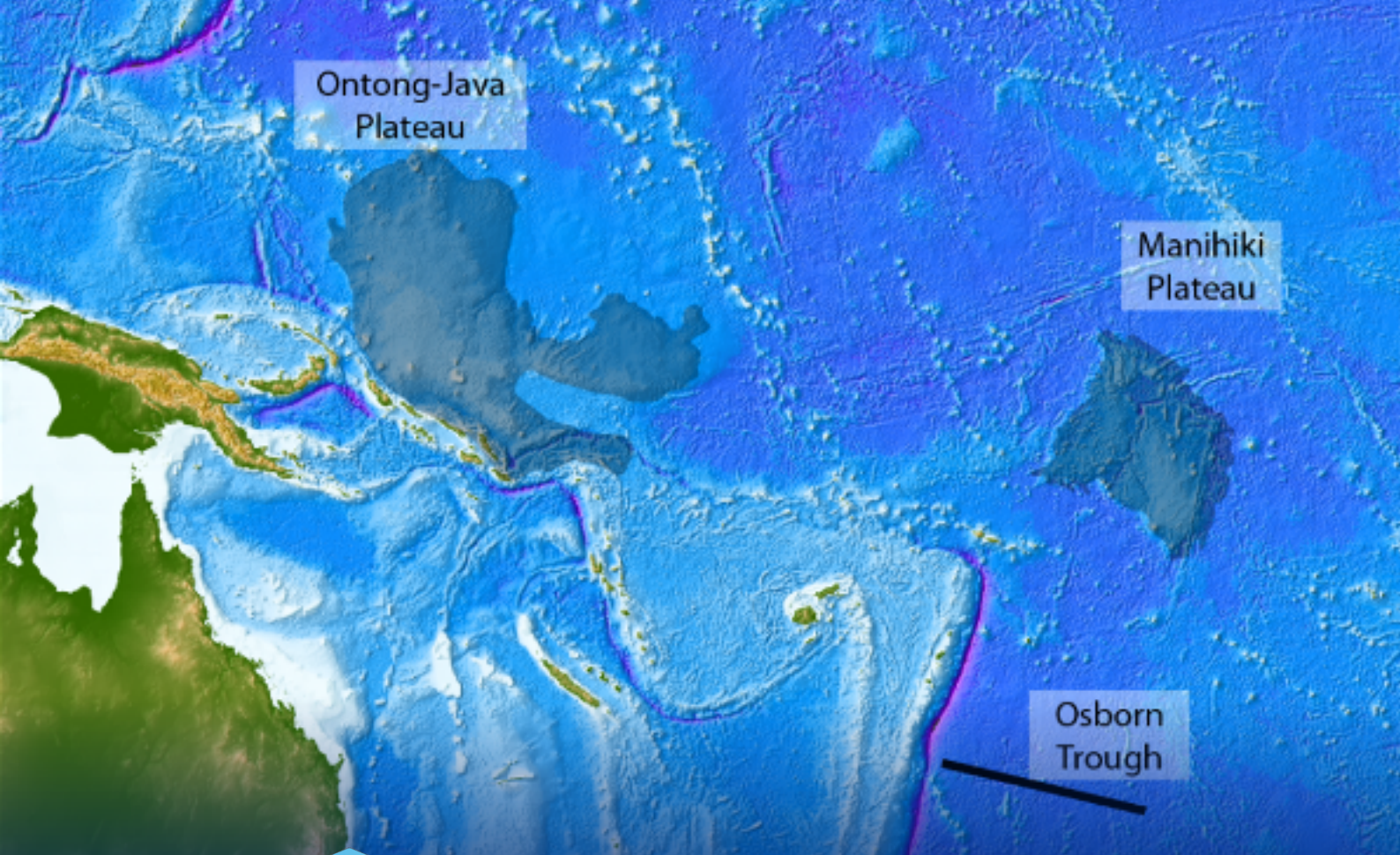

INTERNATIONAL OCEAN DRILLING PROGRAMME

CALL FOR PARTICIPATION

IODP³ Expedition 504S:

Volcanic ash on the Ontong Java Plateau: testing models of subduction reversal and wind transport in the western equatorial Pacific

Deadline: 16 January 2026

17 November 2025

Call for Participation in IODP^3 Expedition 504S: **Volcanic ash on the Ontong Java Plateau**

Co-Chief Scientists: Robert Musgrave & Ann Dunlea

Introduction

IODP^3 Expedition 504S is a SPARC (Scientific Projects using ocean drilling ARChives) expedition involving sampling and analysis of volcanic ashes and surrounding sedimentary rocks in legacy ODP and DSDP cores recovered from the Ontong Java Plateau, and held in the Gulf Coast Core Repository (GCR) in College Station, Texas, USA. We invite applications from scientists with interest and expertise relevant to the objectives of the expedition to apply for membership of the IODP^3 Expedition Science Team. This call is open to applicants based in nations currently participating in IODP^3 or in any nation currently or previously a member of a scientific ocean drilling programme.

