Institute of Meteorology ,
Hydrology and Environment, Mongolia

"2013-2014 winter outlook over Mongolia"

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National Agency for Meteorology and Environment Monitoring
(NAMEM)

The First Session of East Asian winter Climate Outlook Forum
(The 1st EASCOF)
4-6 November 2013

- [ ] Introduction
- [ ] Prediction of statistical models
- [ ] Prediction maps of other centers
- [ ] Winter climate review
- [ ] Winter outlook 2013-2014
- [ ] Summary

❏ **Introduction**

- ❏ Prediction of statistical models
- ❏ Prediction maps of other centers
- ❏ Winter climate review
- ❏ Winter outlook 2013-2014
- ❏ Summary

Monthly and seasonal prediction

❑ Synoptic method – since 1960s
❑ Statistical methods – since 1980s
- Lagged –correlation method –lead time: 6 month
- "Extreme" statistical model - lead time: 6 month
- Statistical downscaling of TCC, GCM lead time: 1 month
- Statistical downscaling of APCC, GCM lead time: 1-3 month

Monthly and seasonal prediction

❑ Lagged –correlation method–lead time: 6 months

Local Climate Model – includes the method of parceling out ascending and descending node from time series curve creating partial linear trend and estimating weighted population mean values.

Monthly and seasonal prediction

❑ "Extreme" statistical model - lead time: 6 month

Extreme model is developed by using discriminate analysis method, classifying the field of monthly mean temperature anomaly into 3 categories such as 'extreme warm', 'extreme cold' and 'extreme near' and field of precipitation anomaly such as 'extreme precipitation', 'extreme light precipitation', 'near average'. The model output shows the expected probability of the three categories for temperature and precipitation.

Monthly and seasonal prediction

- ❑ Statistical downscaling of TCC, GCM –lead time: 1 month

- ❑ Statistical downscaling of APCC, GCM - lead time: 1-3 months

Monthly and seasonal prediction
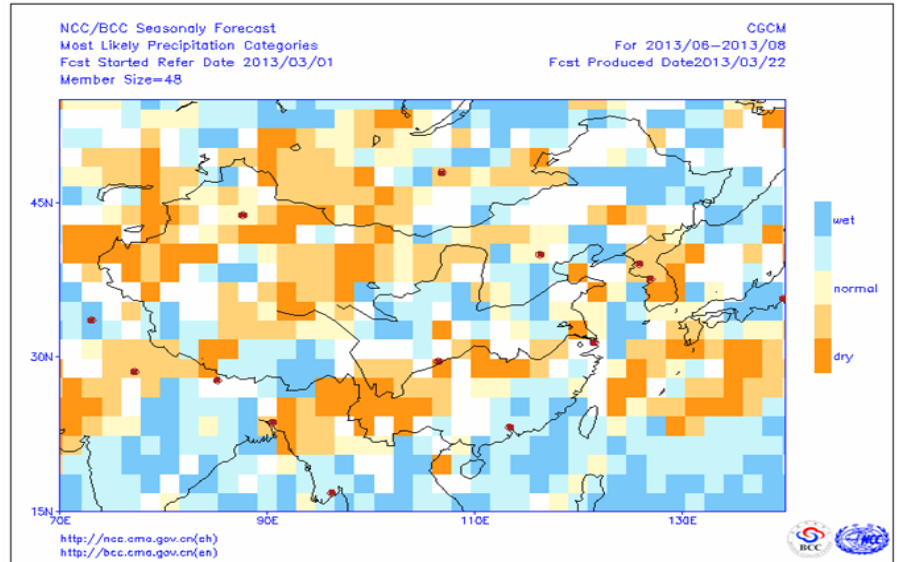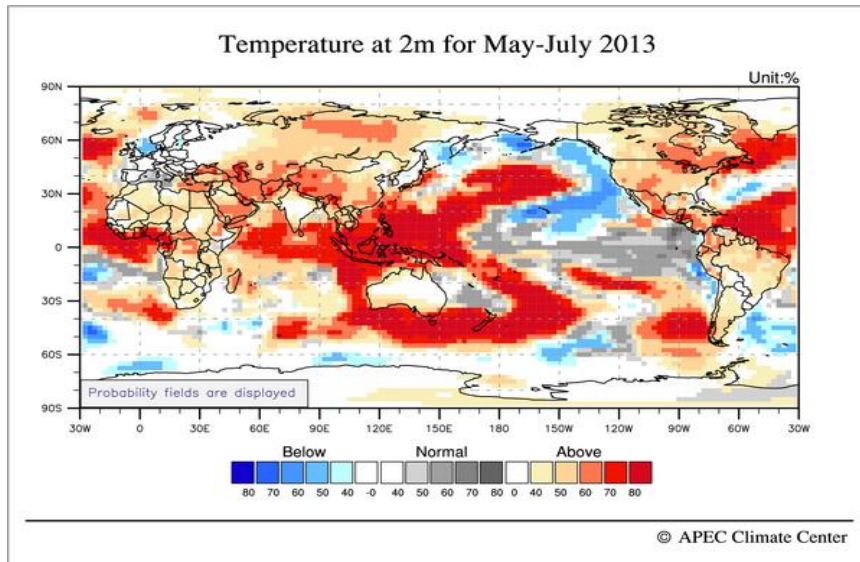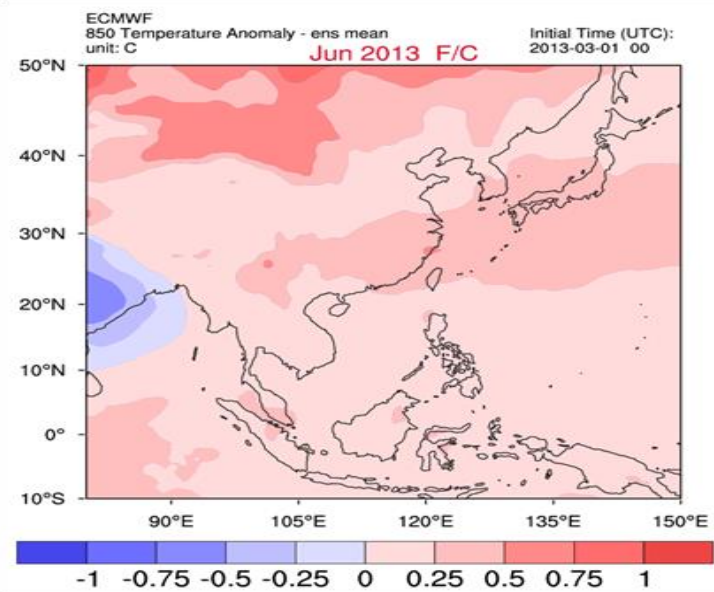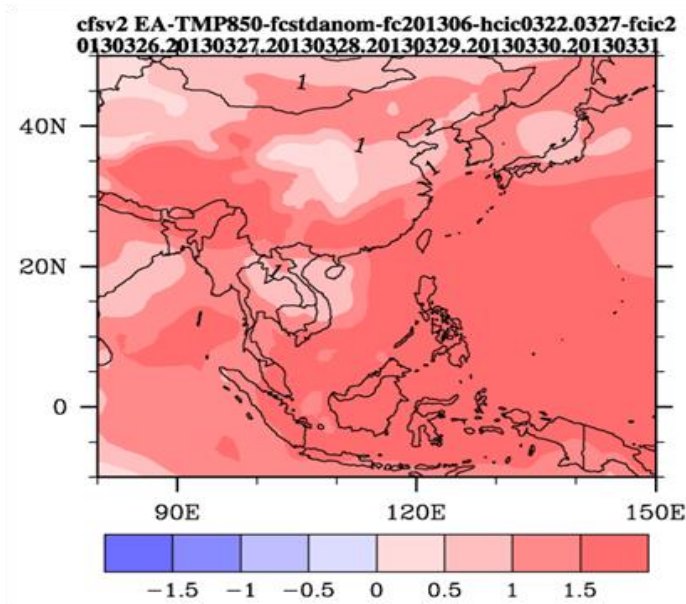
Monthly and seasonal prediction

Monthly forecast
20-23th every month

Seasonal outlook

2 times a year /Summer outlook in March
Winter outlook in August /

Monthly and seasonal prediction

69 stations which represent the mountainous, steppe and Gobi areas
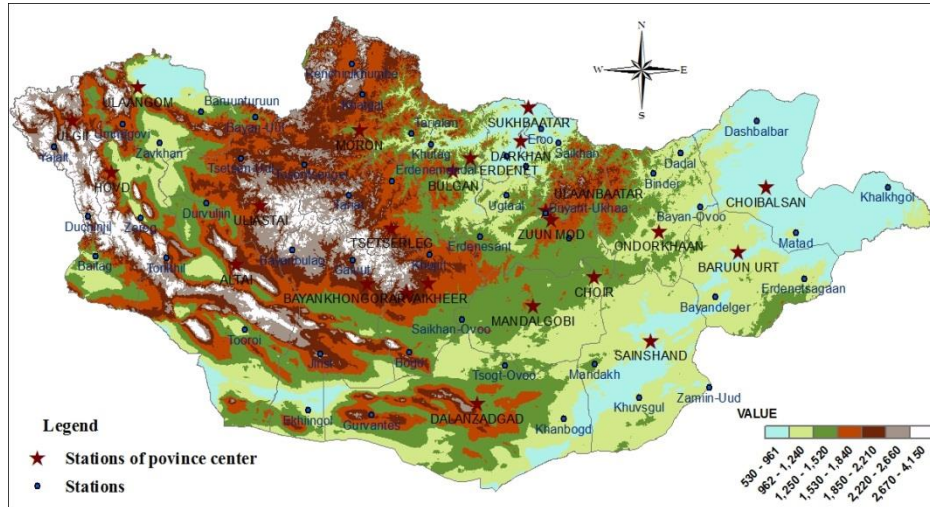
Climatology norm: 1981-2010

	Temperature /°C/	Precipitation /%/
Above normal	>+1	>80
Near normal	-1<+1	50..80
Below normal	<-1	<50

- Introduction
- **Prediction of statistical models**
- Prediction maps of other centers
- Winter climate review
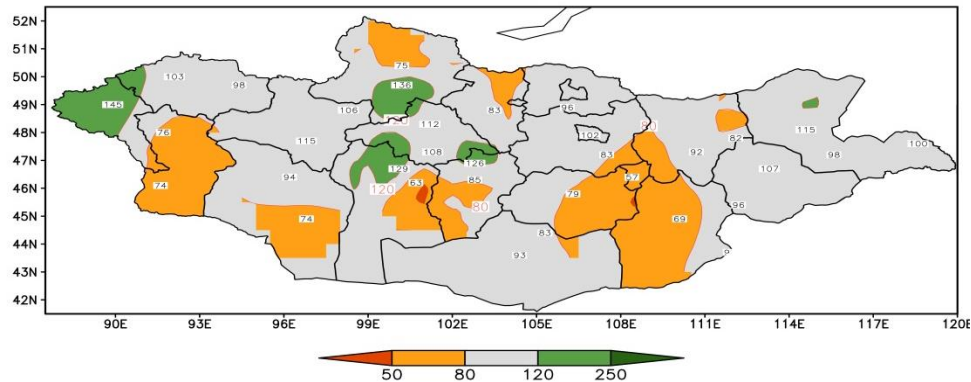- Winter outlook 2013-2014
- Summary

