Using drone photogrammetry for establishing a 3D geosite model application

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Abstract:

Geotourism is a relatively new branch of tourism, which is only moderately spread and known in Hungary. However, at the international level, more and more scientific research works try to sustainably foster and use science communication, conservation, and economic opportunities arising from it. In 2015, UNESCO adopted the initiative of Global Geoparks, so the geologically and geomorphologically significant and spectacular areas that receive this title get a high level of scientific and tourism recognition. The goal of geotourism is to bring earth sciences closer to the general audience through the most spectacular and well-interpretable inanimate natural formations called geosites. This brings benefits to visitors and local communities too. We call visitors geotourists, if they are interested in the geoscientific values of the visited area or object.

Geotourism relies heavily on modern science communication techniques. With the development of IT and field data collection methods, it is possible to create new solutions and new techniques. In Hungary, the science communication tools of geotourism are mostly focused on interpretative panels, and field guides, and are only minimally present in the digital space. The 3D visualisation form has not yet spread widely in our country for the promotion of geoscientific values, but geotourists can encounter it in many other countries, e.g. in some Spanish (Martínez-Graña et. al, 2018) and Greek (Papadopoulou et al. 2022) areas and geoparks there are already visual communication solutions operating on this basis. In our research, we tried to achieve useful and spectacular results for spatial visualisation and 3D modeling too, as well as a tool for the protection of geoheritage.

It is important that various virtual opportunities can make the scientific content experienced in the field available to a larger audience - which, however, cannot be enjoyed by everyone due to various obligations, restrictions, or even distance. To eliminate this, we have created a web platform presenting five different large-resolution 3D geosite models in the sample area of the Balaton Uplands, where geotourists can plan their trips and get to know certain sites before visiting the field (or even without any restrictions). The basis of the models is the toolbox of drone photogrammetry, which was used to generate the data during fieldwork. For constructing models, we used the OpenDroneMap application, which is a user-friendly, open-source, extensible application for drone image processing. Its most important uniqueness is that provides a web-based interface with visualisation, online storage, and data analysis functions. This way five models were created and published to visitors who can freely access the content. Information panels and additional handouts are also accessible on the webpage, so this solution is also capable of decreasing human impact on the environment – creating a new tool for sustainable tourism in Hungary. This study is the first step of the usabilitiy examination of 3D models in geotourism: in the next stage, visitors and webpage users are going to be asked about their opinion and suggestion on making the models more informative and interpretable.

The webpage is available here: https://mercator.elte.hu/~edina/3Dmodels/

Acknowledgments

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