

# Seasonal weather outlook

(Oct-Nov-Dec, 2013)

Issued on Oct 04, 2013



**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 Oct 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 approximately same as normal but with steep narrow band with slightly below normal strength. Decreasing trend in the intensity of jet stream crossing over the region will continue with higher during November, moderate in December and slight in October.

*Probability outlook: less strength in intensity leads to less than normal rain in the region.*

- A ridge at 500 hPa will dominate over the western parts of the region. A narrow trough over Afghanistan and surrounding will be boosted up by western disturbances during early season.

*Probability outlook: Presence of trough over Afghanistan plays its role and causes rain over northern parts of the country during early and late predicted season.*

- Area of high surface temperature will expand during October from normal (1982-2010) over central parts of the country. Day temperature will be on higher side during October over central parts of the country
- North Atlantic Oscillation (NAO) is in slightly positive phase (0.24) 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>

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*Probability outlook: Normal to below normal rainfall over the country. The focus of weather tracks may be towards northern side.*

- Most of the set of dynamical and statistical model predictions issued during late August and early September 2013 predict neutral ENSO conditions, although a few (mainly statistical) models indicate borderline or weak La Nina conditions for northern autumn and later, and a few dynamical models call for borderline El Nino conditions developing during the same period. In the most recent week, the SST anomaly in the Nino3.4 region was 0.0C. The average forecast of all models hints at a gradual warming tendency over the coming seasons.

Data

source:

[http://iri.columbia.edu/climate/ENSO/currentinfo/SST\\_table.html](http://iri.columbia.edu/climate/ENSO/currentinfo/SST_table.html)

*Probability outlook: La Nina (9%), Neutral (89%) and El Nino (2 %) during Oct-Nov-Dec season*

- Arabian Sea Surface Temperatures are expected to be normal near the coast of Pakistan and slightly below normal over far from coast.
- Caspian Sea surface temperatures expected to be 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 going towards normal leads to normal/below normal rainfall over the region.*

### **3. Seasonal Weather Outlook Summary (Oct- Dec-2013)**

Synthesis of the latest model forecasts for Oct-Dec, 2013 (OND), current synoptic situation and regional weather expert's judgment indicates that slightly normal rainfall is expected all over the country with normal during October, slightly above normal during November and above normal during December. The slightly above normal temperature is likely to occur in central parts of the country during October and upper parts of the country during November. However, below normal temperature will be likely over southern and central parts of the country. Neutral-ENSO condition is expected to persist throughout the predicted period.

#### **3.1. Weather outlook**

***“Normal during September, slightly above Normal during November and above normal during December”***

- I. Slightly above average (+ 15 %) rainfall is expected during predicted season 2013.
- II. In October, less intensity rainy spells are likely during first and last week. Whereas, normal rain will be expected over central and south parts of the country.
- III. Dry weather will be expected over upper Punjab, upper KP and Kashmir during October.
- IV. Dry weather will persist in early and mid November, however some rainy spells on isolated places over the country are expected during last decade of the month.
- V. Western weather currents will mostly be effective from December.

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- VI. First winter rain will be expected during 1st week of December, however about 3-4 rainy spells are expected during December.**
- VII. Above normal rain is expected over GB region during predicted period.
- VIII. Below normal rains are expected over KP province during predicted period.
- IX. The focus of monsoonal weather systems during late November and December will be towards central and Upper Punjab, KP and Kashmir.
- X. Well intense snow fall spells over northern glaciers are expected during December.
- XI. Expected Minimum temperature will be slightly above normal all over the country during October and November whereas December will be expected colder month than normal over the country except northern region
- XII. Minimum temperature will be on higher side during October over central parts and November over northern parts of the country from the normal.

