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JAMSTEC

First discovery of submarine volcanic activity at Omurodashi, south of Izu-Oshima

Summary
In August 2012, scientists conducted an intensive geological survey of the submarine rhyolitic Omurodashi volcano located south of Izu-Oshima, Tokyo Metropolis, using the remotely operated vehicle (ROV) *Hyper Dolphin*. The survey, led by Kenichiro Tani, Research Scientist, Institute for Research on Earth Evolution (IFREE) Japan Agency for Marine-Earth Science and Technology (JAMSTEC) (President: Asahiko Taira), is the first to discover that this volcano is currently active. The evidence for this is provided by a zone of continuous submarine hydrothermal activity in the crater-like depression (Omura hole) at the center of the volcano. Hydrothermal deposits generated by this activity, including chimneys of metal sulfides that built up around the hydrothermal vents, were successfully collected during the survey.

This discovery has important implications. Researchers will have to assess the risks and hazards posed by the possible eruption of the shallow-water rhyolitic Omuradashi volcano, and the value of the ore deposits formed in the hydrothermal zone. The interaction between rhyolitic lava and seawater during an eruption in the shallow waters of Omurodashi has the potential to cause explosive eruptions. These will have an impact upon waters surrounding the eruption site, and may be powerful enough to affect neighboring coastal areas. Further investigations are thus essential to clarify the eruptive history and evolution of Omurodashi volcano in order to assess the risks and hazards posed by any future eruptions.

The discovery of this active volcano and the results of this first survey were presented at the fall FY 2012 meeting of The Volcanological Society of Japan held in Miyota, Nagano from October 14.

