



Forecast for 2017/18 Winter for NEACOF-13 from GPC-Beijing

Прогноз на зиму 2017/18 для СЕАКОФ-13 от ГПЦ Пекина

Peiqun Zhang⁽¹⁾

Acknowledgements:

**ZHOU Fang, REN Hongli, ZHANG Daquan, LI Duo, SONG Wenling,
ZHI Rong, LIU Changzheng, GONG Zhiqiang**

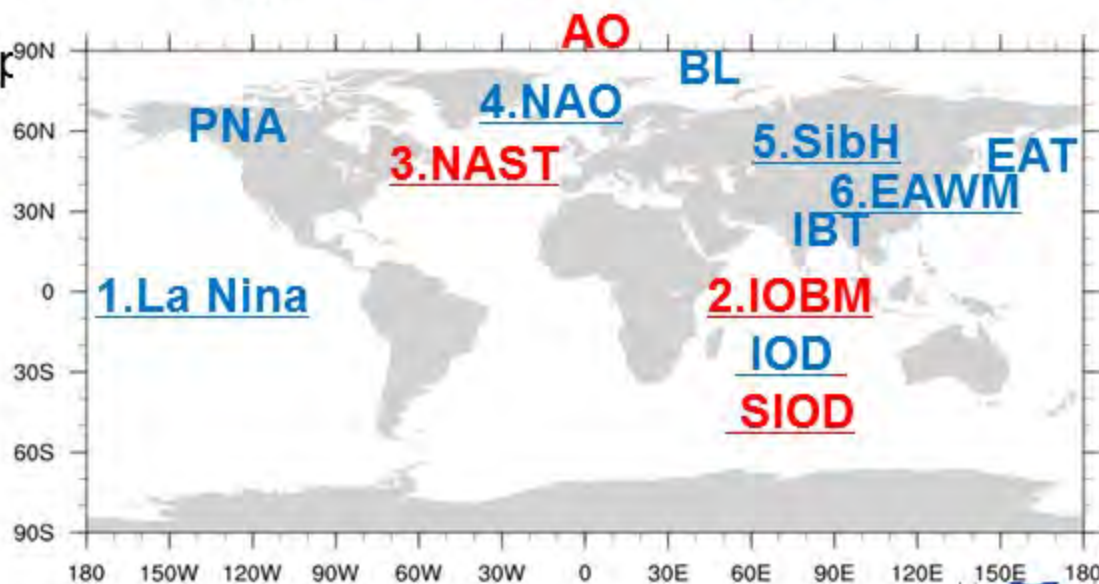
Beijing Climate Center, CMA





Outline Содержание

- BCC_CSM 1.1m
- Outlook of Global Climate Phenomena: Обзор глобальных климатических явлений
 - ENSO, Indian Ocean, North Atlantic Ocean, NAO, Siberian-H, EAWM
- Forecast for DJF with Skill Map Прогноз для DJF с картой
 - H500, precipitation, temp
- Summary Заключение





BCC_CSM1.1m Prediction Scheme

Схема прогноза

- **Model модель:** Climate System model (BCC_CSM1.1m)
- **Resolution разрешение:** Atm: T106 (~110 km) ; Ocean: Tropical ~30 km.
- **Initialisation Исходные данные:**
 - Atmos атмосфера: NCEP daily reanalysis (Air Temp., winds, SLP, etc)
 - Ocean океан: NCEP_GODAS monthly, Pentad reanalysis
- **Ensemble members ансамблевые модели:** 24 (15 LAF+9 SV)
- **Forecasts прогнозы:** 13 months (Operational running since Dec., 2014)**Hindcasts ретроспективные прогнозы:** 1991~2014 (24 yrs)
- **Products продукция:** <http://bcc.ncc-cma.net/channel.php?channelId=22>

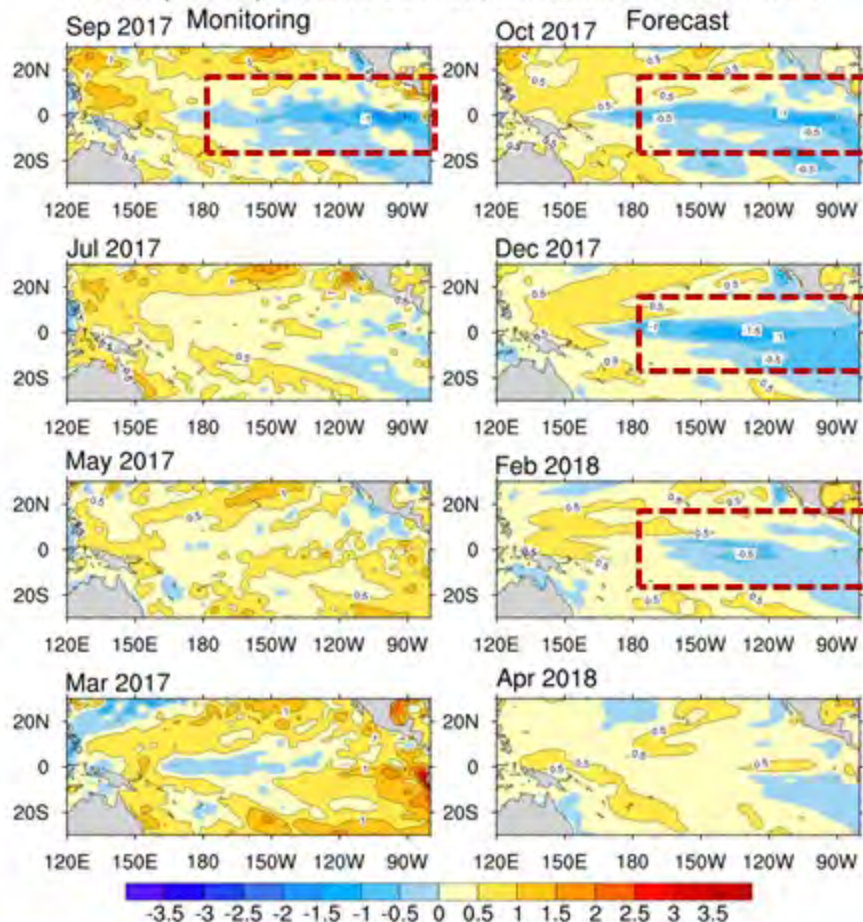




Outlook for ENSO

0630p OT ENSO

Tropical Pacific SSTA (K): BCC_CSM1.1m forecast
Monitor (OISST): 201703-201709; Forecast: 201710-201804

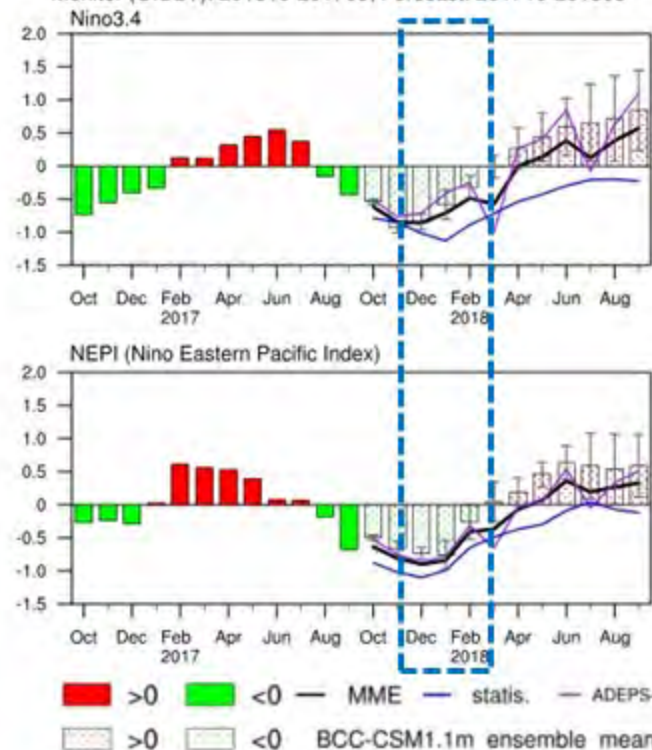


Observation

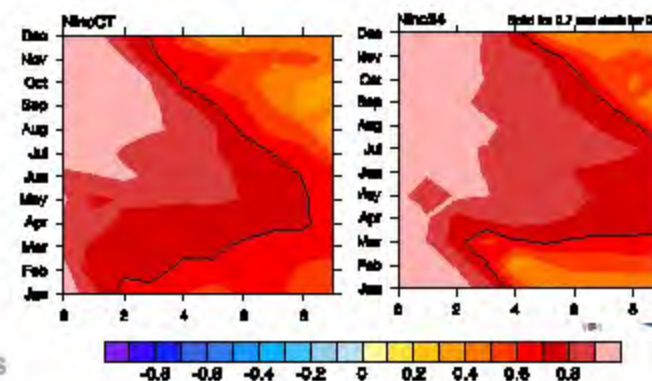
Prediction

Cold phase in in the Middle & East
tropical Pacific Ocean

ENSO SST Indices (K): BCC SEMAP2.0 forecast
Monitor (OISST): 201610-201709; Forecast: 201710-201809

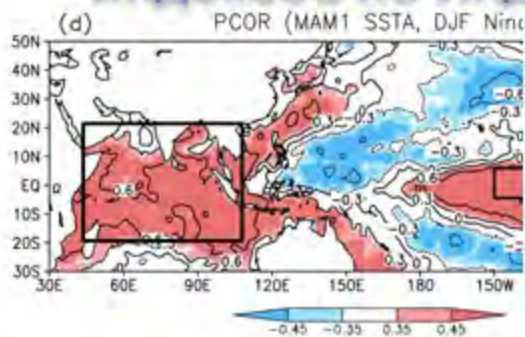


ENSO Index Correlations between BCC-CSM1.1m Prediction and Observation

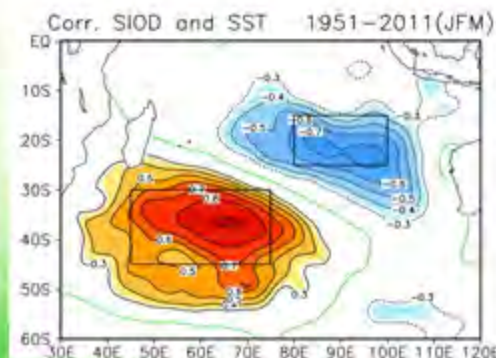
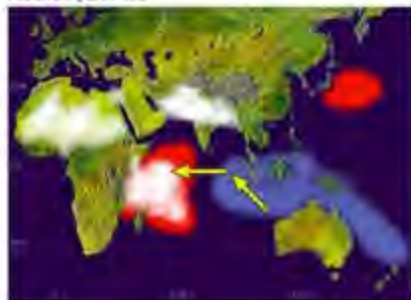




