Geophysical Research Abstracts
Vol. 16, EGU2014-10560, 2014
EGU General Assembly 2014

Update global budget of 134Cs and 137Cs derived from Fukushima NPP1 accident

Michio Aoyama (1), Daisuke Tsumune (2), Takaki Tsubono (2), Kazuhiro Misuimi (2), Yayoi Inomata (3), Yuichiro Kumamoto (4), and Yasunori Hamajima (5)

(1) Meteorological Research Institute, Geochemical Res. Dep, Tsukuba, Japan (maoyama@mri-jma.go.jp, +81 29 853 8683), (2) Environmental Science Research Laboratory, Central Research Institute of Electric Power Industry, Tokyo, Japan, (3) Asia Center for Air Pollution Research, Niigata, Japan, (4) Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan, (5) Institute of Nature and Environmental Technology, Kanazawa University, Kanazawa, Japan

134Cs and 137Cs, hereafter radiocaesium, were released from the Fukushima NPP1 accident on March 2011 and to evaluate total amount of released radiocaesium is essential to assess impacts of released radiocaesium to iur environment. We however still have wide range of reports about total amount of released radiocaesium after the accident till today. Released radiocasium were injected in the North Pacific Ocean by two major pathways, direct discharge from the accident site and atmospheric pathway to the ocean while there was only atmospheric deposition on land. We summarize estimations of budget of radiocasium based on both observations and model studies for land deposition, deposition on the North Pacific Ocean and inventory in the North Pacific Ocean, an inventory of sediment close to the site.

The major portion of released radiocaesium can be believed to be deposited mainly in the western North Pacific Ocean because deposition density at west coast of US continent was only at an order of 100 Bq m-2 while that at close to accident site was MBq m-2. An inventory in the North Pacific Ocean by some of the authors was 15-18 PBq on April-May 2011 by model-observation comparison and that in the mode water in the western North Pacific Ocean based on the observations on January- February 2012 was 6 PBq. The second portion might be on main land Japan and it is rather easy to evaluate total amount of deposited radiocaesium because there are good observation both by direct sampling of soil and aerial survey. A result of integration for land deposition was about 2.5 PBq. The third portion is in the sediment and an inventory in the sediment by observation showed 42 TBq at close to the site while the total inventory of 137Cs in sediments off the Fukushima coast is thus estimated to be the order of 0.1 PBq by a model study by some of the authors. Estimations of direct discharge from the site also still varied much from 3 PBq to 27 PBq. Two larger estimations did the backward-in-time extrapolation approach because they did not include a major direct release period from 26 March to 6 April 2011, which perhaps increased the uncertainties in their estimations. On the other hand, other studies including our study considered the measured 137Cs activities during the major direct release period, and the results lay within the range from 3.5$\pm$0.7 to 5.5–5.9 PBq as total amount of direct discharge. It is also important that the largest estimation of direct release of 27 PBq needed a scaling factor of 0.15 to much simulated concentrations with the observed concentrations which implied an update inverse estimate for the total release amount of 3.3 PBq.

Although summing up the inventories in the North Pacific Ocean and subtract total amount of direct discharge and deposition amount on land from them gave us a reliable estimation of total amount of atmospheric release of 14 - 17 PBq, reported estimations of total amount of atmospheric release of radiocaesium by inversion methods ranged from 6 PBq to 66 PBq.

We will update global budget of radiocaesium released from Fukushima NPP1 accident.