



Determination of Iodine-129 in fish samples as new tracer of marine biology

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Most of Iodine-129 in the surface environment is the anthropogenic origin, i.e. the result of the human nuclear activities. In the marine environment, like Pacific ocean, I-129 is transferred from atmosphere and slowly diffuses into deeper layer so that there is steep gradient of I-129 concentration, i.e. the surface layer has high I-129 concentration and it suddenly decreases going deeper. This peculiar depth profile is thus reflected by the isotopic ratio (I-129/I-127) profile because stable iodine (I-127) concentration is almost uniform in the seawater (ca. 60 ppb).

Iodine isotopic ratio (I-129/I-127) of marine lives like fish should be determined by their habitats and the ways exchanging iodine with seawater. This means that the iodine isotopic ratio is potential indicator of marine biology. However there have been only few studies using I-129 for marine biology. This is because I-129 is so rare in the marine lives that ordinary analytical techniques cannot detect.

Recently, the technique of accelerator mass spectrometry has been developed and demonstrates excellent sensitivity to detect I-129/I-127 ratio as low as $1E-14$. However it requires typically 1 mg AgI sample. To obtain such amount of iodine several hundreds gram should be treated in the case of typical fish.

In this study “carrier method” was adopted to overcome this difficulty. Our procedure is following:

A fish sample was first dried completely then homogenized well. Iodine was extracted into an alkaline solution by the thermal hydrolysis from 0.1 to 0.5g of dried sample. An aliquot of this solution was taken for ICP-MS analysis to determine the stable iodine concentration. The remaining was, added with carrier iodine (about 1 mg), purified by solvent extraction and collected as AgI precipitation.

I-129/I-127 ratio of obtained AgI was determined by AMS. From the AMS result and the stable iodine concentration, the isotopic ratio of the fish samples themselves can be calculated.

The result of fish samples, collected from Suruga-bay (located on Pacific coast in the middle of Honshu, Japan) showed $1E-10$ to $7E-10$, which was consistent with that of surface seawater.