



European Consortium for
Ocean Research Drilling

#39 December 2023

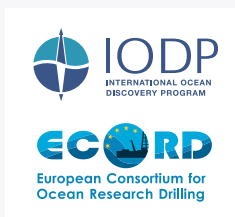
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NEWSLETTER



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The International Ocean Discovery Program (**IODP**) - www.iodp.org - is an international research programme dedicated to advancing the scientific understanding of the Earth through drilling, coring, and monitoring the sub-seafloor. The European Consortium for Ocean Research Drilling (**ECORD**) - www.ecord.org - supports the participation of European and Canadian scientific communities in IODP and provides funding for the implementation of mission-specific platform expeditions. ECORD is funded by 15 countries (*see back page*).

IODP is funded by the US National Science Foundation (NSF), Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT); ECORD; the Australian-New Zealand IODP Consortium (ANZIC); India's Ministry of Earth Sciences; China's Ministry of Science and Technology; and the Korea Institute of Geoscience and Mineral Resources (KIGAM).

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Thanks to all authors who contributed to this issue.

Cover photo: View at the back deck of the *MMA Valour* during IODP Expedition 389. Credits: ECORD/IODP.



Gilbert Camoin



France Lacroix



Nadine Hallmann

On 25 April 2023, ECORD has celebrated its 20th anniversary at the occasion of the European Geosciences Union that was held in Vienna ([read more on page 50](#)). Since its creation in 2003, ECORD has developed a unique European distributed research infrastructure that connects research facilities at multiple sites across Europe and Canada. ECORD's contributions to IODP science have been remarkable during the Integrated Ocean Drilling

Program (2003-2013) and the International Ocean Discovery Program (2013-2024), especially including a leading role in the submission of drilling proposals concerning all IODP capabilities, the active participation to all IODP expeditions and the implementation of successful Mission-Specific Platform (MSP) expeditions using diverse drilling and coring facilities.

ECORD in the last year of IODP

The end of the International Ocean Discovery Program is now scheduled for 30 September 2024. Two years ago, the ECORD Council has decided to extend the 2019-2023 ECORD MoU through 2024, provided that the expected contributions from ECORD funding agencies are available for that year. The ECORD Council has also decided to extend the current terms of the different ECORD entities through 2024: the ECORD Managing Agency (hosted by the Centre National de la Recherche Scientifique – CNRS), the ECORD Science Operator (hosted by the British Geological Survey – BGS - in Edinburgh), the ECORD Science Support and Advisory Committee (hosted by the National Institute of Oceanography and Experimental Geophysics – OGS - in Trieste) and the Bremen Core Repository (hosted by the MARUM at the University of Bremen).

ECORD's partnership with NSF and JAMSTEC is based on a Memoranda of Understanding (MoU) allowing ECORD scientists to participate to expeditions implemented by the *JOIDES Resolution* (JR) and *Chikyu*. These MoUs are in the process of being extended through 2024. In parallel, the continuity of core and data legacies will be maintained for the period 1 October 2023 to 30 September 2029 through an MoU between NSF and ECORD regarding the storage and archiving of NSF-owned cores recovered from previous ocean drilling programmes at the Bremen Core Repository. These cores will then remain available for scholarly study, sampling, and education to all global scientists following guidelines approved by the *JOIDES Resolution* Facility Board.

Incoming ECORD staff



Andrew McIntyre

IODP Research Fellow
EPC,
University of Leicester

(started Dec 2022)

Andrew McIntyre has joined the European Petrophysics Consortium and IODP group at the University of Leicester as an IODP Research Associate. Andrew is a palaeoceanographer and stratigrapher that has joined from The Open University where he completed his PhD and a short post-doc position. Andrew's research focuses on reconstructing ocean circulation and climate throughout the Cenozoic, with a particular interest in intervals of climatic warmth such as the Eocene. A career highlight was sailing on IODP Expedition 390 in April-June 2022, which has an objective to reconstruct Cenozoic South Atlantic Ocean circulation. Andrew sailed as a physical properties specialist and stratigraphic correlator.

IODP expeditions in FY2024

The three IODP platform providers will operate in 2024 for the last year of the current programme.

Mission-specific platform expeditions

IODP Expedition 389: Hawaiian Drowned Reefs



While writing these words, ECORD is implementing the offshore phase of IODP Expedition 389: Hawaiian Drowned Reefs (Co-chief Scientists: J. Webster, ANZIC and A. C. Ravelo, USA) with the MMA *Valour*, equipped with the Benthic Portable Remotely Operated Drill (PROD5). The Onshore Science Party will be organized in February 2024. This expedition aims at generating a record of sea-level change and associated climate variability during several controversial and poorly understood periods over the last 500 kys (see page 16).

JOIDES Resolution and Chikyu expeditions

The *JOIDES Resolution* (JR) has completed four expeditions from October 2022 through September 2023 in the Northern Atlantic and adjacent basins during U.S. FY2023 and **will implement four expeditions** in the same region in U.S. FY2024 before being demobilized at the end of U.S. FY2024. IODP Expedition 404: Arctic-Atlantic Gateway Paleoclimate, which was initially scheduled in September and October 2024 has been cancelled due to the demobilization of the JR. Seven out of the eight proposals supporting these expeditions are led by an ECORD scientist. See table on the [next page](#) and [page 40](#).

Forward look

While entering the last year of the International Ocean Discovery Program, it is of utmost importance to notice that the last two years of the programme will have been very active with the implementation of many drilling expeditions by all platform providers.

IODP Expedition 406 New England Shelf Hydrogeology

IODP Expedition 406: New England Shelf Hydrogeology (Co-chief Scientists: B. Dugan, USA and Karen Johannesson, USA) has been scheduled by the ECORD Facility Board at its September 2021 meeting. The implementation of the offshore phase is scheduled for a maximum of 90 days within a window from the beginning of June to the end of August 2024, and the Onshore Science Party is anticipated in autumn/winter 2024. The objectives of this expedition are to determine the origin and volume of offshore freshwater in the subseafloor of the New England Shelf and will lead to a better understanding of this hydrogeological phenomenon worldwide (see page 19).

IODP Expedition 405 Japan Trench Tsunamigenesis – JTRACK

Chikyu will implement IODP Expedition 405: Japan Trench Tsunamigenesis – JTRACK from 12 September to 7 December 2024 and be the last expedition of the International Ocean Discovery Program. This expedition aims at exploring what controls shallow slip during great earthquakes and will be focused on drilling into the Japan Trench subduction zone. The second transect of this expedition will access the fault zone in the region of large, shallow slip observed during the 2011 Tohoku-oki earthquake (see page 49).

Gilbert Camoin - camoin@cerege.fr
Director of the ECORD Managing Agency

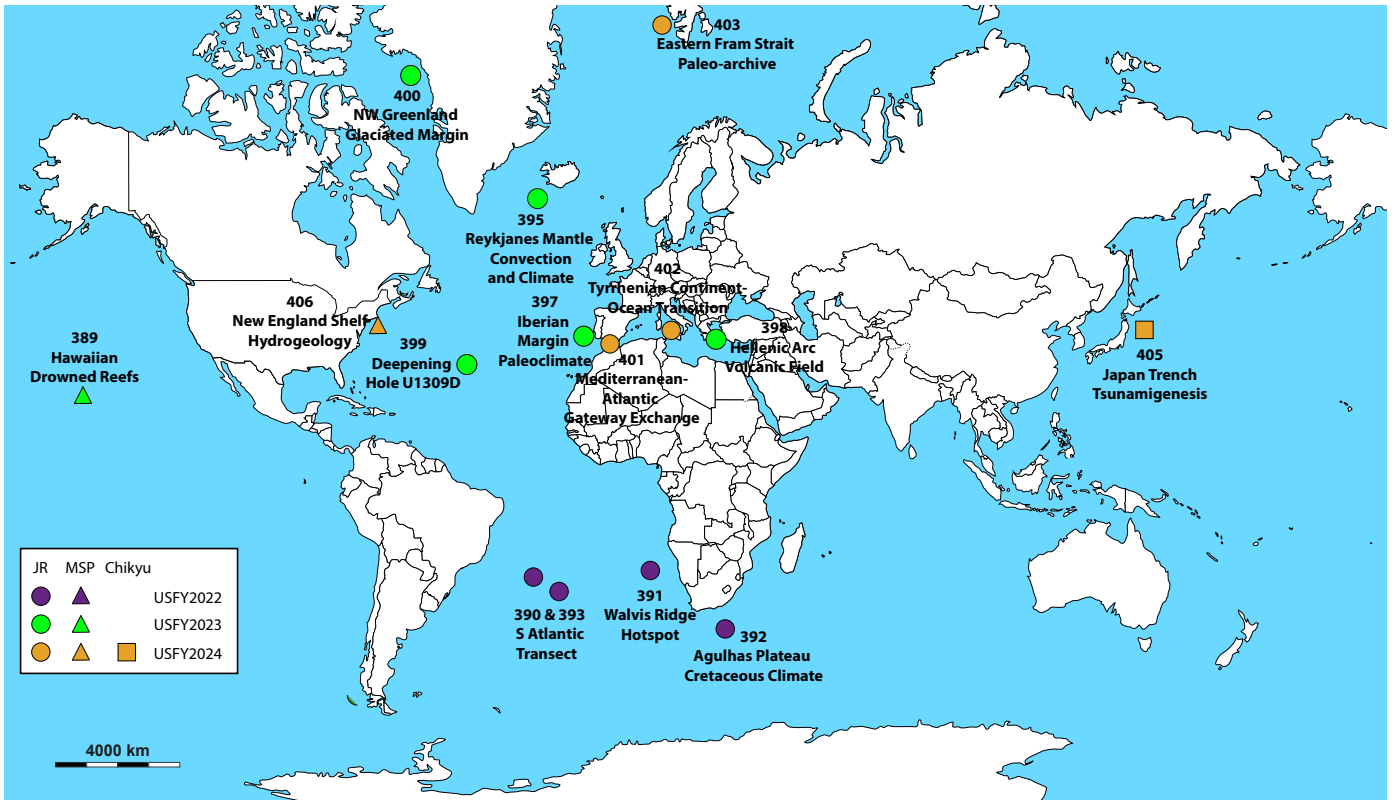
France Lagroix - lagroix@jgpp.fr
Chair of the ECORD Council

Nadine Hallmann - hallmann@cerege.fr
Assistant Director of the ECORD Managing Agency



More info: <https://www.ecord.org>

IODP expeditions 2022-2024



Expedition Name	#	Dates	Ports	Operator
Iberian Margin Paleoclimate	397	Oct. 11 – Dec. 11, 2022	Lisbon / Tarragona	JRSO
Hellenic Arc Volcanic Field	398	Dec. 11, 2022 – Feb. 10, 2023	Tarragona / Heraklion	JRSO
Building Blocks of Life, Atlantis Massif	399	April 12 – June 12, 2023	Ponta Delgada / Ponta Delgada	JRSO
Reykjanes Mantle Convection and Climate	395	June 12 – Aug. 12, 2023	Ponta Delgada / St. Johns	JRSO
NW Greenland Glaciated Margin	400	Aug. 12 – Oct. 12, 2023	St. Johns / St. Johns	JRSO
Hawaiian Drowned Reefs	389	Aug. 31 – Oct. 31, 2023	Barbers Point Harbor, Hawaii	ESO
Mediterranean-Atlantic Gateway Exchange	401	Dec. 10, 2023 – Feb. 9, 2024	Amsterdam / Napoli	JRSO
Tyrrhenian Continent-Ocean Transition	402	Feb. 9 – Apr. 8, 2024	Napoli / Napoli	JRSO
Eastern Fram Strait Paleo-archive	403	June 4 – Aug. 2, 2024	Reykjavik / Reykjavik	JRSO
Arctic-Atlantic Gateway Paleoclimate	404	cancelled	Reykjavik / Reykjavik	JRSO
Japan Trench Tsunamigenesis	405	Sept. 12 - Dec. 7, 2024	TBD	MarE3
New England Shelf Hydrogeology	406	June - Aug, 2024, TBC	TBD	ESO

ECORD Awards in recognition of outstanding contribution to ECORD

25 April 2023

John Ludden

received the 11th ECORD Award on the occasion of the 20th Anniversary of ECORD, and the ECORD-ICDP Townhall meeting



Initially involved in ODP and sailed as Co-chief Scientist on Legs 123 and 185 and served on the Indian Ocean Panel and Chaired the Lithosphere panel at one point, I have a long history of involvement with scientific ocean drilling.

I was involved in ECORD right from the beginning when Europe was constructing the Integrated programme with the USA and Japan. As head of Earth Sciences for the French CNRS, I created the ECORD consortium along with other heads of geoscience research organisations in Europe. Later as Chief Executive of BGS-NERC, I strongly supported the involvement of NERC-UKRI (via BGS) as the ECORD-SO.

I am truly grateful for this award as a pioneer for ECORD.



John Ludden

Read more in the special issue of the ECORD Newsletter (#38)
<https://www.ecord.org/resources/ecord-newsletter/>

ECORD Awards in recognition of outstanding contribution to ECORD

25 April 2023

Catherine Mével

received the **12th ECORD Award** on the occasion of the 20th Anniversary of ECORD, and the ECORD-ICDP Townhall meeting



Catherine Mével with the 12th ECORD Award during celebration of 20th Anniversary of ECORD. Credit: M. Bednarz

Catherine was ECORD Manager from 2003 till 2011.

Looking back at the first phase of ECORD and IODP, it is obvious a lot has been accomplished. Having a consortium helped the European countries to negotiate successfully with the Lead Agencies. Dozens of European scientists were able to participate and to lead exciting expeditions. They were also largely involved in the international advisory structure and therefore contributed to the science orientations of the program. The new access to riser drilling and to MSPs was a major opportunity to scientists, allowing access to new environments. Indeed, the first MSP expedition, ACEX, that drilled the Arctic seafloor beneath the ice to reconstruct past environments, was a major breakthrough. The three expeditions that followed, to Tahiti, New Jersey margin and the Great Barrier Reef, were also successful. But ECORD also contributed to develop more interactions both at the funding agency and at the science community level within Europe. As a convinced European, I can only feel that setting up this Consortium was a major collective achievement, although I don't want to think about my carbon footprint during all these years. And when I reached retirement age at the beginning of 2012 and handed over the management of ECORD to Gilbert Camoin, I was confident ECORD would continue playing its major role in IODP.

Read more in the special issue of the ECORD Newsletter (#38) <https://www.ecord.org/resources/ecord-newsletter/>

In Memory of Judy McKenzie

Judy McKenzie

Passed away on 11 August 2023



We were deeply saddened and shocked by the passing of Judy McKenzie on 11 August 2023.

Besides her prolific research studies focusing on past climate and environmental change recorded in lacustrine and marine sediments, with a special focus on geomicrobiology, Judy has played a pivotal role in different phases of the international ocean drilling programmes (DSDP, ODP, IODP). She has been involved in ODP Expedition 107 "Tyrrhenian Sea" as a sailing scientist and in ODP Expedition 133 "Northeast Australian Margin" as Co-chief Scientist. Judy was instrumental in promoting Swiss participation in different phases of the international ocean drilling programmes. She has been deeply involved in the creation of ECORD two decades ago and its development by serving as ESSAC Delegate for ten years and promoting ocean drilling to the next generations of scientists as ECORD Distinguished Lecturer.



The international scientific community will greatly miss Judy's bright personality, rich character and unwaning enthusiasm. She will remain a model for students and early-career scientists and her memory will not fade away in our hearts and memories.

Gilbert Camoin, *Director of the ECORD Managing Agency*

Angelo Camerlenghi, *Chair of ESSAC*

Martina Kern, *Swiss ECORD Council Member*

Gretchen Früh-Green, *Swiss ESSAC Member*

Promoting ECORD-Japan cooperation in IODP³

Phase 2
in-person

ECORD
European Consortium for
Ocean Research Drilling



Workshop on the future of Scientific Ocean Drilling: Toward submission of drilling proposals for IODP³

Jointly organised by ESSAC and J-DESC

Workshop on the future of Scientific Ocean Drilling with MSPs and Chikyu - Phase 2



ECORD and Japan entities are finalising the launch of the International Ocean Drilling Programme – IODP³ (IODP-cubed) after 2024, open to international members and based on the implementation of mission-specific scientific drilling expeditions.

Following the online-only Phase-1 Workshop in January 2023, the **Phase-2 Workshop** will be held in-person (hybrid). The aim is to gather researchers representing promising drilling ideas that emerged during and after Phase-1 Workshop to present and discuss their scientific and operational plans to prepare for MSP and *Chikyu* drilling proposals to be submitted for IODP³. The Workshop is open to ~ 100 participants from any country.

Dates and location of the Phase-2 Workshop:

 **18 - 20 March 2024**
followed by a 2-day field trip



Nachikatsuura, Kii Peninsula

- 6 hours by train from Tokyo, 4 hours by train from Osaka.
- Far from major cities, aimed at fostering focused discussions (a retreat-like event).
- 3 full days of workshop and a 2-day field trip (either 1 day or 2 days), allowing ample time for discussions. Participants on site will require a full week.
- We plan to recommend several hotels within walking distance of the workshop venue, for each respective budget (TBD).
- Notable local geology includes Neogene accretionary prism, forearc basin, and plutonic rocks. The region's designation as a Geopark and World Heritage site. Lovely hot springs in the vicinity.
- PMOs may provide support for travel expenses on a limited basis. (TBA)



JAPAN
Kii peninsula

Download flyer: <https://www.ecord.org/workshop-on-the-future-of-scientific-ocean-drilling-with-mmps-and-chikyu-phase-2/>

The International Ocean Drilling Programme:

IODP³



Gilbert Camoin



Nobu Eguchi



The end of the International Ocean Discovery Program on 30 September 2024 will mark major changes in the organization of international activities related to scientific ocean drilling.

After decades of unified international programmes, from DSDP to the current IODP, post-2024 scientific ocean drilling initiatives will see a transition from a single international program operated by independent platform providers to independent programmes.

ECORD and Japan, who have advocated for the continuation of a single international programme, intend to continue providing scientific ocean drilling opportunities post-2024 to the international scientific community, based on their well-established infrastructures, competitiveness in the international research landscape and maximum scientific return from investment.



Through a two-year long process of exchange of views and ambitions, ECORD and Japan agreed to build a joint scientific ocean drilling programme: the International Ocean Drilling Programme - IODP³.

IODP³

IODP³ will consist of an international scientific collaboration addressing important questions in Earth, Ocean, Environmental and Life sciences based on the study of rock and/or sediment cores, borehole imaging, in-situ observatory data, and related geophysical imaging obtained from the subseafloor.

IODP³ will adopt a transparent, open, flexible and international modus operandi, program-wide standard policies and guidelines, sustainable management and publicly accessible knowledge-based resources. IODP³ investigations will be based on research proposals that address the objectives of the 2050 Science Framework: Exploring Earth by Scientific Ocean Drilling, or other outstanding new research ideas.

Proposals within IODP³

Proposals will be submitted with a bottom-up process to the IODP³ Science Office by teams of proponents belonging to the international research community. The Magellan³ Programme will be designed to support scientists from IODP³ and ICDP members in developing new and innovative scientific drilling proposals that meet the ambitions of the 2050 Science Framework and/or the ICDP Science Plan 2020-2030 by funding or co-funding workshop proposals and travel grants. The merit-based evaluation of drilling proposals will be conducted in a fair, open, and transparent manner

by advisory panels (the Science Evaluation Panel and the Safety and Environmental Advisory Group) composed of top international experts selected through competitive calls.

IODP³ will implement and fund:

- Offshore expeditions following an expanded MSP concept;
- Scientific Projects using Ocean Drilling Archives (SPARCs) that are international and multidisciplinary projects that have objectives originating from or that are based on ocean drilling archives.

IODP³ expeditions - expanded MSP concept

IODP³ drilling expeditions will be implemented by the MSP Operators, ESO and/or JAMSTEC-MarE3, following the MSP concept. This concept will be an expanded Mission Specific Platform (MSP) concept by diversifying drilling and coring technologies - riserless and riser drilling, giant piston coring - and applying them to all drilling environments, as determined by scientific priorities, operational efficiency and better value for money.

D/V *Chikyu* and R/V *Kaimei* are identified as MSP facilities that are crucial facilities for the successful implementation of the 2050 Science Framework.

Land-to-Sea Transects (L2S), requiring scientific drilling at both onshore and offshore sites or at shallow marine sites to be implemented jointly with the International Scientific Continental Drilling Program (ICDP) are prime objectives for IODP³.

The duration of IODP³ expeditions and will be flexible and be determined by scientific requirements.

IODP³ drilling expeditions will be scheduled by the MSP Facility Board based on their scientific merit and operational constraints within the limits of the available resources.

IODP³ expeditions will be undertaken by international teams of scientists - Science Party - selected by the MSP Operator(s) and Co-chief Scientists, based on recommendations made by Program Member Organizations (PMOs) in accordance with this Memorandum of Understanding. Staffing decisions will consider, as far as possible, the goal of achieving the maximum diversity of gender, career stage, nationality, disciplinary, cultural in science parties.

The size of expedition Science Parties will be flexible and be determined by scientific requirements.

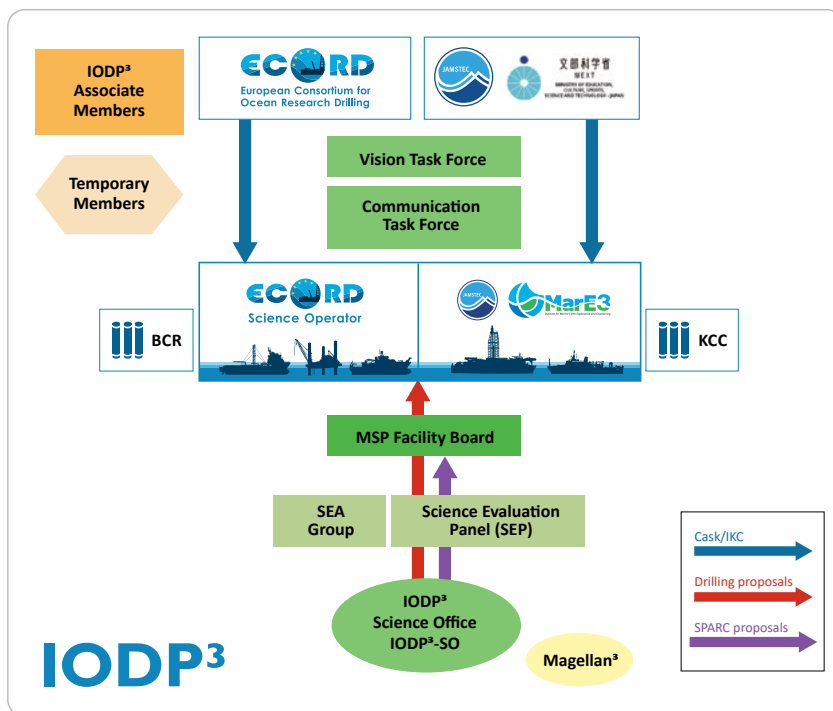
IODP³ core repositories

IODP³ will include the services provided by the current IODP core repositories in Bremen (BCR) and Kochi (KCC).

IODP³ task forces and exchanging ideas

IODP³ will include two task forces: the Vision Task Force will be in charge of developing a long-term scientific and funding strategy and the Communication Task Force will be in charge of the coordination of communication tasks. IODP³ will set up an overarching Scientific Drilling Forum as a venue for exchanging ideas, views and information between all international research programmes that employ scientific drilling to explore Earth and planetary processes.

Based on the well-established operation of the ECORD and JAMSTEC infrastructures, their successful implementation, their competitiveness in the international research landscape and maximum return from investment, a bright future is promised to ECORD and Japan in their intentions to play a prominent role in post-2024 scientific ocean drilling.



Membership within IODP³

As Platform Providers, ECORD and Japan will be the IODP³ Core Members. ECORD and Japan will keep their own identity as their own entities and functioning will be preserved.

International governmental and non-governmental entities not regularly providing scientific ocean drilling platform(s) to IODP³ have been invited to participate either as Associate Members for entities making annual cash contributions to IODP³ (± 1 M€) or as Temporary Members for entities providing cash and/or project-based in-kind contributions (minimum ± 0.5 M€) to access IODP³ expedition(s). In-kind contributions (IKC) and/or cash contributions from any IODP³ member or non-member country/institution are potentially acceptable to fund offshore expeditions.

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Director of the ECORD Managing Agency

Nobu Eguchi - neguchi@jamstec.go.jp
Director of the Operations Dept MarE3-JAMSTEC

and the ECORD-Japan IODP³ Planning Group



See "The International Ocean Drilling Programme-3 (IODP-cubed) will start on January 1st, 2025":
<https://www.ecord.org/the-international-ocean-drilling-programme-3-iodp-cubed-will-start-on-january-1st-2025/>

Letter from the IODP Forum Chair



Henk Brinkhuis

Aloha ECORD & IODP community!

It's that time of the year again: holidays are over, and everybody is 'back to school'. And the IODP-2 wheels keep on turning. I do hope everybody enjoyed an OK summer (or winter) despite global bad vibes all the way to the increasing effects of global warming and accompanying extreme climates. Just a reminder for us to realize that in fact, the study of their ancient counterparts buried beneath the sea floor is one of the paramount targets of IODP. There, see: *Bridge made*.

RE that 'bridge' to the IODP FORUM: earlier this year, we enjoyed another, almost annual now, 'interim' or spring IODP Forum meeting in Vienna (April 22-23) kindly hosted by the Austrian Academy of Sciences and supported by ECORD. Of course, the 'conclusion of IODP-2' in 2024 was on the table, and everything that goes with that. Sort of business as usual. In addition, and more urgently perhaps, we had a day of

presentations dealing with the status of the various developments concerning new program(s), positions of the various funding agencies, role of the JR, and international alliances post-2024 in general, and the Japan/ECORD alliance in particular. For consensus statements, please check <http://iodp.org>.

A new initiative at/of the FORUM in April – cf. as the custodian of the IODP science plan – was a general check for (scientific) lessons learned and remaining (scientific) challenges after IODP-2 and its science plan – this including potential (even far-field) linkage to the 'Framework 2050', and of benefit to any new programs being drafted. Although it is acknowledged that the full scientific impact of any expedition takes years to develop (e.g., in terms of research papers) – one can identify the need to have an instrument (dedicated committee or something) to perform such analyses.

The IODP Forum meeting in Vienna, 22-23 April 2023, hosted by the Austrian Academy of Sciences and supported by ECORD.
Credits: ECORD/IODP.