### 3.2. Monthly Quantitative Weather Forecast

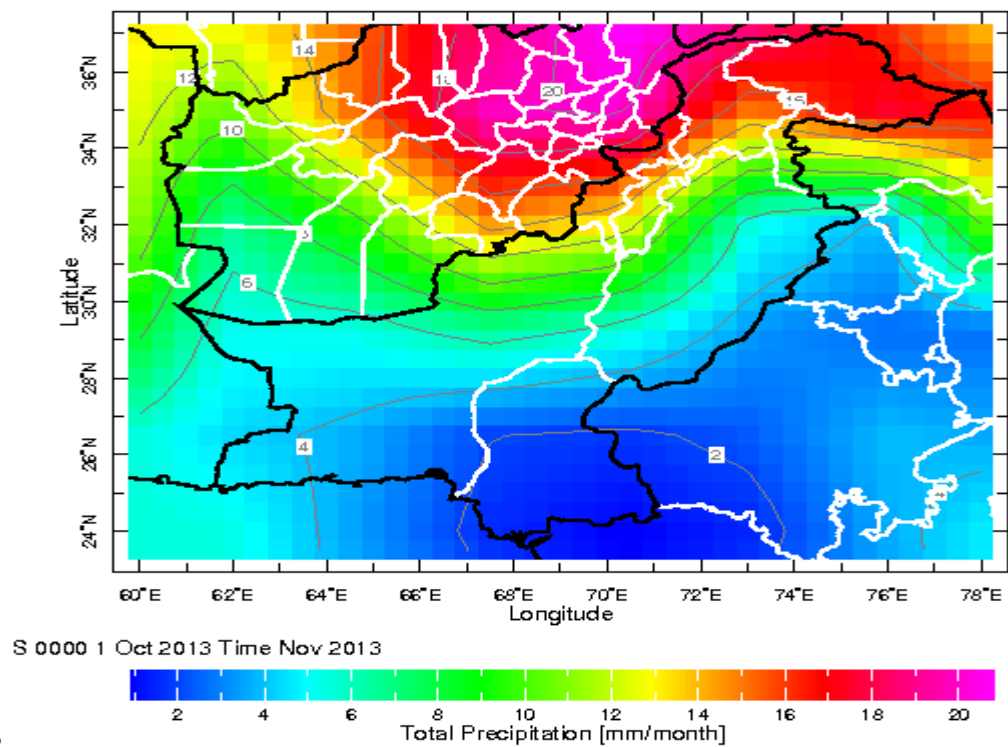
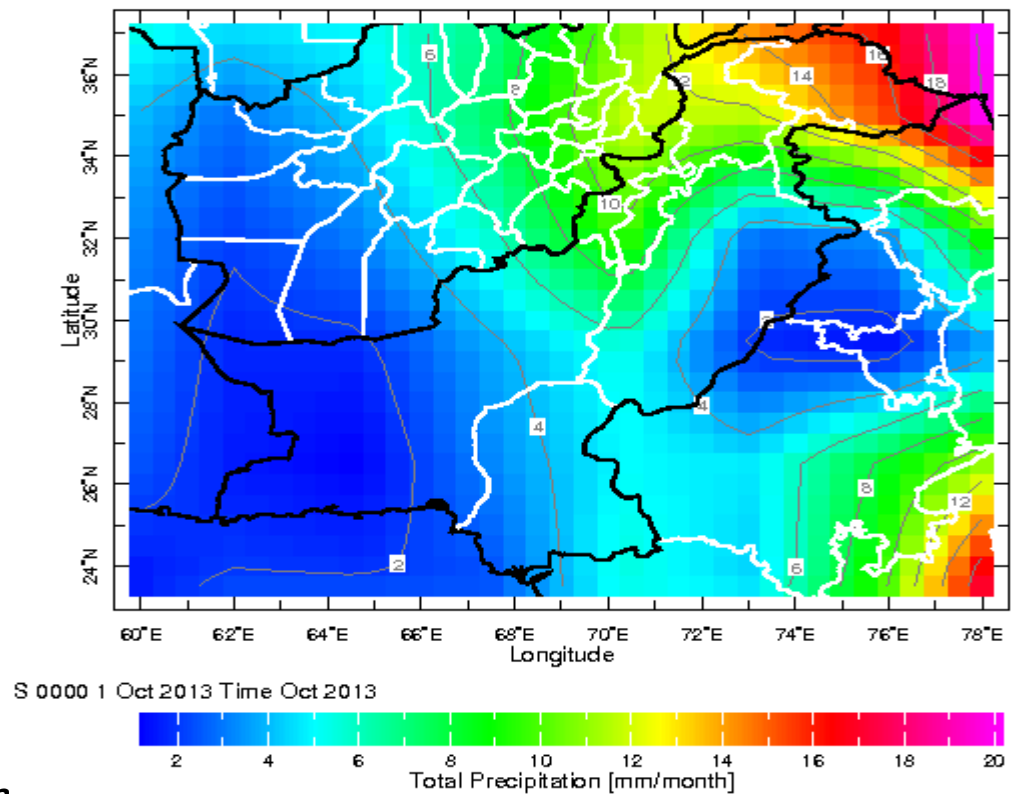
	Oct, 2013		Nov, 2013		Dec, 2013		Oct-Dec, 2013	
	Ave	Exp	Ave	Exp	Ave	Exp	Ave	Exp
<b>GB</b>	9.6	Abv. Ave	10.0	Abv. Ave	16.3	Abv. Ave	35.8	Abv. Ave
<b>KP</b>	23.9	Blw. Ave	20.0	Blw. Ave	32.9	Abv. Ave	76.8	Ave
<b>AJK</b>	31.7	Blw. Ave	23.6	Blw. Ave	50.9	Blw. Ave	106.2	Blw. Ave
<b>FATA</b>	13.2	Blw. Ave	10.9	Abv. Ave	20.6	Abv. Ave	44.7	Abv. Ave
<b>PUNJAB</b>	8.4	Blw. Ave	4.2	Abv. Ave	12.0	Abv. Ave	24.6	Abv. Ave
<b>BALUCHISTAN</b>	3.7	Blw. Ave	3.2	Abv. Ave	14.8	Abv. Ave	21.6	Abv. Ave
<b>SIND</b>	4.5	Ave	1.6	Abv. Ave	5.0	Abv. Ave	11.2	Ave
<b>Pakistan</b>	7.8	Ave	5.7	Abv. Ave	14.9	Abv. Ave	28.3	Abv. Ave

