

Original

Development of Sensing Pipe and Multipoint Monitoring System for On-site Measurement of Radiocesium Distribution in Pond Sediment

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Summary

A new apparatus for on-site measurement of radiocesium vertical distribution in pond sediment was developed. Gamma-ray count rates measured by an array of PIN photodiodes were converted to the vertical distribution of radiocesium in sediment by the maximum entropy method. A 1.6 kg sensing pipe was constructed by assembling photodiodes, a GPS module, and the newly-released Raspberry Pi Zero. It operates about 5 hours by a mobile battery inside the pipe, and can be controlled from a web page via Wi-Fi. A multipoint monitoring system using multi sensing pipes was also developed for effective measurement and convenient visualization of horizontal distribution in pond sediment. On-site test of the apparatus at an uncontaminated pond in Fukushima prefecture reproduced the core-sampling data successfully. High correlation was found between the results obtained by these two methods. The test also revealed the possible shift of contamination peak from sediment top to inside the sediment during the years after 2011. The present method is useful for reducing the labor for core-sampling, and is effective for long-time monitoring since it does not assume any specific vertical distribution such as exponential function.

Key Words: Radiocesium, Sediment, Vertical distribution, Maximum entropy method, Raspberry Pi
