Korea Meteorological Administration

Climate Outlook for Winter 2018/19

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Considerate elements for winter prediction

Dynamical Models

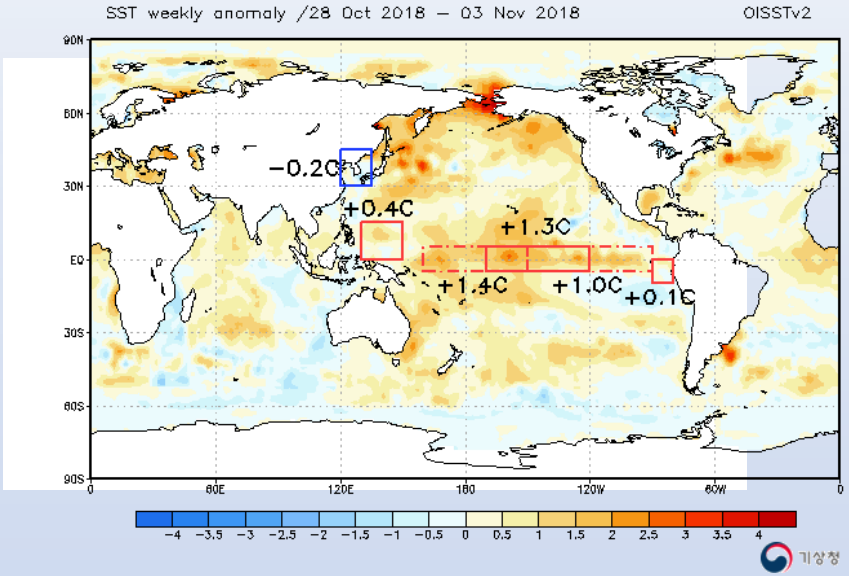
GloSea5,
WMO-LC LRFMME

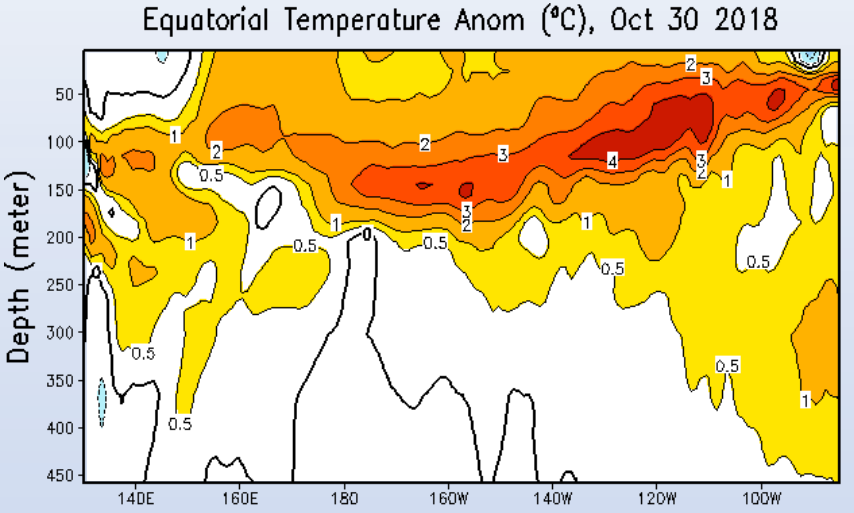
ENSO

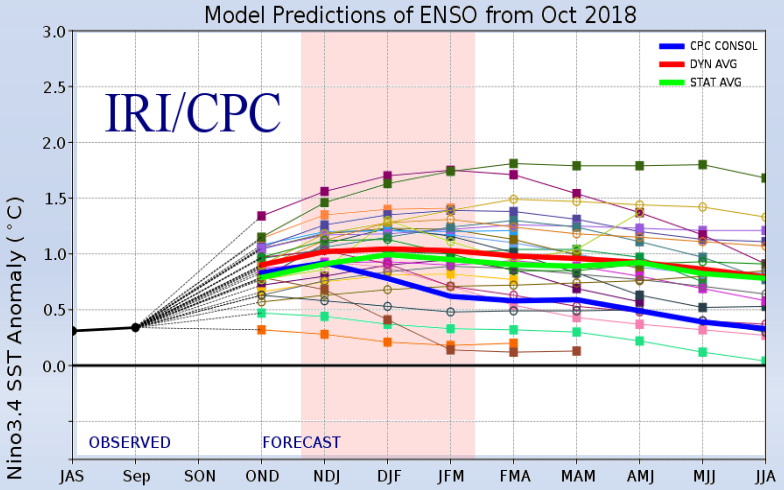
Sea Ice & Snow Cover

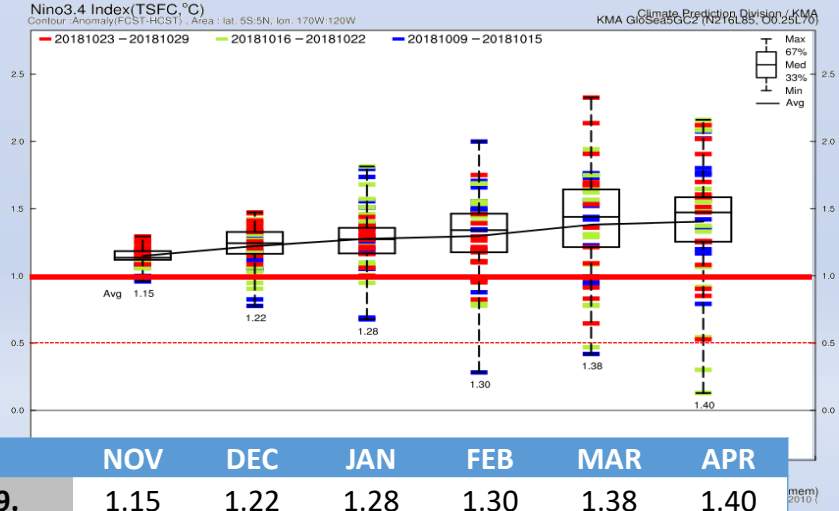
Others

ENSO Condition and Prediction



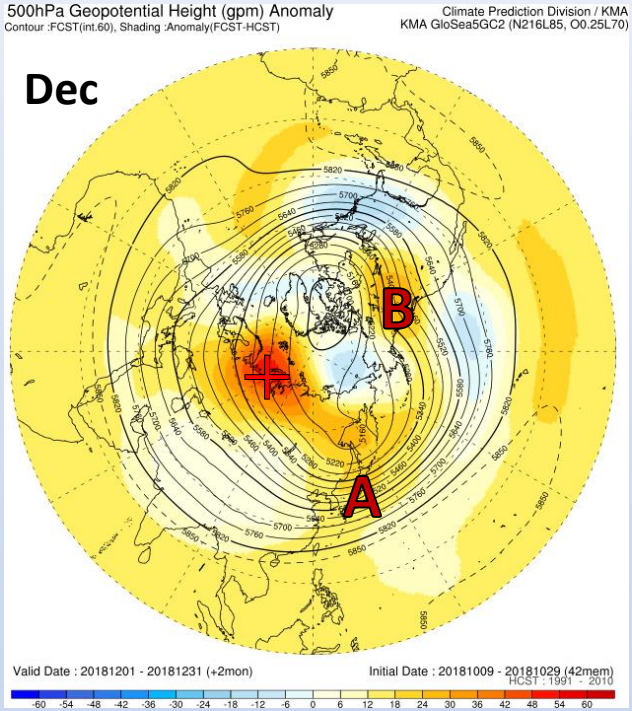


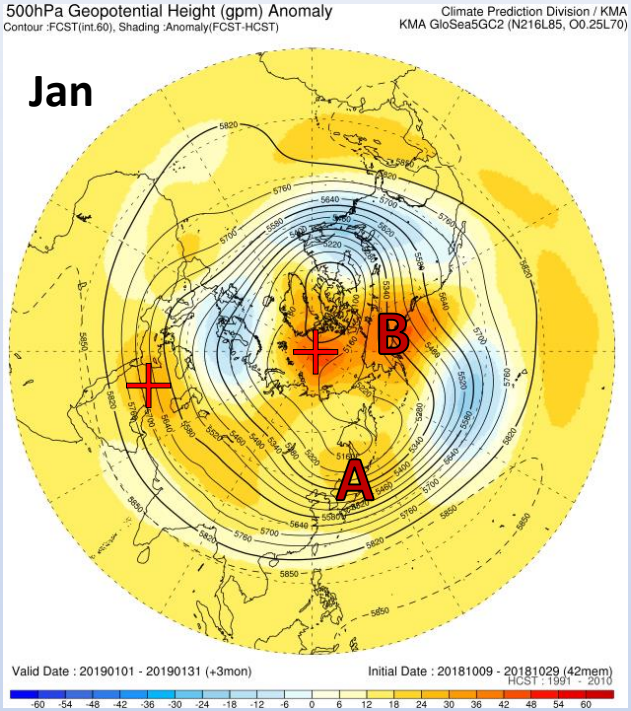


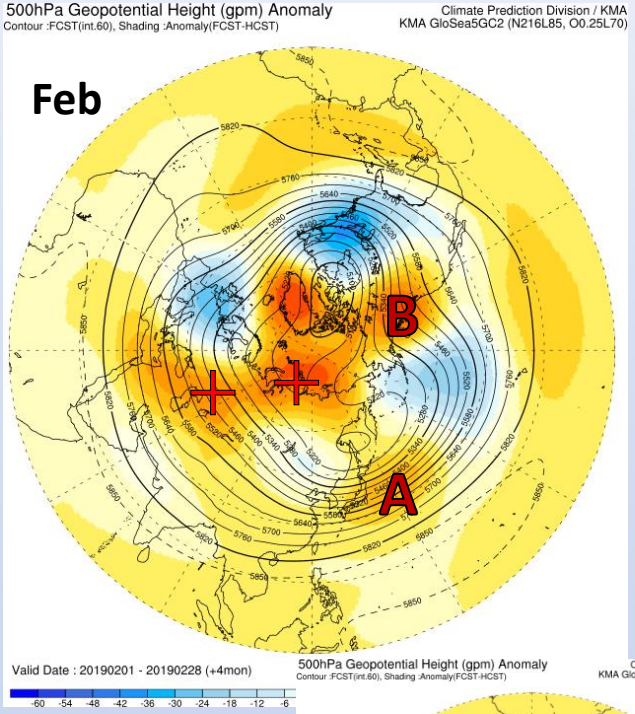


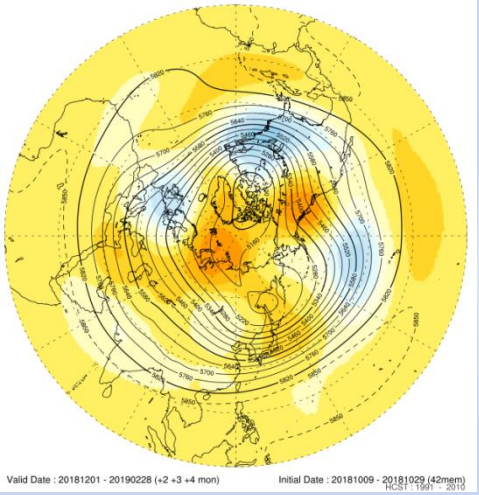
