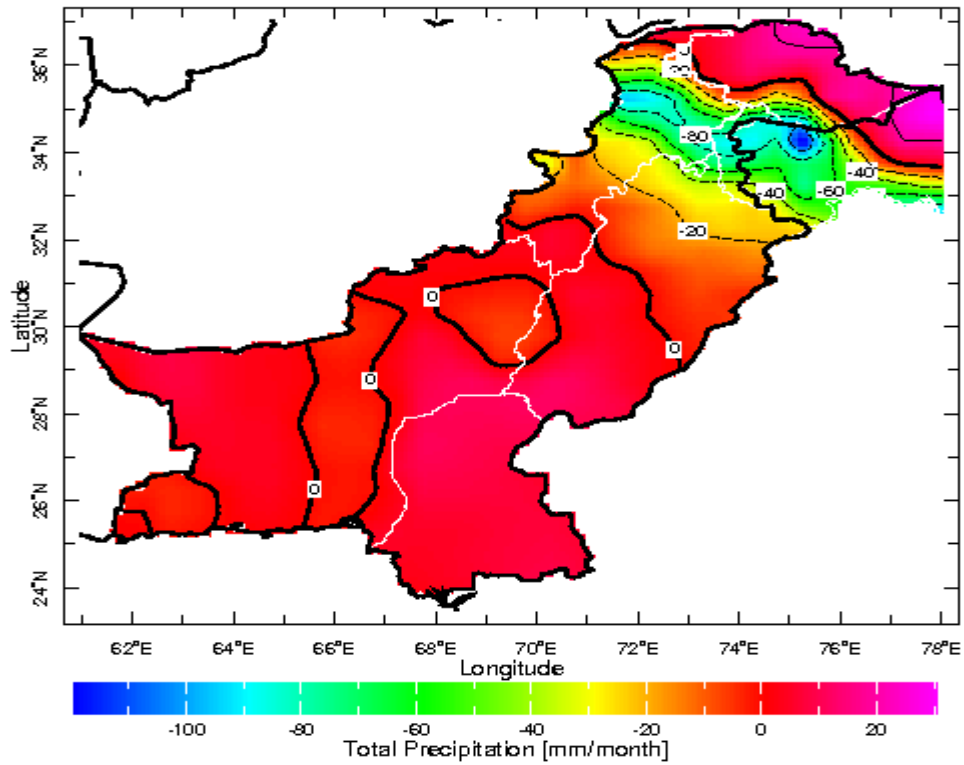


Departure of rainfall from normal May-2014



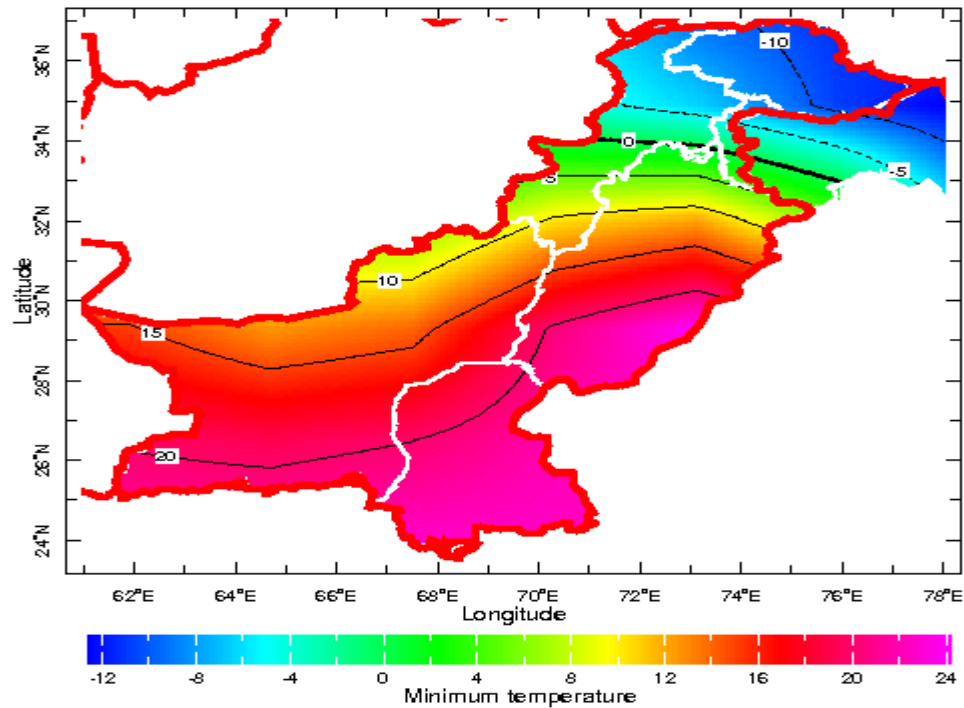
Seasonal weather outlook (Mar-May, 2014)

