Geophysical Research Abstracts
Vol. 13, EGU2011-3897, 2011
EGU General Assembly 2011

Data assimilation in a real-time coastal ocean forecast model off Oregon (US west coast)

Alexander Kurapov, Peng Yu, Gary Egbert, and John Allen
Oregon State University, COAS, Corvallis OR, United States

The pilot Oregon coastal ocean forecast system has provided daily updates of 3-day forecasts of ocean conditions over a part of the US West Coast shelf, where dynamics in summer are dominated by wind-driven upwelling, and adjacent interior ocean where dynamics are more dominated by intrinsic instabilities and interactions of jets and eddies. Data are assimilated in this system using the variational representer-based approach in a series of 3-day windows. The correction to the initial conditions at the beginning of each window is obtained at the 6-km horizontal resolution and then interpolated on a 3-km grid of the nonlinear forecast model. The data assimilation system is modular, providing flexibility in the choice of the forecast model and details of assimilation (data functionals, initial condition and forcing error covariances, tangent linear and adjoint components). In our case, the nonlinear model is based on the Regional Ocean Modeling System (ROMS, myroms.org); the tangent linear and adjoint components are AVRORA codes developed by our group. In the near-real time regime, we have assimilated high-frequency (HF) radar surface currents, GOES hourly SST, and RADS alongtrack altimetry from multiple satellites. The variational system provides effective means for interpolation between these diverse and sparse data. It helps to remove noise and fill gaps in data, particularly in the HF radar surface currents and satellite SST, essentially serving as a mapping tool for observed surface currents, SST, and SSH. A series of data denial experiments have shown the impact of assimilated data on the oceanic fields not directly constrained by data assimilation. Assimilation of HF radar surface currents helps to improve geometry of the upwelling SST front. Assimilation of alongtrack altimetry also improves the structure of the SST front (even without assimilation of SST) and modifies the subsurface hydrographic structure. In turn, assimilation of SST yields qualitative improvement in the SSH slope, compared to the (unassimilated) RADS alongtrack SSH. Results of the forecast model are being analyzed to understand the ocean near-surface circulation and surface boundary layer structure during periods of summer-to-winter transition and winter downwelling, featuring a series of strong storms.