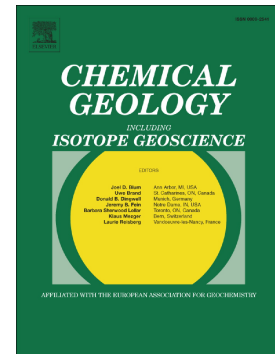


Accepted Manuscript

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PII: S0009-2541(17)30456-4
DOI: doi: [10.1016/j.chemgeo.2017.08.015](https://doi.org/10.1016/j.chemgeo.2017.08.015)
Reference: CHEMGE 18443
To appear in: *Chemical Geology*
Received date: 9 December 2016
Revised date: 31 May 2017
Accepted date: 14 August 2017

Please cite this article as: Gaëlle Mollex, Evelyn Fūri, Pete Burnard, Laurent Zimmermann, Gilles Chazot, Emmanuel O. Kazimoto, Bernard Marty, Lydéric France , Tracing helium isotope compositions from mantle source to fumaroles at Oldoinyo Lengai volcano, Tanzania, *Chemical Geology* (2017), doi: [10.1016/j.chemgeo.2017.08.015](https://doi.org/10.1016/j.chemgeo.2017.08.015)

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Tracing helium isotope compositions from mantle source to fumaroles at Oldoinyo Lengai volcano, Tanzania

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Submitted to Chemical Geology for publication in the special noble gas issue dedicated to the memory of Pete Burnard

Keywords: carbonatite, neon, 2007-2008 eruption, SCLM, argon, cognate xenoliths, helium

Highlights:

The Oldoinyo Lengai mantle source is identified as SCLM, metasomatized by magmas or fluids from the depleted asthenosphere

He data suggest a similar source for Oldoinyo Lengai natrocarbonatites and silicate magmas of the Arusha volcanic province

Matching $^3\text{He}/^4\text{He}$ of fumaroles and the deep magmatic system rule out air contamination or crustal assimilation during ascent

Cognate ijolite xenoliths retain a volatile record of the carbonatite volcano during brief sub-Plinian episodes

Stable fumarolic helium isotope ratios since 1988 testify that the hydrothermal system is deeply rooted

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