**Joint Meeting for the Seasonal Prediction
of the East Asian Winter Monsoon**
＜ 9-11 November 2010 ＞

Seasonal Outlook for winter 2010/2011 over Japan

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Outline

1. Introduction

2. Grounds for JMA's seasonal forecast
   for 2010/2011 winter

   2.1 Current Oceanic Condition
   and ENSO Outlook

   2.2 Numerical Prediction

   2.3 Long-term trend

3. Summary

1. Introduction

Outline of JMA's cold season forecast

Main forecast elements

Probabilities of 3 categories
(below, near, above normal)
of DJF mean temperature,
precipitation, and snowfall
(only Sea of Japan side)

Climatology	Below Normal, 33	Near Normal, 33	Above Normal, 33

(Categories are based on 1971-2000)

Issue date

Around 25th September
(revision 25th October)

Northern
Japan

Eastern
Japan

Western
Japan

Okinawa and Amami
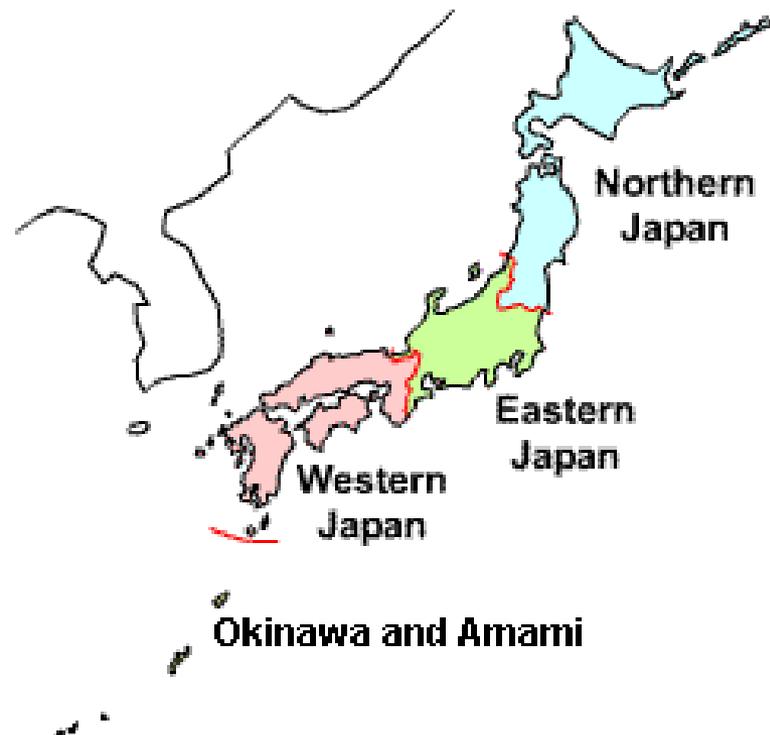
Geographical subdivisions of Japan

Forecast tools

■ **Numerical Prediction Model**

- CGCM (TL95L40) ; Atmosphere-Ocean Couple Model

- Ensemble size is 51

- Evaluated by 30-years hindcast

■ **Statistical Model**

- OCN (Recent 10-years mean) ･････ Recent trend

For this forecast, place importance on numerical model, omit to explain the result of statistical model.

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2. Grounds for JMA's seasonal forecast for 2010/2011 winter

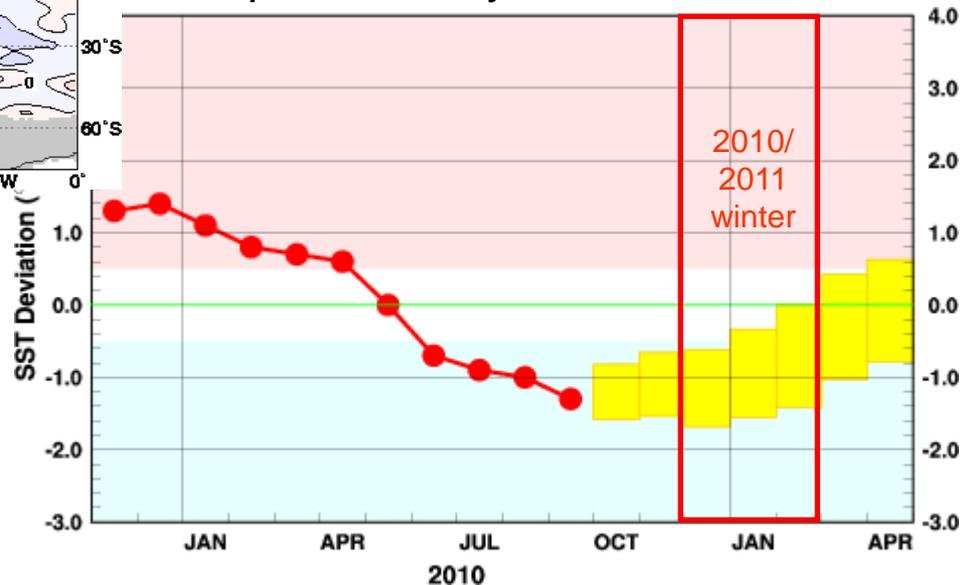2.1 Current Oceanic Condition and ENSO Outlook