Outlook for Indices of Indian Ocean для индексов по Индийскому океану

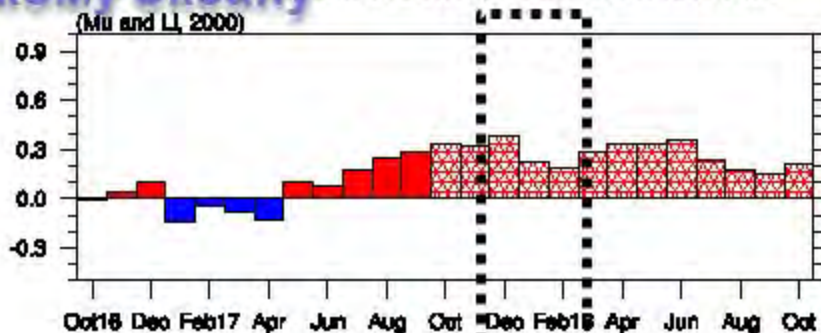


Positive Dipole Mode



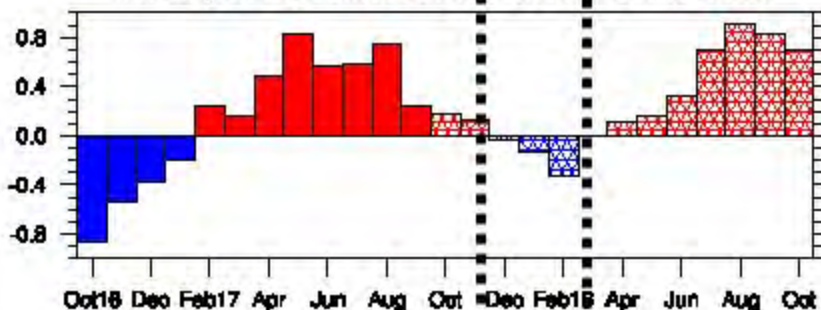
IOBM Index: BCC_CSM1.1m Forecast

Monitor (NCEP I): 201610-201709; Forecast: 201710-201810



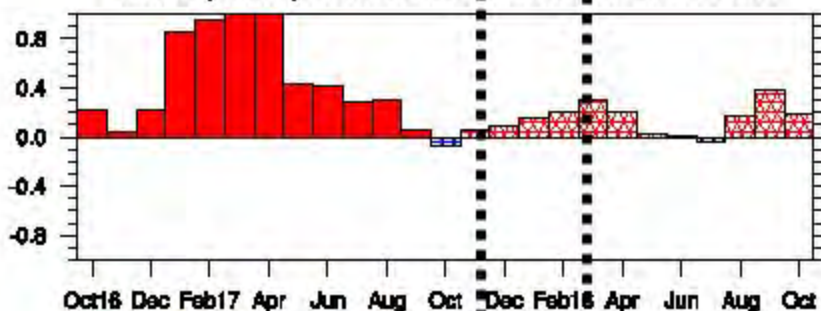
IOD Index: BCC_CSM1.1m Forecast

Monitor (NCEP I): 201610-201709; Forecast: 201710-201810



SIOD Index: BCC_CSM1.1m Forecast

Monitor (NCEP I): 201610-201709; Forecast: 201710-201810



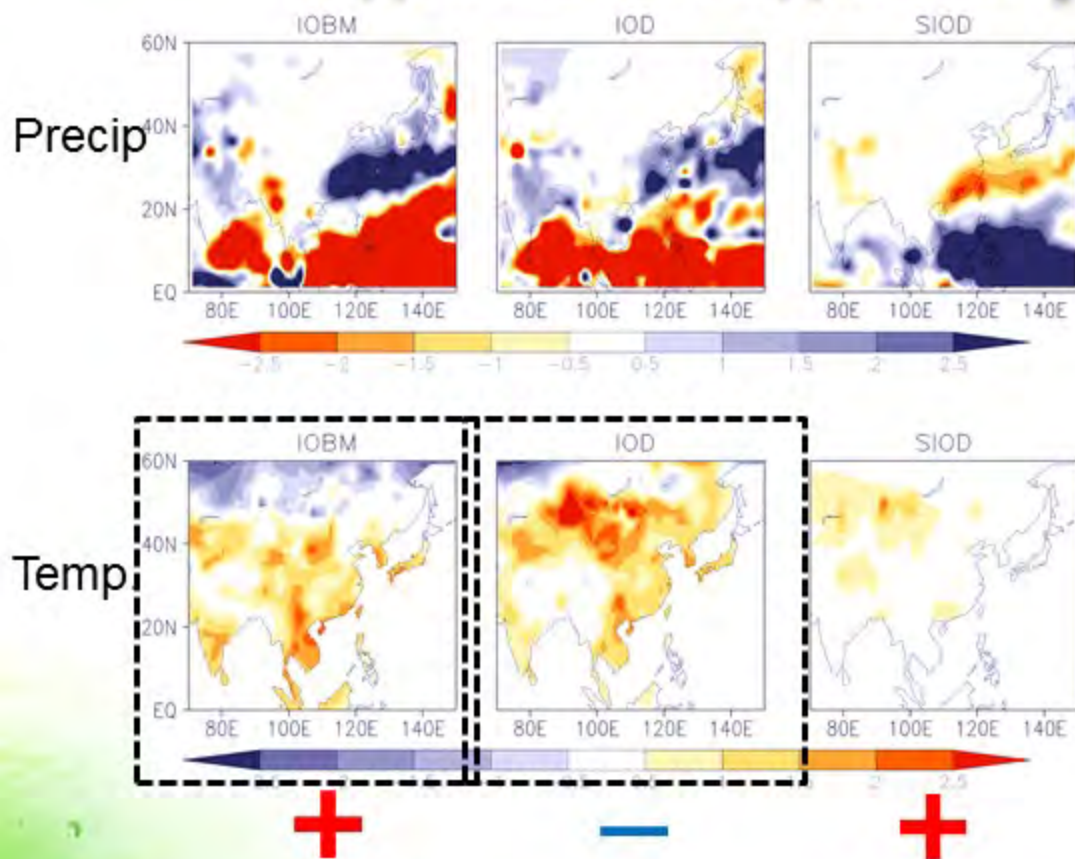
Legend: ■ >0 ■ <0 Monitor ▨ >0 ▨ <0 Forecast

Oct 12, 2017

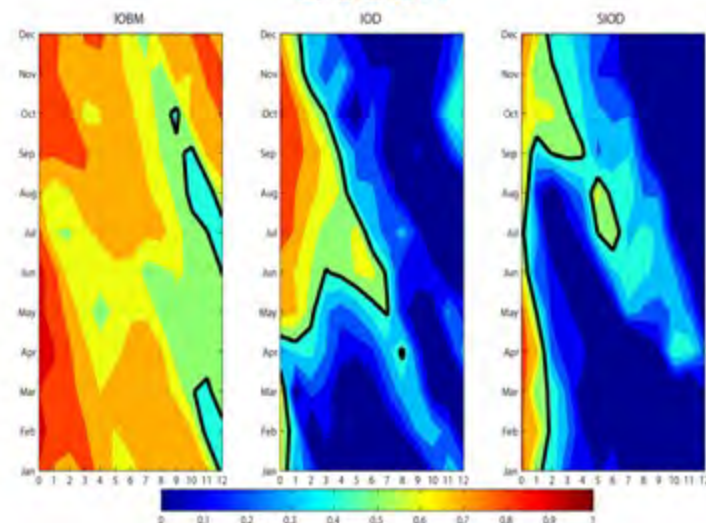




Outlook for Indices of Indian Ocean для индексов по Индийскому океану



Skill of Indices of Indian Ocean



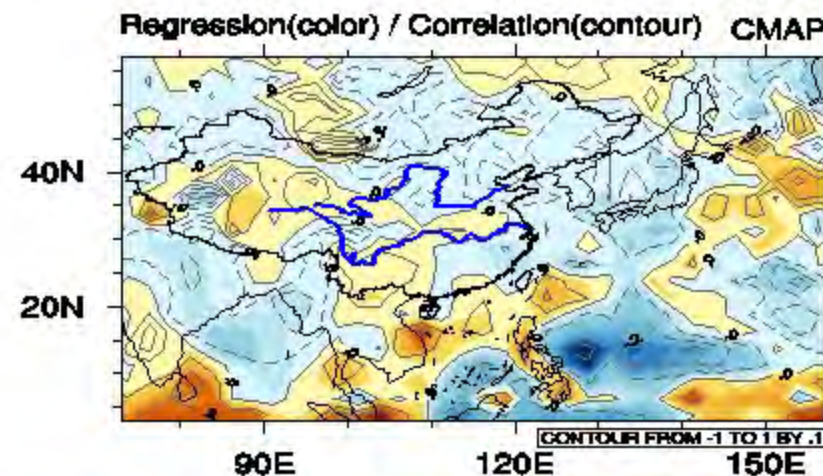
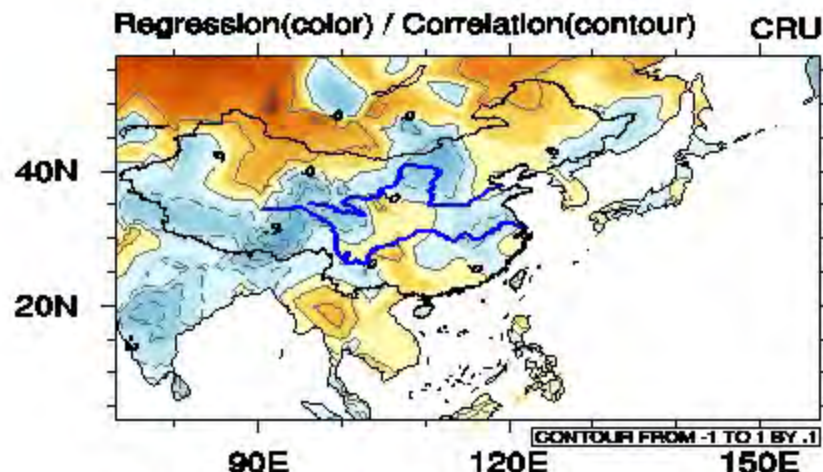
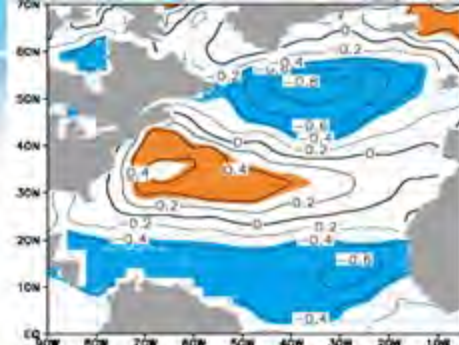
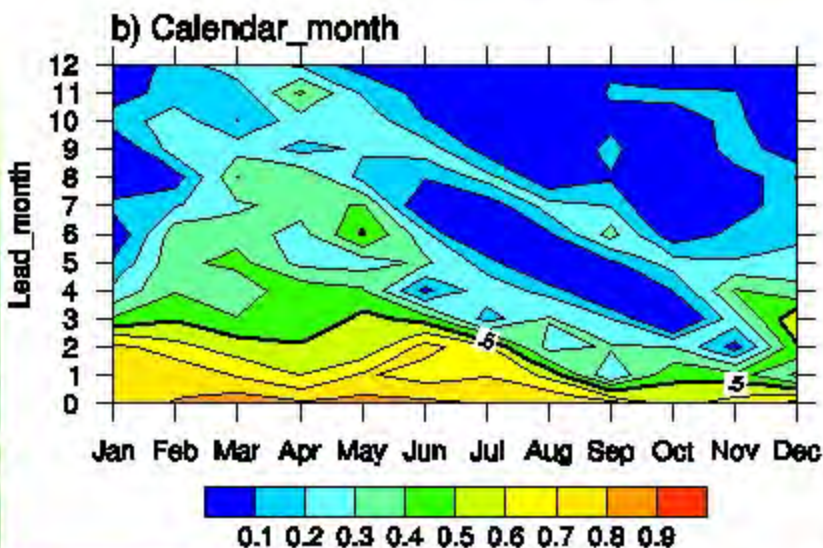
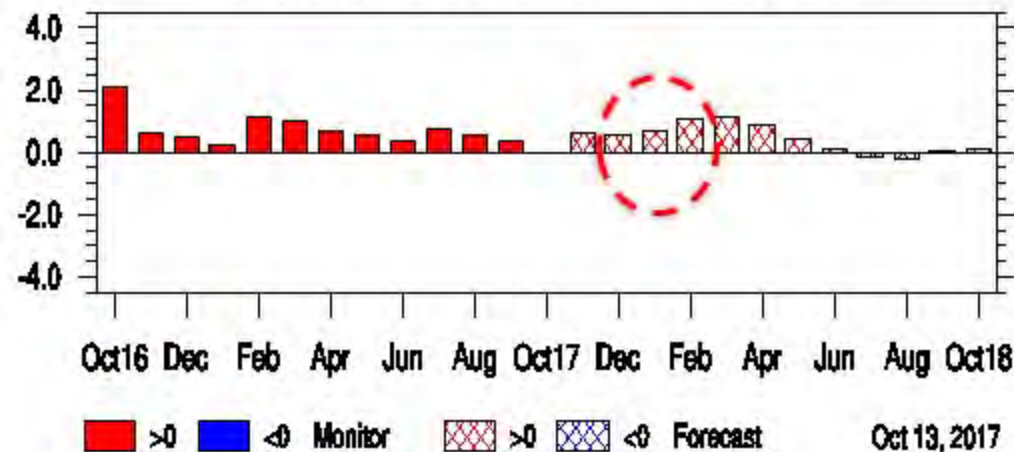
Positive IOBM favor for High Lat. Cold and Mid Lat. Warm over EuroAsia



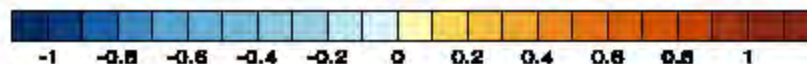
Outlook for NAST Index

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

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



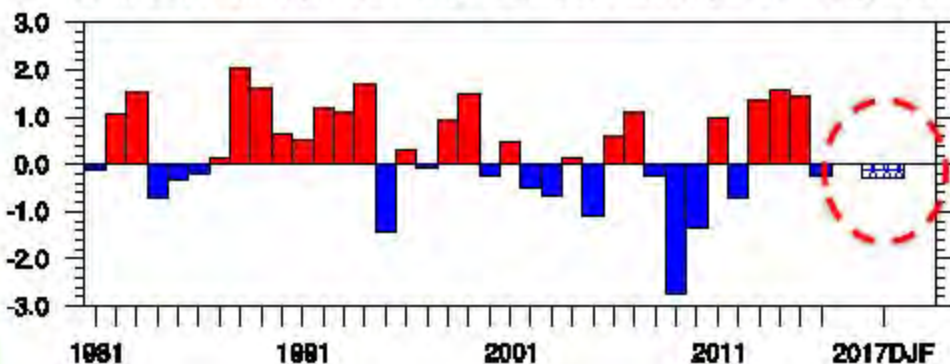
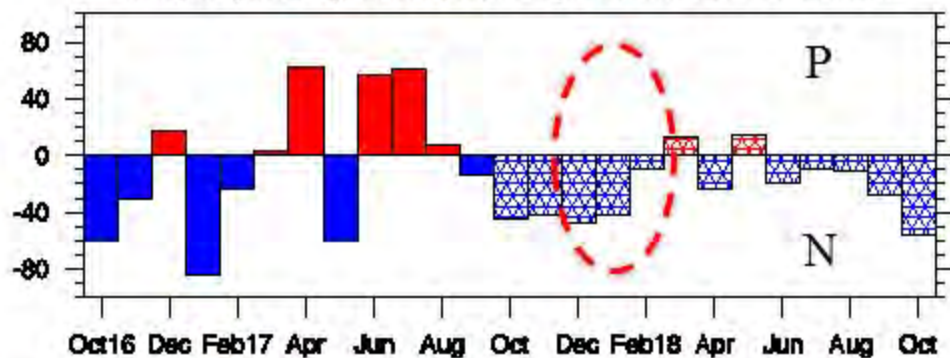
November 20





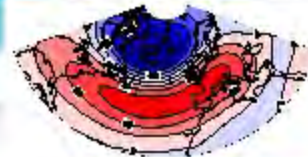
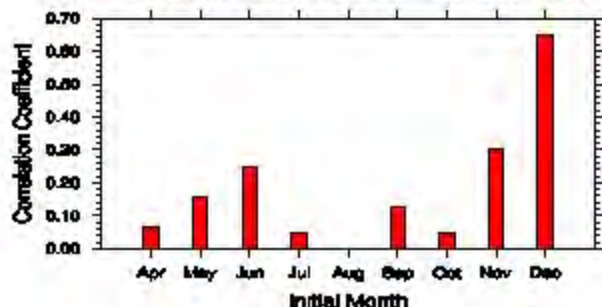
Outlook for NAO

NAO (Li and Wang 2003) Index: BCC_CSM1.1m Forecast
Monitor (NCEP I): 201610-201709; Forecast: 201710-201810

