



How can we extract the information gathered in existing rockfall studies for sediment budget estimations - A conceptual approach

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Rates of back-weathering (rockwall retreat) and rockfall (scree) supply are important parameters for sediment budget estimations in montane, alpine and arctic environments. The rates that are integrated in modelling approaches derive from a few existing studies that have been conducted in Northern Europe, the European Alps and the Canadian Rocky Mountains. Even if those rates differ strongly in response to environmental conditions, they are in most cases applied without adjustments for different environmental settings. Therefore, this article discusses the main parameters that need to be considered (i) when results of different rockfall studies are compared, (ii) when results are extrapolated from one location to another and (iii) those that must be included when results are extrapolated across time. To achieve these goals it is primarily necessary to make a distinction between the rate of back-weathering and rate of rockfall supply as they show significant discrepancies through time and respond to different control parameters. These differences result from the filling and depletion of intermediate storages which appear to be a significant noise included in many short-term rockfall studies. The second step that is vital for the comparison of rockfall studies is to define which types of studies are prone to deliver an output that can either be interpreted in terms of back weathering or rockfall supply. Finally, the extrapolation of rockfall studies requires an enhanced understanding of nonlinearities inherent in response functions that can in some cases be derived from ergodic relations between space and time. It is the authors' opinion that a knowledge-based re-evaluation

of existing rockfall studies including our present understanding of response functions, nonlinear systems and ergodic relations is needed to provide a systematic basis for rockfall sediment budget estimations.