Assessment of Arctic Winter Sea Ice Thickness in Regional Arctic System Model

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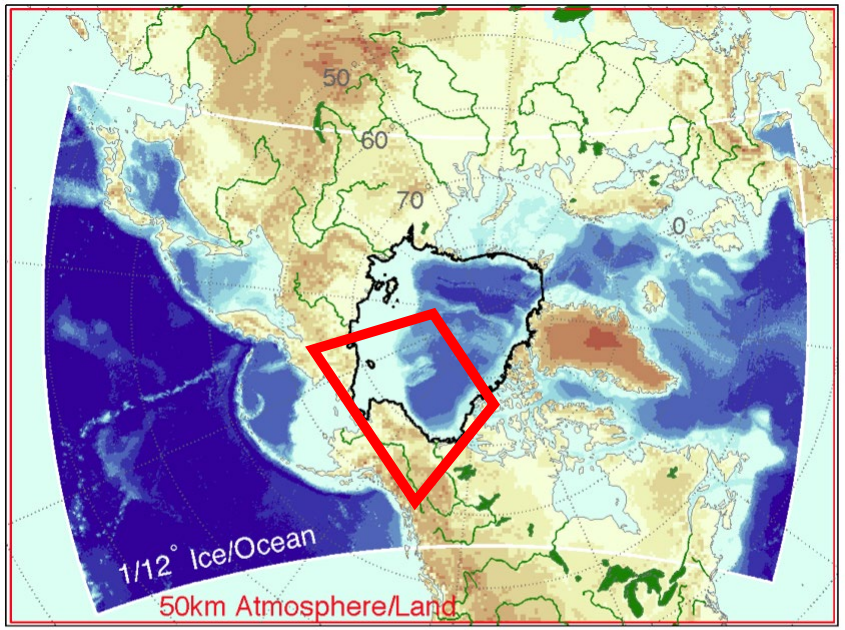
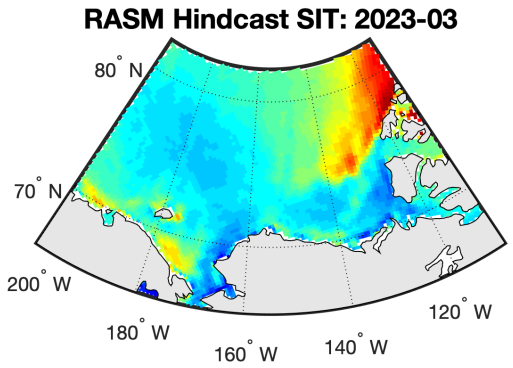
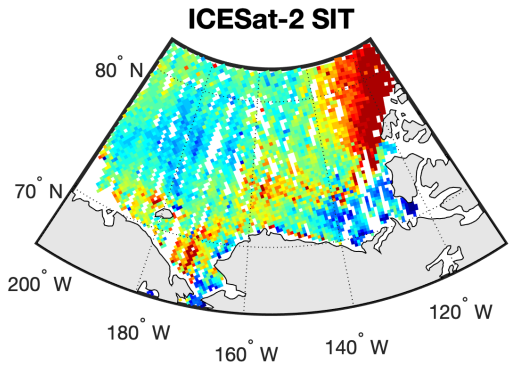
Model & Data

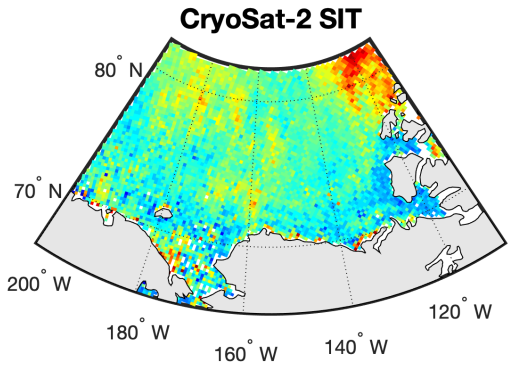
- Regional Arctic System Model (RASM)
  - Fully-coupled regional Arctic climate model.
  - 9-km ocean-sea ice (POP-CICE)
  - 50-km land-atmosphere (VIC-WRF)
  - No data assimilation nor bias correction
- Satellite Data (2019-2023)
  - ICESat-2 (IS2)
    - https://nsidc.org/data/is2sitmogr4/versions/3
  - CryoSat-2 (CS2)
    - https://data.seaiceportal.de/relaunch/CS2.php?lang=en
  - Kacimi & Kwok (K&K)
    - https://doi.org/10.1029/2021GL097448

