

2015 seasonal prediction  
using CNU/KOPRI Seasonal  
Prediction System

Korea Polar Research Institute

Baek-Min Kim

# Experiment Design

# Modelling system and experiments

- CAM3
- Atmospheric initial condition: NCEP FNL analysis
- 15-member ensembles (initial time-lagging method)

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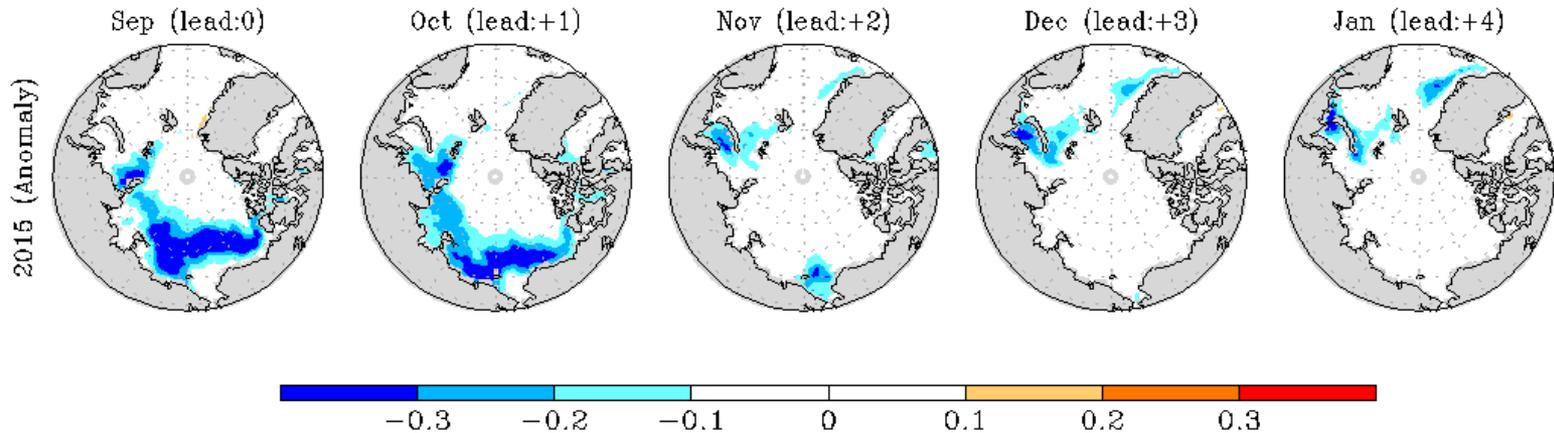
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- SST outside of Arctic : 1) anomaly persistent (Sep. 2015) (GLB run); 2) climatological condition (ART run)

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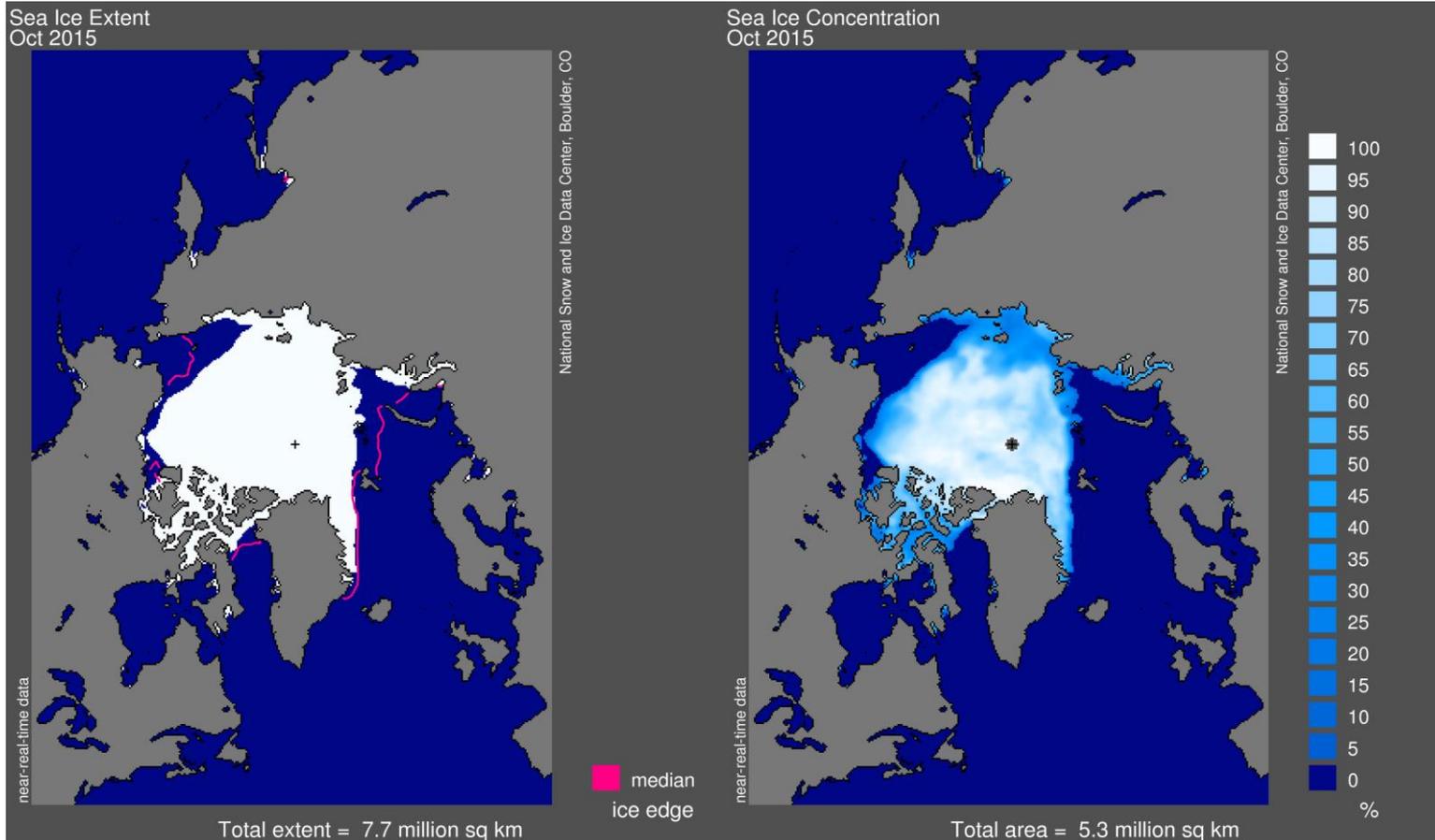
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- Control run: 100-yrs run with climatological mean SST/Sice

# Boundary conditions & Snow

# SIC anomalies used for simulations

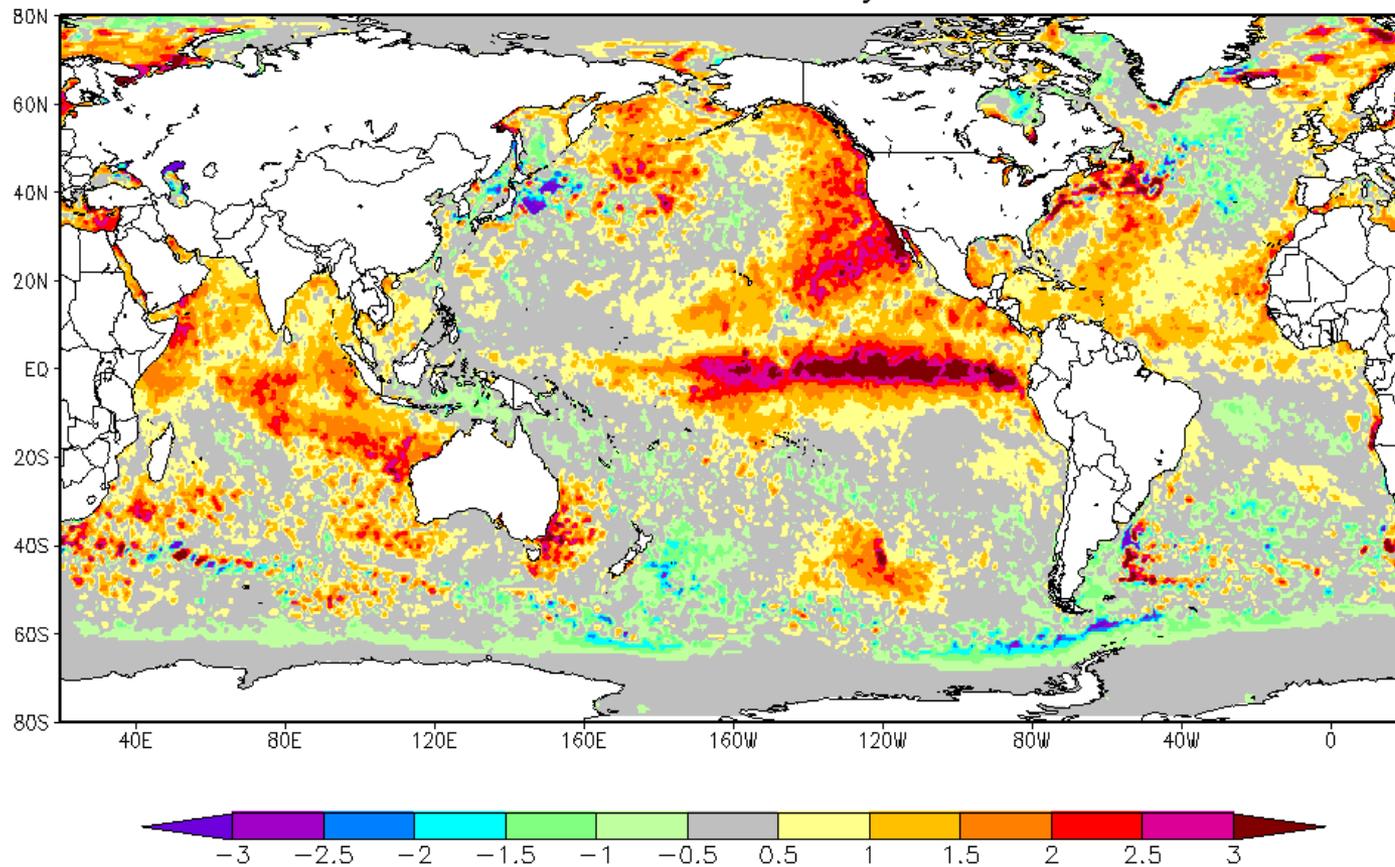


# Sea ice concentration in October 2015 (NSIDC)



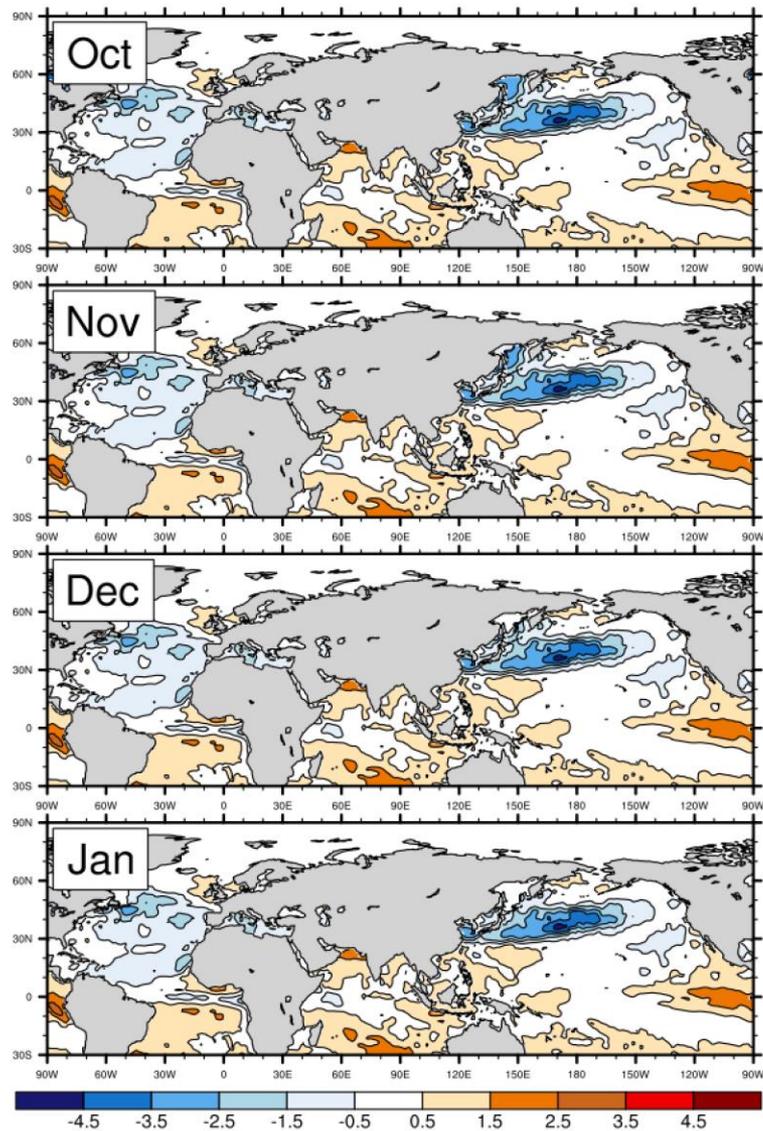
# Sea surface temperature (B.C. of ART & GLB runs)

