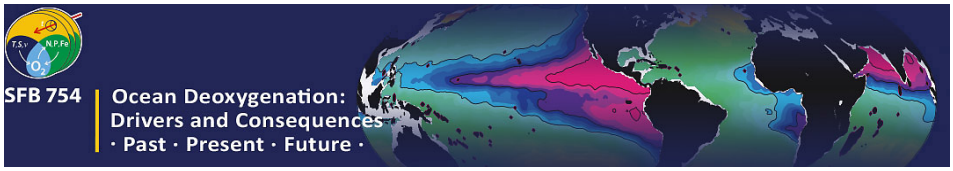

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Regeneration of phosphorus in the ocean during past greenhouse climates: role of redox conditions and impact on primary productivity

Friday, 7 September 2018 15:00 (15)

Phosphorus (P) is a key nutrient for marine primary producers. River input is the most important source of P in the ocean while its main sink is burial in marine sediments. Low oxygen in the ocean can lead to enhanced regeneration of P relative to carbon during degradation of organic matter in the water column and in sediments. This process can act as a positive feedback on marine productivity during intervals of widespread deoxygenation. As recycling leads to changes in the ratio of organic carbon to total sedimentary P (Corg/Ptot), this ratio is often used as a proxy for the reconstruction of past redox conditions and P recycling in sediments. However, other processes such as changes in sedimentation rates can also affect this ratio. Here, we compile and compare ratios of Corg/Ptot and other redox proxies in sediments for periods of widespread oceanic anoxia during past greenhouse climates to better understand and quantify the extent of redox-driven enhanced P recycling. We specifically focus on the Toarcian Oceanic Anoxic Event (T-OAE) and Oceanic Anoxic Event 2 (OAE2), two intervals of severe deoxygenation, and the Paleocene Eocene Thermal Maximum (PETM), an interval during which low oxygen conditions were not as widespread. For each period, we also discuss the relative importance of changes in external inputs of P from rivers to P recycling and the impact on primary productivity as deduced from proxy and modelling studies.

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