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# Deep plumbing model of the Cenozoic Manzaz / Atakor intraplate volcanic system, Central Hoggar, Northwest Africa, based on electrical resistivity models

**Zakaria Boukhalfa**[1,3], Matthew J. Comeau[2], Amel Benhallou[1], Abderrezak Bouzid[1], and Abderrahmane Bendaoud[3]

[1]Centre de Recherche en Astronomie, Astrophysique et Geophysique (CRAAG), Subsurface Geophysics, Algiers, Algeria (boukhalfa.zakaria@yahoo.com)

[2]Delft University of Technology, Department of Geoscience and Engineering, Delft, The Netherlands.

[3]Faculté des sciences de la terre, de Géographie et de l'Aménagement du Territoire (FSTGAT), Université des Sciences et Technologie Houari Boumediene (USTHB), Algiers, Algeria.

Continental intraplate volcanic systems, with their location far from plate tectonic boundaries, are not well understood: the crustal and lithospheric mantle structure of these systems remain enigmatic and there is no consensus on the mechanisms that cause melt generation and ascent. The Cenozoic saw the development of numerous volcanic provinces on the African plate. This includes the Hoggar volcanic province, located in Northwest Africa, part of the Tuareg shield. It is composed of several massifs with contrasting ages and eruptive styles. The magmatic activity began at around 34 Ma and continued throughout the Neogene-Quaternary. Phonolite and trachyte domes as well as scoria cones and necks are found in the Manzaz and Atakor volcanic districts. In order to image the crustal and lithospheric mantle structure of this region, and to understand the origins and potential mechanisms of the continental intraplate volcanic activity in the Central Hoggar and specifically the Atakor/Manzaz area, we acquired magnetotelluric (MT) measurements from 40 locations and generated a 3-D electrical resistivity model. The model covers an area of about 100 km by 200 km. Images of the subsurface architecture, in terms of electrical resistivity, from the near-surface to the lithospheric mantle, allow us image the deep plumbing system of the volcanic system. Low resistivity features (i.e., conductors) in the crust that are narrow, linear structures trending approximately north-south, are revealed along the two boundaries of the Azrou N'Fad terrane, in the Manzaz area. They likely reflect the Pan-African mega-shear zones, which were reactivated throughout the tectonic evolution of the region. The model reveals that these faults are lithospheric-scale. In addition, the low-resistivity features likely represent the signatures of past fluid flow. The location of the recent Cenozoic volcanic activity was likely influenced by the pre-existing structure. A deep feature of moderate conductivity is located in the upper lithospheric mantle directly beneath the Manzaz and Atakor Volcanic Districts. It may represent the origin of the overlying anomalies and may suggest metasomatism of the sub-continental lithospheric mantle.

**Keywords:** intraplate, Hoggar, alkaline volcanism, magnetotelluric, electrical resistivity.