EGU2020-11549
https://doi.org/10.5194/egusphere-egu2020-11549
EGU General Assembly 2020

Can satellites replace mooring arrays? Satellite altimetry transport estimates of the Atlantic overturning meridional circulation along the RAPID 26°N mooring array

Alejandra Sanchez-Franks, Eleanor Frajka-Williams, and Ben Moat
National Oceanography Centre, Marine Physics and Ocean Climate, Southampton, United Kingdom of Great Britain and Northern Ireland (alsf@noc.ac.uk)

The Atlantic meridional overturning circulation (AMOC) is a large-scale oceanic circulation comprising a 2-layer flow: the net northward flow in the upper 1000 m of the Atlantic and net southward flow below. Variations in the AMOC have significant repercussions for the climate system hence there is a need for proxies that can measure changes in the AMOC on larger spatial scales. Here we show a direct calculation of ocean circulation at 26°N from satellites compares well with transport estimates from the RAPID mooring array. In the surface layer (1000 m), transport is estimated from satellite altimetry and has a correlation of r=0.79 (significant at 95% level) with the MOC transport estimates from RAPID. We find that the relationship between sea level anomaly and dynamic height from the western boundary RAPID moorings is robust in the surface layer, with poor agreement occurring largely below 1000 m. Below 1000 m, the return flow of the AMOC is estimated using ocean bottom pressure from satellite gravimetry. This has a correlation of r=0.75 (significant at the 95% level) when compared to the deeper (1000-5000 m) RAPID transports. Combining the results from satellite altimetry and gravimetry, estimates of full-depth 2-layer circulation at 26°N are demonstrated. Finally, empirical orthogonal function analysis reveals that the barotropic and baroclinic streamfunctions are linked to wind stress curl and buoyancy forcing, respectively.