



## **Automated geomorphometric classification of landforms in Transdanubian Region (Pannonian Basin) based on local slope histograms**

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The Transdanubian Region is a typically hilly, geologically manifold area of the Pannonian Basin. It is composed primarily of Permo-Mesozoic carbonates and siliciclastic sediments, however Pannonian sedimentary units and young volcanic forms are also characteristic, such as those in the Bakony-Balaton Highland Volcanic Field. The geological diversity is reflected in the geomorphological setting: beside of the classic eroding volcanic edifices, carbonate plateaus, medium-relief, gently hilly, slowly eroding landforms are also frequent in the geomorphic mosaic of the area.

Geomorphometric techniques are suitable to analyse and separate the various geomorphic units mosaicked and, in some cases, affected by (sub-)recent tectonic geomorphic processes. In our project we applied automated classification of local slope angle histograms derived of a 10-meter nominal resolution digital terrain model (DTM). Slope angle histograms within a rectangular moving window of various sizes have been calculated in numerous experiments. The histograms then served as a multichannel input of for a k-means classification to achieve a geologically-geomorphologically sound categorization of the area.

The experiments show good results in separating the very basic landforms, defined landscape boundaries can be reconstructed with high accuracy in case of larger window sizes (e.g. 5 km) and low number of categories. If the window size is smaller and the number of classes is higher, the tectonic geomorphic features are more prominently recognized, however often at the price of the clear separation boundaries: in these cases the horizontal change in the composition of various clusters matches the boundaries of the geological units. Volcanic forms are typically also put into some definite classes, however the flat plateaus of some volcanic edifices fall into another category also recognized in the experiments.

In summary we can conclude that the area is suitable for such analyses, many characteristic landform elements can be recognized and, more importantly, tectonic geomorphic features are often consistently outlined.

Acknowledgements: ZsK has been partly supported by Campus Hungary Internship TÁMOP-424B1, BS contributed as Alexander von Humboldt Research Fellow.