

Expedition 364 Chicxulub K-Pg Impact Crater

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ECORD Summer Schools 2016

MagellanPlus Workshops

IODP Expedition 373 to Antarctica

Travelling the ECORD world as a Distinguished Lecturer

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The International Ocean Discovery Program (IODP) 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) supports the participation of European, Canadian and Israeli scientific communities in IODP and provides funding for the implementation of mission-specific platform expeditions. ECORD is funded by 16 countries: Austria, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Israel, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and The United Kingdom.

IODP is supported by the US National Science Foundation (NSF); Japan's Ministry of Education, Culture, Sports, Science, and Technology (MEXT); the European Consortium for Ocean Research Drilling (ECORD); the Australia-New Zealand IODP Consortium (ANZIC); India's Ministry of Earth Sciences; China's Ministry of Science and Technology; the Korea Institute of Geoscience and Mineral Resources (KIGAM); and Brazil's Ministry of Education (CAPES).

For more information, visit www.iodp.org

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Cover: Expedition 364 Chicxulub K-Pg Impact Crater: core catcher sample (photo A. Rae, ECORD/IODP).

Right: inside the crane onboard the Liftboat Myrtle during Expedition 364 (photo J. Everest, ECORD/IODP) (see ESO pages 6-7).





Gilbert Camoin

ECORD News



Magnus Friberg

ECORD membership and mid-term renewal

Regrettably, we learned this year that the Polish and Belgian representatives in ECORD, the Polish Geological Institute and Ghent University respectively, had decided to withdraw from the Consortium, which now comprises 16 members (*back cover*).

In recent months, ECORD has been active in trying to attract new members to IODP through exchanges with Turkey, and participation in conferences such as the "Science of the Future" Conference at the Russian Science Ministry in Kazan (Russia) and the International Geological Congress in Cape Town (South Africa), where an IODP session and a booth were organised.

Like most of their IODP partners, the ECORD member countries will have to commit to the second phase (2019-2023) of the International Ocean Discovery Program before the end of 2018. At its spring 2016 meeting, the ECORD Council approved the procedures for an external evaluation of ECORD's achievements and performance to produce a basic document that will be submitted to all ECORD funding agencies. The **ECORD evaluation** will be conducted from January to June 2017 by the ECORD External Evaluation Committee (EEC) composed of 6 to 10 members whose expertise will cover all aspects of ECORD activities: science, technology, management, education and outreach. Based on the nominations provided by ECORD Council members and ESSAC Delegates, the EEC members were appointed by the ECORD Council at its fall meeting in Bremen, Germany on 26-27 October 2016. The ECORD evaluation will mostly rely on science results measured against the Science Plan and the success of ECORD's financial model for platform operations during the first phase of IODP (2013-2018), in addition to the operational plans defined for Mission-Specific Platforms (MSP), *JOIDES Resolution* and *Chikyu* expeditions during the second phase of IODP (2019-2023). The ECORD Managing Agency (EMA) and the ECORD Science Operator (ESO) will be evaluated as part of this process and, based on the review outcomes, the ECORD Council will take the decision at its spring 2017 meeting whether or not to re-tender EMA and ESO at the end of 2018 and mid/late 2019 respectively.

ECORD and the European Commission

A new **Distributed European Drilling Infrastructure (DEDI) proposal**, led by Achim Kopf (MARUM, Bremen), was submitted to the European Commission in March 2016 under

the frame of the EC H2020-INFRAIA Call. The proposal includes 23 partners (from 15 countries) spanning all fields of Earth and Environmental Sciences with an interest in drilling and sampling soils, sediments and rocks onshore and offshore, geothermal areas, and ore deposits on land and in the deep sea. Most of the relevant institutions are involved in ECORD and/or collaborating programmes (ICDP, EMSO and EPOS). The main objectives of DEDI are (1) to create and develop a

sustainable European infrastructure associated with research drilling, logging-while-drilling, monitoring, core curation and data management, and (2) to foster collaboration between geothermal drilling, ice coring, continental and ocean drilling communities in order to enhance the attractiveness of the infrastructure to any scientist in Europe. The DEDI proposal has been selected as one of the 33 proposals that will be considered for funding after the final proposal submission due in March 2017.

Following preliminary recommendations from an ECORD working group, EMA is currently investigating the potential opportunities that could be provided by ECORD gaining the status of an **ERIC (European Research Infrastructure Consortium)**, or as a joint entity to ECORD. EMA representatives attended the 5th ERIC Network Meeting, which

was held on 8-9 November 2016 in Paris (France), and specific discussions focused on ECORD were organised at this meeting.

