

Integration of historical glacier images into the Euro-Climhist database

Christian Rohr¹, Samuel U. Nussbaumer², Céline Walker², Corina Haller¹, Tamara T. Widmer¹, Matthias Fries³, Lukas Würsch³, and Heinz J. Zumbühl⁴

¹ University of Bern, Institute of History, Bern, Switzerland (christian.rohr@unibe.ch)
² University of Zurich, Department of Geography, Zurich, Switzerland (samuel.nussbaumer@geo.uzh.ch)
³ University of Bern, Centre for Development and Environment, Bern, Switzerland
⁴ University of Bern, Institute of Geography, Bern, Switzerland



Climate history made freely accessible

Research into climate history is based on historical **climate data**: Information on weather, whether measured or noted by accident, is one of its most important foundations. Such data are **freely accessible** on Euro-Climhist (<https://www.euroclimhist.unibe.ch>).

The website offers a concise introduction to climate history in **German, English, French and Italian**.

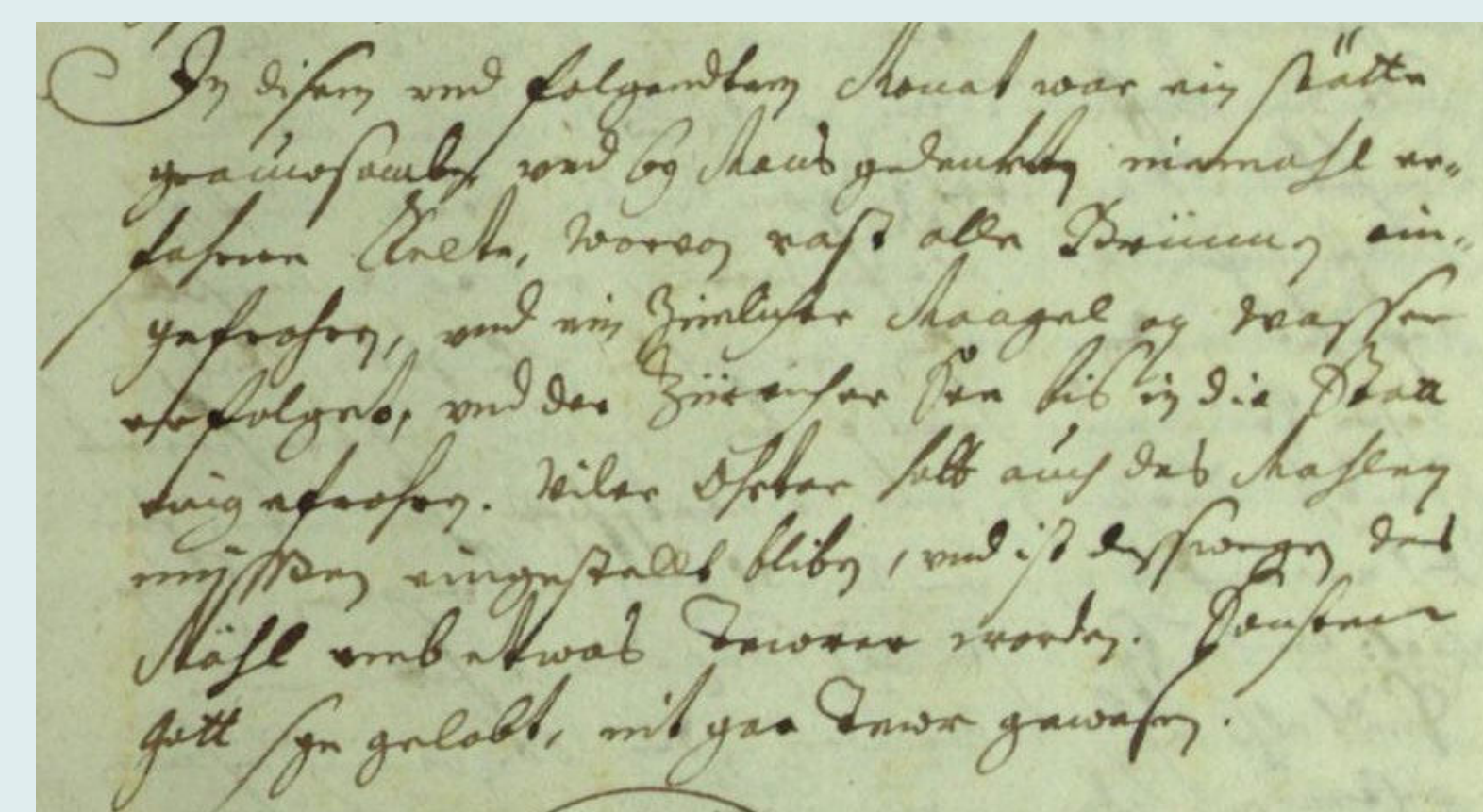
Data

Our database contains weather and climate history data from historical documents:

- Daily observations of precipitation (rain, snowfall, thunderstorms, hail, sleet) in **weather diaries**.
- Descriptions of (exceptional) **weather events**
- Descriptions of the causes and effects of **natural disasters**
- Early **instrumental measurements** (barometer, thermometer, rain gauge, water gauge)
- **Water marks** (flood marks, low water marks)
- References to bio-physical indicators of temperature and precipitation in the near-natural environment (**proxy data**):
 - Vegetation development in the summer half-year (April to September).
 - Snow cover, icing of lakes and rivers and exceptional vegetation activity in the winter half-year (October to March)
- **Pictorial documents** (historical drawings, paintings, and early photographs) for the reconstruction of the increase and shrinking of glaciers.

Sources – weather event

In the following excerpt from the **diary of the monastery of Einsiedeln, Father Josef Dietrich** (1645-1704) writes about the high winter character of November 1676:



«In this and the following month, a persistently cruel cold period took place like never remembered before. Nearly all wells got frozen and caused scarcity of water, and Lake Zurich was covered with ice down to the city centre of Zurich. On many places, mills had to stop their work causing a moderate increase of prices for flour. Thanks to God, otherwise no major rises in price occurred.»

Areas of application

From school projects to doctoral theses, from interdisciplinary research work to application-oriented risk analyses:

- **Reconstruction**: weather, climate and extreme events from the Middle Ages to the late 20th century.
- **Impact**: Research into economic and social vulnerability in relation to weather and climate.
- **History of knowledge**: perceptions and knowledge of weather and climate phenomena over time.

An international database

The content and quantity of our database still focuses on historical climate data **from Switzerland**.

Through **cooperation projects** with partners from other European countries and ongoing historical research at the University of Bern, Euro-Climhist is continuously expanding both geographically and temporally.

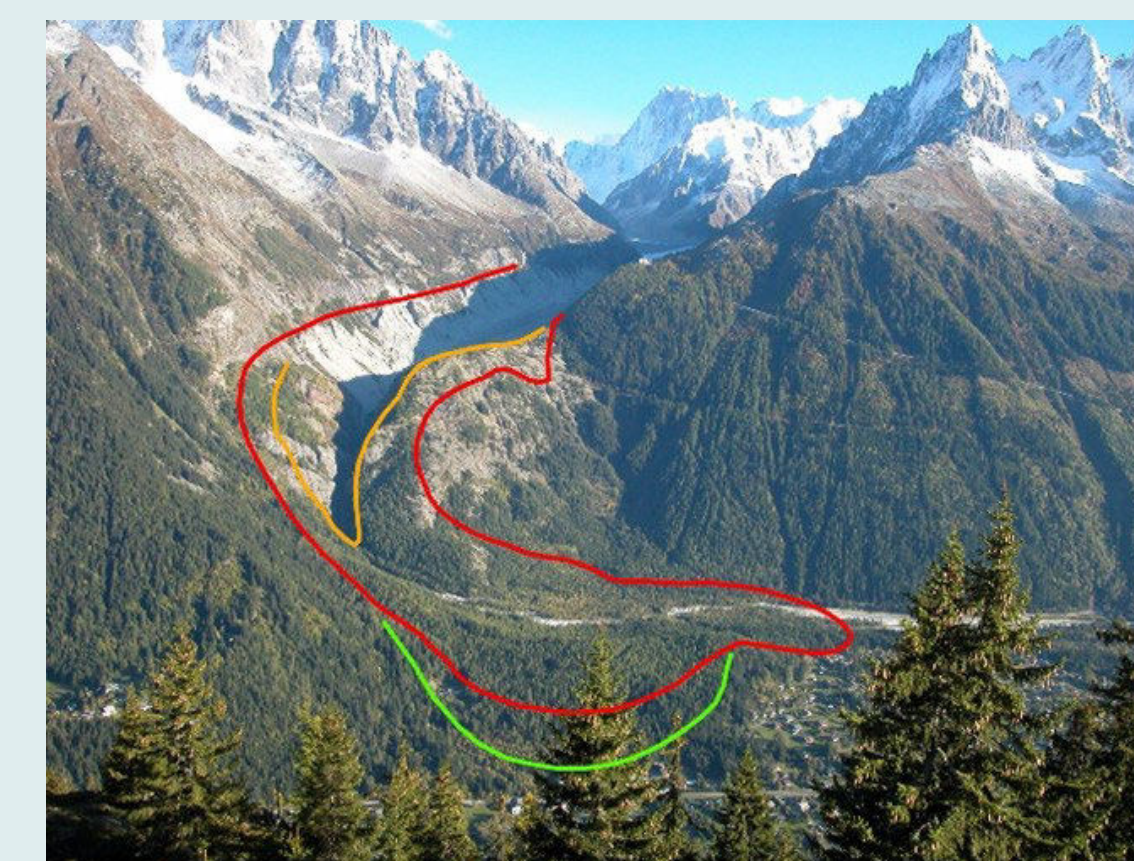
Recently added datasets include France, Spain, the Czech Republic and the Baltic States.

