Transport of organic carbon and mineral associations from soil to sea in the Godavari River Basin (India)

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The Godavari River Basin, located in Central India, is a dynamic system that is driven by the Indian Summer Monsoon. Source-to-sink transport of organic carbon and mineral fractions is linked via rivers, which play a crucial role in carbon cycling via fluvial outgassing or burial in marine sediments and formation of paleoclimate-archives. Down-core records in front of the Godavari mouth have revealed aridification of the basin by alternations from C_3 to C_4 vegetation since the Holocene [1]. However, changes in the provenance of material transported by the Godavari River may have implications for the interpretation of these archives. Hence, detailed records of organic carbon and mineral constituents in the modern-day Godavari River Basin will allow identification of provenance (changes) of particulate matter exported from the Godavari River.

Here we present the combined records of origin, transport and deposition of soils, sediments and suspended particulate matter (SPM) in the Godavari River Basin based on the occurrence and distribution of soil microbial membrane lipids (brGDGTs) and mineral composition. We further evaluated the isotopic signatures of organic carbon and river water throughout the basin. Our multi-proxy record indicates that fluctuations between the Monsoon season and dry season are profound, with changing origin of the organic carbon. SPM exported to the delta in the Monsoon season carries a soil-derived signal originating from the northern headwaters, whereas in the dry season the organic carbon is dominated by aquatic contribution. Notably, the western tributaries reveal a year-round aquatic source of organic carbon, in line with the water isotopic composition showing continuous evaporation. The diverse geological substrates across the basin yield distinguishable source areas based on mineral composition. Chemical analysis of sediments reveals a different behaviour for the transport of organic carbon and mineral fractions.

[1] Ponton *et al.* (2012) *GRL* **39**, L03704.