MSP expeditions

In the last seven months, ECORD has successfully implemented two MSP expeditions in two distinct environments. **Expedition 357 Atlantis Massif Serpentinization and Life** - <http://www.ecord.org/expedition357> - was the first IODP expedition to use remotely-controlled robotic seafloor drills (the BGS RockDrill 2 - RD2, and the MARUM MeBo), and was reviewed by an Operational Review Committee on 24-25 October in Bremen, Germany. **Expedition 364 Chicxulub K-Pg Impact Crater** - <http://www.ecord.org/expedition364> - (*cover and above, see ESO report pages 6-7*) successfully drilled the only known impact structure on Earth that has been directly linked to a mass extinction event. The Onshore Science Party of this expedition was held at the Bremen Core Repository from 21 September to 15 October 2016.

The next MSP expeditions that are currently scheduled are **Expedition 373 Antarctic Cenozoic Paleoclimate** and **Expedition 377 Arctic Ocean Paleooceanography**. Expedition



(photo C. Lowery, ECORD/IODP)

373 was initially scheduled for December 2017 and has recently been postponed to December 2019. ESO is currently exploring other options to implement an MSP expedition in 2017, which, in addition to Expedition 377 Arctic Ocean Paleooceanography that will start in mid-late 2018, will complete the 2014-2018 ECORD operational plan for MSP expeditions as defined by the ECORD Facility Board for the first phase of the International Ocean Discovery Program.

The ECORD Facility Board (*page 5*) will soon be tasked by the ECORD Council to define the **ECORD operational plan for the 2019-2023 phase** of the current programme, which will be considered during the ECORD evaluation procedures. The MSP proposals currently residing at the SEP reflect the needs expressed by the scientific community to implement MSP expeditions covering a wealth of science themes (climate and sea-level change, geohazards, hydrogeology, deep biosphere, CO₂ storage) through the use of various drilling and coring systems in diverse environments and drilling conditions, as well as the development of new concepts such as the Amphibious Drilling Proposals, which combine land and ocean drilling.

ECORD partnership: JOIDES Resolution and Chikyu expeditions

After a three-month break from April to July 2016, the **JOIDES Resolution (JR)** recommenced operations by drilling the Sumatra Seismogenic Zone (Expedition 362) following the remediation of Hole U1473 (Expedition 362T). The *JOIDES Resolution* is expected to implement 12 expeditions in the Pacific Ocean, the South China Sea and the Southern Ocean before March 2019 (*table above*). Various scenarios for the 2019-2021 time-window are being considered by the *JOIDES Resolution* Facility Board depending on the proposal pressure, especially in the southern Atlantic, and the implementation of a CPP* in the Gulf of Mexico in 2019. In any case, it seems clear that the *JOIDES Resolution* will mostly operate in the Atlantic Ocean, the Mediterranean, Caribbean, and the Gulf of Mexico during the final phase (2020-2023) of IODP. With the decision that the *JR* will follow this route, the pressure to submit proposals that address science in these regions is expected to increase significantly in the coming years and the ECORD science community will certainly play a pivotal role.

Pacific Ocean
363 Western Pacific Warm Pool
366 Mariana Convergent Margin
369 Australia Cretaceous Climate and Tectonics
371 Tasman Frontier Subduction Initiation and Paleogene Climate
372 Creeping Gas Hydrate Slides and Hikurangi LWD
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South China Sea
CPPs* 367 & 368 South China Sea Rifted Margin
Southern Ocean
374 Ross Sea West Antarctic Ice Sheet History
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2017-2019 JOIDES Resolution expeditions.

The *Chikyu* resumed its IODP activities in March 2016 with the implementation of Expedition 365 NanTroSEIZE Shallow Megasplay Long-Term Borehole Monitoring System and the ongoing Expedition 370 Temperature Limit of the Deep Biosphere off Muroto. At its October meeting, the ECORD Council reconsidered its membership contribution to the *Chikyu* programme, which was suspended for 2015 and 2016.

ECORD provides substantial support to ECORD scientists to develop innovative drilling proposals concerning the diverse scientific topics addressed by the three IODP platforms. Three workshops have been funded or co-funded in 2016: Brazilian Equatorial Margin II - BEM II (30 March-1 April, Ubatuba, Brazil), Antarctica's Cenozoic Ice and Climate History (9-11 May, College Station, TX, USA) (*pages 20-21*), and Bend-Fault Serpentinization (18-20 June, London, UK).

