



Planning for **Post-2024 ECORD-Japan** Scientific Ocean Drilling Programme



IODP Expedition 386:
Japan Trench Paleoseismology

IODP Expedition 389:
Hawaiian Drowned Reefs

Proposal 637:
New England Shelf Hydrogeology



Contents

ECORD News	3
ECORD Awards	4
Post-2024 ECORD-Japan Scientific Ocean Drilling Programme	10
Letter from the IODP Forum Chair	12
ECORD MSP expeditions	15
MagellanPlus Workshops Series	18
Science Article: Expedition 389: Hawaiian Drowned Reefs	26
ECORD Educational Activities	30
IODP Expeditions	38
ECORD Outreach Task Force News	40
ECORD at meetings, conferences and events	46
ICDP News	48
News from ECORD member countries	50
Acronyms	58



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; and China's Ministry of Science and Technology.

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Cover photo: Group photo on the helideck of R/V *Chikyu*, docked at Shimizu, Japan, at the start of the PSP of IODP Expedition 386: Japan Trench Paleoseismology. Credits: L. Maeda, ECORD/IODP/JAMSTEC



Gilbert Camoin




Guido Lüniger



Nadine Hallmann

While ECORD is prepared to celebrate its 20th anniversary next year, the last months have marked a gradual resumption of activities in our Programme after the strong disruptions that have characterized the last two years during the COVID-19 pandemic that the World has faced. Besides the implementation of drilling expeditions, several educational activities were organized face-to-face and all ECORD and IODP meetings were held in a hybrid form, with an increasing face-to-face component over the last months.

ECORD membership

 Over the last months, regular exchanges between the Spanish Ministry of Science and Innovation (MCIN), EMA and the CNRS Legal Department have led to the redaction of an Agreement to allow MCIN to become an ECORD Member and pay past and future contributions to ECORD.

The end of the International Ocean Discovery Program

The end of the International Ocean Discovery Program is now scheduled for 30 September 2024, as decided by all current IODP partners.

At its meeting that was held on 20 and 21 October 2021 in Granada (Spain) and remotely, 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. An addendum to the 2019-2023 ECORD MoU will be signed soon to cover ECORD activities in 2024.

- to extend the current terms of 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 University of Bremen, Germany) through 2024.

- to extend the 2019-2023 ECORD-NSF MoU and the 2013-2023 ECORD-JAMSTEC MoU through 2024.

continued →

Incoming ECORD staff



Tim van Peer

IODP Research Fellow

EPC, University of Leicester

(since July 2022)

Tim van Peer has joined the European Petrophysics Consortium and the IODP group at Leicester as an IODP Research Fellow and Senior Petrophysicist. Tim is a palaeomagnetist and stratigrapher and has worked as a postdoctoral researcher at University College London and University of Southampton, where he also got his PhD in 2017. His main research focuses on the interaction between the Antarctic ice sheet and the ocean, often using material recovered during IODP Expedition 374 (Ross Sea) on which Tim was a shipboard participant. Tim also enjoys hiking, football, and a good film.

ECORD Awards in recognition of outstanding contribution to ECORD

16 November 2022

Gabriele Uenzelmann-Neben

received the **9th ECORD Award**

on the occasion of the ECORD Council-ESSAC Meeting #111

I feel honoured and am delighted to receive the ECORD award, which has come totally unexpected.

I have been part of the IODP family since working for my PhD, when I used information from ODP Leg 104 to date and interpret seismic data from the Voring Plateau, Norwegian margin. During the whole of my career I have correlated seismic data with information from DSDP, ODP, and IODP sites and thus could extrapolate the geological information into a larger area and reconstruct paleo-environment, -circulation and -climate. So, I have greatly benefitted from the hard work members of scientific parties have carried out during scientific drilling and later during the analysis of the drilled material.

On the other hand, I have supplied seismic data as site survey packages and in that way helped to realise a number of proposals. Earlier this year, I sailed as Co-chief Scientist on Expedition 392, which I led as PI during the evaluation process. This constituted a third perspective on scientific drilling.

Last but not least I acted in a fourth role serving on the Science Characterization Panel, later Science Evaluation Panel from 2010 to 2015 and then on the ECORD Facility Board from 2018 (2019-2022 as chair). In all those different roles I met a large number of great colleagues from different disciplines, which all form the IODP family and have led this Programme to a huge success.

Thanks again.



Gabriele Uenzelmann-Neben on the day of receiving the ECORD Award #9, Gargonza, Italy. Credit: N. Hallmann

ECORD Awards in recognition of outstanding contribution to ECORD

16 November 2022

Ursula Röhl

received the **10th ECORD Award**

on the occasion of the ECORD Council-ESSAC Meeting #11

Ocean research drilling has been part of my studies and training from an early age and has accompanied me in my working life ever since. During my first postdoc I got the chance to work on core samples and data from ODP Leg 122 (Exmouth Plateau, NW Australia). The first participation in an ODP Expedition in 1992 (Leg 143, Atolls & Guyots I) opened the door to this world for me, and I never want to miss insights and experience gained during my time in the German ODP office at the BGR (Federal Institute for Geosciences and Natural Resources) in the early 1990ies. Service on the ODP and IODP Scientific Measurements (SciMP) and Scientific

Technology (STP) Panels between 2000 and 2012 led me to meetings, intense discussions and collaborations around the world. Since 2003 I am the ECORD Science Operator (ESO) Curation and Laboratory Manager and was involved in all MSP expeditions so far.

Numerous research projects targeting early Cenozoic paleoceanography and cyclostratigraphy and including sailing on seven expeditions in many ocean regions on board the *DV JOIDES Resolution* in different capacities (inorganic geochemist, physical properties specialist, stratigraphic correlator, Co-chief Scientist) further deepened my association to scientific ocean drilling and my love to be at sea.

IODP is sustained by the legendary international, multidisciplinary team effort that is a considerable aspect for its success. To be part of the IODP family, on board the drilling vessels, at the core repositories, in ESO and ECORD, during the ECORD Summer Schools and the wider programme as well as the international science community is a great privilege, remains a great adventure, positively challenging and a lot of fun.

I feel very honored and thrilled to receive the ECORD award, thank you very much!



Ursula Röhl on the day of receiving the ECORD Award #10, Gargonza, Italy.
Credit: N. Hallmann



IODP Expedition 386:

Japan Trench Paleoseismology



Following the successful implementation of the offshore and onshore phases of IODP Expedition 386: Japan Trench Paleoseismology, which were both affected by restrictions due to the pandemic, a Personal Sampling Party (PSP) was held from 15 November through 6 December 2022, where the Science Party had the opportunity to meet on *Chikyu* to take samples for their post-expedition research (see page 16).

IODP Expedition 377:

Central Arctic Paleoceanography (ArcOP)



Since 2020, ESO and EMA have collaborated with the Swedish Polar Research Secretariat (SPRS) to set up operational, funding and communication plans related to the implementation of IODP Expedition 377: Central Arctic Paleoceanography (ArcOP; Co-chief Scientists: R. Stein, ECORD-Germany and K. St. John, USA) that was recommended for scheduling by the ECORD Facility Board (EFB) in March 2019. In early April this year, the ECORD Council has decided to postpone the implementation of this expedition, initially scheduled for August and September 2022, due to uncertainties regarding safety issues related to the unstable geopolitical situation in this region. The ECORD Council has mandated the CNRS and EMA to carry out negotiations with SPRS, with the assistance of ESO, in order to settle this termination amicably. A final agreement has been approved recently by the ECORD Council.

IODP Expedition 389:

Hawaiian Drowned Reefs



The offshore phase of IODP Expedition 389: Hawaiian Drowned Reefs (Co-chief Scientists: J. Webster, ANZIC and A. C. Ravelo, USA) is now planned for five to eight weeks between end of August and end of October 2023. Dates of the Onshore Science Party are anticipated to be in early 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 kyr. In July, the ECORD Council has approved an increase of \$3.5M of the overall budget as a consequence of increased operational costs related to the current economic situation. At its last meeting that was held on 20 and 21 September in Aix-en-Provence (France), the ECORD Facility Board (EFB) has recommended the implementation of an expedition based on **Proposal 637: New England Shelf Hydrogeology** (Lead Proponent: B. Dugan, USA) in 2024.

The planning of post-2024 MSP expeditions will rely on the nine MSP proposals that currently reside at the EFB and at the Science Evaluation Panel (SEP), as well as the MSP drilling proposals, including Land-to-Sea Transects to be conducted in conjunction with ICDP, that will arise from the 12 MagellanPlus workshops that have been organized since 2021 or planned for the coming year (see *MagellanPlus* section on page 18). The success of the last MagellanPlus calls for workshop proposals dedicated to MSP drilling demonstrates the prominent role that the MSP concept will play in the future to fulfill the scientific objectives of the 2050 Science Framework (<https://www.ecord.org/science/magellanplus/>).

ECORD partnership



ECORD's partnership with NSF and JAMSTEC is based on Memoranda of Understanding (MoU) that allow ECORD scientists to participate to expeditions implemented by the *JOIDES Resolution* (JR) and *Chikyu*.

Following the implementation of a series of expeditions in the Southern Atlantic from December 2021 through August 2022 (IODP Expedition 391: Walvis Ridge Hotspot, IODP Expedition 392: Agulhas Plateau Cretaceous Climate, and IODP Expeditions 390 and 393: South Atlantic Transects 1 and 2), the *JOIDES Resolution* (JR) will operate during U.S. FY2023 and 2024 in the Northern Atlantic and adjacent basins to accommodate the proposal pressure in this region, with as much as 20 proposals awaiting implementation.

The U.S. FY2023 JR scheduling includes five expeditions from October 2022 through September 2023 (see *Map and Table* on page 9). Four out of the five proposals supporting these expeditions are led by an ECORD scientist.

At its last meeting that was held in a hybrid form (Washington, DC and remotely) on 24 - 26 May 2022, the *JOIDES Resolution*

Facility Board (JRFB) has scheduled four expeditions of low cost and minimal risk for U.S. FY2024 (see *Map and Table* on page 9) if budget allows and depending on potential demobilization of the JR.



Following its last meetings that were held in Kobe (Japan) and remotely on 30-31 August and 18 October 2022, the *Chikyu* IODP Board (CIB) has decided to schedule a *Chikyu* expedition based on Proposal 835: Tracking Tsunami-genic Slips Across and Along the Japan Trench - JTRACK (Lead proponent: S. Kodaira, Japan) and provisionally scheduled for implementation before the end of the current Programme.

Forward look

While entering the final phase of the current Programme, it is of utmost importance to notice that these last two years continue to be very active with the implementation of many drilling expeditions, encompassing all platform providers. This underlines the development towards full capabilities they have undergone during the past decade and emphasizes their readiness, both technologically and scientifically, to take on the challenge of entering the next phase of international cooperation in scientific ocean drilling (see section: *Post-2024 ECORD-Japan Scientific Ocean Drilling Programme on page 10*).

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

Guido Lüniger - guido.lueniger@dfg.de
Chair of the ECORD Council

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



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

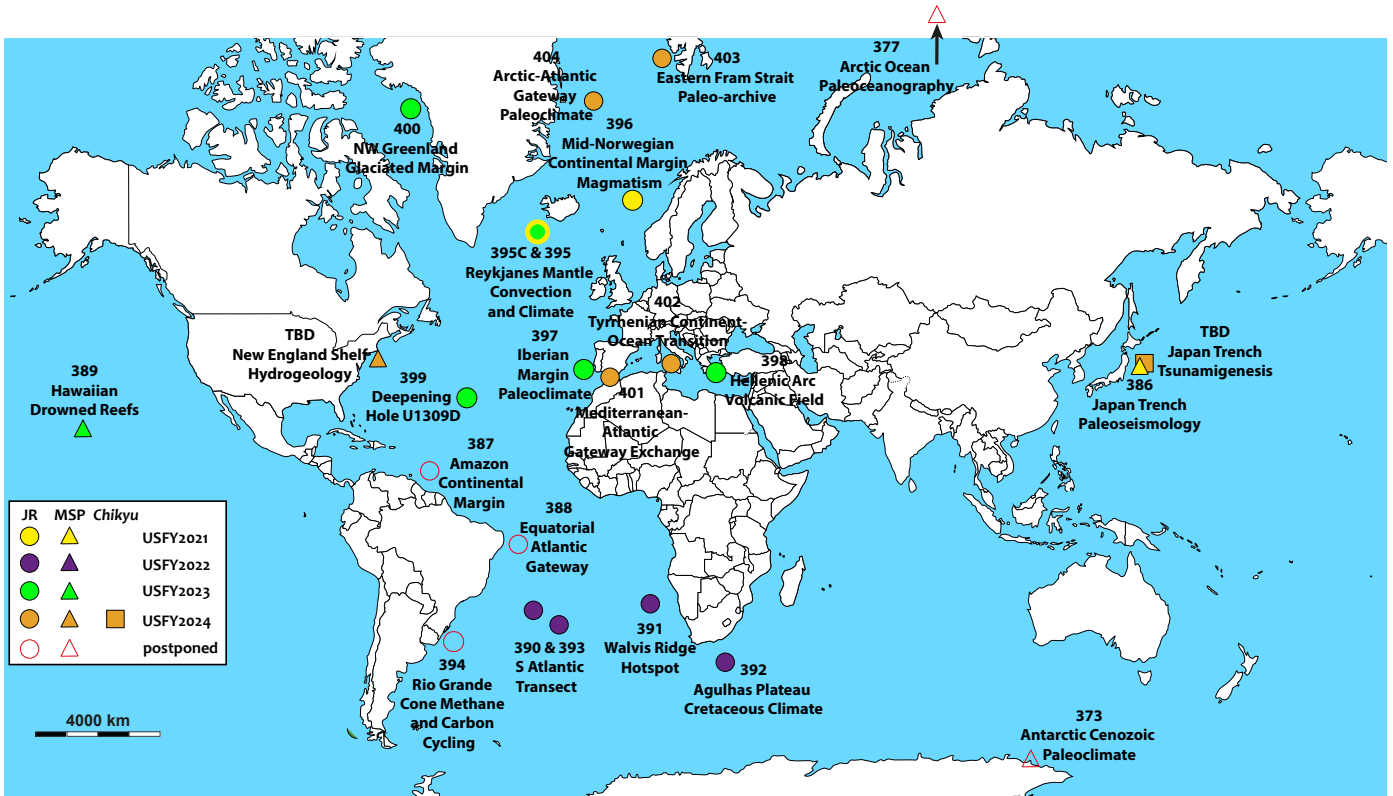
The *Chikyu* - a home for scientists of the Expedition 386
for three weeks of the Personal Sampling Party.
Credit: S.Zellers, ECORD/IODP/JAMSTEC



Sampling during the Personal Sampling Party of Expedition 386: Japan Trench Paleoseismology onboard Chikyu.
Credit: J. Everest, ECORD/IODP/JAMSTEC.



IODP Expeditions 2021-2024



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	Sept. – Oct. 2023	TBD	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	Aug. 2 - Sept. 30, 2024	Reykjavik / Reykjavik	JRSO
New England Shelf Hydrogeology	TBD	2024	TBD	ESO
Japan Trench Tsunamigenesis	TBD	2024	TBD	CDEX
Antarctic Cenozoic Paleoclimate	373	postponed	TBD	ESO
Arctic Ocean Paleoceanography	377	postponed	TBD	ESO
Amazon Continental Margin	387	postponed	TBD	JRSO
Equatorial Atlantic Gateway	388	postponed	TBD	JRSO
Rio Grande Cone Methane and Carbon Cycling	394	postponed	TBD	JRSO



Post-2024 ECORD-Japan Scientific Ocean Drilling Programme



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.

Transition to collaborative programmes

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 programme operated by independent platform providers to independent and collaborative programmes, whose internal organization and mutual collaboration still need to be defined.

The 2050 Science Framework (<http://www.iodp.org/2050-science-framework>), which represents a new and innovative approach for conducting science using a portfolio of offshore drilling platforms, must be the foundation of such future initiatives.

To prepare this sharp transition, ECORD has first elaborated its plans internally, especially through the instrumental role of the ECORD Vision Task Force and via continuous exchanges between all ECORD entities. ECORD has then interacted with its current IODP partners through our regular communication channels and via bilateral meetings.

A major outcome of these bilateral meetings was the decision by ECORD and Japan to build a combined post-2024 programme based on the implementation of Mission-Specific Platform (MSP) expeditions, which will play a prominent role in achieving the major goals of the 2050 Science Framework.



ECORD and Japan:
to build a combined post-2024
programme based on MSPs concept



ECORD and Japan shaping their post-2024 plans

ECORD and Japan are currently shaping their post-2024 plans based on:

1. a commitment to the ‘philosophy’ of the successive scientific ocean drilling programmes;
2. the legacy of their respective achievements, success and innovations since 2004; and
3. the need to adopt an innovative approach tailored to meet the needs of the post-2024 international landscape.

ECORD and Japan intend to implement jointly drilling and coring expeditions following an MSP concept as already developed by ECORD since 2004.

ECORD and Japan intend to further develop the MSP concept by diversifying drilling and coring technologies, including riserless drilling, giant piston coring and even riser drilling, and applying them to all geological environments, as determined by scientific priorities, operational efficiency and better value for funding.

The broad outlines of ECORD-Japan plans have been elaborated by working groups and then presented at IODP meetings (each Facility Boards and IODP Forum) where the architecture of the future programme has been presented.



MSP concept involves operational and funding flexibility, variable operational times compared to the standard two-month expedition, as well as tailored programmatic procedures concerning proposals and science parties.

ECORD-Japan Scientific Ocean Drilling Programme to start in late 2024

ECORD and Japan will keep their own identity as their own entities and functioning will be preserved. In addition, three joint entities are currently considered: an 'Advisory Operational Committee', which will be the expedition scheduling entity and two Task Forces, including Vision - in charge of developing a long-term scientific and funding strategy and monitoring the progress toward the completion of the 2050 Science Framework – and Outreach, in charge of the coordination of communication tasks.

ECORD and Japan anticipate that our joint programme, inspired by the 2050 Framework, will begin immediately after the conclusion of the current IODP.

International governmental and non-governmental entities will be invited to participate as **Associate Members** for non-platform providers providing cash or in-kind contributions, including temporary (e.g., project-based) membership, or as Partners for regular platform providers through exchanges of berths on expeditions and other services.

