TecDEM: A MATLAB Based Toolbox for understanding Tectonics from Digital Elevation Models

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TecDEM is a MATLAB based tool box for understanding the tectonics from digital elevation models (DEMs) of any area. These DEMs can be derived from data of any spatial resolution (Low, medium and High). In the first step we extract drainage network from the DEMs using flow grid approach. Drainage network is a group of streams having elevation and catchment area information as a function of spatial locations. We implement an array of stream structure to study this drainage network. Knickpoints can be identified on each stream of the drainage network by a graphical user interface and are helpful for understanding stream morphology. Stream profile analysis in steady state condition is applied on all streams to calculate geomorphic parameters and regional uplift rates. Hack index is calculated for all the profiles at a certain interval and over the change of knickpoints. Reports menu of this tool box generates detailed statistics report, complete tabulated report, graphical output of each analyzed stream profile and Hack index profile. All the calculated values are part of stream structure and is saved as .mat file for later use with this tool box. The spatial distribution of geomorphic parameters, uplift rates and knickpoints are exported as a shape files for visualization in professional GIS software. We test this tool box on DEMs from different tectonic settings worldwide and received verifiable results with other studies.