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Sheba Ridge's oceanic core complexes

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Long-lived (1 to 2 Myrs) detachment faults at mid-oceanic ridges form large oceanic core complexes that contribute significantly to the accommodation of plates divergence in a much similar way to their continental equivalent, the metamorphic core complexes. We report here for the first time the discovery of oceanic core complexes formed at the easternmost segment of the Sheba Ridge that separates the Somalia and Arabia plates at a full spreading rate of about 2 cm/yr in the Gulf of Aden. Data were acquired during the AOC 2006 geophysical survey aboard the *BHO Beautemps-Beaupré* conducted at the mouth of the Gulf of Aden where the Sheba Ridge meets the Carlsberg Ridge and the Owen fracture zone (see companion Abstract by Fournier et al., this meeting). Oceanic core complexes of the Sheba Ridge share many of the features previously described at slow-spreading ridges, in particular at the Mid-Atlantic Ridge and at the SouthWest Indian Ridge. These include a breakaway ridge, a doming detachment surface several tens of kilometers long with corrugations in the direction of spreading, an inward steep normal fault that cuts off the flat detachment. The high resolution of the multibeam sounder (Simrad EM120, 10 meters vertical resolution) provides important new morphological constraints for the formation and evolution of the detachment faults and megamullions. Diking through the footwall is observed at several places away from the breakaway margin, indicating significant magmatic supply late in the evolution of the detachment fault possibly in the region of maximum fault bending. Abundant spotted volcanism seems to mark the transition in time from tectonic to magmatic extension. The multibeam mapping also reveals the fine structure of the megamullions: small-scale step-like striations share the same symmetry –

perpendicular to the ridge axis – than the large-scale doming of the detachment fault, suggesting that both are cogenetic as suggested by scaling laws describing the rugosity of faults planes on land. At a regional scale, core complexes are abundant only at the termination of the Sheba segment, along what appears to be a less magmatic segment (low-amplitude magnetic anomalies, high Bouguer gravity, deep axial depth). However, most of them are located close to the ridge axis and thus seem to be limited to the past few million years: do they relate to the recent abandonment of the triple junction?