At the IODP Forum that was held at the Lamont-Doherty Earth Observatory, Palisades, New York, in September 2022, ECORD and Japan have invited current IODP partners to join this initiative and share overarching resources, such as proposal and data management (the main responsibility of the current Science Support Office – SSO-) and the proposal review process (the remit of the current Science Evaluation Panel – SEP - and Environmental Protection and Safety Panel - EPSP -).

Continuity of core and data legacies

The development of post-2024 initiatives will also require continuity of core and data legacies, in order to maintain one of the key basic principles of the successive international scientific ocean drilling programmes. The related agreements among current IODP partners will be formalized to ensure the continuity of legacy activities throughout the transition between the current IODP and future scientific ocean drilling initiatives. This is of prime importance especially for the Bremen Core Repository – BCR – and the Kochi Core Center – KCC -. The BCR hosts all cores recovered since the beginning of scientific ocean drilling

There are still many challenges to tackle and many issues to be solved to delineate the final architecture of a potential 'Alliance' hosting these overarching resources and to define the collaborative approach between individual programmes.

Collaboration with other programmes

ECORD and Japan intend to foster active collaboration with other programmes and initiatives with similar scientific objectives, and implement joint expeditions, regardless of the technology and/or the drilling/coring needs.

We believe that drilling expeditions operated on an MSP mode, especially in shallow-environments, will be of pivotal importance to implement Land-to-Sea Transects (L2S) with the International Scientific Continental Drilling Programme (ICDP).

Communication plans

Communication plans to inform international ocean drilling science communities about the rapidly evolving situation of the post-2024 plans have started and will develop in the next months. They involve formal presentations and open exchanges during international and national conferences, webinars, usual channels (websites, newsletters, social media networks), as well as open discussion/online forum to collect community feedback (*see page 39 - Workshop Phase 1*).

from the Atlantic and Arctic oceans as well as the Mediterranean, Baltic and Black Seas, to date more than 160 km of cores acquired during 91 expeditions before the implementation of a number of JR expeditions in these regions before the end of the current programme. The KCC hosts all cores recovered since the beginning of scientific ocean drilling from the Western Pacific and Indian Oceans, corresponding to a total length of more than 140 km of cores.

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.

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

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

and the ECORD-Japan Bilateral Meeting Members



Letter from the IODP Forum Chair



Henk Brinkhuis

Dear ECORD & IODP community!

I do hope you guys enjoyed an OK summer despite all the global negativity; personally, I survived by studying glorious IODP Expedition 396 PETM samples with (quite fittingly) the mighty *Apectodinium augustum* for insiders.. (see pictures at the bottom). More to the point, over the summer, the various key ‘members’ of the IODP FORUM emerged in multiple on-line meetings to prepare for the FORUM meeting at Lamont last September 13-16 (see pictures 3-5). We notably discussed the ‘conclusion of IODP in 2024’ (yes, sounds frightening), and options for new programmes and international alliances post-2024. For consensus statements, please check <http://iodp.org>. Of special note are the broad and continued support for preserving and archiving the IODP legacy-education and outreach materials, the ‘in memoriam’ for **Dick Kroon**, the former IODP Forum chair, and our deep appreciation and sincere thanks to NSF’s **Jamie Allan** for his many years of service to the scientific ocean drilling programmes and research community. We will miss his insights, enthusiasm, and historical perspective at meetings and discussions, and we wish him the best of luck on his upcoming retirement and future pursuits.

Regarding the post IODP phase, post-2024 and beyond, like before, several new developments (e.g., IODP China) were acknowledged, and avenues, and options of future international cooperation were further discussed. These range from the announced continued ECORD-Japan

and IODP-INDIA status’, the NSF considering extending the *JOIDES Resolution* from 2025 to 2028, potentially building a new vessel, and future American-lead program thoughts. Meanwhile, the U.S. Scientific Ocean Drilling Alliance (US-SODA, see <https://us-soda.org/>), who are advocating for a new U.S. drilling vessel and program, reported a growing number of major U.S. institutions supporting their work. Their recent actions demonstrated the broad scope and international character of scientific ocean drilling, with over 2,200 scientists and over 50 institutions from around the world participating. The FORUM attendees were supportive and hope that these actions will help to positively influence and streamline the various ongoing NSF processes.

Apart from progress (cf. the recent and announced webinars and meetings) now further shaping the ECORD-Japan alliance overall internationally, no definitive steps are confirmed as yet. Earliest decisions are not expected before next February. Yet, spirits remain high to continue to build on the 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 form a solid basis for continued positive discussions, at the next meeting, likely either in conjunction with the EGU2023 and/or in Australia in the fall of 2023.

Discussions have been continued at the ECORD Council ESSAC meeting, which was held in Gargonza, Italy, during the week of 14 November 2022. There, Post-2024 ECORD MoU/Agreements, including the status of EMA,

The dinoflagellate *Apectodinium augustum*, marker for the PETM
Credits: H. Brinkhuis, ECORD/IODP.



The dayshift science party of IODP Expedition 396 doing ‘the *augustum*’.
Credits: H. Brinkhuis, ECORD/IODP.



ESO and ESSAC, the ECORD-Japan Scientific Ocean Drilling Programme, and the further development of the MSP concept, proposal guidelines, expedition funding and staffing, and projected ECORD participation in post-2024 MSP expeditions have been on the table.

All the above set against the unfortunate background of international tension, war, pandemic, and other worries, issues, and problems, globally. Let's hope that the situation will improve for the better in the coming months. Yet, I have no doubt that through its versatile MSP programme ECORD will continue to make strong scientific contributions to the current (MSP IODP Expedition 389: Hawaiian Drowned Reefs, *see page 17*), and any post-2024 scientific ocean drilling efforts. For now, key is to

explore how we can create the most effective configuration addressing all needs voiced in the 2050 Science Framework with the global international community. Besides innovative drilling, this also includes securing the ocean drilling legacy in various ways, including e.g., high quality archiving, and maintenance of databases.

It is good to see ECORD alive and kicking, moving forward in various ways, including the organization of successful MagellanPlus workshops directed towards new and innovative MSP proposals, including cooperation with ICDP. We do need your continued input and participation to secure a future programme – so do join up for the coming meetings!

Henk Brinkhuis - henk.brinkhuis@nioz.nl

IODP Forum Chair

Utrecht University

Ocean Systems Research Department, Royal NIOZ, NL



The IODP FORUM meeting at Lamont, and the fieldtrip, with Paul Olsen.
Credits: H. Brinkhuis, ECORD/IODP.



In order for the core not to collapse after samples have been taken, the science party members filled the gaps. PSP during Expedition 386: Japan Trench Paleoseismology onboard *Chikyu*.
Credit: S. Zellers, ECORD/IODP/JAMSTEC.





Gabriele Uenzelmann-Neben

Scheduling of MSP expeditions



The onshore Phase 2 (report writing) of Expedition 386: Japan Trench Paleoseismology has been completed. The third onshore Phase 3 (personal sampling) has been recently finalised.



Preparations for the offshore phase of Expedition 389: Hawaiian Drowned Reefs to be implemented in 2023 are proceeding well, and the call for applications to sail and the webinar have been published.

The EFB is taking an active role in shaping the post-2024 mission specific platform expeditions Programme. The EFB is very glad to see a continued submission of MSP proposals. Those proposals will form the backbone of the

successful establishment of a post-2024 MSP expedition Programme. The EFB thus strongly encourages proponents to pursue the development and submission of MSP proposals.

During the EFB meeting in Aix-en-Provence it was recommended to implement an expedition based on Proposal 637 'New England Shelf Hydrogeology' in 2024.

Gabriele Uenzelmann-Neben
gabriele.uenzelmann-neben@awi.de
 Chair of the ECORD Facility Board



MSP 2020-2024 operational plan

2013 - 2014	2015	2016	2017		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	386 Japan Trench Paleoseismology	No expedition	389 Hawaiian Drowned Reefs	P637 New England Shelf Hydrogeology
Drillship Greatship Maya	RRS James Cook & Seabed drills (MeBo & RD2)	Liftboat Myrtle	Drillship Fugro Synergy					<i>Kaimei & Chikyu</i>		
							377 Arctic Ocean Paleoceanography		postponed	



EFB waiting room ⌚

Exp. 373	#730	Exp. 377
Antarctic Cenozoic Paleoclimate	Sabine Bank Sea Level	Arctic Ocean Paleoceanography

- 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

Expedition 386: Japan Trench Paleoseismology



In the previous ECORD newsletter we reported on the Onshore Science Party (OSP) for Expedition 386: Japan Trench Paleoseismology. Due to Covid travel restrictions into Japan at the time, the OSP was implemented in 'hybrid' mode from 14 February - 15 March 2022.

Throughout the spring and summer, the hybrid OSP (coined OSP Phase 1) was immediately followed by OSP Phase 2, which saw the remainder of the remote OSP measurements completed by ESO partner staff at their home institution laboratories. In parallel, the bulk of the expedition reporting was completed as far as possible with the data generated so far by the Science Party.

The main focus for the ESO team throughout this time was the finalisation and dissemination of IODP Expedition 386 datasets (offshore and OSP), supporting the Science Party to write the Expedition Reports, and planning and preparation for the Expedition 386 Personal Sampling Party (PSP, also known as OSP Phase 3), from 15 November – 6 December.

The ESO-MarE3 joint operator team are tremendously excited to be running the PSP this autumn, as it will be the first time that most of Science Party members and operator staff have convened in person, and in the presence of the split cores. As well as having the opportunity to take samples for post-expedition

Co-chief Scientists:

Michael Strasser
Ken Ikehara

Offshore dates:

13 April - 1 June 2021

on board *R/V Kaimei* from/to Yokosuka

Onshore Science Party dates:

14 February - 15 March 2022

on board *D/V Chikyu* docked in Shimizu

Personal Sampling Party dates:

15 November – 6 December 2022

on board *D/V Chikyu* docked in Shimizu

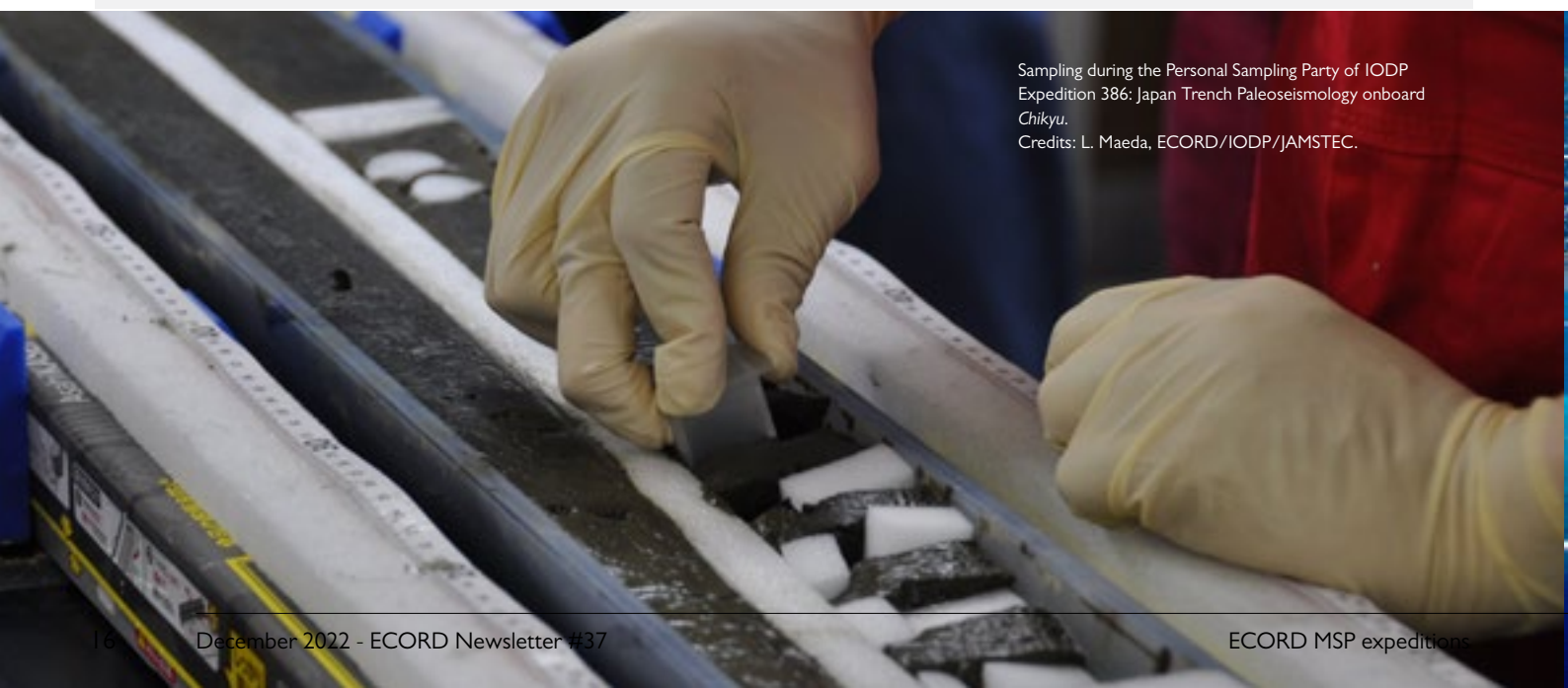
research, the Science Party will be able to mingle and exchange ideas, and hopefully capture the famous IODP spirit which was missed by most participants who were unable to sail offshore or take part in the hybrid OSP in person.

In the build up to the PSP, the ESO-MarE3 team worked on a weekly basis on sample planning, sampling workflows, sample data management, measurements and analyses, consumables lists, and logistics.

At the end of the year the Expedition operational phases will be declared complete, the Expedition Report draft submitted to the *JOIDES Resolution* Science Operator Publication Services, and the start of the 1-year moratorium period will begin.

For more details and updates from the Expedition 386 Personal Sampling Party, please visit ECORD's social media channels and the expedition blog at <https://expedition386.wordpress.com/>.

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



Sampling during the Personal Sampling Party of IODP Expedition 386: Japan Trench Paleoseismology onboard *Chikyu*.

Credits: L. Maeda, ECORD/IODP/JAMSTEC.



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 (see *Science article on page 26*).

A full tender call for drilling and vessel services was issued by ESO-BGS between 14 Apr – 1 June. In early June, ESO completed its review of supplier bids which revealed that the Expedition budget would need to be raised to implement the expedition in the current economic climate.

Co-chief Scientists:	Jody Webster Christina Ravelo
Offshore dates:	August - October 2023 TBD
Onshore Science Party dates:	Early 2024 TBD

A new budget was approved by ECORD in the summer, and ESO moved forward with a new tender call which will be live from 7 November – 12 December.

The Call for Scientists was opened from 1 August – 23 September, and included an information webinar on 9 September (access the recording at <https://www.youtube.com/watch?v=A5mEkzZgfA0>).



Offshore dates are anticipated to be 5-8 weeks between the end of August and 31 October 2023. The Onshore Science Party is anticipated to be run in early 2024.

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

David McInroy - dbrm@bgs.ac.uk
ESO Science Manager

Sarah Davies - sjd27@leicester.ac.uk
EPC Manager

Ursula Röhl - uroehl@marum.de
ESO Curation and Laboratory Manager

Jez Everest - djsem@bgs.ac.uk
ESO Operations Manager



Coral reefs of Tahiti. IODP Expedition 310: Tahiti Sea Level.
Credits: G. Camoin, ECORD/IODP.





Nadine Hallmann



Lucas Lourens

MagellanPlus: Investigating the Oceanic Life Cycle of Tectonic Plates with Mission-Specific Drilling

(University of Plymouth + Online | 1 Feb 2022 and 4-5 April 2022)

Workshop Aim: As we look to the future of IODP and the delivery of the 2050 Science Framework, we were tasked with developing a MagellanPlus workshop to explore how Strategic Objective 2 ‘The Oceanic Life Cycle of Tectonic Plates’ could be addressed with Mission Specific Drilling (MSP).

Online Information Event: The purpose of the information event was to help the community better understand the potential of Mission Specific Drilling, and to start the discussions on how MSPs could help us deliver on Strategic Objective 2 science. This builds on ECORD Headline #18 that emphasises the intention of ECORD to further develop the MSP concept with the use of a broader range of drilling and coring technologies. 51 participants attended this meeting, with scientists from ECORD countries and beyond and from a wide range of career stages. We heard from 3 speakers: David McInroy from BGS, highlighting past examples of MSPs and introducing the types of drilling technology available to the community. Gretchen Fruh-Green, showcasing the MSP IODP Expedition 357: Atlantis Massif Serpentinisation and Life that was the first IODP Expedition to use seabed rock drills. Joanna Morgan, showcasing IODP Expedition 364: Chicxulub: Drilling the K-Pg Impact Crater and demonstrating the potential of diamond coring off a fixed platform.

All of these talks demonstrated that we don’t necessarily need riser or riserless drilling to recover hard rock cores and gave us all food for thought as we prepared for the next part of the workshop.

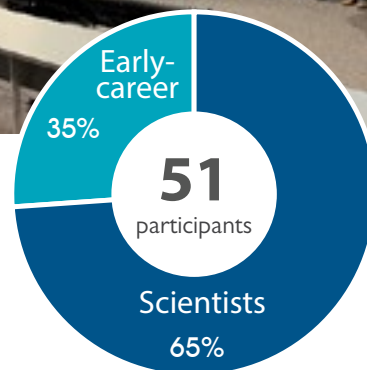
2-day workshop, University of Plymouth & Online: The aim of this main part of the workshop was to stimulate discussions for new MSP-focused IODP projects that would address Strategic Objective 2. In total, we had 41 participants, with 20 attending the workshop in person. All parts of the workshop were offered in hybrid format, and we thank the University of Plymouth Events team for supporting this workshop and especially for establishing an effective hybrid setup. Day 1 focused on delving more into the science questions and future opportunities within Strategic Objective 2, and we had 5 keynote talks that covered the life cycle of a tectonic plate. These talks also brought into focus some of the unifying themes that cover the life cycle of tectonic plate. Our keynotes covered: Back-arc systems (Yasuhiko Ohara); Ocean–continent transition and rift systems (Gianreto Manatschal); Oceanic lithosphere (Damon Teagle); Ocean islands (William Sager) and Arc volcanic systems (Maryjo Brounce).