Daily OISST Anomaly Intv2: 01NOV2015  
AVHRR - only



# Sea surface temperature

GLB run minus ART run



# Observed snow depth from JRA55

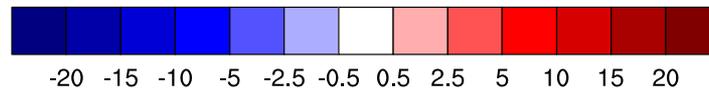
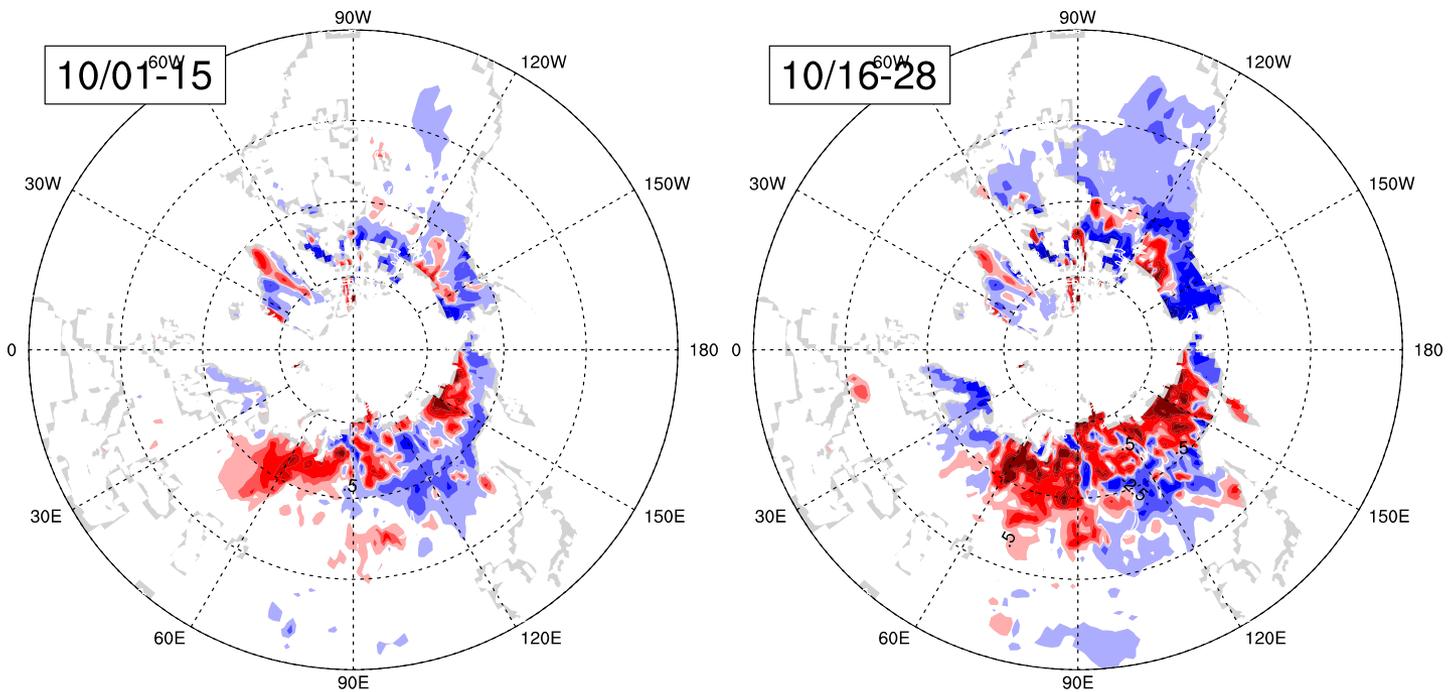
2015.10.01 to 15

2015.10.16 to 28

JRA snow depth anomaly (Oct.2015)

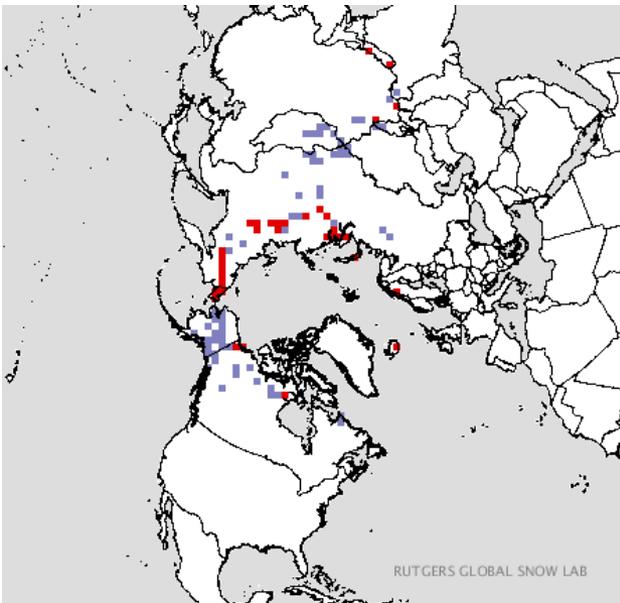
[cm]

[cm]

