

Upwelling Area Northeast of Taiwan on ERS-1 SAR Images

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ABSTRACT

Surface expressions of various oceanic phenomena are detectable by satellite Synthetic Aperture Radar (SAR) under wind speed less than 8 m/s. These manifestations may either enhance or reduce the radar signal in contrast to the background. The upwelling north of Taiwan in SAR images looks dark, representing weak radar signal. It is likely due to the increased concentration of natural surface films that damp the short gravity waves that backscatter the radar signal. The stretched slick bands, filament-like slicks and wave-like structures allowed us to detect Kuroshio front, mesoscale eddies, and internal waves. A strip of several images is more useful than individual frame in the visualization of the oceanic features such as the western Kuroshio front, internal waves, etc.. They may relate phenomena of different scales better. Due to the cloudiness north of Taiwan, few NOAA IR images were available for upwelling study within 1~3 days of the SAR passes. Future measurements need to be made to estimate the relative contribution of different natural factors that form SAR signatures of the upwelling and other oceanic phenomena. In particular, the SST, ocean color (chlorophyll a concentration), currents together with meteorological parameters need to be measured continuously during ship expeditions coinciding with the SAR passes.

(Keywords: upwelling, East China Sea, ERS-1 SAR)

INTRODUCTION

Twenty passes of ERS-1 and Almaz Synthetic Aperture Radar (SAR) were acquired in 1992-1995 over the southern part of the East China Sea covering the upwelling area northeast of Taiwan. The study of this area has special interests to local oceanographers, such that the oceanographic research projects in Taiwan were concentrated on Kuroshio-related studies since 1989. They were under two large projects: the Kuroshio Edge Exchange Processes (KEEP) and World Ocean Circulation Experiment (WOCE). The efforts resulted, in particular, a better understanding of the interaction between the Kuroshio and the East China Sea along the western front of Kuroshio.

The upwelling northeast of Taiwan is a clear expression of this interaction. It was shown

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