Following an open discussion, 3 breakout groups were identified for day 2:

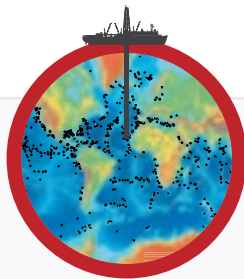
- Group 1: Drilling zero age basalt;
- Group 2: Mantle processes in the context of continental break-up and subduction initiation and
- Group 3: Mantle processes in the context of mid-ocean ridges.

Each breakout group had productive discussions around the science questions in these settings and started to come up with ideas for where they might be addressed with future MSP drilling. We also identified where ESO could support the development of MSPs by testing a broader range of drilling systems.

Michelle Harris, *University of Plymouth*, et al.



More on MagellanPlus Workshop Series Programme: <https://www.ecord.org/science/magellanplus/>



Upcoming MagellanPlus Workshops

REGULAR WORKSHOPS

CenoStore Workshop (11-13 January 2023, Belfast, UK)

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

Contact: Andrew Newton: (A.Newton@qub.ac.uk)

MAREXKUS Workshop (1-3 March 2023, Rome, Italy)

MAntle Remelting and hydrothermal chemical Exchange at Knipovich Ultraslow Spreading ridge.

Alessio Sanfilippo: (alessio.sanfilippo@univr.it)

MANTLE-L2S Workshop (3-6 July 2023, Plymouth, UK)

Accessing the Circum-Iberian mantle archive of Wilson Cycle processes through Land-to-Sea drilling.

Contact: Andy Parsons (andy.parsons@plymouth.ac.uk)

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

TracIng Monsoon, Ocean currents and diagenetic carbon Redistribution

The idea of the workshop originated from the need to find modern-day examples of early diagenetic carbonate cementation in the shallow marine realm. All shallow marine limestones in the rock record have gone through this process, but it has never been observed in-situ. Current models of the early lithification of shallow marine limestones are based on some major assumptions that remain to be tested by the real world. As the Australian carbonate shelf was one of the best regions to study this question, we decided to combine it with the geographically more focussed questions around the Quaternary history of the Australian Monsoon and the Palaeoceanography of the Timor Sea. The workshop was planned to take place just before EGU and when EGU was moved due to Covid, we postponed the workshop to match the new EGU dates.

The aims of the workshop were to find locations and methodological approaches that would make it possible to carry out the science linked to both, questions of early diagenesis and questions of palaeoclimate and palaeoceanography, with the ultimate aim to write a combined MSP proposal. The first day contained a set of academic keynotes across a broad set of topics pertinent to both research areas covering sedimentological and geochemical aspects of early diagenesis, the roles of taphonomy and microbiology in diagenesis, and the palaeoclimate/palaeoceanography context of north western Australia. Keynotes were followed by discussions aimed at defining the scientific objectives and narrowing down possible drilling sites. The second day started with technical keynotes by the ECORD science operators and Allisson Schaap (National Oceanographic Centre, Southampton) talking about new developments in in-situ porewater measurements. The rest of the second and third day were spent in discussion groups to further narrow down the most suitable drilling sites, identify the most suitable platform, drilling methods, and analytical approaches.

From a CaCO_3 diagenesis perspective, drilling sites were constrained by the need to avoid the influence of freshwater diagenesis during the last glacial maximum, to have a varied and abundant mineral composition of the primary sediment (particularly a high amount of aragonitic components), and to have a range of grain-size and organic carbon variability across the sites. Furthermore, sites with significantly high water energy (e.g. due to tidal waves) needed to be avoided. From a palaeoceanographic/palaeoclimate perspective, it was desired to have a transect through the Timor strait and to get as continuous records as possible for the past 2 million years.

A particular challenge lies with finding and sampling the first sedimentary layers with early diagenetic carbonate cements and/or



lithified limestone beds. Conventional drilling by APC or HAPC coring struggles with the expected sudden change in lithification and often results in the obliteration of primary sedimentary/diagenetic textures. Another challenge is also the measurement of ephemeral porewater parameters (particularly related to the carbonic acid system) as these change with degassing in the course of core retrieval.

An important aspect of early CaCO_3 diagenesis is how the primary CaCO_3 components are taphonomically filtered in the taphonomically active zone (ca. uppermost 1 m of the sediment column). It became clear in the course of the workshop that this is outside the scope of ECORD/IODP projects as it too shallow. It was decided that a separate working group be formed to explore alternative funding for this particular aspect.

The workshop was a highly interdisciplinary and international experience with 47 registered participants (15 of them participated virtually) from 18 countries, including five PhD students and six postdoctoral early career scientists.

Uwe Balthasar, *University of Plymouth*, et al.

MagellanPlus: Belize Barrier Reef Workshop

(8-10 July 2022, Frankfurt am Main, Germany)

IODP-drilling off of the Belize Barrier Reef (Central America) to reconstruct postglacial environmental changes

The aim of this workshop was to gather experts interested in developing an IODP proposal to drill the margin of the Belize Barrier Reef, the largest reef system in the Atlantic. The workshop organized by Eberhard Gischler (Frankfurt), Flavio Anselmetti (Bern), and Stefano Fabbri (Bourget-du-Lac) had to be postponed twice due to the covid pandemic, but eventually took place in July 2022 at Goethe University in Frankfurt am Main, Germany. Eighteen colleagues from eight countries including four young scientists participated. An additional nine colleagues had expressed their interest, but could not attend due to schedule collisions.



MagellanPlus workshop participants from left to right: D. Bassi, M. Diaz, A. Droxler, S. Fabbri, G. Eberli, E. Gischler, F. Anselmetti, J. Dickens, M. Sardar-Abadi, J. Peckmann, M. Jez, M. Vinneband, O. Knebel, S. Zoppe. (T. Felis and N. Rabideaux not shown due to early departure.)

The workshop started in the evening of Friday, July 8, 2022, with an ice-breaker-like meeting and joint dinner of the participants. From Saturday, July 9 in the morning until Sunday, July 10, at midday, the talks and discussions commenced. There was another joint dinner in a nearby restaurant on Saturday night. The participants split Sunday, July 10, at midday. A smaller group, whose flights and trains left later in the day, had lunch together.

The schedule of the workshop included three keynote talks on late Quaternary reef development, coral paleoclimatology, and reef microbialite formation as well as three talks on the study area and previous site surveys. There was plenty of time for discussions, which included the identification of possible research questions, potential drill sites, and possible drilling strategies and technologies.

Eventually, it was agreed upon to submit a preliminary proposal to IODP including four objectives:

1. the reconstruction of last glacial maximum (LGM) and postglacial sea-level rise in the western Atlantic;
2. the reconstruction of environmental parameters using corals, coralline algae, and cryptic microbialites in late Quaternary reef successions of Belize;
3. the elucidation of reef paleoecology in relation to postglacial sea-level rise and associated environmental changes; and
4. the assessment of microbial life in a barrier-reef system.

It was also discussed that based on a previous site survey, which acquired high-resolution bathymetric and shallow seismic data from the area, a focus would be laid on three different fore-reef areas of the Belize Barrier Reef. These include two transects of four drillholes each, oriented perpendicular to the modern reef crest. Drillholes will be situated on linear ridges running along the fore-reef slope. A third transect of four drillholes will be located on a southward shoaling ridge, running more or less parallel to the modern reef crest south of the mouth of English Cay Channel, an incised valley cutting through the Belize Barrier Reef platform. In addition to these 12 drillholes, one site is planned in deep water east of the barrier reef and one on the delta of the English Cay Channel in order to obtain off-reef reference records with both limited and strong siliciclastic input, respectively.

As a successful outcome of the MagellanPlus workshop, the IODP pre-proposal entitled “Postglacial Atlantic sea-level reconstruction through drilling the Belize Barrier Reef (BBRdrill)” with 13 proponents (lead proponents Gischler, Fabbri, Anselmetti) was submitted to IODP in late September 2022.

Eberhard Gischler, *University of Frankfurt*
Flavio Anselmetti, *University of Bern*
Stefano Fabbri, *University of Bern*

More on MagellanPlus Workshop Series Programme: <https://www.ecord.org/science/magellanplus/>

MagellanPlus: Mission-specific platform approaches to assessing natural hazards that impact society

(7-9 July 2022, Lisbon, Portugal)

Natural hazards associated with the ocean can have a direct impact on coastal populations, and even affect populations located far away from the coast. These hazards may interact, and include tsunamis that result in major damage and catastrophic loss of life; and submarine landslides, which themselves can produce tsunamis and damage subsea infrastructure like communications cables, oil and gas pipelines, and offshore wind turbines. In addition to these episodic events, currently warming sea temperatures are resulting in more damaging tropical cyclones, severe and nuisance coastal flooding, and larger-scale disruptions to ocean and atmospheric circulation. Tectonically and climatically driven hazards operate and interact over timescales that are societally relevant, from seasonal to decadal; and their records are preserved in the geologic record.

The IODP's 2050 Science Framework lists natural hazards impacting society as a strategic objective, with rapid response measurements of hazardous events, learning from past hazard records, and seafloor monitoring and observation identified as areas where scientific ocean drilling can contribute to understanding. Assessing earthquake and tsunami hazards is specifically identified as a flagship initiative in the Framework, while climate-related hazards fall under the flagship initiative to ground truth future climate change. Mission-specific platforms (MSPs) can provide a significant advantage over large drillships in investigating natural hazards as they can potentially operate in shallower waters, restricted environments, or sea ice; they can be specially tailored for deployment or monitoring of instrumentation; and they have the potential for more rapid deployment in response to new events, or repeat deployment over months or years to visit monitoring stations. MSPs therefore are particularly well suited to these aspects of the Framework.

Twenty-eight participants from around the world attended the workshop, including eight who attended some or all of the workshop virtually. Over three days, we heard keynote talks on natural hazards topics that can be addressed with scientific ocean drilling and short talks from postdoctoral researchers, and participated in breakout groups to develop hypotheses specific to natural hazards that can be addressed in specific locations by MSP drilling.

Objectives.

The objectives of the workshop were:

1. to form working groups to develop plans to address key questions developed at the meeting;
2. to identify locations where natural hazards, or preferably several different hazards, can be addressed with MSP drilling, with consideration of further location-based workshops; and
3. to develop a set of hypotheses that can be tested with MSP drilling to lay the groundwork for future preproposals.

Outcome and future plans

The working groups developed hypotheses and questions focused on three topics: climate and tropical cyclones; slope failure; and processes at active margins. These hypotheses and questions are planned to be used for drilling proposals to be developed for specific locations (see workshop report on the ECORD website).



Davide Gamboa addressing the attendees in the room and online.



Breakout groups working on slope failure and tropical cyclones/climate (left) and active margin processes (right).

Hugh Daigle, *University of Texas at Austin*, et al.

Sampling during the Personal Sampling Party of Expedition 386: Japan Trench Paleoseismology onboard *Chikyu*.
Credit: L. Maeda, ECORD/IODP/JAMSTEC.



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

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

Scientific Ocean Drilling is entering a transitional phase from the 2013-2023 Science Plan to the 2050 Science Framework (www.iodp.org/2050-science-framework), which represents a new and innovative approach for conducting science using offshore drilling platforms.

A prominent role for **Mission-Specific Platforms (MSP)** is anticipated to achieve the goals of the 2050 Science Framework.

MagellanPlus welcomes proposals for topical 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.

Proposals that would use the *JOIDES Resolution* will not be taken into consideration as the JOIDES Resolution Facility Board has recently decided to no longer accept new proposals/pre-proposals for this platform.

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.

Continued →

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

Deadline
for applications:
**15 January
2023**

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

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.

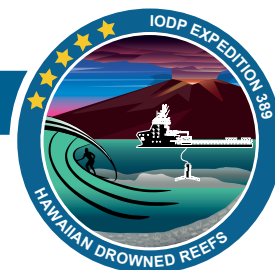
Proposals must be submitted by email as a single, combined pdf document to magellan.plus@uu.nl and to ema@cerege.fr

The deadline for applications: **15 January 2023**

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 389: Hawaiian Drowned Reefs

Unlocking the history of sea-level, climate change and reef responses over the last 500,000 years

J. M. Webster¹, A. C. Ravelo², J. C. Braga³, D. A. Clague⁴ and 716-Full2 proponents

¹Geocoastal Research Group, School of Geosciences, University of Sydney, NSW 2006, Sydney, Australia, jody.webster@sydney.edu.au

²Department of Ocean Sciences, University of California, Santa Cruz, CA, USA, acr@ucsc.edu

³Departamento de Estratigrafía y Paleontología, Universidad de Granada, Campus Fuentenueva, 18002, Granada, Spain, jbraga@ugr.es

⁴Monterey Bay Aquarium Research Institute, Moss Landing, CA, USA, clague@mbari.org

The ECORD Facility Board met in Trieste, Italy on 29-30 September 2021 and confirmed that *IODP Expedition 389: Hawaiian Drowned Reefs* will now be rescheduled for 2023.

Surrounding the island of Hawai'i are a series of twelve fossil coral reefs 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. Covering important time periods in the Earth's climate history, the information contained in these natural fossil reef archives will help IODP scientists reconstruct sea-level change at higher resolution than previously possible at stable far-field sites. 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. These records of natural climate changes occurring from seasonal and decadal to the much longer-term millennial time scales, will also provide an interpretative framework for understanding the effects of climate change originating from human activity.

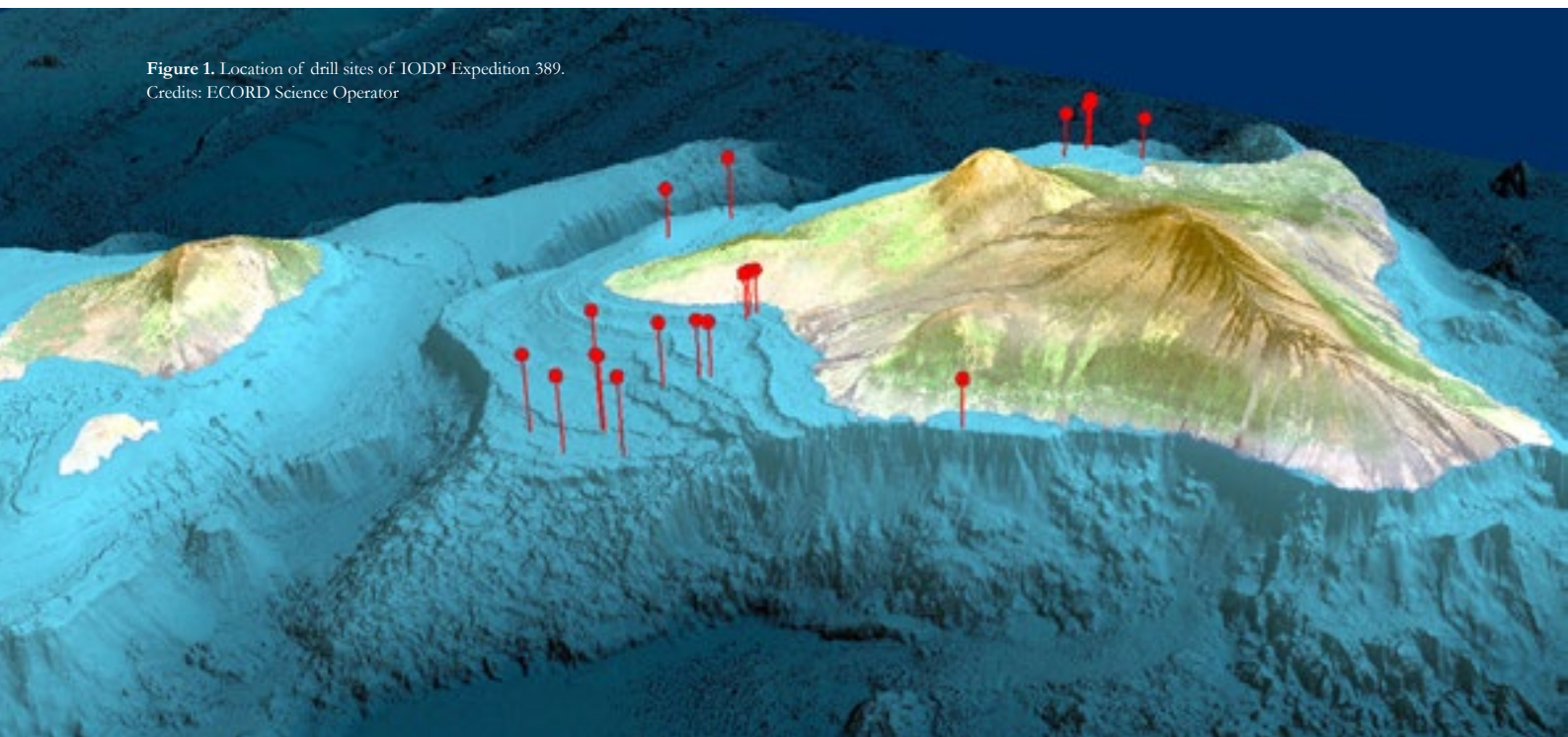
Expedition 389 will core in up to eleven locations (Fig. 1), to a depth of 150 m below the seafloor, with the aim to address scientific questions across four main themes to: (1) reconstruct sea-level change in the central Pacific over the last 500,000 years; (2) characterize climate variability over the last 500,000 years, as recorded in the fossil corals, to better understand long-term shifts in the background state of sea surface temperature, rainfall and storm tracks and the state dependence of seasonal - inter-annual variability; (3) understand how coral reef systems respond both geologically and biologically to rapid changes in sea-level and climate – for example can reefs turn on and off when they

reach certain environmental limits, and how do they recover from disturbances in the system; and (4) better explain the subsidence and volcanic history of Hawai'i. In this article we briefly highlight relevant advances in some of these themes and crucial knowledge gaps that will be addressed by Expedition 389 drilling.

Constraining sea level-changes in the central Pacific over the last 500 kyr.

