# Sea-ice prediction in CAFE-EnKF

A 96 member coupled data assimilation system based on GFDL CM2.1 ingests EUMETSAT OSISAF 10 km horizontal resolution sea-ice analysis data for the Arctic and Antarctic, derived from sensors on SSM/I, SMMR and AMSR satellites with corrections using ECMWF NWP brightness temperatures

Ice extent forecast 20140606

Assimilation is carried out by comparing ice concentration in the forecast field asynchronously to super observations of the OSISAF analysis fields with a prescribed observation error model. The five thickness categories in the ice model are added to the state vector in order to initialize the ice model. Sea-ice forecast innovation errors are used for verification using forward independent observations.

Under ice freezing point SST is derived from OSISAF data and assimilated to help mitigate warm polar SST biases in the coupled model that typically lead to underestimates of summer ice concentration and extent. To account for differing ice area fractions we apply an observation error model inversely proportional to ice concentration to avoid overfitting. The combined assimilation of freezing point SST and ice concentration provides improved performance for sea-ice prediction in CAFE-EnKF.
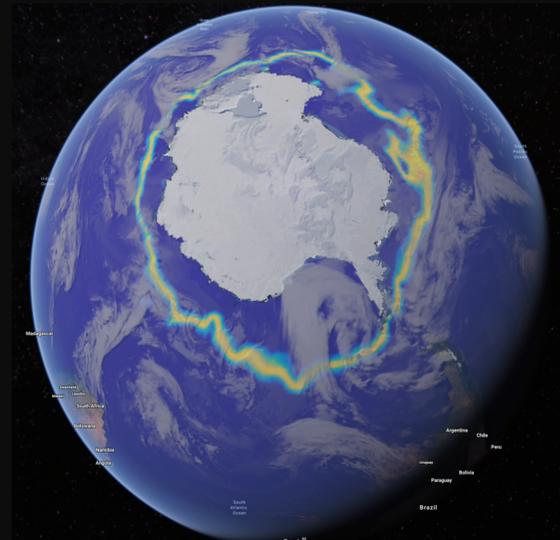
Ensemble spread in ice extent 20140606

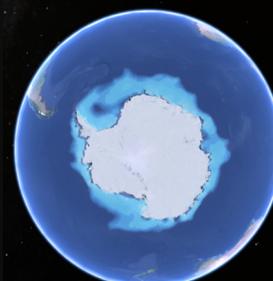## Ice Concentration Forecasts

March 2010
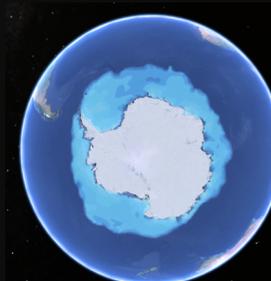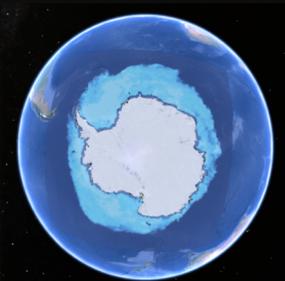

Control

DA Forecast

Observations

July 2010

Control

DA Forecast

Observations

Qualitative comparison of forecast system with (DA forecast) and without (Control) sea-ice data assimilation shown next to unassimilated observations