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# Maps from the Mid-Ocean Dynamics Experiment: Part II. Potential vorticity and its Conservation

**James C. McWilliams**

*National Center for Atmospheric Research, Boulder, Colo. 80303*

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### ABSTRACT

Observations of float trajectories and vertical density profiles from the Mid-Ocean Dynamics Experiment are analyzed in terms of a likely equation of motion for mesoscale eddies involving the conservation of quasi-geostrophic potential vorticity along horizontal particle paths. From maps of the potential vorticity a careful scale analysis is made to estimate both local values for the Rossby number and the relative dynamical contributions of the planetary vorticity gradient, the relative vorticity and the stretching of vortex lines in the vertical. The proposed conservation is verified, to within estimates of the likely error, at several depths where this error is sufficiently small. Furthermore, two regimes in time are found, one in which the dynamical balances are highly nonlinear and another, for longer time scales, in which they are marginally linear.

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