Significant advances have been made in reconstructing sea-level changes over the past 500 kyrs using continuous deep-sediment archives. However, fossil coral reefs continue to

Figure 1. Location of drill sites of IODP Expedition 389.
Credits: ECORD Science Operator



offer more precise temporal resolution than achievable from deep-sea sediment reconstructions and may also provide more accurate constraints on the vertical position of past sea level (Woodroffe and Webster, 2014). There have been several recent reviews of the global fossil coral sea level data (e.g., Fig. 2). Despite significant progress in understanding sea level variability, ice sheet dynamics and global isostatic adjustment (GIA) over the last 150 ka – particular during MIS 5e and the last deglaciation (Barbados, Expedition 310 Tahiti, Expedition 325 GBR), crucial questions remain in part due to the lack of appropriate absolute coral sea-level data. Figure 2A-C highlights: (1) the bias towards high sea-level events (i.e. highstands); (2) the lack of temporal coverage earlier than 150 ka – particularly during interstadial/stadial and lowstand sea levels; and (3) a major bias towards either co-seismically uplifted sites and/or relatively stable sites with condensed reef sections. Expedition 389 will provide the most comprehensive and absolute record of sea levels during the different interglacial, interstadial/stadial, glacial maxima, and deglacial intervals over the last 500 kyrs, including the abrupt meltwater pulse events (MWP's) (Fig. 2) which are proving difficult and controversial to resolve. For example, recent work off the western coast of Hawai'i confirms that the H1d reef terrace (-150 m) drowned ~14.75 ka, coeval with the deglacial MWP-1A timing derived from the Expedition 310 Tahiti reef record but not Barbados at 14.1 ka (Fig. 3). New sea level data are vital to better calibrate and tune dynamical models that simulate ice sheet mass loss and predict the rate and amplitude of future global sea rise.

Reconstruct paleoclimate variability for the last 500 kyr and establish the relationship between the mean climate state and seasonal-interannual variability.

Determining paleoclimate conditions in the open ocean subtropical Pacific remains a high priority for testing climate theory and for validating the ability of fully coupled IPCC-class climate models to hindcast the regional expression of global climate change. This has profound implications for predicting storm distribution, frequency and intensity, and therefore for water resource management and geohazard prevention. Recent work shows that numerical simulations of the amplitude of North Pacific storm tracks is model-dependent because of model-to-model differences in grid spacing and in the ability to calculate accurate temperature gradients; paleoclimate studies can thus provide a test bed to evaluate individual and ensemble model behaviour. Studies focused on MIS 5 predict that, at Hawai'i, there should have been changes in the mean and seasonality of sea surface temperature (SST) due to changes in Greenland ice sheet size and greenhouse gas concentrations and in storminess and winter precipitation. Modelling results of the last glacial maximum

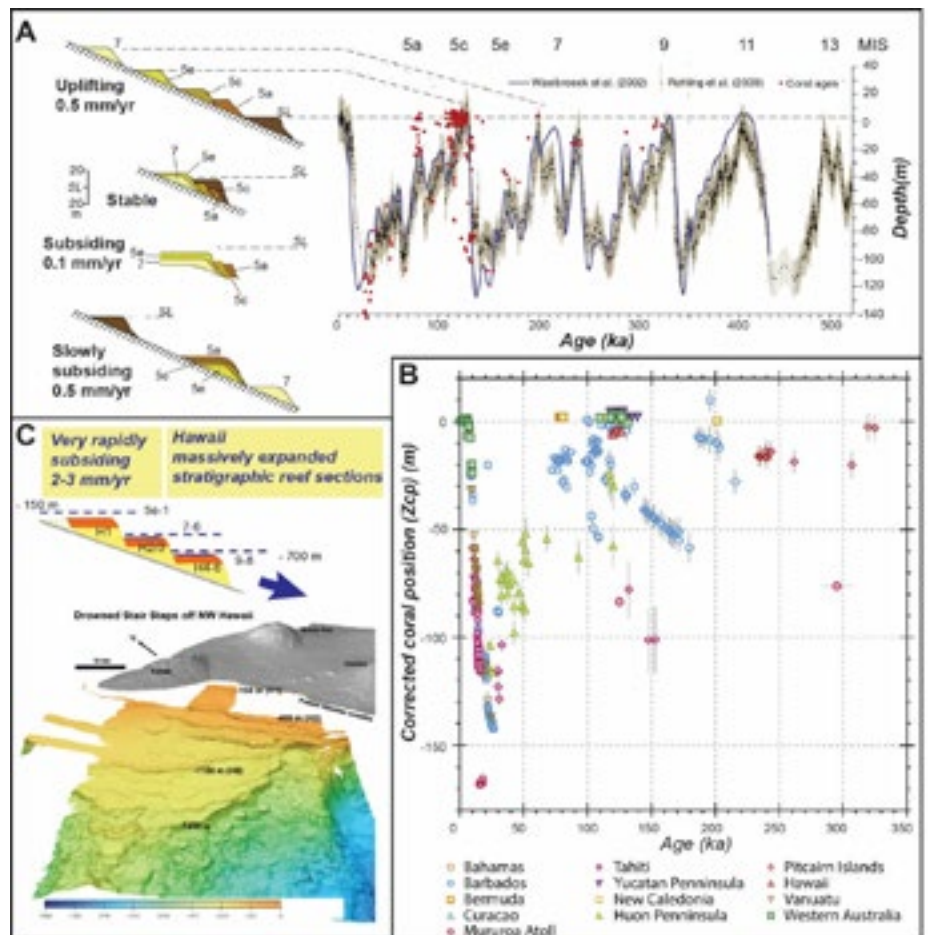


Figure 2. (A) Review of the response of coral reefs to sea level changes (after Woodroffe and Webster, 2014 and see for original sea level data sources). Reconstructions of sea level over the past 500 ka based on continuous records, compiled from the Red Sea, and the coral-calibrated deep-sea benthic $\delta^{18}O$ records. The distribution of the most reliably dated corals (coral that have been U-series dated and have $\delta^{234}U$ values within the range 137–157‰) are shown for those samples >25 ka. (B) Reconstructed relative sea levels for fossil corals, without GIA correction, from both near and far-field locations that pass an initial screening ($\delta^{234}U$ initial, calcite 2% and ^{232}Th concentration 2 ppb) with their respective uncertainties intervals (95%) based on a recent synthesis by Hibbert et al., (2016). Note both reviews clearly highlight lack temporal coverage back past ~150 ka – particularly during interstadial/stadial and lowstand sea levels, and the major bias towards either co-seismically tectonic uplifted sites and/or relatively stable sites with condensed reef sections. (C) Schematic showing the drowned reef terraces and greatly expanded reef sections (see (A) for comparison) in Hawai'i due to the relationship between reef growth, sea level oscillations and very rapid subsidence. 3D multibeam image, see the current coastline, showing the series submerged reefs to drilled by Exp. 389, formed over the last 500 ka, deepest at 1400 m below present sea level (after Webster et al., 2009).

(LGM) predict that Hawaiian coral records should reflect a southward shift in storm tracks, a precipitation anomaly, and SST responses to changes in ice albedo and greenhouse gas forcing. In addition, model simulations of Heinrich 1, interstadial and stadial events, and the LGM, suggests that although extratropical teleconnections to ENSO variability could have changed under different boundary conditions in many locations, Hawai'i is one of the few regions where interannual variability is consistently coupled to tropical ENSO variability. In all, existing modelling studies provide a firm theoretical framework for interpreting the mean, seasonal, and interannual variability that can be derived from the fossil corals targeted by Expedition 389.

With respect to data-based paleoclimate studies, the open-ocean subtropical Pacific remains one of the most important regions for which there is almost no data to compare to other regional data or to models due to the lack of appropriate geological samples. Relevant advancements in data-based paleoclimate work are sparse, but include evidence from a Mauna Kea ice core for a strong atmospheric temperature response to millennial-scale climate changes, from a sub-tropical west Pacific sediment core

for significant changes in SST since the LGM related to Asian monsoon dynamics, and from MIS 7 corals for changes in seasonal and interannual variability. In addition, there have been a number of tropical ENSO reconstructions that can be compared to Hawaiian coral records to test ideas regarding the nature of extratropical teleconnections.

Recent advancements in coral geochemistry have provided a better handle on the complexities of metal and isotope uptake and therefore will enhance the ability of Hawaiian fossil corals to provide robust paleoceanographic reconstructions. For example, there is a better understanding of which coral species are best suited for palaeoclimate reconstruction. Additionally, the boron geochemistry of coral skeletons offers a potential method to reconstruct the dissolved inorganic carbon (DIC) chemistry of the coral calcification fluid from which the skeleton precipitates and reconstruct past DIC e.g. seawater pH. Coral nitrogen and phosphorous isotopes are also increasingly being used as novel proxies for reconstructing nutrient input and upwelling. Finally, although Sr/Ca measurements in some species of corals are not thought to provide reliable SST data, there are promising

new proxies like Li/Mg and Sr-U that can provide robust SST estimates.

Geologic and biologic responses of coral reef systems to abrupt sea-level and climate changes.

Considerable progress has been made in understanding the role of coral reef systems as valuable archives of past sea-level and environmental changes, and how reefs were impacted by these changes (Camoïn and Webster, 2015; Woodroffe and Webster, 2014). However, important questions still remain about: (1) what processes control high-resolution spatio-temporal variations in reef architecture and composition – particularly in response to millennial-scale sea-level and climate changes; (2) what causes reefs to “turn-on” or “turn-off” (i.e. drowning) and what are their climatic and ecologic thresholds; and (3) how reef communities reassemble following disturbances on interglacial/glacial vs. millennial times scales. There is an urgent need for further research, not only to decipher processes driving past sea-level and climate change and its geographical variability, but also to better understand how coral reefs might respond in the context of future global climate changes (Camoïn and Webster, 2015). The combination of Hawaii’s unique geological setting (rapid subsidence, expanded stratigraphic sections, sensitivity to drowning, contrasting local environmental conditions), recent advances in dating techniques (diagenetic vetting – hyperspectral imaging and micro-scale carbonate mineral mapping, U/Th isotope systematics, Laser-Ablation ICP-MS), the novel use of reef assemblages, proxies (endolithic borers) and statistical tools to better constrain reef accretion, palaeowater depth estimates, and sophisticated 3D numerical reef modelling, make the prospect of Expedition 389 all the more exciting.

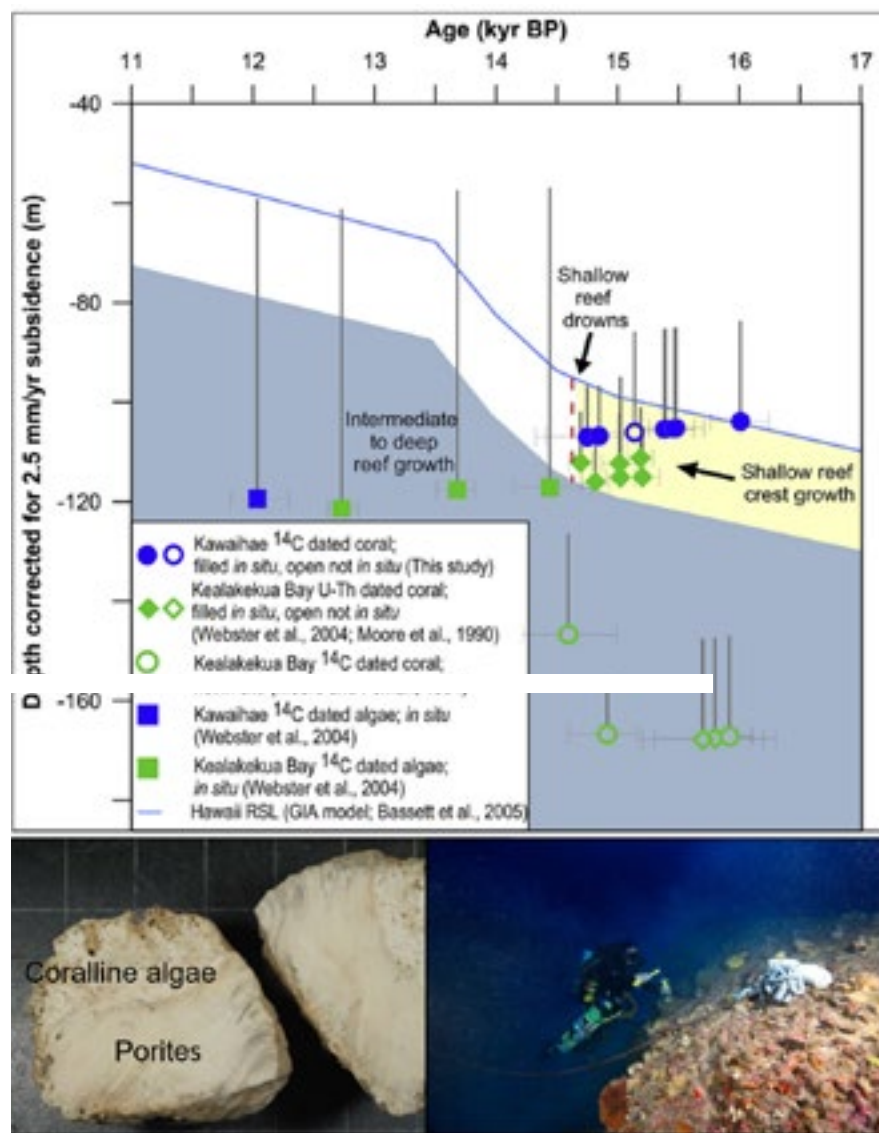


Figure 3. Summary of chronologic data from Kawaihae (blue symbols) and Kealakekua Bay (green symbols) including the new radiocarbon dated corals, published ages from Kealakekua Bay. Vertical error bars represent paleowater depth of the coral or algae samples, and horizontal errors denote 2σ age range. The transition from shallow (yellow) to deep (blue) facies growth is shown with shading (top panel). Deep diver photographs of sample recovery on H1d and examples of shallow water reef crest facies characterised by Porites samples with associated encrusting coralline algae (CAR) and vermetid gastropods (after Sanborn et al., 2017 and see for other data sources).

Expedition 389 is also concerned with elucidating the nature of living and ancient microbial communities in the reefs and their role in reef building. Microbial activity led to the precipitation of significant amounts of carbonate (microbialite) in cavities formed by primary reef builders (corals and encrusters, like coralline red algae, vermetids, and bryozoans), as shown by Expedition 310 (Tahiti), and also coevally on the seafloor by the Expedition 325 (GBR) cores. The microbial carbonate is locally the major component of the Tahiti reef, and some stratigraphic intervals of the GBR reef, contributing significantly to framework development and preservation. Biomarkers in fossil microbialite from Tahiti, GBR and other deglacial reefs indicate a key role of sulfate reducing bacteria in calcite precipitation. Analysis of global microbialite development in reef structures during the LGM-deglaciation suggests a strong correlation between microbial carbonate precipitation and carbonate saturation state of shallow ocean waters but this must be tested through previous glacial/interglacial cycles. Finally, the energy dynamics and role of

different microorganisms within carbonate-precipitating microbial mats remains to be solved.

Reef foundations, subsidence and volcanic history Hawai'i.

Over several decades, researchers have used the surface ages and depths of the various drowned shorelines around Hawai'i to determine the rate of subsidence of the island. These empirical data, along with recent numerical modelling studies, are consistent with constant subsidence over time periods of hundreds of thousands of years. Over a million-year timeframe, however, the island does not subside uniformly because the center of mass of the active volcanoes is slowly but systematically shifting towards the southeast as older volcanoes stop growing and new volcanoes form. Overall, the evolutionary history of Hawaiian volcanoes remains surprisingly poorly known; although the sequence of eruptive stages is well documented, their timeframe is not. Expedition 389 will obtain well-dated volcanic samples from the base of each hole to: (1) refine the variation through space and time of the subsidence of Hawai'i, and; (2) contribute to understanding the volcanic evolution of the island.

The promise of Expedition 389, seabed rock drills and expedition planning.

The implementation of Expedition 389 around the rapidly subsiding island of Hawai'i has the potential to unlock a unique and largely unexploited archive of sea-level and climate changes. The scientific potential of Expedition 389 is supported by a wealth of bathymetric, submersible, ROV observations, sedimentary and radiometric data collected over the last 30 years by many workers (Fig. 3). The drilling platform to be used on Expedition 389 is yet to be finalised, however, there have been significant advances in the seabed rock drill technology used for research and commercial applications (i.e. MeBo 200 – MARUM; RD2 – BGS; PROD1-3 – Benthic; Seafloor drill – Fugro, and the new BMS50M (Benthic Multi-coring System – JOGMEC). Most recently, as a “proof of concept” that seabed rock drills can recover high quality cores from challenging reef lithologies such as heterogeneous reef frameworks and cavities, e.g. friable grainstones, and coralline algal facies, our group investigated a unique suite of cores that were collected by the PROD drilling system as part of a geotechnical survey in ~80 m water (~30 m penetration, ~80% recoveries) on the North West Shelf of Australia (Fig. 4). On the basis of economic cost, environmental/cultural sensitivities, seabed depths, penetration depths and the need for high quality reef cores, the preferred platform for Expedition 389 is a seabed rock drill deployed from a ship.

In summary, Expedition 389 is well positioned to directly address several key Strategic Objectives and Flagship Initiatives in the 2050 Science Framework: Exploring Earth by Scientific Ocean Drilling by investigating the mechanisms that control rapid sea level and climate change as well as the relationship between changes in mean climate state and high frequency (seasonal-decadal) climate variability. As ECORD Science Operator now moves forward with expedition planning, finalizing the ship and drill system logistics, and environmental permitting please stay tuned for the call to join the Expedition 389 Scientific Party and be part of this exciting new phase of IODP coral reef drilling.

Acknowledgments.

We acknowledge the other proponents on the original proposal IODP proposal #716-Full2 (Drowned corals reefs around Hawai'i: a unique archive of sea-level, climate change, and reef response over the last 500 kyr).



Fig. 4. Representative core images showing the high quality core recovery in a range of very challenging fossil reef lithologies using a sea bed rock drill (Webster et al., In Press 10/09/21). These MIS 3 to 4 reef cores were recovered from the North West Shelf of Australia using the seabed drilling system PROD in ~80 m water.

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Angelo Camerlenghi



Hanno Kinkel

ECORD Sphere

We finally started using the ECORD Sphere, an interactive globe that can be used for all kinds of outreach activities for the first time.

The premiere took place at the Italian Geological Society (SGI) Italian Society of Mineralogy and Petrology (SIMP) Joint Congress: Geosciences for a sustainable future in Turin, 19-21 September 2022. Subsequently it was presented to the general public during the Trieste Next Science Festival, Trieste on 22-24 September 2022.

Several thousand people have seen and interacted with the ECORD Sphere, which is very attractive and draws a lot of attention. We are currently improving the content and plan future exhibitions and involvements in events. *(read more on page 42 and 52-53).*



ECORD Sphere in Trieste, September 2022. Credits: ECORD/IODP.

