



Micro-seismicity of oceanic core complexes: the Mid-Atlantic Ridge at 7°S to 8°15'S and at the Logatchev Massif, 14°40'N to 14°50'N

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Lithospheric formation at slow spreading rate is either controlled by symmetric spreading at segments where magmatism dominates or it occurs asymmetrically at segment ends at so called inside corner massifs where tectonics dominate, causing oceanic core complex formation. We report results from three deployments of local seismic networks surveying settings of the Mid-Atlantic Ridge (MAR) where lower crustal and upper mantle rocks were tectonically unroofed in the flanking rift mountains. Two networks surveyed the MAR near 7°S in the vicinity of the Ascension transform fault. Three inside corner highs were investigated. However, they remained seismically largely inactive and major seismic activity occurred along the centre of the median valley. To the south of ~7.9°S, where a central volcanic ridge occurs, seismicity was concentrated along the neovolcanic zone. Some micro-seismicity occurred along the bounding faults flanking the inner central graben. At the Logatchev Massif at 14°43'N to 14°50'N seismicity was sparse within the centre of the median valley but concentrated along the eastern rift mountains just east of the Logatchev hydrothermal vent field. To the north and south of the massif, however, seismic activity occurred along the ridge axis, emphasizing the asymmetry of seismicity at the Logatchev segment. Focal mechanisms indicated a large number of reverse faulting events occurring in the vicinity of the vent field at 3 to 5 km depth. Reverse faulting is interpreted to reflect thermal contraction and cooling of a plutonic intrusion. At shallower depth of 2 to 4 km depth most earthquakes in the vicinity of the vent field showed normal faulting behavior, roughly outlining a single fault. It seems reasonable to suggest that the normal fault is feeding the vent field. Further, a second set of faults occur. Events showed strike-slip motion in NW-SE direction; thus, fault motion is paralleling the trend of the high temperature hydrothermal sites. We therefore suggest that venting at the off-axis Logatchev vent field is controlled by a plutonic body intruding the now inactive core complex. The surface location of the field, however, is controlled by local fault systems.