Geophysical Research Abstracts
Vol. 16, EGU2014-16083, 2014
EGU General Assembly 2014

Coupled Ocean-Atmosphere Data Assimilation in a Low-Order Climate Model

Rober Tardif (2), Greg Hakim (2), and Chris Snyder (1)

(1) NCAR, MMM, Boulder, United States (chriss@ucar.edu), (2) Department of Atmospheric Sciences, University of Washington, Seattle, United States

We consider coupled data assimilation strategies in an idealized atmosphere-ocean model that is a low-dimensional analogue of the North Atlantic climate system, including the Atlantic meridional overturning circulation (MOC). Initialization of the MOC using an ensemble Kalman filter (EnKF) is assessed relative to the simple reference of driving the ocean with known atmospheric conditions, and over a range of experiments, varying the available observations (atmosphere, upper ocean, MOC) and whether the assimilation scheme ingests the raw, daily observations or their time averages. With sufficient observations of the ocean, data assimilation can rapidly and efficiently recover the MOC. Given more limited ocean observations, or observations of the atmosphere alone, assimilation of time-averaged observations shows substantial benefits, recovering the MOC more rapidly and more accurately than high-frequency coupled assimilation. As a next step, we have begun testing the possibility of using climatological covariances in the EnKF together with time-averaged observations, rather than instantaneous covariances computed from the most recent ensemble forecast. Results using climatological covariances and time-averaged observations are favorable in both the idealized low-dimensional model and using an archive of CMIP5 simulations for a comprehensive atmosphere-ocean general circulation model.