Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Stochastic Parameterization of Ocean Mesoscale Eddies LAURE ZANNA, LUCA MANA, University of Oxford — Processes smaller than the model resolution or faster than the model time step are parameterized in climate simulations using deterministic closure schemes. Yet, several subgrid-scale processes are turbulent and potentially best represented by stochastic closures. The goal of our study is to construct a stochastic parameterization of mesoscale eddies in ocean models. The output of a quasi-geostrophic model in a double-gyre configuration with horizontal resolution of 7.5 km (eddy-resolving resolution) is used as the "truth". A coarse-graining methodology is employed on this output to compute "eddy fluxes" tendencies appropriate to the grid scale of a coarse resolution model. The tendencies are binned into different ranges of mean flow and mean shear strength related to the eddy life cycle in order to obtain probability distribution functions (PDFs). The PDFs for the coarse-grained tendencies show that the temporal and spatial eddy fluxes cannot be captured by current downgradient deterministic parameterizations. We rely on the PDFs to implement a novel stochastic parameterization into a coarse resolution model. We show and discuss the impact of this new parameterization on the mean flow and its fluctuations.

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Date submitted: 18 Nov 2012 Electronic form version 1.4