

# Climate Outlook for Winter 2015/16

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# Consideration elements for winter prediction

1. Dynamical model (GloSea5, WMO Lead Center for MME)
2. Strong El-Niño and its developing pattern (EP, CP, EP+CP mixed)
3. Arctic Sea Ice
4. Snow cover for Eurasian Continent
5. AO (Arctic Oscillation)
6. Blocking Activity

# 1. Dynamical model - GloSea5

DJF

Dec

Jan

Feb

500hPa Geopotential Height (gpm) Anomaly  
Contour: FCST(int.60), Shading: Anomaly(FCST-HCST)

Numerical Model Development Division / KMA  
GloSea5 (N216L85, O0.25L70)

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Contour: FCST(int.60), Shading: Anomaly(FCST-HCST)

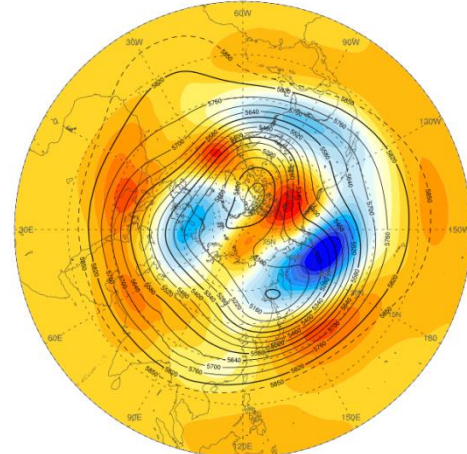
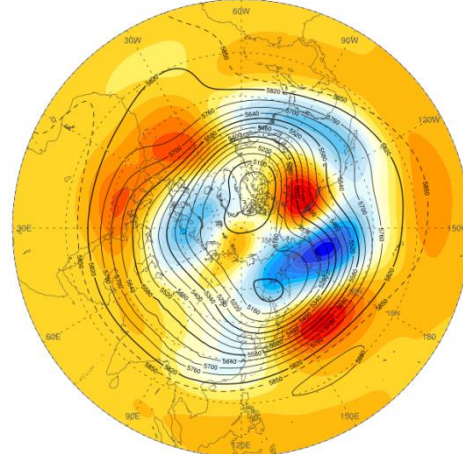
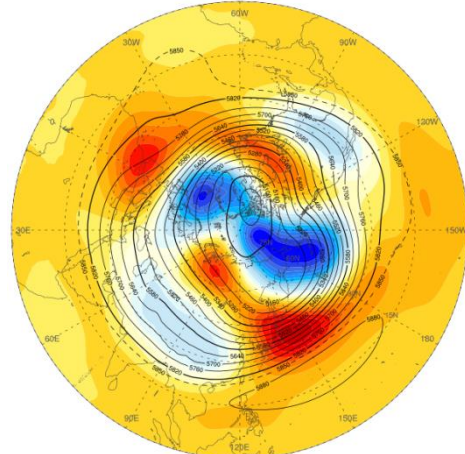
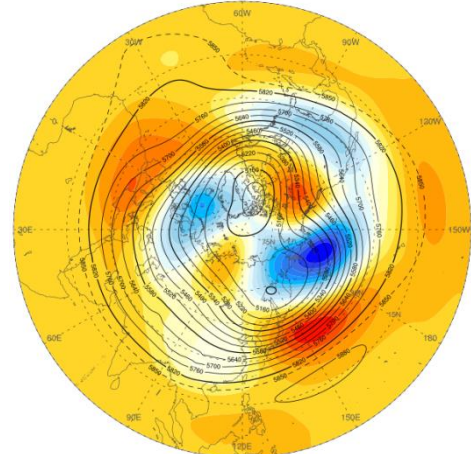
Numerical Model Development Division / KMA  
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Numerical Model Development Division / KMA  
GloSea5 (N216L85, O0.25L70)



Valid Date : 20151201 - 20160228 (+2 +3 +4 mon)  
Initial Date : 20151006 - 20151026 (40mem)  
HCST : 1996 - 2009 (267mem)

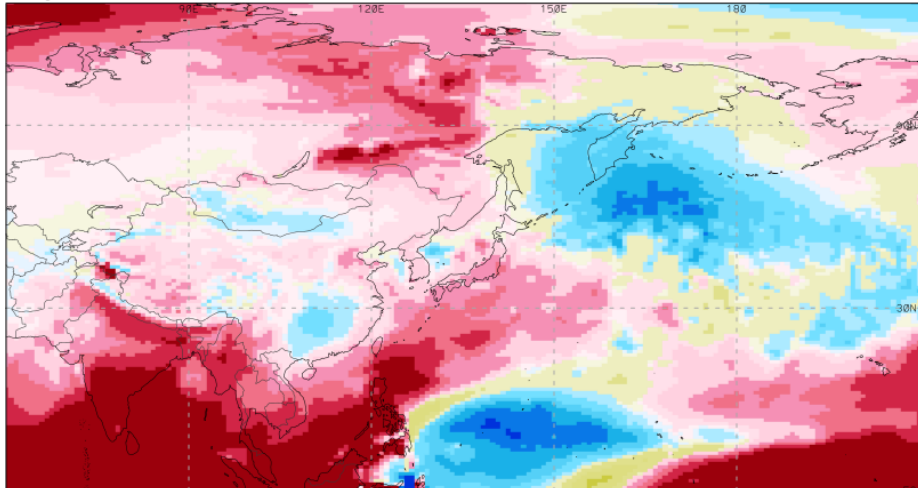
Valid Date : 20151201 - 20151231 (+2mon)  
Initial Date : 20151006 - 20151026 (40mem)  
HCST : 1996 - 2009 (267mem)

Valid Date : 20160101 - 20160131 (+3mon)  
Initial Date : 20151006 - 20151026 (40mem)  
HCST : 1996 - 2009 (267mem)

Valid Date : 20160201 - 20160228 (+4mon)  
Initial Date : 20151006 - 20151026 (40mem)  
HCST : 1996 - 2009 (267mem)

1.5m Temperature total(%)  
Shading: FCST

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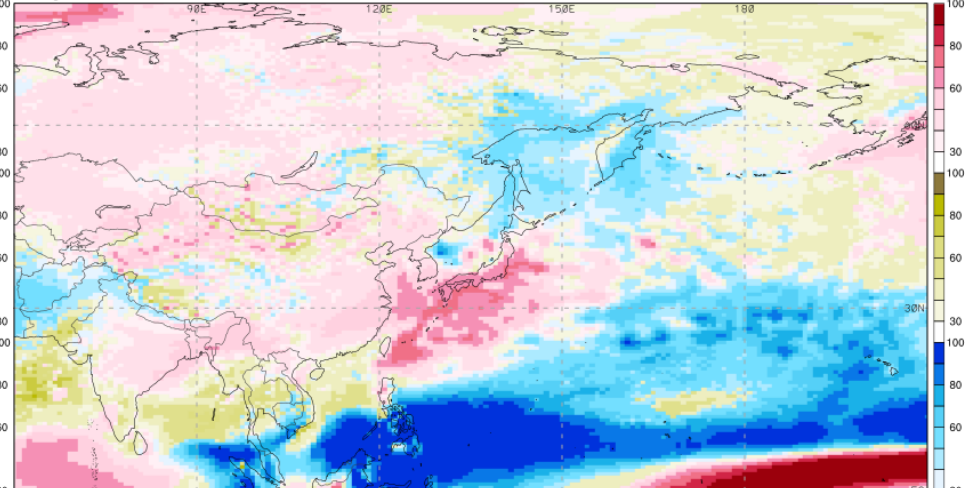


Valid Date : 20151101 - 20160131 (+1 +2 +3 mon)

Initial Date : 20151006 - 20151026 (xxmem)  
HCST : 1996 - 2009 (xxmem)

