



The impact of mesoscale variability on circulation in the Faroe-Shetland Channel

T.J. Sherwin (1), S.L. Hughes (2), W.R. Turrell (2) and M.O. Williams (3)

(1) Scottish Association for Marine Science, Dunstaffnage Marine Laboratory, Oban, Argyll, UK, PA37 1QA (toby.sherwin@sams.ac.uk) (2) Fisheries Research Services Marine Laboratory, P.O. Box 101, Victoria Road, Aberdeen, UK, AB11 9DB (3) PhysE Ltd, The Old Customs House, The Quay, Yarmouth, Isle of Wight, UK, PO41 0PG

A large part of the surface inflow to the Nordic Seas coalesces into a narrow slope current in the Faroe-Shetland Channel that flows along the Shetland shelf edge with mean speeds of order 0.4 m/s. Observations from satellite AVHRR and altimetry, drifter tracks, ADCPs and CTD sections reveal that the flow is unstable and forms large mesoscale meanders with current speeds of up to 0.9 m/s in a front between water masses that crosses the channel. These meanders tend to form at two specific locations. Long term averages of drifter and altimeter archive data show peaks in eddy kinetic energy that are greater than $300 \text{ cm}^2/\text{s}$, and in surface elevation variance that are nearly 40 cm^2 . A baroclinic instability analysis suggests that the growth time of the meanders should be a few days with a separation distance of order 55 km, and that their group velocity could be very close to zero depending on the strength of the southward outflow below 500 m. Thus, unlike their counterparts in the Norwegian Coastal Current for example, the instabilities do not propagate. Decay of the anti-cyclonic meanders probably leads to the formation of cyclonic eddies that mix NAW and MNAW and creates the more homogeneous forms of Atlantic water observed as the water moves northwards through the channel and into the Norwegian Sea. Mesoscale driven entrainment may help to draw MNAW into the Faroe-Shetland Channel from around Faroe.