

200 years of geomorphic history of the Arveyron of the Mer de Glace

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Present Mer de Glace shrinking is fast and outstanding. Beyond the impact on the landscape, the retreat of the glacier tongue has deep and concrete effects downstream on the Arveyron of the Mer de Glace which is the emissary of the glacier. Moraines which are discovered by the ice could be a strong risk since they represent a potential volume of sediment which could increase the geomorphic activity of the stream. However, the results of our researches are counterintuitive. Since end of the Little Ice Age, 200 years ago, the Mer de Glace retreat has implied a decreasing activity of the Arveyron because of the longer distance between the valley

bottom and the active proglacial margin. At the early 19th century, the glacier's tongue reached the Chamonix valley bottom, 2.5 km away from the downtown. Thus, the level of sediment connectivity between the proglacial margin and the Arve river, which is the trunk stream of the valley, was very high as illustrated by the existence of several emissaries which are now totally extinct. Presently, the end of the Mer de Glace takes place in a hanging valley, more than 5 km away from Chamonix. The proglacial margin is very active, especially because of the erosion of the large right lateral moraine, but this geomorphic activity hasn't spread downstream. Consequently, the level of sediment connectivity with the Arve river is now very low, even if the current evolution of the Arveyron is also linked to the presence of an unique hydropower plant which withdraws the main part of the water flow below the Mer de Glace. However, this global trend doesn't exclude high magnitude events, such as the – not famous but highly morphogenic – 1920's water pocket outburst flood.