

First precision spectroscopy of cesium-137 from the ground to 150~m above in Fukushima

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The nuclear disaster at the Fukushima Daiichi Nuclear Power Plant (NPP) in Okuma, Fukushima, was initiated primarily by the tsunami following the Tohoku earthquake on March 11, 2011. After a large amount of radioactive substances was released into the environment of the region, the distribution of the radiation sources on the ground was monitored. However, there have been only few estimations on the height dependence of the air dose rate in the contamination field at Fukushima, all of which discuss only the variation of gross count rates measured in a wide energy range, such as between 50 and 3,000 keV. This paper presents the first results of airborne gamma-ray spectroscopy of a contamination field in Namie, Fukushima, as measured from 0 m to 150 m above the ground by drone. We found that the gamma-ray dose rate measured at 100 m height is about seven times higher than that expected based on ground measuring, which is caused by two factors: (1) the integrated dose includes contamination of upward scattered 662-keV gamma rays and (2) radiation from ^{137}Cs is vertically collimated because ^{137}Cs is buried in the soil. We also argue novel method to obtain the distribution of radioactive substances in the soil only through aerial mapping.

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Author: Mr TANADA, Kazuhisa (Waseda University)

Co-authors: Mr KURIHARA, Takuya (Waseda University); Prof. KATAOKA, Jun (Waseda University); Mr MOCHIZUKI, Saku (Waseda University); Mr TAGAWA, Leo; Mr HOSOKOSHI, Hiroki (Waseda University); Prof. OKOCHI, Hiroshi (Waseda University); Ms GOTOH, Yurie (Waseda University)

Presenter: Mr KURIHARA, Takuya (Waseda University)

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