



## Active kinematics of the southern Red Sea

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GPS measurements adjacent to the southern Red Sea and around the Afar Triple Junction (Red Sea Rift-Gulf of Aden Rift-East African Rift), indicate that the Red Sea rift bifurcates south of 16° N latitude with one branch following a continuation of the main Red Sea rift (~150° Azimuth) and the other oriented roughly N-S traversing the Danakil Depression/Afar volcanic province. These two rift branches account for the full Arabia-Nubia relative motion. Within the resolution of our observations, the partitioning of extension between rift branches varies linearly along strike; north of ~16°N extension (~15 mm/yr at 16°N) is confined to the main Red Sea rift while at the latitude of the Afar Triple Junction (~12°N) extension (~20 mm/yr) has transferred completely to the Danakil-Afar Depression. The Danakil block separates the two rifts and rotates counterclockwise, accommodating extension along the rifts and developing the triangular geometry of the Danakil/Afar Depression. Extrapolating the geodetic rates to the time of initial rifting of Arabia from Nubia (~25 ± 3 Ma) and estimating total extension across the rift branches from the present-day widths of the rifts suggests that Arabia-Nubia relative motion has been roughly constant since the initiation of Red Sea spreading, and that extension was initially confined to the main Red Sea rift with the presently observed bifurcation initiating at about 17 Ma.