山岳湖沼の群馬県榛名湖をフィールドとした放射性セシウムの大気から淡水環境への沈着に関する研究
Study on deposition of ^{134}Cs and ^{137}Cs from atmosphere to freshwater environment using a mountainous lake, Lake Haruna in Gunma Prefecture, Japan

*長尾 誠也[1]、宮坂 將平[2]、渡辺 峻[3]、鈴木 究真[3]、落合 伸也[1]
*Seiya Nagao[1], Shouhei Miyasaka[2], Shun Watanabe[3], Kyuma Suzuki[3], Shinya Ochiai[1]

1. 金沢大学環日本海域環境研究センター、2. 金沢大学大学院自然科学研究科、3. 群馬県水産試験場
1. Institute of Nature and Environmental Technology, Kanazawa University, 2. Graduate School of Natural Science and Technology, Kanazawa University, 3. Gunma Prefectural Fisheries Experimental Station

The Great East Japan Earthquake occurred on 11 March 2011 and damaged the Fukushima Daiichi Nuclear Power Plant (FDNPP) seriously. Through the FDNPP accident, a large amount of radiocesium was released to the environment. It is important to elucidate the short-term and long-term impacts of the accident on terrestrial environments.

This study investigated the deposition of ^{134}Cs and ^{137}Cs at a mountainous lake, Lake Haruna, which is located at 1084 m height in Gunma Prefecture, Japan. The lake has a small inflow stream and one outflow river with watershed of relatively high radiocesium accumulation area. The lake sediments were collected at two sites from northern part (HR1) and central part (HR2) of the lake by using a gravity corer in September 2015. The sediment core samples were sectioned for 1 cm interval. The sediment core was also collected at HR3 from central part of the lake in October 2017. After freeze-drying of the sectioned samples, the radioactivity of ^{134}Cs and ^{137}Cs were measured by a low background Ge detector of Low Level Radioactivity Laboratory, Kanazawa University and shows as Bq/kg in dry-sediment basis at the sampling date.

Radioactivity of ^{134}Cs and ^{137}Cs ranged from D.L. to 2,922 Bq/kg and from D.L. to 34,000 Bq/kg, respectively. Two peaks of the radioactivity are observed for the HR1 sediments at 2-3 cm and 5-6 cm depth in core. One distinct peak of the radioactivity of ^{134}Cs and ^{137}Cs is observed at 3-4 cm depth in the core of HR2. Maximum of the radioactivity is also detected for the HR3 sediment core (2,920 and 23,760 Bq/kg) at 4-5 cm depth. The sedimentation rate based on ^{210}Pb for the HR1, HR2 and HR3 was 0.14, 0.031and 0.026 g/cm^2/y, respectively. The higher sedimentation rate at HR1 shows two peaks, but lower sedimentation rate at HR2 and HR3 show one peak of radiocesium concentration. However, the inventory of ^{134}Cs is almost constant (2.1-2.3 x10^4 Bq/m^2) for the three sampling sites. Two major deposition was observed in the middle of March and the early of April 2011 from the monitoring data of air gamma-ray dose rate at Takasaki and the fallout analysis of radiocesium at Maebashi in Gunma Prefecture. These results suggest that the accumulation of rediocesium at Lake Haruna mainly results from atmospheric deposition and shows short-term deposition to the bottom sediment at early stage of the accident.

キーワード：湖底堆積物、堆積速度、放射性セシウム
Keywords: lake sediment, sedimentation rate, radiocesium

