

Name of research institute or organization:

**Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie (VAW),
ETH Zürich**

Title of project:

Glaciological investigations on the Grosser Aletschgletscher

Part of this programme:

Swiss Glacier Monitoring (GLAMOS)

Project leader and team:

Dr. Andreas Bauder, project leader
2 field assistants, support of the custodians

Project description:

Long-term glacier observations have been carried out in order to document glacier variations of Grosser Aletschgletscher and include annual length change measurements since 1880, accumulation and mass balance measurements starting in 1918, and repeated map or aerial photograph surveys, respectively. In an ongoing project the length, area, volume, and mass changes are continuously observed applying modern remote sensing techniques as well as direct field measurements. The research activities are focused on long term trends and seasonal fluctuations. Net volume changes of the entire glacier are calculated by comparison of digital elevation models representing the surface topography. Mass balance components with firn accumulation and ablation are measured in detail at Jungfraufirn.

The last observation period was characterized by average amount of snow accumulation at the end of the winter period and an intense melt season in July and August (see Figure 1). In comparison, the summer 2015 showed the most intensive glacier melt at Jungfrauoch since the very hot summer 2003.

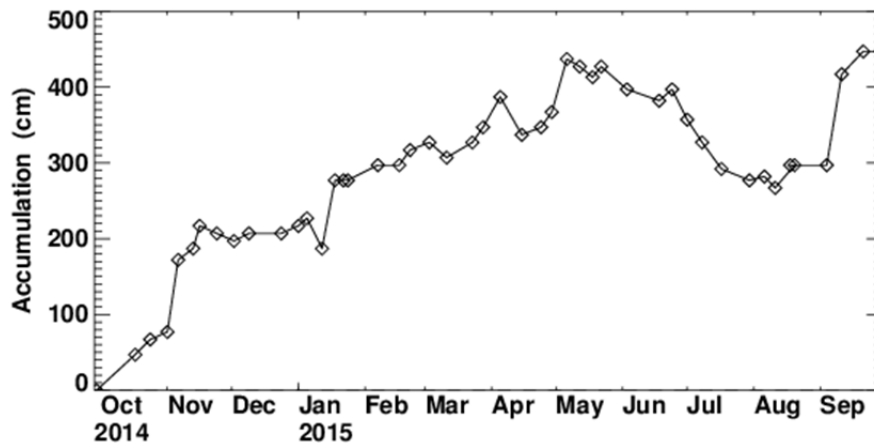


Figure 1. Evolution of the firn accumulation at site P3 on Jungfraufirn (3350 m asl) during the past observation period 2014/15.

As part of a periodical reevaluation, the different mass balance quantities of net volume change and all individual measurements of accumulation have been assimilated and homogenized to evaluate for a glacier wide mass balance. The time-series of mass balance of Grosser Aletschgletscher is one of the three longest series world-wide. The cumulative results of mean specific mass balance are shown in Figure 2. The largest glacier in the Alps experienced an almost steadily mass loss over the 20th century while the two glaciers Clariden and Silvretta in north-eastern Switzerland.

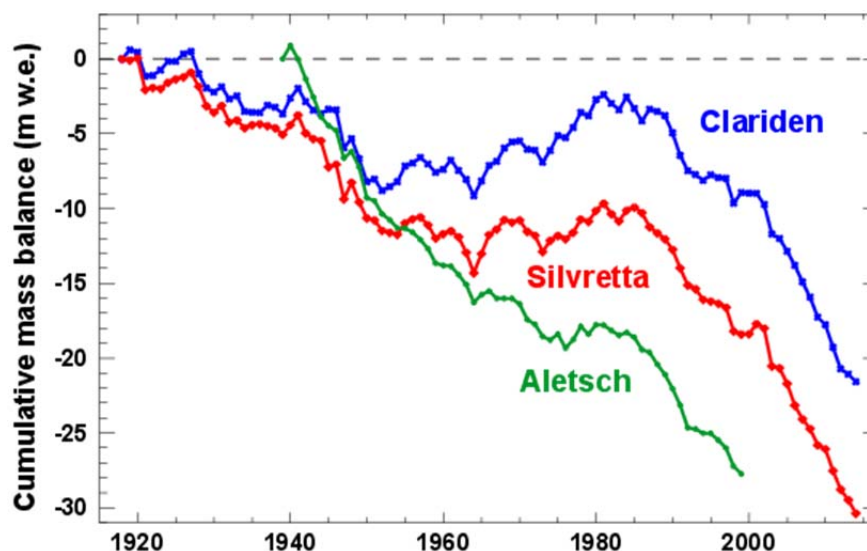


Figure 2. Cumulative mean specific mass balance (in meter water equivalents) of Grosser Aletschgletscher (green) in comparison to the glaciers Clariden (blue) and Silvretta (red) with the worldwide longest continuous measurements.

Key words:

Glacier measurements, mass balance, snow and firn accumulation, ice melt

Internet data bases:

<http://www.glamos.ch>

Collaborating partners/networks:

Swiss Glacier Monitoring Network (GLAMOS)

Scientific publications and public outreach 2015:

Refereed journal articles and their internet access

Huss, M., L. Dhulst, and A. Bauder, New long-term mass balance series for the Swiss Alps, *Journal of Glaciology*, **61**, 227, 551-562, doi: 10.3189/2015JoG15j015, 2015.

<http://www.ingentaconnect.com/content/igsoc/jog/2015/00000061/00000227/art00012>

Data books and reports

Bauder, A., eds., The Swiss Glaciers 2009/10 and 2010/11, Glaciological Report No. 131/132, Cryospheric Commission of the Swiss Academy of Sciences published by the Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zürich, 119p., 2015.

Paul, F., A. Bauder, Ch. Marty, and J. Nötzli, Schnee, Gletscher und Permafrost 2013/14 - Neige, glaciers et pergélisol en 2013/14 - Neve, ghiaccio e permafrost 2013/14, *Die Alpen - Les Alpes - Le Alpi* (Zeitschrift des Schweizer Alpen-Club), 9/2014, 46-52, 2015.

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