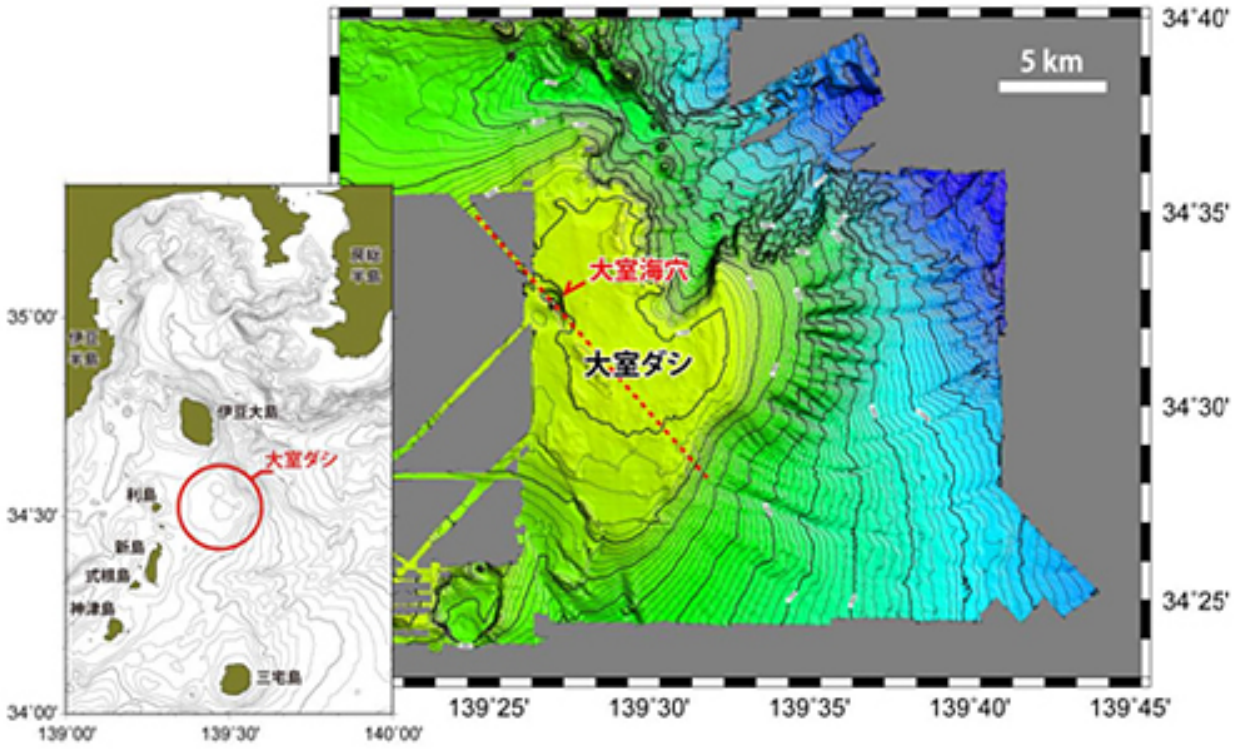

Figure 1. Bathymetric data of the ocean around Omurodashi was obtained by a multi-narrow beam echo sounder system aboard the research vessel Natsushima. The red-dotted line shows the transect for the single channel seismic survey shown in Fig. 3.

