



Seasonal Outlook for Winter 2014/15 over China

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30 Oct 2014, Tokyo, Japan



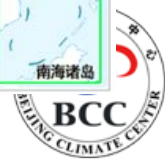
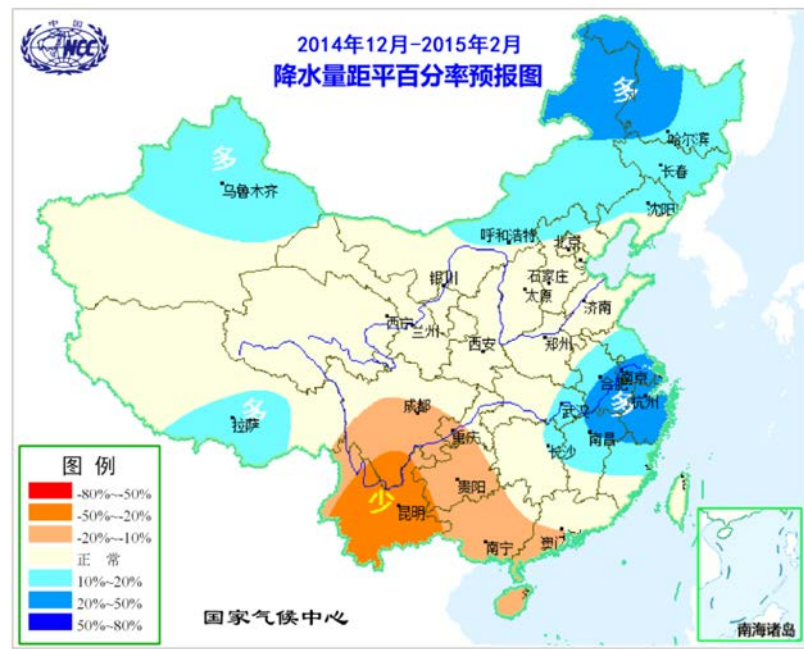
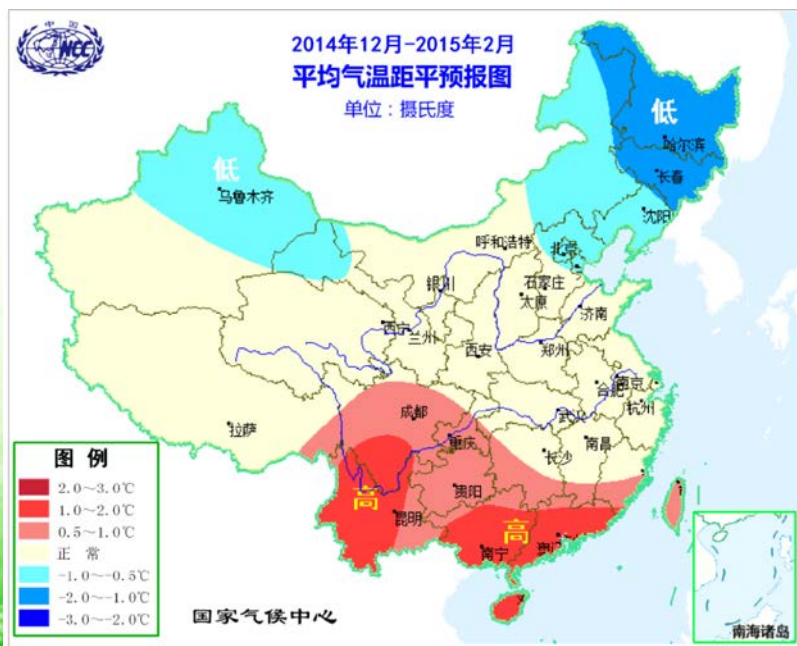


Prediction for winter

EAWM : weak

Temperature

Precipitation





Outlines



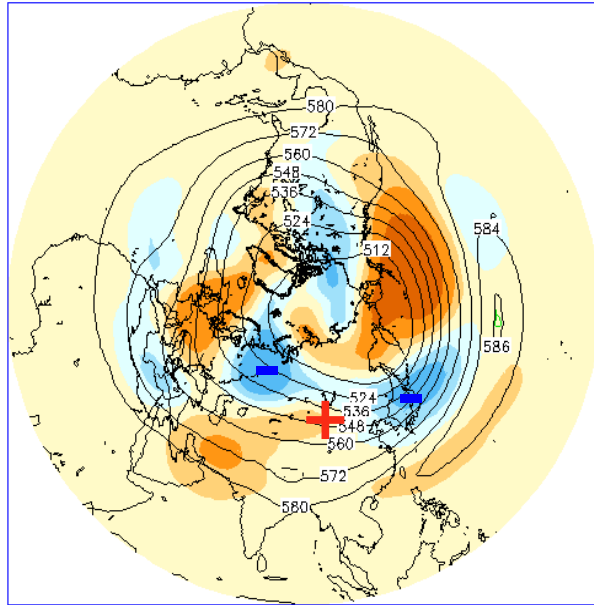
- Prediction from CGCM1.0/BCC
- Interdecadal characteristic of EAWM and wintertime climate
- Impacts of current anomalous external forcing



CGCM1.0/BCC for Atmospheric Circulation in DJF

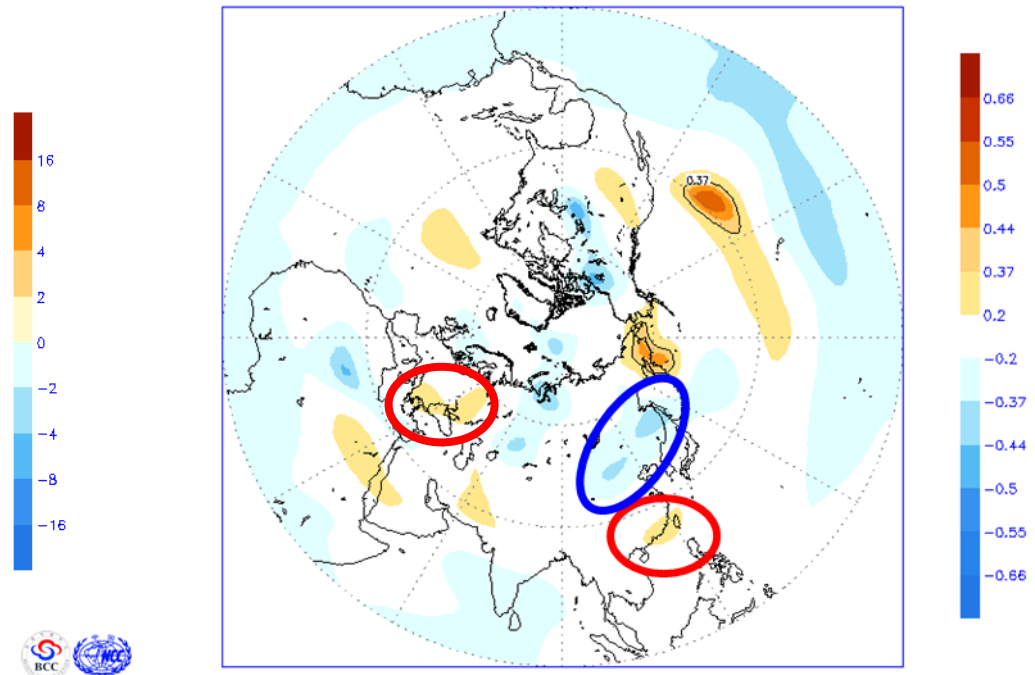
500hPa hgt

NCC/BCC Seasonal Forecast CGCM
Ensemble Mean 500hpa Height and its Anomaly For 2014/12-2015/02
Fcst Started Refer Date 2014/10/01 Fcst Produced Date 2014/10/22
Member Size=48



<http://ncc.cma.gov.cn/ch>
<http://bcc.cma.gov.cn/en>

ACC (CGCM with NCEPI, from 1983 to 2002)



