

**Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 38**

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**Session**

Consequences for the ocean

**Abstract Title (English, limited to 300 characters)**

Cesium isotope monitoring efforts and results in the Central Pacific and the Hawaiian Islands

**Abstract (English)**

Concerns arose in Hawai'i after the Fukushima Dai-ichi Nuclear Power Plant disaster about the potential of increasing levels of radionuclides reaching the islands by air masses, ocean currents, and incorporated in biota or tsunami debris. Studies on the islands have looked at several vectors of transport, focusing on the presence of  $^{134}\text{Cs}$  and  $^{137}\text{Cs}$ . Between March 19 and April 4, 2011, the presence of multiple fission products was confirmed by the US Environmental Protection Agency (EPA) on air filters and in milk. Corresponding measurements in the coastal ocean showed that wet deposition in the ocean was quickly mixed and diluted resulting in only a slight increase, below  $10 \text{ Bq m}^{-2}$  of cesium isotopes. This increase was observed only in April and July of 2011 during a monitoring study that ran through 2017. But further measurements on land have confirmed that cesium deposition reaching Hawai'i was in fact higher (up to  $650 \text{ Bq m}^{-2}$  of  $^{134}\text{Cs}$ ), driven by precipitation patterns over topography of the high islands.  $^{134}\text{Cs}$  was confirmed for regions that received rain in excess of 200 mm between late March and early April, 2011. The presence of  $^{134}\text{Cs}$  was also confirmed in mushrooms collected across multiple islands. Of great concern was the consumption of fish after news of elevated cesium isotopes in fish were reported in Japan and traces of  $^{134}\text{Cs}$  were found in fish migrating across the Pacific. One study of fish caught in the Central Pacific sold in Hawai'i showed that out of 13 different species samples, 5 had  $^{134}\text{Cs}$  still present in 2015. The public was greatly concerned about radionuclide content of tsunami debris, however, albeit made on only a handful of samples, gamma-spectrometric analysis of plastic debris and plastics recovered from fish guts was not able to show any traces of  $^{134}\text{Cs}$ . Same was the case for beach sand samples. In general, the public's perceived concern was greatest from doses received from fish consumption, while swimming and surfing in the ocean, and spending time on the beach. Overall, while any traces of artificial radionuclides caused great concern amongst the public, from regulatory standpoint, all detected  $^{134}\text{Cs}$  and  $^{137}\text{Cs}$  in matrixes listed above were below EPA and Food and Drug Administration limits.