



R/V Kairei Cruise Report

KR14-02

Survey of REY-rich mud around Minami-Torishima Island.

January 22 to February 5, 2014

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

Contents

1. Cruise Information
2. Researchers
3. Observation
 - 3.1 Objectives & Background
 - 3.2 Methods & Instruments
 - 3.3 Preliminary Results - Confidential matters
4. Notice of Using

1. Cruise Information

Cruise ID: KR14-02

Name of vessel: R/V Kairei

Title of the cruise: Survey of REY-rich mud around Minami-Torishima Island.

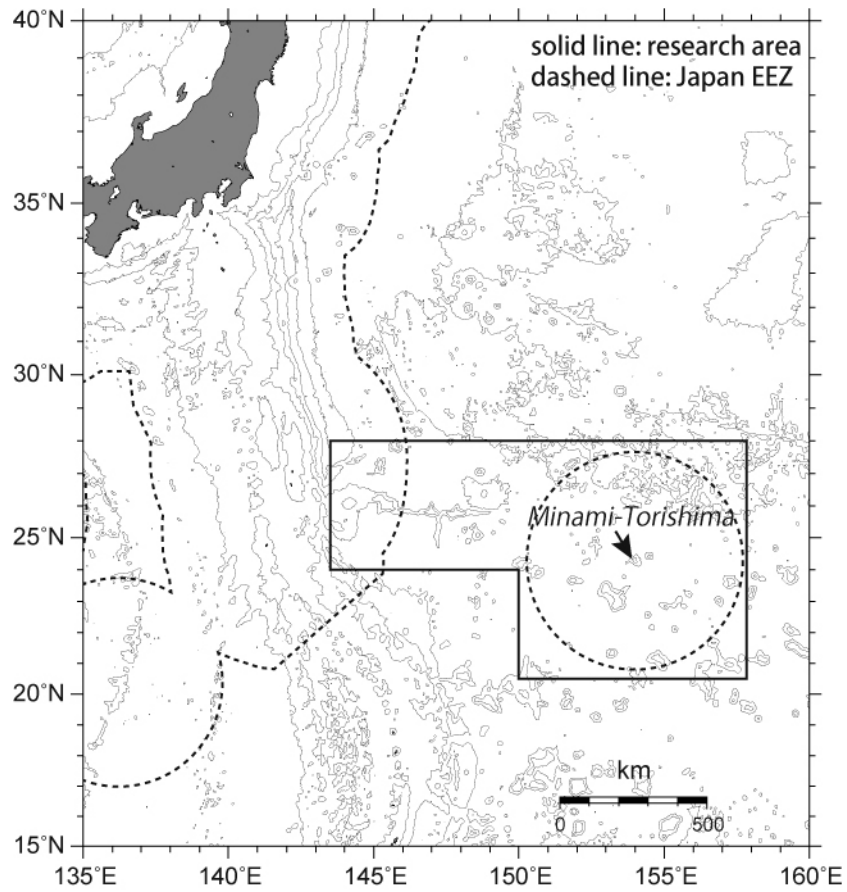
Title of proposal: Survey of REY-rich mud around Minami-Torishima Island.

