Goldschmidt 2024 Abstract
https://doi.org/10.46247/gold2024.24735

Deep mantle source for Kenya Rift magmatism: C-He-Ne-Ar isotopes in CO_2 well gases Menengai, Kenya

FINLAY M STUART[1], DOMOKOS GYORE[1,2] AND BIYING CHEN[1,3]

[1]Scottish Universities Environmental Research Centre
[2]Isomass Scientific Inc.
[3]University of Edinburgh

Presenting Author: Fin.stuart@glasgow.ac.uk

The ultimate origin of and relationship between the main intra-plate volcanic provinces in the East Africa-Arabia region remain poorly understood. Waveform tomography has detailed the seismic velocity structure beneath East Africa revealing interconnected corridors of upwelling hot, partially molten rock beneath the mantle lithosphere under Kenya and the Afar region. There is abundant evidence for high $^{3}He/^{4}He$ and solar Ne isotopes in Afar volcanism placing the ultimate origin in the deep mantle. In contrast evidence for deep mantle volatiles in the source of the Kenya-Tanzania volcanims is sparse, largely restricted to the southern-most part of the Western rift. In a new campaign we are concentrating effort on CO_2 well gases from the Kenya rift rather than phenocrysts and xenolith minerals. Gases from the Menengai geothermal field have C-He isotope systematics that are dominated by magmatic volatiles. High precision Ne isotope data confirm a deep mantle source that is similar to that upwelling beneath Iceland, consistent with the ultimate origin in the African Superplume. This is the first identification of deep mantle volatiles in mantle upwelling beneath the Kenyan rift. Although it overlaps the Ne isotope range determined in volcanic rocks associated with the Afar plume it is significantly more precise making it difficult to draw inferences about the extent to which the volatile inventory of the two plumes is governed by mixing with asthenosphere and slabs in the mantle transition zone.