Climate Outlook for Winter 2015/16

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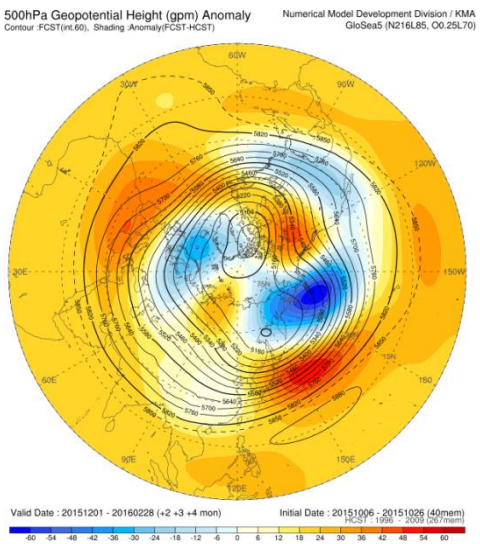
KMA

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



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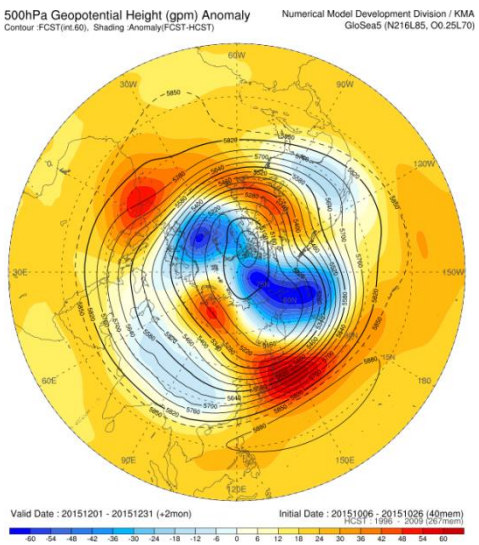

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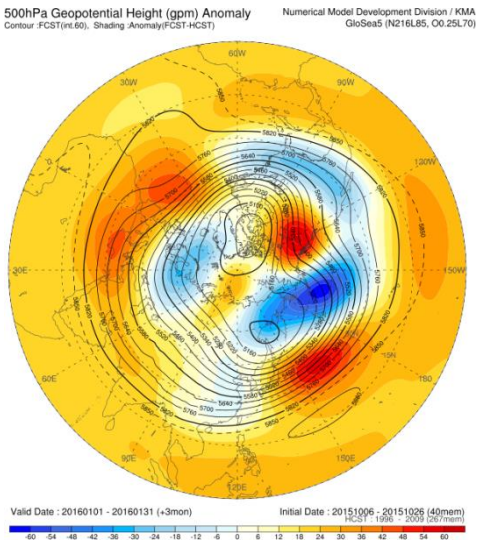

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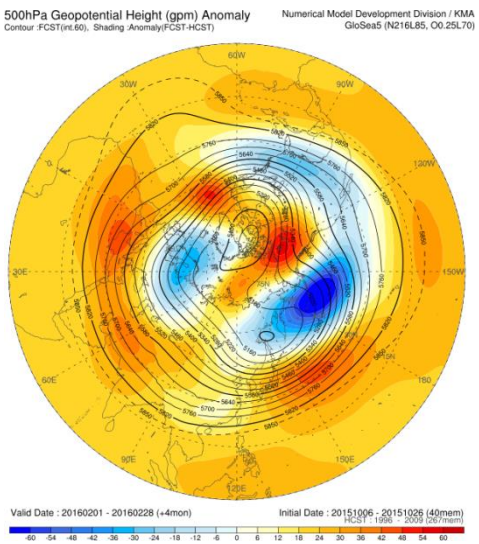
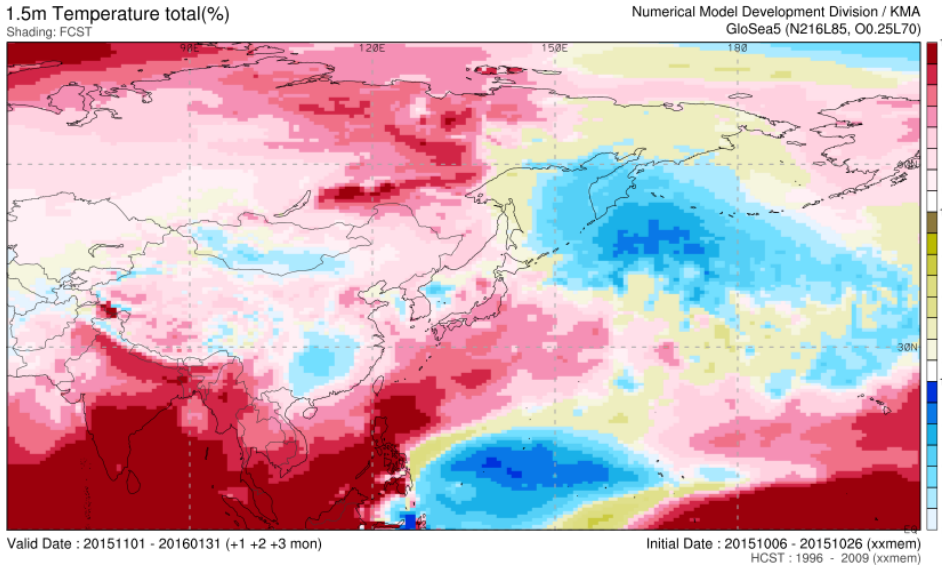
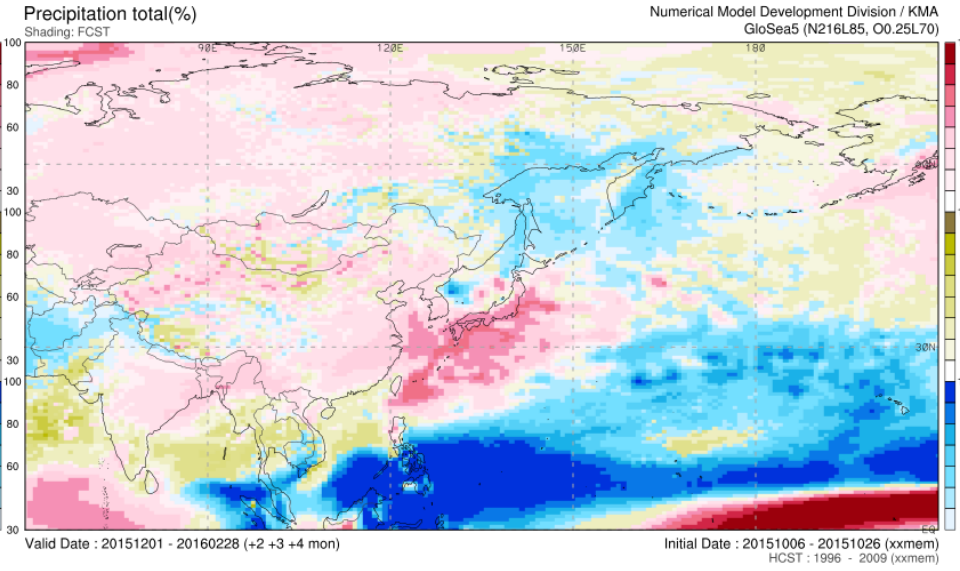
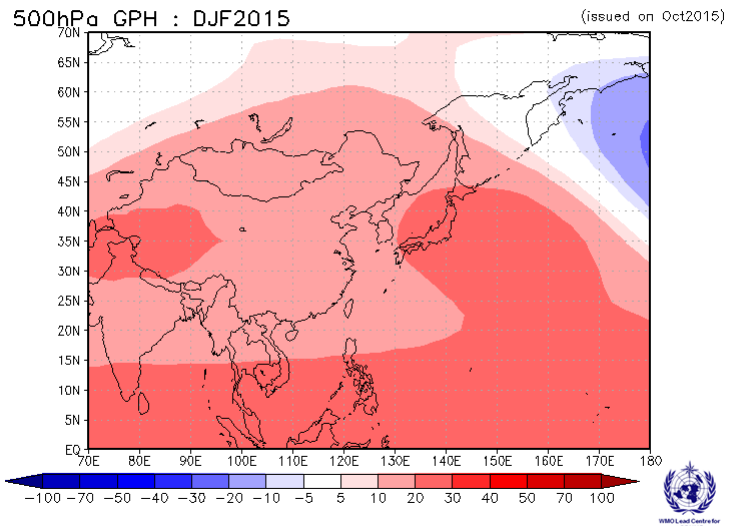






