Speciation of Radiocesium and Radioiodine in Aerosols from Tsukuba after the Fukushima Nuclear Accident - DTU Orbit (28/12/2018)

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Aerosol samples were collected from Tsukuba, Japan, soon after the 2011 Fukushima nuclear accident and analyzed for speciation of radiocesium and radioiodine to explore their chemical behavior and isotopic ratios after the release. Most Cs-134 and Cs-137 were bound in organic matter (53-91%) and some in water-soluble fractions (5-15%), whereas a negligible proportion of radiocesium remained in minerals. This pattern suggests that sulfate salts and organic matter may be the main carrier of Cs-bearing particles. The 129I in aerosol samples is contained in various proportions as soluble inorganic iodine (I- and IO3-), soluble organic iodine, and unextractable iodine. The measured mean I-129/I-131 atomic ratio of 16.0 +/- 2.2 is in good agreement with that measured from rainwater and consistent with ratios measured in surface soil samples. Together with other aerosols and seawater samples, an initial I-129/Cs-137 activity ratio of similar to 4 x 107 was obtained. In contrast to the effectively constant 134Cs/137Cs activity ratios (1.04 +/- 0.04) and I-129/I-131 atomic ratios (16.0 +/- 2.2), the I-129/Cs-137 activity ratios scattered from 3.5 x 10(-7) to 5 x 10(-6) and showed temporally and spatially different dispersion and deposition patterns between radiocesium and radioiodine. These findings confirm that I-129, instead of Cs-137, should be considered as a proxy for I-131 reconstruction.

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