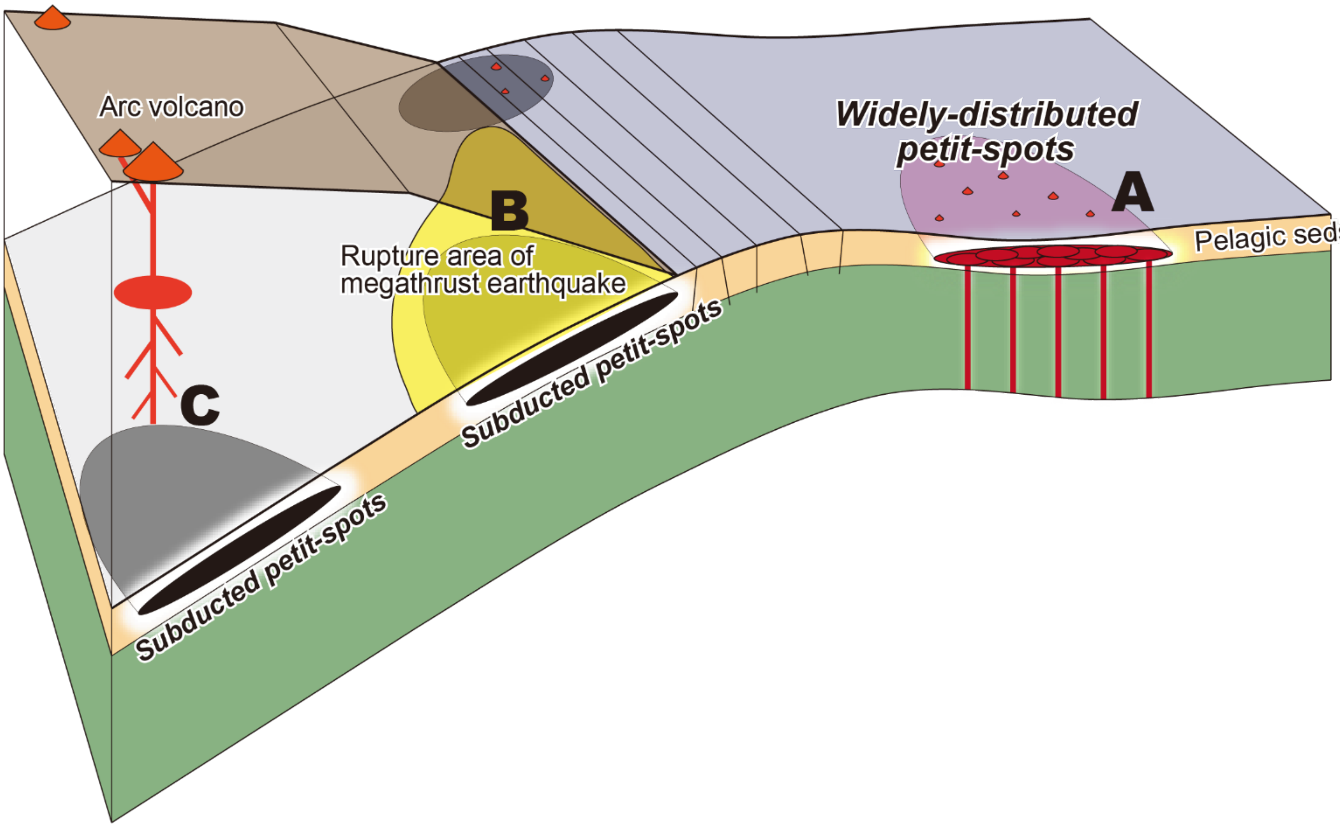
INTERNATIONAL OCEAN DRILLING PROGRAMME



SCIENTIFIC PROSPECTUS

IODP³ Expedition 502: Impact of Petit-Spot Magmatism on Subduction Zone Seismicity and the Global Geochemical Cycle

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IODP[3] INTERNATIONAL OCEAN DRILLING PROGRAMME

IODP^3 Expedition 502 Scientific Prospectus

Impact of Petit-Spot Magmatism on Subduction Zone Seismicity and the Global Geochemical Cycle

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Abstract

International Ocean Drilling Programme (IODP[3]) Expedition 502 plans to explore the nature of the acoustic basement in the outer rise area of the NW Pacific subduction system, where layer-1 pelagic sediment of the subducting old (120–130 Ma) Pacific Plate is exceptionally thin. The hypothesis is that the acoustically thin sediment cover can be attributed to basalt sill intrusions or sheet lava extrusions in and on the pelagic sediment package by basalts fed by petit-spot magmatism. This hypothesis will be tested to see if petit-spot magmatism at the outer rise is more widely distributed than previously thought. The existence of widely-distributed petit-spots would strongly impact the subduction system, including rupture nucleation and slip propagation of plate boundary megathrust earthquakes, as well as effect changes to the geochemical cycle of arc magmatism and the global volatile cycle due to the differing materials associated with the subducted oceanic plate. Testing this hypothesis will shed light on the impacts of subduction inputs and help to determine the global role of petit-spot magmatism, both of which are important elements of the scientific objectives of the International Ocean Drilling Programme (IODP[3]).