Local Climate Model - Temperature
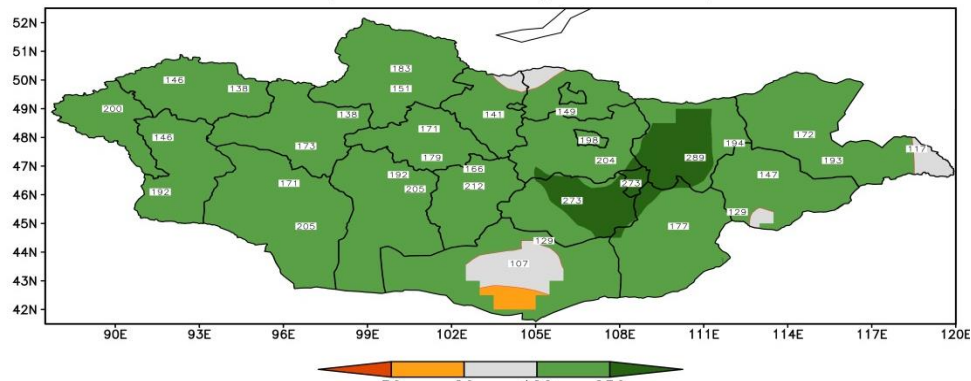
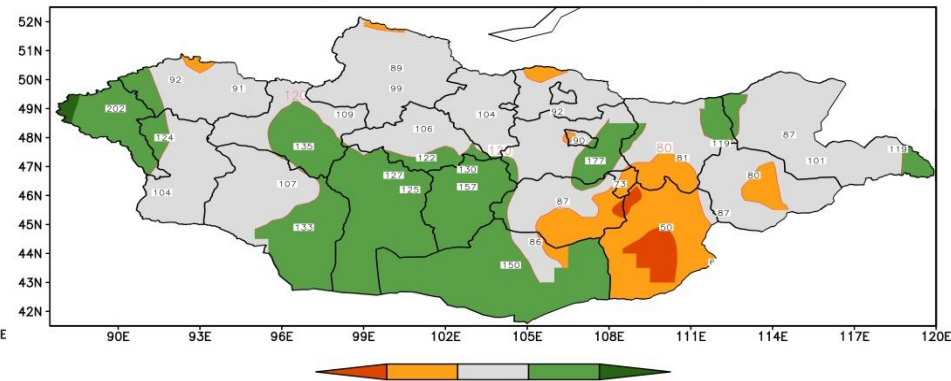# Local Climate Model - Precipitation
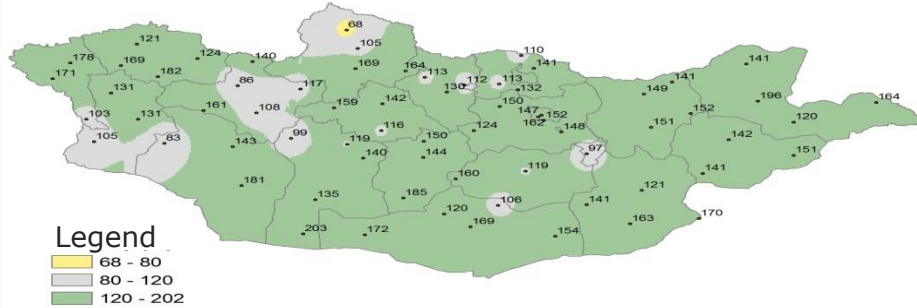
Precipitation anomaly for November

Precipitation anomaly for December
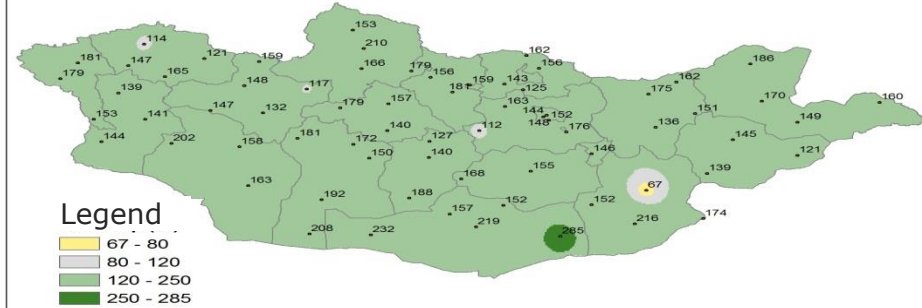
Precipitation anomaly for January
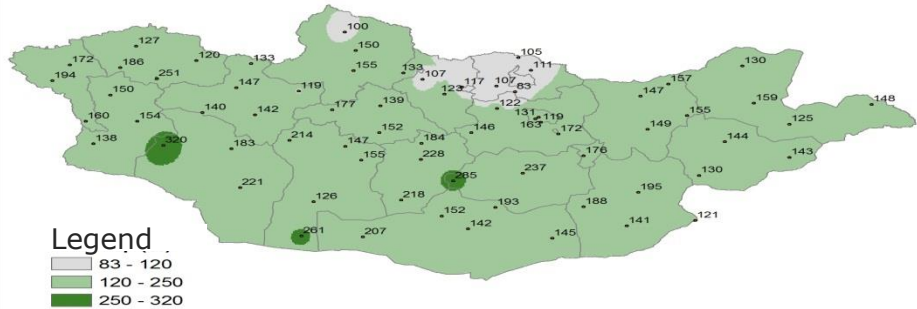
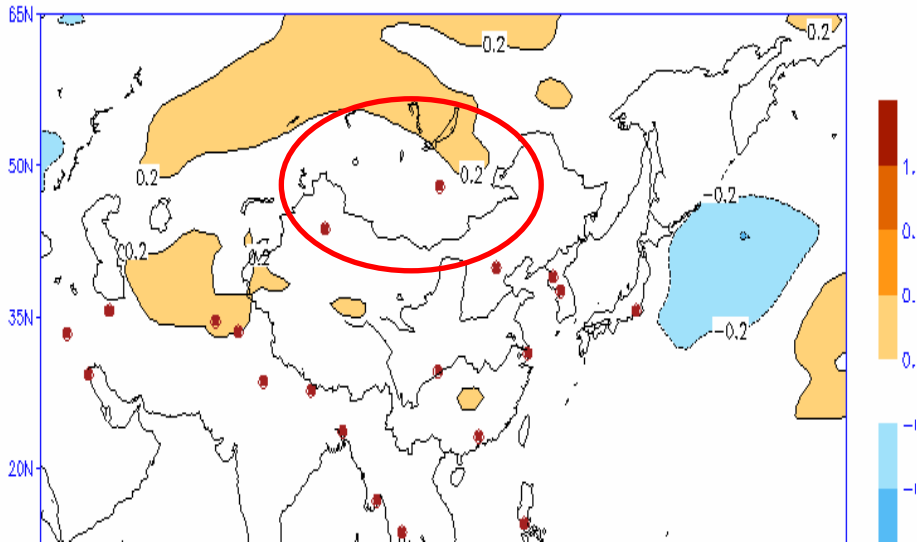Precipitation anomaly for February
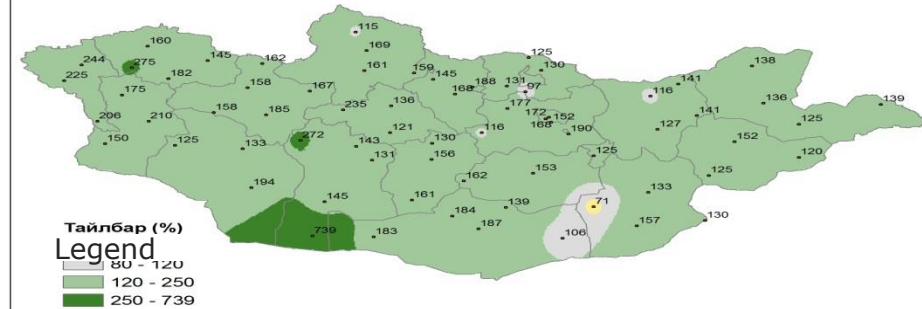
Precipitation anomaly for March
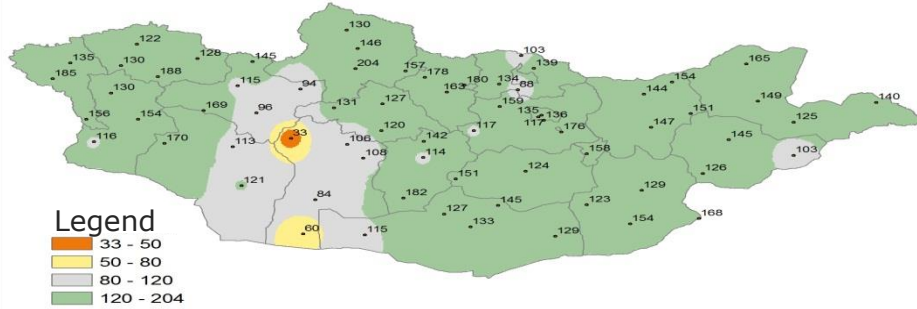
Extreme Model - Temperature

