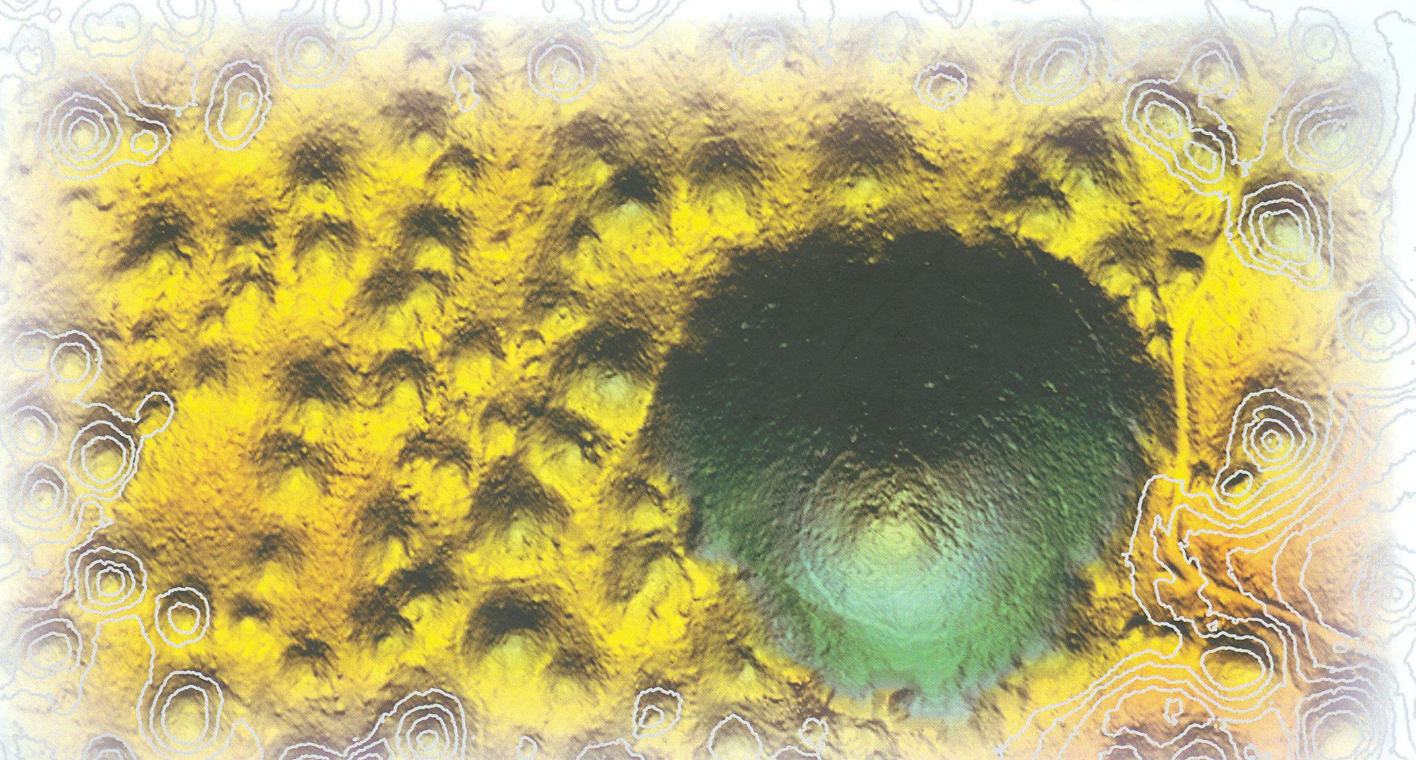
CARPATHO-BALKAN-DINARIC GEOMORPHOLOGICAL COMMISSION
and
Geomorphological Society of Slovenia,
Karst Research Institute, Research Centre of the Slovenian Academy of Sciences and Arts,
Anton Melik Geographical Institute, Research Centre of the Slovenian Academy of Sciences and Arts,
Department of Geography, Faculty of Arts, University of Ljubljana

CARPATHO-BALKAN-DINARIC CONFERENCE ON GEOMORPHOLOGY

ABSTRACTS & GUIDE BOOK



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Cover: Digital elevation model (DEM) of intensively karstified limestone plateau with solution and collapse dolines based on LIDAR (source of data: Slovene Environment Agency).

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OBJECT-ORIENTED MORPHOSTRUCTURAL DIVISION OF THE WESTERN CARPATHIANS

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Results of applying object-based image analysis based on DEM and its derivatives for the purposes of definition of morphostructures (or morphostructural division) of the Western Carpathians are presented. Part of the SRTM V4 dataset resampled to 80-meter resolution was used as input DEM and for derivation of two land-surface variables representing terrain roughness – slope gradient and vertical dissection. Prior to multi-resolution segmentation in the eCognition Developer software the layers were transformed using natural logarithmic (slope gradient) and square root function (elevation and vertical dissection).

First, we evaluated how size (or extent) of the study area affects results of the segmentation. Starting with a rectangle that touches border of the Western Carpathians and using an equal increment of 10 kilometres in all directions for each larger extent we reached total number of 45 extents. For each extent were carried out segmentations with Scale Parameter (SP) 1, 10, 100 and automated three levels using Estimation of Scale Parameter 2 (ESP2) tool. For each segmentation the values of local variance, number of objects, mean object size and SP value (for ESP2 levels only) were registered and analysed in order to determine the most suitable area extent for this study. Next, we performed two processes: automated segmentation of the full scene and selection of distinct individuals based on mean difference in elevation to neighbouring objects. These were repeatedly performed over the scene after excluding the extracted individuals. As a result, we obtained only one level of objects, which, however, contains several hierarchical levels (i.e. different levels of detail). This way we, to some degree, solved issue of under- or over-segmentation caused by using globally set SP value. These delineated objects can be labelled not only as morphometric individuals but rather as morphometric-morphostructural individuals, since the shape of morphostructures is well reflected in terrain morphology.

For compatibility assessment of the segmented objects we used traditional geomorphological division of the area as reference data. The assessment was done by both expert visual comparison and by quantitative evaluation of boundary overlay of segmented and reference objects. Even though not all of the delineated objects show full compatibility, they still have a morphostructural meaning in terms of their alternative interpretation or as their more detailed subdivision.

Keywords: OBIA, multi-resolution segmentation, morphometric-morphostructural individuals, compatibility assessment

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