2.2 Numerical Prediction

2.3 Long-term trend

Oceanic condition and outlook of ENSO

SST Anomaly 2010 Sep.
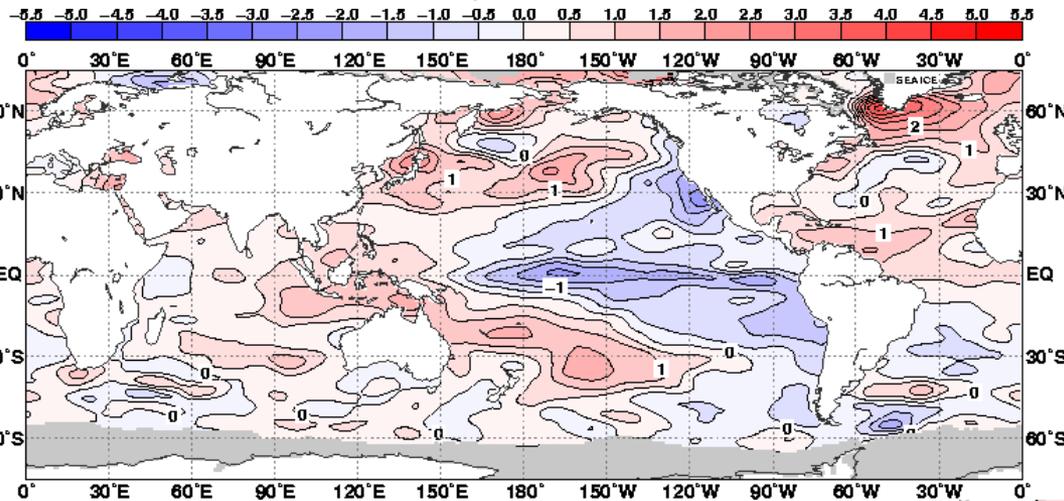
SST deviation over Niño.3 predicted by CGCM

2010/ 2011 winter

- Positive anomalies were found in the western equatorial Pacific, and negative anomalies were found from the eastern part to west of the date line.
- CGCM predicts NINO.3 will be below normal during winter.

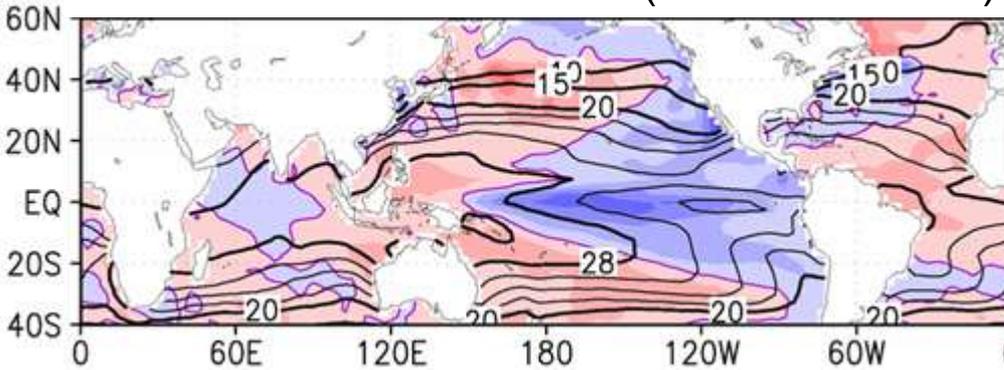# 2. Grounds for JMA's seasonal forecast for 2010/2011 winter

2.1 Current Oceanic Condition and ENSO Outlook
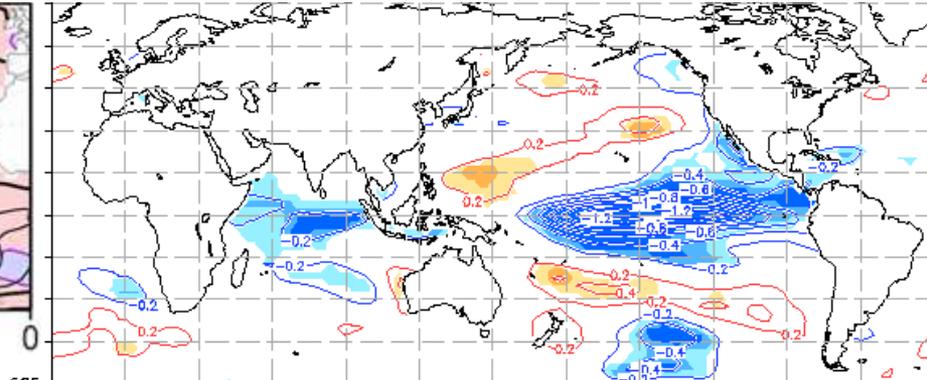
2.2 Numerical Prediction

2.3 Long-term trend

Predicted SST anomalies (DJF)

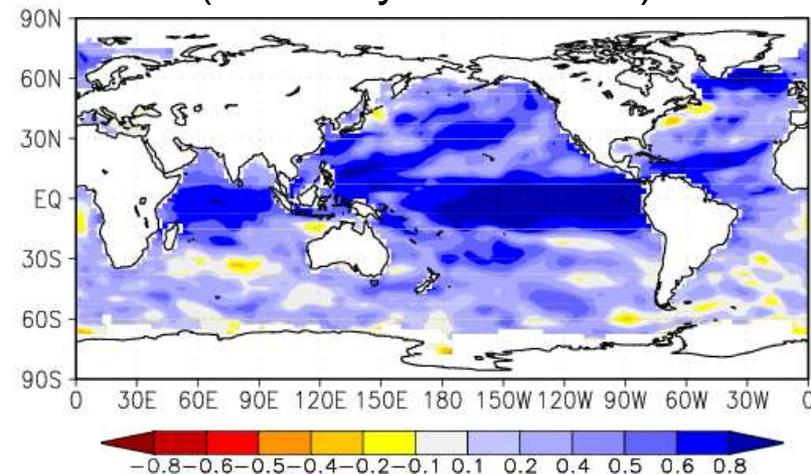### Predicted SST anomalies (DJF 2010/2011)

SSTA La Niña composite map (DJF)

Dark and light shadings show 95%, 90% confidence level based on T-test.

Prediction skill of SST (Anomaly correlation)

- The SST anomaly pattern predicted by CGCM is similar to that of La Niña events.

- Above normal in the western Pacific and below normal in the central and eastern Pacific.

