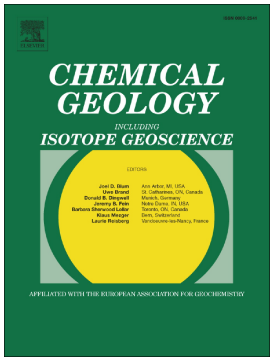

Tracing helium isotope compositions from mantle source to fumaroles at Oldoinyo Lengai volcano, Tanzania

Gaëlle Mollex, Evelyn Füri, Pete Burnard, Laurent Zimmermann, Gilles Chazot, Emmanuel O. Kazimoto, Bernard Marty, Lydéric France

PII: S0009-2541(17)30456-4
DOI: doi: 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 Füri, 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

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

Gaëlle Mollex [a*], Evelyn Füri [a], Pete Burnard [a], Laurent Zimmermann [a], Gilles Chazot [b], Emmanuel O. Kazimoto [c], Bernard Marty [a], Lydéric France [a]

a. CRPG, UMR 7358, CNRS, Université de Lorraine, 15 rue Notre Dame des Pauvres, 54501 Vandœuvre-lès-Nancy, France
b. Université de Brest; CNRS; UMR 6538 Domaines Océaniques; Institut Universitaire Européen de la Mer, Place Copernic, 29280 Plouzané, France
c. Department of Geology, University of Dar es Salaam, P. O. Box 35052, Dar es Saalam, Tanzania

* Corresponding author email address: gmollex@crpg.cnrs-nancy.fr

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 $^{3}He/^{4}He$ 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