Precipitation total(%)  
Shading: FCST

Numerical Model Development Division / KMA  
GloSea5 (N216L85, O0.25L70)



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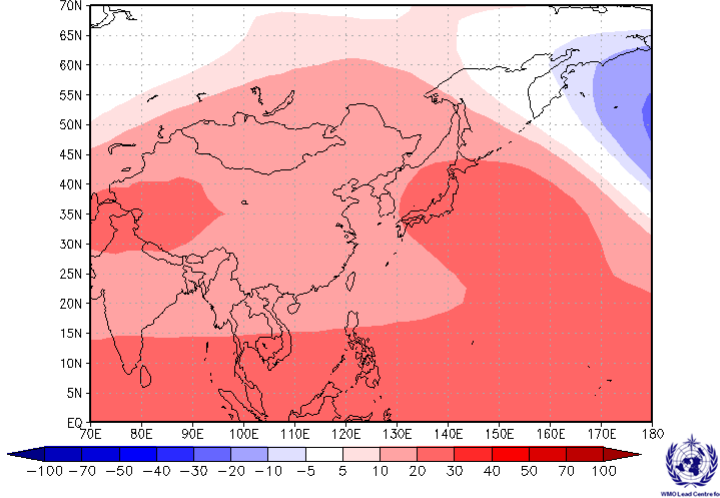
# 1. Dynamical model - WMO LC-LRFMME

Simple Composite Map

Seoul/Melbourne/ECMWF/EXETER/Montreal(CANCM3/CANCM4)/Cptec/Toulouse/Washington

500hPa GPH : DJF2015

(issued on Oct2015)

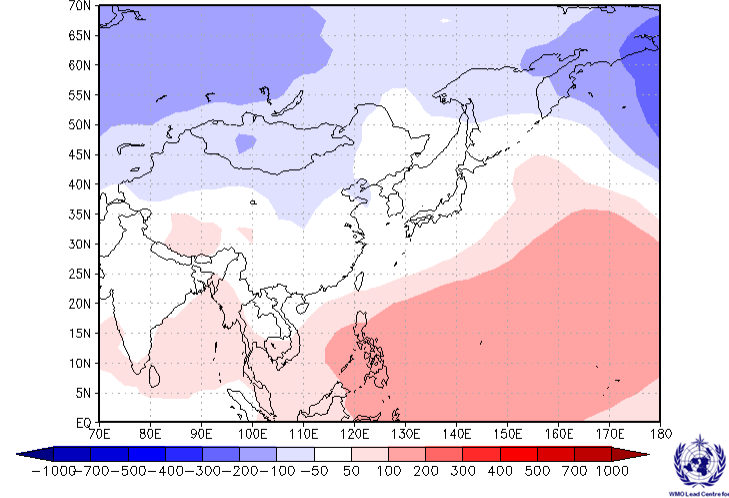


Simple Composite Map

Seoul/Melbourne/ECMWF/EXETER/Montreal(CANCM3/CANCM4)/Cptec/Toulouse/Washington

Mean Sea Level Pressure : DJF2015

(issued on Oct2015)

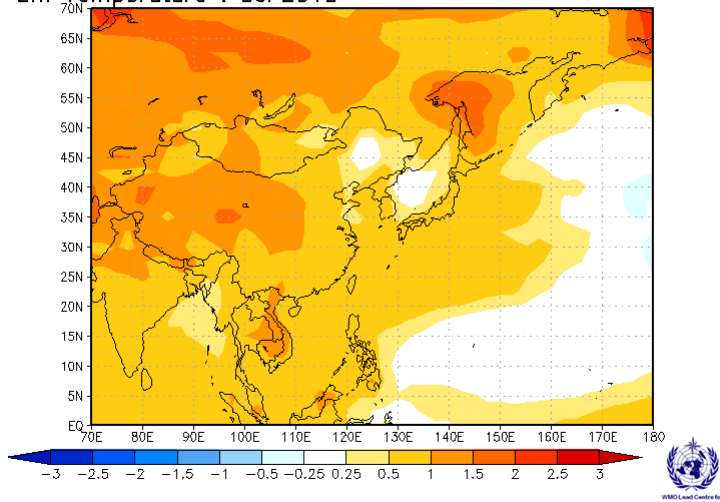


Simple Composite Map

Seoul/Melbourne/ECMWF/EXETER/Montreal(CANCM3/CANCM4)/Cptec/Toulouse/Washington

2m Temperature : DJF2015

(issued on Oct2015)

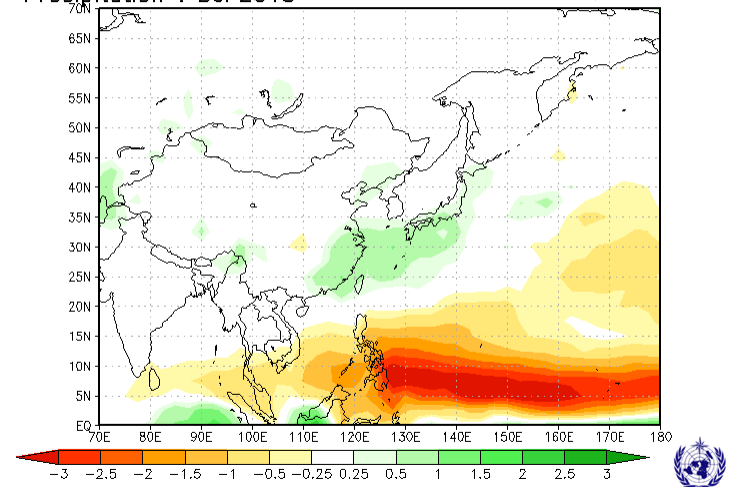


Simple Composite Map

Seoul/Melbourne/ECMWF/EXETER/Montreal(CANCM3/CANCM4)/Cptec/Toulouse/Washington

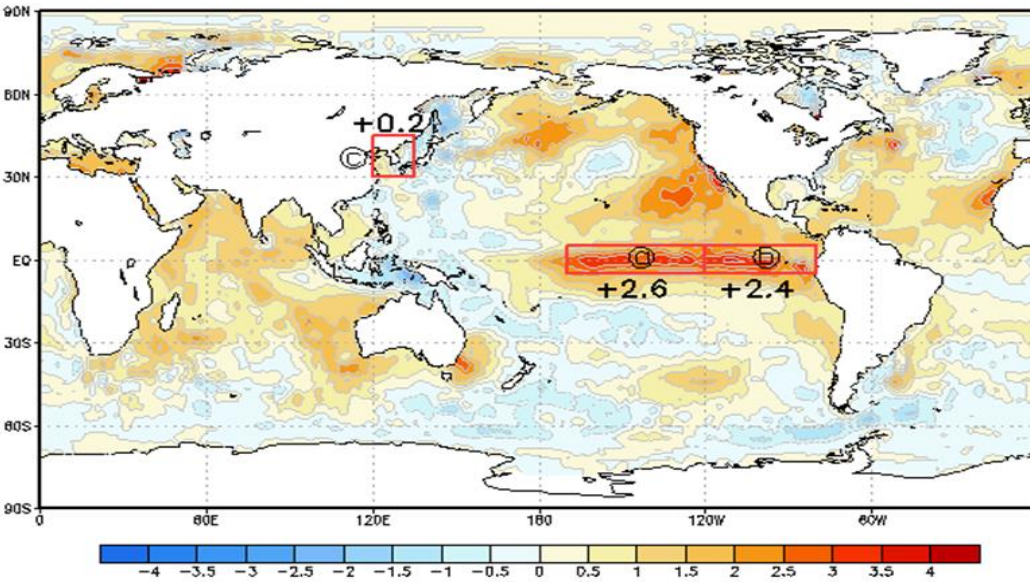
Precipitation : DJF2015

(issued on Oct2015)

