



Differentiated pathways of debris removal along a trunk valley during accelerated glacial recession. Examples from Vallouise area (Southern French Alps) since 1950.

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During the deglaciation period the main valley glaciers are broken up into small independent glaciers (hanging and cirque glaciers) that may remain during many decades. This pattern is common in the Massif des Ecrins (French Alps) more specifically in the Vallouise area. These small glaciers have evolved at their own pace, with lateral and longitudinal paraglacial readjustments and glacio-fluvial processes characterized by varying rates of activity and debris removal.

We carefully documented the evolution of the trunk and small tributary glaciers and their margins, with the help of archive documents (aerial photographs, old maps), field investigations and GIS application. We show how the sediment fluxes may greatly vary according to the existence of glacial remnants (lateral and frontal morainic ridges) left by the trunk valley glacier during its retreat, and to the possibilities of partial or complete damming that may be effective typically during a one-to-ten year period. At the trunk valley scale, the recently deglaciated zone can be opposed to the formerly proglacial zone. In the recently deglaciated zone, the morainic dams temporarily interrupted the sediment cascade system, forcing local aggradation and inducing change in the glacio-fluvial pattern downstream. In the formerly proglacial zone, the export of

sediment was never totally interrupted. Mountain slopes are still affected by slope dynamics (debris flow; ice-, snow- and debris-avalanches), very much influenced by sediment export from hanging or cirque glaciers, thus reducing the area of the proglacial zone and favouring stream incision.

We propose a simple model to understand, at a fine timescale, the rate of sediment export within a catchment subject to deglaciation. The availability of sediments is indeed of prime importance to understand the rate of torrential activity in mountain areas, and furthermore to assess the natural hazards which may occur. In Vallouise area, such hazards may endanger tourism infrastructures (i.e. base camps, motor roads and footpaths, etc.).