

EGU24-16127, updated on 15 Oct 2024
<https://doi.org/10.5194/egusphere-egu24-16127>
EGU General Assembly 2024
© Author(s) 2024. This work is distributed under
the Creative Commons Attribution 4.0 License.



Determination of land deformation indices based on UAV-derived very-high-resolution images

Edyta Puniach¹, Wojciech Gruszczyński², Paweł Cwiąkała³, Wojciech Matwij⁴, and Katarzyna Strząbała⁵

¹AGH University of Krakow, Krakow, Poland (epuniach@agh.edu.pl)

²AGH University of Krakow, Krakow, Poland (wgrusz@agh.edu.pl)

³AGH University of Krakow, Krakow, Poland (pawelcwi@agh.edu.pl)

⁴AGH University of Krakow, Krakow, Poland (matwij@agh.edu.pl)

⁵AGH University of Krakow, Krakow, Poland (strzabal@agh.edu.pl)

In recent years, uncrewed aerial vehicle (UAV)-based photogrammetry has developed rapidly and is increasingly used for monitoring and determining displacements. The presentation discusses the author's solutions for the automatic determination of horizontal and vertical displacements of land surface in urban areas, dedicated to very-high-resolution UAV-photogrammetry products. The processing path is based on orthomosaics and digital elevation models and implements normalized cross-correlation for matching multi-temporal images. Its integral part is the process of semi-automatic removal of outliers. As a result of data processing, displacement vectors are determined in a regular grid, which constitute the basis for determining other indices of terrain deformation, such as ground tilts and horizontal deformations. Based on a comparison with reference data, it was estimated that the root mean square error of determining the displacements is 1-2 pixels for the horizontal components and 2-3 pixels for the vertical component. Therefore, the components of ground tilt and horizontal deformation can be determined based on UAV photogrammetry with a root mean square error of 0.3 pixels.