

Climate Outlook for Winter 2019/20 over KOREA

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Considerate **elements** for winter prediction



**Dynamical
Models**

GloSea5,
WMO-LC LRFMME



ENSO

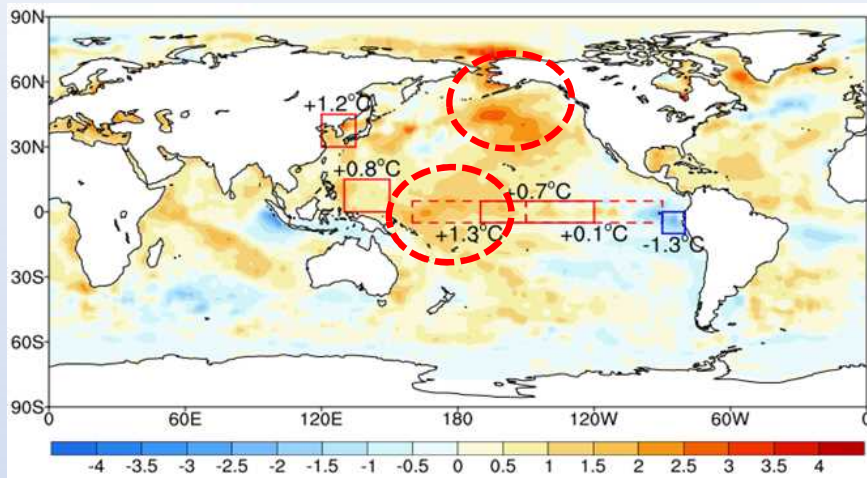


**Sea Ice &
Snow Cover**

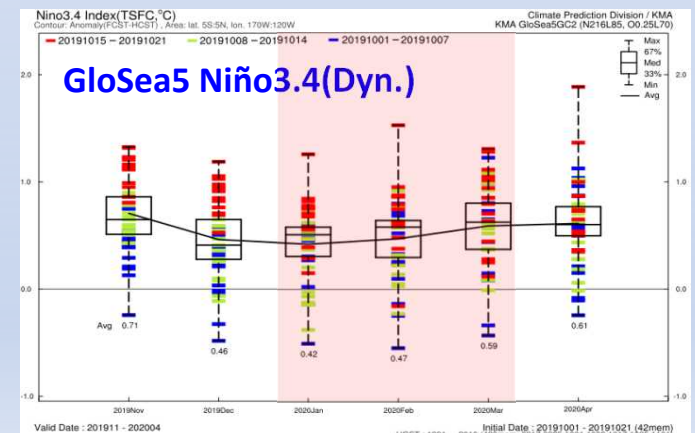
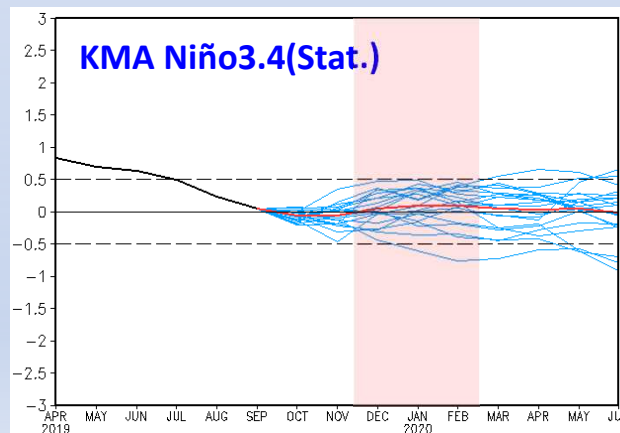
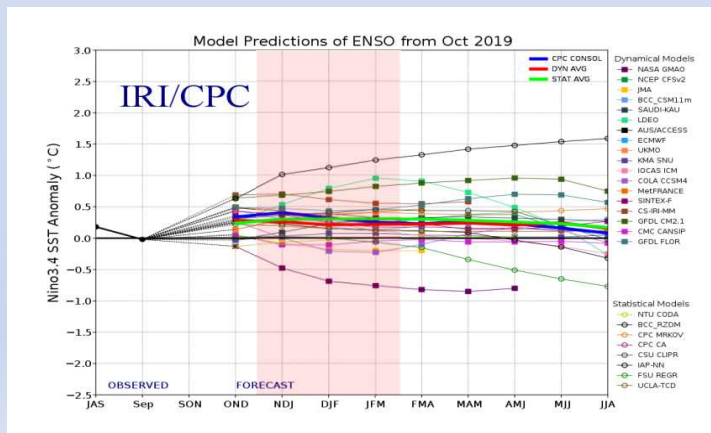
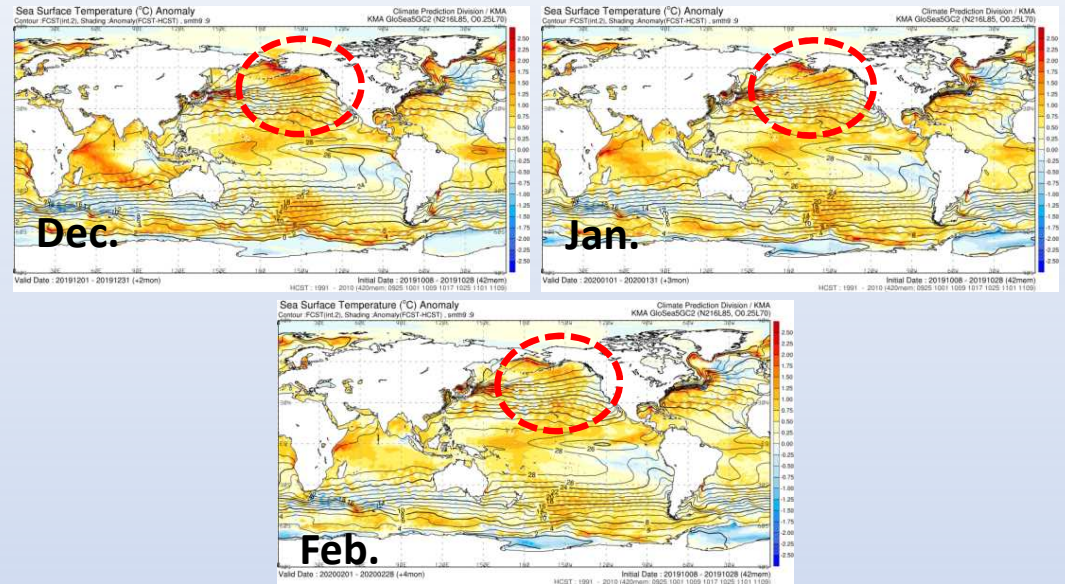


