



Digital simulation of small-scale drainage basins using SRTM satellite images: validity and competence analysis.

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Concept of hydrological modeling is broadly applied nowadays to represent a digital simulation of drainage systems based primarily on terrain analysis and performing automation extraction of the drainage networks. The model executes as well stream orders, watershed, and quantifying the most important morphometric parameters of river catchment.

Analysis of the digital elevation model (DEM) relying on the fact that the physical surface determines characteristics of the flowing water across it. Direction of flow is determined by surface aspect that defines the maximum rate of changes in elevation and slope direction.

The present study based on the analysis of the Shuttle Radar Topography Mission (SRTM) images version two for many reasons such as:

- Accessibility of editing feature classes.
- Extraction of the hydrological features accurately at a high level of detail.
- Possibility of depicting double-line drains where the river width exceeds 183 m for a length of 600 m.

Missing values in the SRTM images are replaced by new values interpolated from the

neighboring pixels. As well grid errors (sinks or peaks) are filled or removed to ensure proper stream delineation. Direction of flow is calculated using 3 x 3 cell neighboring. Flow accumulation and delineation processes are applied by a threshold value ≥ 10 cells as the minimum number of cells required to constitute a stream.

The model is applied to eight small-scale drainage basins in the Central Eastern Desert of Egypt. The basins vary greatly in area from 25.7 to 1892.6 km² and ranging in length between 16 and 86.2 km along the trunk streams.

Validity and competence of the model are sustained in comparison with topographic maps of scales 1:100.000 and 1:50.000. The comparison based principally on variable and variance analysis. The results revealing that the data extracted from the SRTM images are greatly equivalent to those obtained from the topographic maps 1:50.000 and providing more details in the lower stream orders, specifically.