

Long-term permafrost monitoring in the Jungfrau East ridge

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1. Project description

The sub-horizontal Jungfrau Ostgrat borehole is located at 3590 m asl in the North-facing wall of the Jungfrau East ridge. It is 20 m long and is equipped with 9 thermistors and a data logger. Rock temperatures vary between -4 and -7°C (Fig. 1). Due to the time lag with depth, the highest temperatures are registered in winter and the lowest ones in summer. The high elevation of the borehole and its position in a steep rock wall make it valuable for long-term permafrost monitoring, as there are few boreholes in high elevation rock walls in the Alps (Fig. 2). The Jungfrau borehole registers the lowest temperatures of the 8 existing Alpine rock wall boreholes.

The SLF permafrost rock fall data base has registered increasingly high fall activity from permafrost rock walls during summer heat waves, mainly affecting the near-surface rock layer which thaws in summer (active layer). The Jungfrau borehole data clearly indicate a warming trend at all depths, as do other borehole data measured in high-elevation rock walls (Figs. 1 and 2).

The Jungfrau borehole is part of the Swiss permafrost monitoring network PERMOS and the borehole temperature data can be viewed and downloaded from <http://newshinypermom.geo.uzh.ch/app/DataBrowser/>.

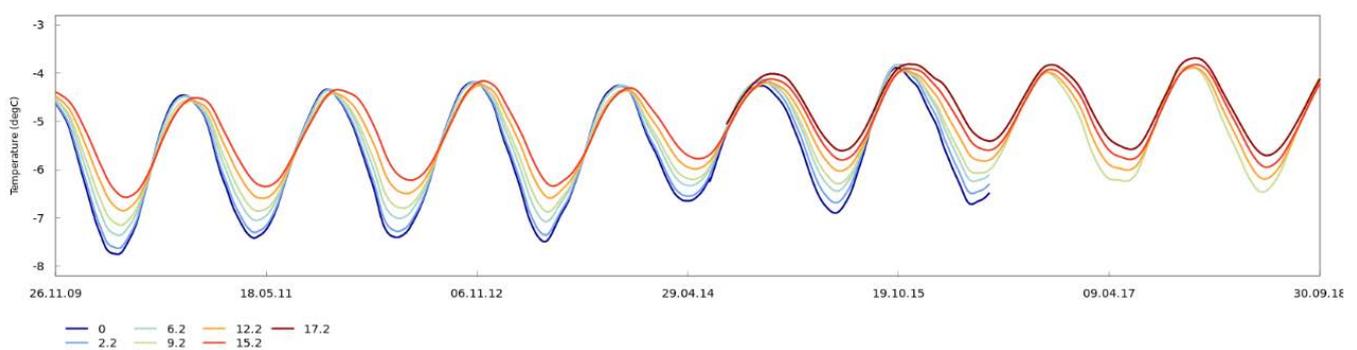


Figure 1. Borehole temperatures (2009-2018) in the Jungfrau East ridge borehole. (Legend: 0 is located 6 m from the outer surface of the rock wall). Data: SLF/PERMOS

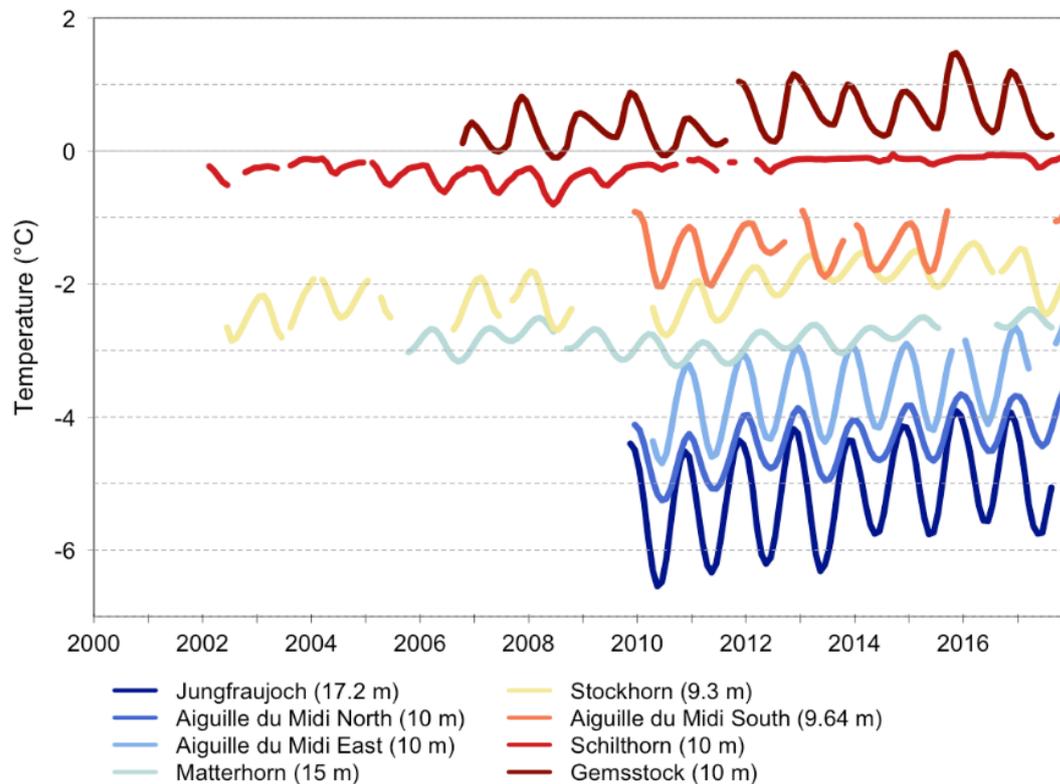


Figure 2. Borehole temperatures in rock at 10-20 m depth at elevations between 2900 m and 3840 m in Switzerland (PERMOS) and at Aiguille du Midi, France (PermaFRANCE) 2002-2017.

Internet data bases

www.permos.ch
<http://newshinypermos.geo.uzh.ch/app/DataBrowser>
<https://permafrance.osug.fr>

Collaborating partners / networks

PERMOS (Permafrost Monitoring Switzerland)
 GTN-P (Global Terrestrial Network for Permafrost)

Scientific publications and public outreach 2018

Data books and reports

Huss, M., A. Bauder, C. Marty, and J. Nötzli, Schnee, Gletscher und Permafrost 2016/17, Kryosphärenbericht für die Schweizer Alpen, 40-45, 2018.

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