Temperature anomaly for November
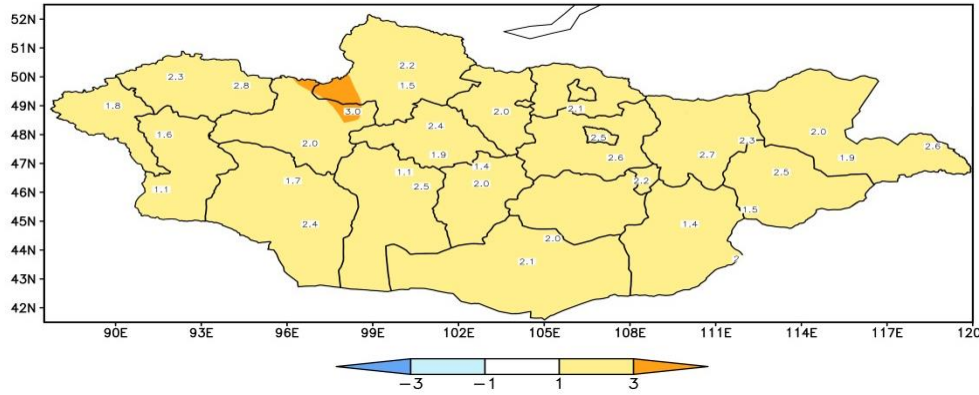
Temperature anomaly for December
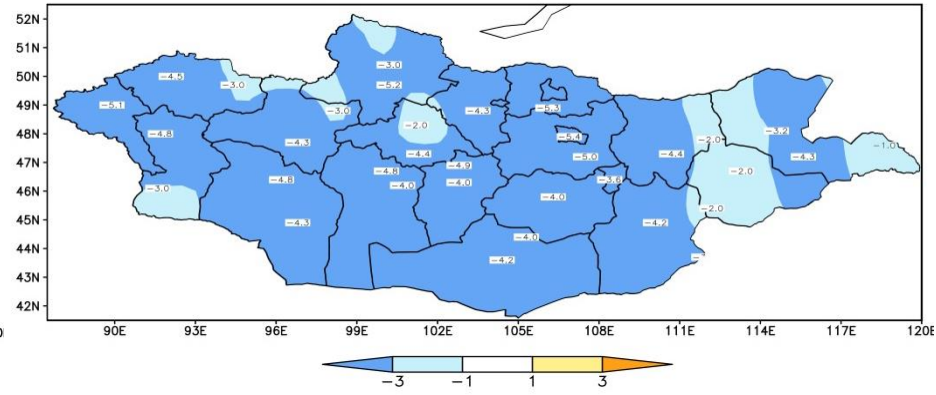
Temperature anomaly for January
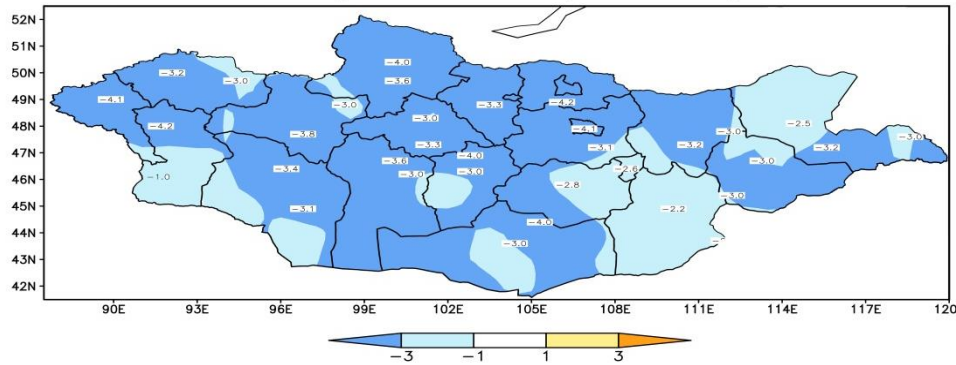
Temperature anomaly for February
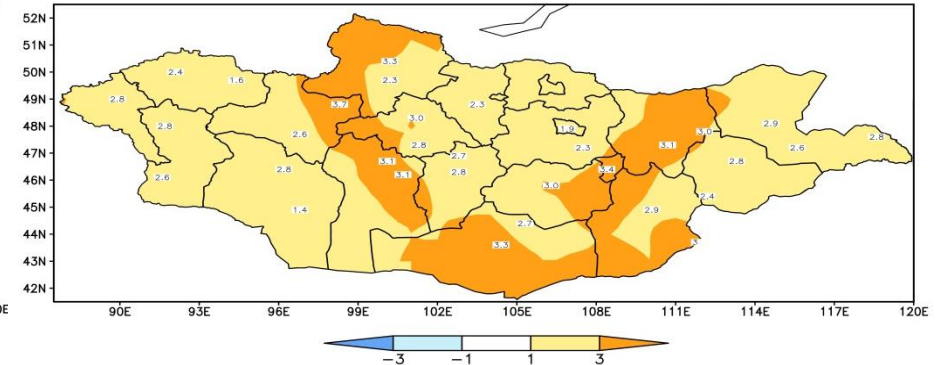
Temperature anomaly for March
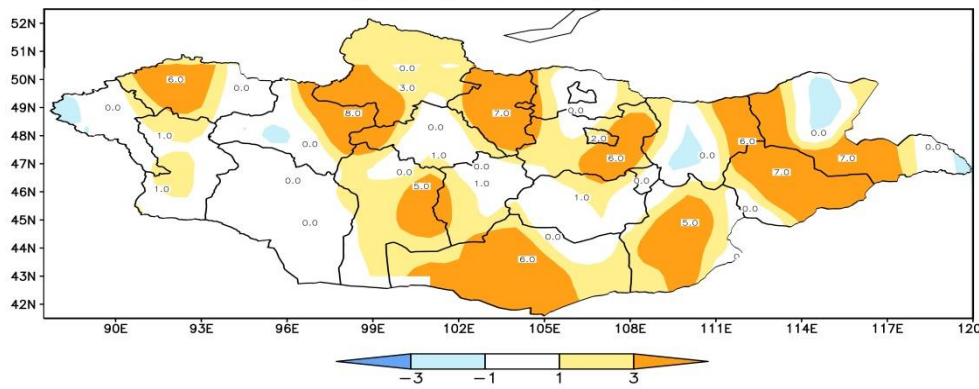
Extreme Model - Precipitation

Precipitation anomaly for November

Precipitation anomaly for December
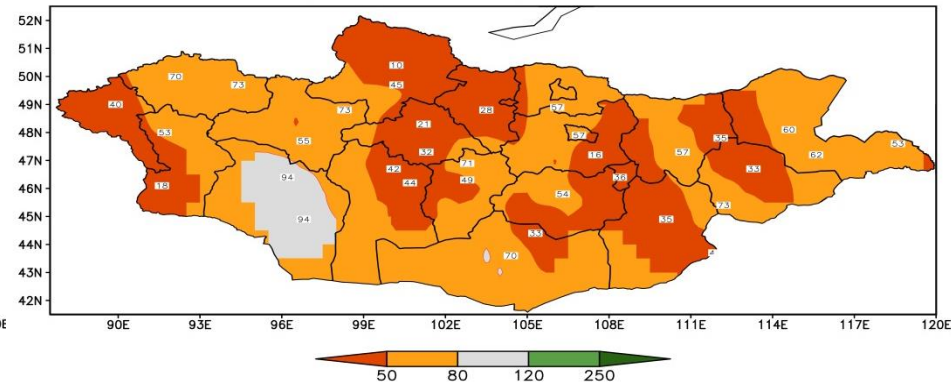
Precipitation anomaly for January

Precipitation anomaly for February

Precipitation anomaly for March
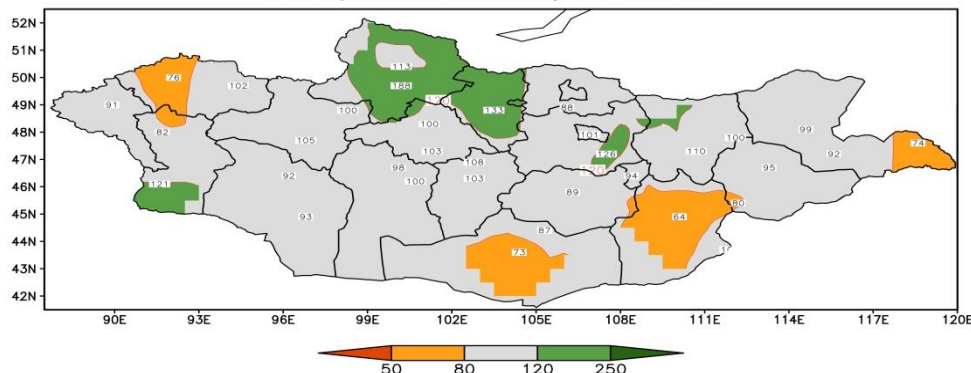
- ❑ Introduction
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- ❑ **Prediction maps of other centers**
- ❑ Winter climate review
- ❑ Winter outlook 2013-2014
- ❑ Summary

CMA- Temperature

Ensemble Mean Surf. Temp. Anomaly
Fcst Started Refer Date 2013/08/01
Member Size=48

September - November

Ensemble Mean Surf. Temp. Anomaly
Fcst Started Refer Date 2013/08/01
Member Size=48
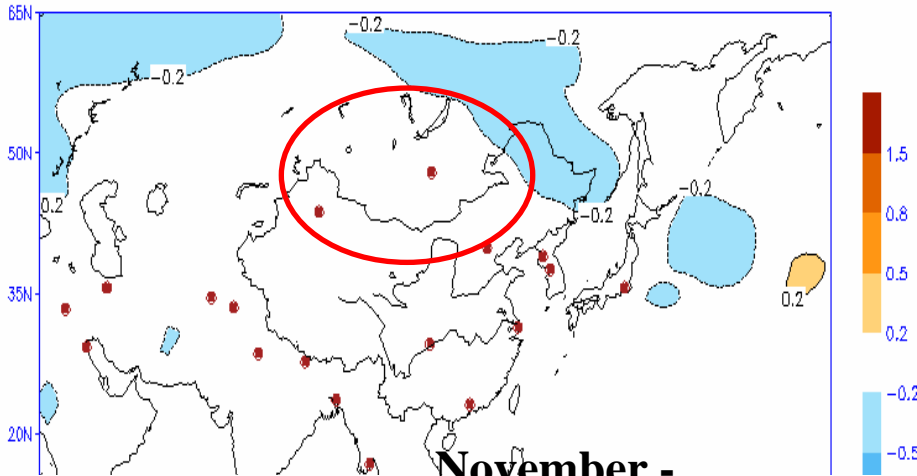
October - December

Ensemble Mean Surf. Temp. Anomaly
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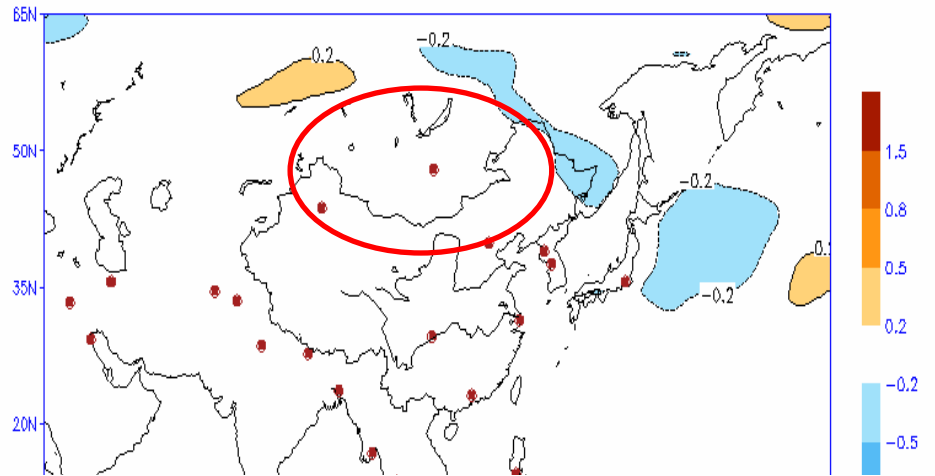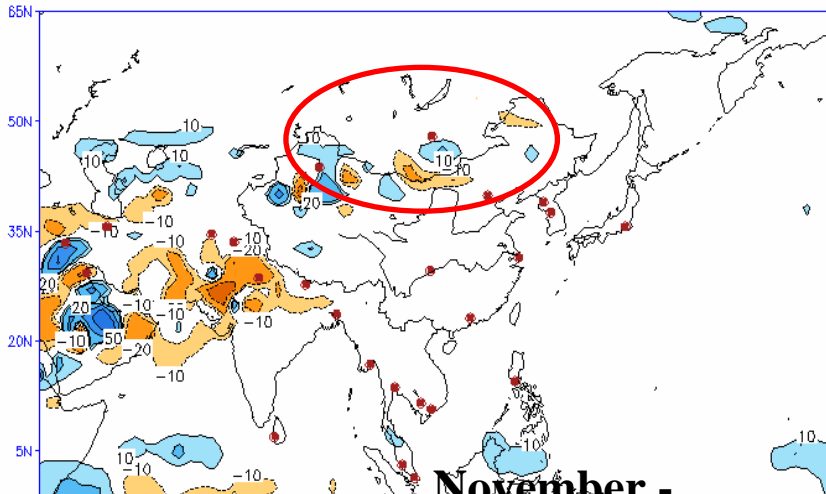
November - January

