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Priming effects in marine sediments

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Continental margin sediments (<2000 m) cover merely 15 % of the ocean's seafloor but are responsible for more than 70 % of the global benthic mineralization. Understanding when these systems act as a source or sink of carbon (C) is thus of primary importance if we are to produce reliable global C budgets and predict the effects of future perturbations on the global C cycle. The chemical nature of organic matter (OM) is thought to be one of the major controls on the degradation/preservation balance in sediments; labile and refractory OM pools degrade at different rates but not independently. Priming effects (PE), i.e. changes in the decomposition of refractory organic matter following inputs of labile OM, have the potential to alter the C budget in sediments but have been largely ignored by marine scientists. Climate-driven changes in primary production, and land erosion and run-off are likely to change the quantity and composition of organic matter inputs in marine ecosystems and influence the magnitude and direction of PEs in seawater and sediments. Here, we attempt to evaluate the importance of priming effects on C cycling in marine sediments by use of labelled substrates of different quantity and quality in stable isotope tracer experiments and argue that PEs need to be incorporated in global change models.