1. Dynamical model - WMO LC-LRFMME

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



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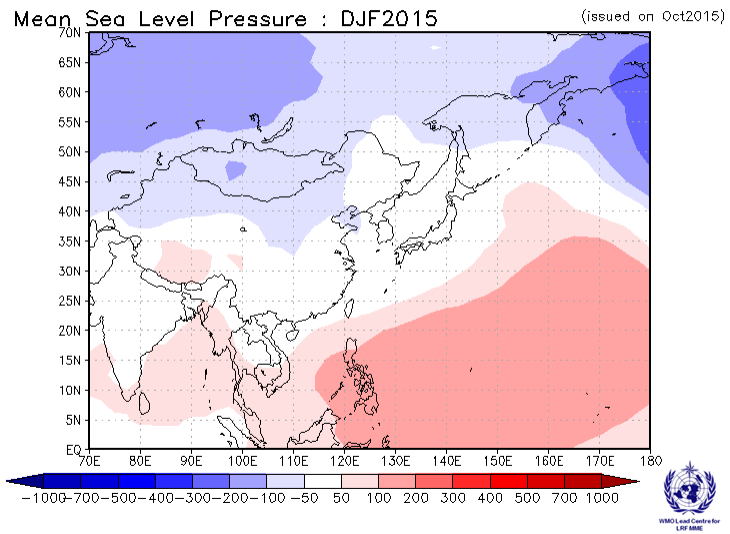

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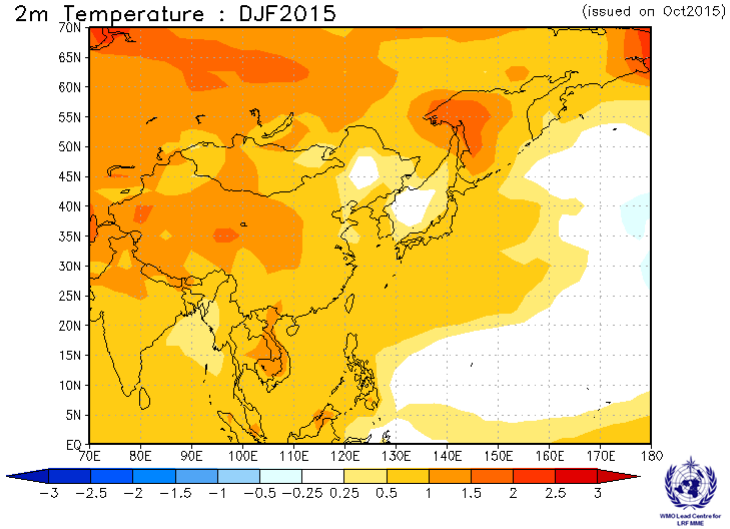

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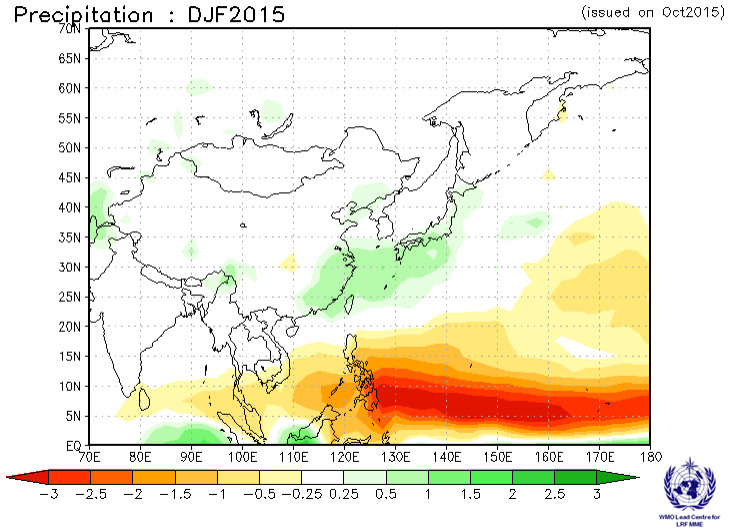
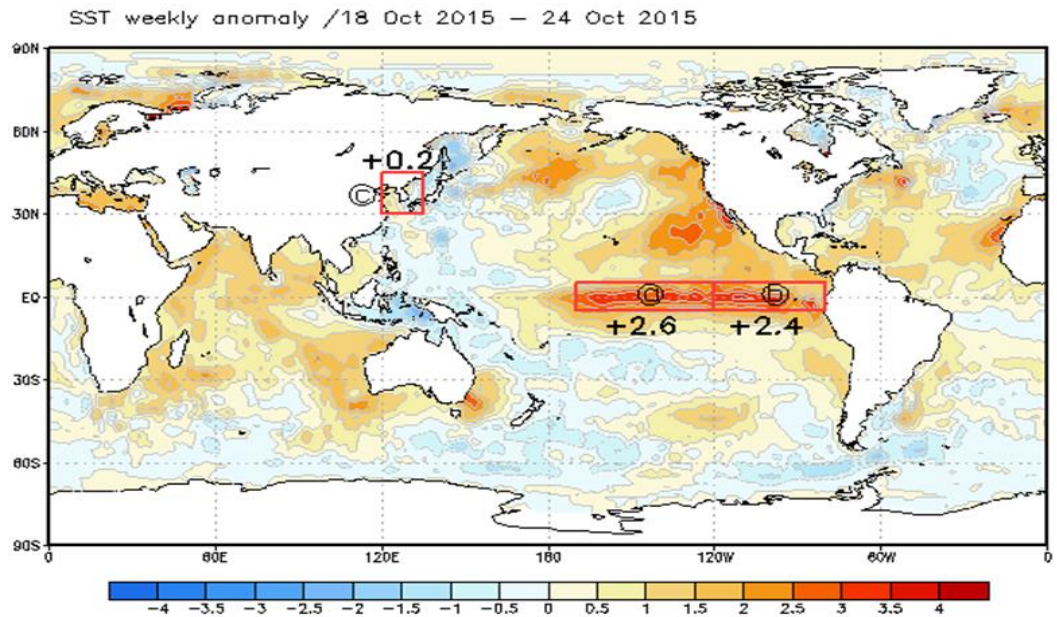
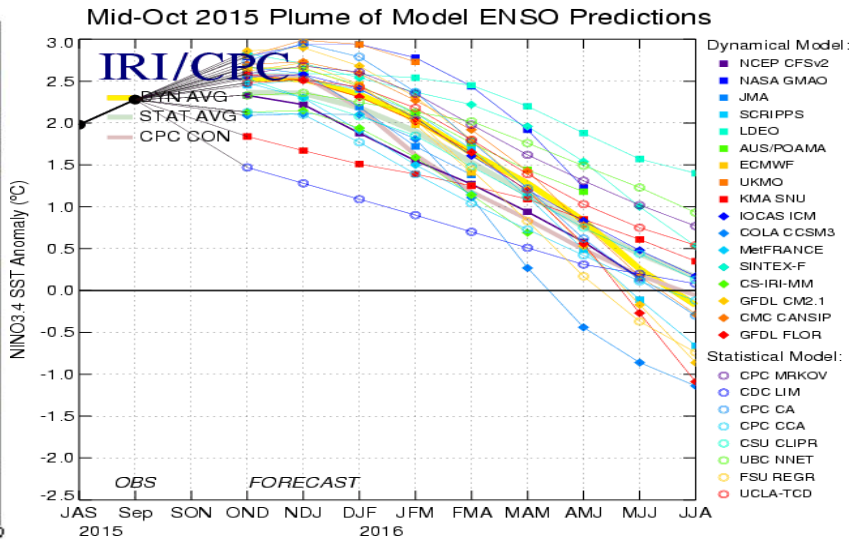
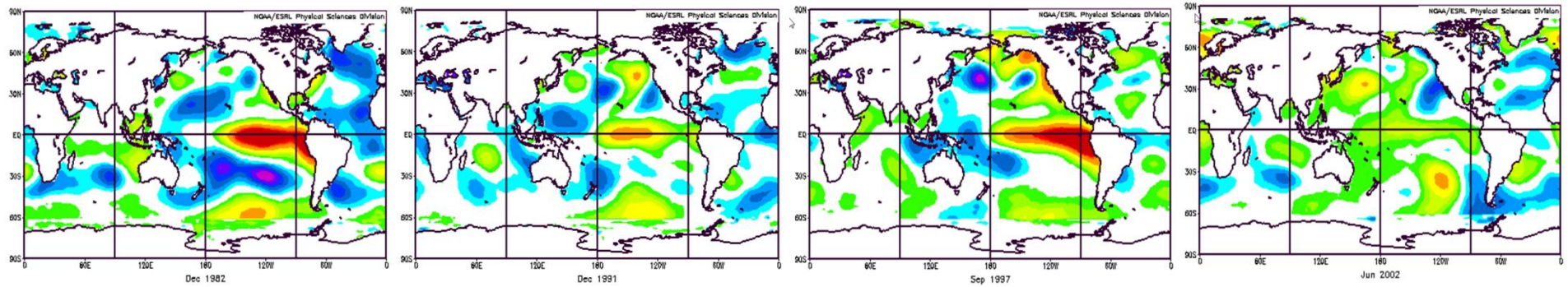


