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Eruption-related changes in magma chamber structure at 9° 50' N on the EPR from coincident reflection images, 1985 and 2008

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The 3D seismic imaging experiment conducted in 2008 from the RV Marcus G. Langseth encompassed several 2D MCS lines obtained in 1985 prior to the series of eruptions that occurred on the ridge in 1991 and then in 2005/06. Both data sets show distinct and variable images of the axial magma chamber (AMC) and comparison of the two data sets can give insight into magma chamber dynamics associated with the eruption. Such comparison is hindered by the greater navigation uncertainty in the 1985 data but we have found that the seafloor topography is sufficiently variable that along axis line CDP41 from the earlier survey can be positioned in the new 3D grid with an uncertainty of about 50 meters in an axis perpendicular direction and less than 20 meters in an along-axis sense. From this analysis CDP41 appears to lie just to the east of the crest. Within the 50 meter region of co-location uncertainty data from the 2008 3D survey show an AMC event that does not change significantly with distance from the ridge crest but exhibits considerable variation along-axis. Comparisons of the old and new data suggest that the AMC in the region beneath the central portion of the 2005/06 eruption where the ridge is shallowest and host to intense hydrothermal activity has changed less than can be detected in our data at

this stage of analysis. By contrast, in the region to the north that is more closely associated with off-axis flows from the 2005/06 eruption the AMC event has changed in a readily detectable manner. While the AMC event in the 1985 data appears essentially continuous from central to northern region, in the more recent data it diminishes in amplitude considerably to the north and appears to abruptly deepen at a location roughly coincident with the southern extent of the off axis flows. This may imply that the northern portion of the AMC was more fully drained by the eruption or that the central portion has replenished very rapidly.

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