Aerial Measurement of Radiation Dose Distribution on Grassland Area in Kawatabi Field Science Center

Aerial Measurement of Radiation Dose Distribution on Grassland Area in Kawatabi Field Science Center

Chinatsu YONEZAWA , Shin-ichiro OGURA and Masanori SAITO

Graduate School of Agricultural Science, Tohoku University, Japan

Fukushima Daiichi nuclear disaster triggered by the 2011 Tohoku earthquake released a large amount of radionuclides. Serious radioactive pollution was caused by this disaster on wide areas in the eastern part of main island of Japan. Integrated Terrestrial Field Station affiliated with Graduate School of Agricultural Science, Tohoku University, called as Kawatabi Field Science Center (FSC), located 150 km far from the nuclear power plant, is placed in the radiation hot spot area. Large grazing pastures (total 105 ha) are included in FSC and cattle were grazing there before the disaster. After the disaster, the cattle grazing has been restrained because of radioactive pollution. Most of the grazing areas are located on alpine areas with complex topography and include a variety of wild plants and small woods. Therefore, complete radiation decontamination all over the area is difficult.

In this study, we tried to estimate spatial distribution of radiation dose in a grassland area on Kawatabi FSC. An aerial measurement was applied to observe wide area at once, and obtained data was converted to a ground level by the assumption of decay rate with height as exponential curve. The air radiation dose rate was observed from a paramotor with flying ca. 500 m high to cover the target area, by a CsI scintillator for 50–300 m intervals. The radiation dose rate at the ground surface was also measured under eight paramotor measuring points and a calibration factor was computed. The radiation dose rate measured by the paramotor was 0.003–0.007μSv/h and that on the ground surface was 0.05–0.08 μSv/h. The ground level radiation was computed based on the paramotor measurements and radiation dose map was estimated by interpolations.

The generated radiation dose map showed heterogeneous spatial distribution of radioactive pollution. The computed ground level radiation distributed from 0.03 to 0.13μSv/h. The calculated value includes the indication error at the time of measurement. However, the generated map is feasible for estimating relatively high radiation dose areas. Another approach to the target area, e.g. observation using Unmanned Aerial Vehicle (UAV) is one of the effective ways to make the generated radiation dose map robuster.