2. El-Niño – intensity, developing pattern (EP, CP, EP+CP)

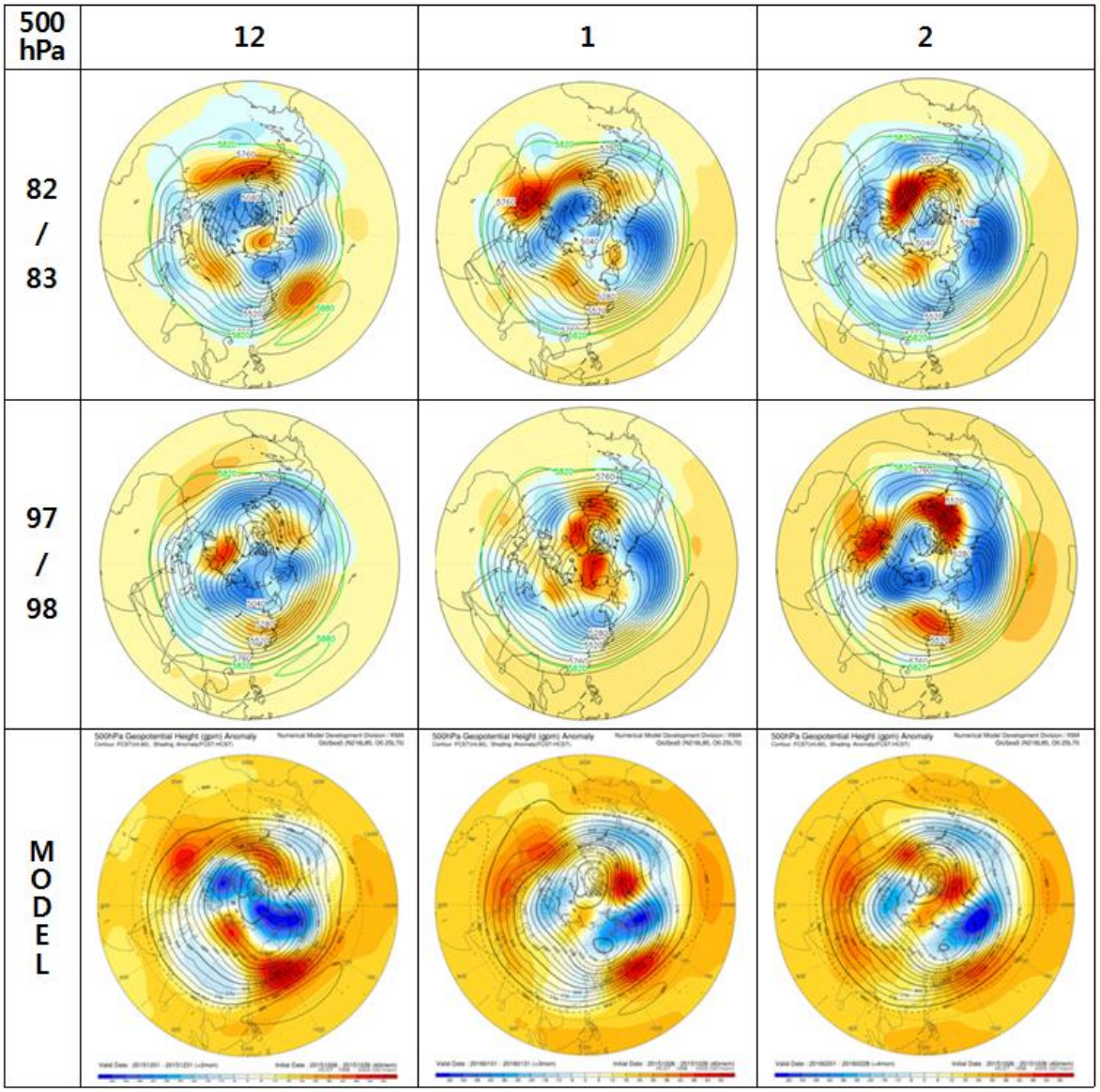






According to the majority of international climate outlook models, the 2015-16 El Niño is likely to be strong intensity with **EP type**, potentially placing **this El Niño event among the four strongest events since 1950** (1972-73, 1982-83, 1997-98).