- **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.*

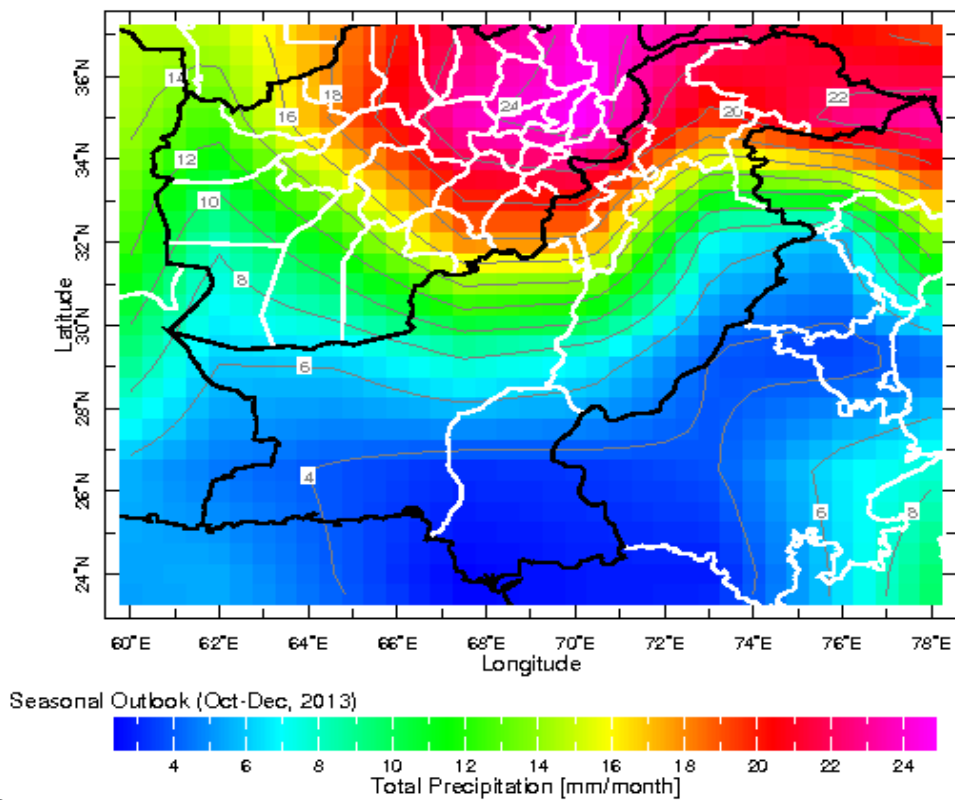
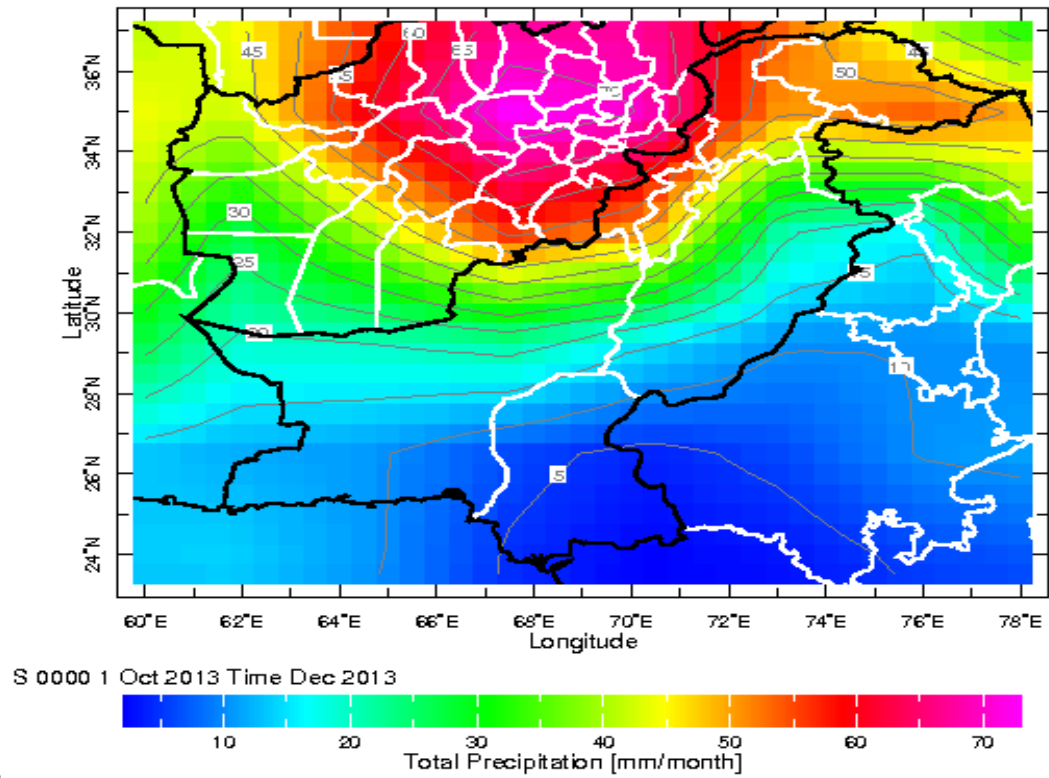
## Seasonal weather outlook (Oct-Dec, 2013)

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





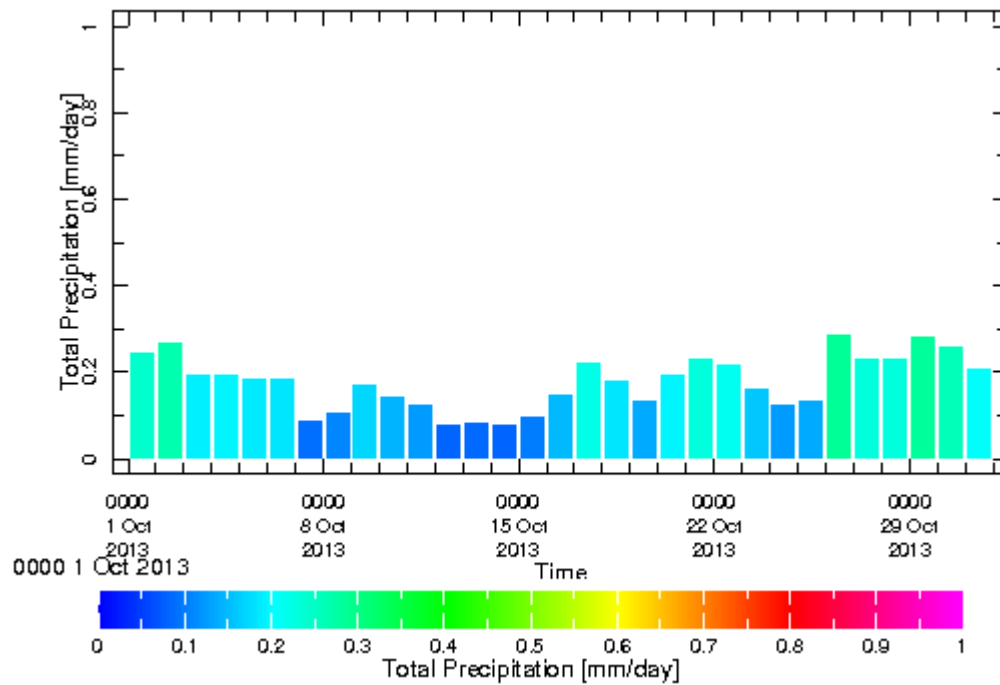
## Seasonal weather outlook (Oct-Dec, 2013)