Educational and outreach activities

Among the multiple educational activities developed by ECORD for scientists, students, and early-career scientists (ECORD Summer School, ECORD Scholarships, ECORD Research Grants), ECORD has recently funded the organisation of the first **Summer School on Petrophysics**, which was held in June and July 2016 in Leicester, UK. This innovative initiative has been added to the two 'traditional' ECORD Summer Schools that are held every year in Urbino (on Paleoclimatology) and Bremen (on Submarine Geohazards in 2016) (*pages 15-16*) and to the ECORD Training Course, which was organised for the second time in 2016 to provide a "Virtual Drillship Experience" for scientists from academia and industry at the IODP Bremen Core Repository at MARUM.

After a development period of seven months of work, the ECORD Outreach and Education Task Force and Cوسيweb (www.cوسيweb.fr), a French web design company, successfully launched the new **ECORD website** on 19 September 2016. The new website now incorporates the former ECORD, ESSAC and ESO websites under a single portal, and includes links to all other IODP websites.

Gilbert Camoin, Director of the ECORD Managing Agency - camoin@cerege.fr - and Magnus Friberg, Chair of the ECORD Council - magnus.friberg@vr.se

* CPP: Complementary Project Proposal



Gilles Lericolais

News from the ECORD Facility Board

During the last ECORD Facility Board (EFB) meeting held in Brussels, on 15-16 June 2016, preliminary results were presented for both Expedition 357 Atlantis Massif Serpentinization and Life - www.ecord.org/expedition357, and the offshore operations of Expedition 364 Chicxulub K-Pg Impact Crater - www.ecord.org/expedition364 (pages 6-7).

Expedition 357 was reviewed in October 2016 by a review committee composed of two external reviewers, Bo Barker Jørgensen (Aarhurs University, Denmark) and Christopher MacLeod (Cardiff University, UK), and three members of the EFB Science Board (G. Lericolais, S. Gallagher and K. Gohl).

The meeting then focussed on the future ECORD programme. For **Expedition 373**, ESO is in communication with the Division of Polar Programs and the Antarctic Support Contract for the National Science Foundation. For this expedition, it is currently planned to install the BGS RD2 on the icebreaker *Nathaniel B Palmer* and to drill at eight sites. ESO has decided to start a new phase of testing to ensure the RD2 coring performance, which will postpone the expedition most likely until the 2019-2020 Antarctic season.

Expedition 377 is scheduled for the Arctic summer of 2018. The proposal is based on two primary objectives and the June SEP report has recommended: "The strategy of drilling two or more sites to develop a composite section back through the early Cenozoic is much more promising than a single deep site". The EFB therefore recommends that objectives should be realised by drilling two boreholes.

The EFB has deactivated Proposal 581 Coralgal Banks due to the long period that it has been in the holding bin and the absence of a response from the proponents to requests for further information from the EFB. Two expeditions focusing on the Climate and Ocean Change research theme, 716 Hawaiian Drowned Reefs and 730-Full2 Sabine Bank Sea-Level were also considered.

Proposal #637 New England Hydrogeology remains in the EFB holding bin after the proponents were encouraged to consider various options to be developed at a workshop on hydrogeology of continental margins.

Last June, Proposal #879 Corinth Rift was forwarded to the EFB. Six sites, in water depths ranging between 347 and 862 m, have been proposed in the Corinth Basin.

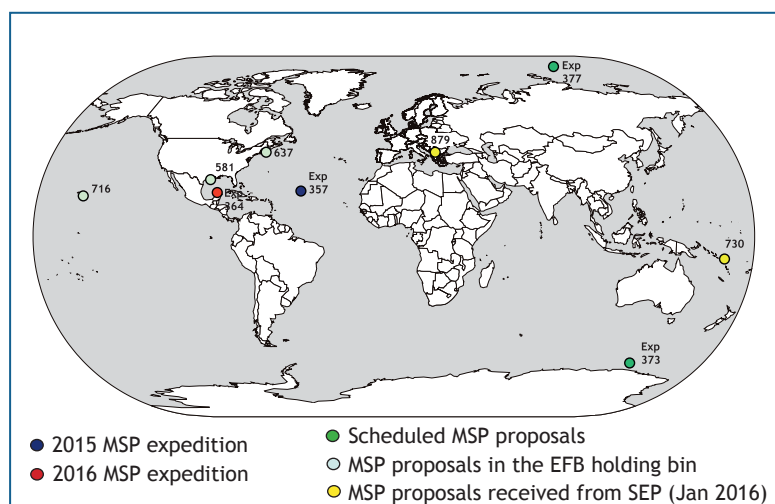
The EFB has ranked this proposal as a high scientific priority.

