



Visualization of small scale structures on high resolution DEMs

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Knowledge on the terrain morphology is very important for observation of numerous processes and events and digital elevation models are therefore one of the most important datasets in geographic analyses. Furthermore, recognition of natural and anthropogenic microrelief structures, which can be observed on detailed terrain models derived from aerial laser scanning (lidar) or structure-from-motion photogrammetry, is of paramount importance in many applications. In this paper we thus examine and evaluate methods of raster lidar data visualization for the determination (recognition) of microrelief features and present a series of strategies to assist selecting the preferred visualization of choice for structures of various shapes and sizes, set in varied landscapes. Often the answer is not definite and more frequently a combination of techniques has to be used to map a very diverse landscape.

Researchers can only very recently benefit from free software for calculation of advanced visualization techniques. These tools are often difficult to understand, have numerous options that confuse the user, or require and produce non-standard data formats, because they were written for specific purposes. We therefore designed the Relief Visualization Toolbox (RVT) as a free, easy-to-use, standalone application to create visualisations from high-resolution digital elevation data. It is tailored for the very beginners in relief interpretation, but it can also be used by more advanced users in data processing and geographic information systems. It offers a range of techniques, such as simple hillshading and its derivatives, slope gradient, trend removal, positive and negative openness, sky-view factor, and anisotropic sky-view factor. All included methods have been proven to be effective for detection of small scale features and the default settings are optimised to accomplish this task. However, the usability of the tool goes beyond computation for visualization purposes, as sky-view factor, for example, is an essential variable in many fields, e.g. in meteorology.

RVT produces two types of results: 1) the original files have a full range of values and are intended for further analyses in geographic information systems, 2) the simplified versions are histogram stretched for visualization purposes and saved as 8-bit GeoTIFF files. This means that they can be explored in non-GIS software, e.g. with simple picture viewers, which is essential when a larger community of non-specialists needs to be considered, e.g. in public collaborative projects. The tool recognizes all frequently used single band raster formats and supports elevation raster file data conversion.