Book of abstracts
XXIV Conference of PhD Students and Young Scientists
October 23 – 25, 2024, hybrid event

THE BENEFITS OF MULTISENSORAL GEOMONITORING: DRONE FLIGHTS TO DETECT FAULT ZONES IN THE AREA OF OPENCAST MINES

Quynh Anh Nguy Thi [*1], Marcin Pawlik [1], Bodo Bernsdorf [1], Tobias Rudolph [1], Benjamin Haske [1]

[1] *Research Center of Post-Mining, Technische Hochschule Georg Agricola, Herner Str. 45, 44787 Bochum, Germany*

*Corresponding author: QuynhAnh.NguyThi@thga.de

Keywords: fault zone, LIDAR, vegetation indices, thermal othophotomap

Shallow mining in Germany's West means operation areas of 31 km^2 to 45 km^2 with 400 to 500 meters depth below surface. This again has a vast impact on the surrounding bedrocks. In the working area this is more or less unconsolidated rock, sediments of Rhein River and Maas River. Pumping out groundwater at great depths to drain the open-cast mine exacerbates the situation. The result is an equalization of the pressure conditions with zones of displacement and faults, causing subsidence and cracks in buildings in the densely populated Rhenish mining area. Mining companies has an enormous interest in predicting and monitoring such vault zones.

High-precision and high-resolution knowledge about topography of the terrain makes it possible to study the position of faults. The aim of this study is to verify different research methods using drone flights with different sensors: LIDAR, multispectral camera, thermal camera to identify fault zones. Multispectral imagery was analysed using remote sensing indices (GNDVI, NDVI, SAVI, VARI), an orthophotomap was created, a DEM and DSM were created using LIDAR, and a thermal orthophotomap was created using the thermal camera. A site visit was carried out to verify the results obtained, and soil profiles were collected. The paper demonstrates that by using multisensoral monitoring it is possible to detect fault zones.

This research was funded by RWE.