

Seasonal weather outlook

(Dec, 2014-Feb, 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 Dec 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 less intensity. The area of jet stream may be squeezed during dec over northern of Afghanistan. Below normal strength of jet stream over west of the region.

Probability outlook: Normal to below intensity of jet stream is associated with normal to below normal precipitation in the region.

- A ridge at 500 hPa is expected to be over northern parts of the country. Slightly below normal trend is expected over northern and eastern parts of the region.

Probability outlook: Less than normal precipitation is likely to occurs the country. Lower and central parts of the country may be dry during December.

- Surface temperatures are expected to be on lower side than normal all over the Pakistan However higher than normal surface temperature over western states of India.
- North Atlantic Oscillation (NAO) is in negative phase (0.68) and in increasing trend. 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: 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.

During November 2014, sea surface temperature (SST) anomalies increased across the central and eastern equatorial Pacific. At the end of the month, the weekly Niño indices ranged from +0.4°C in the Niño-1+2 region to +1.0°C in the Niño-3.4 region. The subsurface heat content anomalies (averaged between 180°-100°W) also increased during November as a downwelling oceanic Kelvin wave increased subsurface temperatures in the central and eastern Pacific. However, the overall atmospheric circulation has yet to show a clear coupling to the anomalously warm waters. The monthly equatorial low-level winds were largely near average, although weak anomalous westerlies appeared in a portion of the eastern tropical Pacific. Upper level easterly anomalies emerged in the central and eastern tropical Pacific during the month. The Southern Oscillation Index has been somewhat negative, but the equatorial Southern Oscillation Index has been near zero. Also, rainfall continued to be below average near the Date Line and over Indonesia, and near average east of the Date Line. Although the SST anomalies alone might imply weak El Niño conditions, the patterns of wind and rainfall anomalies generally do not clearly indicate a coupling of the atmosphere to the ocean. Therefore, despite movement toward El Niño from one month ago, the combined atmospheric and oceanic state remains ENSO-neutral.

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Similar to last month, most models predict SST anomalies to be at weak El Niño levels during November-January 2014-15 and to continue above the El Niño threshold into early 2015. Assuming that El Niño fully emerges, the forecaster consensus favors a weak event. In summary, there is an approximately 65% chance of El Niño conditions during the Northern Hemisphere winter, which are expected to last into the Northern Hemisphere spring 2015 (http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)

Probability outlook: La Nina (0%), Neutral (36%) and El Nino (64 %) during Dec-Jan-Feb, 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 (Dec, 2014-Feb, 2015)

Synthesis of the latest model forecasts for Dec-Feb, 2015 (DJF), current synoptic situation and regional weather expert's judgment indicates that normal to slightly below normal precipitation is expected all over the country with average during December and January and slightly above normal during February. Slightly above average night temperature is likely to occur during December while below normal during January and February all over the country.

2.1. Weather outlook

"Slightly normal to below normal precipitation is expected during the season all over the country with slightly above normal temperature during early and below normal during late of the predicted season."

- I. Below average precipitation is expected over the country during December with higher deficit over Punjab, Sindh and Kashmir.

Seasonal weather outlook (Dec, 2014-Feb, 2015)

- II. Average precipitation is expected over Punjab, Sindh, GB, KP and Baluchistan, Slightly above average over FATA and lower KP during December.
- III. One to two light to moderate rainy spells are expected over northern parts of the country during December.
- IV. Average precipitation with snow fall over the hills is expected during January.
- V. Chances of dense fog over central parts of the country are positive but it would be less than normal during this winter season.
- VI. One moderate rainy spell is expected during first decade of January.
- VII. February would be wet month during the season.
- VIII. Less chances of rainy spell to approach over southern parts of the country.
- IX. Above normal night temperature are expected during December, while below normal during January.

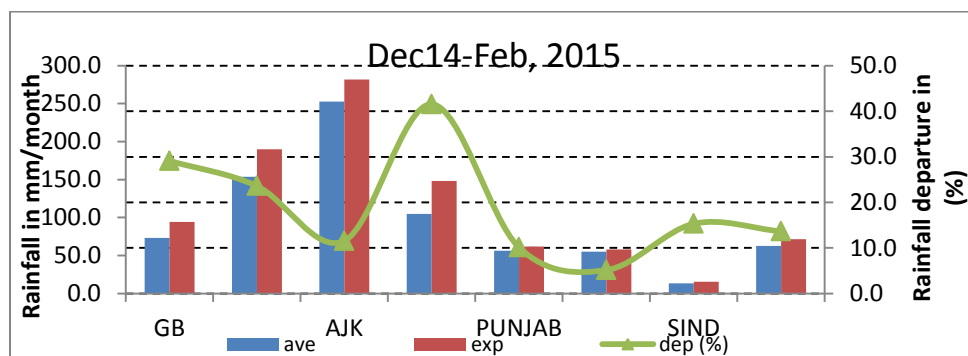
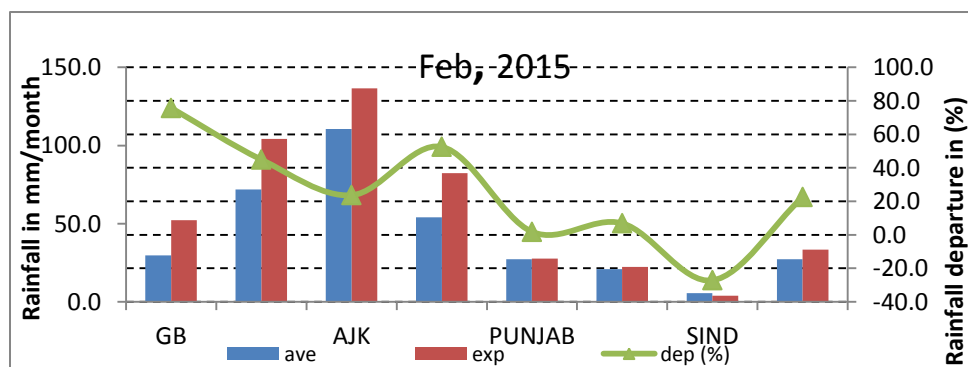
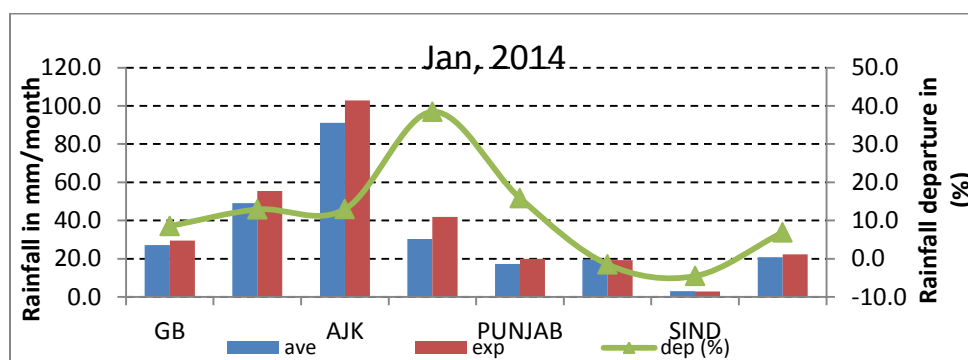
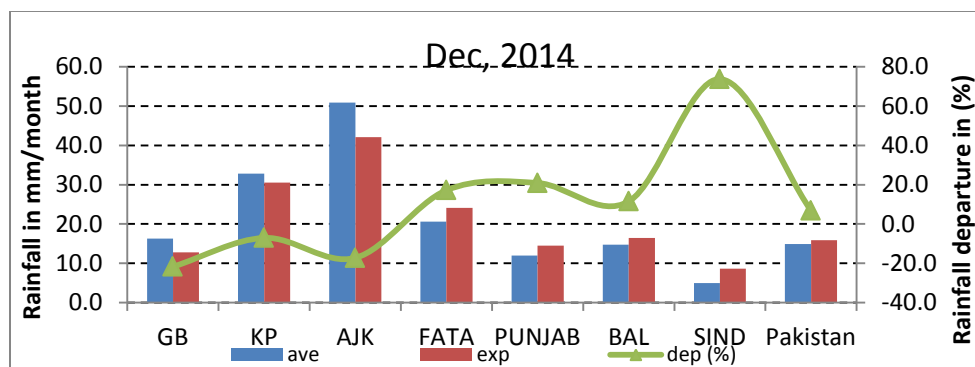
2.2. Monthly Quantitative Weather Forecast

