Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 48

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Session

What happened

Abstract Title (English, limited to 300 characters)

Temporal variations and future estimations of 90Sr and 137Cs in atmospheric depositions after the Fukushima Daiichi Nuclear Power Plant accident with 63 years of continuous observations

Abstract (English)

Atmospheric nuclear tests and nuclear power plant accidents have released artificial radionuclides into the atmosphere, land surface, and ocean. We have measured the artificial radionuclides, such as 90Sr and 137Cs, in atmospheric depositions since 1957 in Japan and observed the variations in 90Sr and 137Cs, which were emitted from atmospheric nuclear tests and nuclear power plant accidents, due to their diffusion, deposition, and resuspension.
In March 2011, the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident occurred in Japan, and significant increases in 90Sr and 137Cs were detected at our observation sites: a suburban site in the Kanto Plain (site A) and a top of the mountain in the northwestern corner of the Kanto Plain (site B), respectively. Our continual observations revealed that the 137Cs monthly deposition rate in 2018 declined to ~1/8100 and ~1/4500 of the peak level at sites A and B, respectively, but it remained more than ~400 and ~130 times higher than those before the accident. Cesium-134 was also measured at both sites until recent observations, implying that most of the radioactive Cs were originated from the FDNPP. The chemical analysis suggested that dust particles were the major carriers of 90Sr and 137Cs during the resuspension period at site A. On the other hand, at site B, 90Sr was mainly from the forest and suggested that 90Sr was reserved and recycled in the forest, but the source of 137Cs could not be identified. Presently, the effective half-lives for 137Cs deposition at sites A and B due to radioactive decay and other environmental factors are estimated as 4.7 and 5.9 years, respectively. These estimations suggest that approximately 42 and 48 years from 2011 are required to reduce the atmospheric 137Cs deposition to a state similar to that before the accident at sites A and B. The current 90Sr deposition, on the other hand, shows the preaccident

seasonal variation, and it has returned to the same radioactive level as that before the accident at both sites.