



Geostatistical analysis of morphometric features in the selected parts of the Sudetes (SW Poland)

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Recent years have brought rapid development of quantitative techniques that are successfully applied in geomorphology. They open up new interpretation possibilities, even in seemingly very well recognized areas. In particular, we are talking about the geomorphometric and geostatistical techniques whose integration in Geographic Information Systems allows to look at the spatial pattern of landforms and process signatures from a new perspective.

The morphology of the Sudetes, as of other mountain ranges in central Europe, is the result of protracted interaction of tectonic and surface processes, passive geological factors such as lithology and structure, and passage of time. This raises the question whether, and to which extent, these different controls and signals have resulted in similarities or differences in the morphometric structure of different parts within the same mountain range. In this paper we assume that geomorphic signals of various origins are expressed by a set of primary and secondary topographic attributes, which can be further analyzed as regional variables and modelled using geostatistical methods. Special attention is paid to variogram modelling. This method allows the identification of the spatial structure of the morphometric characteristics, its spatial scale and direction reflected in quantitative parameters of variograms (model functions, range, sill, nugget, anisotropy). These parameters for various areas are compared to find (dis-)similarities between different parts of the Sudetes.

Thus, the main goals of the paper are:

1. To evaluate the usefulness of topographic attributes' variogram modelling for quantification of the spatial morphometric structure of mountain areas, on the example of medium-altitude, non-glaciated mountain terrain.
2. To compare different parts of the Sudetes to find similarities and differences between them and to interpret the findings through the examination of geology and geomorphology of the region.

The analysis includes four test areas of contrasting relief: elevated surfaces of low relief, inselbergs, cuervas and tablelands for which the set of primary (e.g. absolute and relative height, slope inclination, curvature) and secondary (e.g. topographic wetness (TWI), ruggedness (TRI) and position indices (TPI)) attributes is derived from a 10-m resolution DEM.