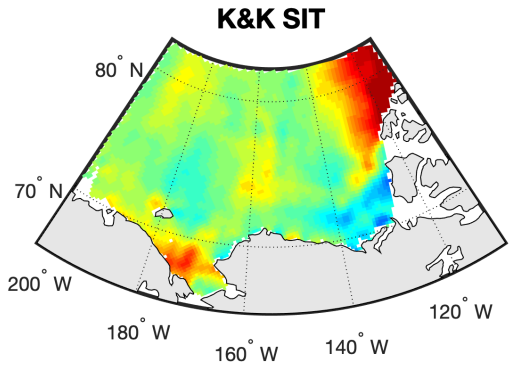


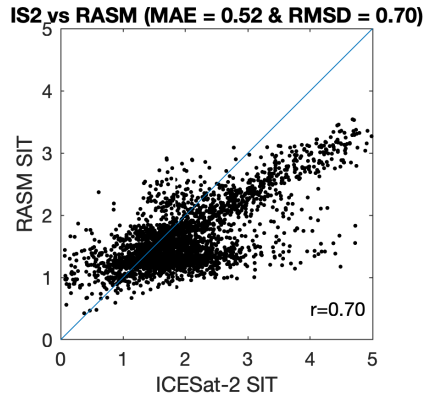
Sea Ice Thickness (SIT)

