

Radioactive materials from Fukushima Daiichi Nuclear Power Plant, natural radioactive materials and stable elements in aerosols in the atmosphere of Nagasaki

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Abstract

^{134,137}Cs due to the Fukushima Daiichi Nuclear Power Plant accident were repeatedly detected in aerosols in the atmosphere of Nagasaki, over 1,000 km distant from the power plant, between March 2011 and December 2014. Air trajectory analysis showed a direct trajectory from the nuclear power plant to Nagasaki at the first arrival of ^{134,137}Cs. However, the direct trajectories were rarely shown at the subsequent arrivals. Alternatively, many trajectories mainly passed through land areas including Korean Peninsula when the concentrations of ¹³⁷Cs were high.

We now have measured concentrations of stable elements in the aerosols with PIXE analysis and found negative correlation between ¹³⁷Cs and stable Na concentrations, and positive correlation between ¹³⁷Cs and S, Ni, V. Na is thought to be mainly due to sea salt in the aerosols. S, Ni and V are considered mainly emitted from the combustion of fossil fuels in land area. The results suggest that ^{134,137}Cs were re-floated from land surfaces distant from the nuclear power plants and transported to Nagasaki.

We collected mosses on road and open parking of many places in Japan. Almost samples contain measurable amount of ¹³⁷Cs and most of the samples contain measurable amount of ¹³⁴Cs including samples of Sapporo Hokkaido and Nagasaki, most distant places from the nuclear power plants in Japan. Therefore, it is clear that ^{134,137}Cs due to the accident spread over almost of Japan with more or less concentrations and re-floating of them is totally possible.