



## Abstract View

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# “Pycnobathic” Currents over the Upper Continental Slope

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#### ABSTRACT

The dynamic interaction of a sloping seafloor with along-isobath density variation is calculated for cases involving a sharp pycnocline and a surface-to-bottom front. Pycnocline depth is supposed to vary in the alongshore direction only, over a sloping plane seafloor; the bottom trace of the surface-to-bottom front is supposed to cut across isobaths. The calculations are diagnostic and make use of linearized equations with a linear bottom friction term.

The results illustrate the manner in which cross-isobath baroclinic flow is converted at the slope into a barotropic flow field, with velocities nearly parallel to the isobaths. The “forward” portion of the slope (that which lies in the direction of Kelvin wave propagation) only is affected, if there is only one inflow or outflow region. However, for equal and opposite inflow and outflow, a closed circulation pattern arises connecting these two regions, accompanied by a secondary closed circulation cell forward of both the inflow and outflow legs. The pressure distribution at the coast is a strongly filtered and phase-shifted version of the off-shore steric-height variation.

In the example of a surface to-bottom front, the divergence of the intensifying baroclinic flow over increasing depth is again drawn from the forward sector, or discharged into that sector when the baroclinic flow is convergent, i.e., passes from deep into shallow water.

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