2. El-Niño – impact



Temperature anomaly(℃), 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

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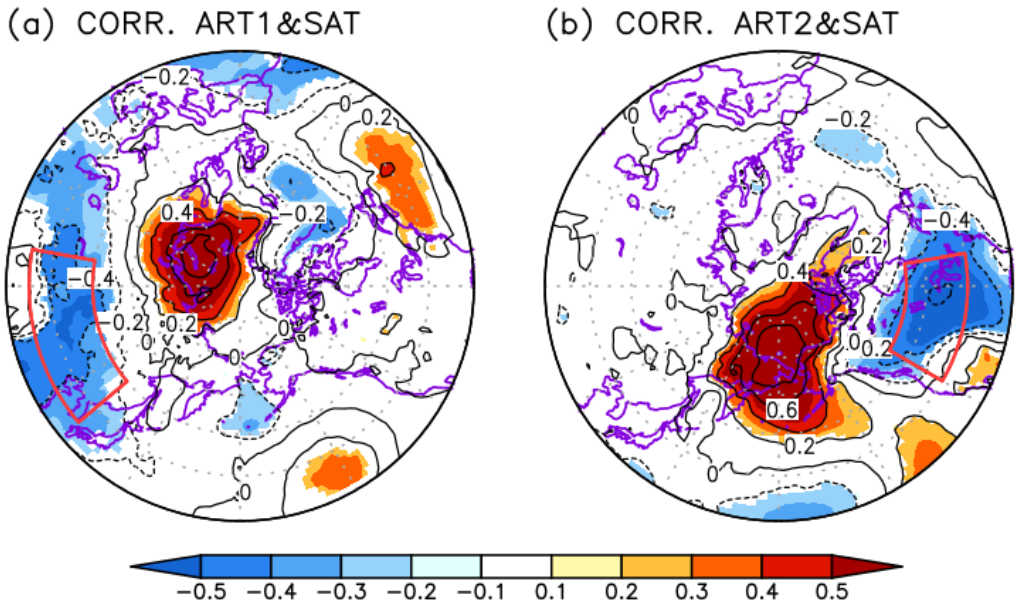
Two distinct influences of Arctic warming on cold winters over North America and East Asia

Jong-Seong Kug[1], Jee-Hoon Jeong[2]*, Yeon-Soo Jang[1], Baek-Min Kim[3], Chris K. Folland[4,5], Seung-Ki Min[1] and Seok-Woo Son[6]

❖ **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)**



✓**Warming in Barents-Kara Seas** → **East Asia Cooling**

✓**Warming in East Siberia-Chukchi Seas** → **North America Cooling**

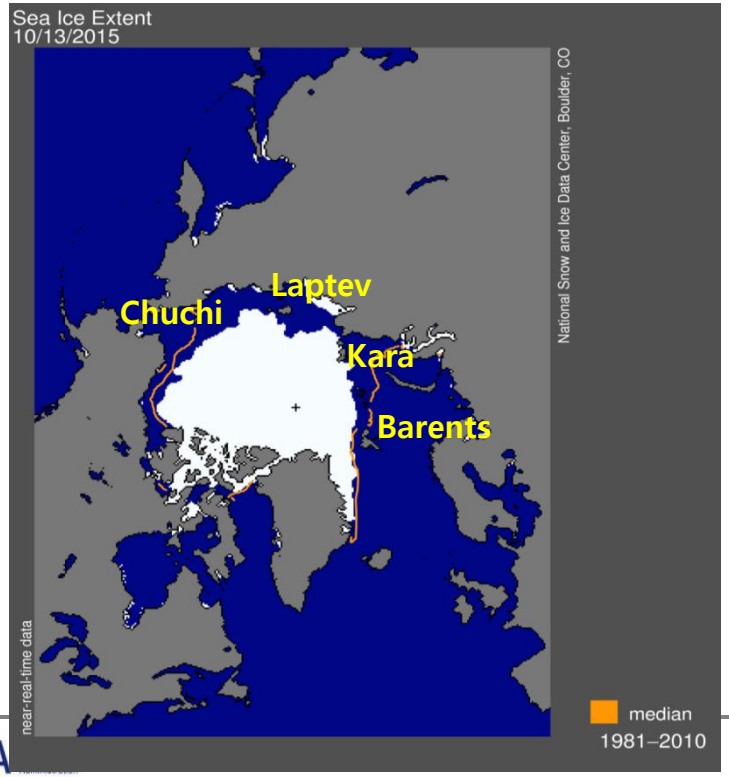
3. Impact of Arctic Sea Ice

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

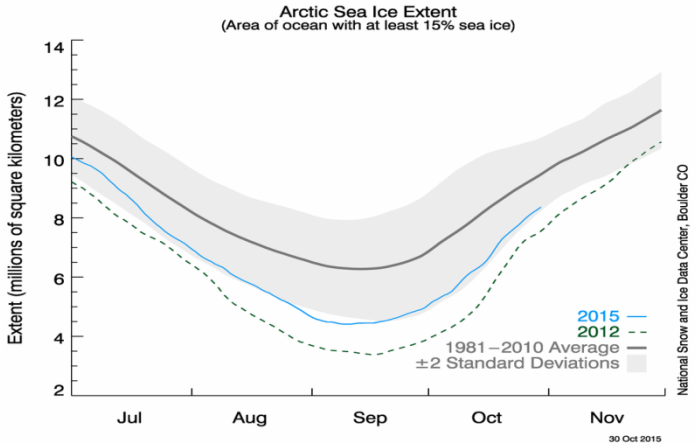
✓ Sea Ice Concentration over Kara-Barents(65-80N, 60~100E)

Korea	Dec	Jan	Feb
SAT	**0.43***	0.04	**0.47***
PRCP	-0.15	0.11	0.15

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



Korea	Dec	Jan	Feb
SAT	**0.51***	0.17	0.24
PRCP	-0.05	0.12	-0.01



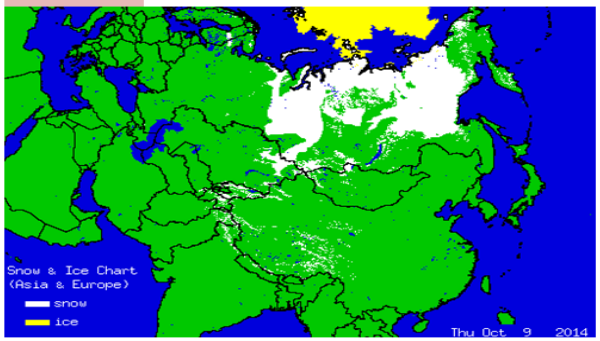
4. Impact of Snow-cover

✓ **October Snow Advanced Index(SAI)**

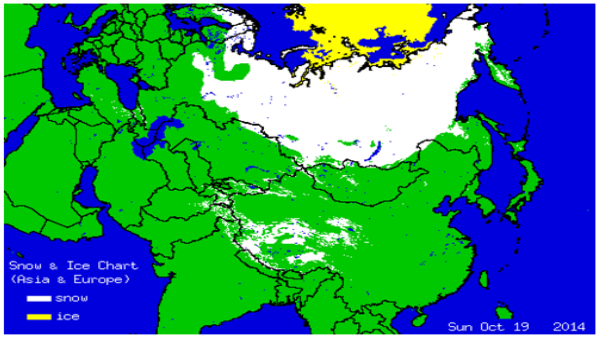
Korea	Dec	Jan	Feb
SAT	**-0.31***	**-0.32***	-0.10
PRCP	0.11	-0.19	-0.11

