Seasonal weather outlook

(Jan-Mar, 2014)

Issued on Jan 06, 2014

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 Jan 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 higher intensity with bigger convergence areas of high winds towards the west. Intensity of jet stream will be slightly above normal during predicted period

Probability outlook: Above normal intensity is associated with above normal precipitation in the region and vice versa.

- A ridge at 500 hPa is expected to be at same position as normal with less intensity. As a result, track of the western disturbances may be changed and tilted towards northward.

Probability outlook: Precipitation is likely to occur over upper half of the country causes less rain over southern parts the country.

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

- North Atlantic Oscillation (NAO) is in positive phase (0.95) and may cause to shift western disturbances towards north during coming months. Data source: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao.shtml

Probability outlook: Normal precipitation over northern parts and below normal over southern parts of the country. The focus of weather tracks may be towards Northern parts of the country.

- Most of the set of dynamical and statistical model predictions issued during late November and early December 2013 predict neutral ENSO conditions into early 2014, with a warming tendency during northern spring and summer 2014. Development of weak El Nino conditions appears possible by the middle of 2014. In the most recent week, the SST anomaly in the Nino3.4 region was 0.0C. Data source: http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html

Probability outlook: La Nina (2%), Neutral (96%) and El Nino (2 %) during Dec-Jan-Feb, 2014 season

- Arabian Sea Surface Temperatures are expected to be slightly above normal near the coast of Pakistan.
- Caspian Sea surface temperatures expected to be slightly above normal.
- Mediterranean Sea surface temperatures are normal to slightly above normal.
- Bay of Bengal Sea Surface Temperatures are 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 (Jan-Mar, 2014)*

Synthesis of the latest model forecasts for Jan-Mar, 2014 (JFM), current synoptic situation and regional weather expert's judgment indicates that average precipitation is expected all over the country with slightly above normal during January and normal during February and March. Below Normal temperature is likely to occur during predicted season all over the country with least during March. In January central parts of the country will be marked below average while during February and March, temperature will be below normal all over 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 more snowfall over the northern region during January."

I. Average (± 15 %) precipitation is expected during predicted season.

II. In January slightly above normal precipitation over northern parts of the country is expected with less than average night temperature over central parts of the country.

III. In February average precipitation with less than average night temperature is expected all over the country.

IV. In March normal to slightly below normal precipitation is likely to prevail over the country. However, below average night temperature will persist all over the country.

V. Density of fog will be less during upcoming winter months

VI. Two to three rainy spells are expected during January. The focus of rainy spell will be towards north and southern Khyber Pakhtunkhawa (KP).

VII. Very limited chances of well rainy spell over southern Punjab and Sindh during month of January.

VIII. In February one to two rainy spell are expected in third decade and focus may be towards southern and central parts of the country.

IX. March may be dry month in most of agriculture plain however; light precipitation is expected over northern parts of the country.

X. The focus of monsoonal weather systems during whole predicted months will be towards Northern parts of the country where as in February one to two spells are expected towards southern parts of the country.

XI. Well intense snowfall spells over northern glaciers are expected during January.

XII. Expected Minimum temperature will be below normal all over the country during whole predicted months whereas March will be expected colder month than normal over the country.

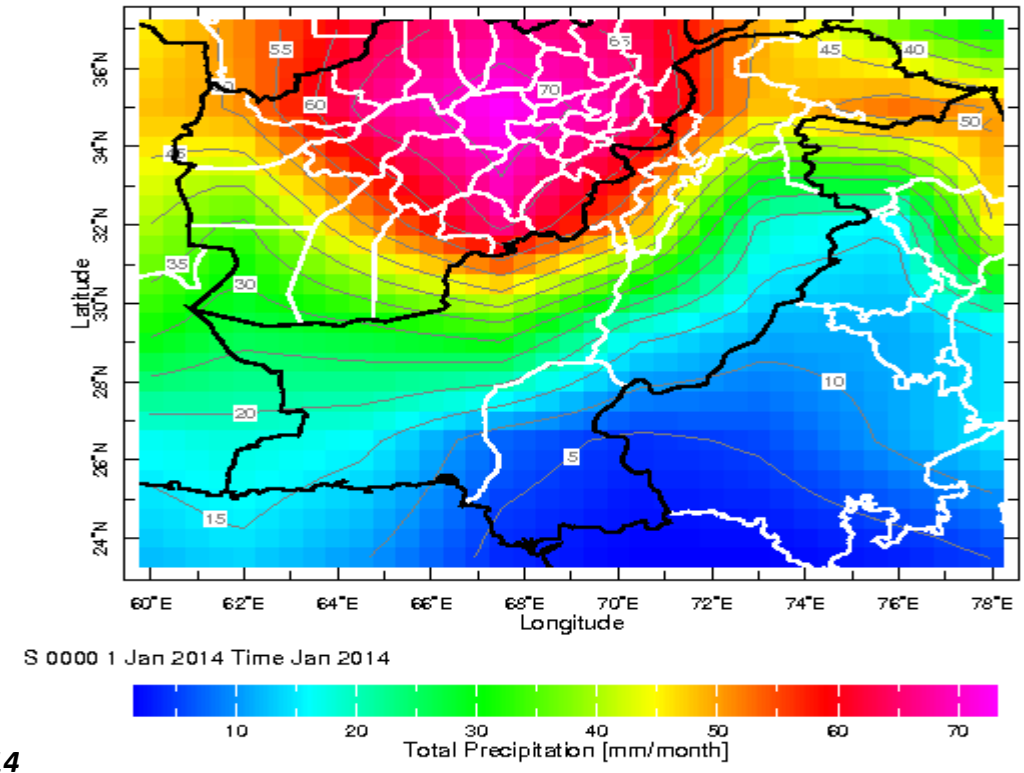
3.2. Monthly Quantitative Weather Forecast

