Abstract View

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The Interaction of a Two-Layer Isolated Mesoscale Eddy With Bottom Topography

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ABSTRACT

The propagation of an isolated mesoscale eddy onto a western bounding topographic slope is examined through the use of a two-layer, primitive equation, numerical model. Variable parameters in the study are sense of rotation (cyclonic/anticyclonic), vertical structure (baroclinic, barotropic), and layer thickness ratio (H_1/H_2). Eddy size and strength (rotational velocity) and frictional parameterization are fixed.

Dispersion in the isolated eddy is induced by planetary and topographic beta-effects, giving the eddy an asymmetric distribution. This asymmetric distribution allows for nonlinear self-advective propagation tendencies. These nonlinear tendencies play a key role in the direction of propagation of the eddy. Specifically, in a quiescient background, an anticyclone can have eastward propagation tendencies which can overcome planetary and topographic beta-effects. Conversely, cyclones can have westward propagation velocities which are augmented (greater than maximum Rossby wave phase speed) by the presence of a topographic slope. This suggests that cyclones may be more likely to propagate onto a continental shelf region than their anticyclonic counterparts of equal strength.