Variations in ^{134}Cs and ^{137}Cs radioactivity of coastal marine sediments off the Abukuma River in Japan during 2013-2015

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It is important to elucidate the short-term and long-term impacts of the Fukushima Dai-ichi Nuclear Power Plant accident on coastal marine environments. This study investigated the spatial distribution of ^{134}Cs and ^{137}Cs in the coastal marine sediment off the Abukuma River, running through the Naka-dori in Fukushima Prefecture, Japan under the funded research from Nuclear Regulation Authority of Japan. Field experiments were conducted during October 2013-January 2014 and August 2014-January 2015. The surface sediment samples were collected once a month by a multiple-corer and sectioned as follows: 0-3, 3-10 and 10-20 cm depth. The radioactivity of ^{134}Cs and ^{137}Cs was measured using gamma-ray spectrometry with low background Ge detectors. The cascade summing effect was corrected for ^{134}Cs using a contaminated soil sample from Fukushima. Decay correction of radioactivity for ^{134}Cs and ^{137}Cs was done at each sampling date.

Radioactivity of ^{134}Cs and ^{137}Cs ranged from 42 Bq/kg-dry sediment to 1800 Bq/kg and from 132 Bq/kg to 5880 Bq/kg, respectively. Water content also varied spatiality and temporality. However there is a positive correlation between the radioactivity and water content. The results indicate that transport of fine particles associated radiocesium is one of important factors controlling the variations in radioactivity of ^{134}Cs and ^{137}Cs in surface sediments. The vertical profile also varied with site, depending on the sediment feature, that is profile of silt and sandy sediment layers. The radiocesium inventory shows decreasing trend with increasing time at offshore sites during the sampling period because of the decrease in the thickness and readiocesium inventory for the surface silty sediment. These results suggest that surface silty sediments with radiocesium are re-suspended and remobilized by heavy rain and strong wind events such as typhoon and winter rough weather during the sampling periods.