	Jan, 2014		Feb, 2014		Mar, 2014		Dec-Mar, 2014	
	Ave	Exp	Ave	Exp	Ave	Exp	Ave	Exp
GB	27.2	Abv. Ave	29.7	Abv. Ave	34.6	Abv. Ave	91.5	Abv. Ave
KP	49.0	Ave	71.9	Abv. Ave	92.5	Blw. Ave	213.4	Blw. Ave
AJK	91.1	Blw. Ave	110.5	Blw. Ave	127.5	Blw. Ave	329.0	Blw. Ave
FATA	30.2	Abv. Ave	54.0	Abv. Ave	67.4	Blw. Ave	151.6	Abv. Ave
PUNJAB	17.2	Abv. Ave	27.2	Abv. Ave	30.9	Blw. Ave	75.2	Ave
BALUCHISTAN	19.5	Abv. Ave	20.9	Abv. Ave	23.3	Ave	63.7	Abv. Ave
SIND	3.0	Abv. Ave	5.4	Abv. Ave	4.7	Abv. Ave	13.1	Abv. Ave
Pakistan	20.8	Abv. Ave	27.2	Ave	31.7	Ave	79.6	Abv

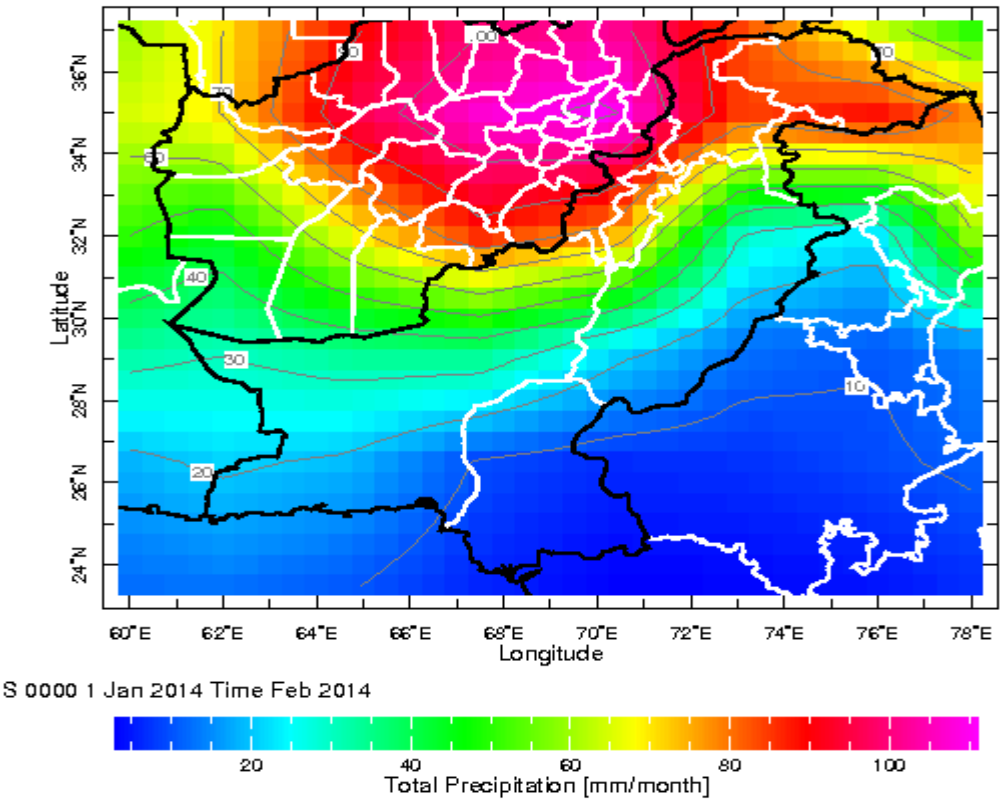
- ***Ave. : average (1981-2010)***
- ***Exp. : Expected rainfall***
- ***Below Average (Blw. Ave) < -15 %,***
- ***Average precipitation range (Ave) = -15 to +15 %,***
- ***Above Average (Abv.Ave) > +15 %***

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.

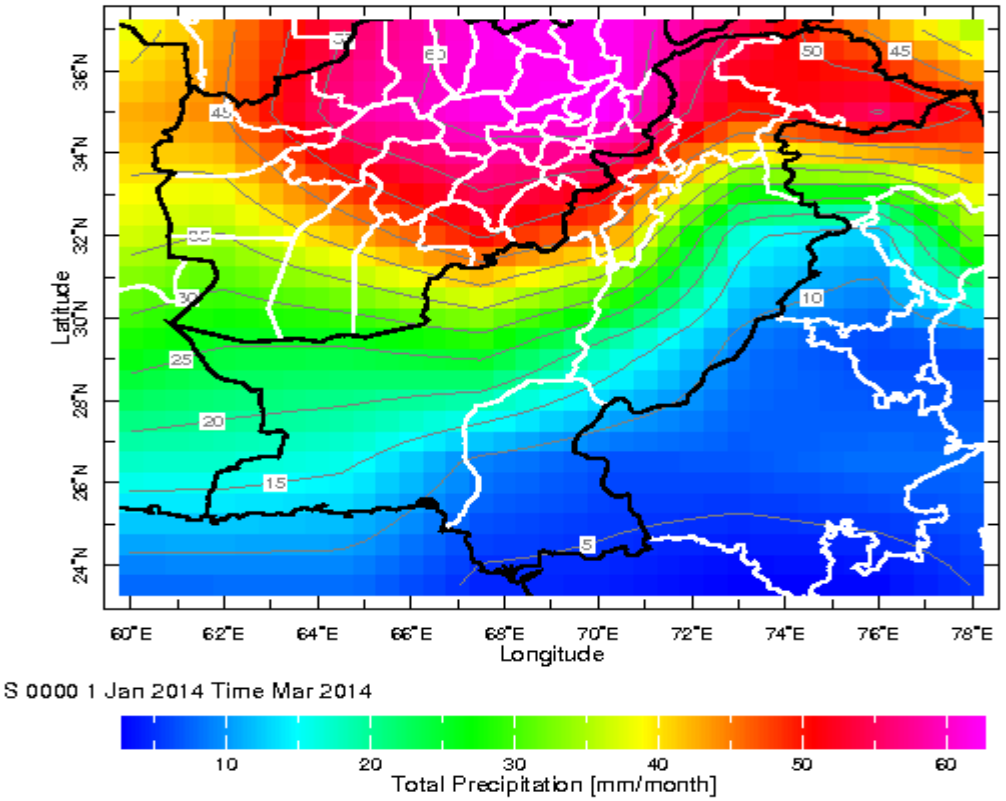
4. Spatial distribution of expected rainfall during coming season (GCM-ECHAM)



