Diverse origins and pre-depositional histories of organic matter in contemporary Chinese marginal sea sediments

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We examine the Bohai/Yellow Sea in order to further our understanding of sedimentary OC delivery, translocation and accumulation in a shallow marginal sea system. Carbon isotopic compositions of lipid biomarkers were determined for a suite of surface sediment samples. Variable $\delta^{13}C$ values and contemporary radiocarbon ages of short-chain *n*-fatty acids (FAs; C_{16}, C_{18}) reflect autochthonous marine and/or fresh terrestrial plant inputs. In contrast, extremely depleted $\Delta^{14}C$ values of short-chain *n*-alkanes (C_{16}, C_{18}) suggest a predominant input from sedimentary rocks (petrogenic OC) or petroleum. Abundance-weighted average $\delta^{13}C$ and $\Delta^{14}C$ values of long-chain leaf wax lipids ($C_{26+28+30}$ FAs, $C_{24+26+28}$ alkanols, $C_{27+29+31}$ alkanes) indicate that terrestrial OC delivery is dominated by pre-aged (~3000−5000 ^{14}C yrs) C_3 plant sources.

Source apportionment estimates using a coupled carbon isotopic model indicate that 35 − 64% of sediment OC reflects modern, 24−49% is pre-aged (soil), and 7−26% is fossil in origin. Pre-aged soil OC is most prominent in front of the modern and Old Huanghe (Yellow River) delta, whereas petrogenic OC is most significant north of the Old Huanghe mouth. About 3.02 and 0.98 Mt/yr of OC in surface sediments is derived from plant-derived pre-aged soil OC and reburial of ^{14}C-depleted fossil OC, respectively, corresponding to 36% and 11% of sediment TOC. These data imply efficient OC burial in adjacent delta and shelf environments (100% for pre-aged soil OC; 70% for fossil OC). Re-burial of these two pools of terrigenous OC exerts little influence on the modern carbon cycle (<100 yr).

Acknowledgement: This study is supported by NSFC Grant No. 41520104009, the “111” Project (B13030) and SNF Grant No. 200021_140850.