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Circulation and Fluxes in the North Atlantic between Greenland

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ABSTRACT

Quasi-meridional flux estimates for volume, heat, and freshwater, with computed errors, in the region of the subpolar gyre of the North Atlantic between Cape Farewell and Ireland between 53° and 60°N are presented. The dataset consists of three approximately 500-km-sided boxes of CTD stations collected as the U.K. Control Volume Experiment during summer 1991 on the RRS *Charles Darwin*, supplemented by stations from the International Geophysical Year surveys of the R/V *Anton Dohrn* to represent the East Greenland Current (EGC), and justification is given for their use. The circulation is determined by an inverse method applied to the boxes of the survey, with in situ current measurements from a vessel-mounted acoustic Doppler current profiler forming an estimate of the strength of the EGC. Climatological wind stress data are used to estimate Ekman fluxes. The principal results are the determination of the poleward heat flux across the survey region as 0.28 ± 0.06 PW, and of the freshwater gain by the Arctic as $0.17 \pm 0.06 \times 10^6$ m^3 s^{-1}. A quantified circulation scheme for the part of the subpolar gyre covered by the survey is presented, upper circulation agrees with that of previous authors (within the errors of the estimates), but the d particularly the Denmark Strait overflow, appears significantly weaker than previous estimates.