

Characteristics of radioactive Cs in the sediment from the storage reservoir in Iitate village, Fukushima prefecture

Yusuke Aoi^{1*}, Keisuke Fukushi², Norio Kitadai², Taeko Itono¹, Kenji Kashiwaya², Hirohisa Yamada³, Tamao Hatta⁴, Yuzo Manpuku⁴

¹Graduate School of Natural Science & Technology, Kanazawa University, ²Institute of Nature and Environmental Technology, Kanazawa University, ³National Institute for Materials Science, ⁴Japan International Research Center for Agricultural Sciences

The storage reservoir sediment contaminated by radioactive Cs, obtained from Hiso district, Iitate village, Fukushima prefecture Japan, were characterized in detail. The 30 cm sediment core from the reservoir were cut into 1 cm on site. The water contents, radioactive Cs concentrations, mineral composition and densities from each sample were measured. The clay fraction was obtained from the parts of the sediments which contain high radioactive Cs concentrations. The clay mineralogy was analyzed by X-ray diffraction of the chemical treated oriented specimen. The desorption experiments of radioactive Cs from the clay fraction were conducted by washing with high Mg concentrations solutions. The radioactive Cs concentrations before and after the experiments were measured.

The radioactive Cs was strongly sorbed by clay minerals containing vermiculite and mica and hardly desorption in the conditions of natural water. The transport of the radioactive Cs in the surface condition must be accompanied with the movements of the clay minerals. The high accumulation of Cs-137 was observed at top 9cm layer in the sediment. The Cs-137 concentration steeply decrease with depth after 9 cm depth. At the surface 9cm layer, the 137Cs concentrations possessed periodicity and were inversely correlated with the densities. In addition, the 137Cs concentrations has inverse correlation with the records of the precipitation in the area. These behavior indicate that the contaminant sediments come in the storage reservoir from the catchment area by the erosion accompanied with precipitation. Therefore, the storage reservoirs play a role for the sink of the radioactive Cs in the area.

Keywords: radioactive Cs, Fukushima Daiichi Nuclear Power Plant, clay minerals, storage reservoir sediment