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# Spatial distribution of lipid biomarkers, dinoflagellate cysts and pollen in coastal marine surface sediments in the northern Gulf of Mexico

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Rivers form a crucial part in the global carbon cycle by transferring terrestrial organic carbon (TerrOC) from land to the coastal zone. Upon burial in marine sediments, TerrOC may be a significant long-term carbon sink. However, much remains unknown about the dispersal of different types of TerrOC in the marine realm upon fluvial discharge, and the influence of this terrestrial input on coastal marine productivity, mostly due to the use of bulk OC parameters that do not reach the required level of source- and process-specific information.

This study aims to characterize TerrOC in marine surface sediments along transects offshore the Mississippi and Atchafalaya river mouths using sediment bulk properties, pollen and lipid biomarkers.

The latter allow to disentangle contributions of higher plants (long-chain odd numbered *n*-alkanes) and soil, fluvial and marine (branched and isoprenoid GDGTs, long-chain diols, alkenones) produced organic matter. Additionally, dinoflagellate cysts are used to assess the marine productivity in the coastal zone.

Our data show that soil-derived OC (indicated by the Branched and Isoprenoid Tetraether (BIT) index) and pollen grains are most abundant near the Mississippi river mouth and decrease rapidly further offshore, while *n*-alkanes remain abundant also in deeper waters. Dinocysts indicate higher abundances of autotrophic species in the open ocean, while heterotrophic species are dominant near shore, reflecting enhanced nutrient input from land and higher marine productivity close to shore, as supported by C/N ratios of the bulk sediment and the higher soil OC and pollen.

Based on our multi-disciplinary approach we show that different types of TerrOC have distinct dispersal patterns upon discharge, highlighting the benefit of including lipid biomarkers and palynology in addition to bulk sediment data to characterize the OC pool in marine sediments.