



A geomorphic analysis of Sinai's drainage pattern. Evidence for interpreting the distribution of uplift?

Angela Oswald, Kurt Stüwe, and Gustav Hanke

University of Graz, Earth Sciences, Austria (angela.oswald@uni-graz.at)

A variety of quantitative geomorphologic methods have proven useful to infer aspects of the interplay between tectonics and surface processes and have been applied to various regions in the world. For example, quantitative analysis of drainage systems may be used to investigate the formation of mountain belts where the exposure of bedrock can be linked with tectonic processes.

Sinai Peninsula, which is located at the northernmost Red Sea, shows what appears to be a fluvial landscape despite present aridity. Its geomorphology is suitable for a quantitative geomorphologic interpretation using a classic stream power approach. Geomorphologic parameters were derived through analysis of the ASTER digital elevation model (DEM). Steepness and concavity index were extracted from slope-area relationships along channel profiles. Although parameters like knickpoints along channels are typically controlled by complex mechanisms, they may be used to interpret different regimes of uplift. Sinuosity has been calculated from plan channel coordinates in order to differentiate between fluvial and fault dominated channels and channel segments. Because of possible overprinting of fluvial features by present day arid climate erosion and sedimentation processes, the DEM-based analysis needs to be supplemented with photographic images and field observations in order to assess the significance of the single parameter values. The spatial distribution of geomorphic parameter values is compared to the large scale topographic and slope pattern and correlated with the different tectonic regimes acting on Sinai, namely the divergent rifting of the Gulf of Suez in the West and the strike slip dominated opening of the Gulf of Aqaba, whereas Northern Sinai is tilted towards the Mediterranean.