Syncline-topped anticlinal ridges (STARs), enigmatic structures from the Moroccan Atlas; role of halokinesis

André Michard[1], Hassan Ibouh[2] and André Charrière[3]

[1]10, rue des Jeûneurs, 75002 Paris, France. E-mail andremichard@orange.fr

[2]Faculté des Sciences et Techniques, Département de Géologie, Bd A. Khattabi BP 549, 40000 Guéliz Marrakech. E-mail ibouh@yahoo.com

[3]26 rue J.-P. Chabrol, 34740 Vendargues, France. E-mail andre.charriere73@orange.fr

We question for the first time the origin of enigmatic structures cropping-out in the heart of the Central High Atlas of Morocco next to Imilchil. In this area, small synclines of Upper Paleocene-?Eocene deposits are preserved on top of narrow, elongated anticlinal ridges made up of Triassic evaporitic and basaltic formations and Jurassic intrusives, whereas Tertiary deposits lack in the major synclines between the ridges. We labelled these stunning structures "syncline-topped anticlinal ridges" (STARs). We explain their formation through a three-step history: i) early halokinetic evolution leading to the formation of elongated diapiric ridges over basement faults, and ending with magmatic intrusions and enhanced diapiric ascent up to the surface; ii) Paleocene-?Eocene unconformable sedimentation; iii) Late Eocene-Quaternary shortening phases, resulting in the erosion of the Paleocene-?Eocene deposits, except in the breached anticlinal axes. The comparison with the breached valleys ("makhteshim") of the Syrian Arc in the Negev Desert allows us to emphasize the role of the early diapiric evolution of the Atlas domain in the genesis of the STAR structure. In the evolution of a future STAR, a diapiric ridge has to burst through the surface and be deeply eroded, which is favoured by mantle activity and associated regional uplift. Following the sedimentation of an unconformable sedimentary sequence, regional shortening will form a STAR provided potentially protecting competent lithologies do occur in the underlying stratigraphic column. The isolation of the Imilchil STARs with respect to the coeval, classic syncline occurrences in the north and south Subatlas Zones depends on an important regional uplift and erosion of the Atlas belt during the Neogene.