



## **Magmatism and seismicity at the Ma'alalta rift segment in Afar**

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Growth of rift segments and development of crustal magmatic systems in continental rifts remain debated issues. We analysed volcanological, geochemical and seismic data from the Afar rift to show that the Ma'alalta region is an active rift segment and not a marginal silicic centre as previously suggested (Barberi et al. 1974; Wiart et al. 2005). The Ma'alalta stratovolcano was initially built around  $0.55 \pm 0.05$  Ma (Barberi et al. 1972), and it produced only evolved lava flows and ignimbrites, mainly trachytic and slightly peralkaline. The evolution of Ma'alalta stratovolcano culminated with the eruption of large-volume, caldera-forming ignimbrite sheets. However, the more recent magmatic activity consisted in mafic lava fields, scoria cones and obsidianaceous rhyolitic domes erupted from vents aligned NNW-SSE. Local seismicity (2005-2009 and 2011-2012) also shows a NNW-SSE-trending lineament of earthquakes with good correlation to where the recent magmatic products were erupted. Furthermore, basalt REE patterns and incompatible trace elements ratios (e.g., Ba/La, Rb/Ta and Zr/Ta) as well as silicic rocks petrogenesis of Ma'alalta are similar to the nearby Dabbahu and Durrie volcanoes. We interpret the geochemical signature of Ma'alalta, the NNW-SSE-trending pattern of scoria cones and rhyolitic domes, as well as the recent seismicity as evidences that Ma'alalta is an active rift segment. This observation is important as it may suggest that rifting episodes (2005-2010 intrusions in Dabbahu) favour rift activity at nearby segments (Ma'alalta).