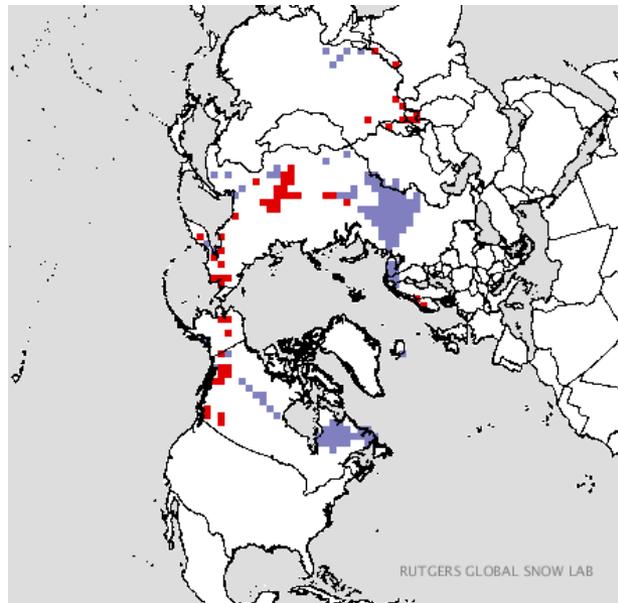


# Observed snow cover anomalies (Rutgers Snow Lab.)

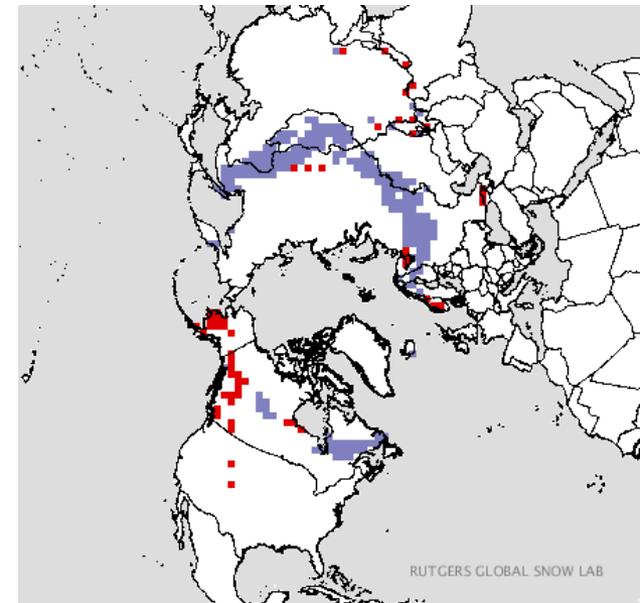
2015.10.01



2015.10.16



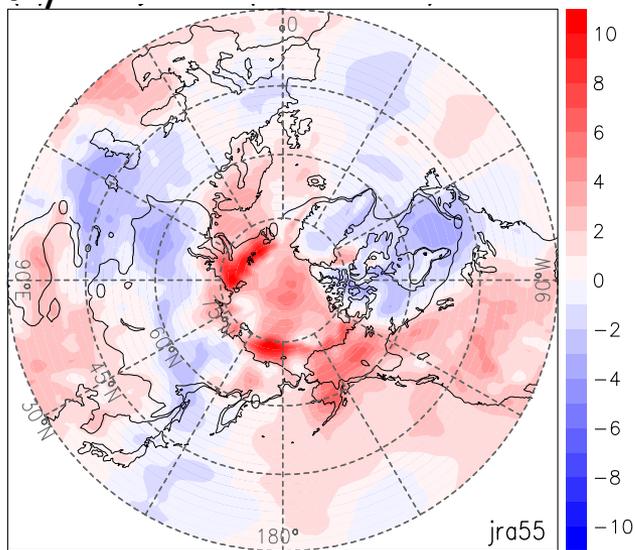
2015.10.28



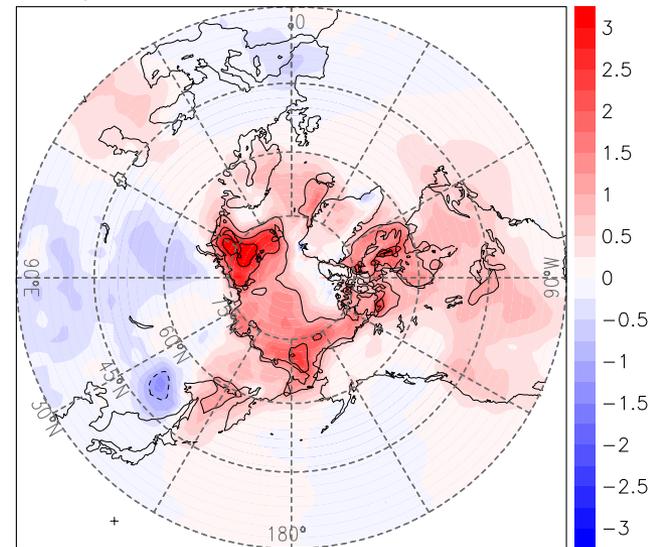
# Results

# Simulated SAT anomalies from ART run

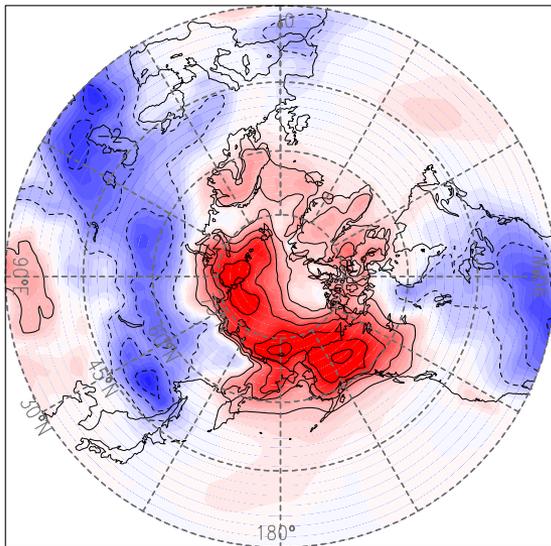
JRA55 Z500 anomaly  
2015.10.15 ~ 28



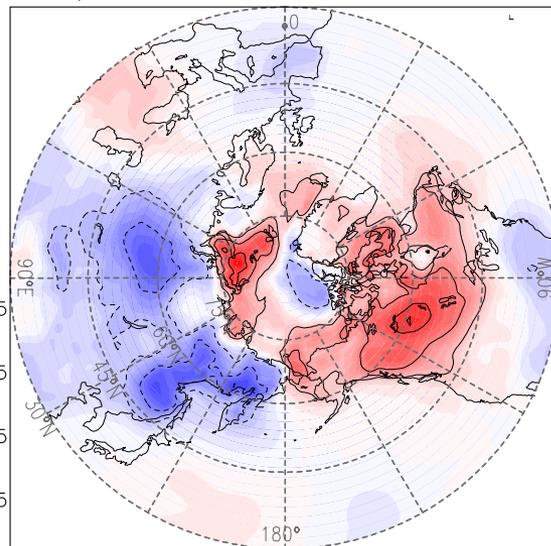
$\Delta$ SAT, DJF 2015



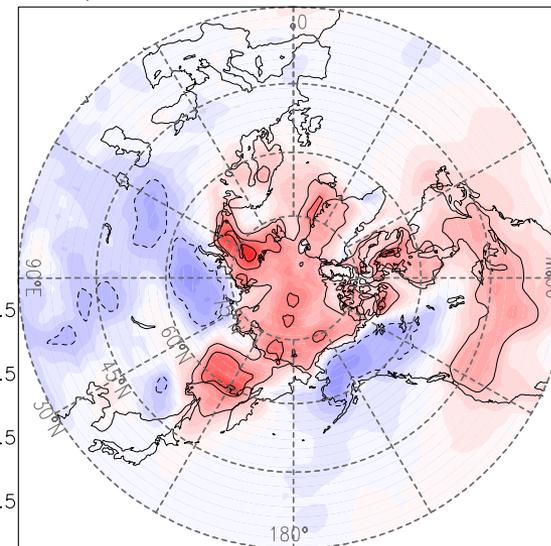
$\Delta$ SAT, NOV 2015



$\Delta$ SAT, DEC 2015

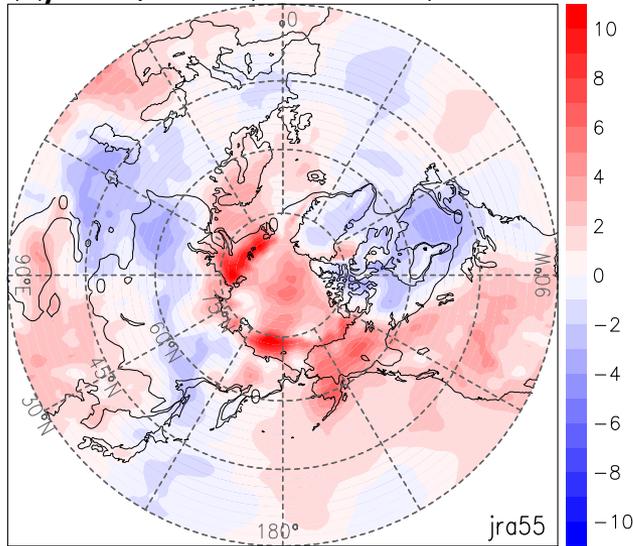


$\Delta$ SAT, JAN 2016

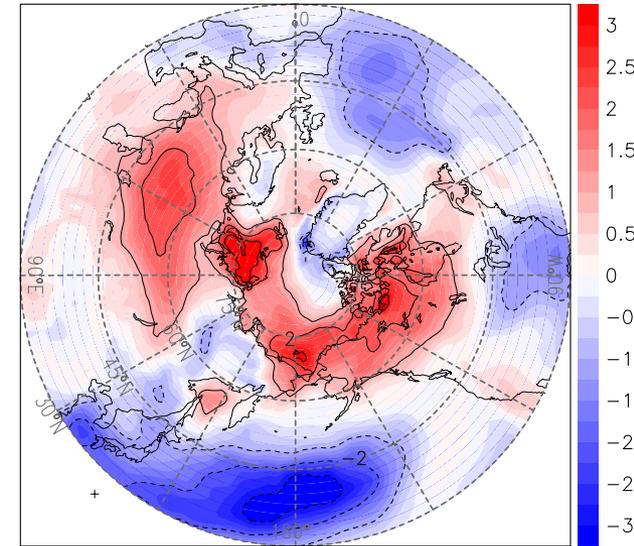


# Simulated SAT anomalies from GLB run

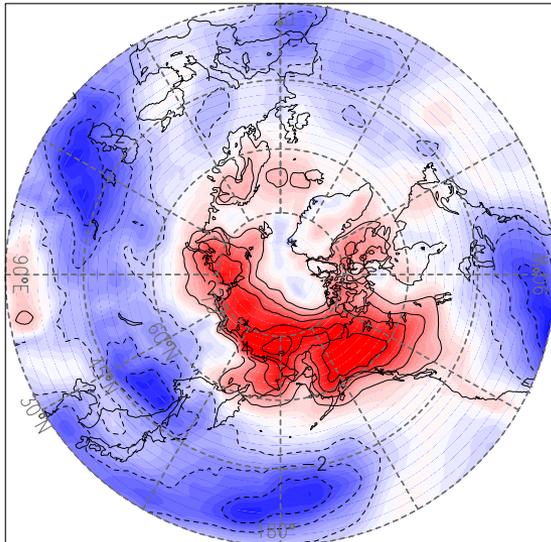
JRA55 Z500 anomaly  
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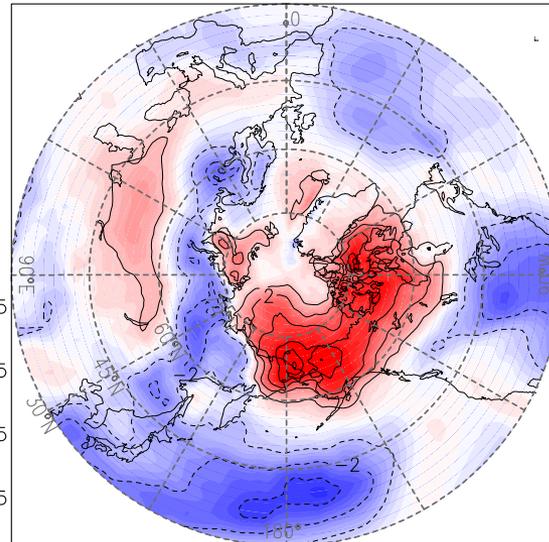
$\Delta$ SAT, DJF 2015



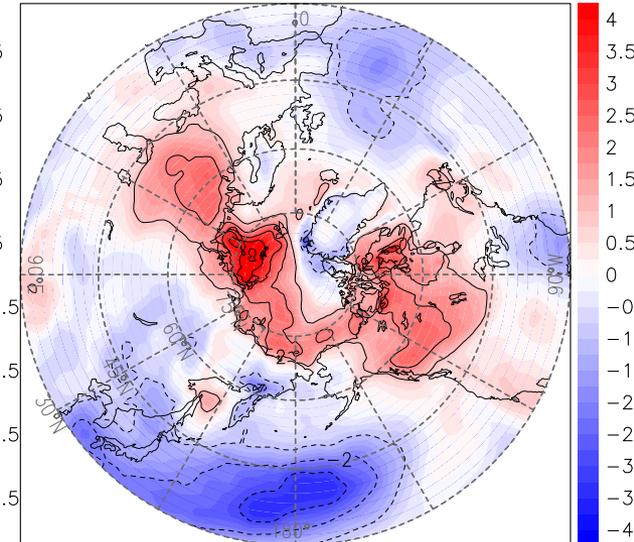
$\Delta$ SAT, NOV 2015



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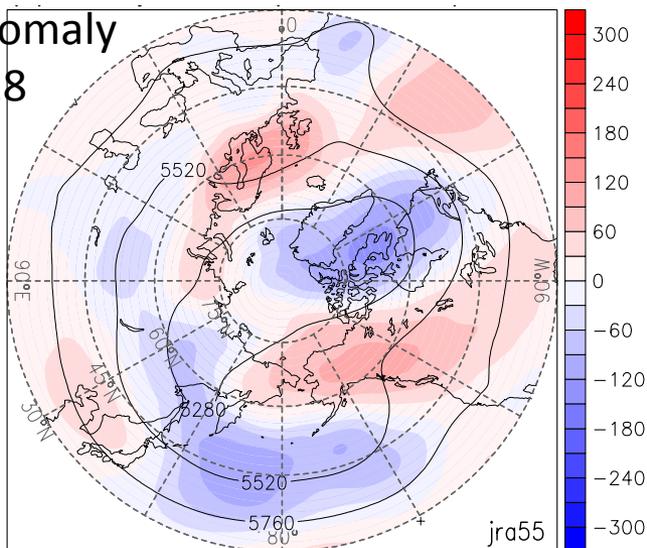