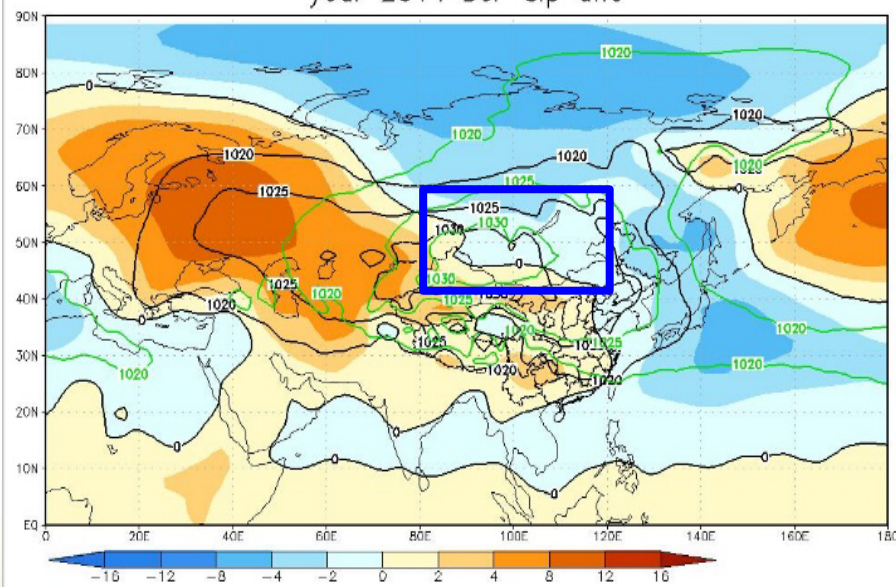
Weak Ural Mountain high(UMH), deep East Asia main trough (EAMT)—(bad skill), strong western Pacific subtropical high, and shallow Indian-Burma trough.



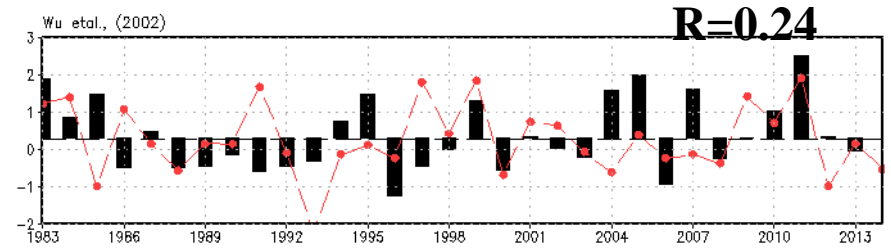


CGCM1.0/BCC for Atmospheric Circulation in DJF

SLP



SH correlation between CGCM1.0/BCC and NCEPI



(SH is defined by standardized SLP averaged from (40-60N, 80-120E), Wu, et al., 2002)

Weak Siberian high (SH)





	Siberian high	Ural Mountain high	East Asia main trough	EAWMI	WPSH	Indian-Burma trough
BCC	Weak	Weak	Strong (bad skill)	Weak	Strong, extend more west	Slightly weak
TCC	Weak	Weak	Weak	Weak	Strong	Weak
Frontier	Weak	Weak	Weak	Weak	Slightly weak	Slightly weak
EC	Weak	Weak	Weak	Weak	Strong	Weak
CFS	Weak	Weak	Weak	Weak	Strong	Weak

**Weak UMH, Weak Siberian high(SH), shallow EAMT
strong WPSH and shallow Indian-Burma trough(IBT)**

Weak EAWM





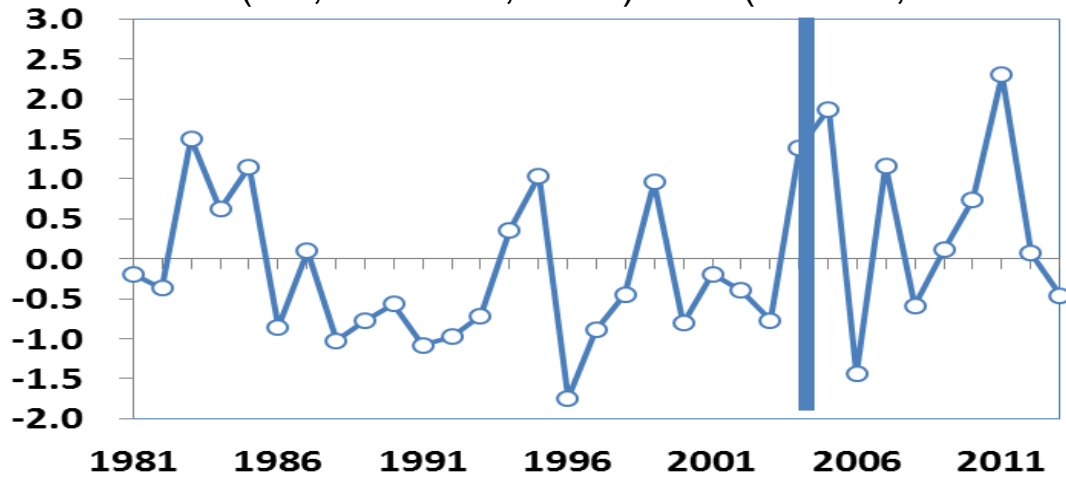
Outlines



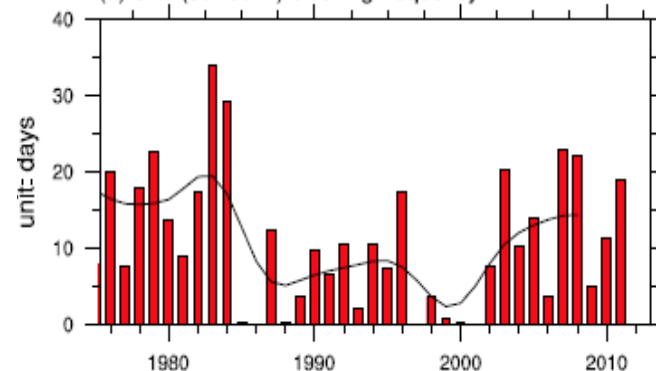
- Prediction from CGCM1.0/BCC
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EAWM Index (SH, Wu et al., 2002): SLP(40-60N, 80-120E)



(a) Ural (50°-80°E) blocking frequency

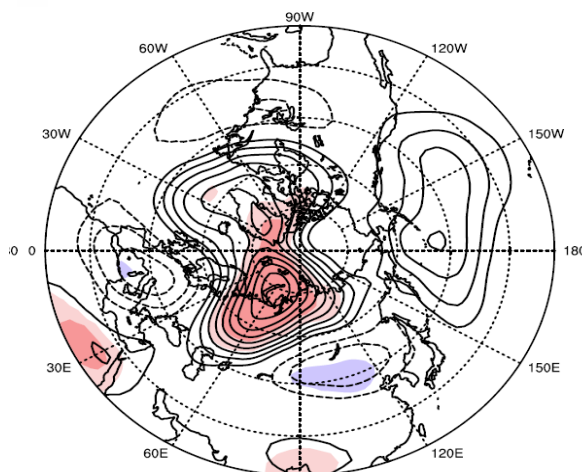
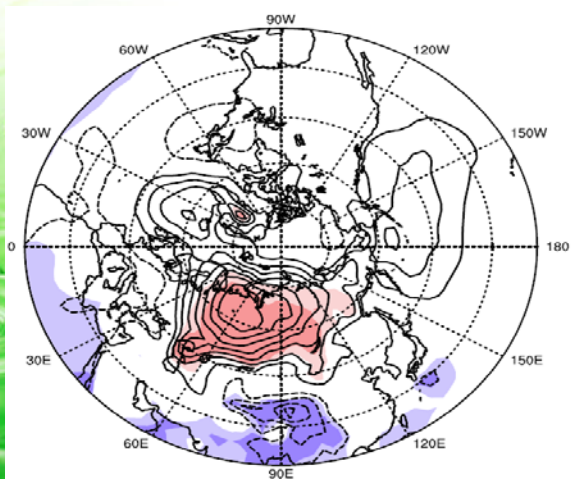


Strong Siberian High and enhanced Ural blocking since 2004

Circulation composite from 2004-2013

SLP

500H



Another epoch of strong EAWM probably starts since 2004?