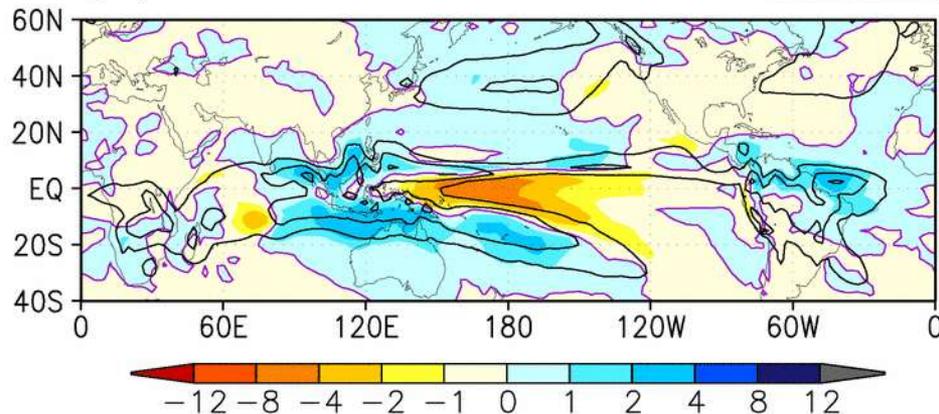- Prediction skill of SST above key areas for ENSO is very high.
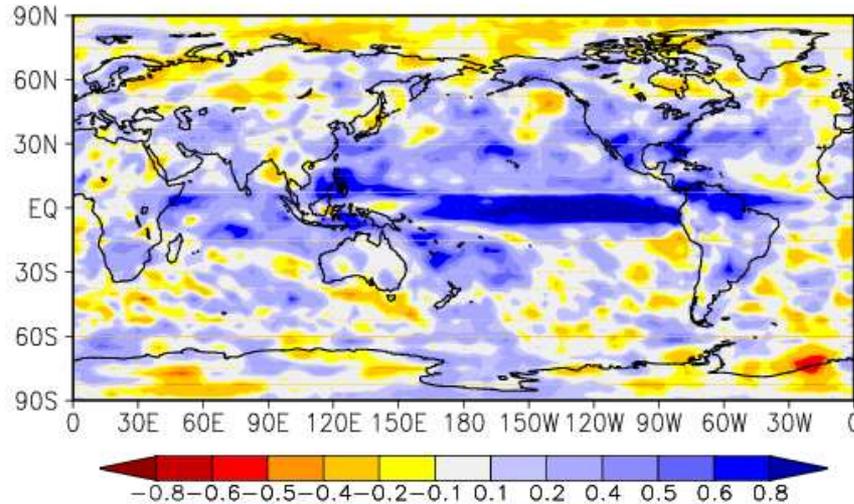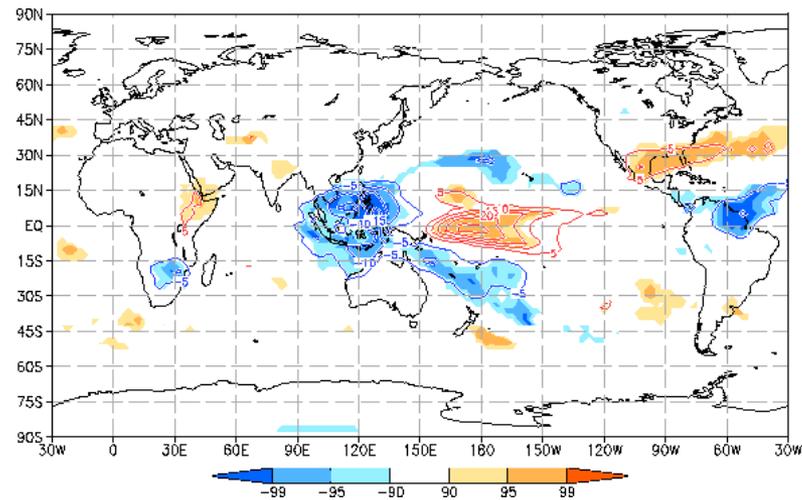
Precip

Precip Ens. Mean.

from: 2010/12− (m345)

(b) SAMOI=0.548   esbl

La Nina composite (OLR)

- The anomaly pattern predicted by CGCM is similar to that of La Niña events.

