

Geophysical Research Abstracts
Vol. 17, EGU2015-13596, 2015
EGU General Assembly 2015
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New seismic images of the crust across the Rivera Plate and Jalisco Block (Mexico)

Diego Cordoba (1), Francisco Javier Núñez-Cornú (2), Rafael Bartolomé (3), Juan José Dañobeitia (3), William Lee Bandy (4), Diana Núñez (1,2), Manel Prada (3), Christian Escudero-Ayala (2), Juan Manuel Espíndola (4), Araceli Zamora (2), Adán Gómez (2), Modesto Ortiz (5), Tsujal Working Group (1,2,3)

(1) Facultad de Ciencias Físicas. Universidad Complutense de Madrid. Spain (dcordoba@fis.ucm.es), (2) Centro de Sismología y Volcanología de Occidente. Universidad de Guadalajara. México (pacornu77@gmail.com), (3) Centro Mediterráneo de Investigaciones Marinas y Ambientales. Consejo Superior de Investigaciones Científicas. Spain (jjdanobeitia@cmima.csic.es), (4) Instituto de Geofísica. Universidad Nacional Autónoma de México. México, (5) Centro de Investigación Científica y Educación Superior de Ensenada, México.

During the spring and summer of 2014, we achieved an extensive offshore geophysical experiment at West Coast of México entitled “Crustal characterization of the Rivera Plate-Jalisco Block boundary and its implications for seismic and tsunami hazard assessment (TSUJAL)”. The project is the result of continuous scientific collaboration between institutions in Mexico and Spain, whose main objective is to study the lithospheric structure at the collision zone between Rivera, North America Plates and the Jalisco Block, and identifying submarine structures which can potentially be tsunamigenic sources

The active phase of this project carried out in February and March of 2014, we acquired around 5200 km of Multichannel Seismic Reflection (MCS) together with multibeam bathymetry and potential fields (gravity and magnetism) data. Moreover, a wide angle experiment was performed, deploying 16 OBS in 32 locations in Jalisco and Nayarit offshore regions, also recorded on a terrestrial network of 100 portable seismic stations in 240 locations across 5 seismic profiles of 200-300 km in length combined with the Seismological Network of the State of Jalisco (SisVOc). In addition, 8 land seismic stations were installed in Marías Islands and Isabel Island. These instruments registered, in continuous mode, the airgun shots generated by airgun array of 5800 ci, shooting every 120 s. The UK vessel RRS James Cook participated in this project as a part of the exchange program between Spanish and English scientific vessels, she was responsible of marine seismic experiment (MCS & WA) using a 6 km length streamer and a high capacity airgun array. Furthermore, the ARM Holzinger and RV El Puma participated in this project and were provided by the Mexican Navy and UNAM, respectively.

The second phase of this project was achieved in June 2014, where 100 short period seismic stations were installed along a 200 km seismic profile from La Caldera de la Primavera (Guadalajara) to Barra de Navidad (Jalisco coast). These instruments registered 3 borehole explosions of 1000 kg specially made for this project, in the northern, central and southern parts of this profile. These new data provide a dense sampling of tectonic plates, W Mexico, and give new seismic constraints on the deformation along and across the subduction zone, accretionary wedge size, at contact between Rivera and North American Plates and, in the transition zone between oceanic and continental crust.