$\Delta$ SAT, JAN 2016

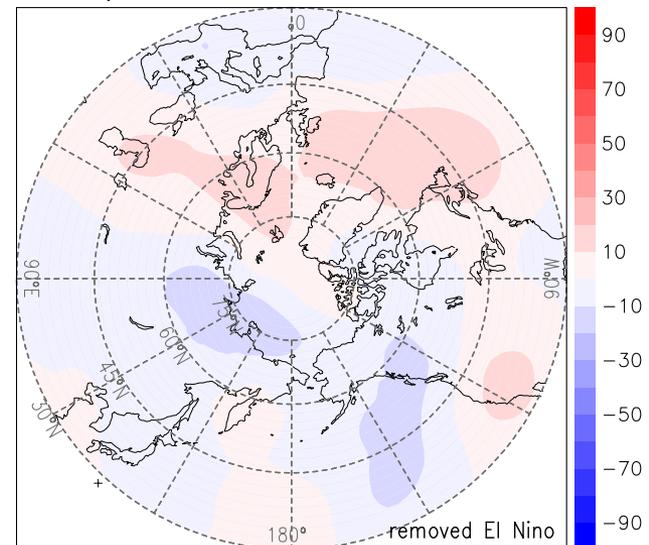


# Simulated Z500 anomalies from ART run

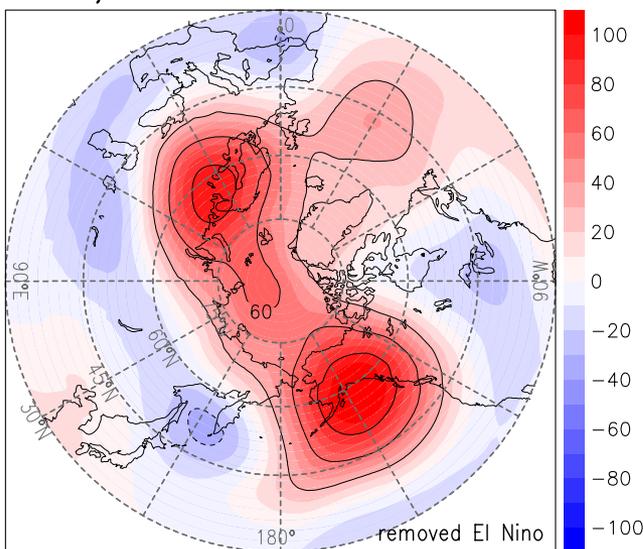
JRA55 Z500 anomaly  
2015.10.15 ~ 28



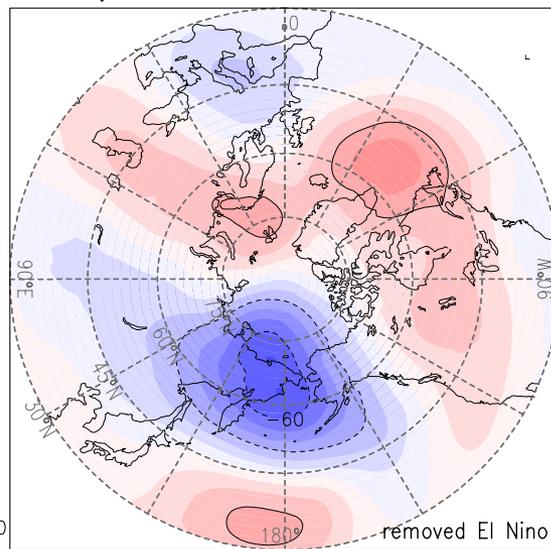
$\Delta Z500$ , DJF 2015



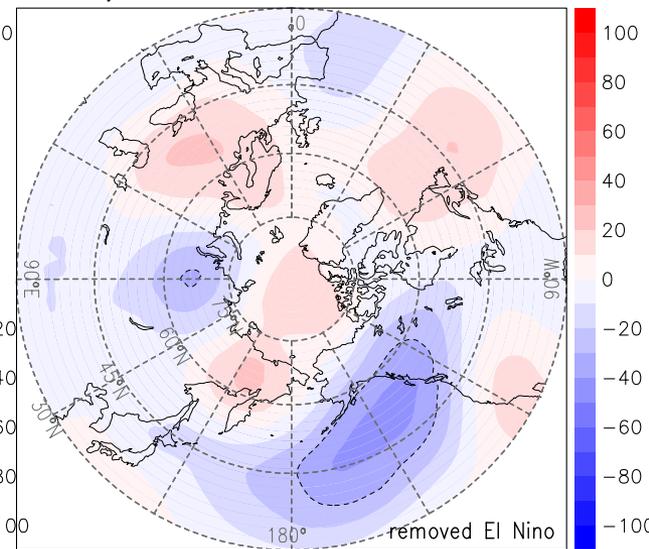
$\Delta Z500$ , NOV 2015



$\Delta Z500$ , DEC 2015

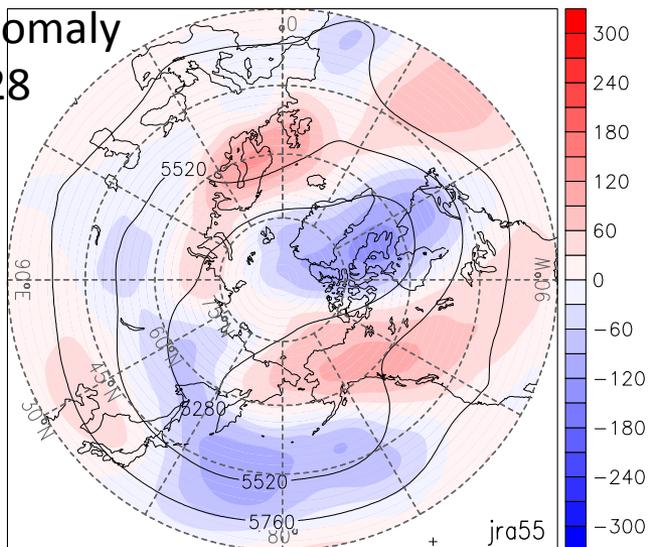


$\Delta Z500$ , JAN 2016

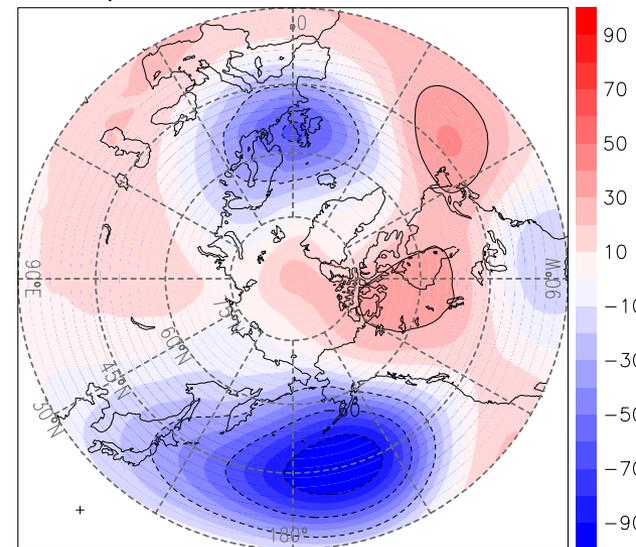


# Simulated Z500 anomalies from GLB run

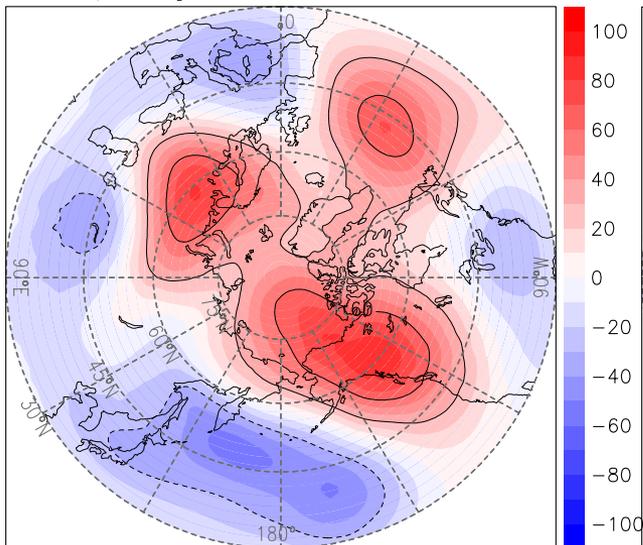
JRA55 Z500 anomaly  
2015.10.15 ~ 28



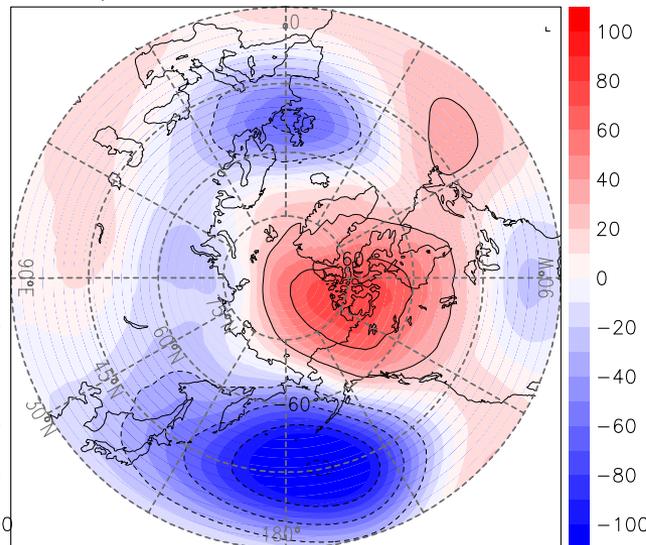
$\Delta Z500$ , DJF 2015



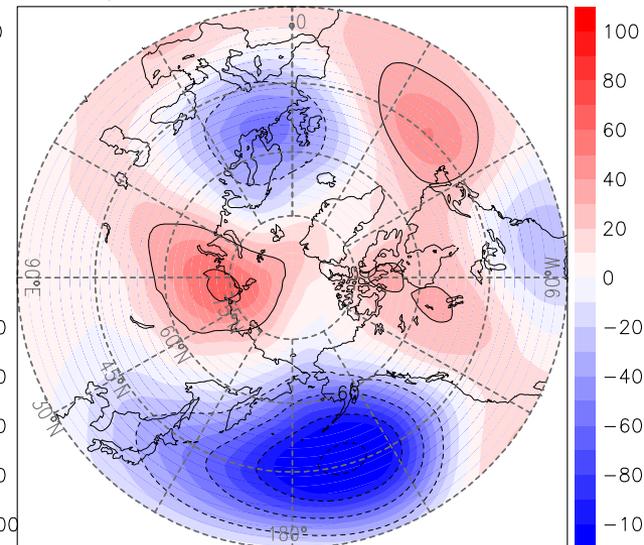
$\Delta Z500$ , NOV 2015



$\Delta Z500$ , DEC 2015



$\Delta Z500$ , JAN 2016

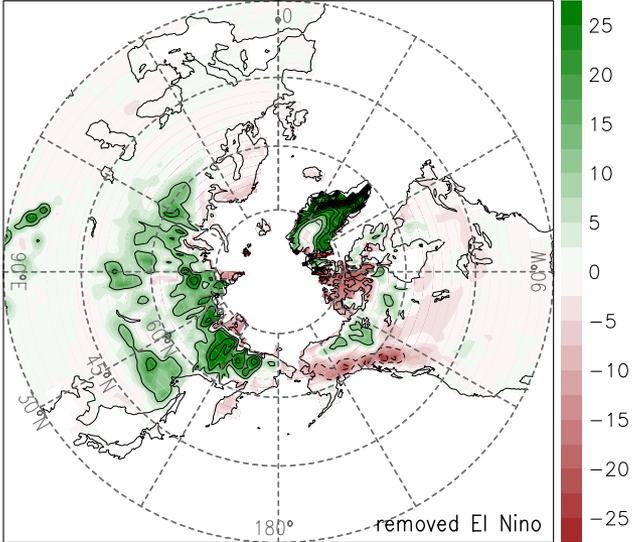


# Simulated SnowDP anomalies from ART run

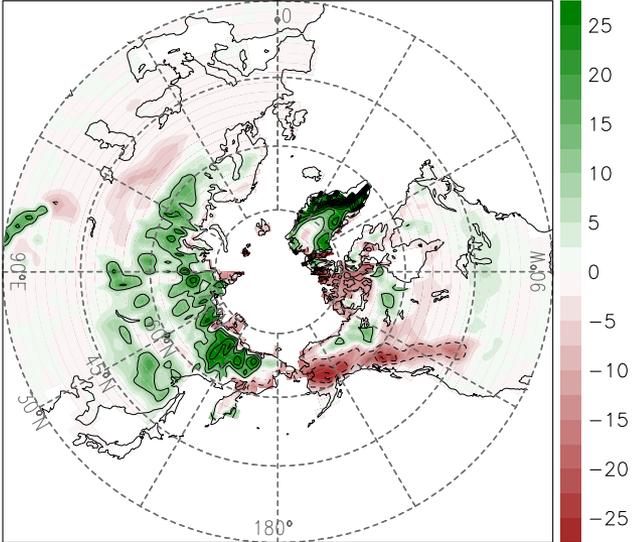
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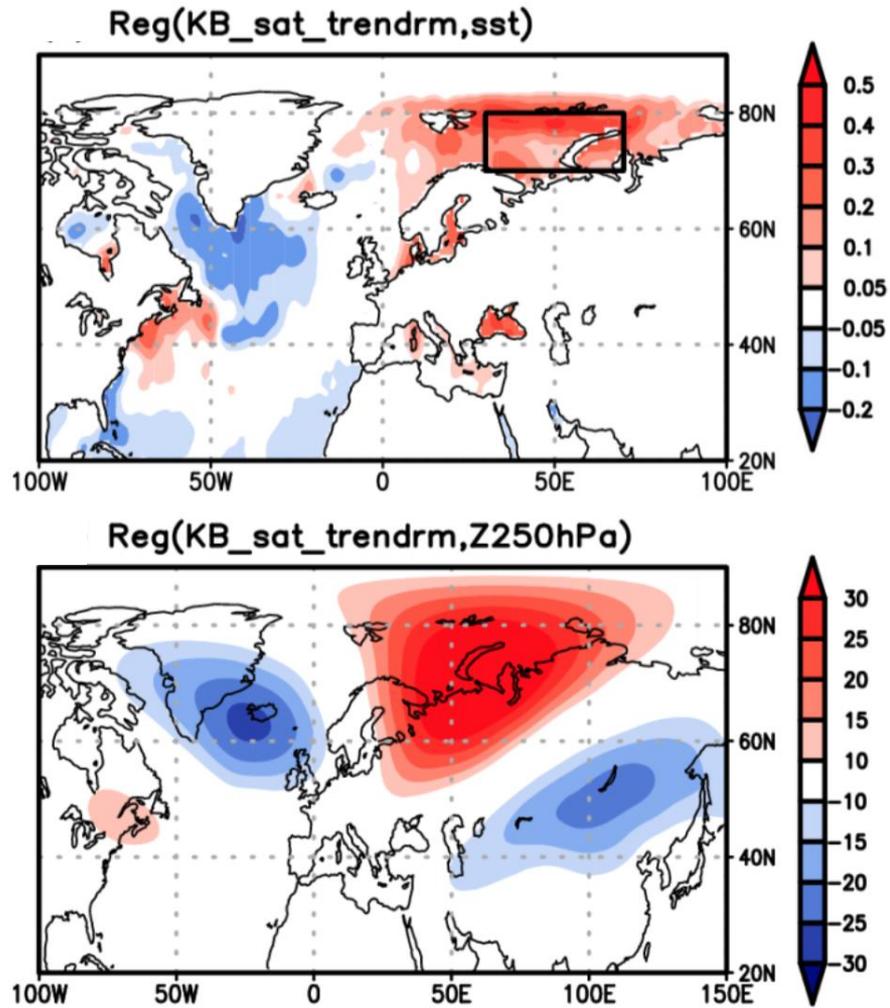
$\Delta$ SNOWDP, DJF 2015



$\Delta$ SNOWDP, DJF 2015

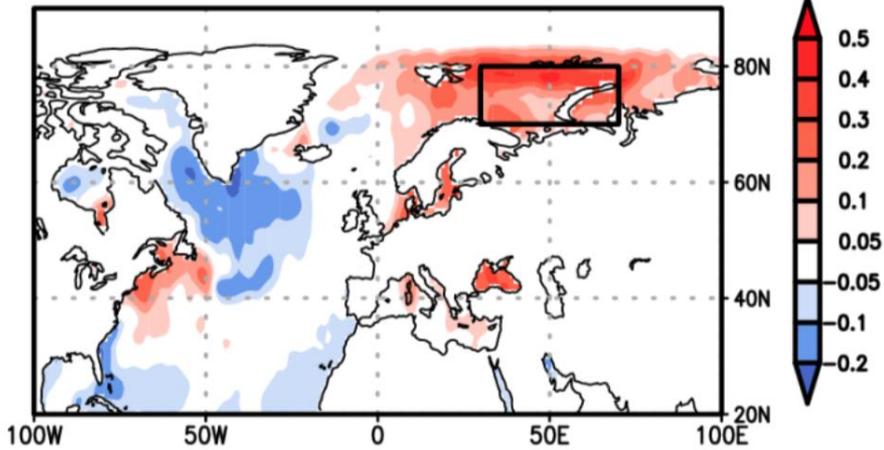


# Analysis

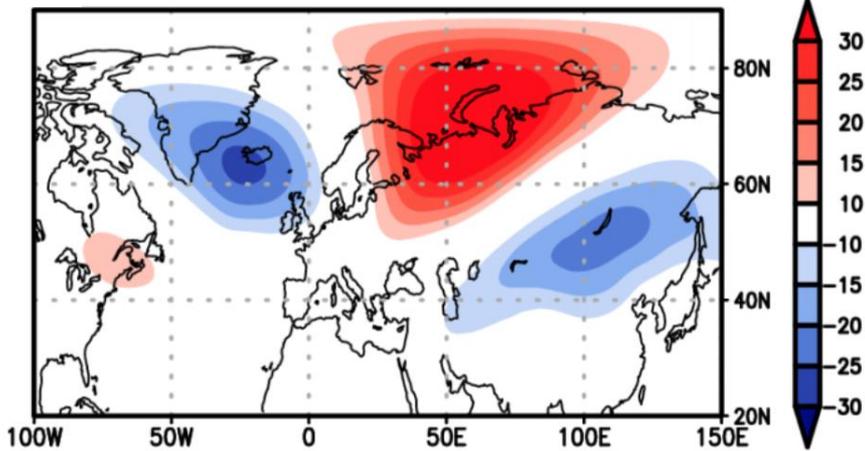


Warm Barents/Kara Sea Pattern=Scand Pattern

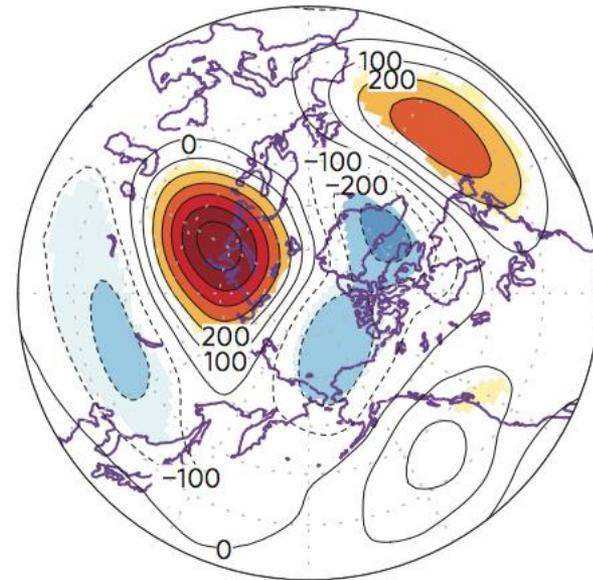
Reg(KB\_sat\_trendrm,sst)



Reg(KB\_sat\_trendrm,Z250hPa)



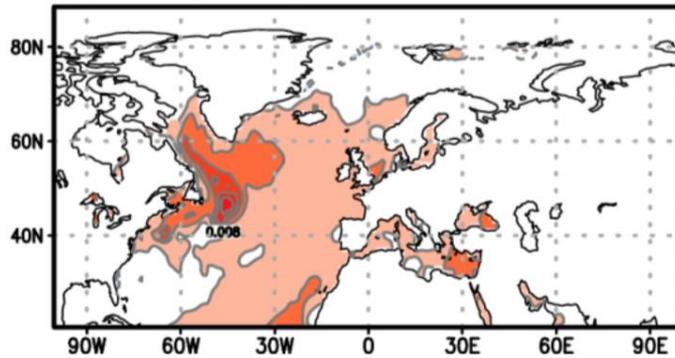
ART1 Z300



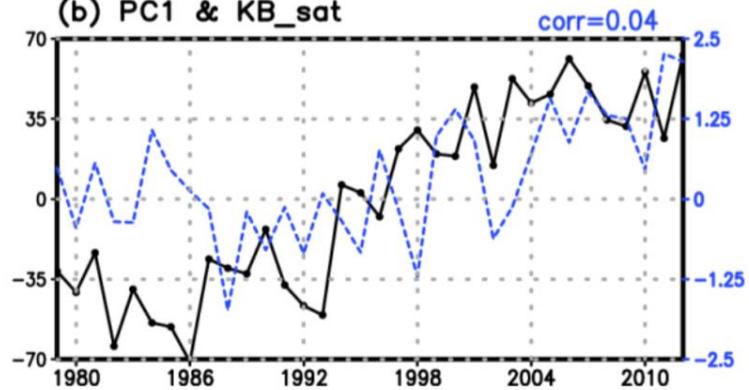
Kug et al. (2015, NG)