Plain Language Summary

International Ocean Drilling Programme (IODP[3]) Expedition 502 plans to drill the outer rise area of the Japan Trench, where the sediment layer above the acoustic basement is unusually thin. There is a hypothesis that this thin sediment is caused by basalt intrusions or lava flows related to a type of volcanic activity called petit-spot magmatism. The goal of this expedition is to determine if this volcanic activity is more widespread than previously thought. If confirmed, it could significantly influence how subduction zones work, including earthquake processes, volcanic activity, and global chemical cycles. This research will help understand the role of petit-spot magmatism and its impact on the Earth's systems.

Schedule for Expedition 502

International Ocean Drilling Programme (IODP[3]) Expedition 502 is based on IODP drilling Proposal 939-APL (available at **https://www.iodp.org/docs/proposals/679-939-apl3-yamaguchi-cover-1/file**). Following evaluation by the IODP Scientific Advisory Structure, the expedition is scheduled for the D/V *Chikyu*, operated under contract with the Institute for Marine-Earth Exploration and Engineering (MarE3) at the Japan Agency for Marine-Earth Science and Technology (JAMSTEC). At the time of publication of this Scientific Prospectus, the expedition is scheduled in 2025, starting on 31 October 2025 and ending 24 November 2025. A total of 24 (not including port call) days will be available for the transit, drilling, and coring, described here in this report. The expedition will start and end in a port call at the Port of Sendai in Miyagi Prefecture, Japan. Due to the expected short transit times, there is a possibility that some measurements, including non-time-sensitive measurements and personal sampling, may need to be done at the Kochi Core Center (KCC), in Kochi, Japan, and/or on the D/V *Chikyu* at quayside. Further details on *Chikyu* can be found here:

https://www.jamstec.go.jp/mare3/e/ships/research_vessel/chikyu.html

Introduction

The Pacific Plate in the NW Pacific contains a few hundred meters-thick layer of pelagic sediment, representing the typical structure of an old oceanic plate. Recent seismic reflection studies, however, show remarkable variation in the thickness of the sediment layer on the outer rise (**Figure 1**). The typical thickness of the sediment layer is roughly 300–400 m, yet wide regions have a sediment thickness of only 50 m or less while their surface topography is not clearly anomalous. The sedimentation rate in this region is ~5-25 cm/kyr (Yamaguchi et al., 2017), suggesting that all sediments overlying the acoustic basement have been deposited within one million years.

We hypothesize that the thin acoustic sediment cover is due to basalt sill intrusions or sheet lava extrusions within and/or above a thicker pelagic sediment package, and that the intrusive and extrusive events were fed by petit-spot volcanism that occurred around the outer rise (**Figure 2**). Petit-spots are a recently discovered volcanic system characterized by highly alkalic and CO_2-rich basalt that is generated by a low degree of partial melting of the asthenosphere. These deep mantle melts have been proposed to form and upwell due to the flexure of the 120–130 My-old oceanic Pacific Plate prior to subduction (Hirano et al., 2006; Yamamoto et al., 2014; Machida et al., 2015; 2017). This magmatism creates a volcanic cluster composed of tiny monogenetic basalt volcanoes of a few kilometers in diameter and less than 300 m high.