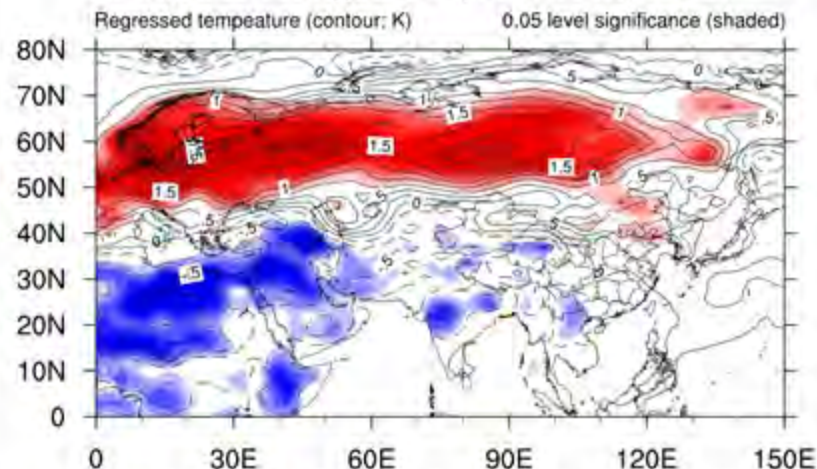


Legend: ■ > 0 ■ < 0 Monitor ■ > 0 ■ < 0 Forecast Oct 16, 2017

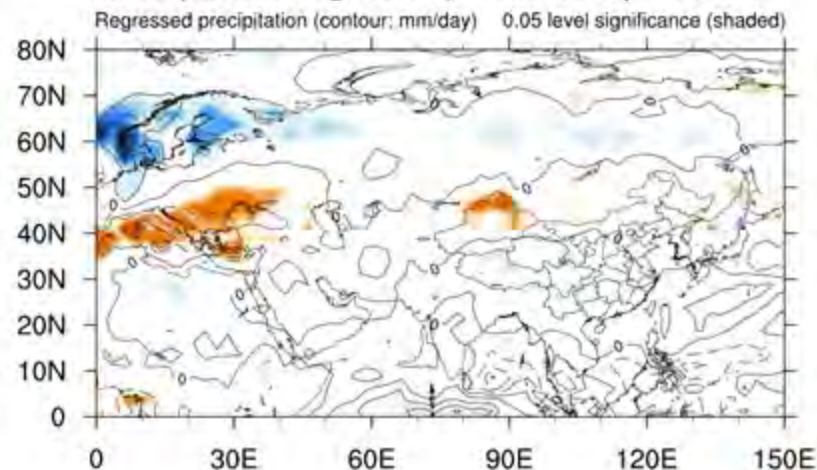
Forecasting Skill of NAO (Li and Wang 2003) Index



NAO(Li & Wang, 2003) and Temp. DJF



NAO(Li & Wang 2003) and Precip. DJF



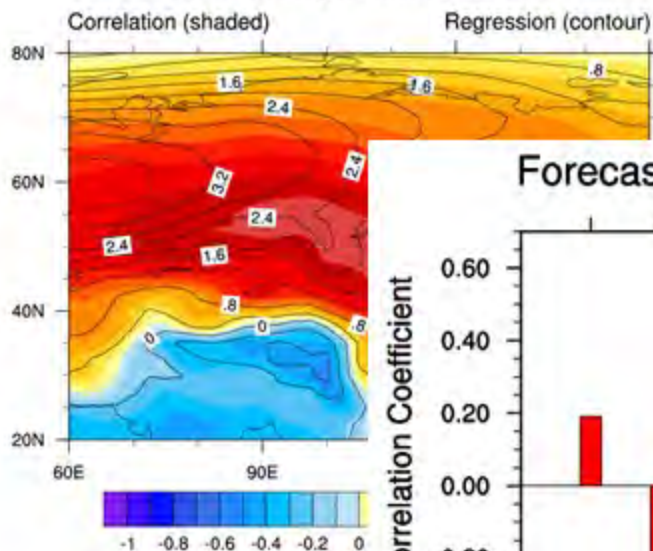


Outlook for Siberian High

Обзор для сибирского антициклона

SibH Intensity Index: BCC_CSM1.1m Forecast
Monitor (NCEP I): 201610-201709; Forecast: 201710-201810
(Gong and Wang, 1999)

Siberian High Pattern in DJF

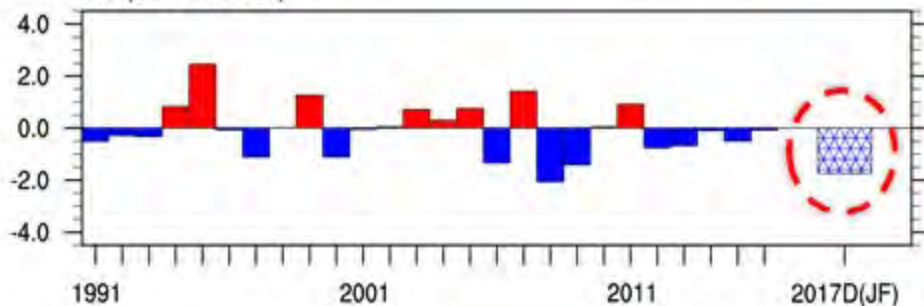




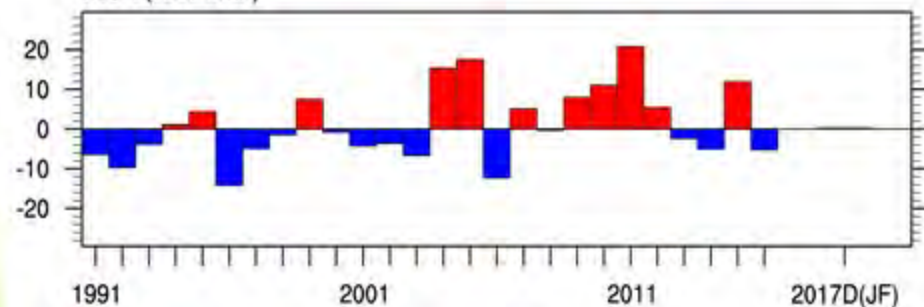
Outlook for EAWM

East Asian Winter Monsoon Indices: BCC_CSM1.1m Forecast
Monitor (NRA1): 1991-2016; Forecast: 201710-201810

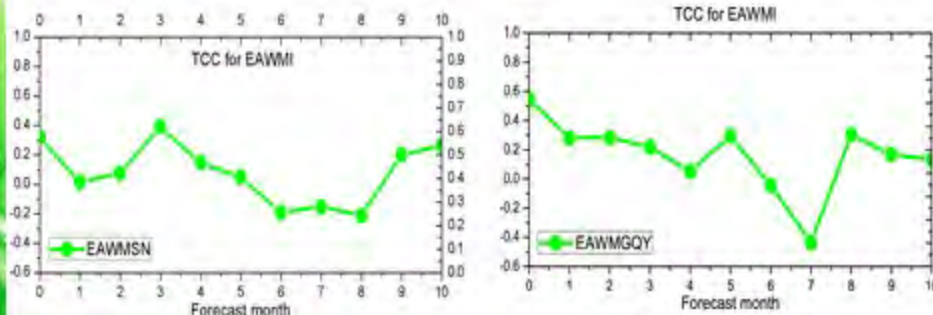
SNI (Shi et al. 1996)



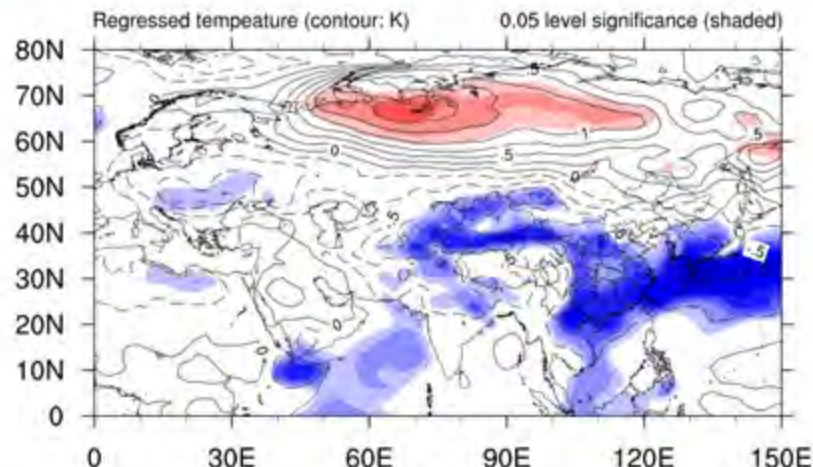
GQYI (Guo 1983)



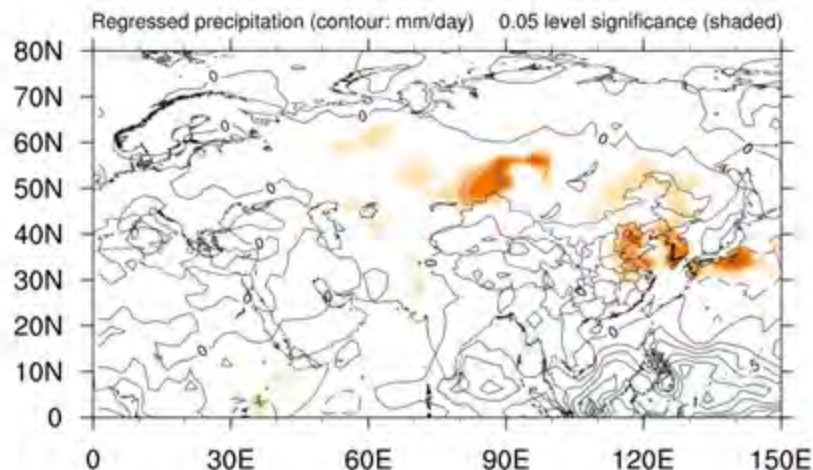
■ >0 ■ <0 Monitor ■ >0 ■ <0 Forecast Oct 17, 2017



EAWM(Shi,1996) and Temp. DJF



EAWM(Shi,1996) and Precip. DJF





Summary of GCP Outlook **сводка**

Global Climate Phenomena	Outlook	Indication for Precip.	Indication for Temp.
ENSO	La nina		
IOBM	+		High Lat. Cold Mid Lat Warm
IOD	Weak -		Warm
SIOD	Weak +		Warm
NAST	+	Dry	Mid-High Lat. Warm
NAO	Weak -		
SibH	Weak	Wet	Mid-High Lat Warm
EAWM	Weak	Central Mid- High Lat Wet	High Lat. Cold Mid Lat Warm

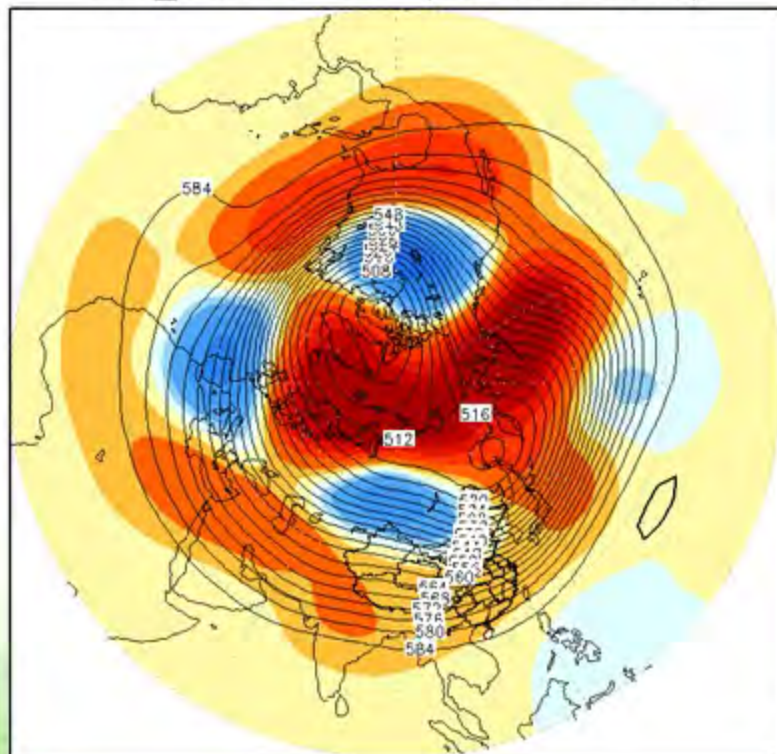


Outlook for GeopH @ 500 hPa

Prediction

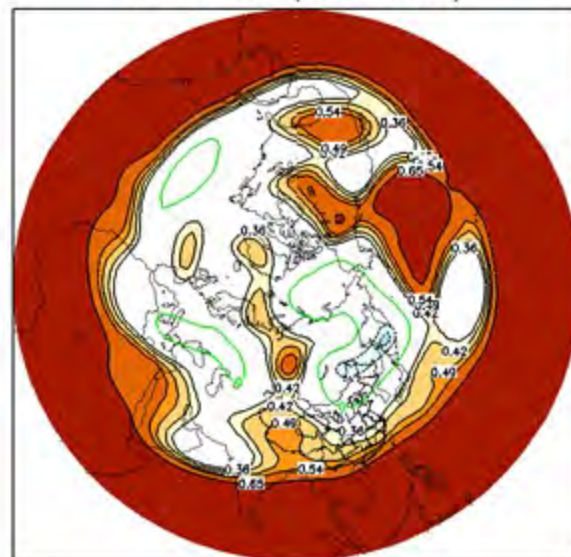
п р о г н о з

BCC_CSM for DJF (Cli.1991–2010)



Hindcast skill
р е т р о с п е к т
и в а

TCC of DJF (1991–2010)



