Abstract View

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Resonant Interactions between Shelf Waves, with Applications to the Oregon Shelf

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ABSTRACT

From the inviscid, unforced, barotropic long-wave equations for a rotating system, it is shown that resonant interactions between three continental shelf waves can occur. Evolution equations governing the amplitude and the energy of individual waves in a resonant triad are derived. The nonlinearity in the governing equations allows energy to be transferred between the waves, but with the total energy conserved. While the shelf waves typically have periods of several days, the energy transfer has a time scale of order 12 days. Observational evidence of resonant shelf wave interactions on the Oregon shelf is found in the spectral analyses of Cutchin and Smith (1973) and Huyer *et al*. (1975), where their observed signals agree well with the resonant frequencies deduced from the theory. The good agreement between theory and observation suggests that nonlinear energy transfer may play a much more significant role in shelf wave dynamics than was previously realized.