	Dec, 2014		Jan, 2015		Feb, 2015		Dec14-Feb, 2015	
	ave	exp	ave	exp	ave	exp	ave	exp
GB	16.3	Blw. Ave	27.2	Ave	29.7	Abv. Ave	73.2	Abv. Ave
KP	32.9	Ave	49.0	Ave	71.9	Abv. Ave	153.8	Abv. Ave
AJK	50.9	Blw. Ave	91.1	Ave	110.5	Abv. Ave	252.5	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	Ave
BALUCHISTAN	14.8	Ave	19.5	Ave	20.9	Ave	55.2	Ave
SIND	5.0	Abv. Ave	3.0	Ave	5.4	Blw. Ave	13.4	Abv. Ave
Pakistan	14.9	Ave	20.8	Ave	27.2	Abv. Ave	62.8	Ave

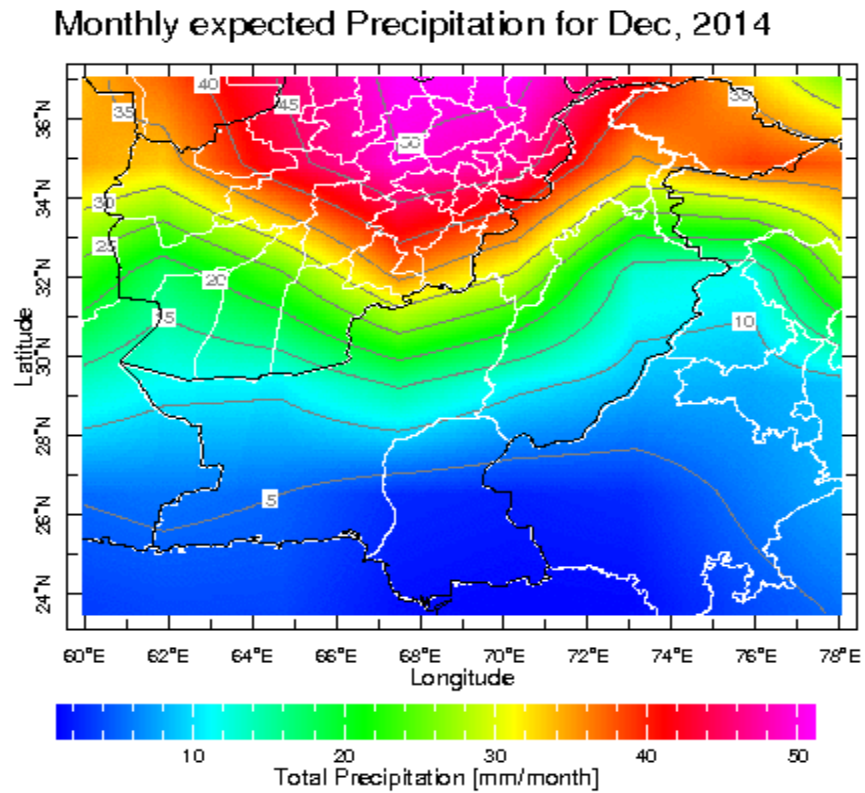
Ave.: average (1981-2010), **Exp.:** Expected rainfall, **Below Average** (Blw. Ave) < -15 %, **Average** precipitation range (Ave) = -15 to +15 %, **Above Average** (Abv.Ave) > +15 %

Seasonal weather outlook (Dec, 2014-Feb, 2015)

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.

