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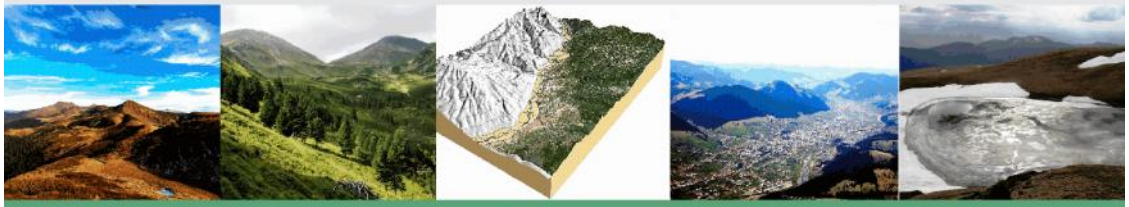

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Linking morphological settings and hydrodynamic river behaviour. Prahova River, Romania

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The purpose of this study is to analyze, using GIS, the relationship between hydrodynamic characteristics during high intensity flood periods and geomorphological controls on channel and valley morphology of the Carpathian and Subcarpathian Prahova River.
In order to acquire Prahova River's topographic information, on its channel and valley from Predeal (upstream) to Campina (downstream), in August 2006 a GIS ground-based survey was used. The survey consisted of 192 topo-bathymetrical cross-section profiles over 55 Km distance (river length) covering the Carpathian and Subcarpathian reaches.
In the summer of 2012, the Subcarpathian bathymetry was remeasured on the 57 cross-section profiles with the assistance of GNSS technology. We used the RTK-Cinematic method in Real Time and differential real time corrections provided by the specialized ROMPOS service. The RTK-POMPOS determinations were realised using two approaches, one through MAC (Master-Auxiliary Concept) and the other through VRS (Virtual Reference Station), both approaches provide corrections from more than one reference station in the same time. The surveys were achieved using Topcon GR-3 state of the art equipment. The Topcon Tools vers.8.2. application was used to process the survey's data.
The geometry of the hydraulic model (cross-section profiles and longitudinal profile) was extracted from topo-bathymetric surveyed data (TIN) under GIS environment by using HEC-GeoRAS utility. Steady flow simulations under mixed subcritical and supercritical conditions (transitions specific to this high slope river reach) were performed with the help of the hydraulic modeling software HEC-RAS for 5 flow values ranging from annual to 100-year flood. The 10-year flood was found to be very close to bankfull flow for this artificialized channel. Stage-discharge curves were used at the gauging stations of Busteni and Campina to calibrate the model.
Mean velocity, shear stress and stream power values were computed in each cross-section. These values were correlated with observed errosion/deposition sites and existing geology and conclusion were drawn regarding the morphodynamic behavior of the river. Five main areas with high values of computed shear stresses and velocities and corresponding low values of width to depth ratio (W/D) were identified (two in the Carpathian sector and three in the subcarpathic sector). These areas were found to match the observed erosion areas, where the river has incised into bedrock and eroded its banks. This erosional areas are tectonic-structurally determined and sustained by the uplift of the Bend Carpathian area in relation to Quaternary river evolution.

Key words: GIS, hydraulic modeling, river behaviour, structural and geomorphological controls