

A spike-like input of perfluoroalkyl substances into the Western North Pacific from the Japanese Coast associated with t

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The recent great earthquake of magnitude 9.0 on 11 March 2011 followed by TSUNAMI and fire in Japan has resulted in serious environmental problems in and around Japan. A huge amount of materials has been discharged into the ocean after the tremendous flood damage by TSUNAMI. A research group of the National Institute of Advanced Industrial Science and Technology has sampled the perfluoroalkyl substances (PFAs), which are chemical materials included in the industrial products, in the Western North Pacific for past a few years. They found some evidences showing an abrupt increase of the PFAs concentration east of Japan in 2011 after the great earthquake. To confirm the anomalous input of two typical PFAs (PFOA and PFOS) from the Japanese coast into the ocean, we conducted a series of chemical tracer simulations using an eddy-resolving ocean reanalysis product, JCOPE2, by assuming the oceanic dispersion of the PFAs dissolved in sea water mainly driven by the ocean current. Comparison of the simulation results with the observation actually indicates a spike-like input of PFOA into the Western North Pacific after the great earthquake; however, the simulations could not well explain the observed distribution of PFOS, suggesting some differences in the oceanic dispersion processes between PFOA and PFOS. We discuss estimates of the total emission amounts of PFOA and PFOS based on a simple process representing the TSUNAMI effect on the emission from the land.

Keywords: perfluoroalkyl substances, the great earthquake 0311, oceanic dispersion, Tsunami, oceanic observation, numerical simulation