- Above normal around South China Sea and below normal in the central Pacific.
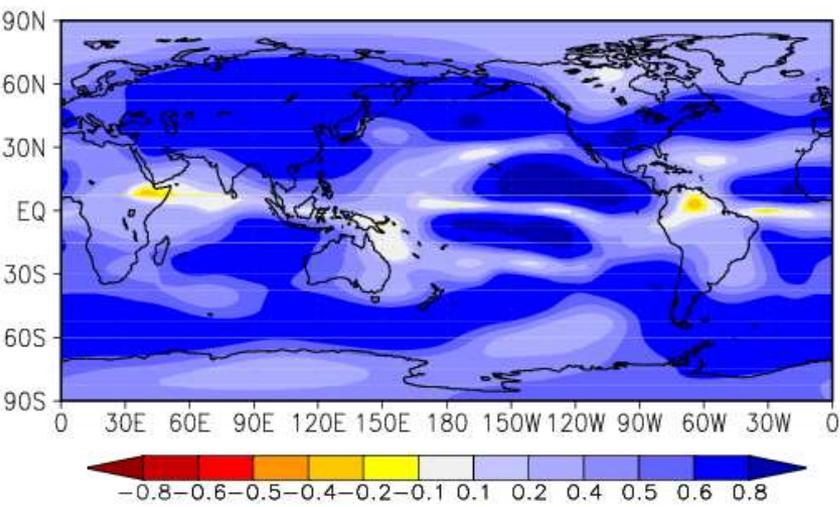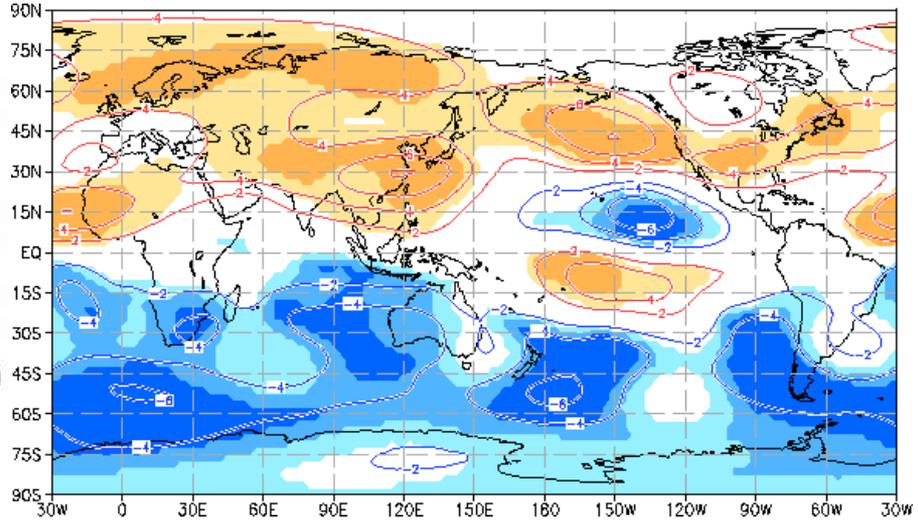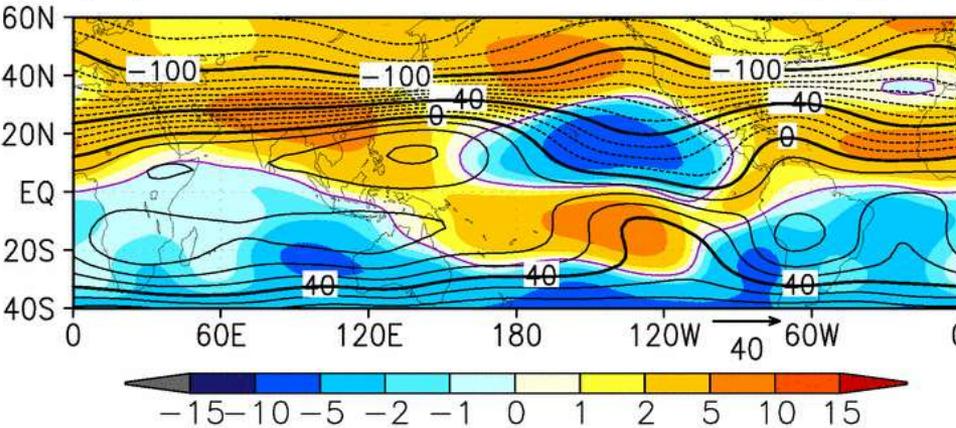
- Prediction skill above key areas is high.

NH	TRP	SH	EU	PAC	JPN
0.130	0.293	0.068	0.089	0.160	0.162

Psi 200

Psi200 Ens. Mean.

La Nina composite

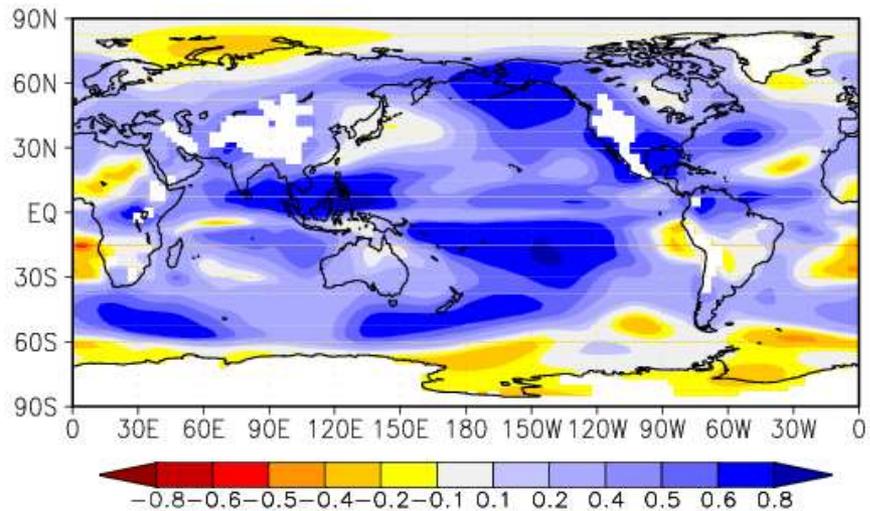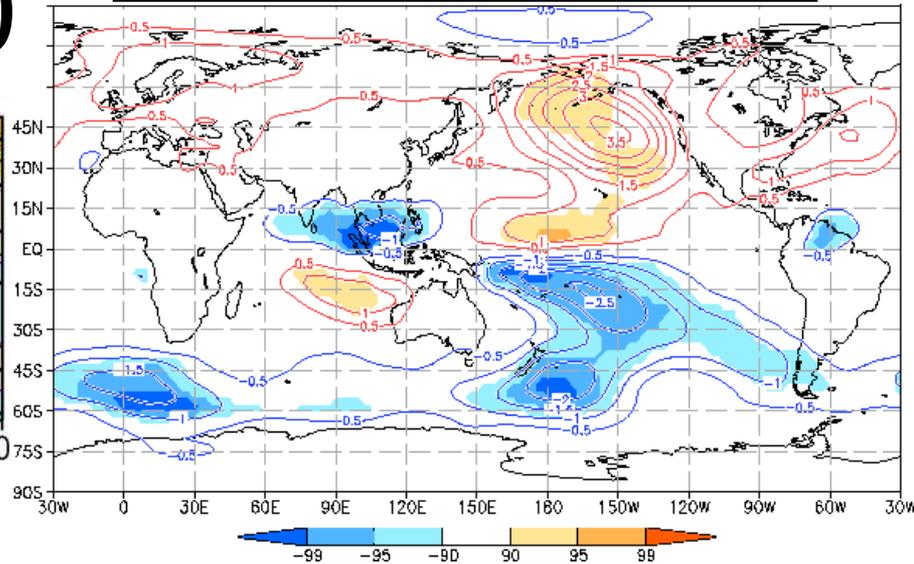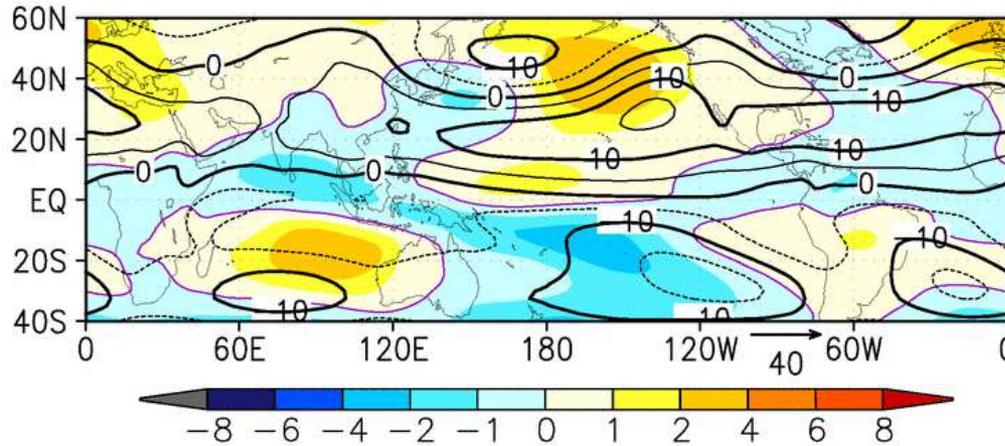- The anomaly pattern predicted by CGCM is similar to that of La Niña events.

