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The LANS-alpha turbulence model in primitive equation ocean modeling MARK PETERSEN, MATTHEW HECHT, Los Alamos Nat. Lab., DARRYL HOLM, Imperial College, London and Los Alamos Nat. Lab., BETH WINGATE, Los Alamos Nat. Lab. — The POP primitive equation ocean model is widely used by the climate modeling community. Like all numerical models, computational time limits the spatial resolution at which POP can operate; standard climate simulations use grids of 0.5 to 1 degree in latitude and longitude. This resolution does not capture the motion of eddies at the Rossby radius of deformation, and thus lacks the correct energy cascade and heat transport at these scales. Simulations using the Lagrangian-averaged Navier Stokes-alpha (LANS-alpha) turbulence parameterization in the POP ocean model resemble higher resolution simulations of standard POP in statistics like kinetic energy, eddy kinetic energy, and potential temperature fields. The LANS-alpha model accomplishes this improvement through an additional nonlinear term and a smoothed advecting velocity. I will discuss my implementation of LANS-alpha in the POP ocean model, and results using an idealized channel domain that invokes the baroclinic instability. Results from a North Atlantic simulations show that LANS-alpha can achieve higher eddy kinetic energy in realistic domains as well.

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