

**DATASET TITLE:** Cs134, Cs137, Ag110m, and K40 in zooplankton and small fish from Fukushima Radionuclide Project collected from the R/V Ka'imikai-o-Kanaloa KOK1108 from 20110607 to 20110617

**PROJECT:** Establishing Radionuclide Levels in the Atlantic and Pacific Oceans Originating from the Fukushima Daiichi Nuclear Power Facility (Fukushima Radionuclide Levels)

**ABSTRACT:**

**DATASET DESCRIPTION:** Counts and concentrations of Cs134, Cs137, Ag110m, and K40 detected in zooplankton and small fish samples are reported. Samples were collected as part of a radioecological study of biota in order to assess the impact of radiation leaks from the Fukushima Daiichi nuclear power facility, damaged by a March 11, 2011 earthquake and tsunami. Radionuclide results were determined from high purity germanium detectors and calibrated against IAEA standards as described in Buesseler et al. (PNAS, 2012).

Reference: Buesseler, Ken O., Steven R. Jayne, Nicholas S. Fisher, Irina I. Rypina, Hannes Baumann, Zofia Baumann, Crystaline F. Breier, Elizabeth M. Douglass, Jennifer George, Alison M. Macdonald, Hiroomi Miyamoto, Jun Nishikawa, Steven M. Pike, and Sashiko Yoshida. 2012. Fukushima-derived radionuclides in the ocean and biota off Japan. Proceedings of the National Academy of Sciences (PNAS): 1120794109v1-201120794. DOI: <http://dx.doi.org/10.1073/pnas.1120794109>

**PROJECT DESCRIPTION:** The March 11, 2011 earthquake in Japan and the subsequent tsunami damaged and disrupted cooling systems at the Fukushima Daiichi nuclear power facility causing contamination of land and seas surrounding the site, as well as food supplies and drinking water. Small but measurable quantities of radioactivity have been detected in the atmosphere over the United States, including aerosol samples collected at the Woods Hole Oceanographic Institution, where I-131 was seen to increase to detectable levels as of March 21-22, 2011.

With major funding from the Moore Foundation, as well as a contribution from the National Science Foundation through a 2011 Grant for Rapid Response Research (RAPID) and support from the Woods Hole Oceanographic Institution, collaborating investigators from the United States, Japan, Spain, Monaco, and the United Kingdom were able to obtain samples off Japan for an early assessment of impacts.

From June 4 through June 19, 2011, a research cruise was carried out aboard the RV Kaimikai-O-Kanaloa, a research vessel operated by the University of Hawaii. During the cruise, hundreds of samples were collected in an area off the coast of Japan as close as 30 kilometers from the Fukushima Nuclear Power Plant and extending as far out as 600 kilometers off shore. The essential components of the program include: radionuclide measurements of water and particles; a radioecological study of biota, especially species at the base of the food chain and key fish species and a physical oceanographic study to characterize transport and water masses. A baseline radionuclide data set for the Atlantic and Pacific was obtained along an east to west network of sampling stations. Three hundred sampling events took place at thirty major stations for a total of more than 1500 samples. Along with 41 CTD stations, bottle samples of salinity, oxygen, radionuclides, and particulates were taken to depths of about 1000 meters. ([http://data.bco-dmo.org/Fukushima/Fukushima\\_radionuclide\\_sampling\\_summary.pdf](http://data.bco-dmo.org/Fukushima/Fukushima_radionuclide_sampling_summary.pdf)). One hundred net tows resulted in approximately fifty pounds of biological samples, including plankton and small fish. Daily samples of aerosol were also taken.

Early investigation following an accidental release of man-made radionuclides is key to understanding the magnitude of the release and the relationship to public health issues. The research results also set the stage for the use of the longer lived radionuclides as tracers in subsequent studies by the community to understand ocean processes.

**DEPLOYMENT INFORMATION:**

**DEPLOYMENT DESCRIPTION** for R/V Ka'imikai-o-Kanaloa KOK1108: The purpose of the 16 day KOK1108 cruise aboard the University of Hawaii research vessel Ka'imikai-o-Kanaloa was to study the fate of radiation released into the ocean from the Fukushima Daiichi nuclear power plant that was badly damaged by a tsunami on March 11, 2011.

**INSTRUMENT INFORMATION:**

**INSTRUMENT:** Bongo Net

**DESCRIPTION:** mesh size = 300 micromol

**GENERIC INSTRUMENT NAME:** Bongo Net

**GENERIC INSTRUMENT DESCRIPTION:** A Bongo Net system (typically 60 cm diameter Bongo nets with 335 millimeter mesh) is a sophisticated sampling device that is capable of multiple unit, simultaneous sampling at mid-ocean depths as well as a reliable single unit tow platform for use in shallow water sampling. One of the unique features of the Bongo system is its opening and closing mechanism that allows discrete "known-depth" sampling. The system has no frontal obstructions to frighten, disturb, or damage the catch and is large enough to filter water at the rate of 47.5 m<sup>3</sup>/minute when towing at a speed of two knots.

**INSTRUMENT:** Methot Net

**DESCRIPTION:** Methot Net mesh size = 4 millimeter

**GENERIC INSTRUMENT NAME:** Methot Net

**GENERIC INSTRUMENT DESCRIPTION:** A Methot Net, a type of plankton net, is used to sample juvenile fish, shrimp, and 'larger' plankton, e.g. 4 millimeters and larger. Named after its designer, Richard D. Methot, of La Jolla, California, it is also called a Methot Trawl. It is a single net with a large square opening or mouth. The net is deployed from the stern and towed behind the vessel. The Methot uses fine mesh (e.g. 4 mm) but with openings slightly larger than other plankton net systems. The larger mesh size allows the net to be towed at higher speeds. A flowmeter suspended in the mouth of net measures the flow of water moving through the net and allows for the calculation of the volume of water sampled. With its larger mouth and faster speed through the water, the Methot is designed to catch the larger zooplankton that are often missed by other plankton net samplers.