Geophysical Research Abstracts
Vol. 18, EGU2016-26, 2016
EGU General Assembly 2016

Calibration of Ocean Forcing with satellite Flux Estimates (COFFEE)

Charlie Barron (1), Dastugue Jan (1), May Jackie (1), Clark Rowley (1), Scott Smith (1), Peter Spence (2), and Silvia Gremes-Cordero (3)

(1) Naval Research Laboratory, United States (charlie.barron@nrlssc.navy.mil), (2) Vencore, Stennis Space Center, United States, (3) University of New Orleans, Stennis Space Center, United States

Predicting the evolution of ocean temperature in regional ocean models depends on estimates of surface heat fluxes and upper-ocean processes over the forecast period. Within the COFFEE project (Calibration of Ocean Forcing with satellite Flux Estimates, real-time satellite observations are used to estimate shortwave, longwave, sensible, and latent air-sea heat flux corrections to a background estimate from the prior day's regional or global model forecast. These satellite-corrected fluxes are used to prepare a corrected ocean hindcast and to estimate flux error covariances to project the heat flux corrections for a 3-5 day forecast. In this way, satellite remote sensing is applied to not only inform the initial ocean state but also to mitigate errors in surface heat flux and model representations affecting the distribution of heat in the upper ocean. While traditional assimilation of sea surface temperature (SST) observations re-centers ocean models at the start of each forecast cycle, COFFEE endeavors to appropriately partition and reduce among various surface heat flux and ocean dynamics sources. A suite of experiments in the southern California Current demonstrates a range of COFFEE capabilities, showing the impact on forecast error relative to a baseline three-dimensional variational (3DVAR) assimilation using operational global or regional atmospheric forcing. Experiment cases combine different levels of flux calibration with assimilation alternatives. The cases use the original fluxes, apply full satellite corrections during the forecast period, or extend hindcast corrections into the forecast period. Assimilation is either baseline 3DVAR or standard strong-constraint 4DVAR, with work proceeding to add a 4DVAR expanded to include a weak constraint treatment of the surface flux errors. Covariance of flux errors is estimated from the recent time series of forecast and calibrated flux terms. While the California Current examples are shown, the approach is equally applicable to other regions. These approaches within a 3DVAR application are anticipated to be useful for global and larger regional domains where a full 4DVAR methodology may be cost-prohibitive.