Others

ENSO Condition and Prediction



Weekly(10.20. ~ 26.) SST anomaly over Niño3.4



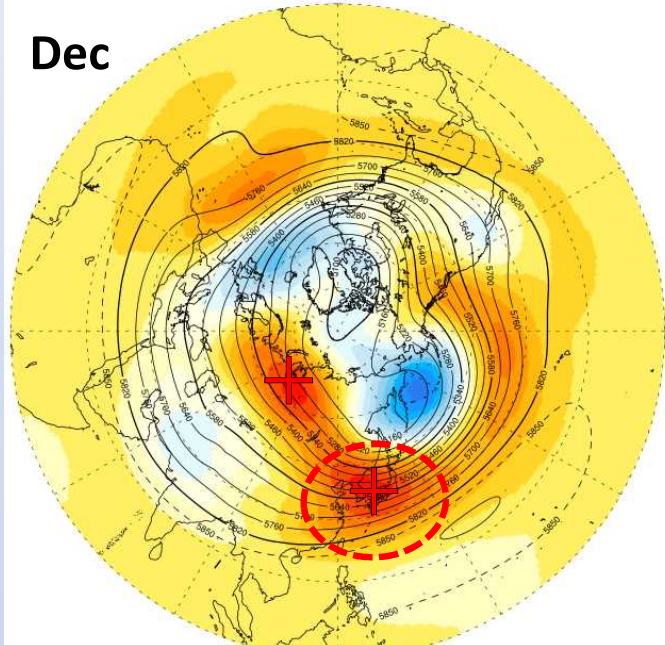
- ▶ Recently Equatorial sea surface temperatures are above normal across the western and central Pacific ocean, and are below normal in the eastern Pacific ocean.
- ▶ ENSO-neutral is likely to continue during this winter

500hPa GPH anomaly(GloSea5_10.21)

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

Climate Prediction Division / KMA
KMA GloSea5GC2 (N216L85, O0.25L70)

Dec

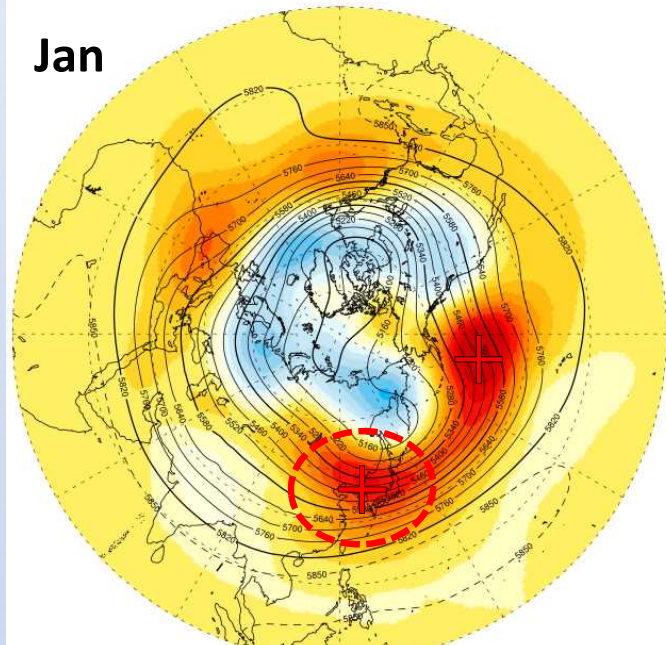


Valid Date : 20191201 - 20191231 (+2mon) Initial Date : 20191001 - 20191021 (42mem)
HCST : 1991 - 2010 (420mem; 0917 0925 1001 1009 1017 1025 1101)

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

Climate Prediction Division / KMA
KMA GloSea5GC2 (N216L85, O0.25L70)

Jan

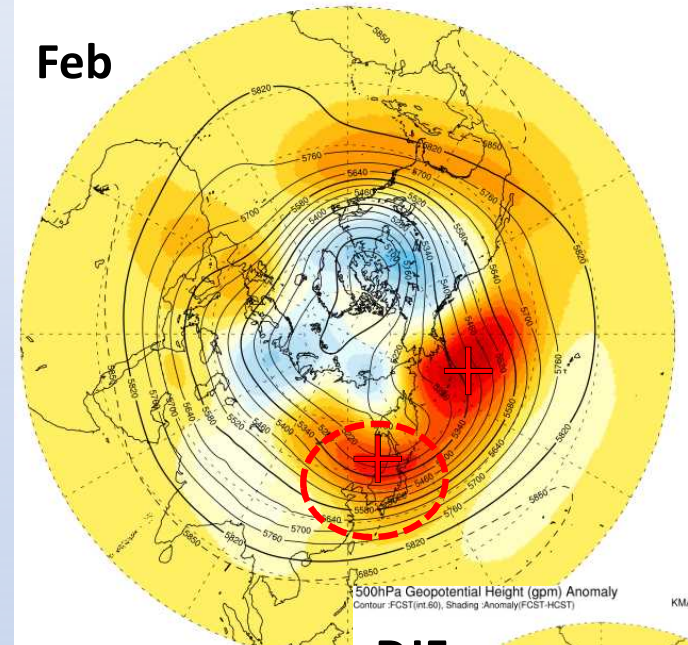


Valid Date : 20200101 - 20200131 (+3mon) Initial Date : 20191001 - 20191021 (42mem)
HCST : 1991 - 2010 (420mem; 0917 0925 1001 1009 1017 1025 1101)

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

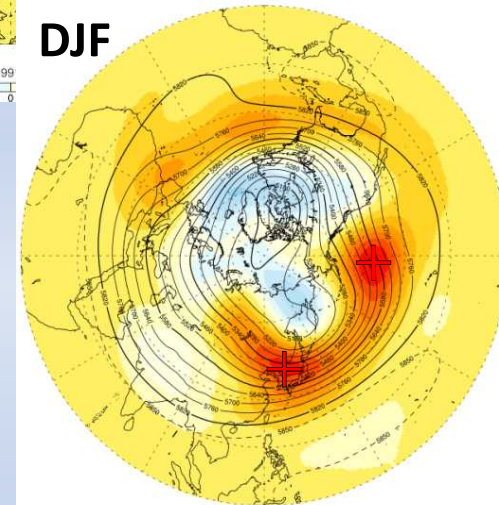
Climate Prediction Division / KMA
KMA GloSea5GC2 (N216L85, O0.25L70)

