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# A Buoyancy Flux-Driven Cyclonic Gyre in the Labrador Sea

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### ABSTRACT

The generation mechanism for a wintertime cyclonic gyre in the western Labrador Sea, first observed by Clarke and Gascard, is studied by using simple theoretical models. It is shown that atmospheric cooling, which occurs during outbreaks of cold, dry continental air, can be localized by air modification induced by oceanic heat and water vapor transport. The resulting scale of cooling is comparable to the cross-shore scale of the observed gyre. The density structure of the underlying water mass is then altered by this localized cooling and also by horizontal mixing. The model results compare reasonably well with observations. Finally, it is demonstrated that the observed gyre may be generated when the new density structure adjusts itself to geostrophic equilibrium.

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