Insight into organic carbon provenance and preservation in coastal sediments based on a multiple organic geochemical approach

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Burial of organic carbon (OC) in marine sediments sequestrates carbon from more rapidly cycling carbon pools for geologic time scale, which acts as a temporal and spatial integrator of numerous biogeochemical processes. However, the provenance and transformation of organic matter (OM), and the mechanisms controlling the degradation and preservation of sedimentary carbon remain elusive. Such is particularly true for large river dominated margins because of significant mixing of organic carbon with different sources (terrestrial vs. marine) and biogeochemical behaviors. In this study, seven cores were collected from northern China marginal seas (six from the Bohai Sea and one from the Yellow Sea), which are subject to the strong influence of the Yellow River and/or Yangtze River. We analyzed/will analyze elemental compositions (OC, N, OC/N), stable carbon isotope ($\delta^{13}C$), biomarkers, ^{13}C solid NMR and radiocarbon to discuss the origin, form, accumulating rate and preservation of OM. Solid-state ^{13}C NMR spectroscopy is an excellent tool for determining the mechanisms by which OC is preserved in the ocean, and thereby can provide quantitative molecular compositions. Radiocarbon data reveal the age of the OM itself and therefore shed light into the source and delivery mechanism of sedimentary OM. Furthermore, we will discuss the composition and distribution of organic carbon among different size fractions: fine (<50um) and coarse (>50um) material in order to determine how important mineral protection of OM preservation. One of the highlights of our work is simultaneously investigation for seven cores which provides an opportunity to evaluate the relative importance of a variety of factors such as organic matter source, mineral composition, sea current and even human disturbance on organic carbon burial in coastal seas, although further studies are definitively needed to fully understand the mechanism of organic carbon sequestration in seas.