



R/V Kaimei Cruise Report

KM22-11C



Unravelling the abnormal gold enrichment mechanism at the
Higashi Aogashima Knoll Caldera hydrothermal field: ROV dive
survey part 2

16th Sep. 2022 – 25th Sep. 2022

Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

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1. Cruise Information

- Cruise ID: KM22-11C
- Name of vessel: R/V Kaimei
- Title of the cruise: Unravelling the abnormal gold enrichment mechanism at the Higashi Aogashima Knoll Caldera hydrothermal field: ROV dive survey part 2
- Title of proposal: (JC22-01) Unravelling the abnormal gold enrichment mechanism at the Higashi Aogashima Knoll Caldera hydrothermal field: ROV dive survey part 2
- Cruise period: 16th September 2022 to 25th September 2022
- Ports of departure and arrival: Odaiba, Tokyo to Yokosuka HQ
- Research area: Higashi-Aogashima Knoll Caldera in the Izu-Ogasawara area
- Research map:

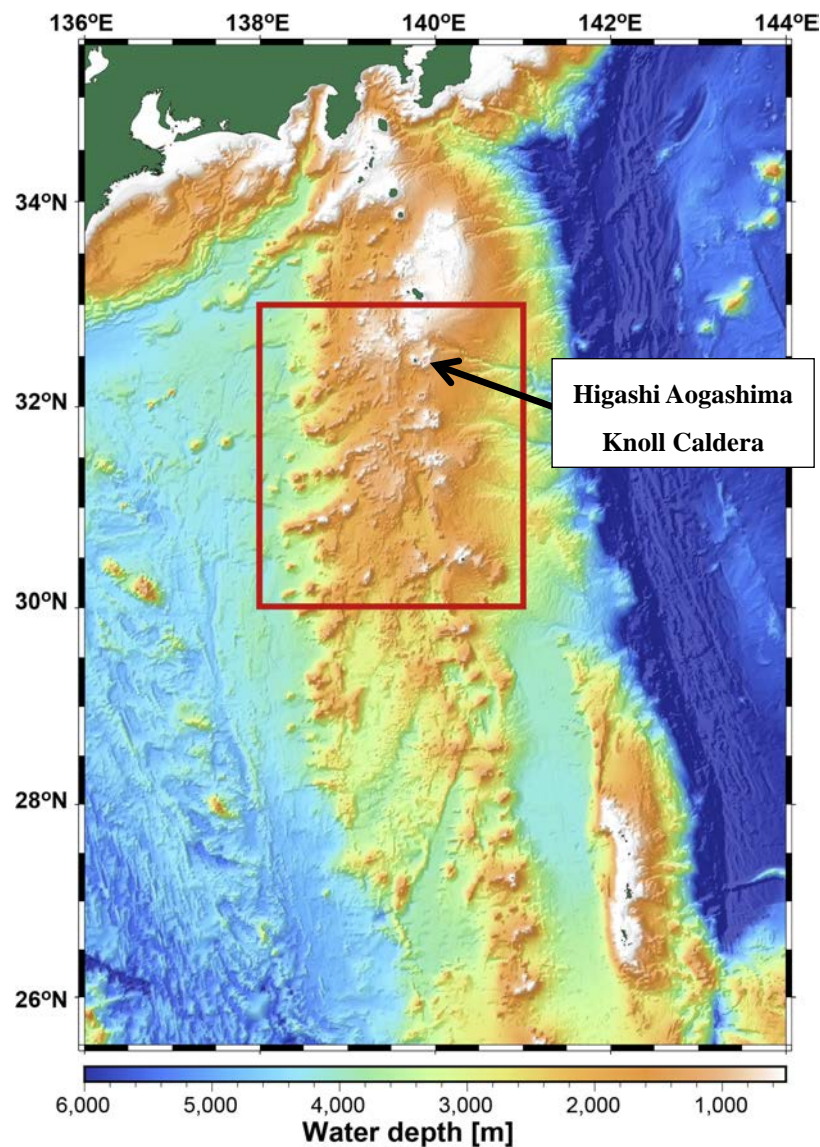


Fig. 1-1 Investigation area map of the cruise KM22-11C.

2. Researchers and Crews

● Chief scientist

Tatsuo Nozaki (JAMSTEC)

● Representative of the scientific party

Tatsuo Nozaki (JAMSTEC)

● Scientific party

Takahiro Kuribayashi	(Tohoku Univ.)
Kazuki Kohama	(Kyushu Univ.)
Jun-ichiro Ishibashi	(Kobe Univ.)
Shin Toyoda	(Okayama Univ. of Sci.)
Marin Yamamoto	(Okayama Univ. of Sci.)
Kazuhide Mimura	(ChibaTech)
John Jamieson	(Memorial Univ.)
Sabina Strmic Palinkas	(UiT, The Arctic Univ. of Norway)
Chong Chen	(JAMSTEC)
Satoshi Wakai	(JAMSTEC)
Shimpei Aikawa	(JIRCAS)
Hsu Fenghsin	(National Taiwan Univ.)
Junji Torimoto	(JAMSTEC)
Vogt-Vincent Noam	(Oxford Univ.)
Yasuyuki Fukushima	(IHI Coop.)

