Abstract View

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The Distortion of a Baroclinic Fofonoff Gyre by Wind Forcing

A.J. George Nurser

Space and Atmospheric Physics Group, Department of Physics, Imperial College, London

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ABSTRACT

The subtropical recirculation regions are considered as examples of nonlinear free flow—"baroclinic Fofonoff gyres." In the interior, where relative vorticity may be neglected, the quad-geostrophic assumption may be relaxed, and the layered treatment extended to a continuously stratified model. The implied density field is compared with observations.

The deformation of the inertial gyre caused by the presence of an anticyclonic wind stress curl is then considered. In addition to the recirculating "free" component of the flow along latitude circles, there is a meridional component whose depth-integrated transport is set by the magnitude of the imposed wind stress curl. It is found that the "bowl" within which the recirculation is contained deepens towards the north and west, and exhibits the "champagne glass" structure found in the quasi-geostrophic eddy-resolving numerical models.