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Observations of water mass structure and currents in the Southern Rockall Trough

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The Rockall Trough, west of Ireland, is an important conduit for warm, saline water masses entering the Nordic Seas as part of the thermohaline circulation of the North Atlantic. Several water masses converge and mix in this region, and the area is known for its deep winter convection. The variability and structure of water masses and currents at the southern entrance to the Trough were measured between October 2003 and October 2004, with focus on the upper and intermediate depth levels.

Two current meter moorings deployed in October 2003 in 2800 m water depth, one at 53ºN near the continental slope and the other further northwest, at the southern end of Feni Ridge, collected current and T/S data for 4.5 months and one year, respectively. In winter 2003-2004, current meters of the eastern mooring showed a mean northward directed flow of 5 cms^{-1}, whereas the western one had a mean north-eastward flow of 15 cms^{-1}. At the eastern mooring saline Eastern North Atlantic Water (ENAW) dominated down to about 600 m, with highly saline Mediterranean Outflow Water (MOW) present around 900 m. The upper saline layer was shallower –down to about 300 m - at the western site in winter, but deepened in the spring, and throughout most of the summer and autumn 2004 the upper 500-600 m were taken up by ENAW.

Two ARGO equivalent floats drifting at the 1000 db pressure level demonstrated significant mesoscale eddy activity at the entrance to the Trough, and an East-West orientated dominant flow pattern. One float circulated anticyclonically around a high dynamic height feature often present in satellite altimetry images, the location of its centre moving mainly in east-west direction. Winter mixed layer depths and the influence of different water masses along the float track were also calculated from float data.