	NOV	DEC	JAN	FEB	MAR	APR
10.29.	1.15	1.22	1.28	1.30	1.38	1.40
10.8.	1.25	1.43	1.45	1.38	1.56	1.54
9.10.	0.80	0.88	0.94	0.90	1.05	

500hPa GPH (GloSea5_10.29)









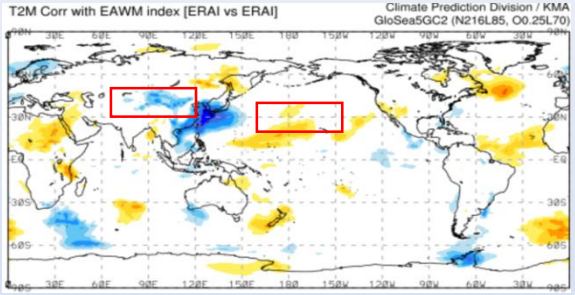
- Positive anomaly over Japan**(A)** & Western side North America**(B)**
- There are relatively negative anomalies over **(Dec)** Western & **(Feb)** Northwestern side of region A.

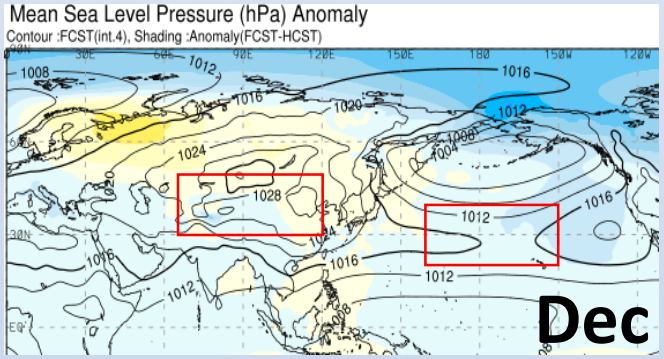
East Asia Winter Monsoon(GloSea5_10.29)

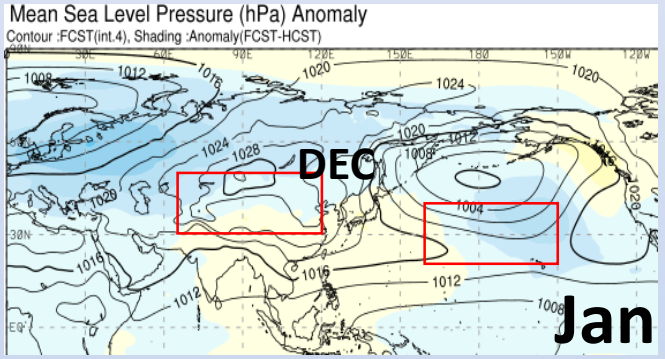
EAWM Index

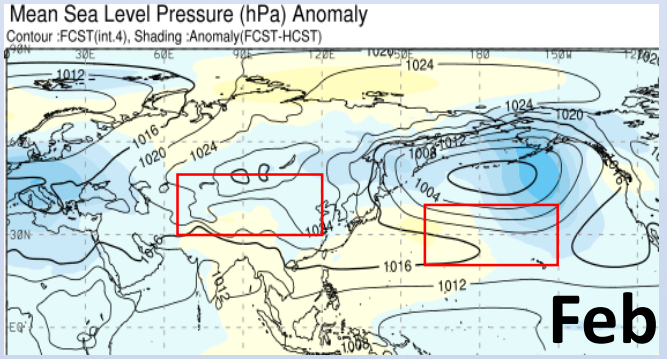
MSLP / σ_{MSLP}

[65-120E, 30-50N] - [160-210E, 20-40E]