The EFB further developed its **long-term scheduling strategy**, accounting for the large spread of expedition costs, which largely depend on the required type of drilling platform, and for budget limits on average annual expedition costs ([table below](#)). The EFB has studied the budget constraints until the end of the current IODP phase in 2023 and, following the expeditions scheduled for 2017/2018, will be able to better evaluate and prioritise the proposals that are in the holding bin for the period 2019-2023. The ranking will be a function of the available ECORD budget correlated with the scientific objectives. Provisional reservations have been made for both the MeBo70/200 and RockDrill2 seabed drilling systems for this period. The operation of these systems, as well as long-piston coring, can be conducted in the low-cost category provided that the research vessels are contributed in-kind.

The next EFB meeting is scheduled on 8-9 March 2017, in Hannover, Germany.

Gilles Lericolais, Chair of the ECORD Facility Board - gilles.lericolais@ifremer.fr

Long-term scheduling strategy of the EFB for MSP expeditions



LC = low-cost (<8MUSD), MC = mid-cost (8-15MUSD), HC = high-cost (>15MUSD) - RD2: RockDrill2 (seabed drilling system).

2016	Exp 364 Chicxulub Liftboat Myrtle - MC
2017	tbd (LC to MC)
2018	Exp 377 Arctic drillship - HC
2019	tbd LC
2020	Exp 373 Antarctic drillship + RD2 - LC-MC
2021	tbd MC
2022	tbd seabed drill - LC
2023	tbd HC



David McInroy



Sarah Davies

ECORD Science Operator News and Views



Ursula Röhl



Dave Smith

In the previous ECORD Newsletter, we reported the successful implementation of IODP Expedition 357 Atlantis Massif Serpentinization & Life. During the summer and autumn of 2016, ESO successfully completed the offshore and onshore phases of its seventh MSP expedition, IODP/ICDP Expedition 364 K-Pg Chicxulub Impact Crater. The expedition, co-led by Joanna Morgan (Imperial College, London) and Sean Gulick (University of Texas at Austin, USA), was a huge success, recovering core samples from the crater's buried peak ring which will allow investigation of the mechanisms of large impact crater formation on Earth and other planets.

The offshore phase of IODP/ICDP Expedition 364 Chicxulub Impact Crater took place between 5 April and 31 May 2016. ESO, the Science Party and expedition contractors recovered 839 m of core at 100% recovery, to a total depth of 1,334 metres below seafloor (mbsf) at Site M0077 (proposed site Chicx-03B), reaching the expedition's target: the peak ring. Over 5.8 km of high quality wireline downhole logs were acquired in open hole, alongside vertical seismic profiling (VSP).

The expedition mobilised in Port Fourchon, USA, on the *Lifboat Myrtle* (*above right*) between 10-15 March, before sailing to Progreso, Mexico, for customs clearance. The expedition set sail on 5 April and, after casing was deployed on 7 April, open holing was carried out to 503 mbsf. The Science Party joined the vessel on 14 April, and coring operations commenced on 17 April. Please see the reports for information on daily activities - <http://www.ecord.org/expedition364/reports>.

The average coring rate during the expedition was 26 m per day but some days over 50 m of core was recovered. Ultra slimline downhole logging services were contracted from the University of Montpellier (France) for wireline logging (*below*), and the Universities of Alberta (Canada) and Texas (Austin, USA) for the vertical seismic profiling (VSP). Typically 4-6 wireline logging tool strings were run at each logging stage. Logs recorded



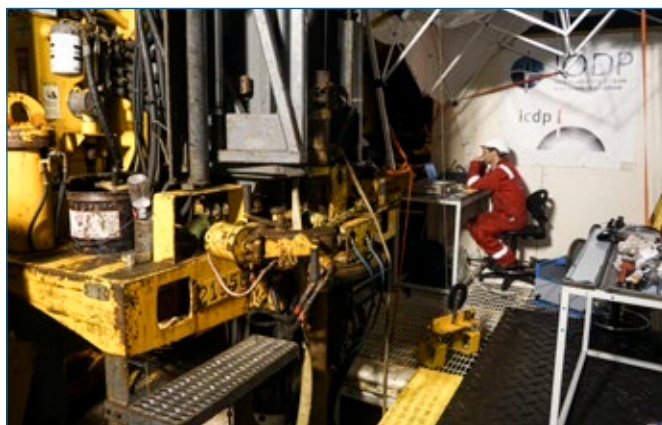
(photo L. Perez-Cruz, ECORD/IODP)

included: resistivity, magnetic susceptibility, gamma ray, sonic, and acoustic and optical borehole images. A particular highlight of the logging programme was acquisition of clear imaging of structures that should allow the cores to be effectively reoriented. VSP data were also acquired from 47 to 1,368 mbsf at various vertical resolutions ranging from 2.5 to 7.5 m. The data are excellent from a very stable, good-quality hole.

