

EGU21-4910, updated on 28 May 2022

<https://doi.org/10.5194/egusphere-egu21-4910>

EGU General Assembly 2021

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Mapping parent material using data originating from Earth Observation as ancillary information

Tünde Takáts^{1,2}, János Mészáros¹, Gáspár Albert², and László Pásztor¹

¹Institute for Soil Sciences, Centre for Agricultural Research, H-1022 Budapest, Hungary (takats.tunde@rissac.hu)

²Eötvös Loránd University, Faculty of Informatics, Institute of Cartography and Geoinformatics, Budapest, Hungary

Parent material is an essential soil property, whose mapping is a challenging task. Usually, large scale geological maps are used if they are available. However, in many cases, especially in medium and large scale mapping, such source data are too old or not existing at all. In this project have been looking for a solution for this problem. Our aim is to create a new, large scale, lithological map of parent material in an old mining region.

The study area is the Dorogi Basin in northern central Hungary. It is known for coal mining, which ended in 2003 after more than two centuries. The latest large scale (1:10,000) geological map series from this area was made in the 1960's, in the "golden age" of mining.

Google Earth Engine was selected as main GIS platform, using mainly open source data and programs for mapping. We have used data originating from Earth Observation as ancillary information (e.g. satellite images, SRTM) and machine learning techniques to spatially predict parent material. The satellite images were used to calculate several geological indices, which can be used as indicators of chemical composition. We examined the use of multiple satellite platform (Sentinel-2, Landsat 8, ASTER) as it has different geological indices. The existing geological maps were used for training in the classification concerning the lithological composition. To predict the parent materials we have used random forest, using geomorphometric features and geological indices as predictors. The newly compiled map was validated by comparing it with the old one.

Acknowledgment: Our research was supported by the Hungarian National Research, Development and Innovation Office (NKFIH; K-131820) and from the part of G.A. financial support was provided from the NRD! Fund of Hungary, Thematic Excellence Programme no. TKP2020-NKA-06 (National Challenges Subprogramme) funding scheme.