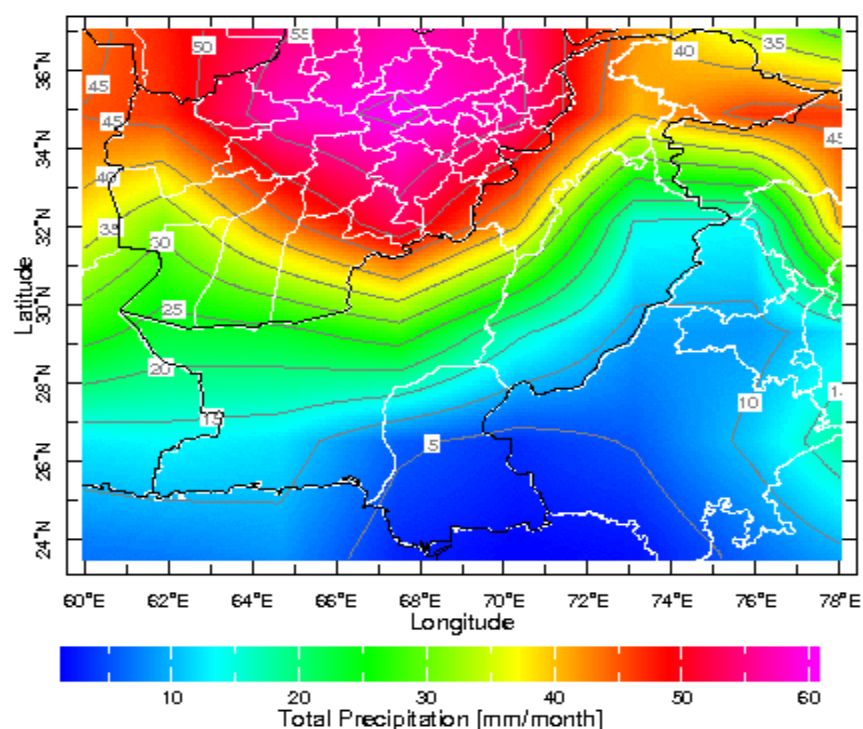


3. Spatial distribution of expected rainfall during coming season (GCM-ECHAM)

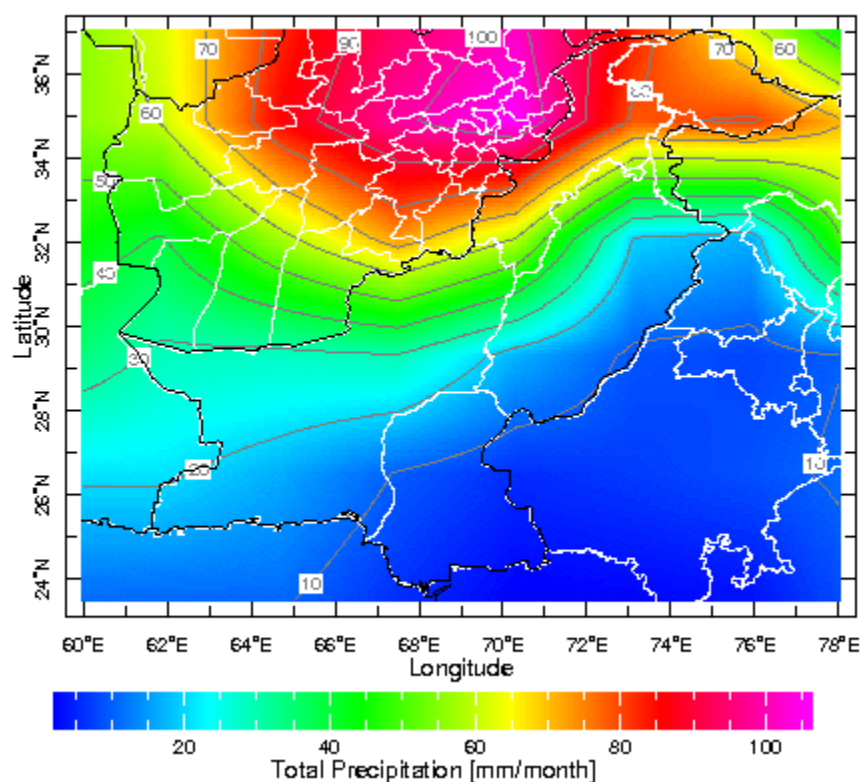


Seasonal weather outlook (Dec, 2014-Feb, 2015)

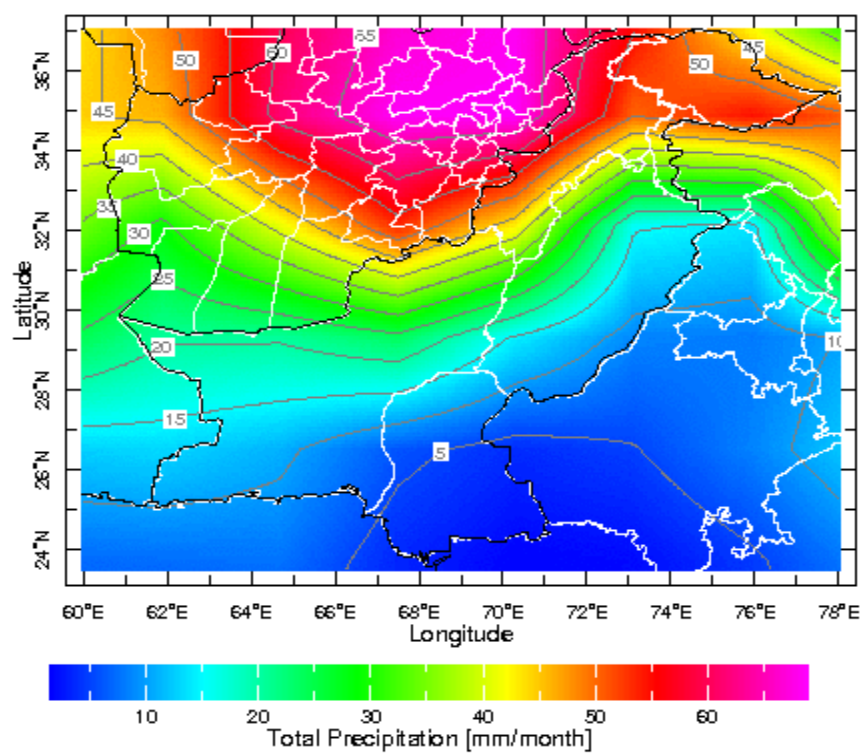
Monthly expected Precipitation for Jan, 2015



