Abstract View

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Steady-State Diagnostic Model of Summer Mean Circulation on the Georgia Shelf

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ABSTRACT

The Galt (1975) diagnostic model was used to investigate summer circulation on the Georgia shelf. The steady-state model uses a finite-element method to solve the depth-integrated vorticity equation for sea surface elevation over the model domain from which horizontal transports are derived. Good agreement was found between predicted and observed flows for the mid-shelf region, between the 20 and 40 m isobaths. The model was not applicable to the outer shelf due partly to the transient occurrence of Gulf Stream meanders and eddies that produced large spatial and temporal variations in the density and flow fields; and partly to the rapid depth changes in the continental slope region which made it difficult to resolve horizontal gradients of the vertical averaged density.

The model was used to estimate a not northward along-shelf volume transport of 70×10^3 m^3 s^{-1} over the model domain for the six-day averaging period. Along-shelf transport was primarily barotropic below the pycnocline and a mixture of Ekman plus barotropic modes above the pycnocline. Net cross-shelf transport was estimated at 40×10^3 m^3 s^{-1} offshore, due mostly to offshore Ekman transport in the upper layer. This cross-shelf transport is equivalent to a net exchange rate and was used to estimate a shelf residence time of 3.8 months.

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