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Anisotropic shear dispersion parameterization for ocean eddy transport SCOTT RECKINGER, Montana State University, BAYLOR FOX-KEMPER, Brown University — The effects of mesoscale eddies are universally treated isotropically in global ocean general circulation models. However, observations and simulations demonstrate that the mesoscale processes that the parameterization is intended to represent, such as shear dispersion, are typified by strong anisotropy. We extend the Gent-McWilliams/Redi mesoscale eddy parameterization to include anisotropy and test the effects of varying levels of anisotropy in 1-degree Community Earth System Model (CESM) simulations. Anisotropy has many effects on the simulated climate, including a reduction of temperature and salinity biases, a deepening of the southern ocean mixed-layer depth, impacts on the meridional overturning circulation and ocean energy and tracer uptake, and improved ventilation of biogeochemical tracers, particularly in oxygen minimum zones. A process-based parameterization to approximate the effects of unresolved shear dispersion is also used to set the strength and direction of anisotropy. The shear dispersion parameterization is similar to drifter observations in spatial distribution of diffusivity and high-resolution model diagnosis in the distribution of eddy flux orientation.

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