Geophysical Research Abstracts
Vol. 21, EGU2019-13696, 2019
EGU General Assembly 2019

Observing the Variability of the Western Boundary Currents and the Atlantic Meridional Overturning Circulation at 11°S

Josefine Herrford (1), Rebecca Hummels (1), Peter Brandt (1), Torsten Kanzow (2), and Marcus Dengler (1)

(1) GEOMAR Helmholtz Center for Ocean Research, Physical Oceanography, Germany (jherrford@geomar.de), (2) Alfred-Wegener-Institut Helmholtz Centre for Polar and Marine Research, Climate Science, Germany

The western tropical South Atlantic constitutes a key region for the exchange of water masses, heat and salt between the Southern and Northern Hemispheres, where AMOC fluctuations imprinted in the North Atlantic and the Agulhas region can be traced. In July 2013 a trans-basin AMOC array was installed at 11°S including four tall current meter moorings off Brazil, moored observations off Angola, bottom pressure recorders (BPR) on both sides of the basin and repeated ship-based observations. This array allows investigating the seasonal to inter-annual variability of the western boundary currents (WBC; namely the North Brazil Undercurrent (NBUC) and Deep Western Boundary Current (DWBC)) off Brazil, as well as the tropical South Atlantic MOC. Transport time series for the NBUC and DWBC from direct current observations are now updated until March 2018, while reconstructions of the velocity field from moored observations are tested using inter-and extrapolation as well as a pattern regression method, the latter showing an improved representation of the transports. Variations in the NBUC transport are predominantly seasonal, but masked by other variability on different timescales. The DWBC transport is dominated by intra-seasonal variability (i.e. deep eddies) with weaker seasonal variations superimposed. Further, the first 4.5 years of continuous AMOC observations at 11°S are presented and analyzed regarding seasonal variability: The BPR measurements on both sides of the basin (at 300m and 500m) are used to assess variations in the basin-wide upper-ocean northward geostrophic transport at 11°S. AMOC transport variations are then derived by adding the wind stress forced, near-surface southward Ekman transport component. In contrast to what is observed in the subtropics (at the RAPID array at 26°N or the SAMOC array at 34°S), in the tropics at 11°S the geostrophic contribution exceeds the Ekman contribution on seasonal time scales by a factor of 3. There are hints towards a baroclinic compensation within the DWBC: The seasonal variability, which is found within the core of the DWBC captured by the mooring array at 11°S, shows the right timing and strength to balance the upper-ocean signal. Further, the seasonal displacement of the 27.6 kg m-3 isopycnal surface in the western tropical South Atlantic corresponds fairly well to volume changes inferred from the observed seasonal AMOC variations.