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Geomorphology and dynamics of supraglacial debris covers in the Western Alps

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In the alpine regions of France and NW Italy, many glaciers of a variety of sizes are at least partly debris-covered, but these have received less scientific research than clean glaciers. During the present period of glacier shrinkage – the area of glacier cover in France has reduced by 26% over the last 40 years –, growing debris cover needs to be understood as an influence on continuing retreat, with consequences for natural hazards, water resources and tourism.

We present the results of a combined ongoing study of an inventory of debris-covered glaciers in France with site-specific studies of c. 12 glaciers of contrasting types, in order to understand spatial and temporal changes in supraglacial debris cover. Our specific aims are:

1. To understand the geomorphology of debris-covers and their formation, investigating the types of debris cover in relation to formative processes including extraglacial supply and development during transport.
2. To document the changing extents of supraglacial debris covers, using historical documents and aerial photographs.
3. To interpret areal changes in terms of glaciological and topographical controls on different glacier and debris cover types (catchment morphology, glacier structure, mass balance history, and rock wall collapse magnitude and frequency).
4. To understand the effect of debris cover on glacier dynamics and geomorphological evolution, related to insulation-related modifications to AAR, long profiles, and length changes on both short and long timescales. This includes investigation of the characteristics of debris-covered glacier depositional systems resulting from their modified dynamics.