

Acoustic Anomalies in Seawater off the Coast of Noto Peninsula

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On January 1, 2024, a Mj7.6 earthquake occurred on the Noto Peninsula. This seismic event, believed to be linked to multiple faults in the ENE-WSW direction, triggered tsunamis and likely caused seafloor surface alterations. The aftershock area spanned from the Noto Peninsula's coast to the eastern offshore region, marking a substantial seismic event in our research area.

From March 4 to 16, 2024, the R/V Hakuho-maru conducted a KH-24-E1 cruise for structural exploration, sampling survey, and seafloor observation. During this cruise, acoustic anomalies were observed in the water column at several locations on the Multi-beam echo sounder (MBES) and Sub-bottom profilers (SBP), which were acquired simultaneously with the multichannel seismic reflection survey (MCS).

Acoustic anomalies were often identified simultaneously in both MBES and SBP. In some cases, their presence was confirmed by crossing multiple survey lines after a time interval. Most of these anomalies are distributed in the area of shallower than 200 meters. The distribution of the anomalies is not uniform, although the correspondence with known faults and topographic anomalies needs to be clarified. No clear trend is observed regarding elevation from the seafloor or depth of distribution in the water column. The shapes and sizes of acoustic anomalies were also varied. For acoustic anomalies extending vertically from near the bottom, it is suspected that they are related to fluid seeps from the seafloor. On the other hand, some of them may be a response by a biotic population. Since active fluid transport in the surface layer is expected in the vicinity of this area, such as the distribution of methane hydrate in the surface layer, future geochemical analysis of seawater and comparison with crustal heat flow is expected. In the MCS sections, strong horizontal reflections in the water column were confirmed at several survey lines in the western part of the survey area. This may indicate the spatial distribution of the thermocline in Toyama Bay. In this presentation, we would like to present our initial results on these underwater acoustic anomalies.

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