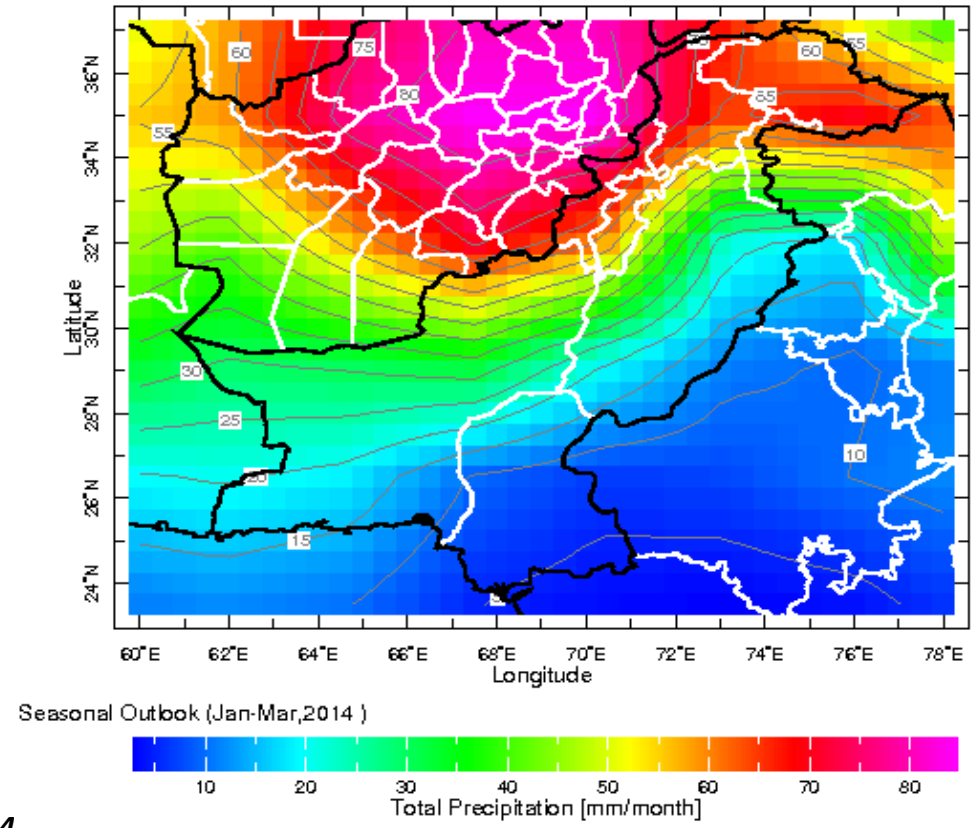
Jan, 2014



Feb, 2014



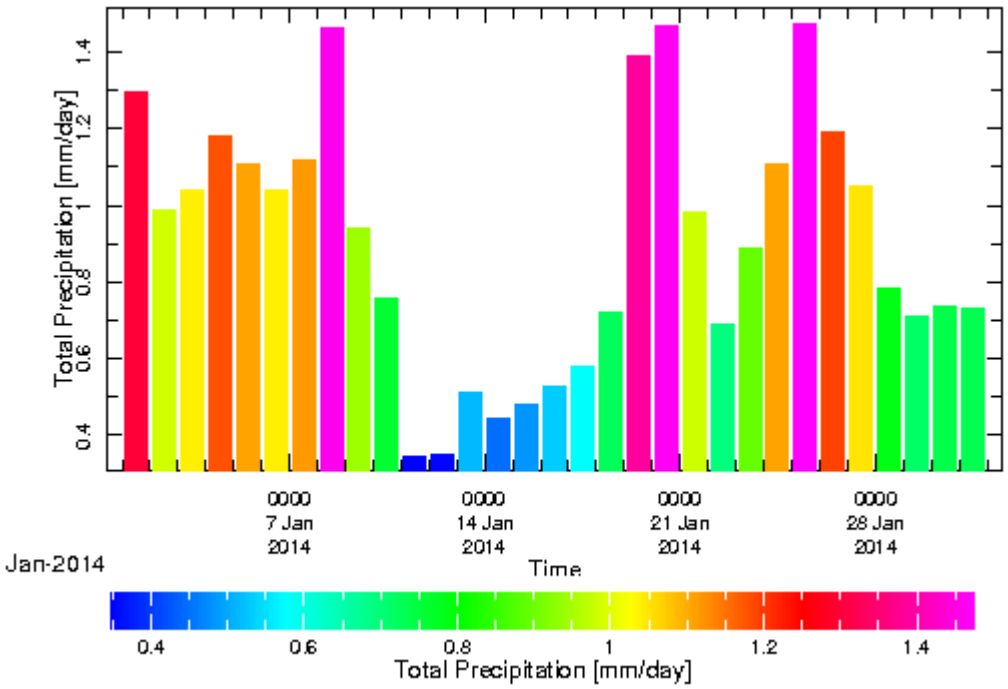
Mar, 2014



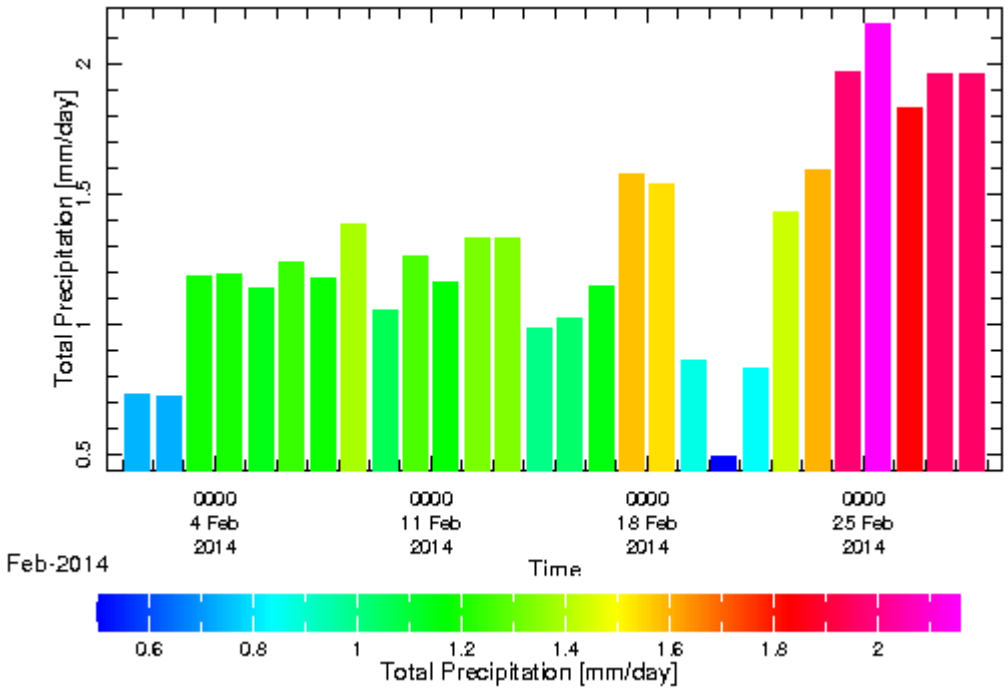
Jan-Mar, 2014

