2012 Robert E. Sheriff Lecture Student Abstracts

[These are ten of the 27 entries for the Sheriff poster series, presented as is. The remainder will be published next month along with identification of the winners. - Ed.]

The Impact of Mantle Heterogeneity on Oceanic Core Complex Formation, 12 – 16°N, Mid-Atlantic Ridge

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The 12-16°N segment of the Mid-Atlantic Ridge has two fundamentally different modes of seafloor spreading: symmetric and asymmetric. The central part of this segment (~14°N) is characterized by continuous axial rift valleys flanked by normal faults with high length/displacement ratios. In contrast, crust that has spread asymmetrically within this segment features shorter fault scarp lengths, outward tilted surfaces, nodal basins, discontinuous neovolcanic zones and has a more irregular bathymetric character. Asymmetric spreading is a result of amagmatic tectonic extension and is accommodated by very-large-offset low-angle normal faults. These faults expose a complete section through the mafic crust to serpentinized mantle on the seafloor. Collectively, tectonic, magmatic and hydrothermal processes lead to the formation and character of oceanic core complexes. Dredged peridotites from this region are predominantly harzburgites. Electron microprobe analyses of accessory chromian spinel suggest at least 16 to 20% melt extraction preceded their exposure. However, it is difficult to reconcile the high melt volumes implied by the peridotite with thin, absent, and asymmetrically spreading crust. This evidence supports our prior suggestions that magma supply, and oceanic core complex formation, within these ridge segments is controlled by mantle heterogeneities. Heterogeneities may include, but are not limited to, garnet-pyroxenite sources that produce high volume melts and ultra-depleted mantle that produce little melt. Large segments of the mantle are likely receiving a free ride to the surface without significant melting. ■