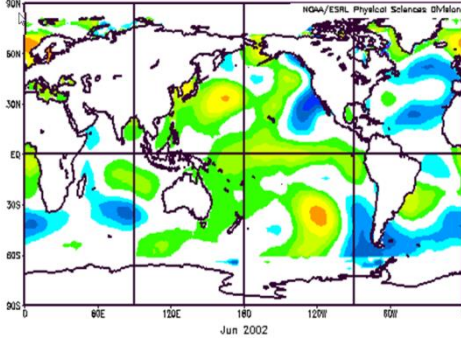
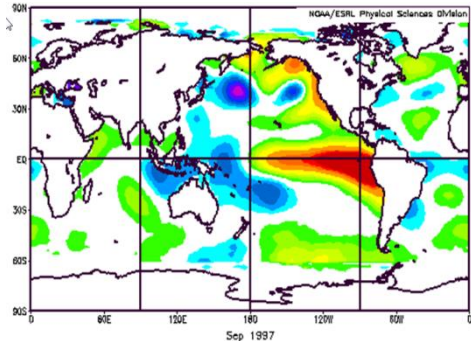
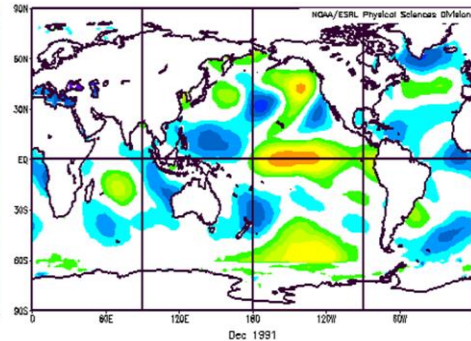
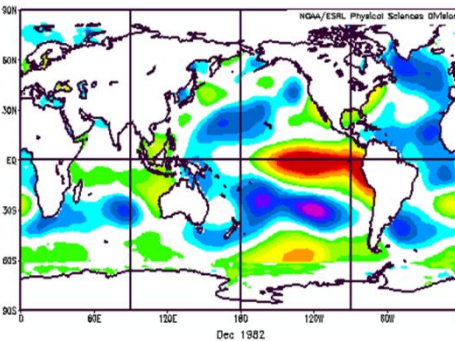
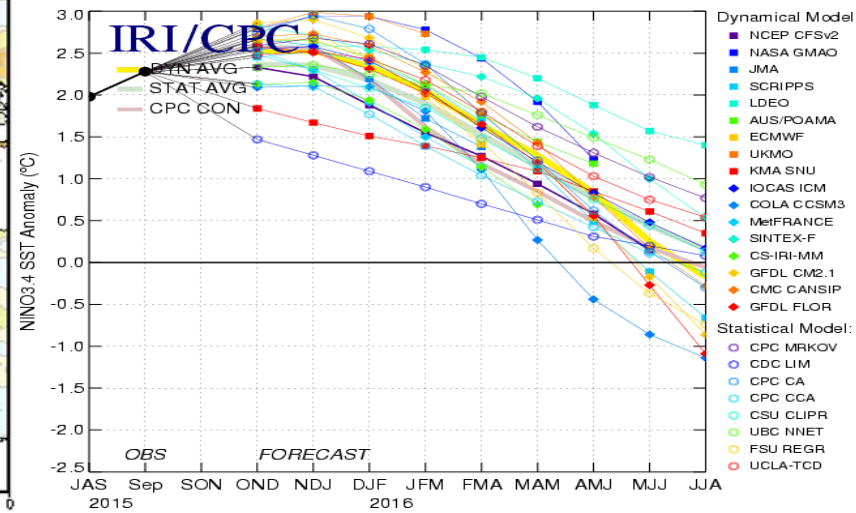


# 2. El-Niño – intensity, developing pattern (EP, CP, EP+CP)

SST weekly anomaly /18 Oct 2015 – 24 Oct 2015

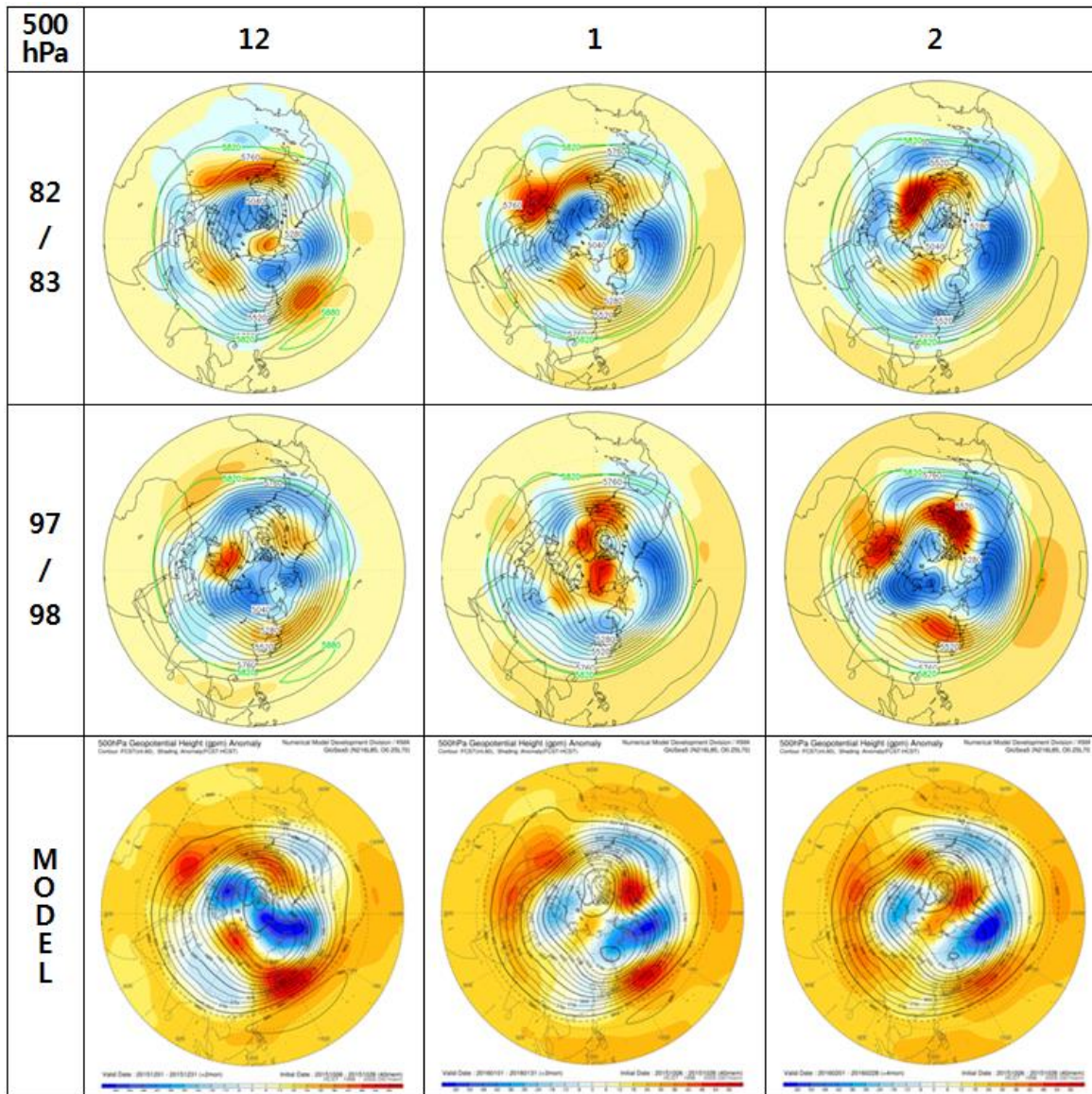


Mid-Oct 2015 Plume of Model ENSO Predictions



According to the majority of international climate outlook models, the 2015-16 El Niño is likely to be strong intensity with **EP type**, potentially placing **this El Niño event among the four strongest events since 1950** (1972-73, 1982-83, 1997-98).