The cores were measured offshore using the multi-sensor core logger (MSCL). Density, resistivity, magnetic susceptibility (all 2 cm sampling interval) and natural gamma ray (10 cm sampling interval) data were acquired from all cores. Natural gamma radiation measurements were taken offshore for the first time on an MSP, representing a significant time- and associated cost-saving for the pre-Onshore Science Party (OSP) period, when the dataset has traditionally been acquired.

The demobilisation of the *Lifboat Myrtle* took place from 13 June at Fourchon, Louisiana, USA, where ESO staff were on hand to oversee the shipping of temperature-controlled (deep-frozen) microbiology samples to scientists' laboratories and of the MSCL's radioactive source to the UK. On import to the USA, the refrigerated container with the expedition cores was immediately taken on by Weatherford and transported to Houston for X-ray CT scanning of the cores. Extra expedition funds were granted by ECORD to facilitate this 2-week CT scanning programme, where all cores were systematically scanned, generating a ~5 TB dataset that has been designated expedition data (*top right, page 7*).

The Onshore Science Party successfully took place from 21 September to 15 October at the IODP Bremen Core Repository and the MARUM, University of Bremen, Germany, with further analytical laboratories accessed at the Department of Geosciences, University of Bremen. The onshore phase of the expedition presented an excellent opportunity for detailed description,



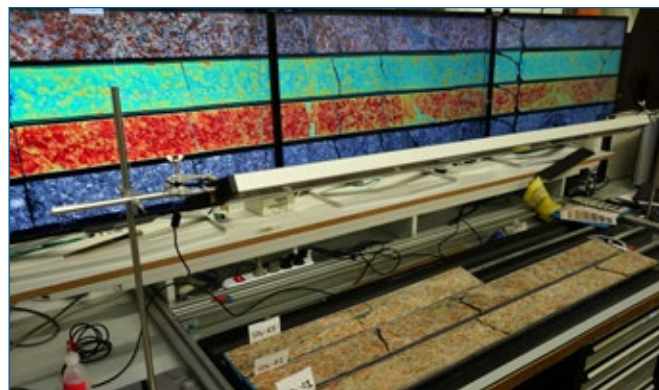
(photo E. Le Ber, ECORD/IODP)



(photo U. Prange, ECORD/IODP)

meeting of all Science Party members, further development of joint research endeavours, and sampling for post-expedition research. During the OSP, the cores were split (*above*), described in detail. IODP standard measurements were made, and samples were taken for both acquiring expedition data in Bremen during the OSP and individual post-expedition research projects.

Initial results from the expedition are presented in a paper, which has been submitted to the journal *Science*. Data acquired during Expedition 364 will be used to (1) refine numerical models of the formation of the Chicxulub crater and environmental effects of this impact, and (2) improve simulations of impact craters on other planetary bodies so that they can be used as a diagnostic tool for revealing near-surface rheology and composition.



(photo E. Le Ber, ECORD/IODP)

This expedition attracted significant media interest from large and small outlets worldwide, and numerous items have appeared on radio, print and online (*page 9*). There have been a number of stories published in both the popular and scientific press (e.g. *Science* and *Nature*). A production company (Barcroft) visited the vessel and OSP to gather material for a documentary to be broadcast in at least the UK and USA next year.

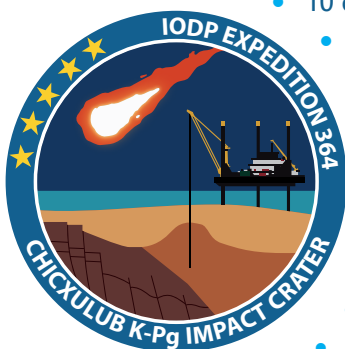
David McInroy, ESO Science Manager; Sarah Davies, EPC Manager; Ursula Röhl, ESO Curation and Laboratory Manager and Dave Smith, ESO Operations Manager

<http://www.ecord.org/about-ecord/management-structure/eso>



Expedition 364 group photo (V. Diekamp, ECORD/IODP).