5. Expected daily rainfall

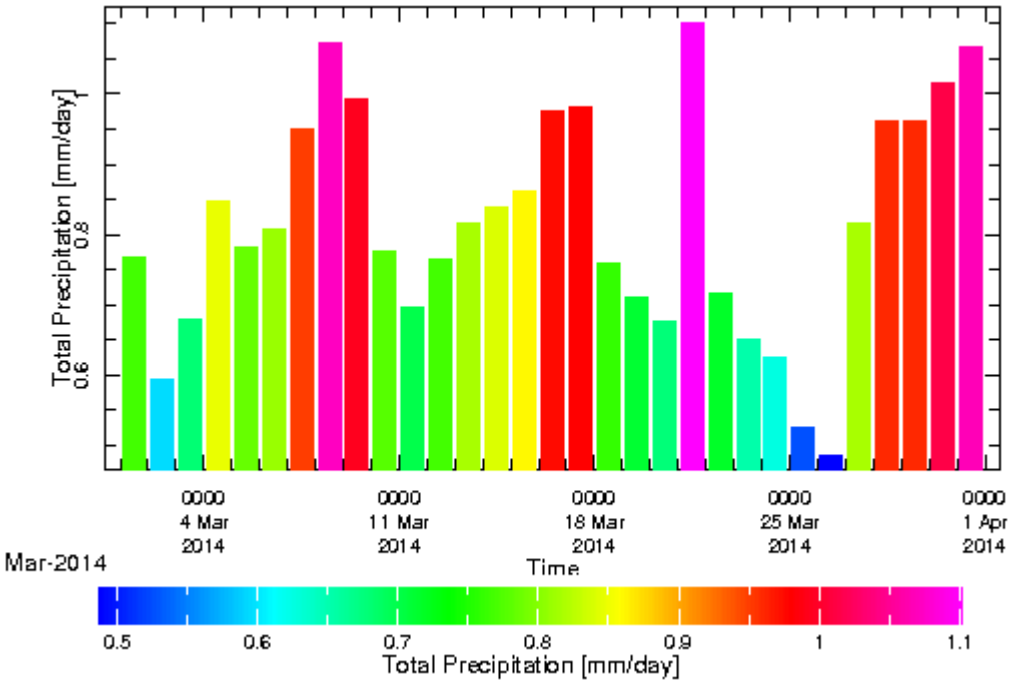
January, 2014



February, 2014

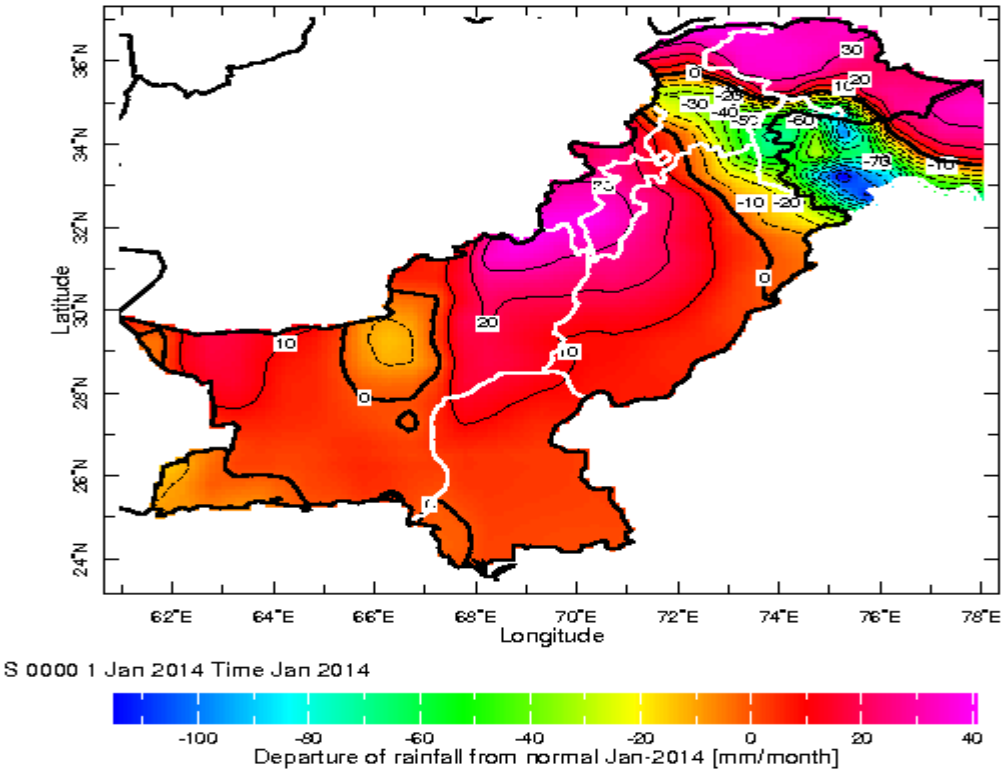


March, 2014

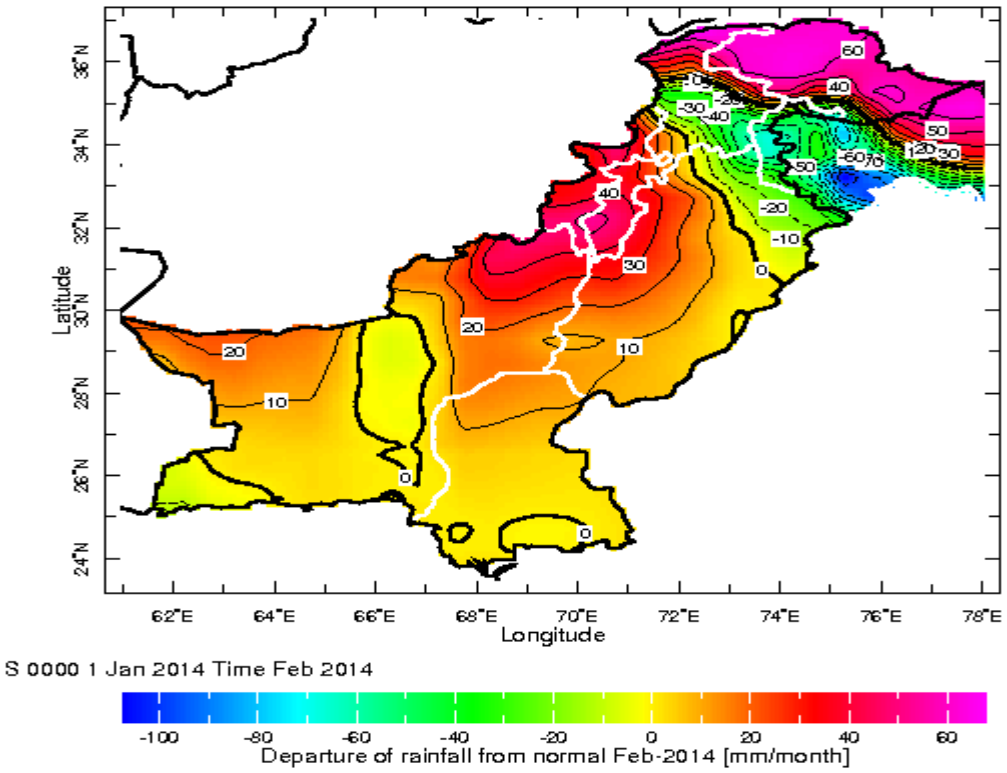


Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

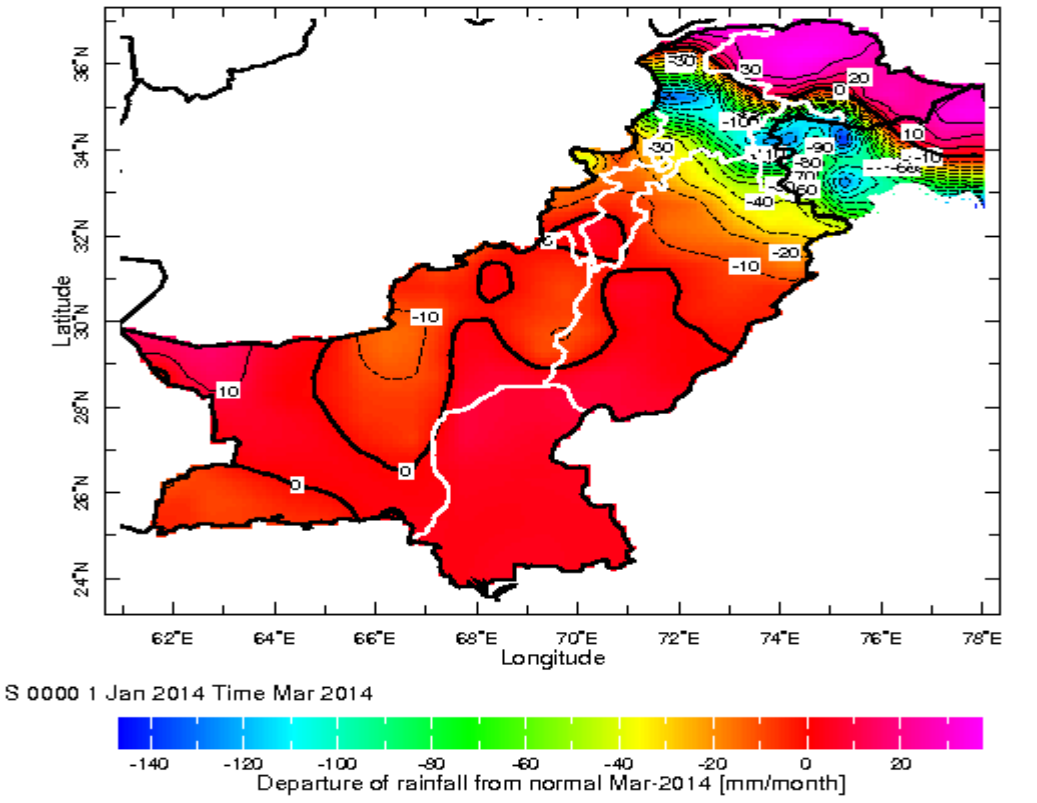
6. *Monthly departure from normal (precipitation) during coming season*



