EASCOF-5 2017, Tokyo Japan

BCC predictions of ENSO and primary East-Asian circulation patterns in 2017/18 winter

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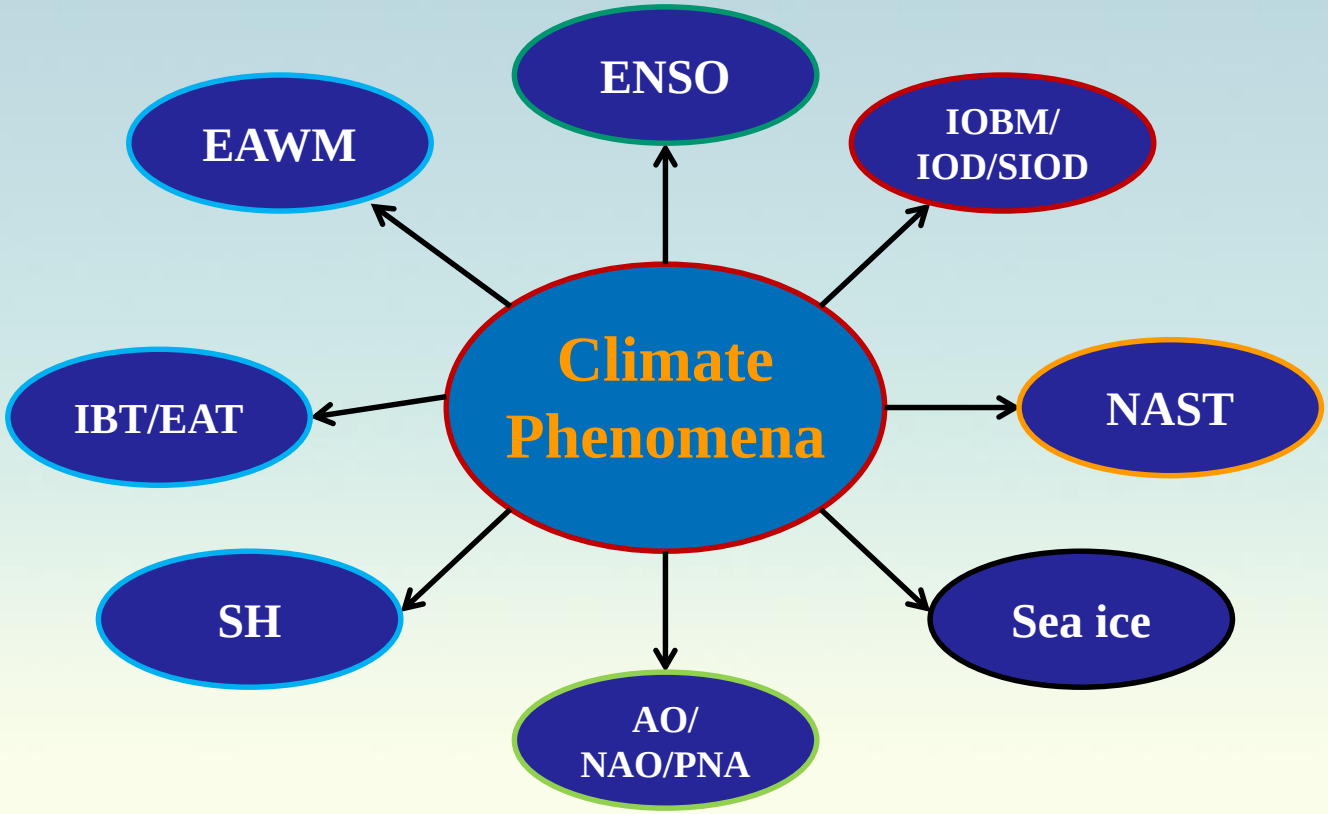
Primary climate phenomena impacting EA climate

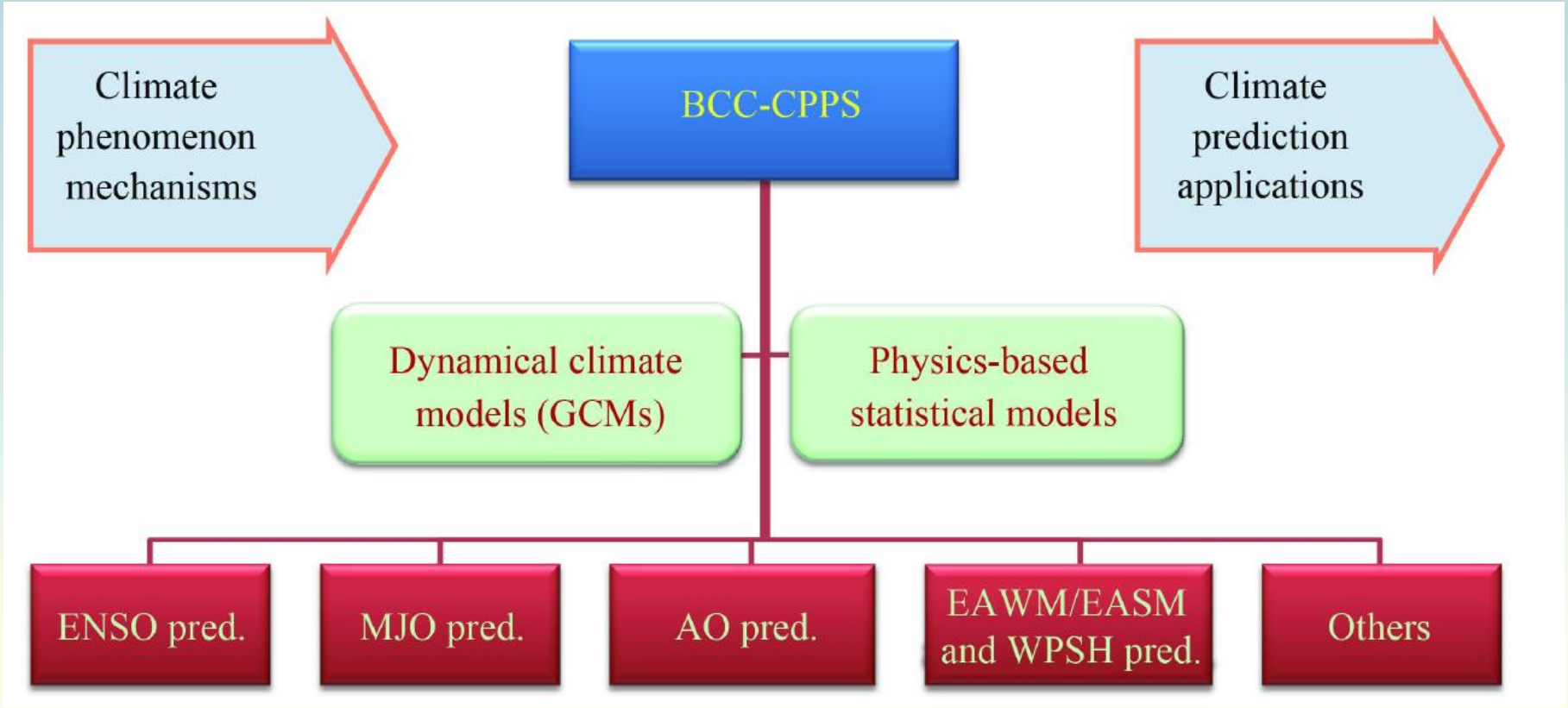


Methods

- Using BCC_CSM1.1m, and some CMME models
- Using physics-based statistical models
- Forecast a group of climate indices

CMME models	Ensemble members
BCC-CSM1.1m	24
FGOALS-s2	4
NZC-PCCSM4	4
FGOALS-FAMIL	24

Climate Phenomenon Prediction System (CPPS)



Support the BCC operational climate prediction

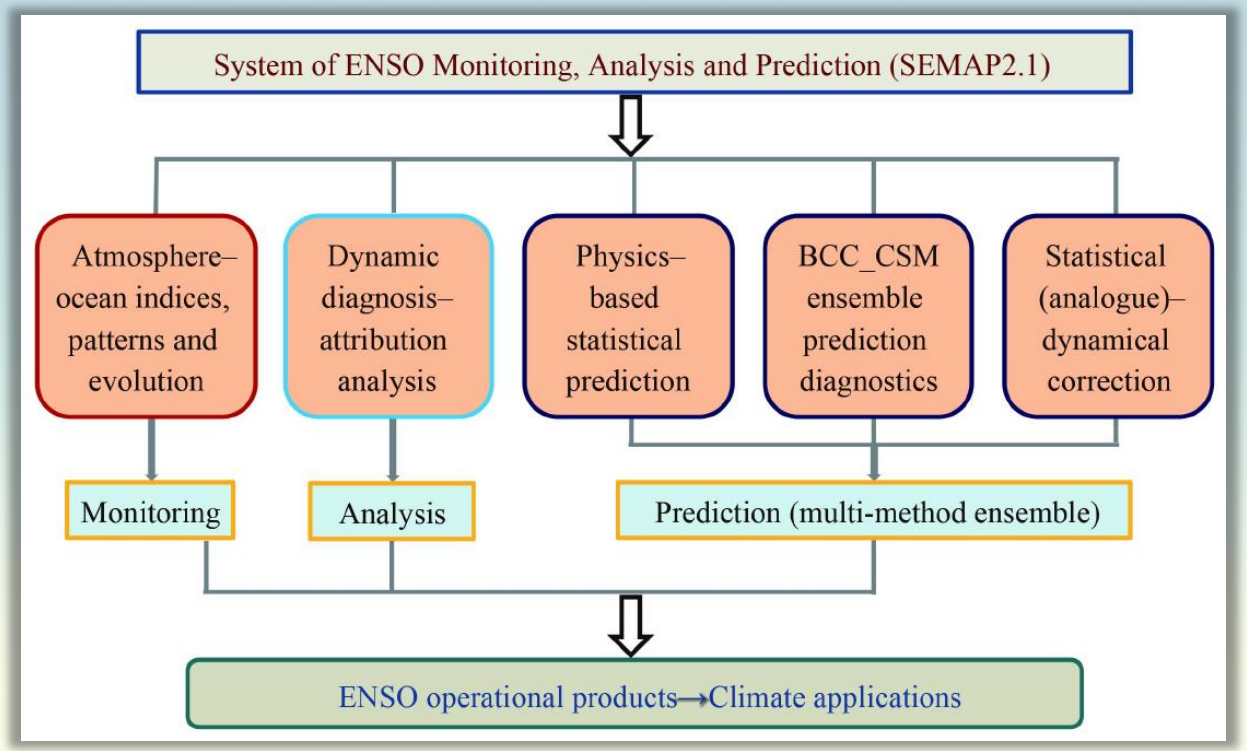
（1）ENSO prediction in BCC

Dynamical method:

BCC-CSM1.1m

LAF、ESVD

24 members



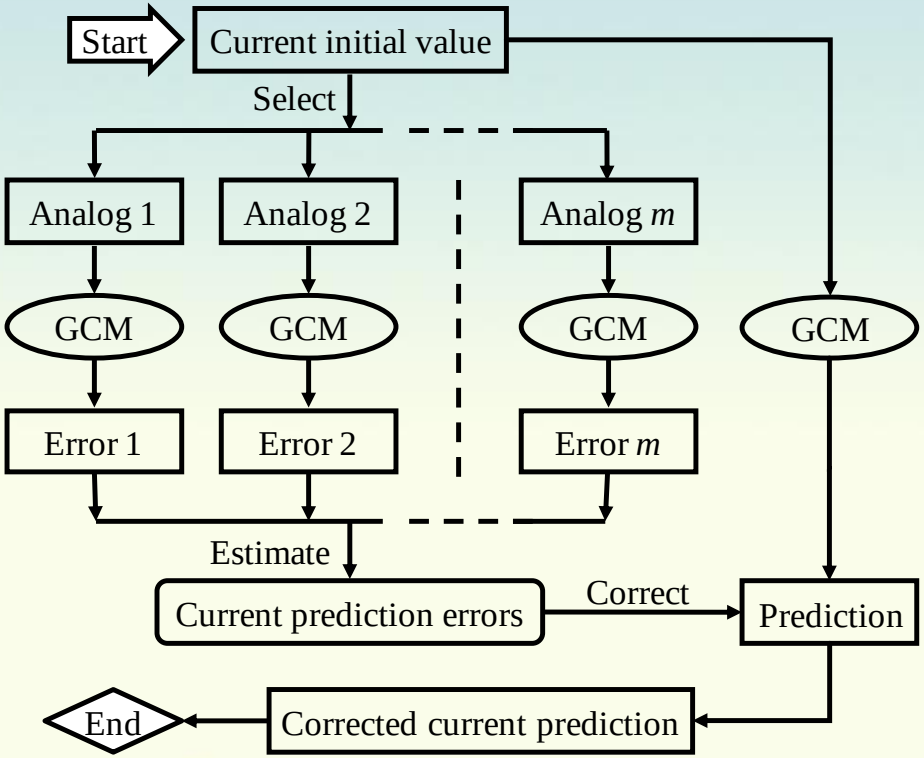
Statistical Method:

$$\mathrm{Nino}(t+\Delta t)=\alpha\mathrm{Nino}(t)+\beta\tau(t)+\gamma\mathrm{WWV}(t)+f\mathrm{FORCING}(t)+c$$

（1）ENSO prediction in BCC

Analogue-dynamical ENSO prediction (ADEPS)

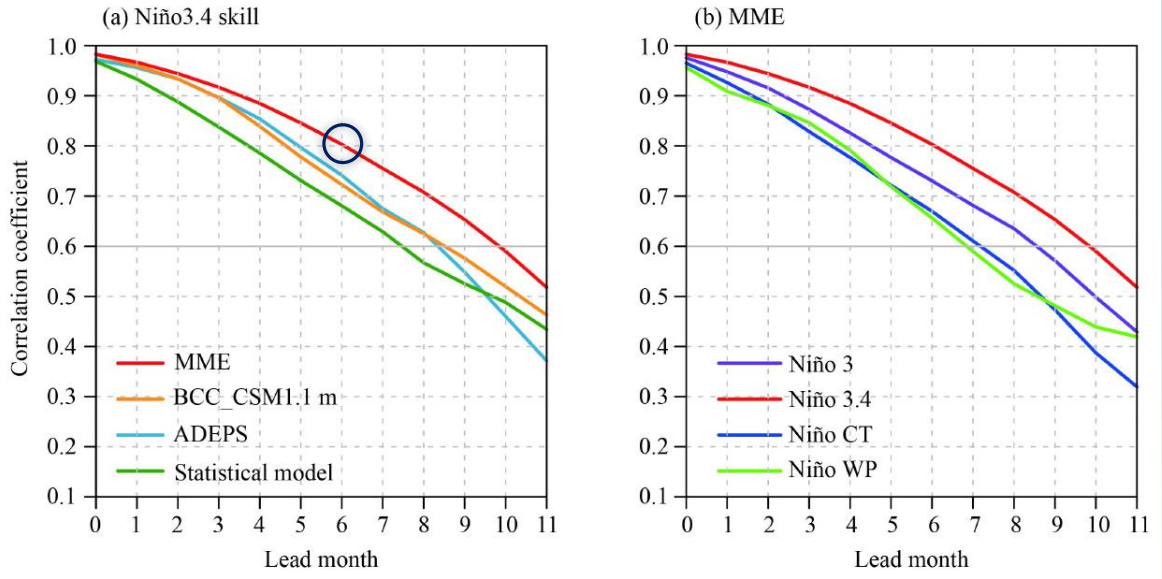
$$\hat{P}_{\mathrm{M}}(\psi_0) = P_{\mathrm{M}}(\psi_0) + \tilde{P}_{\mathrm{M}}(\tilde{\psi}_j) - P_{\mathrm{M}}(\tilde{\psi}_j)$$

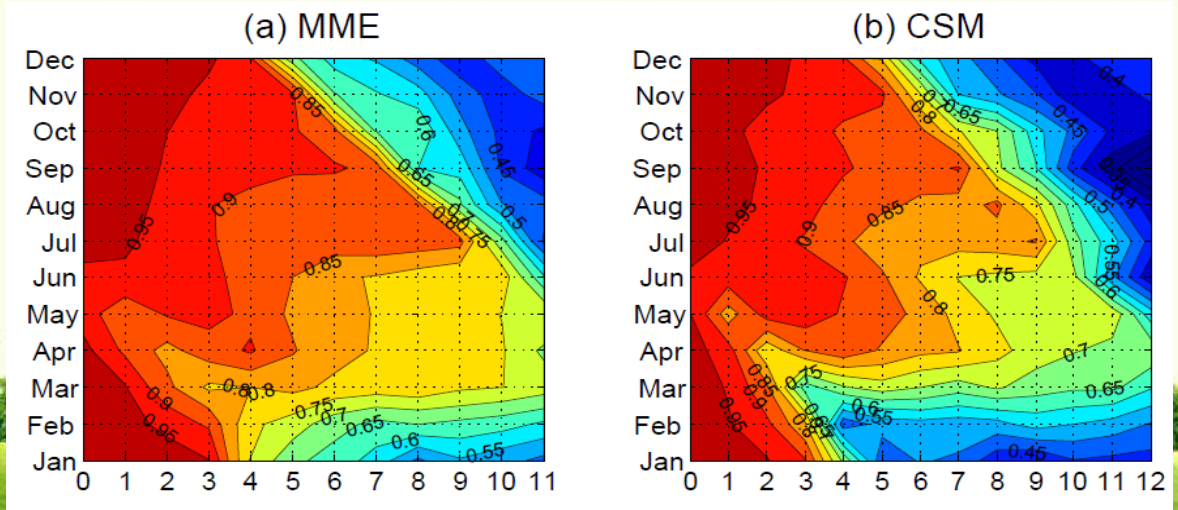


（Ren et al. 2014）

（1）ENSO prediction in BCC

ACC skill (1996-2016)

