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Scientists Will Track Fukushima Radiation To Study Ocean Currents

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• Radioactive Isotopes Expected to Reach U.S. Coast In One To Two Years

• Woods Hole Institute To Send Research Vessel To Japan

Image via Wikipedia

Oceanographers know that the Kuroshio current sweeps west from Japan to the Central Pacific and then toward the U.S. West Coast, but they're less certain how it behaves after it branches toward Alaska and California.

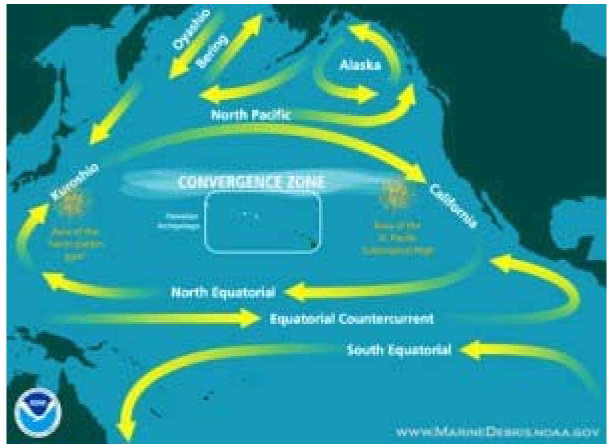
Radiation still leaking into the sea from the damaged Fukushima nuclear power plant will help them document the ocean's circulatory system.

"By the time that current reaches the Central Pacific, there are branches heading more towards Alaska and the South—that gets harder to predict," said Ken Buesseler, a senior scientist with the Woods Hole Oceanographic Institute.

"But that's one of the things that several people hope to do by measuring these isotopes even at levels when they're not harmful. We could actually track those ocean currents and better understand the circulation pattern in the Pacific."

Woods Hole is preparing a research cruise to study waters off of Japan, Beuesseler told me yesterday via email. His comments also derive from a recent interview on WGBH.

Scientists have predicted that Fukushima's longer living isotopes—such as cesium-137, with a half-life of 30 years—will reach Hawaii in about a year and the coast of California in two to three years. By that time, the isotopes should be significantly diluted from mixing with ocean water.



Simplified view of Pacific Ocean currents (NOAA)

"The Kuroshio current is considered like the Gulf Stream of the Pacific, a very large current that can rapidly carry the radioactivity into the interior" of the ocean, Buesseler said.

"But it also dilutes along the way, causing a lot of mixing and decreasing radioactivity as it moves offshore."

Scientists do not expect Fukushima radiation to present a health risk in American waters—mostly because of dilution—and some of the properties of radioactive isotopes can help them understand how those waters behave.

"One of the hardest things in oceanography is getting time scales, how quickly things happen," Buesseler said.

"I often describe the isotopes, whether they're naturally occurring or added by man, as being little clocks. The same way you go to a hospital and have a dye test done, you might think of these as ways to track how currents move, how quickly they're diluted."

The Japanese intentionally dumped about 11,500 tons of water that contained high concentrations of contaminants. An unknown amount of contaminated water leaked into the ocean from a damaged reservoir, and contaminated water may still be reaching the ocean from leaks. More contamination entered the sea through fallout from the air, and through precipitation runoff.

"I consider this to be the largest accidental release to the ocean, even larger than Cherynobyl because of its proximity to the ocean," Buesseler said. "Merely by being on the ocean, more of that release got into the ocean immediately."

Scientists still don't know the full content of the release that reached the ocean. The Japanese regularly test the seawater only for Iodine-131 and for two isotopes of cesium.

They have not tested for other radioactive isotopes that interest oceanographers, such as tritium and strontium, which was detected in Hawaii. Tokyo Electric Power Company conducted one seawater test for plutonium, which had been found in soil around the plant, and reported it non-detectable.

Scientists from the International Atomic Energy Agency are also interested in learning more about releases of Technetium-99, which has a half life of 210,000 years, and Iodine-129, which has a half life of 14 million years. The Japanese have released no information about those isotopes.

The IAEA also plans to track the isotopes with an eye to their impact on the ocean.

"It will be possible to follow these traces—mainly Cs-137 and Cs-134—for the next few years in the Northern Pacific," said Hartmut Nies, a radioecologist with IAEA, during a May 5 presentation on marine impacts of Fukushima. "Water with such traces will reach the Canadian and U.S. Coast in probably one to two years' time."

Radiation has been found so far in only one fish species—the Japanese sand lance—but Buesseler cautioned that radiation in seafood, seaweed, and sediment near Fukushima may present a risk to the local population for some time.

It poses much less of a risk as distance increases from the spill site, for several reasons, and generally radiation poses less risk to humans in seawater than it does on land. According to Buesseler:

> When radioactivity falls on the land it stays put. So there are very short pathways from the gas into the cows and into the milk supply, or directly into the water that you drink. Or just direct exposure when you're walking on that land.

> In the ocean, of course, you get the mixing process going on, so you get both vertical mixing in the ocean, sometimes in the course of a day, and offshore currents....
>
> Radiation is shielded by seawater so direct exposure in the ocean would not be the same as if you were walking on land for the same fallout, the same deposition levels, but then there are pathways like fish and seafood that can short circuit that.

The Japanese had little choice, Buesseler believes, but to use seawater to cool the reactors after their normal cooling systems lost power—and then to release contaminated water into the sea.

"I think they probably did the right thing," he said. "Cooling had to happen, otherwise there would have been much larger releases than what we have seen. So the choice had to be made, and there was no other source of water in sufficiently large quantities."

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