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Apparent Aging and Rejuvenation of Terrestrial Organic Carbon Along the River-Estuary-Coastal Ocean Continuum

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The balance between remineralization and sedimentary burial of terrestrial organic carbon (OC_{terr}) in large river-dominated marginal seas influences atmospheric CO_2 inventory on a range of timescales. Here we systematically investigate the evolution of OC_{terr} along the river-estuary-coastal ocean continuum for three fluvial systems discharging to the Chinese marginal seas. The ^{14}C -depleted characteristics of bulk OC and molecular components of riverine suspended sediments and marine sediments suggest that the Chinese marginal seas are a significant sink of pre-aged OC_{terr} . Lower plant-wax fatty acid ^{14}C contents suggest selective degradation of labile OC within estuaries, resulting in apparent aging of OC_{terr} , followed by an apparent rejuvenation in OC_{terr} in shelf sediments, the latter likely reflecting inputs from proximal sources that contribute younger OC_{terr} . This selective degradation, aging and rejuvenation of OC_{terr} along the continuum confounds the use of plant wax lipid ^{14}C to constrain lateral transport times, and sheds light on more complex OC_{terr} dynamics in marginal seas.