Abstract Submitted
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Eddy kinetic energy transport in barotropic turbulence IAN GROOMS, University of Colorado, Boulder — Eddy energy transport in rotating, barotropic turbulence is investigated using numerical simulation. Stochastic forcing is used to generate an inhomogeneous field of turbulence, and the time-mean energy profile is diagnosed. An advective-diffusive model for the transport is fit to the simulation data by requiring the model to accurately predict the observed time-mean energy distribution. Isotropic harmonic diffusion of energy is found to be an accurate model in the case of uniform, solid-body background rotation (the f-plane), with a diffusivity that scales reasonably well with a mixing-length law $\kappa \propto V\ell$ where V and ℓ are 'characteristic' eddy velocity and length scales. Passive tracer dynamics are added, and it is found that the energy diffusivity is 75% of the tracer diffusivity. The addition of a differential background rotation with constant vorticity gradient β leads to significant changes to the energy transport. The eddies generate and interact with a mean flow. Mean advection plus anisotropic diffusion is moderately accurate only for flows with scale separation between mean and eddies.

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