Anthropogenic iodine-129 in the Japan Sea Bottom Water and Dense Shelf Water of Okhotsk Sea

*松中 哲也[1]、長尾 誠也[1]、井上 睦夫[1]、落合 伸也[1]、森田 貴己[2]、三木 志津帆[2]、荒巻 能史[3]、工藤 勲[4]、本多 直人[2]、滝川 哲太郎[5]、笹 公和[6]、本多 真紀[6]、末木 啓介[6]
*Tetsuya Matsunaka[1], Seiya Nagao[1], Mutsuo Inoue[1], Shinya Ochiai[1], Takami Morita[2], Shizuho Miki[2], Takafumi Aramaki[3], Isao Kudo[4], Naoto Honda[2], Tetsutaro Takikawa[5], Kimikazu Sasa[6], Maki Honda[6], Keisuke Sueki[6]

1. 金沢大学環日本海域環境研究センター、2. 水産研究・教育機構、3. 国立環境研究所、4. 北海道大学、5. 長崎大学、6. 筑波大学
1. Institute of Nature and Environmental Technology, Kanazawa University, 2. Japan Fisheries Research and Education Agency, 3. National Institute for Environmental Studies, 4. Hokkaido University, 5. Nagasaki University, 6. University of Tsukuba

Long-term oceanographic observation revealed that warming and oxygen decrease of the Japan Sea Bottom Water (JSBW) and Dense Shelf Water (DSW) of Okhotsk Sea are responding to air temperature raise in winter [1–2]. The investigation of water dynamics in the Japan Sea and Okhotsk Sea using radioactive tracer are essential for elucidating the interaction between climate change and these convection systems. Anthropogenic ^{129}I ($T_{1/2}$ = 15.7 million years) produced from the thermal neutron fission, is dominated by release from nuclear fuel reprocessing plant in the Europe. To illuminate the availability of ^{129}I as a tracer of surface circulations and vertical convections in the Japan Sea and Okhotsk Sea, we investigated the horizontal and vertical distributions of the ^{129}I at the large area of these seas in 2017. The dissolved ^{129}I in surface water varied from 17.3±0.7 to 23.1±1.0 nBq L^{-1} at the area of 38–46° N and 135–141°E in the Japan Sea, and was negatively correlated with salinity (R^2 = 0.82, n = 9). This salinity-dependent distribution revealed that the dissolved ^{129}I in the area was controlled by mixing of water mass from the Liman Current to the Tsushima Current. Meanwhile, the dissolved ^{129}I in the JSBW observed at the layer of 2480–3500 m of the Japan Basin in 2017 was 4.1±0.5 nBq L^{-1}, which increased by 1.1 nBq L^{-1} in comparison to that in 2007 [4]. The estimated turnover time for the JSBW of 205±25 years using the ^{129}I was within the range of 75–380 years evaluated by bomb-derived ^{14}C [5–6]. The ^{129}I is considered to be a tracer for the surface subarctic front and deep JSBW in the Japan Sea.

[1] T. Gamo, *Trends anal. chem.*, 30, 1308–1319 (2011)
[2] T. Nakanowatari et al., *Geophys. Res. Lett.*, 34, 1955–2004 (2007)
[3] T. Suzuki et al., *Nucl. Instr. Meth. B*, 294, 563–567 (2013)
[4] T. Suzuki et al., *Nucl. Instr. Meth. B*, 268, 1229–1331 (2010)
[5] T. Gamo and Y. Horibe, *J. Oceanogr. Soc. Japan*, 39, 220–230 (1983)
[6] Y. Kumamoto et al., *J. Oceanogr.*, 64, 429–441 (2008)

キーワード：日本海、オホーツク海、底層水、大陸棚高密度水、ヨウ素129
Keywords: Japan Sea, Okhotsk Sea, Bottom water, Dense shelf water , Iodine-129