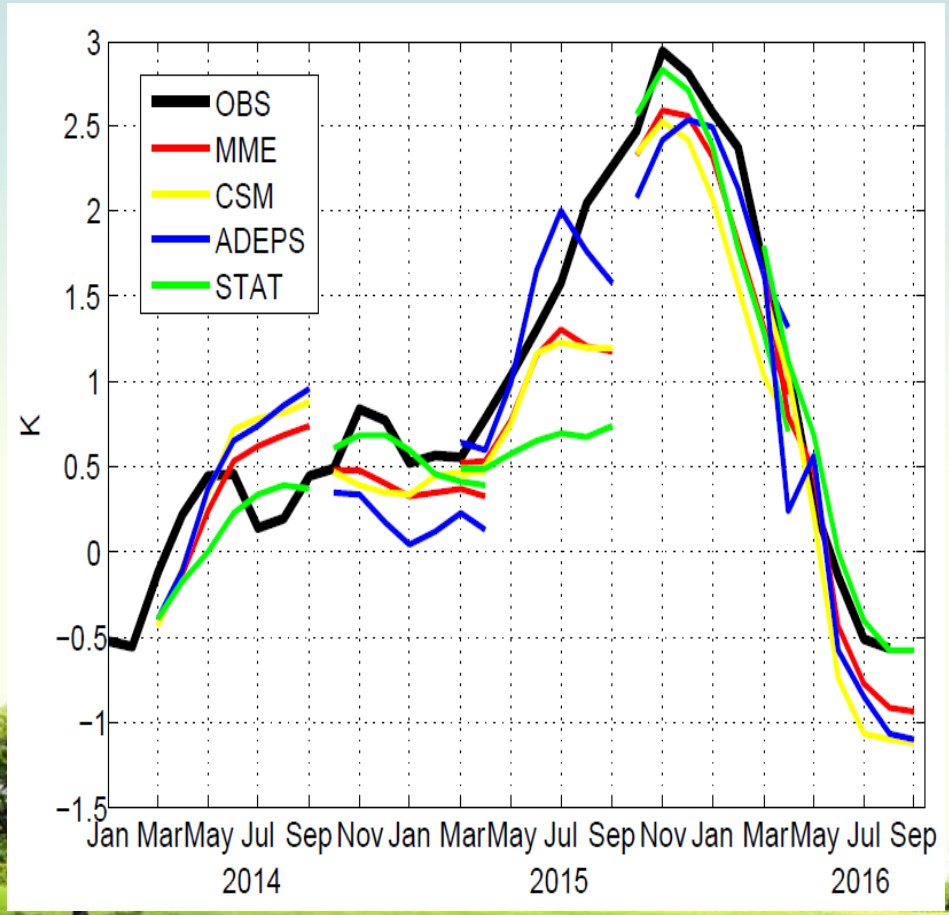




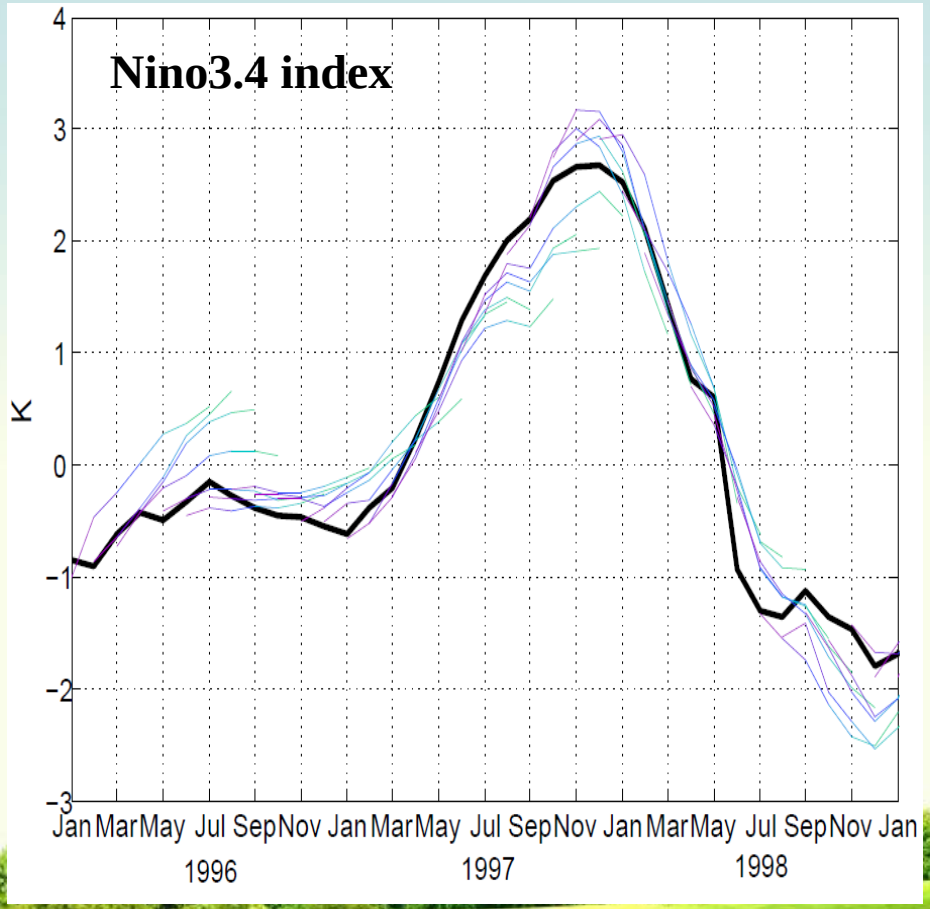
（1）ENSO prediction in BCC

Predictions of extreme El Nino events

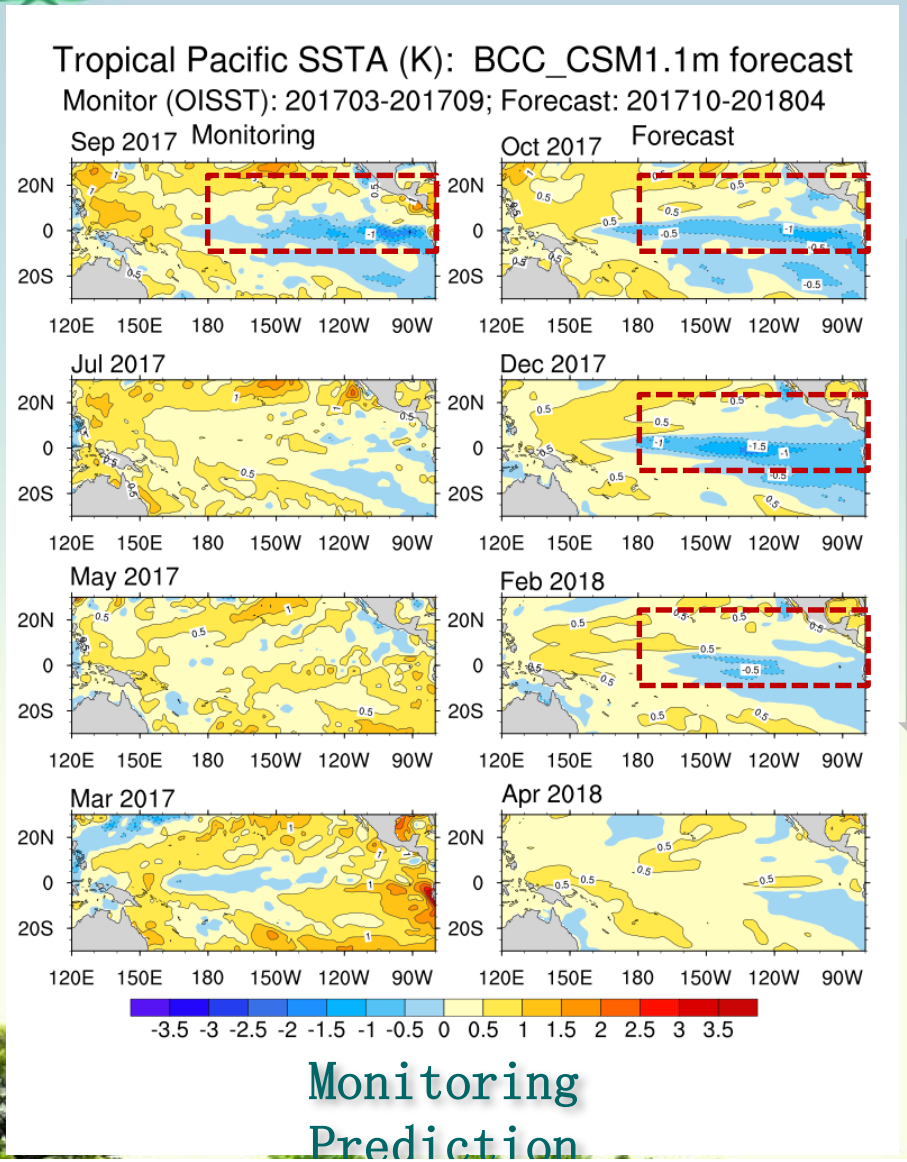
Real-time forecast of 15/16 events

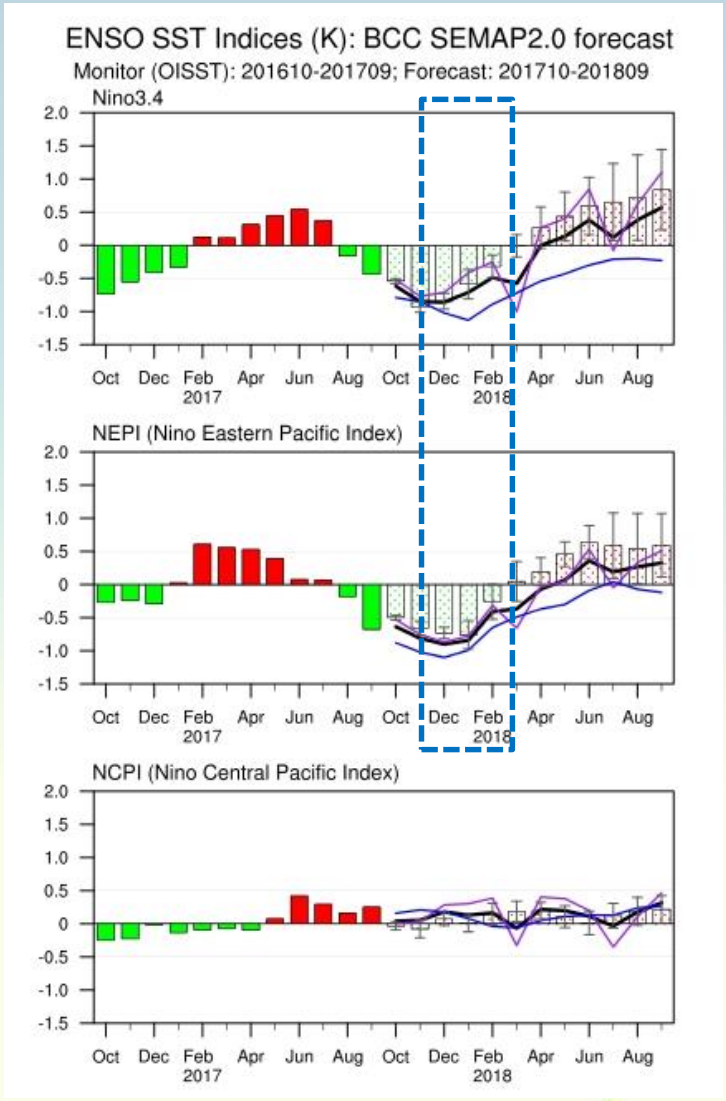


Hindcast of 97/98 events