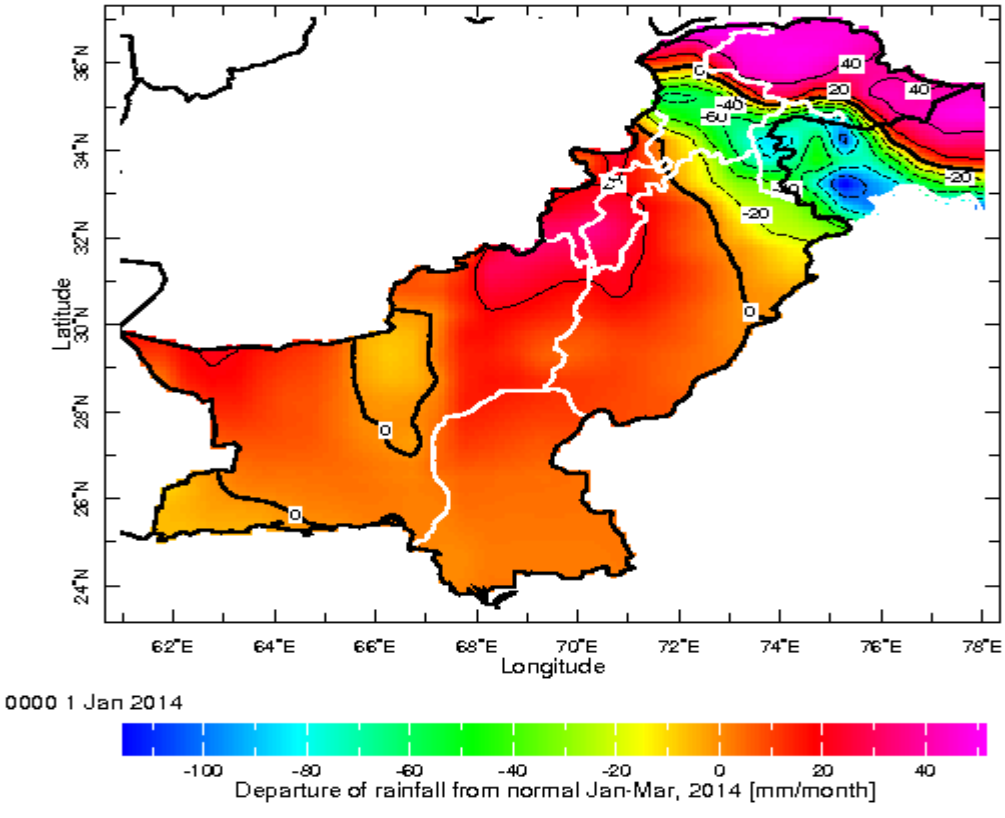
Jan, 2014



Feb, 2014

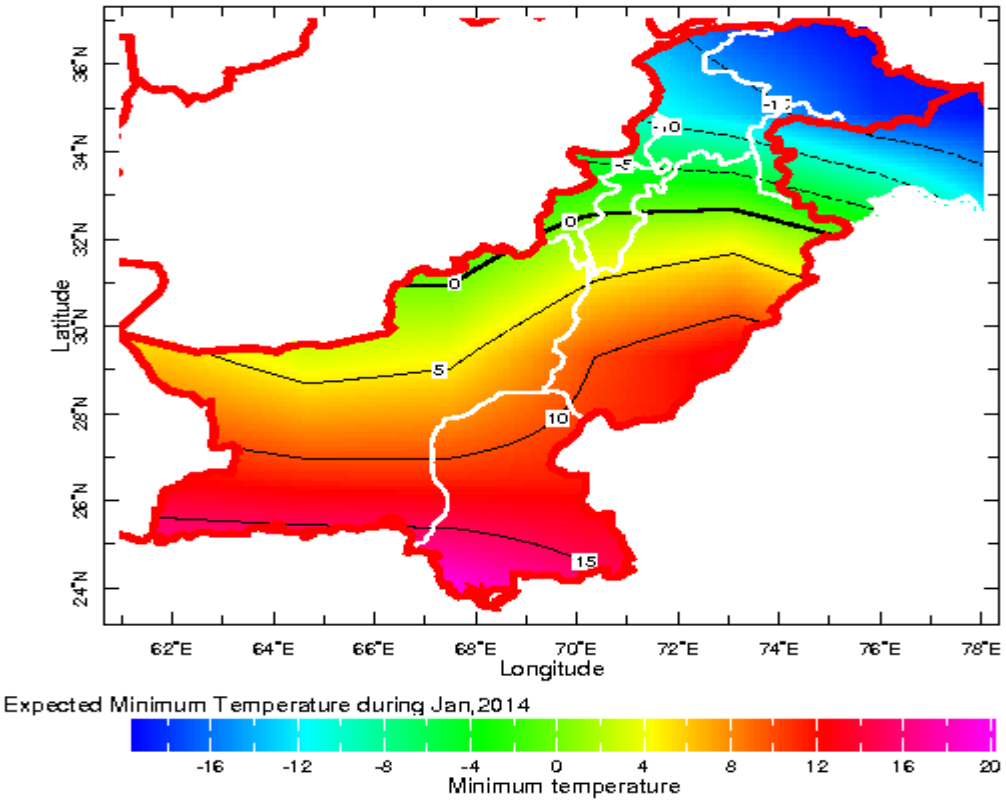


Mar, 2014

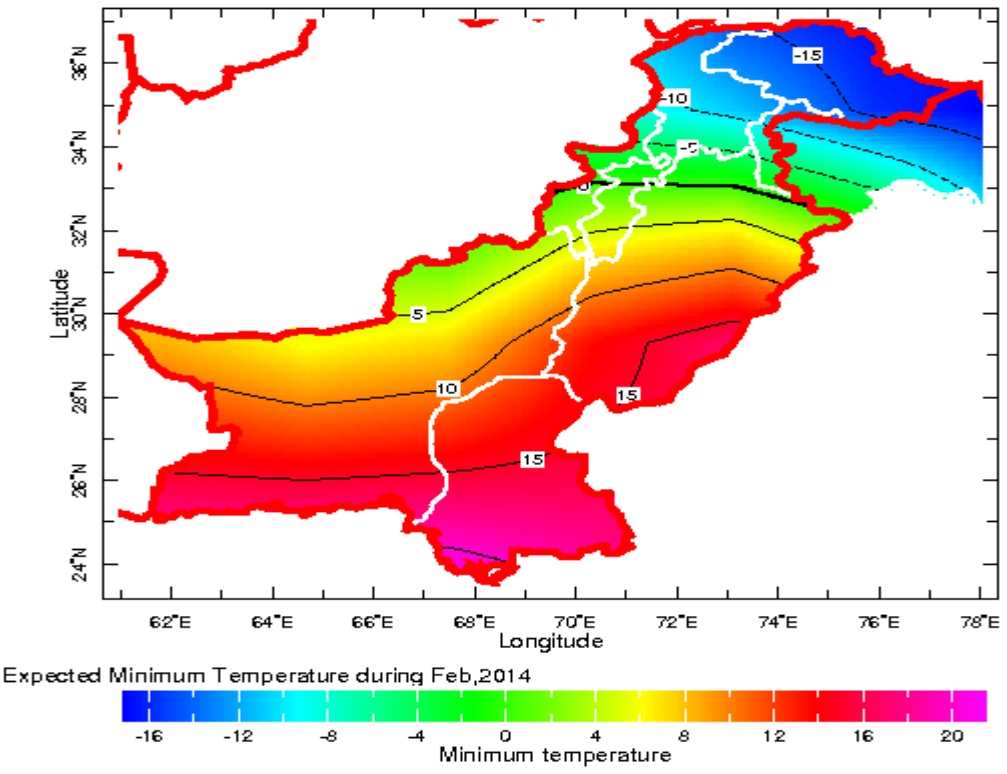