# 2. El-Niño – impact



Temperature anomaly(°C), Korea

Dec	Jan	Feb	DJF	Year
-0.5	0.3	-1.9	-0.8	82/83
0.9	0.9	2.5	1.3	97/98
1.6	1.8	0.1	1.1	91/92
0.7	-0.8	1.3	0.3	02/03

Precipitation ratio(%), Korea

Dec	Jan	Feb	DJF	Year
121	68	82	90	82/83
238	135	43	160	97/98
258	73	102	124	91/92
179	91	143	134	02/03

# 3. Impact of Arctic Sea Ice

Two distinct influences of Arctic warming on cold winters over North America and East Asia

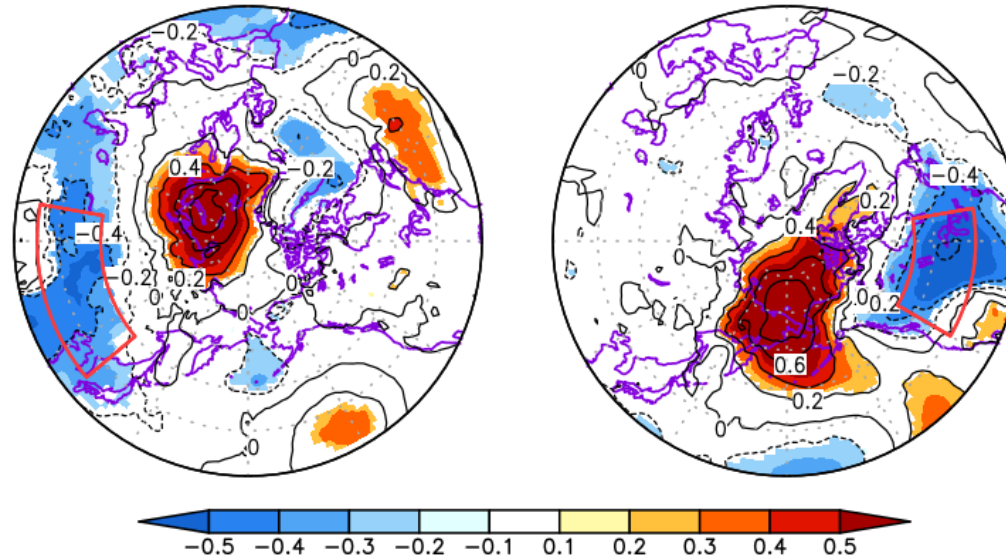
Jong-Seong Kug<sup>1</sup>, Jee-Hoon Jeong<sup>2\*</sup>, Yeon-Soo Jang<sup>1</sup>, Baik-Min Kim<sup>3</sup>, Chris K. Folland<sup>4,5</sup>, Seung-Ki Min<sup>1</sup> and Seok-Woo Son<sup>6</sup>

## ❖ ART(ARctic Temperature Indices) : Index for Arctic regional Warming/Cooling

- ART1 : SAT averaging over Barents-Kara Seas(30-70E, 65-85N)
- ART2 : SAT averaging over East Siberia-Chukchi Seas(160E-160W, 65-80N)

(a) CORR. ART1&SAT

(b) CORR. ART2&SAT



✓ Warming in Barents-Kara Seas    ✓ Warming in East Siberia-Chukchi Seas

↓  
East Asia Cooling

↓  
North America Cooling

# 3. Impact of Arctic Sea Ice

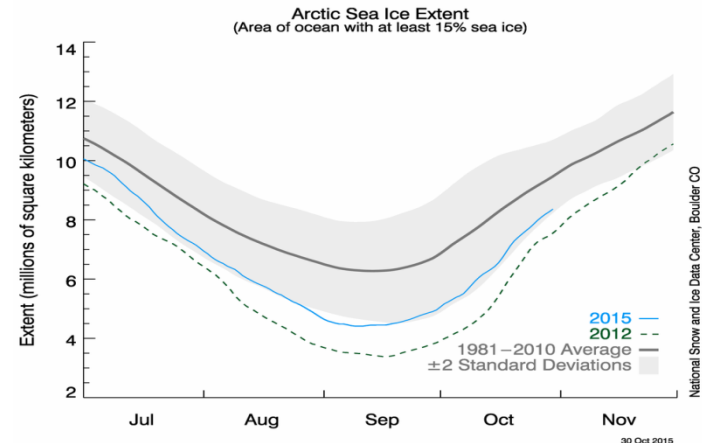
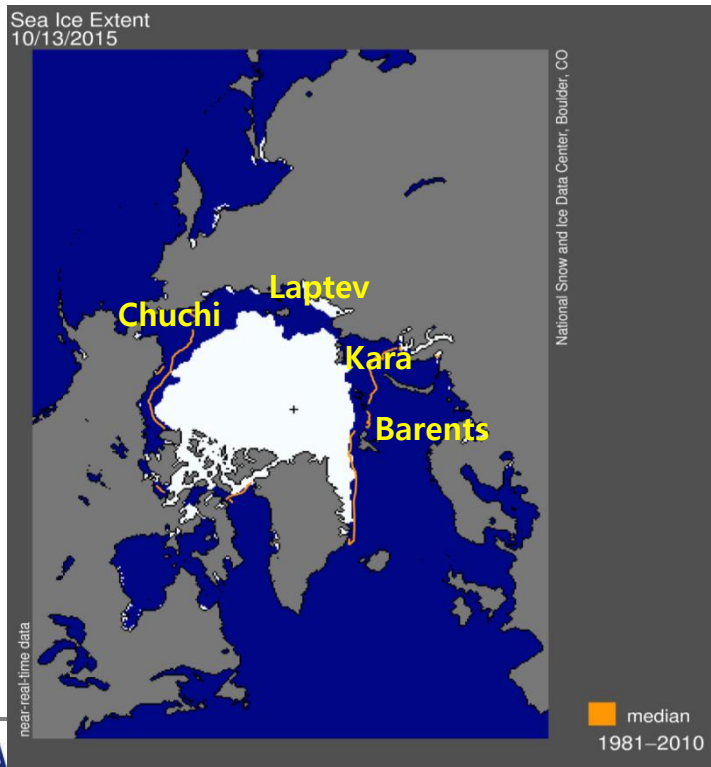
o Analysis data are 1973~2014, and the \* means statistically significant value