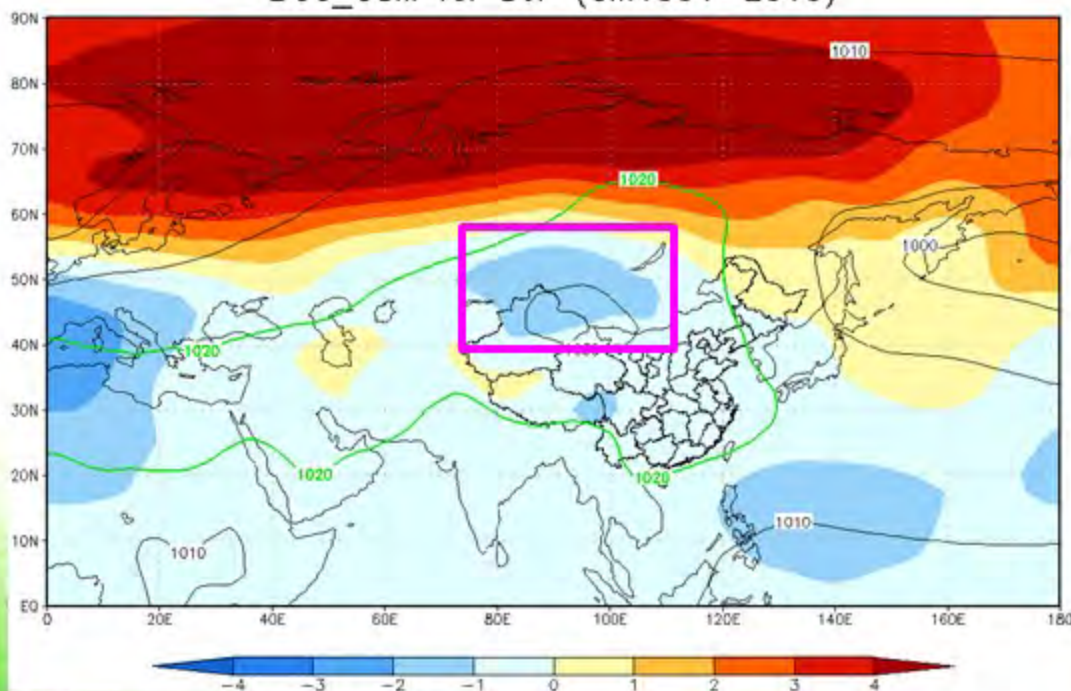
**Zonal wind will dominate Europe
and Asia mid-high latitudes
Weak west pacific subtropical high**



Outlook for SLP

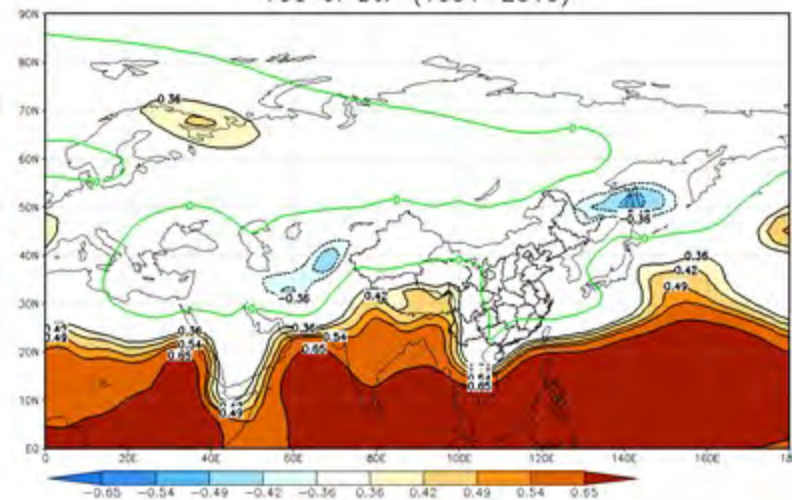
Prediction

BCC_CSM for DJF (Cli.1991-2010)



Hindcast
skill

TCC of DJF (1991-2010)



Weaken Siberia High



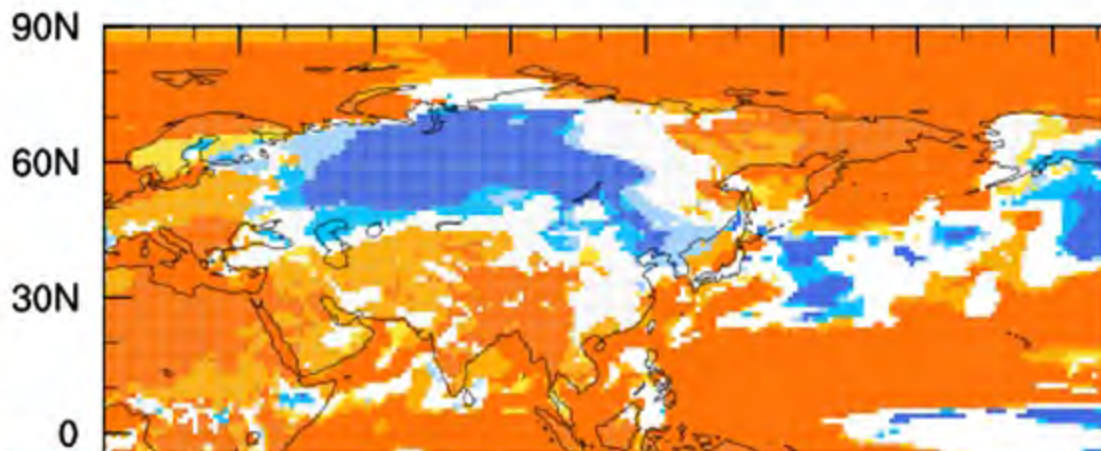
Outlook for Temp. Γ_{po}

BCC Three-Month Forecast

Probability of 2-m Air Temperature

BCC_CSM1.1(m)

Started 2



Above normal favoured:

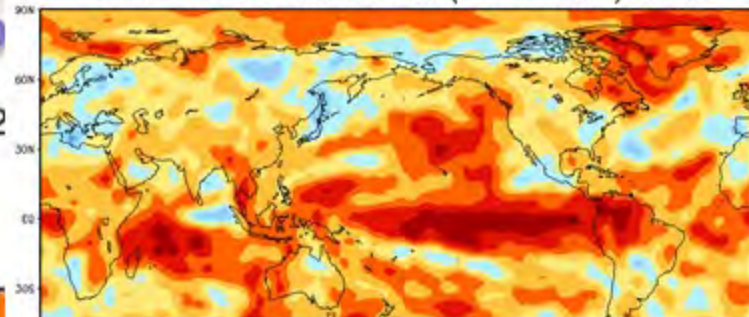
Most part of Europe, mid-latitude region of central Asia, far eastern Russia

Below normal favoured:

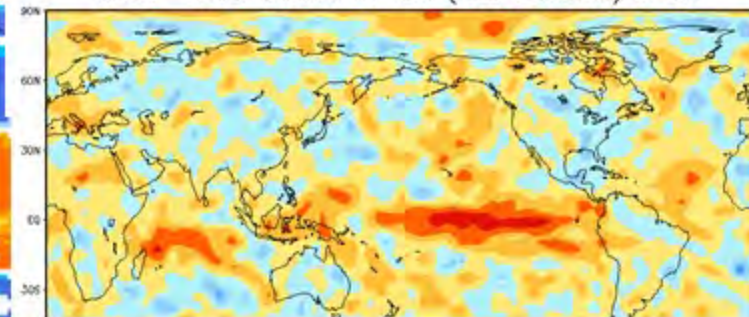
Most part of mid-high lat. region of Euroasia: east Europe, northern Russia, Mongolia, Northwest China and Northeast China.

Skill in most places of Euroasia for above normal but no skill in east part of mid-high lat. region of Euroasia.

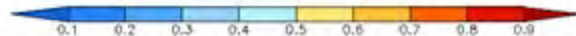
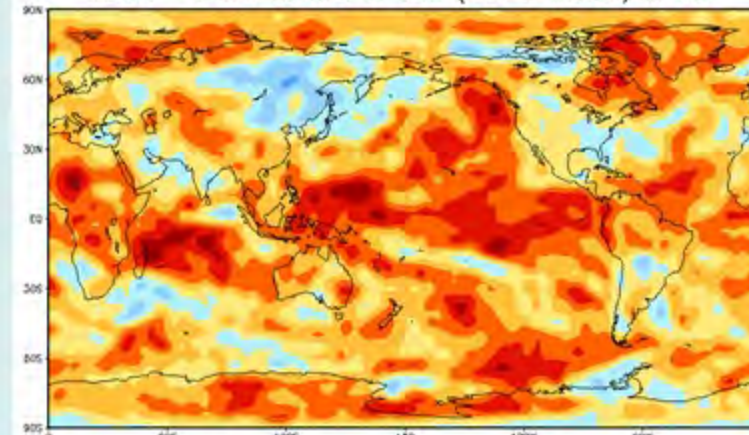
ROCA – Above Normal of t2m (lead 2 month) in DJF



ROCA – Near Normal of t2m (lead 2 month) in DJF



ROCA – Below Normal of t2m (lead 2 month) in DJF

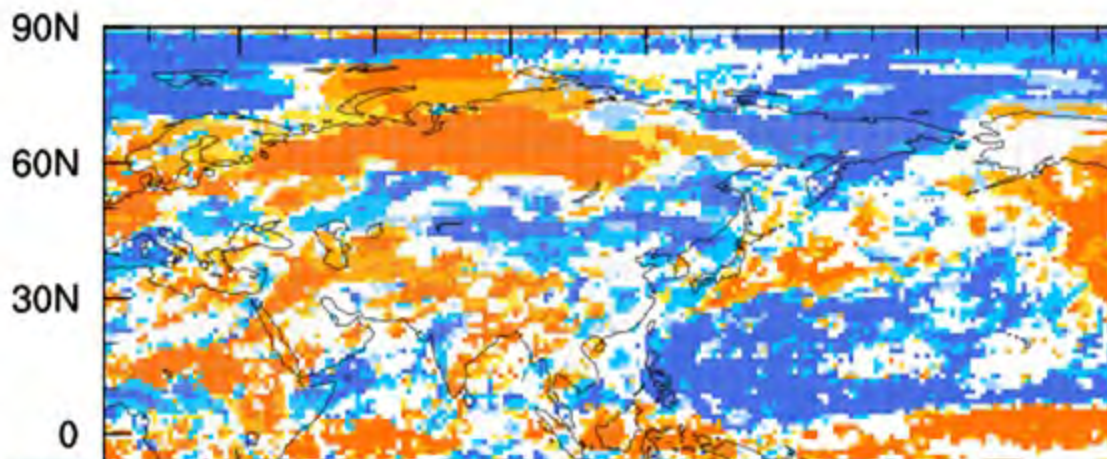




Outlook for Precip. O

BCC Three-Month Forecast
Probability of Precipitation Rate
BCC_CSM1.1(m)

Started 20

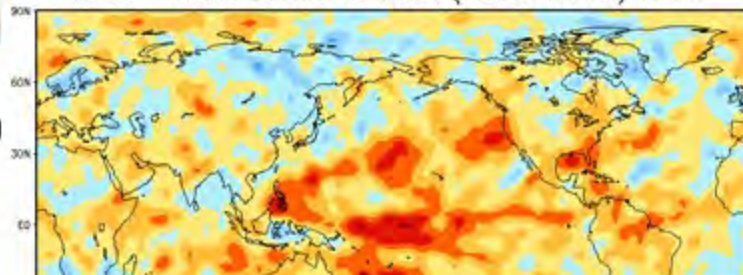


Above normal favoured:
Mid lat. region of Euroasia: southern and southeast Europe, central asia, southern and southeast Russia, Mongolia, northern China

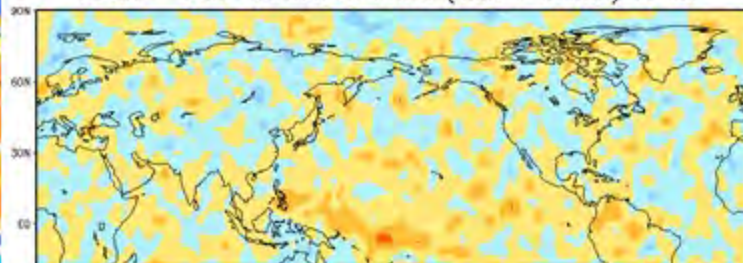
Below normal favoured:
Most part of High lat. region of Euroasia: northern Russia, northern Europe.

Skill is low in most places but some skill central and western part of mid-high lat. region of Euroasia.

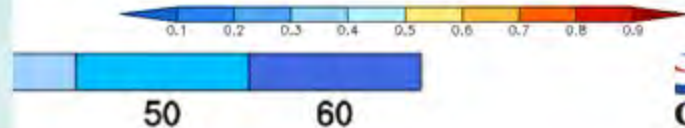
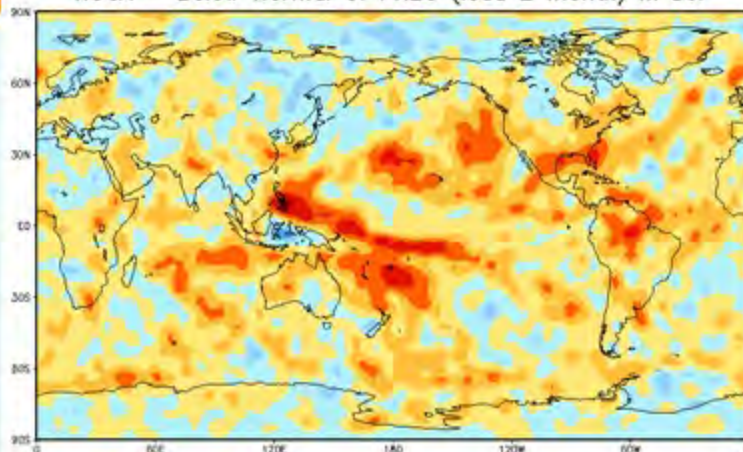
ROCA - Above Normal of PREC (lead 2 month) in DJF



ROCA - Near Normal of PREC (lead 2 month) in DJF



ROCA - Below Normal of PREC (lead 2 month) in DJF





Summary Заключение

ENSO:

- Nino3.4: negative SST anomalies with peak in early winter and increasing afterwards, likely to be positive during next spring.
- spread = -1.0°C to -0.2°C by end of Feb.

Circulation циркуляция

- Zonal circulation over East Asia in mid-high latitudes
- NAO: **weak negative phase** Siberian High: **weak** EAWM: **weak**

Temperature: температура

- Most part of Euroasia is warm to normal with some strong signals for below in mid-high latitude region such as east Europe, north Russia, Mongolia, Northwest China and Northeast China. На большей части Евразии нормально тепло с некоторыми сильными сигналами к похолоданию в умеренно-высоких широтах в Восточной Европе, на севере России, в Монголии, северо-западе и северо-востоке Китая
- Wet in mid-latitude region and dry in high-latitude region of EuroAsia. Влажно в умеренных широтах и сухо в высоких широтах Евразии





Thank You !





