Geophysical Research Abstracts,
Vol. 10, EGU2008-A-08221, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-08221
EGU General Assembly 2008

Flexural rotation of normal faults and the formation of oceanic core complexes and abyssal hill topography

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Oceanic core complexes found along the MAR and other slow-spreading mid-ocean ridges demonstrate how flexural rotation of normal faults can be playing an important role in the formation of sea floor. Steep inward-facing normal faults originating at the edge of the rift valley floor rapidly rotate upon extension, the top of the fault reaching maximum rotations of 30-40 degrees after only 5 km horizontal extension, resulting in symmetrical narrow linear ridges with roughly 30 degree slopes. Upon further extension, the newly exhumed deeper part of the fault develops into a characteristic subhorizontal surface capping a dome, or, low-angle detachment, that is often striated parallel to the exhumation direction. Occasional new normal faults that root in the same long-lived detachment fault below the rift valley raft linear ridges onto the striated domes. Estimates from the shapes of domes and linear ridges of two segments south of the FifteenTwenty FZ suggest that the lithosphere in the rift valley has an elastic plate thickness of Te = 0.5-1 km. At this elastic plate thickness, the cumulative effect of flexural rotation of normal faults at the edge of the rift valley floor can also account for the formation of typical abyssal hill topography. At the present time there are still very few observations to test the hypothesis that most outward-facing slopes in slow-spreading environments like the MAR are due to flexural rotation of normal faults rather than to outward-facing faults cutting volcanic topography.