Ensemble Mean Surf. Temp. Anomaly
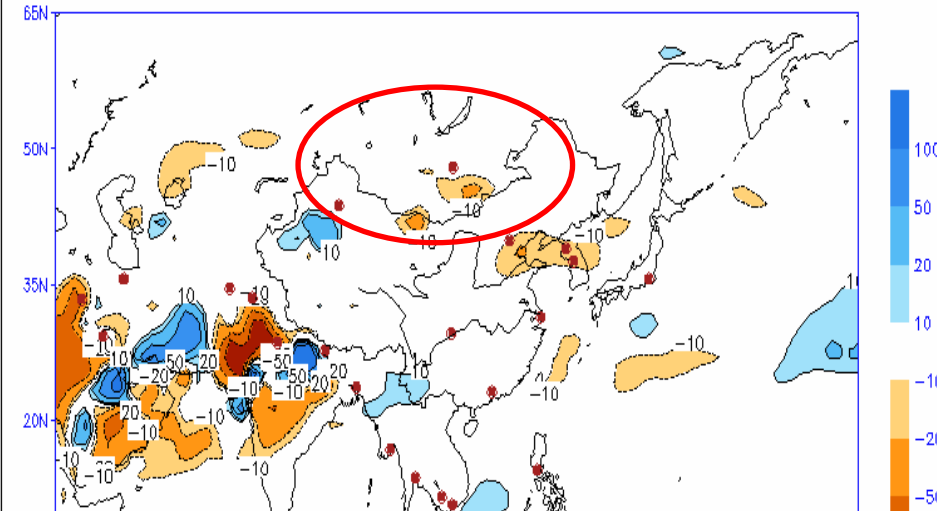Fcst Started Refer Date 2013/08/01
Member Size=48

December - February

CMA- Precipitation

September - November

October - December

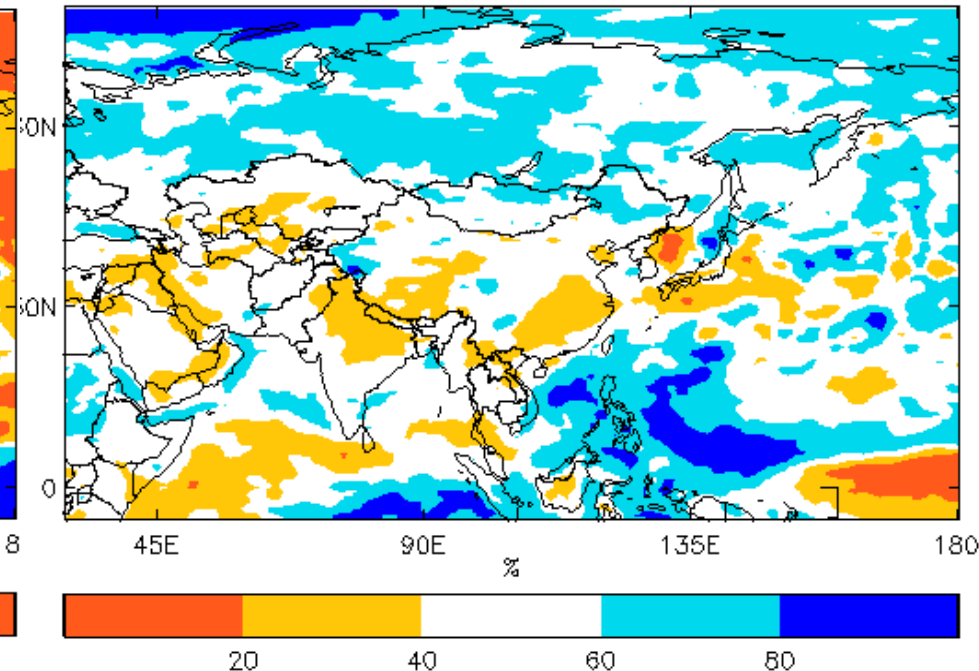November - January

December - February

METOFFICE

Temperature November - January

Probability of above average 2m temperature Nov/Dec/Jan
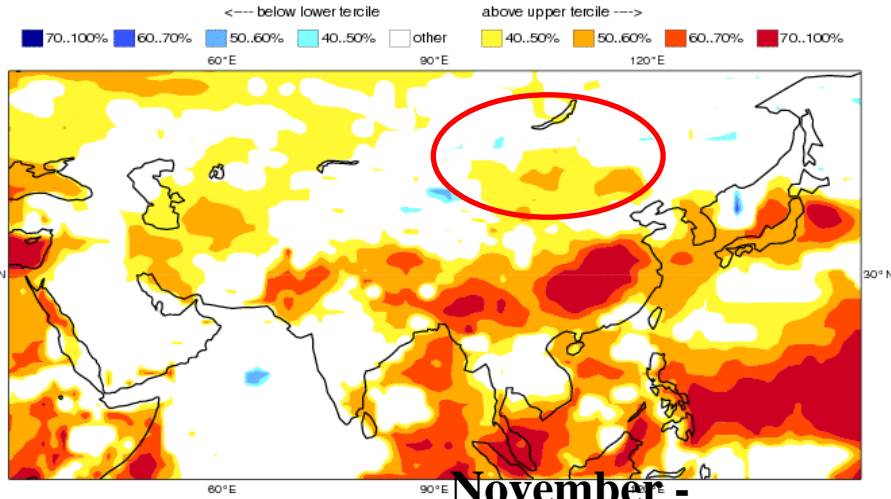Issued August 2013
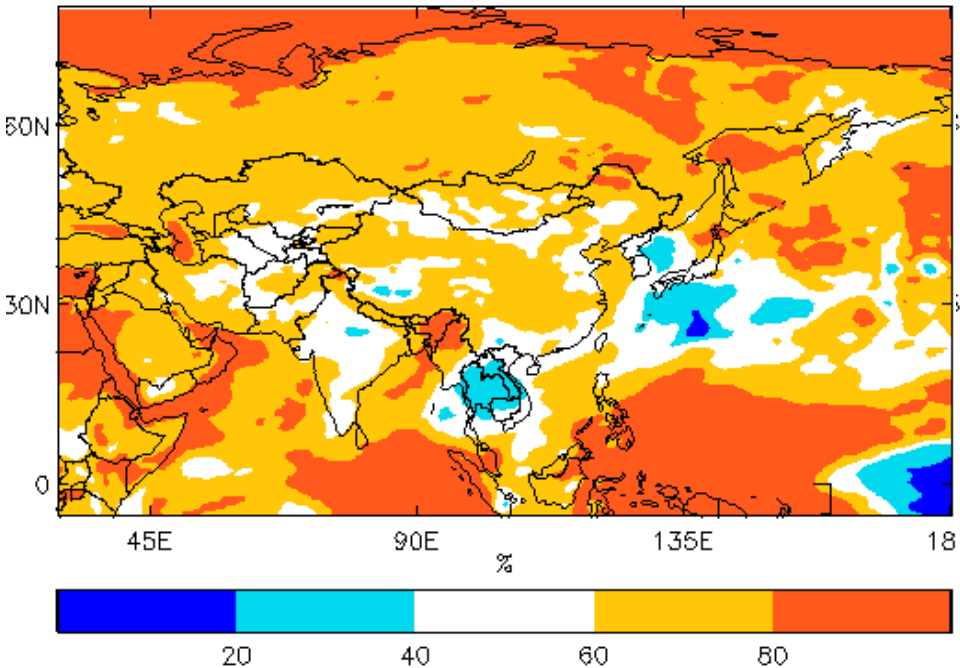
Precipitation November - January

Probability of above average precipitation Nov/Dec/Jan
Issued August 2013
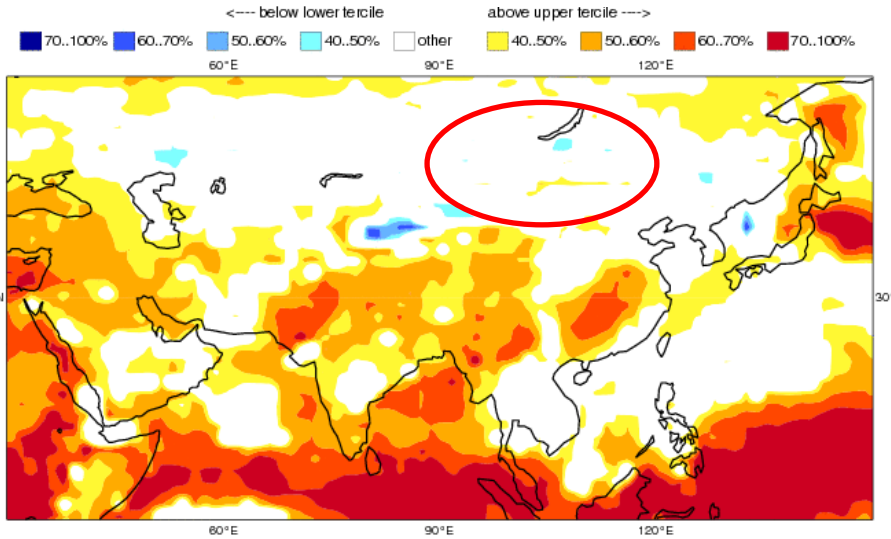
ECMWF- Temperature

