ABSTRACT

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The necessary radiological information was not quickly and widely published by Japan Government during the crisis phase of Fukushima Dai-ichi Nuclear Power Plant disaster. This situation encouraged some individuals from various background to organize, design their own detectors, and mobilize lots of layperson to measure radiation in their environment, and to make all the data to be stored and published in the internet. Despite of large measurements data have been collected, it seems that very little recognition from the expert/scientist group has been given to the work that they have done. This study is an attempt to assess the quality of crowdsourced radiation data in Fukushima by examining the agreement of the data with the expert group data and the possibility to extend measurement on the complex landscape such as forests.

A simple linear regression models were made on radiation data from citizen-scientist group and expert group to know the agreement of air dose rate levels and trends in air dose rate reduction between them. We used KURAMA data from seven survey periods to represent expert group data and seven datasets from SAFECAST data to represent citizen scientist group data of which acquisition periods were comparable to the KURAMA survey periods. The *R-squared* of the models showed the citizen-scientist group data correlated well with the corresponding expert data. The slopes of all the regression models, however, indicated that the air dose rate values measured by the citizen-scientist group were about 30 to 60 percent lower than those of the expert group. The air dose rate reduction trend from the crowdsourced data showed a similar decreasing pattern compared to that of the expert group, although the discrepancy in the magnitude of dose reduction between them could be as high as 18 percent. The present of discrepancy in air dose rate values

suggest a careful interpretation of radiation information generated solely from crowdsourced radiation data.

Since the crowdsourced radiation data were collected by layperson on the ground, the measurements tend to be done on accessible place such as road side and seldom on difficult to access landscape object such as forests. In this study, we investigate whether extending the target of measurements on the forest using the citizen-science designed detector and UAV (Unmanned Aerial Vehicle) will be possible to provide reliable radiation information as well. We set up one hectare plot on deciduous forest and measured the air dose rate at one meter above the ground using the citizen-science detector. Measurement of air dose was performed on the UAV. The measurement took place while it was moving above forest canopy of the plot. After the data were collected, air dose rate surface model was developed on both datasets. Based on the visual comparison, the air dose surface model measured on the UAV mostly did not show a similar pattern to the surface model of air dose rate measured on the ground. We suspected that it was probably due to the high autocorrelation within the air dose rate data measured on the UAV.

From this study, we learned that while citizen-scientist group with crowdsourcing approach could potentially be alternative source of radiation information and a great partner to the expert groups in radiation data collection. Although there are some limitations in their data and detector, with the agility and openness environment that the citizen science group have, the underlying problems of those limitations may be addressed soon.