

Transport processes of plutonium in the East China Sea

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Pu concentrations and Pu-240/Pu-239 atom ratios in the East China Sea and Okinawa Trough sediment cores were determined by isotopic dilution inductively coupled plasma mass spectrometry (ID-ICP-MS). The results show that Pu-240/Pu-239 atom ratios in the East China Sea and Okinawa sediments, ranging from 0.21 to 0.33, are much higher than the reported value of global fallout (0.18). The highest Pu-240/Pu-239 ratios are observed in the deepest Okinawa Trough sediment samples. These ratios suggest the US nuclear weapons tests in the early 1950's at the Pacific Proving Grounds in the Marshall Islands are a major source of Pu in the East China Sea and Okinawa Trough sediments. It is proposed that Pu was delivered from the Pacific Proving Grounds test sites via trophospheric fallout to the Okinawa Trough and East China Sea. Additionally, the North Pacific Equatorial Circulation system and Kuroshio Current might transfer some proportion of Pu from the Pacific Ocean to this area. The total Pu-239+240 inventories in the cores are about 150-200 % of that expected from direct global fallout; about 46-67 % of the total inventories are delivered from the Pacific Proving Grounds.