Monthly expected Precipitation for Feb, 2015



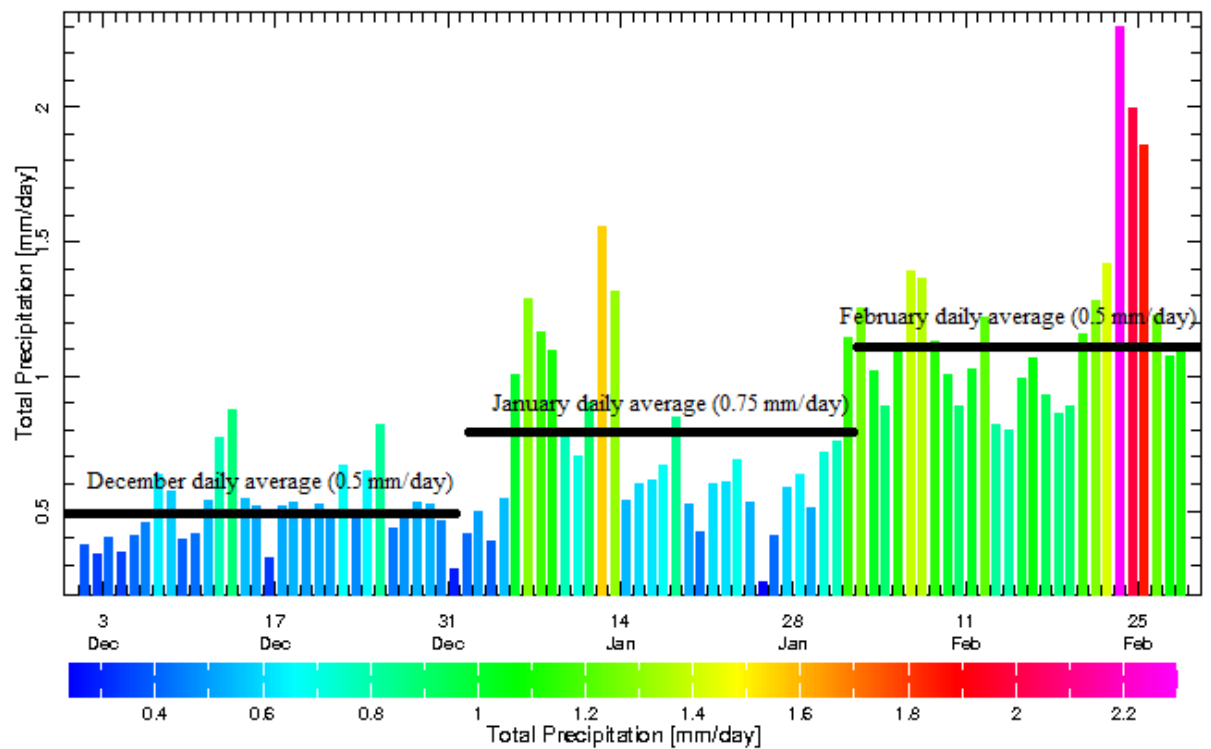
Seasonal Precipitation Outlook (Nov,2014-Jan,2015)



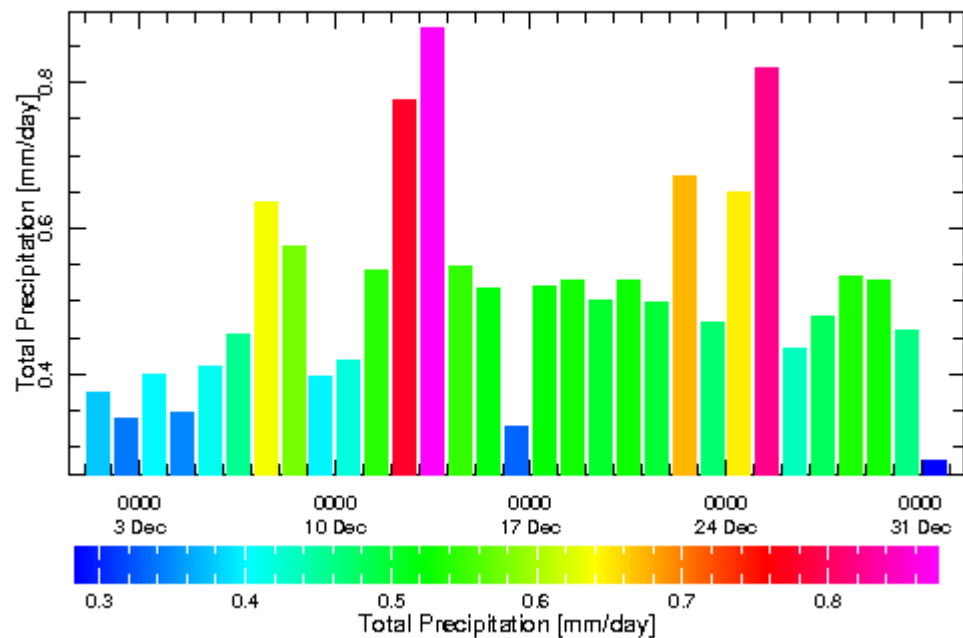
4. Expected daily rainfall

Seasonal weather outlook (Dec, 2014-Feb, 2015)