We look forward to your assistance! Further information and contact at:

https://www.euroclimhist.unibe.ch/about_us/contact/index_eng.html

Sources – glacier images

The photograph taken by H. Plaut (left) shows the Mer de Glace glacier in the 1850s. The photograph (right) illustrates the glacier and its extent in the 17th (green) and 19th centuries (red and orange), reconstructed with the help of historical documents.



Glacier images – a unique view into the Little Ice Age

Glaciers are excellent climate indicators, and the worldwide glacier retreat serves as a warning signal for the current climate change with its dramatic effects on humans and the environment. Visualizing glacier change by means of images can reach a broad public. Historical glacier images, especially from the so-called Little Ice Age (LIA, approx. AD 1300 to 1850 in the European Alps), show the earlier glacier fluctuations in a particularly impressive way and give us a unique insight into the climatic events of that time. These findings are in turn the key to understanding current and possible future climate changes.

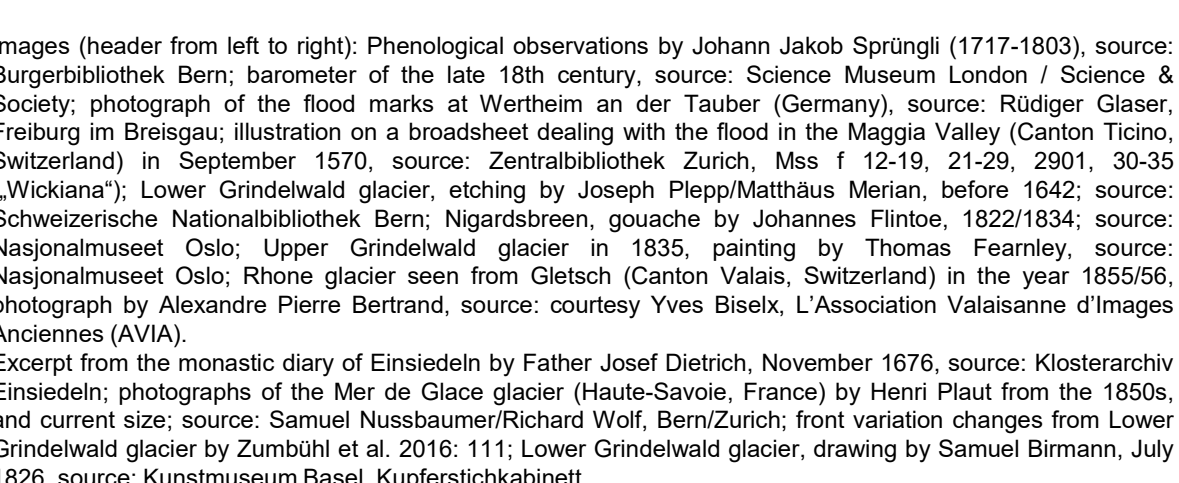
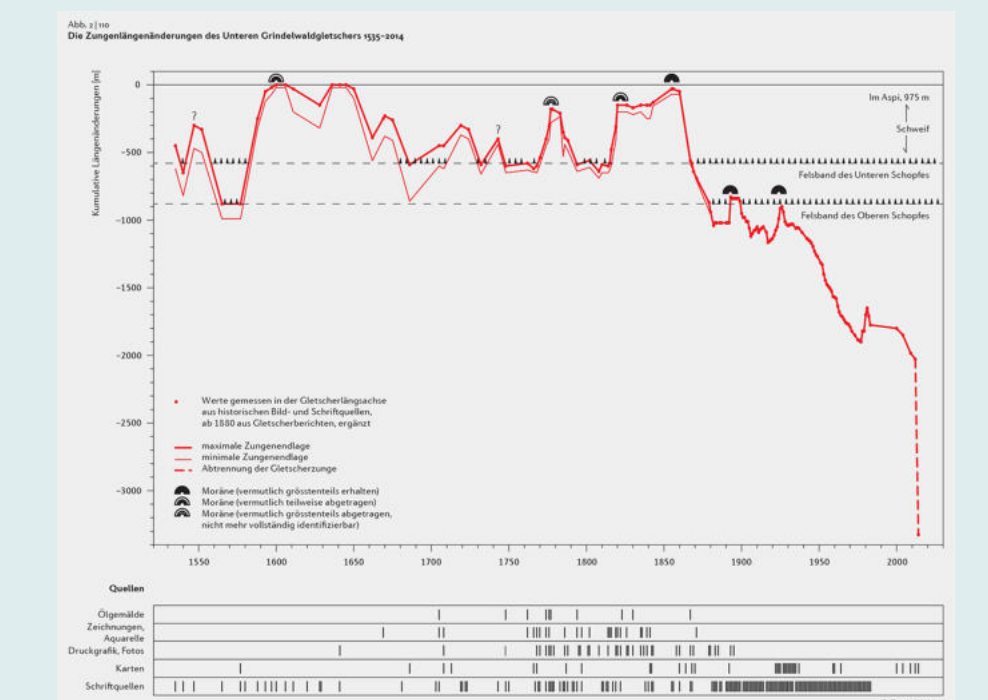
Glacier images in Euro-Climhist

