

## **The ECCO Consortium: Progress and assessment of the Arctic & sub-polar North Atlantic state estimate**

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The Arctic Ocean and sub-polar North Atlantic are home to processes of great importance to the global climate system. These processes include the modulation of heat, moisture, and momentum fluxes between the atmosphere and ocean by sea ice, the ice albedo feedback which regulates the radiative budget, deep water formation in the Greenland and Labrador Seas which affect deep ocean circulation and energy transport, and a coupling between ocean heat and marine terminating glacier melt rates around the marginal Greenland ice sheet. To advance our understanding in this region, we aim to produce an eddy-permitting Arctic and sub-polar North Atlantic state estimate (ASTE) for climate studies using the state estimation techniques developed within the framework of the ECCO consortium. Data constraints for the state estimate will include hydrographic profiles from Argo floats, ice-tethered profilers, a modern climatology, and moored arrays; sea ice observations such as concentration, thickness, and velocity; and the near-surface atmospheric state from several reanalyses. The estimation period is from 1992 to present. The ASTE domain includes the entire Arctic Ocean and the North Atlantic Ocean north of 5 degrees and has a horizontal resolution of 7-12 km with 50 vertical levels. The dynamical consistency of the state estimate will permit closed budget calculations of time-varying tracers such as heat and freshwater. The solution is expected to serve as baseline for future observation sensitivity experiments and as a starting point for observationally-constrained very high resolution nested regional simulations.