ECORD Educational activities

ECORD Scholarships 2022

29
Scholarships
awarded

ESSAC has supported the continuing ECORD educational offer through the ECORD Summer Schools, for which the following Scholarships have been awarded:

ECORD Scholarships awarded in 2022

ECORD Summer Schools 2022	Participants	ECORD Scholarships
Bremen ECORD Summer School 2022, MARUM, University of Bremen, “Sea level, climate variability, and coral reefs”, 5-16 September 2022	~30	6
Urbino Summer School in Paleoclimatology 2022, University of Urbino, 7-20 July 2022	46	15
Downhole Logging for IODP Science, Leicester, UK, 4-8 July 2022 (ONLINE)	15	-

ESSAC further support the participation of Early Career Scientists and Students to other schools organized by IODP members:

Other Schools 2022	Participants	ECORD Scholarships
GLacial Sedimentation School (GLASS): Interpreting past climate using Antarctic and Greenland sediment cores 2022. Oregon State University Marine and Geology Repository (OSU-MGR), Corvallis, OR, USA, 23-27 May 2022	23	8

Angelo Camerlenghi - *incoming ESSAC Chair*
acamerlenghi@inogs.it

Hanno Kinkel - *ESSAC Science Coordinator*
ESSAC@ogs.it



Core description during OSP for Expedition 310: Tahiti Sea Level in Bremen Core Repository, MARUM. Credit: V. Diekampl, MARUM/ECORD.



Deadline
for applications:
**5 January
2023**

THE ECORD DISTINGUISHED LECTURER PROGRAMME

CALL FOR APPLICATIONS AND NOMINATIONS



The European Consortium for Ocean Research Drilling (ECORD) sponsors an initiative for an in-person lecture series to be given by leading scientists involved in the International Ocean Discovery Program (IODP).

The ECORD Distinguished Lecturer Programme is designed to bring the exciting scientific discoveries of the IODP to the geosciences community in ECORD and non-ECORD countries.

Selected lecturers will be funded to travel to research centres and Universities that will ask to host their presentations.

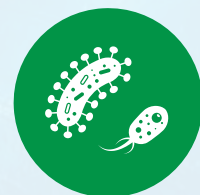
FACTS/TOPICS:

It is anticipated that Distinguished Lecturers will be nominated for the period of 2023 (starting spring-2023), with one lecturer for each of the four main thematic areas of the IODP Science Plan 2013-2023. <http://www.iodp.org/Science-Plan-for-2013-2023/>



Climate and Ocean Change:
Reading the Past,
Informing the Future

Biosphere Frontiers:
Deep life and
Environmental Forcing
of Evolution



Earth connections:
Deep Processes and
Their Impact on Earth's
Surface Environment

Earth in Motion:
Processes and Hazards
on Human Time Scales



Continued →

Previous distinguished lecturers and their lectures since 2007: <http://www.ecord.org/education/dlp/>

Deadline
for applications:
**5 January
2023**

THE ECORD DISTINGUISHED LECTURER PROGRAMME

CALL FOR APPLICATIONS AND NOMINATIONS



LOCATIONS:

As soon as the lecturers are selected, institutions will be invited to apply to host a lecture by one of the speakers. ESSAC will assist the lecturers in putting together a Programme for the period given above.

- Each selected lecturer will be expected to deliver at least **5 lectures** during their term as Distinguished Lecturer.
- Travel costs will be provided by ESSAC. The host institutions are asked to provide accommodation, meals and local transportation for the speaker.
- Each Distinguished Lecturer is expected to provide a recorded version of the presentation, that can be circulated to a wider audience via the ECORD webpage.

APPLICATION:

The ECORD Science Support & Advisory Committee (ESSAC) is now inviting nominations of lecturers, including self-nominations.

Applications for the 2023 schedule should be made via e-mail (with 'DLP Application' in the subject line) to the ESSAC Office at essac@ogs.it.

If you are nominating yourself, please attach your current **CV (1-2 pages)**.

If you are nominating a third party, please first establish their willingness to participate and then ask them to send us their CV.

Applicants should indicate a **draft title** for their proposed lecture, which should be **strongly linked to IODP science**.

The deadline for applications: **5 January 2023**

For further information or questions please contact:

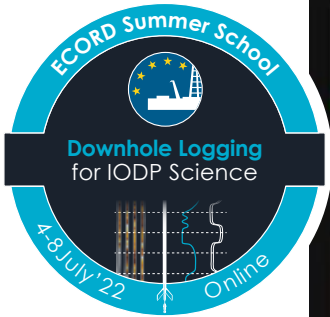
Angelo Camerlenghi (ESSAC Chair) /
Hanno Kinkel (ESSAC Science Coordinator)
e-mail: essac@inogs.it
website: www.ecord.org

Istituto Nazionale di Oceanografia e di
Geofisica Sperimentale - OGS
via Beirut n. 2
34151 Trieste - Italia

Previous distinguished lecturers and their lectures since 2007: <http://www.ecord.org/education/dlp/>

ECORD Summer Schools 2022

6th ECORD Summer School: Downhole-Logging for IODP Science (4-8 July 2022)



Fifteen early career scientists representing 12 nationalities joined the 6th ECORD Summer School: Downhole-Logging for IODP Science online on Zoom on 4-8 July, 2022. As in the previous years, the European Petrophysics Consortium (EPC) organised the course and the University of Leicester hosted it.

Several distinguished guest lectures, including Yoshinori Sanada (JAMSTEC), Philippe Pezard (University of Montpellier), Angela Slagle and Gilles Guérin (both Lamont-Doherty Earth Observatory) presented insightful talks ranging from logging-while-drilling (LWD) to the use of downhole logging to investigate saltwater intrusions in coastal aquifers. Peter Finch from University College London and University of Leicester’s Mike Lovell returned to teach the participants the basic principles of petrophysics in new and engaging ways (learning about permeability through Tim Tam Slams is not only educational but also delicious!).

The summer school also offered an assortment of fun exercises and group projects in which the students could test and present their newly gained petrophysical knowledge. The highlight of this year’s summer school was undoubtedly the video conference with Gilles Guérin who was calling in directly from the scientific drill ship *JOIDES Resolution* during Expedition 393: South Atlantic Transect. The students were able to get a unique glimpse of offshore life which prompted a wave (pun intended) of enthusiastic questions about IODP and how to join expeditions in Angela’s subsequent information session about the organization.

Among the summer school participants was EPC’s newest member: IODP Research Fellow Tim van Peer who had joined

the University of Leicester that same week. Tim: “It has been a fantastic experience to attend to brush up and expand on my knowledge of petrophysics and downhole logging. It was great to meet so many fellow early-career researchers with an interest in IODP and sailing on an IODP expedition, with whom I could also share some of my experiences. I can definitely recommend this summer school for anyone interested in physical rock properties.”

The post-course online survey saw record participation (>90%). The participants voiced their appreciation for the event and positive atmosphere. They also highlighted that they would like to have more exercises and mentioned that they wanted to understand the workings of IODP in more detail. One complaint expressed most often concerned the difference in time zones. Some participants understandably struggled with having to wake up early for a 5 am start or completing petrophysical exercises at 2 am. However, EPC is planning on returning to hosting the 2023 Downhole-Logging for IODP Science summer school in person. So, keep an eye out for the advertisement later this year!



Tim van Peer - tevp1@leicester.ac.uk
IODP Research Fellow
EPC, University of Leicester

17th Urbino Summer School in Paleoclimatology (USSP) (8-20 July 2022)

After two years of pandemic-related delays, the 17th Urbino Summer School in Paleoclimatology (USSP) took place from 8 to 20 July in Urbino, Italy. Almost a third of the participants were financially supported by the European Consortium for Ocean Research Drilling (ECORD). This is a collective report of our experiences regarding the summer school.

Most awardees heard about the summer school and the ECORD scholarship from their supervisors (~67%) or the ECORD website (~22%). When asked about their motivation behind attending USSP, the awardees listed networking opportunities, gaining and/or expanding their existing knowledge in paleoclimatology.

“I don't have a strong background in paleoclimate, nor geology, although my current project is about paleothermometry over the Pleistocene, therefore I was eager to join the USSP to fill my knowledge gaps. Besides, I barely had any opportunity to build up the networking due to the COVID, I thought the USSP would be a nice platform to know people who work on similar topics and talk with peer PhDs.”

We attended 25 lectures over two weeks, and the awardees' favourite was the integrated stratigraphy lecture by Sietske Batenburg. We had a wonderful day on the field where other than the delicious lunch, the famous outcrop of the Cretaceous-Paleogene boundary at Gola del Bottacione and the field exercise were enjoyed the most.

The beautiful medieval town of Urbino provided a breathtaking backdrop to the summer school. The intimate size of the town made it convenient to reach the lecture hall and the restaurants from the accommodation as well as easy to spend time together after-hours.

“Fantastic! I love the tiny town with cool views on the top mountain, also friendly people, the best ice creams I had ever!”

“A small town forces people to stick together”

The USSP provided a wonderful opportunity to meet fellow early career researchers. The poster session, which lasted for several days, offered us to present our research to each other and share ideas. Both professional and personal friendships have been born this year at the summer school.

“The communications with lecturers and peer PhDs, especially during the breaks and poster session. The small talks with PhDs from different countries with distinct backgrounds really broaden my views, it makes me realise that I'm not the only one who is struggling with the annoying daily stuff (stuck in writing, peer pressure, unsmooth lab work etc.). It also gives me a nice opportunity to learn from others, like new techniques, totally different topics, similar topics but different procedures etc..”



Group picture Urbino Summer School 2022. Credit: H. Kinkel, ECORD/IODP



Urbino, panorama. Credit: E. B. Kovács, ECORD/IODP



Poster Session at Urbino Summer School 2022. Credit: U. Amarathunga, ECORD/IODP



Picnic during Urbino Summer School 2022. Credit: U. Amarathunga, ECORD/IODP

The awardees of the ECORD scholarship would like to acknowledge and thank the financial support that we have received to attend the summer school.

“I'm grateful to have had this opportunity to participate in the summer school, which would not have been possible without the financial aid from ECORD.”

By **Emma Blanka Kovács** with the input from:

Hällberg, Peter
Ballalai, João
Agterhuis, Tobias
Shen, Yingchu

Pochini, Enrico
Özen, Volkan
Luciani, Elise
Kovács, Emma Blanka

Lopes, Ana
Gastaldello, Maria Elena
Trubin, Yaroslav
Clavel, Irene Peñalver

Todd, Chloe
Guo, Jingjing
Fischer, Alexa

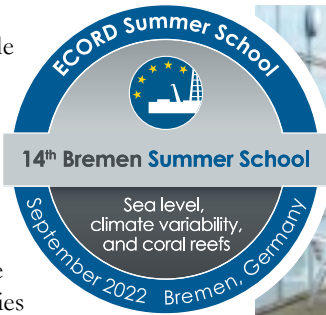
ECORD Bremen Summer School 2022 - Sea Level, climate variability and coral reefs

(5-16 September 2022)

Tropical shallow-water coral reefs provide a unique natural archive of past changes in sea level, climate and environmental variability, as well as of the response of coral reef systems to rapid changes in sea level and climate. Massive, annually banded corals document seasonal and interannual to decadal variations in tropical climate by the geochemical and isotopic proxies incorporated into their aragonitic skeletons, as well as reef-scale environmental changes. They represent a rare source of information from the past, prior to the start of instrumental climate observations and the establishment of systematic reef monitoring programmes. Fossil shallow-water corals of drowned and elevated reefs can be absolutely dated by radiometric methods and provide records of past sea-level changes on centennial to millennial timescales, far away from the influence of the large Quaternary ice-sheets. Moreover, fossil reef archives provide information on the response of coral reef systems both geologically and biologically to changes in sea level and climate on these timescales. Taken together, coral reef records provide a framework for evaluating the effects of recent and future climate change on tropical climate variability and coral reef ecosystems.

On the afternoon of Sunday 5 September, thirty mostly early career scientists (Master / PhD students and Postdocs) from thirteen different countries (Australia, Austria, Canada, China, Czech Republic, France, Germany, Italy, New Zealand, Norway, Poland, United Kingdom, USA) arrived in Bremen. After two years of pandemic-related waiting for this school to happen they finally came together to learn about the numerous processes relating sea level, corals and climate variability during the fourteen's ECORD Summer School, which took place at the MARUM – Center for Marine Environmental Sciences and the IODP Bremen Core Repository (BCR) at the University of Bremen in Germany. The school combined lectures with practicals and laboratory exercises on state-of-the-art IODP-style shipboard methodologies. By the “virtual ship experience” at MARUM, the participants gained insights into how the samples and measurements in publications or use for own research are actually acquired. Moreover, the participants had the opportunity of presenting their own research projects to exchange their most recent findings and ideas regarding sea level, climate variability and coral reefs.

The lectures addressed “Sea Level, climate variability and coral reefs”, the general topics of the summer school, from various disciplines. Topics ranged from climate variability from coral reefs to coral reef responses to sea-level and climate change. Certainly, the participants got to know about IODP in general, its organizational structure and world of acronyms, application processes, proposal writing, current planning and future trends that all might pave the way toward involvement in future IODP expeditions.



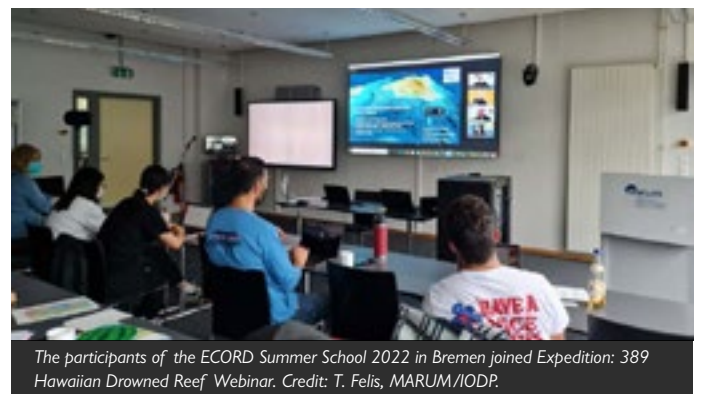
Group picture ECORD Summer School 2022 in Bremen. Credit: U. Prange, MARUM/IODP

The Bremen Core Repository reefer and labs tour and MARUM workshop was crucial part in the beginning. Many aspects of a typical core workflow during an IODP expedition were addressed in practicals: the fun of recognizing composition in a core section or a smear slide, visually describing cores, the measurement of physical properties or the importance of downhole logging.



Visual core description with David de Vleeschouwer (University of Münster). Credit: U. Röhl, MARUM/IODP

Coffee, tea, and lunch breaks as well as socializing “after shift” in the evenings or the organized weekend tour provided numerous opportunities for discussions and networking with a number of new colleagues and potential future collaborators.

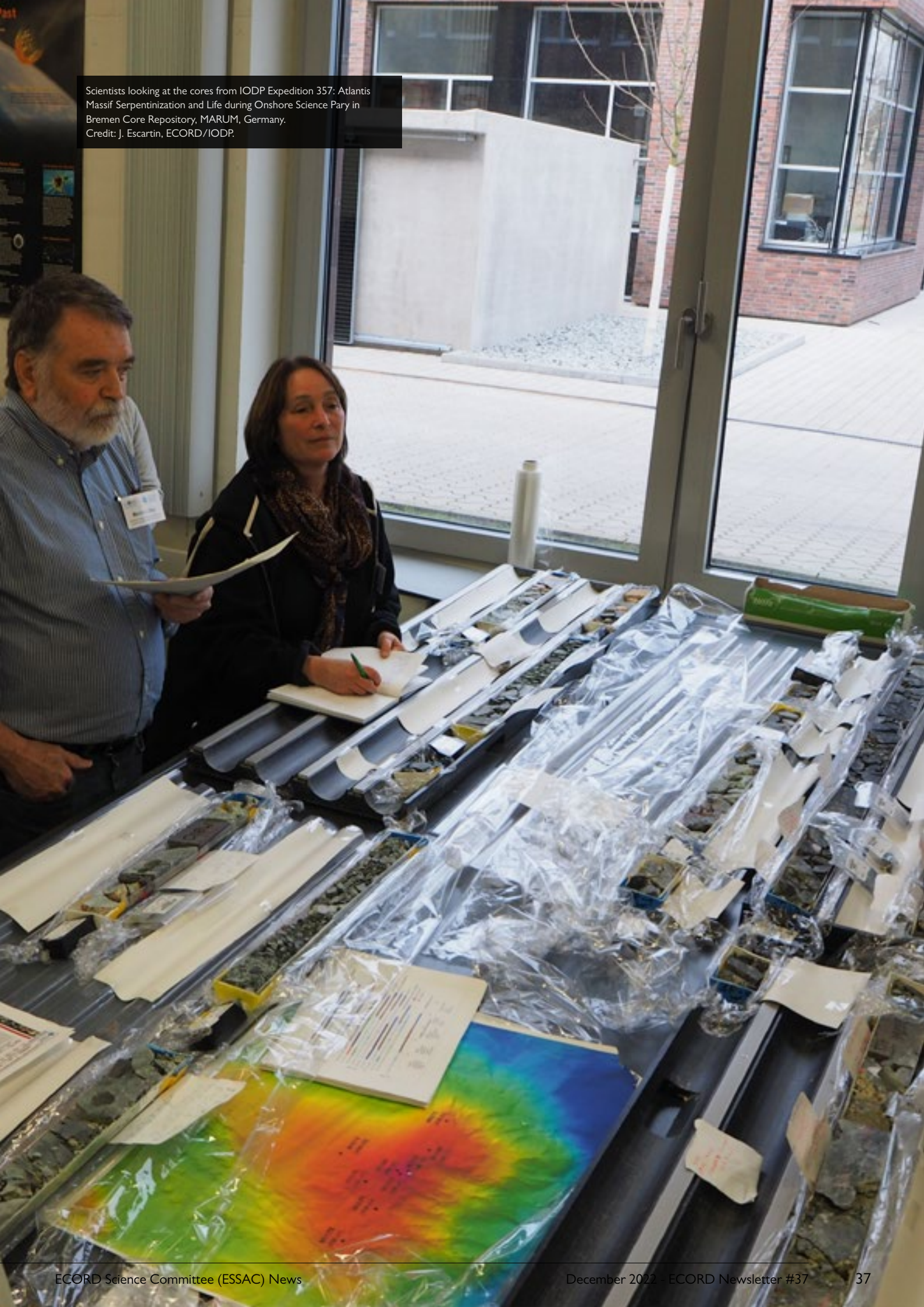


The participants of the ECORD Summer School 2022 in Bremen joined Expedition: 389 Hawaiian Drowned Reef Webinar. Credit: T. Felis, MARUM/IODP.