Departure of rainfall from normal (Mar-May, 2014)



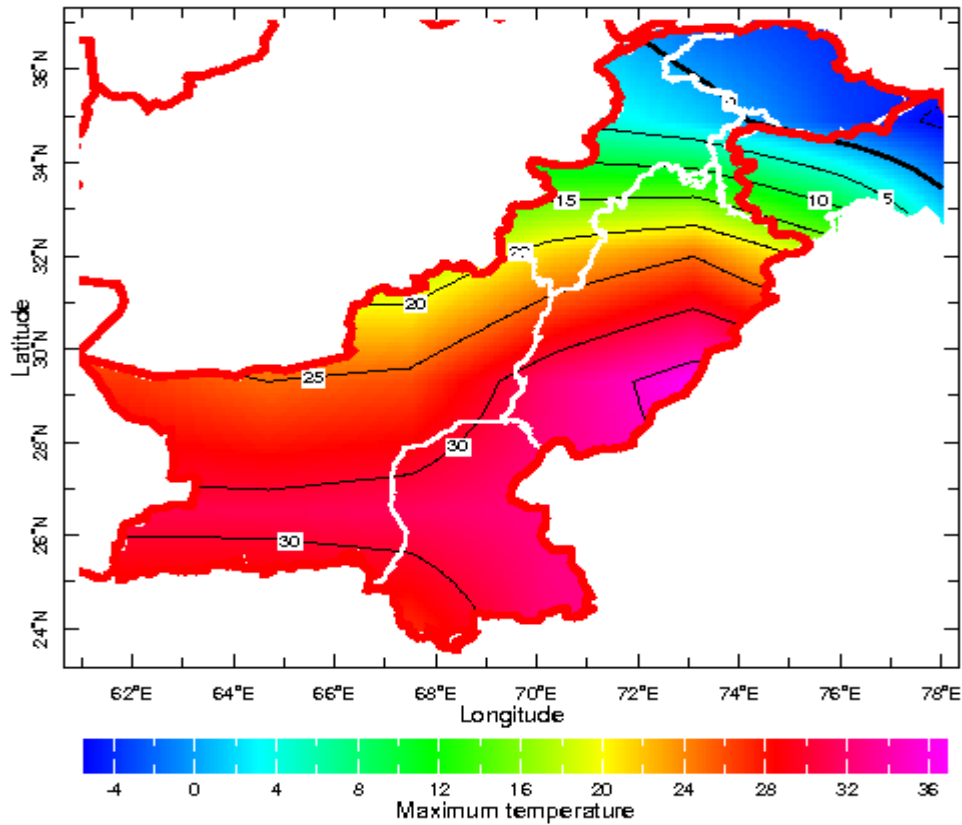
7. Spatial distribution of expected minimum temperature during

