

# KOPRI's initiative for YOPP (2017-2018)

**Seong-Joong Kim**

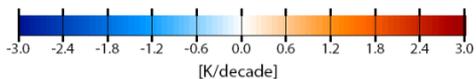
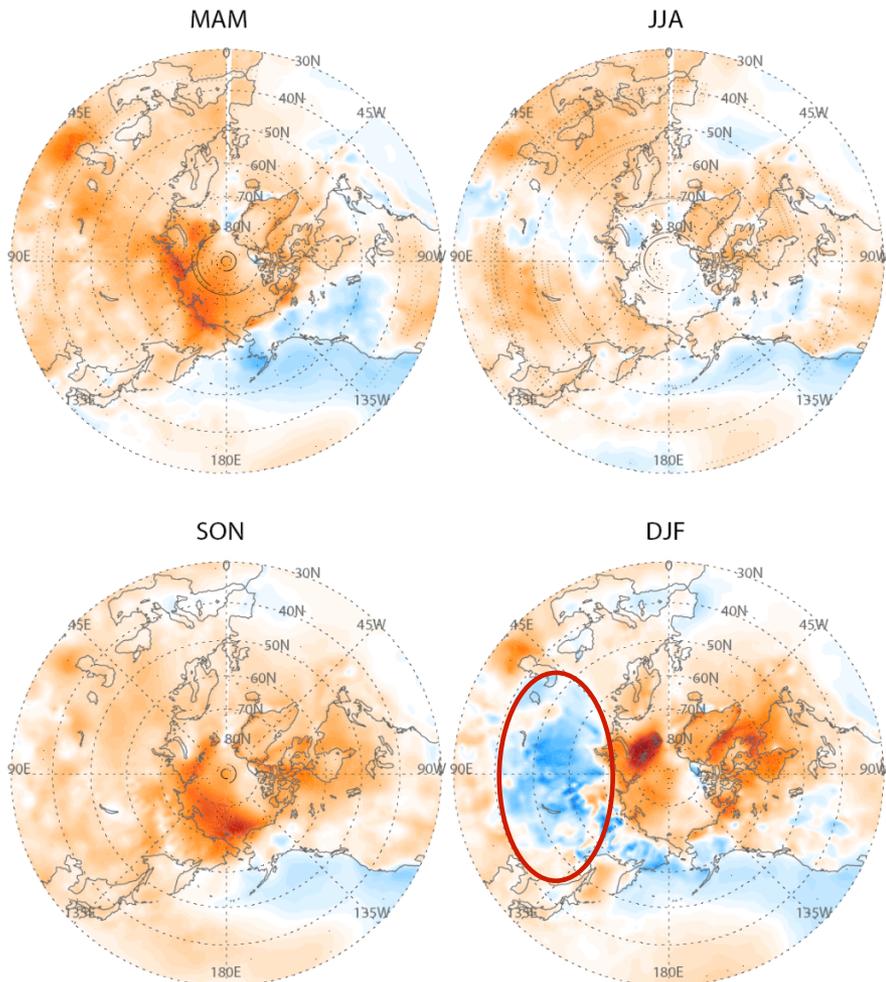
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# Arctic temperature change

ERA-Interim 2 Meter Temperature [K] Trend per Decade  
1979.03-2012.02/Dot: 95% Sig.(Significant Test by Bootstrap Resampling)

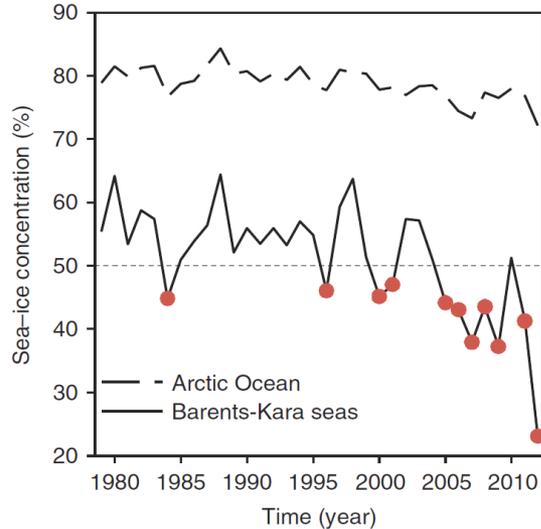


Kim et al. (2013)

