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"Modelling the efficiency of the South West Indian Ridge as a heat pump for the Southern Ocean"

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Transient eddies in the Southern Ocean play a central role in the global thermohaline circulation. Meridional exchange of heat and salt is not geographically uniformly distributed, but may be concentrated in a number of specific regions where high levels of mesoscale turbulence are generated. We have identified a powerful and heuristic example of such a region at the South-West Indian Ridge in which cross-ACC heat transport is dependent on eddy shedding. We compare hydrographic, altimetry and OCCAM data and show that compact Antarctic eddies are shed across the APF into the Subantarctic at an average of 3 a year, that they have a longevity of 11 months and that they sustain annual meridional heat and salt fluxes of at least -17 x 10^{19} J and -24 x 10^{11} kg. These results may be applicable to similar eddy pumping locations elsewhere in the Southern Ocean and could in principle be relatively easily monitored with appropriate remote sensing. Despite the importance of this process, eddy heat transport remains one of the most poorly observed quantities in the Southern Ocean.