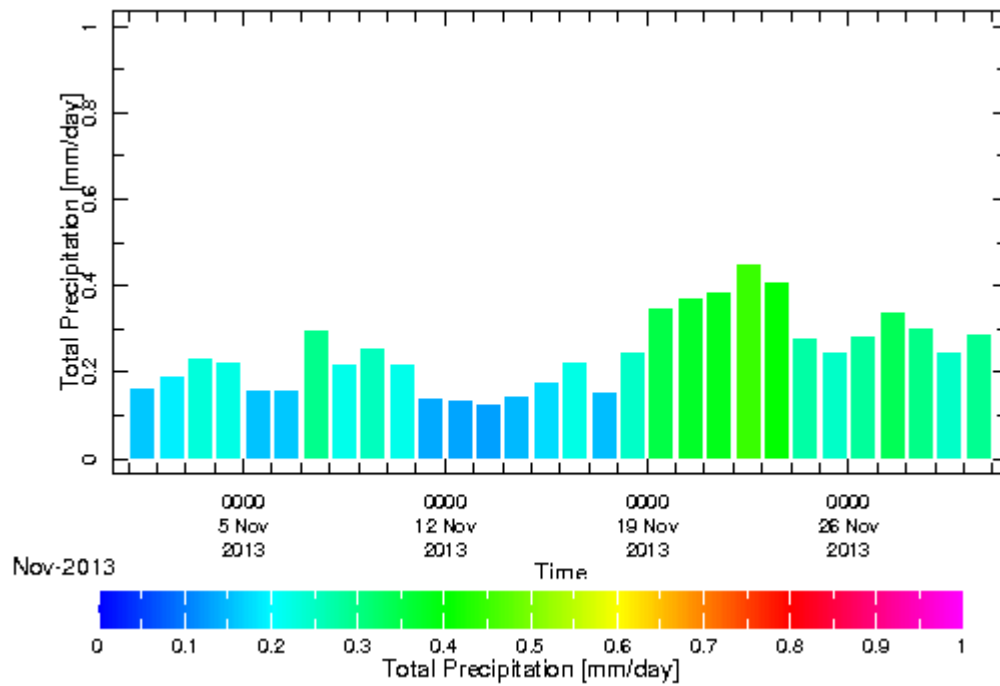
## Seasonal weather outlook (Oct-Dec, 2013)

### *Expected daily rainfall*

#### *October, 2013*

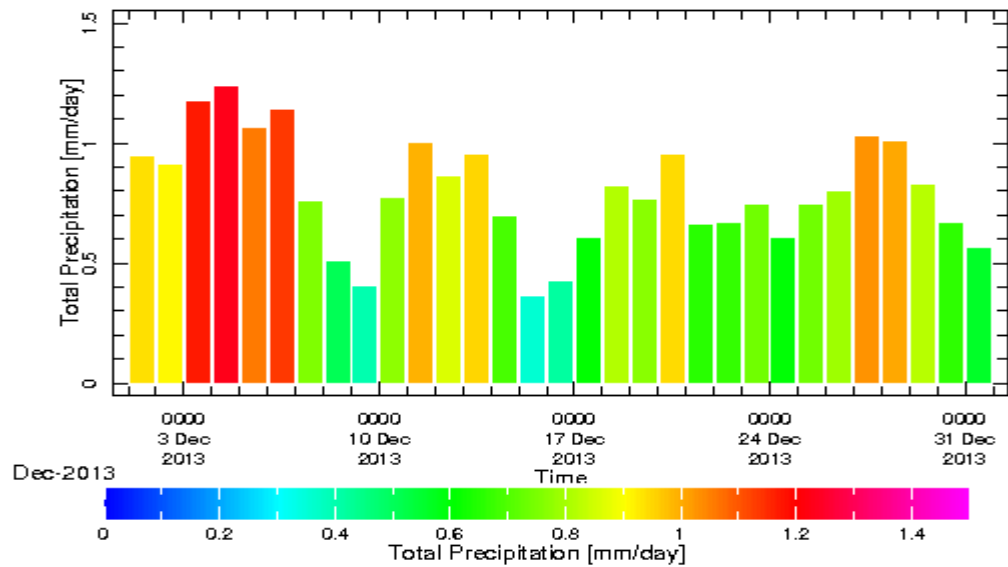


#### *November, 2013*



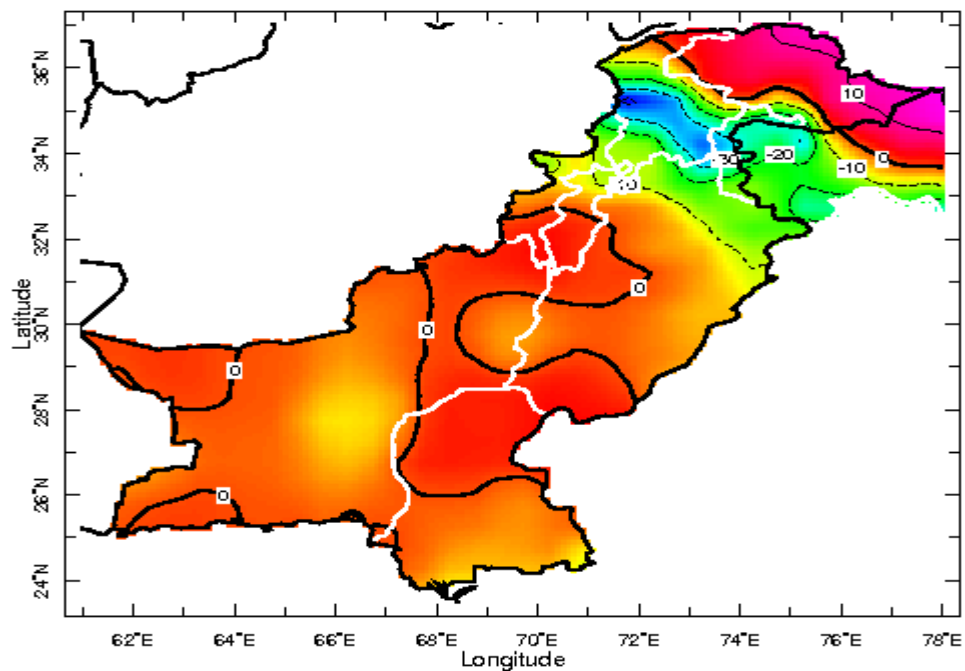
## Seasonal weather outlook (Oct-Dec, 2013)