## ✓ Sea Ice Concentration over Kara-Barents(65-80N, 60~100E)

Korea	Dec	Jan	Feb
SAT	<b>0.43*</b>	0.04	<b>0.47*</b>
PRCP	-0.15	0.11	0.15

## ✓ October Sea Ice Concentration over Laptev(65-80N, 105~150E)

Korea	Dec	Jan	Feb
SAT	<b>0.51*</b>	0.17	0.24
PRCP	-0.05	0.12	-0.01

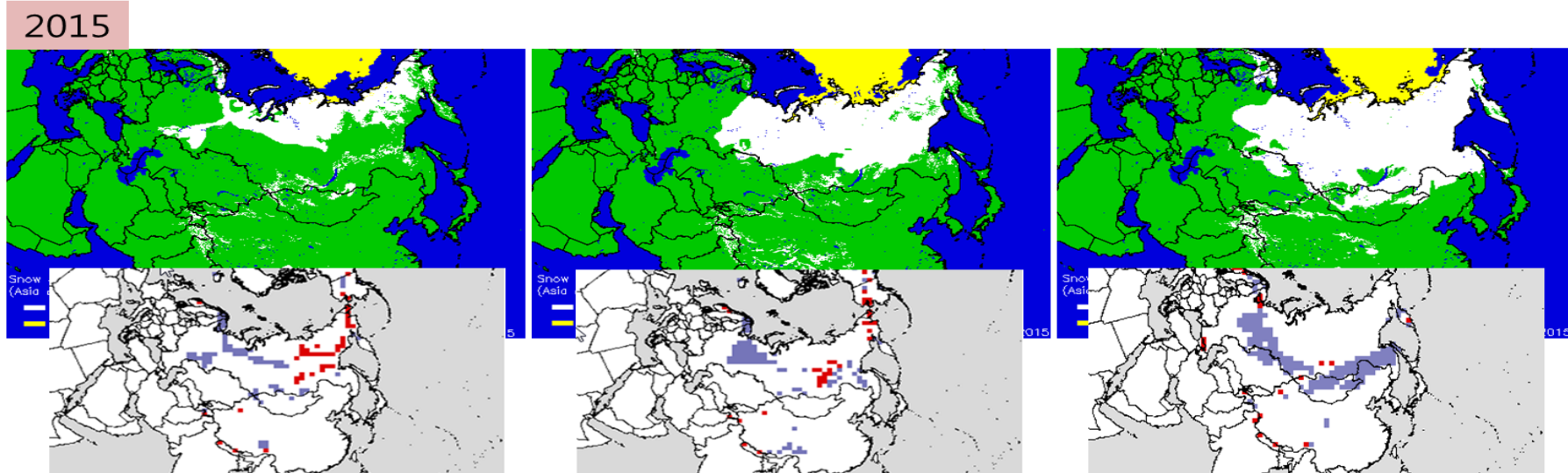
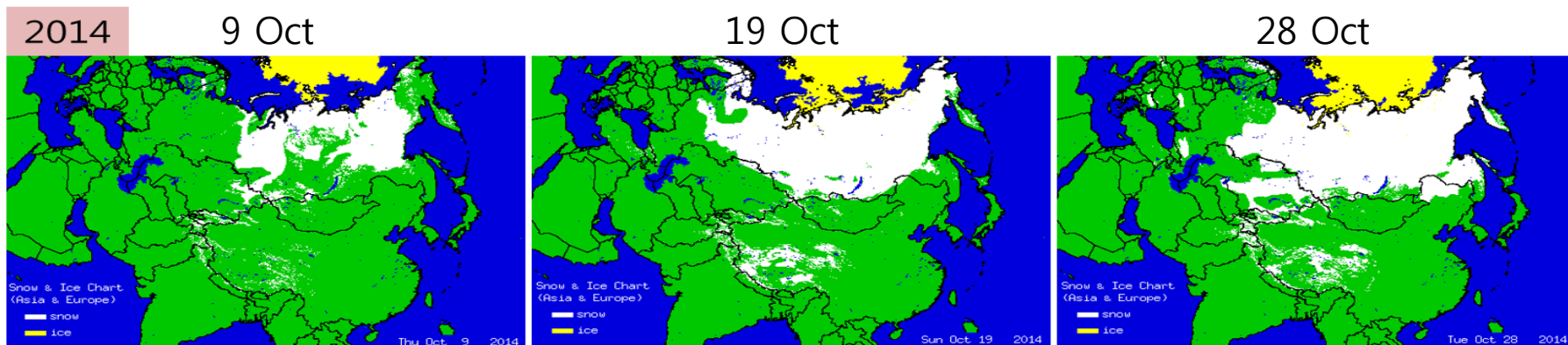




# 4. Impact of Snow-cover

## ✓ October Snow Advanced Index(SAI)

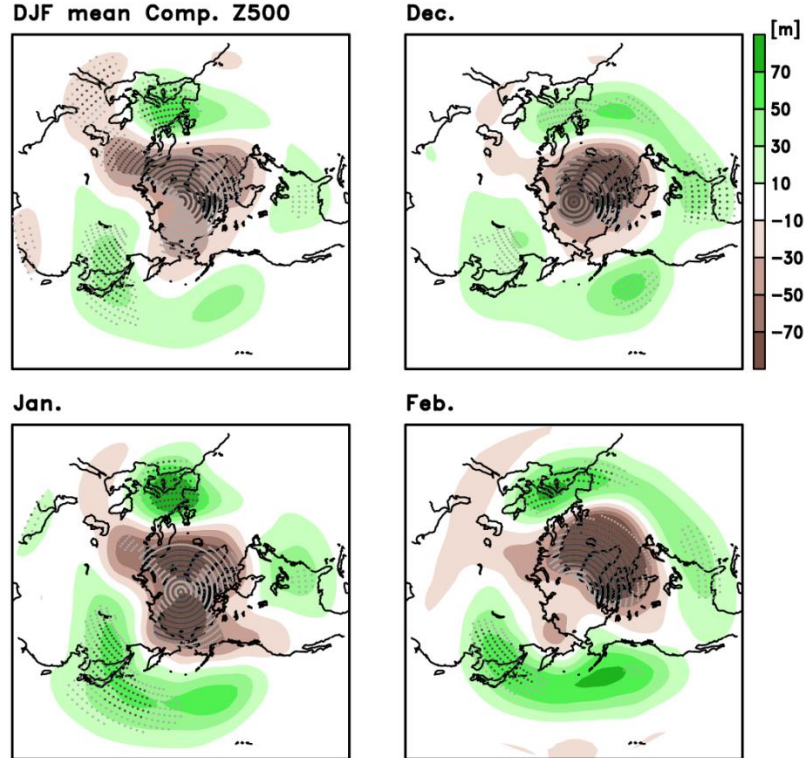
Korea	Dec	Jan	Feb
SAT	-0.31*	-0.32*	-0.10
PRCP	0.11	-0.19	-0.11