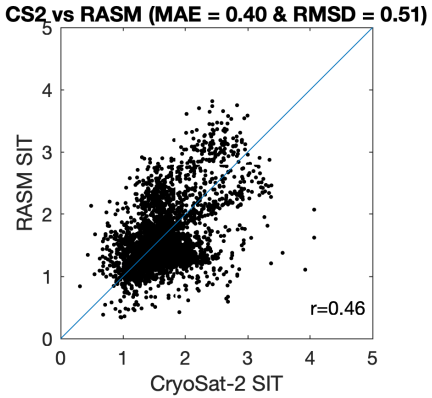


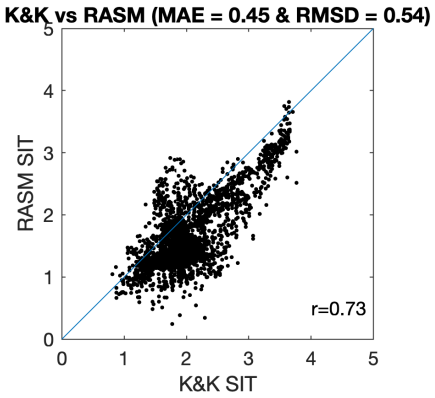






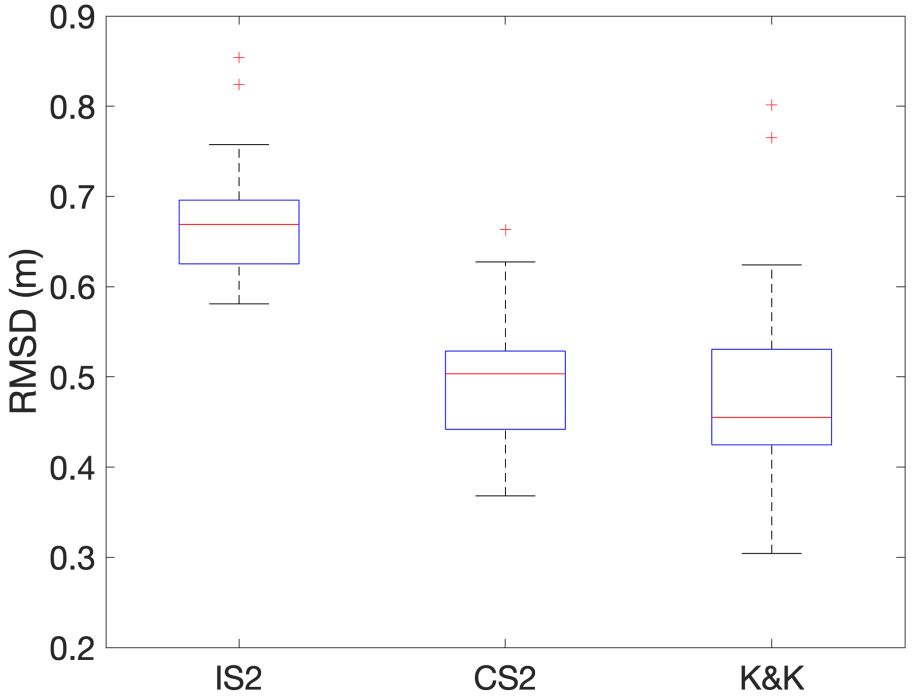




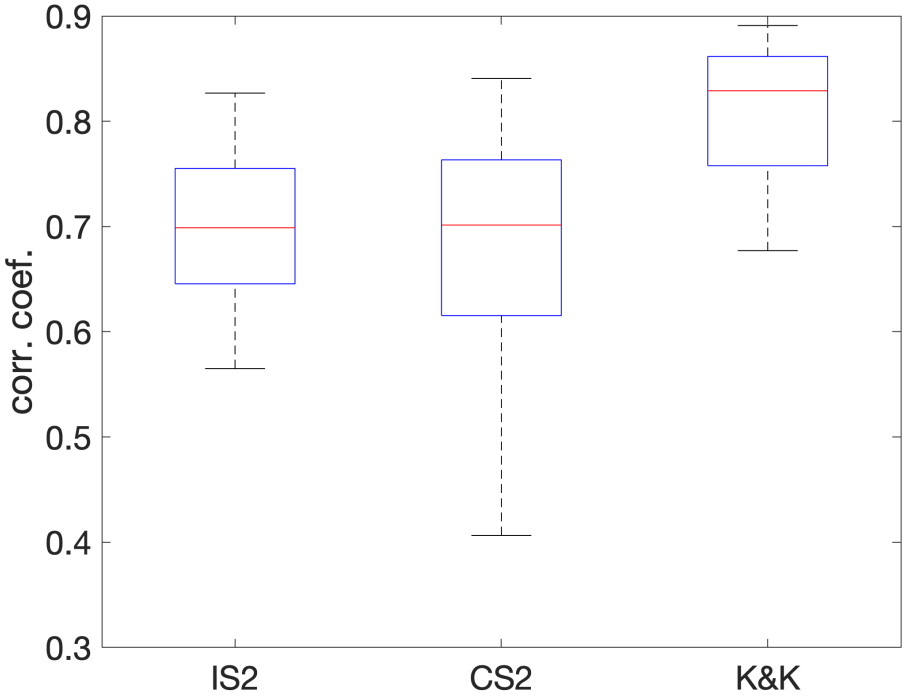


Metrics: SIT in Chukchi-Beaufort seas

$$\boldsymbol{RMSD = \sqrt{\frac{\sum_{i=1}^{N}(obs - RASM)^2}{N}}}$$



$$\boldsymbol{Correlation\ coefficient}$$



Future Works

- RASM sub-seasonal to seasonal (S2S) forecast
  - RASM ensemble forecasts are driven by NOAA/NCEP CFSv2 operational atmospheric forcing.
  - RASM is initialized on the first day of each month: 28 to 31 ensemble members.
  - Each ensemble member is integrated forward for 6 months.
- Evaluation of winter sea ice predictability in Arctic regional seas
  - RASM has demonstrated reasonable skill in simulating summer sea ice conditions (Bushuk et al., 2024).