- Anti-cyclonic anomalies from North India to South China indicates the subtropical jet stream shifts northward over China and southward over Japan, suggesting strong winter monsoon activity around Japan.

NH	TRP	SH	EU	PAC	JPN
0.553	0.441	0.563	0.605	0.579	0.630

Psi 850
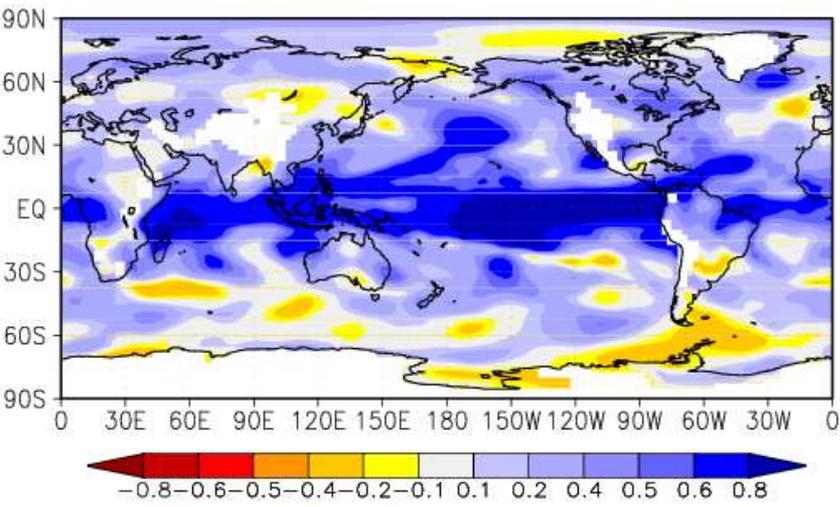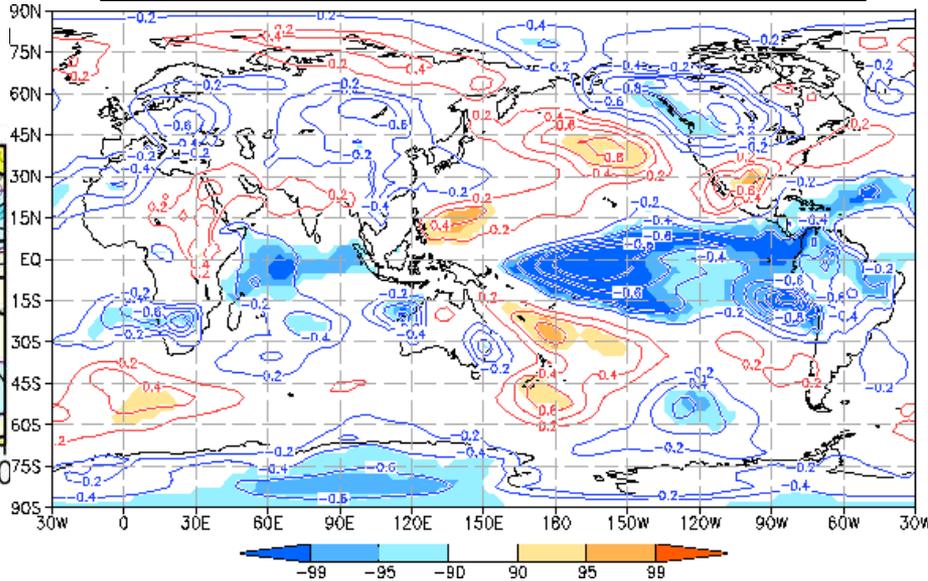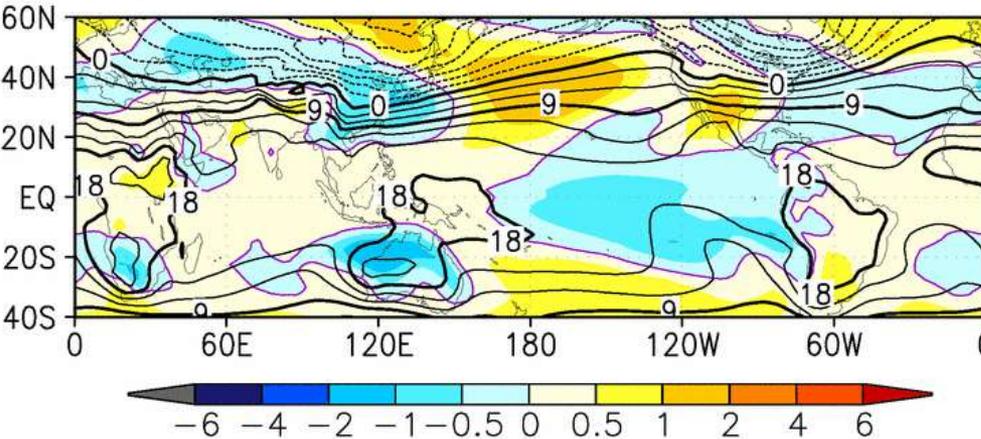
Psi200 Ens. Mean.

