Organic carbon preservation in sediments on the Peruvian margin

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Carbon cycling was examined in Peruvian margin sediments along a depth transect from 74 m water depth on the shelf down to 1024 m. This area lies within the Peruvian oxygen minimum zone, where bottom water oxygen was below detection limit down to ca. 400 m. Oxygen-deficient margins like Peru have been proposed to be sites of enhanced carbon preservation and petroleum-source rock formation. Using a combination of in situ flux measurements, sedimentary geochemistry and modelling, we could show that the organic carbon burial efficiency (CBE) was unusually low on the shelf (< 20 %) and unusually high (> 60 %) at the deep oxygenated sites when compared to an existing global database. Furthermore, organic carbon rain rates alluded to efficient mineralization of organic matter in the water column compared to other oxygen-deficient environments. In general, the observations at the Peruvian margin suggest that a lack of oxygen does not greatly affect the degradation of organic matter in the water column but promotes the preservation of organic matter in marine sediments. Are these somewhat unexpected observations real or are they biased by methodological and sampling artifacts? Our results are compared to data from the oxygen minimum zone on the Mauritanian margin (NW Africa) where minimum oxygen concentrations are relatively high (30-40 µM). Do the data together discern a role of oxygen on carbon preservation?