Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

MAG34-13 会場:国際会議室 時間:5 月 24 日 11:30-11:45

福島第一原発事故により放出された放射性セシウムの環境中での不均質分布
Heterogeneous distribution of radiocesium in the environment emitted from the Fukushima Daiichi Nuclear Power Plant

田中 万也 [1*], 坂口 綾 [2], 金井 豊 [3], 鶴田 治雄 [4], 篠原　厚 [5], 高橋 嘉夫 [2]
TANAKA, Kazuya[1*], SAKAGUCHI, Aya[2], KANAI, Yutaka[3], TSURUTA, Haruo[4], Atsushi Shinohara[5], TAKAHASHI, Yoshio[2]

[1] 広島大学サステナセンター, [2] 広島大学大学院理学研究科, [3] 産業技術総合研究所地質調査総合センター, [4] 東京大学大気海洋研究所, [5] 大阪大学大学院理学研究科
[1]ISSD, Hiroshima Univ., [2]Graduate School of Science, Hiroshima Univ., [3]Geological Survey of Japan, AIST, [4]AORI, The Univ. of Tokyo, [5]Graduate School of Science, Osaka Univ.

We analyzed ^{137}Cs in aerosols, rocks, soils and river suspended sediments collected after the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident. Based on the results of analysis, we discussed the behavior and transportation of radiocesium in natural environments after the accident. First, radionuclides were emitted from FDNPP as hot particles transported by the air, which contained water-soluble fractions of radiocesium. Radiocesium still existed in water-soluble fractions just after deposition on the ground. Subsequently, interaction of hot particles with water (e.g. rainfall) dissolved and strongly fixed radiocesium on rocks and soil particles, which changed radiocesium into insoluble form. The distribution of hot spots was possibly controlled by the initial position of deposition on the ground. Consequently, hot spots were studded on the surface of rocks rather than uniformly distributed. Cesium-137 concentrations of $<$ 2 um fraction of rocks, soils and river suspended sediments were higher than those of the corresponding bulk samples. The distribution of radiocesium in river suspended particles was not homogeneous during transportation by way of rivers, reflecting the heterogeneity of radiocesium in rocks and soils. Leaching experiments demonstrated that radiocesium in rocks, soils and river suspended sediments were fairly insoluble, showing that the adsorption reaction is irreversible. The heterogeneous distribution of radiocesium in aerosols, soils and suspended particles is originated from the presence of hot particles in aerosols. Dissolution of radiocesium in the hot particles in the aerosols and subsequent irreversible adsorption on the soil particle complex are responsible for the preservation of the heterogeneity in soils and also in river suspended particles. The present results showed that their radioactivities are retained by only a part of the constituent in soils and suspended particles originally transported as hot particles in the aerosols.
Keywords: Radiocesium, heterogeneity, soil, Fukushima, FDNPP accident