Outlines



- Prediction from CGCM1.0/BCC
- Interdecadal characteristic of EAWM and wintertime climate
- Impacts of current anomalous external forcing



Current Anomalous External Forcing

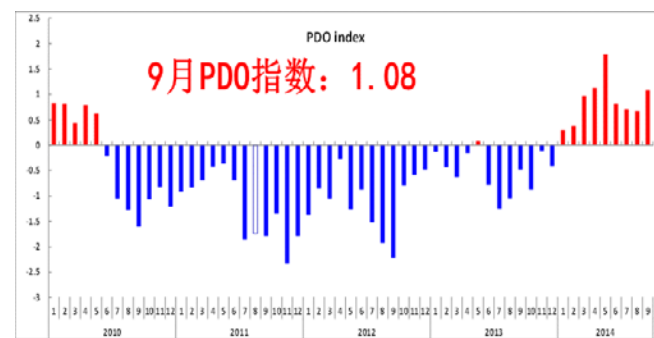
1. Global SST
2. Arctic sea ice
3. Eurasian snow cover



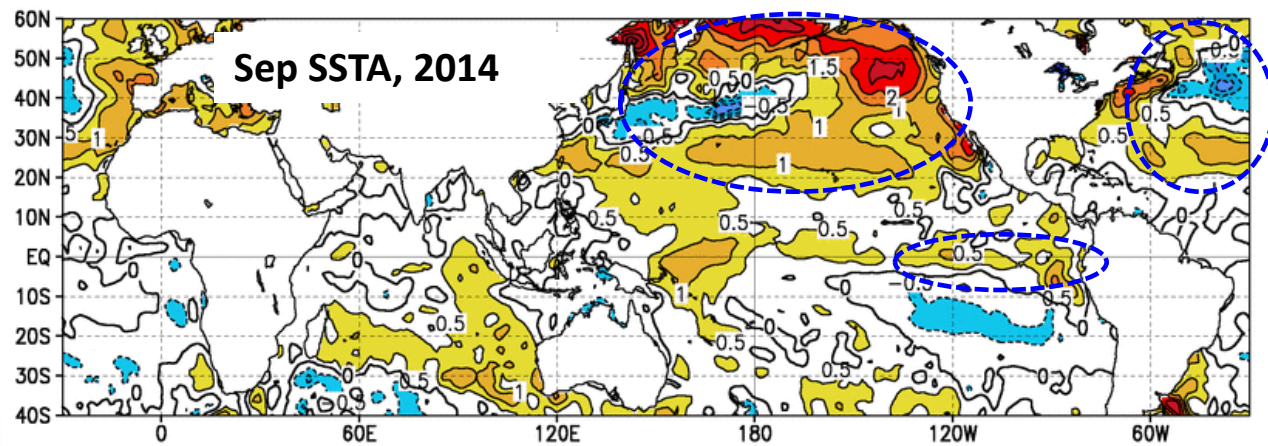
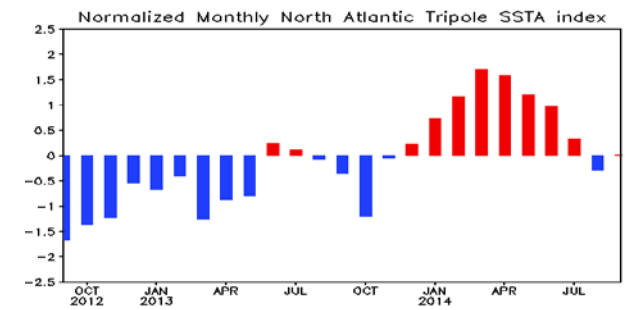
External factors- Global SST



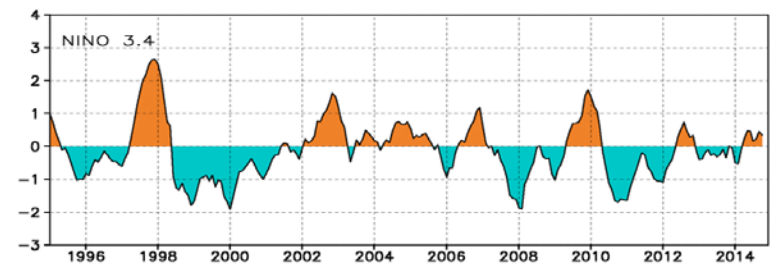
Northern Pacific is significant warmer than normal, PDO changes into positive phase.



NAT is near normal

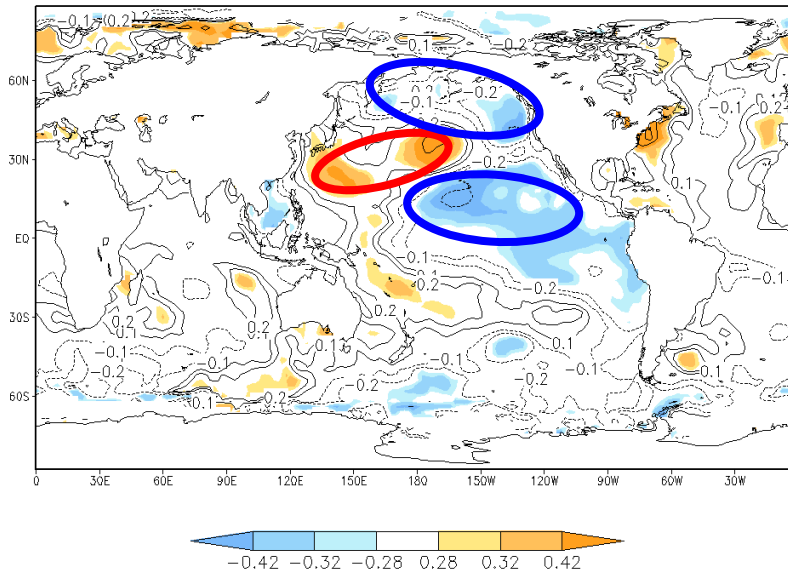


Nino3.4 is slightly above normal, maybe an El Nino event will develop.

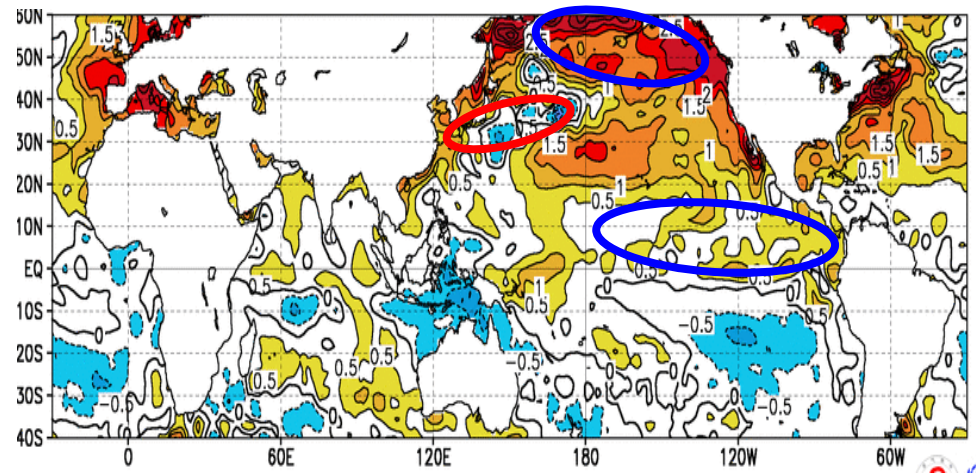


External factors- northern Pacific SSTA

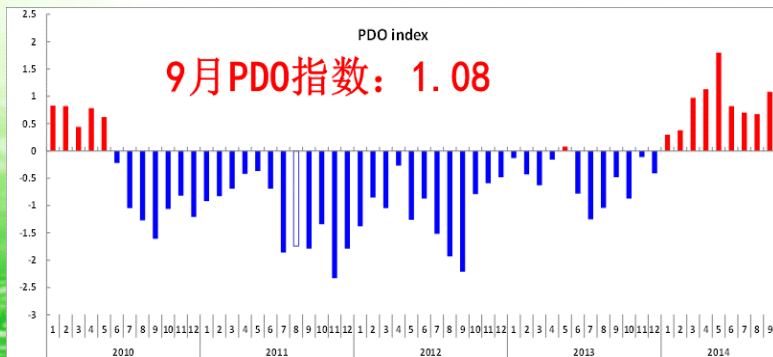
Correlation of DJF SH with Oct SSTA



Sep SSTA, 2014



The SSTA pattern of Pacific Ocean favors a weak EAWM.

