Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 25

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Session

Consequences for the ocean

Abstract Title (English, limited to 300 characters)

Transuranic nuclides and 90Sr in seafloor sediments off the Fukushima Daiichi Nuclear Power Plant

Abstract (English)

In order to elucidate the temporal variability in radionuclide concentrations and to identify the sources of anthropogenic radionuclides in seafloor sediments after the Fukushima Daiichi Nuclear Power Plant (FDNPP) accident, the 238Pu, 239+240Pu, 241Am, 242Cm, 243+244Cm and 90Sr concentrations were determined in seafloor surface sediment samples collected at three sites off the FDNPP site during the period 2012 to 2019. The 239+240Pu, 241Pu and 241Am concentrations and 240Pu/239Pu atom ratios in a sediment core were also determined to allow comparison of their inventories between this study and previously reported values and to identify the Pu sources. The 238Pu, 239+240Pu, 241Am and 90Sr concentrations showed no remarkable temporal variations; no significant increases in concentrations after the FDNPP accident were observed; these concentrations were within the previously reported concentration range; and no detectable 242Cm and 243+244Cm amounts were observed in surface sediments. The Fukushima accident-derived 90Sr may not be present in seafloor sediments; the main 90Sr source still remains as global fallout from atmospheric nuclear weapons testing. The 239+240Pu inventory in the sediment core was about an order of magnitude greater than the cumulative deposition density of global fallout from nuclear weapons testing at the latitude of 30–40°N. The 241Pu inventory was clearly greater than the previously reported values collected within the 30 km zone around the FDNPP after the accident. This extremely high Pu inventory might be due to the enhanced scavenging and sedimentation of Pu from the water column by a high flux of particulate matter in coastal areas. The 240Pu/239Pu atom ratios in the sediment core ranged from 0.239 to 0.246; these ratios were clearly greater than the mean global fallout ratio of 0.18. The Pacific Proving Grounds close-in fallout was unequivocally identified as a predominant source of Pu in the sediment column off the FDNPP site.