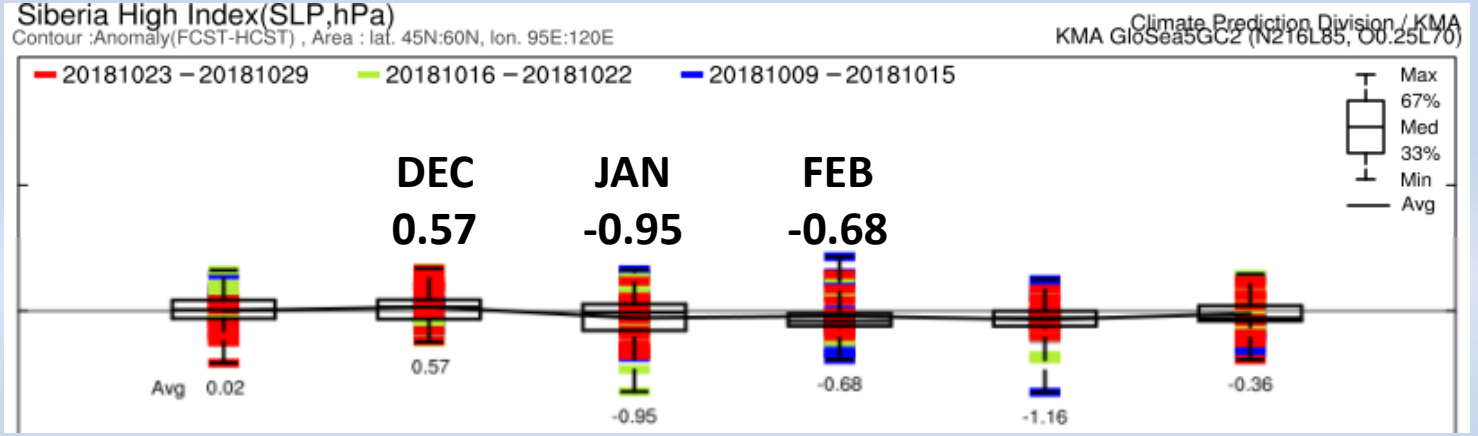




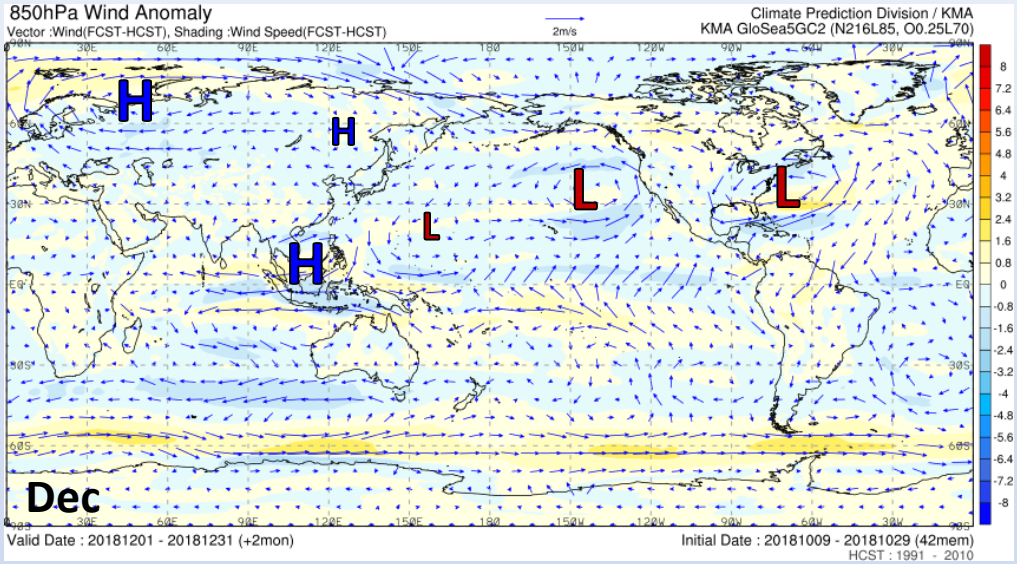


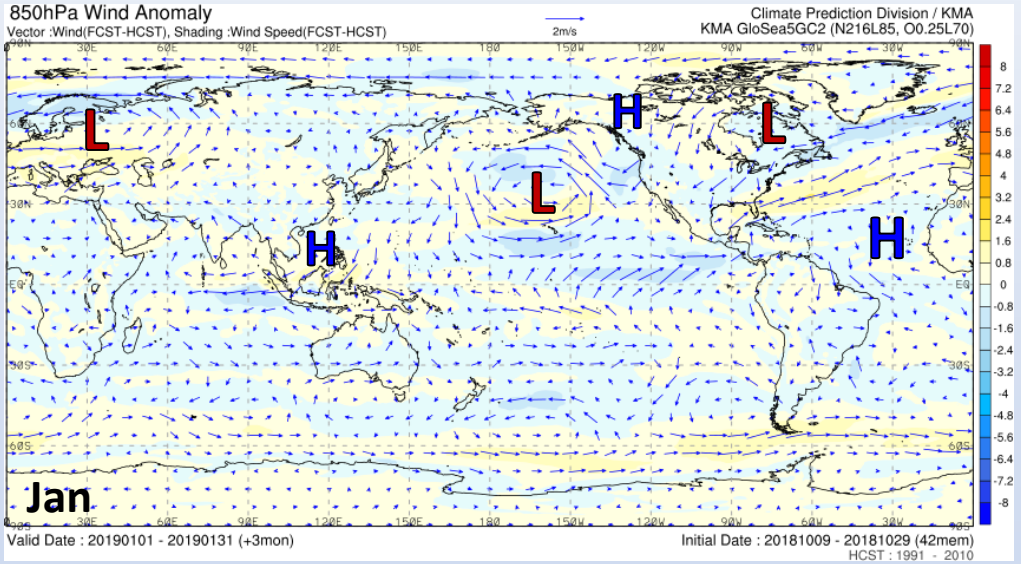


Siberian High Index
MSLP(95E-120E, 45N-60N)



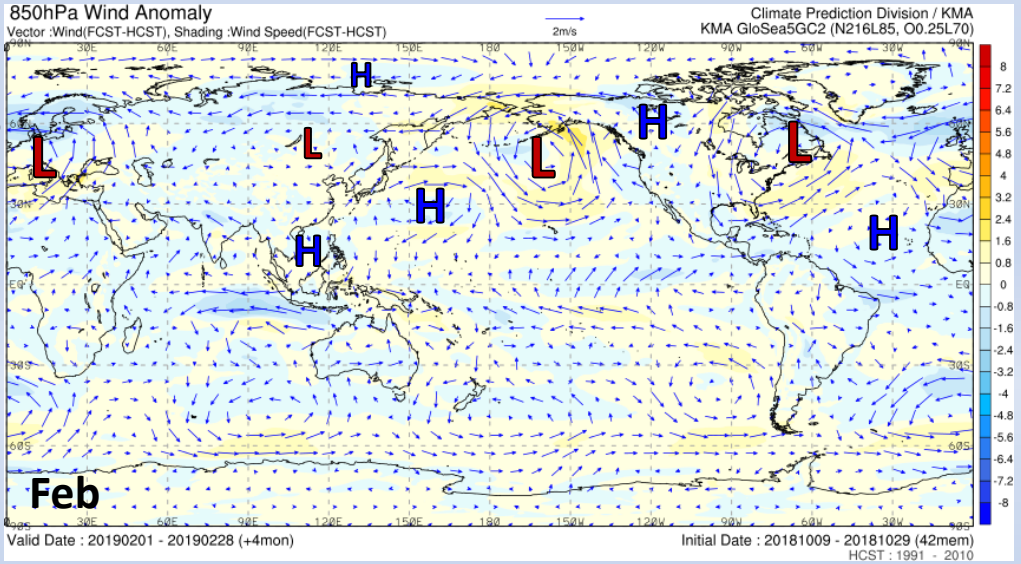
850hPa Wind Anomaly(GloSea5_10.29)





Anti-cyclonic circulation around the Philippines seems to be atmospheric reaction induced by El-Nino.

