Radiocarbon constraints on timescales of particulate organic matter transport over continental shelves

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Lateral transport and redistribution of sedimentary organic matter (OM) on continental shelves is increasingly recognized as a pervasive phenomenon that may exert a fundamental influence on the nature and efficiency of organic carbon (OC) burial [1], and also confound sedimentary records [2]. However, much remains to be understood concerning hydrodynamic controls on sedimentary organic matter dispersal, and in particular on associated transport times. In order to investigate and place quantitative constraints on these processes, we have analyzed a suite of surface sediment samples collected near the mouths of the Yellow River and Yangtze River and along corresponding sediment transport pathways in the adjacent Chinese marginal seas. Here we present ^{14}C measurements on bulk sediment, and on specific organic matter fractions separated as a function of sediment grain size, thermal lability, and molecular specificity for surface sediment samples collected along dispersal pathways. We use resulting data to estimate the lateral transport time of OM associated with different grain size fractions, and to examine the influence of sediment resuspension and dispersal on the amount, composition and age of OC that is ultimately buried. Our findings suggest that hydrodynamic sorting both influences lateral transport time-scale and exacerbates OC ^{14}C age heterogeneity, particularly under the high-energetic conditions that commonly prevail in shallow continental shelf environments.

[1] Keil, *et al*. (2004) *Marine Chemistry* **92**: 157-165.
[2] Ohkouchi *et al*. (2002) *Science* **298**: 1224-1227.