September - November

October - December

November - January

December - February

ECMWF- Precipitation

September - November

October - December

November - January

December - February

NCEP- Temperature

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Winter climate review

Average temperature of September - November

$y = -1E-05x^3 + 0.0011x^2 - 0.0036x - 0.256$

Precipitation amount of September to November

Average temperature of December - February

$y = 6E-07x^4 - 0.0002x^3 + 0.0075x^2 - 0.0894x + 0.2662$

Precipitation amount of December - February

$y = -0.0044x^3 + 0.3134x^2 - 5.0515x + 99.289$
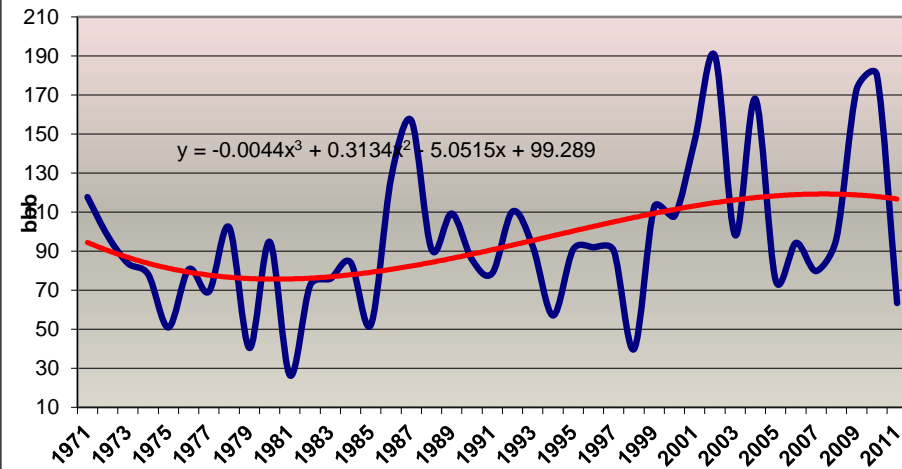
¥69 stations average of 1971-2012 years¥
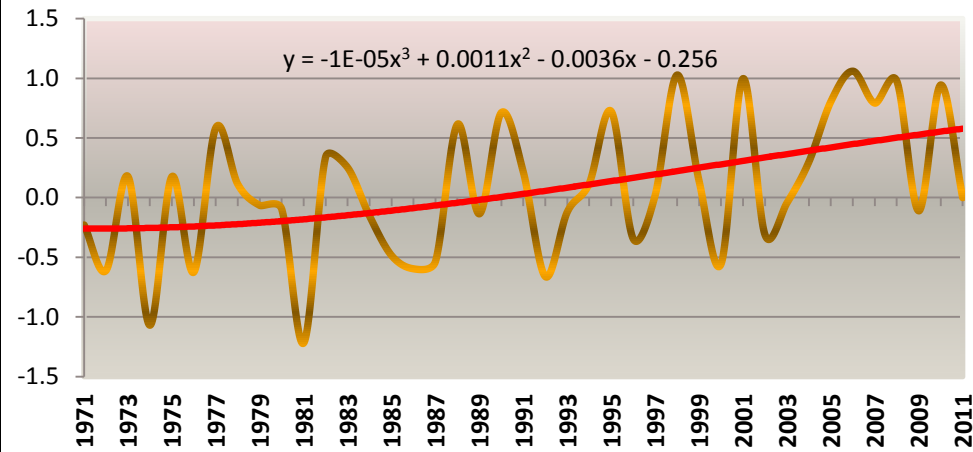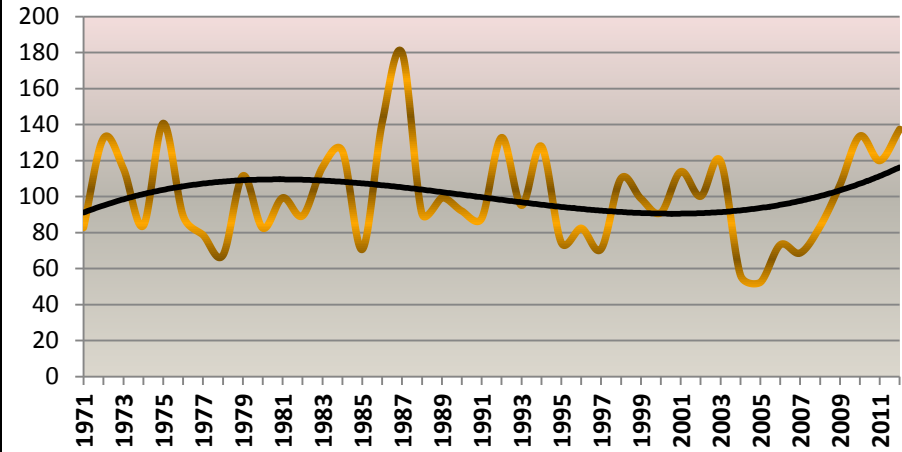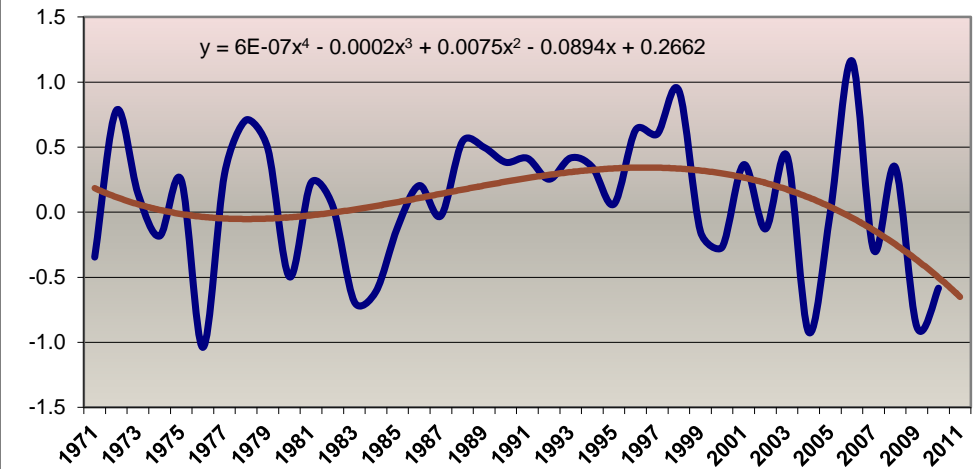
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Temperature – winter 2013-2014

Figure 3. Air temperature forecast, November
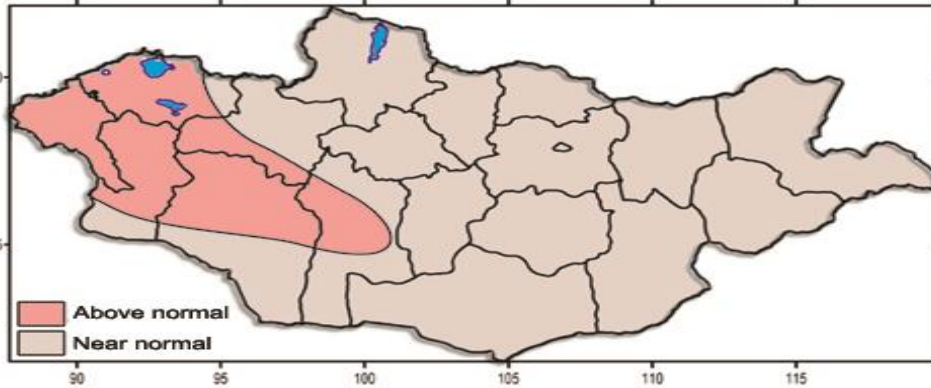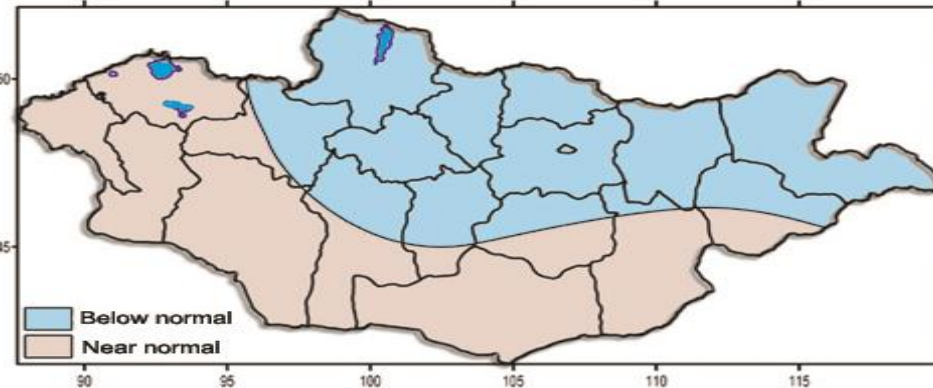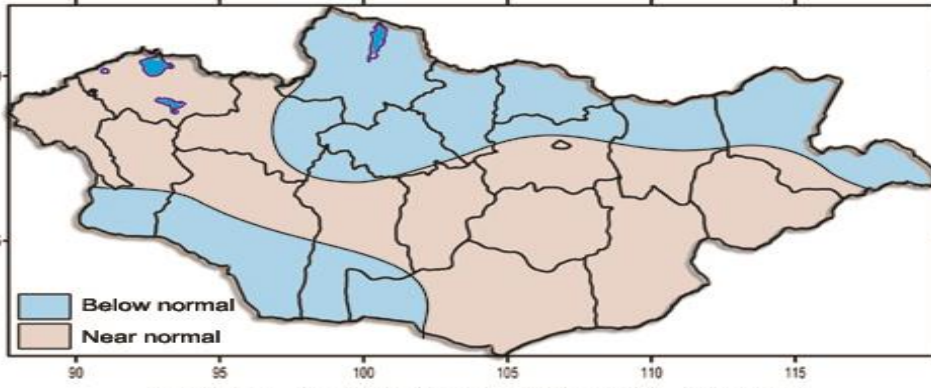
Figure 5. Air temperature forecast, December
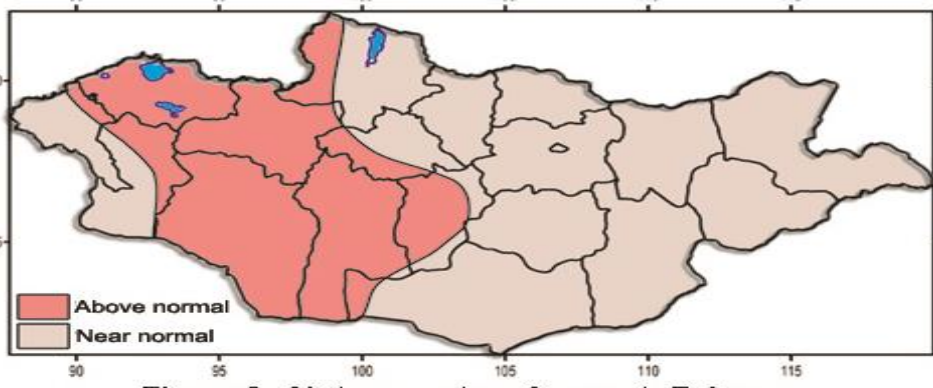
Figure 7. Air temperature forecast, January