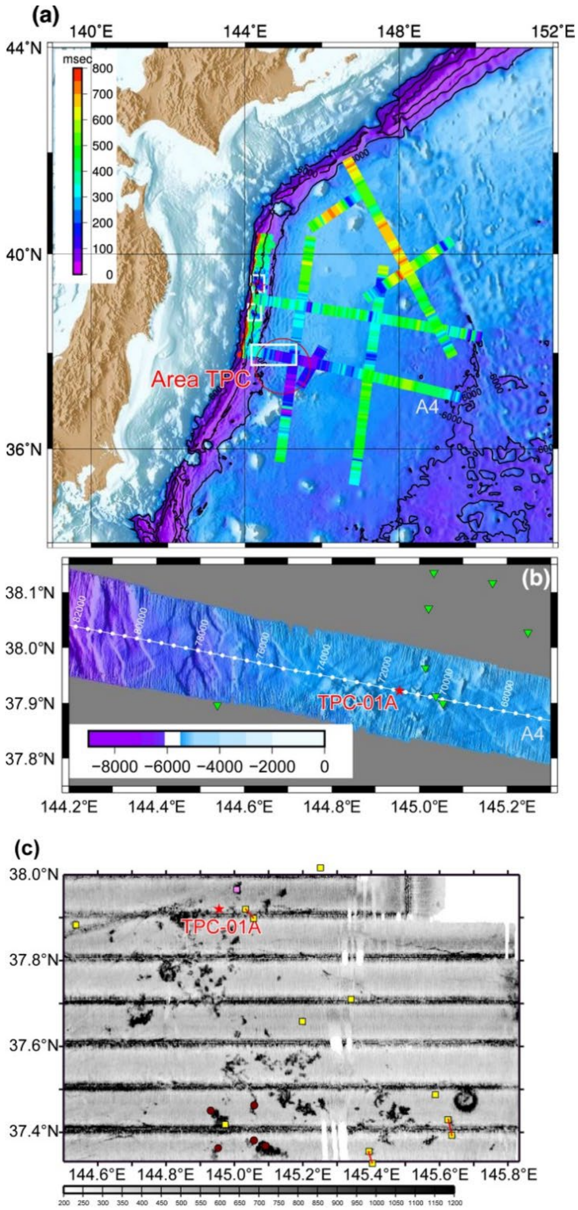

Figure 1. Map of the study area. (A) Bathymetric map of the NW Pacific showing Area TPC and the thickness of sediment above acoustic basement. The sediment thickness in two-way travel time is derived from multi-channel seismic reflection profiles. (B) Detailed bathymetric map along seismic survey line A4 obtained using a multi-narrow beam echo sounder during the seismic survey. Green triangles show previous dive sites of human-occupied submersible (HOV) Shinkai-6500. Proposed Site TPC-01A is our primary drilling site. There are several small knolls around TPC-01A, suggesting the presence of petit-spot volcanoes. Based on this rough seafloor topography, Hirano (2011) suggested that there are more than 80 petit-spot volcanoes in this area. This is corroborated by the recent volcanic activity in this area. (C) Backscatter map covering Proposed Site TPC-01A, modified from Hirano et al. (2008). Yellow squares, a pink square, and brown circles indicate HOV Shinkai-6500 dive sites during the YK14-05 cruise, an ROV Kaiko-7000 dive site during *Kairei* cruise KR07-07, and dredge sites from *Shinsei-Maru* cruise KS18-09, respectively. The youngest and most strongly alkaline lavas were recovered from the southeastern yellow square (younger than 0.13 Ma; Sato et al., 2018). Two older eruption ages of 3.8 and 9.2 Ma from the northern part of TPC-01A were reported by Machida et al. (2015).

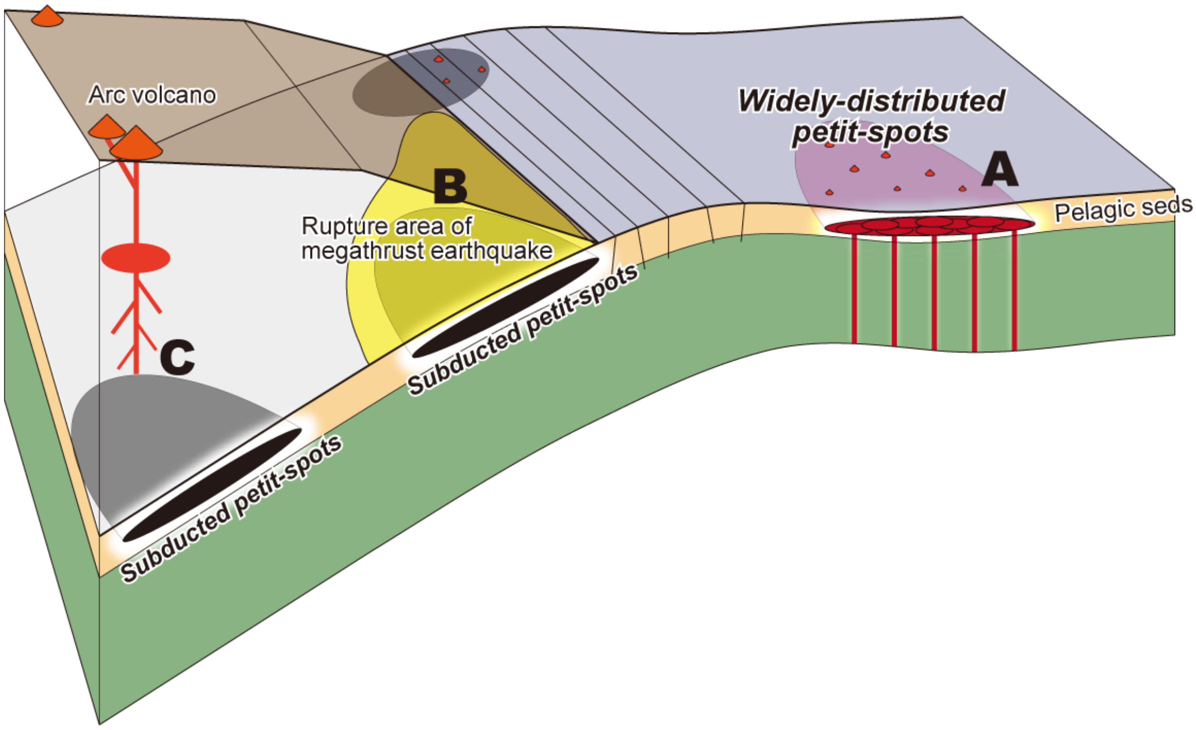

Figure 2. Petit-spots, subduction megathrust earthquakes, and global geochemical cycles. Schematic illustration showing the relationships between widely-distributed petit-spots, subduction megathrust earthquakes, and global geochemical cycles. Widely-distributed petit-spots may affect (A) the global carbon cycle, (B) subduction zone earthquakes (i.e., rupture nucleation at depths and/or inhibit slip propagation along the shallow part of the subduction megathrust), and (C) subduction zone geochemical cycles.

