

Seasonal weather outlook

(Dec, 2013-Feb, 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 Dec 01, 2013. 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 causes de track western disturbances towards north.

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 towards Area of high surface temperature expands during November from normal (1982-2010) over central parts of the country. Day temperature will be on higher side during November over central parts of the country.
- North Atlantic Oscillation (NAO) is in positive phase (0.9) 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.

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- Most of the set of dynamical and statistical model predictions issued during late October and early November 2013 predict neutral ENSO conditions through the rest of 2013 and 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 (3%), Neutral (96%) and El Nino (1 %) during Dec-Jan-Feb, 2014 season

- Arabian Sea Surface Temperatures are expected to be slightly above normal near the coast of Pakistan and normal over far from coast.
- Caspian Sea surface temperatures expected to be slightly below 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 (Nov, 2013-Jan-2014)

Synthesis of the latest model forecasts for Dec, 2013-Feb, 2014 (DJF), current synoptic situation and regional weather expert's judgment indicates that slightly above normal rainfall is expected all over the country with above normal during December and normal during January and February. Normal temperature is likely to occur during December and below normal during January in all over the country. In February below normal temperature over southern parts and normal temperature over northern parts of the country is likely to prevail. Neutral-ENSO condition is expected to persist throughout the predicted period.

3.1. Weather outlook

“Above normal precipitation is expected during the season all over the country with more snowfall over the northern region during December.”

- I. Above average (+ 15 %) precipitation is expected during predicted season 2013.
- II. In December above normal precipitation over northern parts of the country is expected with normal night temperature.
- III. In January normal precipitation with less than normal night temperature is expected all over the country.
- IV. In February normal precipitation is likely to prevail over the country. However, night temperature will improve over northern parts and become at normal where as southern parts will continue and behave as cooler month than normal.
- V. Density of fog will be less during upcoming winter months

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- VI. Area of fog will be less with shallow density.
- VII. Last decade of December and early January will be wet with higher intensity of precipitation over upper parts as well as hilly areas of the country.
- VIII. Above normal precipitation is expected over GB region and southern parts of Khayber Pakthoonkhawa during predicted period.
- IX. Below normal precipitation are expected over AJK province during predicted period.
- X. The focus of monsoonal weather systems during December will be towards Northern parts of the country.
- XI. Well intense snowfall spells over northern glaciers are expected during December and January.
- XII. Expected Minimum temperature will be normal all over the country during December whereas January will be expected colder month than normal over the country.

3.2. Monthly Quantitative Weather Forecast

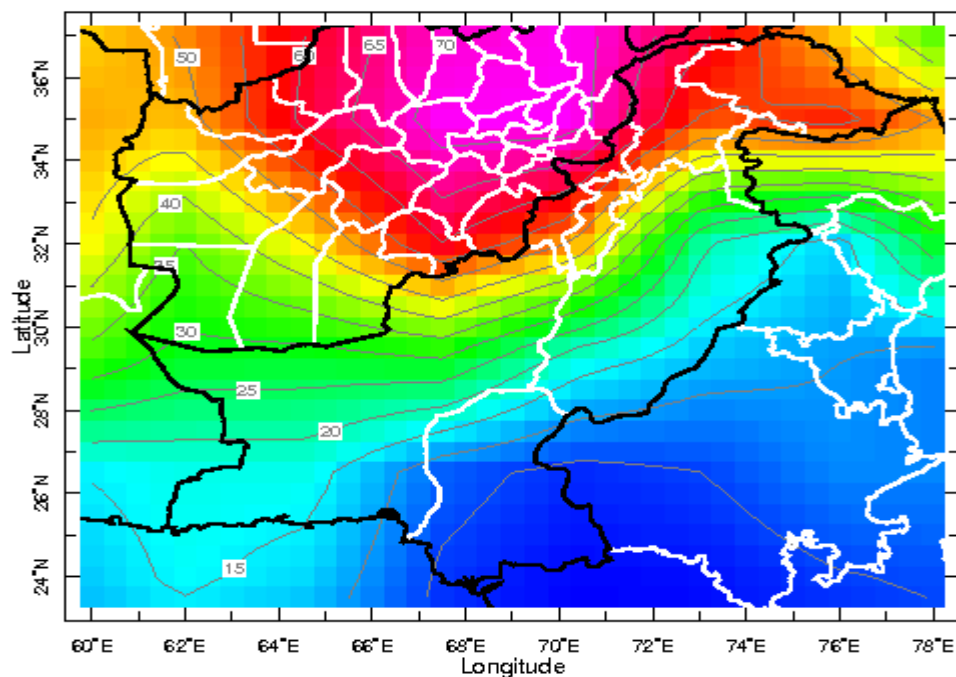
	Dec, 2013		Jan, 2013		Feb, 2014		Dec,2013-Feb, 2014	
	Ave	Exp	Ave	Exp	Ave	Exp	Ave	Exp
GB	16.3	Abv. Ave	27.2	Abv. Ave	29.7	Abv. Ave	73.2	Abv. Ave
KP	32.9	Abv. Ave	49.0	Ave	71.9	Abv. Ave	153.8	Abv. Ave
AJK	50.9	Ave	91.1	Blw. Ave	110.5	Blw. Ave	252.5	Blw. Ave
FATA	20.6	Abv. Ave	30.2	Abv. Ave	54.0	Abv. Ave	104.8	Abv. Ave
PUNJAB	12.0	Abv. Ave	17.2	Abv. Ave	27.2	Ave	56.3	Abv. Ave
BALUCHISTAN	14.8	Abv. Ave	19.5	Abv. Ave	20.9	Abv. Ave	55.2	Abv. Ave
SIND	5.0	Abv. Ave	3.0	Abv. Ave	5.4	Abv. Ave	13.4	Abv. Ave
Pakistan	14.9	Abv. Ave	20.8	Abv. Ave	27.2	Abv. Ave	62.8	Abv. Ave

- **Ave. : average (1981-2010)**
- **Exp. : Expected rainfall**
- **Below Average (Blw. Ave) < -10 %**,
- **Average precipitation range (Ave) = -10 to +10 %**,
- **Above Average (Abv.Ave) > +10 %**

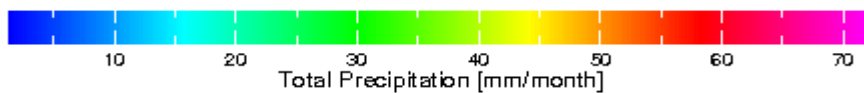
Note: Average precipitation is computed by using Global Precipitation Climatology Centre (GPCC) gridded data by resolution (0.5x0.5°) latitude by longitude. Ensembles of different climate models are used for computation of expected precipitation over the region.

