Spatial and temporal distribution of ^{236}U in the Northwest Pacific Ocean

A. SAKAGUCHI[1*], T. NOMURA[2], P. STEIER[3], T. WATANABE[4], T. NAKAKUKI[2], K. SASAKI[5], Y. TAKAHASHI[6], A. YAMAKAWA[7], H. YAMANO[7]

[1]CRiED, University of Tsukuba, Tsukuba, Ibaraki, 305-8577, Japan (correspondence, ayaskgc@ied.tsukuba.ac.jp) [2]Hiroshima University, Hiroshima, 739-8526, Japan[3], University of Vienna, Vienna, A-1090, Austria[4], Hokkaido University, Hokkaido, 060-0810, Japan[5], Kanazawa-Gakuin University, Ishikawa 920-1392, Japan[6], The University of Tokyo, Tokyo, 113-0033, Japan[7]National institute for Environmental Science, Tsukuba, Ibaraki, 305-8506, Japan

The input histories of ^{236}U to the surface water of the Northwest Pacific were reconstructed through measurement of the $^{236}U/^{238}U$ atom ratio in annually banded coral skeletons which were collected at Kume Island on the Kuroshio Current at the Northeast Pacific and Iki Island in the Tsushima Strait which is the main entrance to the Japan Sea. The $^{236}U/^{238}U$ atom ratios and concentrations of U isotopes were measured for the period 1930s-2010s using AMS and ICP-MS. The $^{236}U/^{238}U$ atom ratios revealed three prominent peaks in 1954-55, 1958-59 and 1963; thereafter the isotope ratios gradually decreased over the next several decades, attaining values of surface ocean water for the present day. Using these results, the mixing ratio between Kuroshio Current and other current/water-mass flowing into the Japan Sea as Tsushima Current was estimated as 70:30 for general conditions. A simplified vertical eddy diffusion model for ^{236}U in the Japan Sea, using the reconstructed time-series of surface water ^{236}U together with observed depth profiles for ^{236}U in the water column in 2010, yielded diffusion coefficients of 3.4-5.6 cm^2/s for 6 sampling points. The diffusion coefficient values obtained for the northern stations were relatively large and fitting uncertainties were also large. We presumed that the distribution of ^{236}U in the water column has been influenced not only by diffusion but also by subduction of the surface water in the Japan Sea.