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SETRAC - A sediment routing model for steep torrent channels

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Compared to lowland gravel bed rivers, relatively few studies were made on sediment transport in steep headwater channels, with stream gradients steeper than about 0.05. Sediment transport dynamics in these channels may be quite different from low-gradient channels.

A one dimensional sediment routing model for steep torrent channel networks called SETRAC has been developed at University of Natural Resources and Applied Life Sciences, Vienna. SETRAC is the acronym for Sediment Transport Model in Alpine Catchments. The channel network is based on nodes and sections. Cross sections are assigned to every node. In SETRAC, the water runoff is given as input hydrographs at discrete points. A kinematic flow routing of the flood hydrograph is performed in the channel network. A sediment transport formulae for steep channels and different flow resistance approaches are implemented in SETRAC. The sediment is transferred through the channel network considering sediment budget in sections. Initial sediment stock can be assigned for each channel reach. Sediment can also be fed as sediment graph at nodes.

At a first step the emphasis of the application of SETRAC is a comparison of the order of magnitudes between observed and modeled sediment transfer along the torrent channel. For that purpose the model is applied to well documented case studies on flood events in torrent catchments with substantial sediment transport in the Austrian Alps.

The main objective of this contribution is to present the SETRAC model and to discuss first results of a model application.