

13 year continuous observation of ambient gamma ray at cold seepage site on deep seafloor with a multidisciplinary cabled observatory off Hatsushima Island in Sagami Bay

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At cold seepage site on deep seafloor off Hatsushima Island in Sagami Bay at a depth of 1175 m, multidisciplinary observation of deep-sea environment has been carried out since 1993 with a cabled observatory. The present observatory, to which a gamma ray sensor with 3 inch NaI(Tl) scintillation detector was attached, was deployed in March 2000 about 40 m north of the present location, recovered in March 2002, and re-deployed at the present location in November 2002. After the re-deployment, the observation at the same location continued up to date for more than 13 years. The specifications and preliminary observational results before the 2011 off the Pacific Coast of Tohoku Earthquake (hereafter "off Tohoku Earthquake") occurred are described in Refs. 1 and 2. In this presentation, the result of the long-term gamma ray observation to date will be reported.

Major events observed were as follows;

After the off Tohoku earthquake occurred, rapid signal level increase of Bi-214 and K-40 was observed. This would not be associated with the off Tohoku Earthquake itself, but would be associated with the mudflow caused by the Eastern Shizuoka Prefecture Earthquake (M6.4) which occurred on March 15, 2011; 4 days after the off Tohoku Earthquake.

After this event, significant event was not recognized except the abrupt signal level fluctuation associated with the underwater work with remotely operated vehicle (ROV) near the observatory. Since December in 2014, gradual signal level decrease of Bi-214 was observed, while the signal level decrease of K-40 started gradually shortly after the off Tohoku Earthquake, roughly in October 2011. The effect of Cs-137 associated with atomic plant accident on the signal level of Bi-214 should be considered.

Throughout the observation period, predominant event is the significant signal level increase of Bi-214 in October 2006, whose fluctuation pattern was different from the other fluctuations associated with the disturbance on seafloor caused by the sedimentation or the underwater work with the ROV. It would reflect the sub-bottom incident associated with tectonic deformation.

References

- 1) Kumagai, et al., *Gamma Radiation* (Intech, Croatia, 2012), DOI:10.5772/36392, p.64.
- 2) Iwase and Takahashi, JpGU meeting 2011, SCG059-P19 (2011).

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