Extending Glacier Monitoring into the Little Ice Age and Beyond

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For full details and references, see Zemp et al., 19(2), 67–69 (2011).

Reconstructions of glacier front variations based on well-dated historical evidence from the Alps, Scandinavia and the southern Andes extend the observational record as far back as the 16th century. The standardized compilation of paleo-glacier length changes is now an integral part of the internationally coordinated glacier monitoring system.

The storage in standardized database formats allows a direct comparison of cumulative length changes between different glaciers as shown in the figure below. Thereby, a first data table contains summary information of the entire reconstruction series including a plot of the data and meta-data (see figure to the right), investigator information, and references. A second table stores the individual glacier front variation data, minimum and maximum glacier elevation, and meta-data related to the reconstruction methods and uncertainties.

The reconstructed front variations extend the direct observations (mostly from the 20th century) by two centuries in Norway and by four centuries in the Alps and South America. Also available are moraines data back to the mid-Holocene.

The standardized compilation and free dissemination of reconstructed and in situ observed glacier fluctuation records offer several benefits for both data providers and users. Their incorporation within the international glacier databases guarantees the long-term availability of the data series and increases the visibility of the scientific results (which in historical glaciology are often the work of a lifetime). Furthermore, the database facilitates comparisons between glaciers and between different methods, and opens the field to numerous scientific studies and applications.

As the next steps of this new initiative, we aim to:
1. Integrate a greater number of time series
2. Incorporate records that cover the entire Holocene, and
3. Include data from other regions (e.g., the Himalayas, North America).

Ideally, the growing new dataset will facilitate collaboration between the glacier monitoring and reconstruction communities and become an additional tool for the comparison of present-day to pre-industrial climate changes.

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