Earthquake-driven noble-gas geochemistry in Lake Van (Turkey)

YAMA TOMONAGA[1], MATTHIAS S. BRENNWALD[1], COLIN MADEN[2], AYŞEGÜL F. MEYDAN[3] AND ROLF KIPFER[12]

[1]Eawag, Swiss Federal Institute of Aquatic Science and Technology, Water Resources and Drinking Water, Duebendorf, Switzerland, tomonaga@eawag.ch
[2]Institute of Geochemistry and Petrology, Swiss Federal Institute of Technology, Zurich, Switzerland
[3]Department of Geological Engineering, Yuzuncu Yil University, Van, Turkey

Terrigenic He release and changes in the He isotope ratio in response to tectonic activity is well known [1,2,3]. However, the very local nature of the He release from the solid earth [4,5,6,7] implies that every system considered has to be addressed as a single and unique entity. Only such case-specific assessment allows to infer possible links between geochemistry and seismic events.

Lake Van (Turkey) is one of the largest terminal lakes and the largest soda lake on Earth. The lake basin is situated in a tectonically active region characterized by the presence of major faults and volcanoes and is known to accumulate mantle fluids [7,8,9]. The societal vulnerability of the area to seismic hazards was dramatically documented by the occurrence of the devastating earthquake of magnitude 7.2 close to the city of Van on Oct. 23rd 2011. This unfortunate and tragic event offers a unique opportunity to study the related emission of fluids from the solid earth. Our research in Lake Van during the last two decades [7,8,9,10] sets a solid experimental basis for understanding possible changes in the noble gas isotope composition in the water column induced by such a major earthquake.

In this work we present the noble-gas concentrations of water samples from Lake Van acquired before and after the earthquake. We compare the new data to our previous measurements and we evaluate the potential of noble gas analysis as geochemical proxy for tectonic activity.

[1] Sano *et al*.,1998. Chem. Geol., 150(1-2), 171–179. [2] Güleç *et al*., 2002. Chem. Geol., 187(1-2), 129–142. [3] Fu *et al*., 2008. Radiat. Meas. 43, Suppl. 1, S348–S352. [4] Mamyrin and Tolstikhin, 1984. ISBN 978-0444421807. [5] Oxburgh et al, 1986. Nature 324, 632–635. [6] Oxburgh and O'Nions, 1987. Science, 237, 1583–1588. [7] Tomonaga *et al*., 2011. Geochim. Cosmochim. Acta 75 (10), 2848–2864. [8] Kipfer *et al*., 1994. Earth Planet. Sci. Lett. 125 (1-4), 357–370. [9] Kaden *et al*., 2010. Water Resour. Res. 46, W11508. [10] Tomonaga et al, 2012. J. Asian Earth Sci. 59, 99–107.

Soil Mineralogy, Geochemistry and Trace Element Mobility in the Bitumen Environment of Ondo state, Southwestern Nigeria

TOMORI W.B.[1], YANFUL E.K.[1], FLEMMING R.[2]; AMOO I.A.[3], AIYESANMI A.F.[3] AND ADEKOYA J.A.[4]

[1] Department of Civil and Environmental Engineering, Western University, Ontario, Canada; email: tomorifuta97@yahoo.com; eyanful@uwo.ca
[2] Department of Geology, Western University, Ontario, Canada,
[3] Department of Chemistry, Federal University of Technology, Akure, Nigeria; adisamoo@yahoo.co.uk, adisamoo@yahoo.com; demolaktp@yahoo.co.uk
[4] Department of Applied Geology, Federal University of Technology, Akure, Nigeria

Surface and subsurface soil from the bitumen environment of Ondo state was characterized for mineralogy, geochemistry and trace element mobility. Physical, mineralogy and geochemical properties of the soil samples was obtained using standard techniques. The soil in the study area is acidic with low cation exchange capacity. The majority of trace elements reside in residue phase. Hence, trace elements are relatively low mobile. They are therefore of little or no risk to ecosystem health. Major oxides are silica, iron oxide and alumina. Quartz, feldspar and kaolinite are dominant mineral constituting more than 99%.

www.minersoc.org
DOI:10.1180/minmag.2013.077.5.20