



Quantifying Atmospheric Fallout of Fukushima-derived Radioactive Isotopes in the Hawaiian Islands

Trista McKenzie (1) and Henrietta Dulai (2)

(1) Geology and Geophysics, University of Hawaii at Manoa, Honolulu, United States (tristam@hawaii.edu), (2) Geology and Geophysics, University of Hawaii at Manoa, Honolulu, United States (hdulaiov@hawaii.edu)

On March 11, 2011, several reactors at the Fukushima Dai-ichi Nuclear Power Plant suffered damage and released the radioisotopes iodine-131, cesium-134, and cesium-137 into the atmosphere. A week later, these isotopes were detected in aerosols over the state of Hawaii and in milk samples analyzed from the Big Island. Because the detected levels were significantly below levels of health concern, the state did not attempt to quantify the deposition of these nuclides on the islands. This study estimated the magnitude of atmospheric fallout of cesium and iodine, and examined the patterns of cesium wet deposition with precipitation observed in March 2011. Mushroom and soil samples were collected along precipitation gradients on Oahu and the island of Hawaii and analyzed for cesium isotopes using gamma spectrometry. Fukushima-derived fallout was differentiated from historic nuclear weapons testing fallout by the presence of Cs-134, which has a shorter half-life of 2.06 years and the fact that Cs-134 and 137 were released from the severed power plant nearly in parity. We found that Fukushima-derived cesium was present in both mushrooms and soil and the soil inventories ranged 2.2-60.9 Bq/m² for Cs-137 and 16.1-445.8 Bq/m² for I-131. Additionally, we found that Fukushima-derived cesium inventories in soils were correlated with precipitation gradients. This research confirmed and quantified the presence of Fukushima-derived fallout in Hawaii, however the activities detected were orders of magnitude lower than fallout associated with the nuclear weapons testing in the Pacific.