Geophysical Research Abstracts, Vol. 9, 10871, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10871
© European Geosciences Union 2007

Preliminary results of Marsibal 1-06 cruise in the Alboran and western Algero-Balearic basins

M. C. Comas (1) and MARSIBAL 1-06 Scientific Party (2)

(1) Instituto Andaluz de Ciencias de la Tierra, CSIC and University of Granada: Campus Fuentenueva, 18002 Granada, Spain. mcomas@ugr.es

The MARSIBAL 1-06 cruise (R/V HESPÉRIDES, December 2006) conducted a geophysical survey to investigate the Alboran and the western Algerian-Balearic basins. Data acquisition consists of multichannel and high-resolution seismic reflection profiling, gravimetry and magnetometry. Concurrent SIMRAD EM120 swath-bathymetry and acoustic backscatter, and TOPAS sub-bottom profiling provided information regarding seafloor morphology and structures affecting the seafloor.

The cruise aimed to determine deep and shallow upper crust structures to constraint past and present-day deformation (seafloor ruptures and fault scarp areas) at the plate boundary south of Iberia that accommodate the NW- SE convergence between Africa and Eurasia. Furthermore, to investigate the sedimentary processes developed during recent times (post-Messinian) at the Palomares margin-segment of the SE Iberian Margin. The survey encompasses the E-W transition between the East Alboran and the Algerian-Balearic-basin, and mayor tectonic lineaments (the Alboran Ridge , the Yusuf, the Palomares and the Cartagena Fault Zones) in a region of distributed present-day deformation with significant seismic activity.

The transition between the East Alboran and Algero-Balearic basins corresponds to very thinned continental crust (typify by the occurrence of volcanic edifices) and concurrent lithosphere thinning in the Alboran Basin, given way to the east to the Algerian-Balearic ocean crust. Shallow and deep structures at this transition denote that compressive wrench tectonics dominates during post-Messinian times. Inheriting of the early-to-middle Miocene rifting affecting the basement is shown in MCS profiles.

The Alboran Ridge, the major NE-SW trending seamount of the Alboran basin, con-

stitutes a positive flower-structure controlled by two left lateral strike-slip fault zones, which involve uplifting, folding, and basin inversion

At the Palomares margin, corresponding to the NNE-SSW trending Palomares Fault Zone, seismic profiles shows two impressive turbidite-systems and slides shaping the continental slope. Sediment transfer drives out by margin uplift and two submarine canyons -the Aguas-Almazora and the Gata canyons- given way downslope to meandering channels and turbidite fans. Significant portions of both canyons were imaged by swath bathymetry data. Ubiquitous mass wasting structures and slide processes are related to Quaternary or present-day active faults.

The Cartagena Margin, corresponding to the E-W trending Cartagena Fault Zone, appears depleted of well-developed turbidite systems, but denotes steep fault-plains conditioning slope inclines and mass wasting.

Cruise results prove that significant active tectonics occurs at the major faults that separate the thinned continental crust of the Alboran Basin and the anomalous or even oceanic crust of the Algerian-Balearicbasin, as well as at the mayor tectonic lineaments. Crustal structures result from post-Messinian contractive wrench tectonics -strike-slip faults, with mayor compressive slip components and occasional local extension-. Seismic data also allow us setting up the limits of the Messinian-salt diapirs in the Algerian-Balearic basin. Messinian-Salt occurs at the cutting edge of the South Iberia margins and at the transition with the Alboran basin, which may indicate the presence of underlying anomalous or oceanic crust.

Integrating MARSIBAL 1-06 results with available data set in the region will illustrate the shallow and deep-seated processes, and the Miocene to present-day kinematics affecting the westernmost Mediterranean margins and basins.

Contribution from Projects REN2002-12095-E (ESF Euromargin WESTMED: WP 1.2), REN 2001-3868-CO3-01 and CTM2005-08071-03-01 (R & D National Plan of the Ministry of Education & Science and FEDER funding, Spain)