JCSDA Ocean Breakout Group

A. Kaplan, M. Cane, N. Arnold: Models for Remotely-Sensed Sea Surface Heights and Temperatures in Ocean Data Assimilation

Goal: Use of power spectral representations for parameterizing spatial and temporal error covariances

Progress: Systematic intercomparison of spatial and temporal variability of sea surface heights in satellite altimetry, tide gauges, and ocean model simulations (baroclinic and barotropic components); identified short-term and small-scale area of wavenumber-frequency spectra contributing to observational error due to imperfect sampling/inconsistent averaging.

R.N. Miller: Estimating Representation Error of Satellite and *in situ* Data for Data Assimilation into Ocean Climate Models

Goal: Estimate representation errors in SST and build a data assimilation system for the ocean component of the CFS based on these new error estimates

Progress: Evaluated 9-month forecasts from the CFS and found that the leading EOFs of the residuals project significantly onto the leading EOFs of the model, indicating the presence of systematic model error.

X. Li, J. Derber: Near Sea Surface Temperature (NSST) Analysis in the NCEP GFS

Goal: Improve atmospheric analyses and forecasts through NSST analysis using IR, MW, and in situ data in the GSI and NSST coupled to GFS.

Progress: Diurnal warming layer and near-surface cooling sublayer models included in NSST model, coupled to analysis and GFS for 7-day forecasts. NSST is analyzed in GSI. A series of experiments show encouraging results. Need to evolve reference temperature below the diurnal layer.

C.L. Keppenne & GMAO: Assimilation into MOM4/ Coupled Data Assimilation with GMAO ODAS-2

Goal: Improve ocean analyses and coupled forecast initialization; enhance collaboration with NCEP by using MOM4.

Progress: Assimilation system for MOM4 implemented with ESMF under GEOS-5; Multivariate analyses for altimeter assimilation under test.

Summary of Ocean Session discussions

Focus Areas:

(1) SST in the GSI

– Efforts should focus on impact of NSST (in GSI) on GFS in analysis (through CRTM) and also on forecast (7-14 day)

– identify whether information from an ocean analysis can improve the first guess for the reference temperature (identify T_r, document time and space scales of T_r in ocean analyses)

(2) Altimeter data. JCSDA partners have different ODAS and already assimilate satellite altimetry data, so place priority on:

- Improving the current methods for assimilating altimetry, possibly identifying a 'community-based approach' through common experimentation and comparisons
- Improving altimetry observational error estimates, including representation errors and model forecast (background) errors,

Milestones for FY09: Alexey Kaplan will undertake diagnostics for MOM4 at NCEP and GMAO

(3) SST in Ocean analysis

- Improving observational error estimates (explicit estimates of representation error for high resolution SST retrievals) for use in ocean analyses
- Implement in MOM4 at climate resolution (1/4-1/2 degree)

Summary of Ocean Session discussions (cont'd)

(4) Other satellite data

- Preparation for satellite surface salinity observations: identify sample data, error characteristics
- Implementation of ocean color assimilation in physical model
- Expanding the current capabilities to include sea-ice, time-varying ocean color for ocean biogeochemistry, significant wave height data in ocean wave models

Important Directions for NWP:

• Ocean and Atmospheric groups should be connected scientifically through attention to the boundary layers, both assimilation and forecasts.

• Ocean analyses in coupled system for NWP as well as intraseasonal-to-interannual climate

• Subsurface ocean needed for SST analyses and prediction for atmospheric boundary conditions

• SST ensembles (uncertainties) for ensemble NWP forecasts

• Higher resolution ocean model