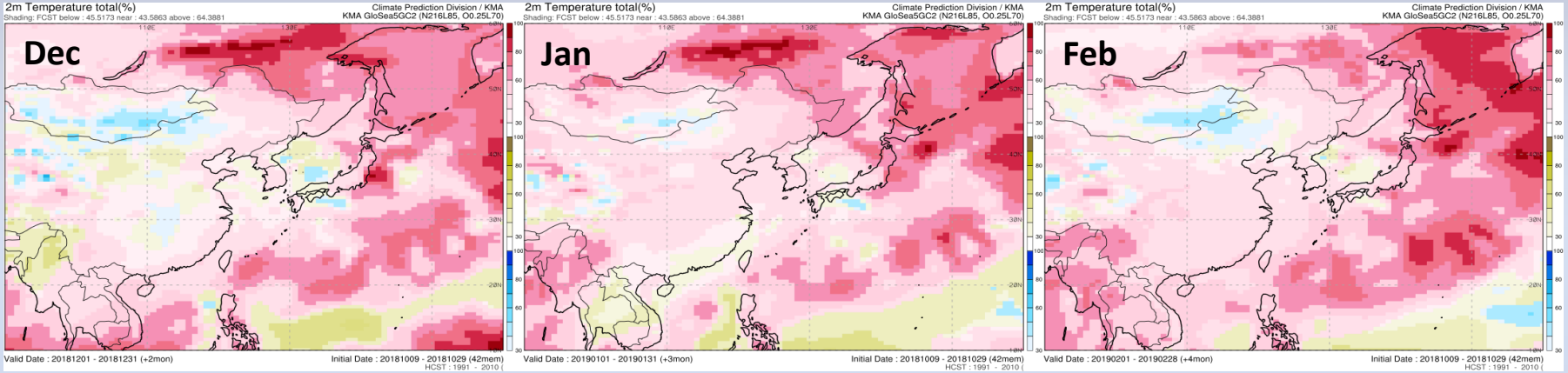
During December, there are the Anti-cyclonic anomaly over the near Barents/Kara Sea.
On the other hand, the circulation replaced to Cyclonic anomaly.



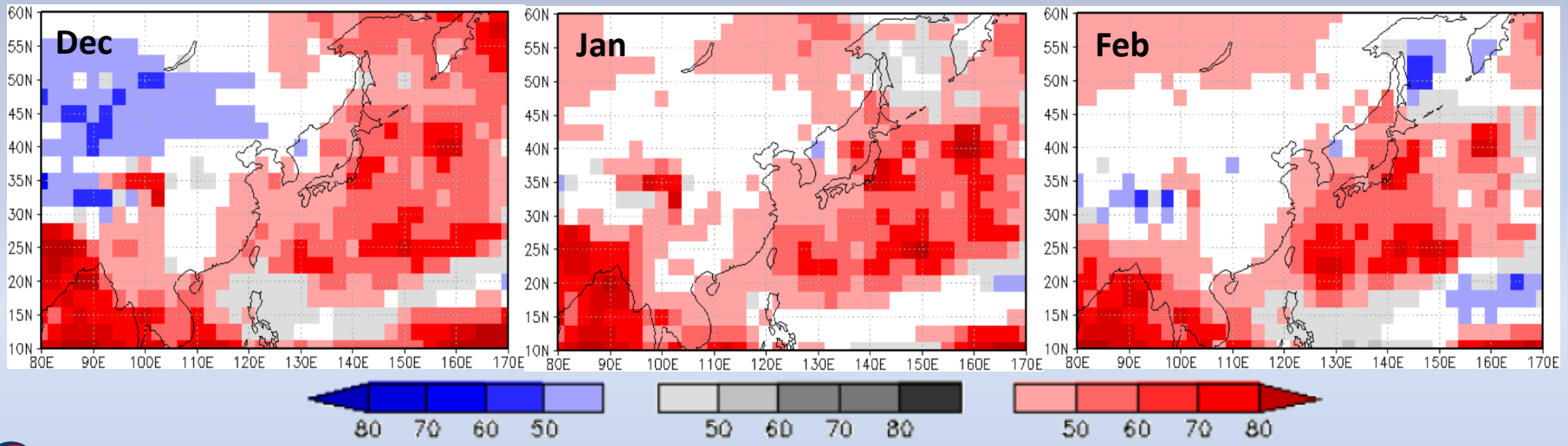
Probabilistic Prediction (Temperature_GloSea5, ECMWF)

Distribution of Probability

GloSea5



ECMWF



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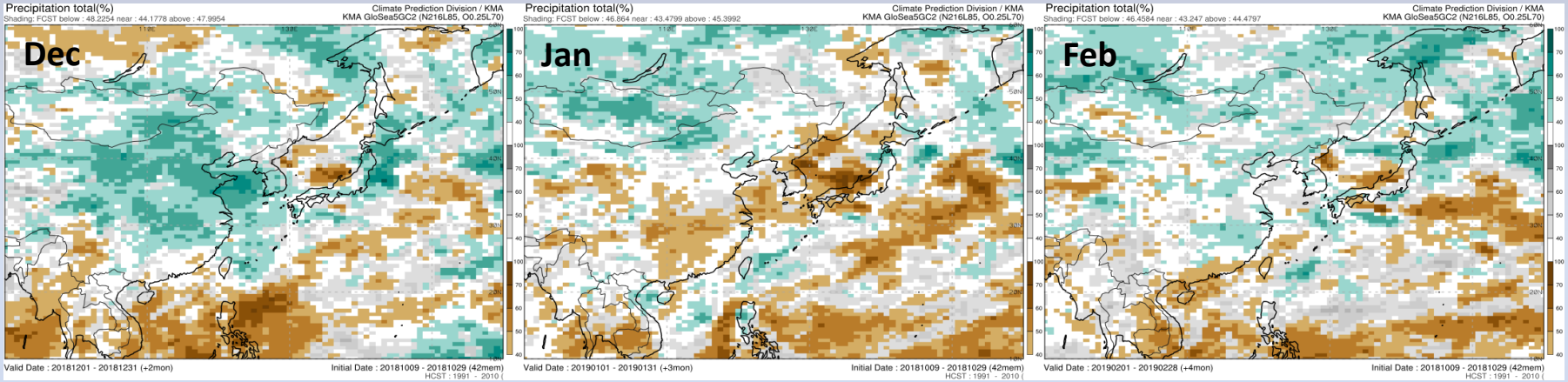
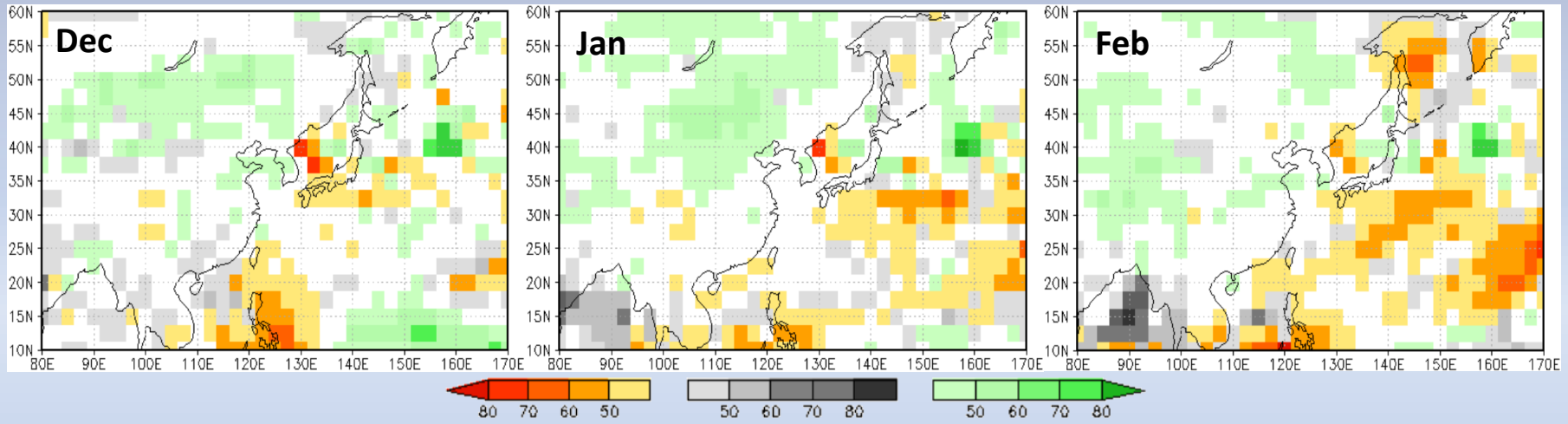
Probabilistic Prediction (Precipitation_GloSea5, ECMWF)