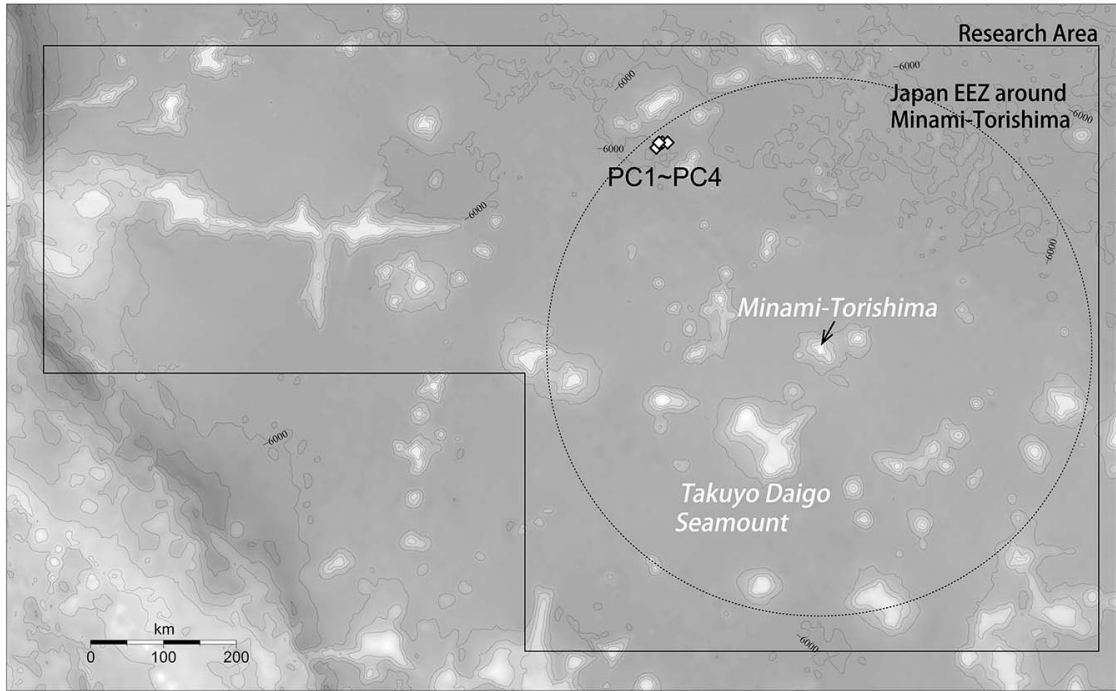
Cruise period: January 22 to February 5, 2014

Ports of call: Saipan to Yokosuka

Research area: Off Minami-Torishima Island (Marcus Island)

Research Map





* Coordinates of the sites are confidential matter.

2. Researchers

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3. Observation

3.1 Objectives & Background

Kato et al. (2011) reported that rare-earth elements and yttrium rich mud (REY-rich mud) is widely spread in the Pacific Ocean. In January 2013, Submarine Resources Research Project, JAMSTEC had carried out the research cruise KR13-02 to obtain sediment cores around Minami-Torishima island in Japanese exclusive economic zone (EEZ). In these cores, we confirmed extremely REY-rich mud in shallow sub-seafloor off south Minami-Torishima (press release, 2013).

Our objective in this cruise was to carry out a detailed investigation of REY-rich mud off east and south of Minami-Torishima, especially around the sites where we found extremely REY-rich mud in cruise KR13-02. Concretely, (1) Obtain sub-bottom profiler data throughout the cruise in the research area to confirm sub-seafloor sedimentary sequences and (2) Collect sediment core samples to examine abundance of rare earth elements.

Kato, Y., Fujinaga, K., Nakamura, K., Takaya, Y., Kitamura, K., Ohta, J., Toda, R., Nakashima, T. and Iwamori, H. (2011): Deep - sea mud in the Pacific Ocean as a potential resource for rare - earth elements. *Nature Geoscience*, **4**, 535 - 539. doi: 10.1038/NGEO1185.

JAMSTEC and The University of Tokyo: Discovery and distribution of mud containing very high concentrations of rare earth elements and yttrium around Minami-Torishima Island (Minami-Torishima Survey Cruise), Press Release on March 21, 2013.

