



Geomorphometric correlations of vegetation cover properties and topographic karst features based on high-resolution LiDAR DTM of Aggtelek Karst, NE Hungary

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Topography and lithology are two major factors influencing the vegetation cover, its mosaic pattern and lateral transitions. In karstic areas the topography has a high diversity, microtopographic landforms influence the local ecological setting, vegetation structure. Presence of sinkholes of various sizes and geometric arrangements causes rapid lateral variation of the slope, aspect patterns as well as highly modify the soil water balance in time and space. These diversity of factors defines a mosaicked habitat pattern for vegetation assemblages.

The World Heritage Site Aggtelek Karst/Slovakian Karst Caves has characteristic natural and environmental properties concerning the geomorphological as well as the ecological values.

In order to be able to study the topographic influence on the ecological setting, a high-resolution digital terrain model (DTM) and digital surface model (DSM) have been derived from airborne laser scanning data depicting the karstic micro- and macrotopographic Landscape elements and the envelope surface of the canopy. Additional vegetation parameters like closure and average height have been derived from a normalized digital surface model (nDSM).

Extensive mapping of vegetation properties has been carried out: centered on points of a grid array several vegetation-specific data - including composition and structure of tree and shrub layers, herbaceous vegetation and tree regeneration - have been acquired. Various classification patterns - based on trees species composition, vertical vegetation structure - have been derived from this data set.

The comparison of the vegetation classification data and the geomorphometric DTM derivatives yielded interesting results. Certain vegetation characteristics often correlate with the geomorphometric properties. We interpret this similarity as sensitivity of vegetation to fine-scale variations in geomorphic properties like aspect, illumination conditions and soil properties. However, in many cases the vegetation pattern shows no correlation with natural settings. It may be the result of human impact, which actively formed the local land use in these hilly-low mountain karst area since the Middle Ages.

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