Tracing the iodine source of marine biota using iodine 129 isotopic ratio

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Recent surface environment has been polluted by anthropogenic iodine 129 (129I, HL = 15.7 M year) released by human nuclear activities, e.g. nuclear bomb testings and nuclear reprocessing. Since stable iodine 127 (127I) exists equilibrium condition, the isotopic ratio of 129I and 127I (129I/127I ratio) clearly changes when the anthropogenic 129I is released into the environment. In the ocean, the highest 129I/127I ratio, 10^-8 – 10^-6, was observed in the European North Sea. This anthropogenic 129I was resulted by direct discharge of 129I from nuclear reprocessing plants [1]. On the other hand, in the Pacific Ocean, far from the currently active source, the 129I/127I ratio of 10^-11 – 10^-9 [1]. In this area, 129I was transported through the atmosphere. These obvious differences of 129I/127I ratio in seawater mean 129I/127I ratio of seawater identifies the ocean area.

It is not well-understood the iodine source of marine biology although iodine is known to be a biophile element. 129I/127I ratio of ocean biota would depend on that of seawater in the habitat environment. Therefore 129I/127I ratio has potential to be a tracer of ocean biology. In this work 129I/127I ratio in biological samples and seawater samples collected at the Western Pacific Ocean were measured and compared to verify the relationship of 129I/127I ratio between marine biota and seawater.