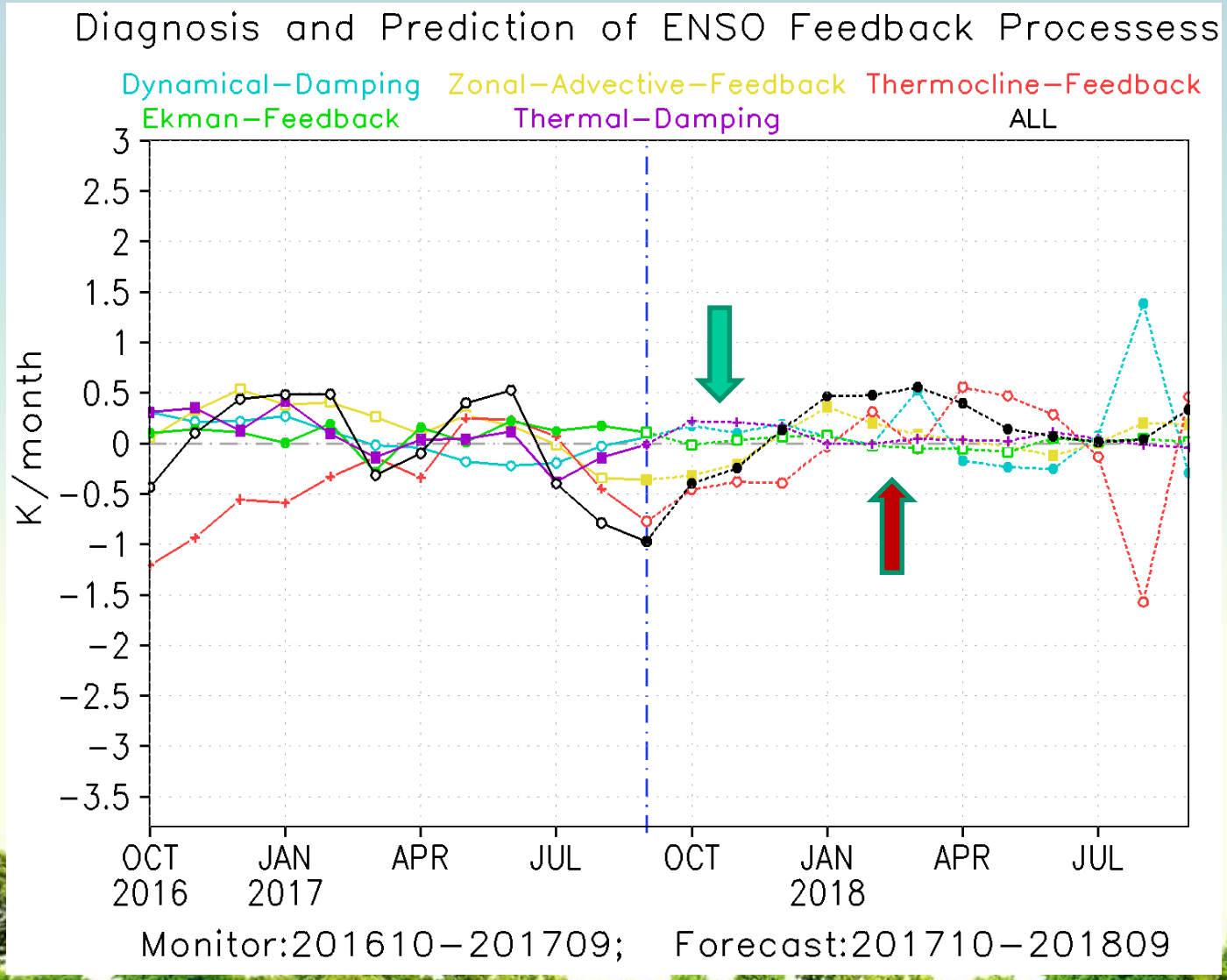
2017/18 winter: ENSO indices monitoring and predictions



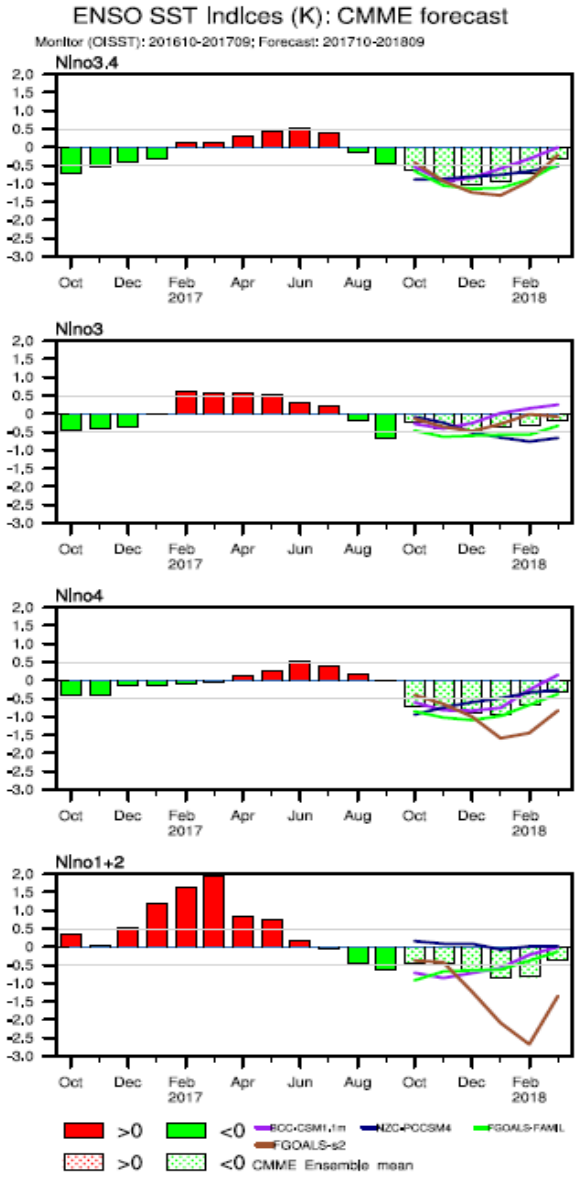


La Nino state will be persistent thru this winter up to next spring

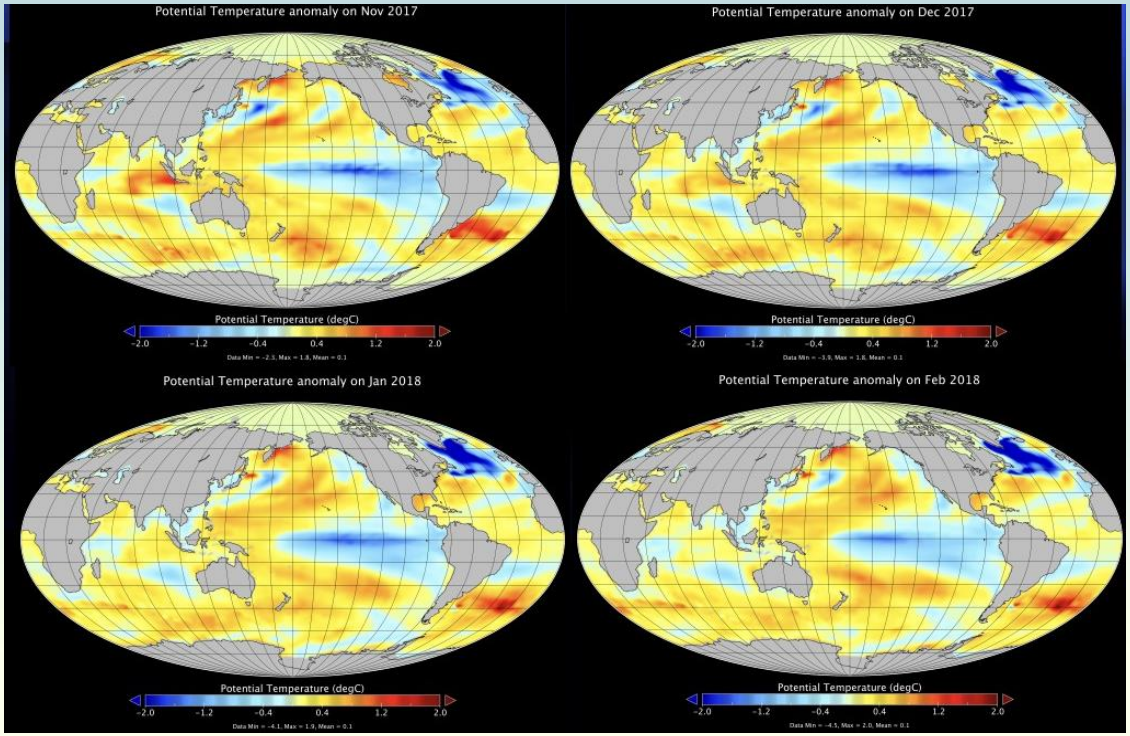
ENSO dynamical feedbacks



CMME：ENSO forecasts (ensemble of 4 models)

