Eddy-driven buoyancy gradients on Eastern boundaries.

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Classical thermocline theories assume that buoyancy gradients vanish on the Eastern boundaries of closed basins, so that the geostrophically balanced flow has vanishing normal component on the boundary. However, eddy-resolving simulations show that there are substantial buoyancy gradients on the subpolar portions of the Eastern boundary, accompanied by an energetic field of mesoscale eddies. Using a simple, semi-analytic model, we show how eddy-buoyancy fluxes can mantain buoyancy gradients on the Eastern boundary. Our consideration of a continuosly stratified model allows to derive a scaling for the depth of this boundary gradient. The role of this depth in the overall scaling of the thermocline is also discussed.