

Publication

Storm pulses and varying sources of hydrologic carbon export from a mountainous watershed

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Author(s) Jung, Byung-Joon; Lee, Hyun-Ju; Jeong, Jong-Jin; Owen, Jeffrey; Kim, Bomchul; Meusburger, Katrin; Alewell, Christine; Gebauer, Gerhard; Shope, Christopher; Park, Ji-Hyung

Author(s) at UniBasel Alewell, Christine ; Di Bella, Katrin ;

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Although soil erosion and leaching can transfer a substantial portion of the annual terrestrial carbon (C) increment to aquatic systems, little is known about rapid changes in the amount and characteristics of soil organic C exported from mountainous watersheds during storm events. To trace short-term changes in sources and characteristics of soil organic C exported during storm events, we investigated storminduced changes in concentrations of particulate and dissolved organic C (POC and DOC) and the stable isotope composition of suspended sediment (SS) in a mountainous, mixed land-use watershed in northern South Korea. Biweekly stream sampling in a headwater forest stream and a watershed outlet receiving agricultural runoff showed that concentrations of SS and POC were higher in the watershed outlet. In both the forest stream and outlet, POC concentrations were lower than DOC concentrations during baseflow, but increased rapidly with rising discharge during intense storms, resulting in higher peak POC concentrations than peak DOC concentrations. When (delta C-13 and (delta N-15 were compared between SS and potential source soils during three storm events. SS delta C-13 and delta N-15 in the forest stream were similar to forest floor (delta C-13 and delta N-15. SS delta C-13 and delta N-15 in the watershed outlet reflected the contribution from forest and cropland mineral soils during peak flow, with sand-size SS displaying increasing (delta C-13 and delta N-15 with rising rainfall intensity. The results suggest that storm pulses of POC can be a transient, but dominant pathway of hydrologic C export overwhelming DOC export and that POC sources and characteristics can rapidly change corresponding to varying rainfall intensity. (C) 2012 Elsevier B.V. All rights reserved.

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