# 5. AO (Arctic Oscillation) – low predictability

Period : 1973–2015  
 AO > +0.75 std  
 DJF mean Comp. Z500

## Positive AO

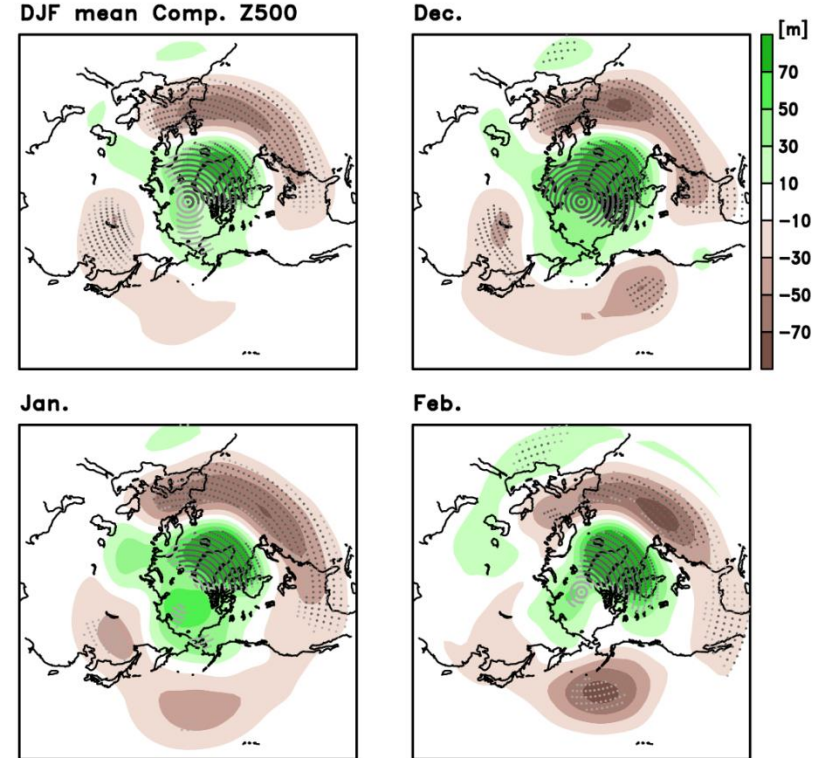


**Weakening of Siberian High**

✓ **Artic Oscillation Index (AOI)**

Period : 1973–2015  
 AO < -0.75 std  
 DJF mean Comp. Z500

## Negative AO

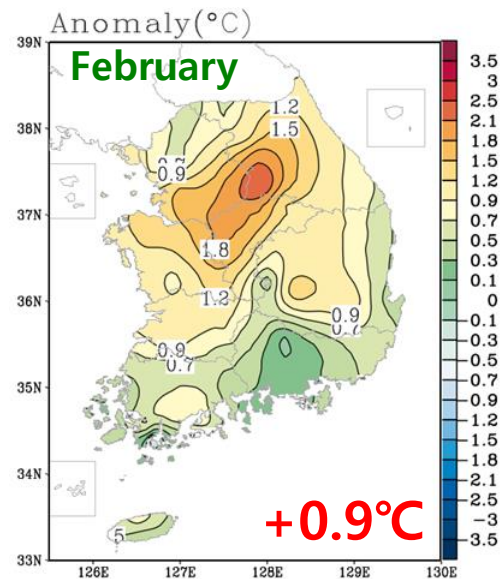
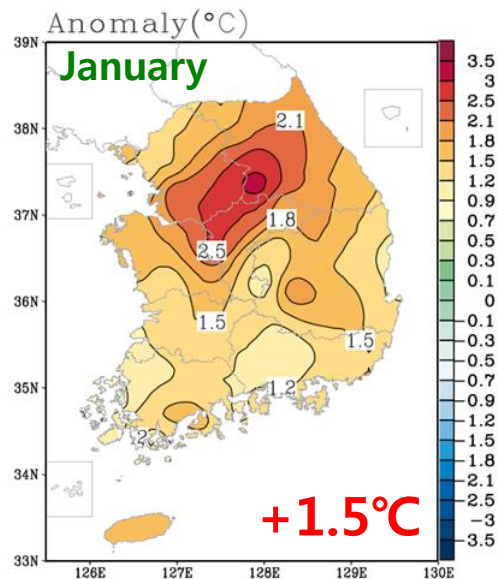
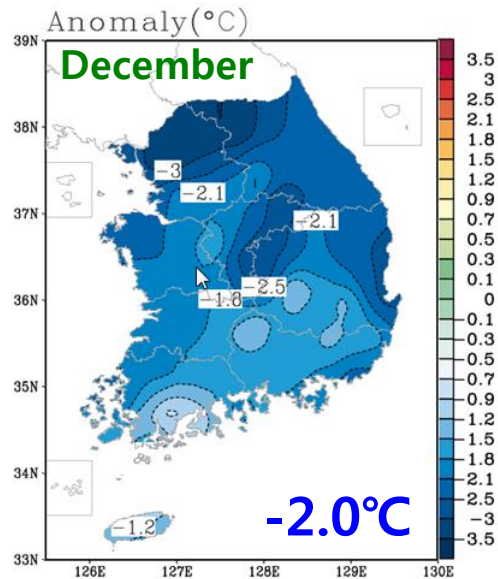
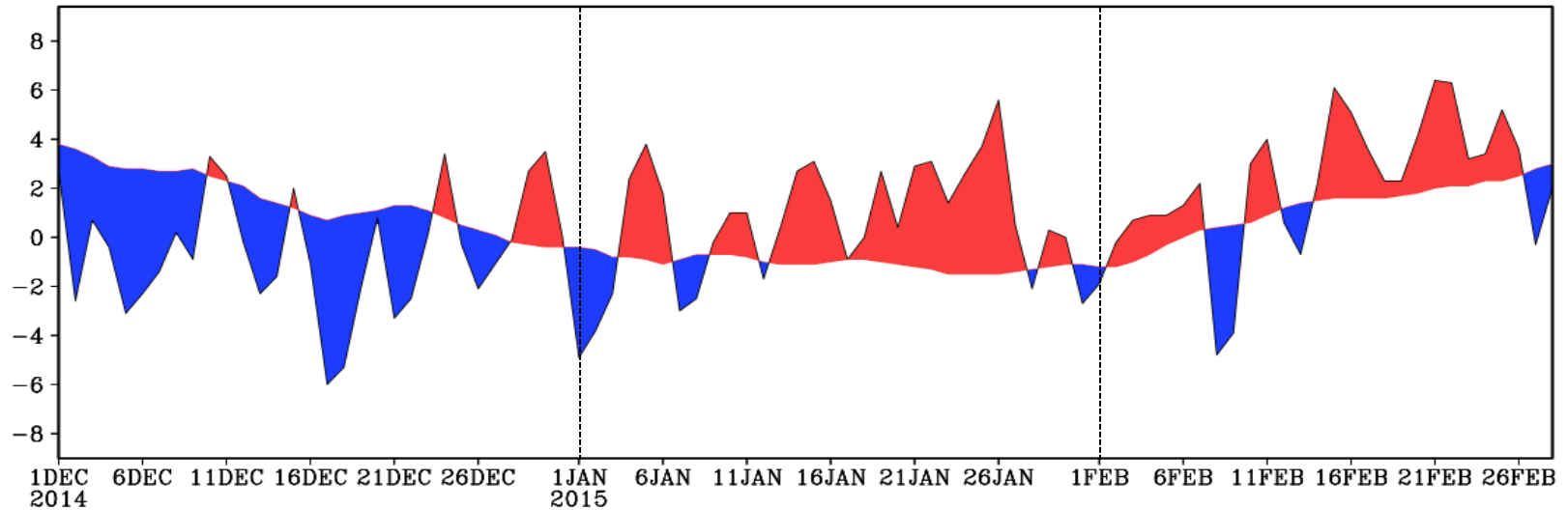