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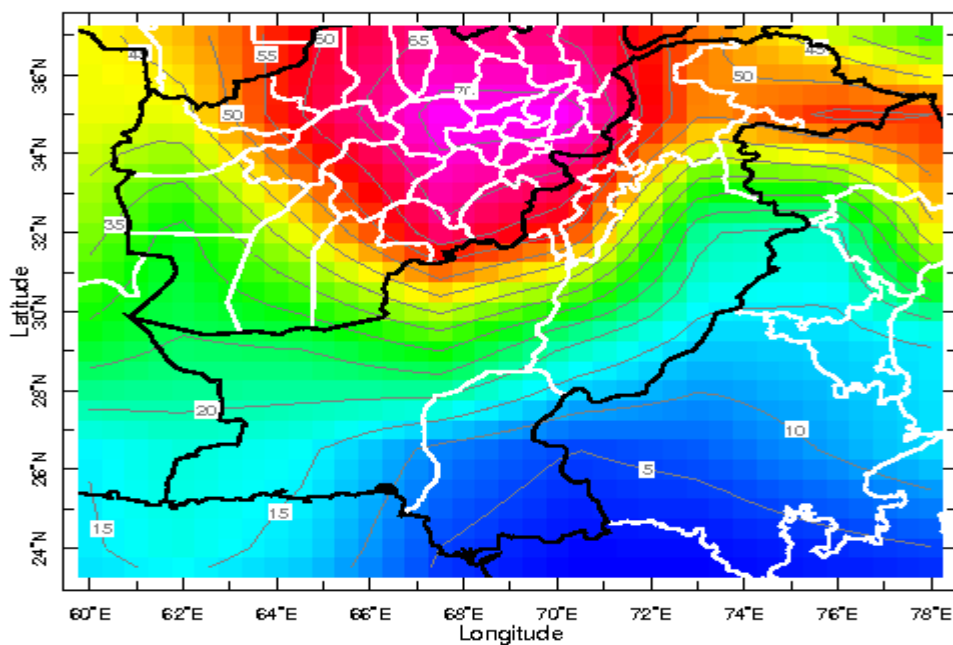
4. Spatial distribution of expected rainfall during coming season (GCM-ECHAM)



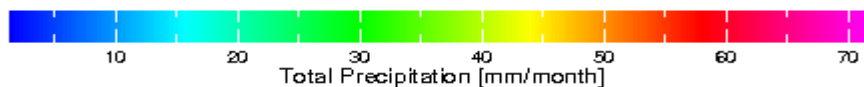
S 0000 1 Dec 2013 Time Dec 2013



Dec, 2013

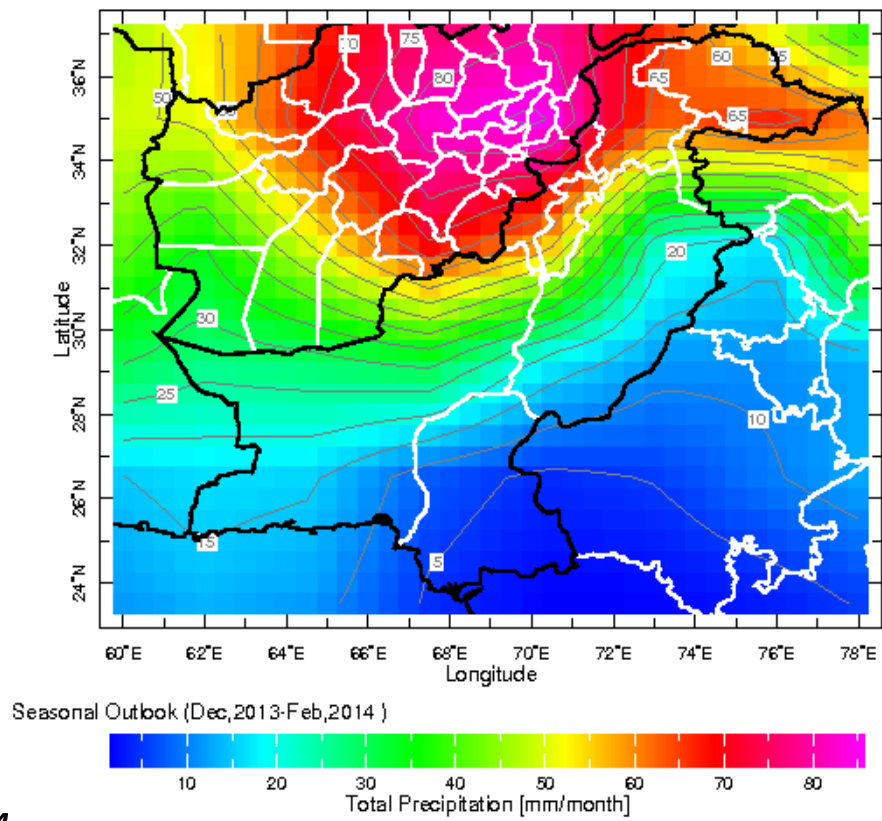
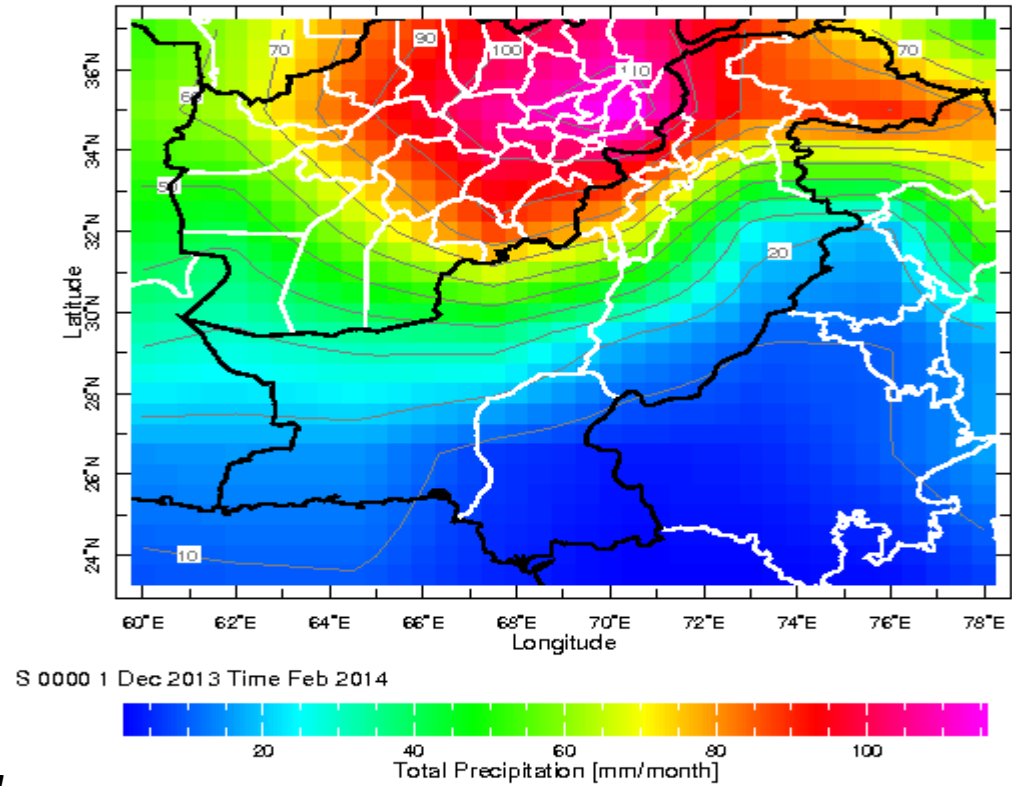


