Environmental impact of the Fukushima accident: past and present

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The 2011 Great East Japan Earthquake and resulting Tsunami caused severe accident in the Fukushima Dai-ichi nuclear power plant (FDNPP). As a result, large amounts of radionuclides have been released in the environment, in which ^{131}I of 150 PBq and ^{137}Cs and ^{134}Cs of 15 PBq were emitted in the atmosphere and ^{137}Cs and ^{134}Cs of 3.5 – 16.2 PBq were directly released in the ocean as liquid effluents during the period of March to early April 2011[1]. Major radioactivity contaminated area spread out about 50 km of northwest from the FDNPP. Dominant radionuclides contaminating land and ocean except short-lived radionuclides are radiocesium, although ^{90}Sr is considered to be a potential contaminant to the ocean. Radiocesium deposited on land surface is tightly bound into soil mineral. Therefore, there is lesser migration of radiocesium on land and from land to ocean via river, and its transfer from soil to plant decreased with time. Highly radioactivity contaminated area has been still remained. Furthermore, higher atmospheric deposition of radiocesium (around 1 kBq m^{-2} $month^{-1}$) has continued in the area near the FDNPP. As a result, evacuation of residents in major contaminated area has continued now, although Japanese government has conducted decontamination of radioactivity in highly contaminated area. On the other hand, concentrations of radiocesium in surface seawater of the western North Pacific decreased with time. However, the high concentrations of radiocesium in surface water near the FDNPP (around 1 kBq m^{-3}) were observed in the late 2013. The monitoring data suggest that both atmosphere and ocean releases of radiocesium from the FDNPP have continued in the late 2013, although release amounts of radiocesium are relatively small.

[1] Povinec, Hirose & Aoyama (2013), Fukushima Accident: Radioactivty Inpact on the Environment, Elsevier.