Temporal variations of Fukushima-derived ^{129}I in precipitations

SHENG XU[1]*, STEWART FREEMAN[1], XIAOLIN HOU[2], AKIRA WATANABE[3], KATSUHIKO YAMAGUCHI[3] AND LUYUAN ZHANG[2]

[1]Scottish Universities Environmental Research Center, East Kilbride, G75 0QF, UK (*correspondence: s.xu@suerc.gla.ac.uk)
[2]Center for Nuclear Technologies, Technical University of Denmark, 4000 Roskilde, Denmark
[3]Geophyscical Institute, Fukushima University, Fukushima 960-1296, Japan

The precipitation samples collected from Fukushima, Japan over 2010-2012 were analyzed for ^{127}I and ^{129}I in order to explore the atmospheric level and behaviour of radioactive iodine released from the Fukushima nuclear accident in 2011. ^{129}I concentration of 1.2×10^{8} atom/L in 2010 before the accident dramatically increased about 4 orders of magnitude to 7.6×10^{11} atom/L in March 2011 immediately after the accident with a $^{129}I/^{127}I$ ratio up to 6.9×10^{-5}. Afterwards the ^{129}I concentrations in precipitation decreased exponentially to $\sim3\times10^{9}$ atom/L until October 2011 with a half-life of about 29 days. This decline trend of ^{129}I concentrations in precipitation was interrupted around October 2011 by newly ^{129}I input to the atmosphere, and the elevated ^{129}I concentration in the atmosphere decreased exponentially again. Such a cycle of abrupt increase - exponential decrease occurred three times until present. This temporal variation can be attributed as alternation of ^{129}I dispersion and re-suspension from the contaminated local environment. A $^{129}I/^{131}I$ atomic ratio of 16±1 obtained from the rainwater sample is comparable with those estimated by analysis of surface soil samples [1]. Comparison of ^{129}I level in Europe suggests an insignificant effect of ^{129}I released from Fukushima to the ^{129}I level in the Europe.

[1] Miyake *et al*. (2012) *Geochem. J*. **46**, 327-333.

Historical trends of heavy metal pollution recorded in sediments from Lake Qionghai, China

WEI XU, ZE-MING SHI, SHI-JUN NI AND YING GAO

Department of Geochemistry, Chengdu University of Technology, Key laboratory of Earth Science and Nuclear Techniques in Sichuan Province, Chengdu, 610059, China (weixuxw@gmail.com; shizm@cdut.edu.cn; nsj@cdut.edu.cn; ying.gaoy@gmail.com)

Heavy metals are serious pollutants due to their toxicity and long persistence in the environment. Lake sediment cores preserved the geochemical environmental changing record. A sediment core was collected in 2011 from Lake Qionghai, the second largest freshwater lake of Sichuan Province in China, to analyze the heavy metal pollution evolution of the lake.

The sediment core was 46cm in height, and was sectioned at 1cm intervals for the above 30cm while 2cm intervals for the left. The coefficients of variation of As, Cd, Cr, Cu, Hg, Ni, Pb, Zn in the sediment core are 0.32, 0.72, 0.16, 0.08, 0.34, 0.24, 0.19, 0.19, respectively, which indicates Cd varies greatly as a result of human activities, while the other heavy metals have little change mainly due to a natural origin.

The content of Cd increased distinctly and continuously to 0.87g/kg in the surficial six centimetres of the sediment core, indicating the lake had a large quantity of Cd input in the last years. According to the ^{137}Cs dating result, this interval was deposited from 1998 to 2011. Besides, the evaluation by potential ecological risk index method showed Cd in the sediments had pollution risk of medium degree. That means the lake has suffered Cd pollution since 1998.

DOI:10.1180/minmag.2013.077.5.24