Project acronym: SED-TRAC

Project title: Fluvial sediment transport characteristics in periglacial and glacial environments of Northern Sweden

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Discipline: Earth Sciences & Environment

Station(s): Tarfala Research Station (Sweden)

The sediment transport and mass wasting processes in glacial and periglacial regions have been investigated in a range of studies at different places around the globe over the years. In many regions, like in the Tarfala River catchment, these processes are increasingly impacted by climate change (Jansson et al., 2005). Additionally, anthropogenic pressures like mining activities (e. g. from the large iron ore mines in and around Kiruna that adjacent to the Tarfala River catchment) have a significant influence on the runoff and sediment transport regimes in these sensitive regions.

Few studies have suggested new drivers of sediment transport that arise due to thinning of the glaciers fronts. Sediment transport in and to river channels is strongly influenced by climatic conditions, particularly when heavy precipitation and warmer climate triggers high-concentrated flows in association with snow/glacier melting in the catchment area. Tarfala River catchment was selected as a representative area for field-based study on the impact of climate change on sedimentation rates and relative contributions of different sediment sources input to the river sediment discharges.

The project is focused on the topic of climate change influence on water and sediment discharges in high mountains polar area and additional influences on water and sediment pathways and intensity of different denudation processes (influence on sediment transport in river system). One of the research aims is Sediment Budget estimation. The watershed is considered as a complex system, which is divided to sub-systems, depending on the type of the surface. In-channel erosion is considered as an additional source of the sediments in total sediment yield. A range of investigative methods like in-situ monitoring, Cs-137 inventory, erosion modelling and geochemical fingerprinting underlie the preformed field activities. A comparative application of these in the proposed study can help to investigate the applicability of these methods in Northern Sweden and other polar & mountainous regions (e. g. Djankuat River in Russian Caucuses mountains) during the summer melt season using and increase process understanding. The ability to estimate the rate of watershed surface erosion, sediment transport, scour and deposition in a river system and sediment deposition and redistribution in a basin is essential to the sustainable development due to increasing of human pressure on these sensitive regions.