

Original

Development of the Radiocesium in situ Measurement System Using the Benthic Radiation Sensor “Minasoko”

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Summary

The radioactive materials that were released from the Fukushima Dai-ichi nuclear power plant hit by a tsunami after the Great East Japan Earthquake have been causing serious environmental problems to the surrounding aquatic environments. An instrumental system named “*Minasoko*” was developed to measure activity concentration of the sediment *in-situ* up to 200m in depth without sampling specimens by encapsulating a NaI(Tl) scintillation detector. *Minasoko* has a feature of calculating the benthic activity concentration of radiocesium (Bq/kg-wet) by the simulation using gamma ray counting data with a set of the distribution of cesium deposit thickness and soil density. A good correlation ($r=0.97$) was observed between the activity concentration indicated by *Minasoko* and radiocesium concentrations of the sediment analyzed by a germanium semiconductor detector. It shows a satisfactory reliability of the *in-situ* measurement of aquatic radioactivity. *Minasoko* is also equipped with an underwater camera that can provide the information about the precise position of the sensor against the bottom surface for the reason that the sensor position has a significant influence on the calculation of radiation values in this system. This enables us to adjust the calculation of radiation values according to the exact position at which the sensor has set down to the bottom surface. It is anticipated in future that *Minasoko* will be widely utilized to facilitate decontamination operations in Fukushima area through the immediate measurement of the benthic radiations in lakes, reservoirs, rivers and coasts.

Key Words: Cesium, Benthic radiation, NaI, Bq/kg, Measuring instrument
