

Volcanism and Rifting: Contrast Between East African and Central-East Asian Rifts

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This paper compares two large rift provinces: the East African Rifts (EARS) and the Central and East Asian Rifts (CEAR). The EARS is located far from any plate convergent margins and its development has been linked to starting plumes impinging on the lithosphere, thus causing active rifting. The CEAR is less clear but has been attributed to the lithosphere response to the collision between India and Asia, without a starting plume. However, local deep conduits could explain the upper mantle buoyancy and the thermal anomalies in the CEAR.

Mafic and ultramafic rocks ($\text{SiO}_2 < 53\%$ and $\text{MgO} > 5\%$) of tholeiitic, alkaline and ultra-alkaline composition enable us to define key-differences between these two types of rifts. The earliest magmas to reach the surface in some areas of the CEAR are from a deep source, indicating slow progressive uprise of the asthenosphere. The EARS shows a rapid ascent of the asthenosphere which fosters partial melting at all levels and allows magmas from shallower depths to reach the surface first. Geochemical features distinguishes mafic rocks from these rifts, e.g. Ce/Pb in the EARS is commonly in the OIB/MORB range (25 ± 5) whereas highly variable and low values (< 15) are common in several areas of the CEAR. We suggest that active rifting is typical for the EARS whereas passive rifting characterizes the CEAR.