While depressed RE the apparent demise of the JR, regarding the post IODP-2 phase, it is of course great news that the Japan/ECORD alliance, coined 'IODP³⁷' (or IODP-cubed) was announced for a 2025 start. As said, avenues towards possible organization, logistics, finances, and potential expansion of this initiative, or the formation of other alliances, including the position of NSF, the other PMOs, and everything in between are currently further discussed. New steps will be announced soon. This, and all other latest developments will be on the table in Wollongong, Australia, including options to organize community-wide queries and polls, mid-October, at the upcoming annual IODP Forum 2023.

At the Forum I do note that spirits and energy-levels remain high to, in one (or more) form(s) or another, build on the ultra-successful international cooperation of the past decades. This, combined with a strong sense of urgency, and acknowledged global need for high impact scientific ocean drilling should form a solid basis for continued operations – no doubt about it.

We have a dream...

Mahalo!

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IODP Forum Chair
Utrecht University
Ocean Systems Research Department, Royal NIOZ, NL

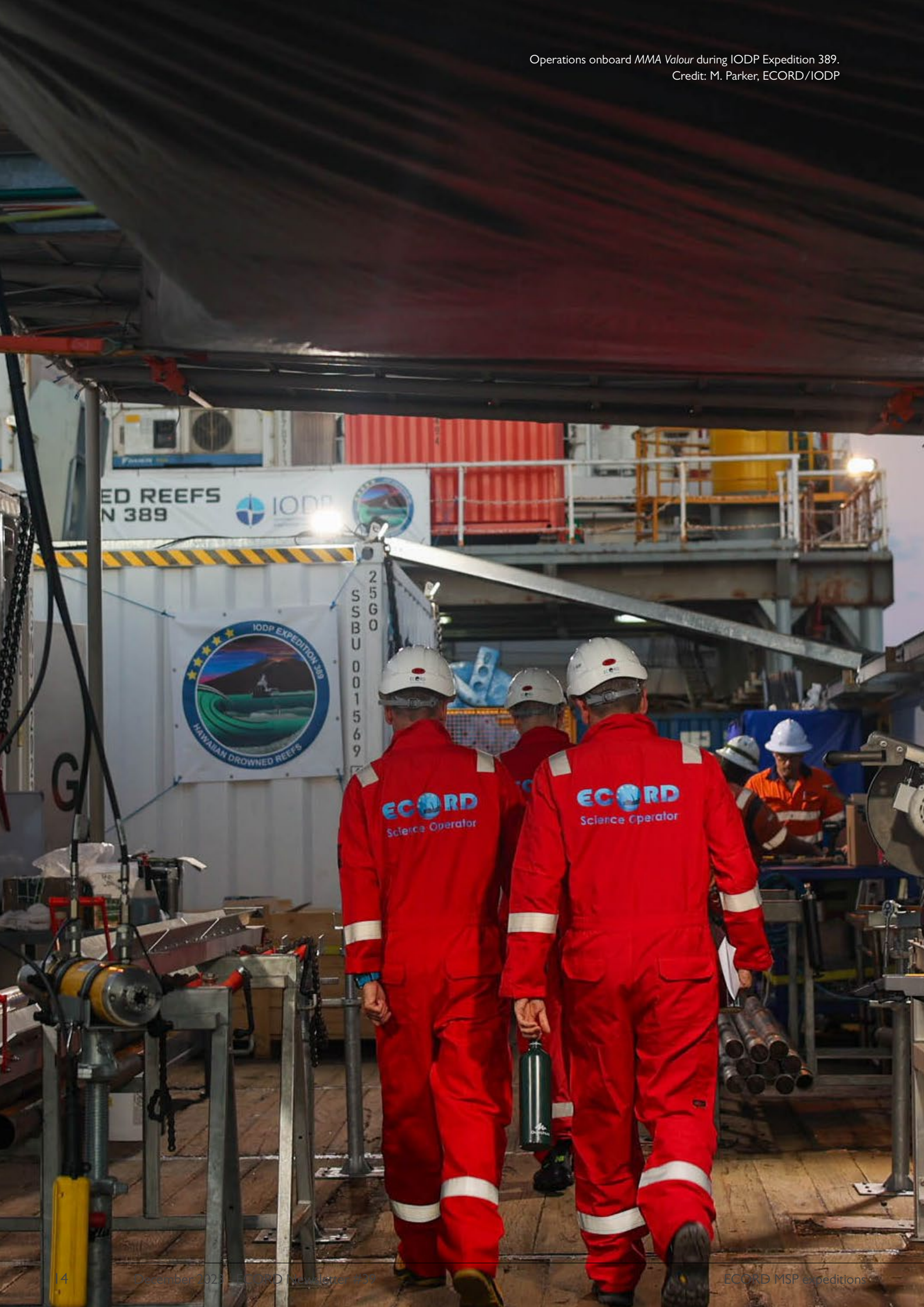


Participants of IODP Forum meeting in Vienna, 22-23 April 2023, in the Austrian Academy of Sciences.
Credits: H. Brinkhuis, ECORD/IODP.



Building of the Austrian Academy of Sciences.
Credits: H. Brinkhuis, ECORD/IODP.







Alexandra V. Turchyn

ECORD Facility Board News

Scheduling of MSP expeditions



Operations are wrapping up for Expedition 389: Hawaiian Drowned Reefs. In addition, in late September we had the postcruise review for Expedition 386, Japan Trench Paleoseismology. Finally, planning is in place for Expedition 406, New England Shelf Hydrogeology, which is scheduled for Spring/Summer 2024.

We currently have three proposals at the EFB, with six further proposals currently at SEP, that we expect will come to the EFB, and later the MSP facility board, in time. The three proposals at the EFB include Antarctic Cenozoic Paleoclimate, Arctic Ocean Paleoceanography, and Sabine Bank Paleosealevel. The six proposals at SEP explore a range of exciting ocean research around the globe. Two of these are looking to explore carbon cycling and sea level change in

the Sunda Shelf. The other four involve sea level near Belize, North Sea paleoclimate evolution, volcanic weathering in the Costa Rica volcanic zone, and the Black Sea - Mediterranean gateway. All proposals at the EFB and at SEP have been aligned with the 2050 Science Framework and can be transferred into the new programme.

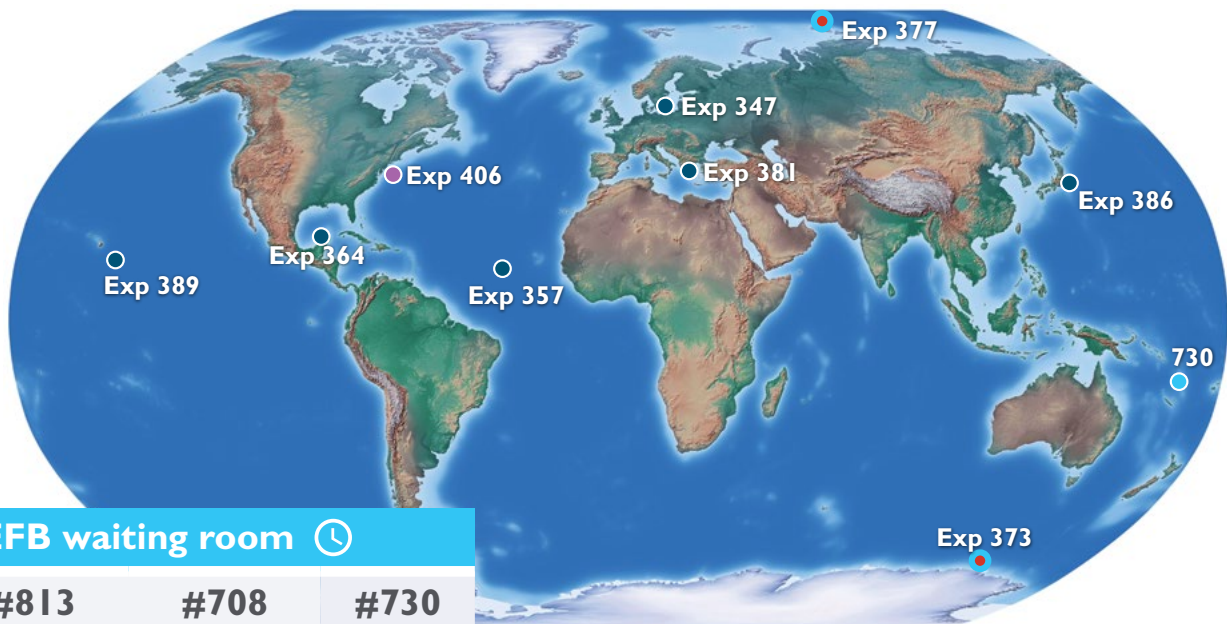
In addition, five proposals that were at the JRFB have requested transfer to the EFB and their addendums will be reviewed in January 2024 at SEP. All in all an exciting time for Scientific Ocean Research Drilling!

Alexandra V. Turchyn
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Chair of the ECORD Facility Board



MSP 2020-2024 operational plan

2013 - 2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
347 Baltic Sea Paleoenvironment	357 Atlantis Massif Serpentinization and Life	364 Chicxulub K-Pg Impact Crater	381 Corinth Active Rift Development	No expedition	ECORD renewal	No expedition	No expedition	386 Japan Trench Paleoseismology	No expedition	389 Hawaiian Drowned Reefs	406 New England Shelf Hydrogeology
Drillship Greatship Maya	RRS James Cook & Seabed drills (MeBo & RD2)	Liftboat Myrtle	Drillship Fugro Synergy				Kaimei & Chikyu		MMA Valour & Seabed drill (Benthic PRODS)	TBD	



EFB waiting room ⌚

#813 Antarctic Cenozoic Paleoclimate	#708 Arctic Ocean Paleoceanography	#730 Sabine Bank Sea Level
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- Completed MSP expeditions
- Postponed MSP expeditions
- MSP proposals in the EFB waiting room
- Scheduled MSP expeditions



David McInroy



Sarah Davies



Ursula Röhl



Jez Everest

Implementation of MSP expeditions

IODP Expedition 389: Hawaiian Drowned Reefs



The overall goal of this expedition is to core a series of twelve fossil coral reefs surrounding the island of Hawaii, that formed as the reef communities successively grew and were drowned by rising sea-levels and/or the near constant subsidence of the crust around the ever-growing volcanic archipelago of Hawaii. Hawaii hosts a unique

succession of expanded reef sequences, key for the recovery of high-resolution climate and reef response records, due to its location away from the influence of any of the large Quaternary ice-sheets or strong boundary ocean currents that can mask the sea-level and paleoclimate signals. The information contained in these natural fossil reef archives will help scientists reconstruct sea-level change at a much higher resolution than previously possible at a stable far-field site. It will also enable them to investigate the links between global sea-level change and global climate change, and therefore the mechanisms that control abrupt climate change.

Co-chief Scientists:	Jody Webster Christina Ravelo
Offshore dates:	31 Aug – 31 Oct 2023
Onshore Science Party dates:	1 – 29 Feb 2024
Vessel:	MMA Valour
Port:	Barbers Point Harbor, Hawaii

At the end of 2022, a new Call for Tender for vessel and drilling services was launched by the ECORD Science Operator (ESO), which in early 2023 led to the selection of the seafloor drill (SFD) operator Benthic as the drilling contractor for this expedition.

Benthic, a brand in the geo-services segment of Acteon, supplied their 5th-generation Portable Remotely Operated Drill (PROD) for this expedition, deployed from the multipurpose vessel *MMA Valour*.

Science Party members and ESO staff gathered at Barbers Point Harbor, Kapolei, to depart on Expedition 389. Credit: M. Parker, ECORD/IODP



PROD is a self-contained, remotely operated seabed drilling and geotechnical testing system, capable of operating in water depths up to 3000 m and investigating subsea bed depths in excess of 130 m. PROD takes rock and stiff sediment cores using proprietary thin kerf rotary diamond core barrels and other specialised coring bits as required. For softer sediments, cores are taken using a hydraulically-tethered piston core (HTPC).

of trials and troubleshooting, the SFD was deployed to take core for IODP for the first time at Hole M0096A about 24 km west of Hawaii Island in 740 m water depth.

By the expedition's mid-cruise port call after 29 days at sea, 16 holes had been cored at four sites (M0096-M0099, see map below), with a total core recovery of 154 m with an average recovery of 68%.

After picking up the Science Party members and ESO staff (see photo on the previous page), Expedition 389 departed from Barbers Point Harbor, Kapolei (20 km west of Honolulu), on 31 August and headed for a wet test site nearby to conduct drill and dynamic positioning tests. After a few days

Please visit the expedition website for access to all [daily and weekly reports](#).

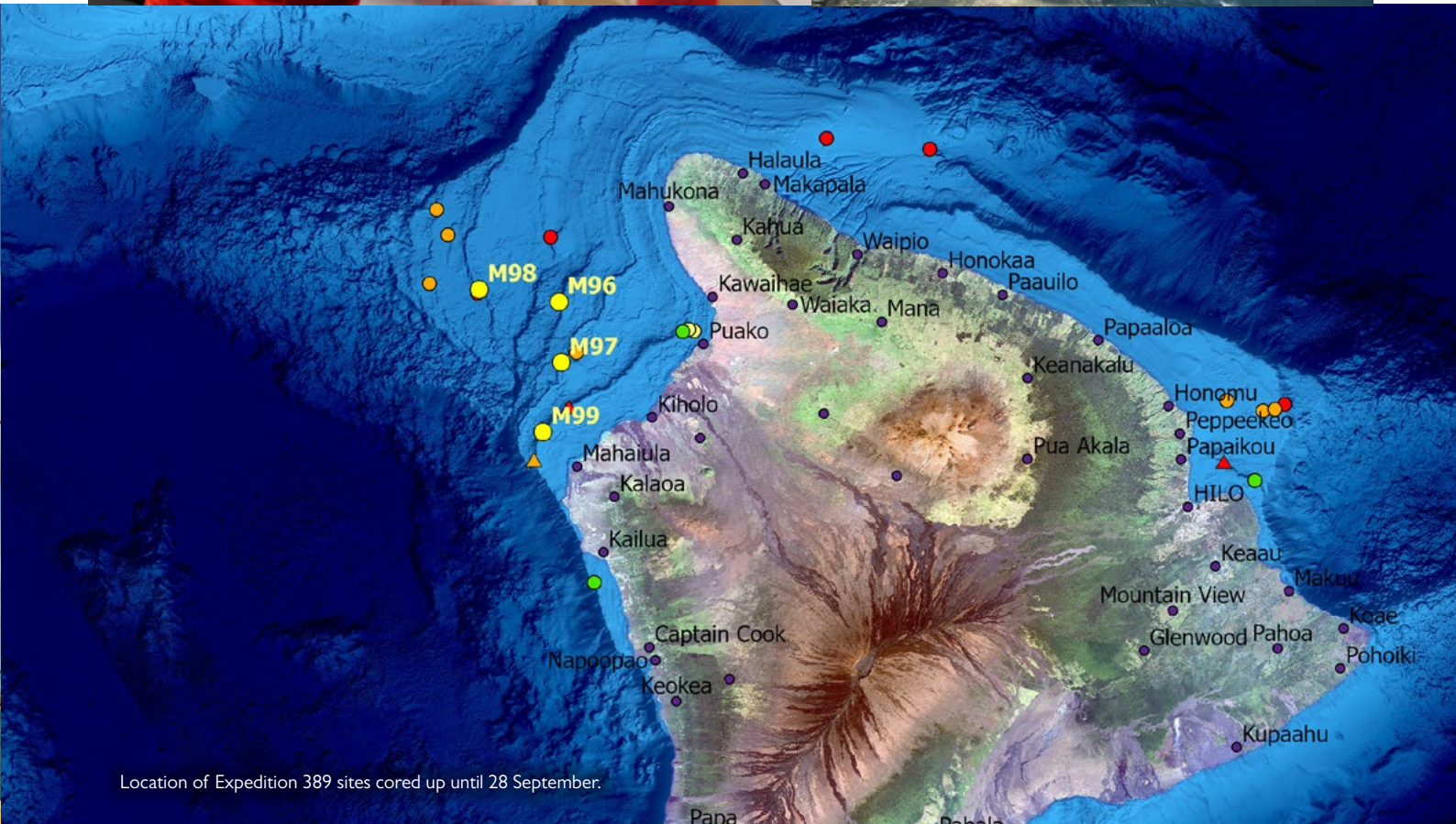
Expedition 389 webpage: <https://www.ecord.org/expedition389/>



Co-chief Scientist Christina Ravelo and Science Party member Pankaj Khanna taking a look at the first core of Expedition 389. Credit: M. Parker, ECORD/IODP



Benthic Portable Remotely Operated Drill (PROD). Credit: Benthic/Acteon.



Location of Expedition 389 sites cored up until 28 September.



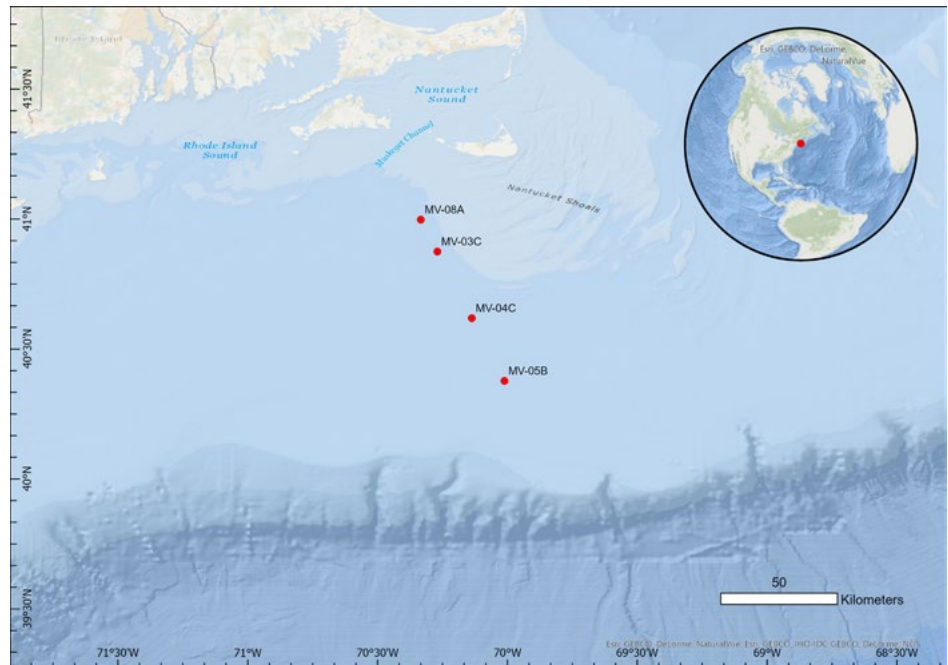
Onboard *MMA Valour* during Expedition 389: ESO day shift staff celebrating MSP Site M100! From left to right: Marisa Rydzy, Alex Wuelbers, Graham Tulloch, and Mary Mowat. Credits: L. Schnieders, ECORD/IODP.

This expedition aims to core into the Atlantic continental shelf offshore New England, USA, to explore current and past states of fluid composition, pressure, and temperature in continental shelf environments. This location is a remarkable example of where the distribution of freshwater within the continental shelf sediments is far out of equilibrium with modern sea level, with low salinity groundwater in shallow Pliocene-Pleistocene sand aquifers over 100 km from shore. Freshwater-saltwater boundaries are abrupt, indicating the disequilibrium nature of such systems. This expedition will help to better constrain rates, directions, and mechanisms of groundwater flow and chemical fluxes in continental shelf systems, and will test process-based models for shelf freshwater off New England and other systems around the world.

The Call for Scientists for this expedition was open between 6 June – 15 August, with shortlisted nominations from the Program member Offices shared with the ECORD Science Operator (ESO) and Co-chief Scientists on 9 October. A Science Party will be selected, and invitations issued, during autumn 2023.

In parallel, ESO has drafted a project specification which will be included in a Request for Proposals to be issued to the drilling and platform market, anticipated to be open in October and November. Supplier bid evaluations will be evaluated in December, with the contract expected to be awarded in early 2024 for the expedition to be implemented in spring and summer 2024.

Co-chief Scientists:	Brandon Dugan Karen Johannesson
Offshore dates:	Spring-summer 2024, TBC



Map with potential drill sites of IODP Expedition 406.
Credit: ECORD/IODP

Expedition 406 webpage: <https://www.ecord.org/expedition406/>

Science article on page 26: [Exploring onshore-offshore freshwater systems and their impacts on groundwater flow, biogeochemical cycles, and microbiology](#)

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MAGELLAN PLUS WORKSHOP SERIES

MagellanPlus: **CenoStore**

(10-13 January 2023, Belfast, Northern Ireland, UK)

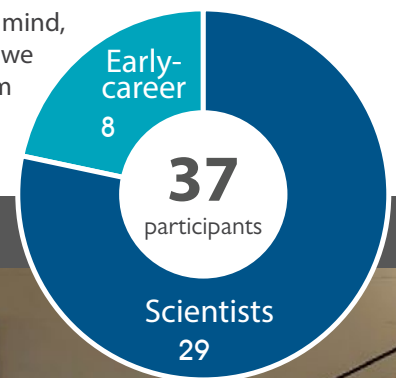
Late Cenozoic palaeo-climate of NW Europe and implications for subsurface CO₂ containment

A year-long virtual site survey (named 'CenoStore') took place in 2022 between the University of Manchester, Queen's University Belfast, and the British Geological Survey. The aim of the virtual site survey was to explore how to recover the highest resolution late Pliocene and Early Pleistocene climate record of the European glaciated margin and to consider its potential relationship with the efficacy of carbon storage in the North Sea. As the project reached a conclusion, the investigators wanted to present these results to colleagues who work in the North Sea in order to explore collaborative opportunities. A workshop was organised for January 2023 in Belfast, Northern Ireland. The aim of the workshop was to bring together stakeholders from the different North Sea states to provide geological expertise and knowledge on national data availability and integration across maritime borders. During the workshop, we also wanted to discuss proposed drill sites from the CenoStore project, as well as the potential for new drill sites. Further discussions would include operational issues, refinement of the scientific hypotheses, and the potential for an IODP North Sea pre-proposal.

The workshop was a hybrid event attended by 37 colleagues (25 in-person and 12 online – of which eight were early-career

researchers) from UK, Netherlands, Germany, Denmark, Belgium, Norway, Portugal, and US. When the workshop began, it started with an introduction to the CenoStore project and its overarching aims and objectives. We then had a range of invited speakers who spoke about the history of Northern Hemisphere glaciation, the infill and evolution of the North Sea Basin, environmental changes, glaciological reconstructions, conflicting ideas, and the potential synergy with other IODP proposals and plans. All presenters were asked to finish their presentations with some ideas on what they felt were the unanswered questions and how/where a drilling campaign might be located to answer them. This was developed further as attendees brain-stormed in groups to develop 'wish lists' of the questions they wanted to answer, and the 'Hollywood message' for why any future drilling campaign in the North Sea was required. This was designed to ascertain the variety of ambitions for drilling and to determine where common ground may lie.

With these ambitions in mind, on the second day we had presentations from colleagues on successful



Participants of the MagellanPlus Workshop: CenoStore. Credit: ECORD/IODP



drilling proposals, drill planning, and the results of CenoStore. We had presentations from ECORD representatives on the logistics of a mission-specific platform, the general workflow after core collection, and the process of wireline logging. With this fresh knowledge on what a mission-specific platform could achieve, the attendees then refined the unanswered questions from the previous day into what the sorts of strata that might be required for these questions to be answered, where they might be located in the NSB, and the trade-offs between different elements, such as continuity of records, drill and logging timescales, and how these all fit into answering the research questions.

On the final day of the workshop, participants gathered to discuss the plan forward and agreed that there was a strong case for a proposal. Colleagues discussed commitments, collaborations, synergies, and follow-up actions – such as exploring the possibility of developing a related ICDP project. A core team of proponents was provisionally agreed and an expected timeline for the preparation of the pre-proposal for April 2023. The pre-proposal would focus around 36 unanswered questions of local to global significance, within four broad themes on how **G**laciers, **L**andscapes, **C**limates, and **E**cosystems evolved in the



Participants of the MagellanPlus Workshop: CenoStore. Credit: ECORD/IODP

North Sea since the late Pliocene – with the label GLACE-NS. The MagellanPlus workshop provided a successful setting for developing the foundations of a drilling proposal by bringing together a range of expertise and experience. The proof of this is in the successful submission of the GLACE-NS pre-proposal to the IODP in April, which in July was invited to proceed to a full proposal.

Andrew Newton et al., Queen's University Belfast, UK



Upcoming MagellanPlus Workshops

21st Century Drilling Workshop (March 2024, Bremen, Germany)

Building Capacity in the Digital Domain on scientific ocean drilling legacy material.

Contact: Anna Joy Drury (a.j.drury@ucl.ac.uk)

More info: <https://www.ecord.org/science/magellanplus/>

MagellanPlus: MAREXKUS

(1-3 March 2023, Rome, Italy)

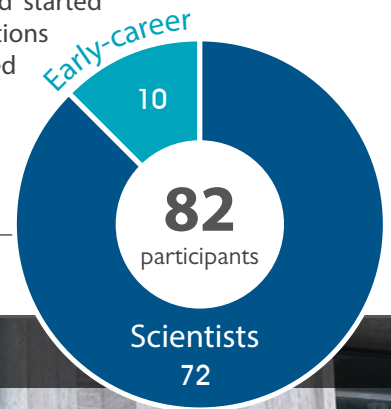
MAntle Remelting and hydrothermal chemical Exchange at Knipovich Ultraslow Spreading ridge

Tectonic spreading at ultra-slow spreading ridges leads to the exposure of deep lithospheric levels - the Earth's mantle - on the seafloor. While the interplay between tectonic extension and magmatic processes are still to be fully constrained, the exposure of mantle on the seafloor further allows for the interaction between these ultramafic lithologies and seawater, through fluid-rock interaction and weathering processes. Notably, these widespread hydrothermal processes and related chemical exchanges between the exhumed mantle and seawater need to be considered within assessments of the global chemical budget of the oceans. Furthermore, hydrothermal fluids can provide the necessary elements and energy to sustain the development of life in extreme, deep anoxic environments. These themes were the basis for the organisation of a MagellanPlus workshop, with a focus on a specific geological object: Knipovich ridge.

