Radioactivity in soil from near the Fukushima Dai-ichi Nuclear Power Plant at five years after the accident

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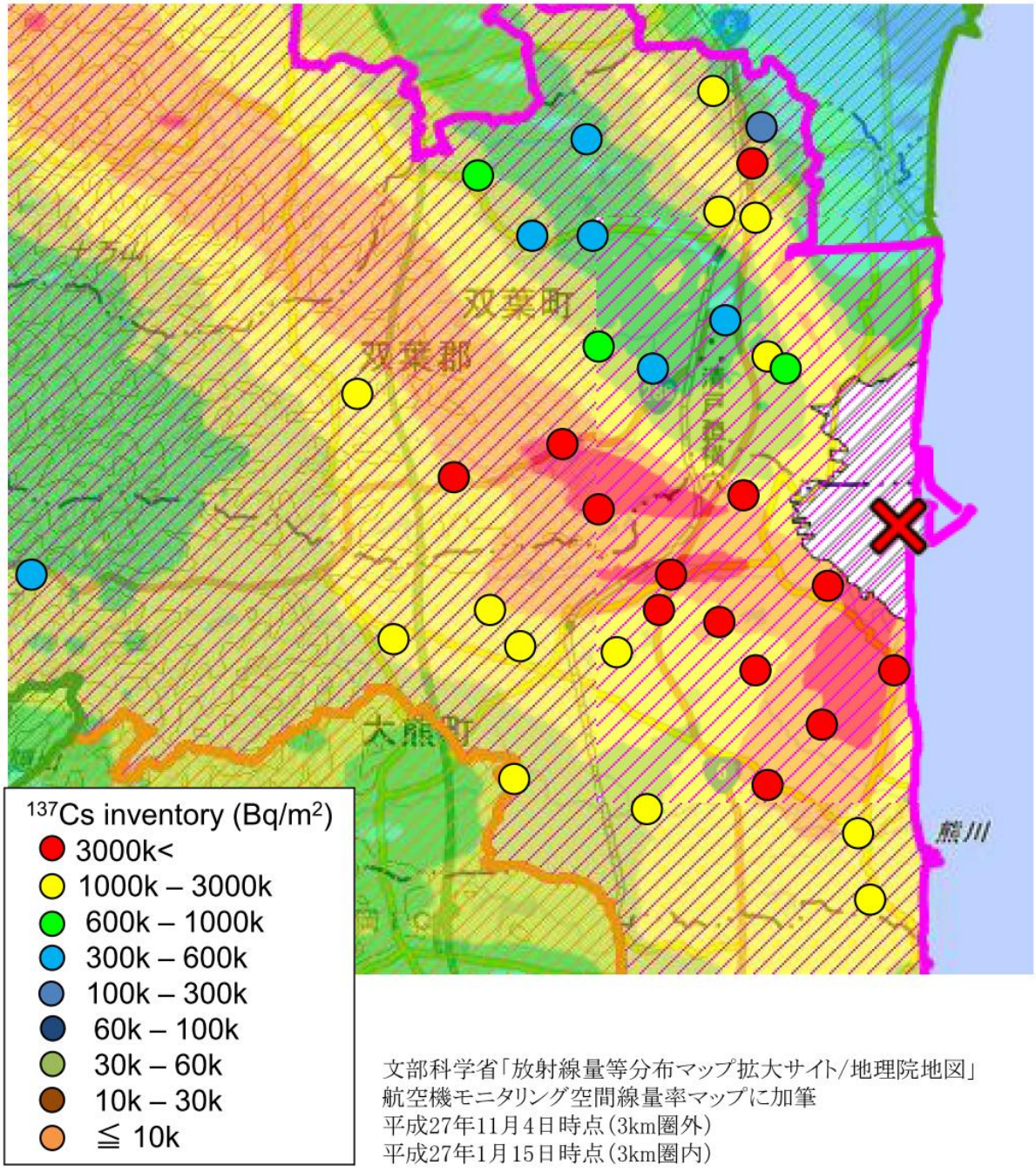
[Introduction] A large-scale soil sampling project for radionuclides from the Fukushima Daiichi Nuclear Power Plant accident was conducted in June 2011 by a research group on the Japan Geoscience Union and the Japan Society of Nuclear and Radiochemical Sciences. New research project followed by was implemented with the objective to know the transition process of radioactivity and the current contamination in 2016 when five years passed since the accident.
Between June and September 2016, 176 researcher of total were work to measure the air dose rate and collect soil samples at 105 locations near the Fukushima Dai-ichi nuclear power plant, mainly on the difficult-to-return zone, for 9 days in total. The outline of the project will be reported in another presentation. In this report, we will present the results of the inventory of ^{134}Cs and ^{137}Cs in the soil, the degree of destribution, the ratio of ^{134}Cs/^{137}Cs concentration, and the correlation with the air dose rate.
[Sample and Measurement] Surface soil of 5 samples per one location was collected from 36 public facilities in the difficult-to-return area of Futaba-machi or Okuma-machi in Fukushima Prefecture in June and July 2016. The sample from depths of 5 cm was divided into two parts of 0 - 2.5 cm depth and 2.5 - 5 cm depth, filled in a U-8 container after drying. Radiocesium was quantified using gamma ray spectrometry with Ge detectors.
[Results and Discussion] The results are shown in Fig.1 The maximum ^{137}Cs concentration was 68400 kBq/m^2 in inventory and 1180 kBq/kg(dry) in specific activity. The inventory clearly correlated with the air dose rate. There was large difference in soil distribution degree (the ratio of radioactivity of 2.5 - 5.0 cm and 0 - 2.5 cm in depth) for each sample, and the values were almost less than 1. Moreover, it was found that there are points where the concentration ratio of ^{134}Cs /^{137}Cs clearly has a low value of 0.87 - 0.93 in the north-north-west direction from the nuclear power plant.

Keywords: Fukushima Dai-ichi Nuclear Power Plant, radiocesium, Cs-134, Cs-137, soil deposition density



文部科学省「放射線量等分布マップ拡大サイト/地理院地図」
航空機モニタリング空間線量率マップに加筆
平成27年11月4日時点(3km圏外)
平成27年1月15日時点(3km圏内)

図1. 2016年の土壌調査による^{137}Csインベントリ
(2016年7月1日時点) 36地点(双葉町18地点、大熊町18地点)