

Ocean Surface Drift and Feature Tracking Using Sequential SAR Images

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Abstract

With repeated coverage, spaceborne SAR (Synthetic Aperture Radar) instruments provide the most efficient means to monitor and study the changes in important elements of the marine environment. Because the swath of high-resolution SAR is narrow, the coverage of SAR sensor is always limited, especially for a repeat cycle. With more SAR sensors from various satellites, new data products such as ocean surface drift can be derived when two SAR's tracks overlap in a short time period. Currently, there are two SAR sensors on different satellites with almost the exactly same path. That is, ERS-2 is following ENVISAT within 30-minutes, which has a good timing for ocean mesosclae feature tracking, such as ocean surface drift. In this study, internal wave refraction around the Dong-Sha Island in the South China Sea has been tracked and demonstrated by sequential satellite images. Based on the wavelet tracking analysis, ocean surface backscattering images provided by ERS-2 SAR and ENVISAT ASAR have been used to derive ocean surface drift near a surface film and around a big eddy for further demonstration. To validate the drift results, wind data from QuikSCAT are compared with the satellite-derived flow field. The qualitative comparison shows a generally consistent flow pattern. For other application, a mystery ship with strong ship wake has been tracked between ERS-2 and ENVISAT SAR images to estimate its ship speed. More application and future work will be discussed.