Distribution of ^{237}Np and Plutonium isotope in terrestrial environment in Fukushima Prefecture

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After the accident at the Fukushima Dai-ichi Nuclear Power Station (FDNPS) happened in March 2011, large amounts of radionuclides released from the FDNPS into the atmosphere and marine environments.The total amounts of ^{134}Cs and ^{137}Cs, which are volatile materials, released from the accident were estimated as 18 PBq and 15 PBq, respectively. In contrast, those of ^{238}Pu,^{239}Pu and^{240}Pu, which are non-volatile materials, amounts were estimated as 0.0019 PBq, 0.0000032 PBq and 0.0000032 PBq and these amounts were not many compared to abundance before the accident (Report of Japan government to the IAEA Ministerial Conference on Nuclear safety, 2011). ^{241}Pu, half-life of which is about 14 year, detected in forest litter samples at some stations collected in April and May, 2011 and it is suggested that these samples were originated from the FDNPS accident also using the results of ^{240}Pu/^{239}Pu and^{241}Pu/^{239}Pu atomic ratio (Zheng et al., 2013). It is possible to identify origin to Pu and Np isotopes using not only Pu isotope atomic ratio such as ^{240}Pu/^{239}Pu and^{241}Pu/^{239}Pu but also ^{237}Np/^{239}Pu atomic ratio. Shozugawa et al (2012) reported that many radionuclides including^{239}Np in terrestrial environment soil and pine leaf collected in front of FDNPS and Iiidate Villege were measured. Other than Shozugawa et al (2012), reports for Np in Environment after the FDNPS accident was almost nothing. In this study, we discussed spatial distributions and origin for Neptunium (Np) and Pulutonium (Pu) based on the results of the Neptuniumand plutonium atom ratios (^{237}Np/^{239}Pu,^{240}Pu/^{239}Pu, ^{241}Pu/^{239}Pu) in soil samples collected in Fukushima Prefecture.Collected soil samples were air-dried,and then, ashed using muffle furnace at 450˚C at least 4 hours to decompose the organic matter (Wang et al., 2015). 0.57 pg of ^{242}Pu was used as recovery tracer for^{237}Np and Pu isotopes. Then, the anion-exchange resin AG MP-1M was used separated of ^{237}Np and Pu isotopes from u, Th and other interfaces (details for Haung et al. prepared).^{237}Np and Pu isotope measured using the Sector-Field ICP-MS. The ^{237}Np activity concentrations in soil samples were 1/100-1/1000 values compared to those of ^{239}Pu and ^{240}Pu. The rough profiles for these all radionuclide decreased with increasing core depth. Both ^{237}Np/^{239}Pu and ^{240}Pu/^{239}Pu atomic ratios were generally within global fallout ranges. Hereafter, it is necessary to elucidate factor controlling a values of outside the range in some layer were outside value.

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