Distribution of Probability

GloSea5

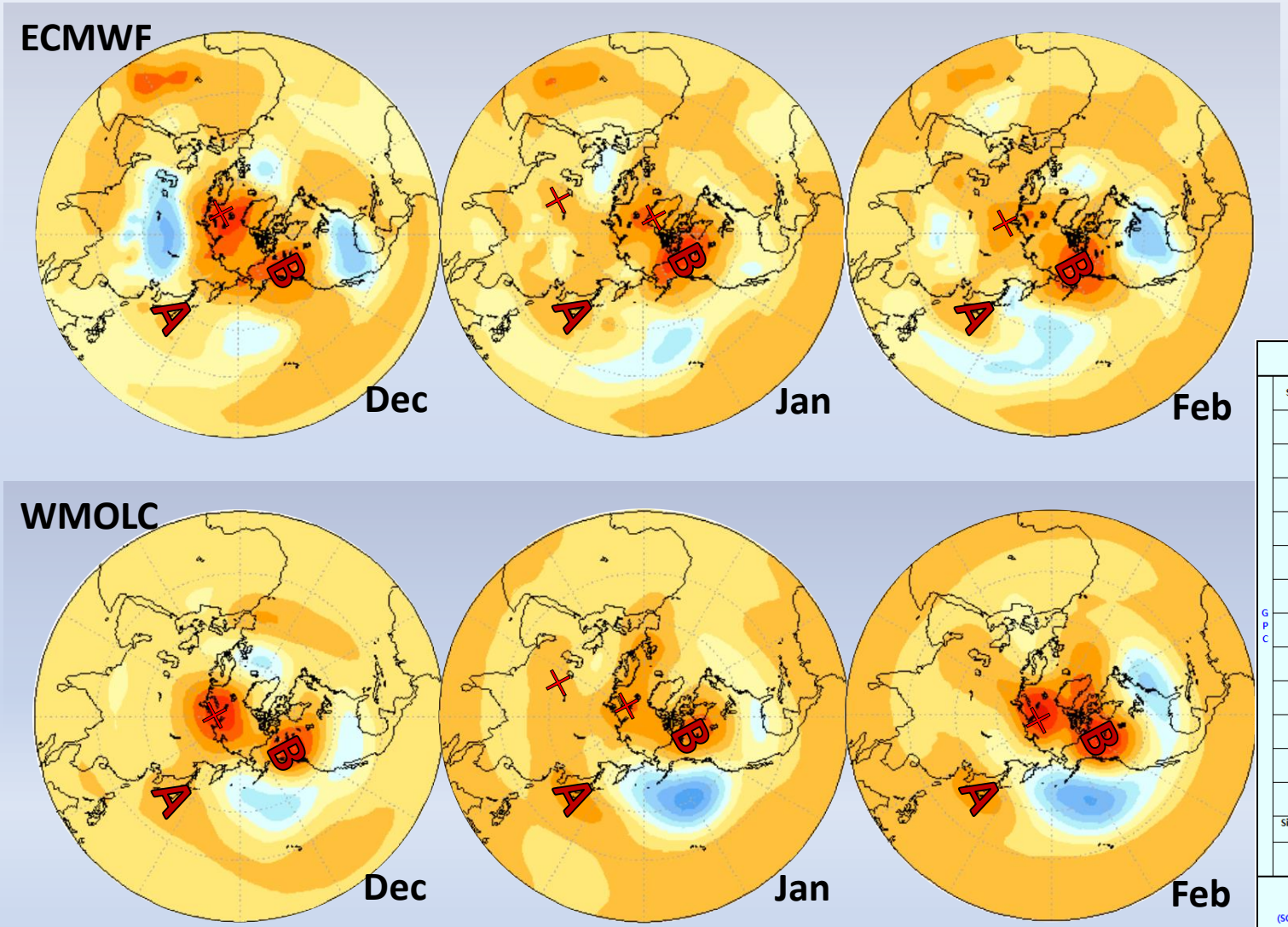


ECMWF



500hPa GPH (ECMWF, WMOLC-LRFMME)

Positive anomaly over Japan(A) & Western side North America(B)
There are relatively negative anomalies over (Dec) Western side of region A.



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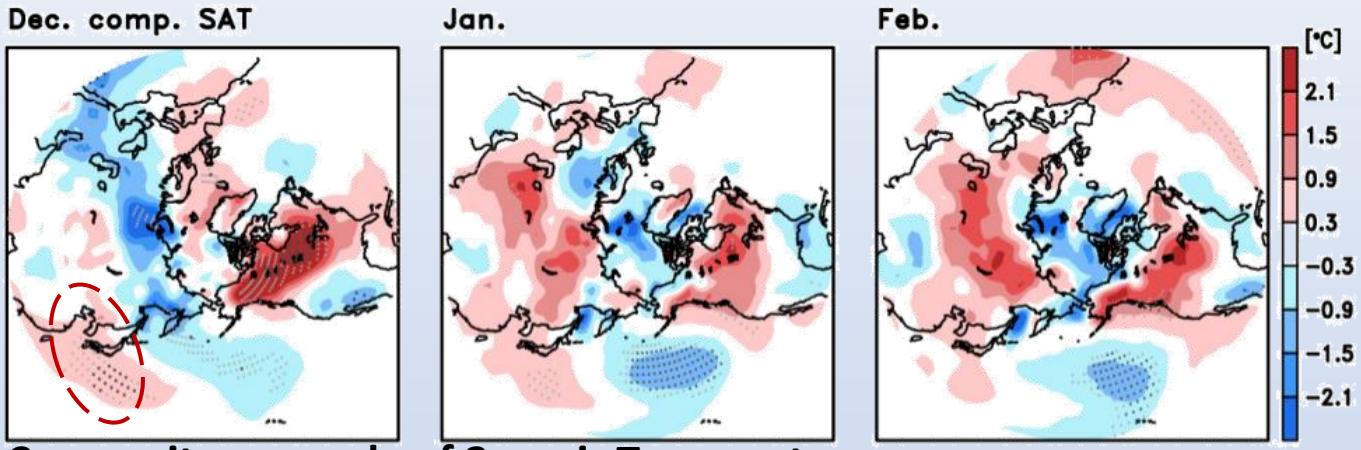
3month Outlook(DJF 2018/19)

2018.10.26.

