

Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 47

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Session

Consequences for the ocean

Abstract Title (English, limited to 300 characters)

Ocean dispersion model simulations for 137Cs distribution derived from the Fukushima Daiichi Nuclear Power Plant Accident

Abstract (English)

Many coastal ocean dispersion models were conducted to evaluate the 137Cs distribution for the earlier period after the Fukushima Daiichi Nuclear Power Plant (1F NPP) accident. The results of 11 regional ocean models were summarized in a report of the Science Council of Japan in 2014. Model inter-comparison showed that meso-scale eddies and the Kuroshio Current, in addition to coastal currents play an important role for the distribution of released 137Cs. Detailed systematic comparison studies, such as ones that use the same radionuclide forcing with different models were required in future.

Model can estimate direct release rate to the ocean from the 1F NPP site by comparison with measured data. The estimated amount of direct release by model simulations considered the measured 137Cs activities during the major direct release period and found results from 3 to 6 PBq.

Direct release from the 1F NPP site have continued to present, although significantly reduced. The longer-term simulation was performed until September 2020. Because the spatiotemporal variability of 137Cs activity was large, the simulated results were compared with the annual averaged observed 137Cs activity distribution. Simulated 137Cs activity was in good agreement with measurement data. Normalized annual averaged 137Cs activity distributions in the regional ocean were similar for each year from 2013 to 2016. This result suggests that the annual averaged distribution is predictable.

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Reasonable settings of initial atmospheric fallout and river discharge remain a challenge for the coastal ocean model. In particular, it has been suggested that leaching from estuarine sediments may have occurred during the heavy rainfall of October 2019.

Some simulations for the North Pacific scale have also been carried out, although model inter-comparison has not yet been achieved due to the large uncertainty in the atmospheric deposition process.