

# Visualization of field measurements of the hydrothermal regime in alpine solifluction

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*The present document accompanies the final python project by Martina Hasler and Lukas Munz*

On the following lines, we present a visualization of measurement data, that was collected on the north face of Blauberg near Furkapass, Switzerland. Temperature and Volumetric Water Content (VWC) was measured on and directly in front of solifluction lobes.

Solifluction is a slow downslope movement of soil. It is found in polar and alpine regions on slopes with permafrost, where the seasonally thawing active layer is affected. However, solifluction is also common to appear on slopes with seasonal frost. This is most likely the case on Blauberg, where sporadic permafrost is likely to appear above 2500 m a.s.l. The downslope movement consists of two separate processes (frost creep and gelifluction), which both strongly depend on soil temperature and soil water content. This is why these two parameters were measured on three selected solifluction lobes along a transect from 2400 m a.s.l. to 2600 m a.s.l. (Fig. 2). Within the three solifluction lobes and directly in front of each, a measurement station was set up. Each station comprises of four sensors. One each 10 cm, 20 cm, 60 cm and 100 cm depth below ground. The sensors measure and record the volumetric water content and the temperature every 30 minutes.



Foto: Armin Rist

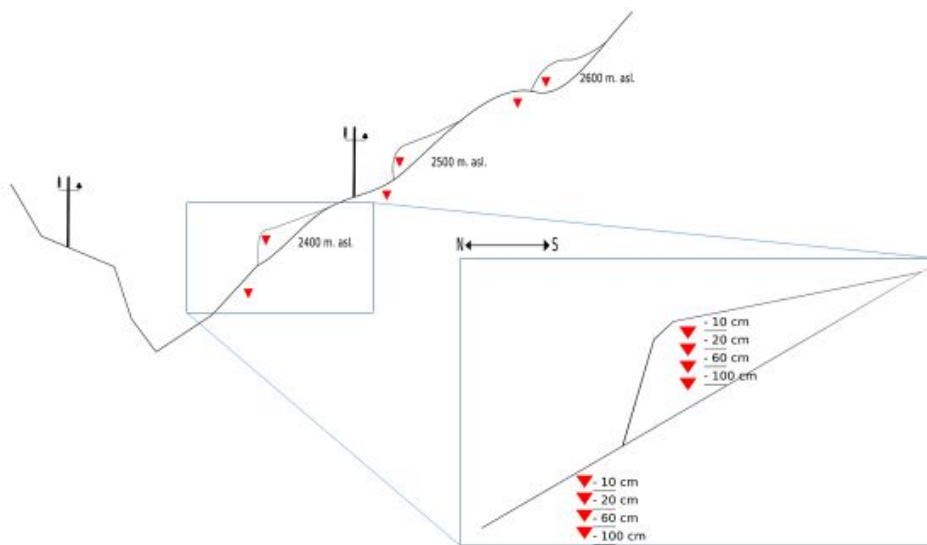
Fig. 1 :  
The Blauberg north face. The slope is covered with solifluction lobes.

The gradual transition zone from alpine meadows to scree slope is at 2500 m a.s.l.

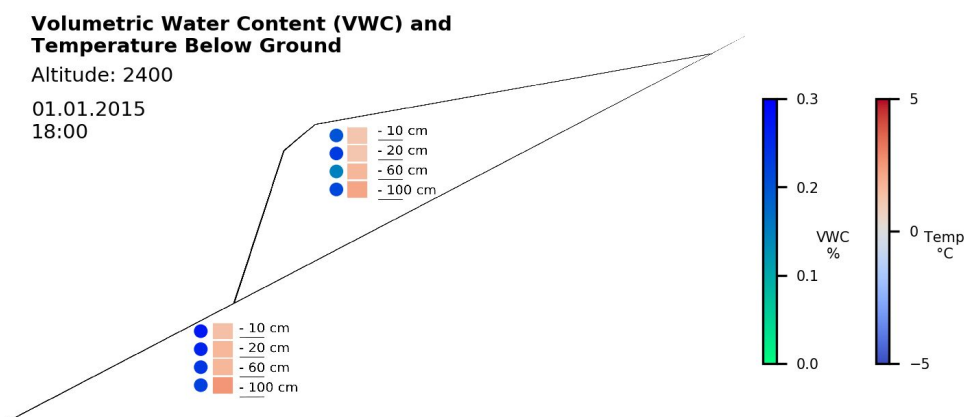
In our measurement data visualization, we use a scheme symbolizing one solifluction lobe. The records of the eight sensors are symbolized by a circle for VWC and a rectangle for the temperature. The symbols change their color according to the measured values over time (Fig. 3).

The user has to choose one of three lobes referred to by their altitude above sea level, 2400, 2500 or 2600. Furthermore, a start and an end time has to be defined. The earliest possible day is September 1 2015 and the last possible day is June 30 2017.

We prepared three scripts. One prepares images and stores them in a folder on disk. These images are then used by the other two scripts as frames, which are combined either to a video or a gif respectively.



*Fig. 2:  
Schematic  
representation of the  
north slope of Blau-  
berg. Three solifluc-  
tion lobes and six  
measurement  
stations are symbol-  
ized. Red triangles  
represent measure-  
ment stations and  
sensors. The scheme  
is not in scale.*



*Fig. 3:  
Output of the script  
"PrepFrames.py". A  
solifluction lobe with  
two measurement  
stations is schemati-  
cally depicted. The  
colorized circles re-  
present VWC and the  
rectangles represent  
soil temperature.*