

Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 32

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Session

What happened

Abstract Title (English, limited to 300 characters)

Total Amount of Radiocaesium Released into the Environment by Fukushima Dai-ichi Nuclear Power Plant accident

Abstract (English)

As a result of reactor accidents at the Fukushima Dai-ichi Nuclear Power Plant (FNPP1), caused by a total loss of electric power (black out) after the Tohoku earthquake and Tsunami on 11 March 2011, large amounts of radioactive materials were released to the environment. Radionuclides were emitted into the atmosphere and transferred to the land and ocean through wet and dry. In addition, highly contaminated fresh and seawater was directly released to the ocean. The main long-lived radionuclide which was released from FNPP1 was radiocaesium, ^{134}Cs and ^{137}Cs , therefore the total amount of radiocaesium released into the environment is one of the global concerns. We estimated the total amount of radiocaesium released into the environment (Inomata et al., 2018; Tsubono et al., 2016; Inomata et al., 2016; Tsumune et al., 2013; Tsumune et al., 2012; Aoyama et al., 2016). We also summarized reliable estimates of them based on mass balance consideration and proposed consensus values of the total amount of radiocaesium released into the environment (Aoyama et al., 2020). Tsumune et al. (2012, 2013) estimated that the oceanic direct release was 3.5 ± 0.7 PBq. Aoyama et al. (2016) estimated total atmospheric ^{137}Cs depositions over Japan and ocean surface based on observed data and model simulations including Tsumune's result. The obtained values were 3 – 6 PBq deposited on Japan, 12 – 15 PBq deposited on the ocean and the total atmospheric release was 15 – 20 PBq. It has been proposed (Inomata et al., 2016; Tsubono et al., 2016) that the inventories of the FNPP1-derived ^{137}Cs in the North Pacific are 15–16 PBq which is were consistent with 15-18 PBq by Aoyama et al. (2016). There are FNPP1-derived ^{137}Cs inventories in three domains of the interior of the North Pacific Ocean: the surface layer, Subtropical Mode Water (STMW), and Central Mode Water (CMW). The FNPP1-derived ^{137}Cs inventories have been estimated to be 4.2 ± 1.1 PBq in the STMW by Kaeriyama et al. (2016), and 7.9 ± 1.4 PBq in the surface layer by Inomata et al. (2018). In the CMW, the FNPP1-derived ^{137}Cs inventory has been estimated to be 2.5 ± 0.9 PBq by Inomata et al. (2018)

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based on the mass balance between the total inventory in the Pacific Ocean and inventories in the three domains. Consensus values will be presented in the poster, too.