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Numerical Simulation of Wind-Driven Circulation in a Subtropical/Subpolar Basin

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ABSTRACT

A one-and-one-half layer, reduced gravity model has been studied numerically in parallel to previous analytical studies by Huang and Flierl. The main emphasis is on a strong nonlinearity associated with the layer depth, especially when the lower layer outcrops.

The numerical results show some highly asymmetric circulation patterns in a subtropical/subpolar basin, even when the wind forcing is symmetric with respect to the zero-wind-curl line. When the lower layer outcrops in the subarctic gyre, there is a closed loop of boundary currents, including an isolated northern boundary current, an isolated western boundary current, and an interior boundary current. All these currents have structures consistent with the theoretical analysis by Huang and Flierl.

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