Impacts of the Fukushima nuclear power station accident on the marine environment in the North Pacific Ocean

Y. KUMAMOTO[1]*, M. AOYAMA[2], A. MURATA[1] AND T. KAWANO[1]

[1]Japan Agency for Marine-Earth Science and Technology, 2-15 Natsushima-cho, Yokosuka 237-0061, Japan (*correspondence: kumamoto@jamstec.go.jp, murataa@jamstec.go.jp, kawanot@jamstec.go.jp)

[2]Institute of Environmental Radioactivity, Fukushima University, 1-1 Kanayagawa, Fukushima, Fukushima 960-1296, Japan (r706@ipc.fukushima-u.ac.jp)

Radiocesium released from FNPPS

Evaluating total amount of radiocesium (^{137}Cs or ^{134}Cs) released from the Fukushima Dai-ichi nuclear power plant station (FD1NPPS) accident on March 2011 is essential to assess its impacts on the marine environment in the North Pacific. Uncertainty of the estimation, however, is still large due to limited observational data. We summarize the budget of radiocesium based on both observations and model studies.

Budget of radiocesium

We estimated the total inventory of dissolved radiocesium in the North Pacific to be 15–18 PBq in April–May 2011 based on a model-observation comparison. On the other hand, a result of integration for deposition on the main land of Japan was about 2.4 PBq [1]. In addition, radiocesium in sediments off the Fukushima coast was calculated to be the order of 0.1 PBq. Thereby the total amount of radiocesium in the North Pacific was an estimated 18–21 PBq corresponding to 25–30% of the preexistent ^{137}Cs derived from nuclear weapon tests in the North Pacific before the accident. The total amount of direct-discharged radiocesium from FD1NPPS was evaluated to be about 4 PBq independently [2] although a larger estimation of 27 PBq has been also reported [3]. A difference between the sum of the inventories in the North Pacific (18–21 PBq) and the total amount of direct discharge (4 PBq) gave us a data-based estimation of the total amount of atmospheric release of 14–17 PBq which was within a range of the estimations based on inversion methods from 6 to 66 PBq.

[1] Morino *et al* (2013) *Environ. Sci. Tech.* **47**, 2314–2322 [2] Tsumune *et al* (2012) *J. Environ. Radioactiv.* **111**, 100–108 [3] Bailly du Bois *et al* (2012) *J. Environ. Radioactiv.* **114**, 2–9