**December, 2013**



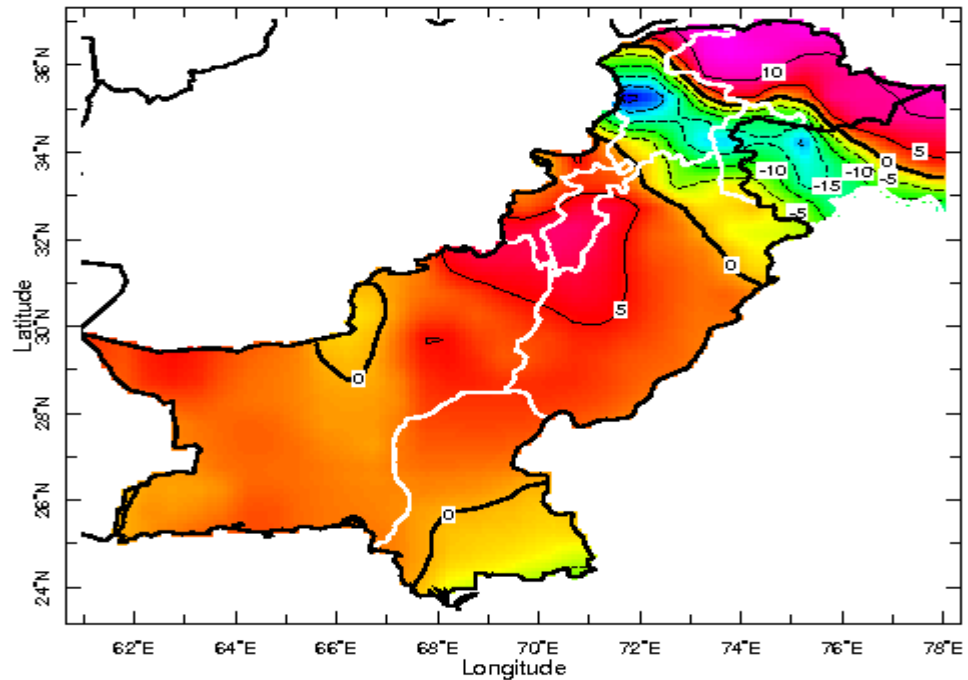
*Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.*

### **Monthly departure from normal (rainfall) during coming season**



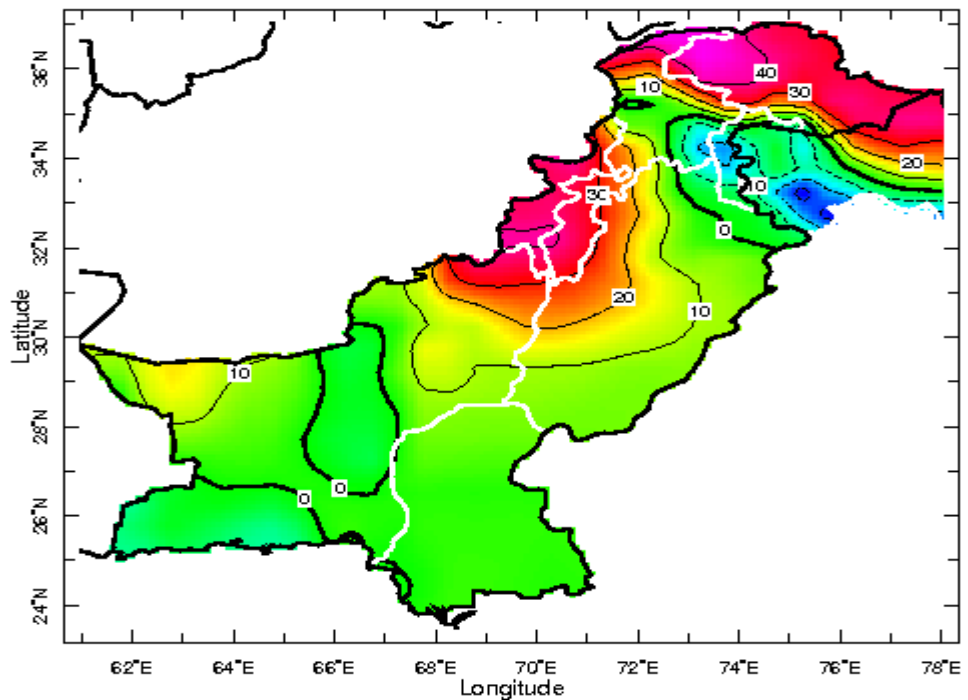
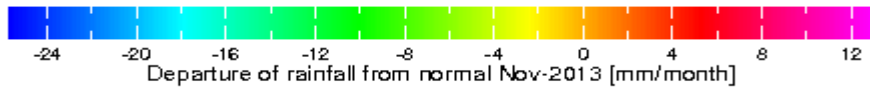
**Oct, 2013**

