Geophysical Research Abstracts
Vol. 19, EGU2017-477, 2017
EGU General Assembly 2017

The Effect of DEM Source and Grid Size on the Index of Connectivity in Savanna Catchments

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The term "hydrological connectivity" is increasingly used instead of sediment delivery ratio to describe the linkage between the sources of water and sediment within a catchment to the catchment outlet. Sediment delivery ratio is an empirical parameter that is highly site-specific and tends to lump all processes, whilst hydrological connectivity focuses on the spatially-explicit hydrologic drivers of surficial processes. Detailed topographic information plays a fundamental role in geomorphological interpretations as well as quantitative modelling of sediment fluxes and connectivity. Geomorphometric analysis permits a detailed characterization of drainage area and drainage pattern together with the possibility of characterizing surface roughness. High resolution topographic data (i.e. LiDAR) are not available for all areas; however, remotely sensed topographic data from multiple sources with different grid sizes are used to undertake geomorphologic analysis in data-sparse regions. The Index of Connectivity (IC), a geomorphometric model based only on DEM data, is applied in two small savanna catchments in Queensland, Australia. The influence of the scale of the topographic data is explored by using DEMs from LiDAR (∼1 m), WorldDEM (∼10 m), raw SRTM and hydrologically corrected SRTM derived data (∼30 m) to calculate the index of connectivity. The effect of the grid size is also investigated by resampling the high resolution LiDAR DEM to multiple grid sizes (e.g. 5, 10, 20 m) and comparing the extracted IC.