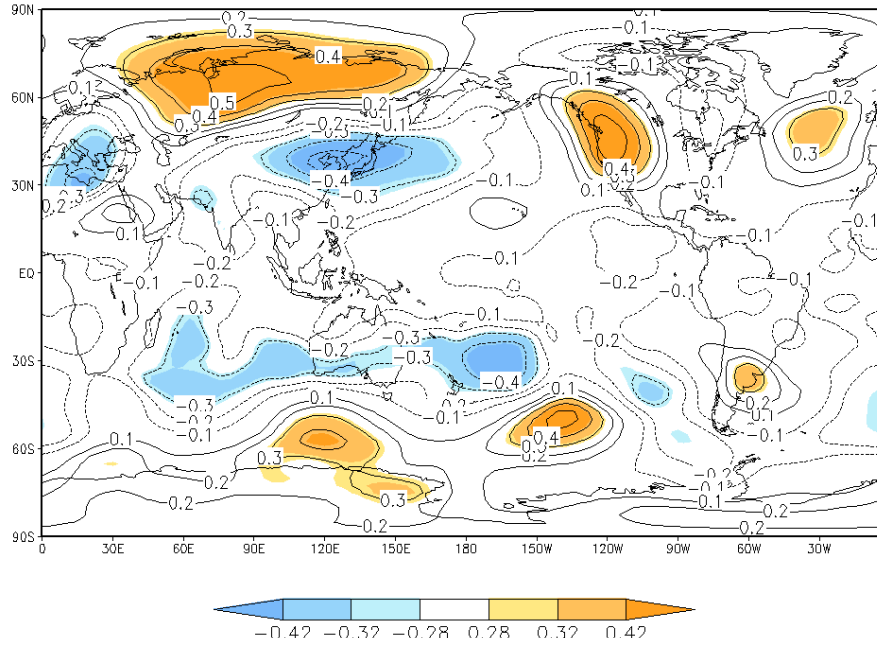


The positive PDO phase favors weak Siberian High and a weak EAWM.

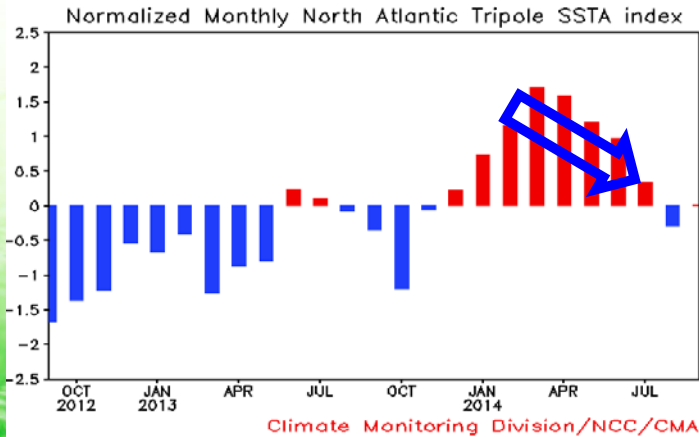
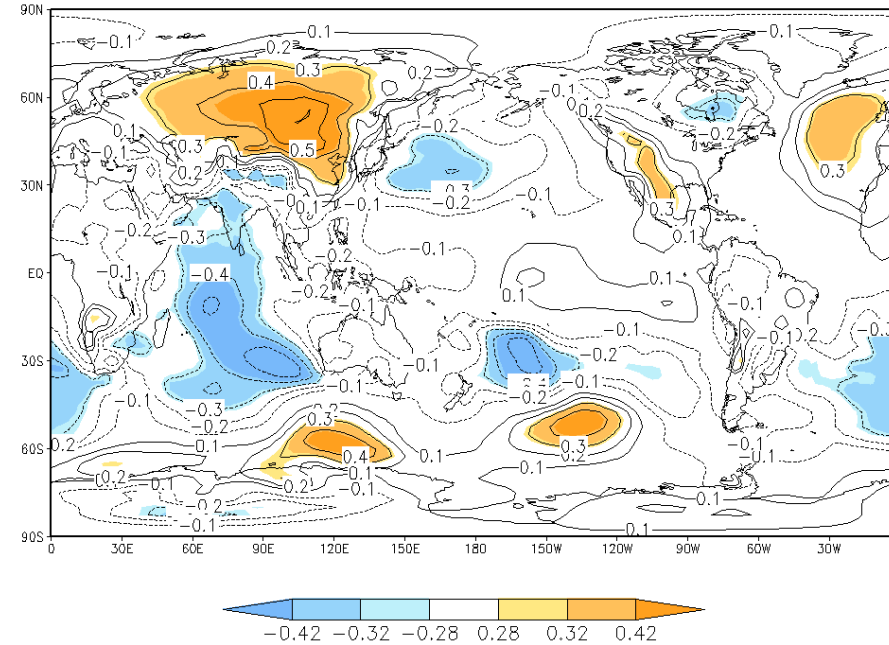
— Yang et al., 2005, Chinese J. of Geophysics

External factors- NAT

Correlation of DJF 500hPa hgt and NAT(oct)

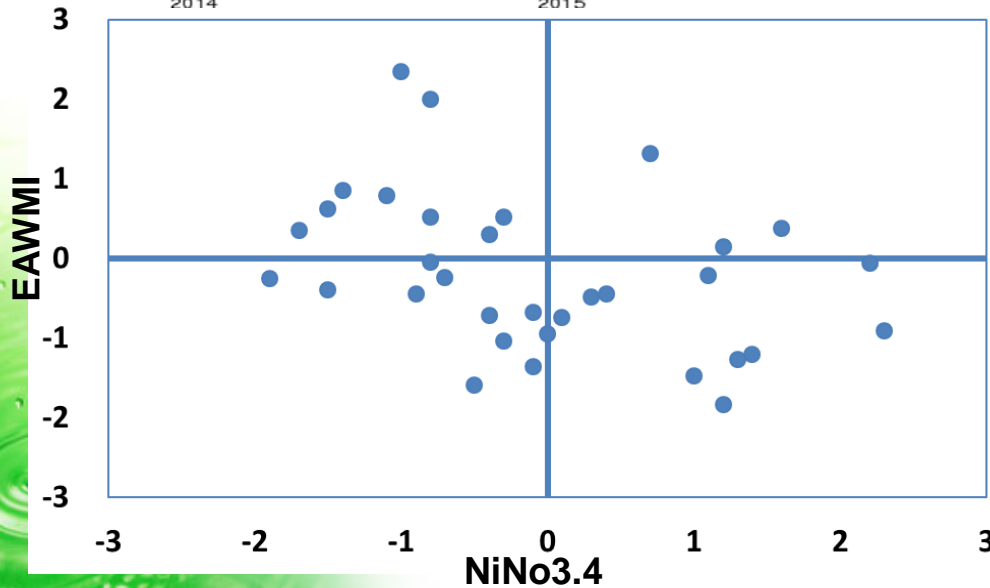
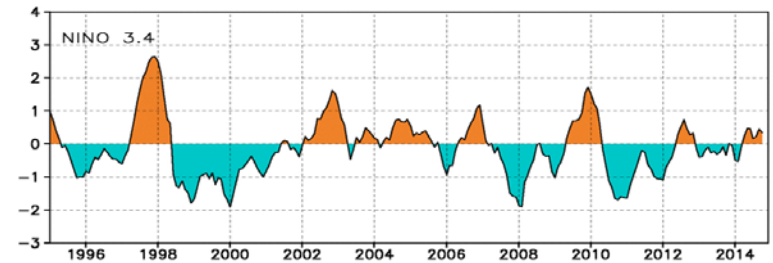
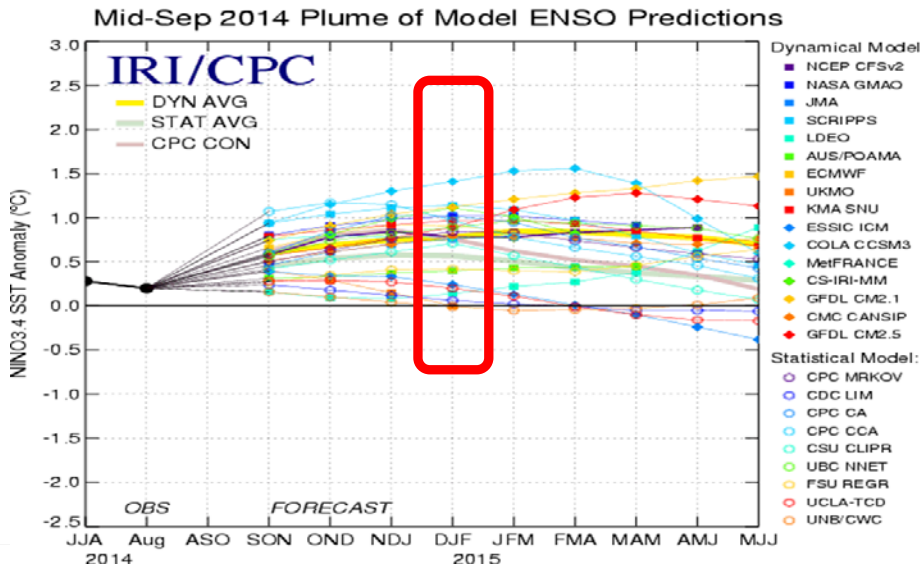


Correlation of DJF SLP and NAT(oct)



The positive NAT phase favors a strong EAWM, while NAT is near normal.

