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Deposition and fate of organic carbon in floodplains along a tropical semi-arid lowland river (Tana River, Kenya)

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Inland organic carbon (OC) burial by sedimentation has recently been shown to be an important component in river catchment carbon(C) budget. However, data on OC burial by sedimentation are hitherto largely limited to temperate zones. We investigated the deposition and fate of sediment-associated OC in the floodplains of a tropical lowland Tana river (Kenya), between two main gauging stations (Garissa and Garsen). Freshly deposited surface sediments and sediment cores were sampled and analysed for OC and total nitrogen content, stable isotope signatures (δ13C) of OC, and grain size distribution. In addition, we incubated sediment cores to quantify CO_2 production as a proxy of OC mineralization. The floodplain receives sediment with a relatively low OC content (1.56$\pm$0.42%), sediments are enriched with OC inputs from floodplain vegetation to levels above 3%. Sediment cores show a sharp decrease of OC with depth, from 3 - 12%C in the (sub) surface to less than 1%OC below $\sim$60cm depth. Relatively high and deep OC mineralization rates (0.14$\pm$0.07mol CO_2 kg-1C d-1) were recorded. We used our data to make a first assessment of the carbon burial efficiency of the Tana river floodplain: in contrast to what is observed in temperate environments, over 50% of carbon present in the top layers is lost in less than a century. While significant amounts of OC are deposited in the Tana river floodplain, the high post-depositional loss limits the long-term C sink.