Abstract View

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The Influence of Stratification on the Inertial Recirculation

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ABSTRACT

A two-layer quasigeostrophic model is used to investigate the influence of stratification on the inertial recirculation in a full basin model. It is found that the barotropic transport of the inertial recirculation is intensified significantly through barotropic–baroclinic interactions in the presence of a shallow thermocline or a strong stratification. Weakly nonlinear theories and numerical experiments show that a strong baroclinic–barotropic interaction intensifies the advection of potential vorticity anomaly toward the inertial recirculation and therefore forces a stronger recirculation. Furthermore, from the potential vorticity point of view, our model recirculations belong to the generalized "modonlike" recirculation (with $dQ/d\Psi < 0$). The increased zonal penetration of recirculation cells with stratification is not caused by the internal dynamics of the recirculation cells. Instead, it is caused by the increased advection of potential vorticity anomaly—an external forcing to the recirculation cells.