Expedition 364 in numbers



- 10 days mobilisation
- 20 days mobilisation-related transit
- 3 hours expedition transit
- 57 days on site
- 1 hole
- 839.51 m of core (100% recovery)
- 1334.69 mbsf total depth
- +5,800 m of wireline downhole logs
- 19.8 m water depth
- 25 days Onshore Science Party
- 11,216 samples taken



Ulrike Prange Carol Cotterill

ECORD Outreach & Education News and Activities



Patricia Maruéjol Hanno Kinkel

We are happy to welcome Ulrike Prange and Carol Cotterill to the ECORD Outreach & Education Task Force (E-OETF). Last April Ulrike Prange replaced Albert Gerdes as ESO Media Relations in MARUM, University of Bremen, Germany and joined the team at EGU 2016. At the end of October, Carol replaced Alan Stevenson who stepped down as ESO Outreach Manager. Carol has a long history with ECORD having taken part in four mission-specific platform expeditions as a Staff Scientist. It is also time to say goodbye to Alan Stevenson who joined the team in October 2005. Alan published the first outreach and education report in the ECORD newsletter after returning from an IODP meeting in Hachinohe, Japan, in November 2005. Alan has played a lead role in all the actions and decisions taken by the E-OETF including the renewal of the website and the media success of Expedition 364 to the Chicxulub crater. We would like to thank Alan for his enthusiasm and unfailing support, and the Scottish touch of humour he brought to the group. We will miss Alan and wish him all the best in his new life!

Since April 2016, the E-OETF has promoted ECORD and IODP at international conferences in collaboration with ICDP, and in conjunction with IODP-related sessions, produced various resources (newsletter, flyers, etc.), organised media activities and supported educational activities and public events. On 6-7 October 2016, the Task Force met in Edinburgh, UK, to coordinate the programme's outreach and education activities with US and Japanese colleagues. The meeting was hosted by Alan Stevenson and Carol Cotterill in the Lyell Centre, the BGS's new home at Heriot-Watt University (*above*).

ECORD at international conferences

EGU 2016 - 17-22 April 2016, Vienna, Austria. A joint ECORD/IODP-ICDP booth (#55-56-57-58) was organised and the IODP-ICDP Town Hall meeting was held on 19 April.

IGC 2016 - 27 August - 4 September 2016, Cape Town, South Africa. A joint IODP-ICDP booth (#EE10) was organised in conjunction with an IODP scientific session.

Resources

ECORD/IODP information materials (newsletter, flyers, etc.) were provided to the participants of the MagellanPlus Workshops (*pages 20-21*), ECORD Summer Schools (*pages 15-16*), during Expedition 364 and at the Goldschmidt 2016

in Yokohama, Japan (*page 13*)

ODP-IODP core replicas - <http://www.ecord.org/pi/core-replicas.html> - were distributed to support teaching (Middle School in Pau and University of Lorraine, France, University College London), exhibition at science conferences in Austria, Spain and Italy (*page 13*), and public events in UK, Germany and France.



Media and public events

ECORD has supported public events in ECORD member countries, for example a science festival in Exeter, UK (*page 14*). Media activities were organised during Expedition 364 (*page 9*).

Educational activities

For the first time, ECORD teachers have been involved in educational activities onboard all IODP platforms. Two Education Officers, Barbara Matyssek (Germany) and Kevin Kurtz (USA) took part in MSP Expedition 364 Chicxulub K-Pg Impact Crater (*page 10*). We thank the ECORD Science Operator and the Co-chief Scientists, who supported this initiative! Agnès Pointu (France) sailed as Education Officer onboard the *JOIDES Resolution*, on Expedition 362 Sumatra Seismogenic Zone (*page 11*). Helder Pereira (Portugal) took part in the first *Chikyu* Onboard School (*page 12*).

ECORD online

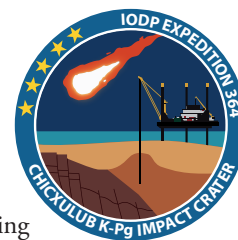
Another important task completed by the E-OETF was the entire renewal of the ECORD website. After nine months of work in collaboration with Cosisweb, a French web company, the new ECORD website was launched on 19 September 2016.

Upcoming events / activities

The E-OETF will continue to promote both the IODP and ICDP programmes at science conferences and support national IODP educational initiatives. ECORD and ICDP are organising an exhibition booth at **AGU 2016** - 12-16 December 2016, San Francisco, USA with JAMSTEC, USSSP and ICDP (#312, 314, 316) and **EGU 2017**, Vienna Austria (#60,61,62,63). Plans for an ECORD booth at the Goldschmidt 2017 in Paris, are being discussed. Support will be provided to organise an ECORD School of Rock for teachers in a member country of ECORD.

