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A multiproxy approach to constrain the source, composition and reactivity of sedimentary organic carbon in the eastern Yellow Sea (the northwestern Pacific)

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We investigated the source, composition and reactivity of sedimentary organic carbon (OC) in a river-dominated continental marginal sea, the eastern Yellow Sea. A multi-proxy approach was applied to 9 riverbank sediments and 69 marine surface sediments, combining bulk and molecular organic parameters. The sedimentary OC in the marine surface sediments appears to have a predominantly marine origin (on average C/N ratio=7.0±0.6 and δ13CTOC=–21.9±0.5‰ n=69) with minor contribution of continental (i.e. soil- and lake/river-derived) OC (on average BIT index=0.00±0.01, n=69). However, the 14C values were depleted (on average –227±53‰ n=8), indicating that about 18-33% of ancient OC, potentially derived from erosion of sedimentary bedrocks or from fossil fuels such as petroleum might be added to the sedimentary OC pool. The possible contribution of petroleum-derived OC was confirmed by Carbon preference indices (CPI) of n-alkanes (<1). Accordingly, our results highlight an important contribution of ancient OC in the eastern Yellow Sea. Nonetheless, more work is needed to better constrain the source, composition, and age of the organic material supplied to the eastern Yellow Sea, given the lack of biogeochemical data from the Korean rivers.