● Kaimei Crew Members:

Captain	Naoto Kimura
Chief Officer	Takeshi Muramatsu
2nd Officer	Ryo Yamaguchi
3rd Officer	Miyu Inoue
Chief Engineer	Kazuhiko Kaneda
1st Engineer	Takahiro Mori
2nd Engineer	Yoichi Yasue
3rd Engineer	Tomoya Koga
Chief Electronic Operator	Yosuke Komaki
2nd Electronic Operator	Shunsuke Fukagawa
3rd Electronic Operator	Kohei Ikeda

Boat Swain	Kaname Hirosaki
Able Seaman	Satoshi Shimpō
Able Seaman	Saikan Hirai
Able Seaman	Takuya Miyashita
Able Seaman	Shohei Uehara
Able Seaman	Yuta Ohjiri
Sailor	Shinnosuke Inoue
No.1 Oiler	Hiroyuki Oishi
Assistant Oiler	Kyotaro Maruyama
Assistant Oiler	Riku Mizuno
Assistant Oiler	Kota Matsumura
Chief Steward	Tatsunari Onoue
Steward	Masanao Kunita
Steward	Keito Sato
Steward	Yuma Fujimoto
Marine Technician	Yohei Sugimoto

● Hyper-Dolphin Operation Team

Operation Manager	Tetsuya Ishitsuka
2nd ROV Operator	Takuma Goto
2nd ROV Operator	Shinnosuke Kumagai
3rd ROV Operator	Atsushi Koguma
3rd ROV Operator	Yuto Okuhira
3rd ROV Operator	Kai Takeda

3. Observation

3.1 Objectives & Background

Higashi Aogashima Knoll Caldera (hereafter called HAKC) hydrothermal field is a relatively new one discovered in 2015 by the research group of The University of Tokyo ([The University of Tokyo, 2015, 2016](#); [Japan Oil, Gas and Metals National Corporation \(JOGMEC\), 2018](#)). There have been known three hydrothermal sites within the HAKC hydrothermal field; (1) Central Cone Site, (2) Southeast Site and (3) East Site ([Katase et al., 2016](#); [Iizasa et al., 2019](#)). Out of these three hydrothermal sites, an abnormal gold enrichment (average Au concentration = 102 ppm, $n=15$) was observed only at the Central Cone Site ([Iizasa et al., 2019](#)). In particular, the gold concentration of the mound samples at the Central Cone Site is abnormally high, up to 275 ppm ([Iizasa et al., 2019](#)). The abnormal gold enrichment at the Central Cone Site is considered to be closely associated with the boiling process of hydrothermal fluid and its concomitant transportation of nano Au particles from the seafloor ([Iizasa et al., 2019](#)). However, researches on the HAKC hydrothermal field are at a beginning stage and only basic petrographic observations about chimney and mound rock samples and a bathymetric map by multibeam echosounder (MBES) were reported so far.

Last year, the cruise KS-21-20 by R/V Shinsei Maru with remotely operated vehicle (ROV) Hyper Dolphin (HPD) was conducted as the first multi-disciplinary research cruise from the aspect of economic geology, (fluid) geochemistry, geochronology, macro-/micro-biology and geophysics. Purposes of the cruise KS-21-20 were to obtain the samples of rock, seawater, hydrothermal fluid, benthic animals and microorganisms as well as geophysical data such as bathymetry, gravity and magnetic intensity to unravel the reason/cause/phenomenon of abnormal gold enrichment in a multi-disciplinary manner at the HAKC hydrothermal field. In the cruise KM22-11C, we tried to collect more rock, fluid, animal, microbiological samples as well as geophysical data to unraveling the abnormal gold enrichment mechanism at the HAKC field.

References

- Iizasa, K., Asada, A., Mizuno, K., Katase, F., Lee, S., Kojima, M. and Ogawa, N. (2019) Native gold and gold-rich sulfide deposits in a submarine basaltic caldera, Higashi-Aogashima hydrothermal field, Izu-Ogasawara frontal arc, Japan. *Mineralium Deposita*, **54**, 117–132.
- Japan Oil, Gas and Metals National Corporation (JOGMEC) (2018) Verification of the occurrence of new seafloor hydrothermal deposit at the Aogashima Island offshore, Izu-Ogasawara area. News Release on 27th December 2018.
- Iizasa, K., Mizuno, K., Asada, A., Matsuda, T. and Saito, Y. (2016) Seafloor hydrothermal deposits exploration by bathymetry and backscattering data using multibeam echo-sounder in the Higashi-Aogashima Caldera. *The Journal of the Marine Acoustics Society of Japan*, **43**, 208–218.

The University of Tokyo (2015) Discovery of the seafloor hydrothermal deposit at the eastern offshore of Aogashima Island, Izu area; Development of a tool that can discover seafloor hydrothermal deposit in a short span of time. Press Release on 7th August 2015.

The University of Tokyo (2016) Accomplishment of the practical and highest accurate exploration tool during the exploration at seafloor hydrothermal deposit in Higashi Aogashima Caldera, Izu Islands. Press Release on 2nd June 2016.

3.2 Preliminary Results

The cruise KM22-11C was subjected to the rough sea state due to the typhoon and Kuroshio current meandering, we cannot conduct any ROV dive surveys. Instead, hydrothermal plume survey was conducted for several days by using MBES. Details of the plume survey will be reported in the future.

4. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.

This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.

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