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Modelling Uncertainty of Stream Networks Derived from Elevation Data Using Two Free Softwares: R and SAGA

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ABSTRACT

Stream networks are considered important units in many environmental decision making processes. The extraction of streams using digital elevation models (DEMs) presents many advantages. However it is very sensitive to the uncertainty of the elevation datasets used. The main aim of this paper is to implement geostatistical simulations and assess the propagated uncertainty and map the error of location streams. First, point sampled elevations are used to fit a variogram model. Next two hundred DEM realizations are generated using conditional sequential Gaussian simulation; the stream network map is extracted for each of these realizations, and the collection of stream networks is analyzed to quantify the error propagation. At each grid cell, the probability of the occurrence of a stream and the propagated error are estimated. The more probable stream network are delineated and compared with the digital stream network derived from topographic map. The method is illustrated using a small dataset (8742 sampled elevations) for Anaguid Saharan platform. All computations are run in two free softwares: R and SAGA. R is used to fit variogram and to run sequential Gaussian simulation. SAGA is used to extract streams via RSAGA library.

KEYWORDS

DEM; Stream Network; Uncertainty Modeling; R; SAGA

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