S 0000 1 Dec 2013 Time Jan 2014



Jan, 2014

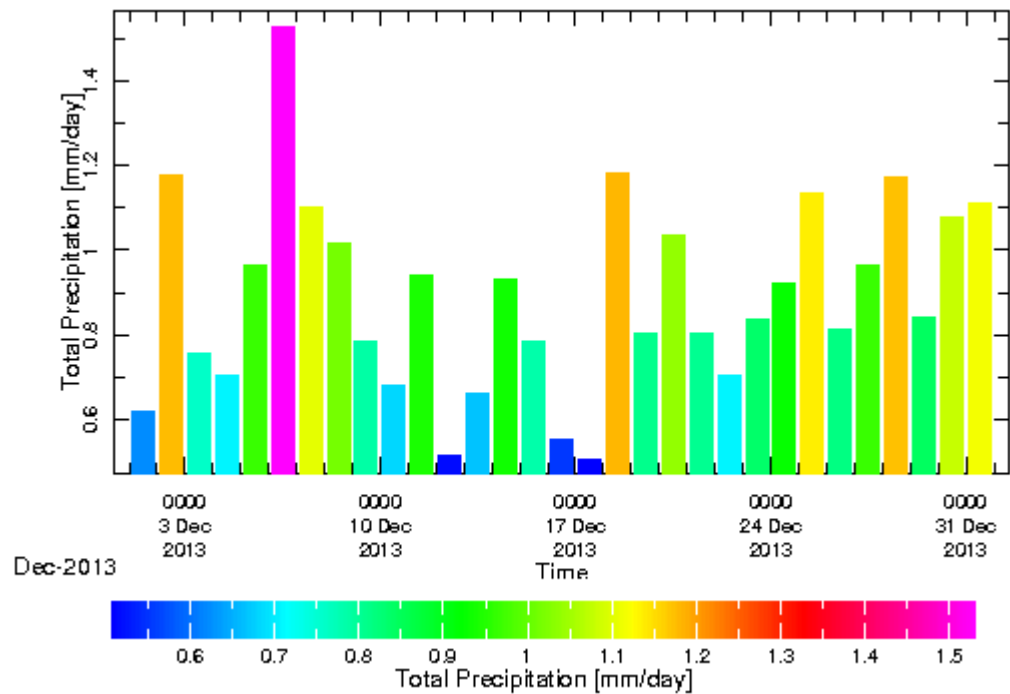
Seasonal weather outlook (Dec, 2013-Feb, 2014)



