Structural evolution of the Moroccan Central High Atlas Syncline-Topped Anticlinal Ridges: Insights from micro-structural analysis of Tirrhist and Anemzi ridges

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The Moroccan High Atlas mountain range is an aborted Mesozoic rift basin that was moderately shortened during the Late Cretaceous-Cenozoic inversion. The range is currently featured in its central part by the presence of conspicuous S-shaped open gentle synclines where Middle Jurassic strata crop out, with sub-horizontal bottom, separated by 15-to-80-km narrow faulted anticline ridges with two distinct directions: ENE and NE. The tight anticline ridges are cored by Triassic continental red-beds intruded by the CAMP basalts and subsequently by Upper Jurassic-Lower Cretaceous alkaline magmatism. Regional cleavage with very low-grade anchi- to epi-zonal metamorphism are depicted along several structures of the High Atlas, particularly the NE-trending anticlines. The sedimentary layers thickness, on the other hand, gets thinner towards the faulted anticlines with the development of intraformational truncations. The structural history of the High Atlas syncline-topped anticlinal ridges remains a controversial matter. Any attempt to reconstruct the evolutionary process of such folded structures must take into consideration the following circumstances:

- After a Triassic rifting episode followed by the establishment of Liassic carbonate platform, the High Atlas basin underwent a wide spread exhumation event at the time interval between the Middle Jurassic and Lower Cretaceous leading to the deposition of continental detrital series and sedimentary hiatus;
- The upward motion was accompanied with the emplacement of alkaline magmas in the Central High Atlas;
- A complex halokinetic history characterizes the Central High Atlas salt province during both pre-orogenic and orogenic stages;
- During the Late Cretaceous-Cenozoic, the High Atlas experienced a moderate crustal shortening which was focused essentially within the range's borders;

In order to bring new insights to the structural history of the High Atlas folded structures, a
structural investigation was carried out in Tirrhist and Anemzi ridges. In each station, fractures measurements were taken, and oriented samples were collected for micro-structural analysis. First paleo-stress inversion in some stations reveals the presence of pre-folding bedding-parallel maximal horizontal stress oriented NE to NNE. For a deep analysis of pre syn and post-folding stresses history, we use a calcite stress inversion technique, namely Etchecopar's method, to unravel the paleo-stresses orientations and to quantify the differential stresses during the different episodes of deformation. The present work is a preliminary attempt to quantify tectonic stresses in the hinterland of an arguably weakly deformed orogenic belt.