

629th ASRC Seminar

Date: 15:00 ~ 16:00 Thursday, April 7

Location: Room 302, ASRC bldg.

Speaker: Dr. Atsushi Nakao
(Kyoto Prefectural University)

Title: Cesium sorption on 2:1 clay minerals in soil and the inhibitory effects

Abstract: Interlayer space of the 2:1 clay minerals is negatively charged by isomorphic substitution (e.g. Si^{4+} with Al^{3+}) in the sheet structure. Cs^+ can be strongly adsorbed in this space as a dehydrated form. In a natural soil environment, the specific adsorption of Cs^+ may be inhibited by either organic matter (OM) coverage on the surface of 2:1 clay minerals or hydroxy-Al polymer (h-Alp) interlayering in the interlayer space. We elucidated these inhibitory effects for Japanese forest soils with a special attention to the relative contribution of these factors to the overall inhibition. Soil particles with a diameter of <20 μm were fractionated from the soils collected every 3 cm from 0 to 30 cm in a soil profile. The <20 μm particles were treated with H_2O_2 to remove OM. They were subsequently treated with hot sodium citrate to remove h-Alp in the interlayer space. Adsorption experiment revealed that the ability to retain Cs^+ was largely increased after removing OM for the particle from 0-3 cm and 3-6 cm soil depths while not largely for those from lower depths. By contrast, the particles from lower depths showed a drastic increase in the retention ability after the subsequent removing of h-Alp. In the end, the <20 μm particles after removing both OM and h-Alp showed similarly high ability to retain Cs^+ . These results indicate that although both OM and h-Alp can largely reduce the Cs^+ adsorption on 2:1 clay minerals in forest soils, their relative contribution to the overall inhibition is different according to soil conditions.

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