USING UAV AND SFM TO UNDERSTAND THE GEOMORPHOLOGICAL DYNAMICS ON PERIGLACIAL TALUS SLOPES

Hanne Hendrickx* (1), Reynald Delaloye (2), Jan Nyssen (1), and Amaury Frankl (1,3)

(1) Department of Geography, Ghent University, Belgium, (2) Department of Geosciences, Fribourg University, Switzerland, (3) Postdoctoral Fellow of the Research Foundation Flanders (FWO)

Using UAVs and the Structure-from-Motion techniques to obtain high resolution Digital Elevation Models (DEMs) is recently being used in many different fields. This method is relatively cheap in comparison with for example terrestrial laser scanning. Moreover, an orthophoto can be produced besides a high resolution DEM. Although applying this method in mountainous areas can be difficult due to large topographic differences and quickly changing weather conditions, it was successfully applied in two talus slope areas in the Valais (Swiss Alps). Talus slopes are one of the most common landform in high mountain environments and an important debris storage. Therefore, they are often subjected to mass wasting processes. Both areas have a variety of geomorphological landforms, such as debris flow channels, small rock glaciers, solifluction, evidence of rock fall and landslide activity. Located on an elevation in between 2300 – 2800 m, different permafrost conditions can be found.

The goal of the UAV surveys is to obtain detailed topographic information, and by repeating this measurements, gaining an insight in the dynamics of these landforms, from volumetric changes to horizontal displacements. These dynamics could then be linked to the potential permafrost distribution. In order to obtain the needed photogrammetric data, flight lines were programmed in QGIS. The flight height was set at 70 to 100 m above the surface of interest and minimum overlap between the flight lines was at least 70%. The software ‘Mission Planner’ was used to write this data on to a Hexacopter DJI F550 drone. A 16MP camera was mounted on the drone in order to obtain the desired resolution. Ground Control Points (GCPs) were placed in the area of interest, with at least one GCP every 200 m. After surveying, data was processed with Agisoft Photoscan. The results are a DEM and orthophoto with an average resolution below 5 cm. In addition, permafrost state will be assessed using year round temperature data and geophysical methods. By doing so, this study will contribute to a deeper understanding about geomorphological process dynamics and will try to conceptually assess the potential impact of climate change on these periglacial talus slopes. First preliminary results of the fieldwork conducted in the summer of 2017 will be presented.

*Email: hanne.hendrickx@ugent.be