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# Demystifying the end of the Little Ice Age: first tests simulating the Rhône Glacier with Úa

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At the end of the Little Ice Age (around 1850), glaciers in the Alps reached their last maximum extent. However, it is still uncertain what caused the preceding advance and the following retreat. Several studies have concluded that temperature alone cannot explain this behaviour. A precipitation increase of about 25% could explain the anomaly, but this is not supported by observations. Further processes have been proposed, including changes in solar radiation (due to either solar activity variations or aerosols in the atmosphere), surface impurities on ice and snow, and dynamical effects in both the atmosphere and the glaciers. We want to test some of these processes in a model study and determine their relative importance by coupling the ice flow model Úa to a mass balance model.

In a first step, we are assessing the performance of Úa, which has previously been used primarily for simulations of the Greenland and Antarctic ice sheets, in the Alpine environment in the period for which observational data is available, i.e. from the late 19th century until now. The Rhône Glacier has particularly long data series of length change, surface mass balance, ice flow speed, and geometry change, and is thus used for these initial tests. We simulate the advance and retreat of the Rhône Glacier around the Little Ice Age maximum with Úa based on temperature and precipitation reconstructions, investigate how it reacts to changes in climate and model parameters, and compare the results with observations.