



Tectonic implications of structural architecture changes along the Red Sea Rift

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The Red Sea rift structural architecture changes dramatically along strike from narrow localized spreading in the south to asymmetrical diffuse extension north of $\sim 21^\circ$ latitude. The diffuse extension take place within a triangle that bounded by the Sarhan graben, which is a Cenozoic failed rift, to the east, the northern Red Sea Rift to the west and Makkah-Madinah-Nafud (MMN) volcanic line to the south. Our goal is to build a finite element model that describes the diffuse extension within the NW Arabian Margin that associated with the Red Sea and Sarhan Rifts initiation. We hypothesize that the NW Arabian margin's lithospheric weakness and structural diversity are playing an important role in producing region of diffuse extension by their interaction with the forces applied by far field stresses represented by the New Tethys slab pull. On the other hand, the SW Arabian margin interacts with the far field stresses as a single strong block in which led to localize the extension in the southern Red Sea. Our work may improve the scientific community understanding for how rifts initiate and evolve over time.