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Dikes and Faults interactions in the Main Ethiopian Rift.

R. Gloaguen (1), M. Casey (2), C. Ebinger (3), B. Abebe (4), M. Boehme (1)

(1) Institut fuer Geologie, University of Freiberg, Germany, (2) School of Eath Sciences, University of Leeds, UK, (3) Geology Department, Royal Holloway University of London, UK, (4) Department of Geology, University of Addis Ababa, Ethiopia (gloaguen@geo.tu-freiberg.de)

The Main Ethiopian rift comprises Miocene-Recent rift basins whose degree of extension and magmatic modification increase to the north, consistent with an along-axis decrease in effective elastic thickness and seismogenic layer thickness. In the northernmost Main Ethiopian rift a system of aligned Quaternary eruptive centres form a right-stepping, en echelon array within the rift valley, which is bounded by Mid-Miocene border faults. Geodetic data show that N108E-directed extension within the northern Main Ethiopian rift has localised to $<$20 km-wide zones. Since 1.8 Ma, magmatism and faulting focussed into discrete, en echelon magmatic segments, which cross-cut the Miocene rift segment boundaries defined by border faults. These patterns demonstrate a recent narrowing of the zone of active extension, magmatism, and subsidence. Refraction, receiver function and gravity data suggest up to 25% of the crust beneath the northern MER and Afar depression is new igneous material, but with minor amounts of crustal stretching south of Fantale volcano ($\sim 9^o$N). Within these en échelon tectono-magmatic segments we observe an intimate relationship between the generation of faults and the localisation and type of magma. At the surface, brittle extension takes place mainly on both sides of the segments whereas aligned basaltic cones and fissural eruptions are the manifestations of dyke intrusions at the segment centres. We propose that these recent faults are also induced by dykes. Field evidences show that these morphologically atypical faults are syn-magmatic. In several places the fissural basalts were ductilely deformed along faults and showed kinematic indicators, in accordance with the geodetic results. Locally, crater rows are geometrically connected to fissures and faults. Photogrammetric Digital Elevation Models with met-

ric resolutions were generated. The analysis of several topographic profiles shows that the average horizontal displacement of faults and fractures is about 2 metres and the fault spacing 200 meters. This generates an extension of $\approx$1% during the last 50 to 100000 years.