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Westward Intensification of the Mean Circulation on the Bering Sea Shelf

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ABSTRACT

Most of the water that eventually flows northward through Bering Strait originates about 500 km south, seaward of the shelfbreak in the Bering Sea. Cumulative observational evidence supports the idea that most of this northward flow across the gently shoaling eastern Bering Sea continental shelf occurs as a western boundary current along the Siberian coast. A homogeneous rotating laboratory model and a barotropic numerical model each demonstrate this westward intensification of the mean flow. The intensification results from the well-known topographic β -effect: the combination of rotation and the depth decrease in the direction of flow acts in a similar fashion to the meridional gradient of the Coriolis parameter. For reasonable values of Bering Strait transport and shelf bottom friction, current speeds of 10–20 cm s⁻¹ and a current width of ~ 50 km are predicted.

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