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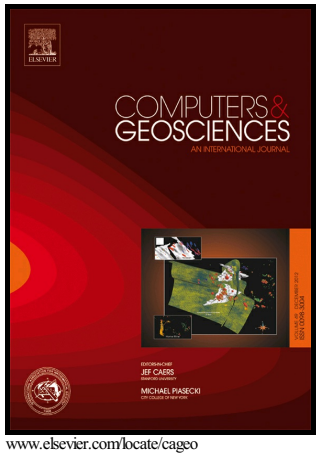

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SwathProfiler and NProfiler: Two new ArcGIS Add-ins for the automatic extraction of swath and normalized river profiles

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Abstract

The present-day great availability of high-resolution Digital Elevation Models has improved tectonic geomorphology analyses in their methodological aspects and geological meaning. Analyses based on topographic profiles are valuable to explore the short and long-term landscape response to tectonic activity and climate changes. Swath and river longitudinal profiles are two of the most used analysis to explore the long and short-term landscape responses. Most of these morphometric analyses are conducted in GIS software, which have become standard tools for analyzing drainage network metrics. In this work we present two ArcGIS Add-Ins to automatically delineate swath and normalized river profiles. Both tools are programmed in Visual Basic .NET and use ArcObjects library-architecture to access directly to vector and raster data. The SwathProfiler Add-In allows analyzing the topography within a swath or band by representing maximum-minimum-mean elevations, first and third quartile, local relief and hypsometry. We have defined a new transverse hypsometric integral index (THi) that analyzes hypsometry along the swath and offer valuable information in these kind of graphics. The NProfiler Add-In allows representing longitudinal normalized river profiles and their related morphometric indexes as normalized concavity (CT), maximum concavity (Cmax) and length of maximum concavity (Lmax). Both tools facilitate the spatial analysis of topography and drainage networks directly in a GIS environment as ArcMap and provide graphical outputs. To illustrate how these tools work, we analyzed two study areas, the Sierra Alhamilla mountain range (Betic Cordillera, SE Spain) and the Eastern margin of the Dead Sea (Jordan). The first study area has been recently studied from a morphotectonic perspective and these new tools can show an added value to the previous studies. The second study area has not been analyzed by quantitative tectonic geomorphology and the results suggest a landscape in transient state due to a continuous base-level fall produced by the formation of the Dead Sea basin.

Keywords: Swath profile; normalized profile; tectonic geomorphology; Dead Sea Transform Fault; Sierra Alhamilla; Betic Cordillera