## Seasonal weather outlook (Oct-Dec, 2013)



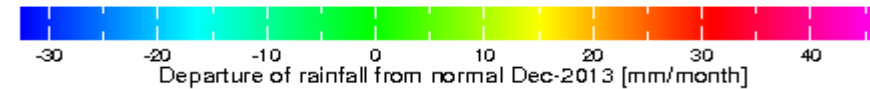
S 0000 1 Oct 2013 Time Nov 2013

**Nov, 2013**

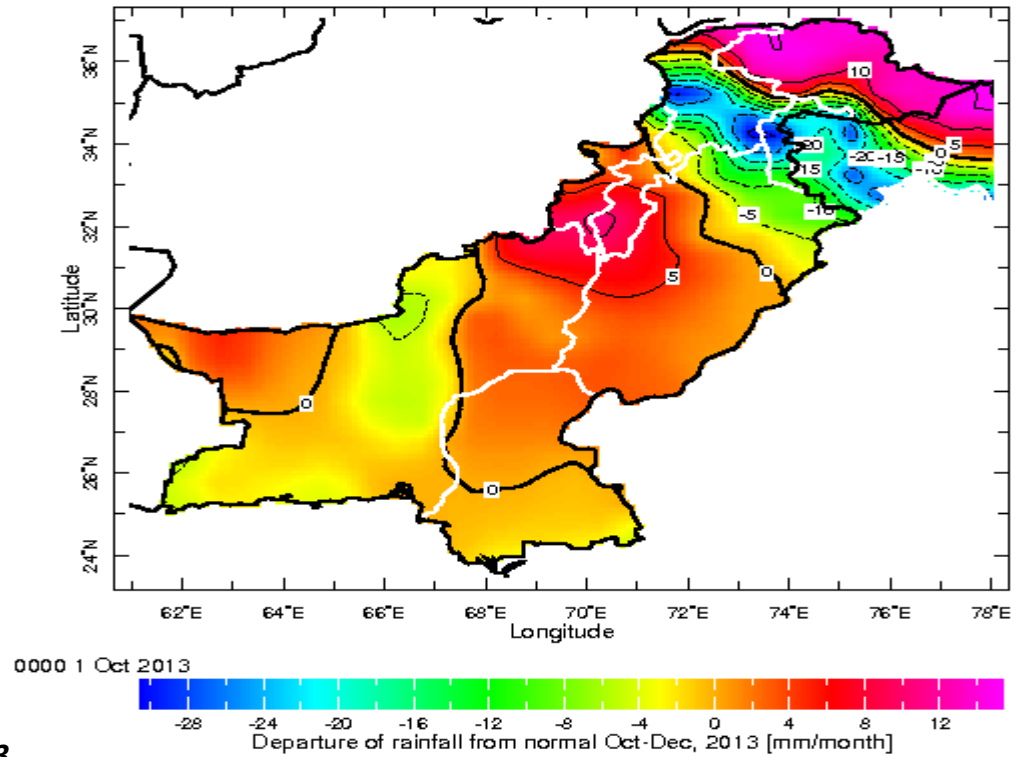


S 0000 1 Oct 2013 Time Dec 2013