3.2 Methods & Instruments

3.2.1 Sub-Bottom Profiler

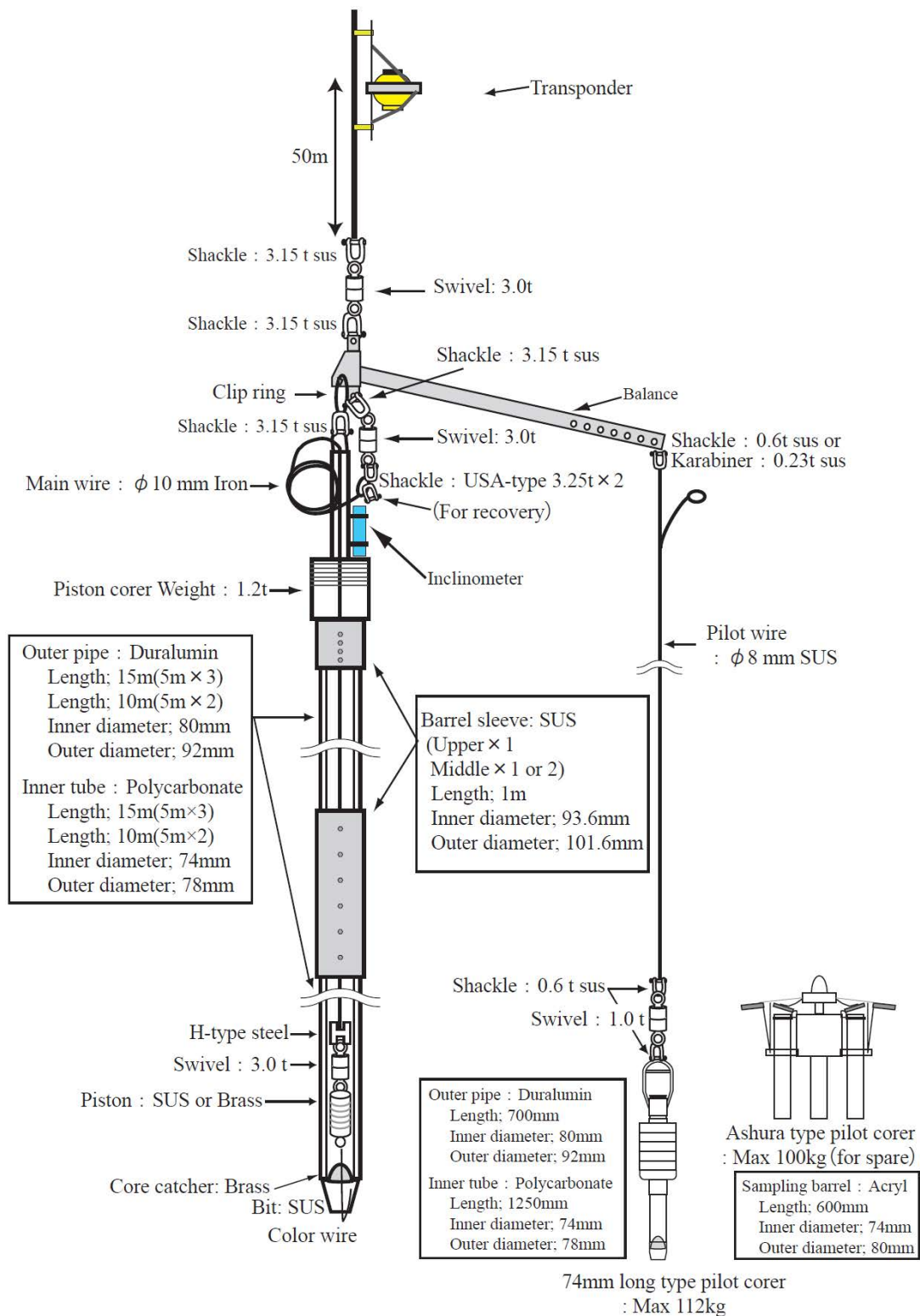
The sub-bottom profiler was used throughout the cruise in the research area to confirm sub-seafloor sedimentary sequences such as chert layer, and for determination of coring site.

3.2.2 Piston Corer

Piston core sampler system (Fig.1) consists of 1.2t-weight, 5m-long duralumin barrel with polycarbonate liner tube and a pilot core sampler. The inner diameter (I.D.) of polycarbonate liner tube is 74mm. The total weight of the system is approximately 1.4t in the air. The length of the core barrel was 15 or 10m that was decided by site survey data and the results of the first time coring. We used Ashura type pilot corer (called Ashura) and ϕ 74mm long type pilot corer (called 74 corer) for a pilot core sampler.

In this cruise, we used annealing polycarbonate liner tube. When we divide the core in half, non-anneal polycarbonate have transformation internally. However, annealing polycarbonate lessen transformation. Moreover, we used Normal type piston. This is composing of brass or stainless steel body and one rubber board (hardness: 50). And we used a winch wire which diameter is 14mm.

