

Interaction of the Kuroshio with the East and South China Sea

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LONG TERM GOALS

The long-term objective is to better understand the interactions between the Kuroshio and the China Seas with the co-ordinate use of two tools already developed by ONR, a numerical model and surface drifters. We intend to investigate the dynamical processes that govern this interaction. To achieve this goal, new observations are being obtained. A range of model parameters will be tested to find the combination that best represents the observed surface circulation. This research contributes to a more realistic prediction of this complex physical environment in area of strategic importance for PACFLEET operations.

OBJECTIVES

The first objective is to obtain accurate velocity measurements at 15 m in the South China Sea and in the Luzon Strait region, in order to better measure the existing current systems. The second objective is to use the existing dataset of surface drifters, enhanced with new deployments, and compare the observations with the results of the UCLA/ROMS numerical model to evaluate the model ability to reproduce a realistic flow field.

APPROACH

To accomplish the first objective, new surface drifters are assembled in Korea, under the supervision of Prof. Lee and are being deployed in the Luzon Strait region. These instruments should move towards the South China Sea and, once the dataset will be completed at the end of the 3rd year, it will accurately illustrate the current systems of the basin, which at present is lacking sufficiently accurate velocity measurements. In addition, the deployment will better document the seasonal swift flow through the strait, from the Philippines Sea to the South China Sea. To accomplish the second objective various runs of the numerical model, made under an appropriate range of settings, will be analyzed in terms of the East China sea budget of mass, vorticity and thermal, potential and mechanical energies. The model set-up and the simulations are being performed by Prof. Lee and the drifter's data analysis will be performed by Dr Luca Centurioni (SIO). They will both perform the

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interpretations of the drifter data and the comparison with the model outputs together with the principal investigator, Prof. Peter Niiler.

WORK COMPLETED

35 drifters were assembled in Korea from parts made in the USA. The drogue was manufactured in Korea by Sun Machinery Co. 28 drifters are about to be deployed from the RV Haeyang 2000 in occasion of cruise National Oceanographic Research Institute (NORI), beginning on 10/06/2003, by Mr. William Scuba (SIO). Setting up ROMS in the East China Sea was completed using coarse horizontal resolution (25 km).

RESULTS

We completed a preliminary study of the flow through the Luzon Strait that has resulted into a peer-reviewed research paper, now in press (see publications and figure 1). Design improvement resulted in a more cost effective procurement of drifters, so that the total number of deployed drifters will be about 100 (40 drifters from Global Drifter Program and 60 drifters from this project). Observational results will be available as soon as the dataset will begin to build up. The test run of ROMS in the East China Sea was successful: the model produced realistic western boundary current, and the open boundary conditions along the inflow and outflow ports using the nudging to the Levitus density field worked well.

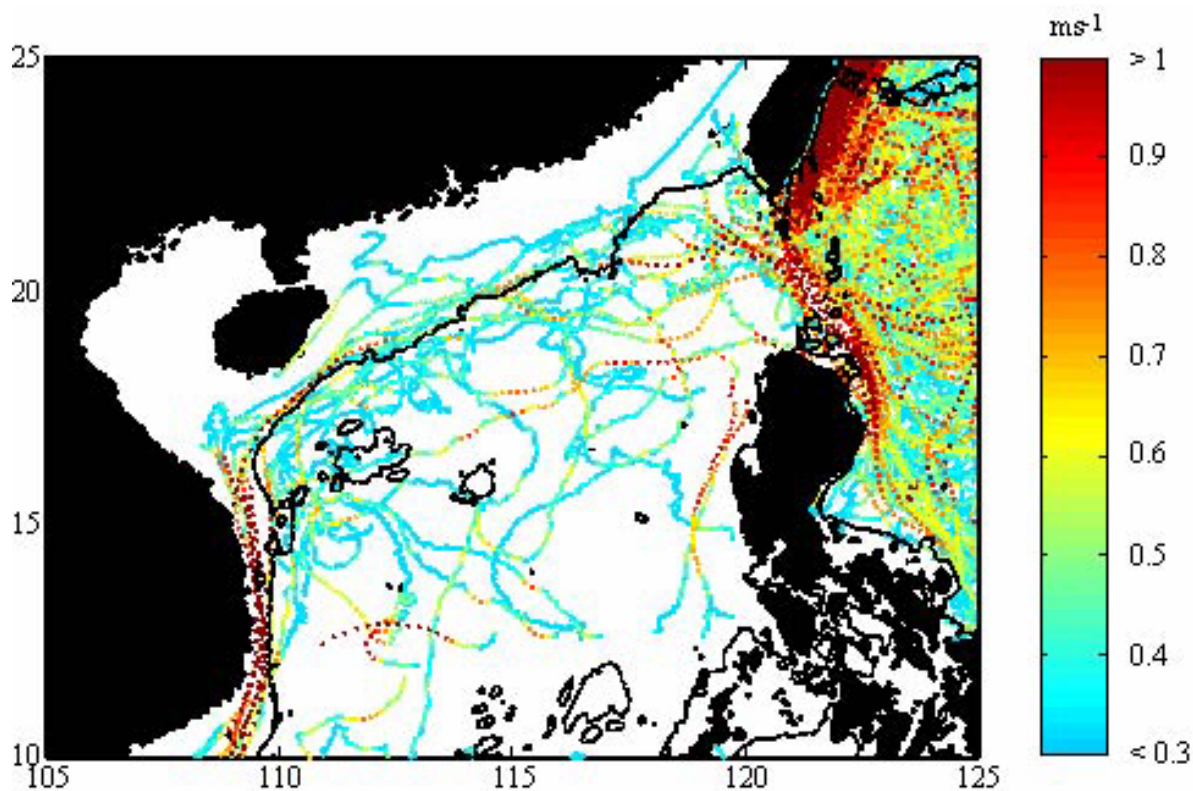


Figure 2: 6-hours interval position of drifters color coded in accordance with the local instantaneous speed 24626 data are shown, collected between September 1987 and May 2002. The black lines represent the 500 m depth contours.

IMPACT/APPLICATIONS

The drifter data are placed on the GTS

TRANSITIONS

None

RELATED PROJECTS

NOAA/OGP funded the “Global Drifter Programme”

PUBLICATIONS

Centurioni, L.R., P.P. Niiler and D.K. Lee, 2003, Observations of inflow of Philippine Sea water into the South China Sea through the Luzon Strait, J. Phys. Oceanogr., in press.