Warm Barents/Kara Sea Pattern=Scand Pattern

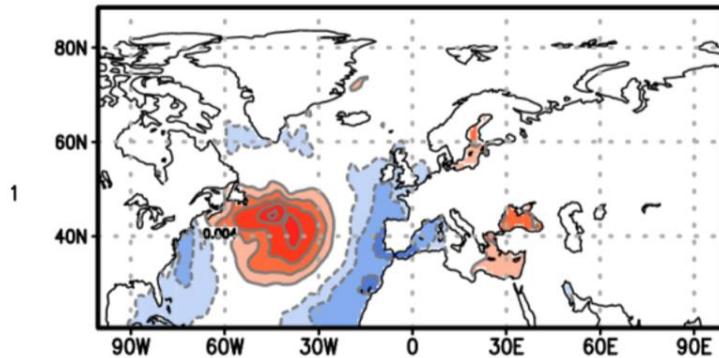
(a) EOF1(34.3%)



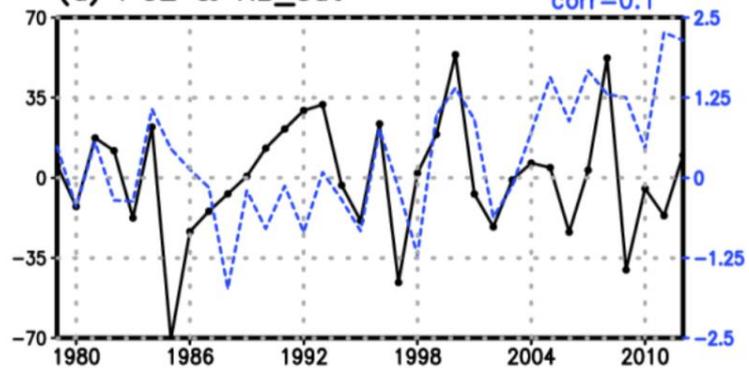
(b) PC1 & KB\_sat



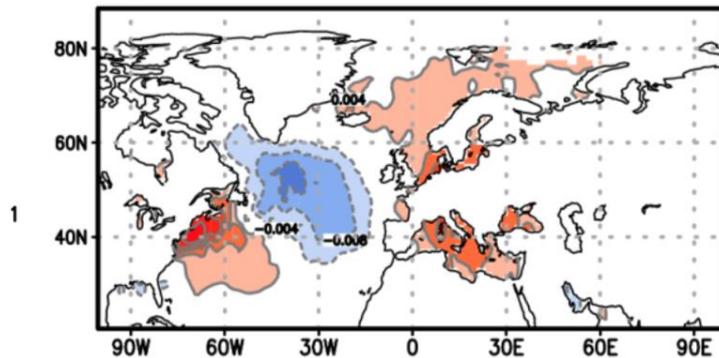
(c) EOF2(13.3%)



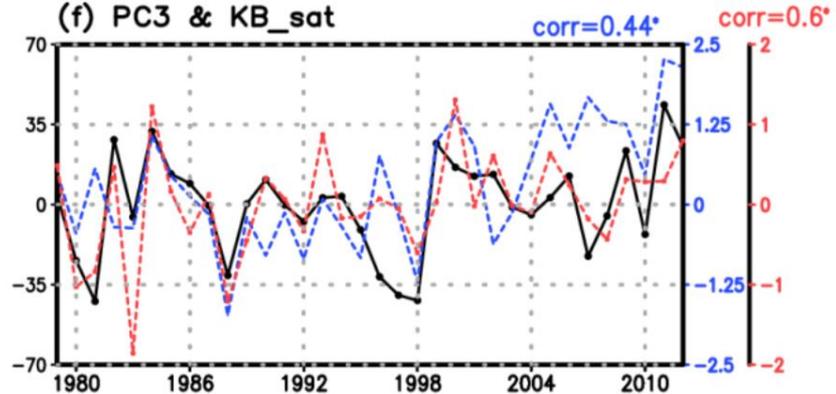
(d) PC2 & KB\_sat



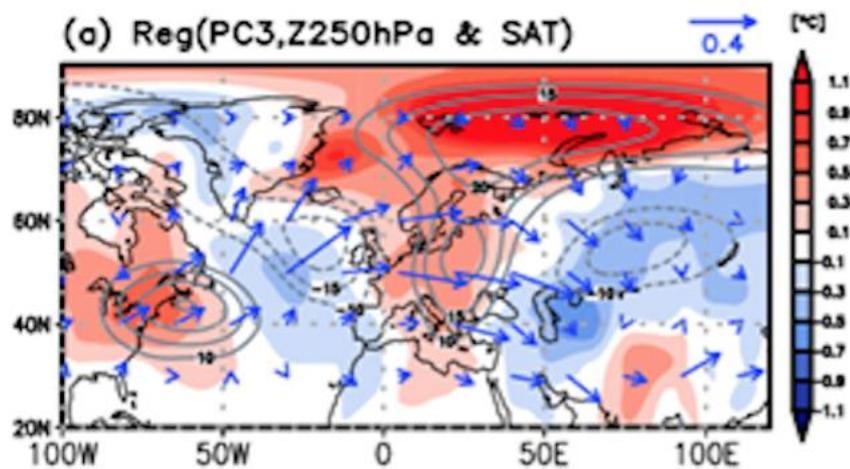
(e) EOF3(9.4%)



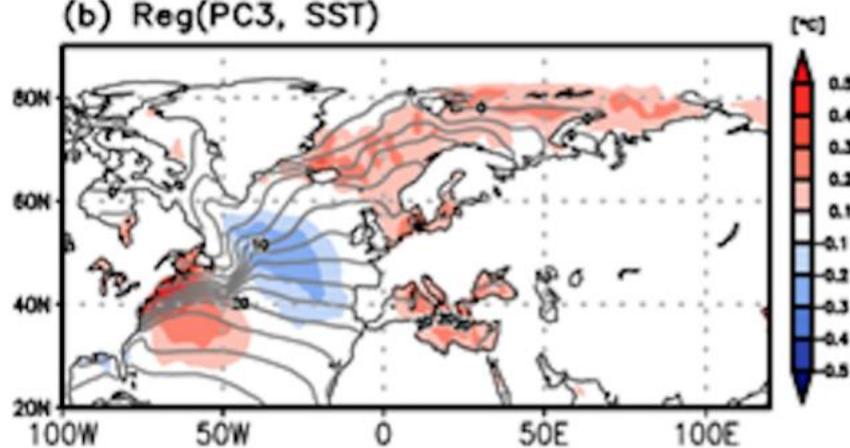
(f) PC3 & KB\_sat



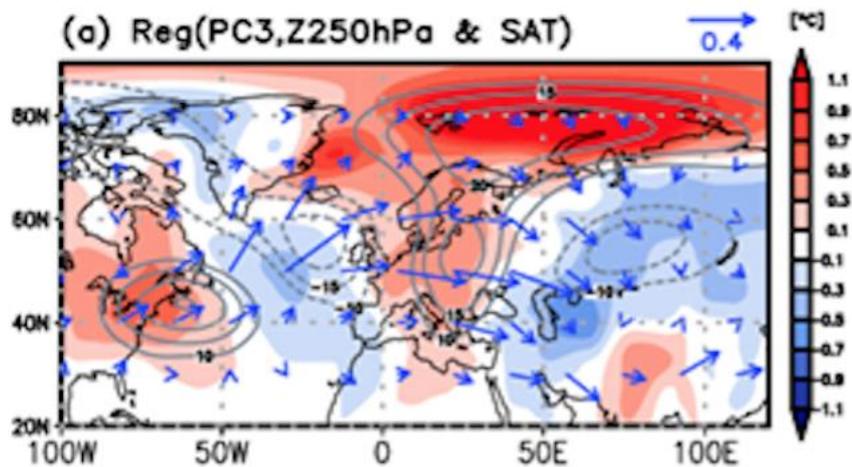
(a) Reg(PC3,Z250hPa & SAT)



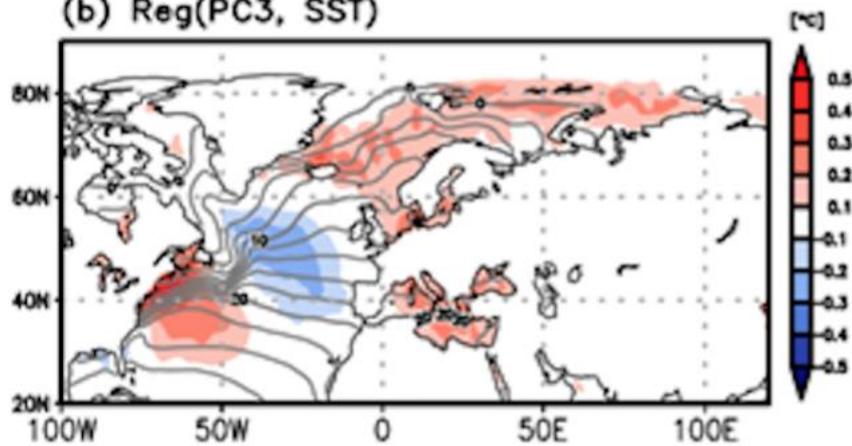
(b) Reg(PC3, SST)



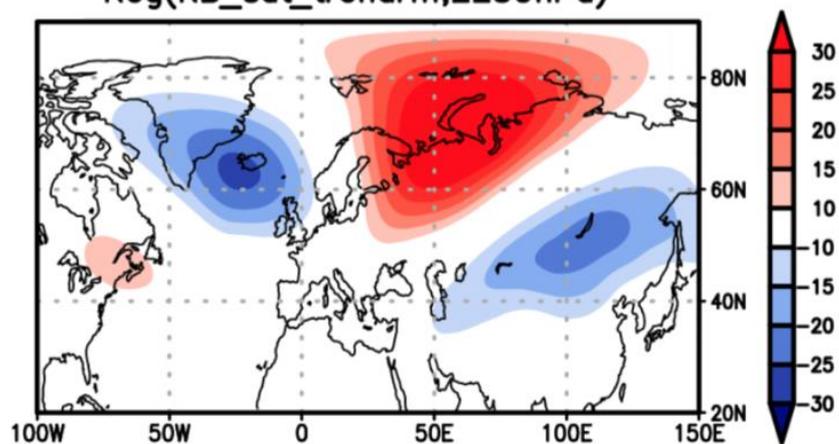
(a) Reg(PC3,Z250hPa & SAT)



(b) Reg(PC3, SST)

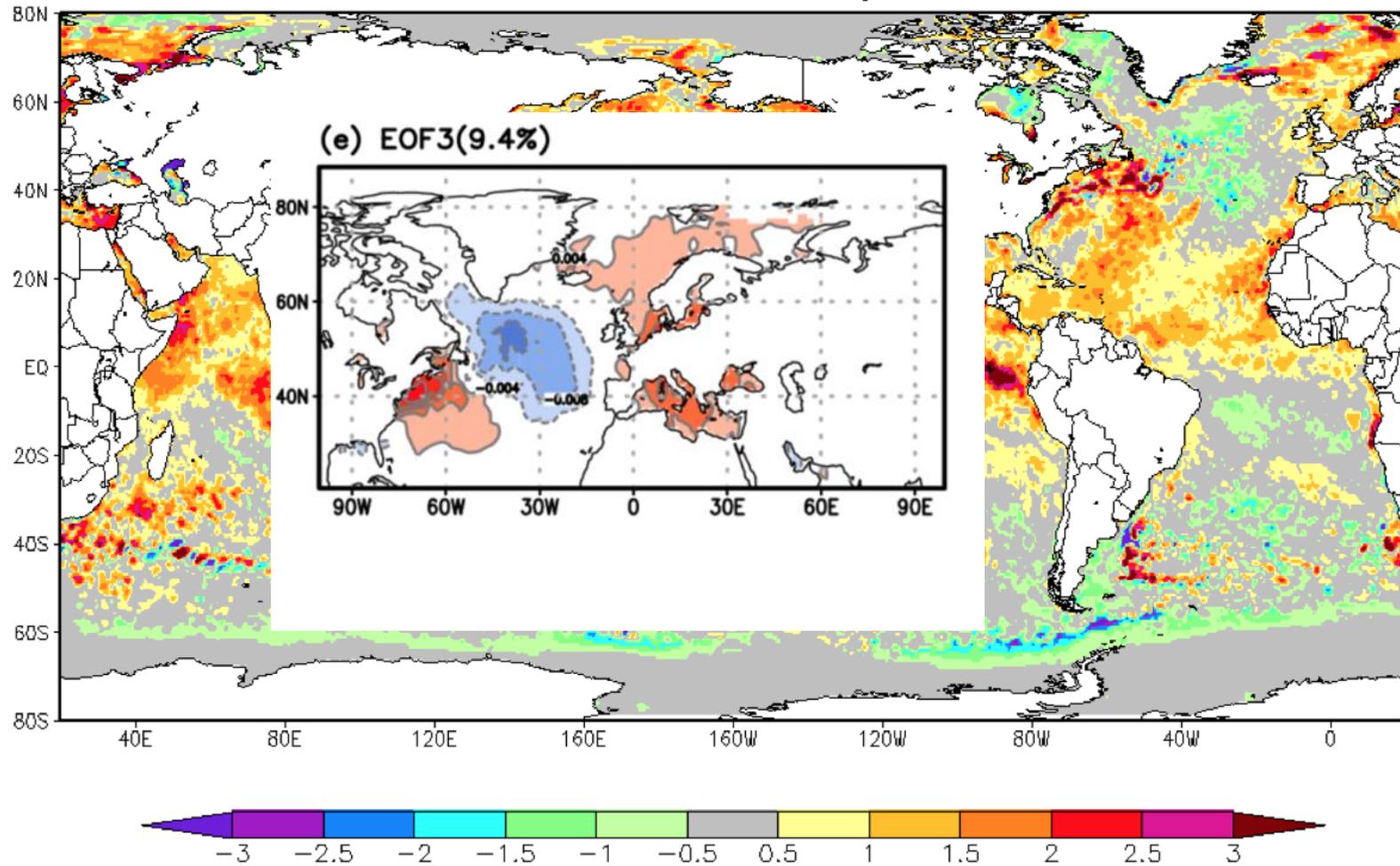


Reg(KB\_sat\_trendrm,Z250hPa)



