

A toolbox for sediment budget research in small catchments

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Abstract

© 2017, Lomonosov Moscow State University. All rights reserved. Sediment monitoring and assessment remain one of the most challenging tasks in fluvial geomorphology and water quality studies. As a response to various environmental and human disturbance effects, the main sources and pathways of the sediments transported within catchments, especially most pristine small one, may change. The paper discusses state-of-the-art in the sediment budget research for small catchments. We identified nine independent approaches in the sediment transport assessment and applied them in 11 catchments across Eurasia in the framework of an FP-7 Marie Curie-International Research Staff Exchange Scheme in 2012-2016. These methods were classified as: i) Field-based methods (In-situ monitoring of sediment transport;-Soil morphological methods and dating techniques; Sediment source fingerprinting; Sediment-water discharge relationships), ii) GIS and remote sensing approaches (Riverbed monitoring based on remote sensing/historical maps; parametrization of the channel sediment connectivity; Sediment transport remote sensing modeling), and iii) Numerical approaches (Soil erosion modeling and gully erosion (stochastic and empirical models); channel hydrodynamic modeling). We present the background theory and application examples of all selected methods. Linking fieldbased methods and datasets with numerical approaches, process measurements as well as monitoring can provide enhanced insights into sediment transfer and related water quality impacts. Adopting such integrated and multi-scale approaches in a sediment budget framework might contribute to improved understanding of hydrological and geomorphological responses.

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Keywords

Erosion modeling, Erosion processes, Sediment budget, Suspended sediment

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