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Mechanical and chemical denudation in two glacier-fed mountain catchments in Nordfjord, western Norway (Erdalen and Bødalen)

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High-resolution surface process monitoring and analysis in the glacier-fed Erdalen and Bødalen catchments, situated in the steep fjord-landscape of western Norway (inner Nordfjord), indicate that there are significant intra- and inter-annual variations with respect to fluvial sediment transport rates and sediment yields.

Three different periods with a high frequency of major discharge events can be identified over the year, with these three periods showing a significant inter-annual variability. High runoff in spring (April - June) is mainly caused by snowmelt whereas major discharge events in summer (July - August) are due to thermally caused glacier melt. In autumn (September - November), major discharge events are associated with heavy rainfall events. Autumn is in Erdalen the clearly most important period with respect to fluvial sediment transport and fluvial sediment yields.

The intensity of fluvial transport in autumn and over the entire year depends in both catchments strongly on the annual number of heavy rainfall events that trigger transfers of sediments from slopes into channels via saturation overland flow with connected slope wash and debris flow events. Annual suspended sediment yields are about two times greater than annual solute yields corrected by atmospheric inputs. Suspended sediment concentrations in glacier melt water during summer show a high spatial variability within Erdalen and Bødalen.

Both sediment yields during glacier melt and annual sediment yields in Erdalen and Bødalen are lower than in many other glacierized catchments worldwide. Fluvial sediment transport and fluvial sediment yields are altogether supply-limited. Because of the quantitative importance of single meteorological events for fluvial sediment transport and yields, and the high intra- and inter-annual variability of sediment yields, process monitoring and analysis will be continued for several more years to be able to calculate more reliable annual sediment yields and denudation rates.

Contemporary fluvial sediment yields are integrated with subrecent (following the Little Ice Age advance) sedimentation rates in lakes in Erdalen and Bødalen.