**Southward cold air**

	Dec	Jan	Feb
SAT	0.35*	0.41*	0.31*
PRCP	-0.05	0.28	0.15

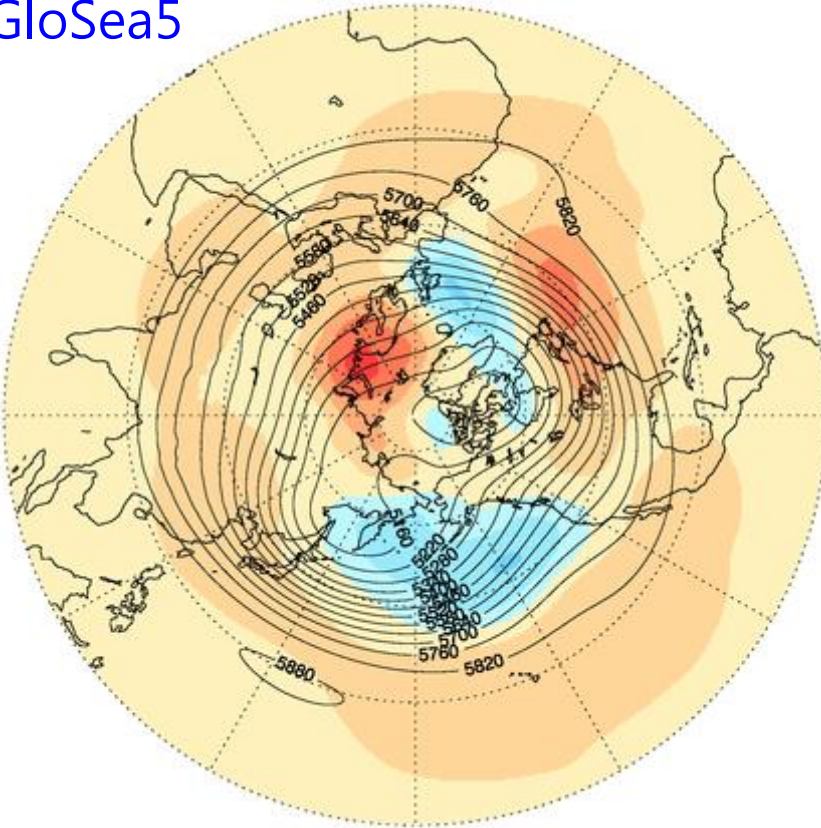
# Overview of Winter 2014/15

Korea

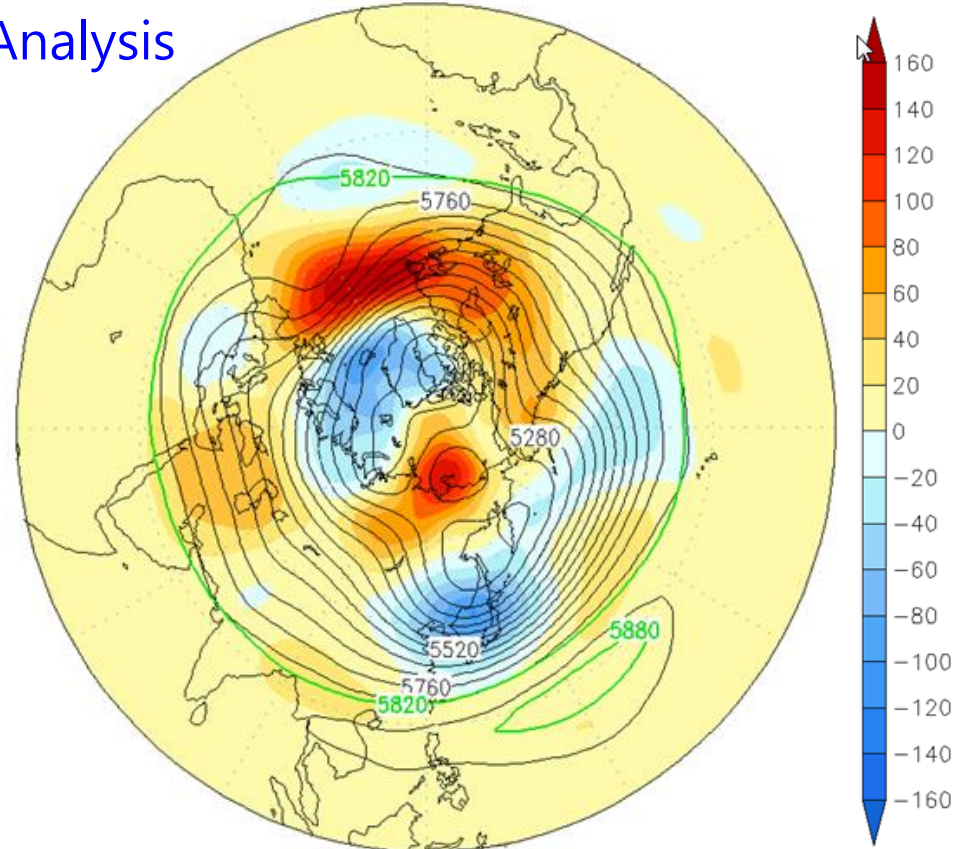


# Overview of Winter 2014/15 - cold surge for December

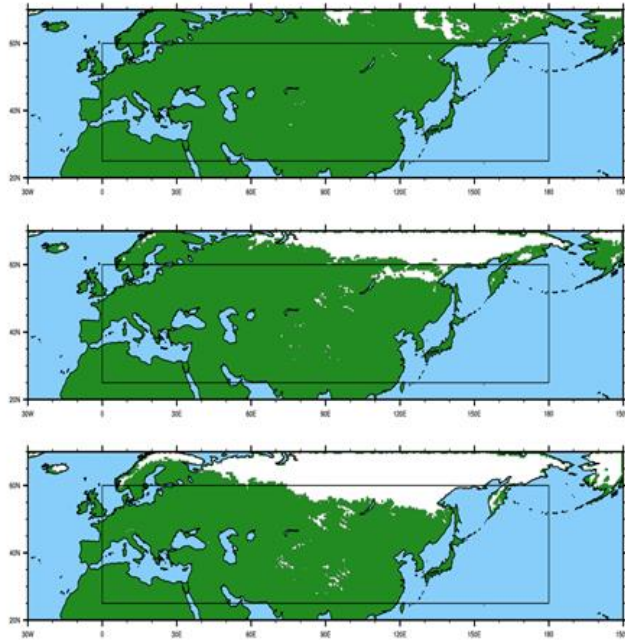
GloSea5



Analysis

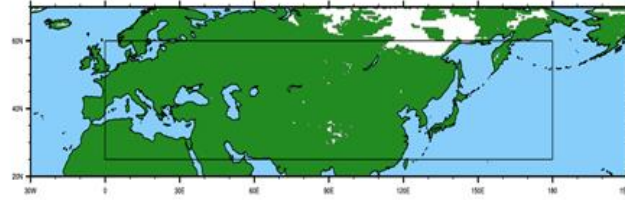


# Overview of Winter 2014/15 - Snowcover and Arctic Sea Ice

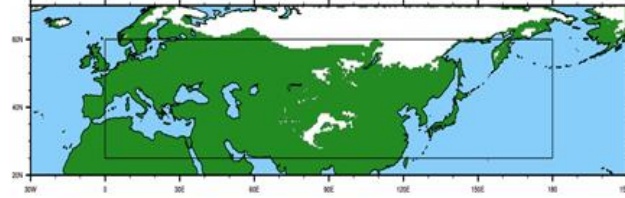


Normal year (October)

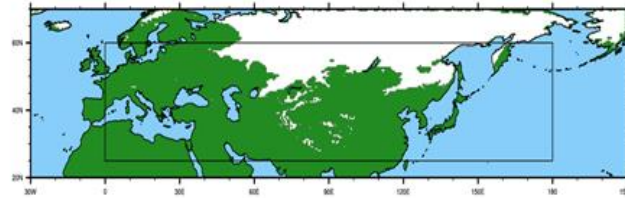
10. 1



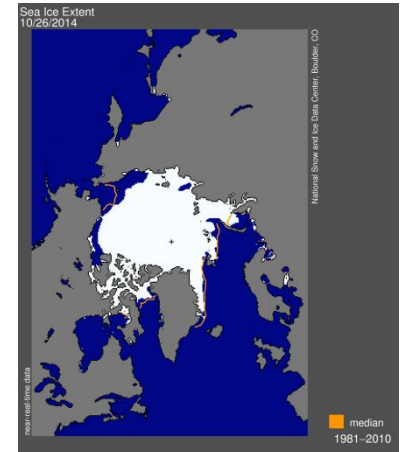
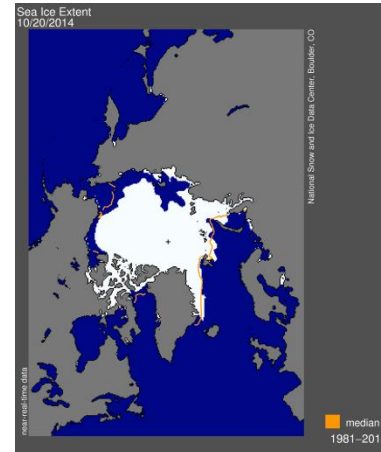
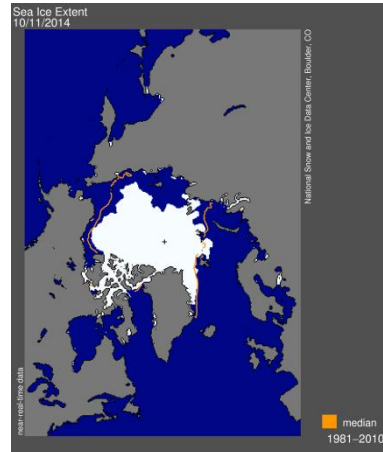
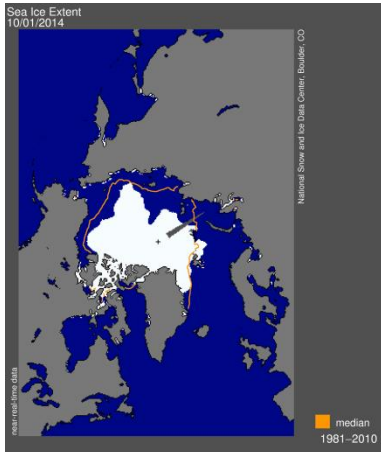
10. 15



