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# Mechanism of the Formation of the East African Rift System

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The East African Rift System (EARS) is located in East Africa, separating into two main branches, the eastern branch and the western branch. It is considered as an intra-continental ridge system, which meets the Red Sea and Gulf of Aden at the Ethiopian Afar, forming the Afar triple junction. The mechanism controlled the initiation of the lithospheric breakup in the East Africa is still unclear, although several models have been proposed. One model considers the local extensional stress is derived from a far-field loads from the oceanic ridges. Alternatively, some scientists suggest that the formation of EASR can be explained by a mantle plume swelling beneath a lithospheric weak zone (e.g. the Pan-African suture zone).First, a 3-D heterogeneous spherical shell model is established, considering the spherical curvature of earth and lithospheric heterogeneity between orogens and cratons. The results are calculated by the finite element method using ANSYS code, which fits the geological evidences well. In order to understand the properties of the 3-D heterogeneous spherical shell model in this study, the effects of various models under different boundary conditions are briefly discussed to compared with the best fit model, which indicates that the extensional environment in East Africa is caused by plume upwelling. In addition, the direction of the extension is controlled by the tectonic stress field due to oceanic ridge loads of the Indian Ocean in the east and Atlantic Ocean in the west.

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