From the Luzon Strait to the Tsushima Strait: Water masses and nutrient transports approached using ^{137}Cs

*Siteng Zhu[1], JING ZHANG[1], Shota Kambayashi[2], Takeshi Matsuno[3], Eisuke Tsutsumi[3], Shigenobu Takeda[4], Seiya Nagao[5], Hiroshi Inoue[5], Hiroshi Ogawa[6], Ichiro Yasuda[6]

1. University of Toyama, 2. Fukushima university, 3. Kyushu university, 4. Nagasaki university, 5. Kanazawa university, 6. The University of Tokyo

More than 95% of the water flowing into the Sea of Japan comes from the Tsushima Strait, and 80% of it is Kuroshio Intimidate Water (KIW), which is rich in nutrients compared with Kuroshio surface Water and Kuroshio Tropical Water. However, there is a lack of direct evidence based on surveys or measurement data. ^{137}Cs in the subtropical mode water (STMW) that originated in the Fukushima Dai-ichi Nuclear Power Plant (FNPP1) accident is an excellent tracer which can be transported from the Kuroshio upstream to the Sea of Japan crossing the shelf edge of the East China Sea (ECS) via the KIW. It is also useful for research on the transport of nutrients from the KIW.

Data and water samples were collected during the Hakuho-Maru KH-17-5 Cruise and the Nagasaki-Maru 464 Cruise in November and July 2017, respectively. Data from the KH-17-5 Cruise was used for the study of the area around the Luzon Strait and those of the Nagasaki-maru 464 Cruise was used for the study of area around the outer shelf region of the East China Sea and the Tsushima Strait. The ^{137}Cs active concentration was analyzed by γ-Ray spectrometry after preconcentration. The turbulence intensity was measured using TurboMAP and VMP2000.

The maximum ^{137}Cs concentration shows the existence of the subtropical mode water (STMW) in the Luzon Strait, the ECS and the Tsushima Strait, respectively, at the similar density (25.2-25.7 kg/m^3), temperature (15-17℃) and salinity (34.60-34.75). Although their depth changes from 400 m in the Luzon Strait to 150 m at the shelf edge of the ECS and 100m in the East Channel of the Tsushima Strait, they can all be identified as the KIW because of the similar density. It is noteworthy that around Luzon Strait, the distribution of ^{137}Cs is influenced by strong vertical mixing. The percentage of nutrients transported to the Sea of Japan by KIW is estimated and this is meaningful to the ecosystem of the Sea of Japan.

Keywords: 137Cs, subtropical mode water, water masses, KIW, nutrients