Figure 9. Air temperature forecast, February

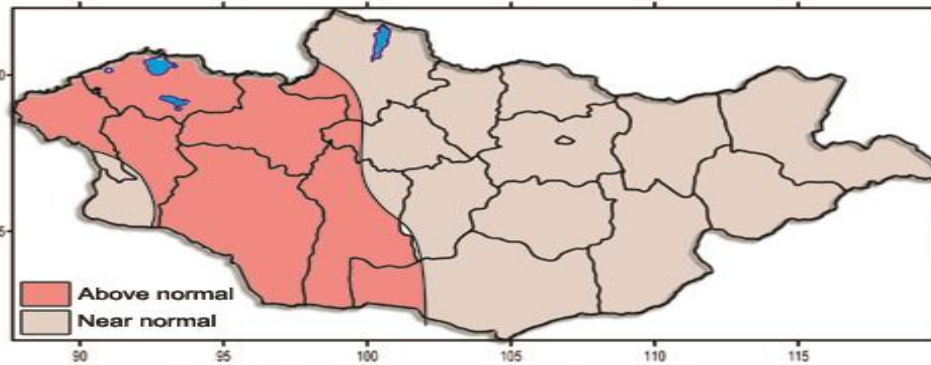Figure 11. Air temperature forecast, March

Above normal
Near normal
Below normal
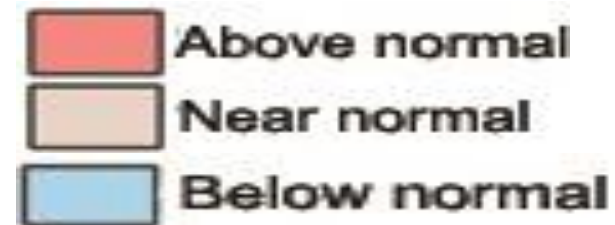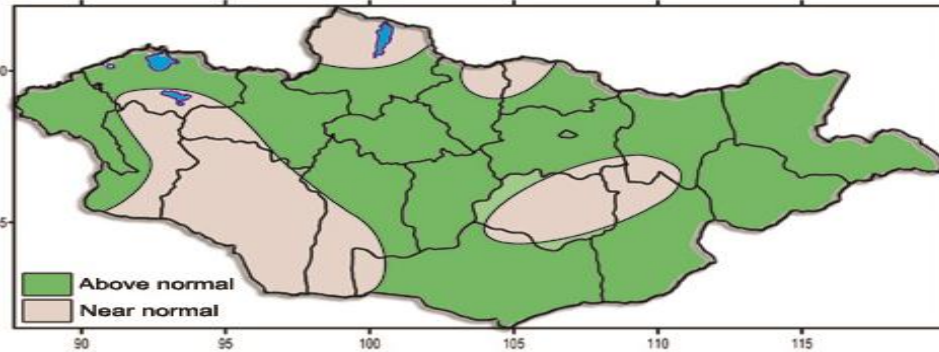
Precipitation – winter 2013-2014

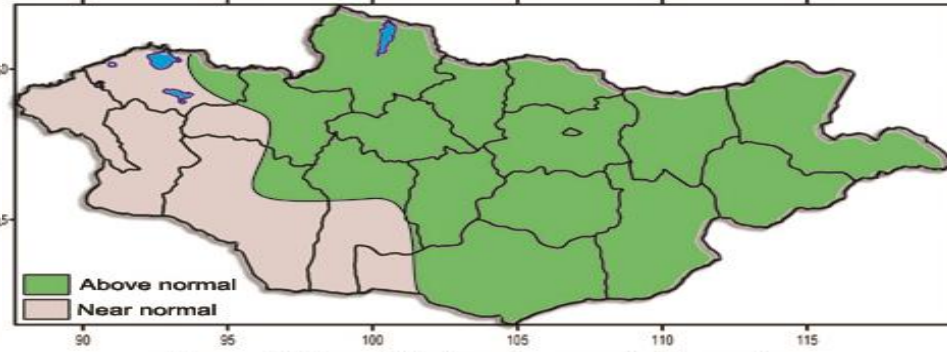Figure 4. Precipitation forecast, November
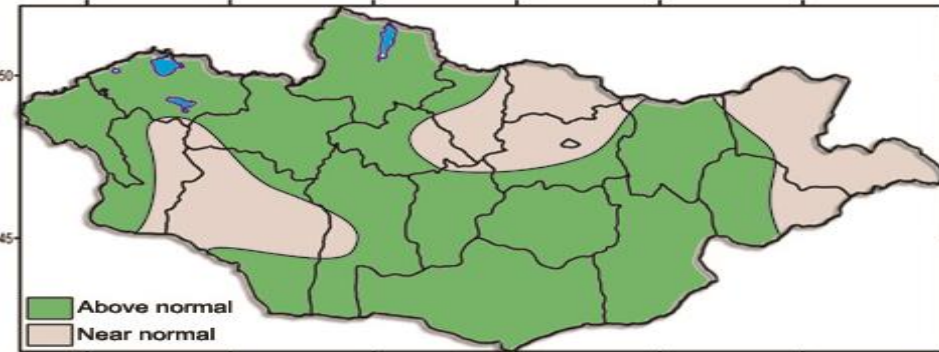
Figure 6. Precipitation forecast, December

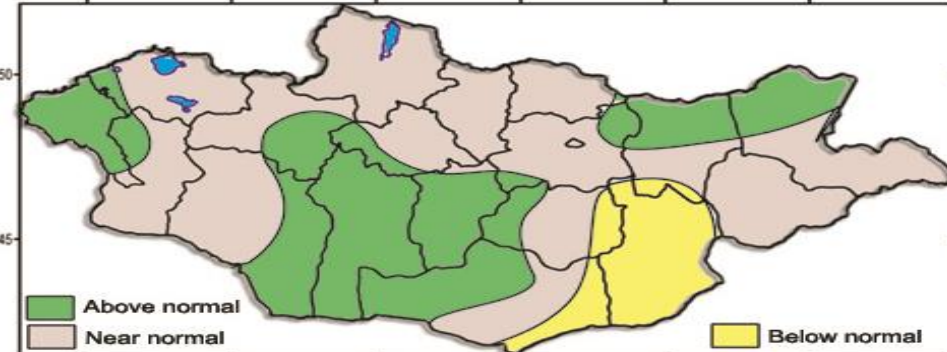Figure 8. Precipitation forecast, January

Figure 10. Precipitation forecast, February

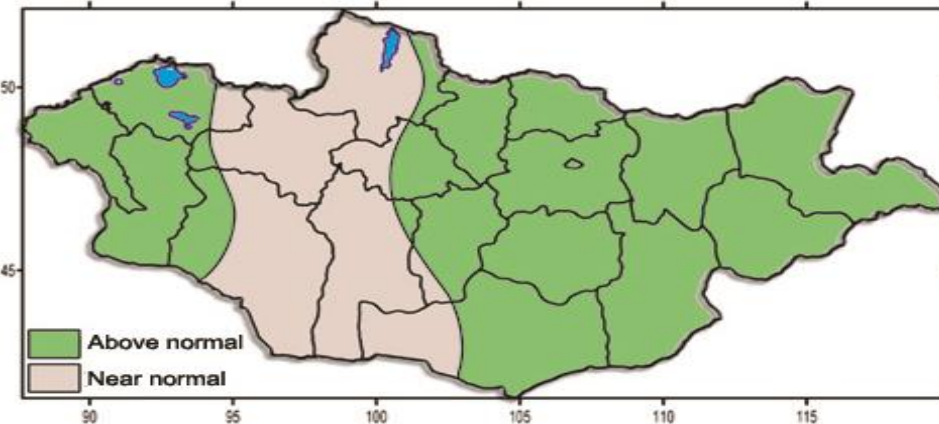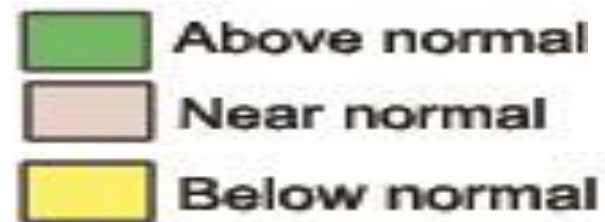Figure 12. Precipitation forecast, March

Above normal

Near normal

Below normal

Summary

❑ In recent years, winter temperature was less than climate, while precipitation was above normal.

❑ In the coming winter temperature would be expected colder than climate in December – January, near normal in February – March and precipitation would be expected above normal.
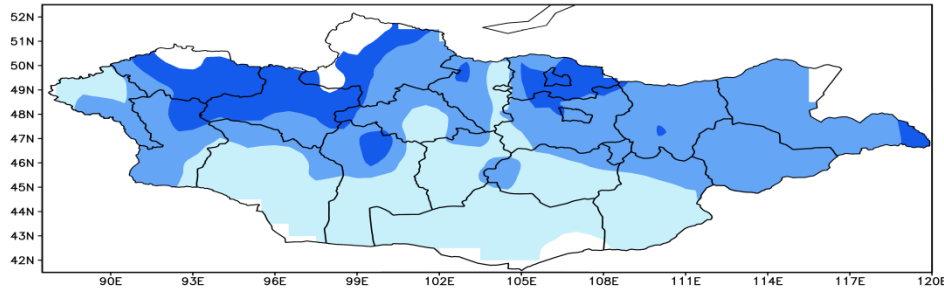
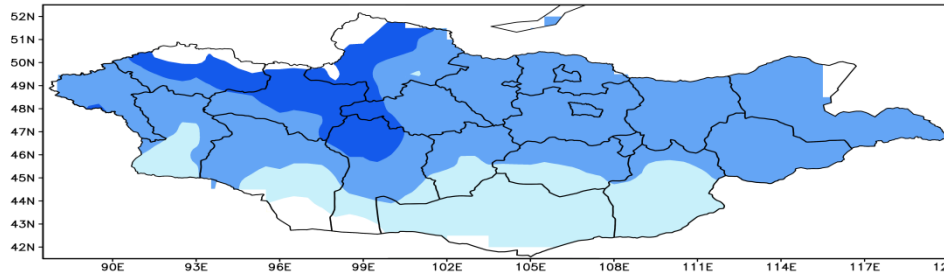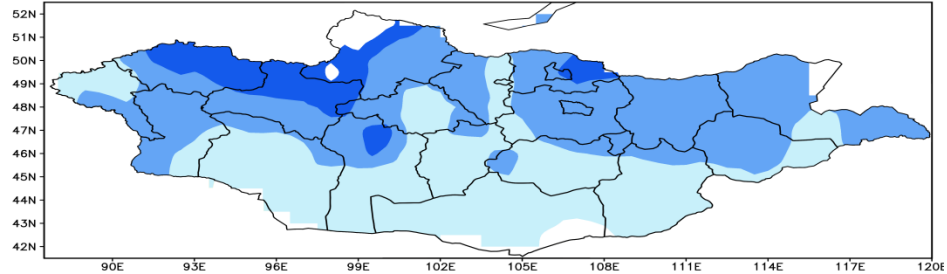# THANK YOU FOR YOUR ATTENTION

