Geophysical Research Abstracts
Vol. 16, EGU2014-11513, 2014
EGU General Assembly 2014

Comparison of UAV and TLS DTMs for acquisition of geological, geomorphological information for Doren landslide, Vorarlberg Austria

Zsófia Koma (1), Balázs Székely (1,2), Peter Dorninger (3), Sascha Rasztovits (4), Andreas Roncat (4), András Zámolyi (5), Dominik Krawczyk (6), and Norbert Pfeifer (4)

(1) Eötvös Loránd University, Hungary (komazsofi@gmail.com), (2) Interdisziplinäres Ökologisches Zentrum, TU Bergakademie Freiberg, Germany, (3) 4D-IT GmbH, Pfaffstätten, Austria, (4) Research Groups Photogrammetry and Remote Sensing, Department of Geodesy and Geoinformation, Vienna University of Technology, Vienna, Austria, (5) OMV Austria Exploration & Production GmbH, (6) Von-Oben, Vienna, Austria

Aerial imagery derivatives collected by the Unmanned Aerial Vehicle (UAV) technology can be used as input for generation of high resolution digital terrain model (DTM) data along with the Terrestrial Laser Scanning (TLS) method. Both types of datasets are suitable for detailed geological and geomorphometric analysis, because the data provide micro-topographical and structural geological information.
Our study focuses on the comparison of the possibilities of the extracted geological information, which is available from high resolution DTMs. This research attempts to find an answer which technology is more effective for geological and geomorphological analysis.
The measurements were taken at the Doren landslide (Vorarlberg, Austria), a complex rotational land slide situated in the Alpine molasse foreland. Several formations (Kojen Formation, Würmian glacial moraine sediments, Weissach Formation) were tectonized there in the course of the alpine orogeny (Oberhauser et al, 2007). The typical fault direction is WSW-ENE.
The UAV measurements that were carried out simultaneously with the TLS campaign focused on the landslide scarp. The original image resolution was 4 mm/pixel. Image matching was implemented in pyramid level 2 and the achieved resolution of the DTM was 0.05 meter. The TLS dataset includes 18 scan positions and more than 300 million points for the whole landslide area. The achieved DTM has 0.2 meter resolution.
The steps of the geological and geomorphological analysis were: (1) visual interpretation based on field work and geological maps, (2) quantitative DTM analysis.
In the quantitative analysis input data provided by the different kinds of DTMs were used for further parameter calculations (e.g. slope, aspect, sigmaZ). In the next step an automatic classification method was used for the detection of faults and classification of different parts of the landslide.
The conclusion was that for geological visualization interpretation UAV datasets are better, because the high resolution texture information allows for the extraction of the digital geomorphology indicators. For quantitative analysis both datasets are informative, but the TLS DTM has an advantage of accessing additional information on faults beneath the vegetation cover.
These studies were carried out partly in the framework of Hybrid 3D project financed by the Austrian Research Promotion Agency (FFG) and Von-Oben and 4D-IT; the contribution of ZsK was partly funded by Campus Hungary Internship TÁMOP-424B1; BSz contributed partly as an Alexander von Humboldt Research Fellow.