Feb



Valid Date : 20200201 - 20200228 (+4mon) HCST : 1991 - 2010 (420mem; 0917 0925 1001 1009 1017 1025 1101)

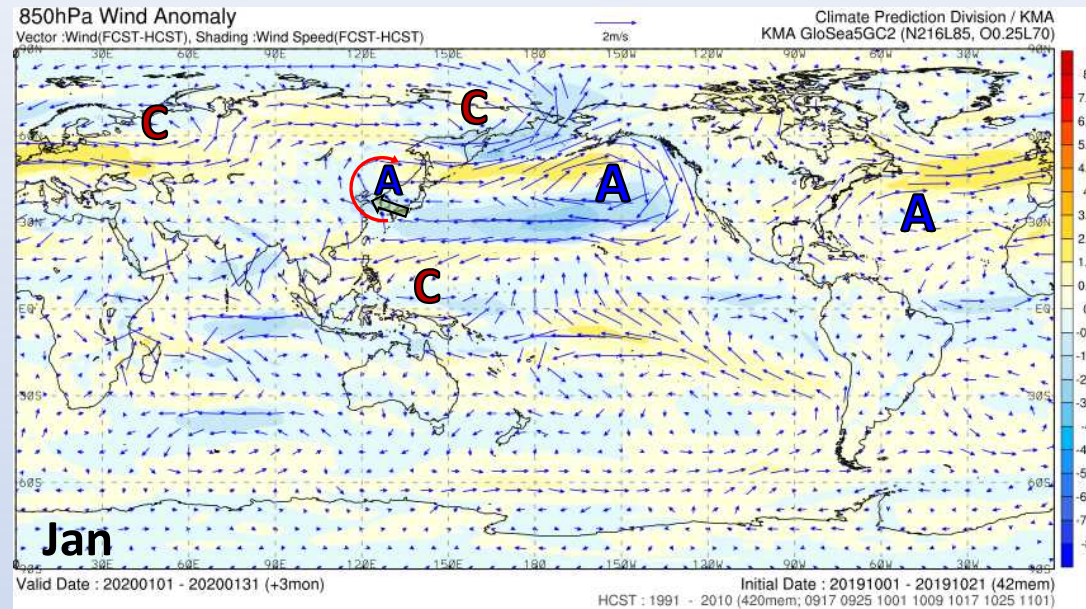
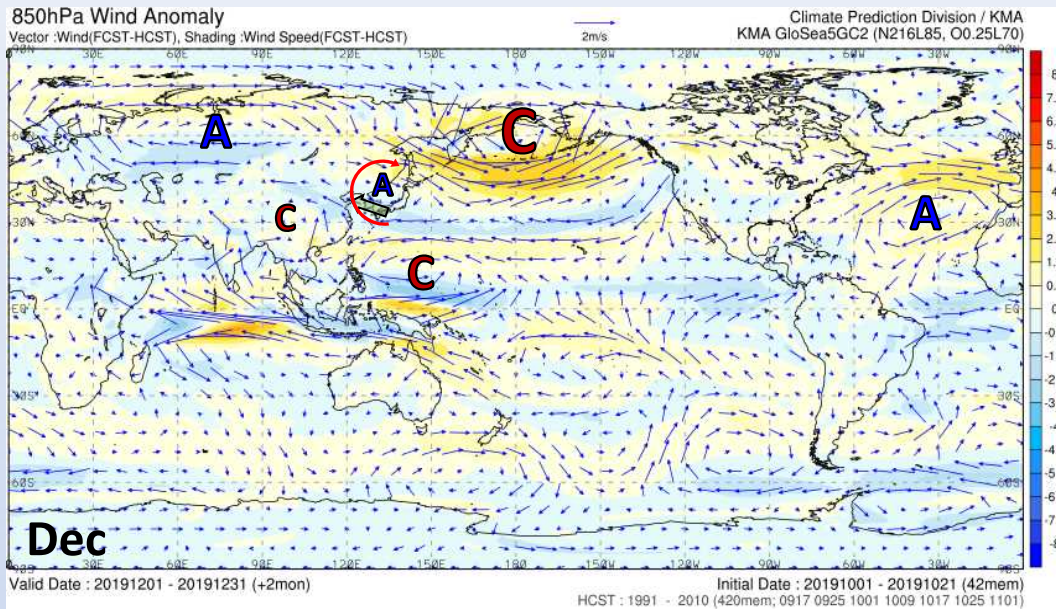
DJF



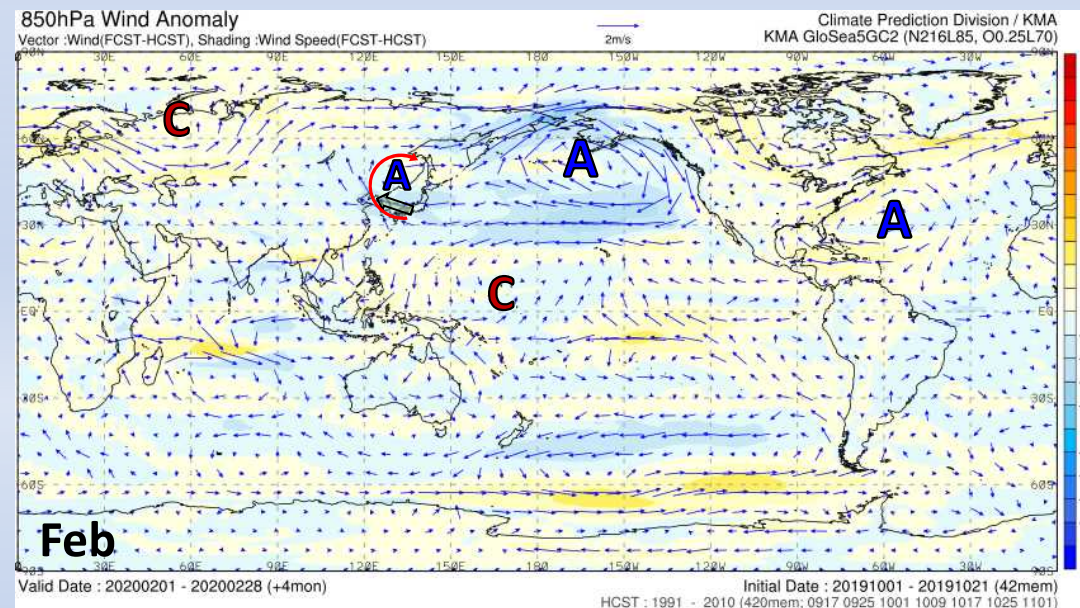
Valid Date : 20191201 - 20200228 (+2 +3 +4 mon) Initial Date : 20191001 - 20191021 (42mem)
HCST : 1991 - 2010 (420mem; 0917 0925 1001 1009 1017 1025 1101)