For the detailed programme see <https://www.marum.de/en/education-career/ECORD-training/ECORD-Summer-Schools/2022.html>.

Ursula Röhl - uroehl@marum.de
MARUM - Center for Marine Environmental Sciences
University of Bremen

Scientists looking at the cores from IODP Expedition 357: Atlantis Massif Serpentinization and Life during Onshore Science Party in Bremen Core Repository, MARUM, Germany.
Credit: J. Escartin, ECORD/IODP.





Angelo Camerlenghi



Hanno Kinkel

Scientific objectives, implementation, and staffing

JOIDES Resolution expeditions in 2022

In 2022, the *JOIDES Resolution* has accomplished five expeditions:

JOIDES Resolution Expedition Name	#	Dates
Walvis Ridge Hotspot	391	Dec. 6, 2021 – Feb. 5, 2022
Agulhas Plateau Cretaceous Climate	392	Feb. 5 – Apr. 7, 2022
South Atlantic Transect	390	Apr. 7 – June 7, 2022
South Atlantic Transect 2	393	Jun. 7 – Aug. 7, 2022
Iberian Margin Paleoclimate	397	ongoing at this time

We congratulate all the **53 ECORD shipboard scientists** who participated in these expeditions, of which **seven were the Co-chief Scientists**.

The interest for scientific drilling remains very high in our community!

JOIDES Resolution expeditions till the end of IODP

JOIDES Resolution Expedition Name	#	Dates
Hellenic Arc Volcanic Field,	398	Dec. 11, 2022 – Feb. 10, 2023
Building Blocks of Life, Atlantis Massif,	399	April 12 – June 12, 2023
Reykjanes Mantle Convection and Climate,	395	June 12 – Aug. 12, 2023
NW Greenland Glaciated Margin,	400	Aug. 12 – Oct. 12, 2023
Mediterranean-Atlantic Gateway Exchange,	401	Dec. 10, 2023 – Feb. 9, 2024
Tyrrhenian Continent-Ocean Transition,	402	Feb. 9 – Apr. 8, 2024
Eastern Fram Strait Paleo-archive,	403	June 4 – Aug. 2, 2024
Arctic-Atlantic Gateway Paleoclimate	404	Aug. 2 - Sept. 30, 2024

The schedule of the *JOIDES Resolution* is now fixed until the end of the current programme, with all the expeditions located in the North Atlantic region. There is a strong focus on the Arctic (three expeditions) and on the Mediterranean (three Expeditions).

It is a pleasure to see that most of the expeditions of 2023 and 2022 result from drilling proposals led by ECORD scientists. We expect a continued highly qualified and strong participation of ECORD scientists in the next two years.

JOIDES Resolution expeditions schedule

The science addressed in 2023-24 spans across three Themes of the IODP Science Plan 2013-2023: Climate and Ocean Change (especially focussing on polar regions, Exp. 400, 403, 404, and the Mediterranean-Atlantic gateway, Exp 401), Earth Connections (Exp. 395, 398 and 402), and Biosphere Frontiers (Exp. 399), with cross-theme contamination from Earth in Motion.

Beyond 2024, the scientific objectives of drilling proposals and resulting expeditions will be addressing the 7 Strategic Objectives of the 2050 Science Framework document, and the long-term long-term, multidisciplinary research endeavours will be co-ordinated within the new Flagship Initiatives.

Phase I
online-only

Workshop on the future of **Scientific Ocean Drilling** with **Mission-Specific Platforms** and *Chikyu* Jointly organised by ESSAC and J-DESC

ECORD
EUROPEAN CONSORTIUM FOR
OCEAN RESEARCH DRILLING



Workshop on the future of Scientific Ocean Drilling with MSPs and *Chikyu* - Phase 1



ECORD and Japan have developed a new program to facilitate post-2024 Scientific Ocean Drilling using Mission Specific Platforms.

The aim of this workshop is to encourage new scientific collaborations among the scientific communities of ECORD and Japan, together with international partners, in an online-only scientific workshop.

This workshop, which will take place over three-days, will serve to review the status of planning of post-2024 Scientific Ocean Drilling, communicate the intention of the new **ECORD-Japan programme** and collect new ideas for the development of new MSP and *Chikyu* drilling proposals based on identified knowledge gaps and novel scientific questions to be addressed in the next 5-10 years.



Dates of the Phase-I online Workshop:

1	17 January 2023 (3 hours)	(Same time in the three days) CET 09:30 – 12:30 JST 17:30 – 20:30 UK Winter time 08:30 – 11:30
2	19 January 2023 (3 hours)	
3	26 January 2023 (3 hours)	

The workshop will be structured following the Strategic Objectives of the 2050 Science Framework and will be **open** to participation of scientists from the **whole** international geoscience community. Participation from people with no prior involvement in scientific drilling is welcome.

The second phase of the workshop will be an in-person meeting in Fall 2023 with the purpose of developing the most promising ideas generated from the phase 1 workshop into drilling proposals.

Download flyer: <https://www.ecord.org/joint-essac-and-j-desc-workshop-on-the-future-of-scientific-drilling/>



EOTF News and Activities



Malgo Bednarz



Ulrike Prange



David McInroy



Hanno Kinkel



Nadine Hallmann

After the difficult pandemic time the majority of meetings and conferences as well as exhibitions started to be organized in a usual, physical form. The EOTF team started planning to promote ECORD mission and activities in future conferences where in-person presence is welcome.

The EOTF, similarly to the outreach teams of JAMSTEC/MarE3 and USSSP, decided to participate physically in the AGU 2022 (12-16 December), the EGU 2023 (23-28 April) and the INQUA (14-20 July) in Rome. At AGU 2022 and EGU 2023 joint ECORD-ICDP booths will be organized (*see page 45*).

EOTF members used the pandemic time to develop new ideas and materials for the future, as well as to explore new ways of promoting ECORD. As a result ECORD is, and will be in future present in long-term and permanent exhibitions in various museums in Europe (*see below*).

In 2022, outreach work focused on Expedition 386 and especially on Expedition 377 (the latter has been cancelled in the middle of 2022). Furthermore the EOTF restarted planning for outreach actions for Expedition 389: Hawaiian Drowned Reefs which will be implemented in 2023. This Autumn, ECORD decided to implement an expedition based on Proposal 637: New England Shelf Hydrogeology in 2024, therefore the EOTF started also planning for this expedition.

Projects

Permanent/long-term exhibitions

The EOTF has been working towards ECORD presence at permanent exhibitions in museums 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.

Exhibition in the Natural History Museum Vienna (NHM)

2023-2033



The EOTF worked with the Natural History Museum (NHM) Vienna to promote scientific drilling on the occasion of the newly planned, long-term (>10 years) exhibition at the NHM Vienna. The NHM Vienna exhibition will concentrate on geology with the focus on climate and major changes in the atmosphere and biosphere. The planning started in 2020 and the opening of the exhibition (originally planned for 2021) was postponed till early 2023 due to the COVID-19 pandemic.

The exhibition will be officially opened in February 2023

The EOTF invited the ICDP outreach team to join this initiative. The joint ECORD-ICDP effort resulted in providing materials that will be a backbone for the “sediments as climate archives” section of the exhibit at the NHM Vienna and where scientific drilling will be promoted and explained.

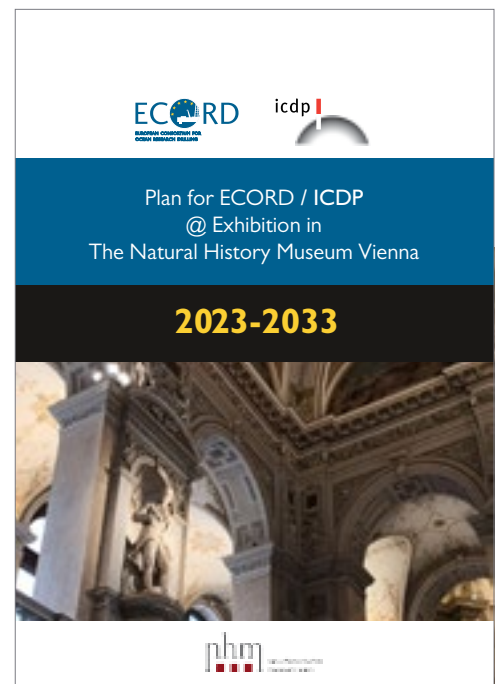
Physical materials provided to NHM Vienna for the exhibition:

Core replicas:

1. PETM; Hole 1262C - Core 5H, Section 4,
2. Tahiti Sea Level: Core 310-M0024A-010R-001,
3. Chicxulub Impact Crater: Core 364-M0077A-081R-002,
4. Chicxulub Impact Crater: Core 364-M0077A-040R-01,
5. Great Oxidation Event (Pechenga Greenstone Belt),

3D coral models associated with Tahiti Sea Level core replica:

1. *Porites lobata*;
2. *Pocillopora eydouxi*.



ECORD and ICDP at the opening ceremony at NHM Vienna

Selected representatives of ECORD and ICDP will actively participate in the opening ceremony at the NHM Vienna.

The opening celebration: February 2023

Exhibitions in the German Maritime Museum (DSM)



• “CHANGE NOW - Ships change the world” 24 February - 31 July 2022

<https://www.dsm.museum/en/press-area/change-now-ships-change-the-world>

The EOTF worked with the German Maritime Museum (DSM) and provided materials and information related to IODP Expedition 302: ACEX.

The EOTF arranged a loan of the ACEX core replica and provided the museum with photographs from the expedition. Science related information was provided by Jan Backman who was Principal Investigator on the ACEX expedition, and Rudy Stein, Expedition 377 Co-chief Scientist.

The ACEX core replica was displayed in the section of “Ocean research” in the area focused on “Science“. This section presented

the history of ships in the light of ocean science. The core replica and the information related to the expedition were located in the immediate proximity to the model of the *Glomar Challenger*.

The exhibition lasted five months and is now available to be visited through a virtual tour, where the user can explore all the areas of the former physical form of the exhibition using Internet connection:

<https://www.dsm.museum/en/exhibition/virtual-tour-of-change-now-and-into-the-ice>



Core replica of a section from the IODP MSP Expedition 302: ACEX displayed at the exhibition “CHANGE NOW - Ships change the world”. On the right: location of the ACEX core replica next to the model of *Glomar Challenger*. Credits: German Maritime Museum (DSM).

• Permanent exhibition focused on laboratory settings

Planned start: second half of 2023

The EOTF is now cooperating with the German Maritime Museum (DSM) on planning the ECORD input into the newly planned permanent exhibition focused on laboratory settings related to ocean research. ECORD will provide the museum with materials (including donation of a core replica) and science related info.

Permanent Exhibition: Cosquer Méditerranée museum, Marseille, France

Since summer 2022

<https://www.grotte-cosquer.com>

A core replica related to IODP Expedition 310: Tahiti Sea Level is now displayed at the newly opened museum Cosquer Méditerranée (harbour of Marseille, France).

The museum shares information about the Cosquer cave that was visited by Upper Paleolithic men during the glacial maximum (from 25000 to 19000 years before the present), when the coastline was more than ten kilometres from the seaside than it is today. The Tahiti core replica illustrates how the high-resolution dating based on corals identified in the cores explains sea-level changes during postglacial upwelling (from 19000 to 6000 years) and the following closure of the entrance to the Cosquer cave.



Core replica from the IODP MSP Expedition 310: Tahiti Sea Level at the exhibition in the Cosquer Méditerranée museum, Marseille, France. Credit: E. Bard.

ECORD Sphere

The ECORD Sphere presents ECORD and its MSP concept on an interactive spherical display, which is to be loaned to museums and aquariums across Europe and showcased at meetings and conferences. The ECORD Sphere is targeted at the general public.

The scientific content focuses on an introduction to the four IODP science themes, IODP/ECORD drilling vessels, selected IODP/ECORD expeditions covering all IODP themes, and the three IODP core repositories. It also illustrates and/or animates selected scientific data of ocean acidity, sea-level rise, draining the oceans and tectonic plates.

ECORD Sphere at exhibits, meetings and conferences

ECORD Sphere was displayed in Italy at the SGI-SIMP Joint Congress: Geosciences for a sustainable future in Turin on 19-21 September 2022. Subsequently it was presented to the general public during the Trieste Next Science Festival in Trieste 22-24 September 2022 (*read more on pages 30 and 52-53*). During these events the ECORD Sphere was presented to several thousand of people and proved its role as an exceptional way to convey the mission of scientific ocean drilling and ECORD.

In November 2022, the ECORD Sphere was presented to the members of the ECORD community during the Council-ESSAC meeting that took place in Gargonza, Italy.

The EOTF is currently working on updates to the content of the ECORD Sphere as well as on planning for its future travels to meetings and exhibitions. The later will most likely include presentation of the ECORD Sphere at the NHM Vienna in February-April 2023, EGU 2023 in late April) and INQUA 2023 in Rome, Italy in July 2023.



ECORD Sphere at display during the ECORD Council-ESSAC meeting in Gargonza, Italy, November 2022. Credits: M. Bednarz, ECORD.



Outreach activities related to MSP Expeditions

Outreach for Expedition 377: Arctic Ocean Paleoceanography (ArcOP)

The MSP Arctic Ocean Paleoceanography (ArcOP) was supposed to be a unique scientific opportunity - and was also to be accompanied accordingly with outreach measures. Various activities were planned together with our international partners from Swedish Polar Research Secretariat and Arctic Marine Solutions as well as with the designated Onboard

Outreach Officer and the TV documentary team. Unfortunately, we had to cancel everything due to safety reasons related to the geopolitical situation since early 2022.



Expedition 377 webpage: <https://www.ecord.org/expedition377>

Outreach for Expedition 386: Japan Trench Paleoseismology

With the MSP Japan Trench Paleoseismology being the first expedition with two science operators (MarE3 and ESO) in charge, all scientists and staff involved were looking forward to the Personal Sampling Party (PSP). Since it was – due to COVID 19 - the first time for the science party to meet in person after the

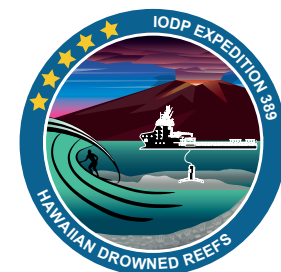
off- and the first part of the onshore phase, the blogpage was reactivated to focus on the researchers involved and the international cooperation behind this MSP expedition.



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

Outreach for Expedition 389: Hawaiian Drowned Reefs

For 2023, the ECORD Outreach Task Force now focuses on the MSP expedition Hawaiian Drowned Reefs. This will include preparing the pre-expedition materials, liaising with Australian and American colleagues and bundling the activities before the start of the expedition.



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



Mo the mule - a mascot of the University of Central Missouri in the US, that was brought by Dr. Sally Zellers, a biostratigrapher, to join scientists onboard *Chikyu* during the PSP of IODP Expedition 386. Credit: S.Zellers, ECORD/IODP/JAMSTEC.

Resources

Core replicas

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

The EOTF ordered fabrication of several new core replicas from among which, four was donated to the NHM Vienna, and one to the Cosquer Méditerranée museum (*see page 40-41*).

More core replicas are planned be produced in the near future.



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

Models of corals

Four realistic (1:1 scale) models of two species of corals were fabricated. These models accompany the core replica from Expedition 310: Tahiti Sea Level (<https://www.ecord.org/resources/core-replicas/core-replica-tahiti-sea-level-iodp-expedition-310/>). Two of the models were donated to the NHM Vienna for the permanent exhibition (*see page 40*).



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

ECORD publications, brochures and flyers

The digital versions of the ECORD publications, posters and brochures are available for download on the ECORD website (<https://www.ecord.org/resources/>).



ECORD Annual Reports: <https://www.ecord.org/resources/reports/activities/>

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

ECORD brochures and flyers: <https://www.ecord.org/resources/brochures/>

ECORD online

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



How to loan a core replica?

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

ECORD shares the core replicas on a temporary basis with scientists and teachers under the conditions described in the loan document, with special attention to core replica preservation and treatment (core replica may not be visually or physically altered in any way). Core replicas are loaned free of charge with the ordering university/research institution covering the shipment of core replicas back to EMA.

ECORD at conferences, events and meetings

AGU 2022 (12-16 December, Chicago, USA)

A joint IODP-ECORD/ICDP booth will be organized during the AGU Fall Meeting, which will be held in Chicago from 12 to 16 December. Outreach teams of ECORD and ICDP worked together with USSSP and MarE3-JAMSTEC partners in order to plan a merged space in the exhibit hall during the AGU 2022. Visit our joint booth (#1507-1506-1407) to find out about ECORD-IODP and ICDP news, expeditions and projects (*read more on page 48*).



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

The EGU 2023 General Assembly will be held from 23 to 28 April 2023 and a joint ECORD/IODP-ICDP booth will be organized by our outreach teams in the Entrance Hall. Our booth this year (#48-49) will be equipped with the ECORD Sphere. A joint Town Hall Meeting is currently being planned.



At the EGU 2023, the **joint IODP-ICDP Session** "Achievements and perspectives in scientific ocean and continental drilling" will be a part of the ITS – Inter- and Transdisciplinary Sessions.

<https://egu23.eu>



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

The ECORD outreach team decided to join the International Union for Quaternary Research 2023 Congress as a sponsor in July 2023. The EOTF is planning to bring the ECORD Sphere to Rome in July for the INQUA 2023 Congress, together with some core replicas and other promotional materials.



