A semi-automated method for extracting channels and channel profiles from LiDAR-derived digital elevation models

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Stream channels are an integral part of hydrology, alluvial geomorphology and tectonic geomorphology, and have long been studied qualitatively and quantitatively. With the advent of digital elevation models (DEMs) and geographic information systems (GIS), several methods have been proposed to extract channels from raster DEMs. This presentation introduces a semi-automated method for extracting stream channels from high resolution DEMs. The methodology flowchart includes the following major steps: (1) channel detection, (2) mathematical morphological operation, (3) vectorization, (4) profile generation, and (5) accuracy assessment. The method is implemented as an ArcGIS Python add-in toolbar. The application of the toolbar is demonstrated using a LiDAR-derived DEM in a study area along the San Andreas Fault in California, USA.

Keywords: Stream channel, Digital elevation model, Geographic information system, Light detection and ranging (LiDAR), Python