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# Temporal Variability of Diapycnal Mixing in Shag Rocks Passage

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Diapycnal mixing rates in the oceans have been shown to have a great deal of spatial variability, but the temporal variability has been little studied. Here we present results from a method developed to calculate diapycnal diffusivity from moored Acoustic Doppler Current Profiler (ADCP) velocity shear profiles. An 18-month time series of diffusivity is presented from data taken by a LongRanger ADCP moored at 2400 m depth, 600 m above the sea floor, in Shag Rocks Passage, a deep passage in the North Scotia Ridge (Southern Ocean). The Polar Front is constrained to pass through this passage, and the strong currents and complex topography are expected to result in enhanced mixing. The spatial distribution of diffusivity in Shag Rocks Passage deduced from lowered ADCP shear is consistent with published values for similar regions, with diffusivity possibly as large as 30 $\times$ 10-4 m2 s-1 near the sea floor, decreasing to the expected background level of $\sim$ 0.1 $\times$ 10-4 m2 s-1 in areas away from topography. The moored ADCP profiles spanned a depth range of 2400 to 1800 m; thus the moored time series was obtained from a region of moderately enhanced diffusivity.

The diffusivity time series has a median of 4.0 $\times$ 10-4 m2 s-1 and a range of 2.3 $\times$ 10-6 m2 s-1 to 1.1 $\times$ 10-2 m2 s-1. There is no significant signal at annual or semiannual periods, but there is evidence of signals at periods of approximately four days, fourteen days, and eighty days. Mechanisms that might cause these are discussed.