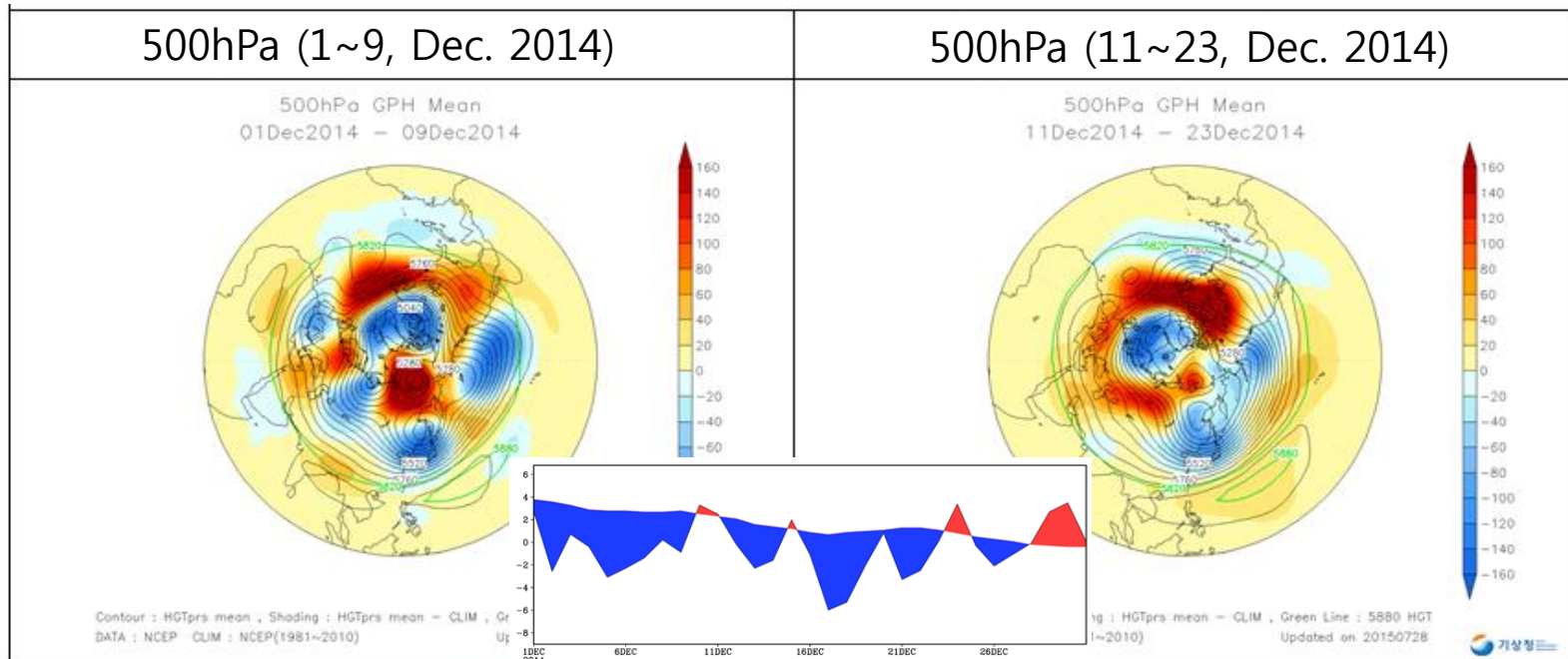
10. 30



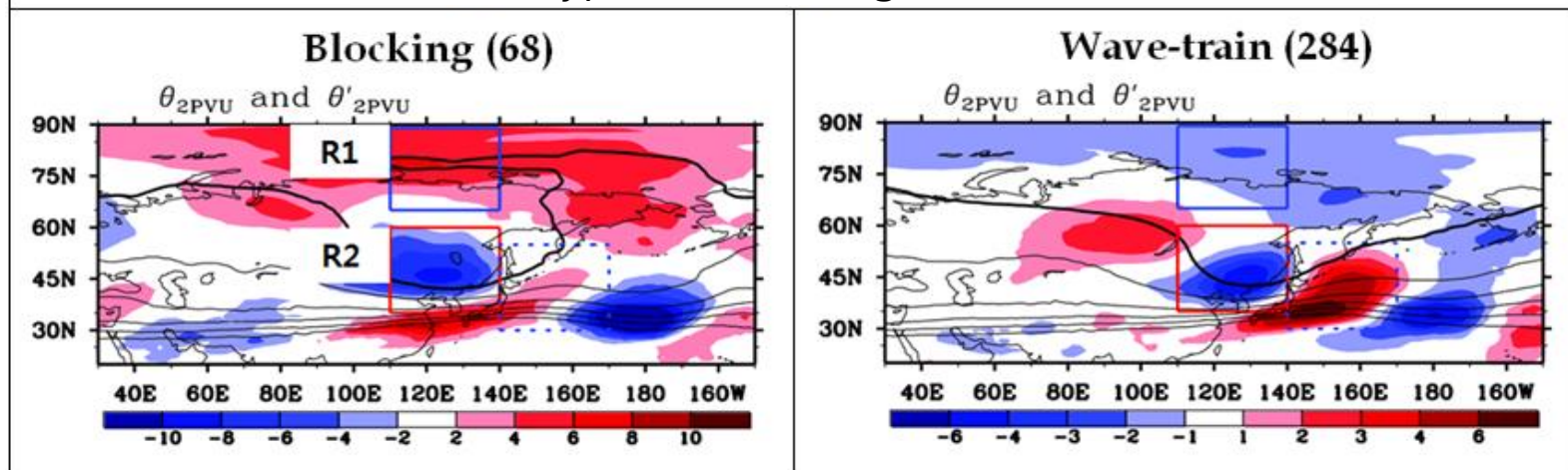
October 2014



# Overview of Winter 2014/15 - Blocking activity



Two types of cold surge (Park et al., 2014)



# Summary

## ■ Consideration for prediction

- El-Niño : Strong intensity, EP type
- Low sea-ice over the Laptev sea for previous October is likely to induce below-normal temperature for December over Korea
- Anomalous warmth in the Barents-Kara Sea is expected to bring cold surge across East Asia.
- More snow-cover over the Eurasian continent and its fast progress in the fall are significantly related to below-normal temperature for early winter

## ■ 2015/16 winter outlook

- Near normal winter monsoon is expected
- Strong intra-seasonal variation

	Temperature			Precipitation		
	Below Normal	Near normal	Above normal	Below Normal	Near normal	Above normal
Winter	20	50	30	20	40	40

Thank you !!

A horizontal blue bar with a gradient from light blue on the left to dark blue on the right. On the right side, there are several overlapping, light blue circular arcs that create a sense of motion or a stylized globe.