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Time-temperature constraints on vertical movement along a Moroccan pericratonic transect (NW Africa) from zircon (U-Th)/He dating

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During the last decade, apatite fission track (AFT) and (U-Th)/He (AHe) techniques have been intensively used to unravel the low-temperature/time evolution of NW Africa; mainly in Morocco (Missenard et al., 2006; Malusa et al., 2007; Barbero et al. 2007; Ghorbal et al., 2008; Balestrieri et al., 2009; Ruiz et al., 2010). An overview of AFT and AHe results (Ghorbal, 2009) show that a large part of NW Africa experienced a complex thermal evolution, from Mesozoic onward, with two phases of vertical movement related to Mesozoic Atlantic/Tethys rifting and to the Tertiary Eurasia/Africa convergence.

If the amplitude of the vertical movement is fairly well-determined for Cenozoic-Quaternary times using Cenomanian-Turonian strata as time-benchmark (Frizon de Lamotte et al., 2009), significant open questions remain concerning the thermal evolution of this region for the Paleozoic-Mesozoic transition. In order to better document vertical movement in this timeframe, we applied zircon (U-Th)/He (ZHe) dating on samples collected along a >500km pericratonic transect roughly N-S to NNW-SSE extending from the Moroccan Meseta Plateau to the Central Anti-Atlas, the northern outcrop of the West African Craton (WAC).

In addition to AFT and AHe data from identical basement rocks (from Eburnean to Late Hercynian in age), ZHe ages in the three Moroccan structural domains of the Meseta, the High Atlas and the Anti-Atlas range between 280 and 30 Ma, with important clusters in between 250-170 Ma. Perspectives of this new dataset allow: (i) a more accurate estimation of the vertical movements related to the Atlasic event, showing that the Ourika massif experienced more than 6km of exhumation in Neogene times, and (ii) significant improvements in the interpretations of syn- and post-rift vertical movement along the Central Atlantic and Alpine Tethys passive margins.