Extracting possible terrace surfaces from digital elevation models – methodological issues and case study from Hungary

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Abstract—**Terraces of the Danube is a mainstream research topic for Hungarian geomorphologists. The research group of Demoulin, A. developed a GIS-based algorithm to extract terrace surfaces, which proved the suitability of automated landform extraction to detect even small terrace remnants [1]. Further improvement of this method was carried out in the form of GIS model tools and R scripts to provide an automated approach to create consistent and repeatable results.**

Issues arising from the methods used for the terrace extraction were analysed using an artificial hillslope model. The effect of erosion processes were imitated by adding Gaussian noise to the data. Besides, the algorithm was tested on a contour-based DEM of the Danube tributaries in the Southeastern-Börzsöny, Northern Hungary, where small terrace remnants were expected.

In the first step the analysed catchment is cut into parallel sections and the relative altitude above streamline is plotted against the filtered slope values of every cell in the section. Afterwards the cells potentially belong to terrace surfaces are selected and the histogram of altitude values is created, also showing the mean slope and standard deviation of slope for every relative elevation value. This diagram helps to define a minimum area threshold and maximum mean slope value for the detection of possible terrace cells. As a final output a plot is created that shows the stream's long profile and marks at altitude of the selected cells and a map containing the terrace remnants cells. Based on these results, with the consideration of the neotectonic processes, it is possible to reconstruct the paleo-profile of the given valley and the terrace top-surfaces.

The biggest challenge of the proposed algorithm is the determination of the thresholds best adapted to the topography and the available DEM of a given study site, therefore further testing is necessary.

REFERENCES

[1] Demoulin, A., B. Bovy, G. Rixhon and Y. Cornet, 2007. "An automated method to extract fluvial terraces from digital elevation models: The Vesdre valley, a case study in eastern Belgium." Geomorphology 91(1–2), 51–64.