Session: C37 Poster: TH65A

Atlantic Meridional Overturning Circulation: Compensation at the western boundary between the Gulf Stream and Interior Transport

Eleanor Frajka-Williams[†]; Harry Bryden; Chris Meinen; Stuart Cunningham; Torsten Kanzow; Joel Hirschi; William Johns
[†] National Oceanography Centre, United Kingdom
Leading author: e.frajka-williams@noc.soton.ac.uk

In the North Atlantic, the meridional overturning streamfunction reveals a northward-flowing, upper branch (shallower than ~1 km) and a southward-flowing lower branch (from ~1km to 5km). Together, the upper and lower branches comprise the southward deep flow of the Atlantic Meridional Overturning Circulation (MOC). The MOC is estimated by the RAPID array at 26∫N, a transatlantic array of moored instruments including CTDs and current meters. Past results have shown a distinct annual cycle in the overturning, and that individual components of the MOC have been uncorrelated, meaning that variability of individual components all contribute to variability of the MOC. However, in 2008, the seasonal cycle of transport in the upper mid-ocean (UMO) changed: the annual cycle was absent, replaced instead by a semi-annual cycle with two peaks and two troughs in transport, with a range of 10 Sv. Furthermore, the character of the relationship between the Gulf Stream and UMO transport changed: From 2004-2007 they were uncorrelated, but in 2008, they were significantly anticorrelated. During the same time period, eddy-kinetic-energy at the western boundary is reduced, suggesting that the anticorrelation between the Gulf Stream and UMO transport is not masked by eddy noise. Separating the UMO transport into variability contributed by density changes at the western boundary only shows that UMO-W has been anticorrelated with Gulf Stream transport since mid-2006, while changes at the eastern boundary (UMO-E) are unrelated to Gulf Stream transport. This changing relationship between the Gulf Stream and mid-ocean transport implies that all of UMO-W, UMO-E, Gulf Stream and Ekman transport are needed to construct an MOC index.