Expected Minimum Temperature during Mar, 2014

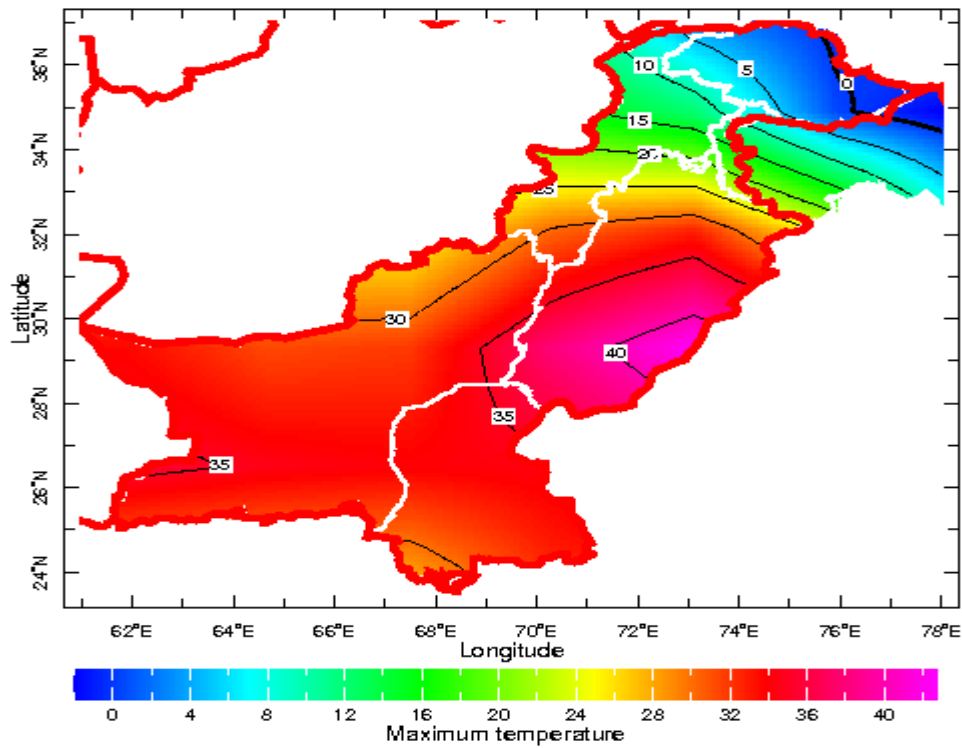


Seasonal weather outlook (Mar-May, 2014)

