Geophysical Research Abstracts
Vol. 15, EGU2013-8578, 2013
EGU General Assembly 2013

Meso-Cenozoic evolution of the Tuareg Shield (Algeria, Sahara): insights from new thermochronological data

Sylvain Rougier (1), Yves Missenard (1), Cécile Gautheron (1), Jocelyn Barbarand (1), Hermann Zeyen (1), Rosella Pinna (1), Jean-Paul Liégeois (2), Bernard Bonin (1), Aziouz Ouabadi (3), Mohammed El-Messaoud Derder (4), Dominique Frizon de Lamotte (5), and Djouher Kettouche (3)

(1) UMR 8148 IDES, bât.504, Université Paris Sud XI, Orsay, France , (2) Royal Museum of Central Africa, B-3080 Tervuren, Belgium, (3) Laboratoire "Géodynamique, Géologie de l'Ingénieur et Planétologie", FSTGAT/USTHB, BP 32, El-Alia Bab Ezzouar, 16111 Alger, Algeria, (4) Centre de Recherche en Astronomie Astrophysique et Géophysique (CRAAG), BP63, 16340 Bouzaréah, Alger, Algeria, (5) Géosciences et Environnement Cergy, Université de Cergy-Pontoise, 5 mail Gay Lussac, 95031 Cergy-Pontoise Cedex, France

In North Africa, Meso-Cenozoic large scale topographic swells, such as Hoggar, Tibesti or Darfur domes, are superimposed to a Paleozoic arch and basin morphology which characterizes this region. Although these topographic highs are associated to Cenozoic intraplate volcanism, their development remains poorly constrained, both from temporal and spatial points of view.

This study is focused on the Tuareg Shield bulge, a topographic high where Precambrian rocks, exposed over 500000 km^2, can reach 2400 m above sea level (Atakor district, Hoggar, South Algeria). While presumed Cretaceous sedimentary remnants, resting unconformably over the basement, suggest a possible stage of weak topography during the Mesozoic, current high topography is emphasized by <35 Ma volcanic formations, mostly basaltic in composition.

In this context, we present first apatite (U-Th)/He thermochronological data acquired across the whole swell (Rougier et al., Geology, in press). Mean ages range from 78 $\pm$ 22 Ma to 13 $\pm$ 3 Ma. These results demonstrate the existence of a widespread Eocene exhumation of the shield before volcanic activity began. In the northeastern part of the swell, Cretaceous sedimentary remnants unconformably lying on the basement close to our samples evidence that they were near the surface at that time. We show that basement rocks have thus suffered a subsequent heating stage at 60–80 °C.

We also present new apatite fission track ages on same samples. Central ages range from 71 $\pm$ 6 to 285 $\pm$ 29 Ma. When track length measurements were possible, preliminary modelings of the time-temperature history were performed. As previously deduced from apatite (U-Th)/He analyzes, these modelings show that samples underwent a heating to at least 80°C before their Late Eocene exhumation. Moreover, they also indicate that samples underwent another cooling stage during Lower Cretaceous, prior to Upper Cretaceous/Paleogene heating.

We interpret these results as an evidence of a large-scale subsidence stage after the Cretaceous and until the Eocene, which allowed the deposition of a 1.5 to 3 km thick sedimentary cover and a heating at $\sim$80°C of the currently outcropping basement. During the Eocene, the establishment of a thermal anomaly beneath the Tuareg Shield lithosphere resulted in erosion of the major part of this cover and, since 35 Ma, the development of intraplate volcanism.