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# Thickness diffusivities from linear stability analysis derived from observational data

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Meso-scale oceanic processes are not resolved in most of recent climate models hence an appropriate parametrization is needed in these models. In this study a closure for fluxes of buoyancy and vorticity based on quasi-geostrophic linear stability analysis (Eden et al, 2011) is applied to a new climatology ($http://icdc.zmaw.de/woce\_climatology.html$) and compared with results from high-resolution models. Distributions of buoyancy fluxes and thickness diffusivity $\kappa_b$ appropriate to the Gent and McWilliams parametrization, as well as vorticity fluxes and a lateral diffusivity $\kappa_{pv}$ are presented on the global scale and for typical ocean regimes. Diffusities are high in strong geostrophic currents and vanish in the interior of the gyres. Values of $\kappa_b$ in the Antarctic Circumpolar Current and in the Gulf Stream are compared, displaying a different vertical structure. In the Gulf Stream $\kappa_b$ shows a well-defined maximum in the thermocline, decreasing rapidly below, while in the Southern Ocean it has a rather constant vertical distribution with an increase with depth. Lateral diffusivities $\kappa_{pv}$ for vorticity fluxes are revealing a structure, that increases with depth in both current systems.