Knipovich ridge is a one-of-a-kind ultraslow-spreading ridge in the Arctic Ocean; it shows widespread exhumation of mantle lithologies, active hydrothermal vents recently discovered along the ridge axis, and its vicinity to the Norwegian continental margin translates into a high sediment discharge into the actively spreading rift valley. Hence, the element exchange at Knipovich is controlled to some extent by the presence of sediments, yet this process is poorly understood. Given its unique character, Knipovich ridge is a compelling target for a drilling proposal that integrates several aspects of the 2050 Science Framework, including the formation of the oceanic lithosphere, mantle alteration and global geochemical cycles.

The MAREXKUS MagellanPlus workshop was held in Rome in March 2023, and gathered a working group of scientists from different disciplines spanning from seismic, igneous

petrology, rock alteration, sedimentary geology, magnetics and microbiology. The workshop was highly multidisciplinary and international, with the attendance of 38 scientists from eight ECORD countries and two from Japan on site, and 42 participants online. Ten on-site participants were early career scientists, including PhD students and postdocs. The first day was focused on defining the state-of-the-art knowledge on the area of interest and considered research topics. The second day was aimed at creating working groups on specific topics, with the task of defining precise objectives and hypotheses to be tested by drilling at Knipovich ridge. The third day provided an overview of the conclusions reached by the different working groups, discussion regarding possible locations for drilling and existing data. The participants identified three specific scientific objectives to be implemented in a future IODP proposal such as: (i) defining the link between magmatism and composition of the mantle at spreading ridges; (ii) characterizing chemical fluxes during fluid-rock interaction processes at a sedimented ridge axis; (iii) constraining hydrothermally-sustained development of biological communities and the limiting conditions for the occurrence of life. Moreover, discussion with leaders of existing proposals in the region allowed the identification of potential drill sites, and discussion on drilling strategies and technologies. Based on existing data, we verified the existence and availability of geophysical and site survey data and samples, and started to establish future connections with other entities interested in developing a drilling proposal in the region..



Alessio Sanfilippo et al., University of Pavia, Italy

Participants of the MagellanPlus Workshop: MAREXKUS. Credit: ECORD/IODP





A freshly recovered core onboard MMA Valour during Expedition 389. The section contains visible growth bands in a piece of columnar *Porites* spp. that is surrounded by microbialite sediments. Credit: ECORD/IODP.

ECORD/ICDP MagellanPlus Workshop Series Programme **CALL FOR PROPOSALS**

The ECORD/ICDP MagellanPlus Workshop Series Programme aims **to foster the development of new IODP³/ICDP drilling projects**, and invites scientists from ECORD/ICDP member countries to propose workshops for the elaboration of compelling drilling proposals.

The International Ocean Drilling Programme (IODP³), inspired by the 2050 Science Framework (www.iodp.org/2050-science-framework), will start on January 1st, 2025 immediately after the conclusion of the current IODP. IODP³ offshore drilling and coring expeditions will be implemented by the IODP³ operators following an expanded **Mission-Specific Platform (MSP)** concept that will be applied to all drilling environments, as determined by scientific priorities, operational efficiency and better value for money.

MagellanPlus welcomes proposals for workshops aimed at generating **MSP drilling proposals**, either as **stand-alone projects** or as part of **land-to-sea transects** that integrate marine and continental coring. Scientific themes must be aligned with the **Strategic Objectives** defined in the **2050 Science Framework**, i.e.:

- Earth's Climate System;
- Feedbacks in the Earth System;
- Tipping Points in Earth's History;
- Global Cycles of Energy and Matter;
- Natural Hazards Impacting Society;
- The Oceanic Life Cycle of Tectonic Plates;
- Habitability and Life on Earth (e.g., deep biosphere).

Workshops may be either focused on specific scientific ideas and targets or be designed to explore a range of potential ideas related to the Strategic Objectives listed above.

The submission of MSP drilling proposals that consider the possibility of in-kind contributions is encouraged.

MagellanPlus workshops are normally expected to take place in ECORD/ICDP member countries, but exceptions can be made when justified. Workshops that combine virtual and face-to-face sessions, in order to both reduce our carbon footprint and allow for wider participation in workshops, can be considered.

<http://www.ecord.org/science/magellanplus>

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The contribution of the MagellanPlus Workshop Series will not exceed 15,000 € per workshop. Proponents are encouraged to seek co-funding from other sources. Workshops will be held no later than 12 months after approval by the MagellanPlus Science Steering Committee.

Proposals must include:

- 1) a short summary (max. 500 characters) stating the purpose of the proposed workshop and its expected impact;
- 2) a full description (max. 2 pages) of the proposed workshop outlining the goals, rationale, expected outcome, involvement of early-career researchers, number of participants and location;
- 3) a workshop programme;
- 4) a list of keynote speakers;
- 5) a flyer of the workshop;
- 6) a full budget for the workshop;
- 7) a CV (max. 1 page) plus a list of international, peer-reviewed publications for the last five years, of main applicant.

Proposals must be submitted by email as a single, combined pdf document to magellan.plus@uu.nl and to ema@cerege.fr

The deadline for applications is **15 January 2024**

For further information, please contact MagellanPlus via magellan.plus@uu.nl

ECORD remains committed to a vigorous policy of broad participation and inclusion, and to providing a safe, productive, and welcoming environment for all programme participants and staff.

<http://www.ecord.org/science/magellanplus>

IODP Expedition 406: New England Shelf Hydrogeology

Exploring onshore-offshore freshwater systems and their impacts on groundwater flow, biogeochemical cycles, and microbiology

B. Dugan¹ and 637-Full2 proponents

¹Colorado School of Mines, 1500 Illinois St., Golden, CO 80401, USA, dugan@mines.edu

The ECORD Faculty Board met in Aix-en-Provence on 22-21 September 2022 and confirmed that *IODP Expedition 406: New England Shelf Hydrogeology* will be scheduled for 2024.

Coastal hydrological systems are important as they provide significant freshwater to coastal communities around the world. These freshwater resources are exploited by groundwater wells that produce from unconfined or confined aquifers with well screen depths of less than 100 m. In 2000, coastal groundwater production along the US Atlantic and Pacific coastlines was about 2.4% of annual global groundwater withdraws (Konikow and Kendy, 2005). Sea-level rise poses a unique issue to coastal freshwater sustainability (Werner et al. 2013). In this context, offshore freshened groundwater (OFG) systems that occur within continental shelves below sea level are of particular interest. The global occurrence of OFG is volumetrically significant (Post et al., 2013; Micallef et al., 2021), but not a well-studied resource. To date, the residence times of these freshwater resources are unknown. This leads to questions related to the origin of the freshwater and over what time scale was it emplaced. As coastal populations continue to grow and sea-level rises, stresses on these vulnerable coastal resources will increase. It is therefore crucial to understand the hydrodynamics of these systems, to characterize their extent, to establish their relation to equilibrium conditions, and to define their potential as a resource.

IODP Expedition 406 was designed to directly investigate OFG systems including their linkages to onshore systems, their dynamics and residence times, their relation to nutrient and rare Earth element transport, and their influence on biogeochemical cycling and microbial distribution and activity. Expedition 406 targets the U.S. Atlantic continental shelf south of Massachusetts, USA (Figure 1A). We are focusing on this system as it has strong baseline data. Prior drilling campaigns documented OFG at depths exceeding 100 m below sea floor (mbsf) (Hathaway et al., 1979). Three-dimensional modeling, based on limited hydrogeological data, has estimated that up to 1300 km³ of freshwater is sequestered between New Jersey and Maine (Cohen et al., 2010). Recent marine electromagnetic surveys have also helped document the distribution of OFG along this margin (Figure 1B) (Gustafson et al., 2019). Prior studies along the margin, however, were not focused on the hydrologic system, and did not characterize hydrogeological properties or complete extensive analyses of water or dissolved gas chemistry, which limits our ability to fully characterize the OFG system and model its evolution. Expedition 406 will provide an integrated geological, hydrological, geochemical, biological, and geophysical approach to

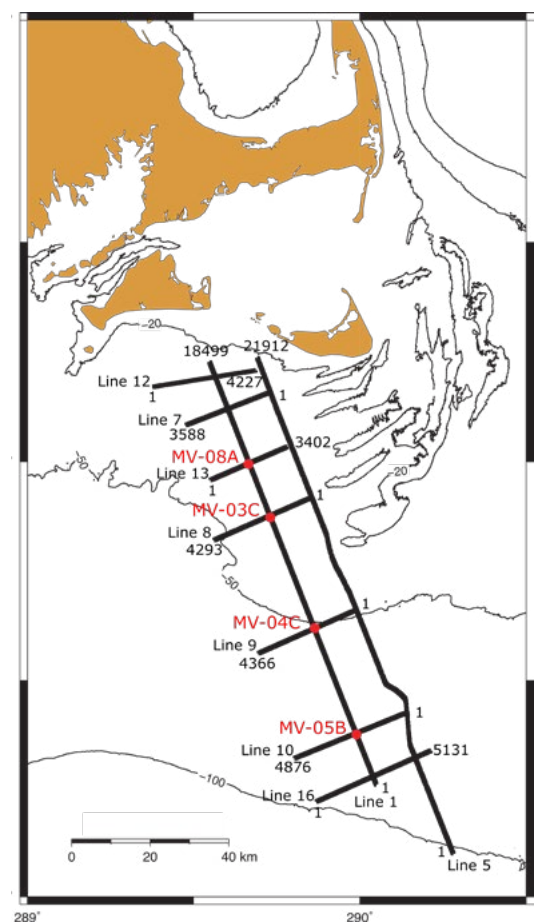


Figure 1A. Basemap of IODP Expedition 406 study region including primary sites (solid red circles) and high-resolution MCS data (black lines).

understand the volume and distribution of this OFG, its emplacement mechanism, and the impacts of this active hydrogeological system on element and nutrient cycling as well as on microbe diversity and activity.

Volume and Distribution of Offshore Freshened Groundwater

Limited well data from the AMCOR drilling project provide evidence that freshwater exists within the U.S. Atlantic continental margin (Hathaway et al., 1979) (Figure 2). Marine electromagnetic surveys in our study region document a significant offshore extension of elevated resistivity

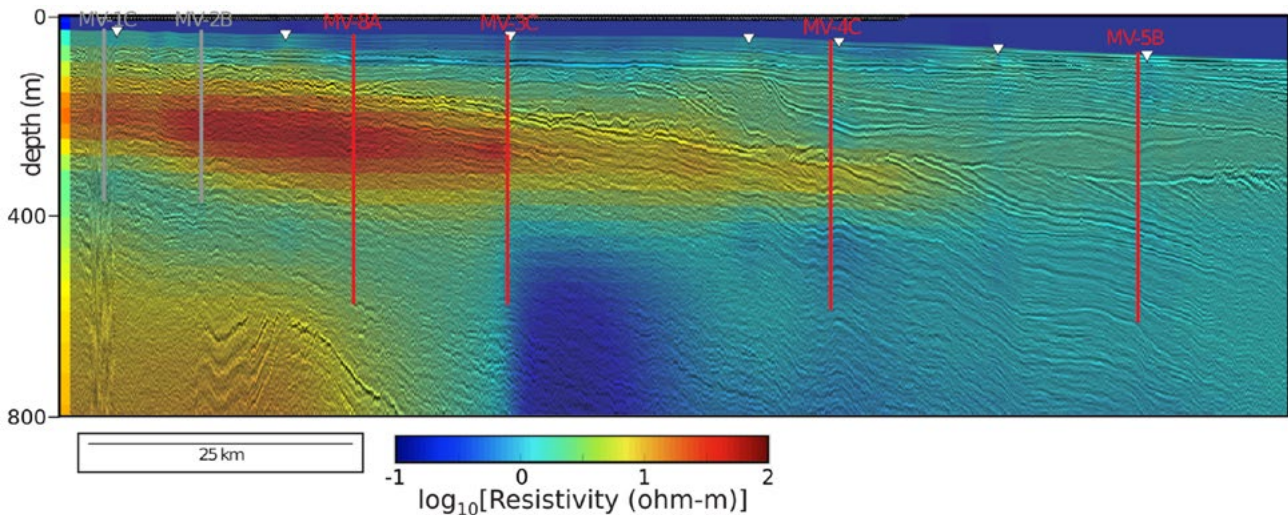


Figure 1B. Top – Depth-converted seismic Line 1 (Siegel et al., 2012) (located in Figure 1A) overlain by electrical resistivity interpretations based on joint inversion of controlled-source electromagnetic and magnetotelluric data (Gustafson et al., 2019). Primary proposed sites MV-8A, MV-3C, MV-4C, and MV-5B are labeled in red.

that is interpreted to be controlled by freshwater with shelf sediments (Gustafson et al., 2019) (Figure 1B). Expedition 406 will complete high-resolution porewater analyses on fluids from core samples and from limited pump tests to provide a robust downhole salinity profile at each site. Porewater analyses combined with lithological characterization will allow evaluation of preferential lithologies in which freshened water is migrating and stored. Porewater salinity data will be integrated with wireline resistivity data to calibrate models that can be used to estimate salinity in sand-rich units (Archie, 1942) and clay-rich units (Glover et al., 2000). Calibrated resistivity models applied to the marine electromagnetic data and core-informed regional stratigraphy will allow significant improvements of the distribution and volume of freshened water.

Emplacement Mechanisms and Timing

There is growing evidence that passive margin sediments host large volumes of paleo-freshwater, and it is hypothesized that these waters were emplaced during the past 2 million years as a result of Pleistocene glaciations (e.g., Edmunds, 2001; Person et al., 2003; McIntosh et al., 2012; van Geldern et al., 2014). A number of mechanisms have been proposed to explain the emplacement of freshwater within continental shelf sediments during glacial periods. Early studies focused on the shore-normal hydraulic gradient associated with topography as the prime driving force for freshwater recharge during sea-level lowstands (Meisler et al., 1984) (Figure 3). Alternatively, Groen et al. (2000) argued that local flow systems associated with secondary topography of the subaerially exposed and incised shelf are essential for freshwater emplacement in continental shelf sediments (Figure 3). Person et al. (2003, 2012) emphasized the role of sub-ice-sheet recharge and recharge from pro-glacial lakes as critical for freshwater emplacement far offshore (Figure 3).

Key aspects to characterizing the emplacement mechanism(s) and timing are determining water and dissolved gas isotopic composition and obtaining water ages. At the simplest level, these data provide the temporal constraints on the

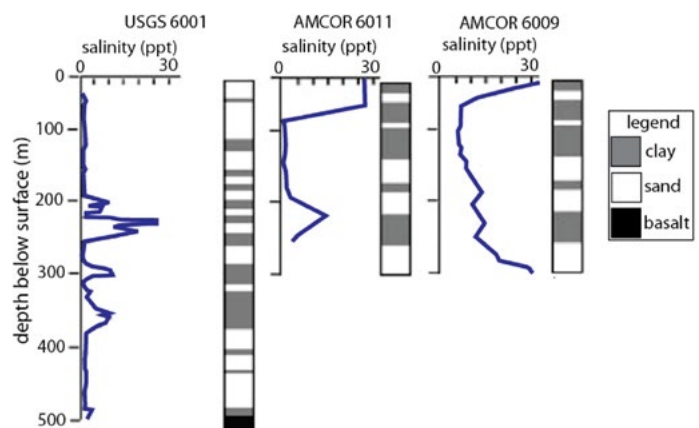


Figure 2. Salinity and lithology data from USGS and AMCOR wells drilled in the 1970s (Folger et al., 1978; Hathaway et al., 1979). USGS 6001 is located on Nantucket Island and documents the presence of freshwater deeper than predicted from modern equilibrium conditions. AMCOR 6011 and 6009 document the presence of freshened groundwater up to 100 km offshore along the U.S. Atlantic margin offshore New England.

origin of the freshwater which then can be used to refine groundwater flow models to test emplacement mechanisms, to evaluate flow pathways, and to predict dynamics of the flow system. The primary approaches for determining water ages are with krypton (⁸¹Kr), helium (⁴He), carbon (¹⁴C), tritium (³H), and oxygen (¹⁸O) from porewater samples. To get the best constraints on water ages, multiple age-dating approaches will be employed. We will collect fluids from confining units via Rhizon samplers and core squeezing. In limited aquifer intervals we will collect water using pumping tests. Our combined approach for fluid sampling will also provide enough fluid for rare earth elemental (REE) analyses allowing improved constraints on global geochemical cycles and on the contribution of REEs to the ocean via submarine groundwater discharge (SGD). This in turn allows a better understanding of SGD volumes, which are not well constrained.

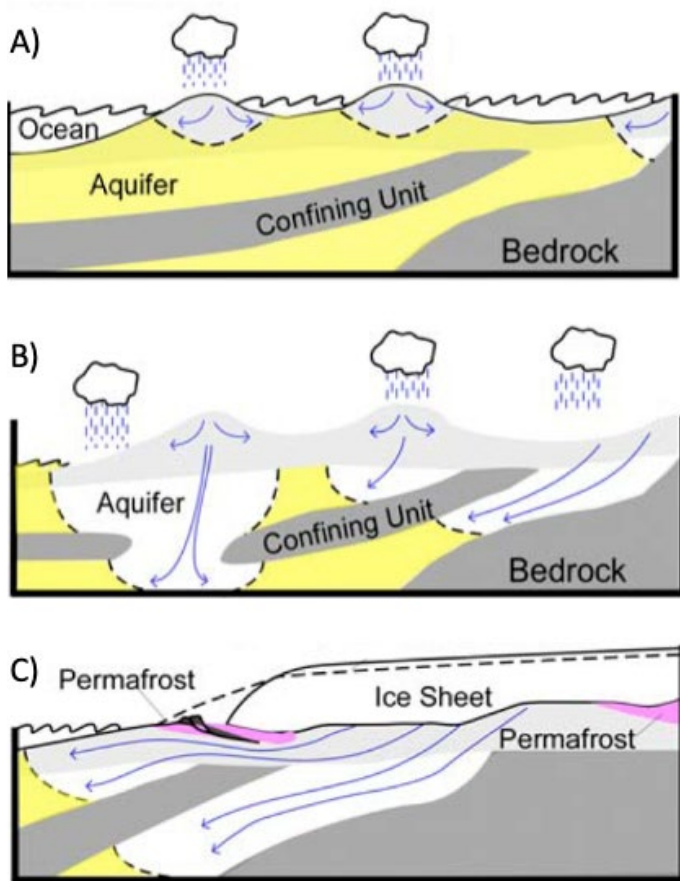


Figure 3. Conceptual models of offshore freshwater emplacement. Freshwater-saturated sediments are light gray and white; saltwater-saturated sediments are yellow.

A) Equilibrium freshwater lens under present-day meteoric recharge produces a small lens of freshwater under islands.

B) Meteoric recharge to exposed aquifers and increased gradient during sea-level low-stand drives the freshwater-saltwater interface deeper and farther offshore (e.g., Groen et al., 2000; Meisler et al., 1984).

C) Sub-ice sheet recharge during a glacial period; high pressure from glacial advances drives freshwater deeper and pushes the freshwater-saltwater interface farther offshore (e.g., Person et al., 2003; Siegel et al., 2014).

We will also use core data and pump tests to develop a permeability model that will be integrated with the stratigraphic interpretation for the region. By constraining the hydrostratigraphic framework for the OFG system, we will have improved constraints for modeling the dynamics of the flow system including recharge rates, fluid residence times, and transport of dissolved nutrients and REEs.

Microbe Diversity and Activity

Through core and fluid sampling we will constrain the lateral and vertical variations in microbial abundance, diversity, and productivity. It has been suggested that salinity is the most important determinant of a microbial community. We will integrate salinity, pH, temperature, and pressure data with microbial abundance, taxonomic diversity, and metabolic diversity analyses on microbiological samples. With three sites, we will gain insights on vertical gradients and lateral gradients and their relation to regional advection and local advection/diffusion. This allows addressing questions related to methanogenesis versus methane oxidation, if the systems are aerobic or anaerobic, and to determine the important microbial processes (e.g., Mailloux et al., 2013; Trembath-Reichert et al., 2017). This could also expand our

understanding of methane cycling in the shelf and the slope to define the importance of fluid flow and sediment in this connected ecosystem. Such analyses linked with geochemistry could provide motivation for post-expedition research such as culturing to isolate environmentally relevant model organisms, metagenomics, metatranscriptomics, and isotopic studies to give a more detailed microbiological picture. Data from this environment with bioinformatic and statistical learning interpretation can also be used to inform process-based models on microbial-biogeochemical cycling and bio-energetic models to quantify microbial activity and geochemical cycling (Bradley et al., 2018, 2020).

Drilling Approach with Advanced Fluid Testing and Sampling

Expedition 406 will use a three-site approach to allow characterization of the freshwater endmember, the seawater endmember, and the transition between the endmembers. All sites will include a single hole to a maximum depth of 550 mbsf. The single hole methodology for coring, wireline logging, and in situ testing builds on the successful operational strategy used on IODP Expedition 313 which sampled similar sediments in a similar geological environment (Mountain et al., 2010).

The drilling strategy is to drill MV-8A first, which will sample the freshwater endmember that is predicted to be bounded on top and bottom by seawater (Figure 1b). The second site to be drilled will be MV-4C which could be the seawater endmember based on numerical modeling results (Siegel et al., 2014) or the freshwater-seawater transition based on electromagnetic and magnetotelluric data (Gustafson et al., 2019) (Figure 1b). If MV-4C is the seawater endmember, the third site to be drilled will be MV-3C to sample the seawater-freshwater transition. If MV-4C sample the freshwater-seawater transition, the third site to be drilled will be MV-5B to sample the seawater endmember, as predicted by numerical models and electromagnetic and magnetotelluric data.

At each site, we will employ a robust wireline logging plan that will provide high quality density, porosity, and resistivity logs. Wireline logging data will be critical in intervals dominated by unconsolidated sand where recovery will be limited and recovered material will be disturbed and contaminated by the drilling process. Standard core measurements of moisture and density and porewater analyses for fluid chemistry in silt-to-clay rich zones combined with wireline logging resistivity and density data will provide more than sufficient information to ground-truth the electromagnetic and magnetotelluric data. The core and porewater data will provide regular and precise porosity and chemistry data that can be enhanced by wireline logs especially in zones where recovery is limited. These porosity and porewater chemistry data also provide essential inputs and constraints for numerical models.

In addition to coring and logging, Expedition 406 will complete a limited number of downhole pump tests to provide hydrogeological, geochemical, microbiological data from permeable horizons that contain freshened water. Downhole pump tests are limited within IODP, and challenging, however, a downhole casing and testing plan

will be developed to increase our probability for success. Successful pump tests will provide in situ field measurements of permeability and pristine-to-minimally contaminated water samples that will provide essential samples for microbiological analyses and gas samples for determining water age.

Closing Remarks

Expedition 406 will be the first study dedicated to characterizing OFG, which is present in continental shelves around the world. In some locations, these OFG systems could provide water resources for densely populated, near-shore regions. Expedition 406 data and post-expedition research will provide a step-change in our understanding of the processes driving emplacement and recharge of OFG systems and will also lead to a better fundamental understanding of this worldwide hydrogeological phenomenon and its impact on microbial process and biogeochemical cycling. With advanced knowledge, we can begin to assess OFG systems as a potential resource and develop strategies for protection and sustainable management of these valuable resources in the near future. As we constrain the flow dynamics, we will also gain a better understanding biogeochemical and element cycling in continental shelf environments.

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IODP Expedition 386: Japan Trench Paleoseismology

IODP Expedition 386 discovers earthquake-enhanced carbon cycling in the ultra-deep-water Japan Trench

Text contribute by: Strasser, M.¹, Chu M.², Ikehara K.³, Bao, R.², Everest, J.⁴

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The first Expedition jointly implemented by ECORD and Japan used giant piston coring (GPC) for the first time within IODP to conduct the first-ever deep-subsurface sampling in a hadal trench at high spatial resolution. Hadal trenches, with their deepest locations situated in the so-called hadal zone, the deepest parts of the ocean in water depth >6km, are the least-explored environment on Earth, linking the Earth's surface and its deeper interior. Unprecedented access to deep-subsurface samples and first results from post-expedition research now reveal exciting insights on the carbon cycling in the trench sediment (Fig. 1; Chu et al., 2023, *Nature Communications*)

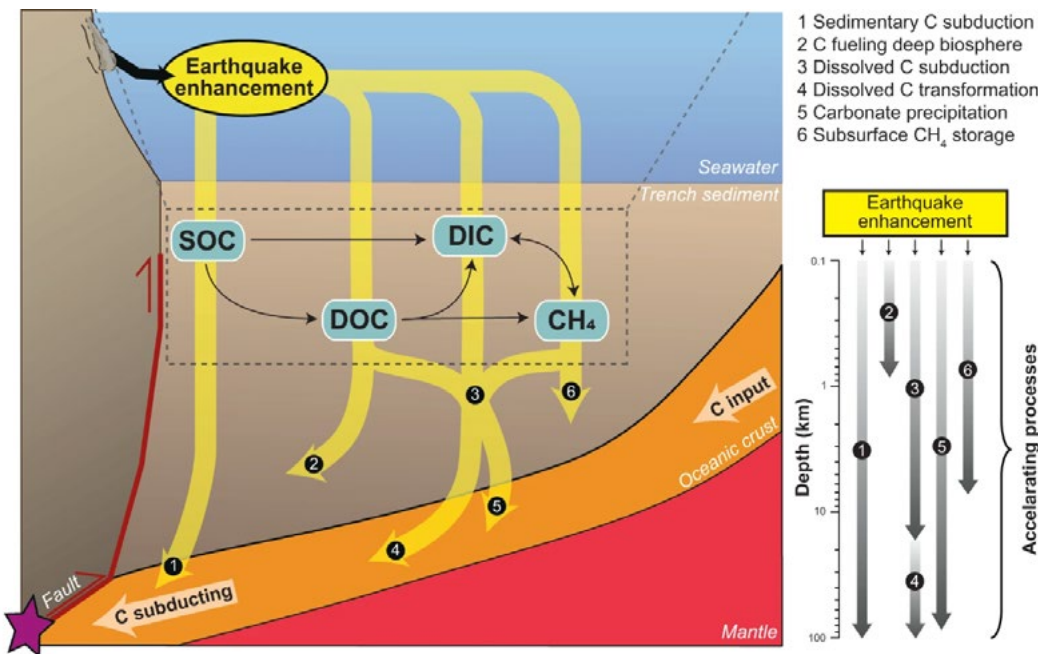


Figure 1. The impact of earthquakes on the carbon cycle in the subduction zone (Figure by Chu et al., 2023).