- ▶ (DJF) Positive anomaly over near Korea
- ▶ (Dec) Positive anomaly over Ural mountain
- ▶ (Jan, Feb) Positive anomaly over near Bering Sea

850hPa Wind Anomaly(GloSea5_10.21)

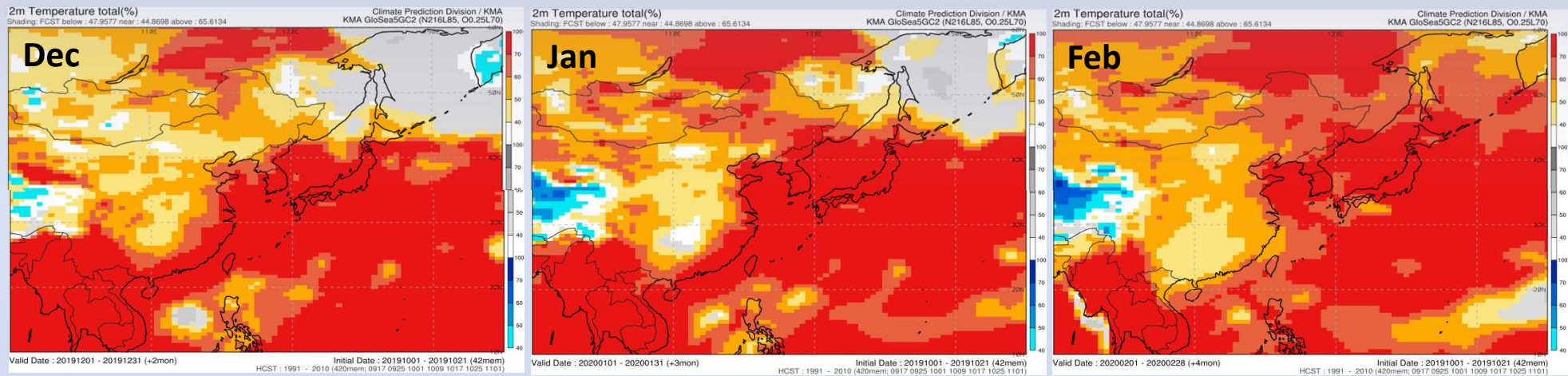


- ▶ (Dec) Anti-cyclonic anomaly over the Ural Mt. and Cyclonic anomaly over Bering Sea.
- ▶ (Jan, Feb) Anti-cyclonic anomaly over the NE Pacific ocean.
- ▶ (DJF) Anti-cyclonic anomaly over NE of KOREA. NW wind is weaker than normal over KOREA.

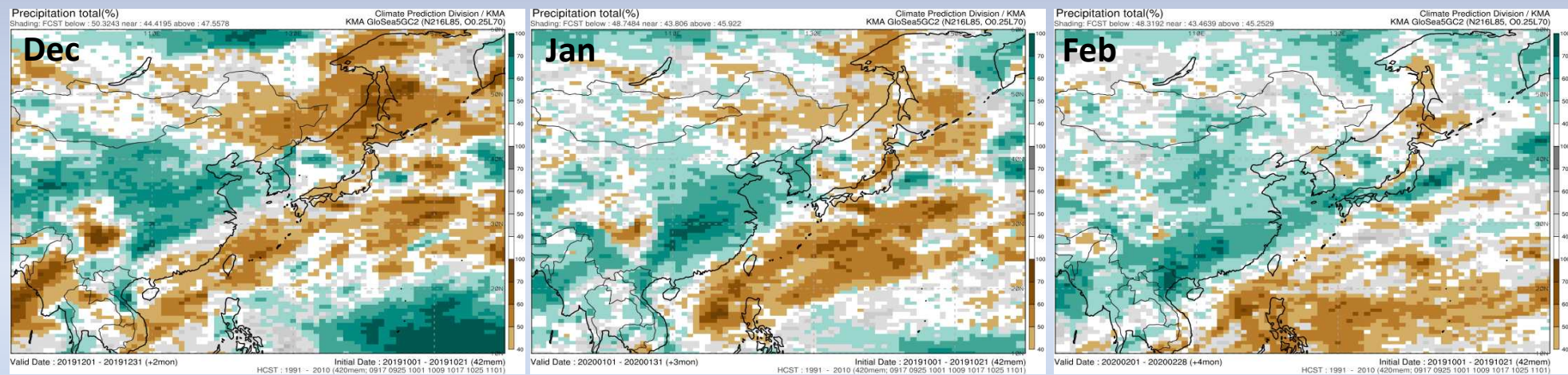


Probabilistic Prediction (GloSea5)

Probability distribution of Temperature



Probability distribution of Precipitation

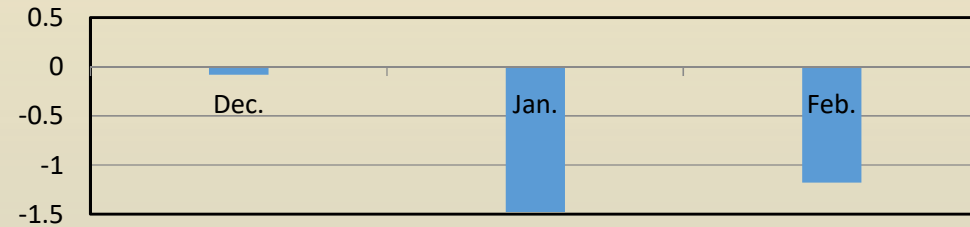
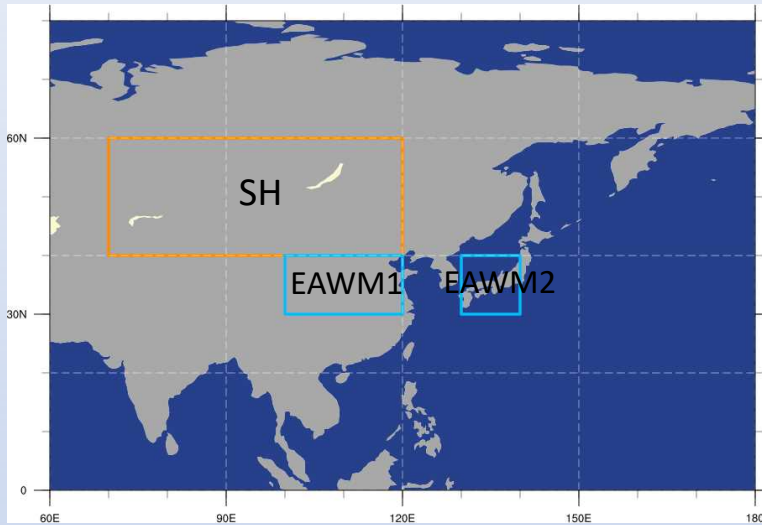