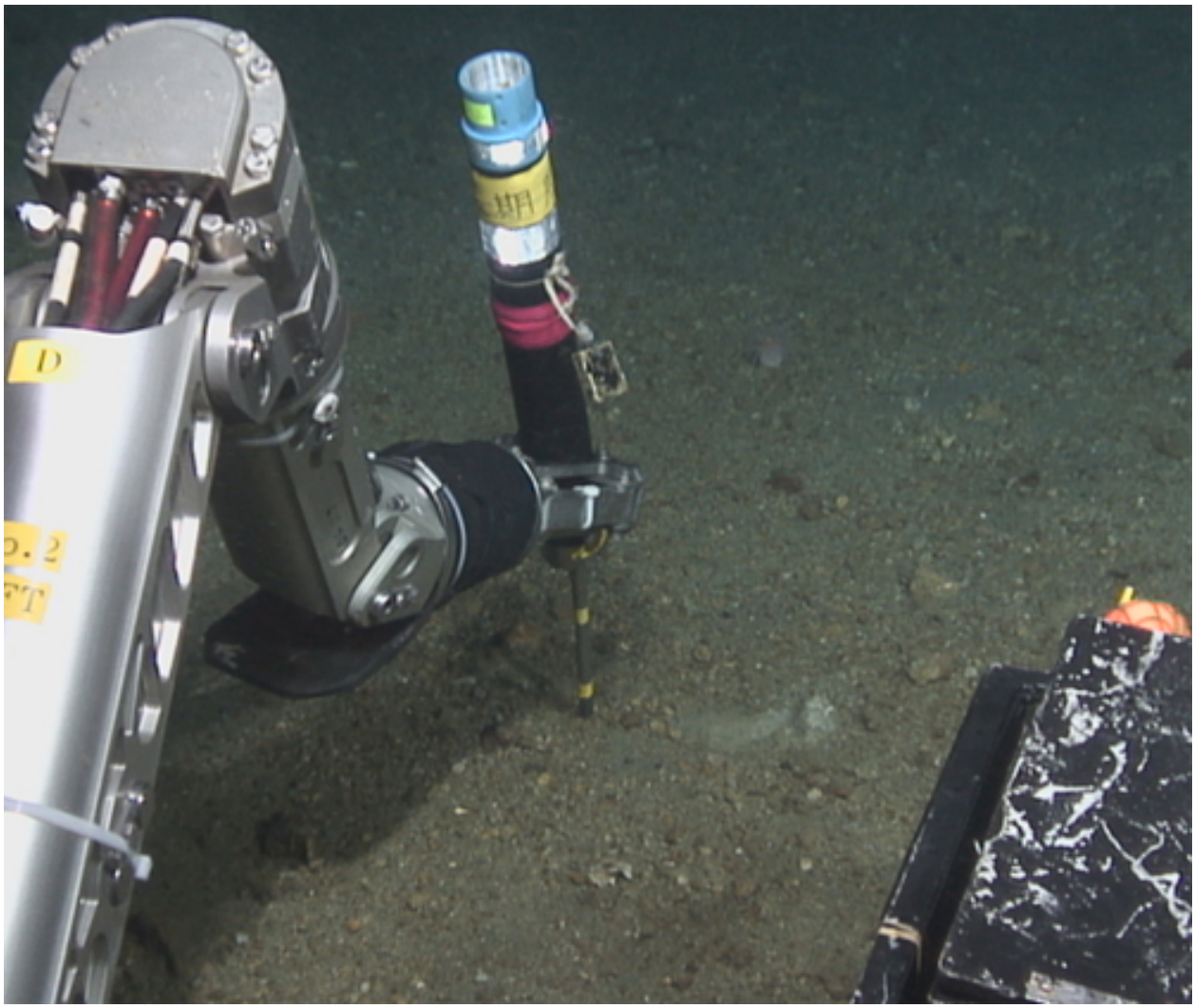

Figure 2. A picture of terrestrial heat flow measurements being taken by the ROV *Hyper Dolphin*. Measurements are taken by inserting a terrestrial heat flow measuring probe called the Stand Alone Heat Flow Meter into the seafloor. The terrestrial heat flow represents the amount of heat emitted from the Earth's interior up to its surface. High heat flow measurements reflect a high heat source (such as magma) relatively near the surface.

[Reference] Stand Alone Heat Flow Meter: Five thermistors are situated along the 60 cm probe. To measure the temperature gradient, the probe is pushed into the seafloor using the manipulator of the manned submersible or ROV.

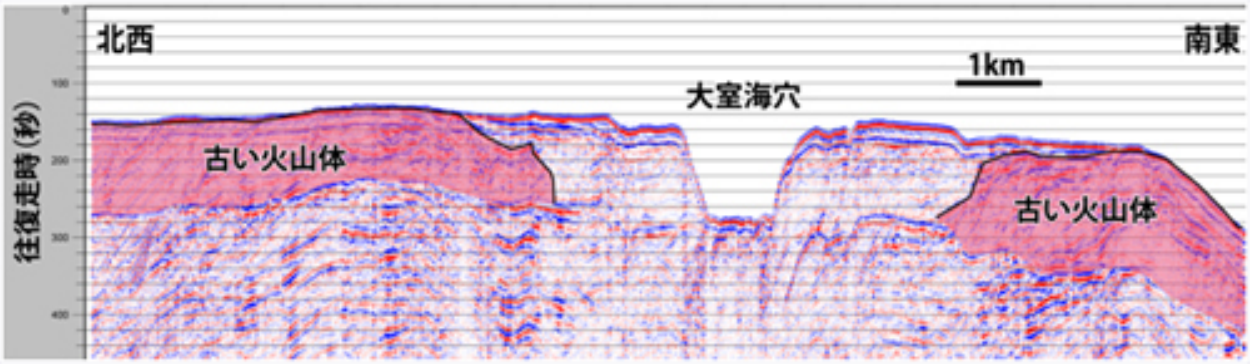

Figure 3. The internal structure of the Omuradashi volcano body from northwest (left) to southeast (right) obtained by single channel seismic (SCS) survey. SCS surveys use sound waves generated by a source at the ocean surface that propagate through the seawater into the rock beneath the seafloor and bounce back of interfaces, such as rock layering and boundaries between rock types, to receivers at the surface, to reveal subseafloor geological structures. The vertical axis denotes the time (in seconds) it takes the sound waves generated from a source on the ocean surface to reflect back to receivers at the ocean surface. The results of the survey reveal the existence of a caldera, 8 km in diameter, that has since been infilled with volcanic deposits forming the flat-top form of Omurodashi. Subsequently at the center of this caldera the smaller current crater, Omura hole, has formed.

