Geophysical Research Abstracts
Vol. 14, EGU2012-4887, 2012
EGU General Assembly 2012

Neotectonic deformation model of the Northern Algeria from Paleomagnetic data

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The seismic activity of the Western Mediterranean area is partly concentrated in northern Africa, particularly in northern Algeria, as it is shown by the strongest recent earthquakes of “Zemmouri” 21 May 2003 Mw=6.9 and the “El Asnam” 10 October 1980 Ms= 7.3. This seismicity is due to the tectonic activity related to the convergence between Africa and Eurasia plates since at least the Oligocene. The deformation is mostly compressional with associated folds, strike-slip faults and thrusts, and a direction of shortening between N-S and NNW-SSE. This convergence involves a tectonic transpression which is expressed by active deformation along the plate boundary. In northern Algeria, the seismicity is concentrated in a coastal E-W thin band zone (the Tell Atlas). Active structures define there NE-SW trending folds and NE-SW sinistral transpressive faults, which affect the intermountain and coastal Neogene to Quaternary sedimentary basins (e.g. “ Cheliff ”basin, “ Mitidja ”basin, . . .). These reverse faults are associated with NW-SE to E-W strike-slips deep faults. The active tectonics could be explained by a simple blocks rotation kinematics model. In order to test the validity of this kinematic model, three different paleomagnetic studies have been conducted. The first one concerned the “Cheliff” basin where sedimentary Neogene formations were extensively sampled (66 sites). The second study was carried out on Miocene andesite and dacite rocks cropping out along the northern coastal zone of the “Cheliff” basin ("Beni Haoua" area, 19 sites). The third study has been carried out on the Miocene magmatic rocks (rhyolites and basalts) cropping out north-eastern part of the “Mitidja” basin (“Cap Djinet” – “Boumerdes” area, 23 sites).

The obtained results show existence of paleomagnetic clockwise rotations in all the studied areas and then validates the kinematics block rotation model. Accordingly, the deformation related to the convergence between the Africa and Eurasia plates, is partly accommodated in northern Algeria by blocks rotation movements. It seems that the Tellian Atlas (northern Algeria) domain is organized as tectonic blocks with relative clockwise blocks rotation movement as in a “bookshelf” model.