Siberian High Index & East Asia Winter Monsoon Index (GloSea5_10.21)

Siberian High Index

MSLP / σ_{MSLP} [40-60N, 70-120E]

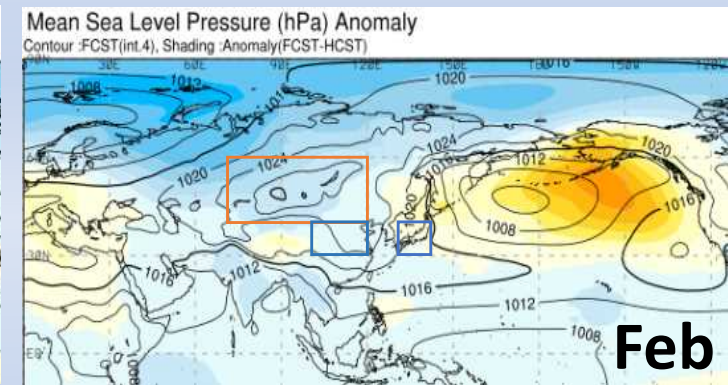
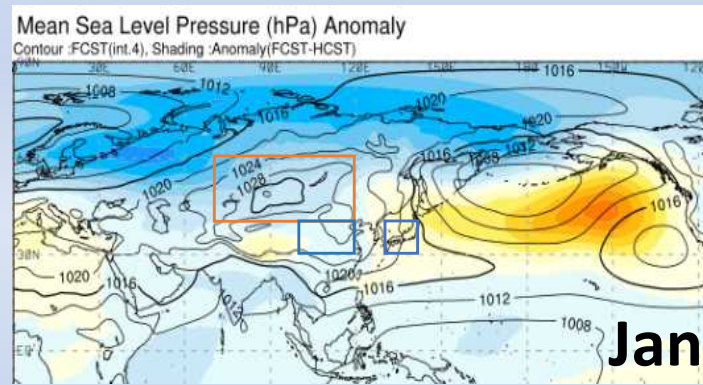
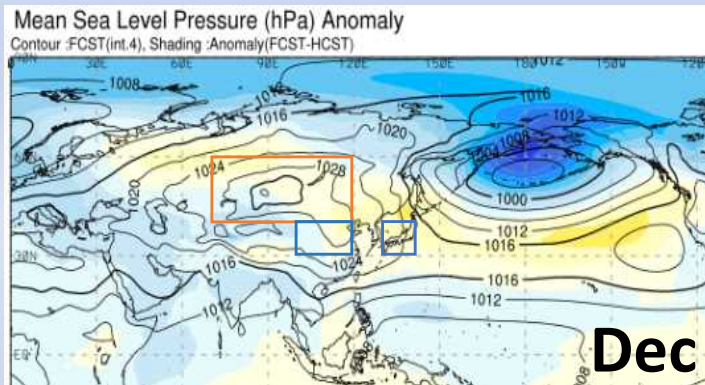
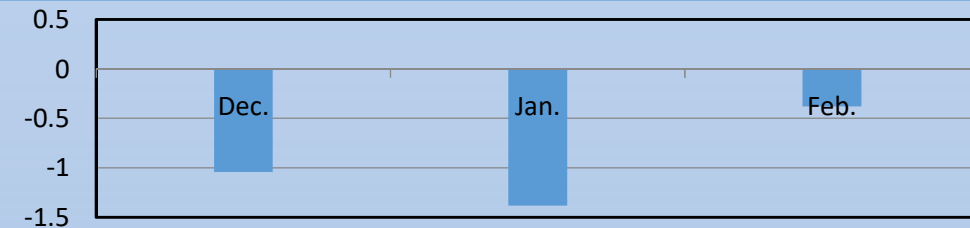
(Gong and Ho, 2002)



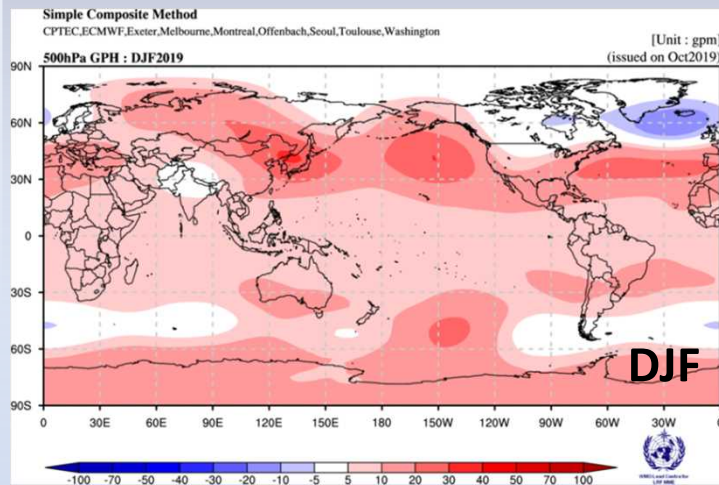
East Asia Winter Monsoon Index

MSLP / σ_{MSLP} [30-40N, 100-120E] - [30-40N, 130-140E]

