



Focal mechanisms, stress field and crustal rheology in the North Tanzanian Divergence (East African Rift) inferred from local seismicity analysis

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We deployed a temporary local seismic network in the North Tanzanian Divergence (NTD) for 6 months in 2007 (35 stations, SEISMOTANZ'07 experiment). The region is characterized by major changes in the magmatic/tectonic nature of the rift, at the place where the eastern branch of the East African Rift enters the Tanzanian craton.

More than 200 earthquakes were accurately located south of Lake Manyara. They form two main clusters rooted at ca. 20-35 km depth, i.e. significantly deeper than the neighbouring Natron-Gelai seismic crisis of July-November 2007. This apparently long-lasting seismic activity is surprisingly associated with significant NE-SW strike-slip faulting. The preliminary stress field determined in Manyara is transtensive, with the minimum principal stress oriented WNW-ESE. From a non-linear inversion method using direct P, SV and SH wave amplitudes (Simulated Annealing algorithm, Godano et al., 2009), we improve the double-couple focal mechanisms database, preliminarily determined with P wave polarities.

The active structures determined depict clear links with the inherited structures of the basement, at the contact of the Tanzanian craton with the Proterozoic belt.

We also model the yield stress envelope of the crust from the depth frequency distribution of earthquakes. The results are consistent with the presence of a mafic lower crust and further support the overall tendency of strength increase of the rifted crust from south Kenya to the NTD (Albaric et al., 2009). It is suspected that deep fluid injections at sub-crustal levels may trigger this anomalous activity in the lower crust.