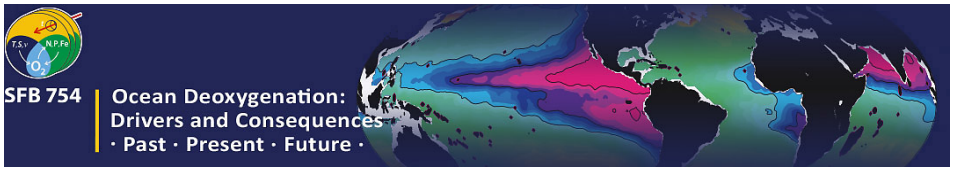

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A quantitative, late Pleistocene to Holocene bottom water oxygen record from the Peruvian Oxygen Minimum Zone (OMZ) based on benthic foraminiferal assemblages

Many paleo-proxy records from the mid-depth Eastern Pacific Ocean indicate an extension of oxygen-depleted conditions during the last deglaciation. The ensuing oxygen loss has not been quantified to date. Being one of the strongest and most pronounced OMZs in the world's oceans, the Peruvian OMZ is a key area to monitor such changes in bottom-water oxygenation in relation to a changing climate. We investigated the extension of the OMZ through time and space using four sediment cores from intermediate depths (600 - 1250 m) at the northern part of the Peruvian OMZ between 3°S and 8°S. A multiple regression analysis was applied to a comprehensive dataset of living (Rose Bengal stained) calcareous benthic foraminiferal faunas from the Peruvian continental margin. The oxygen concentrations close to the sea bed (BWO) during sampling periods were used as dependant variable. The correlation was significant ($R2 = 0.87$; $p < 0.05$) indicating that the prevailing oxygen concentrations are governing the foraminiferal assemblages. We applied the regression equation to four sediment cores from the lower OMZ and below, with emphasis on the late Holocene (LH), early Holocene (EH), Bølling Allerød (BA)/Antarctic Cold Reversal (ACR), Heinrich-Stadial 1 (HS1) and Last Glacial Maximum (LGM). The shallowest core (M77/2-47-2; 600 m) did not reveal major changes in BWO during the last deglaciation proposing that the OMZ has been relatively stable at these depths. The deeper cores on the other hand showed that BWO continuously decreased from ca. 50 µmol/kg to ca. 20 µmol/kg during the last deglaciation. This oxygen drawdown happened in particular during the BA/ACR. The oxygenation slightly increased during the Holocene.

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