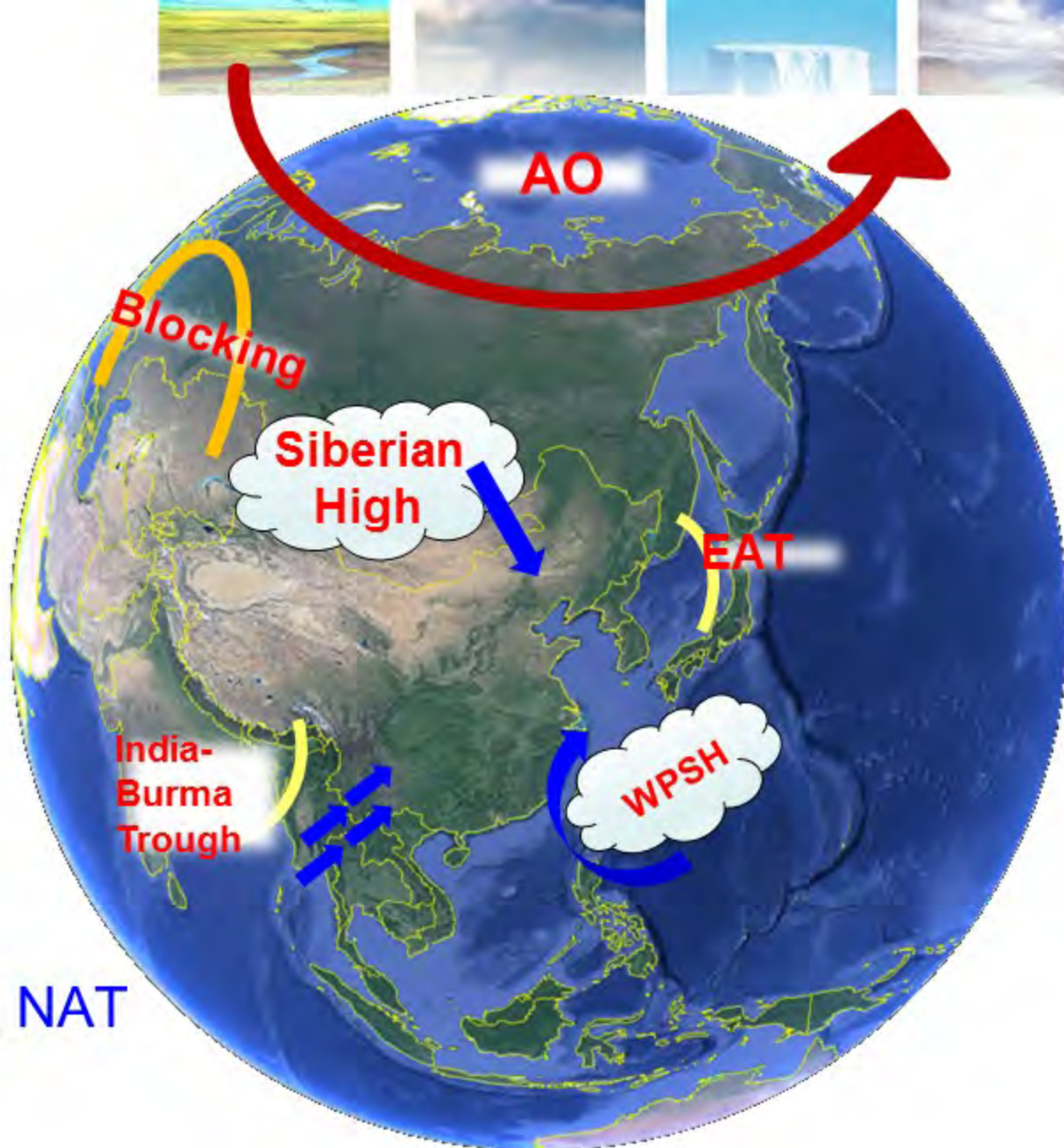
Outlook for Winter Circulation in DJF 2017/2018

- **Zonal** circulation over East Asia in mid-high latitudes
зональная циркуляция в Восточной Азии в умеренно-высоких широтах
- NAO: **weak negative phase** слабая негативная фаза
- EAWM: **weak**
- Siberian High: **weak**
- Tibetan Plateau height anomaly: **positive** высотная аномалия Тибетского нагорья
- India-Burma Trough: **weak** индийско-бирманская котловина
- Low level: **cyclonic anomalies** around the Philippines, **weak** WPSH циклонические аномалии вокруг Филиппин



(I) EAWM system and potential boundary forcing

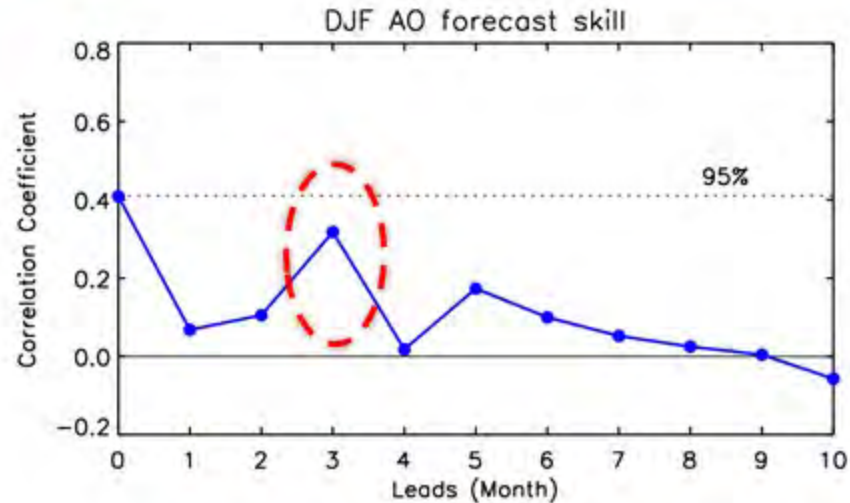
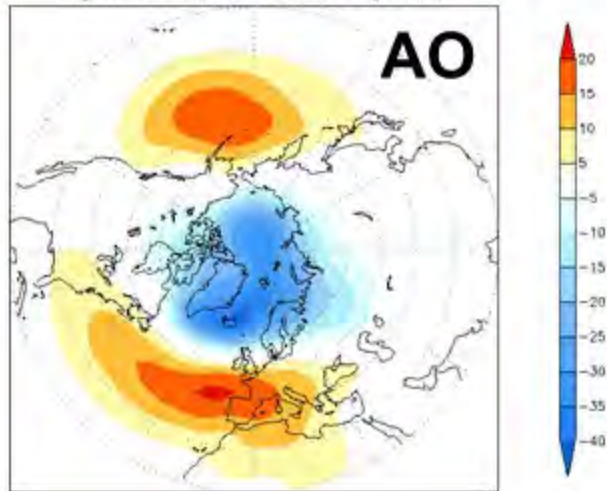
SSTA (ENSO, IO, NAT)
Sea Ice
Snow Cover



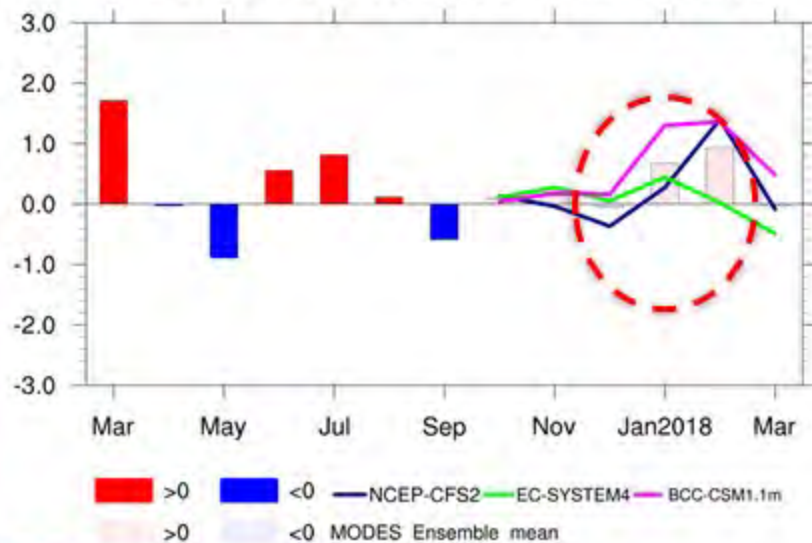


Outlook for AO

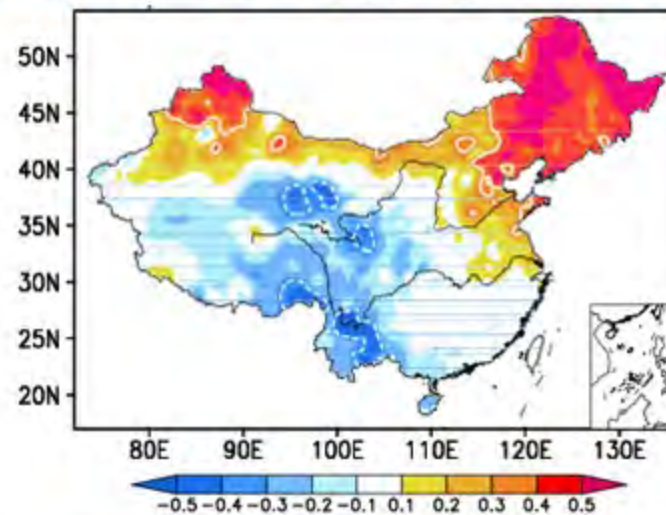
Leading EOF (19%) shown as regression map of 1000mb height (m)



Monthly AO index: Observed & MODES Forecasts



冬季AO指数与地表气温的相关关系



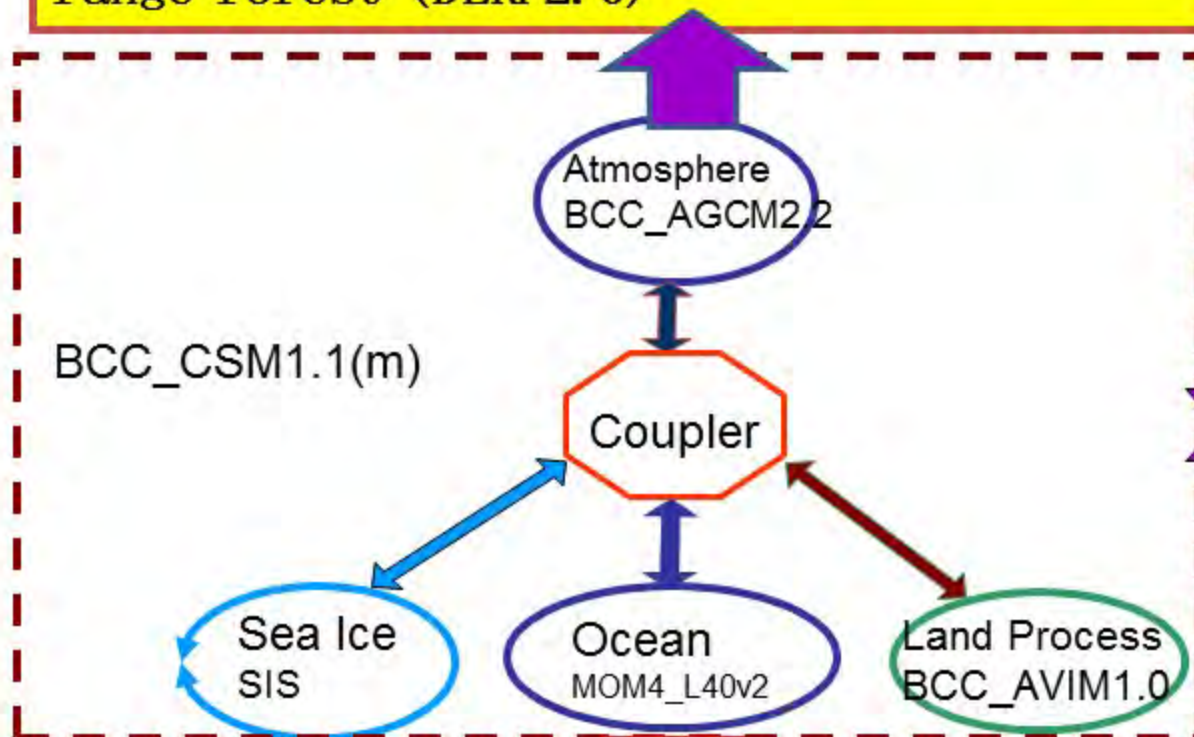
Initial: Sep. AO+

NOV-13,14-16 November 2017, Moscow, Russia





The second generation dynamical extended range forecast (DERF2.0)



The second generation seasonal prediction model
второе поколение модели
сезонного прогнозирования

Regional climate model system Система
регионального
климатического
моделирования



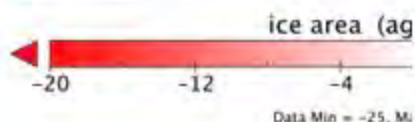
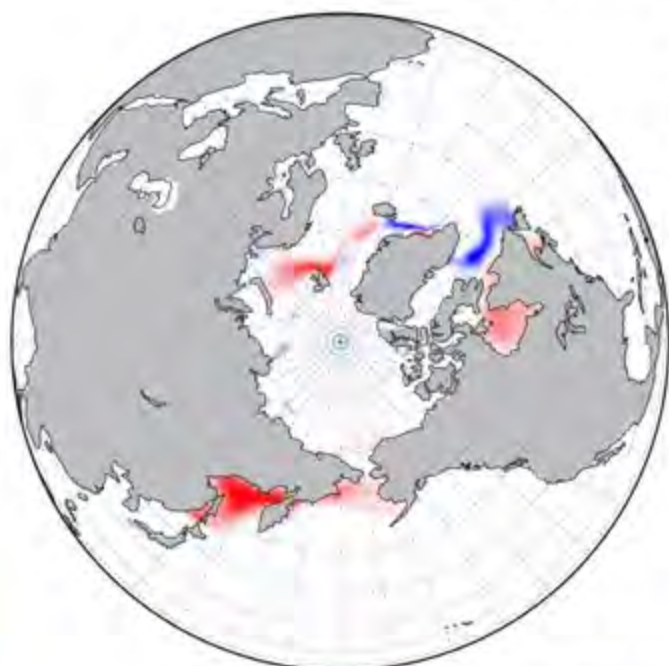