2014

9 Oct



19 Oct



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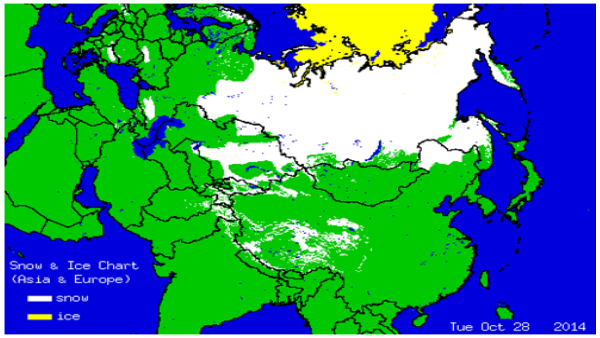
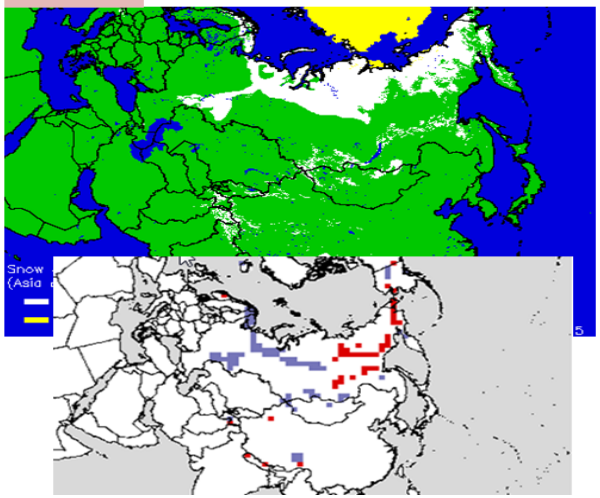
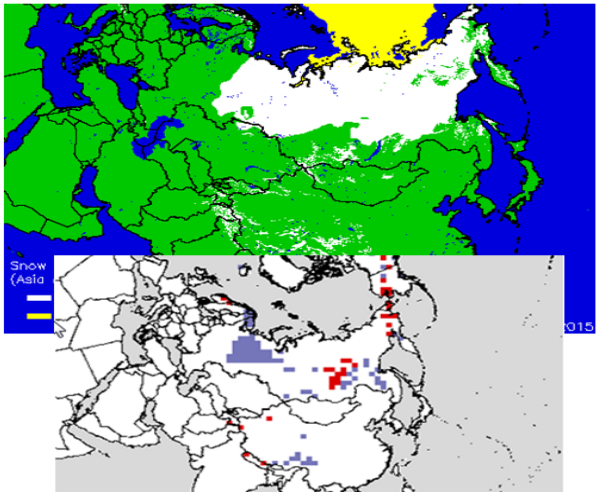
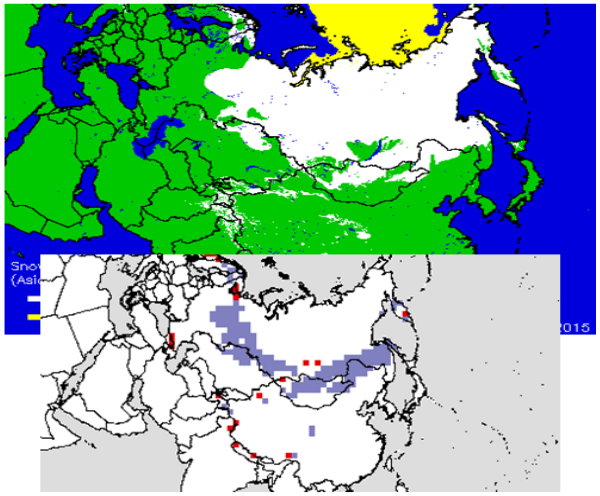