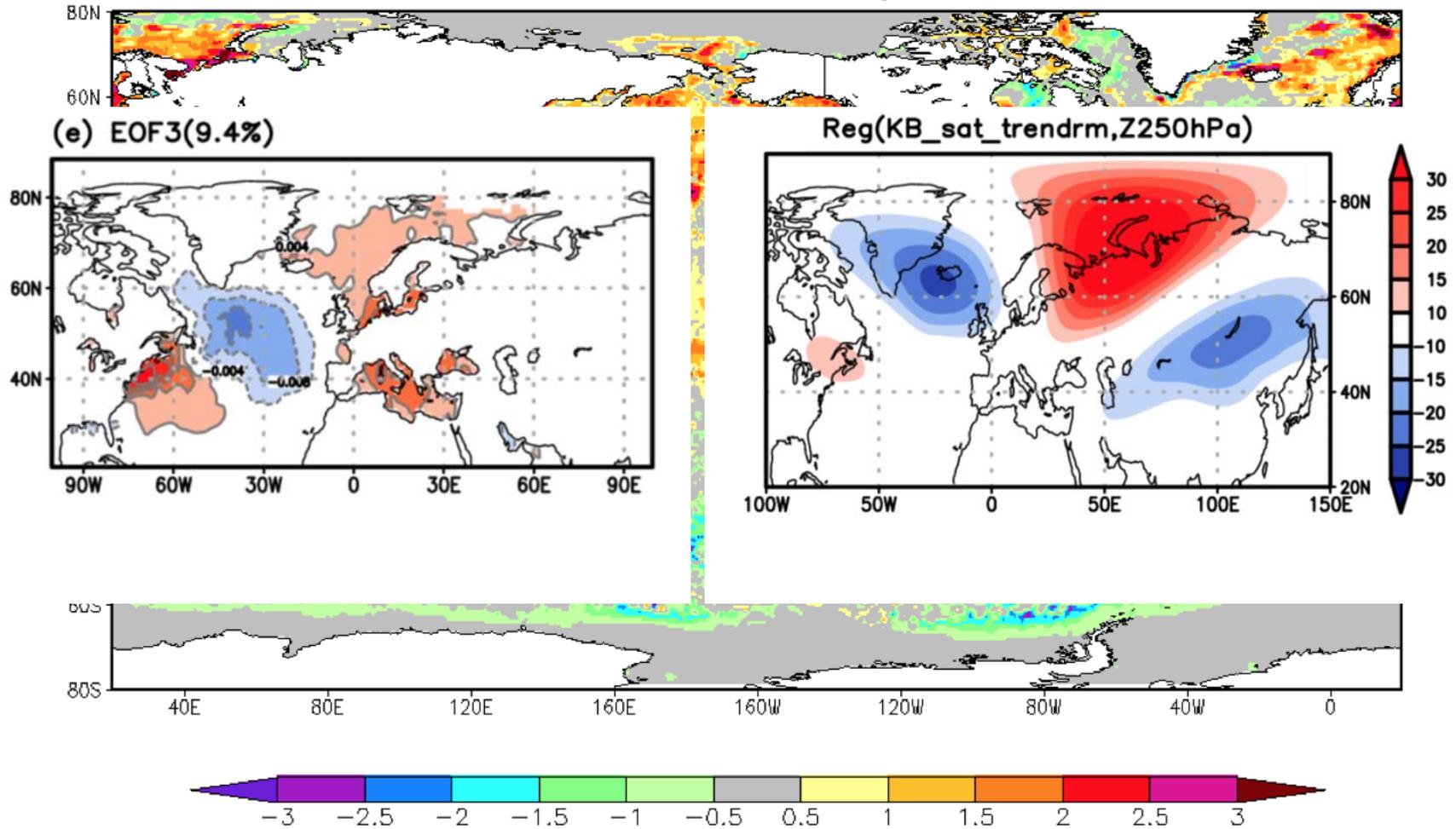
# Daily OISST Anomaly Intv2: 01NOV2015

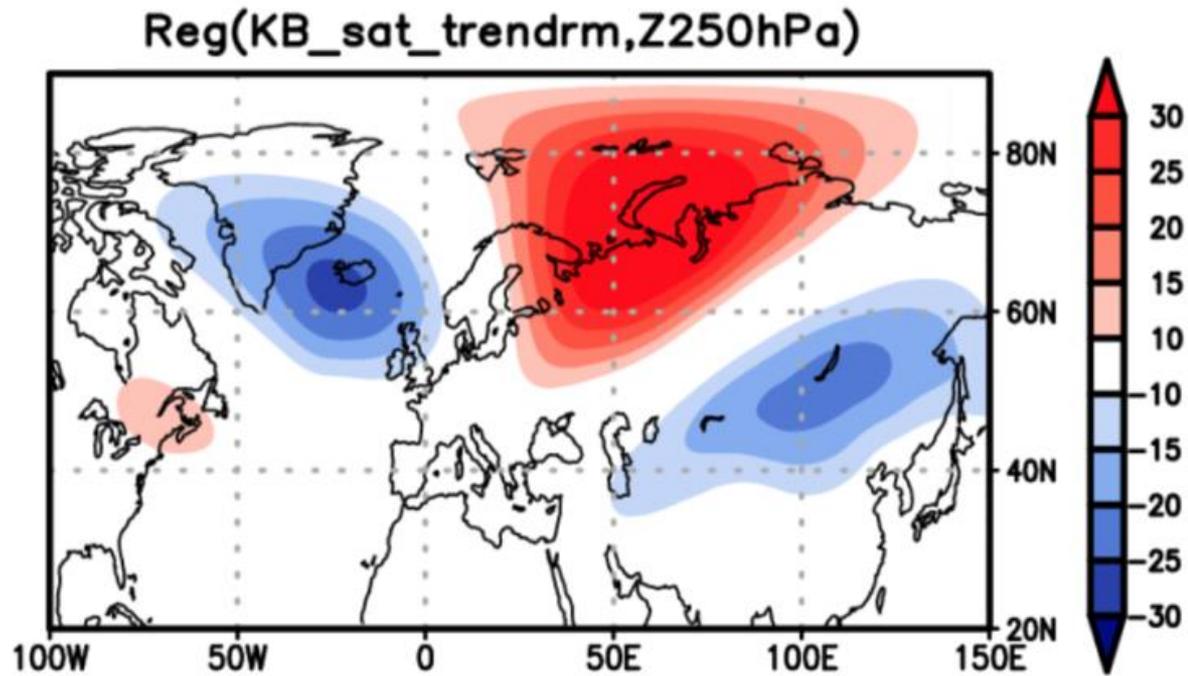
AVHRR - only



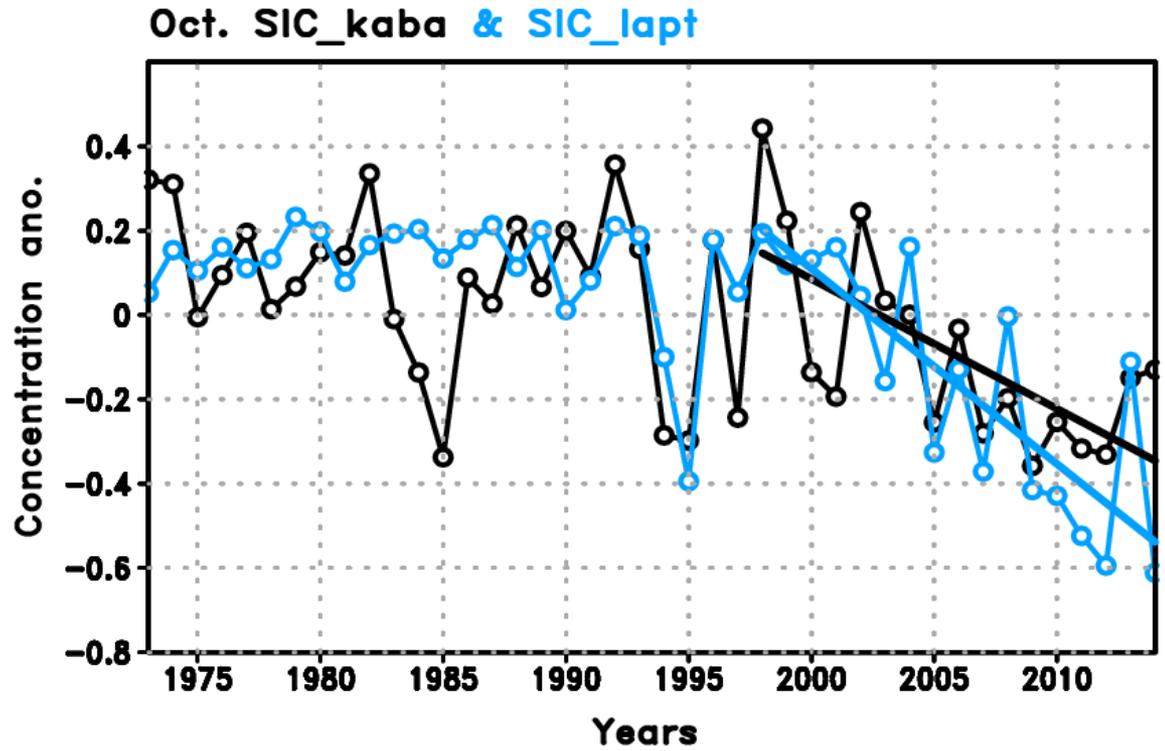
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## AVHRR - only



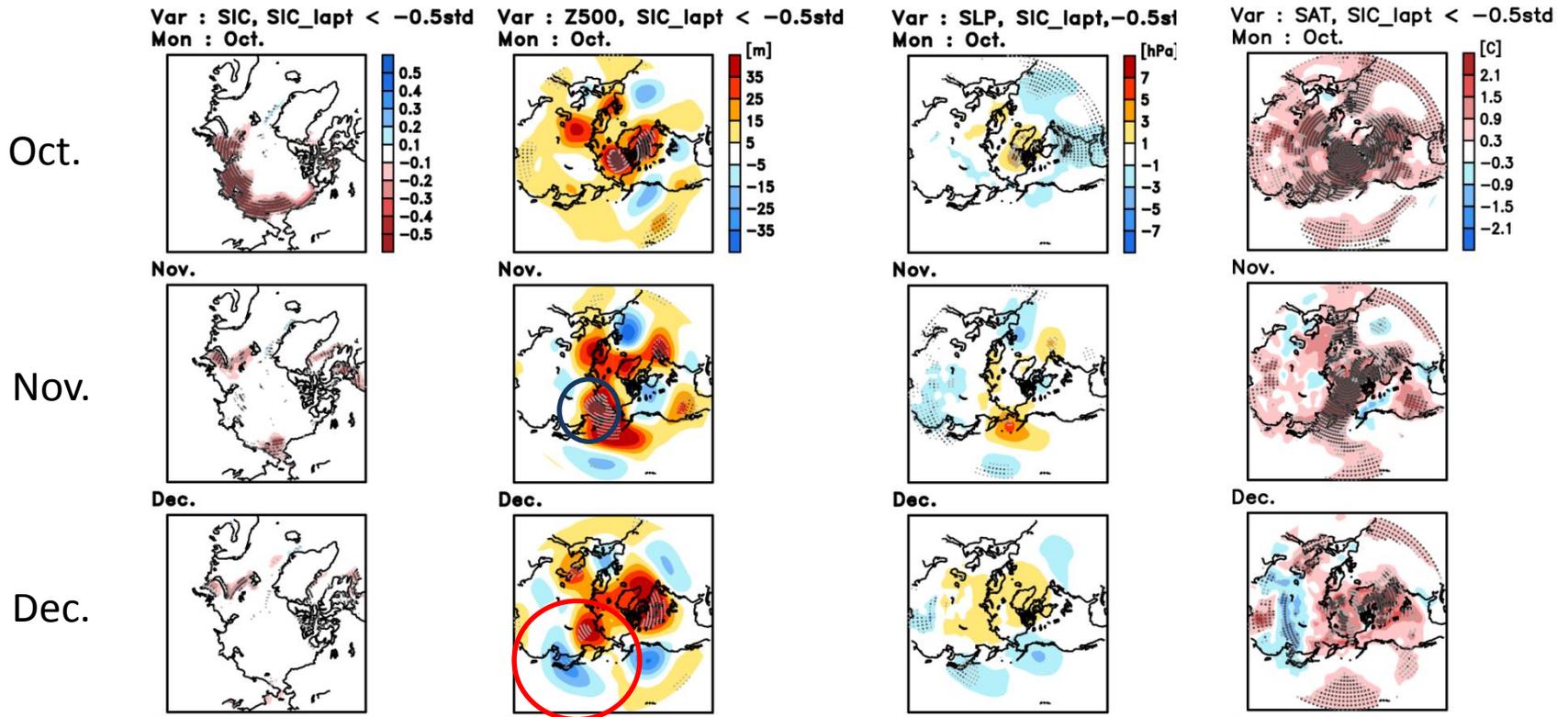


SCAND pattern: A typical pattern of cold Eurasia!



