Classifying surface displacements in mining regions using differential terrain models and InSAR coherence

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Abstract

This study focuses on classifying height differences in the area of the Marcel mine in the Upper Silesian Coal Basin, using UAV photogrammetry, UAV laser scanning, and InSAR coherence data. The Random Forest (RF) algorithm was selected for this purpose. The RF classifier used features calculated based on the digital terrain model of differences, InSAR coherence data, digital terrain, and surface models with their derivatives. Besides the 6-day coherence to capture temporal coherence variability, key statistical parameters of the time series were calculated. The model achieved an accuracy of 79% and an F1-score of 81%, effectively distinguishing mining-related displacements from other classes. The results indicate that incorporating InSAR coherence improved the separation of classes, but certain limitations, such as data resolution and the temporal similarity of features, suggest the need for further research.

Keywords: DoD, InSAR coherence, Random Forest classification, UAV photogrammetry, UAV laser scanning

This contribution was selected for publication as a peer-reviewed paper in the "Special issue Deformation Monitoring 2025" of the Journal of Applied Geodesy – https://www.degruyter.com/journal/key/jag/html.