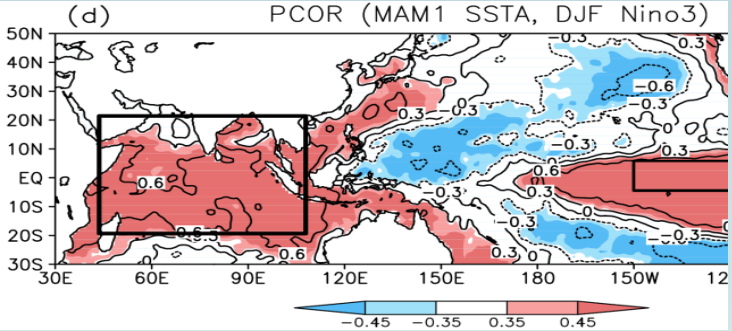


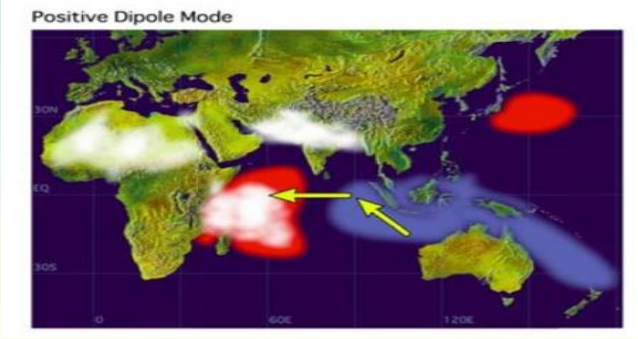
FGOALS-F forecast SSTA patterns

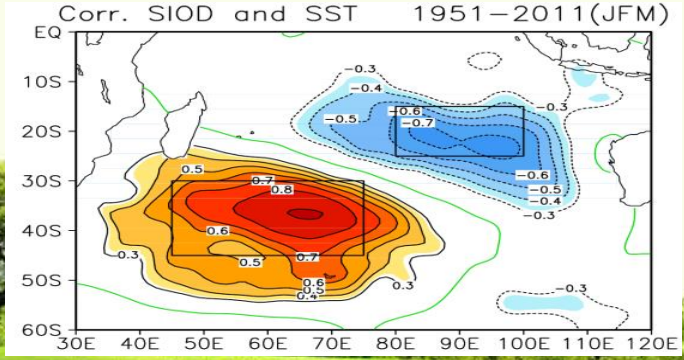


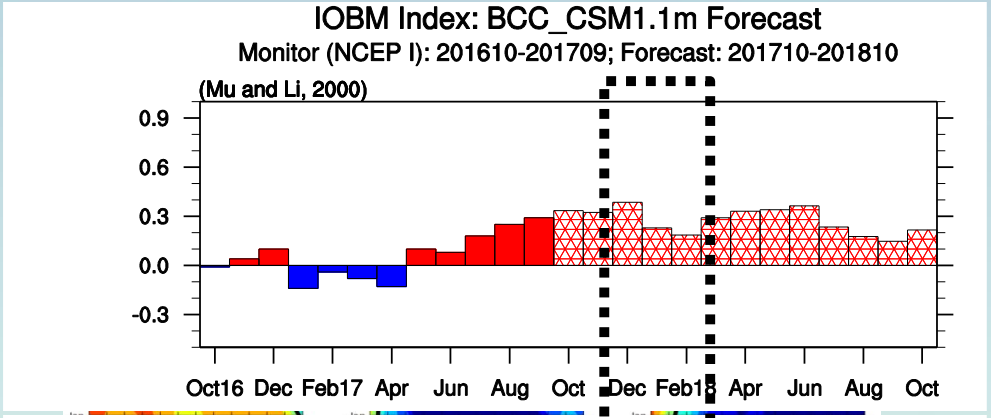
CMME results show that a weak La Nina event will occur this winter

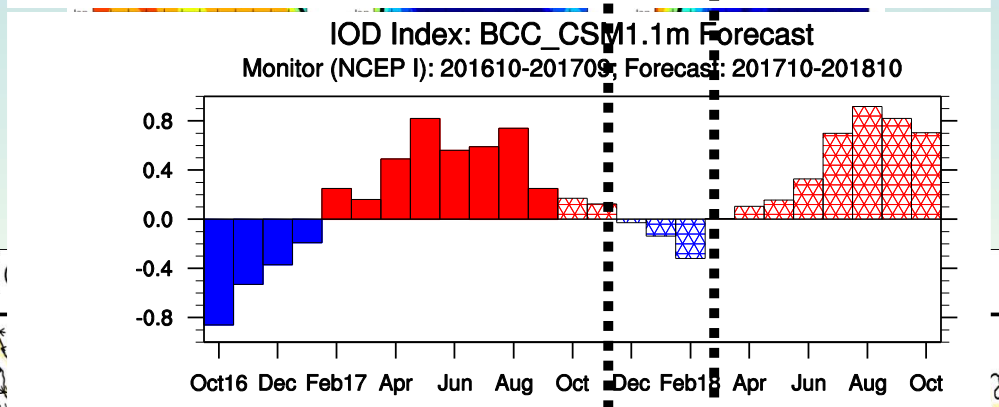
(2) Indian Ocean SST modes

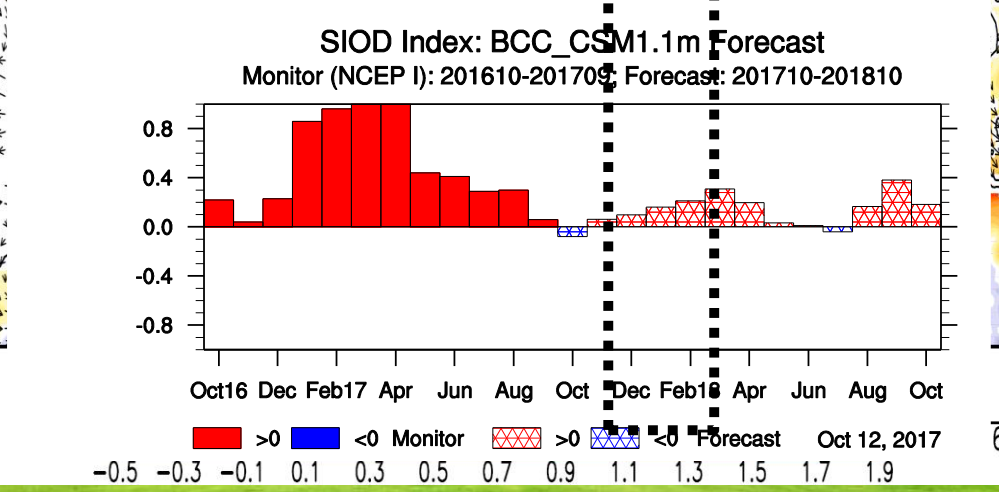






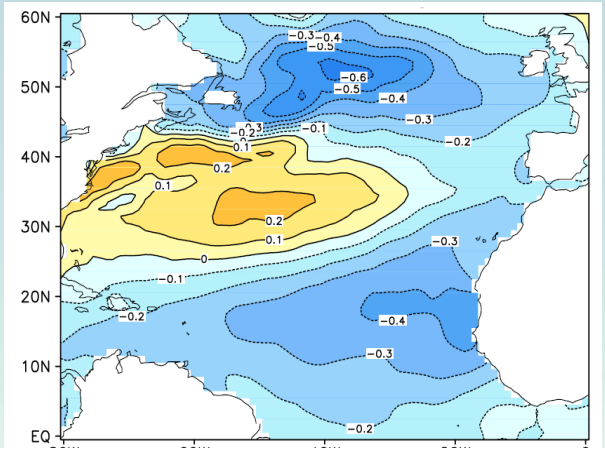




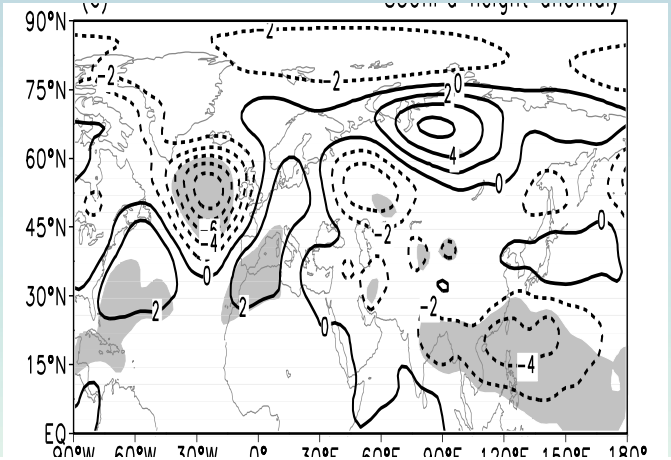


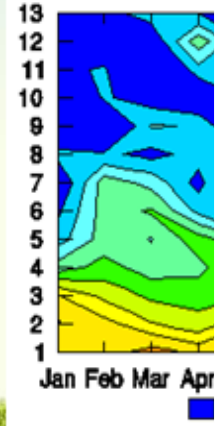
(3) North Atlantic SST Tripole (NAST)