NORM - Temperature

Temperature 11
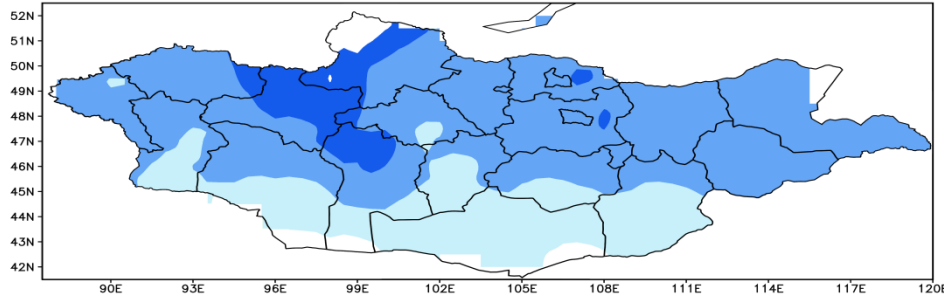
Temperature 12

Temperature 01

Temperature 02

Temperature 03

GrADS: COLA/IGES
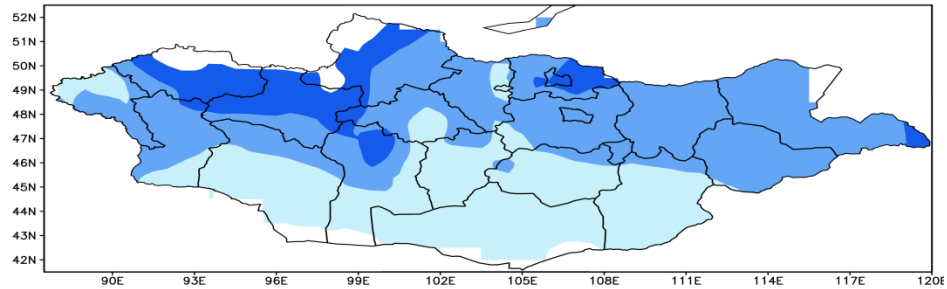
1981-2010

NORM - Precipitation
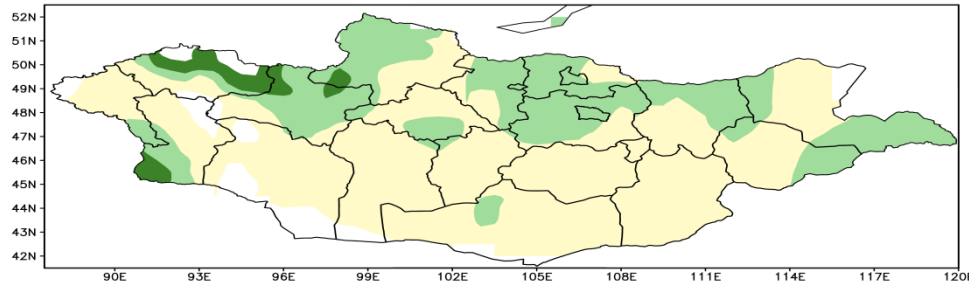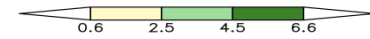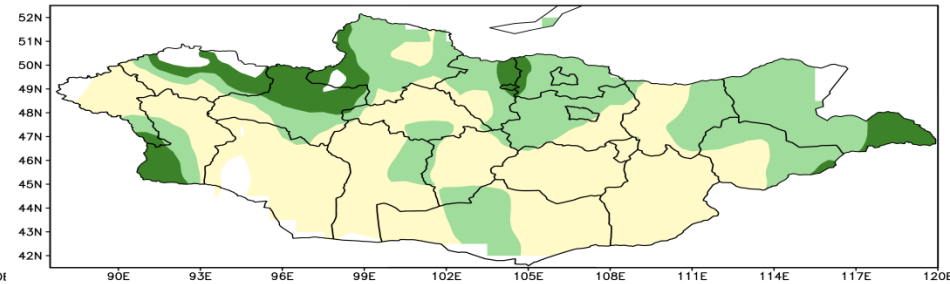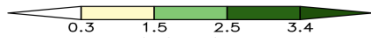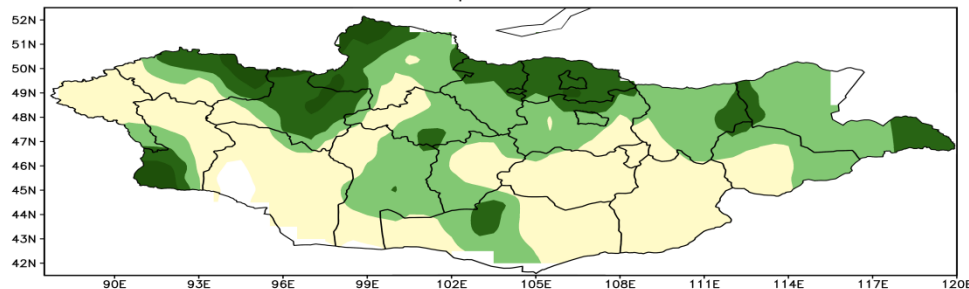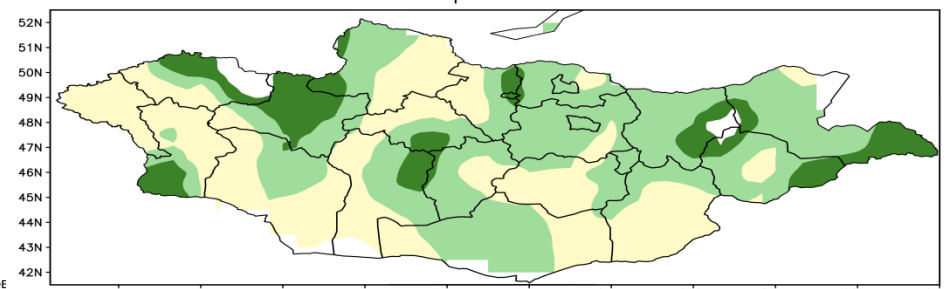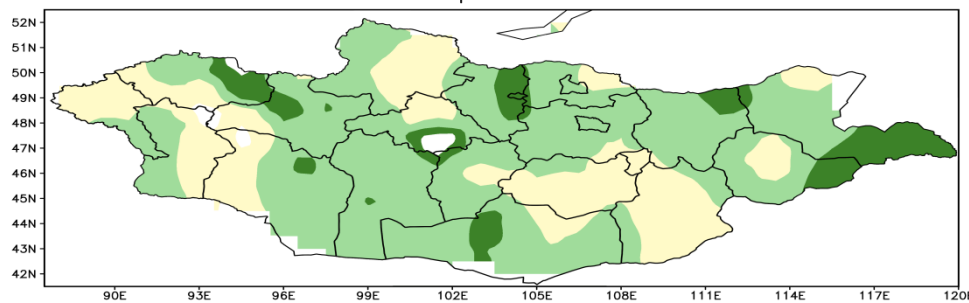
1981-2010

JMA - November

Ensemble forecast (3rd month : NOV)

Z500 (FORECAST) from 2013 8 9 0 kt=2016 [m]

Z500 (SPREAD) from 2013 8 9 0 kt=2016 [m]

T850 (FORECAST) from 2013 8 9 0 kt=2016 [C]

T850 (SPREAD) from 2013 8 9 0 kt=2016 [C]

KMA – September - November

Nov

SON

IRI
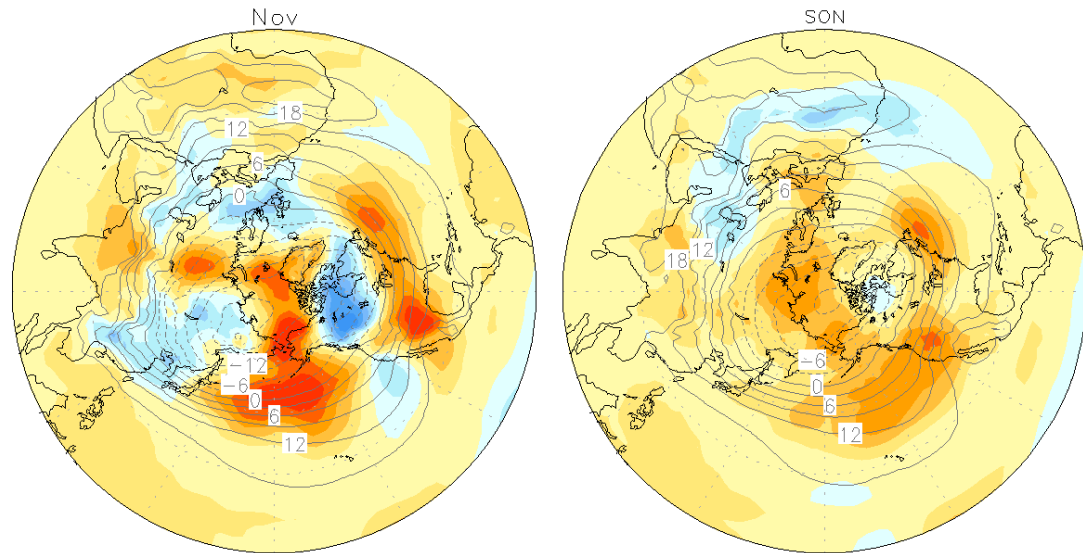
IRI Multi-Model Probability Forecast for Temperature
for September-October-November 2013, Issued August 2013
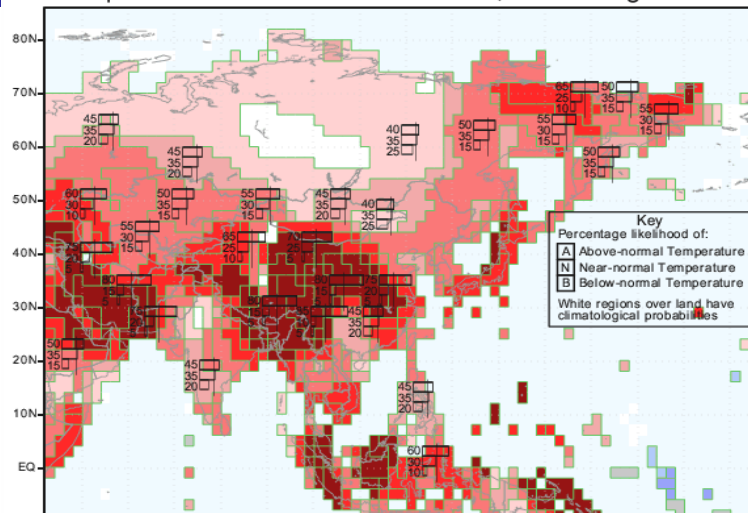
IRI Multi-Model Probability Forecast for Precipitation
for September-October-November 2013, Issued August 2013

IRI Multi-Model Probability Forecast for Temperature
for October-November-December 2013, Issued August 2013

