福島県沖の堆積物と直上水中の放射性セシウム濃度分布
Distributions of radiocaesium activity in sediment and overlying water off the Fukushima

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After the accident at the Fukushima Dai-ichi Nuclear Power Station (FDNPS) happened in March 2011, large amounts of radionuclides including radiocaesium also released from the FDNPS into the terrestrial and marine environments. In marine environment, parts of particulate radiocaesium have transported in seawater and accumulated to seafloor. Then, radiocaesium in sediment have partly re-suspended as particulate form and re-eluted as dissolved form due to several factors such as bottom current and deformation. The characters of seafloor topography are more different in the area off the coast of northern and southern part of Fukushima Prefecture, dividing areas at the Onahama port (Mogi and Iwabuchi, 1961). Because the wave bases in fine and stormy weather are about 20 and 80 m, respectively (Saito et al., 1989), it seems that the area of shallower than 100 m is also affected by erosion and re-sedimentation near seafloor with ocean wave degree. Thus, it is necessary to elucidate interaction for radiocaesium between sediment and seawater close to seafloor with more stations in order to guess radiocaesium activity variation at long times. For example, in the case of collected bottom-layer water with the Conductivity-Temperature-Depth (CTD) system, it is very difficult to collect seawater close to sediment because it is careful not to touch CTD system seafloor. This study was aimed at elucidating the relationship for radioacesium activity concentration between sediment and trapped water on sediment collected using Multiple Corer, which is considered as overlying water.
Sediment samples were collected using a Multiple Corer during UM14-04 cruise in May 2014 at three stations: I01 (37˚14’ N, 141˚07’ E, water depth:60 m), I02 (37˚14’ N, 141˚13’ E, water depth:120 m) and C (36˚55’ N, 141˚20’ E, water depth:190 m).Overlying waters were collected using tube for 2 hours later from collected sediment. In laboratory, collected sediment sample are dried and overlying water samples were filtered through a 0.2-μm pore size filter and was concentrated by the ammonium phosphomolybdate (AMP) method (Aoyama and Hirose, 2008). The radiocaesium activity concentrations in each sediment and overlying water samples were measured by gamma-ray spectrometry using a high-purity Ge-detector and corrected to sampling date.
In overlying water, the dissolved ^{137}Cs activity concentrations (mBq/l) were 3.1-16 and the activity at I01, I02 and C in order from the higher. In the surface-layer sediments (core depth 0-3cm), the activity concentrations (Bq/kg-dry) were 8.4-286 and the high activities at I01 and I02 have characters of relatively high percentage for silt to clay particle compared to those at C. At I02 and C, the activity in overlying water were same value compared those in bottom-layer of seawater, which collected above water depth 10 m from seafloor. On the other hand, the activity in overlying water at I01 was five time higher than those in bottom water. The calculated K_d' (L/kg) of apparent distribution coefficient using ^{137}Cs activity concentrations in surface-layer sediment and overlying water were 8.8×10^2-1.5×10^4 and within rages of recommended K_d value of 2.0×10^3 for caesium by IAEA TRS422.

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