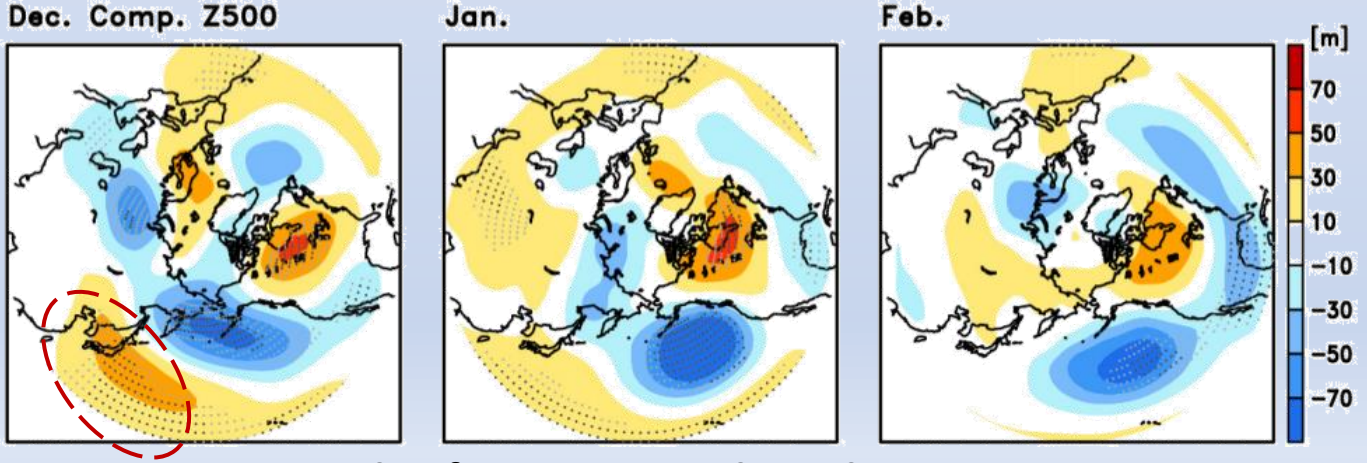
		2m Temp.			Prep.		
		DEC	JAN	FEB	DEC	JAN	FEB
GPC	Seoul (GloSea5)	+	+	+	0+	EQ	EQ
		50%	50%	40%	40%		
	Melbourne	EQ	+	+	0	0+	0+
			40%	40%	40%	40%	40%
	ECMWF	0+	0+	+	EQ	EQ	EQ
		40%	40%	40%			
	Montreal	0+	0	0+	0+	EQ	0+
		40%	40%	40%	40%		40%
	Moscow						
	CPTEC	+	+	+	0+	0	EQ
		80%	80%	80%	50%	40%	
	Beijing	0	0+	0+	0	EQ	0-
		40%(0+)	40%	40%	40%		40%
	Toulouse (단정)	0-	0		0-	0	0
	Washington	0+	+	+	0-	EQ	EQ
		40%	50%	50%	40%		
	Exeter	EQ	0+	0+	0	EQ	0+
			40%	40%	40%		40%
	Tokyo						
	Pretoria						
	offenbach	+	EQ	+	0+	EQ	0+
		50%		40%	40%		40%
	Simple Composite Map(단정)	0+	+	+	0	0	0
	PMME	+	+	+	0+	EQ	EQ
		40%	40%	50%	40%		
Summary (SCM, PMME be excepted)		A 3	A 4	A 6	A 0	A 0	A 0
		+N 3	+N 3	+N 3	+N 4	+N 1	+N 4
		N 1	N 2	N 0	N 3	N 2	N 1
		-N 1	-N 0	-N 0	-N 2	-N 0	-N 1
		B 0	B 0	B 0	B 0	B 0	B 0

※ It has a little differences between individual prediction from the LC and each GPCs due to the resolution and the threshold for AN/NN/BN.

Impact of ENSO – El Nino years composite



Composite anomaly of 2-m air Temperature



Composite anomaly of Geo-potential Height

· (·) : statistically significant level with 95(90)%

* El Nino Years

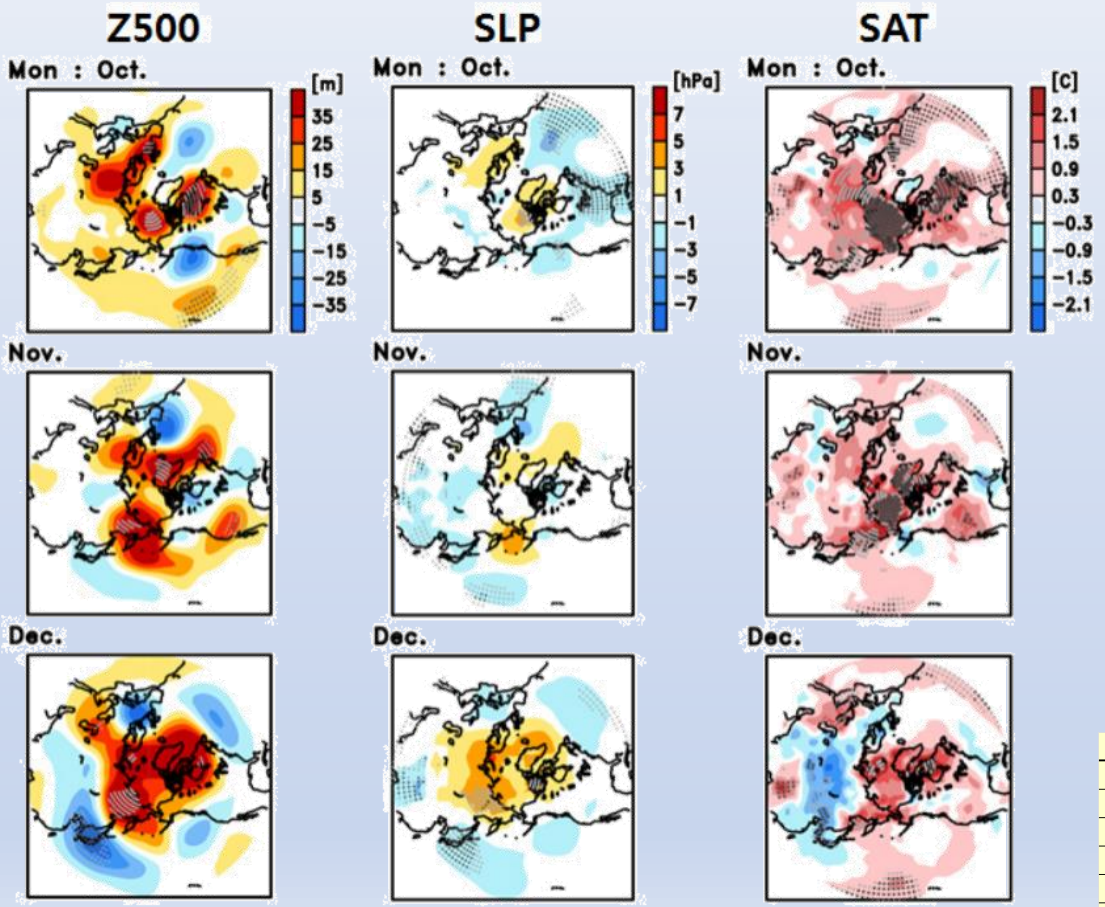
→ Nino3.4 > 0.75σ

In El Nino years,
Korea has experienced near or above-normal condition for temperature and precipitation during Winter season except Jan.