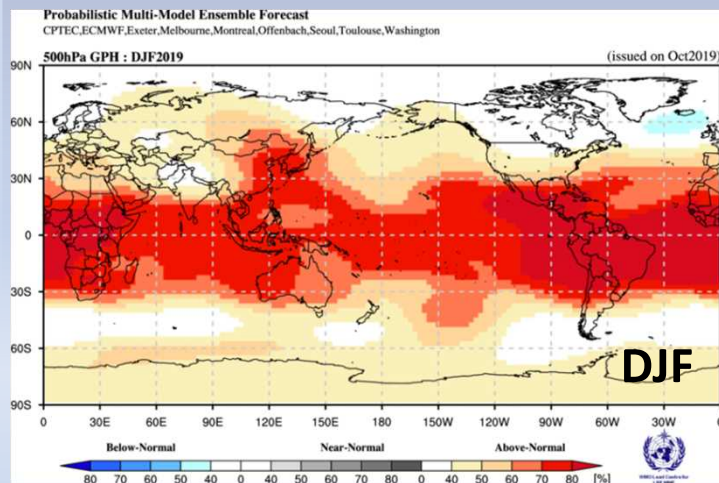
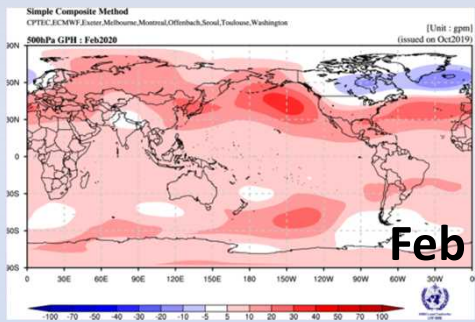
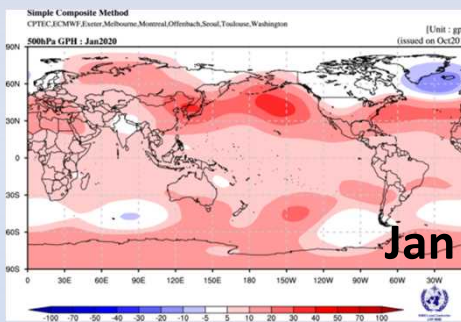
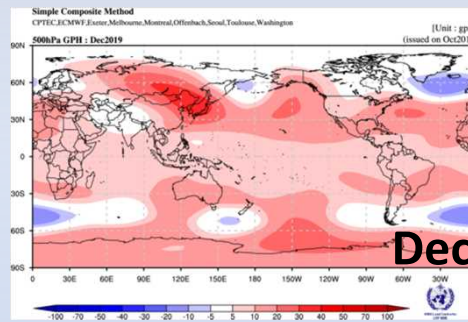
(Wang and Chen, 2010)



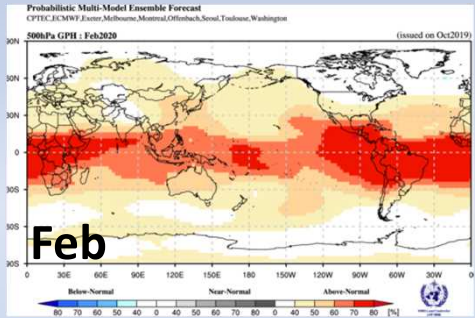
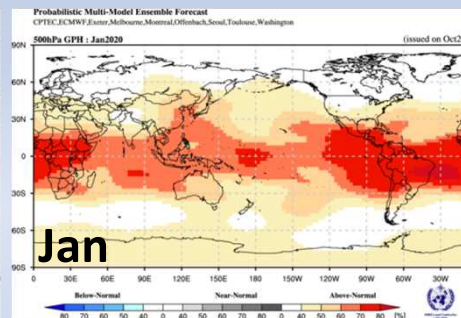
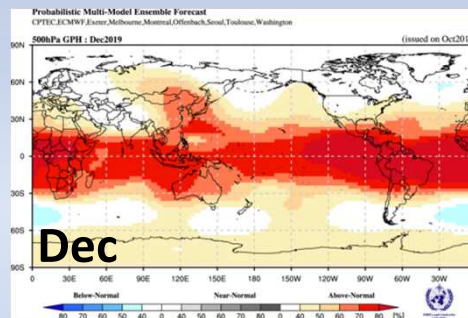
500hPa GPH anomaly (WMOLC-LRFMME)



SCM

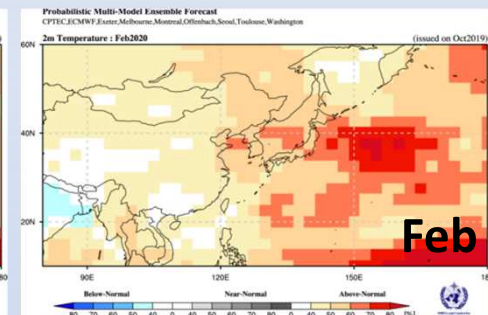
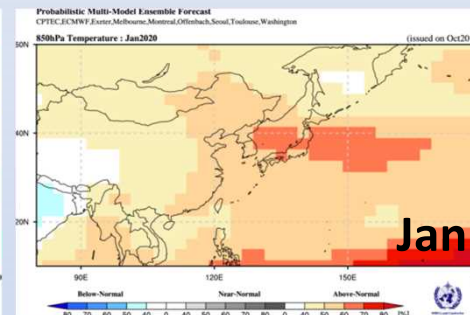
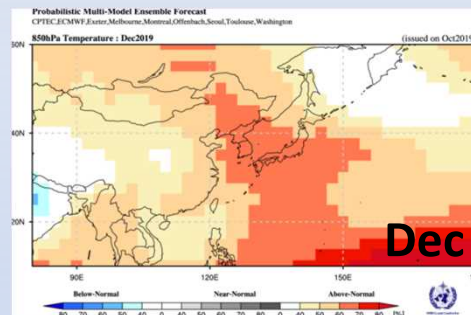
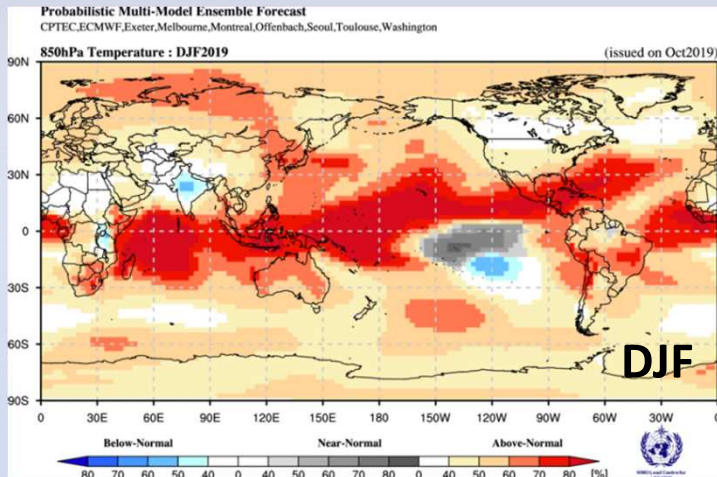


