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ABSTRACTS VOLUME

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Morphometrical-Morphostructural Subdivision Of The Western Carpathians (Slovakia) By Object-Based Image Analysis (Obia)

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Geomorphological regionalisation has long tradition in Slovak geomorphology. However, in view of high demands for objective approaches in modern geomorphology, the manually elaborated regionalisation currently in use suffers from subjective decisions of its authors. To address the demands, we applied object-based image analysis for semi-automated and objective delineation of the basic, third-order morphostructures of the Western Carpathians, which should approximately correspond with the traditional geomorphological regions. Three morphostructurally meaningful geomorphometric variables derived from the SRTM V4 dataset – slope gradient, vertical dissection of terrain (representing terrain roughness) and elevation (reflecting intensity of vertical tectonic movements) – were used as input into multiresolution segmentation based on the ESP2 tool in the eCognition Developer software. Two processes were repeatedly performed in our object-oriented workflow: automated iterative segmentation and selection (and removal) of distinct individuals based on mean difference in elevation to neighbouring objects. Such repetition of segmentations with decreasing scale used for partitioning of systematically smaller domains proved to be important when delineation of morphostructural features variable in size and homogeneity degree is targeted. As a result, one object level containing several hierarchical levels different in level of detail was obtained. Compared to the traditional geomorphological regions it has quantitative compatibility of 60 %. Statistically incompatible boundaries are not considered as failure of the proposed approach, since most of them still have a morphostructural meaning either in terms of their alternative interpretation or as more- or less-detailed substitution. Some inconsistencies were visually attributed to uncertainties present in the traditional regions, which cannot be dealt with algorithmically, e.g. boundaries that do not follow the obvious morphological contrast or were determined lithologically. Our subdivision can be used as a more objective alternative for the traditional regionalisation, with strongly reduced influence of subjective decisions in the process.

Keywords: geomorphometry; multiresolution segmentation; object-oriented approach; objective mapping

THEME: S24 : GEOMORPHOLOGY AND ALLIED DISCIPLINES: MUTUAL CONTRIBUTIONS FOR THE PROGRESS OF INTEGRATED ENVIRONMENTAL AND DISASTER STUDIES

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Floodplain Mapping And Vulnerability Of Kashmir Valley Using HEC-RAS And Arc GIS : A Case Study Of Upper River Jhelum, Kashmir India.

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The present study demonstrates the relevance of the HEC RAS model for the formulation of the detailed floodplains maps of the Kashmir basin, which will provide an immense assistance to planners in formulating the flood management and development plans in Kashmir valley, as the study area experienced unprecedented floods throughout its history, the recent flood of September 2014 which created havoc, exposed the vulnerability extent of the valley and place forwards need of the detailed management plan. The HEC RAS model used in the present study is known for its precision. A detailed terrain modelling of River Jhelum has been carried out using RTK GPS for preparation of the Digital Elevation Model, which was subsequently used for the extraction of the geometrical data of river Jhelum. In the present investigation gauge records of annual peak flows (1956-2014) of two gauging stations i.e., Sangam (upstream) in south and Ram Munshibagh (downstream) in central reaches of the river, were used to carry out the flood frequency analysis (FFA) of the Jhelum River by Gumbel and Log-Pearson type-III (LP3) probability distributions, as revealed by the goodness of fit test (Chi-square and Kolmogorov Smirnov), Log Pearson Type-III was found to be the best fitted probability distribution. The results obtained from the frequency analysis were used as an input to find out the corresponding flood levels likely to be in the river Jhelum. The outputs from the HEC RAS were transferred to Arc GIS 10.2 for the preparation of the floodplain maps in accordance with their return period. These maps were then attributed with various social parameters to get the complete vulnerability profile of Kashmir valley. Analysis of these maps revealed that 1505 (9.43%) square kilometre with 22% population found to be vulnerable.

Keywords: Flood Frequency, HEC RAS, Arc-GIS