Outlook for Sea Ice Concentration

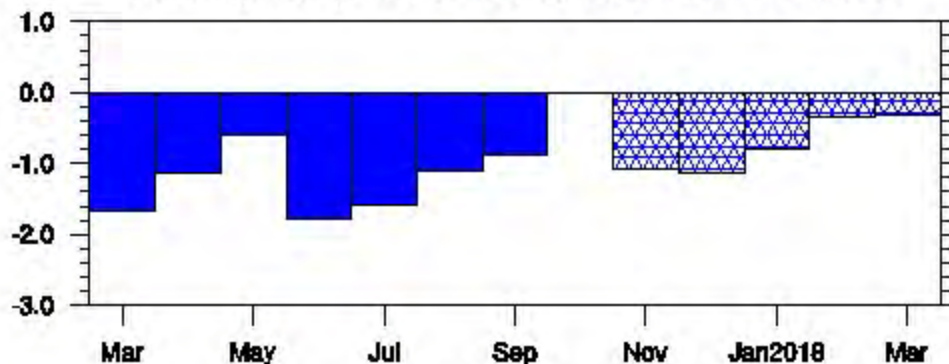
концентрация морского льда

By FGOALS-famil

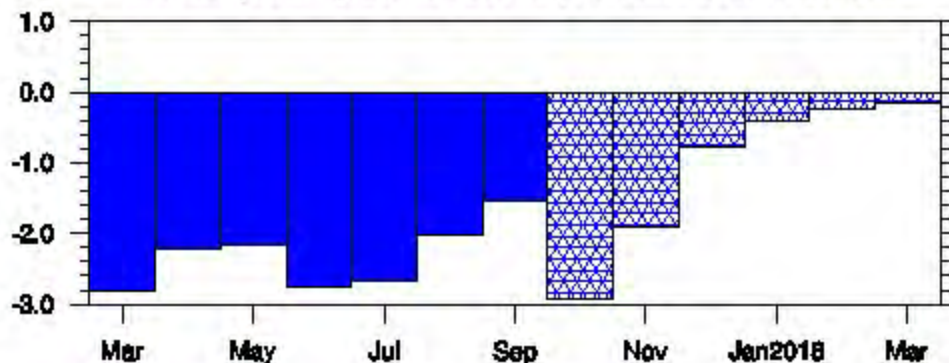
ice area anoma



Barents-Laptev Sea: FGOALS-famil Forecast
Monitor (NCEP I): 201703-201709; Forecast: 201711-201803



Arctic Ice: FGOALS-famil Forecast
Monitor (NCEP I): 201703-201709; Forecast: 201711-201803

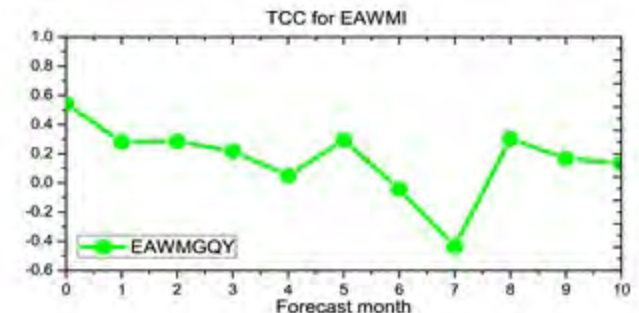
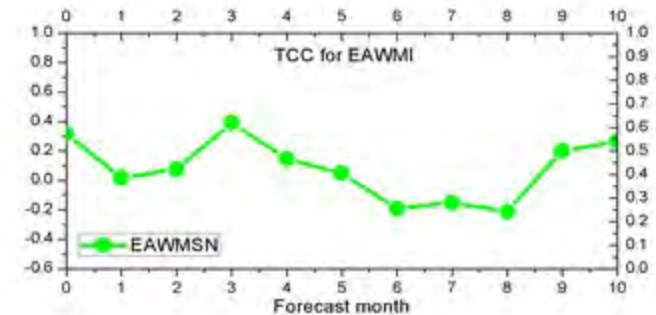
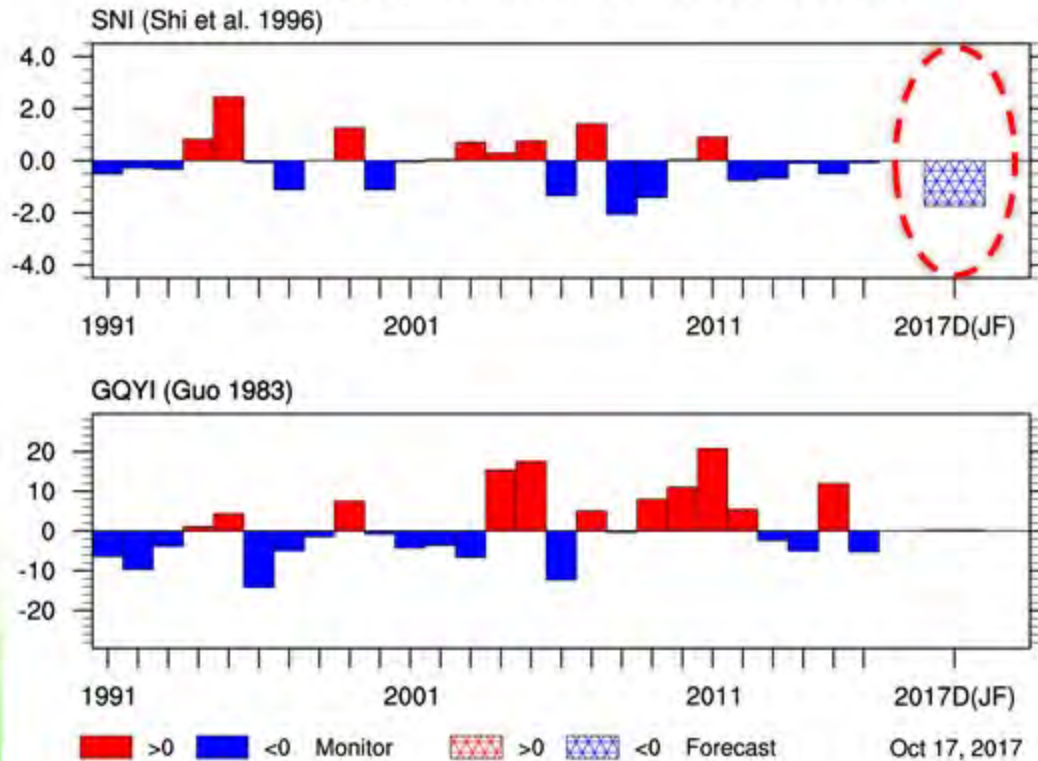


Legend: ■ >0 ■ <0 Monitor >0 <0 Forecast Oct 12, 2017



Outlook for East Asian Winter Monsoon Index: BCC_CSM1.1m Восточно-Азиатский зимний муссон

East Asian Winter Monsoon Indices: BCC_CSM1.1m Forecast
Monitor (NRA1): 1991-2016; Forecast: 201710-201810

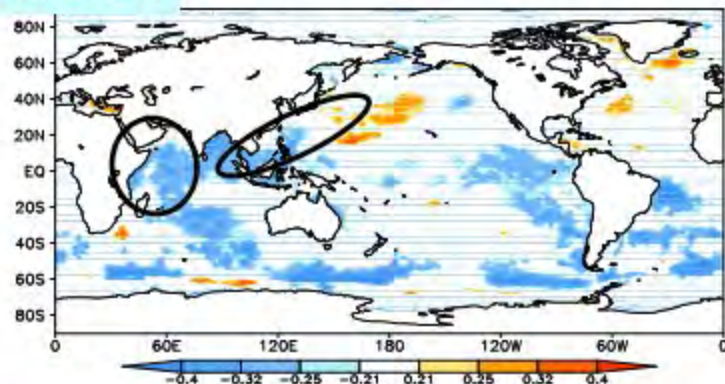


Weak EASM in the coming winter

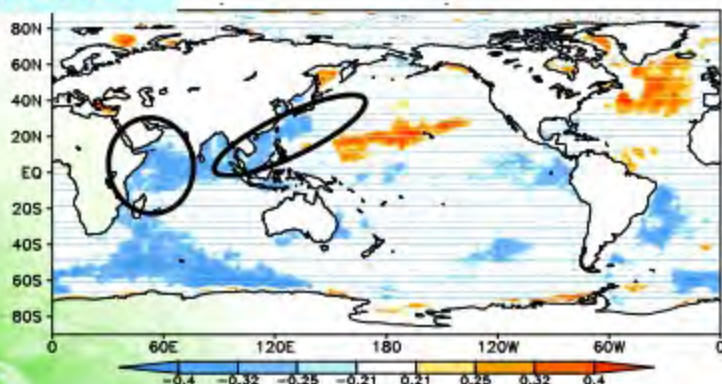


Possible impact of Tropical SST on SH

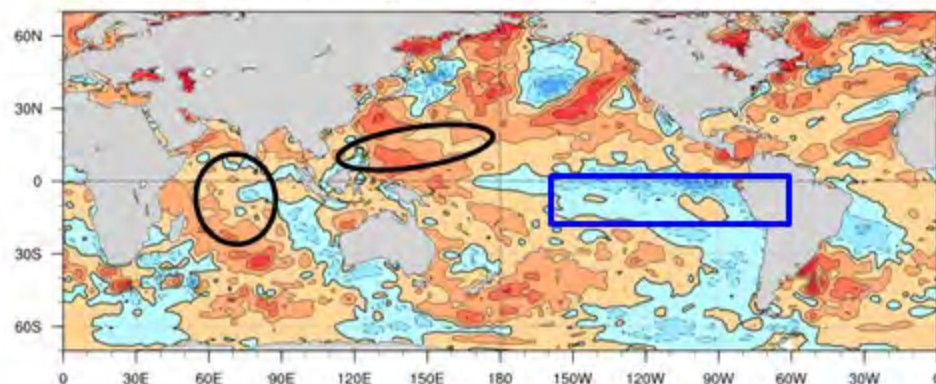
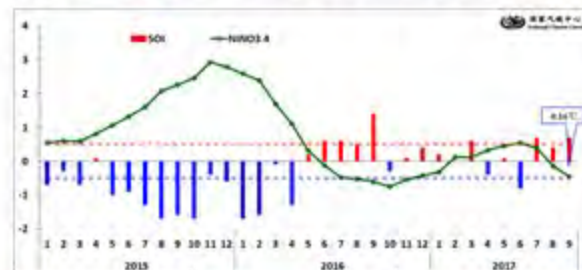
SSTA-SON



SSTA-DJF



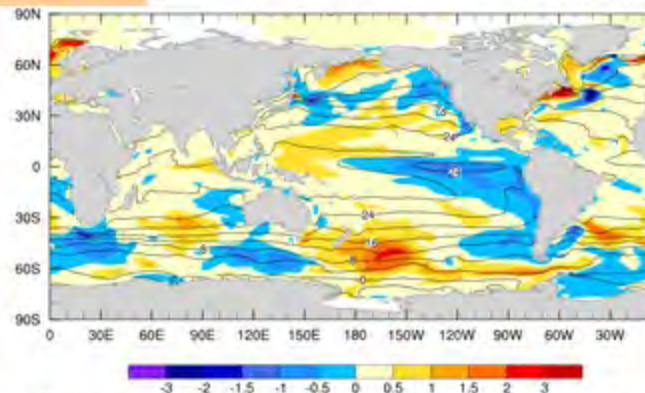
SSTA-201709



Unit: °C

BCC_CSM1.1

North Forecast Started 20171001 Valid 201712 - 201802
Temperature (line) and its Anomaly (shading)
Units: C
Member Size = 24