La Nina composite

- The anomaly pattern predicted by CGCM is little different from that of La Niña events.

- Cyclonic anomaly around Japan does not seen in the La Niña composite map.

NH	TRP	SH	EU	PAC	JPN
0.304	0.391	0.261	0.228	0.367	0.207

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T850

T850 Ens. Mean.

La Nina composite

- The predicted anomaly pattern around Japan is similar to that of La Niña events.

- Above normal around Northern Japan and below normal around Western Japan.

- However, the result of hindcast suggests the model does not have enough skill to predict around Japan.

NH	TRP	SH	EU	PAC	JPN
0.248	0.548	0.136	0.190	0.270	0.207

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Z500 Ens. Mean.

Z500

La Nina composite

(b)
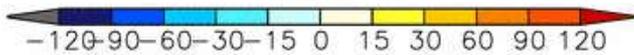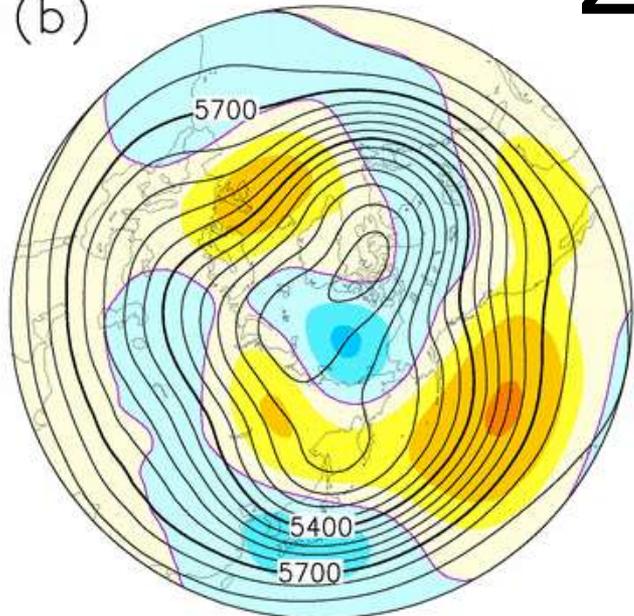
- The anomaly pattern predicted by CGCM is similar to that of La Niña events.

- Below normal around Eastern and Western Japan.

- However, the result of hindcast suggests the model does not have enough skill to predict around Japan.
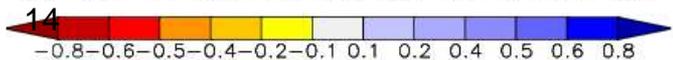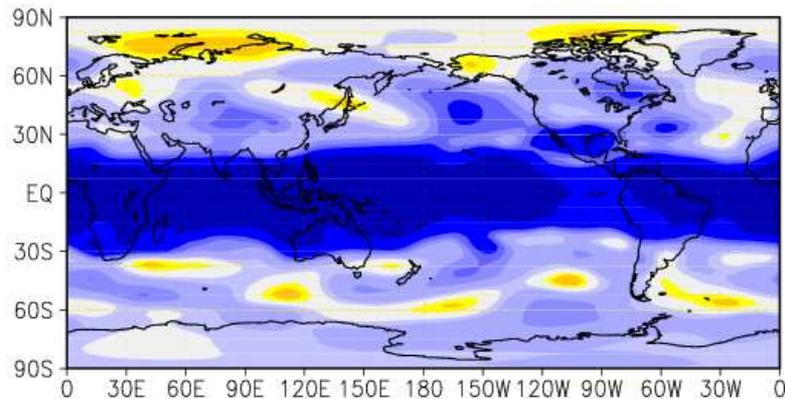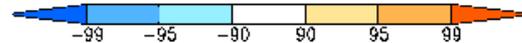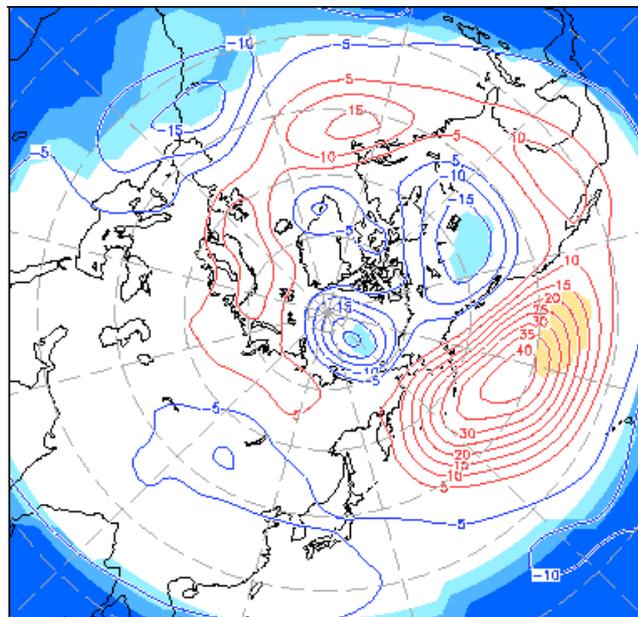
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Prediction of the Arctic Oscillation (AO)