**Dec, 2013**

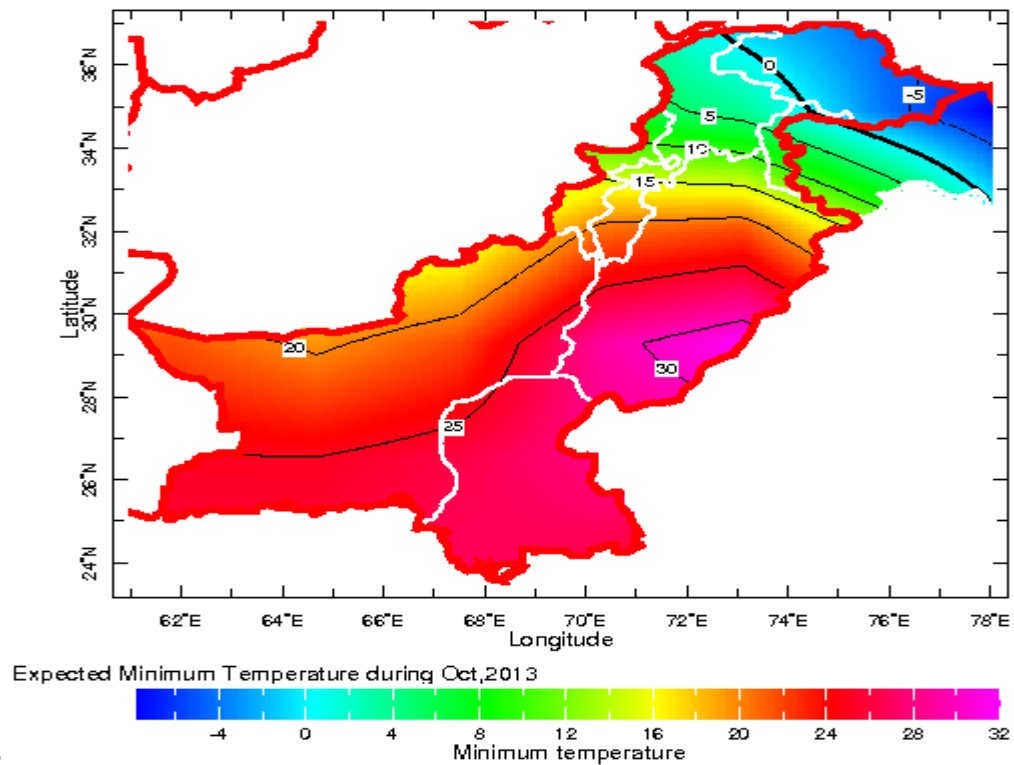


## Seasonal weather outlook (Oct-Dec, 2013)



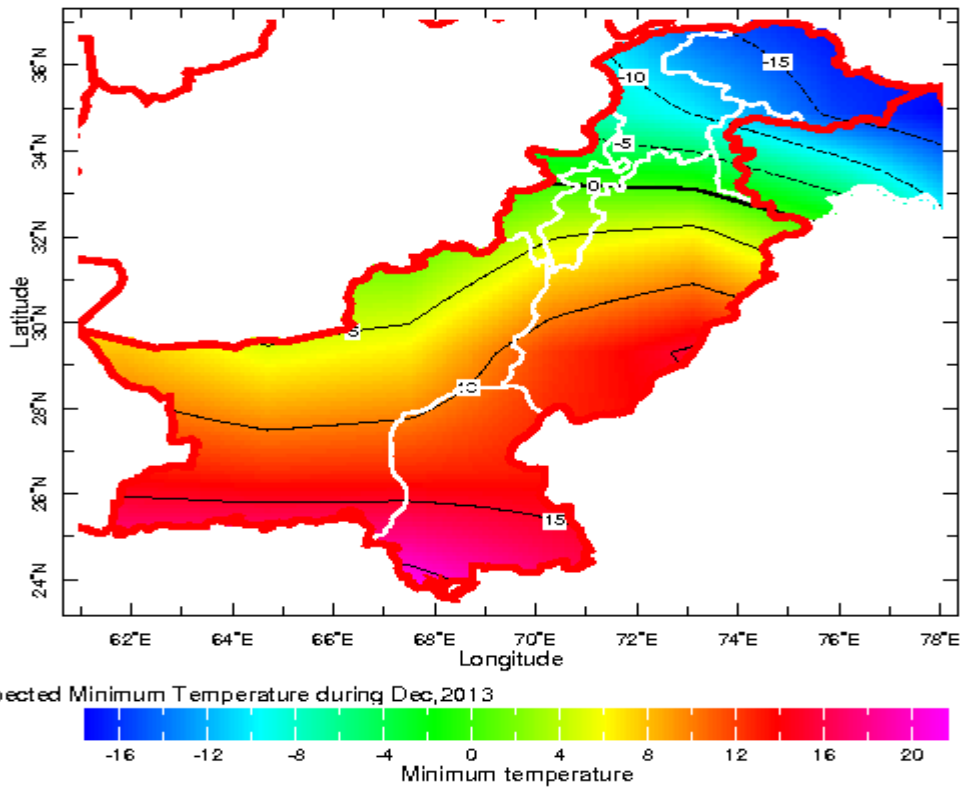
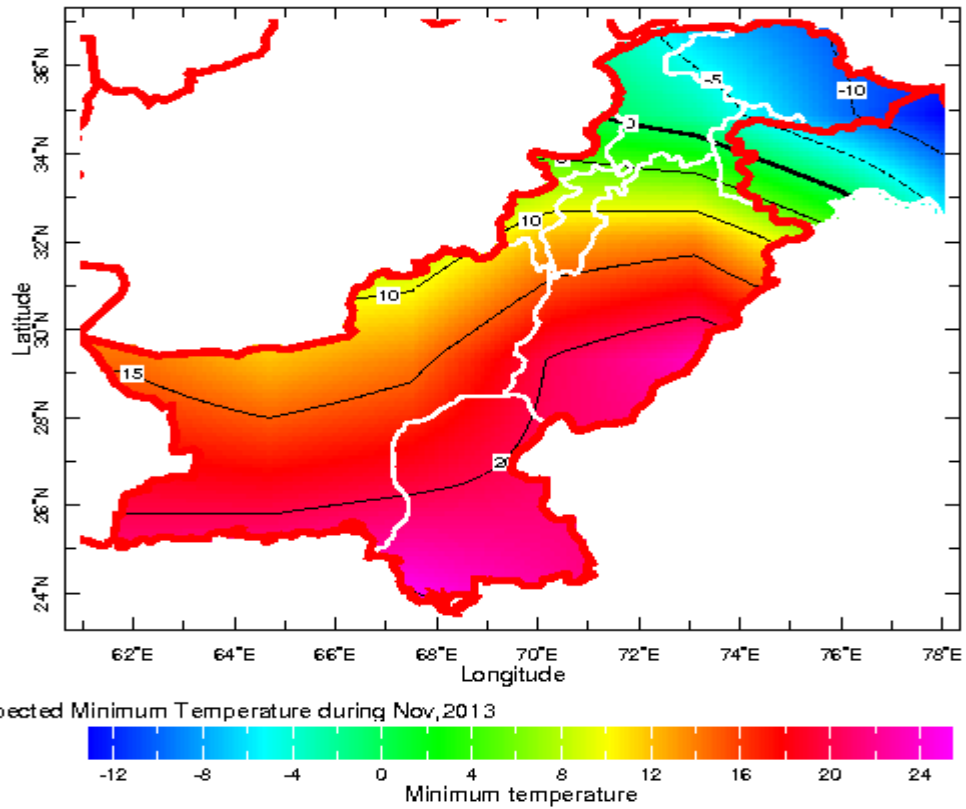
*Oct-Dec, 2013*

