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On the width of the equatorial deep jets

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The equatorial deep jets (EDJ) are a striking feature of the equatorial ocean circulation. In the Atlantic Ocean, the EDJ are associated with a vertical scale of between 300 and 700 m, a time scale of roughly 4.5 years and upward energy propagation to the surface. It has been found that the meridional width of the EDJ is roughly 1.5 times larger than expected based on their vertical scale. Here a representation of a equatorial basin mode excited in a linear shallow water model for a high order baroclinic vertical normal mode is used as a simple model for the EDJ. We argue that mixing of momentum along isopycnals can explain the enhanced width and a lateral eddy viscosity of $300\,m^2 s^{-1}$ is found to be sufficient to account for the width implied by observations. Additionally, the effect of barotropic mean flow on the spatial and temporal structure of the wave field is studied. A mean flow resembling the Atlantic Equatorial Intermediate Current System with eastward jets at 2°N/S and westward flow in between results in a wave shielding of the equatorial band from adjacent regions.