Year	DEC	JAN	FEB	DJF	
2002	0.7	-0.8	1.3	0.3	AN
2003	0.5	0.1	1.9	0.8	NN
2004	1.6	0.0	-1.6	-0.1	BN
2006	0.5	2.0	3.1	1.8	
2009	-0.5	-0.7	1.2	-0.1	
2014	-2.0	1.5	0.9	0.1	
2015	2.0	0.1	0.6	0.8	
Mean(℃)	1.5	-1	1.1	0.6	
Normal Range(℃)	±0.5	±0.6	±0.7	±0.5	

Year	DEC	JAN	FEB	DJF	
2002	44.2	26.3	48.6	119.1	AN
2003	15.3	13.7	41.4	70.4	NN
2004	28.1	13.4	33.9	75.3	BN
2006	22.7	9.3	44.1	76.1	
2009	30.2	30	82.1	142.3	
2014	26.2	25.1	25.6	76.9	
2015	40.3	25	43.8	109.1	
Median(㎜)	22.0	23.4	30.0	76.2	
Normal Range(㎜)	16.6~ 28.5	18.4~ 28.7	19.2~ 41.5	67.7~ 97.3	

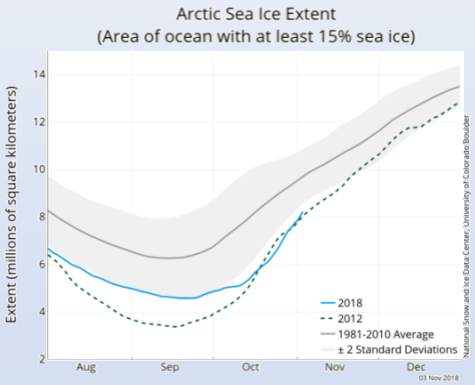
Impact of Sea Ice – Laptev



Composite anomalies for less Sea Ice over Laptev Sea

· (·) : statistically significant level with 95(90)%

Fewer sea ice over the Laptev Sea for previous October is accompanied by the below-normal temperature for December for Korea.

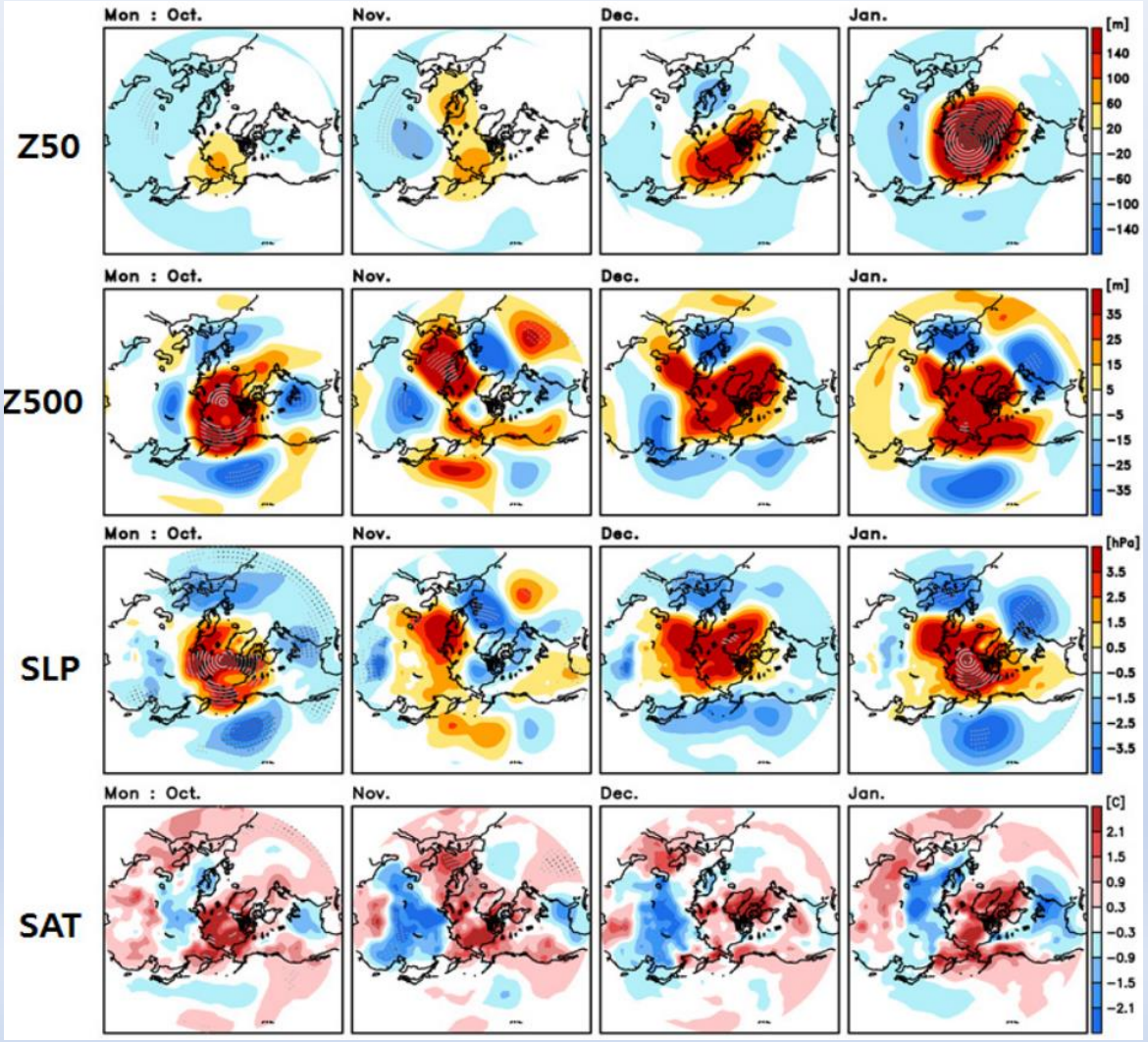


Currently, the sea ice over Laptev Sea has been opened until late October and whole of arctic sea ice is less than normal.

Year	DEC	JAN	FEB	DJF
2005	-3.7	1.6	0.1	-0.7
2007	1.2	0.8	-1.4	0.1
2009	-0.5	-0.7	1.2	-0.1
2010	-0.6	-3.8	0.8	-1.3
2011	-0.8	-0.2	-1.9	-1.0
2012	-3.2	-1.1	-0.4	-1.6
2014	-2.0	1.5	0.9	0.1
Mean(℃)	1.5	-1	1.1	0.6
Normal Range(℃)	±0.5	±0.6	±0.7	±0.5

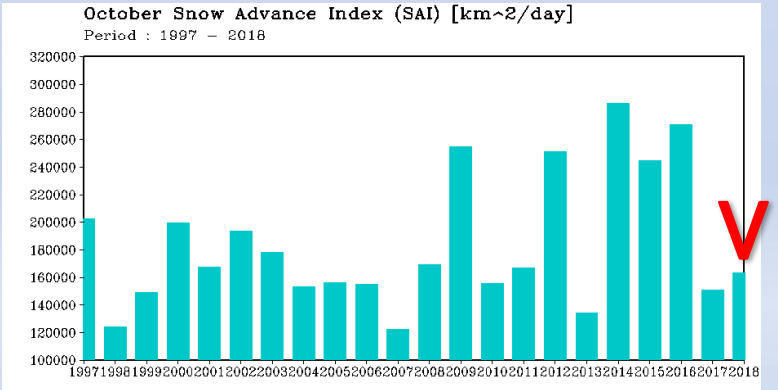
Year	DEC	JAN	FEB	DJF
2005	17.2	28.4	30.6	76.2
2007	29.8	39.1	8	76.9
2009	30.2	30	82.1	142.3
2010	29.7	5.6	63.5	98.7
2011	17.6	17.7	10.4	45.6
2012	60.4	28.5	50.4	139.3
2014	26.2	25.1	25.6	76.9
Median(㎜)	22.0	23.4	30.0	76.2
Normal Range(㎜)	16.6~ 28.5	18.4~ 28.7	19.2~ 41.5	67.7~ 97.3

Impact of Eurasian Snow cover



More snow cover over the Eurasian continent and its fast progress comparing to the previous October are significantly related to below-normal temperature for early winter.

