An updated LIA glacier length record for the central and western European Alps based on historical data

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Introduction

At the end of the 19th century, the first accurate measurements of glacier length fluctuations were carried out. Unfortunately, the preceding time of the Little Ice Age (LIA) is not documented by instrumental data, and interdisciplinary approaches that use both historical and physical methods are needed to reconstruct the behaviour of glaciers back in time.

Study sites

Methods

The analysis and interpretation of historical documents (drawings, paintings, prints, photographs, maps, written accounts) allows the determination of former glacier extents. Regarding pictorial documents, three conditions have to be fulfilled in order to obtain reliable former glacier extents (1):

1. The dating of the pictorial document has to be known or reconstructed.
2. The glacier and its surroundings have to be represented realistically and topographically correctly (which implies certain qualities of the picture and skills of the corresponding author).
3. The artist’s position in the field should be known.

Historical material is only available in any adequate quantity for those glaciers which drew the attention of travellers, scientists and artists through their reputation and scenic attraction. Besides, other evidence such as moraine findings, fossil trees in the glacier foreland and archaeological findings complete the task (2, 3).

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Cumulative glacier length changes relative to the maximum extent during the LIA.

Sources:


Rhône Glacier forfield according to S. Birmann

The analysis of historical sources and the hereby derived quantitative data are the prerequisite to study the connection between climatic driving factors and glacier changes. Using high-resolution climate reconstructions (temperature, precipitation), it can be showed that different configurations of climate variables lead to a glacier advance/retreat (3, 4).

References


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