Considering the wide distribution of the acoustic thin sediment cover in this region (**Figure 1**), we may have vastly underestimated the volume of petit-spot magmatism. If this is the case, then petit-spot rocks are much more widely distributed than has been previously thought.

Why are widely-distributed petit-spots a matter of concern in Earth Science?

Their impact on subduction zone earthquakes

The thickness of the sedimentary package of an incoming plate affects the rupture of the plate boundary megathrust. Variations in sediment thickness in the Japan Trench suggest that a thick sediment layer is likely to reduce interplate coupling (Tsuru et al., 2002). The hypocenter of the 2011 Tohoku earthquake corresponds to the high-seismic-velocity section of the plate boundary, potentially related to thin incoming sediment (Huang and Zhao, 2013). On the other hand, the existence of frictionally weak material in the plate boundary also affects coseismic slip propagation. The shallow tsunamigenic slip during the 2011 Tohoku earthquake was caused by a smectite-rich pelagic clay layer with low coseismic friction (Ujiie et al., 2013). Although this pelagic clay layer was deposited in the Miocene and is broadly distributed in the NW Pacific (Kameda et al., 2015; Moore et al., 2015), if such a layer were intruded or covered by the widely-distributed petit-spot basalt sills or extrusive lavas, the clays would have been thermally metamorphosed or dismembered. In either situation, subducted petit-spots could influence plate boundary earthquakes; they could potentially activate the nucleation of fault rupture at depth, and also potentially inhibit slip propagation at shallow portions.

Their impact on global geochemical cycles

Understanding the extent of magmatism and the geochemical nature of widely-distributed petit-spot basalts are potentially significant to Earth's geochemical cycles. Since they are believed to be small in volume, the contributions of the petit-spots to global geochemical cycles could be greatly underestimated. Petit-spot lavas are strongly alkalic and have a high carbon dioxide (CO_2) content; the estimated CO_2 flux at various petit-spots is higher than that observed in hot spot volcanism (Okumura and Hirano, 2013). If the total volume of petit-spot magmatism is larger than previously thought, then it could be an important pathway for CO_2 outgassing from the mantle that influences the global carbon cycle.

The isotopic signatures of petit-spot basalts are of the enriched mantle 1 (EM1) type in terms of Sr-Nd-Hf-Pb isotopes (**Figure 3**) (Machida et al., 2009; Miyazaki et al., 2015). This chemistry differs from that for any other Pacific Plate components subducted beneath NW Japan. If widely-distributed petit-spots had been active in the past, then the EM1 geochemical component could be recycled into present-day arc magmas. Identification of widely-distributed petit-spots would then require a reassessment of the subduction zone geochemical cycle.

International Ocean Drilling Programme (IODP[3]) Expedition 502 plans to explore the nature of the acoustic basement in the outer rise area of the NW Pacific subduction system, where layer-1 pelagic sediment of the subducting old (120–130 Ma) Pacific Plate is exceptionally thin. The hypothesis is that the acoustically thin sediment cover can be attributed to basalt sill intrusions or sheet lava extrusions into and on the pelagic sediment package by basalts fed by petit-spot magmatism. This hypothesis is supported by studies of seismic reflection (Fujie et al., 2020) and dive surveys (Akizawa et al., 2022), but will be tested through drilling to see if petit-spot magmatism at the outer rise is more widely distributed than previously thought. The existence of widely-distributed petit-spots would strongly impact the subduction system, including rupture nucleation and slip propagation of plate boundary megathrust earthquakes, as well as effect changes to the geochemical cycle of arc magmatism and the global volatile cycle due to the differing materials associated with the subducted oceanic plate. Testing this hypothesis will shed light on the impacts of subduction inputs and help to determine the global role of petit-spot magmatism, both of which are important elements of the scientific objectives of the International Ocean Drilling Programme (IODP[3]).

