Geophysical Research Abstracts
Vol. 16, EGU2014-4919, 2014
EGU General Assembly 2014

Geodynamics of the Dead Sea Fault: Do active faulting and past earthquakes determine the seismic gaps?

Mustapha Meghraoui

CNRS -UMR7516, Institut de Physique du Globe, Geodynamics and Active Deformation, Strasbourg, France (m.meghraoui@unistra.fr)

The ∼1000-km-long North-South trending Dead Sea transform fault (DSF) presents structural discontinuities and includes segments that experienced large earthquakes (Mw>7) in historical times. The Wadi Araba and Jordan Valley, the Lebanese restraining bend, the Missyaf and Ghab fault segments in Syria and the Ziyaret Fault segment in Turkey display geometrical complexities made of step overs, restraining and releasing bends that may constitute major obstacles to earthquake rupture propagation. Using active tectonics, GPS measurements and paleoseismology we investigate the kinematics and long-term/short term slip rates along the DSF. Tectonic geomorphology with paleoseismic trenching and archeoseismic investigations indicate repeated faulting events and left-lateral slip rate ranging from 4 mm/yr in the southern fault section to 6 mm/yr in the northern fault section. Except for the northernmost DSF section, these estimates of fault slip rate are consistent with GPS measurements that show 4 to 5 mm/yr deformation rate across the plate boundary. However, recent GPS results showing ∼2.5 mm/yr velocity rate of the northern DSF appears to be quite different than the ∼6 mm/yr paleoseismic slip rate.
The kinematic modeling that combines GPS and seismotectonic results implies a complex geodynamic pattern where the DSF transforms the Cyprus arc subduction zone into transpressive tectonics on the East Anatolian fault. The timing of past earthquake ruptures shows the occurrence of seismic sequences and a southward migration of large earthquakes, with the existence of major seismic gaps along strike. In this paper, we discuss the role of the DSF in the regional geodynamics and its implication on the identification of seismic gaps.