Expected Maximum Temperature during Apr, 2014

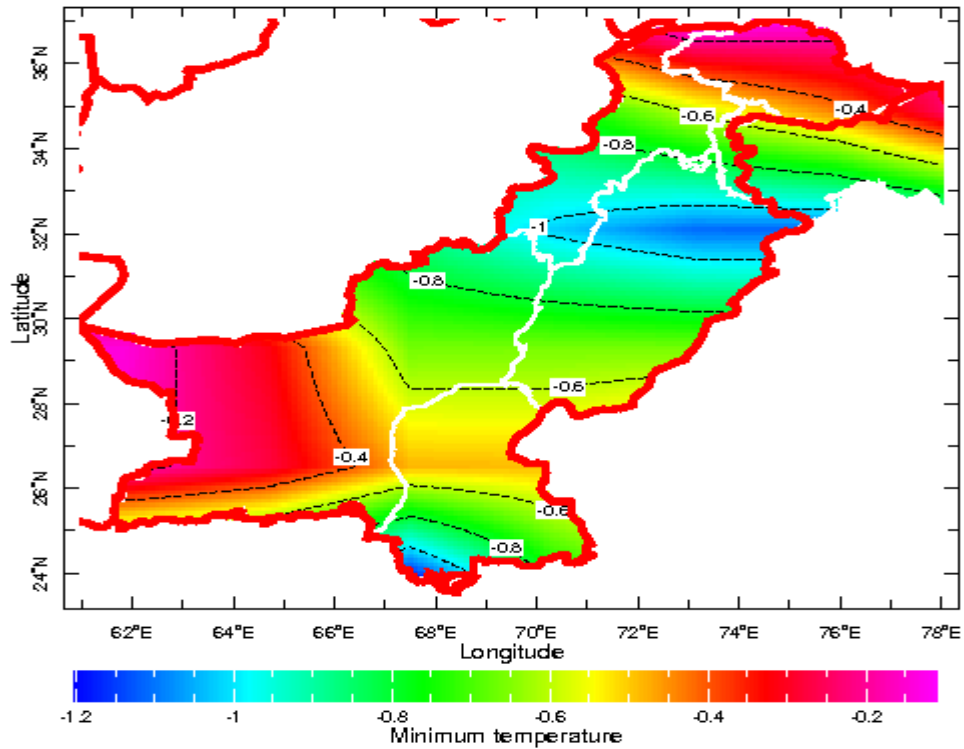


Expected Maximum Temperature during May, 2014

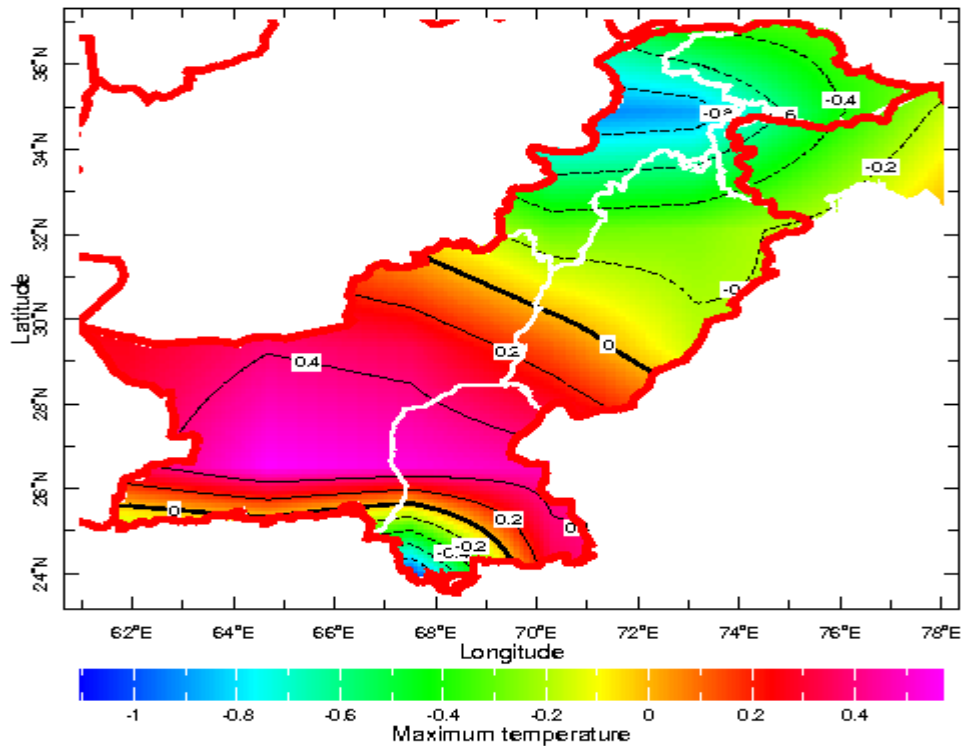


8. *Departure of expected minimum temperature from normal*

Departure of Minimum Temp. from normal during Mar,2014

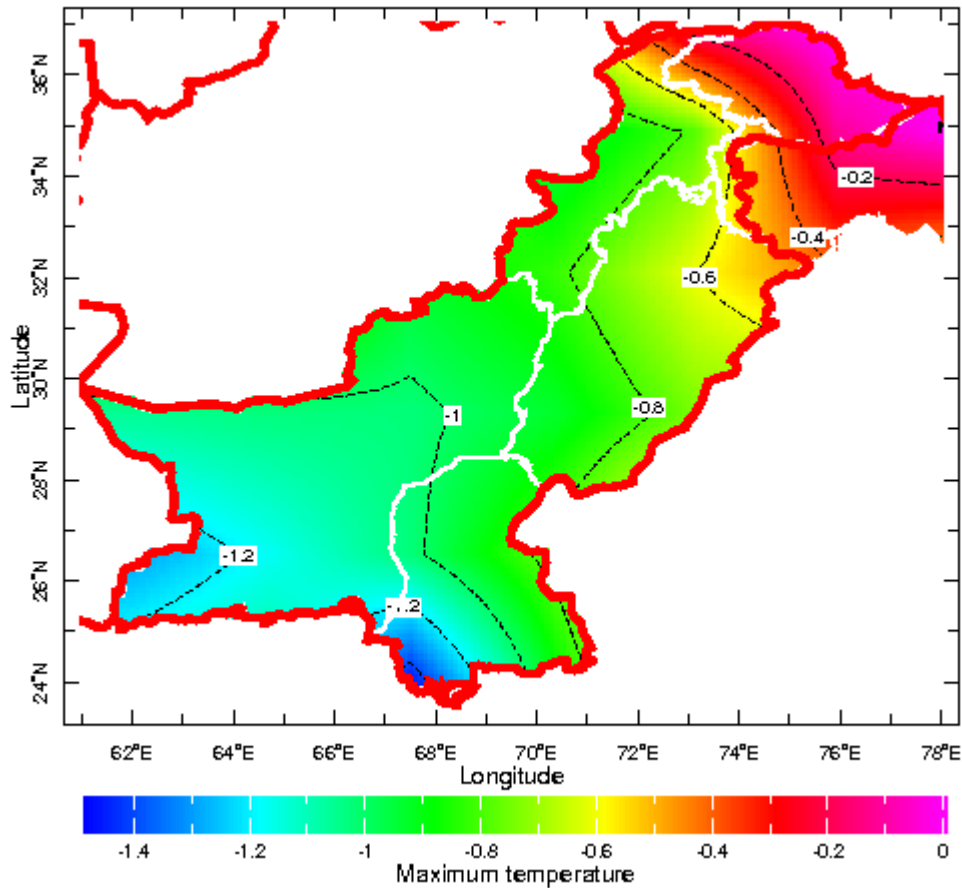


Departure of Maximum Temp. from normal during Apr,2014



Seasonal weather outlook (Mar-May, 2014)

Departure of Maximum Temp. from normal during May, 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. Lastest seasonal weather summay can be download from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>