Until now, the Euro-Climhist database consisted mainly of written sources and measurement data. Within this project, the Euro-Climhist database was conceptually extended to include and secure glacier images in the long term, and to make them accessible to researchers and to the public. Around 350 glacier images from Switzerland, France and Norway were prepared for the database and provided with the corresponding metadata (name of the artist, the original descriptions as well as supplementary descriptions from the literature, the dating of the images, and the image type). In particular, the assignment to one of five image types - drawing, oil painting, print, photograph, or map - allows conclusions to be drawn about the accuracy of the glacier extents depicted.

Application – glacier images

Besides written evidence, historical pictorial representations of glaciers allow us to reconstruct glacier extents in the Alps from the early 17th century onwards. Satisfactory quantities of historical material are only available for those glaciers that achieved the necessary degree of fame early on to attract travellers, scientists, and artists.

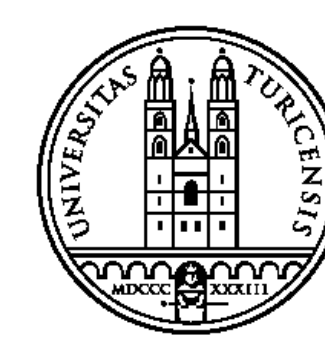
Such reconstructions are only possible for certain glaciers which achieved the necessary level of fame and attractiveness early on to lure travellers, scientists, and artists, resulting in a large number of historical depictions. Some pictorial representations date back to the early 17th century, but they only began to appear more frequently with the emergence of Alpine travelling in the 18th century. Photographs are available from the end of the 1840s. The evaluation of these sources requires careful analyses and a critical examination of the historical image sources in order to obtain reliable information on the earlier glacier extents. The Lower Grindelwald glacier in the Bernese Oberland is probably the historically best studied glacier in the world. Its changes have been reconstructed back to the year 1535, which impressively demonstrates that today's glacier retreat is absolutely unique in historical times.



University of Bern
 Institute of History
 Department WSU
 Länggassstrasse 49
 CH-3012 Bern
euroclimhist.hist@unibe.ch

u^b
 UNIVERSITÄT
 BERN

u^b
 UNIVERSITÄT
 BERN



University of
 Zurich UZH

wgms

World Glacier Monitoring Service

Schweizerische Eidgenossenschaft
 Confédération suisse
 Confederazione Svizzera
 Confederaziun svizra
 Eidgenössisches Departement des Innern EDI
 Bundesamt für Meteorologie und Klimatologie MeteoSchweiz
MeteoSchweiz



SEBASTIANA
 STIFTUNG

DESCHGER CENTRE
 CLIMATE CHANGE RESEARCH