Kinematics of rift propagation throughout the Tadjoura-Ghoubbet connection zone, western of Aden, Republic of Djibouti.

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Tadjoura Gulf (TG) lies at the western tip of the EW-trending Gulf of Aden which forms one the three diverging branches of the Afar Triangle.

The EW-trending axis veers abruptly counterclockwise into the N120°E-oriented Ghoubbet rift which is part of a submeridian, and partly emerged, rifted zone encompassing to the N the Asal and Manda Inakir en echelon subrifts.

Scientific goals of the present work are:
- to define the overall structure of the TR
- to precise the kinematics of recent rifting in the linkage zone
Methodology and datasets

- bathymetric data
- seismic reflection profiles
- remote sensing data:
  - Aster images (lateral resolution 15 m)
  - Aster 3-D topographic data (vertical resolution 7 m)
- onshore geology
Overall structure of the Tadjoura Rift

TR appears as:
- a 40 km-wide SSW-facing half-graben, filled by 1-3 Ma Gulf Basalts
- bounded to the north by a master fault and with a highly faulted footwall block (Northern Coastal Fault Belt)
- To the south, it extends as a >20 km-long shallower flexural margin (Djibouti Plain), locally disrupted by:
  - 1) antithetic extensional faults (Southern Coastal Fault Belt)
  - 2) the Goumarre transverse fault-dyke corridors, close to the inflexion point of the Somali Basalts monocline
- Recent faulting onshore is spatially restricted to the young Gulf Basalts
Spatial distribution of the South Coastal Fault Belt

- Three distinct sets of faults at: N100–110°E, N130–140°E, and to a lesser extent N60–70°E.
- The dominant N100°E veers clockwise westwards into a ∼5 km-wide swarm of probably coeval N140°E faults.
- Most Gulf-parallel faults are sigmoid or curved in map-view.
Morphostructural and statistical analyses of the SCFB

- Dominantly antithetic Gulf normal faults, dipping toward the Gulf.
- Increase of displacement to the W, toward the Arta zone.
- Over-displaced normal faults, evidenced on the D/L log/log diagram on the western edge of the SCFB, close to the Arta zone.
Faults cutting the Gulf Basalts to the E as well as cutting the Stratoide Basalts to the W do not penetrate through older synrift volcanics.

- The Arta transverse zone acts as a rigid micro-block with respect to the rift of the Tadjoura.
- The spatial distribution of seisms seems to avoid the Arta tranverse zone.
- Frontal pinning of axial fault growth in the Tadjoura Rift against a rigid zone, orthogonal to rift propagation.
- Lateral jump of rifting in the Ghoubbet trough.
- Influence of inherited structures on recent rift kinematics in SE Afar.
Thanks for your attention

Gadda Geyya

Amasaginaloh
Statistical analysis of fault network (southern margin)