Geophysical Research Abstracts
Vol. 17, EGU2015-6454-1, 2015
EGU General Assembly 2015

Meso- to submesocale oxygen variability and lateral oxygen fluxes in the oxygen minimum zone of the eastern tropical North Atlantic

Johannes Hahn, Peter Brandt, and Gerd Krahmann
GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany (jhahn@geomar.de)

The oxygen minimum zone (OMZ) of the eastern tropical North Atlantic (ETNA) is located between the oxygen-rich equatorial region and the Cape Verde Frontal Zone at 20°N in a depth range between 300m – 700m. Its southern boundary is predominantly set by the equatorial zonal current system, where the northernmost current branch is represented by the eastward flowing North Equatorial Counter Current / North Equatorial Undercurrent (NECC/NEUC) at 5°N. Recent studies have shown enhanced oxygen variability for this location at the OMZ core depth which is generated due to mesoscale stirring induced by tropical instability waves as well as seasonal variability of the NECC/NEUC.

An extensive measurement program was carried out in the past decade consisting of repeat ship sections as well as moored and glider observations along the 23°W section in order to study oxygen ventilation and oxygen variability in the ETNA OMZ regime. Moored and shipboard observations of oxygen and velocity reveal an eddy-driven northward oxygen flux towards the OMZ core, which results in an oxygen supply of up to 60% of the observed oxygen consumption. Based on the several year long moored observations at 5°N and 8°N, a seasonal variability of the eddy-driven meridional oxygen flux is found. Corresponding frequency spectra of the mooring time series are used to discuss time scales of enhanced variability of oxygen and meridional velocity.

In this study, we explicitly present a measurement program which was conducted at 5°N, 23°W consisting of a triangular mooring array (Nov. 2012 – Apr. 2014) as well as a glider swarm experiment with a fleet of 3 gliders (Nov. – Dec. 2012). Based on this data set, a variogram of oxygen is derived to study spatial scales on the meso- to submesoscale in the NECC/NEUC regime.