### *Spatial distribution of expected minimum temperature during*



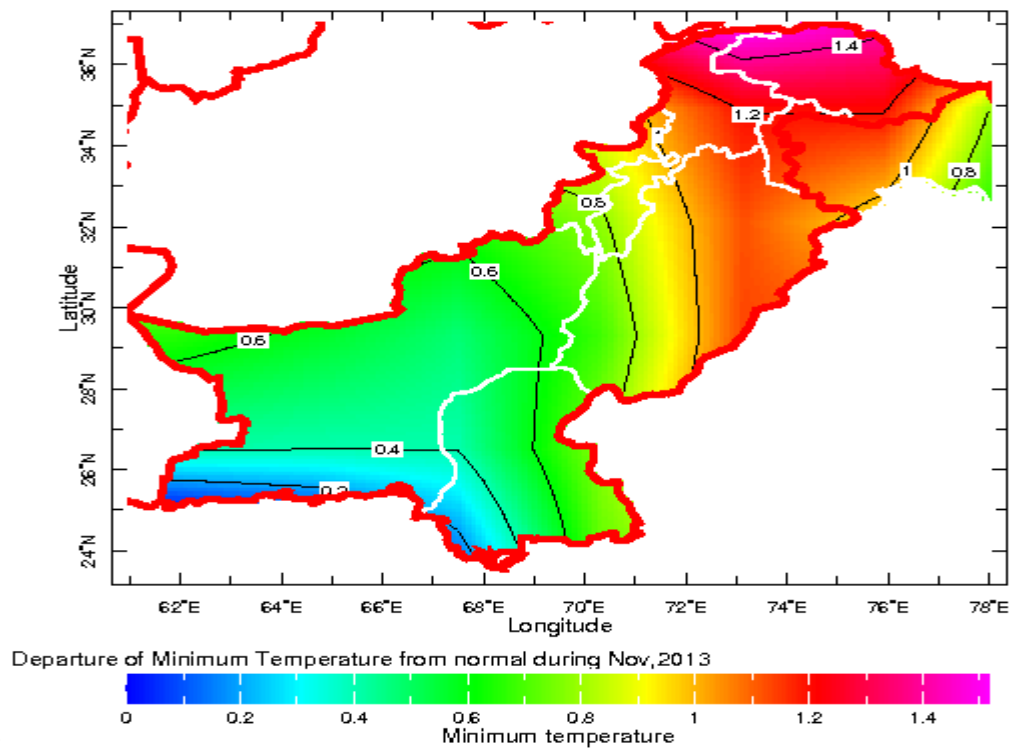
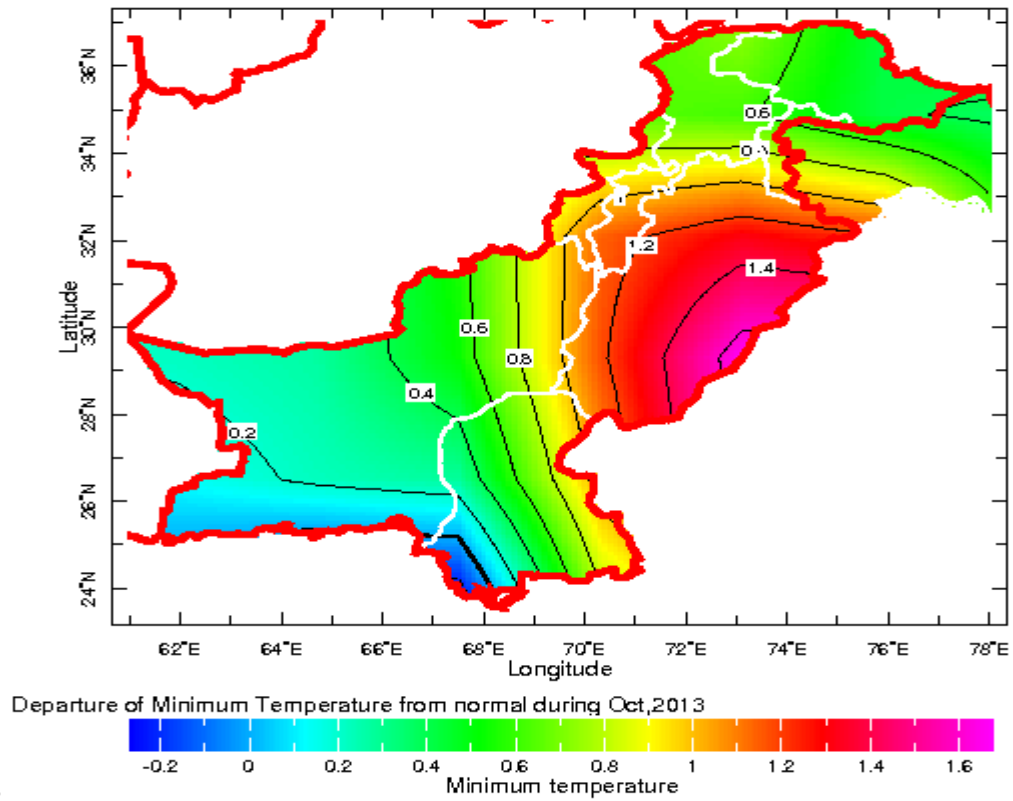
*Oct, 2013*

## Seasonal weather outlook (Oct-Dec, 2013)

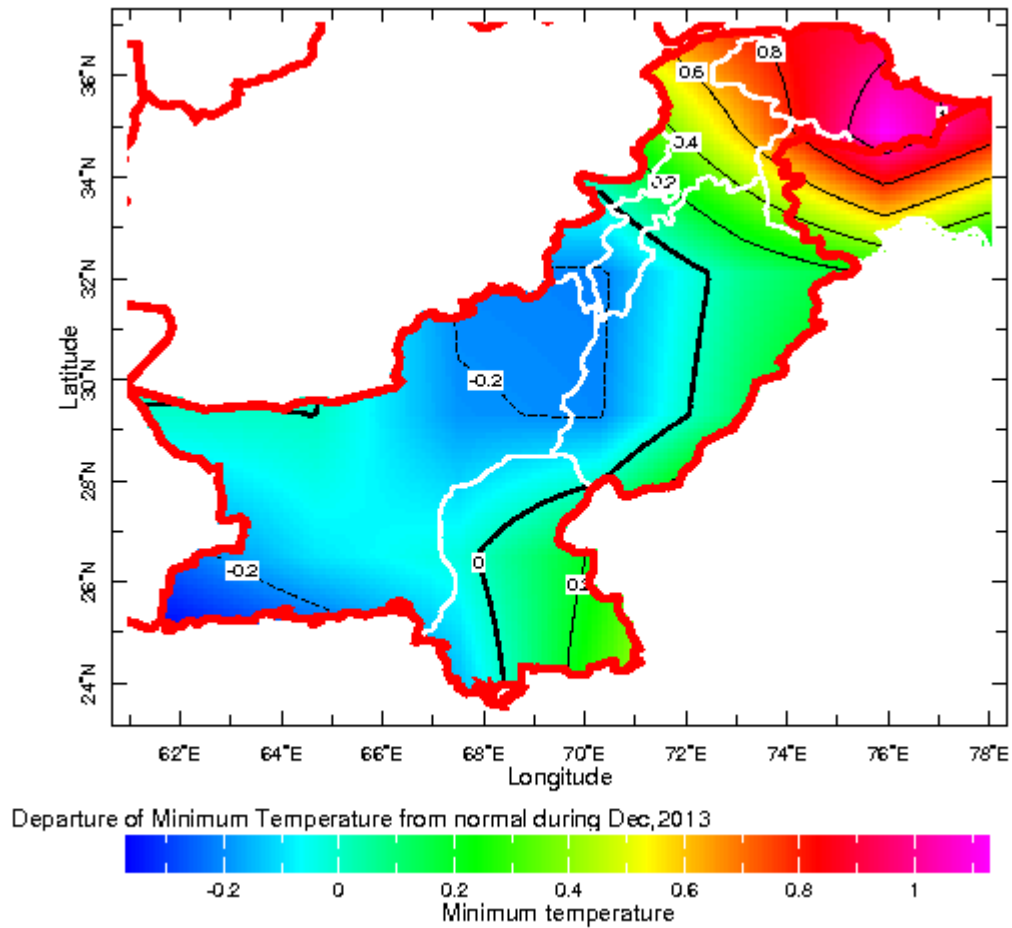


## Seasonal weather outlook (Oct-Dec, 2013)

### *Departure of expected minimum temperature from normal*



## Seasonal weather outlook (Oct-Dec, 2013)



**Dec, 2013**

*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 10<sup>th</sup> 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/>*