

Abstract AGU

The Algerian Margin: an Example of a Reactivation in Compression of a Complex Cenozoic Passive Margin

Authors:

Anne Domzig (1), Jacques Déverchère (2), Karim Yelles (3), Rob Govers (4), Rinus Wortel (4), Carole Petit (5), Antonio Cattaneo (6), Abdelaziz Kherroubi (3) and the MARADJA Scientific teams.

(1) LPG - UMR 6112, Université de Nantes, 2 rue de la Houssinière, BP 92205, 44322 Nantes Cedex 3, France, anne.domzig@univ-nantes.fr

(2) Université de Bretagne Occidentale, IUEM-CNRS UMR6538, Plouzané, France

(3) CRAAG, Algiers, Algeria

(4) Faculty of Earth Sciences, Utrecht University, The Netherlands

(5) Laboratoire de Tectonique, Université Pierre et Marie Curie, Paris 6, France

(6) Laboratoire Géosciences Marines, Ifremer, Brest, France

The Western Mediterranean underwent a complex Cenozoic history involving subduction of the Tethys Ocean as well as subduction roll-back and associated opening of back-arc basins. During the Oligo-Miocene, the subduction roll-back to the south led to the collision of the Kabylies into the African plate, but subduction continued towards west, causing the Alboran slab to migrate towards the Gibraltar Arc. Northern Africa is at the southern border of this system and is therefore a major study area in the context of slow convergent plates to study the reactivation in compression of a Cenozoic passive margin but also the records of past geodynamic processes. This work aims to characterize the multi-scale structure of the offshore Algerian margin, based on the MARADJA'03 and MARADJA2/SAMRA'05 cruises data (multibeam bathymetry, seismic-reflection, side-scan sonar, backscattering, CHIRP, gravimetry). Tectonic (geomorphology, folds, faults) records reveal large recent and active structures as well as the geological inheritance of the margin. In western Algeria, slab roll-back is likely to have been accompanied by lithospheric tearing (STEP fault) as it has been modelled at a regional scale (Govers and Wortel, 2005): we provide first evidence for the presence of such structure(s) offshore Algeria. The geodynamical conditions have now changed, and we are facing new types of structures. Two main tectonic styles are identified: reverse to the centre and east; and strike-slip to the west. In Central Algeria, the compressional structures are active blind thrusts (Plio-Quaternary) verging to the north (opposite to pre-existing features) expressed as asymmetrical folds, sub-perpendicular to the convergence direction and often en echelon. These faults may all trigger $M=6-7.5$ earthquakes (e.g. Khair al Din fault near Algiers). Among them, the fault associated with the 2003 Boumerdes event ($M_w=6.8$) would continue to the surface by flats and ramps creating piggy-back basins or rollovers. From our estimate of sub-surface shortening on Quaternary structures, a significant part of the deformation resulting from Africa-Eurasia convergence (about 5 mm/yr at the longitude of Algiers) appears to be accommodated at the foot of the Algerian margin, which could indicate, with the compressional flexure of the deep basin, a future subduction inception.