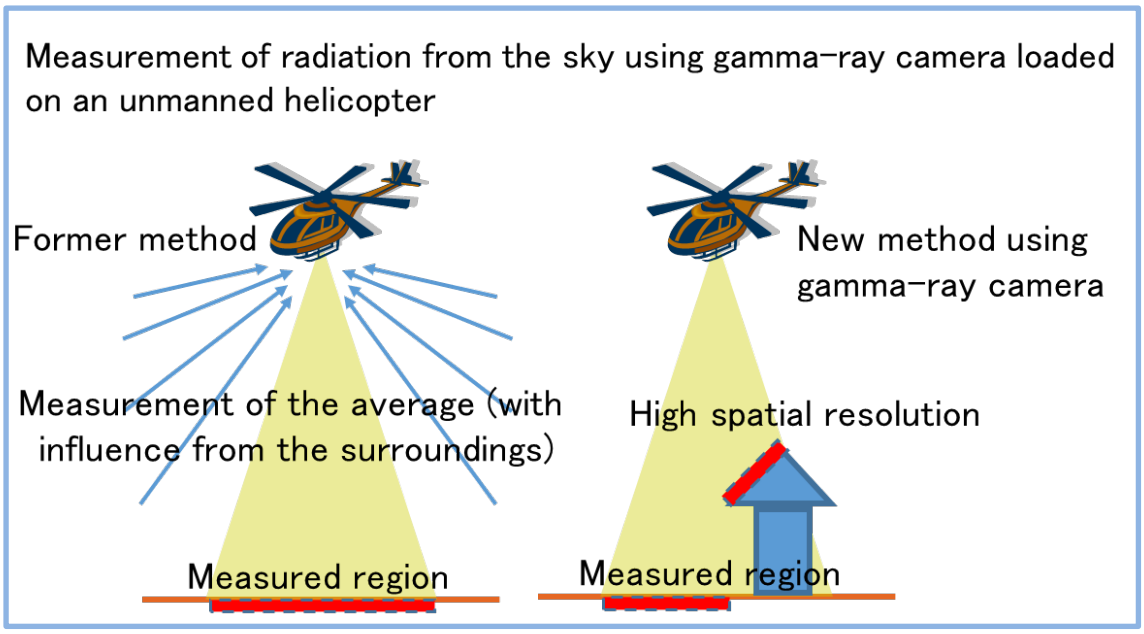
Measuring the distribution of radioactive cesium from the sky

Radiation mapping at a spatial resolution less than 10 m in diameter became possible

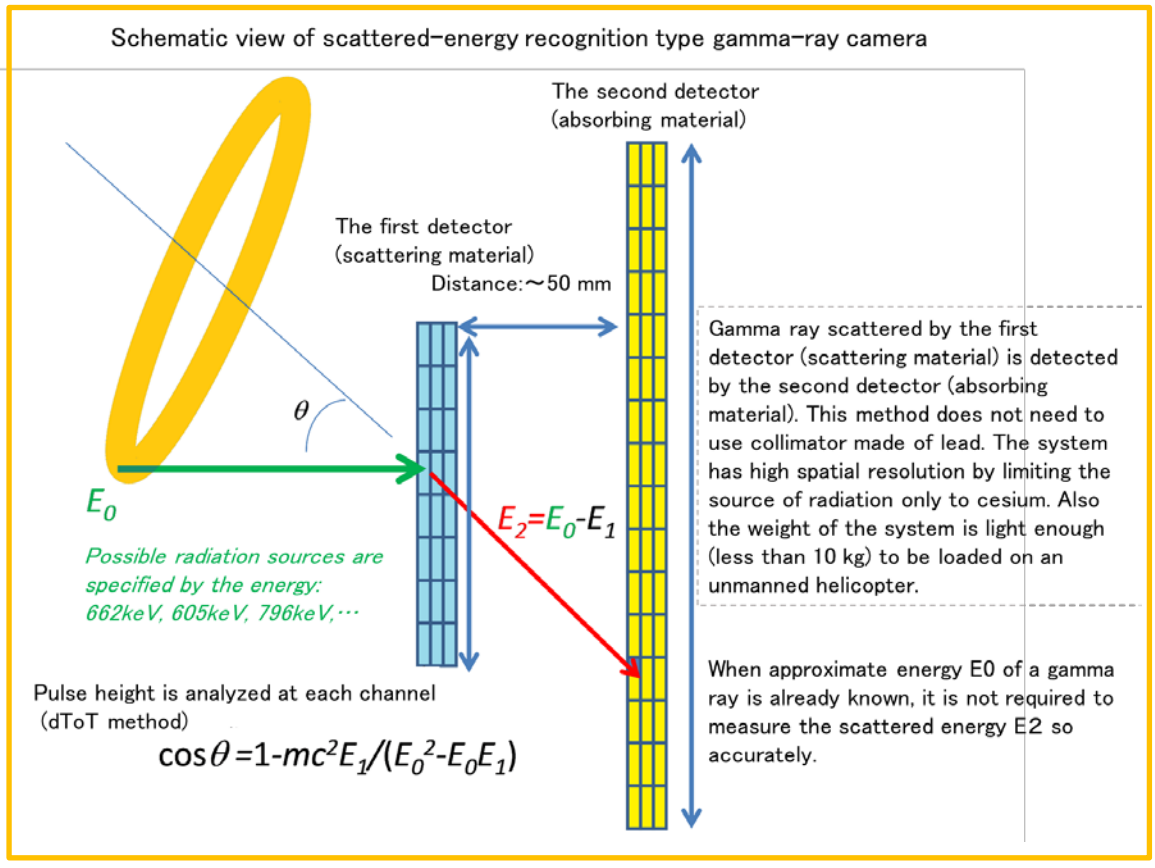
The Japan Atomic Energy Agency (JAEA) has developed a method to measure the distribution of radioactive cesium from the sky more precisely than before. So far, the spatial resolution of radiation mapping from the sky had been limited to a range of several ten to a hundred and several ten meters in diameter. By improving the performance of the measuring devices loaded on an unmanned helicopter, the spatial resolution of averaged radiation mapping has been improved down to a range of 10 meters in diameter. Accordingly, it has become possible to map more precise radiation doses in the place where people cannot access. It is expected that this technique will contribute to the improvement of the efficiency to specify the contaminated spots and to confirm decontamination effects.

