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AIZM model – advantages and limits of flood delineation by GIS model

Martin Caletka and Monika Sulc Michalkova
Masaryk University, Brno, Faculty of Science, Department of Geography, Czech Republic (martintygrcaletka@gmail.com)

The Alternative Indicative Inundation Model (AIZM) is a GIS-based tool for the delineation of flood extents using the water heights relative to digital elevation model. The tool is composed of several sub-models in the ESRI ArcGIS ModelBuilder. In contrast to most traditional hydrodynamic models, hydraulics is omitted which is compensated for by ease of application and low demands on both the input data and computational capacity. Our study presents an analysis of flood extents delineated by the AIZM model for 30 diverse river reaches in the Czech Republic on the basis of flood marks‘ elevations from catastrophic flood events which occurred in summer 1997, summer 2002 and spring 2006.

The accuracy of the outputs has been assessed through the comparison with corresponding inundation extents, as mapped from in situ observations and aerial imagery. It has been proved that the AIZM model is able to deliver inundation extents with accuracy comparable with that of hydrodynamic models. The median difference of the modelled flood extents and benchmarks is 21 %. Non-metric multidimensional scaling and cluster analyses have been conducted. It has been found out that longitudinal slope and channel width pose the most important of all evaluated characteristics of river reaches influencing the accuracy of the delineated flood extents. Predominance of flood extents with good accuracy has been recorded for river reaches with wider channels (approximately more than 15 m) and smaller longitudinal slopes (less than 3 ‰. Presence of transverse barriers over floodplains, such as road or railway embankments and also the transmission capacity of bridges and culverts in their bodies are the important factors influencing the accuracy of the outputs.