



Long-term landscape evolution, cooling and exhumation history at the Moroccan passive continental margin, Western Anti-Atlas

Manuel Sehrt and Ulrich A. Glasmacher

University of Heidelberg, Institute of Earth Sciences, Thermochronology, Heidelberg, Germany
(manuel.sehrt@geow.uni-heidelberg.de)

The ENE-trending Anti-Atlas of Morocco is located at the northwestern fringe of the West African Craton and south of the High Atlas and represents the Phanerozoic foreland of the Late Palaeozoic North African Variscides and the Cenozoic Atlas Belt. The Anti-Atlas mountain belt extends from the Atlantic Ocean over 500 km into the Moroccan interior and shows a rugged topography with elevations of about 2700 m. The exhumation of the Precambrian basement and the deformation and erosion of the Palaeozoic cover is mainly related to the Variscan orogeny in the Upper Carboniferous–Lower Permian. Subsequently, exhumation of the inliers occurred in the Triassic–Jurassic, as the Anti-Atlas formed the shoulder of the Atlantic rift and finally in the Upper Eocene–Pleistocene, contemporaneously with the uplift of the Atlas belt.

In Morocco, a large amount of Mesozoic terrigenous sedimentary rocks are deposited in most of the basins along the continental margin indicating a major episode of erosion during the rift and early post-rift period in the Central Atlantic. In the Tarfaya-Laâyoune-Dakhla Basin, south of the Anti-Atlas, the sedimentary cover reach a thickness of up to 12 km. The presence of high surface elevations in the Anti-Atlas mountain belt indicates a potential source area for the surrounding basins.

Currently, phases of exhumation in the Anti-Atlas during the Central Atlantic rifting and places where the associated erosion products are deposited are poorly constrained and there is little quantitative data available at present.

The present study was focused on the thermal and exhumation history of the Western Anti-Atlas, the burial and inversion history of the Tarfaya-Laâyoune-Dakhla Basin and on provenance analysis of the Meso–Cenozoic sedimentary rocks in the basin. In order to characterize the t-T history, apatite and zircon fission-track dating, apatite and zircon (U-Th-Sm)/He dating and furthermore 2-D modelling with 'HeFTy' software has been carried out at Precambrian rocks of the Western Anti-Atlas and Cretaceous to Neogene sedimentary rocks from the Northern Tarfaya-Laâyoune-Dakhla Basin.

Thermochronological data and t-T path modelling indicate exhumation in the Western Anti-Atlas between Upper Carboniferous and Lower Cretaceous, whereby 9 km of Precambrian–Palaeozoic overburden has been eroded.