PMME

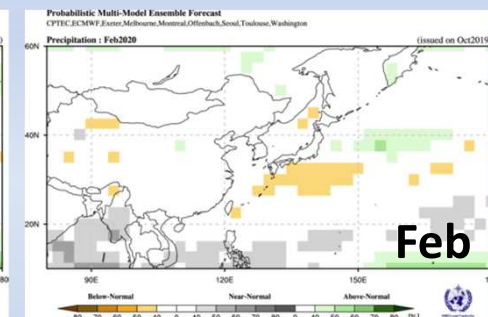
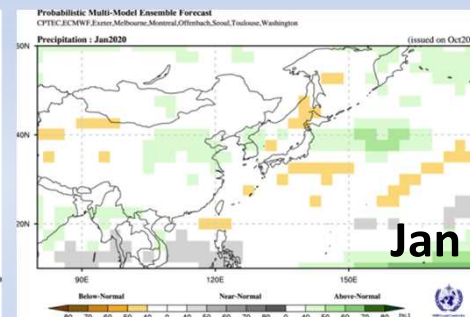
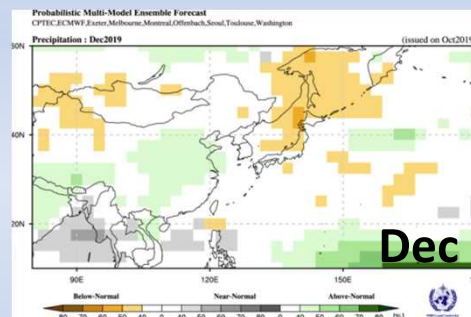
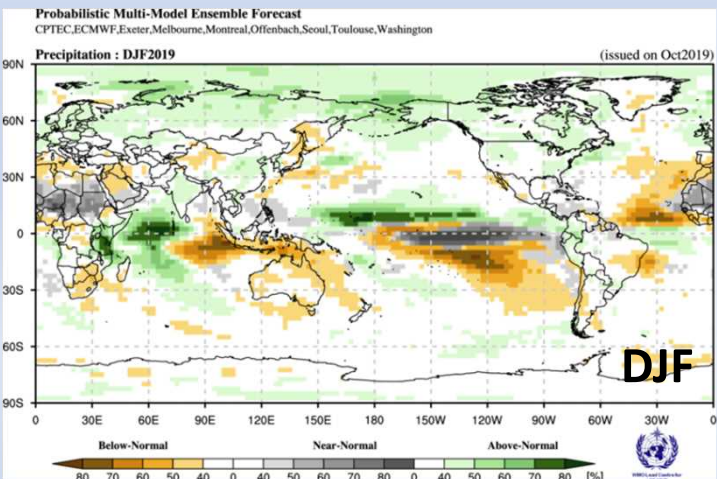


850hPa Temperature & Precipitation anomaly (WMOLC-LRFMME)

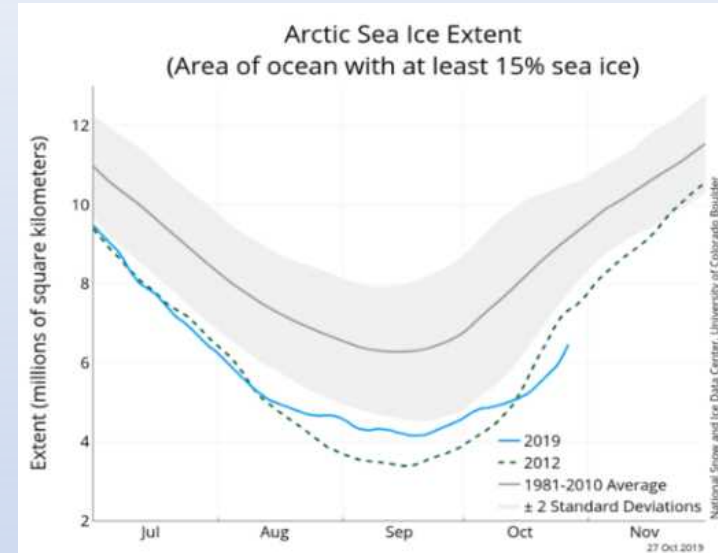
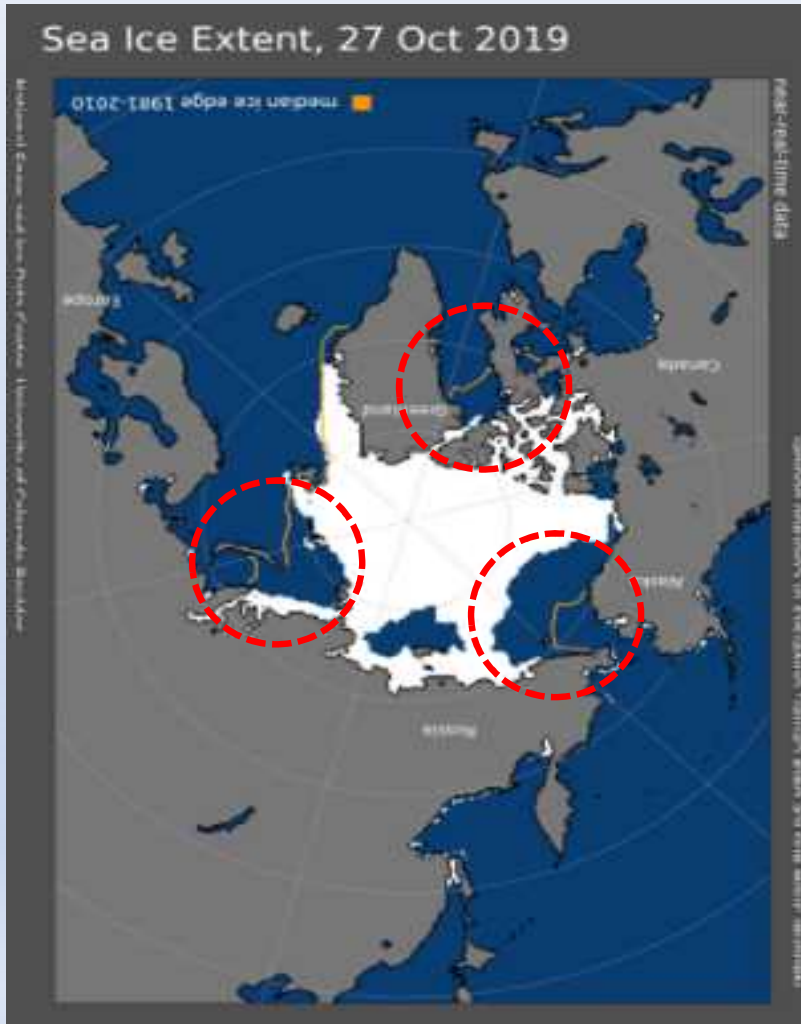
Probability of temperature



Probability of precipitation



Arctic Sea Ice



Currently, the arctic sea ice cover is less than normal.

