Abstract View

Volume 15, Issue 7 (July 1985)

Journal of Physical Oceanography
Article: pp. 825–843 | Abstract | PDF (1.11M)

Geostrophic Volume Transport in High Eddy-Energy Areas of the Kuroshio Extension and Gulf Stream

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(Manuscript received June 28, 1984, in final form February 11, 1985)

DOI: 10.1175/1520-0485(1985)015<0825:GVTIHE>2.0.CO;2

ABSTRACT

Three new deep hydrographic sections taken in July 1980, May 1981 and May 1982, between 29–41°N along 152°E across the high eddy-energy area of the Kuroshio Extension are used to compute the relative geostrophic transport as a function of depth. The mean eastward geostrophic transport relative to the bottom through this section is 57×10^6 m^3 s^{-1} ($\equiv$57 Sv). These sections were occupied across an array of ten moorings deployed from mid-1980 to mid-1982. Using the 22-month average directly measured currents at 1200 and 4000 m depth for reference levels in the least-square sense, the absolute transport during the 1980–82 period is estimated to be 31±16 ($\times10^8$ m^3 s^{-1}) to the *west*. This lower bound on the uncertainty of the net transport estimate is based on the uncertainty of the measured mean currents. At 55°W, we use July 1976 and July 1977 deep hydrographic sections to compute the bottom-relative geostrophic transport across the high eddy-energy area of the Gulf Stream. Between 42 and 32°N, it is 32 Sv^{-1} to the east. Using 24-month average directly measured currents at 4000 m for a reference level, the absolute transport during the 1976–77 period is estimated to be 47±36 Sv to the *west*. Climatological, wind-driven Sverdrup mass divergence requires a net eastward transport of 17 Sv in the Pacific and 10 Sv in the Atlantic. Thus, the net westward circulations must be maintained by eddy or bottom or thermohaline interaction processes.

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