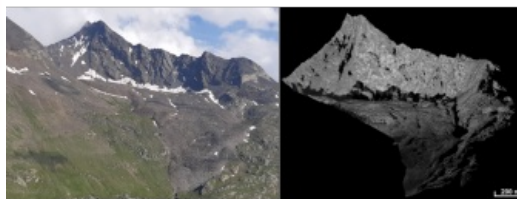


Lidar Monitoring of Rock Glaciers with Improved Measurement Frequency



The 3D Geospatial Data Processing Group from Heidelberg University in Germany is conducting studies of rock glacier dynamics in a high-Alpine permafrost environment. The team is utilizing a RIEGL VZ-2000i terrestrial laser scanner and a UAV equipped with the RIEGL miniVUX-1 UAV unmanned laser scanner. This fascinating research project is leading to new insights into rock

glaciers.

Short-interval (e.g. < monthly) topographic Lidar monitoring has begun to provide new understandings into a range of geomorphic processes. Such 4D data help us to better understand the dynamics of rock glaciers. Rock glaciers are creep phenomena of mountain permafrost. In the era of climate change, rock glaciers are important water reservoirs and potential unstable slopes. Their surface exhibits a range of change processes which feature different spatial characteristics, magnitudes and timescales of occurrence, that are not yet fully understood.

Research in this field is being conducted by the [3D Geospatial Data Processing \(3DGeo\) Research Group](#) of Heidelberg University in a high-Alpine permafrost environment. With a [RIEGL VZ-2000i](#) terrestrial laser scanner, the [Äußeres Hochebenkar rock glacier \(Ötztal Alps, Austria\)](#) is being monitored during the summer period, when the ground is free of snow cover.

Fortnightly monitoring

While conventionally monitored at annual timescales, recent fortnightly monitoring of the rock glacier is being undertaken to quantify the contribution of individual processes to the annual surface change budget. This enables to constrain the various mechanisms of sediment production, transport, and removal from the system.

To obtain a complete picture of these dynamics, the 3DGeo research group will also combine terrestrial Lidar measurements with data from its recently acquired UAV-borne laser scanning system, equipped with a [RIEGL miniVUX-1 UAV](#) unmanned laser scanner.



Photo and 3D point cloud of the entire rock glacier. (Photo: Vivien Zahs, 20 July 2019; point cloud: Jack Williams)

Based on these 3D time-series datasets, automated methods will be developed that are able to quantify the contribution of individual processes to the total movement of sediment through the point cloud scene. Such methods can enhance our general understanding of the dynamics of rock glaciers and similar geomorphic objects and their interaction with connected environmental systems.

Click on the links below to find more details about related research projects and publications:

[AHK-4D](#) – High-resolution and high-frequency monitoring of the rock glacier Äußeres Hochebenkar (AHK) in Austria

[Geomorph4D](#) – Characterising multi-process geomorphic change through high spatial- and high temporal-resolution monitoring