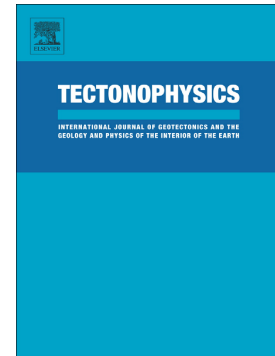


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Off-axis volcano-tectonic activity during continental rifting: insights from the transversal Goba-Bonga lineament, Main Ethiopian Rift (East Africa)

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Abstract

The Main Ethiopian Rift, East Africa, is characterised by the presence of major, enigmatic structures which strike approximately orthogonal to the trend of the rift valley. These structures are marked by important deformation and magmatic activity in an off-axis position in the plateaus surrounding the rift. In this study, we present new structural data based on a remote and field analysis, complemented with analogue modelling experiments, and new geochemical analysis of volcanic rocks sampled in different portions of one of these transversal structures: the Goba-Bonga volcano-tectonic lineament (GBVL). This integrated analysis shows that the GBVL is associated with roughly E-W-trending prominent volcano-tectonic activity affecting the western plateau. Within the rift floor, the approximately E-W alignment of Awasa and Corbetti calderas likely represent expressions of the GBVL. Conversely, no tectonic or volcanic features of similar (E-W) orientation have been recognized on the eastern plateau. Analogue modelling suggests that the volcano-tectonic features of the GBVL have probably been controlled by the presence of a roughly E-W striking pre-existing discontinuity beneath the western plateau, which did not extend beneath the eastern plateau. Geochemical analysis supports this interpretation and indicate that, although magmas have the same sub-lithospheric mantle source, limited differences in magma evolution displayed by products found along the GBVL may be ascribed to the different tectonic framework to the west, to the east, and in the axial zone of the rift. These results support the importance of the heterogeneous

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