Jan-Mar, 2014

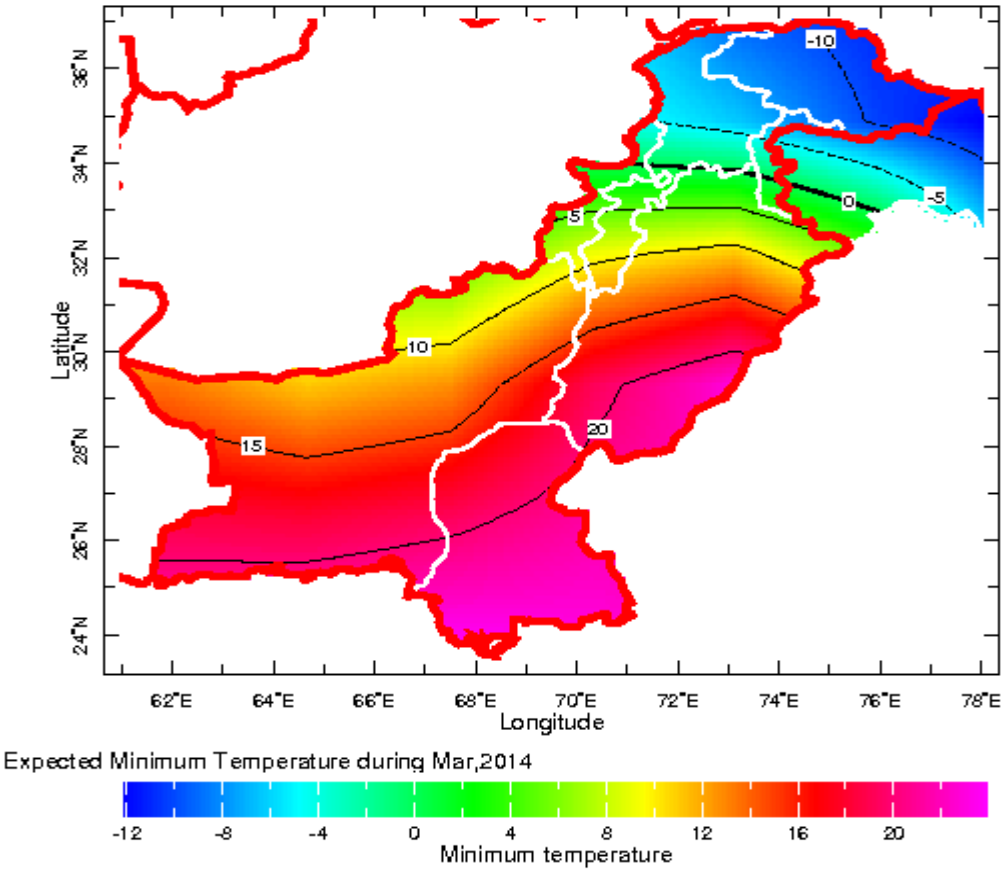
7. Spatial distribution of expected minimum temperature during