500hPa height (DJF)
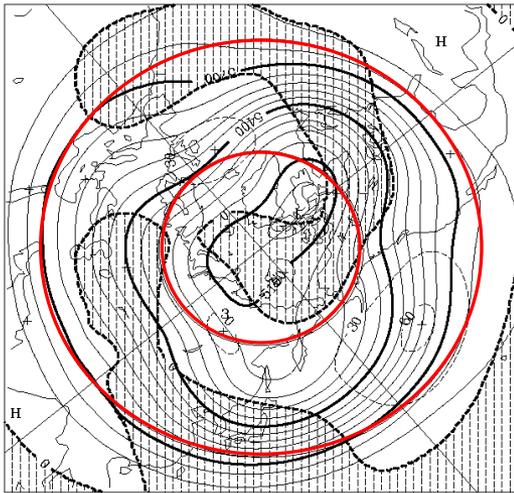
EOF1 of 500hPa height in DJF (AO pattern)
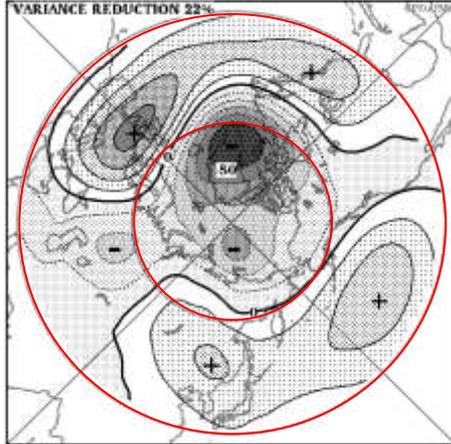
Observed and predicted DJF mean AO index.

Z500 EOF_1(ERA+JRA) SCORE (win) DEC-FEB INIT.09/10
COR=-0.08

Correlation = −0.08

Observed : black
Predicted : blue
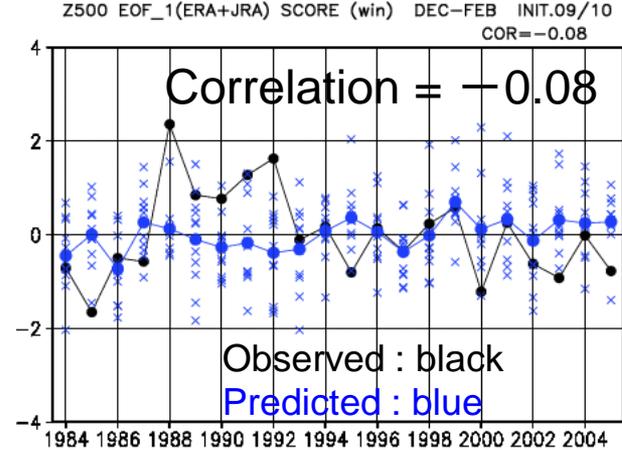
- AO is an oscillation in sea-level pressure between the Arctic and the mid-latitudes.
- JMA monitors the AO by 1st component of EOF of 500 hPa height in DJF.

Prediction of EOF1 score (AO index) for 2010/2011 DJF

12/ 1 - 2/28
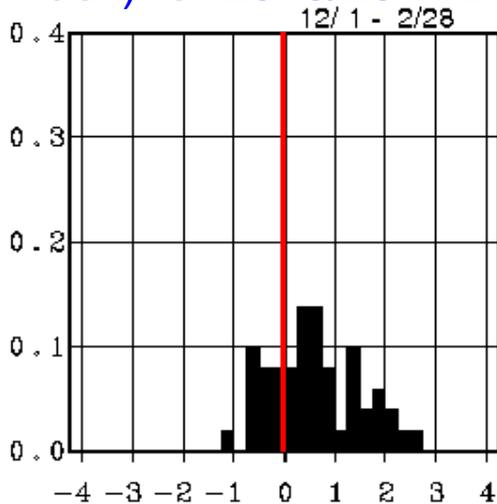
- Positive (negative) phase of AO tends to cause weak (strong) winter monsoon, and above-normal (below-normal) temperature in Japan.
- Slightly positive phase of the Arctic Oscillation (AO) is predicted by CGCM for this winter.
- However, the result of the ensemble model varies widely among members.

Numerical Prediction guidance
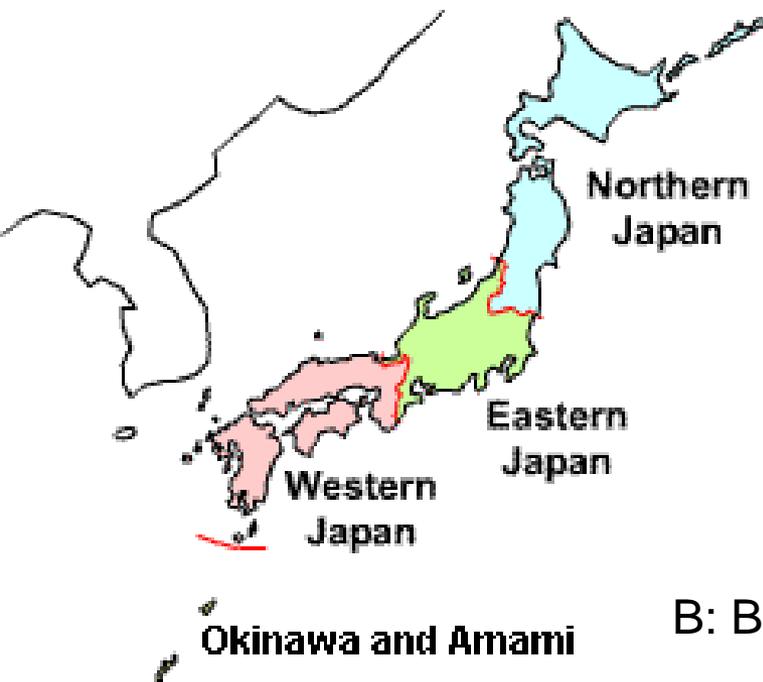
3-month mean temperature	Probabilities of three categories (%)		
	B	N	A
Northern Japan	30	24	46
Eastern Japan	23	33	44
Western Japan	19	40	41
Okinawa/Amami	21	26	53

B: Below Normal   N: Near Normal   A: Above Normal
(Base period of normal is 1971-2000)

Northern Japan

Eastern Japan

Western Japan

Okinawa and Amami

- Area averaged temperature anomalies obtained from the numerical prediction model is above normal whole of Japan.

- However, taking into consideration of the magnitude of the variability of AO-prediction and so on, temperature anomaly should be shifted to the climatological normal.

