VIEW ABSTRACT

EXPLORING THE INFLUENCE OF ORGANIC MATTER REACTIVITY ON BENTHIC-PELAGIC COUPLING ON THE GLOBAL COASTAL AND OPEN OCEAN (E)

Marine sediments are a key component of the global carbon cycle and climate system. The complex interaction of benthic biogeochemical processes controls not only the long-term burial of carbon, but also the benthic-pelagic exchange of nutrients, oxygen, dissolved carbon and alkalinity, with important implication for the biogeochemical dynamics of the sediment-ocean system. The degradation of organic matter (OM) is the engine behind this biogeochemical process interplay. As a result, the ability to quantify the rate of OM degradation in marine sediments and associated processes and fluxes is key to advancing our quantitative understanding of the climate system. Reaction-transport models (RTMs) are, in combination with field observations, ideal tools to quantify these rates and fluxes. Yet, their application on the global scale is severely limited by the lack of a generic framework with which to constrain OM reactivity. Previously published global estimates assume that OM reactivity decreases with water depth. However, a global compilation of field observations and local RTM studies indicate that such an assumption is overly simplified. Here we apply a RTM across a global ocean transect from the shallow coastal ocean to the abyssal ocean to explore the sensitivity of global benthic burial and exchange fluxes to OM reactivity. Results show complex patterns of OM degradation rates and associated redox fluxes, revealing non-linear properties which clearly are not only affected by water depth, but also by OM source and its transformation along its transportation pathway.

AUTHORS

Pika, P., University of Bristol, United Kingdom, philip.pika@bristol.ac.uk

Arndt, S., University of Bristol, S.Arndt@bristol.ac.uk

Eglinton, T., ETH Zurich – Swiss Federal Institute of Technology Zurich, Switzerland, timothy.eglinton@erdw.ethz.ch

S. Freitas, F., University of Bristol, United Kingdom, felipe.salesdefreitas@bristol.ac.uk

DETAILS

Oral presentation

Session #:013
Date: 03/01/2017
Time: 12:45
Location: 304 A/B

Presentation is given by student: Yes