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Southern Ocean hydrography and circulation: Diapycnal and isopycnal mixing experiment in the Southern Ocean (DIMES)

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Eddy mixing across and along isopycnal surfaces in the Antarctic Circumpolar Current plays an important role in the meridional overturning circulation of the ocean, an important component of the climate system. DIMES, a US/UK CLIVAR project, is a study of mixing in the SE Pacific and SW Atlantic segments of the ACC. Tracer released 2000 km west of Drake Passage in early 2009 has shown that the diapycnal diffusivity in the SE Pacific Sector is 0.1 to 0.2 cm^2/s near the boundary between upper and lower circumpolar deep water. Profiles of turbulent dissipation rates, and of shear at 10- to 100-m scale, extend this result to nearly the full water column, with the possible exception of the top and bottom few hundred meters where mixing may be enhanced. Both tracer dispersion and dissipation rates measured in Drake Passage, on the other hand, indicate diapycnal diffusivity more than an order of magnitude greater than in the Pacific sector. Floats released with the tracer, and the tracer itself, in conjunction with numerical ocean circulation models, will give information on eddy mixing across the ACC, a process particularly important to the global-scale meridional flux of heat and carbon dioxide. See the poster by Gille et al. A mooring array has been deployed in Drake Passage to study the flow of energy from the eddies, through internal waves, to turbulent dissipation.