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## The use of geomorphons in geodiversity assessment

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The quantification of geodiversity has become an important task for researchers just after the formulation of the definition. For ‘measuring’ the values of the physical environment, many quantitative assessment models were presented in the past decades. The common characteristic of these methods is that they use thematic (geological, geomorphological, pedological, mineralogical, palaeontological) layers/datasets to evaluate each geoscientific property of a certain sample area. These data can be printed maps or databases with geospatial reference. The geodiversity index can be produced by objectively examining and evaluating these source materials. However, in some countries, scientists lack proper datasets, or they do not have the legislative background to use them.

We propose an alternative methodology based on Pereira et al. (2013) to determine geomorphological diversity, an important subvalue of the geodiversity index. The concept of geomorphons (Jasiewicz & Stepinski, 2013) is a relatively new pattern recognition approach to classify and map landforms. Any kind of DEMs (Digital Elevation Models) can be used to produce this categorization (better resolution means a more realistic result). The algorithm uses 8-tuple pattern of the visibility neighbourhood (not necessarily immediate neighbours) to delineate terrain forms in the eight principle directions to a certain point. The result of the algorithm produces a quasi-geomorphological map with 10 relief categories: flat, summit, ridge, shoulder, spur, slope, hollow, footslope, valley and depression.

This concept can be built in the geodiversity assessment process of any area as DEMs are freely available with at least 1 arc second resolution all over the world. We have used geomorphons during the geodiversity assessment of the Bakony–Balaton UNESCO Global Geopark in Hungary. The results follow field experiences and the patterns of large-scale geomorphological maps. As geomorphons are freely available in desktop GIS software (e.g. GRASS), their use can become an objective global opportunity to quantify geomorphological diversity.

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