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Multiple controls on glacier dynamics in the Copper River Basin, Alaska

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In the Copper River Basin, south-central Alaska, glaciers are shaped by a complex set of various processes acting on different temporal and spatial scales. Beside climatic controls, they are strongly influenced by unsteady inputs of large landslides related to the vicinity to the active tectonic system (with earthquakes such as the one of 1964 with a magnitude of 8.4 on the Richter scale). Thick debris insulates the ice and retards glacier thinning and retreat. This protective effect is enhanced when vegetation becomes established on glacier debris cover and cools the glaciers surface. However, debris and vegetation may also impede drainage and lead to lake formation and growth. In addition, some glacier fronts are influenced by calving processes.

These multiple controls make this glacial environment highly dynamic and susceptible to changes. Accordingly, glaciers in the Copper River Basin are loosing mass and area, consistent with Alaska's general trend and recent climatic developments. Other factors can exceed or negate climatic influences on individual glaciers or parts of glaciers.

We present here first analyses within a multi-disciplinary project, with a focus on ground-based field campaigns and complementary remote sensing studies.