

Horizontal distribution of radiocaesium in the northwestern North Pacific after the accident of TEPCO's Fukushima NPS

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The accident of TEPCO's Fukushima Dai-ich Nuclear Power Station (Fukushima NPS) was caused by the 2011 off the Pacific coast of Tohoku Earthquake and tsunami on March 11, 2011 and large amount of radioactive material were discharged by the hydrogen explosion and leaked from Fukushima NPSs to the ocean. To investigate the transport of radionuclides to the ocean and their dispersion, we conducted two cruises with the R/V Mirai in the western North Pacific about one and three months after this accident and measured caesium (Cs-134 and Cs-137) in seawater. During two cruises (from 14 April to 5 May and from 27 June to 3 August, 2011), 20-L seawater in the surface and shallow layer (< 200 m) were collected along the cruise track with an underway surface pump and a multiple water-sampling system, analysed by the ammonium phosphomolybdate/Cs compound method and measured by low back ground gamma spectrometry using Ge detectors.

Cs-137 in surface seawater ranged from < 0.002 to 0.284 and <0.001 to 0.561 Bq/kg during April and May and during June and August, respectively. The radiocaesium could not be detected in seawater of the Kuroshio extension current. Samples from stations off Fukushima and off Miyagi had higher Cs-137 (0.11 ~ 0.28 Bq/kg) than those at other stations in April, however, the highest Cs-137 was observed at JKEO (38.5N, 148.25E) and Cs-134 could be detected in the 200 m depth at JKEO and off Fukushima in June. At S1 (30N, 145E), is located in the south of the Kuroshio current, Cs-134 in the 200 m depth was observed in April, that was not detected in June. On the other hand, at K2 (47N, 160E), the activities of Cs-134 and Cs-137 were almost 0.01 Bq kg/kg in the surface seawater, and those of Cs-134 were less than the limit of detection (< 0.002 Bq/L) at the depth of 200 m in both April and June. The obvious variation of these activities were not observed around the observed northern east area. These results suggest that the dispersion of radiocaesium in the marginal area were effected of the atmospheric diffusion and the leakage of contaminated water, and that in open sea were effected of only the atmospheric diffusion after a half year from the accident.

Keywords: radiocaesium, seawater, North Pacific, The accident of TEPCO's Fukushima NPS