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Baroclinic transport time series of the Antarctic Circumpolar Current in Drake Passage

Maria Paz Chidichimo, Kathleen A. Donohue, D. Randolph Watts, and Karen L. Tracey
University of Rhode Island, Graduate School of Oceanography, Narragansett, United States (mpchidichimo@mail.uri.edu)

We present the first four-year long continuous time series of Antarctic Circumpolar Current (ACC) baroclinic transport, based on observations from 17 current and pressure-recording inverted echo sounders and 3 current meter moorings deployed in Drake Passage between 2007 and 2011. The full-depth ACC baroclinic transport through Drake Passage relative to the bottom is 125.7 Sv with fluctuations of 9.6 Sv rms. The mean annual baroclinic transport is remarkably steady. Approximately 80% of the total baroclinic transport is carried by the Subantarctic Front and the Polar Front. There is a large short-term variability in the baroclinic transport; about 60% of the transport variance is associated with periods shorter than 60 days. Nearly 30% of apparent energy in the spectrum computed from transport subsampled at the 10-day repeat cycle of the Jason altimeter results from aliasing of high-frequency signals. The largest transports in neutral density layers are found in the density class of Upper Circumpolar Deep Water while the smallest transports are found in the density class of Antarctic Bottom Water. The ACC baroclinic transport is not only the major contributor to the total ACC mean transport but also contributes between 30% to 50% to the total variability of ACC transport.