



Using UAV and LIDAR data for gullies erosion monitoring

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Gullies formation and evolution represent one of the most threatening processes of land value and conservation. In the same time, they represent a natural hazard, which occurred especially during the heavy rainfall events. In a classic way, the intensity of these erosion processes, and the volumes of sediments involved, are assessed by using field measurements, and high resolutions remote sensing images. These methods recently were completed by the images captured by on-board photographic sensors of Unmanned Aerial Vehicles (UAV).

In Moldavian Plateau (north-eastern Romania) gullies are common landforms due to geologic, topographic, climatic and anthropic factors. Their episodic development and the relationship with high rainfall and/or snowmelt events constitute a key point in the deciphering of gullies evolution.

A DJI Phantom 4 Pro UAV was flown over the study case areas and acquired images with 80% side and forward overlap at 20 MP resolution.

The UAV point cloud was obtained using the Structure from Motion technique in VisualSFM open source software from overlapping images and was georeferenced with ground control points. The filtering of the point cloud for obtaining bare ground points was performed semi-automatically with the CANUPO plug-in Cloud Compare open source software.

LiDAR data acquired in 2012 was used to obtain a 0.25 m resolution bare earth DEM for every gully. This reference DEM was used together with the UAV DEM for deriving the change detection data using the Geomorphic Change Detection technique implemented in R stat.

Several flights were carried out in the winter 2018/2019 and collected images were compared with LIDAR data from 2012. There have been identified some erosional hotspots of this process. By overlapping with infrastructural lifelines and built space, some preliminary recommendation have been already done, with an immediate effect in risk mitigation.