

Quantitative Estimation of Upper Ocean and Air-Sea Interaction Processes Using Tandem ERS-1/2 SAR and Synergetic Instrument Combinations

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Abstract

This study involves use of Tandem AO ERS-1/2 SAR images at one-day separation, together with LBR data, to investigate ocean surface and air-sea interaction processes. With Tandem SAR data, wind variations at small spatial scales, in coastal regions in particular, can be investigated more comprehensively than with SAR data from only one satellite. Wind and wave patterns observed in the SAR images can be related to ocean frontal structure, and other spatial and temporal variations in ocean currents. The investigation is being conducted in three chosen areas: on the Norwegian continental shelf and near the shelf break; in the North Sea; and in the Bay of Biscay. The results so far indicate that there is considerable day-to-day variation in the signatures of ocean current patterns and frontal structures, primarily as a result of variations in the wind speed and other meteorological conditions. There is evidence that sharp sea-surface changes at ocean fronts are reflected directly in the observed sigma-0 values, when the wind speed is low (2-3 m/s) and there are significant variations in the marine atmospheric boundary-layer stability. Signatures of ocean waves are detected mainly in the Bay of Biscay and Norwegian continental shelf areas, This includes enhanced backscatter signatures associated with steep and breaking waves near shorelines and breakwaters.

Keywords: Tandem ERS-1/2 SAR, Air-Sea Interaction, Ocean Currents, Fronts, Surface Slicks