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Seasonal dynamics of organic carbon in the Tana River Basin, Kenya

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Abstract

The Tana River is the longest river system in Kenya (∼1300 km), with a total catchment area of ∼130,000 km^2. Here, we present data on the seasonal dynamics of suspended sediment and organic carbon, based on monthly sampling of two sites established along Tana River mainstream, for a period of three years between January 2009 to December 2011. Total suspended matter (TSM), particulate and dissolved organic carbon (POC and DOC) concentrations, and their isotopic composition (δ13CPOC and δ13CDOC) were determined. The discharge measurements ranged from 20 to 765 m3s-1. The concentrations of TSM (66 to 5128 mg L-1), POC (1.3 to 80.1 mg L-1) and DOC (1.3 to 3.3 mg L-1) were highly episodic, and maximum concentrations for both TSM and POC preceded peak discharge, suggesting release of relatively mobile sediments during initial peak discharge. There was a strong seasonal patterns for both δ13CPOC signatures 7.4 ‰ (-28.4 to -21 ‰ and δ13CDOC signatures 5.9 ‰ (-25.7 to -19.8‰. δ13C signatures increased markedly during periods of high discharge, and decreasing towards predominantly C3 signatures towards the end of dry periods. This suggests that high organic matter mobilization during high flows occurs mostly in areas with significant grassland cover (C4). However, the seasonal pattern for δ13CPOC signatures was more pronounced compared to δ13CDOC signatures. There was seasonal pattern of low POC:PN and high %POC/TSM during low hydrograph and vice versa suggesting contribution from direct plant litter input from riverine vegetation.