Geophysical Research Abstracts
Vol. 15, EGU2013-5344, 2013
EGU General Assembly 2013

Determination of trunk streams via using flow accumulation values

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There is often a problem, with schematisation of catchments and a channel networks in a broken relief like sandstone landscape (with high vertical segmentation, narrow valley lines, crags, sheer rocks, endorheic hollows etc.). Usual hydrological parameters (subcatchment areas, altitude of highest point of subcatchment, water discharge), which are mostly used for determination of trunk stream upstream the junction, are frequently not utilizable very well in this kind of relief. We found, that for small, relatively homogeneous catchments (within the meaning of land-use, geological subsurface, anthropogenic influence etc.), which are extremely shaped, the value called "flow accumulation" (FA) could be very useful. This value gives the number of cells of the Digital Elevation Model (DEM) grid, which are drained to each cell of the catchment. We can predict that the stream channel with higher values of flow accumulation represents the main stream. There are three crucial issues with this theory. At first it is necessary to find the most suitable algorithm for calculation flow accumulation in a broken relief. Various algorithms could have complications with correct flow routing (representation of divergent or convergent character of the flow), or with keeping the flow paths uninterrupted. Relief with high curvature changes (alternating concave/convex shapes, high steepness changes) causes interrupting of flow lines in many algorithms used for hydrological computing. Second – set down limits of this theory (e.g. the size and character of a surveyed catchment). Third – verify this theory in reality. We tested this theory on sandstone landscape of National park Czech Switzerland. The main data source were high-resolution LIDAR (Light Detection and Ranging) DEM snapshots of surveyed area. This data comes from TU Dresden project called Genesis (Geoinformation Networks For The Cross- Border National Park Region Saxon- Bohemian Switzerland). In order to solve these issues GIS applications (e. g. GIS GRASS and its hydrological modules like r.terraflow, r.watershed, r.flow etc.) are very useful.

Key words: channel network, flow accumulation, Digital Elevation Model, LIDAR, broken relief, GIS GRASS