NUMERICAL EXPERIMENTS
ON
PREDICTING HURRICANE CAUSED WIND WAVES

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Abstract

The purpose of this study is to develop a practical method for operational forecasts of hurricane generated ocean surface waves. As a first step toward this goal, the feasibility of combining winds obtained from NCEP=s global atmospheric spectral model T126 and hurricane model GFDL/MMM to drive a wave model is examined. The resolution of the transform grid of the global T126 spectral model is about one degree latitude-longitude and is too coarse to resolve a realistic wind field structure associated with a hurricane vortex. The grid resolutions of GFDL/MMM (Multiple nested Movable Mesh) hurricane model, on the other hand, telescopically increase from 1 to 1/3 and to 1/6 degree longitude-latitude covering an area of 75x75, 11x11 and 5x5 degree in longitude and latitude, respectively. In this experimental study, however, only wind data obtained from the outer and the inner most grids are interpolated and blended with T126 winds onto the regional wave model domain. The reason for blending is that wind fields predicted by GFDL model does not always cover the entire wave model domain, and those missing points need to be supplemented by T126 winds. Since the hurricane model treats each storm separately, some discrepancies in the wind field feature may occur when there are multiple storms/hurricanes co-exist over the area of concern. The area of influence of a storm is defined and a weight average procedure is used to ensure a smooth varying wind field over the wave model region occupied with multiple hurricanes. Wind fields constructed in such manner are then used to drive wave models for the U.S. East Coast. Predicted results for Hurricane Floyd 1999 are compared with observed data. It is found that with the application of this kind of blending procedure, the resulting wave model predictions are more consistent with the variation of observed values both in time and magnitude.