ON SAR REMOTE SENSING OF OCEANIC INTERNAL WAVES IN SOUTH CHINA SEA WITH COMPARISON OF LONG TIME IN-SITU ADCP MEASUREMENTS

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ABSTRACT

Oceanic internal waves are general known ubiquitous physical process in South China Sea (SCS). Many publications have investigated this process Based on in-situ measurements and/or remote sensing observations. However, seldom in-situ measurements lasted more than a month, even a week. Therefore, the consequent study can only demonstrate short-term case studies. There was no way to study the temporal variations of internal waves in a year long time. Although a long time dataset can be accumulated of remote sensing measurements, it is necessary to have corresponding in-situ measurements in order to validate results derived from remote sensing observations.

During Sep. 2008 to Jul. 2009, a large field experiment was conducted by Chinese Academy of Sciences. The main objective of this experiment is to investigate meso-scale physical oceanographic processes in SCS, oceanic internal waves are one of major processes. Three deep water mooring systems were deployed in the area between Dongsha island and Luzon strait. Meanwhile, more than 30 SAR images with oceanic internal waves signal were acquired during the field experiment period. In present work, the SAR images were analyzed and dynamical parameters of internal waves were derived, including propagation speed, characteristic wave-length, amplitude etc. The parameters retrieved from the image were validated by data acquired from long-term in-situ measurements, including temperature chains, CTD profiles, and long ADCP time series.

After validation of results from SAR images by various in-situ measurements data, the SAR images were adopted to study the temporal variation of SAR internal wave signatures and its relations to local

geophysical processes, such as wind speed, background current etc. This work is valuable to investigate under what conditions internal waves can be observed by SAR, and vice versa.

METHODOLOGY

A two layer KDV model is applied to retrieve internal wave parameters. A non-hydrostatic model from Lamb is used to study the mechanisms of intensity of oceanic internal wave signatures in SAR imagery.

MAJOR CONCLUSIONS

A year long SAR images series and in-situ measurements demonstrate that local atmospheric and oceanic conditions are important factors that determine whether oceanic internal waves be present in SAR imagery. The results are compared with previous analytical studies.

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