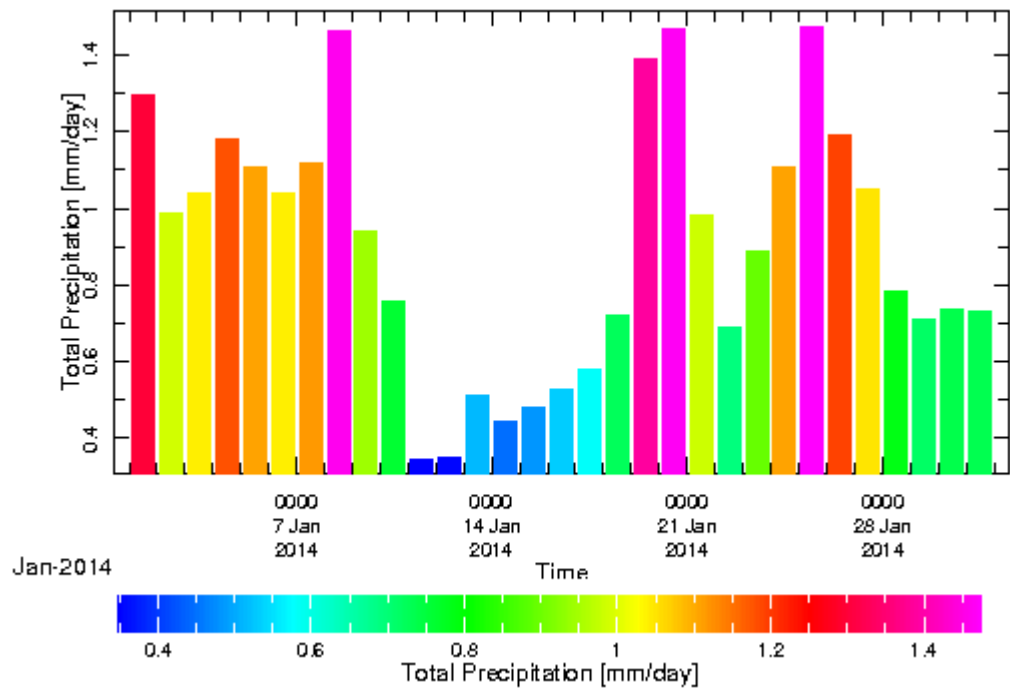
Seasonal weather outlook (Dec, 2013-Feb, 2014)

