Abstract View

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Eastern Boundary Ventilation and the Structure of the Thermocline

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ABSTRACT

The effect of relaxing the zero *geostrophic* zonal flow condition at the eastern boundary on the structure of the ventilated thermocline is described. It is argued that the effect of dissipation can allow a vertical exchange of mass between layers at the eastern boundary. A model is studied analytically that assumes such an interchange while continuing to forbid a *net* eastward mass flux at each latitude.

The consequences of the relaxation of this condition are striking. Each active layer in the ventilated thermocline can now have a non-zero thickness on the eastern wall. As a result, each such layer has a stagnant shadow zone near the eastern boundary. Each shadow zone extends across the gyre at low latitudes. Hence the isopycnal surfaces, while shallow, remain at finite depth as the equator is approached. The shadow zones are nested, i.e., the shadow zone of the deepest layer is laterally most extensive and the zone shrinks eastward and southward with decreasing depth. The vertical recirculation at the eastern boundary adds a new source of ventilation and a zone of motion to the structure of the ventilated thermocline described by Luyten, Pedlosky and Stommel.