Patricia Maruéjol, EMA, Carol Cotterill and Ulrike Prange, ESO and Hanno Kinkel, ESSAC - <http://www.ecord.org/outreach/> and <http://www.ecord.org/education/>

Education and outreach from the crater of doom



The ESO Outreach Team were busy during April and May with the huge interest in the Chicxulub expedition. A media conference was organised at the start of the expedition in collaboration with the expedition's Mexican Scientific Coordinator Professor Jaime Urrutia Fucugauchi, expedition scientists Dr Mario Rebolledo-Vieyra and Dr Ligia Perez-Cruz, and communications staff of the Universidad Nacional Autónoma De México. The event was held at El Gran Museo del Mundo Maya in Mérida, Mexico, on 13 April 2016 where questions were put to Sean Gulick, Claire Mellett, Jaime Urrutia Fucugauchi, Ligia Pérez Cruz, Ricardo Bello (Director of Higher Education) and Eduardo Batliori (Secretary of Urban Development and Environment). The media conference was attended by about 40 media representatives, mainly from Mexican radio, TV and print media, therefore the event was conducted in both Spanish and English.

Interest in the expedition and the proximity of the platform to the Mexican coast led to a number of visits by media representatives and VIPs to the platform during the offshore phase of the expedition. A media day was organised on 23 April, when 24 media representatives/VIPs were able to visit the platform (*below*). The expedition received global interest and was reported in the USA, Canada, Australia and Mexico as well as several countries in Europe and Asia.



(photo D. Smith ECORD/IODP)

The expedition was also the first since the Arctic Coring Expedition in 2004 to involve Education Officers both during the onshore and offshore phase. Educator and children's author Kevin Kurtz took part in both the onshore and offshore expedition and organised an offshore Reddit AMA (Ask me Anything) event on 13 May in collaboration with the US Science Support Program (USSSP) and the University of Texas at Austin. A second AMA event took place during the Onshore Science Party (OSP). Teacher Barbara Matyssek and Kevin Kurtz also

organised other educational activities during a two-week stay at the OSP in Bremen (*page 10*).

Regular promotion of the expedition's accomplishments were posted on ECORD's social media platforms such as Twitter and Facebook. The ESO Outreach Facebook page reached an average of 2000 visitors per day, peaking at 20,000 visitors on 7 May, and a blog - <https://esoexpedition364chicxulubimpactcrater.wordpress.com/about> - was maintained throughout both the offshore and onshore phases of the expedition. The blog received 5,982 views in April 2016 and 10,911 in May 2016, principally from the USA, UK, Mexico, Germany and France.



(photo V. Diekamp/MARUM).

Outreach activities continued during the OSP in Bremen in September/October. In addition to the participation of the two Education Officers mentioned above, a second media event was held on 11 October, featuring short presentations by the Co-chief Scientists followed by interviews and tours of the laboratory facilities and core repository at MARUM (*above*). The event was attended by representatives from Deutschlandfunk, Radio Bremen, Kreiszeitung, Planet Erde and the BBC.

During the expedition, the ESO team, Co-chiefs and members of the Science Party worked with the TV Production company Barcroft Productions to make a TV documentary that will be broadcast in 2017. Journalists working on 'Asteroid Day' - <http://asteroidday.org> - asked British astronaut Tim Peake to tweet a photograph of the Chicxulub area from the International Space Station, which was re-tweeted by the team onboard the *Lifboat Myrtle* during the expedition.

Carol Cotterill (ESO Outreach Manager) - cjcott@bgs.ac.uk
- and Ulrike Prange (ESO Media Relations) - uprange@marum.de

Dinosaurs. Asteroids. Mass extinctions. Education Officers. Expedition 364 had it all.

Kevin Kurtz¹ and Barbara Matyssek²

For two months during the spring of 2016, Expedition 364 scientists went to the Gulf of Mexico to drill into the Chicxulub crater for the first time ever from sea. Since this expedition promised to help us learn more about the asteroid impact that, 66 million years ago, wiped out 75 per cent of species on Earth at that time, including the non-avian dinosaurs, it has drawn attention from news outlets around the world. After the offshore phase on the *Lifboat Myrtle* the cores were first scanned and then shipped to the IODP Bremen Core Repository in MARUM, Germany. On 21 September 2016, thirty-one scientists and a large ESO support team came to Bremen to start studying the cores at the Onshore Science Party (pages 6-7).

Two of the support team were educators, Barbara Matyssek and Kevin Kurtz (right). Their job was to do outreach to share the excitement and science of the Chicxulub K-Pg Impact Crater Expedition with the rest of the world.



(photo M. Mowat, ECORD/IODP)

Barbara is a biology and chemistry teacher at a German High School and has been engaged in fields connecting education projects of STEM subjects with the MARUM UNISchullabor (School lab) for more than seven years.

Kevin is a children's author and educator from Rochester, New York, USA. He has been involved with IODP outreach and education since 2009, including writing two children's eBooks about IODP science. Kevin was also lucky enough to be on the



(photo U. Prange, ECORD/IODP)

Lifboat Myrtle for a few days in early May to do outreach about the drilling phase of the expedition (left).

