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Observations of vertical propagation of near-inertial Waves in a complex vorticity field during the EURAC⁴A-OA campaign in the tropical western North Atlantic

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In this study, we investigate the mesoscale flow field and how it enables energy to propagate vertically in form of near-inertial waves. As part of the EURAC4A-OA campaign the research vessels RV Maria S. Merian and NO L'Atalante simultaneously surveyed mesoscale eddy fronts in the western tropical North Atlantic. From velocity profile data, measured by a shipboard Acoustic Doppler Current Profiler (sADCP), we reconstruct eddies in the upper 1000m of the surveyed area, by fitting a Rankine Vortex model. The model derives an idealized velocity structure of the eddy as well as the location of its centre. Multiple occurrences of stacked eddies are identified and often surrounded by current shear structures associated with near-inertial waves. Using data from ship sections, where both research vessels operated less than 1nm apart, the vertical component of the relative vorticity (zeta) is calculated using different methods (single ship, two ships)[Shcherbina et al. 2013]. It is found that in particular zeta outside of the eddy cores is sensitive to the way the vorticity is calculated and may even change sign. Furthermore, the resulting zeta sections and its impact on the ability of near-inertial waves propagating vertically below the mixed layer is discussed.