Automation of Land Displacement Determination Using UAV Photogrammetric Data

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SUMMARY

Monitoring of the land surface under the underground mining influence is necessary to maintain the safety of the buildings located on it. The development of spatial data acquisition techniques using unmanned aerial vehicles (UAV) is the reason for their increasing use for land deformation mapping. The report presents the results of the determination of land surface displacements on the basis of UAV photogrammetric data. The research concerned two independent paths of automatic data processing, which are complementary. The first one used high-resolution orthomosaics and digital surface models (DSM). It was based on a normalised cross-correlation used to match multi-temporal images. The second path of determining the land surface displacement was based on the automatic registration of photogrammetric point clouds. The integral parts of both solutions were the filtration of vegetation in order to minimise its negative impact on the determined values of displacements and the process of removing outliers. The data processing resulted in displacement vectors determined in a regular grid. This allowed for spatial analysis of the development of land surface displacements over time. The paper analysed the accuracy of the results obtained on the basis of both raster data and point clouds, which enabled the assessment of the suitability of both solutions in various field conditions.

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