Geophysical Research Abstracts
Vol. 12, EGU2010-771-2, 2010
EGU General Assembly 2010

Seismic crustal structure in southern Gulf of California

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The region of Baja California and Sea of Cortes, has been the subject of recent studies due to tectonic and geological interest related with the processes associated with continental breackup and sedimentary basin formation. The Gulf of California is an oblique rift system with short spreading segments connected by long transform faults.

Within the CORTES-P96 project, a deep geophysical experiment was carried out in the spring of 1996, with the aim to investigate the deep crustal structure in the western part of Mexico acquiring multichannel and wide-angle seismic, potential fields (gravity and magnetism), bathymetry and backscatter data from 30ºN to 17ºN. As a part of the seismic experiment, a set of 6 OBS, were anchored in the Gulf of California, and 18 seismic portable stations were deployed onshore along a seismic line of 260 km long transect called Line 301, running across Carmen, Farallon and Pescadero Basins, and crossing the southern part of the Baja California. A coincident multichannel seismic profile was shooted at the same time during the acquisition.

In this work, we present new findings based on the latest data processing and interpretation of Line 301. From the Baja California Peninsula to the continental Mexico the new crustal structure obtained using forward modelling shows the P-wave velocities distribution and some crustal variations in thickness along the profile. The Upper Crust is the least homogeneous part of the model due to the tectonic and geological complexity of the study area related to the recent rifting activity. The continental crust is 29 km, experiencing a significant thinning of 10 km in the central part of the Gulf of California, where Alt Transform Fault is located, being consistent with the recent breackup history of the crust. Further to the east, under continental Mexico, the model reveals a 25 km crust depth. An homogeneous upper Mantle with a P-wave velocity of 7.9 km/s has been modelled all along the profile. Moreover, we propose a 3 D model in the Southern Segment of the Gulf of California including our modelling results in the CORTES-P96 survey and compatible with the ones obtained in the PESCADERO 2002 experiment (Lizarralde et al., Nature, 2007).