EOF1 pattern of detrended SST



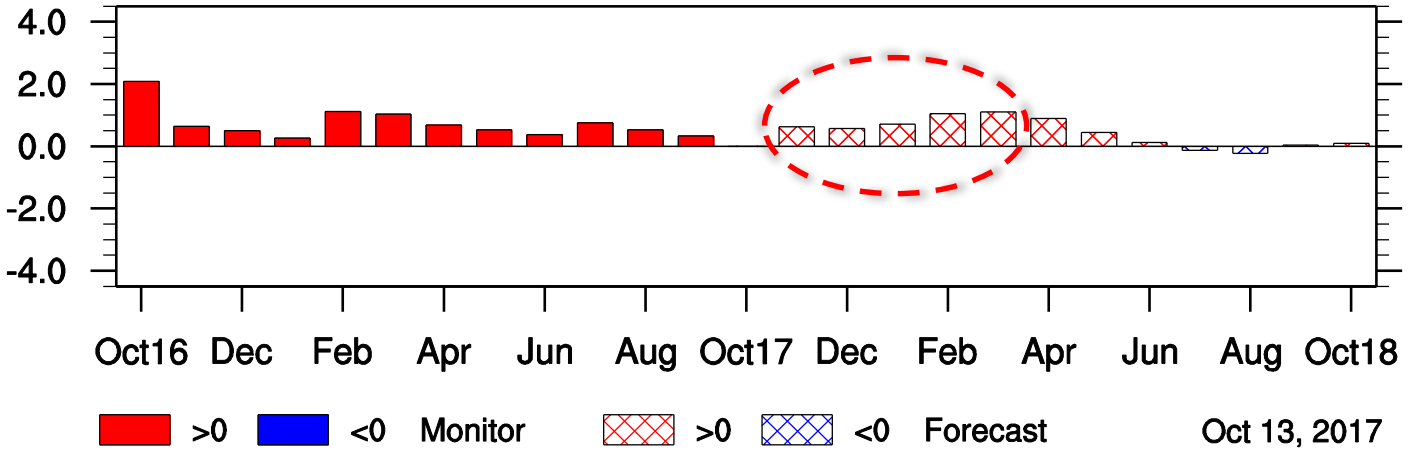
Patternof Z850 against NAST index

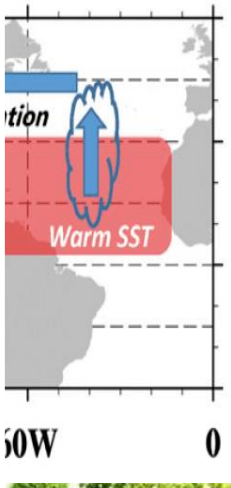




NAST Index (North Atlantic SST Triple Index): BCC_CSM1.1m Forecast

Monitor (OISST): 201610-201709; Forecast: 201710-201810

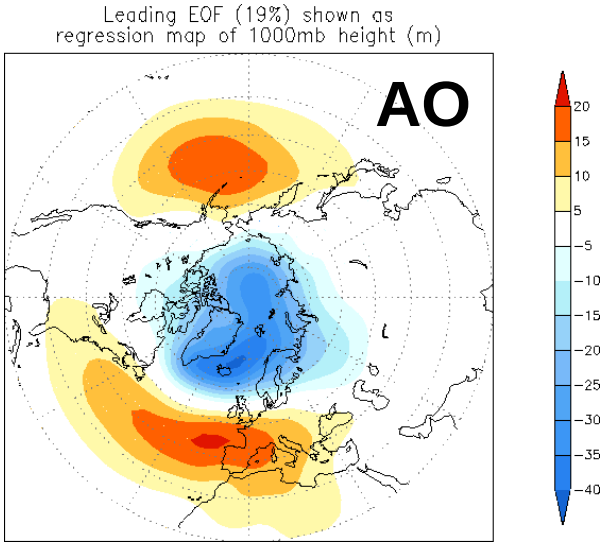


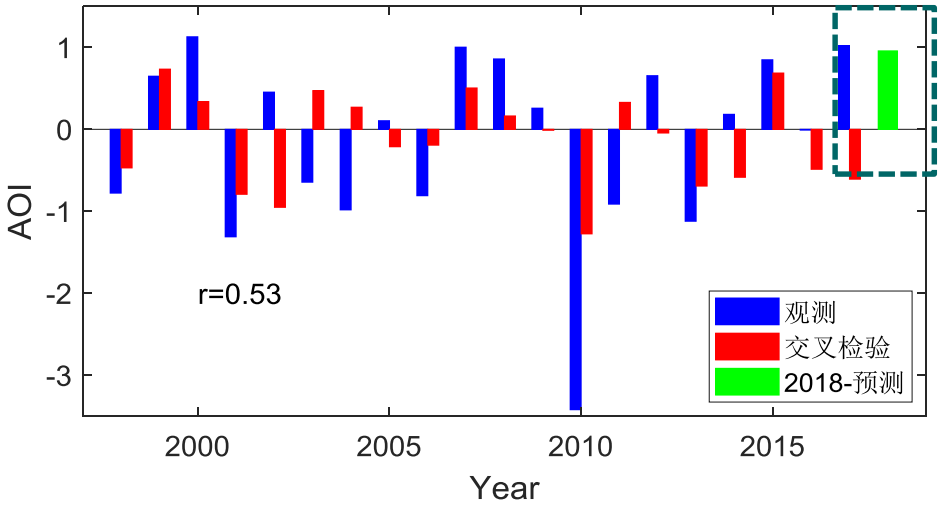


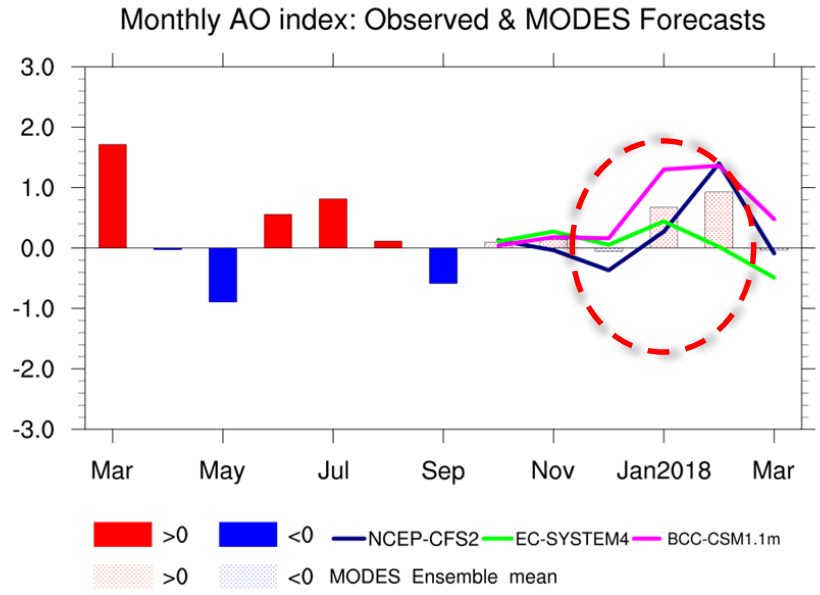
NAST in

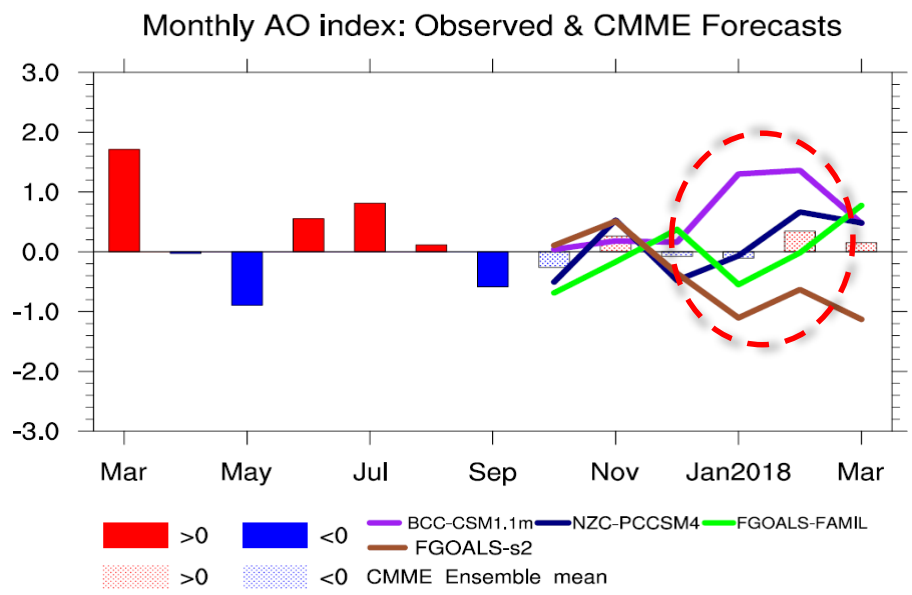
Difference between the SST anomalies averaged over 34°–44°N, 72°–62°W and the sum of regional-averaged SST anomalies over 0°–18°N, 46°–24°W and 44°–56°N, 40°–24°W (Zuo et al., 2012)