The Japan Trench is located on the “Pacific Ring of Fire”, a region of special interest in earthquake and deep-water research. It is here that oceanic plates bend, form ultra-deep-water trenches and move below overriding plates in so-called subduction zones, while accumulating long-term global plate tectonic strain. This energy is released cataclysmically during so-called megathrust earthquakes, like it happened in 2011 during the devastating Tohoku-oki Earthquake. Earthquake-related seafloor deformation and

shaking can remobilize large amounts of sediments and fresh organic carbon that is subsequently transferred by gravity flows into the terminal sink of hadal trench basins. In order to study the long-term history of megathrust earthquakes and investigate the roles of earthquakes in the ultra-deep-water environment, IODP Expedition 386 has collected 58 sediment cores taken from holes cored up to 37.82 meters deep in the sea bed at 15 sites along the 500-km-long trench axis (Ikehara et al., 2023). These operational expedition

achievements of successful deep-subsurface sampling at water depths between 7445-8023 m below sea level set two new records in over 50 years of scientific ocean drilling and coring. IODP Expedition 386 cored the deepest water site at a water depth of 8023 meters and recovered the deepest sub-sea level sample from 8060.74 meters below sea level.

Analyses of such unprecedented samples has found large amount of labile dissolved carbon stored in the sediment interstitial water. The dissolved carbon storage implies active organic carbon remineralization in the hadal trenches that is much greater than in other deep-water environments of the open ocean. Advanced radiocarbon analyses by Chu et al., 2023 document aging and accumulation of the dissolved organic and inorganic carbon in the deep subsurface sediments. These dissolved carbon fractions may have great impacts on the deep carbon cycle as they are buried still deeper into the trench sediments and the subduction zone.

A comprehensive geochemistry investigation on the sediment interstitial water based on IODP Expedition 386 results supports the hypothesis. Storages of methane are found in sediments along the whole Japan Trench, together with other outstanding geochemical characteristics of the interstitial water. This points to intensive microbial methanogenesis in the hadal trenches and is interpreted as an enhancement effect of repeated large earthquakes along the subduction zone (Fig. 1; Chu et al. 2023). Through increasing organic carbon fluxes and regulating the physical and chemical characteristics of the sediment deposits, earthquakes serve as a powerful modulator in the trench carbon cycle and the deep biosphere metabolisms in these extreme environments. These discoveries provide strong evidence that the hadal trenches are not 'tranquil' deep-sea environments as previously considered. IODP Expedition 386 also found occurrence of authigenic carbonates in the deep subsurface of Japan Trench sediments, which suggests

active transformation of carbon between its different forms (sedimentary, dissolved, gaseous and mineral) and implies that hadal trench environments host dynamic carbon cycling, which link the Earth's surface and its deeper interior along subduction zones.

The new discoveries of a dynamic carbon cycle in the Japan trench by Chu et al., 2023 represent the first major scientific achievement resulting from the novel high temporal and high spatial resolution subsurface sampling and investigation of hadal oceanic trench achieved by Expedition 386 in the Japan Trench. Along with the new perspectives on deep-sea elemental cycles and their influence on hadal environments, samples and data from this expedition also reveal fascinating event records ranging back more than 24000 years (Ikehara et al., 2023). This enables now-ongoing research and new perspectives for the discussion on long-term recurrence and hazards of major megathrust earthquakes. More substantial scientific advances are expected to push the frontier of ultra-deep-water, subduction zone and earthquake researches.

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Official Press Release about the publication in *Nature Communications*: <https://www.ecord.org/2023-iodp-exp-386-press-release-nature-communications/>

Expedition 386 webpage: <https://www.ecord.org/expedition386/>





Angelo Camerlenghi



Hanno Kinkel

ECORD Educational activities

ECORD Research Grants 2023

14
Grants
awarded

ECORD Research Grants awarded in 2023			
Name	Country	University	Project
Freitas, Mafalda	PRT	"Christian-Albrechts-Universität zu Kiel, Kiel, Germany GEOMAR Helmholtz Centre for Ocean Research Kiel, Kiel, Germany IPMA - Portuguese Institute for Sea and Atmosphere, Lisbon, Portugal"	"Unravelling the temperature dependent mechanisms of natural carbon sequestration : insights from authigenic carbonate precipitation in marine serpentinite mud volcanoes"
Jamson, Katie	CND	University of Victoria	Which group is producing the most carbonate, and is that always the case through time?
Jebasinski, Lena	GER	Kiel University	Ocean circulation in the South Pacific Ocean and its effect on Antarctic ice sheet stability during Marine Isotope Stage 11 and Termination V compared to the Holocene
Molina, Giulia S.	PRT	(IPMA), Lisbon	Improving the interpretation of benthic foraminifera paleoenvironmental changes in the Gulf of Cadiz during Early to Middle Pleistocene transition: New insights from trace element and eNd data
Pascoal Duarte, Debora	UK	Heriot-Watt University	Reconstructing the evolution of the Equatorial Atlantic Gateway and the Nadir Crater Impact: Insights from DSDP and ODP sediment cores
Peral, Marion	FRA	University of Bordeaux	"DOMINO: Drivers Of the Mid-Pleistocene Glaciations The DOMINO project provides, for the first time, accurate high and low-resolution paleoclimate data to document oceanographic, atmospheric, and cryospheric interactions across the Mid-Pleistocene Transition (MPT) using a novel multiproxy approach; this key climatic period forms a stepping-stone transition to the climate state that exists today."
Preine, Jonas	GER	University of Hamburg	Core-log-seismic integration and physical property analysis of the Christiana-Santorini-Kolumbo volcanic field to unravel its volcano-tectonic evolution
Pwavodi, Joshua	FRA	Université de Strasbourg	"Re-assessing hydro-mechanical properties of rocks in Nankai subduction zone using laboratory and machine learning models."
López-Quirós, Adrián	ESP	University of Granada	SUBmarine Green cLAY: Did tectonics cause the present Antarctic glaciation?
Toyos Simón, María	GER	MARUM, Bremen	"A novel approach to estimate long-term mass accumulation rates corrected for syndepositional redistribution in marine sediments"
Torricella, Fiorenza	ITA	OGS Trieste	Palaeoceanographic reconstruction during MIS 7 and MIS 9 - PAGES
Turton, Nikita	IRE	University College Dublin	PETM
Zhao, Xiaoxiao	GER	Kiel University	"Climate change impacts on ocean nitrogen cycling during the Paleocene Eocene Thermal Maximum"
Zorzi, Coralie	FRA	University of Bordeaux	Underlying the forcing of intense Indian summer droughts: a model-data perspective (acronym: DROUGHT)

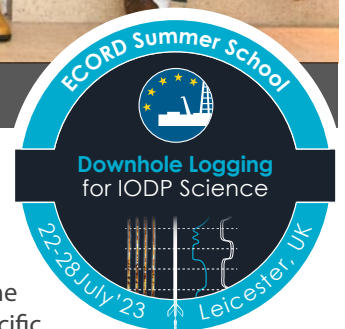
ECORD Scholarships 2023		
Name	Country	University
ECORD Scholarships Bremen 2023		
Duque-Castaño, Mónica Liliana	PRT	Portuguese Institute for the Ocean and Atmosphere (IPMA)
Krahl, Julia	GER	University of Greifswald
Martinelli, Pierluigi	ITA	University of Turin
Mubashir, Ali	ITA	University of Milano-Bicocca
Saha, Rajib Kumar	FRA	Muséum national d'Histoire naturelle (MNHN), Paris
Santucci, Eleonora	ITA	University of Pisa
Suarez Ibarra, Jaime Yesid	FRA	CEREGE
Trejos Tamayo, Raul	ESP	University of Salamanca
Wang, Yunyi ("Wanyee")	NOR	NORCE Climate & Environment
ECORD Scholarships Leicester 2023		
Martínez Bautista, Orlando	NOR	UiT The Arctic University of Norway, Tromsø
Casalena, Giulia	ITA	OGS Trieste
Ortler, Marcel-Luciano	AUT	University of Innsbruck
Raad, Fadl	FRA	University of Corsica Pasquale Paoli
ECORD Scholarships Urbino 2023		
Arndt, Iris	GER	University Frankfurt
GIORGIA BALLABIO	IRE	UNIVERSITY COLLEGE DUBLIN
Ballian, Armelle	GER	Senckenberg ((SBIK-F)
Bolandini, Marco	SUI	ETH Zuerich
Michael BOLLEN	SUI	University of Lausanne
Buljore, Dhishna	FRA	Ifremer
Chen, Lingle	UK	University of Southampton
Diaz Tamayo, Juan Fernando	UK	University of Calgary
Garrido, Sebastian	UK	Heriot-Watt University
Gheiasvand, Masoumeh	FRA	Muséum national d'Histoire naturelle
Havryltsov, Illia	FRA	University of Lille
Hingley, Joe	UK	University of Southampton, UK
Krishnaswamy, Karthik	UK	University of Oxford
Francesca Lanterna	GER	Senckenberg (SBIK-F)
Löberbauer, Marlene	AUT	University of Graz
Lockwood-Ireland, Christine	NOR	The Arctic University of Norway
Reuter, Runa	GER	MARUM-Bremen
Probygd, Joakim	SWE	Lund University
Sigismondi, Silvia	ITA	Università degli Studi di Ferrara
Soleimani, Mojgan	AUT	University of Innsbruck.
Turton, Nikita	IRE	University College Dublin
Urban, Anais	NED	Utrecht University & German Research Center for Geosciences
Perera, Amanda	IRE	Trinity College Dublin

ECORD Summer Schools 2023

7th ECORD Summer School: Downhole-Logging for IODP Science (22-28 July 2023)



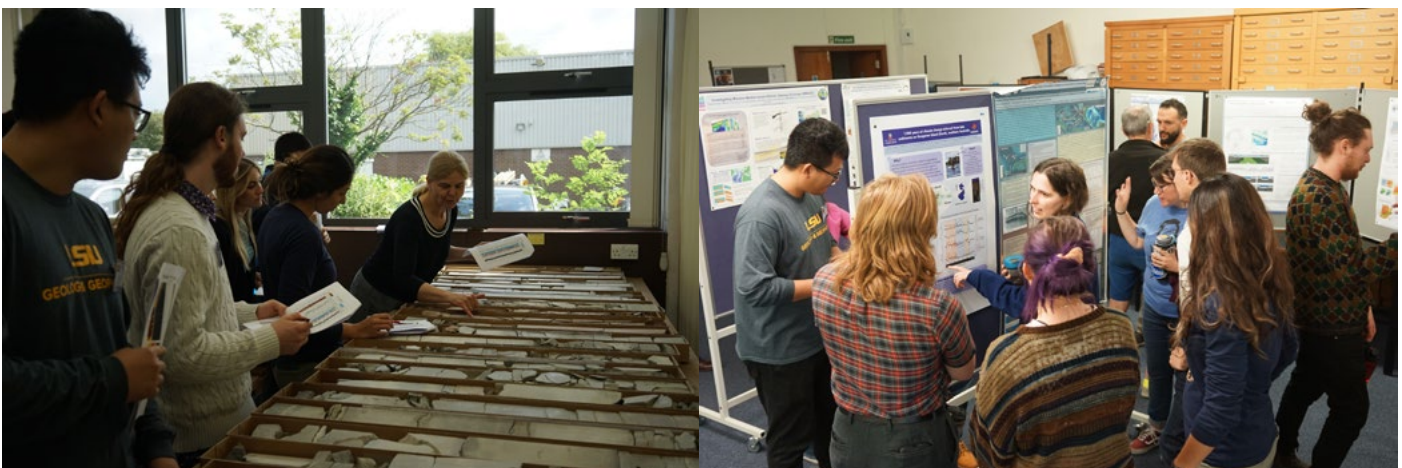
Participants and organisers of the 2023 ECORD Summer School: Downhole Logging for IODP Science.
Credits: Colin G Brooks Photography



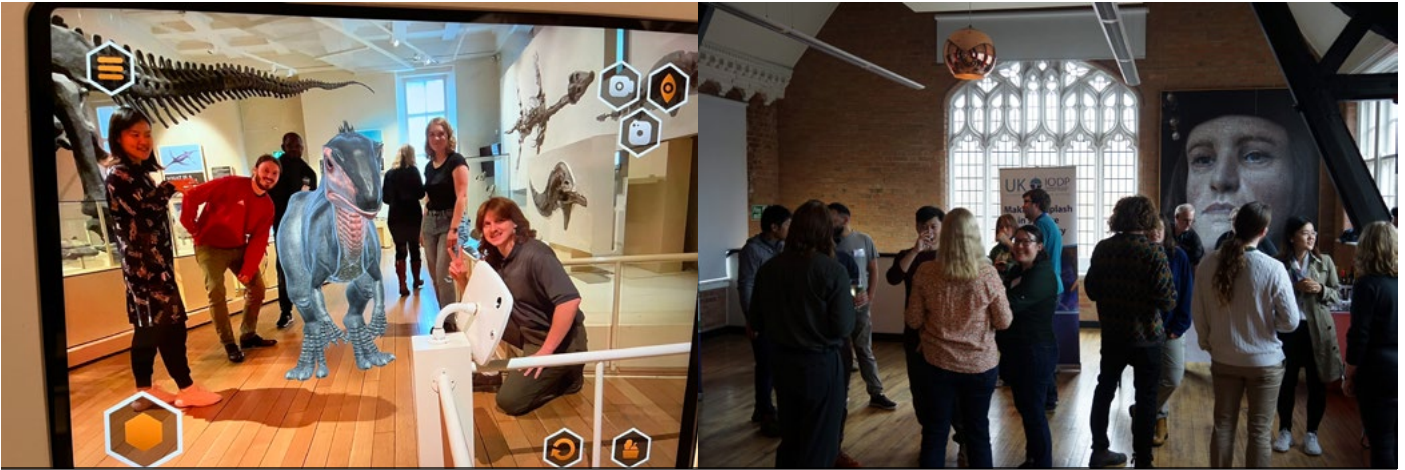
Twenty-six participants representing 11 countries and 13 nationalities joined the 7th ECORD Summer School: Downhole Logging for IODP Science on 22 -28 July 2023. We were excited to welcome participants to Leicester as this was our first in-person summer school after two successful online iterations. As in the previous years, the course was hosted by the European Petrophysics Consortium (EPC) within the School of Geography, Geology and the Environment at the University of Leicester.

Several distinguished guest lecturers, including Hanno Kinkel (OGS), Yohei Hamada (JAMSTEC), Philippe Pezard (University of Montpellier) presented excellent talks introducing participants to the International Ocean Discovery Program

(IODP), the various platforms and drilling technologies used within IODP (including the *JOIDES Resolution*, the *Chikyu* and Mission Specific Platforms), and some applications of downhole logging in the Oman Drilling project, coastal aquifers, and evaporite deposits. The participants also received dedicated training in an industrial software package to visualise, interpret and analyse downhole logging data. University of Leicester's Mike Lovell presented on the basic principles of petrophysics and gave a fantastically engaging lecture on the role of petrophysics in making the best sand castles at the beach and misconceptions while cooking in the



Participants get an up-close look at some cores at the BGS, and enjoy learning about the many research projects in the mini conference poster session.
Credits: E. Le Ber, EPC/ECORD.



Participants explore and learn about the local Leicestershire and Rutland geology in the geology gallery at Leicester Museum & Art Gallery; and enjoyed the icebreaker visit to the King Richard III Visitor Centre. Credits: A. Vila and E. Le Ber, EPC/ECORD.

kitchen! Biscuits came in handy (and tasty) to demonstrate the difference between porosity and permeability.

We visited the British Geological Survey (BGS), where we were given a tour around the core store, the largest core facility in the UK, home to over 18,000 pallets of drilled core and 80,000 trays of samples, weighing up to 10,000 tons! Also, we saw the core scanning facilities, which will be used in the upcoming IODP Expedition 389: Hawaiian Drowned Reefs to CT scan all the cores to get spectacular high-resolution images of the coral core samples! After the BGS visit, a mini conference was hosted, where participants got a chance to present their current or upcoming research projects. The broad range of research topics was incredible to see and demonstrates the significance of scientific (ocean) drilling in the tackling major questions within the Earth Sciences.

During the week, participants and instructors got the chance to visit a few of Leicester museums including an icebreaker

at the King Richard III Visitor Centre and the geology gallery at Leicester Museum & Art Gallery. These events allowed for networking and socialising outside of the formal summer school sessions. On the penultimate night, we held the summer school dinner at a local restaurant, where everyone enjoyed a night of delicious food and great company.

We have received glowing feedback from participants (86%) with positive comments on level of preparedness, organisation, and high-quality engaging teaching and practical exercises. 100% of participants said the summer school was a safe and professional environment of learning and would recommend the course to colleagues or other interested groups. We look forward to building on the experiences from this year to improve the course further for future iterations of the summer school.

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INA Summer School on Evolution and Taxonomy (INASSET 2023)

INASSET 2023 - Mesozoic Nannofossils (Parma, Italy, 25 June - 1 July 2023)

This year the INA (International Nannoplankton Association) Summer School on Evolution and Taxonomy (INASSET) was held at the University of Parma, Italy

ECORD for the first time has provided financial support, as biostratigraphy was and is an essential tool in Scientific Ocean Drilling and we are grateful to INA for organising high quality training. This year's course dealt with Mesozoic Nannofossils and 20 participants from all around the world participated. Invited lecturers covered a wide range of topics from paleoceanography and biostratigraphy, statistical treatment of data, sample preparation to Scientific Ocean Drilling. The Practical exercises and extensive microscopy sessions were rounded up by a one-day field trip to the Northern Apennines.

We thank the local host - Giuliana Villa - and the organising committee for organising such an excellent event.

Read more: <https://ina.tmsoc.org/meetings/summerschool2023/inasset2023.html>

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ESSAC Science Coordinator



INA Summer School on Evolution and Taxonomy (INASSET 2023), Parma, Italy. Credits: G. Villa, E. Matioli, INASSET



Participants of the INA Summer School on Evolution and Taxonomy (INASSET 2023) in Parma, Italy. Credits: G. Villa, E. Matioli, INASSET

18th Urbino Summer School in Paleoclimatology (USSP)

Enhancing Understanding and Collaboration (6 - 22 July 2023)

1. Introduction

The Urbino Summer School in Paleoclimatology (USSP) held from 6 July to 22 July 2023, was a collaborative effort sponsored by the European Consortium for Ocean Research Drilling (ECORD), the Netherlands Earth System Science Centre (NESSC), and the Institute for Climate Change Solutions (i4ccs). USSP welcomed a diverse group of 50 students ranging from Masters, PhD and Postdoctoral levels. The primary objective was to delve into paleoclimatology and numerical modeling of the climate and geochemical proxies, with a focus on exploring climate dynamics across different time scales. This gathering facilitated not only the understanding of Earth's past climate but also its implications for future global climate change. ECORD generously sponsored 24 students from its member countries.

Despite the diverse, big group of participants, everyone managed to create a warm, welcoming atmosphere for all.

The schedule featured a one-day field excursion near Gubbio, which was linked to a later practical exercise, enabling students to examine the remarkable K-Pg boundary and work on integrated stratigraphy. Poster sessions allowed participants to showcase their work, fostering collaboration and discussion.

2. Thematic Highlights

The scientific program was organized into thematic sessions, each led by distinguished experts. Topics were focused into four themes; 1) an earth system overview, 2) exploration of climate archives and proxies, 3) analytical techniques, statistics, and modeling, and 4) the cryosphere. Each session combined lectures with practical exercises to allow the general attendance to develop software skills and become familiar with a breadth of proxies. Furthermore, parallel sessions were organized for participants to attend their preferred topic among three distinct themes.

Finally, two evening sessions with open discussion were held to tackle more philosophical issues, addressing the science-policy interface, diversity and inclusion, science communication, and study design.

Highlights included practical exercises following lectures in which attendees were tasked to brainstorm and evaluate the Eocene-Oligocene Transition as well as the Miocene Climatic Optimum, and to determine which of these intervals provides a better analogue for future projections of climate change. The final session of the summer school, was also widely appraised, clearly outlining the reality of the science-policy interface at the highest levels of the IPCC and UN. Presentations on the importance and application of statistics in

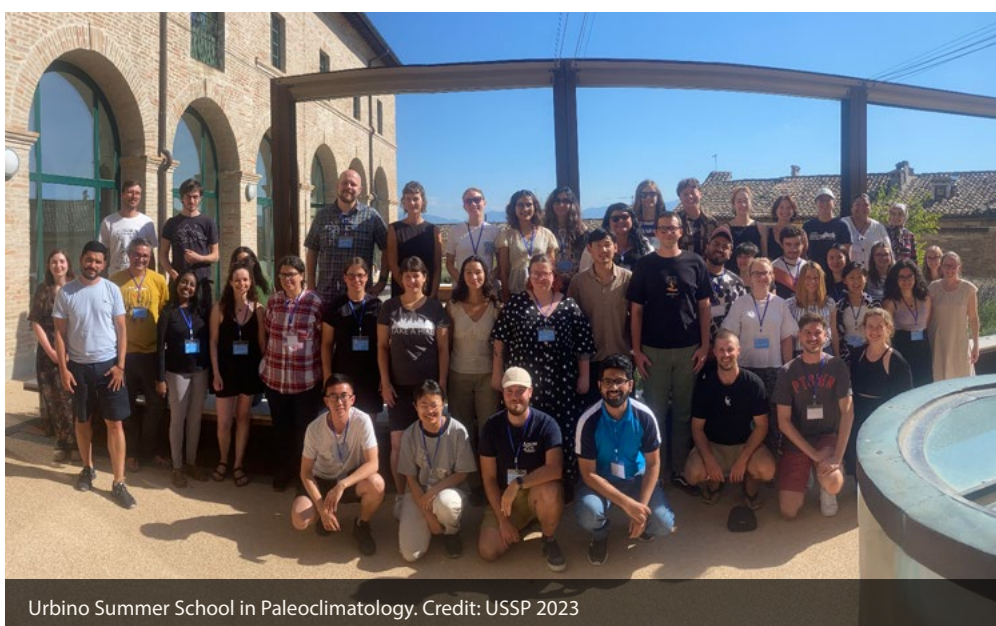
paleoclimate research provided a solid backing for evaluating and communicating uncertainty, with great implications for a wide range of scientific applications. A breadth of discussions on foraminifera-based proxies for ocean temperature and chemistry reconstructions were well received and the possibilities for the testing of hypotheses and application of results through geochemical and earth system models was well communicated, and greatly strengthened the skillsets of many students.

3. Concluding Remarks

The Urbino Summer School in Paleoclimatology delivered a comprehensive and enlightening educational experience. Notably, teaching staff shared their expertise with passion and humility, fostering an environment where critical thinking and dialogue thrived. This program was a stepping stone in the academic, professional and personal journeys of many participants, providing a platform for knowledge exchange, networking and social experience. Certainly, friendships were found and re-connection at upcoming conferences can be expected among the next-generation researchers.

The Urbino Summer School in Paleoclimatology, with its dedication to advancing understanding and collaboration in paleoclimatology, made a significant impact on the academic journeys of its participants. We would like to thank ECORD for their generous support, providing opportunities for early career researchers to build community, share ideas, and excel. We would also like to acknowledge the hard work of the organizing committee for creating this summer school, and all the lecturers who generously shared their knowledge and wisdom. We hope that future participants will have equally enriching experiences.

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ESSAC Science Coordinator



Urbino Summer School in Paleoclimatology. Credit: USSP 2023

15th ECORD Bremen Summer School 2023

From Greenhouse to Icehouse - The Cenozoic Arctic Ocean and (global) climate history (4-15 September 2023)



Participants of ECORD Summer School at MARUM, 2023. Credits: V. Diekamp, MARUM

In early September 2023, we attended the ECORD Summer School at MARUM – Center for Marine Environmental Sciences, Bremen, Germany. This event gathered 22 participants from all over the world and combined lectures with hands-on practice dealing with innovative knowledge about the Arctic Ocean evolution along the Cenozoic. Throughout the 2-week summer school, our days were filled with engaging activities, including a visit to the IODP Bremen Core Repository (BCR) and state-of-the-art IODP-style shipboard simulation exercises. During the so called “virtual ship” practical exercises, all participants got the chance to gain insights into on-board sampling and measurements.

The lecturers, renowned researchers and scientists, covered a wide range of topics related to the geological past and significance of the Arctic Ocean in the Earth’s climate system. The lectures helped us better understand how this unique system has been impacted and how it impacts the global climate, particularly in relation to the anthropogenic activities and near future climate-projections. In addition, we had the chance to present our research projects to our classmates and the lecturers, fostering a dynamic exchange of ideas and

insights. As an extra activity, we were asked to rate our colleague’s presentations, being Monica Duque Castaño the highest rated student.

In the same way, we were able to connect with the *JOIDES Resolution* (JR), which at that time on the Expedition 400 in NW Greenland. During an exciting video conference, Dr. Paul Knutz showed the inner workings of the research vessel and shared insights about the analyses being conducted at Site U1604. This experience not only provided valuable context for the lessons learned throughout the course but also deepened our comprehension of the challenges faced by scientists during oceanographic campaigns on board the JR.

Finally, the course was the perfect occasion to become familiar with IODP. We got to know all about the structures and objectives of IODP and ECORD, especially about the future of the ocean discovery program, how to apply for samples, drill holes and even cruise proposals. To conclude the course, we were asked to plan an IODP proposal, including the scientific questions behind it and how-to-write advice.

In summary, the course accomplished its objectives: to provide with a deep knowledge of the Arctic Ocean, while creating new scientific collaboration networks and educating the future generations to look for in past climate geological archives keys to understand the current anthropogenic climatic crisis the humanity is facing nowadays.

Read more: <https://www.marum.de/en/education-career/ECORD-training/ECORD-Summer-Schools/2023.html>

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University of Bremen



ECORD Summer School at MARUM, 2023. Credits: V. Diekamp, MARUM



Freshly recovered core sections onboard *MMA Valour* during Expedition 389: fossilized reef deposits after they have been placed in plastic core liners. The different colors and textures represent various corals, algae, and microbialites from the fossil reef. Credit: M. Parker, ECORD/IODP.