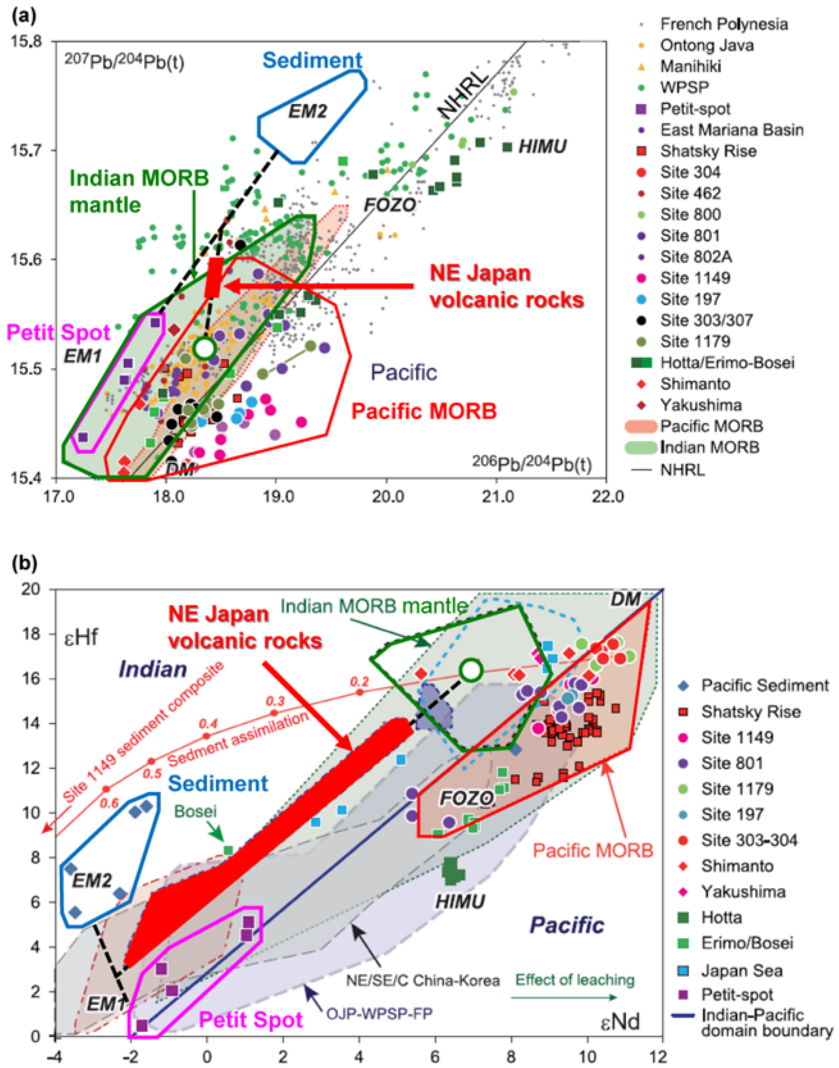

Figure 3. Nd-Hf-Pb geochemistry of volcanic rocks from petit spot and NE Japan compared with Pacific Mid-Ocean Ridge Basalt (MORB), Indian MORB mantle, sediments, and volcanic rocks in the Pacific Ocean (Miyazaki et al, 2015). (A) Time-corrected Pb isotopic competitions. (B) εNd-εHf compositions. The isotopic variation of NE Japan volcanic rocks (red area) can be explained by mixing the components of petit spot-derived volcanic rock, Indian MORB, and sediment as shown by thick broken lines. This indicates that significant amounts of petit-spot lavas were transported into the Earth's deep interior as the oceanic plate subducting beneath NE Japan.

Background

Petit-spot magmatism

Volcanism on the Earth had been believed to occur in three tectonic settings: divergent plate boundaries (such as mid-ocean ridges), convergent plate boundaries (such as island arcs), and hot spots. However, clusters of small alkalic volcanoes on the ~135 million-year-old Pacific Plate not conforming to any of these categories were found in the early 21st century, and due to their small sizes were termed "Petit-spot volcano" (Hirano et al., 2006). After their first discovery in the Japan Trench, petit-spot volcanoes have been found off Java, Chile, and the Mariana (Hirano and Machida, 2022). Petit-spots are thought to have been formed in response to the flexure of a subducting oceanic plate and provide a unique opportunity to directly examine the structure, geochemical composition, carbon cycle of the lithospheric and asthenospheric mantle beneath the subducting oceanic crust (Machida et al., 2017; Hirano and Machida, 2022). Petit-spot magmatism creates volcanic clusters composed of tiny monogenetic basalt volcanoes a few kilometers in diameter and less than 300 m high (Hirano et al., 2006). These are similar to subaerial intraplate volcanic fields (Valentine and Hirano, 2010) that can produce widespread lava flows and shallow sills (Valentine and Krogh, 2006; Richardson et al., 2015).

Scientific Objectives

The goal of this project is to elucidate the existence of widely-distributed petit-spot volcanism that may significantly impact the generation of megathrust earthquakes and the Earth's geochemical cycles. Only ocean drilling can assess the nature of the acoustic basement beneath regions of anomalously thin sediment cover. For this purpose, we also plan to sample the sediment cover, including gases and pore fluids.

Nature of the acoustic basement in regions of thin sediment cover

If the acoustic basement consists of extrusive rocks, then lavas or volcanic breccias will be sampled. In the case of intrusive rocks, fragments of thermally affected sediment will also be recoverable.

Impact of petit-spots on composition of pelagic sediments

We will determine the ages of all recovered sediments using magnetostratigraphy, tephrochronology, and biostratigraphy. If Miocene smectite-rich pelagic clay is deficient in the thin sediment cover, it could inhibit coseismic slip propagation at shallow depths yet facilitate rupture nucleation at seismogenic depths, with a significant impact on megathrust earthquake segmentation.

Geochemical estimation of fluxes related to petit-spot volcanism

Geochemistry for the basalt samples will characterize the geochemical signature of this petit-spot magmatism and allow us to better assess its influence on subduction zone magmatism. Volatile contents in the basalts and adjacent sediments, along with the isotope geochemistry of gases and pore waters, will be used to determine the nature of volatiles released at the outer rise.

