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THE APPLICATION OF SEASAT-1 RADAR ALTIMETRY TO CONTINENTAL SHELF CIRCULATION MODELING

Peter Cornillon
Mark Reed
Malcolm Spaulding
Craig Swanson

Department of Ocean Engineering
University of Rhode Island
Kingston, Rhode Island 02881

ABSTPACT

This study investigates the applicability of high resolution radar altimetry to numerical modeling of continental shelf circulation. The Georges Bank/Gulf of Maine region, one of the richest fishing grounds in the world and currently being considered for oil exploration, was selected as the test site.

Radar altimetry is employed in verifying predictions of the continental shelf circulation model. SEASAT-1 radar altimetry has been selected over GEOS-3 altimetry because of its higher resolution, a necessity for observing elevation changes on the shelf, and because of its repeating orbit, which provides a convenient means of improving the GEM-10b geoidal estimate in the Georges Bank/Gulf of Maine region.

Details of the numerical circulation model to be used in the analysis are presented elsewhere. In overview, the model is three dimensional in nature and incorporates a vertical coordinate transformation to resolve the surface and bottom layers. Although for this investigation, tidal forcing only was used, the model is capable of responding to all significant forcing mechanisms on the shelf (tides, wind, atmospheric pressure and density gradients). The model makes use of the efficient semi-implicit mode of time integration, removing the surface gravity wave time step restriction.

Verification of the predicted surface elevation is achieved through a comparison of model and altimeter derived values of this quantity on two SEASAT tracks passing through the study area. For this comparison tidal gauge data along the shelf break were used to drive the model while open ocean tidal data were used to correct for SEASAT orbital bias and tilt. The comparison is in general excellent, the only problems being in the absolute magnitudes of the sea level. This problem appears to be attributable to errors in the bias and tilt correction rather than errors in the circulation model.
