

## **Multi-decadal evolution of ice/snow covers in the Mont-Blanc massif (France)**

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Dynamics and evolution of the major glaciers of the Mont-Blanc massif have been vastly studied since the XXth century. Ice/snow covers on steep rock faces as part of the cryosphere however remain poorly studied with only qualitative descriptions existing. The study of ice/snow covers is primordial to further understand permafrost degradation throughout the Mont-Blanc massif and to improve safety and prevention for mountain sports practitioners. This study focuses on quantifying the evolution of ice/snow covers surface during the past century using a specially developed monoplottting tool using Bayesian statistics and Markov Chain Monte Carlo algorithms. Combining digital elevation models and photographs covering a time-span of 110 years, we calculated the ice/snow cover surface for 3 study sites — North faces of the Tour Ronde (3792 m a.s.l.) and the Grandes Jorasses (4208 m a.s.l.) and Triangle du Tacul (3970 m a.s.l.) — and deduced the evolution of their area throughout the XXth century. First results are showing several increase/decrease periods. The first decrease in ice/snow cover surface occurs between the 1940's and the 1950's. It is followed by an increase up to the 1980's. Since then, ice/snow covers show a general decrease in surface which is faster since the 2010's. Furthermore, the gain/loss during the increase/decrease periods varies with the considered ice/snow cover, making it an interesting cryospheric entity of its own.