5. Expected daily rainfall

December, 2013

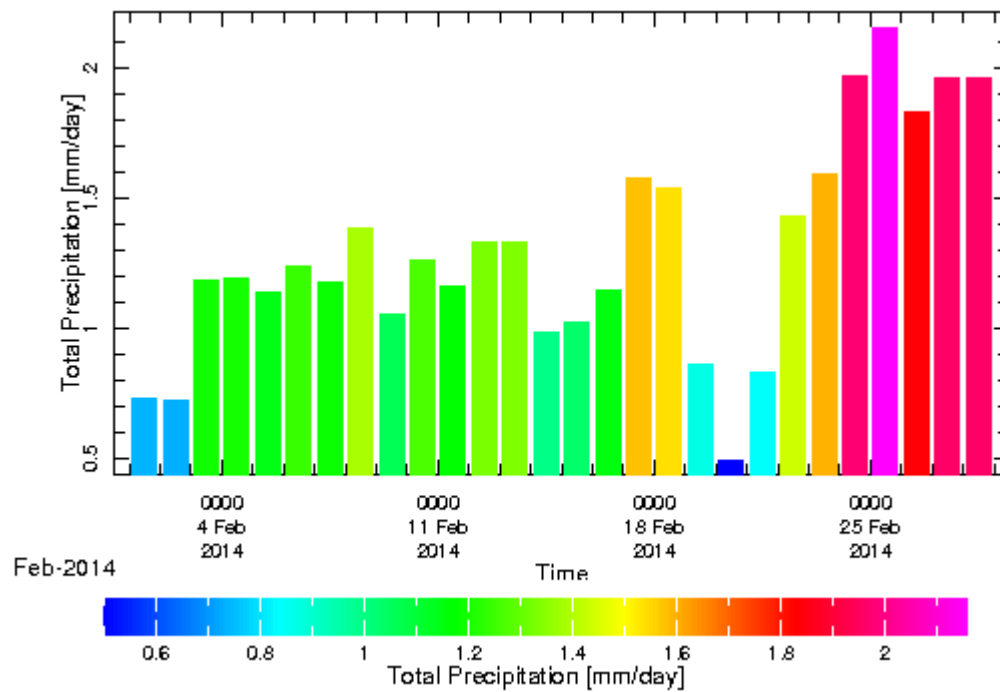


January, 2014



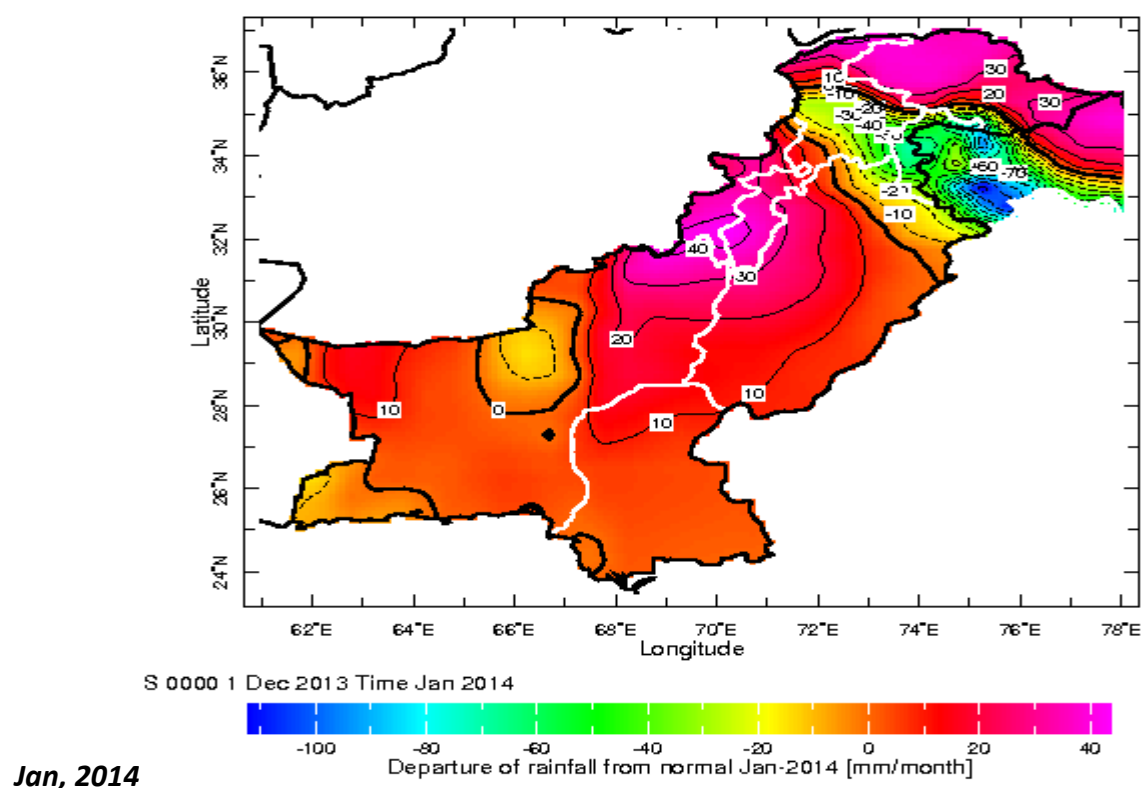
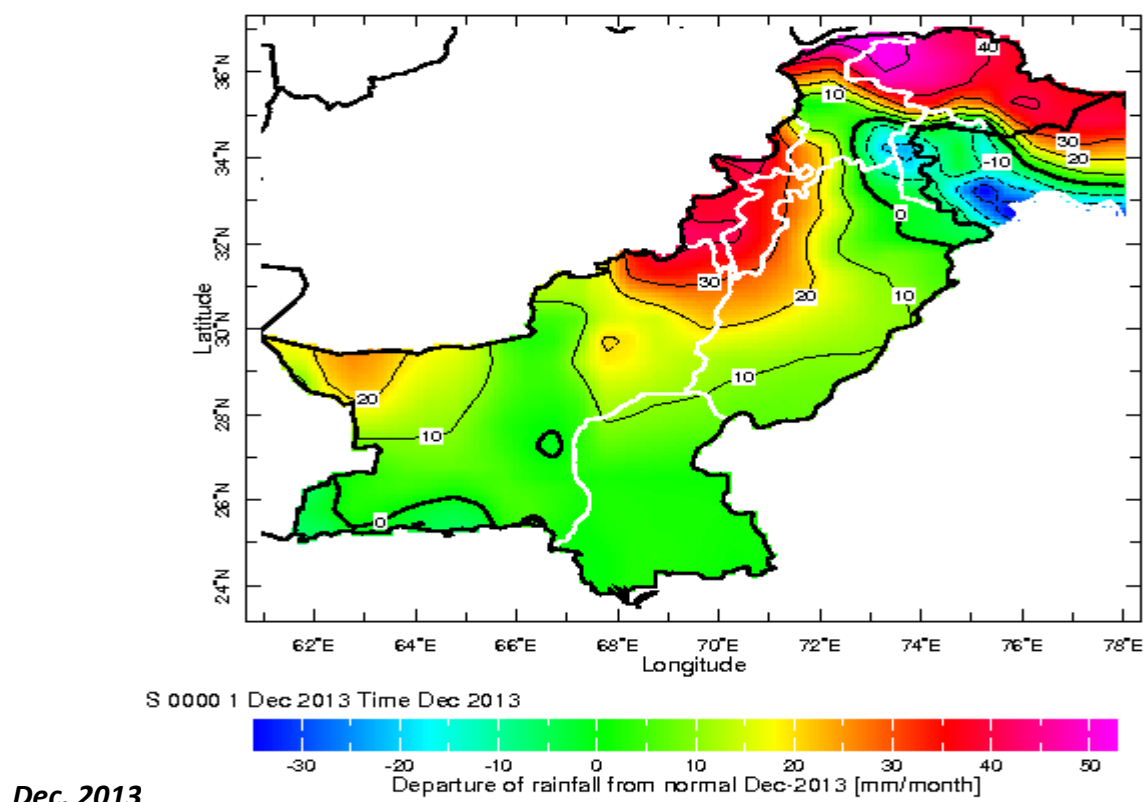
Seasonal weather outlook (Dec, 2013-Feb, 2014)

