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## **Evaluation of the influence of Structure-from-Motion software processing parameters on the quality of digital elevation models and orthomosaics in the context of earth surface dynamics.**

**Szymon Śledź** and Marek Ewertowski

Adam Mickiewicz University, Poznań, Faculty of Geographical and Geological Sciences, Poznań, Poland (szysle@amu.edu.pl)

The Structure-from-Motion (SfM) approach for developing digital elevation models and orthomosaics has been known and used in photogrammetry for several decades. Using appropriate algorithms, SfM software combines images taken from different angles and distances based on the characteristic points determined in each image. Years of practice and experience have allowed researchers to provide a solid description of the applicability and limitations of this method, but still the impact of input processing parameters in software on the quality of photogrammetric products has not been fully recognized. This study aimed to identify the most advantageous processing workflow to fill this research gap by testing 375 different setup variations in the Agisoft Metashape software for the same set of images acquired with an unmanned aerial vehicle in a proglacial area. The purpose of the experiment was to determine three workflows: 1) with the shortest calculations time; 2) as accurate as possible, regardless of the time taken for the calculations; 3) the optimum, which is a compromise between accuracy and computation time.

Each of the 375 processing setup variations was assessed based on final product accuracy, i.e., orthomosaics and digital elevation models. Three workflows were selected based on calculating the height differences between the digital elevation models and the control points that did not participate in their georeferencing. The analysis of root mean square errors (RMSE) and standard deviations indicate that excluding some of the optimization parameters during the camera optimization stage results in high RMSE and an increase in values of errors' standard deviation. Furthermore, it has been shown that increasing the detail of individual processing steps in software does not always positively affect the accuracy of the resulting models. The experiment resulted in the development of three different workflows in the form of Python scripts for Agisoft Metashape software, which will help users to process image sets efficiently in the context of earth surface dynamics studies.

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