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Automatic positional Correction of River Axes based on High Resolution Digital Terrain Models

Michael Wimmer (1), Markus Hollaus (1), Norbert Pfeifer (1), and Jürgen Komma (2)

(1) TU Wien, Geodesy and Geoinformation, Photogrammetry, Austria, (2) TU Wien, Hydraulic Engineering and Water Resources Management, Austria

Hydraulic modeling for flood risk management requires amongst others Digital Terrain Models (DTMs) and river axes as inputs. These spatial datasets often suffer from positional discrepancies due to (i) different data sources, (ii) different acquisition techniques, and (iii) temporal decorrelation as a result of physical changes between the respective acquisition times. It is thus necessary to ensure spatial consistency of the datasets. We developed an automatic procedure to adapt a given river axis to the river bed represented in a high resolution DTM. The original or densified nodes of the axis are sequentially corrected with a cross-section-based weighting function. The multiplicative weight composition enables the introduction of several criteria concerning river bed geometry, river axis height profiles and water flow behavior. Practical application of the procedure shows good results as long as the assumptions concerning river bed or water surface representation in the DTM are met. While narrow, alpine river beds can be detected very well, wide lowland rivers pose certain challenges especially in case of a poor water surface representation. For the latter, the resulting corrected axis still remains in the river bed but tends to have a visually less appealing zig-zag course. Evaluating the results in a study area of about 6000 km^2 in Austria showed that at most a few per cent of a river's automatically corrected nodes needed manual editing, mainly in the upper reach where no clear river bed can be identified. Exceptionally, this value exceeds 3 % for rivers where significant parts are conducted underground.