ANALYSIS OF THREE DIMENSIONAL CURRENT STRUCTURES

USING SHIP-MOUNTED ADCP

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Abstract

A method of analysis for ship-mounted ADCP (Acoustic Doppler Current Profiler) data, originally proposed by Candela et al. (1992), was modified and applied in this thesis. The improved scheme was used to separate tidal from subtidal currents for three ship-mounted ADCP datasets. The datasets we selected in this work are quite different from and more complicated than, those of Candela et al., so they give us a good chance to test and improve the method's performance.

These three interesting datasets were obtained from: (1) a survey around the southern tip of Taiwan, showing the Kuroshio and strong diurnal tides; (2) a survey in the Solomon Sea, showing a strong jet and two anticyclonic eddies; (3) a survey during the intensive observation period of COARE, located in the warm pool in the equatorial Pacific Ocean, showing intermittent waves at several frequencies.

Dynamical and kinematic properties of the velocity fields were studied based on the three-dimensional current structures obtained by applying the method to ship-mounted ADCP datasets, and additionally by using the CTD datasets and mooring observations available in COARE. The consistency of our results with previous observations, theoretical analysis, and numerical modelings give us confidence in both the modified method and our results obtained. The success of this modified method shows the potential of its wide applications in analyzing ship-mounted ADCP data.