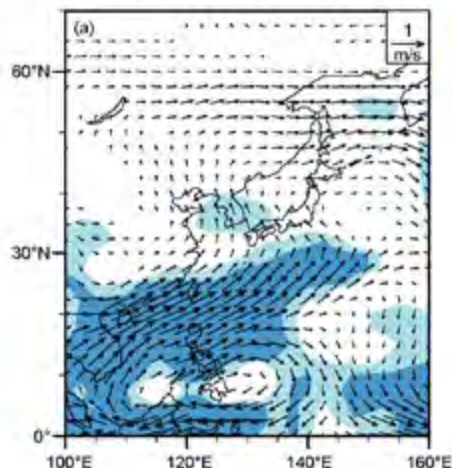




Joint impact of ENSO and AO on Temperature

совместное влияние ENSO и АО на температуру

Correlation of 850hPa wind
and Nino3 index



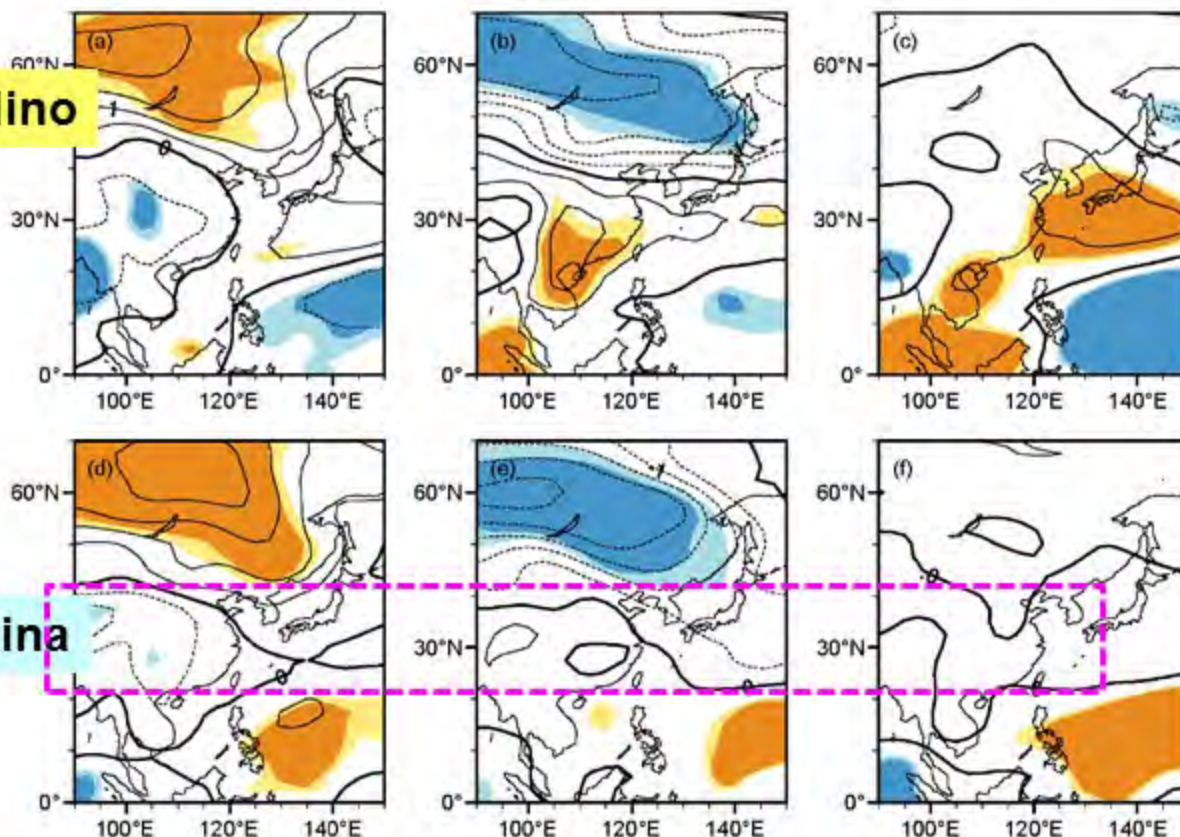
El Nino

La Nina

AO+

AO-

All month of DJF

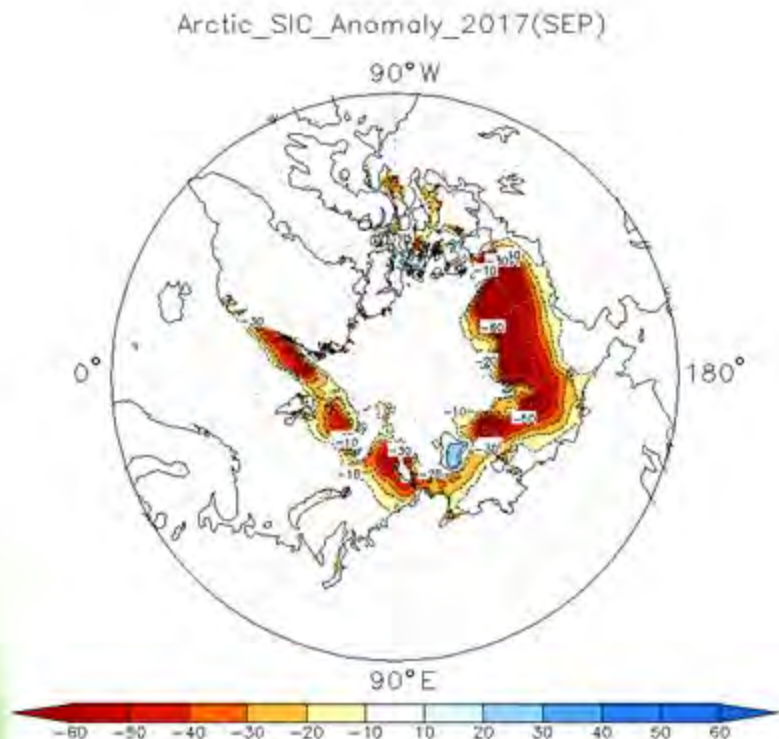


Not significant in mid-latitudes незначительно в умеренных широтах

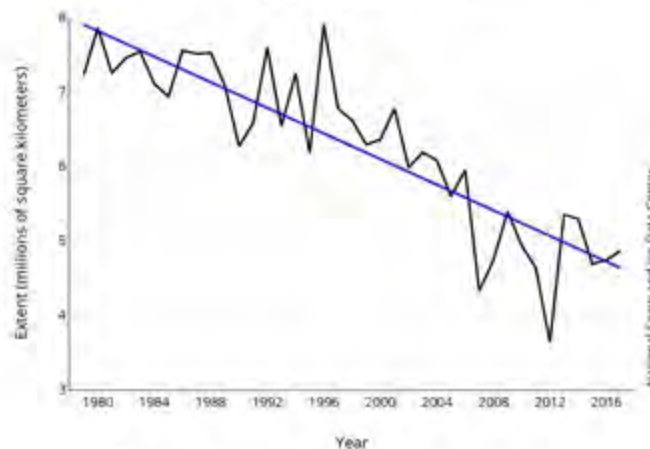


Possible impact of SIC in BK Sea

SIC anomaly in Sep 2017



Average Monthly Arctic Sea Ice Extent
September 1979 - 2017

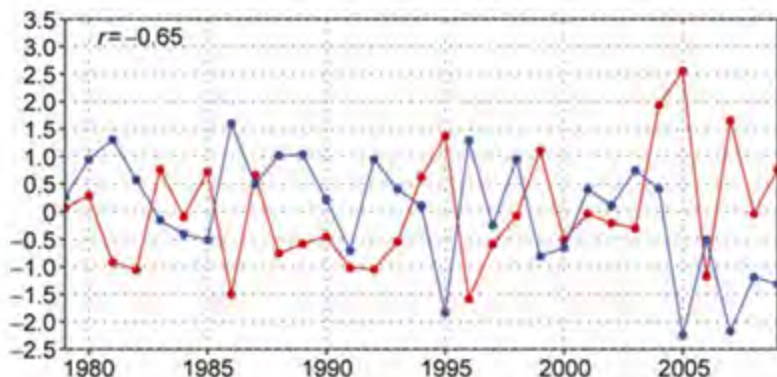


Barents-Kara Sea:
67.5-80.5N, 20.5-80.5E

- Arctic sea ice is below normal, 7th least since 1979;
- Average Monthly Arctic Sea Ice Extent is slightly above normal after removing trend



Possible impact of SIC in BK Sea

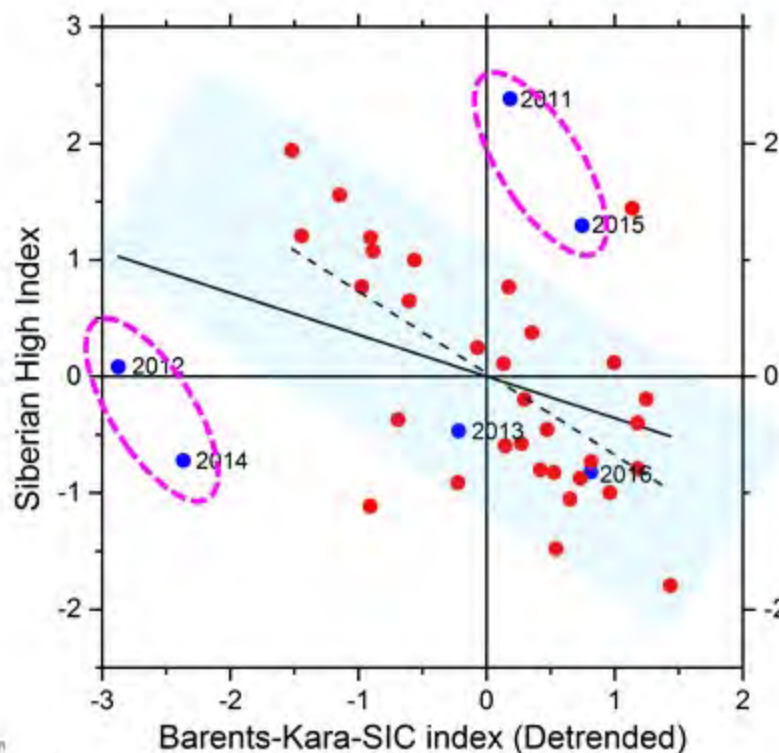


SH in DJF and SIC in Sep (detrend)

How about 2017/18?

Blue: SIC of SEP

Red: SH of DJF



- DJF (1979/80-2016/17)
- - - Linear regression (79-10)
- Linear regression (79-16)

Statistics on correlation (79-10)

Equation	$y = a + b \cdot x$		
Weight	No Weighting		
Residual Sum of Squares	18.10798		
Pearson's r	-0.61517		
Adj. R-Square	0.35771		
F	Intercept	Value	Standard Error
	Slope	-0.70141	0.16412

Statistics on correlation (79-16)

Equation	$y = a + b \cdot x$		
Weight	No Weighting		
Residual Sum of Squares	33.12652		
Pearson's r	-0.35812		
Adj. R-Square	0.10403		
C	Intercept	Value	Standard Error
	Slope	-0.35812	0.15561

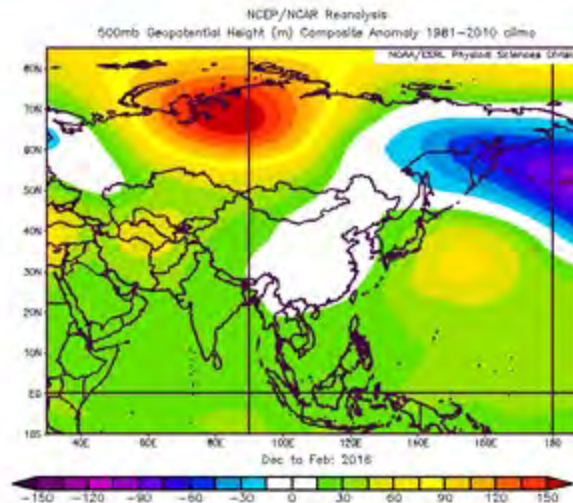
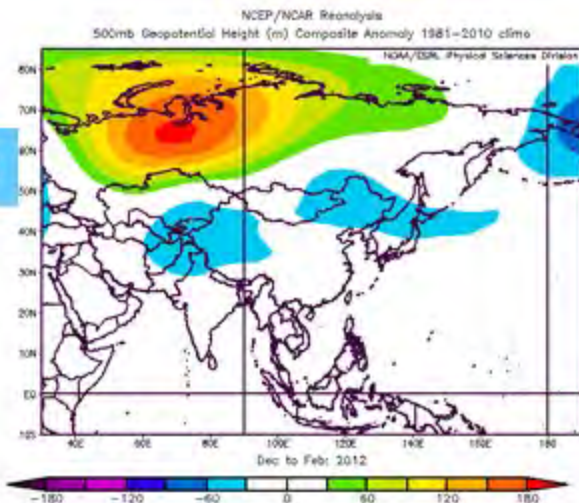


Possible impact of SIC in BK Sea

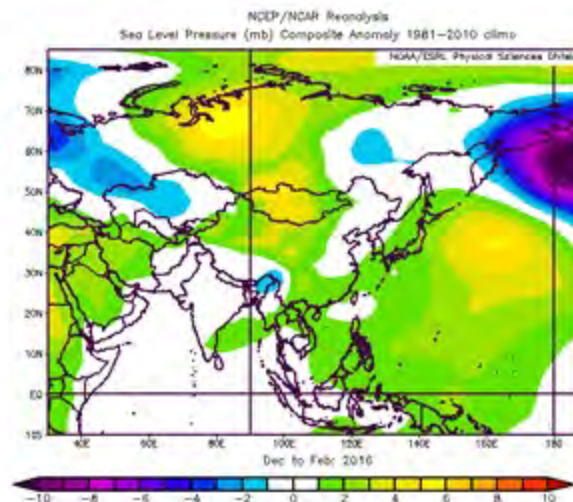
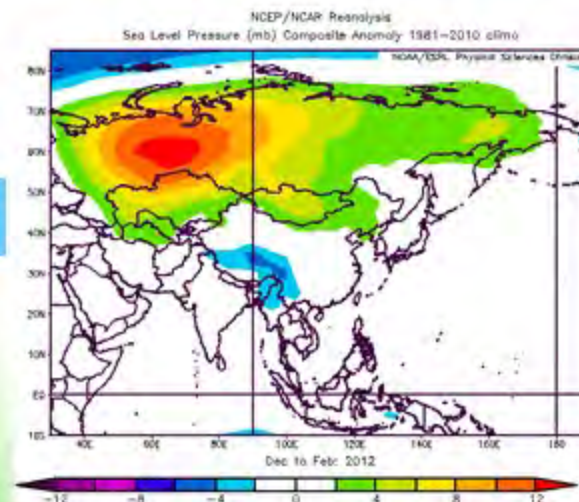
2011/12