Thanks to Dr. Woo of KMA

# 10 Cases composite of less sea-ice cover in the Laptev Sea

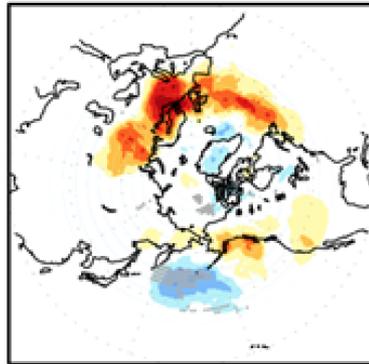


Black dots (95%)  
Gray Dots (90%)

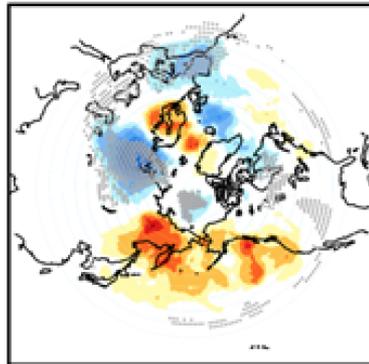
Thanks to Dr. Woo of KMA

# Composite for negative year of Oct–Laptev SIC index

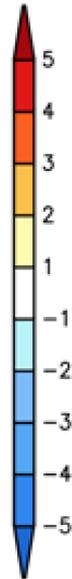
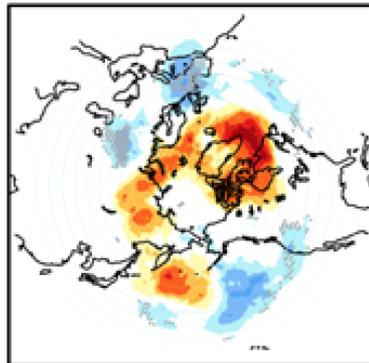
## Oct BF anomaly



## Nov BF anomaly



## Dec BF anomaly



\* Shading : blocking frequency anomaly

\* Grey dots : 95% significant values

# Summary

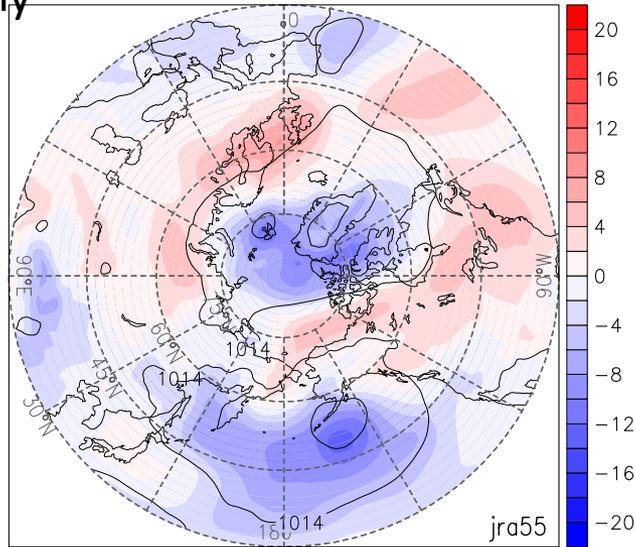
- CNU/KOPRI dynamical seasonal prediction system predicts cold SAT over most part of eastern Eurasia this winter.
- Cold anomaly is mostly persistent over Siberia/Mongolia (northern East Asia)
- Weaker and intermittent cold anomaly is expected over Korea, Northern China & Japan

# Summary

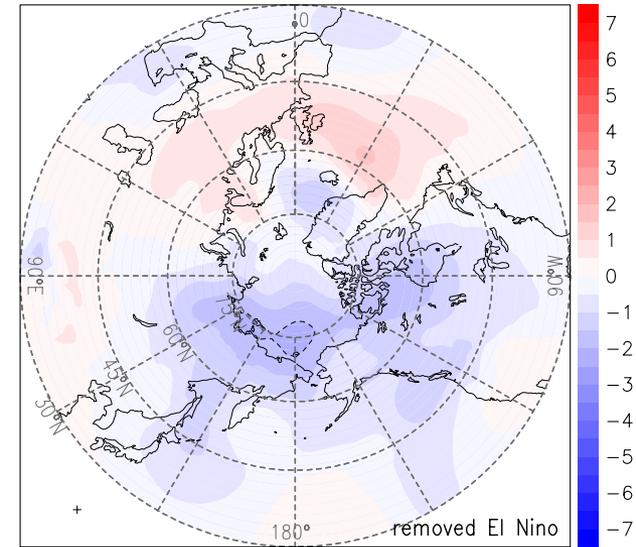
- Analysis indicates that
  - North Atlantic SST pattern this year favors cold Eurasian teleconnection pattern
  - characteristic less sea-ice over Laptev sea favors cold Eastern Eurasia
  - Larger extent of snow cover this year may help colder Eastern Eurasia condition this year
- Caveat: Our modelling system still does not give a credible prediction results if SST anomalies play a dominant role for the global teleconnection

