Geophysical Research Abstracts
Vol. 13, EGU2011-213, 2011
EGU General Assembly 2011

Meso-Cenozoic vertical movements of the Tuareg Shield, Algerian Sahara

Sylvain Rougier, Yves Missenard, Hermann Zeyen, Jocelyn Barbarand, and Cécile Gautheron
Université Paris Sud XI, France (sylvain.rougier@gmail.com)

Africa, mostly built during the Panafrican Orogeny (Proterozoic), is surrounded at 90% by passive margins. The mean topography is anomalously high, in particular in the South (Doucouré & de Wit, 2003). The African continent shows several topographic swells, of controversed ages, which are often associated to local volcanism suggesting the involvement of deep processes.
The Hoggar Moutains, in the Tuareg Shield, are one of these swells: they form a topographic high reaching 2900m (Mt Tahat, in the Atakor district), allowing outcrops of Precambrian rocks over 500000km^2. Some presumed Middle Cretaceous fluviatile sedimentary remnants, described by Bordet (1954), could testify of a possible stage of shallow positive topography during the Mesozoic. Topography is emphasized by Cenozoic volcanism, mostly basaltic, roughly aligned in an NE/SW direction.
The aim of this study is, first, to produce new constraints on the topographic evolution of the Hoggar during the Meso-Cenozoic, with lithosphere-scale geophysical modelling, following the method of Zeyen & Fernandez (1994). Then, we correlate the results with new low temperature thermochronology data (fission track and (U-Th/He) on Hoggar substratum apatites).
Four 2D geophysical lithospheric profiles have been modelled, using two scenarios for crustal structure (34km thinned or classical 40km-thick, both extrapolated from seismic studies). We show that lithospheric thinning can account for the Hoggar topographic bulge. This modelling allows us to estimate ante-Eocene topography from -600m to +600m, relative to actual sea level, which appears, at least partially, compatible with Mesozoic sedimentary deposits.
The involvement of a now-eroded Mesozoic sedimentary cover is also confirmed by first thermochronology results, showing that the Precambrian basement has experienced thermal heating of approximately 80°C between Cretaceous and Eocene volcanism. Such heating could be related to burial beneath a 1.5km thick sedimentary cover, a result compatible with the geophysical modelling.

Bordet, P., 1954. La série de Serouenout (Ahaggar oriental) est d'âge « Continental Intercalaire » (Crétacé moyen). Comptes Rendus de l'Académie des Sciences, 238, n°4, 500-503.

Doucouré, C.M., de Wit, M.J., 2003. Old inherited origin for the present near-bimodal topography of Africa. Journal of African Earth Sciences, 36, 371-388.

Zeyen, H., Fernandez, M.,1994. Integrated lithospheric modelling combining thermal, gravity, and local isostasy analysis : Application to the NE Spanish Geotransect. Journal of Geophysical Research, 99, 18089-18102.