External factors- tropical Pacific Ocean SSTA



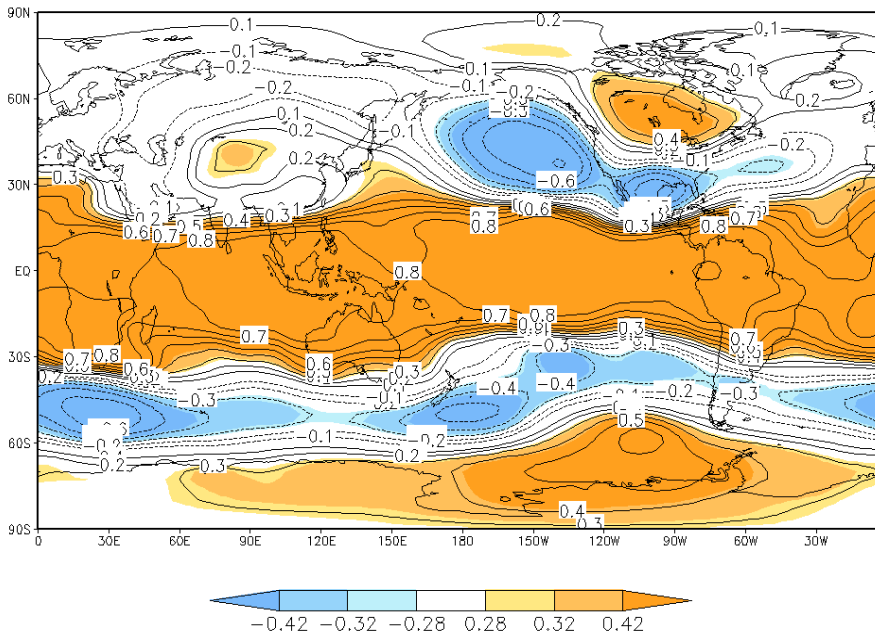
There are 13 years Nino3.4 ≥ 0 from 1981 to 2013.

- 10 weak EAWM years (10/13)
- 2 slightly strong EAWM (1994, 2009) (2/13) ;
- 1 strong EAWM (2004)

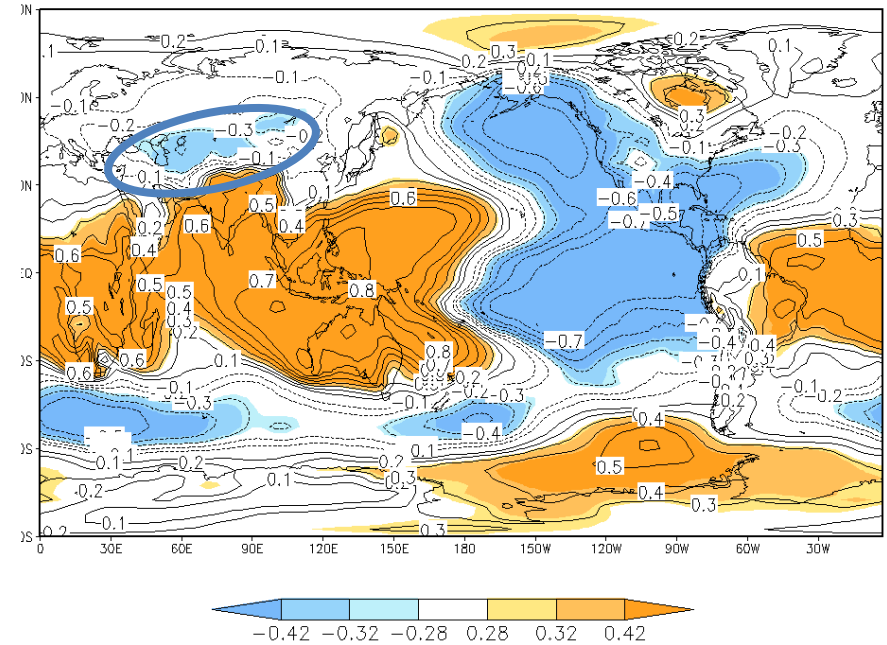
The developing El Nino is favor the weak Siberian high.

External factors- tropical Pacific Ocean SSTA

Correlation of DJF 500hPa hgt and the Nino3.4



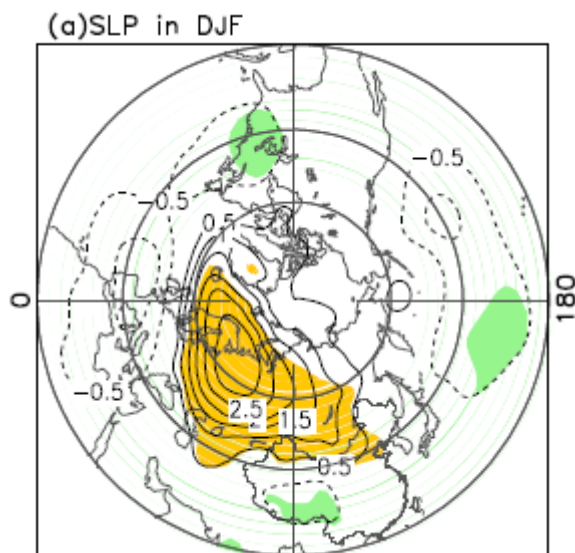
Correlation of DJF SLP and the Nino3.4



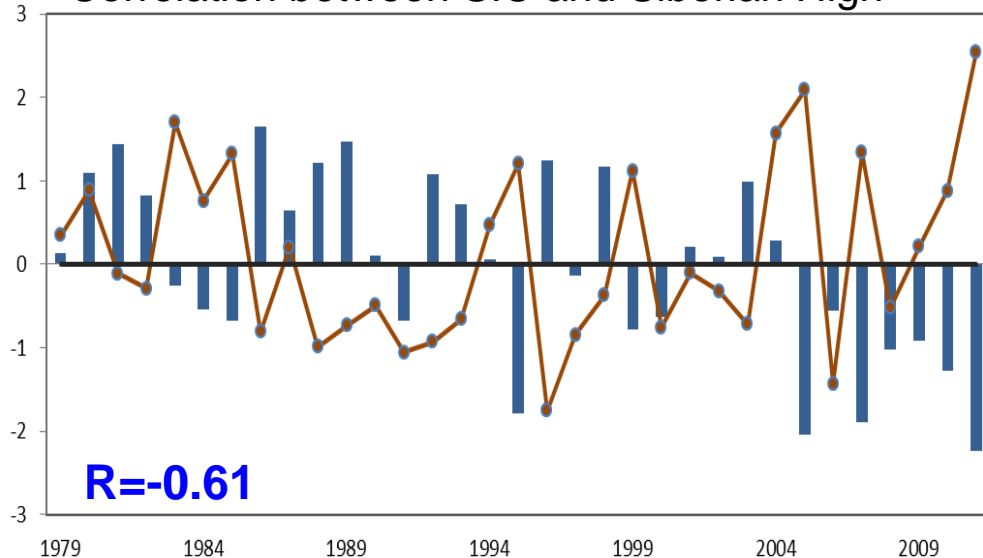
The warm central-eastern tropical Pacific Ocean favors strong WPSH and weak Siberian high.

External factors- Arctic Sea Ice

Regr. of SLP(DJF) on Barents-Kara Sea SIC



Correlation between SIC and Siberian High

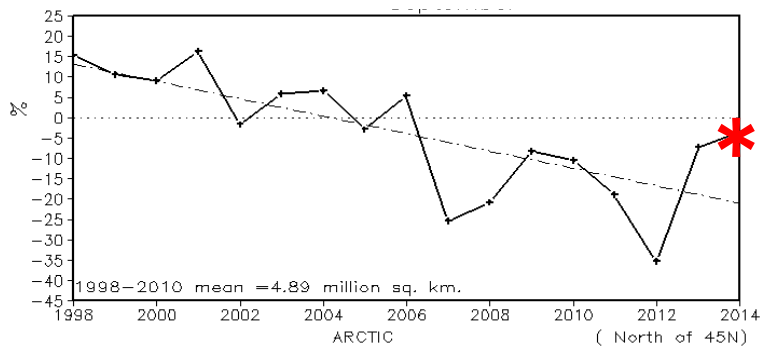


➤ The key area sea ice extent over Arctic in September is significantly related to the Siberia High and the temperature in East Asia.

