Post-Variscan vertical movements of the Anti-Atlas Belt (Morocco): Synthesis of the low-temperature thermochronological data

M. Oukassou[1,*], O. Saddiqi[2], J. Barbarand[3], A. Michard[4]
[1]*Laboratory "DBSCG" Faculty of Sciences Ben M'sik, Hassan II University of Casablanca, BP 7955, Sidi Othman, Casablanca, Morocco,* [2]*Laboratory "Géosciences", Faculty of Sciences Aïn Chock, Hassan II University of Casablanca, BP 5366, Maârif, Casablanca, Morocco,* [3]*Paris-Sud University, UMR CNRS-UPS 8148 IDES, Bâtiment 504, 91405 Orsay cedex, France,* [4]*Paris-Sud University, 10 rue des Jeûneurs, 75002 Paris, France*
[*]E-mail : mostafa.oukassou@gmail.com

The northern margin of the West African Craton (WAC) is a mobile zone affected by numerous geodynamic episodes: Pan-African, Variscan and Alpine orogenies. These orogenic phenomena dominantly horizontal are followed by more discreet vertical movements, the restitution of which is often problematic.

The Anti-Atlas Belt occupies a critical position at the northern edge of the WAC. Surprisingly, this ancient Variscan fold belt is characterized by a relatively high and rough relief with several peaks up to 2000-2500 m above sea level.

Some key points that can help us to better understand the post-Variscan geodynamic evolution of this area and the vertical movements responsible for its high relief have been enlightened using low-temperature thermochronology.

In this abstract we present a synthesis of low-temperature thermochronology data (fission-track and U-Th/He) obtained over the past decade by different groups in the different parts of the Anti-Atlas (Malusà et al., 2007; Missenard et al., 2008; Balestrieri et al., 2009; Ghorbal, 2009; Sebti et al., 2009; Ruiz et al., 2011; Sebti, 2011; Oukassou et al., 2013; Oukassou, 2013; Sehrt, 2014; Gouiza et al., 2016).

The belt, which has for long been interpreted as the external fold belt of the Variscan orogen is now revealed to have experienced major vertical movements through Mesozoic and Cenozoic times. Thereby, the Anti-Atlas domain appears to be affected by two episodes of exhumation separated by an episode of subsidence. The initial episode began in the Late Triassic and led to the exhumation of 7.5-10.5 km crustal basement by the end of the Middle Jurassic. The following phase resulted in 1-3 km of basement subsidence and occurred during the Late Jurassic and most of the Early Cretaceous.

The basement rocks were then slowly brought to the surface after experiencing 2-3.5 km of exhumation throughout the Late Cretaceous and the Cenozoic.

The timing of these episodes of exhumation and subsidence coincides with major tectonic (reactivation of the Variscan structures) and thermal events (regional mantle anomaly) in relation with the evolution of the Atlantic and Tethys Oceans, indicating that the effects of their rifting and drifting extended beyond their presumed margins.

Keywords : Thermochronology, exhumation, vertical movements, fission-track, U-Th/He, Anti-Atlas, Morocco