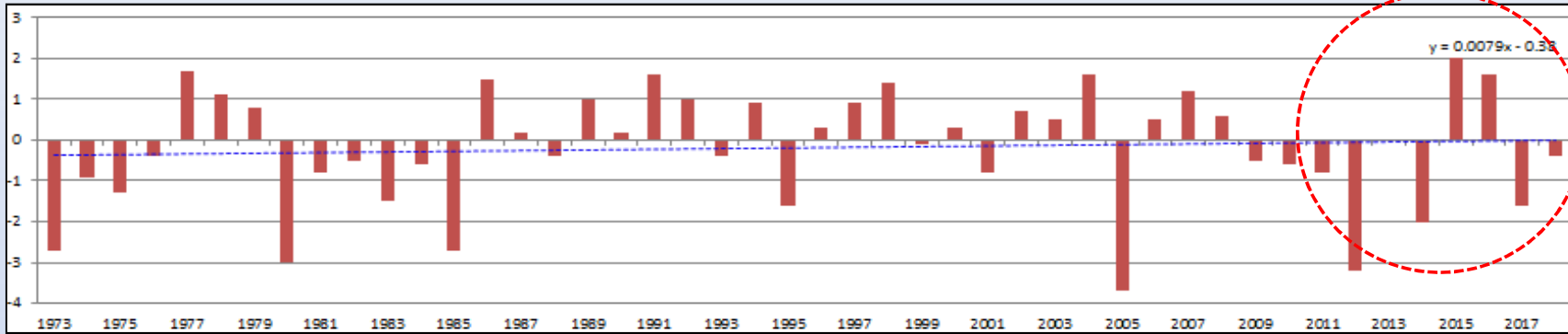
Especially, there are opened sea ice in chukchi sea and Kara-Barents sea yet.

Less than normal sea ice cover is likely to develop blocking. Ural blocking can bring coldness to East Asia.

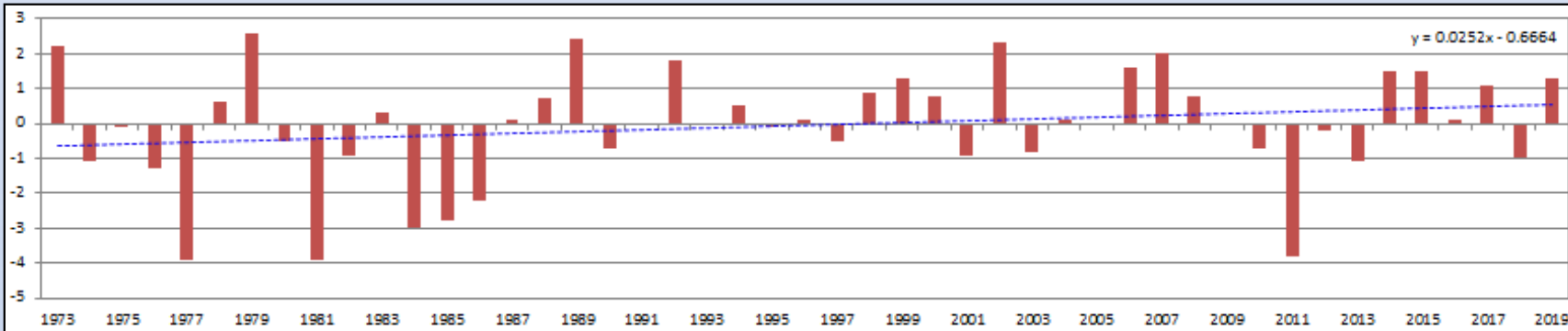
Trend of Observed Temperature

Trend of Mean Temperature over Korea

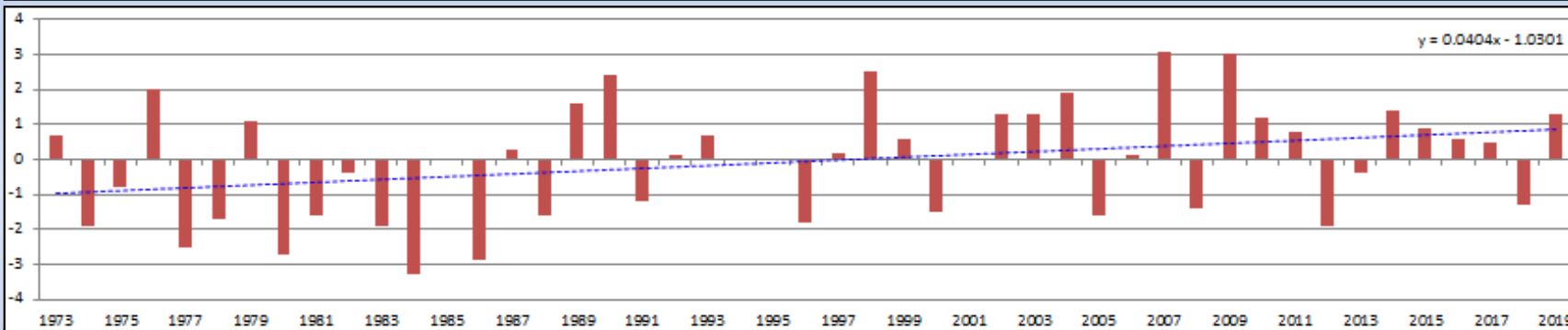
Recently monthly mean temperature for December has larger inter-annual variation than the others.



Dec
0.4°C / 45yr



Jan
1.2°C / 46yr



Feb
1.9°C / 46yr

Summary

■ Consideration for prediction

- ENSO is expected to be **neutral** during the coming winter season.
- Most dynamic model results show **above-normal** temperature and precipitation.
- Statistical analyses(**arctic sea ice**) give us a little **below-normal** temperature for early winter.
- East Asia Winter monsoon is expected to be **weak**.

■ 2019/20 winter outlook over KOREA

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

Thank you !!