Year	DEC	JAN	FEB	DJF	Year	DEC	JAN	FEB	DJF
2003	0.5	0.1	1.9	0.8	2003	15.3	13.7	41.4	70.4
2009	-0.5	-0.7	1.2	-0.1	2009	30.2	30	82.1	142.3
2012	-3.2	-1.1	-0.4	-1.6	2012	60.4	28.5	50.4	139.3
2014	-2.0	1.5	0.9	0.1	2014	26.2	25.1	25.6	76.9
Mean(℃)	1.5	-1	1.1	0.6	Median(㎜)	22.0	23.4	30.0	76.2
Normal Range(℃)	±0.5	±0.6	±0.7	±0.5	Normal Range(㎜)	16.6~ 28.5	18.4~ 28.7	19.2~ 41.5	67.7~ 97.3



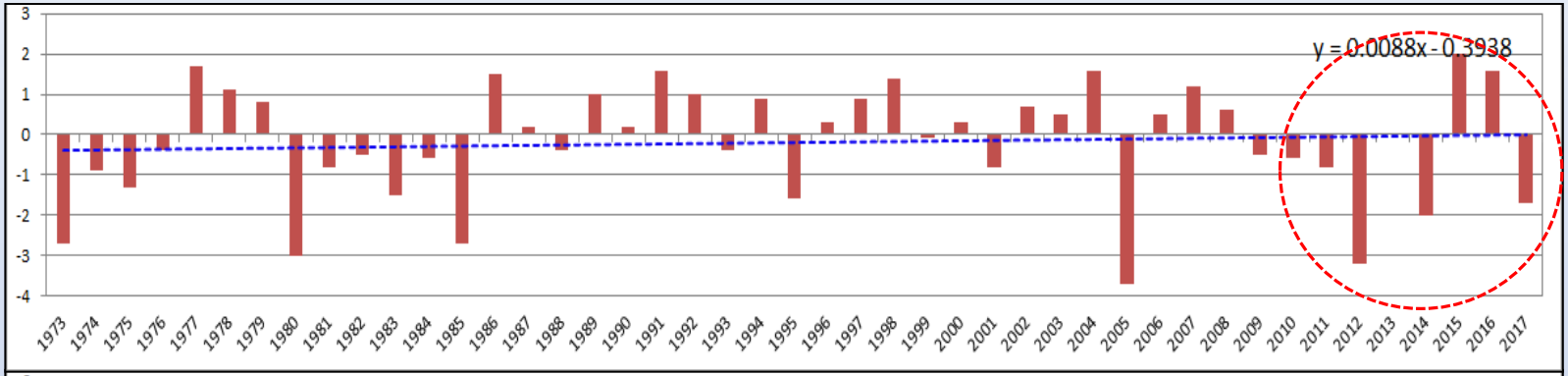
Composite anomalies for more snow cover over Eurasian Continent

· (·) : statistically significant level with 95(90)%

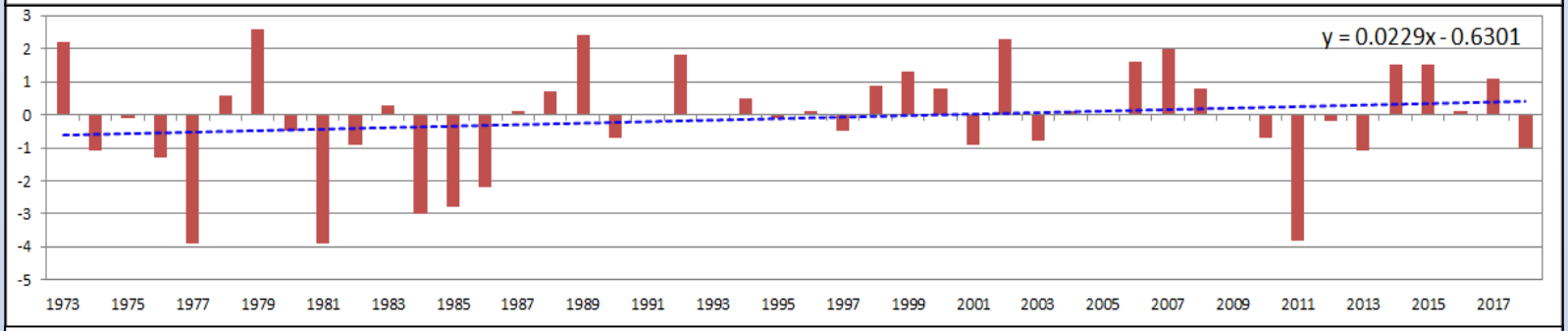
Trend of Observed Temperature

Trend of Mean Temperature over R. of Korea

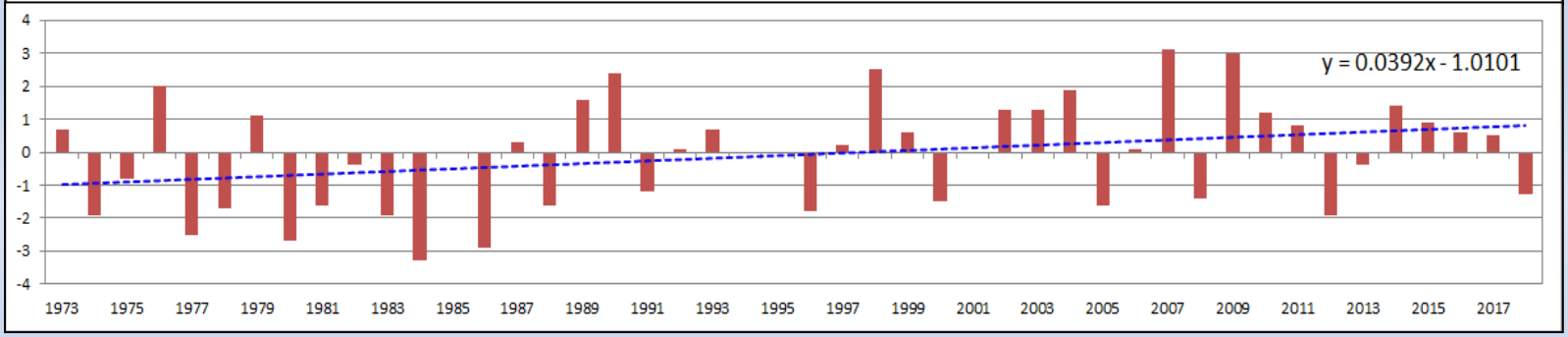
Recently monthly mean temperature for December has larger inter-annual variation than the others.



Dec
0.4℃ / 44yr



Jan
1.1℃ / 45yr



Feb
1.5℃ / 45yr

Summary

▣ Consideration for prediction

- **Weak** El Niño is expected.
- Most dynamic model results show above-normal temperature. and near or above-normal precipitation for the following winter.
- Statistical analyses(**El Niño, arctic sea ice, and Eurasian. snow cover**) give us different signs for temperature.

▣ 2018/19 winter outlook

- Winter monsoon is expected to be slightly weaker than normal.
- 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 !!