Scientific drilling session (208) "Achievements and new perspectives in Quaternary sciences from scientific drilling" will be held at the INQUA 2023 under the theme of "Climate record, processes and models". <https://inquarema2023.org/>

Malgo Bednarz - bednarz@cerege.fr,
ECORD Managing Agency Outreach Officer

Hanno Kinkel - hkinkel@ogs.it,
ESSAC Science Coordinator




Ulrike Prange - uprange@marum.de,
Science Communication, MARUM, ECORD Science Operator

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

Dave McInroy - dbm@bgs.ac.uk,
ECORD Science Operator Outreach Manager



Calendar of meetings, workshops and conferences in 2022 and 2023

2022		
12-16 December AGU 2022 Chicago, IL, USA		
2023		
10-11 January SEP La Jolla, CA, USA	Spring ESSAC Spring Meeting #19 TBD	October PMO Meeting Australia
11-13 January MagellanPlus Workshop: CenoStore Belfast, UK	16-18 May JR Facility Board Washington, DC, USA	Autumn ECORD Outreach TF Meeting #24 TBD
17, 19, 26 January ESSAC and J-DESC Workshop: Future of Scientific Ocean Drilling Virtual	Spring ECORD Council Spring Meeting #9 Virtual	Autumn ESSAC Fall Meeting #20 TBD
22 February ECORD Outreach TF Meeting #23: Vienna, Austria	7-8 June Chikyu IODP Board Kobe, Japan	Autumn ECORD Council-ESSAC Meeting #12 Italy
1-3 March MagellanPlus Workshop: MAREXKUS Rome, Italy	Summer SEP Europe	11-15 December AGU 2023 San Francisco, CA, USA 
21-23 March EPSP College Station, TX, USA	September ECORD Facility Board Meeting #12 Edinburgh, UK	
23-28 April EGU 2023 Vienna, Austria 	October IODP Forum Australia	

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



Scientists are helping the curation team by labelling sample bags in preparation for the next section, Personal Sampling Party of Expedition 386. Credits: K. Hsiung, ECORD/IODP/JAMSTEC

ICDP Activities Autumn 2022

Busy times for ICDP. Since October 6, the drill bit rotates near Ornavasso in Northern Italy to study the Ivrea-Verbano Zone in the frame of the ICDP project DIVE. The Ivrea-Verbano Zone provides a truly unique natural laboratory to fundamentally advance our understanding of the continental lower crust and the crust-mantle transition zone (the “Moho”). Research in the Ivrea-Verbano zone includes a combination of different geoscientific approaches using scientific drilling.

BASE: Barberton Archean Surface Environments project



The Barberton Archean Surface Environments Project successfully completed core recovery in July, as did GRIND (Geological Research through Integrated

Neoproterozoic Drilling) for the Brazilian sites in June. GRIND has already held a sampling party for cores from Namibia and Brazil, and the COSC-2 and EGER projects also ensured initial access to samples for participating scientists. For upcoming new drillings in Brazil (TransAmazon) and South Africa (Bushveld) we are looking forward to start of operations in 2023.

ICDP Training Course on Continental Scientific Drilling

After a 2-year hiatus we were pleased to hold an ICDP Training Course on Continental Scientific Drilling in September at the

KTB Geocenter in Germany. Twenty nine attendees from 13 countries followed lecturers and conducted exercises on project planning and management, drilling engineering, rock and fluid sample handling, management, and storage, downhole logging and seismic monitoring, data management, and outreach. The course included a field trip to an active geothermal drilling site in southeastern Germany to provide insight into 5-km-deep drilling operations and equipment.



Group photo: participants of the ICDP Training Course on Continental Scientific Drilling in September 2022 at the KTB Geocenter in Germany

ICDP at meetings and conferences

Some upcoming events cast their shadows ahead.

AGU 2022 in Chicago, USA

We welcome you to join us at the IODP-ECORD/ICDP booth during the AGU Fall Meeting, which will be held in Chicago from 12 to 16 December, to discuss relevant topics. The ICDP-CSD Facilities Town Hall meeting will likely be held on Monday, December 12, 7:00 pm (CST North America). The exact location, date and time of the Town Hall meeting will be announced in due time on ICDP's website and social media.

EGU 2023 in Vienna, Austria

The EGU 2023 General Assembly will be held in Vienna (Austria) & Online from 23 to 28 April 2023, including a joint ECORD/IODP-ICDP booth, a joint Town Hall Meeting and the IODP-ICDP Session “Achievements and perspectives in scientific ocean and continental drilling” that is now part of the ITS – Inter- and Transdisciplinary Sessions. Call-for-abstracts is open since 1 November 2022.

28th IUGG Meeting in Berlin, Germany

There will also be an ICDP Session “S07 Scientific Drilling and Downhole Monitoring – A Key to Understand Geohazards” at the 28th IUGG Meeting in Berlin (11-20 July 2023) for which abstract submission is now open and the community is invited to take part.



AGU
FALL MEETING
Chicago, IL & Online Everywhere
12-16 December 2022



EGU General Assembly 2023
Vienna, Austria & Online | 23-28 April 2023



IUGG
BERLIN 2023
THE 28th GENERAL ASSEMBLY
OF THE INTERNATIONAL UNION
OF GEODESY AND GEOPHYSICS



SCIENTIFIC DRILLING

Volume 31 | November 2022

Volume 31 of the ICDP-IODP programme journal SCIENTIFIC DRILLING is currently in press. Sedimentary archives formed by monsoonal action, glaciation, or opening and closing of marine gateways are in the focus of three articles published in this volume. A synthesis paper address the long-term development of monsoon climate systems between Southeast Asia and Australia by evaluating a series of IODP expeditions drilled between 2013 and 2016, and a MagellanPlus workshop report lays out the ambitious plan of ocean drilling to elucidate the complex evolution of the Mediterranean gateways over the past 7 Myr. Two other papers report on continental drilling of the sedimentary infill of glacially overdeepened valleys along the northern front of the Alps in Switzerland and Germany and about drilling and instrumenting of five boreholes in the Bohemia (Czech Republic) geodynamic region, respectively, where seismic swarms and carbon dioxide emanations are connected to late-stage volcanism. Two articles on Technical Developments round off the volume. We kindly invite the scientific drilling community to consider publication in SCIENTIFIC DRILLING. SD is open access, all contributions are peer-reviewed, and authors bear no publication costs.

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.

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

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



Austria

austria@ecord.org

This year 2022, represents the so far highest and most diverse activity year for the Austrian IODP community ever. Four scientists at different careers levels are actively involved in 2022 IODP Expeditions: Arianna del Gaudio, PhD Student, micropaleontologist on IODP Expedition 391: Walvis Ridge (Tristan-Gough) Hotspot, Professor Walter Kurz, shore-based petrologist on IODP Expedition 390: South Atlantic Transect, and Dr. Jhy-Jaan Steven Huang and Professor Michi Strasser, XRF-core logging scientist and co-chief, respectively, on IODP Expedition 386: Japan Trench Paleoseismology. Successful drilling and coring during these Expeditions in the South Atlantic and Northwest Pacific Ocean provides them invaluable data and samples to conduct exciting post-expedition research and raise additional research grants for larger projects involving new PhD students and postdocs. Furthermore, these Austrian efforts contribute to testing important hypotheses related to: (Expedition 391) the evolution of the oceanic circulation patterns and water column structure in the South Atlantic Ocean; (Expedition 390) the architecture of oceanic crust and the variations in alteration processes at different structural levels, and (Expedition 386) the relationship between the spatiotemporal pattern of megathrust earthquakes, plate-boundary interface properties, and megathrust slip behavior.



Furthermore, Austrian scientists organized and hosted three MagellanPlus Workshops in Austria this year. In May, Martin Zuschin hosted the TIMOR-Workshop at the University of Vienna (*see page 18*). The international group discussed and elaborated mission-specific drilling and coring plans to trace monsoon, ocean currents, and diagenetic carbon redistribution in the Timor Sea (IODP Proposal 1009Pre submitted in October 2022, with Austrian co-proponents Gerald Auer and Theresa Nohl). In September, two Magellan-Plus Workshops were co-organized and hosted by Walter Kurz and Gerald Auer at the University of Graz. During the Exploratory IO:DIP Workshop “Indian Ocean: Delving Into the Past”, overarching and interconnected research goals were discussed to develop integrated mutually-beneficial drilling proposals for the Indian Ocean. In parallel, the COSNICA Workshop discussed integrating several drilling projects and proposals on- and offshore Nicaragua and Costa Rica under a general umbrella and to develop an amphibious IODP/ICDP drilling proposal studying the life cycle of a microplate, the Cocos Plate, at a convergent margin.

Those three workshops in Austria also provided great opportunities for Austrian PhD students and early career scientists to get exposed to and build networks within the international IODP community and gain experience developing scientific hypotheses, objectives, drilling strategies, and expedition proposals. This year thus showed a breadth of research themes and activity in ongoing IODP expeditions, as well as a continuously growing involvement and co-leadership in IODP workshops and proposals while engaging early career scientists in related research projects and workshop participation. This broad spread of activities is founding 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 post-2023 international scientific ocean drilling activities.

ECORD 2022 MagellanPlus Workshops in Austria

TIMOR – Tracing Monsoon, Ocean currents and diagenetic carbon Redistribution (19-22 May 2022, Vienna)

IO:DIP Indian Ocean: Delving Into the Past (27-30 September 2022, Graz)

COSNICA – The life cycle of a microplate at a convergent margin (27-30 September 2022, Graz)

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

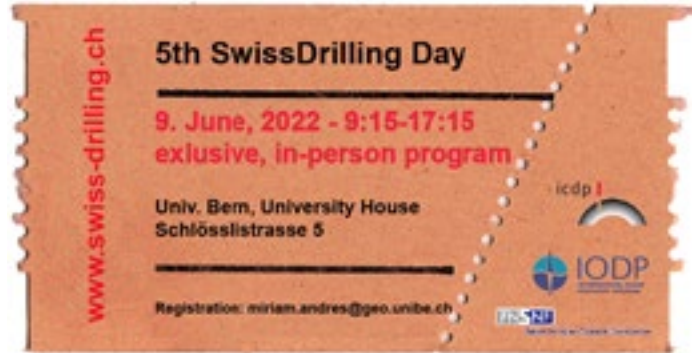
Walter Kurz - walter.kurz@uni-graz.at
ESSAC Alternate

Bernhard Plunger - bernhard.plunger@ocean.ac.at
ECORD Council Delegate

In early June 2022, the Swiss-based scientific drilling community came together in person and celebrated scientific drilling on land and under the sea with its 5th edition of the Swiss Drilling Day. After a long period of mostly virtual contact, our day offered the perfect mix of updates, discussion, and dialogue on scientific drilling.

Despite moored drilling vessels, postponed expeditions, closed laboratories, groundings, and confinement to home offices, the Swiss scientific drilling community continues to be impressively industrious, creative, and productive. A highlight of the meeting was Daniel Bernoulli's talk on "Central Atlantic and Alpine Tethys, 50 years ago: The legacy of Leg 11 of the Deep Sea Drilling Project". He reminded us how important scientific ocean drilling and comparative sedimentology was in ultimately understanding the Alpine geology. Extra long breaks and a superb lunch were appreciated by all of us to catch up in person and also to welcome new members to the community.

Our ESSAC representative, Gretchen Früh-Green, gave an update on ECORD and IODP, especially the situation of the ageing RV *Joides Resolution* and the consequences for a future IODP



programme. We were also updated on the nascent ECORD-Japan Alliance and thoughts around a more MSP-focused future programme.

The ensuing discussions and dialogue proved an interested and engaging community. As a result, Swiss Drilling, wrote a letter of support to the head of the US National Science Foundation, stating Switzerland's interest and continuing funding of the next phase of IODP.

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

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

During summer 2022, Geological Survey Ireland was pleased to launch a new call for funding of high quality research projects utilising data collected from IODP expeditions. The aim of the call was to build capacity and increase the impact of the participation of Irish researchers in IODP activities, through the provision of a dedicated mechanism for funding short-term initial research. Applications were encouraged from both those who've sailed on expeditions, and those basing their work on existing IODP datasets.

Arising from this, funding was provided to Weimu Xu (UCD) to develop additional research directions based on her participation in IODP Expedition 396. This funding is enabling additional

geochemical processing to explore the trigger mechanisms of the Paleocene-Eocene Thermal Maximum, generate a carbon-isotope stratigraphy from terrestrial organic matter to more precisely constrain the timing of the PETM onset & assess the effect of hydrothermal fluid migration on Osmium isotope signals.

Elsewhere, Weimu has sourced further funding from iCrag (an Irish research cluster in Applied Geosciences) which has enabled her to secure a PhD candidate who will be heavily involved in research following from IODP Expedition 396.



David Hardy - david.hardy@gsi.ie
ESSAC Delegate

Koen Verbruggen - koen.verbruggen@gsi.ie
ECORD Council Delegate

Scientific participation in the programme – Highlights

IODP-Italy is pleased that the lead proponents Nevio Zitellini (CNR-ISMAR) and Renata Lucchi (OGS) will sail onboard the JOIDES Resolution as Co-chief Scientists for IODP Expedition 402 and 403, respectively. IODP Expedition 402: Tyrrhenian Continent-Ocean Transition (Feb-Apr 2024) will explore the evolution of the continent-ocean transition, including the presumably subsequently exhumed mantle, while the Arctic IODP Expedition 403: Eastern Fram Strait Paleo-Archive (June-Aug 2024) will investigate how the ocean system and cryosphere worked during past warmer intervals of either/both high insulation and/or high atmospheric CO₂ content. These notable nominations have been announced to the national community in a joint CNR-OGS press release, which is available online at <https://bit.ly/3gJQylk>. The post-cruise research of the shipboard scientists Jaume Dinarès-Turell (INGV, IODP Expedition 390), Chiara Amadori (University of Pavia, IODP Expedition 393), and Claudio Robustelli Test (University of Turin, IODP Expedition 393) is currently underway. Sara Satolli (University Chieti-Pescara), shore-based scientist for IODP Expedition 395C, will sail as a Paleomagnetist on the upcoming IODP Expedition 395: Reykjanes Mantle Convection and Climate (June-Aug 2023).

The active involvement of Italian scientists in ocean drilling research is also mirrored by 26 active proposals with Italian co-proponents currently in the system, and the Magellan Plus

workshops that have been funded in 2022 and 2023. Recently, two of such workshops took place in Italy: m“Serpentinite diapirs in the Calabrian Subduction System return lower plate mantle from Earth’s oldest ocean”-SCYLLA (hosted in Bologna by co-proponents Luca Gasperini and Alina Polonia) and “The coupling of volcanic, climatic and sedimentary processes across the lifetime of arc-volcanic systems” - VOCS (hosted in Lecco by co-proponent Andrea Di Capua). A third workshop “Mantle Remelting and hydrothermal chemical Exchange at Knipovich Ultraslow Spreading ridge” - MAREXKUS MagellanPlus Workshop will be held at the National Research Council headquarters in Rome (1-3 March 2023), organized by Alessio Sanfilippo, Marco Cuffaro, Johan Lissenberg, Valentin Basch, Alessia Conti, Eleonora Ficini, and Lorenzo Petracchini.

Following the successful evaluation of three project proposals related to the themes of IODP Science Plan 2013-2023 Climate and Ocean Change, three postdoctoral positions are being assigned by IODP-Italy to conduct research on IODP data and samples. The IODP-Italy Postdoctoral Fellowships are funded through the initiative for early career scientists “CNR IODP-Italy call for projects on IODP scientific drilling themes - 2022” (website: <https://www.urp.cnr.it/segnalazione.php?id=210>).

Dissemination and outreach - IODP-Italy at the SGI-SIMP conference 2022



ECORD/IODP-Italy exhibition booth at the Joint SGI-SIMP Congress “Geosciences for a sustainable future”, 19-21 September 2022, Turin, Italy. Top-left: Photo of the booth staff; Jonathan Ford, Annalisa Iadanza and Hanno Kinkel. Bottom-left: Visitors at the booth looking at ECORD Sphere. Right: ECORD Sphere and IODP-Italy giveaways. Credits: IODP-Italy.



The annual congress of the Italian Geological Society (SGI) was finally back in person after two years of postponement due to covid restrictions: the Joint SGI-SIMP Congress “Geosciences for a sustainable future” took place in Turin 19-21 September 2022. During the conference, Elisabetta Erba (University of Milan, President of IODP-Italy) presented a plenary talk entitled “IODP-Italia and the Italian participation in ECORD-IODP and ICDP in the transition towards a new drilling partnership” on behalf of the “CNR Committee for ECORD-IODP and ICDP”. As a platinum sponsor of the congress, IODP-Italy displayed an ECORD/IODP-Italy exhibition booth with IODP/ECORD/IODP-Italy posters and three main spots set up as follows: 1) core replicas and the coral 3D models were showcased on the first table, with K-Pg-ODP Leg 171B to be compared with the record of Chicxulub Impact Crater-IODP Expedition 364 and Tahiti-IODP Expedition 310 associated with the three-dimensional models of coral *Porites* and *Pocillopora*; 2) Distribution of informational flyers, reports, leaflets, and brochures, together with the new IODP-Italy goodies for fieldwork, accompanied by the live handling of additional information by our team; 3) Display, for the first time in a geo-scientific event, of the ECORD Sphere. The team supporting the booth was composed of Annalisa Iadanza (CNR), the ESSAC Science coordinator Hanno Kinkel (OGS), Jonathan Ford (OGS), Angelo Domesi (CNR) and M. Elena Martinotti (CNR).

We outline the impact on the audience engaged by the new coral models, the Chicxulub impact Crater core stratigraphy, and in particular by the ECORD Sphere. The ECORD Sphere inspired curiosity in all the booth visitors, which tried the interactive experience of its spherical display. After the SGI-SIMP Congress the ECORD Sphere was presented to the general public during Trieste Next Science Festival, Trieste (22-24 September 2022). Several thousand people have seen and interacted with the ECORD Sphere, which played the role of the ‘star’ in the display area.

Annalisa Iadanza - iodp-italia@cnr.it, annalisa.iadanza@cnr.it
 ECORD Council Delegate
 (CNR) IODP-Italy Scientific Secretariat and the national IODP-Italia Committee



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



ECORD/IODP-Italy exhibition booth at the Joint SGI-SIMP Congress “Geosciences for a sustainable future”, 19-21 September 2022, Turin, Italy. Flyers and brochures. Credits: IODP-Italy.

The Association of French Sedimentologists (ASF) organized its annual meeting in Brest last September. The IODP-France – ECORD booth enjoyed a great attendance. This event was an excellent opportunity to confirm the great popularity of the programme, especially among the young generation, fascinated by the core replicas and enthusiastic about the perspective to sail.

The year 2023 will be a good vintage for the IODP-France community: among the five expeditions scheduled with the *JOIDES Resolution*, three will sail with French Co-chiefs:

- IODP Expedition 398: Hellenic Arc Volcanic Field (Tim Druit)
- IODP Expedition 395: Reykjanes Mantle Convection and Climate (Anne Briaïs)
- IODP Expedition: 401 Mediterranean–Atlantic Gateway Exchange (Emmanuelle Ducassou)

Emmanuelle and Anne shared with us their feeling about this future - and new! - experience:

“As a marine sedimentologist working for years on hints of marine currents along the seafloor, it is an invaluable chance to be part of the IMAGE project and IODP Expedition 401, which imply drilling on both sides of the Atlantic-Mediterranean gateway and aims at collecting sediments from the Messinian Salinity Crisis period. This so extreme and debated event, discovered for the first time by DSDP in 1970, should disclose new information about the timing of connexion/deconnexion between Mediterranean and Atlantic, nature and dynamics of the Mediterranean overflow since the Miocene and physical oceanography issues. Being Co-chief of such an expedition could be chilling but it is above all challenging and exciting, working with Rachel Flecker, the other Co-chief.”