2015

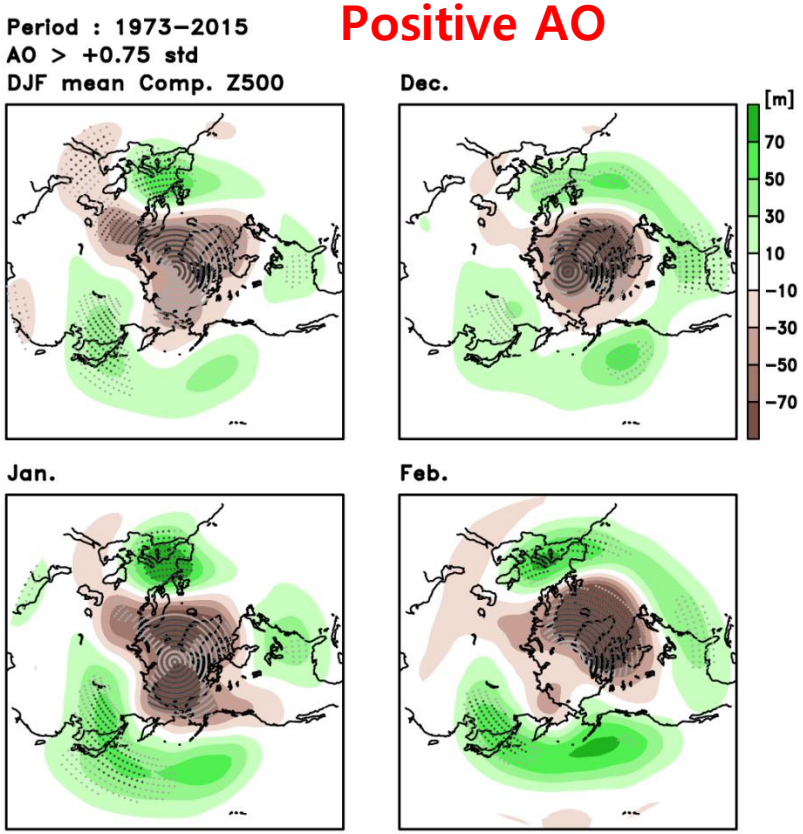




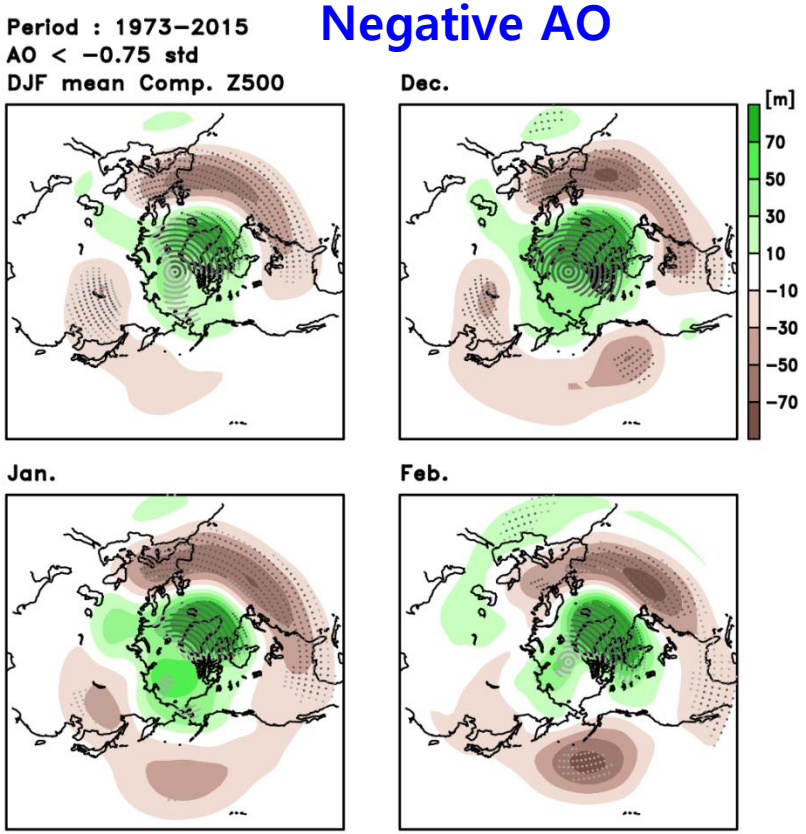


5. AO (Arctic Oscillation) – low predictability

Positive AO



Negative AO



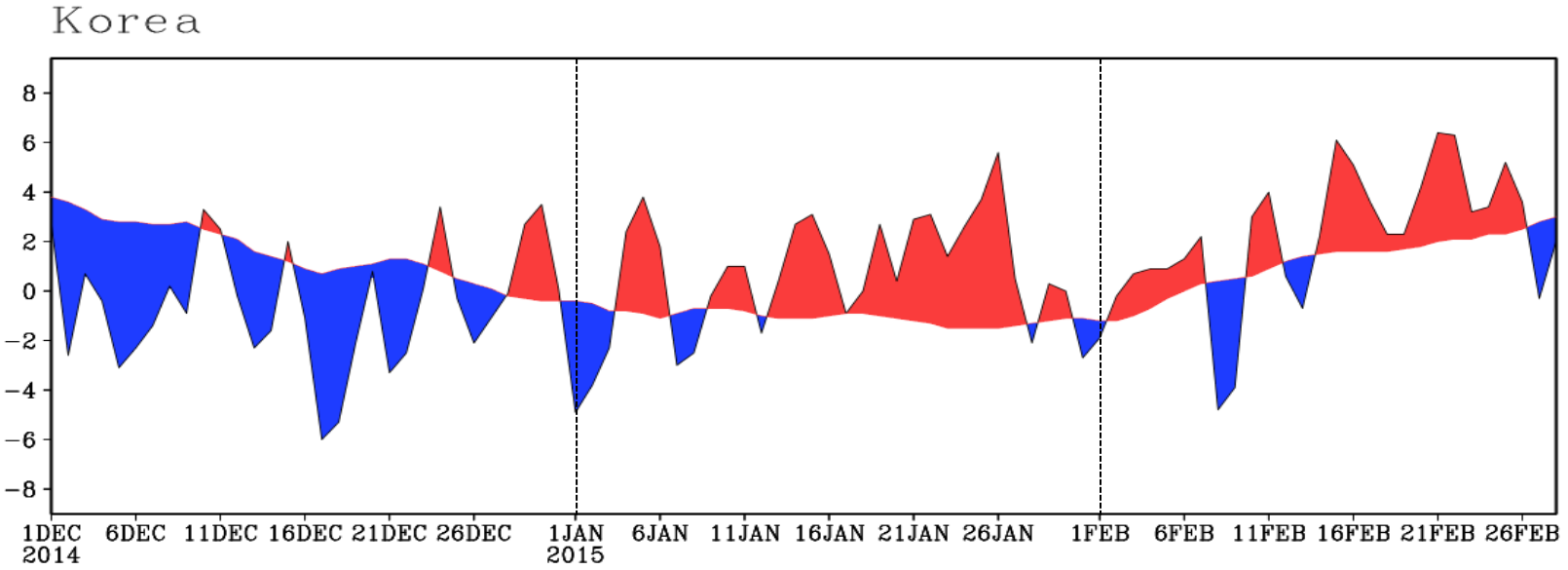
Weakening of Siberian High

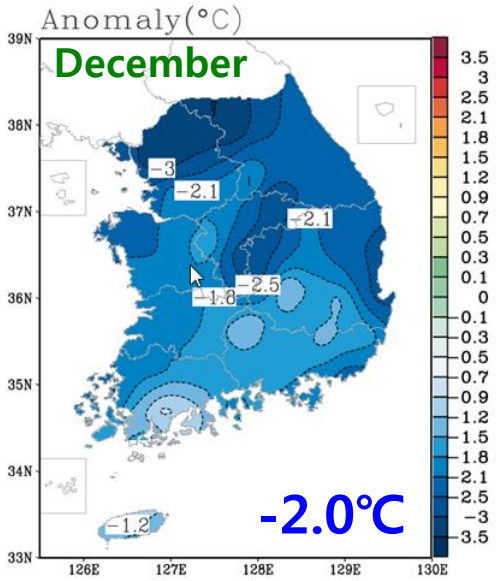
Southward cold air

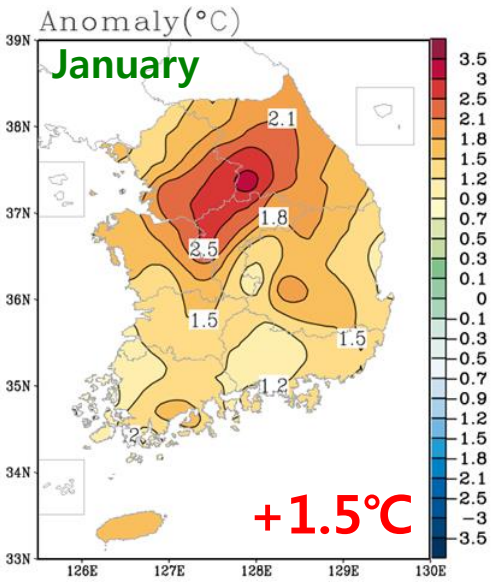
✓ **Artic Oscillation Index (AOI)**

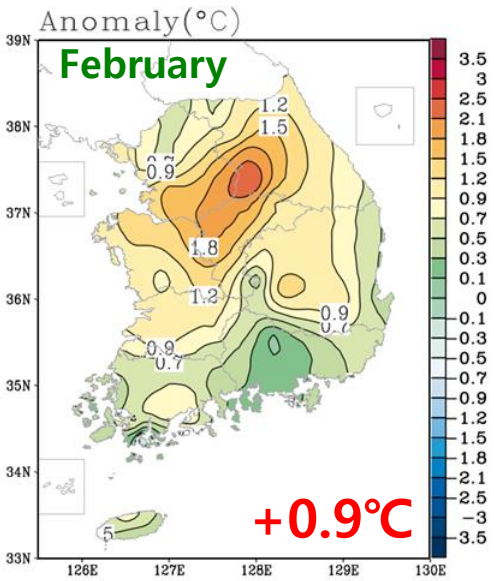
	Dec	Jan	Feb
SAT	**0.35***	**0.41***	**0.31***
PRCP	-0.05	0.28	0.15

