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Eddy flux convergence and its impact on mixed layer depth in the Southern Ocean

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In high resolution models of the Labrador Sea, eddies act to restratify the upper ocean and so give more realistic, shallower winter mixed layer depths than the unrealistically deep mixed layers predicted by coarse resolution models.

We find a similar effect in the Southern Ocean of the OCCAM model. The unrealistically deep winter mixed layers seen particularly to the north of the Antarctic Circumpolar Current in the 1° version of the model are less evident in the $\frac{1}{12}^\circ$ version. Detailed diagnostics of the $\frac{1}{12}^\circ$ run show that the eddy flux convergences indeed generally act to restratify the upper ocean. Estimates are made of the wind-mixing power or surface buoyancy loss needed to maintain the surface mixed layer against the eddies.