Progressions of SCOPE/NLIWI project

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Abstract

South China Sea Ocean Process Experiment (SCOPE) is a domestically integrated physical oceanography researching project in 2006-2008, collaborating with NonLinear Internal Waves Initiatives (NLIWI) funded by Office of Naval Research (ONR) of United States. It provides a platform, between Taiwanese and American physical oceanographers, for developing survey technology and exchanging scientific ideas and findings. The objective of SCOPE/NLIWI is to study the variations of the various scale motions including the Kuroshio intrusion, the seasonal and mesoscale variations, the inertial motions, the internal tide, and the strong nonlinear internal waves (NLIWs) and their interactions in South China Sea (SCS). Special attention will be drawn on the large-amplitude NLIWs in northern South China Sea, which have been recorded by using satellite images, *in-situ* shipboard marine radar, ADCP, CTD, and echo sounder. The analyses suggest NLIWs appear at tidal periodicity with amplitudes modulated at a fortnightly tidal cycle. In the deep basin of northern SCS, NLIWs present persistently except in winter. The observed NLIW properties generally could be described simply by K-dV type equations. In the continental slope and shelf, near Dongsha Island, strong divergences of energy and energy flux of NLIWs are found along and across waves' prevailing westward propagation path. Rapid activities of transformation, interaction, and dissipation of NLIWs occur. Consequently, the NLIWs are hard to be described by the K-dV type equations. It is noteworthy that second mode NLIWs, rarely seen in the ocean, present frequently in this area. Some of the properties of second mode NLIWs have been known, but the further study is needed. The relationship between NLIW surface scattering strength and NLIW interior properties, surface convergence, horizontal scale, and amplitude, was summarized using simultaneous shipboard radar, ADCP, echo sounder, and CTD measurements. It is useful for the future field work. The impacts of internal tides, mesoscale variations, and Kuroshio intrusion on NLIWs are expected, and are the focus of the ongoing experiments.