

The objective of assimilating in-situ and remote sensing observations into an ice-ocean model is to 1) demonstrate the usefulness of improved Arctic observing system for process understanding; and 2) improve predictability of the ice-ocean environment;

The coupled ocean-sea ice data assimilation system builds on MIT general circulation model coupled with a zero-layer thermodynamic-dynamic sea ice model. The model domain covers the entire Arctic Ocean north of the Bering Strait and the Atlantic Ocean north of 44N (Fig 1). The system has 50 vertical z-levels a curvilinear grid with a resolution of ~16 km is used. The adjoint method adjusts the model initial conditions in the year 2007 and daily surface atmospheric states to make the model simulation consistent with the observations (Fig. 2 and 3).

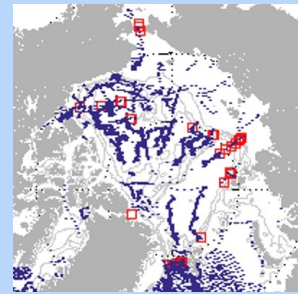


Figure 1. Model domain and locations of moorings (red rectangles) and T/S profiles (blue dots, year 2008)

Results:

- 1) A 10-year Arctic Ocean reanalysis with all available data assimilated into the ice-ocean model.
- 2) deliver information on where and what to observe to complement the current observing system.

Reference:

Lyu, G. et al., Q J R Meteorol Soc. 2021;
<https://doi.org/10.1002/qj.4002>

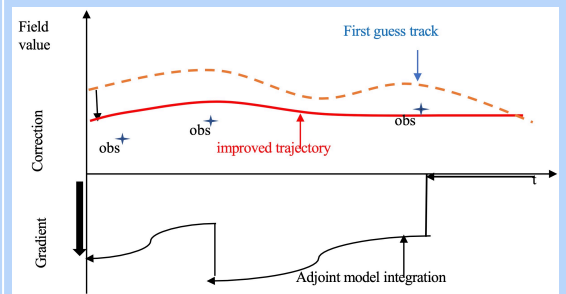


Figure 2. 4D variational data assimilation scheme

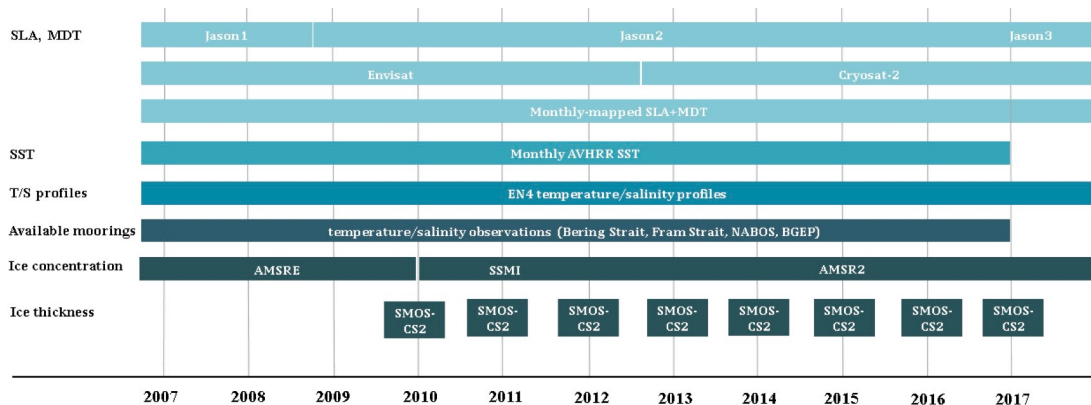


Figure 3. Observations used in the reanalysis