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Fortnightly modulation of deep mixing inside a Mid-Ocean Ridge fracture zone in the Brazil Basin

Mid-Ocean Ridge fracture zones channel bottom waters in the eastern Brazil Basin and are known to be regions of intensified deep mixing. Despite the essential role of bottom waters in the oceanic circulation, the mechanisms responsible for the circulation and the deep turbulent mixing inside fracture zones are still subject to debate. Two McLane moored profilers were deployed inside a deep canyon: one in a sill-contraction passage and another one in a less topographically constrained section of the canyon. The analysis of the density and velocity fields as well as microstructure measurements reveal the presence of a fortnightly modulation of the shear variance, of the Thorpe displacements and of the dissipation of turbulent kinetic energy downstream of the sill. In addition, a 2-layer mean flow with a deep eastward up-canyon transport and a shallower westward transport is present inside the canyon. The velocity and density fields as well as the acceleration in the sill-constriction region are interpreted in terms of a 2.5 layer model inside the canyon. Given the mean flow and the isopycnal area of the isopycnal at the 2-layer interface, a heat budget is estimated and compared to microstructure measurements.