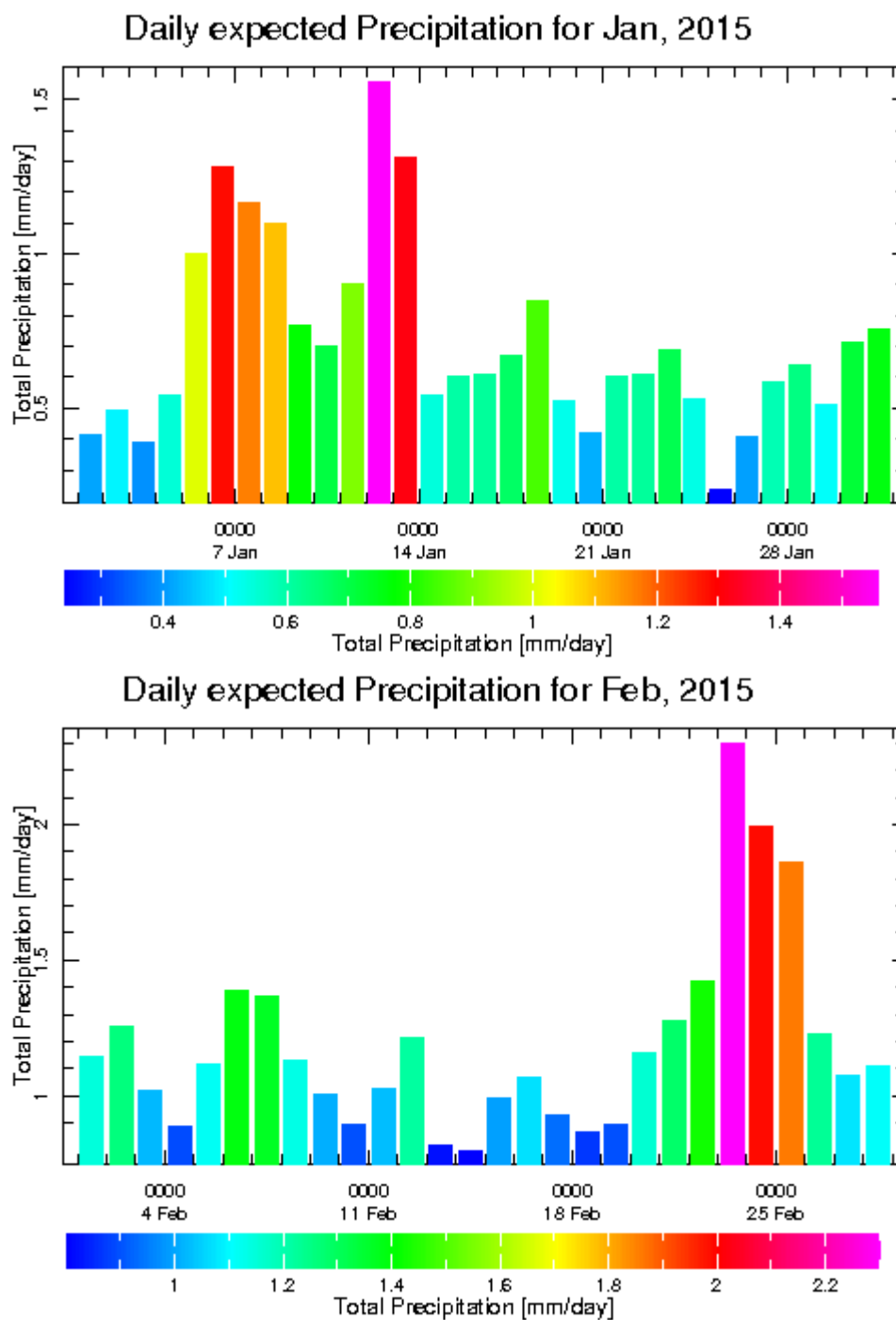
Daily expected Precipitation for Dec, 2014-Feb, 2015



Daily expected Precipitation for Dec, 2014



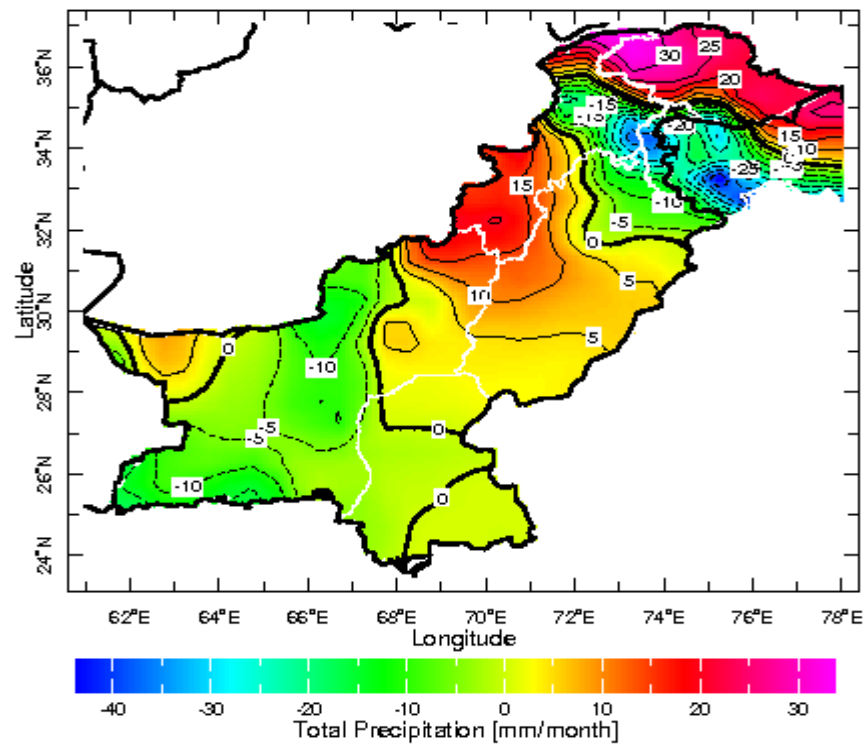
Seasonal weather outlook (Dec, 2014-Feb, 2015)