Angelo Camerlenghi



Hanno Kinkel

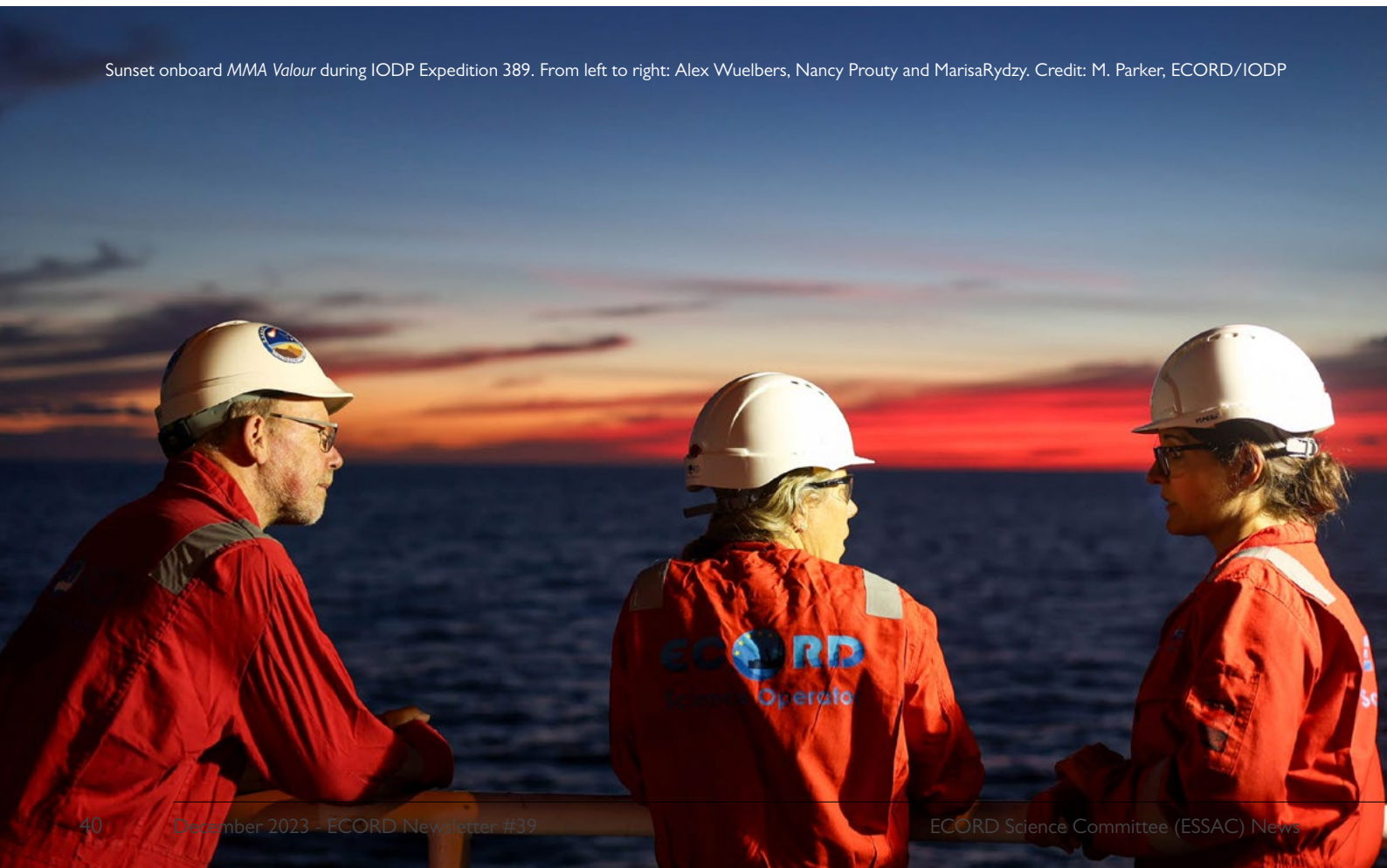
Scientific objectives, implementation, and staffing

Expeditions in 2023 and 2024

The last expeditions of IODP have been scheduled, all Co-chief scientists have been appointed and the staffing is nearly finished with only Expeditions 405 and 406 are in the process of completing the science parties. Once more we emphasise that in 2024, all three IODP ship operators will be engaged with expedition implementation at the same time.

<i>JOIDES Resolution</i> Expedition Name	#	Dates		
NW Greenland Glaciated Margin	400	Aug. 12 – Oct. 12, 2023	Reykjavik / Reykjavik	JRSO
Hawaiian Drowned Reefs	389	Aug. 29 – Oct. 31, 2023	Honolulu / Honolulu	ESO
Mediterranean-Atlantic Gateway Exchange	401	Dec. 10, 2023 – Feb. 9, 2024	Amsterdam / Napoli	JRSO
Tyrrhenian Continent-Ocean Transition	402	Feb. 9 – Apr. 8, 2024	Napoli / Napoli	JRSO
Eastern Fram Strait Paleo-archive	403	June 4 – Aug. 2, 2024	Reykjavik / Reykjavik	JRSO
Japan Trench Tsunamigenesis	405	Sept. 12 – Dec. 7, 2024	TBD	MarE3
New England Shelf Hydrogeology	406	TBD (2024)	TBD	ESO

Sunset onboard *MMA Valour* during IODP Expedition 389. From left to right: Alex Wuelbers, Nancy Prouty and Marisa Rydzy. Credit: M. Parker, ECORD/IODP



XRF analysis of the sediments

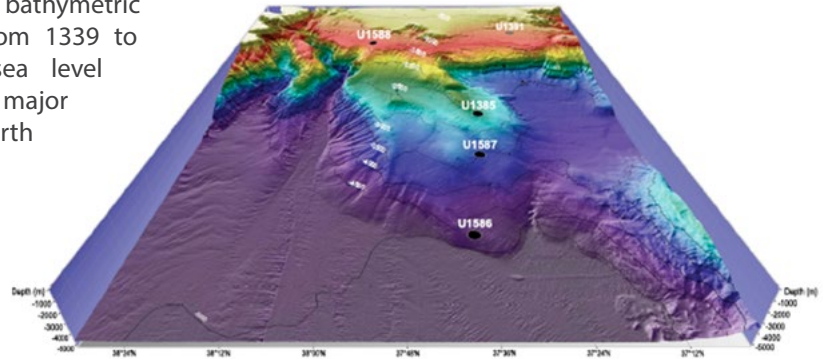


IODP Expedition 397 – Iberian Margin Paleoclimate aimed to recover southwestern Iberian margin sedimentary archives to study climate variability from the Quaternary through the late Miocene along a bathymetric transect of 4 sites from 1339 to 4692 meters below sea level spanning the range of the major

subsurface water masses of the eastern North Atlantic (figure on the right; Hodell et al., 2023).

The southwestern Iberian margin is well known for containing high-fidelity millennial climate variability in the oxygen isotope records of the late Pleistocene since the seminal work of Shackleton et al., (2000), and sea-surface temperature records of Pailler and Bard (2002) and Martrat et al. (2007). IODP Site 339U1385, recovered in the same region, confirmed that surface oxygen isotope and sea-surface temperature records mirror those of Greenland ice core records. In contrast, the deep-water signal follows the Antarctic ice core climate signal, while the narrow shelf allows its correlation to the European pollen records. Thereby, a single sedimentary archive allows for the linking of the regional circulation and environmental conditions to the European hydroclimate (Sánchez-Goñi, 1999) and the polar atmospheric conditions, making it possible to determine the relative phasing of changes in proxy variables that monitor different components of the ocean climate system in the same core (Shackleton et al., 2000, 2004). However, to allow for inter-core and global comparison of the many proxy data expected to be produced from Expedition 397 material it is essential that the respective Sites' splices are as precise as possible so that an accurate age model can be established. The Site 339U1385 splice was improved based on the XRF data, and its age model, mainly based on the benthic foraminifer oxygen isotope record, has been the object of extensive verification (Hodell et al., 2015; 2022). To improve the splice definition and age model for the Sites drilled during Expedition 397, the decision to run XRF analysis on all sections included in the shipboard splice of each Site, and make it available to the entire shipboard party, was taken way before the beginning of the expedition. Furthermore, the work was split between four laboratories in Europe and the USA so that each lab would analyze one Site to guarantee the consistency of measurements throughout each Site. In addition, all the selected laboratories operate the same instrument, ensuring comparable results between sites. The EMSO-GOLD Laboratory of the Marine Geology and Georesources Division of the Portuguese Institution for the Sea and Atmosphere in Lisbon (<https://emso-gold.ipma.pt/>) was assigned Site U1586.

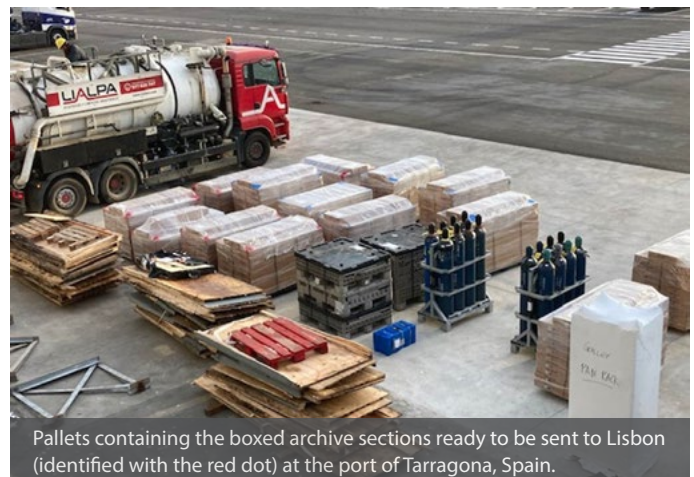
Co-chief Scientists:	David Hodell Fatima Abrantes
Offshore dates:	11 Oct – 11 Dec 2022



Depth distribution of Expedition 397 drill sites looking onshore to the east. The sites are located on a bathymetric transect that intersects each of the major subsurface water masses of the North Atlantic. Depths range from 1339 mbsl (Site U1588) to 4691 mbsl (Site U1586). Expedition 339 Site U1391 is also shown. (Figure made by Helder Pereira using Mirone and iVew4D software). From Hodell et al., 2023

Although without a funding source, we took up the challenge as a group effort, and most members of the Paleoclimate group, from the technicians to the researchers including Ms, PhD students, and trainees, and four colleagues from the University of Salamanca, on a total of 22 persons, got ready to do the XRF analysis of the 1346.85 m of sediment recovered in 349.5 h (14.6 days) in the four holes (U1586A–U1586D) drilled to 350 meters below seafloor at Site U1586.

The palettes with the archive halves left the *JOIDES Resolution* (photo below) directly to Lisbon but reached the city on a day marked by flash flooding caused by intense rainfall during the night of 13 December 2022 (<https://www.efas.eu/en/news/floods-portugal-and-spain-december-2022>). The transport truck could not reach IPMA, nor could we. That forced us to find a temporary asylum for the material, which spent a couple of nights in the company of fruits and vegetables.



Pallets containing the boxed archive sections ready to be sent to Lisbon (identified with the red dot) at the port of Tarragona, Spain.

When the cores finally arrived at IPMA, everyone was ready to carry all the boxes into the cold storage room (the so-called reefer).

The plan was to work 12 hours daily in 4-hour shifts to guarantee everyone could contribute without jeopardizing our other responsibilities (photos below). The equipment started running on 9 January 2023, and scanning the splice sections at 10 and 30 kV was complete on the deadline, although special dedication of 10 days of 24-hour work was needed. It took 88 days and 1176 hours, something like 3.4 times the period used to drill the Site. The deadline of 30 April 2023 was established to provide the necessary time for better-informed sampling decisions since the sampling party was to start on 4 June 2023.

Since then, 49 extra sections were run with the same conditions to improve the splice, and all the rest of the cores of each Hole were run at 10kV. Runs of the Splice sections at 50kV are still ongoing. This data will allow for the correlation between any section of any Hole and the splice record, increasing the potential of future requested samples. Methods will be described in detail in a Data Report to be submitted by the XRF Science Party.



Preparing sections and running the equipment



References

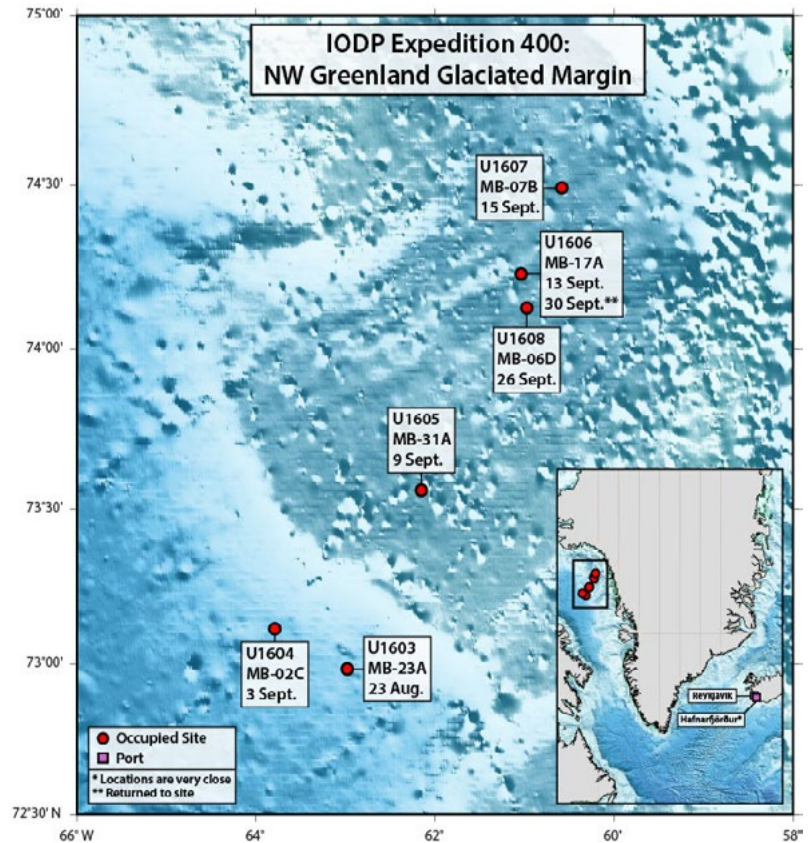
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Expedition 397 webpage: https://iodp.tamu.edu/scienceops/expeditions/iberian_margin_paleoclimate.html

Fatima Abrantes - fatima.abrantes@ipma.pt
ECORD Council delegate, Portugal

Elucidating the long-term history of the Greenland Ice Sheet (GrIS) is essential for understanding glacial instability thresholds, identified as major climate system tipping points, and how the cryosphere will respond to anthropogenic greenhouse gas emissions. To address current knowledge gaps in the evolution and variability of the GrIS and its role in Earth's climate system, International Ocean Discovery Program (IODP) Expedition 400 will obtain cores from seven sites across the northwest Greenland margin into Baffin Bay where thick Cenozoic sedimentary successions can be directly linked to the evolution of the northern GrIS (NGrIS). The strategy of drilling along this transect is to retrieve a composite stratigraphic succession representing the Late Cenozoic era from the Oligocene/Early Miocene to Holocene. The proposed sites will specifically target high-accumulation rate deposits associated with contourite drifts and potential interglacial deposits within a trough mouth fan system densely covered by seismic data. We seek to test if the NGrIS underwent near-complete deglaciations in the Pleistocene and to assess the ice sheet's response to changes in orbital cyclicities through the mid-Pleistocene transition. Paleoclimate records will be obtained that can provide chronology on the NGrIS expansion and unravel potential linkages between marine heat transport through Baffin Bay and high Arctic warmth during the Pliocene. A deep coring site (980 meters below seafloor) targeting a Miocene and Oligocene strata succession will examine possible linkages between changes in atmospheric CO₂ and climate-ecosystem conditions in Greenland. The overall aim is to investigate the full range of forcings and feedbacks—oceanic, atmospheric, orbital, and tectonic—that influence the GrIS over a range of timescales, as well as conditions prevailing at the time of glacial

Co-chief Scientists:	Paul Knutz Anne Jennings
Offshore dates:	12 Aug – 13 Oct 2023



inception and deglacial to interglacial periods. The data and results gathered from Expedition 400 will effectively constrain predictive models addressing the GrIS response to global warming and its impending effects on global sea levels.

Expedition 400 webpage: https://iodp.tamu.edu/scienceops/expeditions/nw_greenland_glaciated_margin.html

Introduction to **IMMAGE** - by Olivia Gaitonde, *IMMAGE Project Manager*



Co-chief Scientists of Expedition 401:

Rachel Flecker
Emmanuelle Ducassou

Offshore dates:

10 Dec 2023 – 9 Feb 2024

First Land-2-Sea project



Olivia Gaitonde,
IMMAGE Project Manager



In February 2023, I embarked on an exciting journey, stepping into the role of project manager for IMMAGE (Investigating Miocene Mediterranean-Atlantic Gateway Exchange), the first ever Land-2-Sea project involving both IODP and ICDP drilling.

IMMAGE will target Miocene-Pliocene sediments on both the Atlantic and Mediterranean sides of the Gibraltar Straits, as well as onshore drilling in southern Spain and northern Morocco.

This ambitious project is driven by three main research objectives:

- To document the time at which the Atlantic first started to receive a distinct overflow from the Mediterranean and to evaluate quantitatively its role in Late Miocene global climate and regional environmental change.
- To discover a complete record of Atlantic-Mediterranean exchange before, during and after the Messinian Salinity Crisis and to evaluate the causes and consequences of this extreme oceanographic event, locally, regionally and globally.
- To test our quantitative understanding of the behaviour of ocean plumes during the most extreme oceanic exchange in Earth's history.

Because it is the first Land-2-Sea project, there are lots of issues that do not typically arise in drilling projects involving just IODP or ICDP and plenty of unforeseen problems. ECORD recognised the challenges the project would face and agreed to fund my position for the first eighteen months to support IMMAGE and its scientific team.



Rachel Flecker,
Expedition 401
Co-chief Scientist

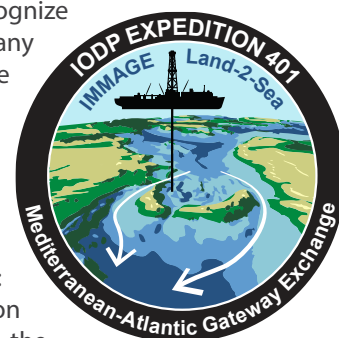
Based in Bristol, I am working with IMMAGE PI Professor Rachel Flecker to set up the governance structure that will integrate both IODP and ICDP procedures, helping with funding applications for the project, supporting the integration of the science and scientists and planning outreach activities. As Rachel and the Expedition 401 shipboard party prepare to board the



JOIDES Resolution in December 2023 for its antepenultimate expedition, we find ourselves at an exciting moment. However, it is important to recognize the perseverance of the many individuals whose collective efforts have propelled us to this moment of action.

Origins of IMMAGE

The origin of IMMAGE can be traced to two key initiatives: MEDGATE and IODP Expedition 339. MEDGATE, funded by the EU, explored Mediterranean-Atlantic gateway exchange during and after the Messinian Salinity Crisis. IODP Expedition 339 recovered Pliocene sediment around the Iberian margin to study the Mediterranean Outflow Water's impact. Scientists from these projects came together during a MagellanPlus-funded 2015 colloquium in Morocco, to consider questions about Late Miocene Mediterranean overflow's role in driving Late Cenozoic climate change. The barrier to answering these questions is the absence of a complete sedimentary record, both of Late Miocene Mediterranean



overflow, and the three Miocene Mediterranean-Atlantic gateway connections (see map). The concept of a coordinated offshore and onshore drilling with IODP and ICDP emerged from that meeting.

Challenges of IMMAGE

Looking ahead, IMMAGE faces significant challenges many of which are likely to be encountered by other future Land-2-Sea projects:

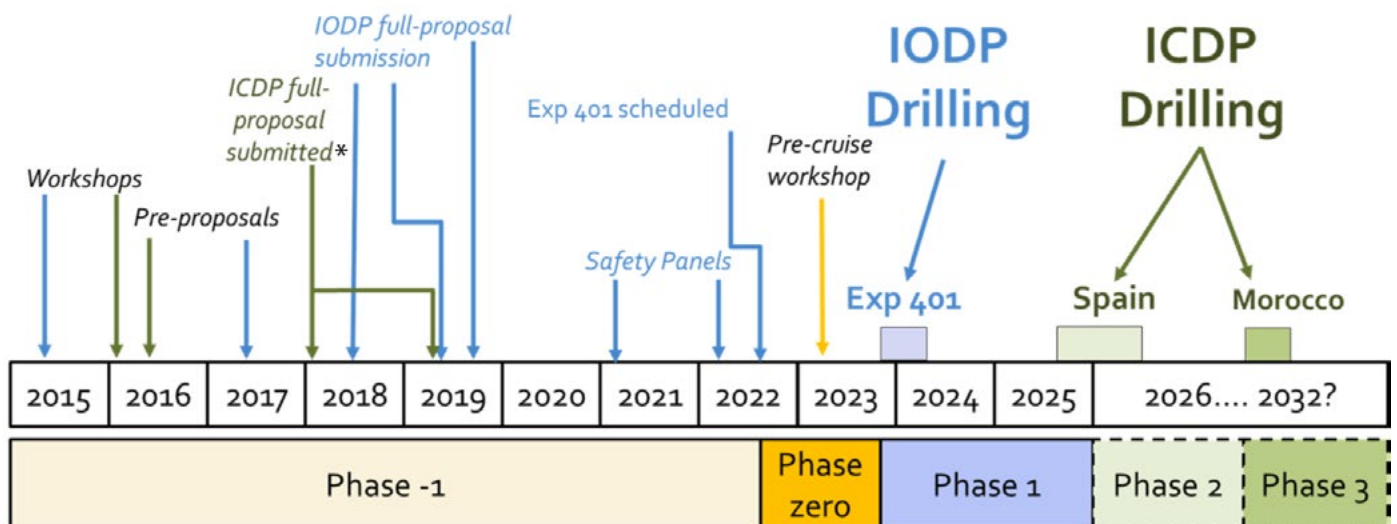
1. Unlike IODP, which finances drilling directly, ICDP provides an initial sum towards the onshore drilling and requires proponents to seek additional resources. The ICDP proposal approval and funding serve as dooropener to secure matching funds from other science funding agencies. For a Land-2-Sea project however, viable applications for onshore funds can only be made once the offshore element of the drilling has been approved and the expedition scheduled. Thus, despite having ICDP approval for over five years, IMMAGE's quest for substantial onshore drilling funding has only started in the summer of 2022, when JRSO announced that the *JOIDES Resolution's* last Christmas expedition, would be for IMMAGE.

2. Drilling initiatives are always multi-year projects. IMMAGE's 8-year pre-drilling development is neither unusual nor particularly long. What is less typical is the likely duration of the project once drilling has started. We anticipate it will take around a decade to deliver the drilling alone. In part this is because IMMAGE is not two drilling projects, but three, since the onshore drilling in Spain is a completely separate endeavour from that in Morocco, requiring different drilling rigs and permissions etc. What can't be compartmentalised however is the science, since Land-2-Sea drilling objectives require integrated analysis of data from all the sites drilled. The challenge is that you don't know which intervals will be recovered at each site until the last location is complete, so targeted sampling has to wait. That doesn't mean of course that lots of interesting and important science isn't done before this, but it does mean

that the early IODP cores must not be depleted before the later ICDP cores are obtained. One consequence of this is that IMMAGE's sample allocation committee will remain in place after the moratorium period up until the last drilling is completed.

Pre-drilling workshop

Integrated Land-2-Sea science also requires the science parties for each drilling expedition to be integrated. With a view to kickstarting the ten-year scientific collaboration necessary to underpin this, a pre-drilling workshop was held in Bristol in July 2023 for the Exp-401 shipboard party and IMMAGE proponents. A large part of my job as project manager to date has been to organise this meeting. We obtained generous funding from ICDP, IODP, IODP China, IODP France, J-DESC, JRSO, ONHYM, the University of Bristol and USSSP to support the attendance of all those who were willing and able to travel to Bristol ending up with 35 participants attending in person and another 24 online from 12+ countries. The workshop was a fantastic opportunity to work out how IMMAGE will function over the short and longer



Timeline for the IMMAGE project. Credit: R. Fletcher, modified.
*ICDP full proposal accepted: 2019

term, it's decision-making framework and funding strategy. Although the hurdles this first Land-2-Sea project faces were made crystal clear to all, what came out of this workshop is that IMMAGE's international team are up for the challenge.

Outreach Efforts

IODP, ECORD and ICDP are all committed to outreach, so one of the exciting elements of a Land-2-Sea project is that you can combine the resources and expertise available across these organisations. As a result IMMAGE has an ambitious outreach plan involving the creation of the "Mobile Science Sensorium", a roaming sensory science exhibition and "Earth System Song", that will use scientists, poets and composers to communicate global experiences of the Earth and Climate through song. We are currently in the process of helping to develop an exhibition in Faro, Portugal which will be timed to synch with IMMAGE drilling in Portuguese waters so that Expedition 401's outreach officers and scientists can interact with visitors via the ship-to-shore interface. We are also working with a team of film-makers on a 50 minute documentary featuring both IMMAGE and Expedition 403 which is drilling between Svalbard and Greenland.

Through these outreach activities, we aim to bridge the gap between science and society, the scientists studying the samples and the people living close to our drilling sites, inviting people from diverse backgrounds across the world to join us on IMMAGE's extraordinary Land-2-Sea journey.



The IMMAGE workshop team by the William Smith memorial pile of stones.
Credit: T. I. Flecker.

Expedition 401 webpage: https://iodp.tamu.edu/scienceops/expeditions/mediterranean_atlantic_gateway_exchange.html
IMMAGE project website: <https://www.immageland2sea.ac.uk/>

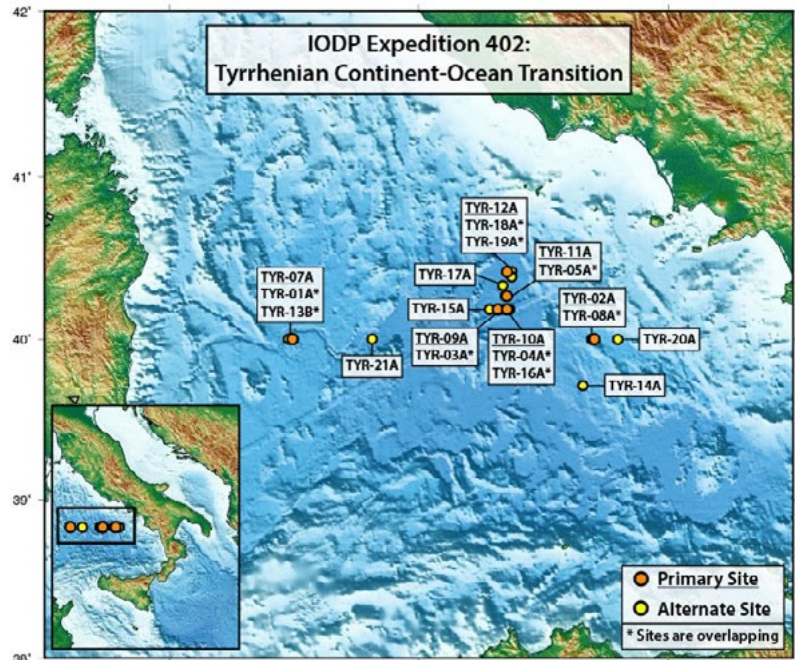
Olivia Gaitonde - olivia.gaitonde@bristol.ac.uk
IMMAGE Project Manager



A tenet of plate tectonics is that divergent plates cause the asthenospheric mantle to ascend, decompress, and melt, producing new magmatic crust. However, drilling west of Iberia in the 1980s discovered a continent–ocean transition (COT) made of exposed mantle, revising models of lithospheric thinning and melt generation and defining magma-poor margins. A long-standing argument about mantle in COTs concerns its nature as either subcontinental or being exhumed during ultraslow seafloor spreading. Additionally, two models attribute the apparent lack of melts either to slow extension resulting in low ascent rates with enhanced asthenospheric cooling and reduced melt production or to upwelling mantle originally too depleted to produce a significant melt fraction. The debate on COT models is limited by the scarce evidence obtained in ultra-deepwater drilling, restricted to a few basement highs. Thus, 30 y after its discovery, the nature and genesis of COTs is still controversial. The comparatively shallow water depth and thin sediment cover of the Tyrrhenian Sea provide an optimal location to test COT formation models by drilling.