Site characterization

IODP[3] Expedition 502 proposes one main drilling site (TPC-01A) (**Figure 1**). In terms of the relationships with the 2011 Tohoku earthquake, Area TPC corresponds to the largest slip. **Figure 4** shows seismic reflection profiles of all the proposed drilling sites. Seismic reflection line A4 is located in the outer rise region of the central Japan Trench; the eastern half of the profile crosses Area TPC. The first strong reflector beneath the seafloor (acoustic basement) has significantly rough topography. Proposed Site TPC-01A is located in areas where the sediment cover is thin.

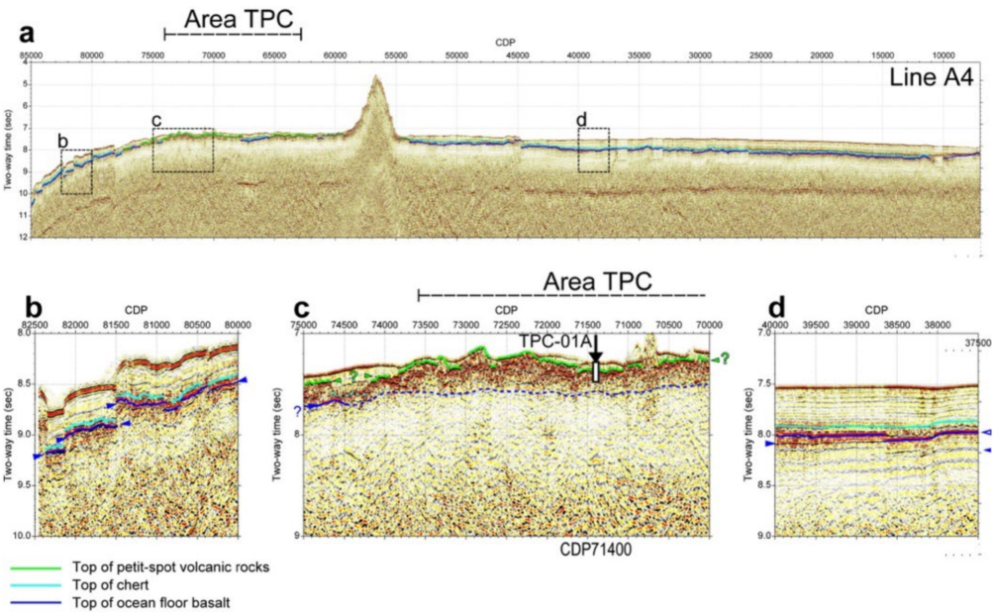

Figure 4. Time-migrated seismic reflection profiles of Line A4 with showing the proposed drill site TPC-01A. Dark blue, light blue, and light green interpretation lines in each figure indicate the top of ocean floor basalt, top of chert, and top of petit-spot volcanic rocks, respectively. Seismic reflection line A4 (A) is located in the outer rise region of the central Japan Trench; the eastern half of the profile crosses Area TPC. Reflectors corresponding to chert and ocean floor basalt are well observed on both sides of Fig. 4a (B and D), whereas from CDP59000 to CDP78000 the first strong reflector beneath the seafloor (acoustic basement) has significantly rough topography and is shallower than those in other portions, and is interpreted as buried petit-spot basalt (C). Proposed Site TPC-01A is located in areas where the sediment cover is thin. Along A4, a large tuned airgun array (with a total volume of 7800 cubic inches) was used, and the receiver and shot spacings were 12.5 m and 200 m, respectively.

Site survey data

All site survey data for Expedition 502, such as bathymetric data, are archived at the IODP Site Survey Data Bank (**https://ssdb.iodp.org/SSDBsearch/index.php**; use P939 for proposal number). **Table 1** and **Figure 5** depict the site summary for Proposed Site TPC-01A.

Table 1. Site summary. TD: total depth, mbsf: metres below seafloor.

Site:	TPC-01A
Priority	Primary: *Chikyu* Expedition 502 (riserless)
Position	37.9218 144.9548
Water depth (m)	5485
Target drilling depth (mbsf)	225
Approved maximum	225
Survey coverage	CDP71400 of Seismic Line A4
Objective	Wireline logging to TD. Recover sediment/basement boundary and further drill down to ~100 m below the basement to penetrate through petit-spot lava or sill.

Operation plan and coring strategy

Operations will begin after a short portcall in Sendai, Japan, where the Expedition 502 Science Team will embark, before transiting to the drill site. IODP^3 Expedition 502 will visit Proposed Site TPC-01A. The general operations plan and time estimates are provided in **Table 2** and **Figure 5**. The operational sequence to be completed by D/V *Chikyu* during IODP^3 Expedition 502 will penetrate through the acoustic basement underlying ~60 m below the sea floor (mbsf), and then drill down an additional 165 m, down to ~225 mbsf (**Figure 5**). This includes the target interval plus an additional depth to compensate for the length of the wireline logging (WL) tools and a 20 m rathole. This target depth is chosen because a single channel seismic reflection study shows that the petit-spot lavas are likely to have a thickness of <100 m (Fujiwara et al., 2007). The estimated time for the entire operation is 24 days, determined by MarE3/JAMSTEC.

Table 2. Operations schedule for IODP^3 Expedition 502.

