



Post-Miocene Paleomagnetic Rotations in The Betics and Rif: New Insights into The Gibraltar Arc Tectonic Evolution

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The Neogene and Quaternary tectonic evolution of the Gibraltar Arc is strongly debated and different models have been proposed through time. In particular is still under debate whether the west dipping subduction was a continuous process since Miocene, or if the present-day active tectonic is dominated by the complex deformation pattern related to the oblique convergence along the Nubia-Eurasia plate boundary, evidenced by GPS data. In this framework paleomagnetism can give first order constrains on the time of the Gibraltar arc bending and on the possible presence of independent, small sized, crustal blocks characterized by different amount and sense of vertical axis rotations.

We present new paleomagnetic results obtained from the Moroccan side of the Gibraltar Arc. Thirty sites (more then 300 samples) were collected in the Tertiary sedimentary sequences from the western to the central part of the external Rif Belt. In particular, an extensive sampling was carried out in the upper Miocene units outcropping in the Tafrant-Tounate post- nappe sedimentary basins and in the Fez foreland basin. Paleomagnetic results show that that the sampled units underwent a general counter-clockwise (CCW) paleomagnetic rotations, throughout the sampled area. These results evidence that the CCW rotations, previously measured in Mesozoic units of the Rif chain, occurred also during (after) the Late Miocene. These data, together with new paleomagnetic results from the Neogene basins in the Betic Cordillera, indicate that

the bending of the Gibraltar Arc was not completed in the Late Miocene. The overall data point out that the rotational pattern in the Gibraltar arc is more complicated than previously stated and imply a reconsideration of the proposed model for the Gibraltar Arc evolution.