February, 2014

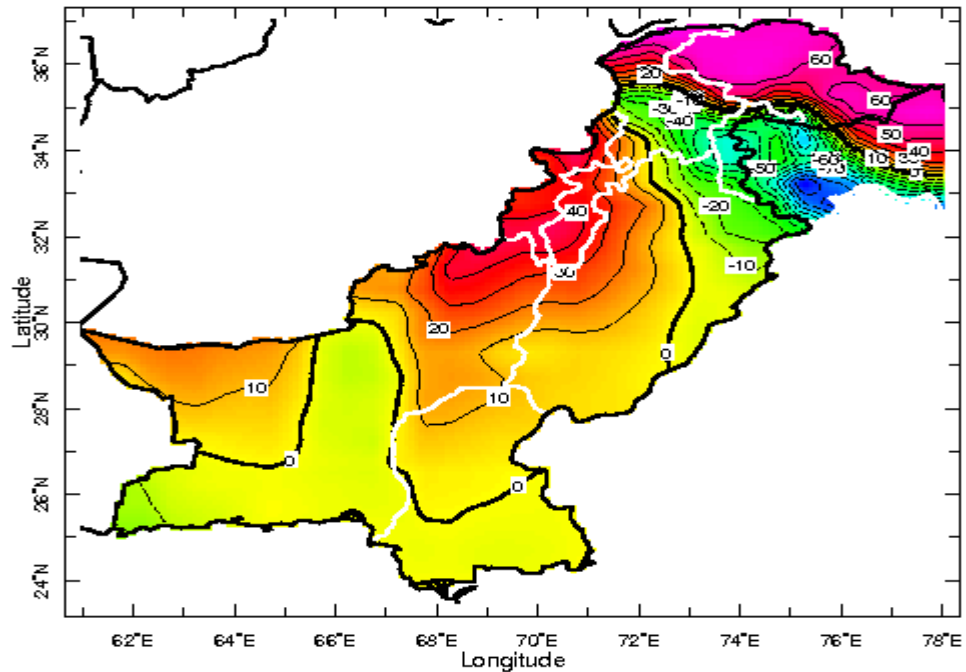


Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

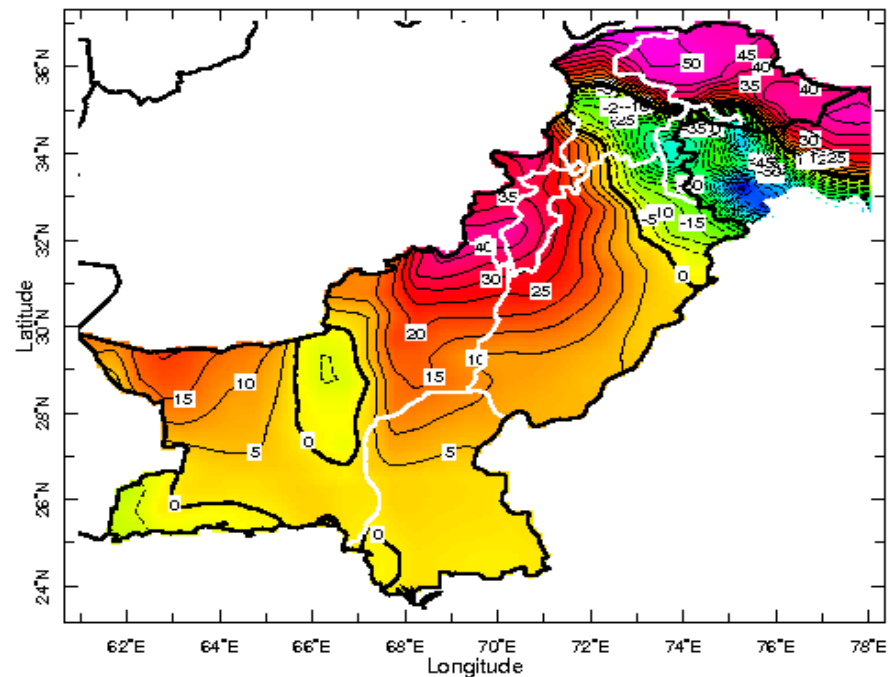
6. Monthly departure from normal (rainfall) during coming season



Seasonal weather outlook (Dec, 2013-Feb, 2014)