The Tyrrhenian is the only example where extensive modern geophysical data has accurately mapped basement domains of a conjugate pair of COTs. They can be characterized with unprecedented detail in a single drilling expedition to study the time and space evolution of COT processes. Expedition 402 will drill two perpendicular transects. An east–west transect will target the progression from magmatic crust to exhumed mantle; a north–south transect will map the fault zone that exhumed the mantle. Drilling will sample the complete sediment section including

Co-chief Scientists:	Nevio Zitellini Alberto Malinverno
Offshore dates:	9 Feb - 8 Apr 2024



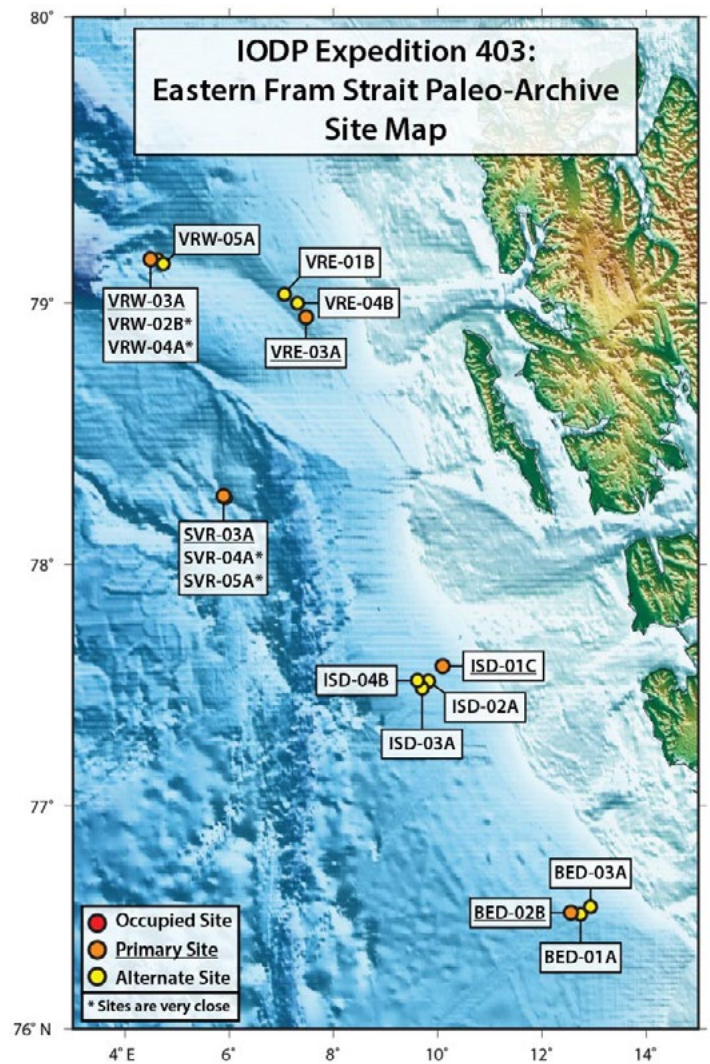
Messinian deposits, the sediment/basement interface, the mantle, the associated magmas, and the products of syntectonic, and possibly ongoing, fluid-rock interactions to evaluate the hydrosphere–lithosphere geochemical exchange and potential related ecosystems.

Expedition 402 webpage: https://iodp.tamu.edu/scienceops/expeditions/tyrrhenian_continent_ocean_transition.html

Co-chief Scientists:	Renata Giulia Lucchi Kristen St. John
Offshore dates:	4 June – 2 Aug 2024

The North Atlantic and Arctic Oceans are unquestionably major players in the climatic evolution of the Northern Hemisphere and in the history of the meridional overturning circulation of the Atlantic Ocean. The establishment of the modern North Atlantic Water (NAW) transporting heat, salt, and moisture to the Northern Hemisphere has been indicated as one of the main forcing mechanisms for the onset of the Northern Hemisphere glaciation. NAW controls the extent and dynamics of circum-Arctic and circum-North Atlantic ice sheets and sea ice in addition to deep water and brine production. How the ocean system and cryosphere worked during past warmer intervals of high insolation and/or high atmospheric CO₂ content is still largely unknown and debated.

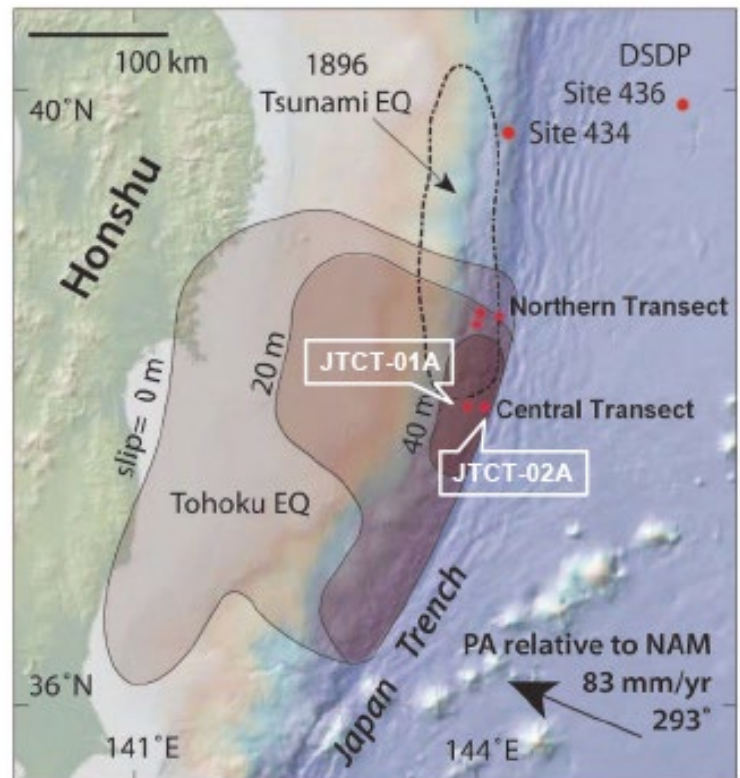
The required information can only be attained by offshore scientific drilling in high-resolution, continuous, and undisturbed sedimentary sequences identified on the western continental margin of Svalbard (eastern side of the Fram Strait) along the main pathway and northern penetration of the NAW flowing into the Arctic Ocean. The area around Svalbard is very sensitive to climatic variability and it can be considered as a “sentinel of climate change.” Further, the reconstruction of the dynamic history of the marine-based paleo-Svalbard-Barents Sea Ice Sheet is important because it is considered the best available analog to the modern, marine-based West Antarctic Ice Sheet, for which the loss of stability is presently the major uncertainty in projecting future global sea level rise in response to the present global climate warming.



Expedition 403 webpage: https://iodp.tamu.edu/scienceops/expeditions/eastern_fram_strait_paleo_archive.html

The 11 March 2011 M 9.0 Tohoku-oki earthquake was one of the largest earthquakes ever recorded and was accompanied by a devastating tsunami. Slip during the earthquake was exceptionally large at shallow depth on the plate boundary fault, which was one of the primary factors that contributed to the extreme tsunami amplitudes that inundated the coast of Japan. International Ocean Discovery Program Expedition 405 aims to investigate the conditions and processes that facilitated the extremely shallow slip on the subduction interface in the 2011 Tohoku-oki earthquake. Proposed work includes coring and logging operations at two sites in a transect across the trench. The first site, located within the overriding plate, will access the fault zone in the region of large shallow slip, targeting the plate boundary décollement, overlying frontal prism, and subducted units cut by the décollement. The second site, located on the Pacific plate, will access the undisturbed sedimentary and volcanic inputs to the subduction zone. A borehole observatory will be installed into the décollement and surrounding rocks to provide measurements of the temperature in and around the fault over the following several years. Sampling, geophysical logs, and the observatory temperature time series will document the compositional, structural, mechanical, and frictional properties of the rocks in the décollement and adjacent country rock, as well as the hydrogeologic structure and pore fluid pressure of the fault zone and frontal prism—key properties that influence the effective stress to facilitate earthquake slip and potential for large slip. Results from Expedition 405 will address fundamental questions about earthquake slip on subduction zones that may directly inform earthquake and tsunami hazard assessments around the world.

Co-chief Scientists:	Shuichi Kodaira (Chief of Co-Chiefs) Marianne Conin Christine Regalla Patrick Fulton Kohtaro Ujiie Jamie Kirkpatrick
Offshore dates:	12 Sept – 7 Dec 2024



Credits: JAMSTEC/MarE3

Expedition 405 webpage: <https://www.jamstec.go.jp/chikyuu/e/exp405/expedition.html>



ECORD Outreach Task Force News

EOTF News and Activities



Malgo Bednarz



Ulrike Prange



David McInroy



Hanno Kinkel



Nadine Hallmann

In February 2023, after a few years of planning and preparations, the permanent exhibition in the National History Museum Vienna (NHM) was finally opened, and the representatives of ECORD and ICDP were invited for the Opening Day Celebration (see next page). The NHM is the second museum in Europe that has a permanent exhibition presenting materials that are related to or have been provided by ECORD (visit <https://www.ecord.org/resources/gallery/ecord-at-exhibitions/>)

The EOTF works on establishing cooperations with other museums and science centres for the purpose of promoting scientific drilling and ECORD at permanent, long-, and short-term exhibitions.

Besides core replicas and audio-visual materials, one of the elements that the EOTF offers to support short-term exhibitions is the ECORD Sphere, which has already travelled throughout Europe (see page 54).

Following the successful start of the year, ECORD celebrated its 20th Anniversary in April, and on this occasion introduced its new logo (see below).

This year, outreach activities focused on IODP Expedition 389: Hawaiian Drowned Reefs. Furthermore, the EOTF restarted planning for outreach actions related to IODP Expedition 406: New England Shelf Hydrogeology, which will be implemented in 2024 (see page 19).

20th Anniversary of ECORD

celebrated on 25 April 2023, NHM, Vienna, Austria

On 25 April 2023, ECORD celebrated its 20th Anniversary at the Natural History Museum in Vienna, Austria, during the ECORD-ICDP Town Hall Meeting (<https://www.ecord.org/about-ecord/about-us/20th-anniversary-of-ecord/>). The event was well attended and the ECORD community had a chance to hear presentations from John Ludden, Catherine Mével and Gilbert Camoin. During the meeting John Ludden and Catherine Mével received the 11th and 12th ECORD Awards in recognition of their outstanding contributions to ECORD and IODP (see pages 6 and 7).



On the occasion of the 20th Anniversary, ECORD produced a special issue of the ECORD Newsletter (issue #38) which contains articles about creation, and 20 years of history of ECORD.

<https://www.ecord.org/resources/ecord-newsletter/>

New ECORD logo

After 20 years in operation, ECORD decided to refresh its logo (see image below).

The new logo was presented to the community during the 20th Anniversary celebration of ECORD at the NHM, and is available for download on the ECORD website (<https://www.ecord.org/resources/logos-and-maps/>)



Read more: <https://www.ecord.org/about-ecord/about-us/20th-anniversary-of-ecord/>
Photo gallery: <https://www.ecord.org/resources/gallery/photos/ecord-iodp-events/20th-anniversary-of-ecord-2023/>

ECORD in museums and exhibitions

The EOTF has been working towards ECORD's presence at permanent exhibitions in museums all around Europe. This includes fabrication and donation (or long-term loans) of materials for museums and research institutions as well as loans of the ECORD Sphere for dedicated exhibitions.

ECORD and ICDP at the Natural History Museum Vienna (NHM)

Permanent exhibition since February 2023



Since 21 February 2023, ECORD and ICDP are present at the National History Museum in Vienna, Austria. ECORD and ICDP representatives were invited for the Opening Day Celebration, during which Gilbert Camoin (ECORD) and Thomas Wiersberg (ICDP) were talking about scientific drilling to about three hundred international guests at this official, high-profile event (photo on the right; visit photo gallery at <https://www.ecord.org/resources/gallery/photos/ecord-iodp-events/ecord-nhm-exhibition-opening-day>).

The permanent exhibition in the Geology section Hall 6: *"The Earth – a dynamic Planet"* at the NHM Vienna presents five core replicas donated by ECORD and ICDP with corresponding information and video materials (see photos on pages 59, 63, and visit photo gallery »).

The four core replicas donated by ECORD are: the PETM, the Tahiti and two from the Chicxulub Impact Crater. ICDP donated a core replica from the Great Oxidation Event (ICDP project FAR-DEEP).



Gilbert Camoin (ECORD) and Thomas Wiersberg (ICDP) (in the middle) during the Celebration of the Opening Day of the permanent exhibition "The Earth – a dynamic Planet" at the NHM, Vienna, 21 February 2023. Credit: U. Heidbach, ICDP.

Photo gallery: Exhibition opening day: <https://www.ecord.org/resources/gallery/photos/ecord-iodp-events/ecord-nhm-exhibition-opening-day/>
Photo gallery: ECORD materials at the NHM exhibition: <https://www.ecord.org/resources/gallery/ecord-at-exhibitions/ecord-in-nhm-vienna/>
Official webpage of the exhibition: https://www.nhm-wien.ac.at/en/exhibitions/permanent_exhibitions/mezzanine_level/hall_6-9_earth_history

ECORD at German Maritime Museum (DSM)

Permanent exhibition to be opened in Winter 2023/2024



After successful cooperation with the German Maritime Museum (DSM) related to a short-term exhibition that took place in summer 2022 (see [ECORD Newsletter #37](#)), the EOTF started working together with the museum on a permanent exhibition focused on laboratory settings. This exhibition will be related to ocean research, and ECORD agreed to provide

materials to the museum, including related information, a core replica from IODP Expedition 310: Tahiti Sea Level, and a 3D coral model. Additionally, an interview with IODP Expedition 310 Co-chief Scientist Gilbert Camoin was filmed in October at MARUM, and will be set as an audio-visual element of the permanent exhibition to accompany the materials provided by ECORD. The exhibition at the DSM is planned to open in Summer 2024.

ECORD and ICDP at Algarve Living Science Center

Short-term exhibition, December 2023 - February 2024, Faro, Portugal

An exhibition at the Algarve Living Science Center will take place in early December, at the start of IODP Expedition 401, which will be the first part of the Land-2-Sea IMIMAGE project (see page 44).

The exhibition will be a multidisciplinary initiative and a variety of materials, including models of 3D fossils, 3D bathymetric models of the Mediterranean Sea and dynamic/interactive elements, are planned. The ECORD Sphere will also be on display, and after the exhibition in Faro it will continue travelling to Naples, Italy (see below).

ECORD in Naples, Italy

Short-term exhibition, February 2024, Naples, Italy

The EOTF along with IODP Italy are involved in the preparations of an exhibition in Naples, Italy, where scientific ocean drilling will be promoted to the general public at the occasion of the start of IODP Expedition 402: Tyrrhenian Continent-Ocean Transition (see page 47).

At the beginning of February 2024, the *JOIDES Resolution* will be in the port of Naples and the general public will have the chance to visit the ship and the exhibition promoting ECORD/IODP where the ECORD Sphere will also be displayed.

ECORD online

The EOTF keeps working on the active presence of ECORD in the Internet through social media (Facebook, Twitter, Instagram and Youtube, Mastodon) and through ECORD website improvements and additional applications.



Co-chief Scientist Jody Webster examining a freshly recovered section of a core onboard *MMA Valour* during Expedition 389.
Credit: M. Parker, ECORD/IODP



Outreach activities related to MSP Expeditions

Outreach for Expedition 386: Japan Trench Paleoseismology

An international, multilanguage press release for a high-profile publication related to this expedition was published and disseminated widely (see page 30, and <https://www.ecord.org/2023-iodp-exp-386-press-release-nature-communications/>). It also drew attention to the [blogsite](#) for the

various stages of the expedition, which was reactivated for the Personal Sampling Party aboard R/V Chikyu in fall 2022.



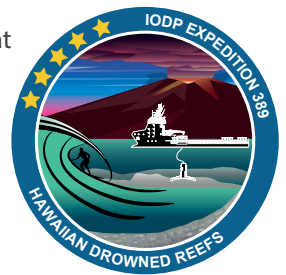
Expedition 386 blog: <https://expedition386.wordpress.com/>
Expedition 386 webpage: <https://www.ecord.org/expedition386/>

Outreach for Expedition 389: Hawaiian Drowned Reefs

Beautiful scenery, beautiful cores – IODP Expedition 389 started successfully in late August 2023 (see page 16). A press release marking the start of the expedition was published (<https://www.ecord.org/iodp-expedition-389-press-release-2023/>).

As part of the outreach strategy, Marley Parker participated as Onboard Outreach Officer during the offshore phase. Regular [blogposts](#) allow a glance behind the scenes into the organization of a mission-specific platform expedition as well as the excitement of the Science Party as the expedition progresses – and they bridge a gap between the offshore and onshore phase of IODP Expedition 389. All blog articles were accompanied by social media posts across the various ECORD channels in order to disseminate news about the science and the people behind it. This will be resumed during the Onshore

Science Party, which will take place at MARUM in Bremen in early 2024. Science Party members engaged with different target audiences, supported by the EOTF, in order to disseminate the scientific objectives and their involvement in the expedition.



A challenge is to involve the Hawai'ian community. The EOTF and the ECORD Science Operator team will look further into this while preparing for the Onshore Science Party in 2024.

Expedition 389 blog: <https://expedition389.wordpress.com/>
Expedition 386 webpage: <https://www.ecord.org/expedition386/>

Outreach for Expedition 406: New England Shelf Hydrogeology

In 2024, the EOTF will focus on the preparations for extensive outreach materials for IODP Expedition 406. These include pre-expedition flyers, a logo, a communications plan and targeted campaigns tailored to the region. For this, the EOTF is already in contact with USSSP. The goal is to involve local

communities and learn from past expeditions. Depending on the expedition platform, the possibility of involving an offshore and an onshore outreach officer is currently being assessed. *See more about the expedition on page 19.*

Expedition 406 webpage: <https://www.ecord.org/expedition406/>

Outreach for Expedition 401: Mediterranean-Atlantic Gateway Exchange

This expedition will be implemented by the *JOIDES Resolution* and corresponds to the offshore part of the first Land-2-Sea project being jointly undertaken by IODP and ICDP (IMMAGE project). The EOTF cooperates with USSSP and the University

of Bristol concerning outreach activities (see page 44), and is also planning a short-term exhibition that will take place in the Algarve Living Science Center in Faro, Portugal, from December 2023 to February 2024 (see page 52).

Expedition 401 webpage: https://iodp.tamu.edu/scienceops/expeditions/mediterranean_atlantic_gateway_exchange.html
IMMAGE project webpage: <https://www.immageland2sea.ac.uk/>

Resources

ECORD Sphere

The ECORD Sphere was shown in the Natural History Museum in Vienna (Austria) as an addition to the special exhibition "The Earth" (see page 51). A poster and a standing banner were developed to accompany the ECORD Sphere during its display (see next page, download at <https://www.ecord.org/resources/ecord-sphere/>). After being on display at the NHM Vienna, the ECORD Sphere was part of the joint Scientific Drilling exhibition booth at the EGU 2023. From July to October, it was embedded into the interactive exhibition "3,688 Meters Below Sea Level" focusing on ocean floor research in the "Haus der Wissenschaft" in Bremen, Germany. The exhibition was conceived and organized by MARUM. The ECORD Sphere representing ECORD and IODP was also on display at the GEOBerlin, organised by the "Deutsche Geologische Gesellschaft – Geologische Vereinigung (DGGV)", which took place in Berlin from 3 to 8 September.

The next stop for the ECORD Sphere will be at the Science Center in Faro, Portugal, for an exhibition related to IODP Expedition 401 (December 2023 - February 2024). In February 2024, the ECORD Sphere will be displayed in Naples, Italy, on the occasion of the start of IODP Expedition 402 when the JR will be at the port of Naples. In April 2024, the ECORD Sphere will be transported to Vienna for the EGU 2024 and then to the University of Utrecht, The Netherlands, to be displayed in the University Museum (see page 70).

ECORD Sphere webpage:

<https://www.ecord.org/resources/ecord-sphere/>

Core replicas

Seven replicas of ODP and IODP drilled cores are available for various activities and display at temporary exhibitions and conferences in Europe and Canada.

The EOTF plans to order the fabrication of several new core replicas, from among which, some will be donated to museums and other will find their home at the EPC (University of Leicester) as the ECORD hub for replica loans within the UK.

Core replicas webpage:

<https://www.ecord.org/resources/core-replicas/>

Models of corals

Two realistic 1:1 scale models of two species of corals are available for loans. These models accompany the core replica from IODP Expedition 310: Tahiti Sea Level (<https://www.ecord.org/resources/core-replicas/core-replica-tahiti-sea-level-iodp-expedition-310/>).

More: <https://www.ecord.org/resources/>



ECORD Sphere in NHM Vienna, February-April 2023.
Credit: M. Bednarz, ECORD/IODP.

How to loan a core replica or a coral 3D model?

To order a loan, contact Malgo Bednarz at EMA (bednarz@cerege.fr) with inquiry about the availability of any of the core replica or coral model.

ECORD shares these materials on a temporary basis with scientists and teachers under the conditions described in the loan document. The materials are loaned free of charge with the ordering university/research institution covering the shipment of core replicas back to EMA.



3D models of specimens of corals identified in cores from Exp. 310.
Left: *Porites lobata*; right: *Pocillopora eydouxi*. Produced by Kamyk.pl.

ECORD Sphere

Touch and find out more...



● With ECORDs Sphere, you can interact and learn more about the how, where and why of **scientific ocean drilling**

Where we work How we do it Core Repositories Members

Continental Crust Litho Asthenospheric Mantle

Watch videos on science in action

Who We Are

● Explore the scientific themes of the current science plan and see where we drill to answer those challenges....

Earth in motion

Biosphere Frontiers

Climate and Ocean Change

Earth Connections

All Themes

● Display scientific data on a changing ocean

Rising Sea Levels

Ocean Acidity

Tectonic Plates

Drain the Ocean

Scientific data

● Explore our platforms....

ECORD at conferences, events and meetings - past

EGU 2023 (23-28 April 2023, Vienna, Austria)



The EGU 2023 General Assembly was held from 23 to 28 April 2023 where a joint ECORD/IODP-ICDP booth was organized by the ECORD and ICDP outreach teams. The booth was equipped with the ECORD Sphere and we had a chance to enjoy conversations with a lot of visitors interested in scientific drilling. A joint ECORD-IODP Town Hall Meeting was held on 25 April at the NHM Vienna, during which ECORD celebrated its 20th Anniversary (see page 50), and ICDP announced its celebration of 25+ years of scientific drilling that was celebrated three months later in July 2023 (see page 62). In addition, ECORD presented plans for IODP³ to start on 1 January 2025 (see page 10)



ECORD-ICDP Scientific Session “Achievements and perspectives in scientific ocean and continental drilling” at the EGU General Assembly 2023

Following some discussions in 2022, the traditional joint ECORD-ICDP Scientific Session at the EGU General Assembly has been moved from the Stratigraphy, Sedimentology and Paleontology (SSP) Division to the Inter- and Transdisciplinary Sessions (ITS). The reason for this is to emphasize the inter- and transdisciplinary character of scientific drilling, and to attract presenters outside the sedimentary geology area. SSP has remained the co-hosting division for this session. The team of co-conveners has been enriched by a representative

of the Japanese scientific community: Harue Masuda, Osaka City University. The session has received a record attendance with 47 abstracts, of which 30 were oral and 17 poster presentations.

EGU 2023 team of co-conveners: Thomas Wiersberg, Angelo Camerlenghi, Cindy Kunkel, Jorijntje Henderiks, Harue Masuda (see next page about EGU 2024).

INQUA 2023 (13-20 July 2023, Rome, Italy)



Scientific drilling session (208) “Achievements and new perspectives in Quaternary sciences from scientific drilling” was held at the INQUA 2023 under the theme of “Climate record, processes and models”.

The conveners of the Session 208: “Achievements and new perspectives in Quaternary sciences from scientific drilling” were Henrieka Detlef (Aarhus University, Denmark) for IODP,

Antje Voelker (Instituto Português do Mar e da Atmosfera & CCMAR, University of Algarve, Portugal) for IODP, and Flavio Anselmetti (University of Bern, Switzerland) for ICDP.

In summary, there were nine oral presentations (three for IODP) and 11 poster presentations (three for IODP). Additionally, there were presentations using IODP material in several other sessions during the INQUA 2023.



SIMP, SGI, SOGEI, AIV Congress 2023 (19-21 September 2023, Potenza, Italy)
 “The Geoscience paradigm: Resources, Risks and future perspectives”

The annual joint SIMP, SGI, SOGEI, AIV Congress “The Geoscience paradigm: Resources, Risks and future perspectives” took place at the University of Basilicata Campus in Potenza from 19 to 21 September 2023. During the conference, Elisabetta Erba (University of Milan, President of IODP-Italy) presented a plenary talk entitled “lo stato attuale e le prospettive future del programma di perforazione oceanica [The current status and future perspective of the ocean drilling program]” on behalf of the “CNR Committee for ECORD-IODP and ICDP”.

