

“Ocean Model Assessment With Lagrangian Metrics”

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N00014-01-1-0137

LONG TERM GOALS

The long-term goals of this project are to aid in the development of accurate modeling of upper ocean circulation by using data on circulation observations to test models. These tests, or metrics, will be statistical measures of model and data comparisons. It is believed that having accurate models of upper ocean currents will produce accurate models of sea level and temperature patterns.

OBJECTIVES

Assess the efficacy of several OCGMs to model the surface circulation and Lagrangian particle drift in NAVY important areas. The assessment is to be performed with a series of objective measures or metrics that are used to determine how well current OCGM represent Lagrangian properties of circulation. These metrics will be applied to the following models: 1) POP, HYCOM in the Atlantic; 2) POP, MOM, HYCOM and ROMS in the California Current System; 3) POP, NLOM, POM in the Japan-East Sea. Additionally, metrics will be installed into the operational FNMOC system to assess COAMPS performance in near real time. The investigation will initially focus on testing deep-water circulation patterns with drifter and float data, and expand to include assessments of circulation modeling in the littoral zone using drifter and moored current meter data.

APPROACH

Comprehensive data will be acquired from a variety of sources on the motion of drifters and processed into a uniform format. These data will be corrected for wind slip and bias resulting from drogue loss. OGCM model fields will be acquired from existing model integrations and from NAVY operational centers (NAVOCEANO and FNMOC) for comparison. To facilitate the comparison of the COAMPS model with Lagrangian metrics a real time data port will be established at FNMOC and applets will be written to install operational metrics at COAMPS.

WORK COMPLETED

A complete historical drifter data set from the North Atlantic and Japan-East Sea is on file at SIO. Both have been processed into 1-2day average data and corrected for wind slip and bias resulting from drogue loss has been removed. A summary of the North Atlantic data set has been made and a manuscript entitled: “North Atlantic Ocean Surface Currents”, by g. Reverdin, P. Niiler and H.

Valdmarsson, has been written and accepted by the JGR. Metrics have been developed and computed for the evaluation of the eddy energy, and its uncertainty, for the North Atlantic.

Access to the POP data set, generated at Los Alamos, has been established and this PI has visited NAVOCEANO in with express purpose of organizing acquisition of their operational model outputs. Daily maps of drifter (for the mean), satellite (for geostrophic eddies) and wind (for Ekman velocity) produced surface currents has been developed for the JES. This product is being evaluated by drifter observations.

RESULTS

Comparison of daily maps of altimeter derived surface currents with drifter observations in the Japan East Sea show good correlation for the large spatial scale features (Figure 1). However, drifter data indicates the presence of strong short period or short spatial scale motions that the satellite data cannot resolve. This implies that initialization of prediction models in the Japan-East sea with altimeter data that samples on a 10-7 day period will not be successful.

The data from the 0.1 degree, global POP model simulation has serious deficiencies in representing the North Atlantic circulation and it will not be analyzed further. The project now focuses on the California Current System modeling output, both from systematic statistical analyses and from nowcasts with altimeter derived surface current s due to mesoscale. To accomplish the objectives, a no-cost extension of the project for one year has been requested and has been granted.

IMPACT/APPLICATIONS

Maps of surface currents in the California Current can be produced in near real time using techniques developed in this research activity.

TRANSITIONS

None.

RELATED PROJECTS

NOAA/OGP funded “Global Drifter Program”

REFERENCES

None

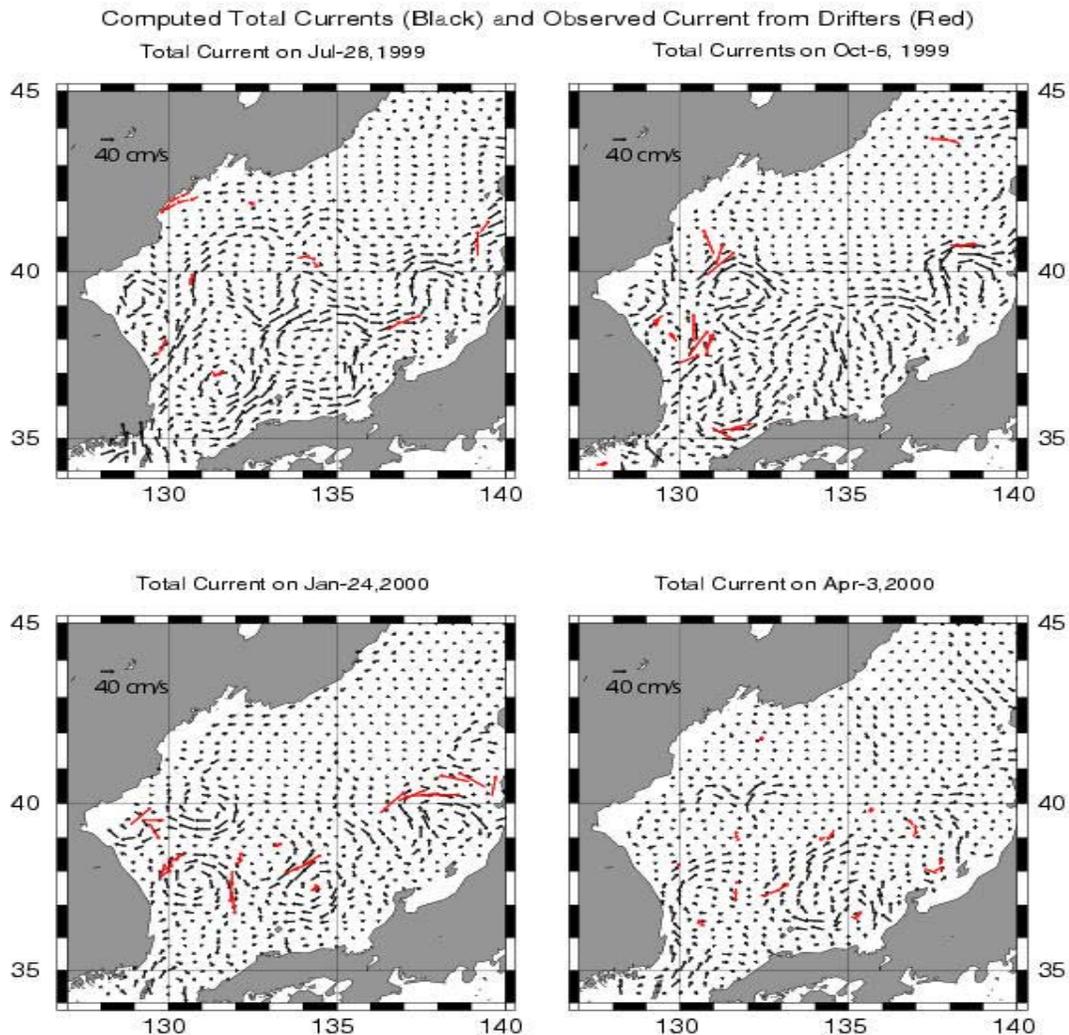


Figure 1. Computed total currents (black) and three one-day averages of observed current from drifters (red). One plot is shown for each season. Dates shown were chosen based on the availability of drifter observations from eight or more drifters.

PUBLICATIONS

Reverdin, G., P.P. Niiler and H. Valdimarsson: North Atlantic Ocean surface currents. (In Press: *Journal of Geophysical Research*, 46 ms pp., September 2002)

None

PATENTS

None