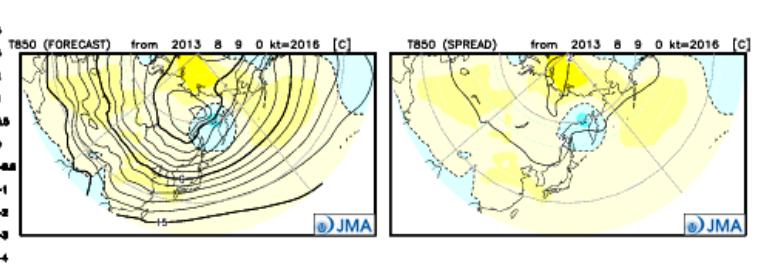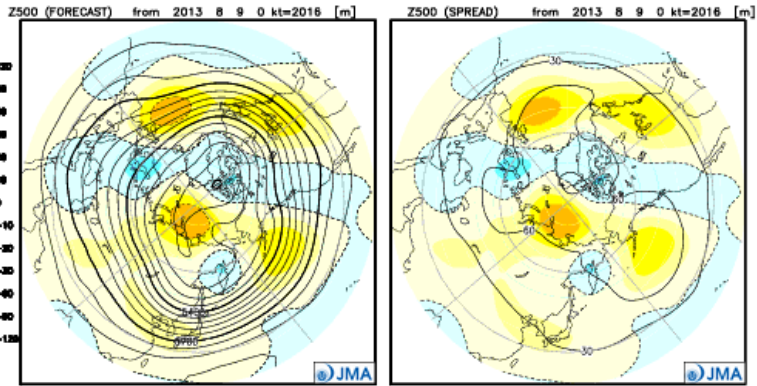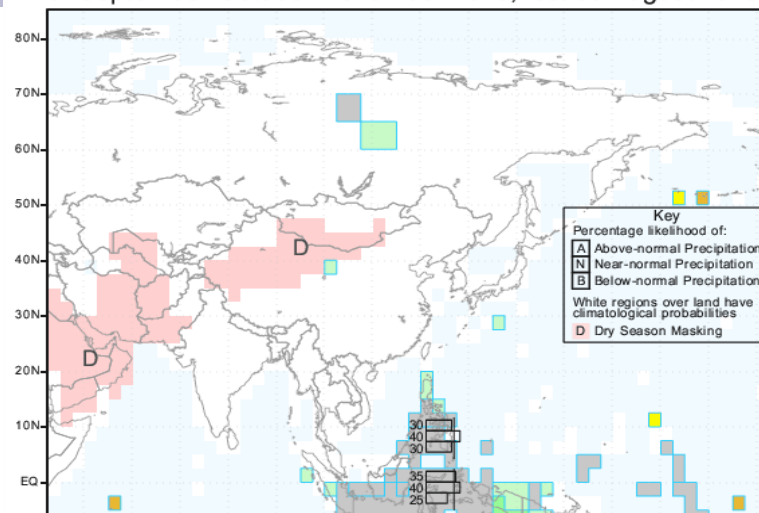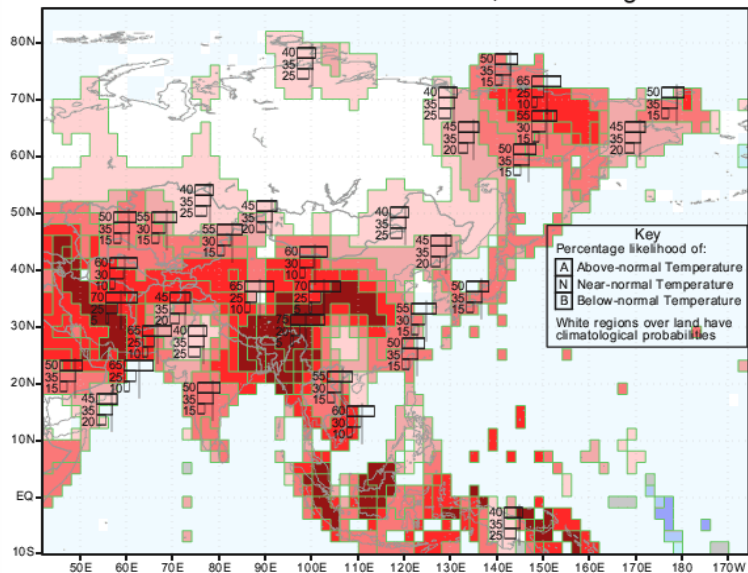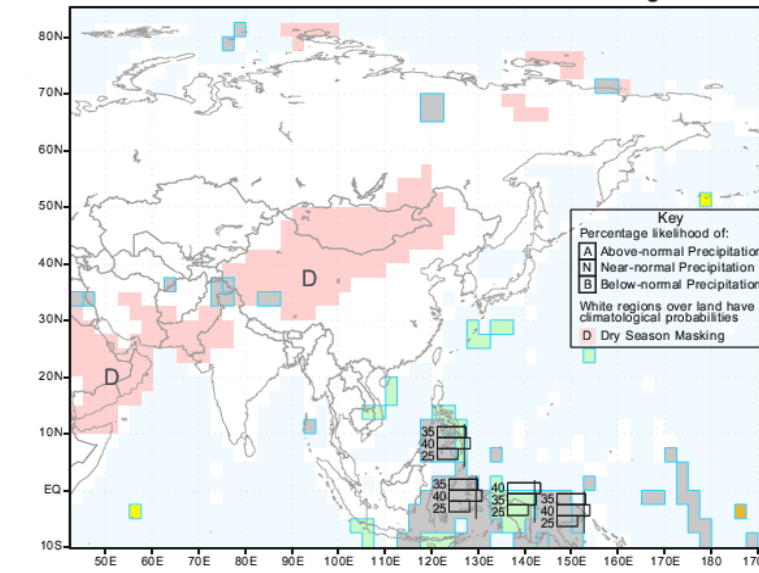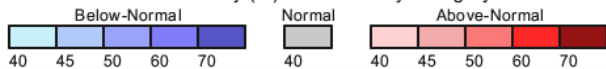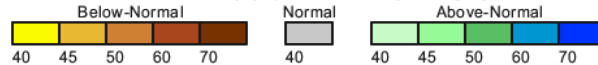IRI Multi-Model Probability Forecast for Precipitation
for October-November-December 2013, Issued August 2013

Key
Percentage likelihood of:
A Above-normal Temperature
N Near-normal Temperature
B Below-normal Temperature

White regions over land have
climatological probabilities

Key
Percentage likelihood of:
A Above-normal Precipitation
N Near-normal Precipitation
B Below-normal Precipitation

White regions over land have
climatological probabilities
D Dry Season Masking

Probability (%) of Most Likely Category

Below-Normal   Normal   Above-Normal
40 45 50 60 70   40   40 45 50 60 70

Below-Normal   Normal   Above-Normal
40 45 50 60 70   40   40 45 50 60 70

IRI Multi-Model Probability Forecast for Temperature
for November-December-January 2014, Issued August 2013

IRI Multi-Model Probability Forecast for Precipitation
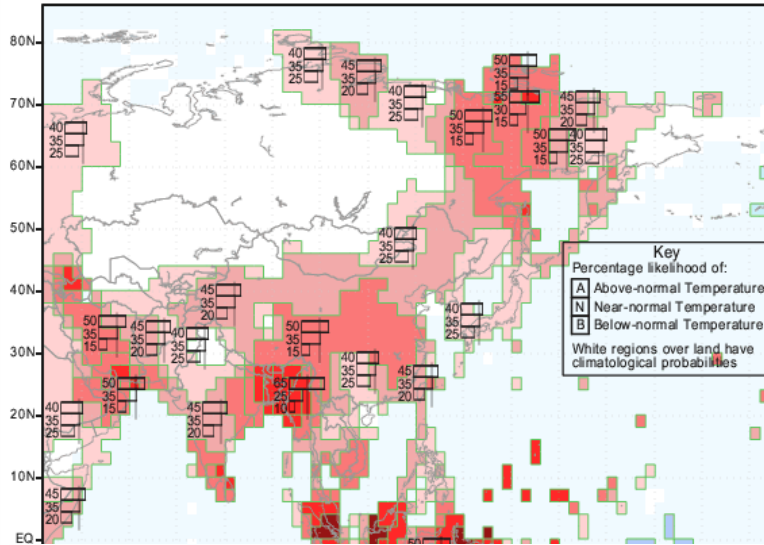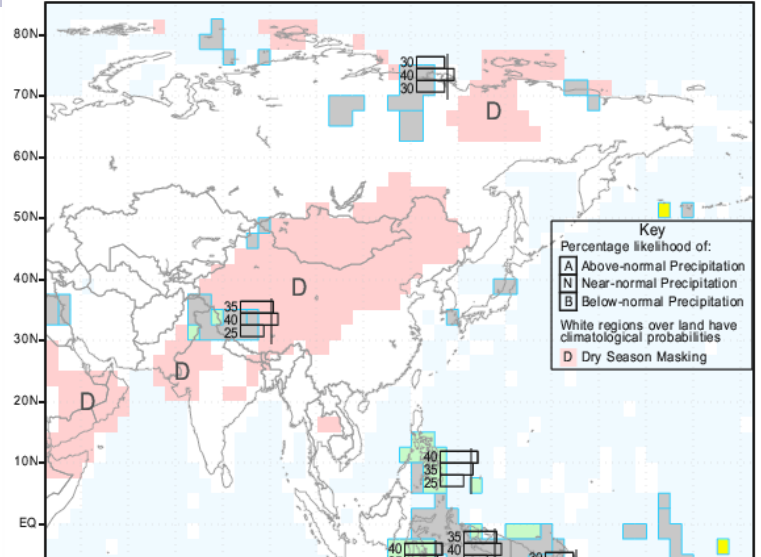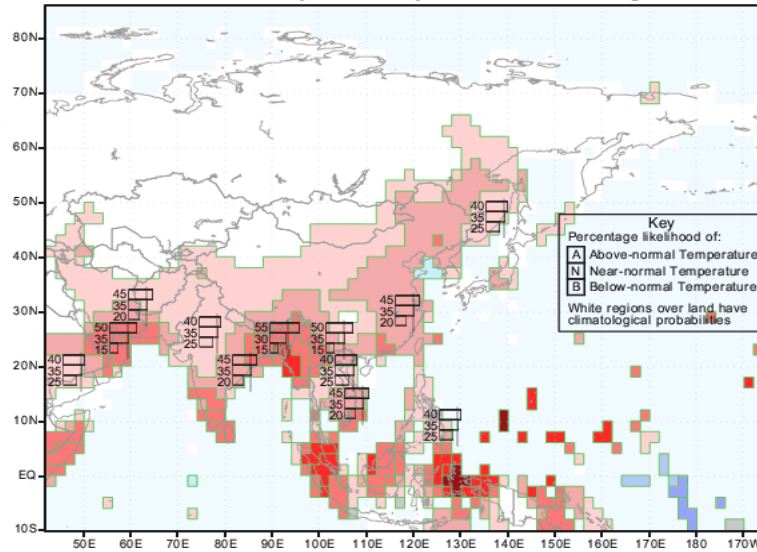for November-December-January 2014, Issued August 2013

IRI Multi-Model Probability Forecast for Temperature
for December-January-February 2014, Issued August 2013

IRI Multi-Model Probability Forecast for Precipitation
for December-January-February 2014, Issued August 2013