Overview of Winter 2014/15



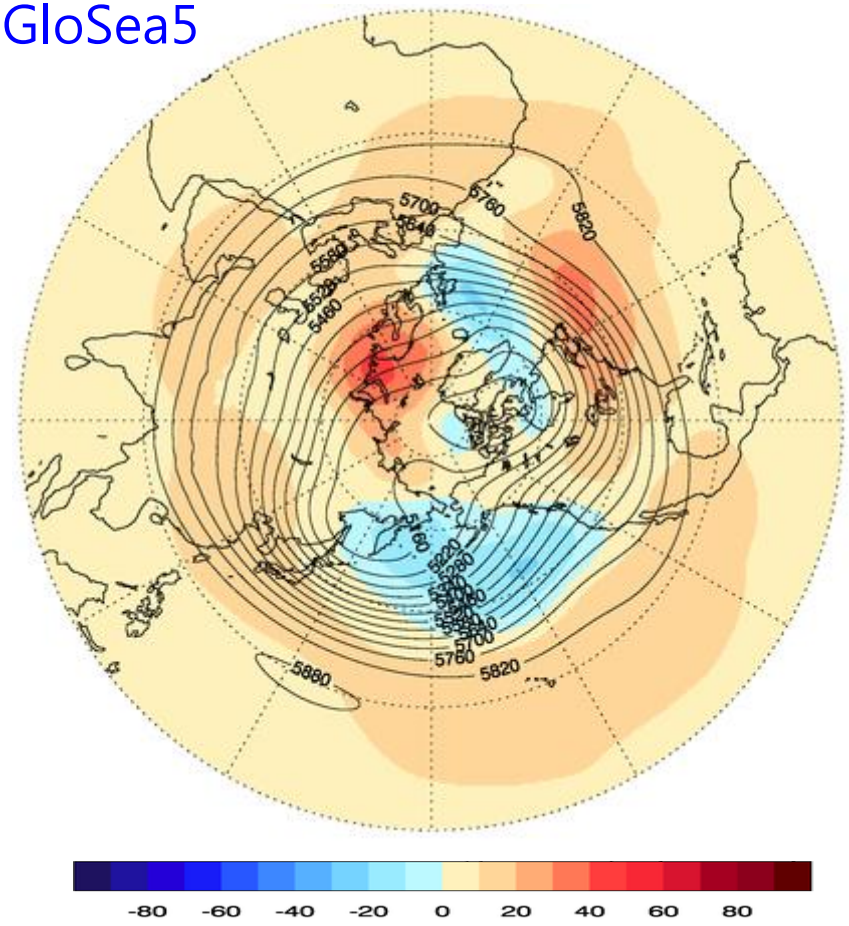




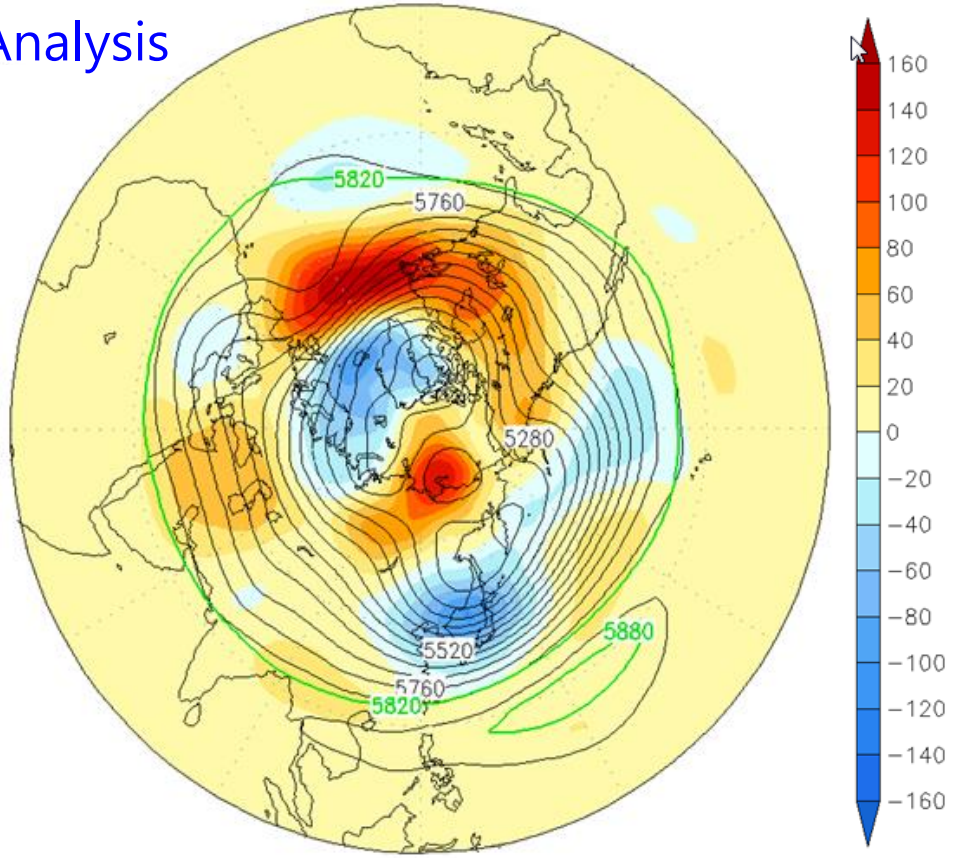


Overview of Winter 2014/15 - cold surge for December

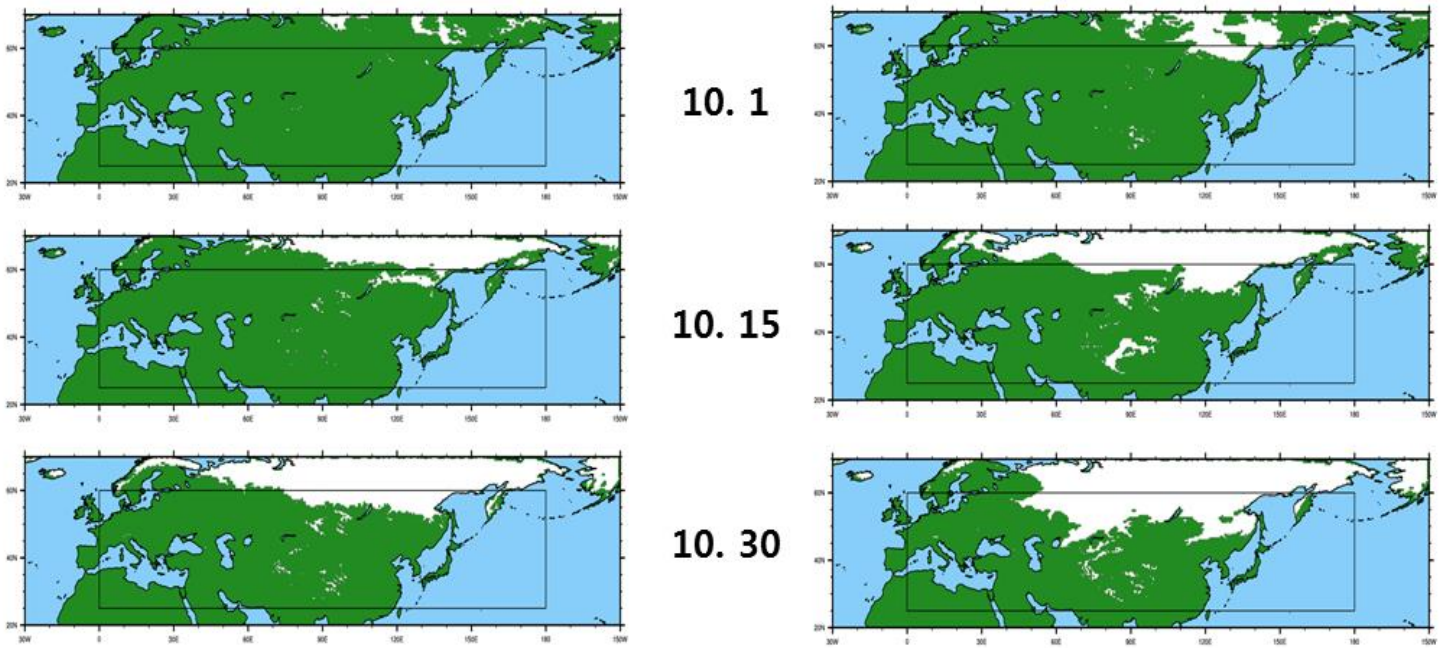
GloSea5

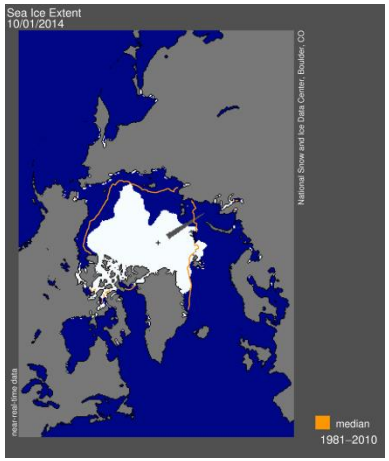


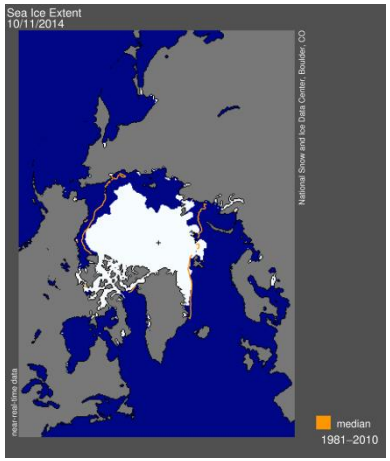
Analysis

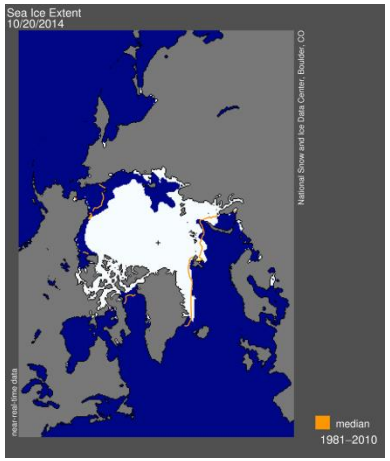


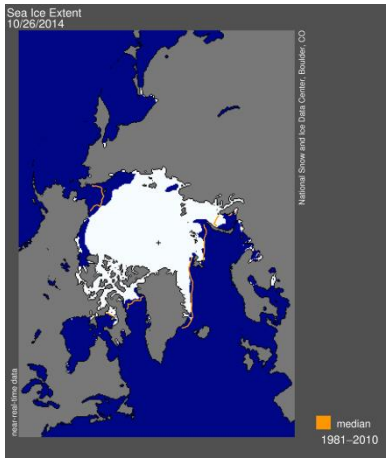
