Observing the Evolution of Typhoon Wakes

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LONG-TERM GOALS

The long-term goal of this work is to observe, understand, quantify and parameterize upper-ocean mixing for use in global ocean modeling.

OBJECTIVES

Our research program is to observe the temporal and spatial evolution of typhoon cold wakes, in particular we plan to directly observe the mixing associated with turbulence generated by the strong air-sea interaction in a typhoon. These observations will be used to make quantifiable assessments of mixed layer models under the extreme conditions of a typhoon. We will also observe the restratification of the cold wake from air-sea fluxes and lateral mixing by sub-mesoscale eddies.

APPROACH

We will make these observations by equipping Seagliders with microstructure sensors and then deploying them prior to the passage of a typhoon in the Western Pacific Ocean and in its wake. Also, a ship-based survey of the evolution of the typhoon wake will be undertaken to observe the restratification and collapse of the cold wake. The cold wake survey will utilize a towed profiling sensor and a tethered turbulence package.

WORK COMPLETED

The planning of the observational field program has been the focus of the work completed thus far, with several meetings of the Impact of Typhoons On the Pacific (ITOP) and Tropical Cyclones Study 2010 (TCS2010) investigators haven taken place. The integration and testing of microstructure sensors on the gliders has been completed. Plans are now finalized and we begun the observational phase of the program. Daily teleconferences between ITOP and TCS2010 investigators are on-going and we are currently awaiting the formation of a sufficiently intense typhoon to begin the cold-wake survey.

RESULTS

The planning for the observational field program has been completed. As we are waiting for a typhoon of sufficient size and intensity to form so that we may observe, we have no scientific results to report yet.

IMPACT/APPLICATIONS

The technical problem of integrating and testing microstructure sensors on gliders is well underway, and this field program offers an excellent opportunity for using these technical developments to study an important scientific problem while providing a new measurement capability to the oceanographic community.

RELATED PROJECTS

Related to this project is my work in understanding and parameterizing mixing in global ocean models, such as the Community Earth System Model (http://www.cesm.ucar.edu/), and a newly funded Climate Process Team on the same subject (http://www-pord.ucsd.edu/~jen/cpt/).