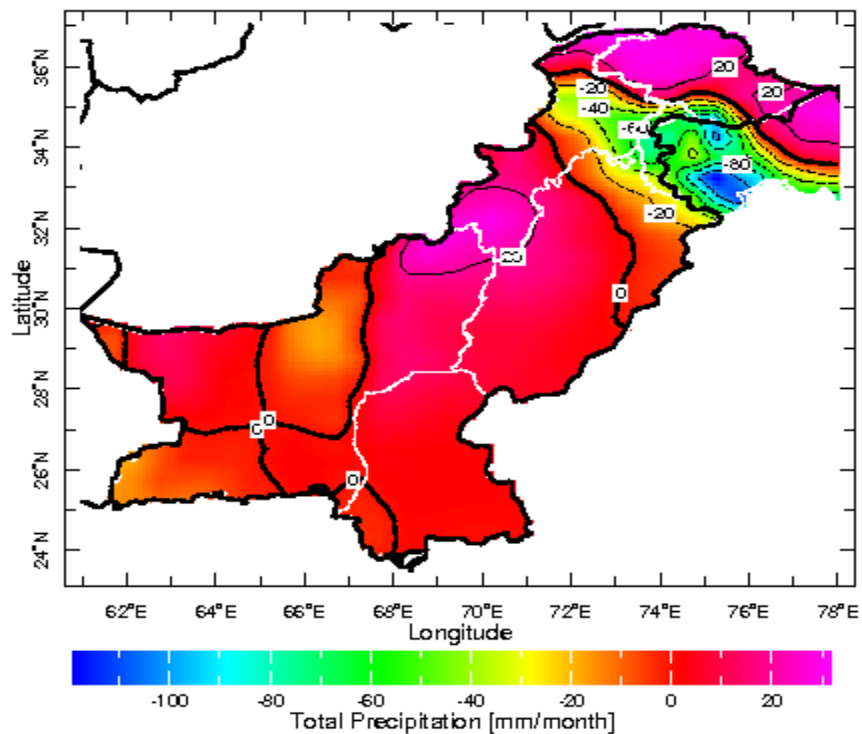
Note: It is ECHAM climate model prediction. The numbers of spell can be predicted from above graph. However, the exact data of start or end of spell can be varied and this can be in advance or delayed from the actual observation over the region.

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

Departure of rainfall from normal Dec-2014

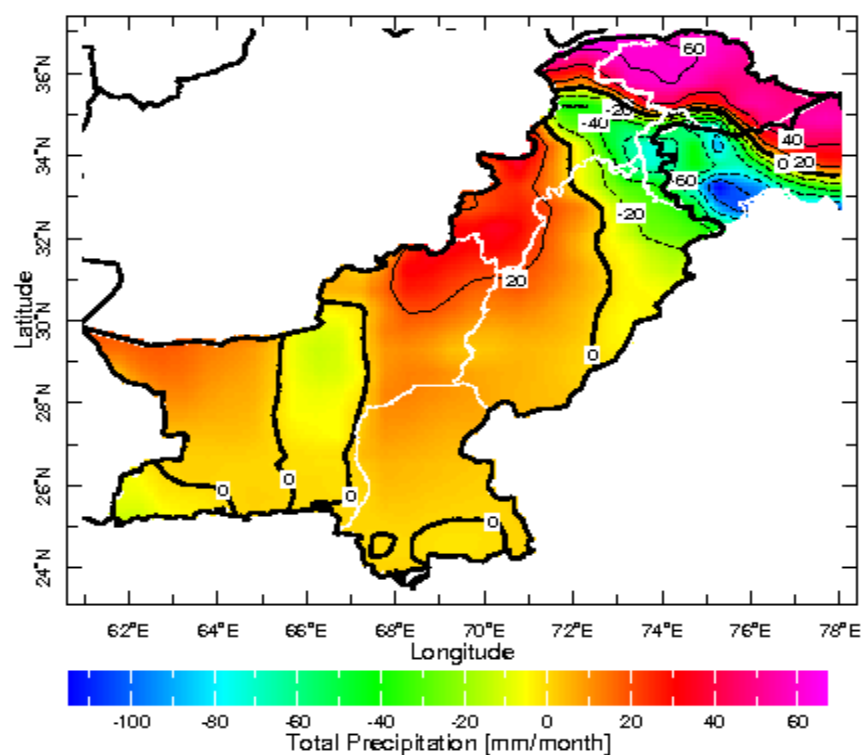


Departure of rainfall from normal Jan-2015

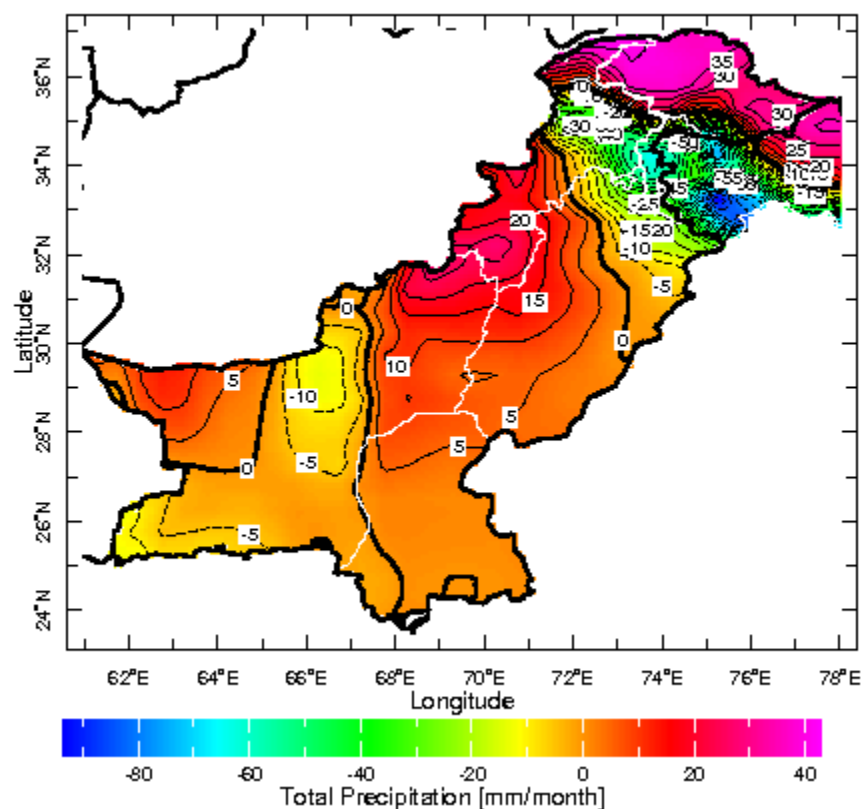


Seasonal weather outlook (Dec, 2014-Feb, 2015)

