

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
3 field assistants, support of 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 ice volume changes of the entire glacier are calculated by comparison of digital elevation models representing the surface topography. A modeling approach allows ice volume changes over multi-annual periods to be downscaled to annual time scales. Mass balance components with firn accumulation and ablation are measured in detail at Jungfraufirn. Seasonal observations at the end of winter and end of summer are performed. During winter snow accumulation is the dominating process while ablation of snow and ice occurs in the summer period. Thus results from seasonal mass balance measurements allow to separate the processes of accumulation and ablation.

On Jungfraufirn the last observation period was characterized by average amount of snow accumulation at the end of the winter period and extensive melt during the summer season (see Figure 1). The winter accumulation culminated with extensive snowfall between mid April and May 2017. The melt season started abruptly in May with a warm and continuous period lasting until end of June causing a rapid depletion of the winter snow accumulation. Intensive melt in August again resulted in the largest melt rates since summer 2003. Inter-annual fluctuations of mass balance are mainly driven by the higher variability of the summer balance. The result of the past period 2016/17 is the combination of a below average accumulation and intensive melt. In the record since 1918 the past period ranks second lowest only outranged by the extreme period of 2002/03 with the hottest summer ever.

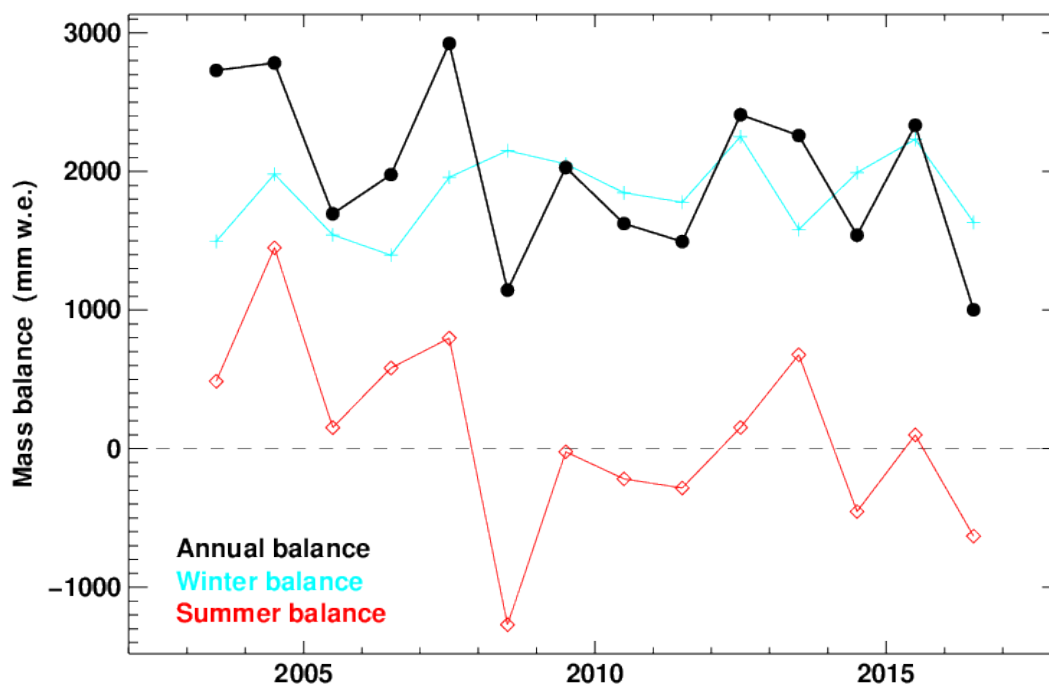


Figure 1. Winter, summer and annual mass balance (in millimeter water equivalents) at site P3 on Jungfrauoch since 2003.

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 2017:

Data books and reports

Bauder, A., eds., The Swiss Glaciers 2013/14 and 2014/15. Glaciological Report No. 135/136, Cryospheric Commission of the Swiss Academy of Sciences published by the Laboratory of Hydraulics, Hydrology and Glaciology (VAW), ETH Zürich, 144p., doi: 10.18752/glrep_135-136, 2017.

Huss, M., A. Bauder, Ch. Marty and J. Nötzli, Schnee, Gletscher und Permafrost 2015/16 - Neige, glaciers et pergélisol 2015/16 - Neve, ghiacciai e permafrost 2015/16. Die Alpen - Les Alpes - Le Alpi (Zeitschrift des Schweizer Alpen-Club), 8/2017, 45-51, 2017.

Radio and television

Themenabend «+3°», Glaciological field investigations on Jungfraufirn with glaciologist Andreas Bauder, ETH Zürich, SRF, November 29, 2017.

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