—— Wu B Y et al., 2011, 《Chinese Science Bulletin》



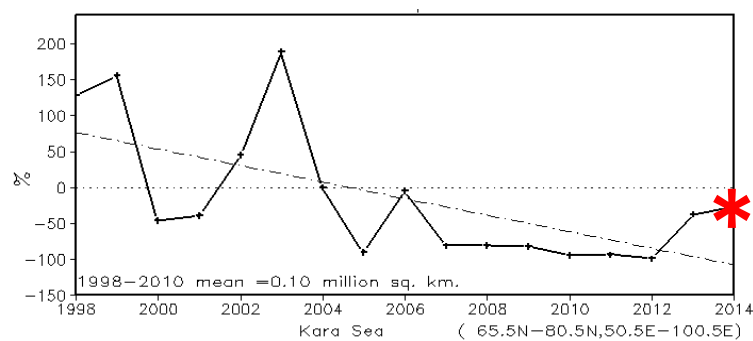
Percentage of monthly sea ice anomaly over Arctic in September 2014



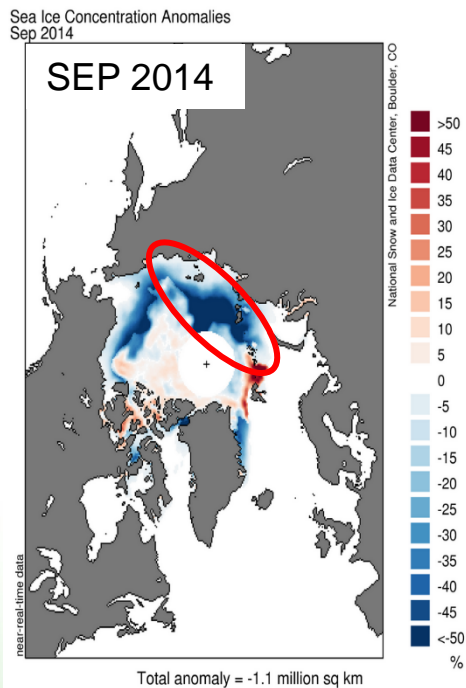
Climate Monitoring Division/NCC/CMA



Percentage of monthly sea ice anomaly over Kara Sea in September 2014



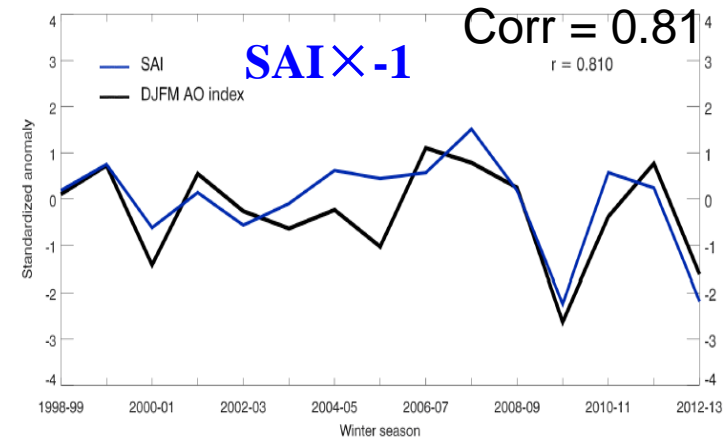
Climate Monitoring Division/NCC/CMA



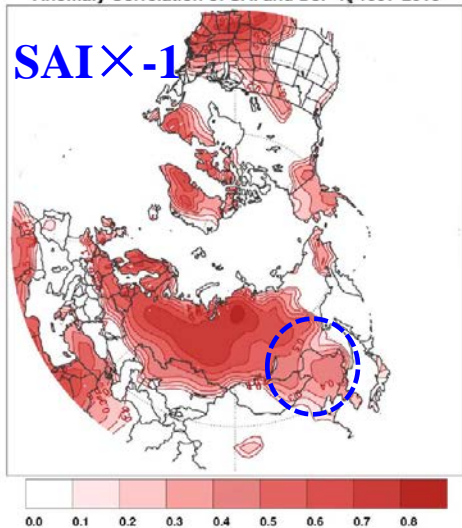
Both the sea ice anomalies all over Arctic and over Kara Sea in Sep 2014 are nearly last year and much above linear trend which indicates Siberian high will be weaker than normal in the coming winter.



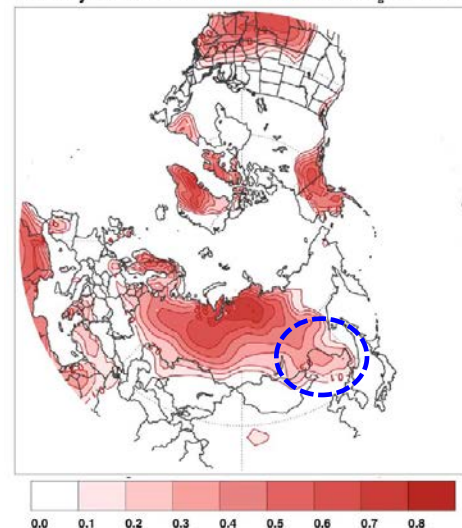
External factors- Eurasian snow



Anomaly Correlation of SAI and DJF T_e, 1997-2010



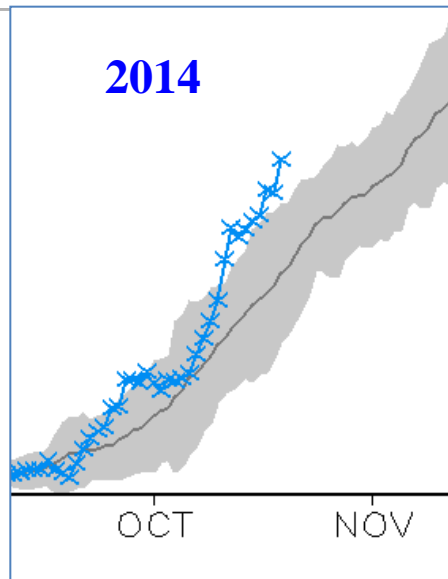
Anomaly Correlation of AO Index and DJF T_e, 1997-2010



➤ **Snow Advanced Index (SAI)** derived from antecedent Oct observed snow cover explains a large fraction of the variance of the winter AO.

— Judah Cohen and Justin Jones, 2011, GRL

Recent evolution of Eurasian SC



Anomalous Eurasian snow cover increasing favors negative phase of AO.

Summary of Circulation analyses

		Siberian high	East Asia main trough	Ural Mountain high
Dynamical models		Weak	Weak	Weak
Interdecadal tendency		Strong	Strong	Strong
External forcing	Central-middle Pacific SSTA (above normal)	Weak	Weak	Weak
	Arctic sea ice (less)	Weak		Weak
	PDO (positive phase)	Weak		Weak
	northern Pacific Ocean SST(significantly warm)			Weak
	NAT(near normal)	No signal	No signal	No signal

EAWM—weak

WPSH—stronger and extend more west

Indian-Burma trough—shallow

AO—negative phase

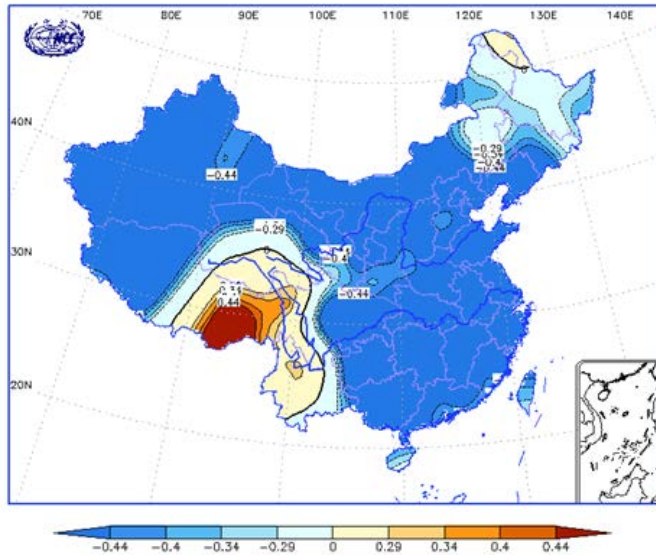


Under the impact of the circulation characterized by weak EAWM, negative AO phase, strong WPSH, shallow Indian-Burma trough, what will the temperatures and rainfall be over China in 2014/15 winter?