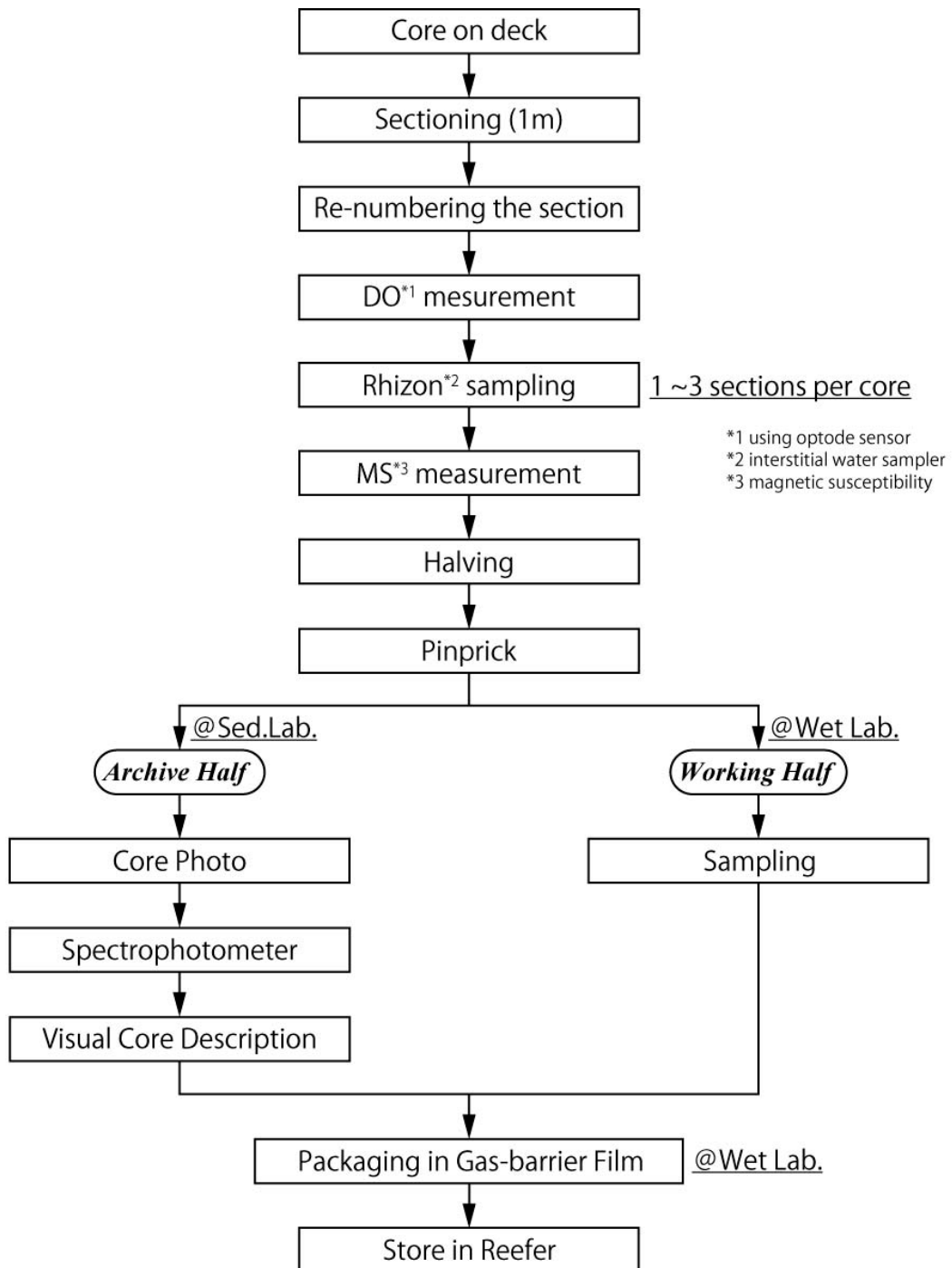
When we started lowering PC, a speed of wire out was set to be 20 m/min., and then gradually increased to the maximum of 60 m/min. The corer was stopped at a depth about 100 m above the seafloor for 3 minutes to reduce some pendulum motion of the system. After that, the wire was stored out at a speed of 20 m/min., and we carefully watched a tension meter. When the corer hit the bottom, wire tension decreases suddenly by the loss of the corer weight. After that, wire out was stopped and winding of the wire was started at a speed of 10m/min. Then, until the tension gauge indicates that the corers were lifted off the bottom. After leaving the bottom, winch wire was wound in at the maximum speed (60m/min).



Construction of 10 or 15m PistonCorer (KR14-02)

Fig.1 Piston corer system with 1.2t weight in KR14-02.

3.2.3 Core Flow



3.3 Preliminary Results

We obtained 4 sediment cores at 4 sites. The detail is confidential matter.

4. Notice of Using

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

This report may not be corrected even if changes on contents may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.

Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.