# Simulated SLP anomalies from ART run

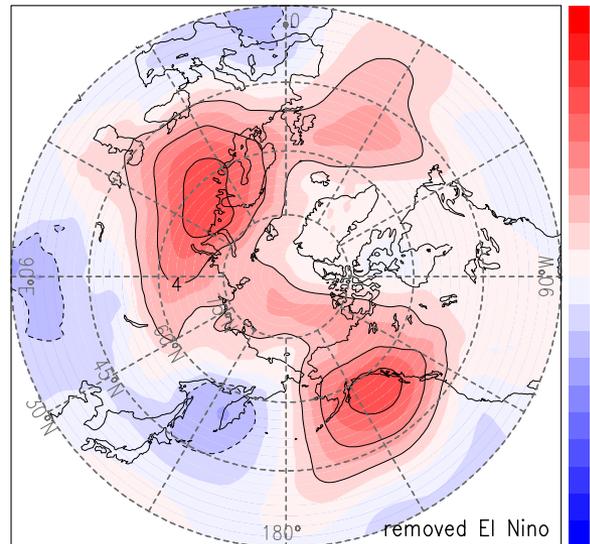
JRA55 Z500 anomaly  
2015.10.15 ~ 28



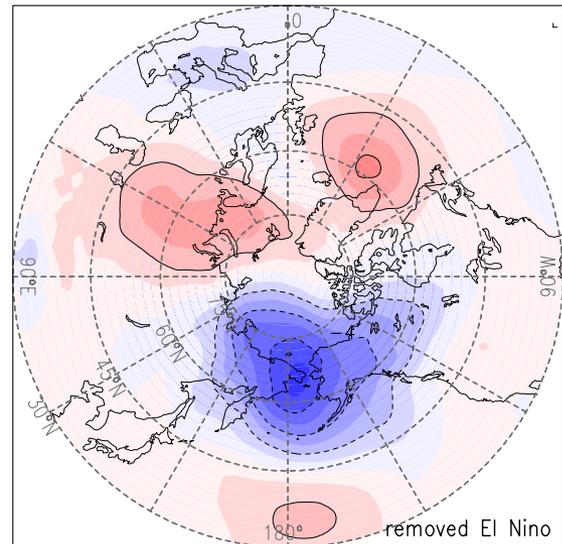
$\Delta$ SLP, DJF 2015



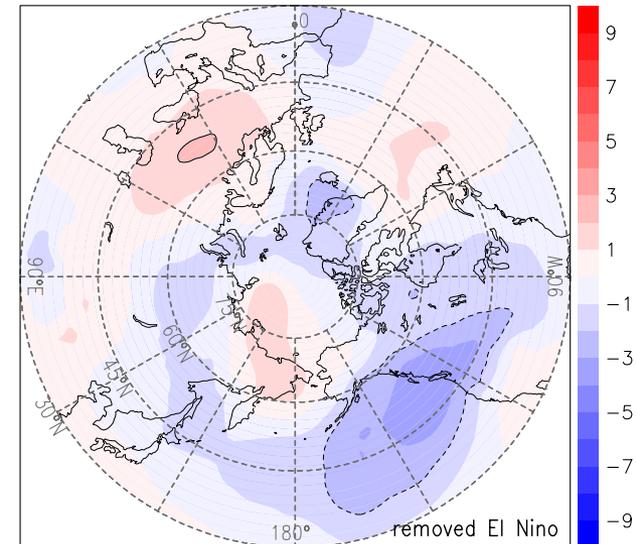
$\Delta$ SLP, NOV 2015



$\Delta$ SLP, DEC 2015

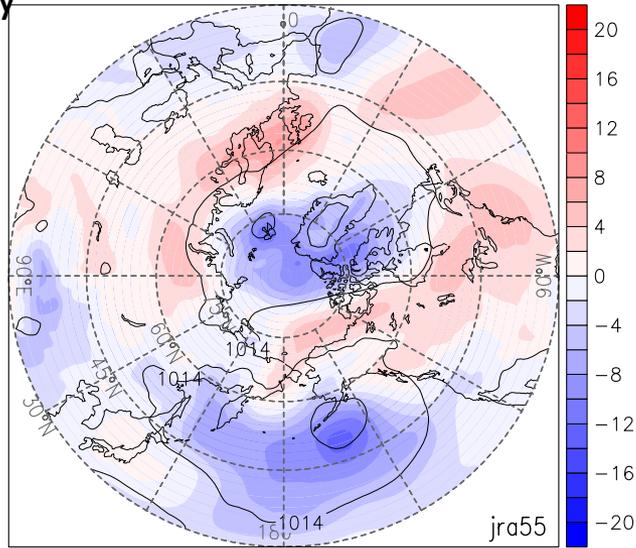


$\Delta$ SLP, JAN 2016

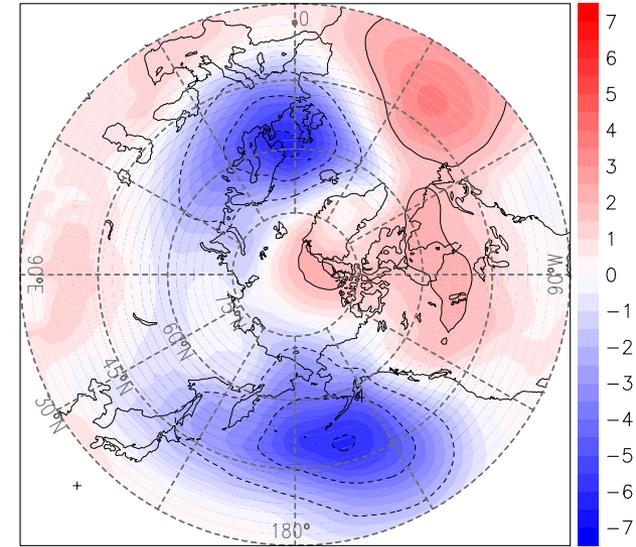


# Simulated SLP anomalies from GLB run

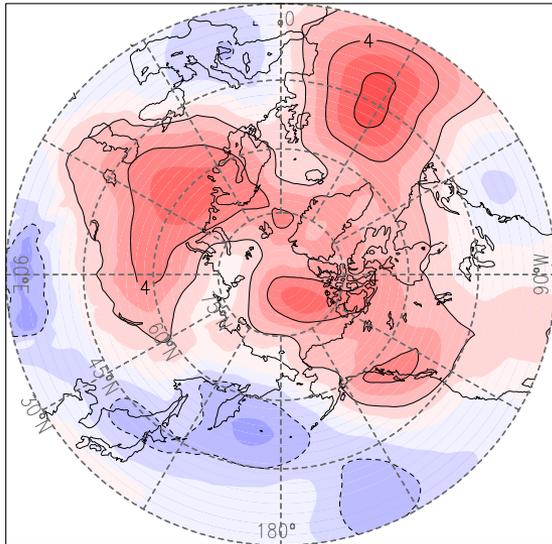
JRA55 SLP anomaly  
2015.10.15 ~ 28



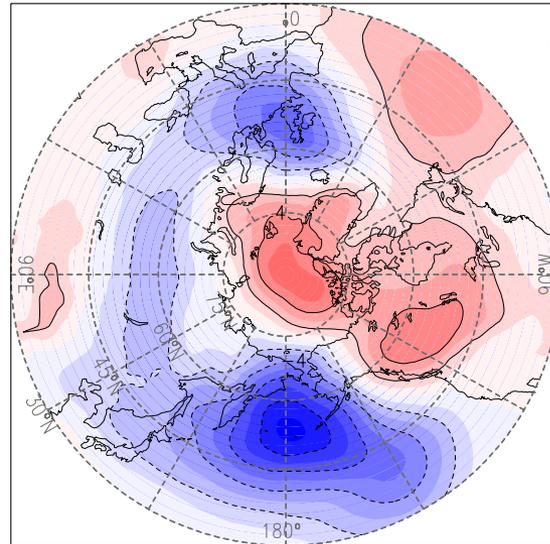
$\Delta$ SLP, DJF 2015



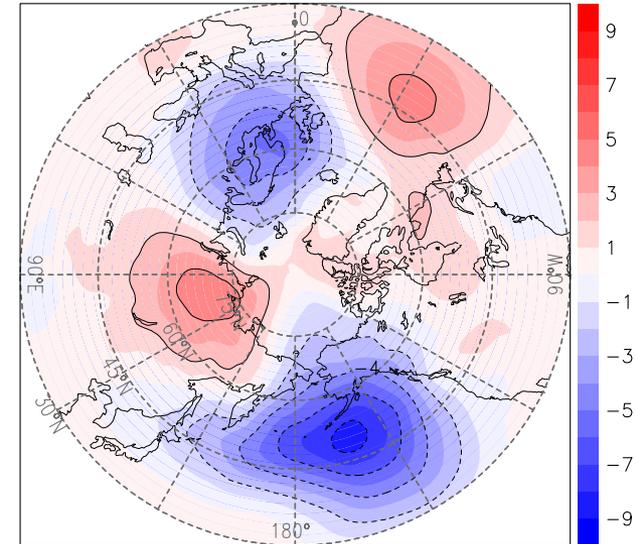
$\Delta$ SLP, NOV 2015



$\Delta$ SLP, DEC 2015

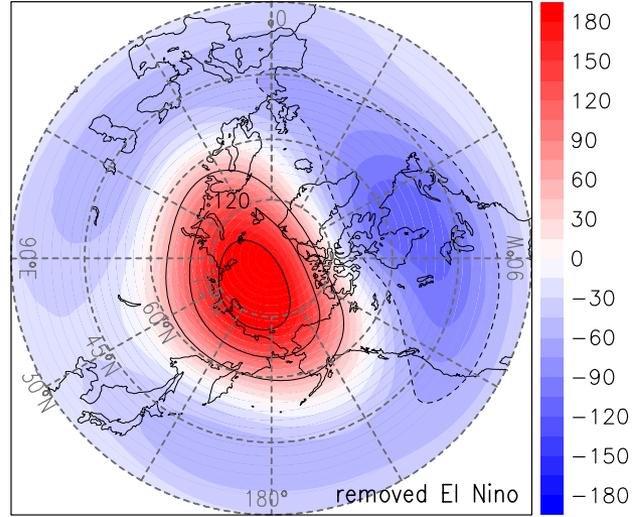


$\Delta$ SLP, JAN 2016

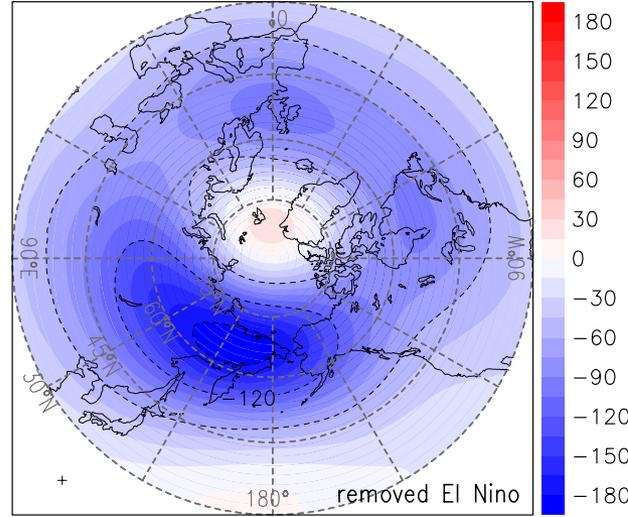


# Simulated Z50, Z30 anomalies from ART run

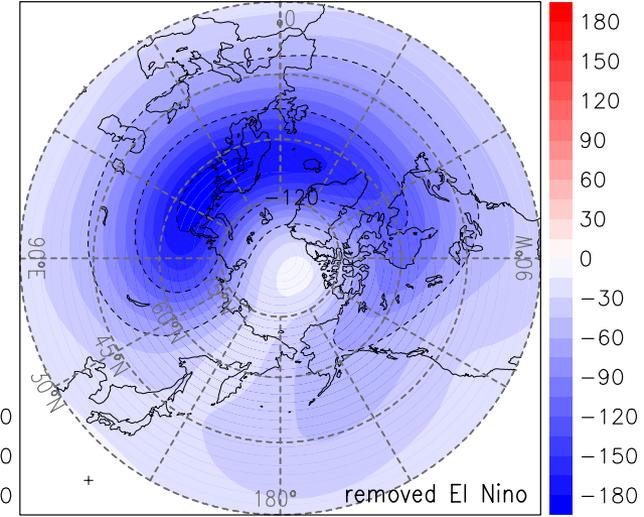
$\Delta Z50$ , NOV 2015



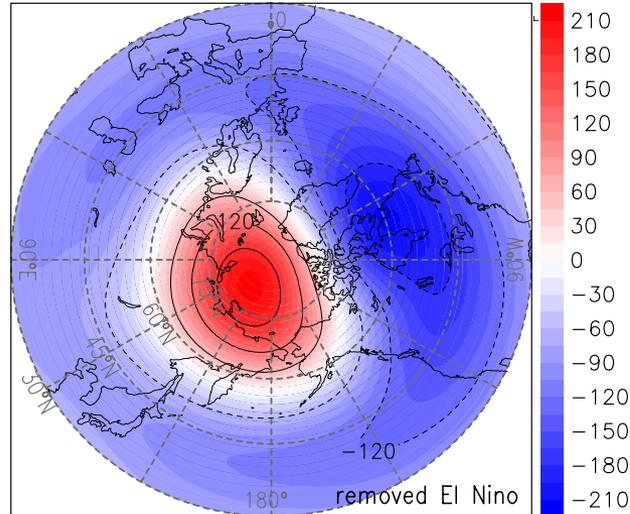
$\Delta Z50$ , DEC 2015



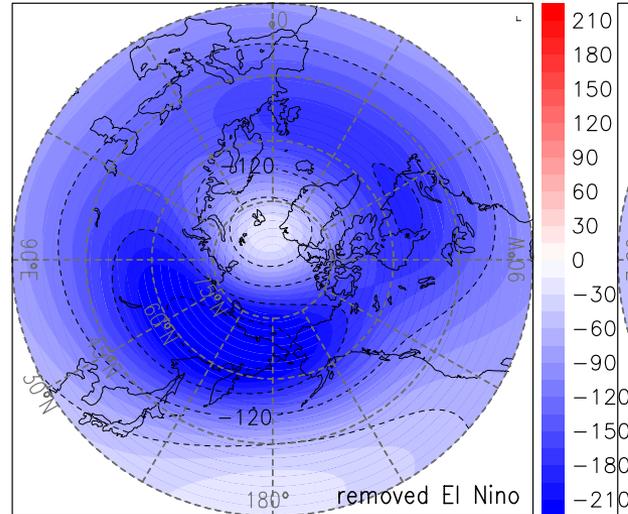
$\Delta Z50$ , JAN 2016



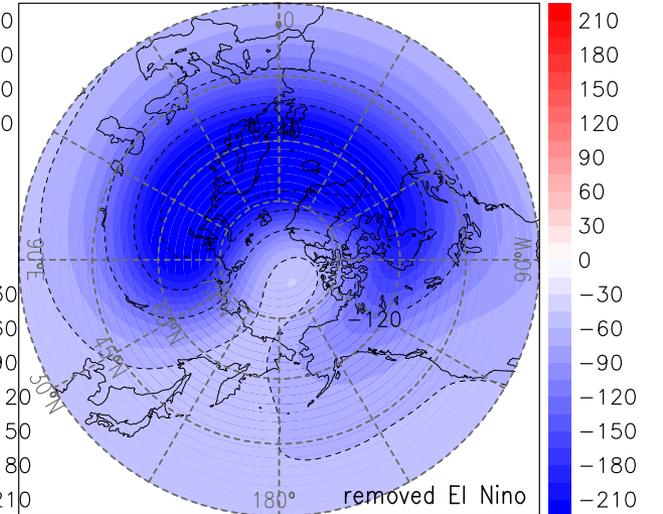
$\Delta Z30$ , NOV 2015



$\Delta Z30$ , DEC 2015

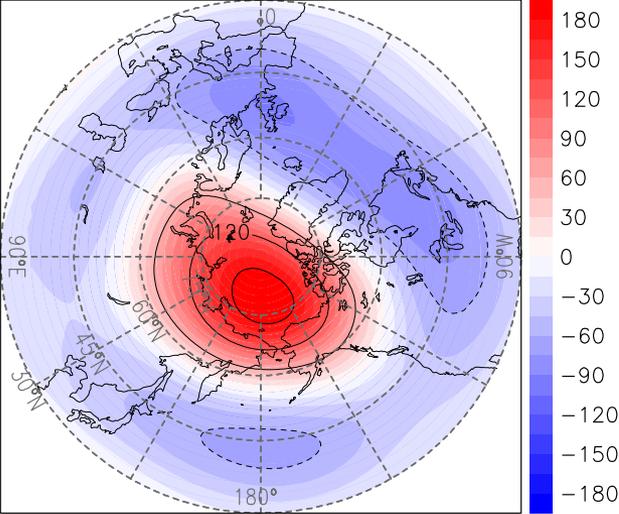


$\Delta Z30$ , JAN 2016

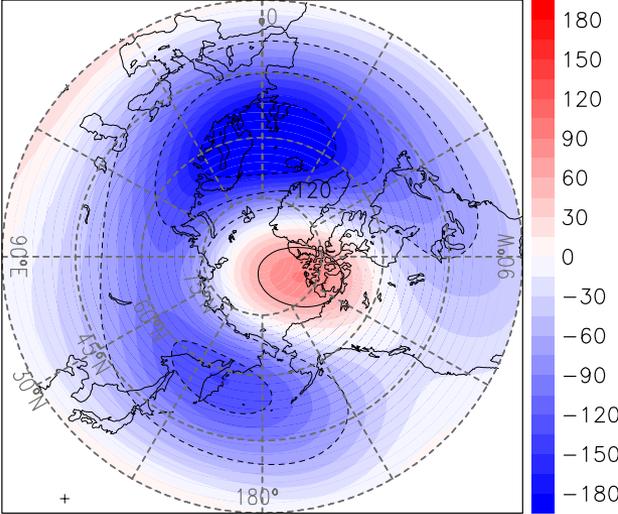


# Simulated Z50, Z30 anomalies from GLB run

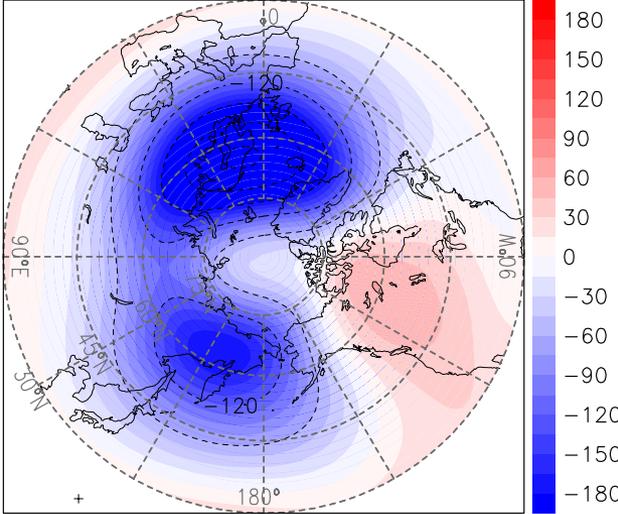
$\Delta Z50$ , NOV 2015



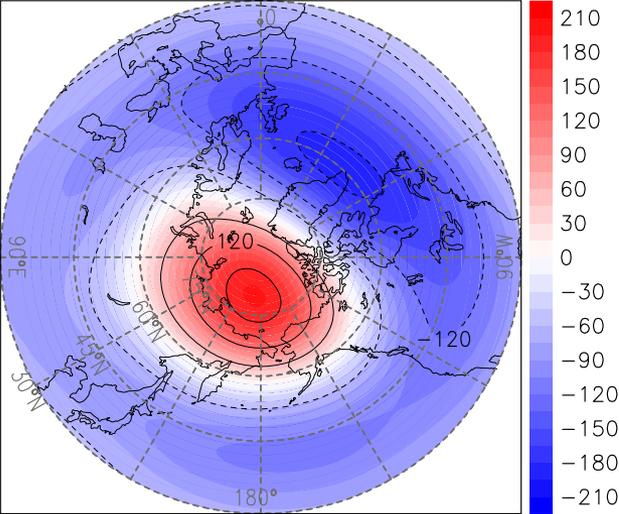
$\Delta Z50$ , DEC 2015



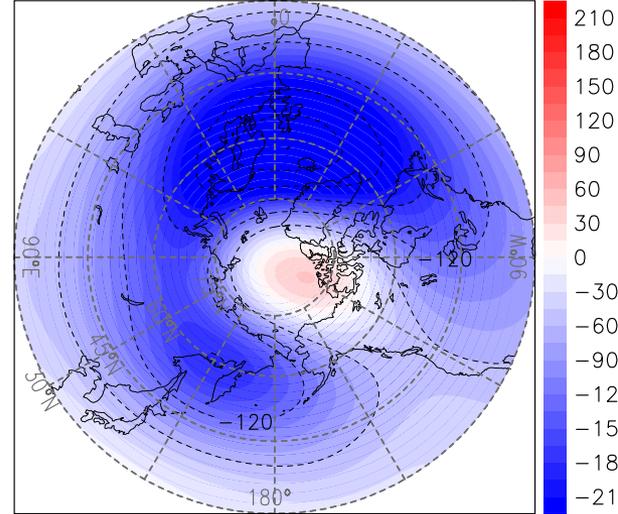
$\Delta Z50$ , JAN 2016



$\Delta Z30$ , NOV 2015



$\Delta Z30$ , DEC 2015



$\Delta Z30$ , JAN 2016

