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# Evaluation of the changes in the Radiocaesium Interception Potential (RIP) of Japanese and European soils based on their potassium content, mineralogy and agricultural zeolite amendments

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After the Fukushima Daiichi Nuclear Power Plant (FDNPP) aftermath in 2011, potassium addition has been increasingly valued as the most effective countermeasure for soil remediation of polluted sites. Potassium is a competing cation with caesium during plant root uptake. Recent studies have elucidated that potassium application can increase the Radiocaesium Interception Potential (RIP), a key parameter that determines the radiocaesium selectivity in soil and therefore its phytoavailability. The RIP is determined as the product of the distribution coefficient of caesium and the concentration of potassium in soil solution, considering the occupation in exchange regular sites but especially in the so-called frayed-edged of the 2:1 phyllosilicate layers of clay minerals, that account for most of the high-selectivity sites for caesium. In order to increase soil RIP, mineral amendments -especially zeolite- were applied in Japanese target fields as a major measure for safe agricultural production. In this study, we aimed at the determination of the RIP of Japanese and European soils with different clay mineralogy, as a key parameter for the solid-liquid distribution of radiocaesium in soils. To do so, we analysed the clay mineralogy of soils by X-Ray diffraction (XRD), as well as the solid and soil solution phases of five types of soils with different potassium fixing capacity by atomic absorption spectrometry (AAS) and ionic chromatography (IC), respectively. As potassium fixation varies among soils, we expected very different relationships between their potassium content and RIP. Their RIP was determined by spiking with 1-2 KBq of radiocaesium-134 prior to the use of thallium doped sodium iodine scintillator (NaI(Tl)). Both solid phase exchangeable caesium and soil solution caesium were analysed by inductively coupled plasma mass spectrometry (ICP-MS). Partial findings for Japanese

soils showed a potassium fixing rate of approximately 93% for vermiculitic soils, while for imogolitic Andosols with low 2:1 phyllosilicate clay mineral content, only 17% of potassium addition was determined to be fixed. The fixation capacity for smectitic soils reached 57%. Furthermore, additional research is currently being done regarding RIP determination of several agricultural soils and with and without zeolite amendments. The final results will be shown in the EGU General Assembly 2020.