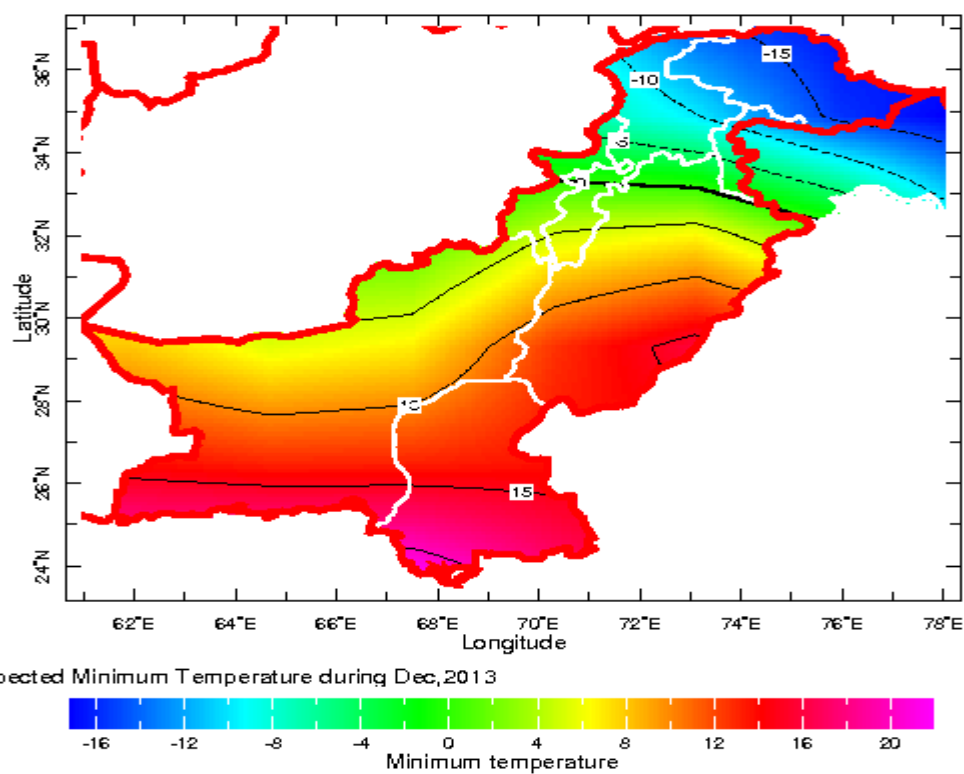


Feb, 2014

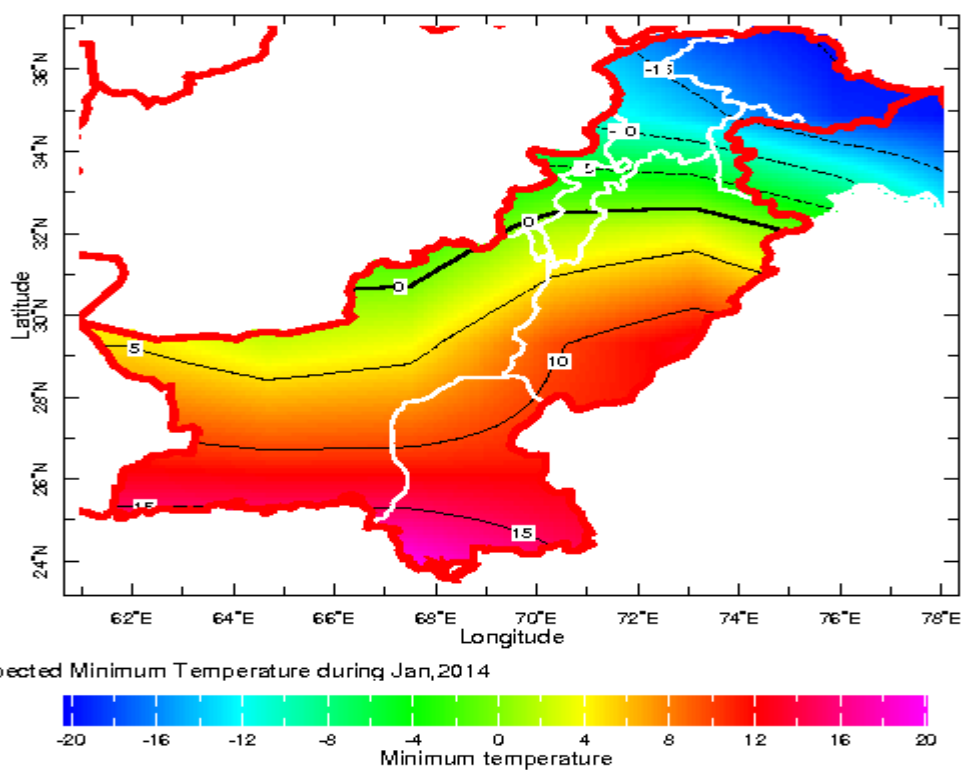


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7. Spatial distribution of expected minimum temperature during

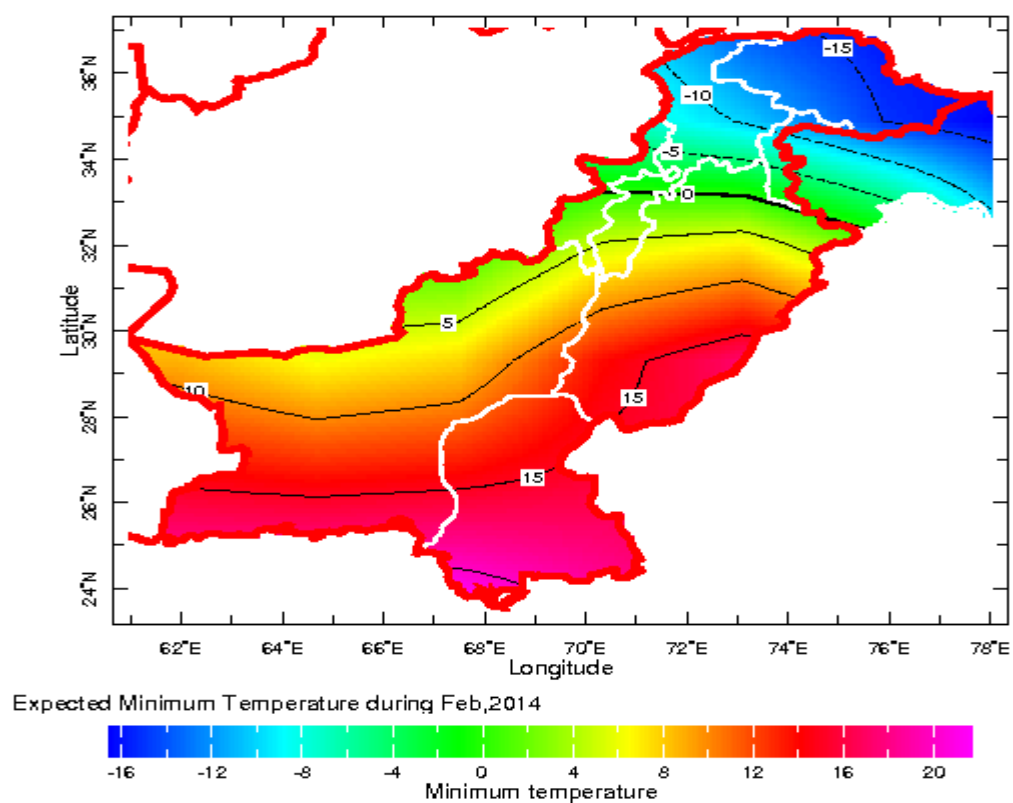


Dec, 2013



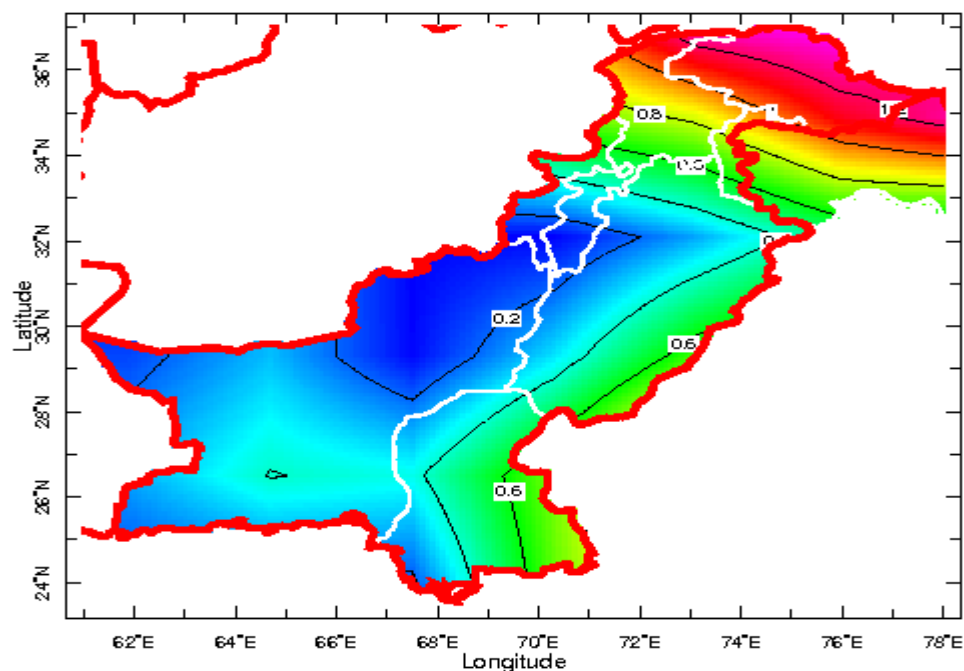
Jan, 2014

Seasonal weather outlook (Dec, 2013-Feb, 2014)

