THE ASSIMILATION OF SEA ICE PRODUCTS IN THE TOPAZ FORECASTING SYSTEM

Knut A. Lisæter and Laurent Bertino
Nansen Environmental and Remote Sensing Center

ABSTRACT

The TOPAZ forecasting system is a model suite consisting of an ocean model (HYCOM) coupled with a dynamic-thermodynamic sea-ice model. This model suite is run in real time, producing 10 day forecasts on a weekly basis. In addition to the assimilation of sea level anomalies and sea surface temperature, the forecasting system also assimilates sea-ice concentration derived from passive microwave sensors (SSM/I) using the NORSEX ice concentration retrieval algorithm. TOPAZ uses the Ensemble Kalman Filter as the assimilation scheme.

The Ensemble Kalman Filter is a data assimilation method which uses an ensemble of model simulations to calculate the error statistics of the ice-ocean model. This error statistic is used in the assimilation scheme to produce an analysis, where observations of the sea ice are combined with model forecasts. The relation between ice variables and ocean properties is complex, and this affects the error statistics of the model forecast. Of particular importance for the model error statistics are the seasonally varying location of the ice edge and different forcing mechanisms acting on the sea ice. The complexity of these error statistics makes the Ensemble Kalman Filter well suited as an assimilation scheme for the coupled ice-ocean model.

Examples of how the assimilation of ice variables modifies the state of the ice and ocean model will be shown, along with plans for future ice products to be used in TOPAZ.