Exp.	**Operation**	**Hole Size (inch)**	**Depth (m)**	**Day(s)**	**Subtotal (d)**	**Total (d)**
502	Portcall in Sendai			1	1	
	Transit			2	3	3
	TPC-01A: Drilling to TD	8-1/2	225	5	5	
	TPC-01A: WL	8-1/2	160	3	8	
	TPC-01A: HPCS/ESCS	10-5/8	60-65	3	11	
	TPC-01A: RCB	10-5/8	160	8	19	19
Sendai crew change				1	1	20
Contingency Time				3.5	3.5	23.5

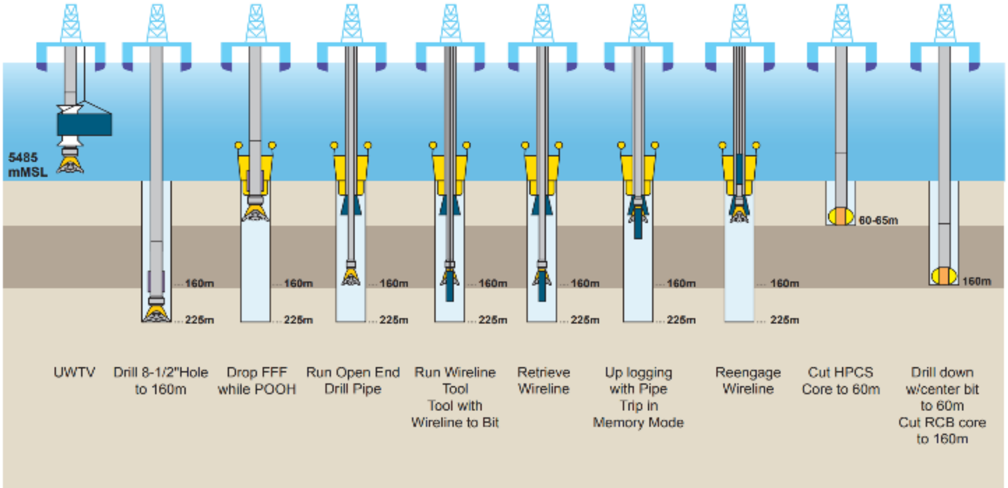

Figure 5. Proposed operations plan for IODP[3] Expedition 502. The initial borehole will be drilled to total depth (TD) (ca. 225 mbsf), and then before pulling out of hole, a free-fall funnel will be dropped to allow for borehole re-entry. An open drillpipe will be run into the borehole, and then the ThruBit wireline logging (WL) tools will be run through the open pipe to log the open borehole. Once WL is complete, the logging data will be used to identify the coring targets for the coring borehole, where HPCS/ESCS coring and RCB coring will be performed. The most prioritized target in this project is recovering the sediment/basement contact and determining the thickness of the intrusive/extrusive body. Logging (gamma-ray, resistivity, velocity) will help determine the exact depth of the acoustic basement and the thickness of volcanic rocks.

Wireline logging

The IODP[3] Expedition 502 drilling operation will begin with drilling an 8-1/2-inch hole to ca. 225 meters below seafloor (mbsf). After installing a free-fall funnel onto the open borehole, wireline logging (WL) will be used to clarify the geophysical and geological nature of the basement, as well as the exact depths of the boundaries. WL tools will be run through the center of open-ended drill pipe, and will be comprised of the following suite of Schlumberger ThruBit WL tools: Telemetry Memory Gamma-ray (TMG), Laterolog (resistivity [TBLA]), Dipole Sonic (TBDS), and the Electronic Imager (TBEI). Clear changes in gamma-ray, resistivity, and sonic velocity are expected at the sediment/basaltic basement contact from WL data.

Coring

The next phase of operations will comprise coring the entire depth range with the Hydraulic Piston Coring System (HPCS)/Extended Shoe Coring System (ESCS) for sediments, and the Small-Diameter Rotary Core Barrel (SD-RCB) for basement.

Science operations

A Sampling and Measurements Plan (SMP) for Expedition 502 will be prepared by MarE3 and the Co-Chief Scientists to meet the scientific objectives of IODP[3] Expedition 502. Science activities on the D/V *Chikyu* during the Expedition will apply standard IODP[3] shipboard curation, measurements, and publications. Details of the facilities that will be available can be found on the *Chikyu* wikipages. The Measurements Plan will take account of *Chikyu* specifications for QA/QC. The following briefly summarizes the scientific activities:

- Logging and Core-log-seismic integration (CLSI): Gamma-ray, resistivity, and sonic velocity logs and their depth distribution. Comparing and integrating logging results with core and seismic results.
- Sedimentology: Non-destructive visual core description and smear slide observation, high-resolution digital imaging, X-ray computed tomography (X-CT) scans, colour reflectance spectrophotometry, bulk mineralogy with X-ray diffraction (XRD), bulk chemistry with X-ray fluorescence (XRF), particle size analysis, and tephrochronology.
- Igneous petrology: Visual core description, thin section observation, high-resolution digital imaging, X-CT scans, bulk mineralogy with XRD, bulk chemistry with XRF.
- Structural geology: Destructive visual core description, Fault and fracture orientation analysis, X-CT scans, detail microstructure of lithological boundaries.
- Micropaleontology: Biostratigraphic analyses of siliceous microfossils (e.g., diatom and radiolaria), benthic foraminifers and redeposited calcareous pelagic micro- and nannofossils.
- Paleomagnetism: Paleomagnetic measurements and magnetostratigraphy, magnetic susceptibility.
- Physical properties: Multi-sensor core logging for gamma density, P-wave velocity, electrical resistivity, natural gamma radiation, thermal conductivity measurement, P-wave velocity and moisture and density (MAD) on discrete samples, undrained shear strength and unconfined compressive strength.
- Geochemistry: Taking samples for headspace (HS) shipboard gas analyses of concentrations and relative abundance of light hydrocarbon gases (C1 to C4) and noble gases, pore fluid chemistry (by Rhizon and squeezed samples), carbon-hydrogen-nitrogen-sulfur (CHNS) elemental analysis, and sediment organic/inorganic carbon analyses.
- Taking and proper storage (+4° and -80°C) of samples for microbiological post-expedition research and for ephemeral properties.

In principle, report preparation will take place on board as required; the reports to be compiled include:

- Daily and weekly operational reports will be compiled by MarE3 and provided to the management and panels of IODP[3], and any other relevant parties. Scientific reports are provided by the Co-Chief Scientists.

- Daily and weekly operational reports compiled by MarE3 and provided to the management and panels of IODP³, and any other relevant parties.
- Expedition Summary compiled by the Science Team (submission to IODP³ publications at the end of the expedition).
- The Methods and Site Reports compiled by the Science Team (submission to IODP³ publications as soon as practically possible after the expedition).

Research planning: sampling and data sharing strategy

All researchers requesting samples should refer to the IODP³ Sample, Data, and Obligations Policy & Implementation Guidelines (**https://iodp3.org/documents/sample-data-obligations-policy/**). This document outlines the policy for distributing IODP³ samples and data to research scientists, curators, and educators. The document also defines the obligations that sample and data recipients incur. The Sample Allocation Committee (SAC; composed of Co-Chief Scientists, Expedition Project Manager, and IODP³ Curator) will work with the entire Science Team to formulate an expedition-specific sampling plan for "shipboard" (expedition) and post-cruise (personal post-expedition research) sampling.

Members of the Science Team are expected to carry out scientific research for the expedition and publish results. Before the expedition, all members of the Science Party are required to submit research plans and associated sample/data requests via the IODP³ Sample, Data, and Research Request (SDRM) system (**https://web.iodp.tamu.edu/SDRM/#/**) about six months before the beginning of the expedition. Based on sample/data requests submitted by this deadline, the SAC will prepare a tentative sampling plan, which will be revised on the ship once cores are collected and split as dictated by recovery and cruise objectives. All post-cruise research projects should provide scientific justification for desired sample size, numbers, and frequency. The sampling plan will be subject to modification depending upon the material recovered and collaborations that may evolve between scientists during the expedition. This planning process is necessary to coordinate the research to be conducted and to ensure that the scientific objectives are achieved. Modifications to the sampling plan and access to samples and data during the expedition and the 1-year post-expedition moratorium period require the approval of the SAC.

The permanent archive halves are officially designated by the IODP³ curator. Should there be a copy of an interval from parallel holes, they may be classified as temporary archives. All sample frequencies and volumes must be justified on a scientific basis and will depend on core recovery, the full spectrum of other requests, and the expedition objectives. Some redundancy of measurement is unavoidable, but minimizing the duplication of measurements among the shipboard team and identified shore-based collaborators will be a factor in evaluating sample requests.

If critical intervals are recovered, there may be considerable demand for samples from a limited amount of cored material. A sampling plan coordinated by the SAC will be required before critical intervals are sampled. The SAC strongly encourages, and may require, collaboration and/or sharing among the shipboard and shore-based scientists so that the best use is made of the recovered core. Coordination of post-cruise analytical programs is anticipated to ensure that the full range of geochemical, isotopic, and physical property studies are undertaken on a representative sample suite.

Core and data management

The data management plan follows the standard *Chikyu* and IODP[3] measurement policies:

- Core sections will be registered in J-CORES, the *Chikyu* Lab Management System, along with all personal samples, subsamples, data, images, and standard shipboard measurements. At the end of the expedition, the data will be archived in the web-browser accessible JAMSTEC Scientific Ocean Drilling Data (J-SODD) database.
- Core sections (archive and working halves) will be stored at an IODP[3] core repository to be determined.
- Shipboard data will be available in the JAMSTEC Scientific Ocean Drilling Data (J-SODD).

Outreach

JAMSTEC/MarE3, PMO offices, and IODP[3] will collaborate on outreach activities before, during, and post-expedition.

Staffing

Scientific staffing is determined on the basis of task requirements and nominations from the IODP[3] Programme Member and Associate Member Offices. Staffing is based on the need to carry out the drilling and scientific operations safely and efficiently. A list of participants for Expedition 502 will be added to the JAMSTEC *Chikyu* Expedition 502 website when available (**https://www.jamstec.go.jp/chikyu/e/exp502**).

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