New!

To enable the IODP^3 Science Office to provide support to scientists interested in applying for this expedition, we are asking potential applicants to complete our new Expression of Interest Google Form (available **here**). This is not compulsory, does not commit you to apply, and not completing the form does not influence the evaluation of any application you make in any way. However, we strongly encourage completion of this form to ensure that we can best support you if you proceed to apply… completion will take less than two minutes!

This form will close on 17 December 2025 (one month prior to the application deadline of 16 January 2026)

Background and Objectives

Positioned in the western equatorial Pacific, the Ontong Java Plateau (OJP) is the world's largest oceanic plateau and is flanked by island arc and hotspot volcanoes. Since at least the Eocene, eruptions have deposited volcanic ash throughout the marine sediment accumulating on the OJP. IODP^3 Expedition 504S will focus on the provenance, history, and evolution of the volcanic ash record to achieve two principal objectives: (1) pinpoint the timing and mechanism of the subduction reversal resulting from collision of the OJP with the Solomon Islands arc; and (2)

reconstruct wind patterns and the deposition of dust and volcanic ash in the western equatorial Pacific since the Eocene.

Collision of the OJP with the arc is thought to have congested the subduction zone, accreted a plateau fragment (the Malaita Terrane) and caused subduction reversal. Despite being regarded as the prototypical example of this process, several incompatible hypotheses for the timing and mechanism of the collision and subduction reversal have been proposed. One widely accepted hypothesis involves “soft docking”, a concept involving an initial late Oligocene to early Miocene collision that halted subduction but was not marked by local deformation, and in which subduction reversal was not completed until the late Miocene. Such soft docking has been invoked in other collisional settings, and locally as the cause of a change in Australian plate motion.

Our primary tectonic objective is to investigate the mechanism of subduction reversal. Our principal tectonic focus is to test the legitimacy of the soft docking model for the collision of the OJP and Solomon Islands arc, and weigh it against the two competing hypotheses, one involving a single-stage late Miocene-Pliocene collision and rapid subduction reversal, and the other invoking a two-stage collision of the Malaita Terrane in the late Eocene, followed by the collision of the main part of OJP, and consequent subduction reversal, in the late Miocene. Determination of whether the OJP ashes are arc- or hotspot-derived will discriminate between these tectonic hypotheses.

Secondary tectonic objectives concern the relationship of alkaline volcanic sequences of the Malaita Terrane, the OJP, and the Samoan hotspot. If the OJP ashes prove to have a Samoan hotspot origin, this may help fill a gap in the Samoan hotpot record. If the two-stage collision model is correct, the Malaita Terrane alkaline volcanics would have had an outer-trench swell setting at the time of their eruption and may represent petit-spot volcanism. If so, this makes the Malaita Terrane alkaline volcanics a prime, accessible target for the study of petit-spot volcanism.

The Expedition will fingerprint the origin of volcanic ashes and establish a chronology of eruption history. We will characterize both ash deposited in layers and ash dispersed throughout the bulk sediment separately from aeolian dust derived from continental crust, for a comprehensive perspective on ash and aeolian dust deposited on the OJP.

The primary palaeoclimate objective of Expedition 504S is to unravel the sources of dust and volcanic ash to the OJP and reconstruct the history of deposition of dust and volcanic ash in this part of the western equatorial Pacific over million-year timescales during key periods in the Cenozoic. Specifically, Expedition 504S will test the hypothesis that the late Eocene to Miocene intensification of the East Asian Monsoon, and accompanying changes to the position of the inter-tropical convergence zone, increased the delivery of aeolian dust into the western equatorial

Pacific, while potentially decreasing the transport of volcanic ash to the plateau. Unlike previous studies of OJP aeolian materials, the integration of geochemical evidence for the source of the layered ash, with its implications for the direction and distance of the source from the deposition site, will allow direct inferences of the strength and direction of winds before and during the onset of the East Asian Monsoon.

