

Geochemical Studies and Analytical Methods of Anthropogenic Radionuclides in Fallout Samples.

Abstract

Since 1957, anthropogenic radionuclides in fallout samples collected in Japan have been continuously measured by the Geochemical Research Department of the Meteorological Research Institute (MRI). In this report, a detailed radiochemical analysis of long-lived anthropogenic radionuclides (i.e., ^{90}Sr , ^{137}Cs and plutonium isotopes) in fallout samples is provided together with a data set of monthly deposition rates of ^{137}Cs and ^{90}Sr at 12 stations in Japan. To control the quality of radiochemical analysis of fallout samples, we prepared a fallout reference based on deposition samples collected at 14 stations throughout Japan during 1963–1979. Using this reference, several independent institutions determined the activities of ^{137}Cs , ^{90}Sr and plutonium isotopes. The fallout reference is useful in guaranteeing the quality of radiochemical analysis of anthropogenic radionuclides.

The geochemical behavior of anthropogenic radionuclides in deposition samples originating from atmospheric nuclear testing and severe nuclear reactor accidents (such as the Chernobyl accident) is discussed. The major processes controlling the behavior of radioactive deposition are stratospheric fallout, tropospheric fallout and resuspension. Resuspended radionuclides are considered to be a major source of the recent deposition of ^{90}Sr and ^{137}Cs observed at MRI.