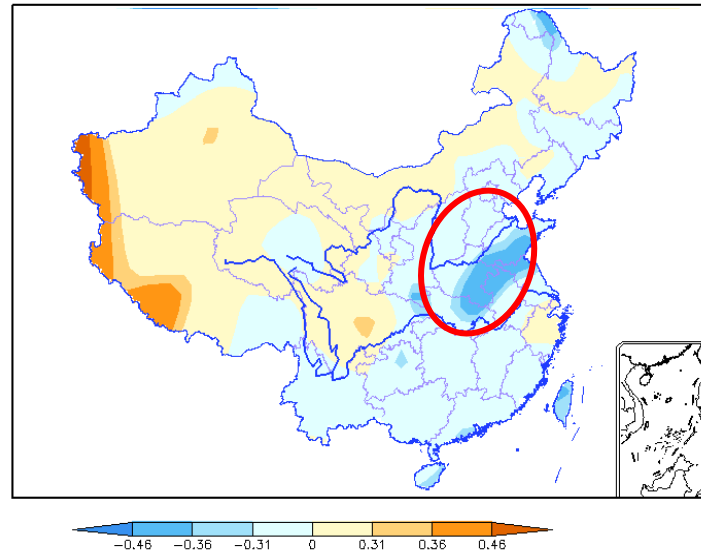


Siberian High and Winter Climate

correlation with DJF temperature



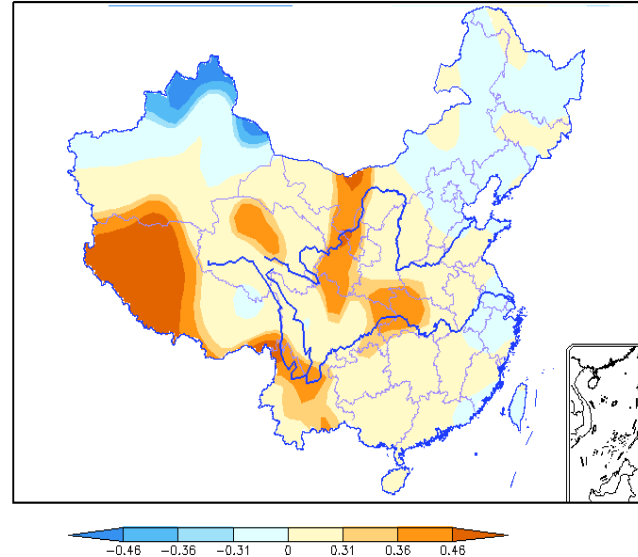
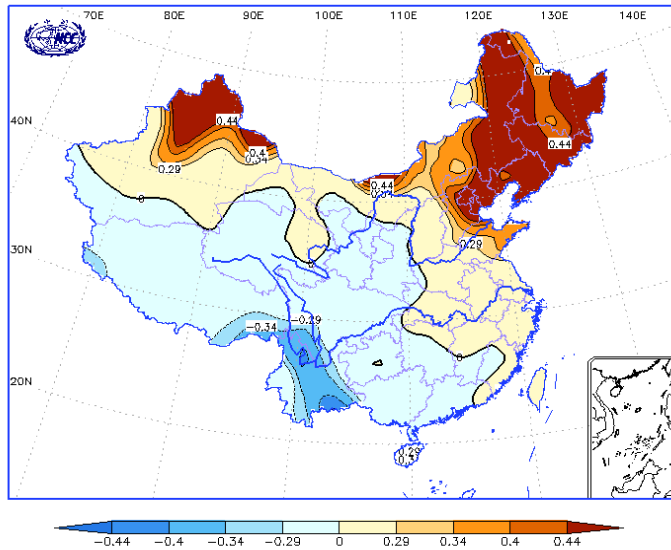
correlation with DJF precipitation



Weak SH favors most of China warmer than normal.

AO and winter climate

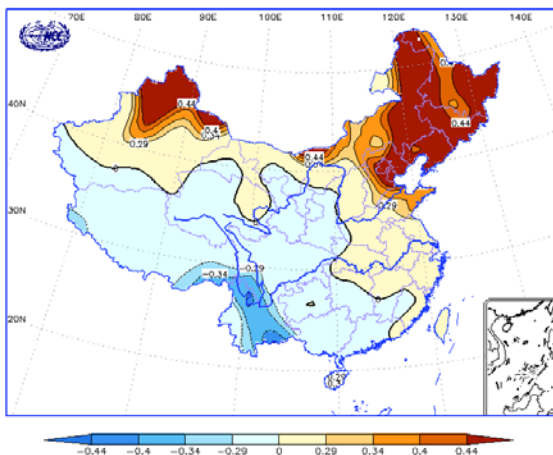
Correlation with DJF temperature/precipitation



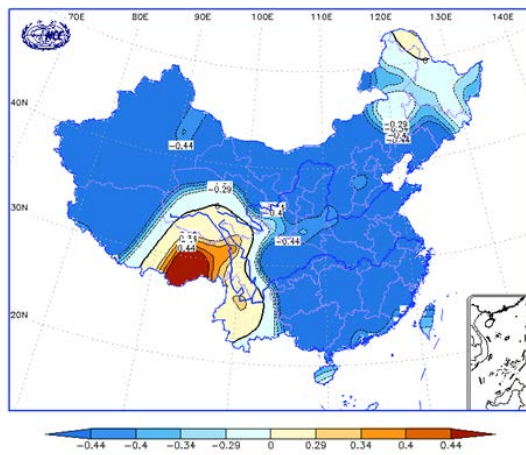
The negative AO phase favors northeast China and northern Xinjiang colder than normal, central to western China drier and northwestern China wetter than normal.



AO

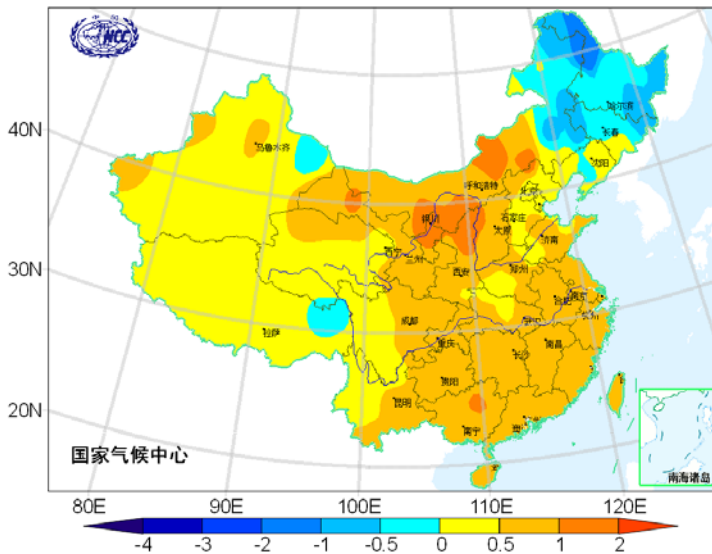


SH



Composite of AO- and weak SH

COMPOSITE 160_temp MON(12-2) 1986 1997,2000,2003 AN

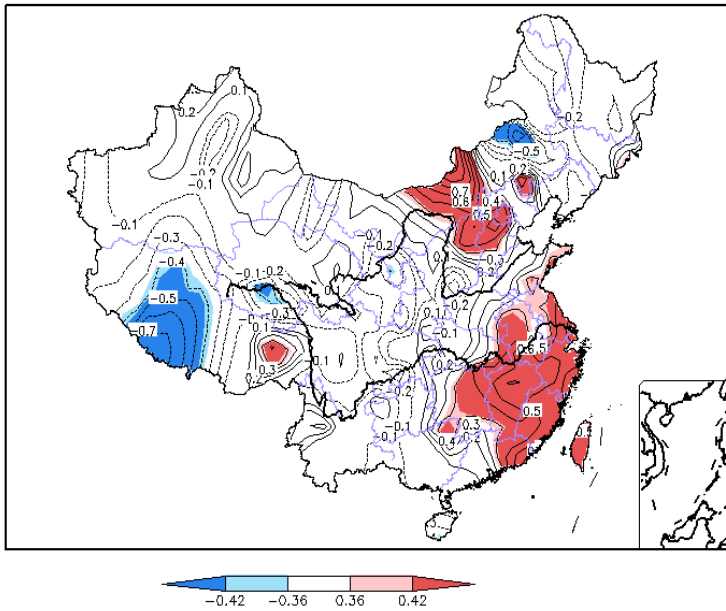


Weak SH with negative AO phase favors most of China warmer than normal expect northeastern China and part of northwestern China.