Jan, 2014

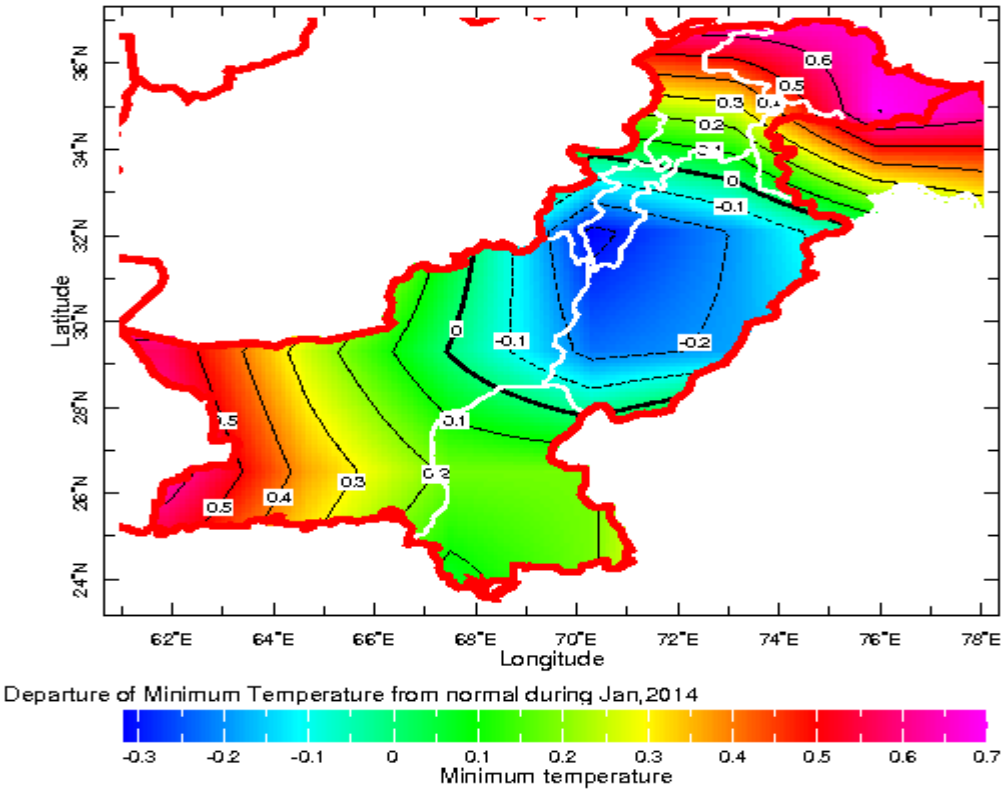


Feb, 2014

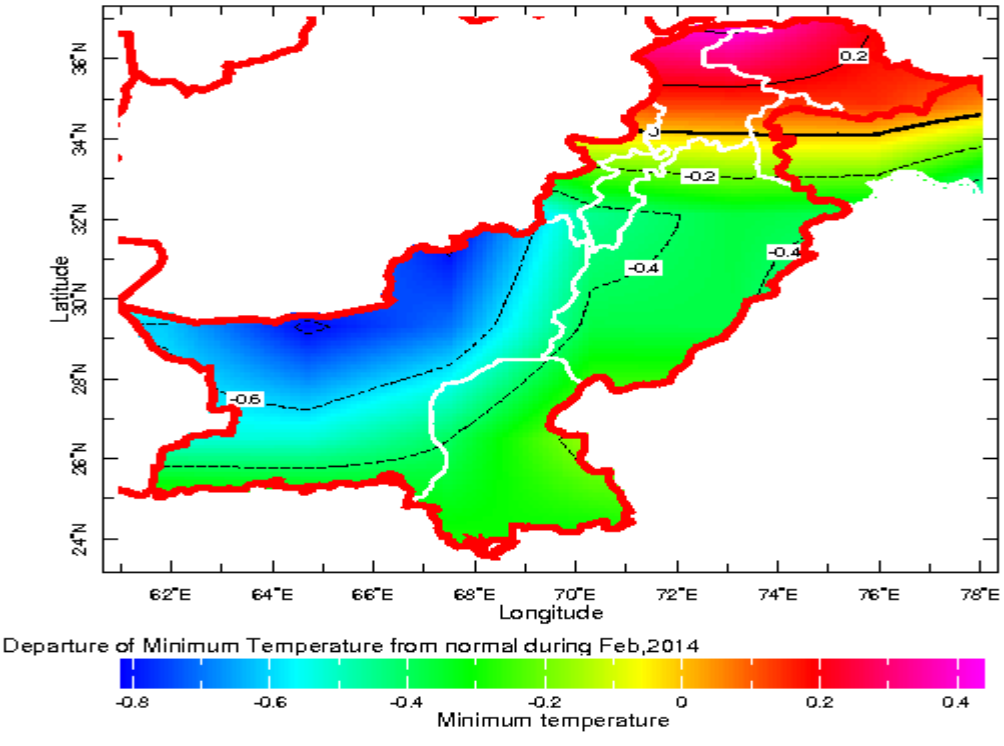

-10
-5
0
5
10
15
20
36°N
34°N
32°N
30°N
28°N
26°N
24°N
Latitude
62°E
64°E
66°E
68°E
70°E
72°E
74°E
76°E
78°E
Longitude
Expected Minimum Temperature during Mar,2014
-12
-8
-4
0
4
8
12
16
20
Minimum temperature

Mar, 2104

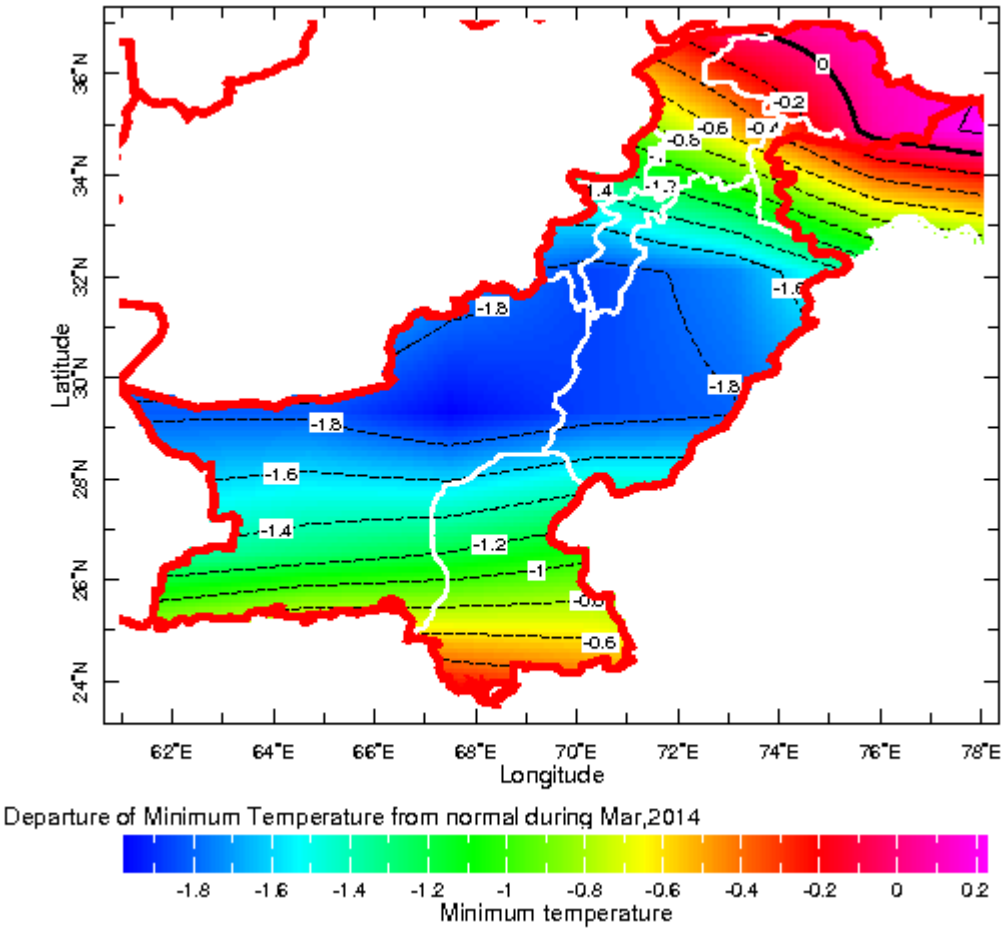
8. *Departure of expected minimum temperature from normal*



Jan, 2014



Feb, 2014



Mar, 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/