As a platinum sponsor of the congress, IODP-Italy set up an ECORD/IODP-Italy exhibition booth with IODP/ECORD/IODP-Italy posters, informational flyers, reports, leaflets, and brochures as well as IODP-Italy goodies for fieldwork and ECORD gadgets accompanied by the live handling of additional information by the booth team. The team was composed of Elisabetta Erba (University of Milan, President of IODP-Italy), Angelo Domesi (CNR) and M. Elena Martinotti (CNR). The stand was frequented by many visitors of all ages. According to a more sustainable and green approach, mainly lists of QR codes linking to the most important information with regards to the programme were distributed.

Taking advantage of the symposia, a huge work of updating scientific posters of either Science Party members or postdocs was accomplished. All new materials have been made available through the IODP-Italia web site <http://iodp-italia.cnr.it>.

More details: <https://www.geoscienze.org/potenza2023/>



Top and bottom photos: Maria Elena Martinotti at the ECORD/IODP-Italy exhibition booth, SIMP, SGI, SOGEI, AIV Congress, September 2023, Potenza, Italy. Credits: IODP-Italy.



The Geoscience paradigm:
 resources, risks and future perspectives
 Potenza 19-21 Settembre 2023



IODP-France Scientific Days (29-30 November 2023, Paris, France)



IODP-France Scientific Days have taken place on 29-30 November at the Institut de Physique du Globe de Paris in France.

The scientific sessions aimed at providing a preliminary assessment of the involvement of the French scientific community in IODP during the decade of 2013-2024. The meeting has been an opportunity for French scientists involved in IODP expeditions to present the results of their research during oral presentations and/or poster sessions.

The programme is at a turning point of its history. IODP will end in September 2024, coevally with the decommissioning of the *JOIDES Resolution*. The meeting has been therefore an opportunity to inform the French community and to discuss

about IODP³. In particular, the emphasis has been placed on the ability of MSPs to fulfill the goals of the new programme and to discuss the role that ECORD in this new programme.

A representative of the ECORD Outreach Task Force was invited to the meeting and gave a presentation to the French IODP community.

Three core replicas has been displayed:

- Blake Nose Paleooceanographic Transect – ODP Leg 171B (<https://www.ecord.org/k-pg-boundary/>)
- Chicxulub Impact Sequence – IODP Expedition 364: Chicxulub K-Pg Impact Crater (<https://www.ecord.org/core-replica-chicxulub/>)
- Japan Trench Fast Drilling Project – IODP Expedition 343: J-FAST (<https://www.ecord.org/resources/core-replicas/>)

Registration and more details:
<https://jsiodpfr2023.sciencesconf.org/>

ECORD at conferences, events and meetings - future

AGU 2023 (11-15 December 2023, San Francisco, USA)

A joint booth under the banner of Scientific Drilling is being organized at the AGU 2023 in San Francisco by the outreach teams of ECORD, ICDP, MarE3 / JAMSTEC, USSSP and IODP China. Find our welcoming staff at the merged booths numbers 1031, 1033, 1130 and 1132 in the central part of the exhibition hall.

<https://www.agu.org/fall-meeting>



EGU 2024 (14-19 April 2024, Vienna, Austria)

The outreach teams of ECORD and ICDP started preparations for the upcoming EGU 2024, including a Town Hall Meeting, which is planned on 16 April 2024 at the NHM Vienna. A joint ECORD/IODP-ICDP booth (numbers 48 and 49) will be organized by the ECORD and ICDP outreach teams in the Entrance Hall where the ECORD Sphere will be set up.



ECORD-ICDP Scientific Session “Achievements and perspectives in scientific ocean and continental drilling” at the EGU General Assembly 2024

The session has been accepted as ITS/SSP Session at the EGU General Assembly 2024 with one change in comparison to the last year: Harue Masuda has been replaced by Norikatsu Akizawa (University of Tokyo) in the team of co-conveners. In the session description, the importance of scientific results from the use of scientific drilling legacy samples and data has been emphasized.

EGU 2024 team of co-conveners: Angelo Camerlenghi, Thomas Wiersberg, Jorijntje Henderiks, Cindy Kunkel, Norikatsu Akizawa.

<https://egu24.eu/>

Part of the exhibit "The Earth - a dynamic Planet" in the Natural History Museum Vienna, Hall 6, where the four core replicas donated by ECORD are at display. Credits: NHM Vienna.



Gesteine als Klima-Archive Rocks as climate archive

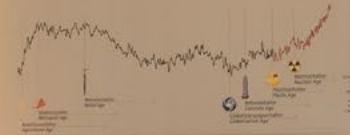


Der Mensch als geologische Kraft Man as a geological force

Seit Menschen aus Afrika wandern über den Mittelmeerraum nach Europa, ist die geologische Einfluss des Menschen in den Anthropozän, nach dem geologischen Äon "Anthropozän" für Mensch.




Stahl, Beton und Plastik
Steel, concrete, and plastic

Der Beginn des Anthropozäns
The beginning of the Anthropocene





Calendar of meetings, workshops and conferences in 2023 and 2024

2023		
29-30 November IODP France Paris, France	11-15 December AGU 2023 San Francisco, CA, USA	
2024		
10-11 January SEP La Jolla, CA, USA	8-9 May JR Facility Board Hawaii, USA	September PMO Meeting Japan
6 February ECORD Outreach TF Meeting #25 Naples, Italy	18-19 June ECORD Council Spring Meeting #10 Virtual	September ECORD Facility Board Meeting #13 Dublin, Ireland
March MagellanPlus Workshop: 21 st Century Drilling Bremen, Germany	7-8 June Chikyu IODP Board Kobe, Japan	September IODP ³ meeting: MSP-FB Dublin, Ireland
March ECORD Training Course: The Shipboard Simulation Experience Bremen, Germany	June SEP Helsinki, Finland	October ESSAC Fall Meeting #22 Oslo, Norway
14-15 March IODP ³ meeting: interim MSP-FB Japan	July 19th ECORD Urbino Summer School in Paleoclimatology Urbino, Italy	October ECORD Council-ESSAC Meeting #13 Oslo, Norway
18-20 March ESSAC and J-DESC Workshop: Future of Scientific Ocean Drilling Kii Peninsula, Japan	July 8th ECORD Summer School on Downhole Logging for IODP Science Leicester, UK	October ECORD Outreach TF Meeting #26 Oslo, Norway
14-19 April EGU 2024 Vienna, Austria		September 16th ECORD Bremen Summer School Bremen, Germany
28-30 May ESSAC Spring Meeting #21 Helsinki, Finland	September IODP Forum Japan	9-13 December AGU 2024 Washington, D.C., USA
		

IODP meetings | ECORD meetings | IODP³ meetings | Conferences | ECORD Summer Schools and Training Course | Workshops and colloquia

Check for updates: <https://www.ecord.org/calendar/>

IODP Expeditions 2024

10 December 2023 - 9 February 2024	Expedition 401 (JR): Mediterranean-Atlantic Gateway Exchange
9 February - 8 April	Expedition 402 (JR): Tyrrhenian Continent-Ocean Transition
4 June - 2 August	Expedition 403 (JR): Eastern Fram Strait Paleo-archive
Spring-summer	Expedition 406 (MSP): New England Shelf Hydrogeology
12 September - 7 December	Expedition 405 (Chikyu): Japan Trench Tsunamigenesis

SCIENTIFIC DRILLING

SCIENTIFIC DRILLING is an Open Access journal with no publication costs for authors. We kindly invite the scientific drilling community to consider publication in SCIENTIFIC DRILLING.

SCIENTIFIC DRILLING now with World of Science Impact Factor

Scientific Drilling received for the first time an **Impact Factor (1.2)** from Clarivate Analytics



The Editorial Board of the joint ICDP-IODP journal SCIENTIFIC DRILLING (Chief Editor: Uli Harms, Editors: Nadine Hallmann, Tomoaki Morishita, Will Sager, Thomas Wiersberg) is thrilled to announce that, after eighteen years, SCIENTIFIC DRILLING is for the first time listed with an Impact Factor (1.2) in the Web of Science from Clarivate Analytics. The Editorial Board is very grateful to all authors, reviewers, and Copernicus Publications for their dedicated work contributing to the success of our journal and for reaching this important milestone and looks forward to publishing more exciting, innovative, open-access research from all fields of scientific marine, continental, and ice drilling.

Volume 32 | November 2023

Volume 32 of Scientific Drilling has been published and can be downloaded at <https://sd.copernicus.org/articles/sd-volume32.pdf>

Scientific Drilling: <https://www.scientific-drilling.net/>

SCIENTIFIC DRILLING Volume 33 | April 2024 Call for manuscript submission

ECORD and ICDP encourage their communities to submit manuscripts for the next issue of Scientific Drilling (Vol. 33) which is planned to be published in April 2024.

For details on manuscript preparation and file submission check the journals webpage:

<https://www.scientific-drilling.net/submission.html>



Thomas Wiersberg



Ursula Heidbach

25⁺ years of International Continental Scientific Drilling Program

For almost three decades, drilling related to international Earth sciences on the continents is being coordinated by the ICDP.

Accordingly, ICDP celebrated its 25⁺ anniversary in July with the IV. International Conference of Continental Scientific Drilling “ICDP in the Second Quarter of its First Century”, to re-consider accomplishments, look into future scientific targets, and to critically examine the organizational structure of the ICDP. The conference was convened at the German Research Center for Geosciences GFZ in Potsdam, Germany. 139 participants from 23 countries attended the meeting – from early-career dynamos to acknowledged experts – discussed the future scientific and programmatic orientation of ICDP, including PIs of completed, ongoing and future ICDP drilling projects, members of ICDP panels, representatives from partner organizations (such as IODP), funding agencies, as well as 30 international early-career researchers. Highlights of the past years were presented and the future scientific and programmatic orientation of ICDP was discussed.

The conference program was divided into nine sessions with a mixture of contributions on the four core research themes of the ICDP (geodynamics, geohazards, georesources, environmental change) with outlines of achievements and short presentations on new plans and projects, as well as



25⁺
YEARS OF
SCIENTIFIC DRILLING

Conference on
**International Continental
Scientific Drilling 2023**

five ‘cross-topics’ on the future organizational direction of the ICDP, funding of major drilling projects, organization of operational support, the Land to Sea (L2S) drilling initiative and major new research initiatives related to ICDP, and outreach activities with a focus on early career researchers.

Participants of ICDP 25⁺ anniversary at the IV. International Conference of Continental Scientific Drilling July 2023. Credit: ICDP



The conference aimed to highlight achievements of the past years and to discuss the scientific outlook and the organization of our program, which included:

1. actions to implement the objectives defined in the ICDP Science Plan 2020-2030,
2. strengthening and expanding ties among member countries and partner organizations, including IODP, and
3. initiating new measures for a better integration and involvement of early-career researchers in ICDP.

The recommendations of the conference discussions are still being compiled, and key suggestions will be brought up at forthcoming ICDP board meetings. ICDP will keep you in the loop about further steps via ICDP newsletters, Town Hall meetings at AGU and EGU, and ICDP Social Media.



Participants of ICDP 25th anniversary at the IV. International Conference of Continental Scientific Drilling in July 2023. Credit: ICDP

Thomas Wiersberg & Ursula Heidbach - icdp-outreach@gfz-potsdam.de
Helmholtz Centre Potsdam, GFZ

More information about ICDP: <https://www.icdp-online.org>

Part of the exhibit “The Earth - a dynamic Planet” in the Natural History Museum Vienna, Hall 6, where the core replica donated by ICDP is on display.
Credits: M. Bednarz, ECORD/IODP





Austria

austria@ecord.org

Austrian scientists have been and remain highly involved in multiple IODP-related activities throughout the year 2023. We welcome increasing interest and new involvements of early career scientists that help the Austrian scientific ocean drilling research community to continuously grow and cover broader expertise and research fields and increase the variety of Austrian research institutions and universities now actively involved in IODP.

Earlier this year, Theresa Nohl moved to Austria as assistant professor for geobiology at the University of Vienna. She is the Austrian sedimentologist in the Science Party of IODP Expedition 389: Hawaiian Drowned Reefs, and looks forward to participating in the upcoming Onshore Science Party to contribute to core description and collect samples for her post-expedition research project studying microbially mediated carbonate diagenesis. From late August to early September, she also participated in the ReC23-01 project, which was co-led and initiated by Gerald Auer from the University of Graz at the IODP Kochi Core Center (KCC) in Japan. This project represents a first internationally coordinated legacy core analyses project launched within the Japanese ReCoRD (Repository Core Re-Discovery) Program, a new initiative coordinated by the KCC, Koch University, JAMSTEC and J-DESC. This first ReCoRD "expedition" aims to understand the effect of changing climatic conditions during the "near-future warm period analogues" such as the Miocene Climatic Optimum (MCO) and subsequent cooling during the Middle and Late Miocene and Pliocene had on intermediate water formation and circulation.

Two PhD students from the University of Innsbruck, Marcel Ortler and Mojgan Soleimani, participated in the ECORD summerschool in Leicester and Urbino. They gained training and motivation to apply to sail in upcoming Expeditions.

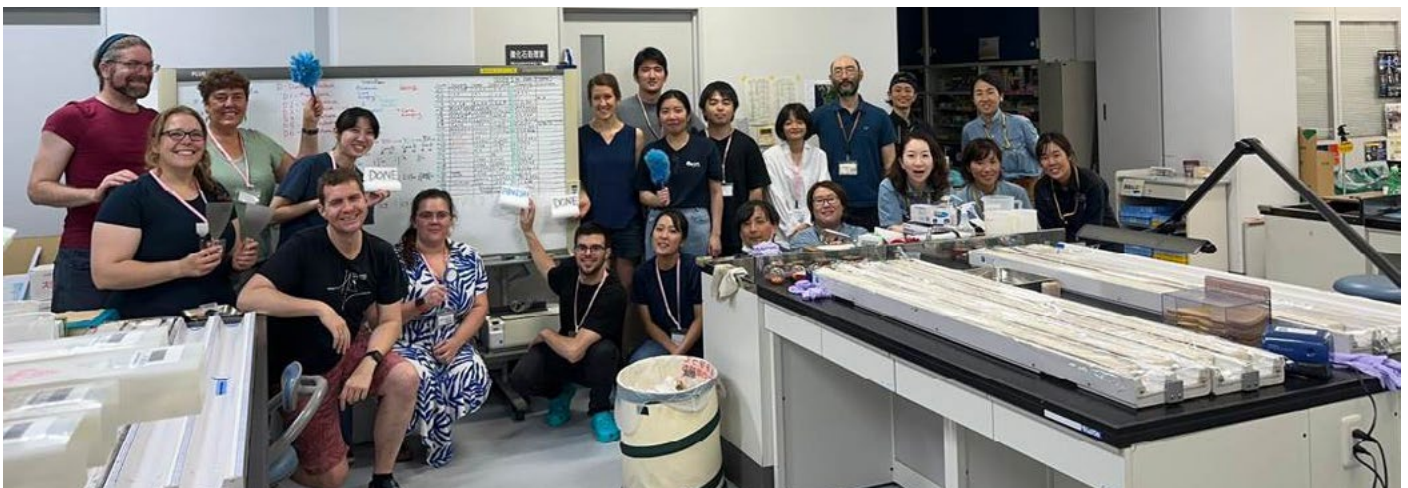
Austrian scientists involved in recent Expeditions worked on their post-expedition project in the last few years, won research grants from the Austrian Science Foundation to take the science resulting from their participation to the next higher level and published their results. For instance, Arianna del Gaudio, Walter Kurz and Werner Piller from the University of Graz published a paper on foraminifera assemblages from Fantangisña serpentinite mud seamount in the NW Pacific Ocean during the Pleistocene (result from IODP Expedition 366). Michi Strasser collaborated with science party members from "his" Expedition 386 – Japan Trench Paleoseismology to publish a first high impact moratorium paper documenting newly discovered earthquake-enhanced dissolved carbon cycles in ultra-deep ocean sediments (*see page 30*). Strasser also contributed as a member of the JTRACK Project Coordination Team (PCT) to the planning of the upcoming IODP Expedition 405: Tracking Tsunamigenic Slip Across the Japan Trench.

In summary, this year showed the Austrian IODP community contributing to top-level science achievements, leadership activities in several IODP initiatives and engaging new early career scientists. This founds a solid and prospective base for the growing Austrian IODP community with active involvement from several universities across the land-locked country to contribute to and participate in IODP³.

Michael Strasser - michael.strasser@uibk.ac.at
ESSAC Delegate

Walter Kurz - walter.kurz@uni-graz.at
ESSAC Alternate

Bernhard Plunger - bernhard.plunger@oeaw.ac.at
ECORD Council Member



The science party of the ReCoRD project under Austrian co-leadership (Gerald Auer, University Graz, 4th person from the left) at the IODP Kochi Core Center in Japan in early September 2023. Credits: O. Bialik, posted on X, 5 Sept. 2023

The Swiss scientific and drilling community are greatly saddened by the passing of our colleague, mentor and good friend, Judith McKenzie (*see also page 8*). For decades, Judy has played a key role in promoting Swiss participation within the ocean and continental drilling programs. Her role as supporter and model for her students and colleagues had and will have a long-lasting impact on our community. We will miss her enthusiastic, charming personality and her passion for science. We plan to organize a special session in honour of Judy at the 2024 EUG meeting in Vienna.

We are pleased to report that the Swiss National Science Foundation (SNSF) has extended the Swiss membership in ECORD by one year to the end of 2024. This will allow scientists at Swiss institutions to remain active in various proposals and on-going projects as well as to participate on expeditions. Next year the Swiss community will submit a multi-year proposal to SNSF to further support Switzerland as an ECORD member country in the new upcoming IODP³ phase of ocean drilling.

We are also pleased to have a scientist from Switzerland participating in an expedition this year. Sandrine Le Houedec from the University of Geneva sailed on the JR as a sedimentologist on IODP Expedition 400: NW Greenland Glaciated Margin (12 August –13 October 2023). Her post-cruise research will focus on sedimentological and multi-proxy geochemical studies to trace ocean circulation and the dynamics of water masses from shallow to deep sites over the Cenozoic.

A workshop on the future of Scientific Ocean Drilling with Mission-Specific Platforms and *Chikyu* was jointly organised by ESSAC and J-DESC in January 2023. There were four participants from Switzerland involved in this Phase-1 workshop, and Prof. Esther Schwarzenbach (University of Fribourg) is part of the Steering Committee. A follow-up Phase-2 workshop is planned to take place in Japan in the Spring 2024 and Swiss participation is anticipated.

In November the Swiss scientific drilling community will come together for our biennial meeting in Bern. The program includes updates and news of scientific drilling projects on land and at sea, but one focus will be on the future of scientific drilling from a Swiss perspective.



Judy on DSDP Leg 55, 1977. Drilling the Hawaii-Emperor Seamounts. Credits: SwissDrilling

Miriam Andres - miriam.andres@geo.unibe.ch
SwissDrilling Coordination Office

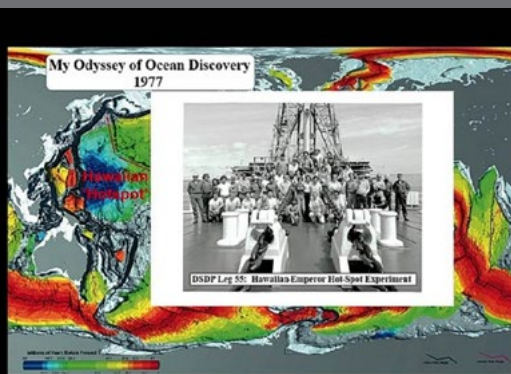
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ECORD Council Member

SwissDrilling: <http://www.swissdrilling.ch>

Judith McKenzie telling the story of her first Ocean Drilling Expedition, DSDP Leg 55, 1977. Credits: SwissDrilling

Judith McKenzie with Alex Isern (left) and Miriam Andres (right) entering the Panama Canal, ODP Leg 166. Credits: SwissDrilling



A four-year term commitment – towards the new program, current and future perspectives

The National Advisory Committee in support of the Italian participation in ECORD-IODP and ICDP (“Commissione CNR ECORD-IODP e ICDP”) was renewed for a four-year term last April. Three members rotated off (M. Frezzotti, I. Raffi, and C. Ravazzi) and were replaced by I. Mazzini, P. Montagna, and P. Vannucchi. E. Erba and M. Sacchi will act as Chair and Vice Chair as in the previous committee. The IODP-Italy national office supporting the national Advisory Committee has been reinforced, with two members committed to provide the committee with institutional support: A. Iadanza (Council Delegate) will oversee any official exchange between the CNR and the ECORD Council and, accordingly, will be the liaison between the National Advisory Committee and the ECORD Council; M. E. Martinotti is the new IODP-Italy Scientific Secretariat.

Looking ahead to the Italian participation in the forthcoming new programme, “ECORD” as an infrastructure, was included in Italy in the seven-year term National Plan for Research Infrastructures (PNIR) 2021-2027. Accordingly, Italy is expected to annually reaffirm its financial commitment to ECORD until the end of 2027. In view of the start of IODP³, active negotiations with the national policy makers are required by now to secure and even reinforce the inclusion of “ECORD” in the next 7-year PNIR, which represents the base

upon which the Italian Ministry of University and Research (MUR) annually funds the research infrastructure within the ordinary financial framework for research entities. In the frame of the Next Generation EU Fund, the Italian activity in ECORD/IODP is getting additional funding in the FYs 2023-2025, to implement a multiple environmental research infrastructures project (ITINERIS), whose primary objective is to ensure the FAIR data principles to be implemented. IODP-Italy has obtained a total funding of about 3M EUR, whereof some resources have been allocated to improve the access to the ECORD infrastructure and to maintain the access to ICDP. As a result, in the last years, Italy has allocated on average 80 to 90% of the annual budget for the ECORD membership, taking advantage of a positive budget related to the first two years of funding, when the IODP-Italy office and the national advisory committee were not yet fully active. Besides travels, outreach activities and functioning costs, the remaining 20% and the residual positive budget is assigned to the IODP-Italy funding scheme to support the scientific activity of the members of the science parties, as well as travel grants for ECS attending ECORD and IODP Summer Schools, national grants and calls members. Considering the contribution coming from the project ITINERIS, these proportions should be easily guaranteed for the next 2-3 years.

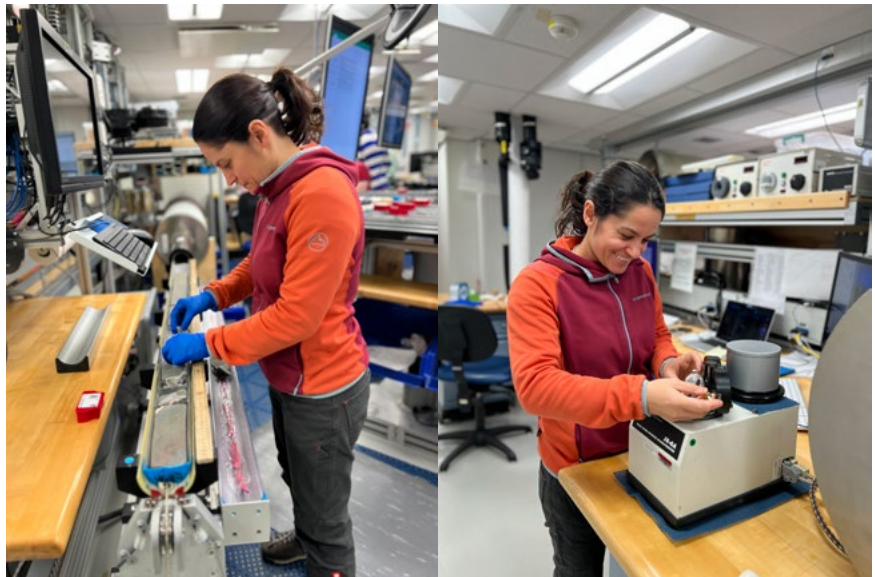
Scientific participation in the program – Highlights

Two Italian experts in paleomagnetism have been involved in IODP Expedition 395: Reykjanes Mantle Convection and Climate as: A. Di Chiara (INGV), that took part in the offshore phase last summer, and S. Satoli (University of Chieti) who is involved as shore-based scientist.

Towards the end of the current program, Italian co-proponents are involved in 27 drilling proposals, two of which will be implemented in the last *JOIDES Resolution* expeditions of the current program by the Lead Proponents and Co-chief Scientists N. Zitellini (CNR-ISMAR), IODP Expedition 402: Tyrrhenian Continent-Ocean Transition, and R. Lucchi (OGS), IODP Expedition 403: Eastern Fram Strait Paleo-Archive. M.F. Loreto (CNR-ISMAR) and A. Di Stefano (University of Catania) will also take part in Expedition 402: as shipboard scientists. C. Ferrando (University of Genova) has recently become member of the onshore science party of Expedition 399: Atlantis Massif. The science meeting of IODP Expedition 374: Ross Sea West Antarctic Ice Sheet History was finally organized in September by the Co-chief L. De Santis (OGS), M. Perotti (University of Siena) also participated as shore-based member of the expedition.

Three Italian ECS have been awarded following their successful applications to the ECORD Research Grants Call

2023: C. Amadori (University of Pavia) with the project “Investigating the effects of a novel analytical method on Moisture and Density estimates: porosity correction of basement rocks from the South Atlantic Transect (Expedition 390-393)”, Fiorenza Torricella (OGS) with the project “Understanding the planktic foraminiferal morozovellids



Anita di Chiara (INGV), Paleomagnetist, ship-board scientist on oceanographic Expedition 395: Reykjanes ridge mantle and climate in the North Atlantic Ocean, (12 June - 12 August 2023). Left: on board laboratory analysis on cubic rock samples selected from sedimentary drilled cores. Right: on board laboratory analysis on drilled cores using the Superconducting Rock Magnetometer. Credits: IODP Italy.



permanent decline at the Early Eocene Climatic Optimum, ~53-49 Ma (ODP Site 1209-1210 and ODP 762)”, and Giulia Filippi (Univ. of Ferrara) with the project “Palaeoceanographic reconstruction during MIS 7 and MIS 9 – PAGESS”.

On the national side, the IODP-Italy Postdoctoral Fellowships initiative for early career scientists “CNR IODP-Italy call for projects on IODP scientific drilling themes” is now at its fourth edition (2023). An evaluation committee has been appointed to identify the 2 most relevant projects to be granted. On IODP-Italy website you can access the short bios of the successful applicants of the previous editions, as well as their projects information.

Dissemination and outreach

On the occasion of the event “The prospects of Italian geology: from the scientific heritage of Antonio Praturlon to the new frontiers and applications” in memory of Prof. A. Praturlon, which took place at the Accademia dei Lincei, 3 May 2023, A. Camerlenghi gave a presentation entitled “The impact of an important choice: the Italian involvement in the international ocean scientific drilling program”.