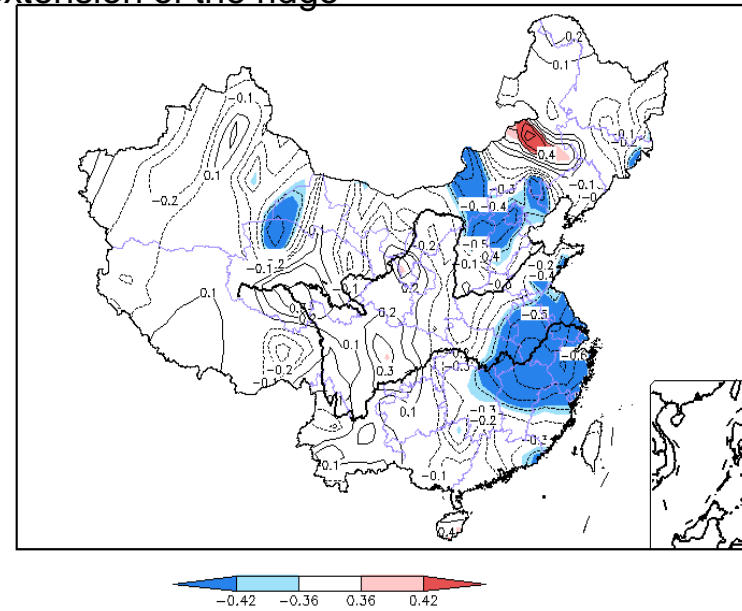


Impact of WPSH

Correlation between DJF and WPSH intensity index



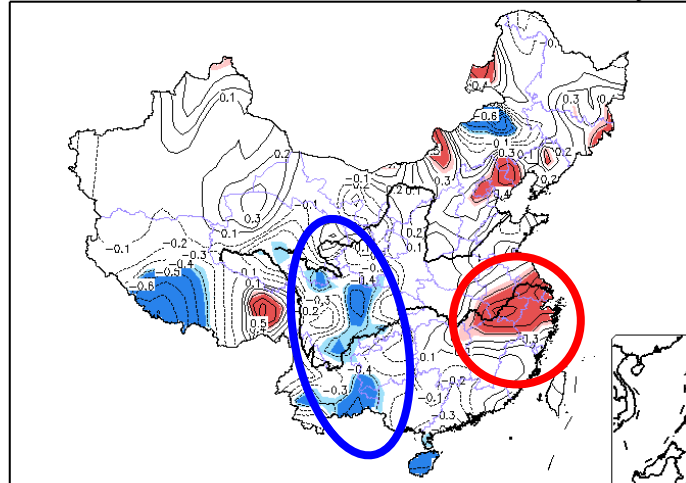
Correlation between DJF and WPSH western extension of the ridge



WPSH will be stronger and extend more west than normal, which favors more precipitation than normal over eastern China.

Impact of IBT

Correlation between DJF and IBT intensity index

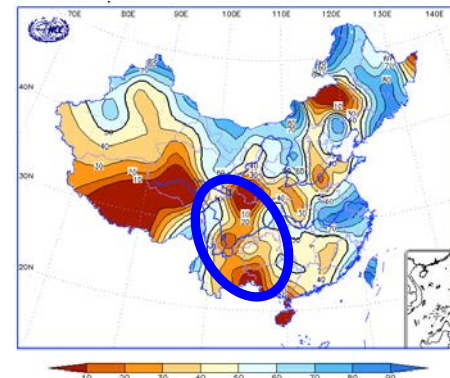
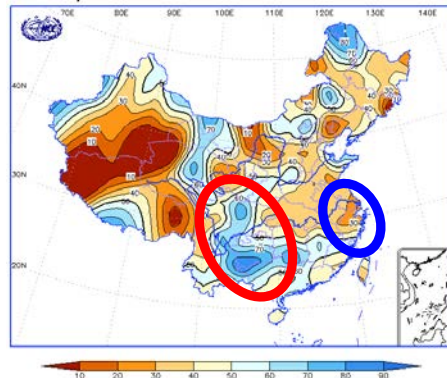


Shallow IBT favors abundant rainfall over eastern China, and lack of rainfall over eastern China .

Deep IBT

Shallow IBT

composite



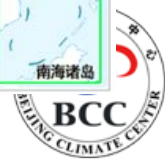
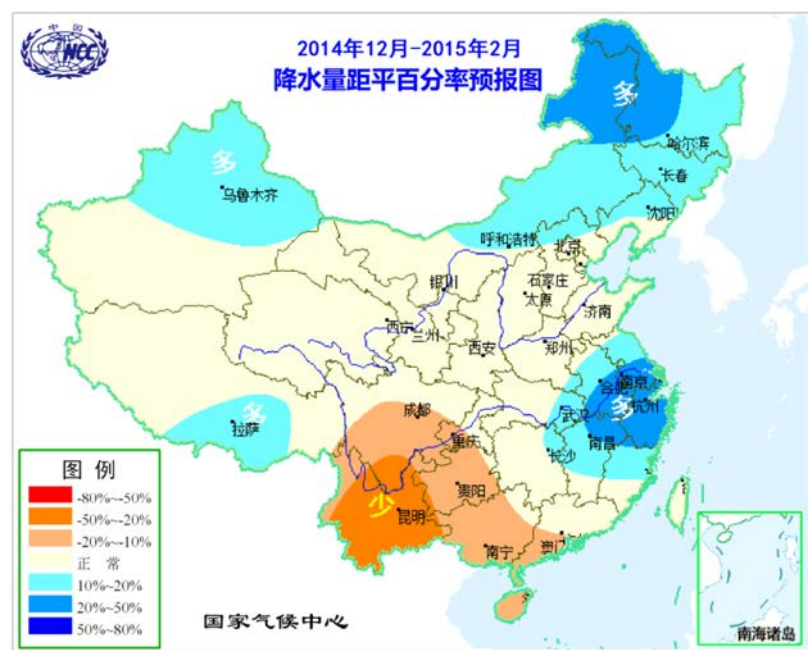
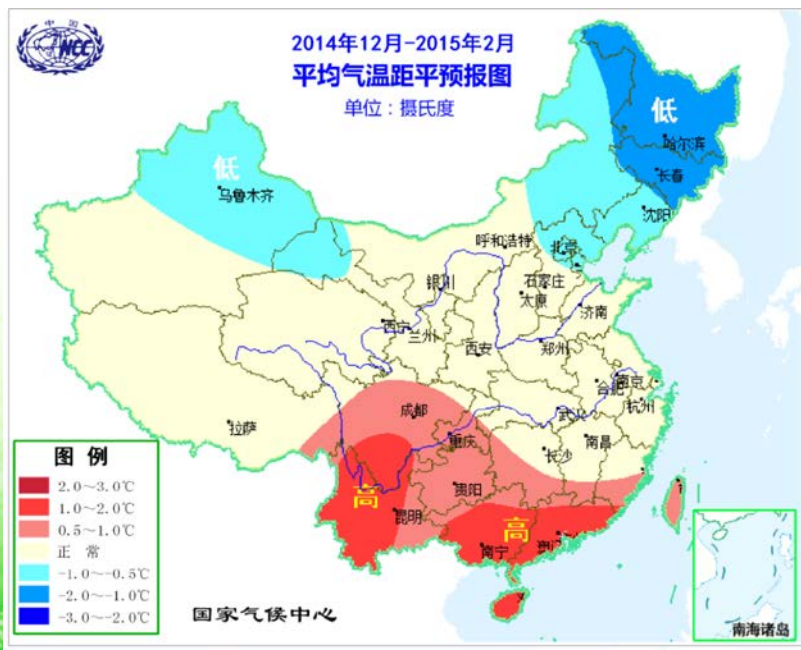


Prediction for winter

EAWM : weak

Temperature

Precipitation





Thanks !