Departure of rainfall from normal Feb-2015

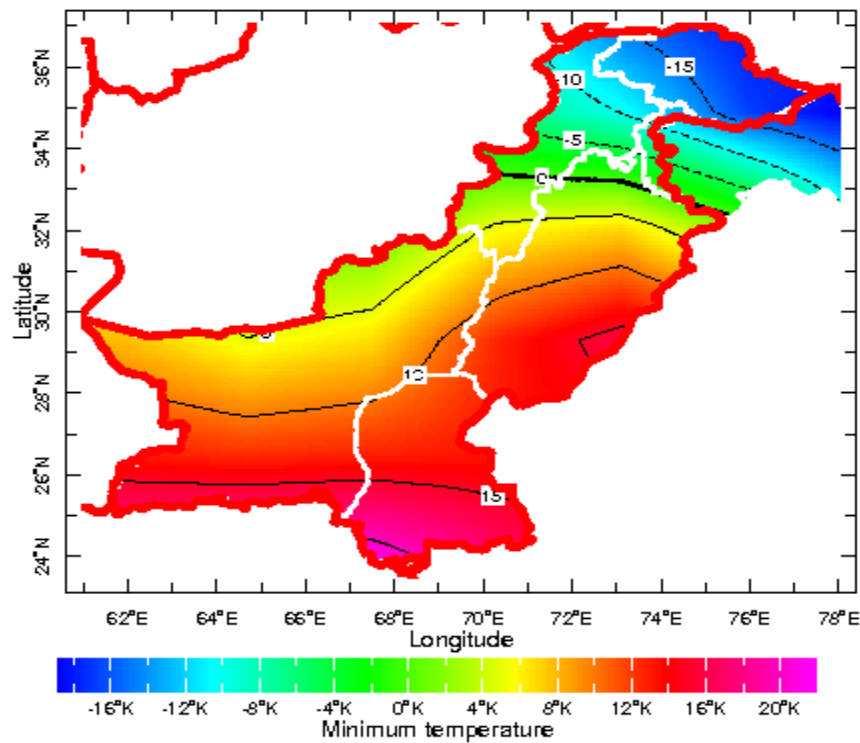


Departure of rainfall from normal (Dec,2014-Feb,2015)