Last Spring IODP-Italy was also co-organizer of the International Workshop “Genesis and Dynamic of large

calderas Campi Flegrei and Campanian Plain” (Naples, 2-5 May 2023). A. Iadanza illustrated to the attendees the ongoing state of the art of “ECORD and IODP-Italy towards post-2024 scientific ocean drilling”.

The annual Joint SIMP, SGI, SOGEI, AIV Congress “The Geoscience paradigm: Resources, Risks and future perspectives” took place in Potenza 19-21 September 2023, at the University of Basilicata Campus. IODP-Italy displayed an ECORD/IODP-Italy exhibition booth with gadgets and flyers. A dedicated paragraph can be found in the outreach section (see page 57).

Italian experts and representatives in ECORD and IODP boards and panels

Italian experts and representatives in ECORD and IODP boards and panels are committed until the end of IODP2. Three Italian scientists are serving as international experts on the SEP: A. Sanfilippo (Uni. of Pavia), L. De Santis (OGS) (SEP - Science), and M. F. Loreto (ISMAR-CNR) (Site evaluation). M. Rebesco (OGS) is a component of the Science Board of the EFB, while A. Camerlenghi (ESSAC Chair) and A. Iadanza (ECORD Vice Chair) are members of the ECORD Vision Task Force.

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ECORD Council Member

(CNR) IODP-Italy Scientific Secretariat and the national IODP-Italia Committee

Maria Elena Martinotti - mariaelena.martinotti@cnr.it

(CNR) IODP-Italy Scientific Secretariat and the national IODP-Italia Committee

and the national IODP-Italia Committee

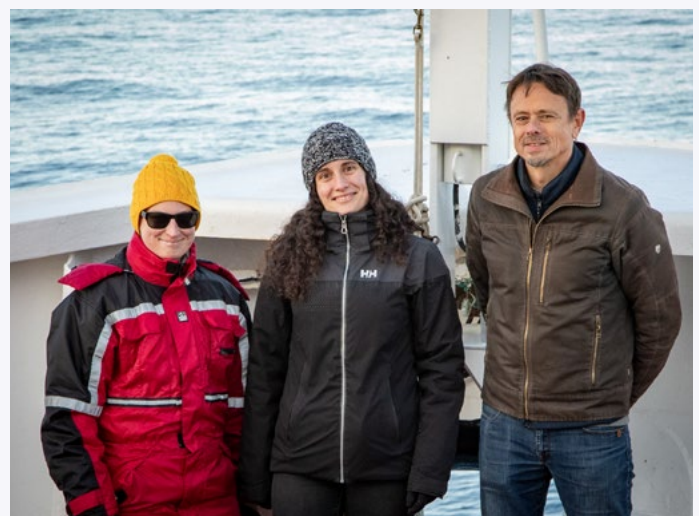
IODP-Italy: www.iodp-italia.cnr.it

Denmark

denmark@ecord.org

IODP Expedition 400: NW Greenland Glaciated Margin was successfully completed 13 August – 13 October 2023 (see page 43) with participation of three sailing scientists from Denmark; Paul Knutz (co-PI), Lara F. Perez (stratigraphic correlator and downhole logging specialist) and Heike H. Zimmermann (microbiologist/ancient DNA specialist).

Six sites were drilled on a transect from the Baffin Bay oceanic basin and across the continental shelf of northwest Greenland with the overarching aim of understanding Greenland Ice Sheet history and Arctic climate evolution. 2300 meters of sediment cores were recovered, and downhole logging was implemented in four sites. The initial results indicate a stratigraphic coverage from Holocene to Oligocene. The archive will be further investigated after the sampling party due to be held at MARUM, Bremen, in March 2024.



Expedition 400 participants from Denmark: Heike Zimmermann, Lara Perez and Paul Knutz onboard JR. Credits: IODP.

Paul Knutz - pkn@geus.dk
ESSAC Delegate

In 2023, IODP France continued to encourage the participation of young scientists in the program by offering funding for both post-expedition analyses and ensuring continued financial support for young scientists, enabling them to embark on various expeditions. IODP France is also proud to provide funding or co-funding for scientists to participate in various summer schools (e.g. Downhole Logging for IODP Science, Leicester, UK), international conferences (INQUA, AGU, etc.). IODP-France also funded dedicated pre-cruise workshop like IMMAGE (Investigating Miocene Mediterranean-Atlantic Gateway Exchange, <https://www.immageland2sea.ac.uk>) Land-2-Sea project (see page 44) for Emmanuelle Ducassou and Fadl Raad that participated for the preparation of the upcoming Expedition 401 (10 December 2023 – 9 February 2024). In Expedition 401, they will be involved respectively as a Co-chief and as a physical properties / downhole measurements specialist.



Participants of IODP expedition 395 celebrating co-chief Anne Briais' birthday. Credits: ECORD/IODP.

The IODP French community has also been very actively involved during several IODP expeditions in 2023. It started with Expedition 398: Hellenic Arc Volcanic field with Tim Druitt (LMV/University Clermont Auvergne) as Co-chief, Alexis Bernard (LFCR/University of Pau) and Carole Berthod (IPGP Paris). Then the Expedition 399: Building blocks of life, Atlantis Massif involved Marguerite Godard (University of Montpellier), Olivier Sissmann (IFPEN) and the structural geologist Rémi Coltat.

Recently Expedition 395 that began in Ponta Delgada, Portugal on 12 June 2023 and finished in Reykjavik, Iceland on 12 August 2023 gathered three participants from France: Anne Briais (Geo-Ocean) - the Co-chief of the mission, Matthias Sinnesael (IMMCCE/Observatoire de Paris) and Gabriel Pasquet (University of Pau). The objectives of this expedition were threefold: to explore the formation of the V-shaped ridges and troughs which are visible on the ocean floor south of Iceland, to discover the dynamic history of the oceanic gateways between the Norwegian Sea and Arctic Oceans and the North Atlantic, and to investigate the changes in hydrothermal fluid and basalt alteration over different types and ages of crust.

During the expedition, outreach efforts were various and included a series of YouTube videos explaining the process of coring from the view of the drill floor and of the core flow in the core lab. Images and videos were disseminated to the public via Twitter, Facebook, and Instagram as well. As the Expedition took place in the summer months, ship-to-shore events were focused on summer programs for students. Gabriel Pasquet conducted a ship-to-shore event with a French school in the Hague. This team effort of the part of

the science party and technicians made the ship-to-shore events a more educational and positive experience for the participants. Outside the scientific work, there were plenty of non-science happenings onboard the *Joint RESOLUTION* for Expedition 395. This expedition was also a birthday expedition with each of the Co-chiefs celebrating their birthdays in addition to 8 other scientists and technicians on board (see photo). There were a couple of holiday celebrations as well like the French National Day.

Finally, the Expedition 389: Hawaiian Drowned Reefs, an MSP expedition with Youri Hamon (IFPEN) and Stephan Jorry (Ifremer/Geo-Ocean) promises to provide a unique archive of sea-level, climate change and reef response over the 500 kyr.

In addition, first major results of the Expedition 386 revealed dynamic carbon cycling in the ultra-deep-water Japan Trench and were published in *Nature Communications* (see page 30). Several French participants took part in this expedition: Morgane Brunet, Antonio Cattaneo, Jean-Noël Proust, and Chloé Seibert.

Finally, this year is also a special year for IODP-France office who is organizing the 2023 edition for its scientific days on 29-30 November at IPG-Paris (for details see page 58).

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 Scientific Coordinator, IODP-France Office

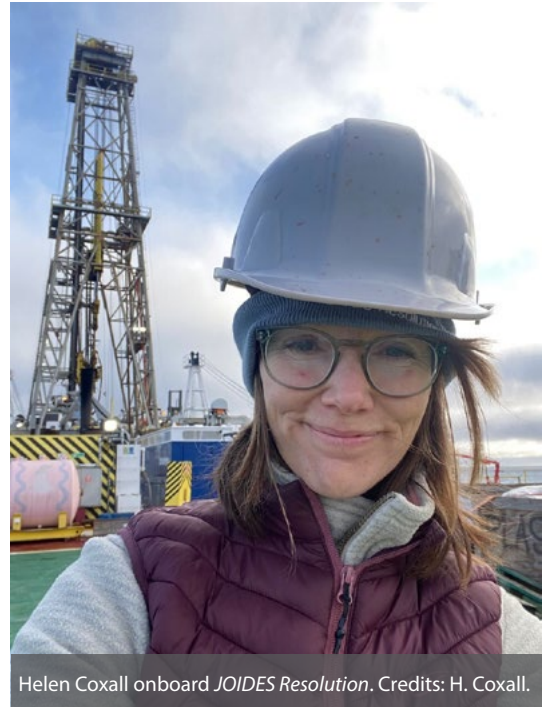
IODP France: <http://iodp-france.org>

Cruise Activities

Dr. Boris Karatsolis, Uppsala University, participated in Expedition 395: Reykjanes Mantle Convection and Climate as a calcareous nannofossil specialist. Boris had previously participated in the onshore sampling party after Expedition 395C when COVID prevented scientists from joining the offshore drilling operations.

Professor Helen Coxall, from Stockholm University, joined the *JOIDES Resolution* in Reykjavik and sailed as a foraminifera specialist on Expedition 400: Northwest Greenland Glaciated Margin.

Matt O'Regan - matt.oregan@geo.su.se
ESSAC Delegate



Helen Coxall onboard *JOIDES Resolution*. Credits: H. Coxall.

The German IODP community has continued to be very active in 2023. Besides several German participants in IODP expeditions, Steffen Kutterolf (GEOMAR, Kiel) was a Co-chief of Expedition 398: Hellenic Arc Volcanic Field. In August, the national community met during the joint IODP-ICDP Colloquium at the Leibniz University in Hanover. Despite the holiday season, 135 scientists participated in this meeting, and 80 scientific contributions have been presented. As a highlight, Gilbert Camoin (Director of the ECORD Managing Agency) introduced the German community to the new IODP³ in a remote presentation. As a public event the "unterirdisch Show" with more than 600 school kids accompanied the conference. The ECORD summer school "From Greenhouse to Icehouse - The Cenozoic Arctic Ocean and (global) climate history" at MARUM, University of Bremen, took place in September.

ESSAC Delegates

Jan Behrmann (GEOMAR, Kiel) has served as German representative on ESSAC for 7 years. He also chaired the ESSAC office at GEOMAR in 2016 - 2017. We are very grateful for his engagement for IODP and for his service to the scientific community. In the end of 2022, Jan stepped back from this position. The new German delegate is Susann Henkel, a marine geochemist at the Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Bremerhaven. She participated in IODP Expedition 370 to the Nankai Trough.



Susann Henkel, ESSAC delegate, Germany.
Credits: IODP Germany.

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ESSAC Alternate

Susann Henkel - Susann.Henkel@awi.de
ESSAC Delegate

The University Museum of Utrecht University has reopened its doors after several years of renovation. The new exhibition features a very nice room on ocean drilling and paleoclimate research with a special attention to IODP (see more about the museum at <https://umu.nl/> and page 54).



Several scientists from the Netherlands are currently involved in several ongoing IODP expeditions.

Utrecht University Professor Wout Krijgsman is preparing for his first IODP adventure. He will join Expedition 401: Mediterranean-Atlantic Gateway exchange. He will join as paleomagnetist and will be co-responsible for the construction of robust age frameworks for the drill cores of the Atlantic and Mediterranean sites. IODP Expedition 401 will recover records of exchange preserved offshore in the Atlantic and Mediterranean, and subsequent onshore drilling with ICDP will target the fossil gateway records that are now preserved on land in northern Morocco and southern Spain. The "Investigate the Miocene Mediterranean-Atlantic Gateway Exchange (IMMAGE)" project is the first Land-2-Sea drilling project (see page 44).

Martin Ziegler - m.ziegler@uu.nl
ESSAC Delegate

Prof. Willem Renema from the Naturalis Museum in Leiden joins the Science Part of Expedition 389 "Hawaiian Drowned Reefs" as Micropaleontologist and specialist in benthic foraminifera.

Mei Nelissen, PhD student from Utrecht University is sailing on board the *JOIDES RESOLUTION*, IODP Expedition 400. A message from Mei:

"Hi from the JOIDES RESOLUTION, currently located in the Baffin Bay on IODP Expedition 400, where we are studying the response of the northern Greenland Ice Sheet to past climate warming. I am sailing as a palynologist in the biostratigraphic team to provide shipboard constraints on the age of the drilled sediments. The recovered material will give insights into changing sea surface conditions across glacial- and interglacial periods, as well as important information about the early evolution of the northern Greenland Ice Sheet. Looking forward to five more weeks of drilling, sieving in the lab with the best view and dodging icebergs."

Mei Nelissen

Tobias Agterhuis got the opportunity to stay several weeks at the University of Lausanne, thanks to the ECORD research scholarship. He is a final year PhD student from Utrecht University, working on deep ocean temperature reconstructions of the early Eocene hothouse on the legacy cores from ODP Leg 208, Walvis Ridge. In Lausanne, Switzerland, he carries out neodymium isotope measurements in the geolaboratory of UNIL.

"Looking forward to see what the Nd isotope data will tell me about deep water circulation in the warmest climates of the Cenozoic!"

Tobias Agterhuis

PhD student Mei Nelissen on board the JR. Credits: IODP



Tobias Agterhuis in the Lab in Lausanne. Credits: IODP



This year Portuguese scientists have been very active in discussing and planning new drilling proposals for Mission-Specific Platforms and the new IODP³ program. In January, Davide Gamboa from the University of Aveiro participated in the MagellanPlus workshop “CenoStore: Cenozoic palaeoclimate of NW Europe and implications for subsurface CO₂ containment”, held in Belfast (UK) (see page 20). Ana Jesus from the Instituto Dom Luiz (IDL) at the University of Lisbon and Marta Neres and Pedro Terrinha from the Instituto Português do Mar e da Atmosfera (IPMA) and IDL participated in the MagellanPlus workshop “MANTLE-L2S: Accessing the Circus-Iberian mantle archive of Wilson Cycle processes through Land-to-Sea drilling” in July in Plymouth (UK). Finally, Lelia Matos from the Centro de Ciências do Mar do Algarve (CCMAR) was one of the two ECORD scientists who participated in the USSSP sponsored workshop on

“Developing Strategies for the Scientific Investigation of Sediment Drifts on Campeche Bank, Gulf of Mexico”, held in Mexico City in August (see photo below). She contributed her knowledge on regional cold water coral studies and will become a co-proponent of the full proposal to be submitted by 1 October 2023.

IPMA scientists from junior to senior level dedicated significant portions of their time to perform the needed XRF scans for one of the sites recovered last year during IODP Expedition 397 (see page 41). In addition, extensive research is still ongoing on sediment material collected during Expedition 339, among others, with three PhD students and one Master thesis providing new insights that were presented at the FORAMS 2023 and the XXI INQUA congresses in Italy this summer (see page 56).

Group photo of the participants in the workshop discussing future drilling on Campeche Bank in the Gulf of Mexico, held at the National Autonomous University of Mexico in August. Photo courtesy of final workshop report available at <https://usoceandiscovery.org/workshop-campeche-bank-sediment-drifts/>



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ESSAC Delegate

Raisa Alatarvas defended her PhD thesis at the University of Oulu, using materials from the Expedition 347: Baltic Sea Paleoenvironment. Participants of the Expedition 347, Outi Hyttinen and Aarno Kotilainen, have continued working with the materials.

Joonas Virtasalo has continued to participate in the activities of Expedition 386 Japan Trench Paleoseismology, the first article of which has recently been published in *Nature Communications* (see page 32).

Christoph Beier has participated in publishing results from the Expedition 330: Louisville Seamount Trail in the journal *Geology*.

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ESSAC Delegate



A team of palaeoclimate scientists from the University of Exeter, led by Dr Kate Littler and Dr Sev Kender and supported by UK IODP, took deep sea drilling to the people as part of the British Science Festival (<https://britishsciencefestival.org>) this September. This four-day extravaganza of science took place in Exeter, UK, split between the University's Streatham campus and a variety of venues around the city. As part of the "Tales from the Ancient Oceans" exhibit, the team presented an interactive whistle-stop tour of scientific ocean drilling, and the amazing advances which have stemmed from over 50 years of exploration.

Supported by a video of drilling operations on the *Chikyu*, the public were invited to try their hand at simulated hole re-entry at 4000 m water depth, to convey the enormous engineering challenge of core recovery in the deep sea. Visitors were also able to touch mud from below the bottom of the Andaman Sea, which proved to be an enjoyable tactile experience for visitors old and young. "Would you like to touch the deepest mud you've ever touched...? Absolutely!" There was also the chance to look at a range of beautiful foraminifera under the microscope, to admire their intricate structures and better understand their value as indicators of past conditions. Finally, visitors could put all the pieces of the puzzle together to see how fossils, sediment, and geochemistry could combine to shed light on dramatic past events like the K-Pg boundary mass extinction.

Hosted in the somewhat unlikely setting of a city-centre shopping mall in the evening, and as part of a multi-exhibit session covering climate change, conservation, and medicine, there was a diverse crowd to entertain and educate. The team were impressed with the enthusiasm of the visitors and their curiosity to learn about a totally new area of science from their perspective. Of the more than 100 people that visited the stand, all of whom had chosen to come to this after-hours science exhibit, not one had heard of UK IODP or scientific ocean drilling before talking to the team. Clearly as a community we need to do a better job of actively engaging with the public. If we can do this in an engaging way that builds on people's natural curiosity about the world around them, we can ensure that the future of scientific ocean drilling in the UK and beyond is a bright one, by bringing the public along with us on our journeys of exploration and wonder.



Showing the beauty of foraminifera using both 3D models and high-powered microscope. Credits: K. Littler.



Kate Littler chatting to visitors about the great engineering challenges of deep sea scientific drilling. Credits: T. Moye, British Science Festival 2023.



The "Tales from Ancient Oceans" team: from left to right: S. Kender, K. Littler, J. Wilkin and J. Gan. Credits: S. Kender.

Article originally published in the UK IODP Newsletter https://issuu.com/uk-iodp/docs/news_2023_10_october/12

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UK-IODP webpage: <https://www.ukiodp.org/>

Taking samples of a freshly recovered core onboard MMA Valour during IODP Expedition 389. Credit: M. Parker, ECORD/IODP

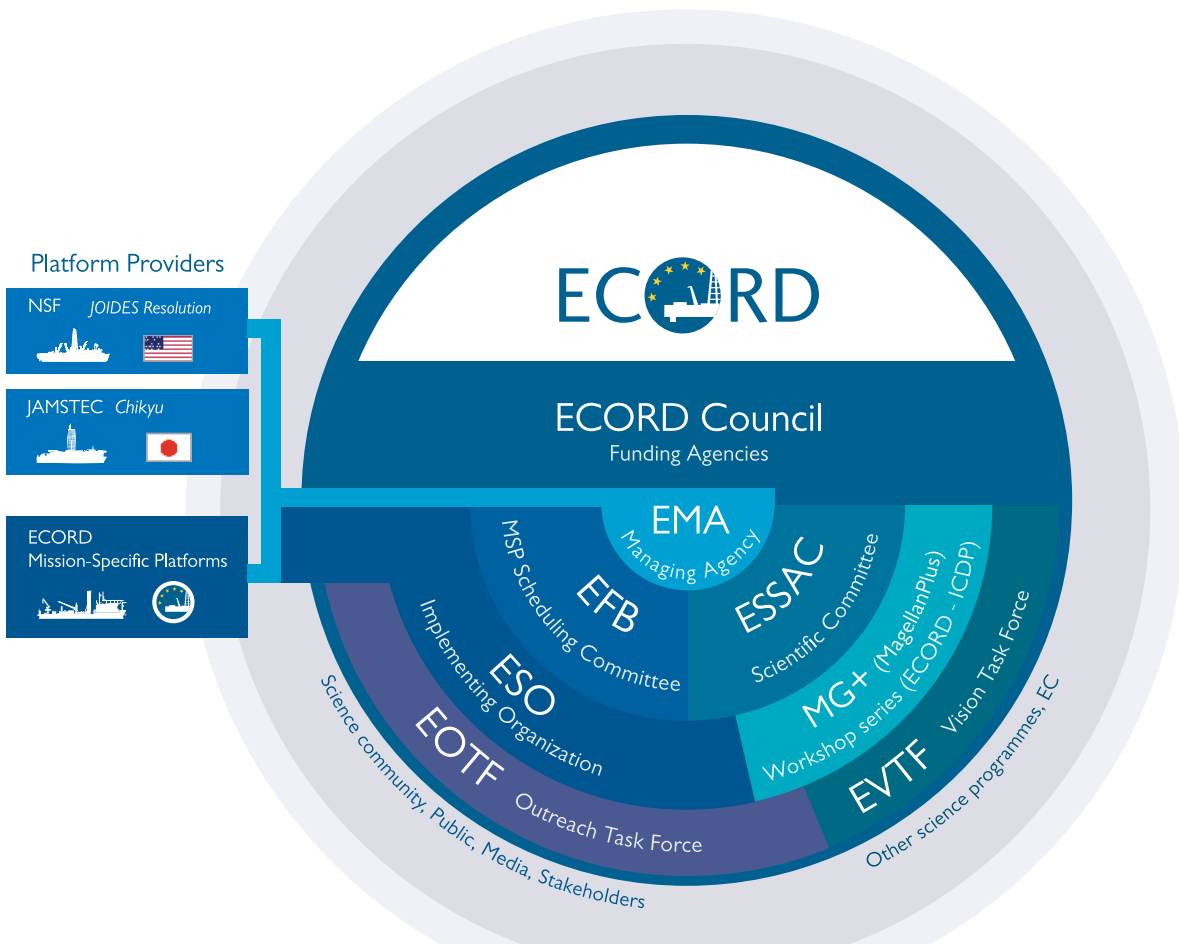




ACEX: Arctic Coring Expedition	IODP³: (IODP cubed) International Ocean Drilling Programme (starting 1 January 2025)
AGU: American Geophysical Union	JAMSTEC: Japan Agency for Marine Earth Science and Technology
AMS: Arctic Marine Solutions	J-DESC : Japan Drilling Earth Science Consortium
ANZIC: Australian and New Zealand IODP Consortium	JOIDES: Joint Oceanographic Institutions for Deep Earth Sampling
ArcOP: Arctic Ocean Paleoceanography, IODP Expedition 377	JpGU: Japan Geoscience Union
BCR: Bremen Core Repository	JR: <i>JOIDES Resolution</i>
BGR: Bundesanstalt für Geowissenschaften und Rohstoffe - Federal Institute for Geosciences and Natural Resources	JRFB: <i>JOIDES Resolution</i> Facility Board
BGS: British Geological Survey	JRSO: <i>JOIDES Resolution</i> Science Operator
BMS: Boring Machine System	MarE3: Institute for Marine-Earth Exploration and Engineering
CCOD: Canadian Consortium for Ocean Drilling	MARUM: Zentrum für Marine Umweltwissenschaften der Universität Bremen - Center for Marine Environmental Sciences, University of Bremen
CIB: <i>Chikyu</i> IODP Board	mbsf: metres below seafloor
CNR: Consiglio Nazionale delle Ricerche – National Research Council, Italy	mbsl: metres below sea level
CNRS: Centre National de la Recherche Scientifique - National Center for Scientific Research, France	MCIN: Ministry for Science and Innovation, Spain
DAFSHE: Danish Agency for Science and Higher Education	MeBo: Meeresboden-Bohrgerät - seafloor drill
DFG: Deutsche Forschungsgemeinschaft - German Research Foundation	MEXT: Ministry of Education, Culture, Sports, Science & Technology, Japan
ECORD: European Consortium for Ocean Research Drilling	MoU: Memorandum of Understanding
EFB: ECORD Facility Board	MSP: Mission-specific platform
EGU: European Geosciences Union	NHM: Natural History Museum
EMA: ECORD Managing Agency	NSF: National Science Foundation, USA
EOTF: ECORD Outreach Task Force	NWO: Nederlandse Organisatie voor Wetenschappelijk Onderzoek - Netherlands Organisation for Scientific Research
EPC: European Petrophysics Consortium	ÖAW: Österreichische Akademie der Wissenschaften - Austrian Academy of Sciences
EPSP: Environmental Protection and Safety Panel	ODP: Ocean Drilling Program
ESO: ECORD Science Operator	OSP: Onshore Science Party
ESSAC: ECORD Science Support and Advisory Committee	PI: Principal Investigator
EVTF: ECORD Vision Task Force	PMO: Program Member Office
FB: Facility Board	PSP: Personal Sampling Party
FCT: Fundação para a Ciência e a Tecnologia - National Funding Agency for Science and Technology	SEP: Science Evaluation Panel
FNS: Fonds National Suisse de la Recherche Scientifique - Swiss National Science Foundation	SMR: Science Mission Requirements
FY: Fiscal Year	SPRS: Swedish Polar Research Secretariat
GPC: Giant Piston Corer	SSO: Science Support Office
GSI: Geological Survey of Ireland	UKRI: UK Research and Innovation
IBM: Izu Bonin Mariana	USSSP: U.S. Science Support Program
ICDP: International Continental Scientific Drilling Program	VR: Vetenskapsrådet - Swedish Research Council
IKC: In-kind contribution	
IODP: Integrated Ocean Drilling Program (2003-2013) & International Ocean Discovery Program (2013-2024)	



Mobilising the MMA Valour before IODP Expedition 389.
Credits: J. Everest, ECORD/IODP.



ECORD Member Countries



- | | | |
|----------------|----|---|
| Austria | 1 | Österreichische Akademie der Wissenschaften (ÖAW) |
| Canada | 2 | Canadian Consortium for Ocean Drilling (CCOD) |
| Denmark | 3 | Danish Agency for Science and Higher Education |
| Finland | 4 | Suomen Akatemia |
| France | 5 | Centre National de la Recherche Scientifique (CNRS) |
| Germany | 6 | Deutsche Forschungsgemeinschaft (DFG) |
| Ireland | 7 | The Geological Survey of Ireland (GSI) |
| Italy | 8 | Consiglio Nazionale delle Ricerche (CNR) |
| Netherlands | 9 | Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO) |
| Norway | 10 | Forskingsradet |
| Portugal | 11 | Fundação para a Ciência e a Tecnologia (FCT) |
| Spain | 12 | Ministerio de Ciencia, Innovación (MCIN) |
| Sweden | 13 | Vetenskapsradet (VR) |
| Switzerland | 14 | Fonds National Suisse (FNS) |
| United Kingdom | 15 | United Kingdom Research and Innovation (UKRI) |


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