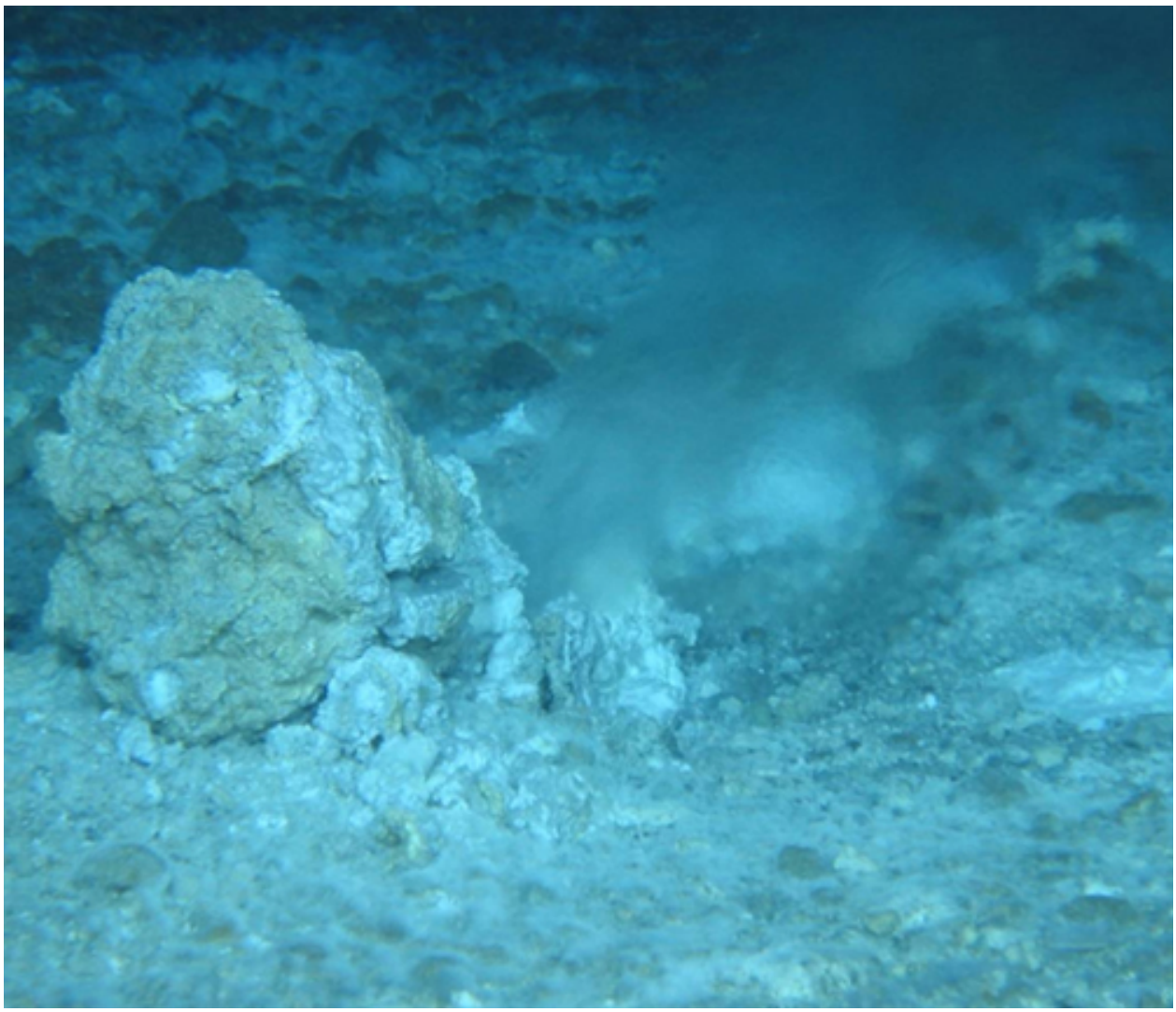

Figure 4. Hydrothermal activity, reaching temperatures of 194°C, discovered at the bottom of the Omura hole (depth: 200 m)

Figure 5. A chimney of hydrothermal deposits collected from the bottom of the Omura hole. Length: approx. 40 cm.

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