Observed trends in oxygen and nutrients in oxygen minimum zones

L. STRAMMA[1*], R. CZESCHEL[1], S. SCHMIDTKO[1] AND R. A. WELLER[2]

[1]GEOMAR Helmholtz Centre for Ocean Research Kiel, 24105 Kiel, Germany (*corrspondance: lstramma@geomar.de)
[2]Woods Hole Oceanographic Institution, Woods Hole, MA02543, USA

Measurements in the world ocean point to a deoxygenation of the last 50 years with the focus on the tropical oxygen minimum zones (OMZ). Within the research initiative 'Climate – Biogeochemistry Interactions in the tropical Ocean' the temporal-spatial scales of oxygen distribution and oxygen changes in the Eastern Tropical South Pacific (ETSP) and the Eastern Tropical North Atlantic (ETNA) are investigated. Although the ETNA is hypoxic while the ETSP is suboxic both areas show a deoxygenation trend. These deoxygenation trends are overlain by climate signals like the Pacific Decadal Oscillation, variability in the subtropical-tropical cells, El Nino events and variations in the equatorial wind field.

In the equatorial regions the zonal current bands are important in resupplying oxygen to the OMZ. Mesoscale related oxygen changes are important on the poleward side of the tropical OMZ. Measurements of the oxygen distribution of eddies near the Peruvian shelf show a large expended low oxygen layer in anticyclonic eddies while in cyclonic eddies the low oxygen layer decreased [1]. Measurements of floats with oxygen sensors turned out to be a helpful tool to investigate the oxygen distribution as well as eddy structures in the ETNA and ETSP. Compared to the ETSP in the ETNA there are less eddies with a weaker vertical extend. Connected to the decrease in the oxygen since 1976 an increase in nutrients (nitrate, phosphate and silicate) could be observed in the upper ocean in some regions near the equator in the eastern Pacific [2].

Although a deoxygenation trend was observed for the past 50 years, the influence of climate signals and local variations e.g. by eddies or wind changes need to be further investigated to improve prediction for future oxygen trends.

[1] Stramma *et al.,* (2013) *Biogeosciences,* **10,** doi:10.5194/bg-10-7293-2013. [2] Czeschel *et al.,* (2014) *Ocean Sci. Discuss.,* **11**, doi:10.5194/osd-11-2205-2014.