Geophysical Research Abstracts
Vol. 18, EGU2016-6347, 2016
EGU General Assembly 2016

Tectonics of the Afar triple junction from InSAR and GPS derived strain maps and seismicity

Carolina Pagli (1), Cynthia Ebinger (2), Sang-Ho Yun (3), Derek Keir (4), and Hua Wang (5)

(1) Department of Earth Sciences, University of Pisa, Pisa, Italy (carolina.pagli@unipi.it), (2) Department of Earth & Environmental Sciences, University of Rochester, Rochester, USA (cynthia.ebinger@rochester.edu), (3) Jet Propulsion Laboratory, Caltech, Pasadena, USA (Sang-Ho.Yun@jpl.nasa.gov), (4) National Oceanography Centre Southampton, University of Southampton, Southampton, UK (D.Keir@soton.ac.uk), (5) Department of Surveying Engineering, Guangdong University of Technology, Guangzhou, China (ehwang@163.com)

Strain and seismicity show us the mode by which deformation is accommodated in rifting continents. Here we present a combined analysis of InSAR and GPS derived strain maps and seismicity to understand the tectonics of the current Afar triple junction plate boundary zone.
Our results show that that the plate spreading motion is accommodated in different ways in the Red Sea Rift after jumping southeastward along the Gulf of Aden Rift. At the Red Sea Rift, extension and shear are coupled with seismicity, occurring both along-rift but also in areas off-rift. In the Gulf of Aden Rift extension and normal faulting occur in the central parts of the rifts while at the rifts tips strike-slip earthquakes are observed. The extensional strains occur over a broad zone encompassing several overlapping rifts. Conversely the strike-slip earthquakes are focused along a narrow EW trending lineament.
The pattern suggests that the recent history of magmatic intrusions in the Red Sea Rift still dominates the plate boundary deformation inducing earthquakes even in areas off-rift and with no previous faults mapped. On the other hand, in the Gulf of Aden Rift our strain and seismicity maps are consistent mainly with extensional tectonics occurring over an exceptionally broad zone (over 200 km). We interpret the strike-slip earthquakes observed at the rift tips as the result of shearing at the rifts tips where the extension terminates against continental lithosphere.