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Upper ocean mixing from shear microstructure and density inversions near the Walvis Ridge

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The M180 cruise is part of the observational program of the TRR 181 'Energy Transfers in Atmosphere and Ocean', and will focus on observe numerous energy compartments in order to construct a regional oceanic energy budget for the southeast Atlantic. The study area will be nearby the Walvis Ridge, a region of strong eddy activity and internal tides, in the Eastern South Atlantic (0 -10 E, 30 -35 S). There, energy is converted from barotropic to baroclinic tides at the seafloor. Additionally, in this region, the Agulhas leakage regularly sheds eddies from the Agulhas current in the form of Agulhas rings that propagate slowly northwestward. The location is, therefore, ideal for the study of interaction and links between different energy compartments in the ocean and at the ocean-atmosphere boundary.

The work will focus on energy dissipation and diapycnal mixing which, on the smallest scales, drive the circulation in the ocean and is thus of highly significant for the global meridional overturning circulation in the ocean and its deep ventilation. Time series microstructure stations will be used to assess locally the temporal variability of mixing and dissipation. From temperature, density and shear profiles obtained with a Vertical Microstructure Profiler (VMP-250-IR), it will be possible to calculate the energy dissipation rate of turbulent kinetic energy by assuming a statistically valid linear relationship between the Thorpe Scale and the Ozmidov Scale. A direct comparison between the inferred estimation of the dissipation rate and the directly calculated dissipation rate will be presented. Moreover, in case a possible influence from Agulhas rings on dissipation is detected, it will be investigated.