



Application of geomorphological mapping and fingerprinting to identify the different suspended sediment sources of the glaciated Djankuat catchment, Caucasus mountains

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Suspended sediment yield values from glaciated mountain catchments are often among the highest in the world. Nonetheless, the sediment sinks, sources and dynamics can be highly variable in such environments under climate change. The aim of this study is to quantify the different suspended sediment sources of the Djankuat river catchment ($A=9,1 \text{ km}^2$). This small high mountain stream is located in the Caucasus mountains. It is partly glaciated with steep slopes, alpine meadows and glacial-nival terrains. Large scale geomorphological mapping of the catchment was undertaken using drone images and field surveys. This allowed to identify the main sediment sources as well as key pathways of the sediment to the river. In addition, about 50 composite surface (topsoil) and subsurface (riverbanks) samples were collected within the catchment area to characterize the different sediment sources. Two different mixing models (fingerPRO and SIFT) were applied to evaluate the relative contribution of these sources to river suspended sediment yield. Furthermore, direct measurements of water discharge and turbidity were undertaken at two gauging stations. One of them was located near the edge of glacier and the other about 1 km downstream. This allowed to evaluate the relative contribution of the glacial and proglacial part of the catchment to the total suspended sediment yield. Overall, these independent approaches resulted in relatively similar estimates of the relative importance of the different sources to suspended sediment yield. It has been established that the proportion of glacial material (generated by glacier erosion, including subsurface and supraglacial runoff) in total suspended sediment load decreases from 80-90% at the first 50-100 m from the glacier edge to 60-70% at a distance of 700-1000 m.

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