Emmanuelle Ducassou

“I felt very honoured to be appointed Co-chief of IODP Expedition 395 in early 2020 when it was originally put on the JOIDES Resolution schedule. Although the expedition has been postponed to 2021, and then to June-July 2023, it has already had several successful seasons with IODP Expeditions 384 (2020) and 395C (2021). In 2023, we will complete coring of a transect south of Iceland, with three main objectives: (1) to analyze the relationships between the Reykjanes mid-ocean Ridge and the Iceland hotspot, (2) to study the changes in oceanic circulation, oceanic gateways, and sedimentation in the last ~32 million years, and (3) to investigate how the ocean crust interacts with seawater. This means coring sediments drifts as well as the ocean crust. With such a large range of observations to be combined and compared to reach the objectives, I find it really exciting to interact with scientists from very different domains, from geodynamics to paleoclimate. It has been both very interesting and challenging to maintain the momentum of enthusiasm in more than two years. Being a Co-chief feels like leading an orchestra with excellent musicians: you don't have to tell them what to do, just make sure they work together.”

Anne Briaïs

Georges Ceuleneer - Georges.Ceuleneer@get.omp.eu
iodp-france@get.omp.eu
 Chair of the IODP-France Office

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



Discussion around a core replica during ASF meeting, Brest, September 2022. Anne Briaïs shows to a visitor the “fireball layer” at the K/Pg boundary drilled during ODP Leg 171B. Photo G. Ceuleneer



Emmanuelle Ducassou onboard the JOIDES Resolution during IODP Expedition 339 off Spain. Photo: IODP



Anne Briaïs onboard L'Atalante during the STORM cruise off Tasmania and Antarctica. Photo: G. Ceuleneer

ESSAC Delegate from Sweden:

Jorijntje Hendricks (Department of Earth Sciences, Uppsala University) has served as a Swedish representative on ESSAC since 2014. During this time she has remained active in IODP science, while successfully promoting ECORD and IODP activities to the Swedish community. Together with the alternate delegate (Helen Coxall, Stockholm University), they hosted the 2022 ESSAC meeting in Stockholm. After nearly 10 years of service, Jorijntje will step-back from this position. We are indebted to her long-standing service, support and commitment to IODP and extend our sincere thanks for all her work.

The new Swedish delegate will be Matt O'Regan from the Department of Geological Sciences, Stockholm University. Matt has sailed on numerous ODP and IODP expeditions, first as part of the technical support staff and later in his career as a shipboard scientist. He has served on the Science Evaluation Panel of IODP, and was a member of the writing team for the 2050 IODP Science Framework "Exploring Earth by Scientific Ocean Drilling".



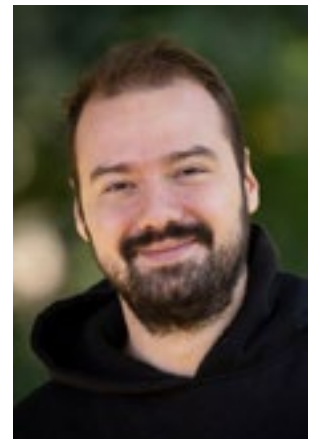
Matt O'Regan, Stockholm University

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

Cruise Activities:

In May, Boris-Theofanis Karatsolis from Uppsala University participated in the IODP Expedition 395C: Reykjanes Mantle Convection and Climate Core Description Party at the IODP Gulf Coast Repository in College Station, Texas. Boris successfully defended his PhD in October this year, which focused on Neogene paleoceanography using calcareous nannofossils from a number of ODP and IODP boreholes.

Daniel Rudbäck, a Masters student at Stockholm University, is sailing as a Temporary Marine Laboratory Specialist on IODP Expedition 397: Iberian Margin Paleoclimate - a fantastic opportunity and introduction to IODP science aboard the *JOIDES Resolution*.



Boris T Karatsolis, Uppsala University



Daniel Rudbäck, Stockholm University



Selected core samples from IODP Expedition 386: Japan Trench Paleoseismology visited the Geological Survey of Finland for micro-CT imaging during the summer and have been returned to Japan. Joonas Virtasalo continues to participate in IODP Expedition 386 activities.

Joonas Virtasalo - joonas.virtasalo@gtk.fi
ESSAC Alternate

Raisa Alatarvas has continued her PhD project at the University of Oulu, using materials from the IODP Expedition 347: Baltic Sea Paleoenvironment. Participants of the IODP Expedition 347, Outi Hyttinen and Aarno Kotilainen, have continued publishing results from the expedition.

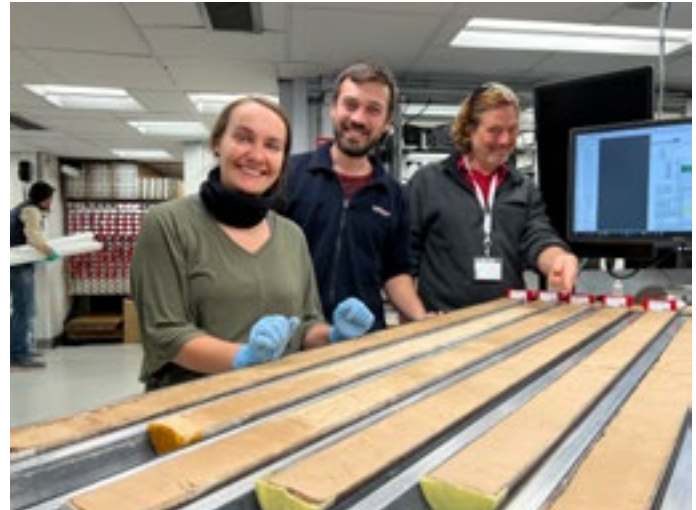


ECORD Council delegate Fatima Abrantes included scientific examples arising from IODP Sites in her talks “O estudo da História dos Oceanos no passado geológico” given to members of the Geographical Society of Lisbon within the Seminário do Mar series in January 2022 and “Paleoceanography: A Look at the Past to Inform the Future” given to the Earth Science PhD student seminar at the University of Evora in February 2022. New scientific results from several IODP Sites in the North Atlantic and Indian Ocean were also presented by various scientists throughout the year at conferences like the EGU, PAGES Open Science Meeting, Galileo Conference 10 on Pliocene climate, and the 14th International Conference on Paleoceanography.

Instituto Dom Luiz scientist Alina Shchepetkina (photo 1) participated in IODP Expedition 393: South Atlantic Transect 2 (7 June – 7 August 2022) as one of the four sedimentologists on board. As post-cruise research, she will evaluate the response of the ichnofossil community to past global warming and ocean acidification events from the Paleocene to the present day. At the end of October, she presented her research plan to the wider scientific community during the University of Lisbon’s Ciências Research Day.

The *JOIDES Resolution* arrived in Lisbon on 1 October 2022 marking the end of IODP Expedition 397T and the start of IODP Expedition 397 – Iberian margin paleoclimate. Although visiting the *JR* is currently not possible due to COVID protocols, its arrival was eagerly anticipated by scientists based at the Marine Geology division of the Portuguese Institute for the Sea and Atmosphere (IPMA) (photo 2), especially by the PhD and Master students who had never seen the *JR* before, but are analyzing IODP samples for their research projects. IODP Expedition 397 is a major event for the Portuguese community, not only because we have two Portuguese scientists on board, Fatima Abrantes as Co-chief Scientist and Emilia Salgueiro as observer. Shore-based Education and Outreach officer Maya Pincus, with immense support from the U.S. Science Support Programme, will visit several schools in Portugal during late October, introducing the newer generations to the exciting science done by IODP. More details on activities and outcomes of IODP Expedition 397 will be reported in the spring 2023 newsletter.

The MagellanPlus workshop “Mission-specific platform approaches to assessing natural hazards that impact society” took place as hybrid event at the Instituto Dom Luiz between July 7th and 9th, 2022 and was co-hosted by João C. Duarte from the University of Lisbon (*see page 22*).



Alina Shchepetkina (IDL, University Lisbon) with her fellow sedimentologists Paul Moal-Darrigade (University of Bordeaux, France) and Stephen Pekar (Queens College N.Y., USA; in back) studying sediment cores collected during IODP Expedition 393. Photo credit: IODP.



IPMA and CCMAR scientists together with POGO funded intern Verynice Temu from Tanzania (on right) observed the *JOIDES Resolution* picking up the pilot and continuing its journey into Lisbon harbor from the roof terrace of IPMA in Alges. Photo credit: T. Rodrigues, IPMA.

Antje Voelker - antje.voelker@ipma.pt
ECORD Council member, ESSAC Delegate

The June 2022 IODP Science Evaluation Panel (SEP) was hosted by outgoing SEP Co-Chair Lisa McNeill (University of Southampton) at the National Oceanography Centre Southampton, with simultaneous online participation via Zoom. It was the first time the SEP have met in person since January 2020, and was preceded by palaeontological excursion on 28 June to the Isle of Wight, for the SEP members. Tim Reston (University of Birmingham) thanked Lisa for her sterling work in the role as well as for showing him the ropes at the virtual meeting in January when he stepped up as one of the new SEP Co-Chairs.

UK members of the IODP community have been privileged to sail on three expeditions over the summer and early autumn: on IODP Expedition 390 Roz Coggon (University of Southampton - Co-chief Scientist and lead proponent), Elliot Carter (University of Manchester), Andrew McIntyre (Open University) and Lewis Grant (University of Southampton); on IODP Expedition 393 Damon Teagle (University of Southampton - Co-chief Scientist and proponent), Michelle Harris (University of Plymouth), Tom Belgrano (University of Southampton), Marcin Latas (University College London) and Aled Evans (University of Southampton); IODP Expedition 397T Mike Widdowson (University of Hull).

UK IODP sponsored two sessions at the Challenger 150: The Challenger Society Conference 2022, which took place in London from 6-8 September 2022. Damon Teagle (University of Southampton), Richard Herrington (NHM) and Rachel Mills (Kings College London) convened a session on Deep Sea Mining - geology, resource, legal, technical, and societal aspects. Anya Crocker, Anieke Brombacher (both University of Southampton) and Eleanor John (Cardiff University) convened a session on Unlocking climate histories from marine sediments.

As this goes to press we are preparing for the UK-IODP Workshop 2022 – An Introduction to Scientific Ocean Drilling, which took place online and in person at the National Oceanography Centre Southampton, from 2 to 3 November. The



Participants of the palaeontological excursion to the Isle of Wight during SEP meeting, January 2022. Photo credits: C. Meth.



SEP palaeontological excursion to the Isle of Wight, January 2022. Photo credits: M. Weber.

workshop aimed to introduce participants to the practicalities of ocean drilling as well as demonstrating the scientific advances that have been born of IODP and its predecessors.

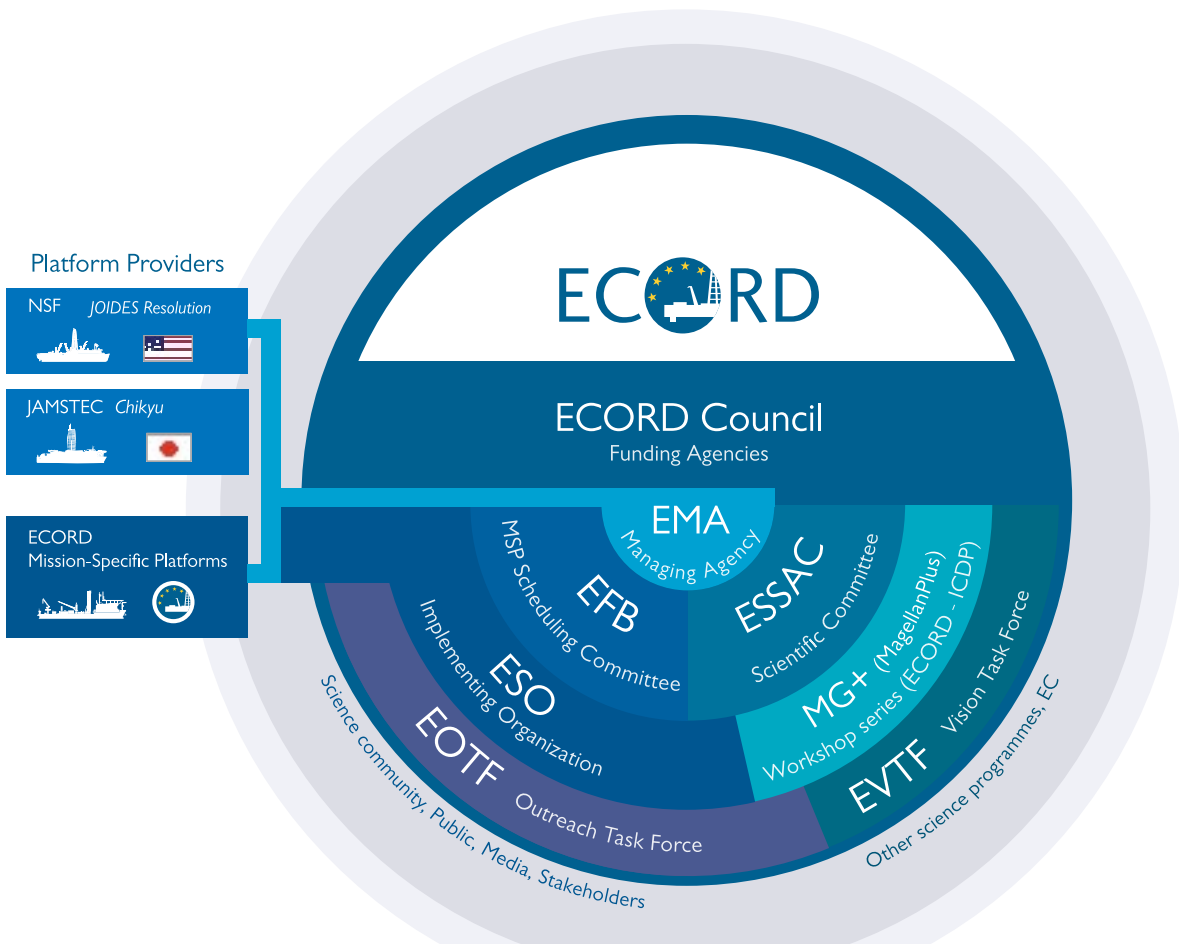
Jude Coggon - info@ukiiodp.org
UK IODP Knowledge Exchange Coordinator
University of Southampton, UK

UK-IODP webpage: <https://nerc.ukri.org/research/funded/Programmes/ukiiodp/>

ACEX: Arctic Coring Expedition	JAMSTEC: Japan Agency for Marine Earth Science and Technology
AGU: American Geophysical Union	J-DESC : Japan Drilling Earth Science Consortium
AMS: Arctic Marine Solutions	JOIDES: Joint Oceanographic Institutions for Deep Earth Sampling
ANZIC: Australian and New Zealand IODP Consortium	JpGU: Japan Geoscience Union
ArcOP: Arctic Ocean Paleoceanography, IODP Expedition 377	JR: <i>JOIDES Resolution</i>
BCR: Bremen Core Repository	JRFB: JOIDES Resolution Facility Board
BGR: Bundesanstalt für Geowissenschaften und Rohstoffe - Federal Institute for Geosciences and Natural Resources	JRSO: JOIDES Resolution Science Operator
BGS: British Geological Survey	MarE3: Institute for Marine-Earth Exploration and Engineering
BMS: Boring Machine System	MARUM: Zentrum für Marine Umweltwissenschaften der Universität Bremen - Center for Marine Environmental Sciences, University of Bremen
CCOD: Canadian Consortium for Ocean Drilling	mbsf: metres below seafloor
CIB: <i>Chikyu</i> IODP Board	mbsl: metres below sea level
CNR: Consiglio Nazionale delle Ricerche – National Research Council, Italy	MCIN: Ministry for Science and Innovation, Spain
CNRS: Centre National de la Recherche Scientifique - National Center for Scientific Research, France	MeBo: Meeresboden-Bohrgerät - seafloor drill
DAFSHE: Danish Agency for Science and Higher Education	MEXT: Ministry of Education, Culture, Sports, Science & Technology, Japan
DFG: Deutsche Forschungsgemeinschaft - German Research Foundation	MoU: Memorandum of Understanding
ECORD: European Consortium for Ocean Research Drilling	MSP: Mission-specific platform
EFB: ECORD Facility Board	NHM: Natural History Museum
EGU: European Geosciences Union	NSF: National Science Foundation, USA
EMA: ECORD Managing Agency	NWO: Nederlandse Organisatie voor Wetenschappelijk Onderzoek - Netherlands Organisation for Scientific Research
EOTF: ECORD Outreach Task Force	ÖAW: Österreichische Akademie der Wissenschaften - Austrian Academy of Sciences
EPC: European Petrophysics Consortium	ODP: Ocean Drilling Programme
EPSP: Environmental Protection and Safety Panel	OSP: Onshore Science Party
ESO: ECORD Science Operator	PI: Principal Investigator
ESSAC: ECORD Science Support and Advisory Committee	PMO: Programme Member Office
EVTF: ECORD Vision Task Force	PSP: Personal Sampling Party
FB: Facility Board	SEP: Science Evaluation Panel
FCT: Fundação para a Ciência e a Tecnologia - National Funding Agency for Science and Technology	SMR: Science Mission Requirements
FNS: Fonds National Suisse de la Recherche Scientifique - Swiss National Science Foundation	SPRS: Swedish Polar Research Secretariat
FY: Fiscal Year	SSO: Science Support Office
GPC: Giant Piston Corer	UKRI: UK Research and Innovation
GSI: Geological Survey of Ireland	USSSP: U.S. Science Support Programme
IBM: Izu Bonin Mariana	VR: Vetenskapsrådet - Swedish Research Council
ICDP: International Continental Scientific Drilling Programme	
IKC: In-kind contribution	
IODP: Integrated Ocean Drilling Programme (2003-2013) & International Ocean Discovery Program (2013-2023)	

Safety drill during PSP on Expedition 386, *Chikyu* docked at Shimizu, Japan. Credits: K. Hsiung, ECORD/IODP/JAMSTEC






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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