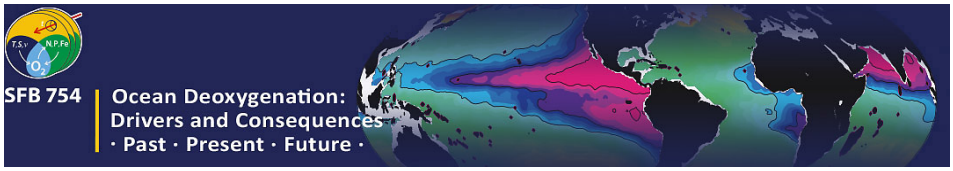

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Effects of regimes of dissolved oxygen variability on functional diversity of sublittoral macrobenthos off central Peru (12°S) and northern Chile (23°S)

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In the Humboldt Current System water deoxygenation occurs naturally producing Oxygen Minimum Zones where the fauna usually present different levels of adaptations or tolerance to low oxygen conditions. The high variability of the system causes variability of hypoxia at different spatial and temporal scales throughout the HCS, and the responses of the seabed biota may be different between localities along the latitudinal gradient. Herein, we evaluated the effect of oxygen variability on the community structure and functional diversity of the sublitoral macrobenthos off Callao (12°S, central Peru) and Mejillones (23°S, northern Chile) studying time series data taken between February and October 2016. 15-years historical dissolved oxygen data (2000-2016), were analyzed for characterizing the frequency of oxygenation and hypoxic events and the seasonal variability and were identified three oxygen regimes at equivalent depths in both locations. At 30m depth a seasonal hypoxia regime was present at a semiannual (Callao) or annual (Mejillones) cycle. At 50m there was a predominant hypoxic regime, with three seasons of the year under hypoxic conditions in Callao, with winter oxygenation. Additionally, in Callao at 90m depth the regime was persistent severe hypoxia throughout the year, with rare and very short episodic oxygenation. When we assessed the effect of oxygen and its variability in these regimens we identified a functional diversity loss gradient, consistent with the increased severity and persistence of hypoxia. The “seasonal hypoxic” habitat showed higher expression of feeding-strategies and life forms, which indicates more energy pathways and higher horizontal and vertical exportation of mater and energy. At the “predominant hypoxia” habitat some of these strategies remains but the diversity of live forms decreased. The regime of persistent hypoxia presented the lowest values of functional diversity, which is characteristic of a community limited to the recycling of nutrients that indicates an early stage of ecological succession. This is evidence of the profound effect that oxygen depletion causes in the ecosystem function and energy flows.

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