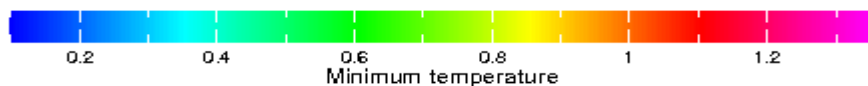


Feb, 2104

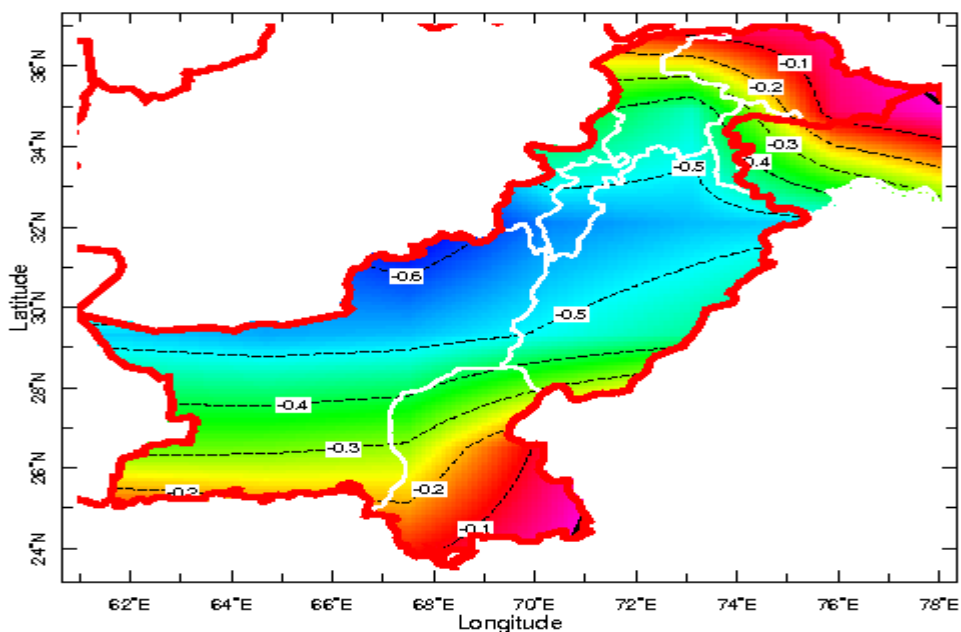
8. Departure of expected minimum temperature from normal



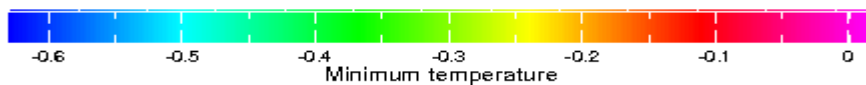
Departure of Minimum Temperature from normal during Dec, 2013



Dec, 2013

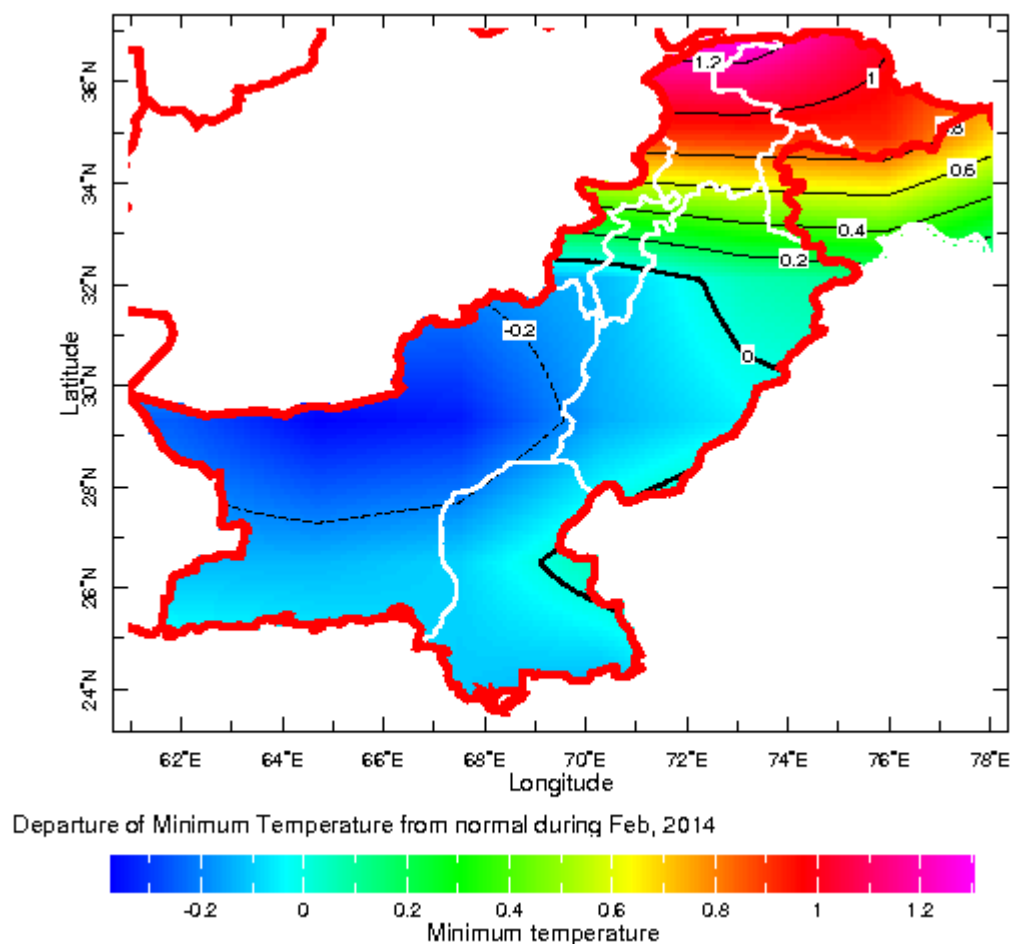


Departure of Minimum Temperature from normal during Jan, 2014



Jan, 2014

Seasonal weather outlook (Dec, 2013-Feb, 2014)



Feb, 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/>