Abstract View

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Effects of a Discontinuous Surface Stress on a Model of Coastal Upwelling

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ABSTRACT

We report on laboratory model experiments in which coastal upwelling was created by a radially discontinuous surface stress in the presence of bottom topography in the form of a ridge. An anticyclonic torque was thus applied to the surface of the fluid at the location of the stress discontinuity which, in turn, generated large, offshore cyclonic and anticyclonic eddies in the stress-free region. When the upwelled front interacted with this offshore eddy field, dense, upwelled water was transported far offshore as jetlike flows. The strong interaction between the stress discontinuity “front” and the upwelled front at the ridge resulted in an upwelling maximum and a downstream jet at the ridge that were weaker than those reported previously by Narimousa and Maxworthy. One observation of interest was that a large number of flow-marking particles accumulated in the region where the ridge intersected the stress discontinuity.