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Generalized Swath Profiles

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Swath profiles are used to condense topographic information from a rectangular area (swath) to an elevation profile. One direction of the swath defines the profile coordinate, while averaging is performed in the other direction. Depending on the width of the swath, the resulting profiles are less affected by small-scale structures than individual topographic profiles. However, all topographic structures which are not perpendicular to the swath introduce artefacts, e.g., curved river valleys are artificially widened. We introduce a new method which avoids such artefacts, but preserves the advantages of swath profiles. In a first step, a baseline defining the origin of the profile's x-axis is specified. This line may be curved. In case of a generalized swath profile across a river valley, this line will be the river itself in most cases. The profile coordinate is the oriented distance from this baseline, and the elevations are averaged over all points of the surface having the same (oriented) distance from the baseline. For generating the profile, the elevations can be either considered as absolute values or relatively to the corresponding point on the baseline and be brought to absolute values afterwards.
We present an efficient implementation of this concept, applications to some river valleys, and an easy-to-use web-based tool.