2. Grounds for JMA's seasonal forecast for 2010/2011 winter

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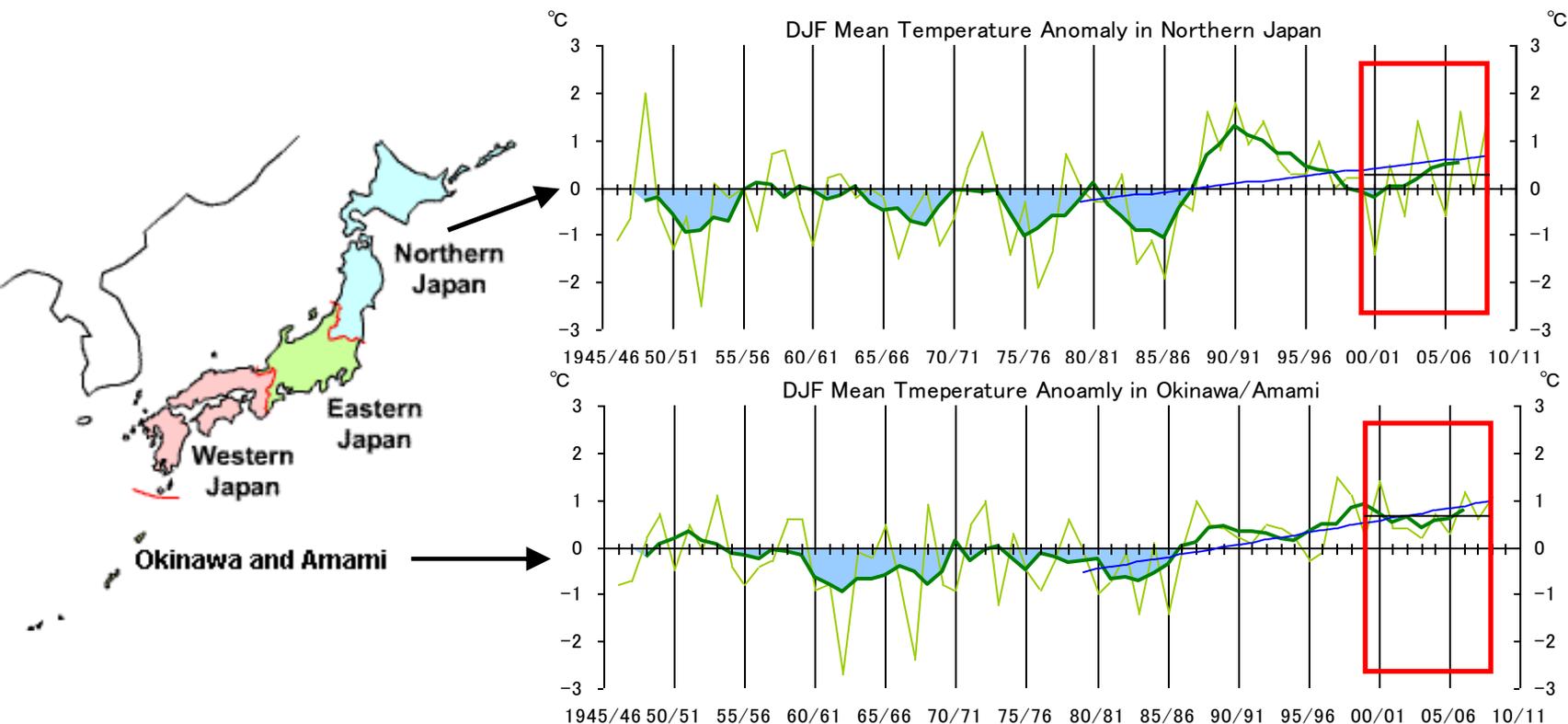# DJF mean temperature in Japan

- Long-term upward trends are clearly seen in winter mean temperatures over Okinawa/Amami, especially in recent 30 years.
- In Northern Japan, the winter mean temperature has large year-to-year fluctuations.

Statistical guidance : OCN

OCN : Optimal Climate Normal
　　　Statistical guidance based on the recent 10-years climate

3-month mean temperature	Probabilities of three categories (%)		
	B	N	A
Northern Japan	30	20	50
Eastern Japan	10	30	60
Western Japan	10	50	40
Okinawa/Amami	0	20	80

B: Below Normal   N: Near Normal   A: Above Normal
(Base period of normal is 1971-2000)

- In Northern and Eastern Japan, the recent ten-winters-mean
　　　temperature is above normal.
- In Okinawa/Amami, it is clearly above normal.
- In Western Japan, it is near or above normal.

3. Summary

Conclusion

- From the numerical prediction, in response to the La Niña condition, 850hPa_temperatures are expected below-normal in the coming winter except for Northern Japan.

- However, considering the numerical prediction guidance, the statistical guidance and so on, it is not likely that temperatures will be lower than normal in any region of Japan.

- Especially in Northern Japan, the coming winter will be warmer than normal from almost predictive outputs, suggesting weak winter monsoon activity around Northern Japan.

Summary of the outlook in 2010/2011 winter

3-month mean		Temperature			Precipitation			Snowfall		
		B	N	A	B	N	A	B	N	A
Northern Japan	Sea of Japan side	30 : 30 : 40			30 : 40 : 30			40 : 40 : 20		
	Pacific side				30 : 30 : 40			—		
Eastern Japan	Sea of Japan side	30 : 40 : 30			30 : 40 : 30			30 : 40 : 30		
	Pacific side				30 : 40 : 30			—		
Western Japan	Sea of Japan side	30 : 40 : 30			30 : 40 : 30			30 : 40 : 30		
	Pacific side				30 : 40 : 30					
Okinawa and Amami		30 : 40 : 30			30 : 40 : 30					

B: Below Normal   N: Near Normal   A: Above Normal
(Base period of normal is 1971-2000)

Northern Japan
Sea of Japan side

Northern Japan
Pacific side

Eastern Japan
Sea of Japan side

Eastern Japan
Pacific side

Western Japan
Sea of Japan side

Western Japan
Pacific side

Okinawa and Amami

END