Abstract View

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Nonlinear Internal Wave Evolution in the Sulu Sea

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ABSTRACT

This paper presents an analytical investigation of nonlinear internal wave evolution in the Sulu Sea. A solitary wave theory that describes tie evolution of internal solitons has been developed and expanded to include effects of vertical shear, variable bottom topography, radial spreading, and dissipation. A numerical parametric study has been performed in order to understand the relative importance of radial spreading and dissipation effects on soliton decay across the Sulu Sea. Using Sulu Sea environmental and initial data, the numerical simulations reproduce reasonably well the measurements at the downstream mooring from the Sulu Sea Internal Soliton Experiment. Comparison of simulations with data on the evolution of lead wave amplitude across the Sulu Sea indicates that the variable depth effect is appreciable, and the radial spreading and dissipation effects are very significant The effects of the Earth's rotation, vertical shear, variable bottom topography, radial spreading and dissipation on the Sulu Sea solitons are evaluated quantitatively. A close correlation with data demonstrates the validity of the nonlinear wave theory.

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