2006 Fall Meeting
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HR: 0800h
AN: **B31B-1096**
TI: Oceanic Core Complexes and Crustal Accretion at Slow-Spreading Ridges. Indications From IODP Expeditions 304-305 and Previous Ocean Drilling Results

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AB: Oceanic core complexes expose intrusive crustal rocks on the seafloor via detachment faulting and are often associated with significant extents of serpentinized mantle peridotite at the seafloor. These serpentinite units have unknown thickness in most cases. Assuming that steep slopes surrounding the domal core provide a cross section, one would infer they comprise much of the section for depths of at least several hundred meters. IODP expeditions 304-305 results at the Mid-Atlantic Ridge 30°N (Atlantis Massif), taken together with recent results from seafloor mapping and ODP drilling in the Atlantic as well as on the SWIR, suggest that a revised model of oceanic core complex (OCC) development should be considered. All of the ODP/IODP drilling at 4 different core complexes and/or inside corner highs so far have recovered only gabbroic sections, with almost no serpentinized peridotite. Here we explore aspects of a possible revised model for oceanic core complex development in which the "core" of these structural complexes represents a period of greater than typical mafic intrusion in overall magma-poor regions of slow and ultra-slow spreading ridges. Exposure of the gabbroic intrusion(s) is enabled by deformation that localized predominantly within the serpentinized peridotite that initially surrounded them. The development of a detachment fault system on the central dome of Atlantis massif may have occurred relatively late in its evolution, controlling the exposure along a domal high via mostly brittle faulting. The proposed model is different from previous published models in that OCC represent the tectonic and morphoplogic expression of the magma-rich end-member of a fundamental mode of crustal accretion- the intrusion of gabbro plutons at depth. The model resembles a system of ball-bearings, in which episodically some gabbroic "balls" are larger. It does not necessarily imply that the detachment fault capping OCC is a single, deep-rooting fault. The geometry of the fault system may vary on a case-by-case basis, depending on the volume of gabbro present beneath the axis and on its crystallization depth. The model implies that serpentinized fault zones envelop the gabbro intrusions, thus explaining the paradox of dominantly gabbroic cores in the vicinity of seafloor serpentinites on top or on the flanks of OCC. We predict that dominant serpentinites on the southern wall of Atlantis massif may form a relatively thin sheath on the terminus of a dominantly gabbroic core. Further work (e.g., deep drilling on the southern ridge) is required to determine if this working model is correct since current data are equivocal.

DE: 3035 Midocean ridge processes
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DE: 8120 Dynamics of lithosphere and mantle: general (1213)
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