Abstract View

Volume 18, Issue 4 (April 1988)

Journal of Physical Oceanography
Article: pp. 552–564 | Abstract | PDF (987K)

Ventilating Warm Rings: Structure and Model Evaluation

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(Manuscript received May 22, 1987, in final form October 9, 1987)

DOI: 10.1175/1520-0485(1988)018<0552:VWRSAM>2.0.CO;2

ABSTRACT

The theory of the evolution of rings under a Cooling atmosphere is extended in two ways. First effects of stratification are studied analytically through the use of a “two and one-half” layer model. Second, model predictions are compared with observations. Qualitative support of the analytical model is also provided by a brief comparison of the analytical predictions with a numerical model.

Ring evolution is computed using the conservation of angular momentum. Idealizations in the analytical model include zero potential vorticity in the upper layer and an infinitely deep and resting third layer. The results from the analytical model witch is based on a crude representation of fluid thermodynamics and a continuously stratified numerical model with an active mixed layer agree qualitatively. Further, both models yield predictions of main thermocline deepening under warm rings which are consistent with field observations. This agreement supports the idea that the response of warm rings to cooling is governed by Rossby adjustmentlike mechanics.