



## **A late Tortonian paleotectonic restoration of the Gibraltar Arc System (GAS) based on the restoration of block rotations. Consequences on the GAS geodynamic evolution**

Ana Crespo-Blanc (1), Menchu Comas (2), and Juan Carlos Balanyá (3)

(1) University of Granada, Dpt of Geodynamics, IACT-CSIC, Spain (acrespo@ugr.es), (2) IACT-CSIC, Spain (mcomas@ugr.es), (3) University Pablo de Olavide, Sevilla, Spain (jcbalrou@upo.es)

The Gibraltar Arc System (GAS) closes the Alpine-Mediterranean orogenic system to the west and includes the Betic-Rif orogenic belt, the Alboran and Argelian-Balearic basins and the accretionary prism present in the Cadiz Gulf. Previous investigations on this orogenic system, both onshore and offshore have permit to establish the first order milestones of its Miocene to Recent geodynamic evolution.

In most of the models of the geodynamic evolution of the GAS, the external boundary of the Betic-Rif orogenic wedge, initially N-S directed, sweeps from east to west the Gibraltar Arc area, acquiring his arcuate geometry during this westward movement. Nevertheless, most of these models are generally at scale equivalent to 1:10.000.000 or even smaller, and frequently based on 2D schematic cross-sections from which a model for the whole arc is deduced. This fact under evaluates not only the mass movements oblique to the selected cross-section plane, but also the diachronism of the deformation, in turn expected in a so closed arc.

In this communication, we want to zoom on the Gibraltar Arc area, to draw a detailed Late Tortonian paleotectonic restoration and to highlight the consequence of this reconstruction on the final evolution of the westernmost Mediterranean. Our approach is based on: 1) the identification and characterization of structural domains of the Gibraltar Arc orogenic system and the transfer fault zones that separate them, 2) an accurate dating of the superposed events of deformations for each one of these domains, 3) the restoration of vertical axis-rotations of some of these structural domains (evidenced by paleomagnetic data previously published), and 4) the quantification of Miocene shortening in the External zones.

This exercise makes us to put all together the results of twenty years of research of our teams on this natural case-study, mainly with field and marine geology techniques, and to test it through the revision of an extensive bibliography. It will be shown that the proposed reconstruction permit to simplify most the kinematics models proposed at the moment. Although some key points are still problematic, this paleotectonic restoration may solve more problems than arise them.

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