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The 3D structure of Mesoscale Eddies in the Northeastern Arabian Sea, and their impact on Submesoscale Dynamics

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In the Northeastern Arabian Sea, the pathway of the salty Persian Gulf Water outflowing from the Persian Gulf is strongly impacted by the mesoscale and submesoscale features which evolve in the Sea of Oman and around the Arabian Peninsula. We use ARGO floats colocalized with eddies detected in the Arabian Sea for the period 2000-2015 from altimetric data, to extract anomalies of temperature and salinity related to mesoscale eddie. It allows us to compute a composite 3D structure of mesoscale eddies in the region. These structures are validated with *in situ* observations and are shown to be representative of the typical mesoscale activity of the Sea of Oman. Our results suggest that eddies, and particularly cyclonic ones, carry Persian Gulf Water in their core, meaning that they are able to trap, transport and diffuse such a water mass away from the Persian Gulf. Using a primitive equation simulation at high resolution, we show that such an eddy may destabilize and create submesoscale features such as cold filaments or small eddies, which may impact the local dynamic and thermoaline properties of the area.