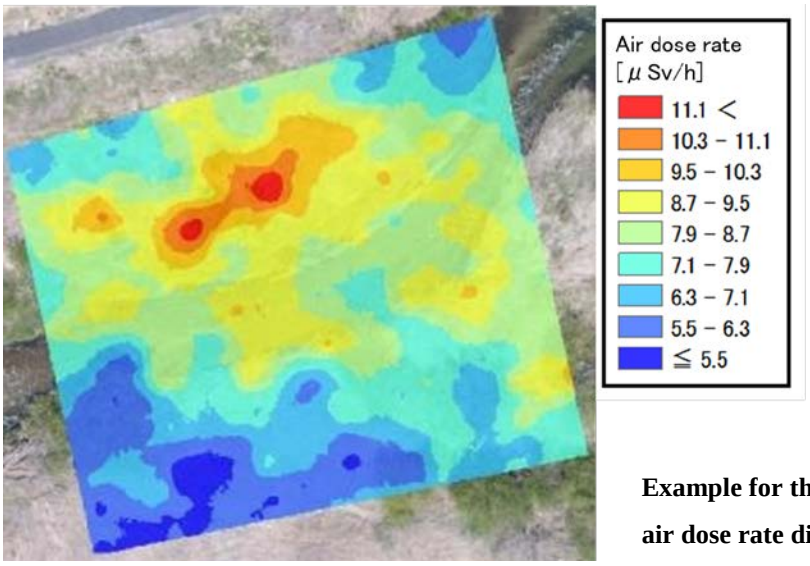
After the accident at the Fukushima Daiichi Nuclear Power Station, Tokyo Electric Power Company, JAEA has been investigating the distribution of radioactive cesium released to the environment in a wide range. Also, JAEA has developed a technology to measure the radiation distribution from the sky by loading a radiation detector on an unmanned helicopter in order to advance decontamination efficiently. Especially, regarding the spots where it is difficult for a person to access, such as mountains, forests, rivers, and roofs of the buildings, radiation doses have been measured from the sky using a helicopter. However, the spatial resolution of this method is not so good, so it was difficult to measure the detailed radiation distribution.

In order to solve this problem, the joint research group of JAEA, Furukawa Co., Ltd., the University of Tokyo and Tohoku University adopted “Scattered-energy recognition type gamma-ray camera” (see the figure on the next page) as a radiation detector loaded on an unmanned helicopter. The measurement system has been simplified by limiting the source of radiation to radioactive cesium. Furthermore, the measurement in the direction of direct underneath of the helicopter became possible removing the effects of the surroundings such as trees and mountain slopes by selecting the scattered energy of the scintillation detector. The measured data are combined with the information from GPS/map, and highly accurate map of radiation dose that makes the distribution visible can be created.



Owing to the development of gamma-ray camera, it has become possible to make precise radiation dose map. This technique will contribute to the specification of contaminated spots in a wide area and the confirmation of the decontamination effect. For the future, the research group is planning to increase the number of detection elements in order to improve the sensitivity and spatial resolution. Furthermore, the research group is aiming at the spatial resolution capable of distinguishing distance of 1 meter or less by achieving high integration of measurement circuit and miniaturizing the detectors.





Example for the map of air dose rate distribution

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