Reconstruction of the accident-derived I-131 deposition in Fukushima through the analysis of I-129 in soil.

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Large quantities of radionuclides were released durring the accident at Fukushima Daiichi Nuclear Power Plant which occurred during March of 2011. We have carried out intensive studies on the distribution and behaviour of radioiodine and radiocesium in the environment following the accident. Special attention was paid to I-131 (half-life: 8 days) because of its affinity to thyroid glands and because, at the time of the Chernobyl accident, an increase of thyroid cancer for infants and children was observed as a result. Although the amount of I-131 released from the Fukushima accident is about one tenth of that released from the Chernobyl accident, it is necessary to obtain information on the deposition density of this nuclide in different locations surrounding the nuclear power plant at the time of the accident. However, most of it decayed away after some months due to its short half-life and there were not enough data to construct a deposition map for I-131.

In order to estimate the deposition of I-131, we focused on I-129 (half-life: 15.7 million years) which was also co-released during the accident and deposited in soils across the region. Surface soil samples collected from different places in Fukushima Prefecture were analyzed for I-129 by AMS (accelerator mass spectrometry) after the chemical separation. Soil samples that had been determined for I-131 were used to estimate I-131/I-129 ratio. A good correlation was found between the concentration of I-131 and that of I-129 in soil. This finding suggests the possibility to estimate the I-131 deposition through the analysis of I-129 in soil. We also analyzed soil samples collected from different locations of Fukushima Prefecture within a project organaized by MEXT (Ministry of Education, Culture, Sports, Science, and Technology, Japan) for reconstracting the deposition density of I-131.

Heterogeneous melt involved in formation of a thick Moho transition zone in northern Oman ophiolite: implications for MORB evolution

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The evolution process of MORB from depleted melts in equilibrium with abyssal peridotites has been left unclear. Here a melt with gentle REE pattern like the ordinary MORB is referred to “Melt 1”, and a melt with steeply LREE-depleted pattern like ultra-depleted MORB [1] to “Melt 2”. CPXs (clinopyroxenes) in dunites and wehrlites in the Moho transition zone of Oman ophiolite were generally in equilibrium with Melt 1 [2]. We found dunites-wehrlites containing CPXs in eqiulibrium with Melt 2 in predominant Melt-1 related dunites-wehrlites from a thick Moho transition zone of Wadi Thuqbah, northern Oman ophiolite [3]. Some of the Melt-2 related dunites-wehrlites contain relic OPX (orthopyroxeen) partially replaced with olivine: other Melt-1 related ones are free of OPX, and occasionally contain sulfides [3]. The Fo content of olivine is higher in the Melt-2 related rocks (around 91) than in the Melt-1 related ones (88-90). The Cr_2O_3 content in CPX is higher in the former (1.1-1.3 wt%) than in the latter (0.9-1.1 wt%). The OPX in the former is simar in chemistry to that in the mantle harzburgite downsection.

These features possibly indicate chemical evolution of Melt 1 from Melt 2 through reaction with the mantle peridotite (consumption of OPX combined with olivine production). The Moho transition zone dunites and wehrlites are cumulates from melts enriched with olivine crystals (crustal mush) [3]. The Mlet-2 related rocks sometimes with OPX were formed from an incomplete melt-peridotite reaction product, and the Melt-1 related rocks, from a melt-peridotite reaction product, where OPX digestion was completed. This suggest a possibly imprtant role of the Melt 2-peridotite reaction in formation of ordinary MORB (Melt 1) in the upper mantle [cf.4,5].

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