2015/16

H500



SLP



The possibility of strong SH in 2017/18 winter is low

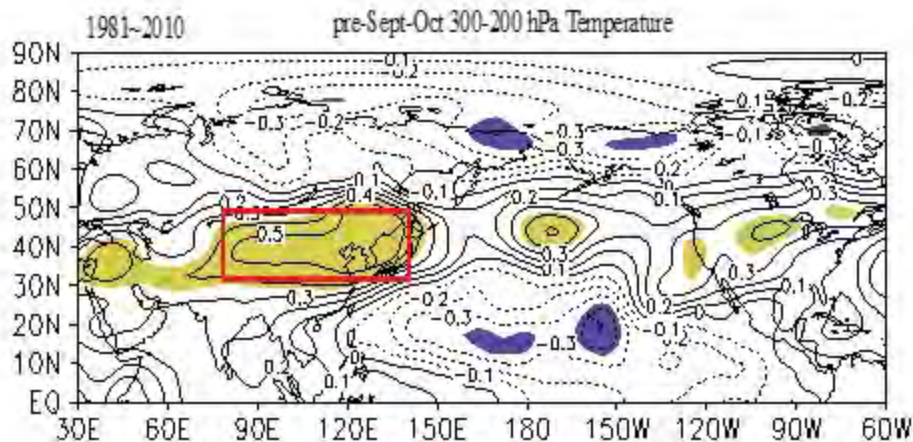
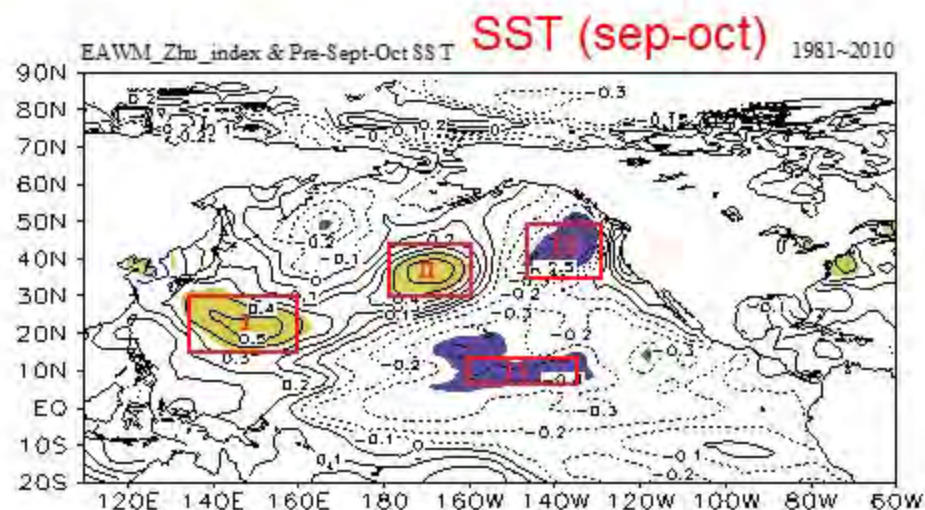
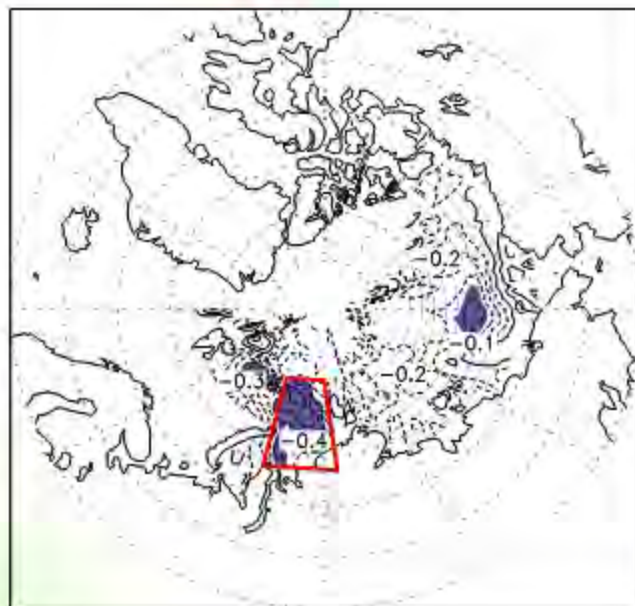


Statistical prediction of Arctic Oscillation Index

статистическое прогнозирование индекса арктического колебания

Precursors:

SIC



Air Temperature



Statistic model: AO outlook

статистическая модель

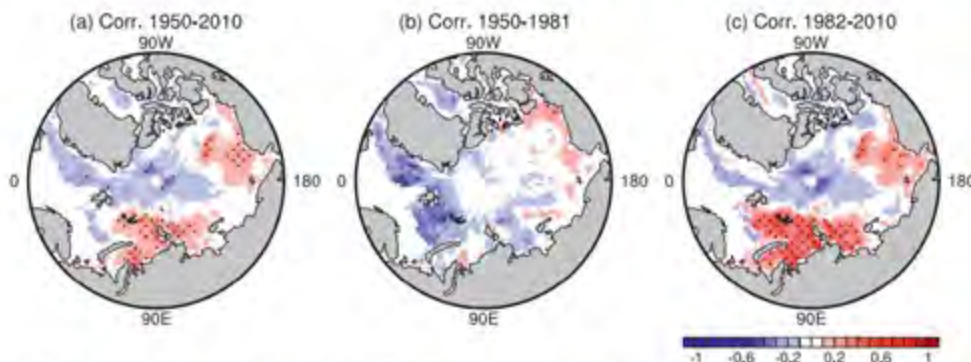
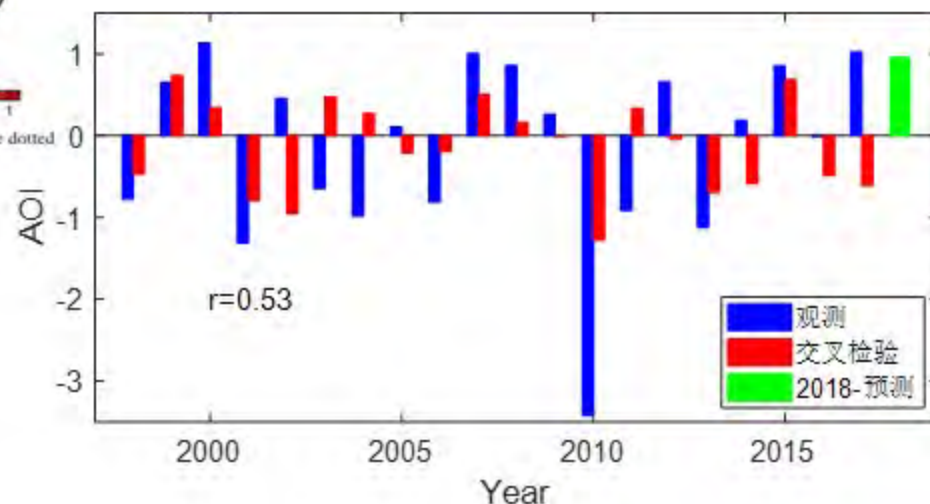
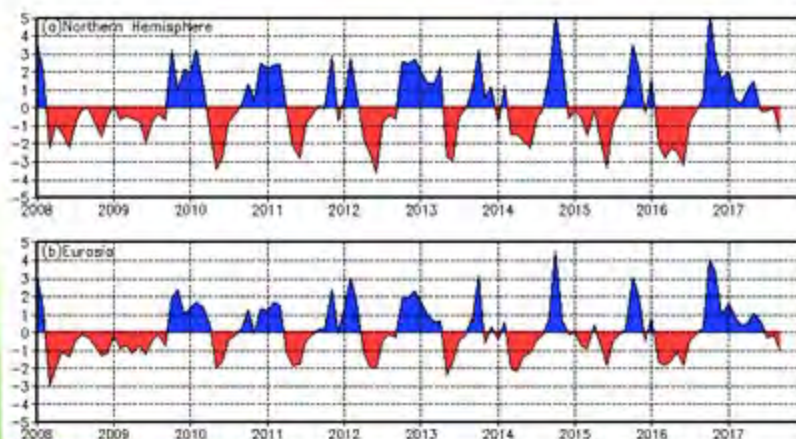


FIG. 1. Correlations of autumn Arctic SIC with winter NAM for the periods (a) 1950–2010, (b) 1950–81, and (c) 1982–2010. The dotted regions have correlations above the 95% confidence level.



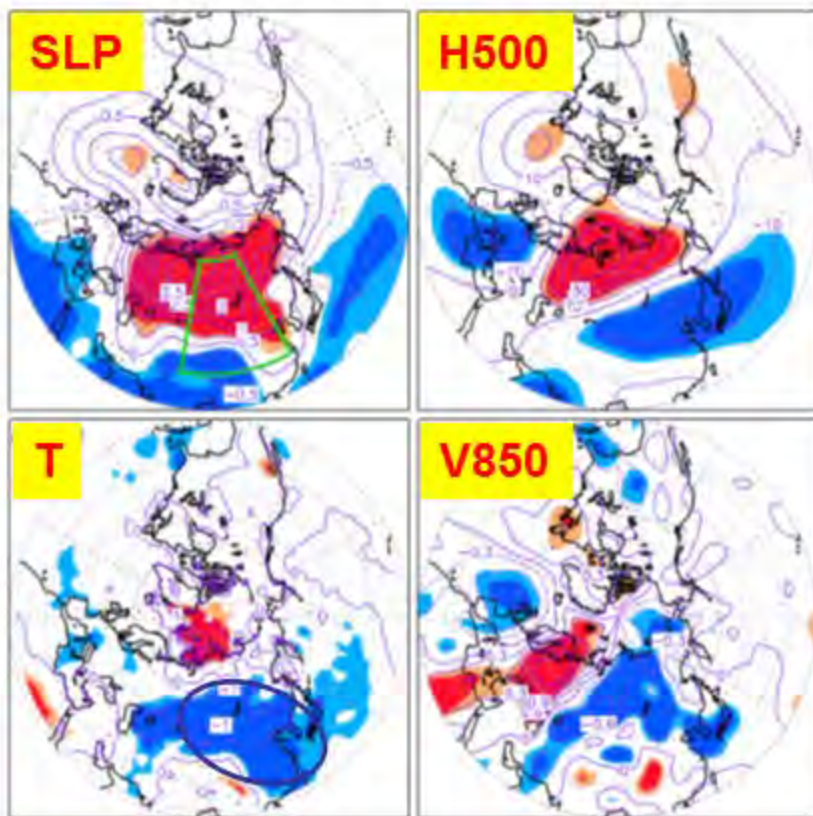
**predictors: sea ice in Aug and
snow cover over Eurasian in Oct**
AO outlook: positive phase

**предикторы: морской лед в августе и
снежный покров в Евразии в октябре:**
позитивная фаза

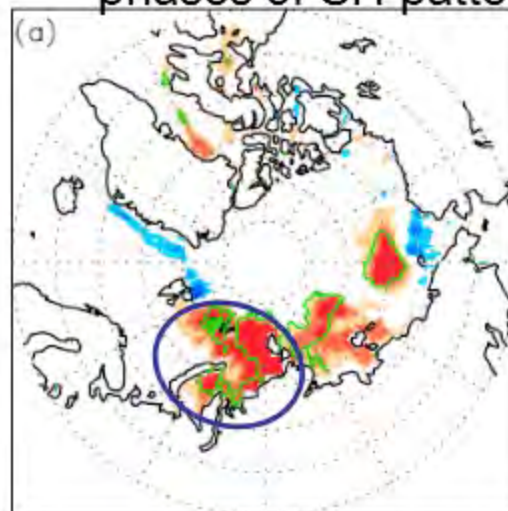


Possible impact of SIC in BK Sea

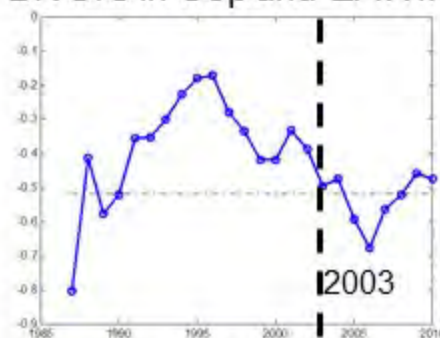
Regression map of SH pattern



Differences in detrended mean SIC between the positive and negative phases of SH pattern



11-yr running cor between BK SIC in Sep and EAWM

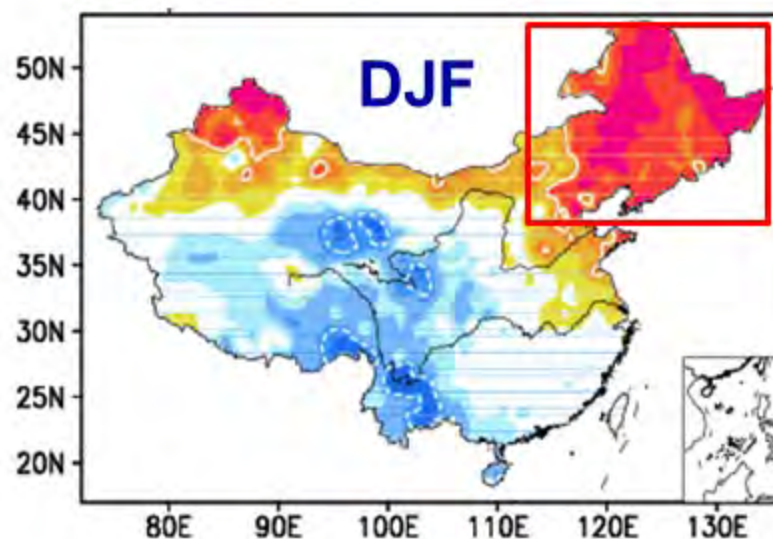


Decreased autumn Arctic SIC along the northern Barents–Kara Seas provides favorable external forcing for generating the positive phase of SH pattern. (Wu BY et al., 2015; He et al., 2015)



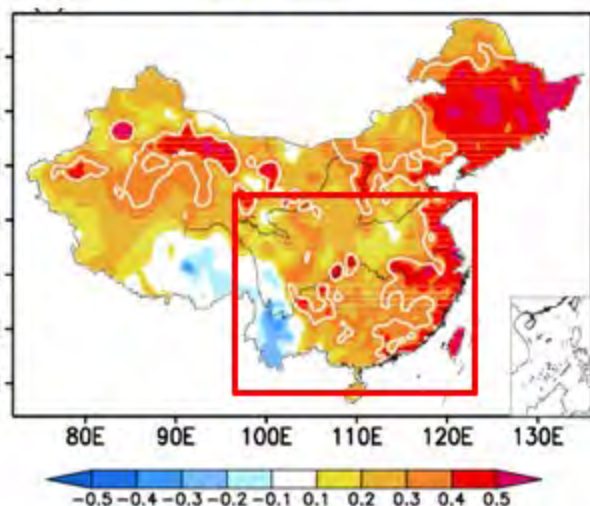


The correlation between AO and Temp. Корреляция между АО и температурой

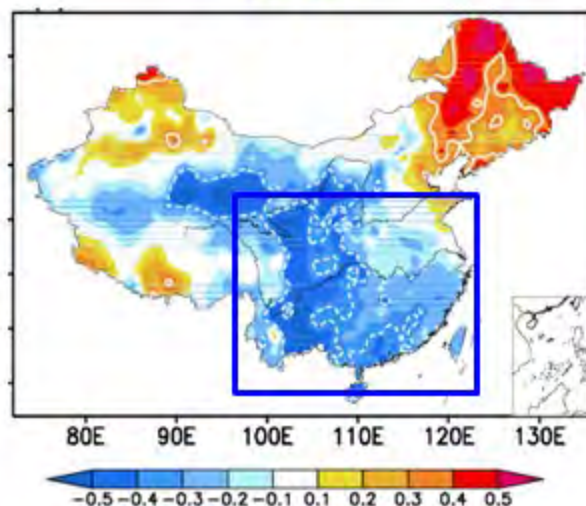


Zuo, Ren, Li 2015

DEC



JAN



FEB

