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Axial magma chamber segmentation along the East Pacific Rise from Clipperton to Siqieros Fracture Zone

***Marjanovic, M**
milena@ldeo.columbia.edu
Marine Geology and Geophysics, Lamont-Doherty Earth Observatory, Palisades, NY, USA
Carbotte, S M
carbotte@ldeo.columbia.edu
Marine Geology and Geophysics, Lamont-Doherty Earth Observatory, Palisades, NY, USA
Carton, H D
hcarton@ldeo.columbia.edu
Marine Geology and Geophysics, Lamont-Doherty Earth Observatory, Palisades, NY, USA
Mutter, J C
jcm7@columbia.edu
Marine Geology and Geophysics, Lamont-Doherty Earth Observatory, Palisades, NY, USA
Nedimovic, M R
mladen@dal.ca
Department of Earth Sciences, Dalhousie University, Halifax, NS, Canada
Canales, J
jpcanales@whoi.edu
Woods Hole Oceanographic Institution, Woods Hole, MA, USA

In summer 2008, the first 3D multi channel seismic survey of the R/V Langseth was conducted at the East Pacific Rise (EPR) 9°50'N, one of the Ridge2000 Integrated Study Sites. Besides the main 3D box, the survey included a suite of along axis lines extending throughout the entire ridge segment from the Clipperton to Siquieros Fracture Zones (three closely spaced parallel lines between 10°10'N and 9°41'N, two from 9°41'N to 9°20'N and one 2-part line from 9°20'N to 8°20'N extending over both limbs of an overlapping spreading center, OSC). Each of these sail lines covered a swath of subsurface (262.5 m or more, depending on feathering), with eight parallel CMP lines spaced some 37.5 m apart. Profiles were shot following the trend of the ridge axis, which displays slight changes in azimuth within the two main sections north and south of the OSC. In order to apply 3D CMP binning, we split the dataset in multiple overlapping 3D boxes, with the orientation of each grid matching the average shooting direction inside it. Seismic data processing is now complete within a first box extending from 9°40'N to 9°55'N, where the binned area is nominally 900 meters wide in axis-perpendicular direction. The data were processed for the seismic layer

2A event and the axial magma lens P-wave reflection. Along-axis sections from the post-stack time migrated data image a succession of four separate lenses each ~6 km long, thus providing insight into axial magma lens segmentation and associated along-strike length scales. The magma lens located beneath the shallowest portion of the ridge crest at 9°50'N, where the 2005/06 and 1991/92 volcanic eruptions occurred and where hydrothermal venting is focused, is on average 20 ms shallower than the adjacent lenses. Within this region, reflection amplitude varies across the width of the magma lens and is strongest beneath the eastern part of the axis away from the hydrothermal vent cluster. Current work is focused on processing the remaining along-axis data south of 9°40'N, which along with the results already obtained, will give us detailed insight into the architecture and segmentation of the axial magmatic system for over 200 km of the EPR.

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