DOC transport and export in a dynamic tropical catchment


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Abstract

Dissolved organic carbon (DOC) transport and export from headwater forests into freshwaters in highly dynamic tropical catchments are still understudied. Here, we present a DOC analysis (2017) in a pristine and small (~2.6 km²) tropical catchment of Costa Rica. Storm flows governed a rapid surface and lateral allochthonous DOC transport (62.2% of the annual DOC export). Cross-correlation analysis of rainfall and stream discharge indicated that DOC transport occurred on average ~1.25 hours after the rainfall maxima, with large contributions of event water, ranging from 42.4±0.3% up to 98.2±0.3% of the total discharge. Carbon export flux (annual mean=6.7±0.1 g C m⁻² yr⁻¹) was greater than values reported in subtropical and temperate catchments. Specific ultraviolet absorbance indicated a mixture of hydrophobic humic and hydrophilic non-humic matter during both baseflow and storm events. Our results highlight the rapid storm-driven DOC transport and export as well as low biogeochemical attenuation during baseflow episodes in a climate sensitive hotspot. By understanding the key factors controlling the amount of organic carbon transported to streams in dynamic tropical landscapes, better global and catchment-scale model assessments, conservation practices, and water treatment innovations can be identified.

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