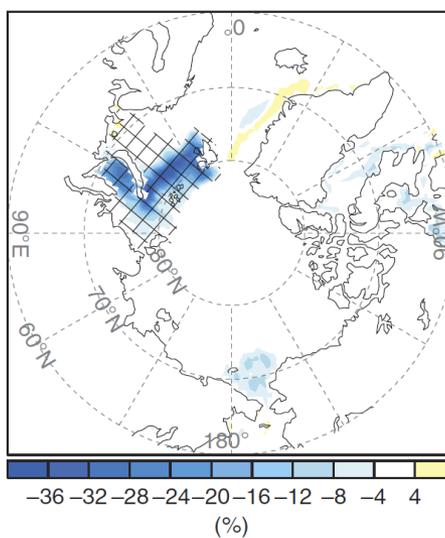


# Role of sea ice on SAT and polar vortex

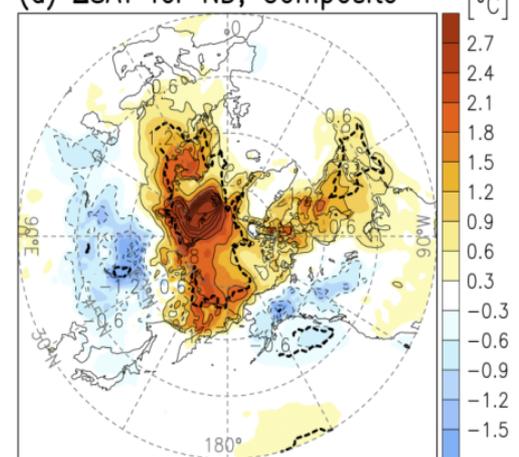
**a** SIC time-series for ND



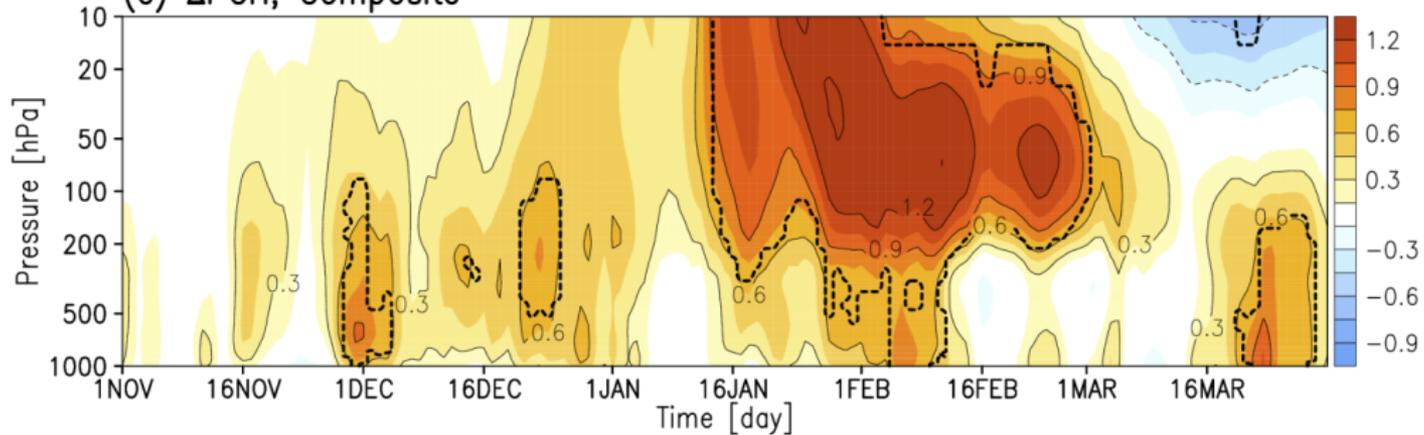
**b** SIC for ND



**(a)  $\Delta$ SAT for ND, Composite**



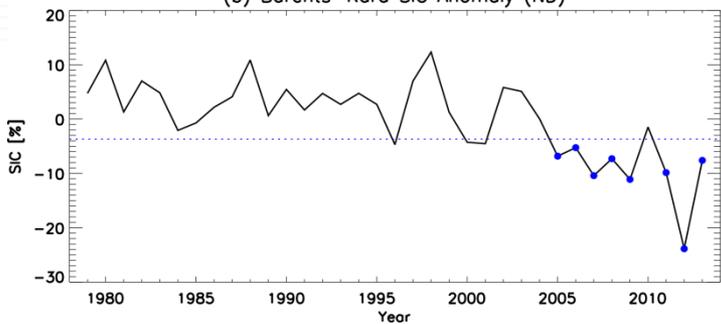
**(c)  $\Delta$ PCH, Composite**





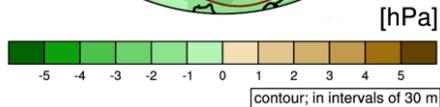
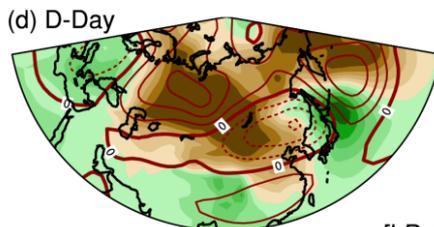
