The characteristics of the mid-depth striations in the North Indian Ocean

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Argo trajectory data is used to estimate the velocities of mid-depth (1000db) currents in the North Indian Ocean (NIO). Based on these estimated velocities rather than an assumed level of “no motion”, the structure of upper ocean absolute geostrophic currents can be derived more accurately from the Argo temperature and salinity profiles. The derived flow field reveals that eastward zonal velocities have a striation-like structure in the Arabian Sea, while barely observed in the Bay of Bengal. The striation-like structure is most prominent in the layer from 500db, with a meridional scale of about 300km. Both the meridional scale and the distribution of these mid-depth striations are unique as compared to the other ocean basins. The nonlinear 1 1/2-layer reduced gravity model and the baroclinic Rossby wave triad interaction theory capture the essential factors controlling the characteristics of the quasi-zonal striation structure. Compared to the Pacific Ocean, the narrower meridional scale in the NIO is because of the smaller basin scale in the equatorial zone rather than semiannual wind stress forcing period or slope of the eastern boundary. Coastal trapped Kelvin waves contribute significantly to the generation of the zonal striation in the Arabian Sea.