Geophysical Research Abstracts
Vol. 15, EGU2013-13875, 2013
EGU General Assembly 2013


# Compressional tectonic inversion of the Algero-Balearic basin since the late Miocene, an example from the Palomares margin (Western Mediterranean).

Flavio Giaconia (1), Guillermo Booth-Rea (1), Cesar R. Ranero (2), Eulalia Gràcia (3), Claudio Lo Iacono (4), Montse Guzman-Vendrell (2), and Topomed Survey-Party ()

(1) Departamento de Geodinámica, Instituto Andaluz de Ciencias de la Tierra (CSIC-UGR), Campus Fuentenueva s/n, 18071, Granada, Spain , (2) B-CSI, Instituto de Ciencias del Mar-CSIC, Centre Mediterrani d'Investigacions Marines i Ambientals, Passeig Marítim de la Barceloneta 37-49, 08003, Barcelona, Spain, (3) B-CSI, Unidad de Tecnología Marina-CSIC, Centre Mediterrani d'Investigacions Marines i Ambientals, Passeig Marítim de la Barceloneta 37-49, 08003, Barcelona, Spain, (4) National Oceanography Center, Southampton, UK

We present two deep seismic reflection lines together with 3.5 kHz multi parametric echo-sounder profiles and bathymetric data acquired during the TOPOMED-GASSIS seismic survey across the Palomares margin. We integrated these data with onshore structural analysis and mapping to refine the structure of the Palomares margin and its significance in the tectonic inversion of the westernmost Mediterranean. The margin formed during middle to late Miocene extension driven by back-arc type volcanic accretion marking presently the crustal transition between the east Alboran and the Algero-Balearic basins (thinned continental and oceanic crust, respectively). Later, since approximately 8 Ma ago, the margin suffered a compressional tectonic inversion with both reverse and sinistral strike-slip faults and associated folds congruently oriented with respect to the present NW-SE shortening stress field. GPS geodetic displacement data, earthquake focal mechanisms, borehole and recent sediments deformation indicate that tectonic inversion of the Palomares margin continues at present-day.

The deep seismic reflection lines presented in this paper suggest that the back-arc extension and crustal thinning affecting the Algero-Balearic basin and the Alborán domain during the middle to late Miocene was accommodated by Serravallian - Tortonian pervasive volcanic intrusion in the Palomares margin. The deep seismic and echo sounder profiles together with the bathymetric data evidence both pure shortening and transpressional strike-slip structures. Anticlines and synclines occur obliquely along the margin with a N40-50ºE orientation affecting the volcanic igneous basement up to the Quaternary sediments. The main anticline (the Abubacer antiformal ridge) is cut by reverse faults indicating a fault propagation fold system. The excess-area graphical technique applied on the balanced cross section indicates a 10 km depth basal detachment probably coinciding with the brittle-ductile transition (e.g. crustal thickness and heat flow data in the region). The present activity of these structures is confirmed by submarine channels deflection and the focal mechanisms in the region. N10ºE transpressional strike-slip structures occur in the southern part of the margin affecting both the volcanic igneous basement and the late Tortonian – Quaternary sediments indicating that Palomares-type faults continue southward offshore. Both pure shortening and transpressional strike-slip structures show a global age between the late most Tortonian and the Quaternary and are congruent with the onshore tectonic regime, the present NW-SE shortening stress field, GPS geodetic displacement data and focal mechanisms in the region.

The Palomares margin fits in the late Miocene to Plio-Quaternary compressional tectonic inversion of the Algero-Balearic basin in the context of the Eurasia-Africa diffuse convergent plate boundary. The data presented here highlight a transpressive shortening tectonic regime along the Palomares margin that fit in an oblique convergence model where the present NW-SE shortening affects a NNE-SSW margin. This stress field generates subperpendicular NE-SW thrusts and folds, NNE-SSW sinistral and WNW-ESE dextral strike-slip faults. During the oblique convergence the shortening is mainly accommodated by the pure shortening structures, meanwhile the strike-slip faults connect most of these structures allowing the shortening transfer and the partitioning of deformation.