

FOREWORD

Dear Readers! We are handing over the next issue of our journal hoping that you will find there many interesting scientific ideas and practical results.

The first article is devoted to the study of the reduction of the impact of vegetation height on the accuracy of constructing digital models of the height of the ground (DEM) according to SRTM and InSAR radar scanning. Two methods are proposed. The first method is based on the multiple regression of two features of a forest – its height and density. The second method involves obtaining multiple regression variables based on data on forest density (MODIS_VCF) and the Global Tree Height Map (GTHM). Tests from the ICESat satellite have shown that the first method takes into account about 68% of the vegetation height, and the second covers it almost entirely in the construction of DEM for the territory of Poland, where coniferous forests predominate. The use of these methods requires additional research in areas with a predominance of deciduous forests.

The second article addresses the impact of the location of the ASG-EUPOS reference stations on the accuracy of determining the spatial coordinates of local network points using the static GNSS method in a mining area. This is important to improve the accuracy of determining horizontal and vertical terrain movements during periodic measurement cycles. The article presents functional and stochastic mathematical calculation models, on the basis of which the test correction of the vector geodetic network of GNSS points was carried out. The use of numerical analysis gives several possibilities for designing geodetic matrices, depending on the location of periodic measurements in the east-west or north-south direction, as well as depending on the number of ASG-EUPOS stations used.

The next article presents the use of UAV data to create photogrammetric documentation. The aim of this study was to make an orthophotomap of the cemetery in the Sułoszowa municipality on the basis of data obtained during a drone raid, and to compare it with the existing orthophotomap. Unmanned aerial vehicles used to perform photogrammetric raids allow to obtain photogrammetric images of the surface of the site or the buildings themselves (other objects), and then allow to generate orthophotomaps and even three-dimensional terrain models, enabling further analysis of the research area. The summary presents the results of the comparison with an existing orthophotomap.

The topic of the fourth article was the use of data from unmanned aerial vehicles (UAVs) to create photogrammetric documentation, including orthophotomaps of

the terrain. This paper conducts morphometric analysis of terrain and editing of the geomorphometric map of the physical-geographical microregion of Polkowice Hills. The analysis was performed using the GIS program (ESRI ArcMap) based on a digital elevation model (LiDAR - DEM). The basic topographic parameters of terrain, such as slope, exposure, planar and vertical curvature, local height difference, allow for the classification of landforms in the studied area with the unattended ISODATA classification method. This method proved to be effective and allowed to edit the geomorphometric map, in particular to separate diverse areas and to assign them their own nomenclature.

The fifth article presents experiments based on the measurements of vertical displacements of a unique engineering structure, which is the figure of Christ the King of the Universe in Świebodzin with a height of 50 m. These measurements were made by students of the Wrocław University of Science and Technology during scientific camps. For the research, the students used modern measuring devices: digital levelers, motorized electronic total stations, GNSS satellite receivers and terrestrial laser scanners.

The topic of the sixth paper is digital soil mapping (DSM), in which the soil cover is modelled using space-time relationships between environmental covariates and soil. The article describes the characteristics of DTM derivatives, which are most often used in digital soil mapping and DSM creation.

The analysis of land use changes in the Tricity metropolitan area developed on the basis of a multi-time classification of LANDSAT and RAPIDEYE images is covered by the next article in this issue of the journal. The aim of this study was to diagnose the main trends in land cover changes around urban agglomerations, on the example of the Tricity (Gdańsk, Gdynia, Sopot), over the last twenty years (1997–2016) and to present them statistically and graphically in the form of a compilation of numerical maps.

The last article concerns the 3D visualization of the interior of the “U Jaksy” gallery. The 2D imaging of space became insufficient because it forced the artist to choose the right perspective and a holistic view of the object. The 3D imaging could be recreated using 2D photographs by creating, for example, a stereogram, a panorama, or creating a 3D model. 3D modelling techniques have become a very important element of modern photogrammetry as they allow for an interesting, effective, as well as metric way of imaging reality.

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