Complementary land-based study

Expedition 504S will operate in parallel with a land-based study of volcaniclastic rocks from the Malaita Terrane, an accreted fragment of Ontong Java Plateau-related crust that constitutes the islands of Malaita and Santa Isabel in Solomon Islands. Opportunities to potentially participate in this complementary study will be discussed with the Expedition 504S Science Team members once staffing is complete.

Timing and Operations

A detailed implementation plan for the expedition will be developed in discussion with all Science Team members invited to participate following evaluation of applications received. This approach means the overall expedition research effort will benefit not only from the individual contributions proposed by all Science Team members in their applications but also from collaborations developed between team members once staffing is complete.

Expedition 504S has €300,000 of core funding from IODP^3. After selection, Science Team members will engage with the Co-Chief Scientists in developing a detailed budget plan for use of this funding, to ensure the most effective use of this investment and to maximise resulting scientific benefits.

Once the implementation and budget plans are finalised and approved by the IODP^3 MSP Facility Board, a formal start date for the expedition will be agreed with the IODP^3 Science Office and IODP^3 Managing Agency. The funded period will last for three years from this date, with the bulk of the expedition research effort taking place in this period. **Note that there will be no offshore operations.**

Sampling, description and measurement of target core resources stored in the Gulf Coast Repository (GCR) in College Station, Texas, USA, will be conducted by a sub-group of the Science Team over a two-week period. They will be responsible for collecting samples on behalf of the entire Science Team. Final dates for this phase of the expedition are yet to be confirmed, but we currently anticipate this to occur sometime in the period from June to August 2026. Requested samples will then be distributed to other members of the Science Team not involved in the GCR activities. While there are cumulatively 99 recognised ash layers in Eocene to Miocene cores recovered by ODP and DSDP drilling on OJP, the volume of material available for sampling

is restricted. To ensure that all Science Team members have access to the full range of materials, samples will go through an initial stage of description, petrography, grain-size analysis and X-Ray Diffraction (XRD), followed by glass shard picking and mineral separation, before aliquots of the sample extracts are distributed to the corresponding Team members. Selection of the laboratory responsible for this initial processing step will be determined after the Science Team is announced and following discussions between Team members and the Co-Chief Scientists. A similar strategy will be followed for the major and trace element analysis of cryptotephra and carbonate samples, with a selected laboratory tasked with the initial steps of grain-size analysis, XRD, and separation of terrigenous and volcanogenic materials, prior to distribution of aliquots to requesting Science Team members.

Expertise sought

A range of skills will be needed to conduct the core components of the expedition. These include (but are not restricted to) sedimentology, volcanology, physical properties analysis, igneous and sedimentary geochemistry, XRF analysis, palaeomagnetism and rock magnetism, palaeoclimatology and palaeoceanography, biostratigraphy, tephrochronology, and tectonic reconstruction. We invite applications by scientists with expertise in each of these specialities, both for “Repository and Laboratory” and “Laboratory-only roles” (see below). We also welcome applications from researchers proposing complementary research projects that go beyond the stated research objectives or wishing to apply additional or novel techniques not listed above.

How to Apply

★★★ Reminder ★★★

Please consider completing our Expression of Interest form (available **here**) to ensure that we can best support you if you proceed to apply… completion will take less than two minutes!

This form will close on 17 December 2025.

Applications must be submitted to the IODP^3 Science Office by the deadline of **23:59 GMT on Friday 16 January 2026** using the **IODP^3 Gateway** system, accessed via the **Apply to Participate** link on the **IODP^3 website**.

Information on requesting an IODP^3 Gateway account and on the content required in applications to this call is also available in the IODP^3 **Guide for Applicants**. Note that the applicant roles for this call are “Repository and laboratory” (if you would like to take part in the GCR phase of the

expedition) and “Laboratory only” (if you do not wish to work at the GCR) - see Section 4.1 in the IODP^3 **Guide for Applicants** for further information.

Applications received by the deadline will be evaluated by the Programme Member Offices and shortlisted candidates will be considered for selection by the Co-Chief Scientists in January 2026.

- For further scientific details, please contact:
  Robert Musgrave, Expedition 504S Co-Chief Scientist, **robertmusgrave@gmail.com**
  Ann Dunlea, Expedition 504S Co-Chief Scientist, **adunlea@whoi.edu**
- For enquiries about the application process and IODP^3 Gateway, please contact:
  Jodie Fisher, IODP^3 Science Office, **applications@iodp3.org**