（4）AO index monitoring & predictions



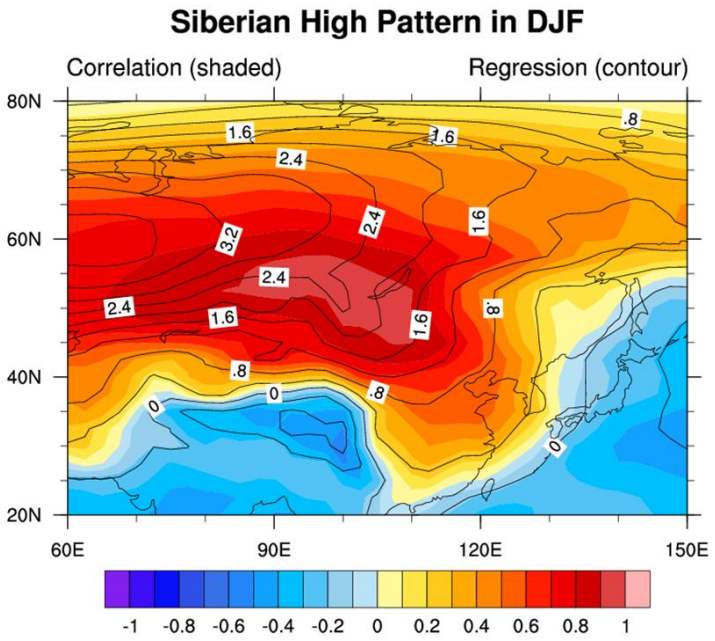


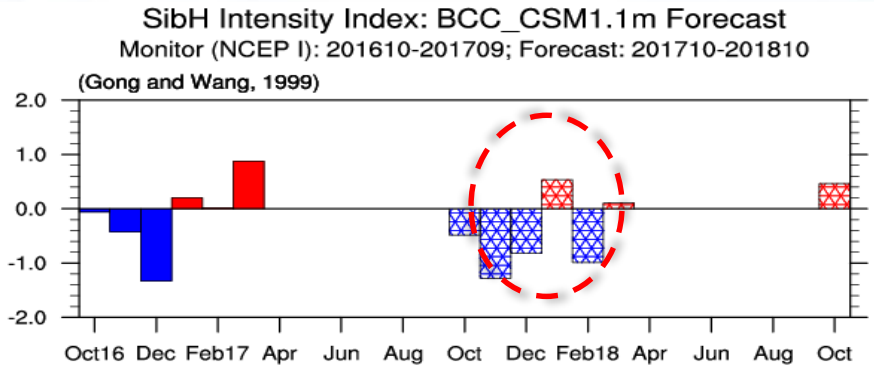


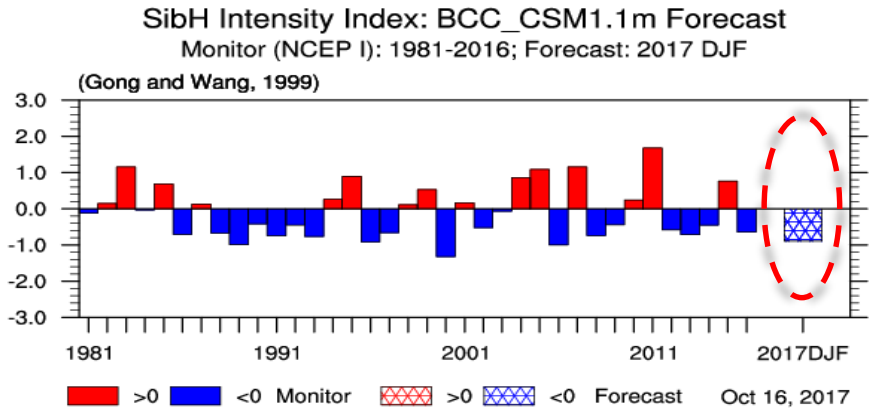


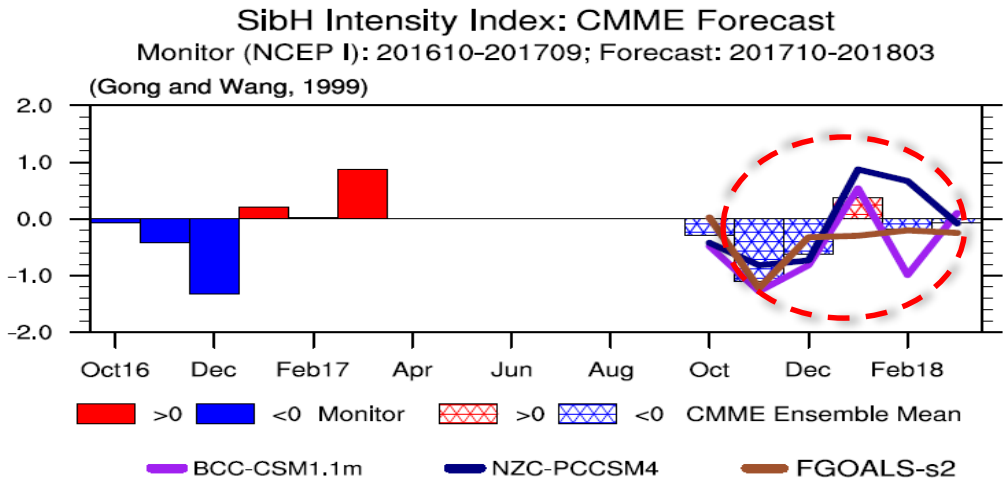
In 2017/18 winter, AO will be possible in the positive phase

（5）Siberian High predictions： BCC_CSM1.1m & CMME



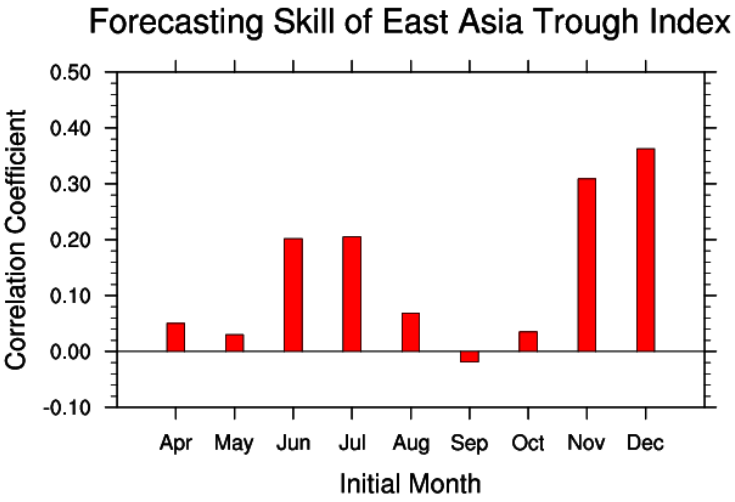


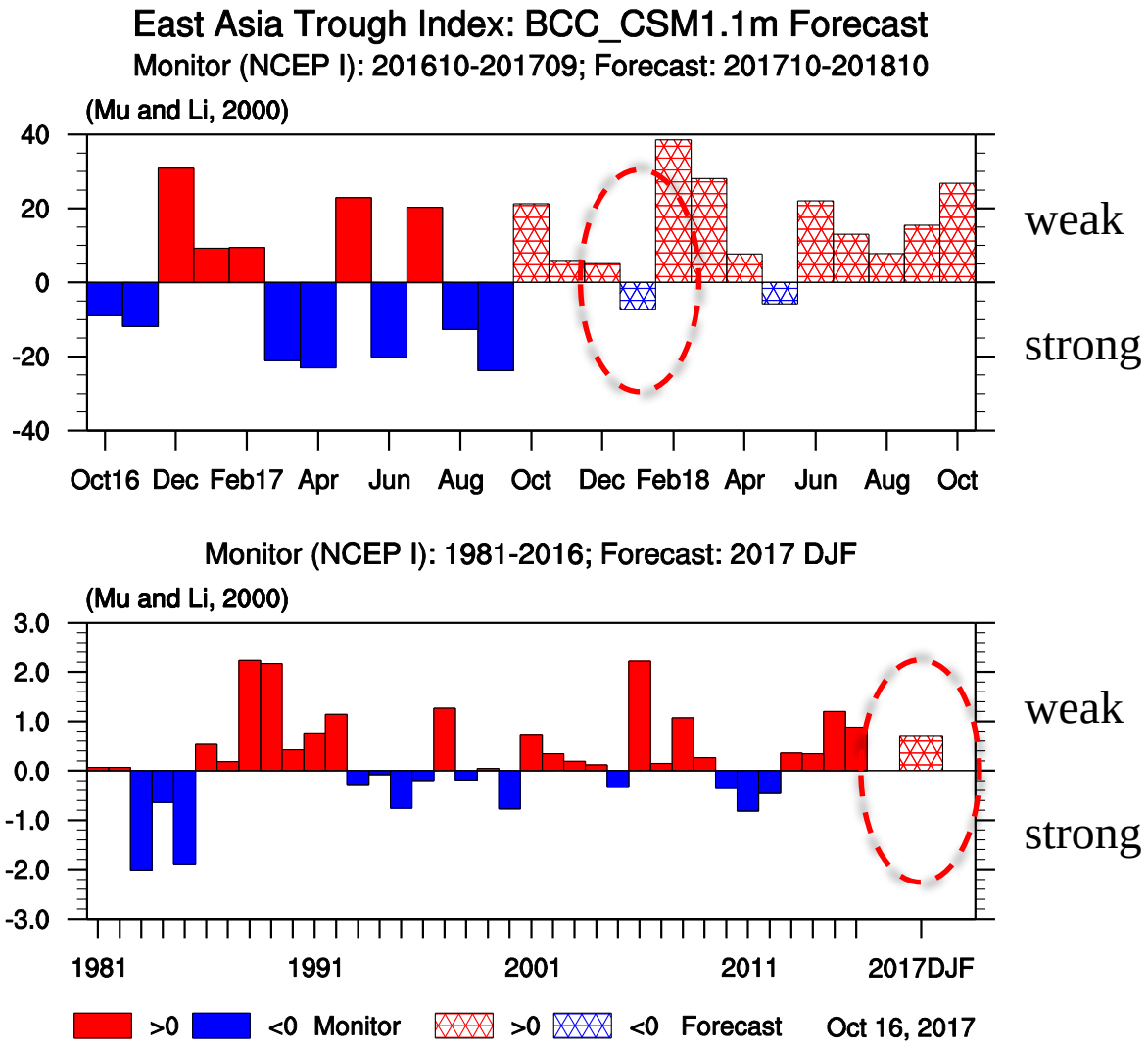




Siberian High may become weaker in this winter

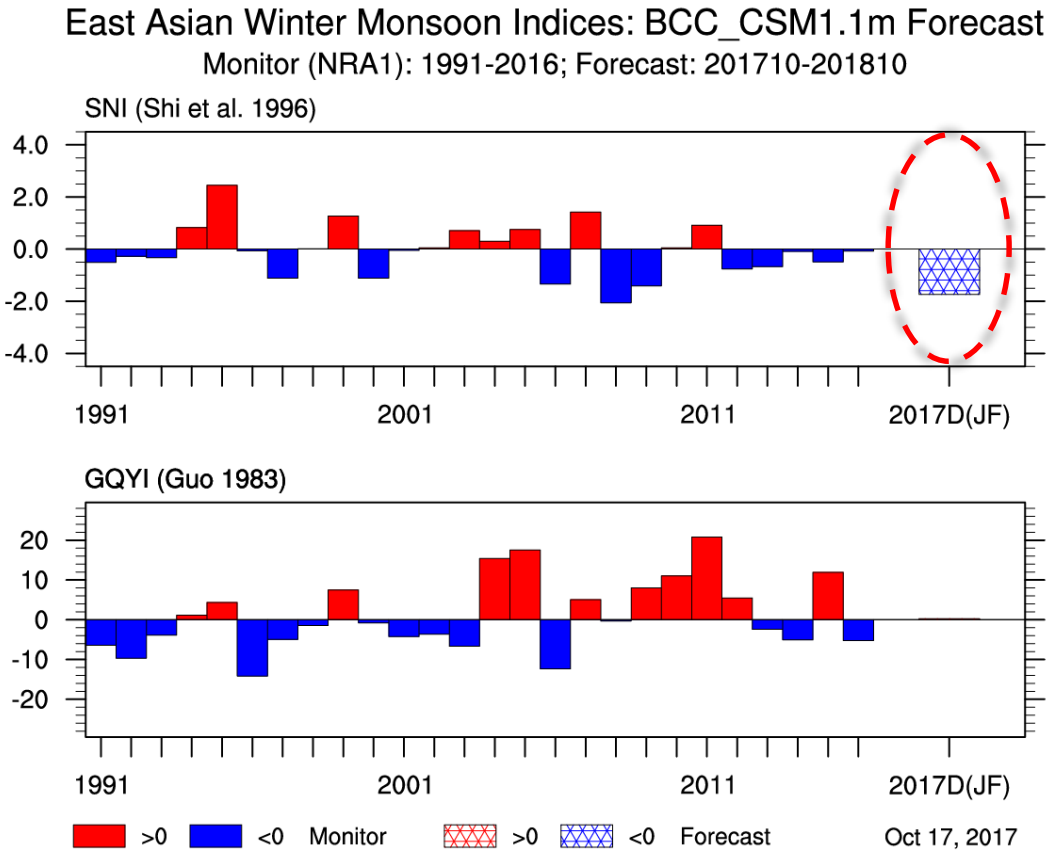
（6）East Asian Trough index prediction： BCC_CSM1.1m

