Observed and modeled diapycnal diffusion in the Indian Ocean

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The deep Indian Ocean’s role in the global overturning circulation is to upwell abyssal waters to deep and ther-
mocline waters. This requires diapycnal diffusion of buoyancy downwards. The required diapycnal diffusivity
(“kappa”) is on the order of the Munk value $10^{-4}$ m$^2$/sec, but the spatial distribution of kappa is enormous. Ex-
tending previous works, we use CTD and LADCP profiles throughout the Indian, compare strain-only calculations
with strain-shear calculations, and map diffusivity and diapycnal mixing relative to topography, isoneutral surfaces
that span the water column, and monsoon phase (northern Indian). Diapycnal diffusivities and mixing from the
high resolution POP general circulation model, which includes some but not all physical processes responsible
for diapycnal mixing, are compared with these observations and with our recent estimates of diapycnal diffusivity
from Argo profiles, with the comparison providing insight the multiple mechanisms controlling diapycnal mixing.