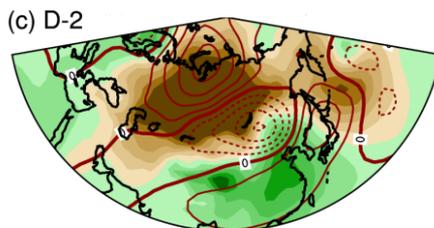
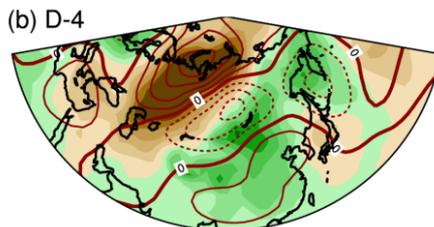
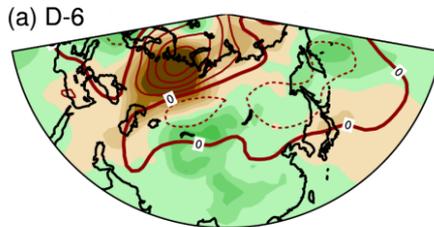
# Role of sea ice on EA cold surge

(b) Barents-Kara SIC Anomaly (ND)

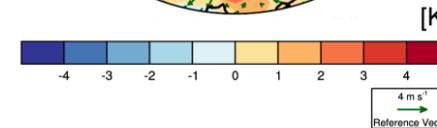
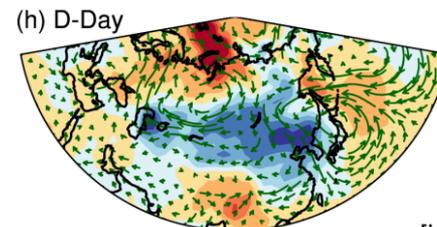
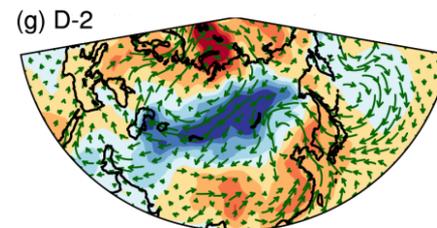
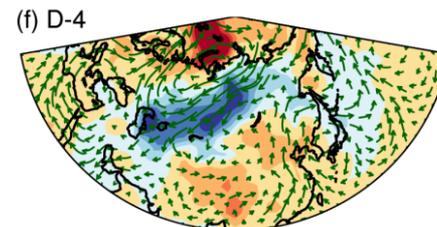
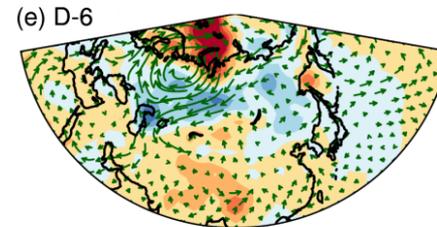


Overland et al. (2015)