Overview of Winter 2014/15 - Snowcover and Arctic Sea Ice





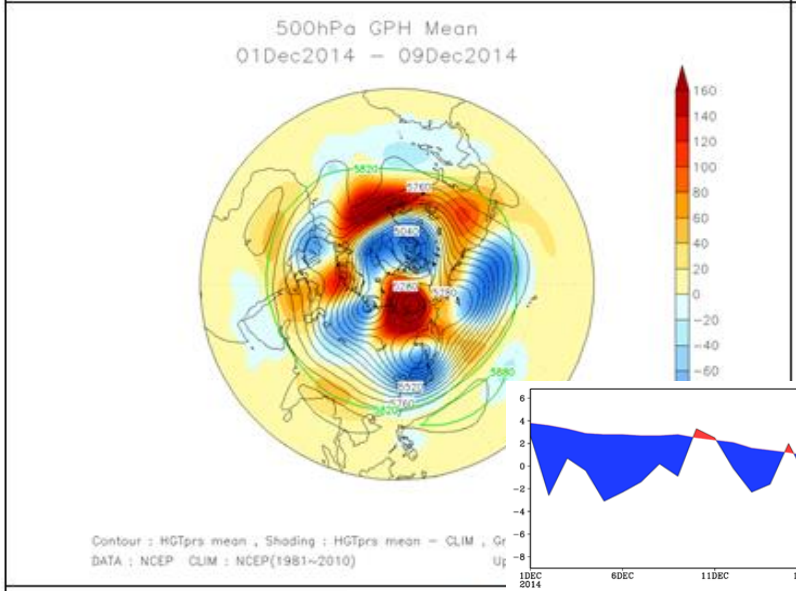




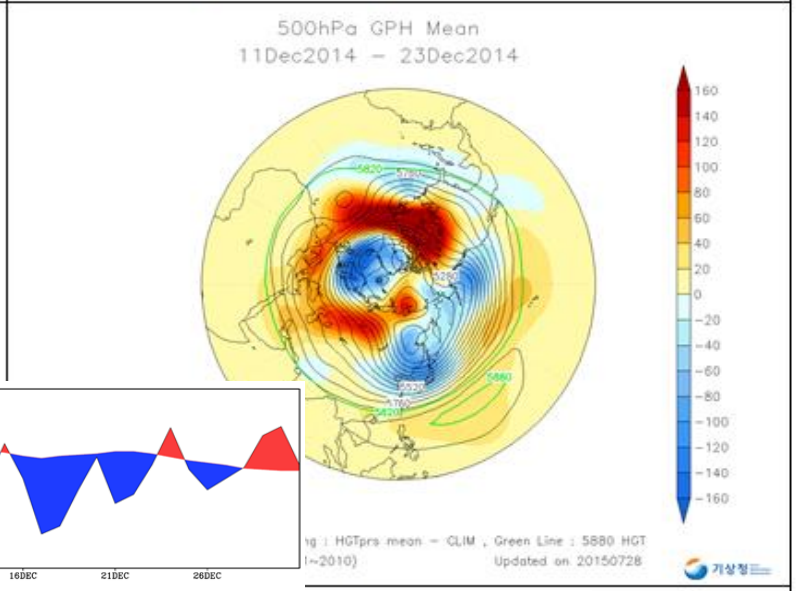


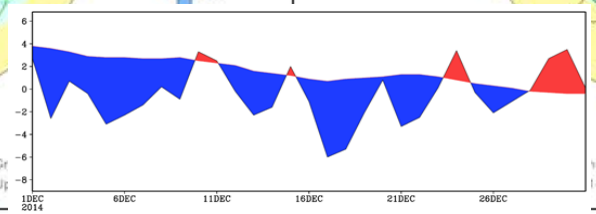
Overview of Winter 2014/15 - Blocking activity

500hPa (1~9, Dec. 2014)

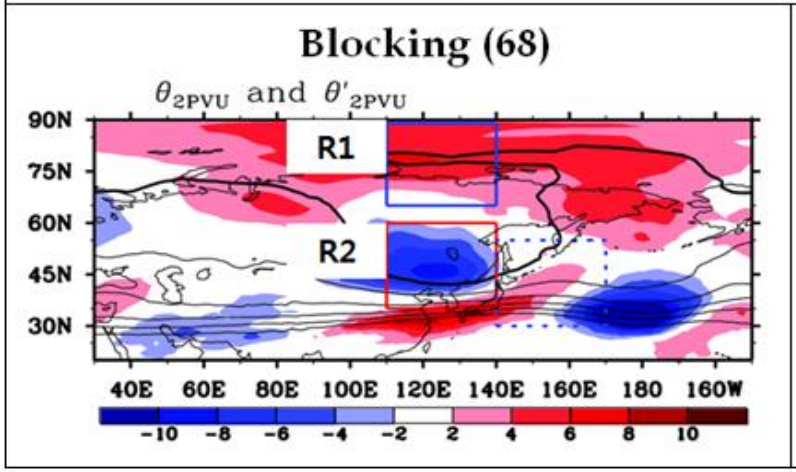


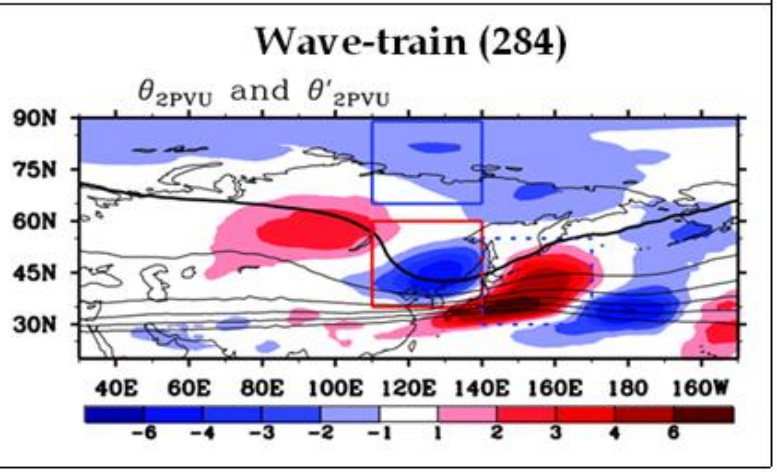
500hPa (11~23, Dec. 2014)





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 !!