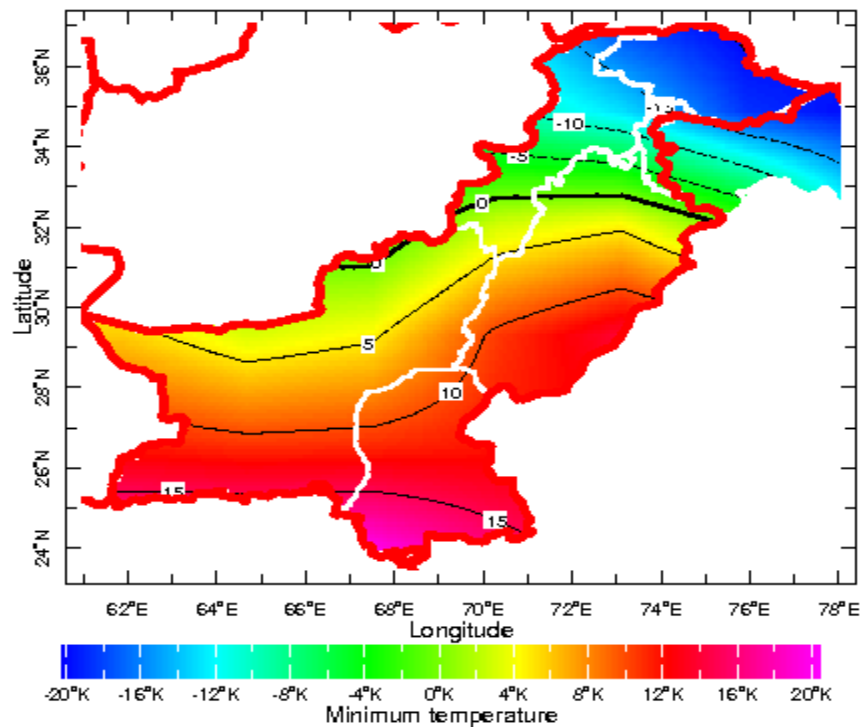


6. *Spatial distribution of expected minimum temperature*

Expected Minimum Temperature during Dec, 2014

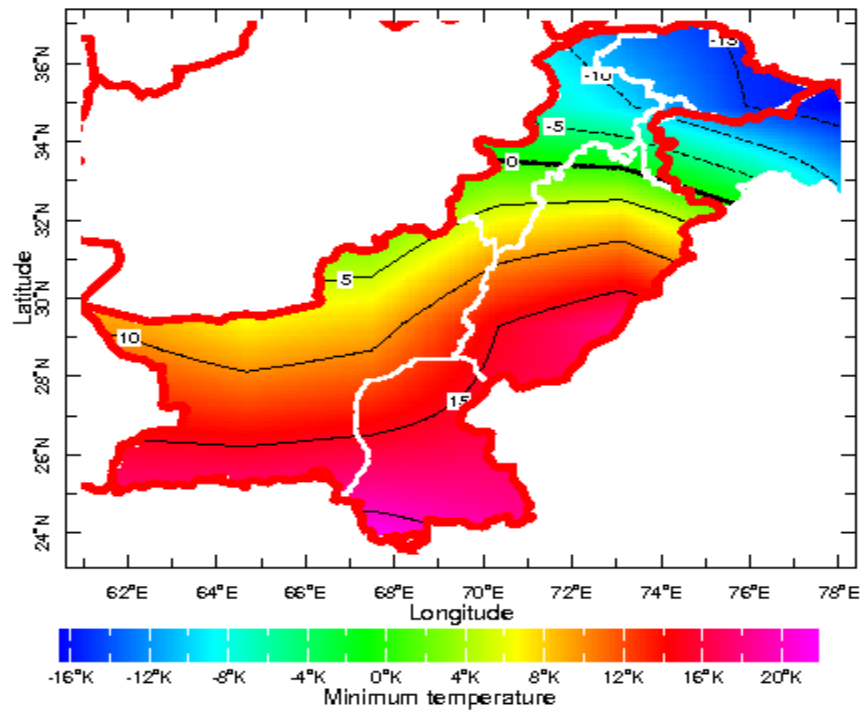


Expected Minimum Temperature during Jan, 2015



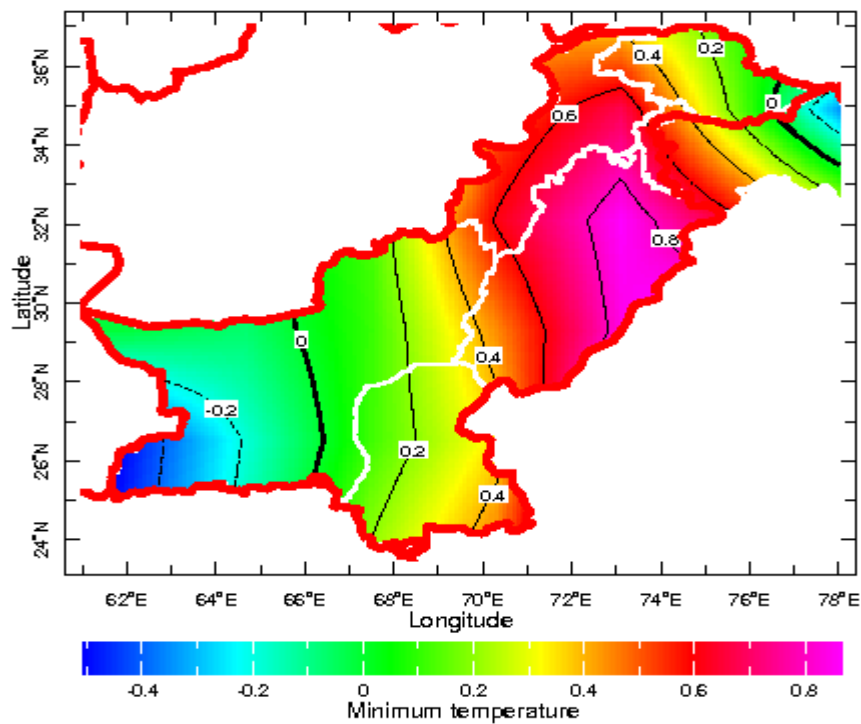
Seasonal weather outlook (Dec, 2014-Feb, 2015)

Expected Minimum Temperature during Feb, 2015



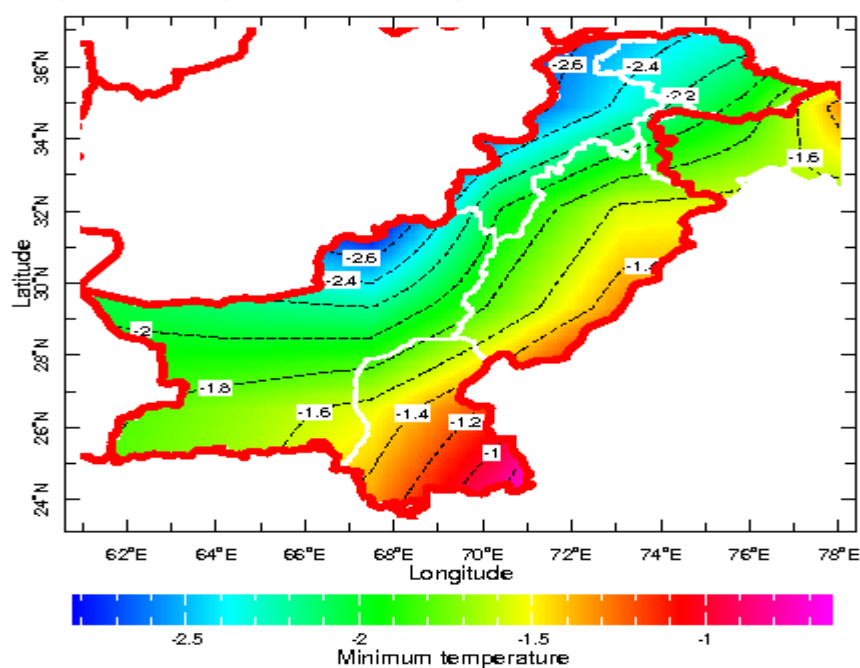
7. Departure of expected minimum temperature from normal

Expected Dep. of Min. Temp. from normal, Dec-2014

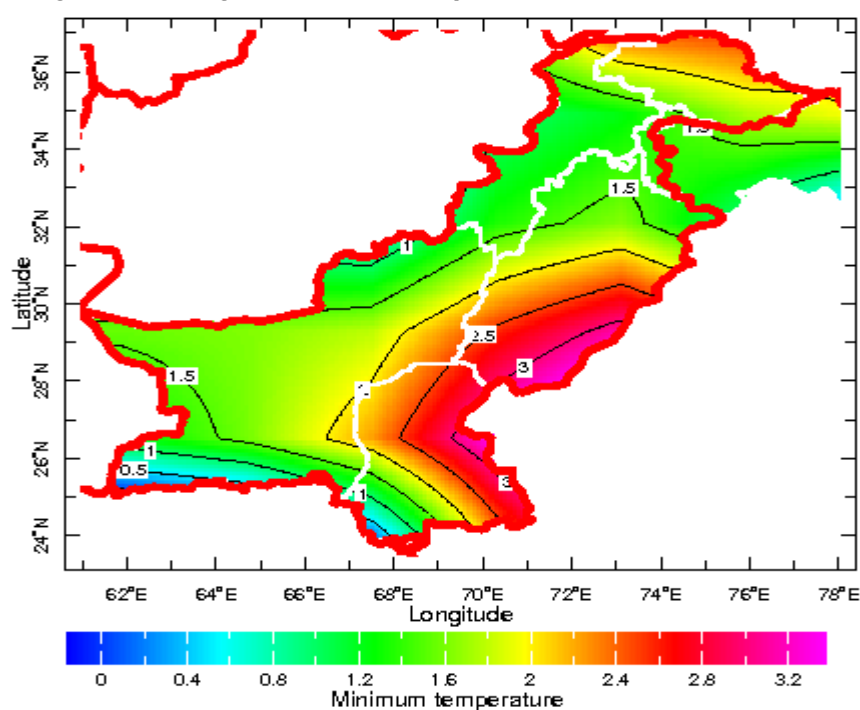


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Expected Dep. of Min. Temp. from normal, Jan-2015



Expected Dep. of Min. Temp. from normal, Feb-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. Lastest seasonal weather summay can be download from NAMC web site mentioned below: <http://namc.pmd.gov.pk/>