SLP and Z300



SAT and V850





# KOPRI infrastructure



King Sejong Station, King George Island, Antarctica



Dasan Station, Ny-Alesund, Svalbard



IBRV ARASON



Jang Bogo Station, Terra Nova Bay, Antarctica



# Observation plan

- Station-based (S-J Park)
    - Svalbard site: met profile (Wind Doppler Lidar and MW Radiometer) from 2017 summer + additional radiosonde sounding?
    - Russian (Baranova?) site: support AARI frequent sounding? (limited period 2017, 2018?)
    - Antarctic Sejong station: met observation with radiosonde sounding (2018?)
    - Antarctic Jang Bogo station (auto launcher): frequent radiosonde sounding (2018?)
  - Ship-based
    - Met observation and radiosonde sounding (on-line, GTS) for Arctic summer (S-J Park, J-H Kim)
    - Met observation and radiosonde sounding (on-line, GTS) for Antarctic summer at Ross Sea and/or Amundsen Sea (S-J Park, T-J Choi)
    - Hydrographic survey for Arctic and Antarctic summer (K-H Cho, T-W Kim)
    - Ice-tethered ocean and sea ice observation buoys in the Arctic (J-H Kim, K-H Cho)
- \* For MOSAiC,
- ARAON support?
  - Funding support in the atmospheric science work package?



# Modelling plan

- Representation of Arctic clouds in a climate model (B-M Kim)
  - Based on NCAR CESM
  - New parameterizations: Unified Convection (S Park, NCAR) + New cloud microphysics
- Sea ice prediction system (J-H Kim, B-M Kim, S-J Kim)
  - Based on NCAR CESM with finer Arctic Ocean using adaptive grid scheme (tentative)
  - Ocean and sea ice initialization
  - Benchmark: PIOMAS and MIZMAS (J Zhang, UW), RASM (W Maslowski, NPS)
- Arctic-midlatitude teleconnection (B-M Kim, S-J Kim)
  - Improving subseasonal to seasonal predictability over the Northern midlatitude with the aid of cryospheric predictors (sea ice and snow)
- Impact of radiosonde data assimilation on Arctic storm prediction (J-H Kim)
  - Based on high-resolution limited area model (WRF)
  - Impact of various data assimilation methods (in collaboration with other modeling agencies)
  - Benchmark: ARCROSE project (Jun Inoue, NIPR, Japan)



# KOPRI ongoing project related to YOPP

- **Ongoing major project of polar meteorology and climate modeling (PI: S-J Kim)**
  - ~ 0.9 million US\$ per year (2014.01-2016.12)
  - Some representative activities (as of July 2015)
    - Exclusive support of KOPRI's N-ICE2015 participation (Jan – Mar 2015)
    - Major support of meteorological observations in two Antarctic stations and IBRV Araon
    - Substantial support of research on Arctic-midlatitude teleconnection (“Weakening of the stratospheric polar vortex by Arctic sea-ice loss” 2014, Nat.Comms.)
    - Primary project supporting climate modeling activity and multi-model based climate researches
- **Ongoing major project of Arctic ocean and sea ice observation (PI: S-H Kang)**
  - ~ 3 million US\$ per year (1<sup>st</sup> step: 2011.07-2016.06, 2<sup>nd</sup> step: 2016.07-2020.06)
  - Major research area: ocean and sea-ice biogeochemistry, hydrographic survey
  - Exclusive support of chartering Araon for Arctic research cruise during August
  - Some representative activities (as of July 2015)
    - Support of US ONR Marginal Ice Zone (MIZ) program (Aug 2014)
    - Take the leadership of the Pacific Arctic Group (PAG) under IASC (2015-2016, Chair: S-H Kang)
    - Sustaining ocean and sea ice observations over the Pacific Arctic since 2012
  - During 2<sup>nd</sup> step: continuously support Arctic ocean and sea ice observation, will be a major supporter for developing a sea ice prediction system, interested in supporting MOSAiC with Araon
- **Planned project for supporting observation and modeling of atmosphere and sea ice (PI: B-M Kim)**
  - ~ 1.4 million US\$ per year (2016-2018)
  - Ultimate aim: Improving Arctic climate and weather simulation and prediction
  - Interested in: supporting Svalbard observing network and ship-based meteorological observation, MOSAiC with respect to atmosphere and sea ice observation, improving the representation of clouds in climate models

Thanks for your attention!  
감사합니다.

