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Geomorphology in a Rifting Environment. Can Channel Profiles from Arid Sinai, Egypt, Provide Constraints on Tectonics?

A. Oswald and K. Stüwe
University of Graz, Earth Sciences, Austria (angela.oswald@uni-graz.at)

Significant surface uplift along rift flanks results in the formation of rift-parallel mountain belts. The combination of uplift and erosion processes characterizes fluvial systems in the vicinity of the rift. Geometry of the drainage network and channel profiles may provide information on timing and geometry of rifting. However it is not clear if traditional approaches to fluvial erosion (e.g. the stream power approach) can be used to infer aspects of landscape evolution to areas, which show fluvial geomorphology, but are arid at present, like Sinai, Egypt. In this project we set out to test this and provide a description of channels as a database for our considerations.

Sinai is located at a major rift system, the Red Sea, which branches into the Gulf of Suez and the Gulf of Aqaba bordering Sinai from West and South to South East, respectively. Uplift associated with the rifting exposed bedrock in Southern Sinai and topography of up to more than 2.5km, which also acts as a drainage divide between East and West. Despite Sinai's present day aridity, the large scale geomorphology appears to be characterized by fluvial features. In contrast to channels along the northern Gulf of Aqaba, channels draining to the Gulf of Suez show a more classical profile with clear knickpoints that seem however not to have mirgrated significantly from the basin-mountain transition. As the change to arid climate may have preserved to some state a previous configuration, the knickpoints may not be used to put a time frame on the uplift, but could in combination with paleoclimate data indicate changes in the relative importance of uplift versus erosion.