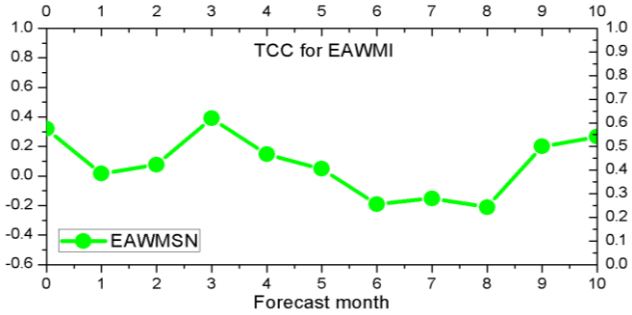


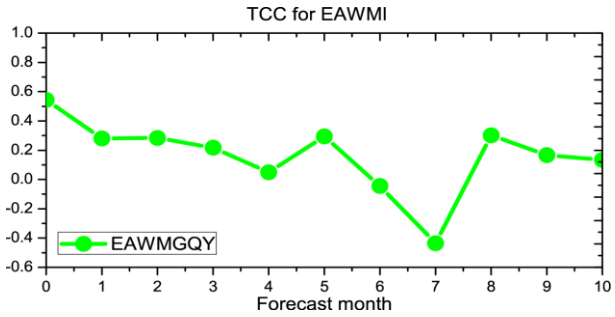


EAWM may be weaker than normal in 2017/18 winter

（7）EAWM indices monitoring & predictions： BCC_CSM1.1m

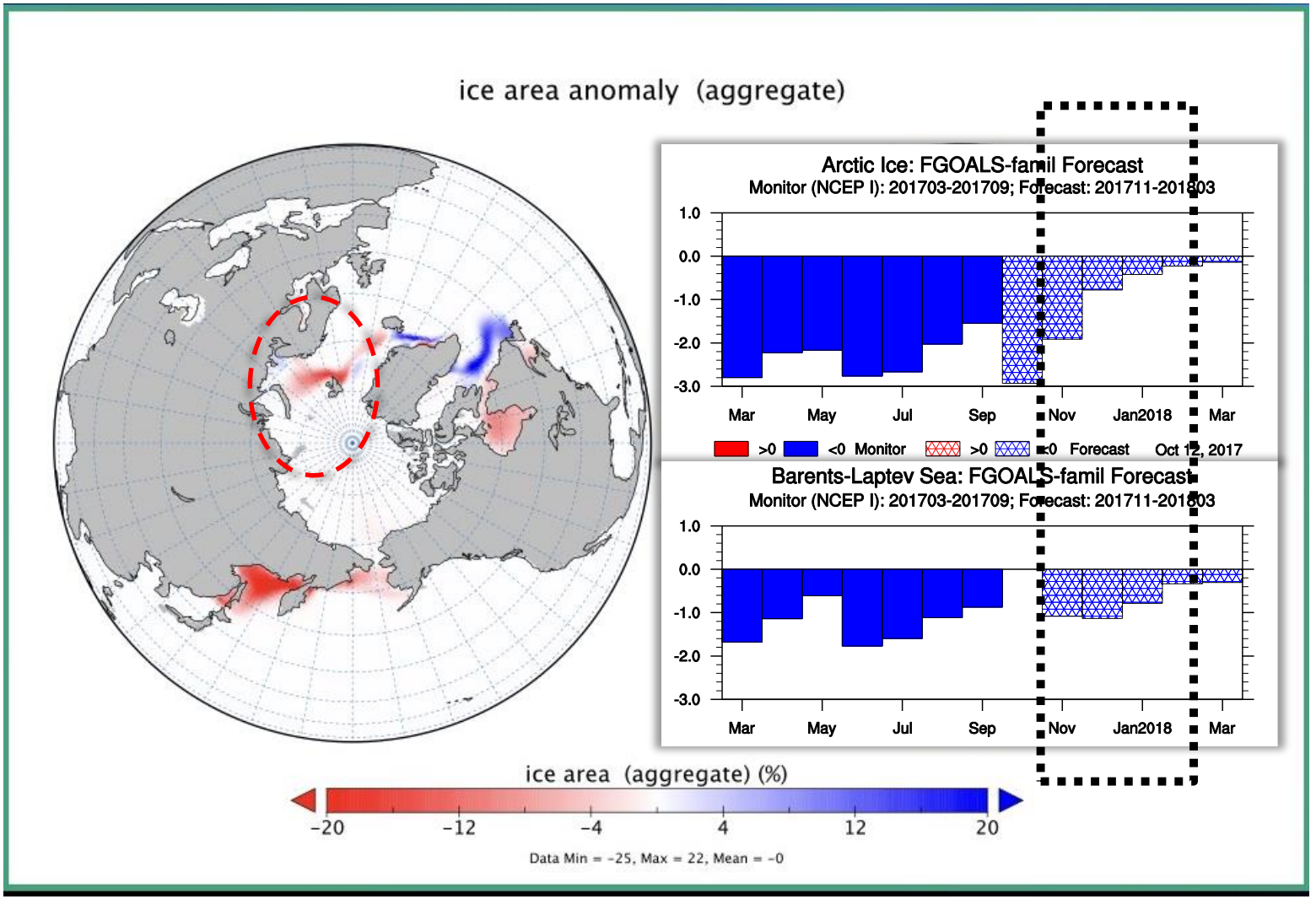






EAWM may be weaker than normal in 2017/18 winter

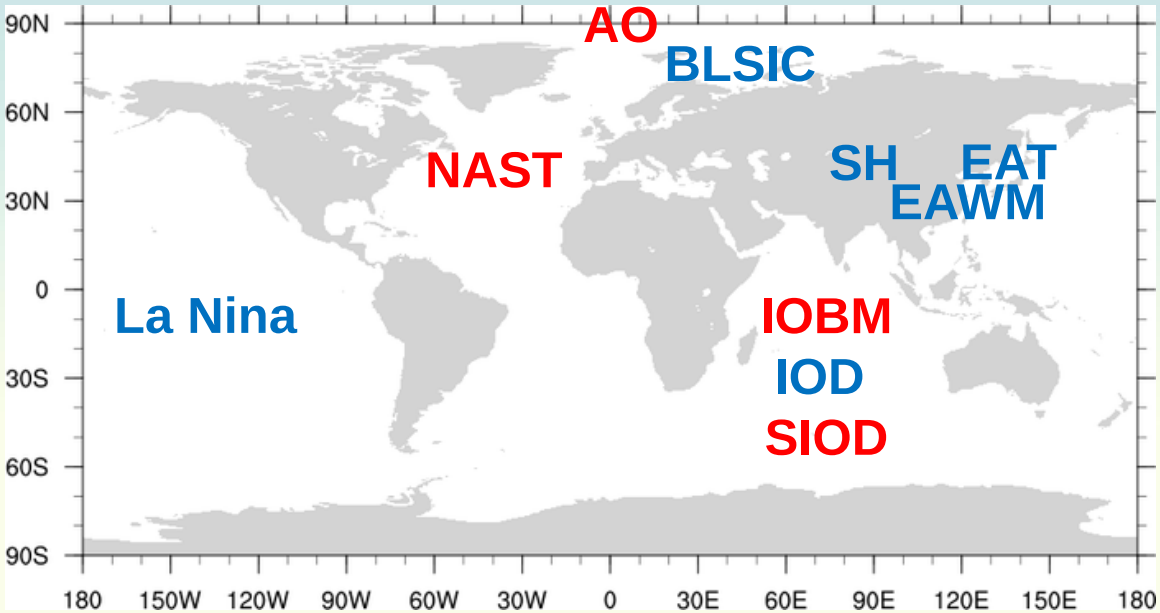
（8）Arctic sea ice concentration： FGOALS-f in CMME



Summary： 2017/2018 winter

Climate phenomena	Predictions	Implications for precip	Implications for SAT
ENSO	La Nina	Less in SC	Colder in most C, warmer in SWC
IOBM	Positive	More in SEC	
IOD	Weakly negative		Colder in most C
SIOD	Weakly positive		
NAST	Positive	Less in most C	Warmer in NEC-EC
Sea Ice	Less		Colder in most C
AO	Positive		Warmer in NEC&NWC, colder in WC
SH	Weaker	More in YZR-HR	Warmer in most C
EAT	Weaker		Warmer in most C
EAWM	Weaker		Warmer in most C

Thank you 谢谢!


AO
BLSIC
NAST
SH
EAT
EAWM
La Nina
IOBM
IOD
SIOD
90N
60N
30N
0
30S
60S
90S
180
150W
120W
90W
60W
30W
0
30E
60E
90E
120E
150E
180