Barbara and Kevin were able to join the scientists in Bremen for two weeks. During that time they observed, learnt from, and occasionally even helped the scientists as they did their core description and sampling work. Both educators wrote posts for the expedition blog to share these experiences - <https://esoexpedition364chicxulubimpactcrater.wordpress.com>

Both educators also had their own special outreach project they worked on during their time with the scientists.

Barbara joined the scientists in several laboratories to find out how the researchers work and help each other. She conducted interviews with some researchers related to questions from school students with special attention on the career of female researchers. The ECORD homepage will host links to these interviews.

Kevin did a series of live video events with school groups. Using the camera on his laptop and walking through the labs, Kevin was able to give classrooms with students, from ages 7 to 21 years old, brief tours on how the Chicxulub scientists were working. Students' questions were answered by selected scientists with complementary expertise. Kevin managed to do twenty-six of these programmes, which reached over 1,400 students and teachers.

The Chicxulub K-Pg Impact Crater Expedition was an amazing opportunity for us to see first-hand the evidence of one of the most cataclysmic events in Earth's history, while learning from scientists about what they know and how they know it. We felt very grateful to be a part of this amazing expedition and to be able to share the experience with students and the general public.

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ECORD Teachers at Sea

Expedition 362 Sumatra Seismogenic Zone

Agnès Pointu*

I have always remembered the Boxing Day tsunami of 2004, which killed over 250,000 people around the Indian Ocean. So, when I had the opportunity to apply as an Education Officer on the *JOIDES Resolution (JR)*, I was quite sure of my choice: I wanted to sail on Expedition 362 Sumatra Seismogenic Zone. To be part of a drilling expedition in the Indian Ocean, to uncover the secrets of the sediments lying on the seafloor was an incredible opportunity for me to see science in progress and to share it with classrooms around the world.

The thickness of the sediments stacked on the seafloor of the Indian Plate is very important. At the site where we drilled, the sediments are nearly 1.5 km thick, and increase toward the subduction zone, where they reach as much as 5 km! One goal of Expedition 362 is "to find out more about how specific sediments control the size and type of earthquakes in this kind of environment" says Co-chief Scientist Lisa McNeill of the University of Southampton. This is why we spent two months during August and September 2016 drilling two sites (up to 1.5 km below the seafloor) west of Sumatra, about 200 km from the point where the Indian Plate reaches the subduction zone, to sample the sediments before they are buried and develop into the faulted plate boundary region. The sediment cores that we collected help us to characterise more precisely their physical properties, chemistry, and geological history.

There were two education and outreach officers on board Expedition 362. My American partner, Naomi Barshi, and I divided our efforts between blogs, social media posts, videoconferences, and gathering materials and connections for future collaborations and educational resources. We both used our background in geology to write in-depth operational and scientific blog posts that expand the *JOIDES Resolution* online teaching resources - <http://joidesresolution.org>. I focused my science blog posts on tectonics, sedimentology and micropaleontology, with blogs spanning topics from "What is a subduction zone?" to "The formation of the Ninetyeast Ridge", with several cruise-specific science subjects, such as drilling deformation and sediment provenance. We spent a lot of time discussing these topics with the scientists onboard, trying to understand why their eyes lit up at the sight of grey mud!

I also wanted to inform the general public about how we are able to drill and core up to 1.5 km below ~4 km of water, so I also wrote posts about the drilling operations. At the same time, I kept a blog in French, to focus on High-School geology programmes in France - <https://expedition362joides.wordpress.com>. In addition, artist Elsa Ayache was inspired by Expedition 362 and posted three 'JR-spirit' works on this French blog. Maintaining two blogs at the same time kept me very busy, but helped me reach more French students than usual. Several posts included original graphics intended as teaching tools. I will use some of



Nisha Nair, left, and Agnes Pointu, right, examine the cores at the sampling table (T. Fulton, IODP-JRSO).

these materials post-cruise, in collaboration with sedimentologist Hugo Pouderoux, to develop learning resources using real-world data, and adjusted to fit the French school programmes.

Videoconferences became my outreach priority during the second half of the expedition, when students began school in September. I conducted 24 videoconferences, not only with schools in France, but also French schools in Uruguay, Romania, and Belgium, and in total both education officers delivered 76 videoconferences to schools, universities and other groups worldwide. I prioritised showing how data are gathered and how Earth science works as most scholarly books do not really explain how difficult it is to collect and interpret data. I was also interested in explaining the variety of approaches used to study the sediments: from the micropaleontologists and sedimentologists observing the natural state, to the more analytical approaches of the physical properties and geochemistry groups.

We arrived back onshore on 6 October. Since then, all the scientists have received their post-cruise research samples at their home labs, and some have already started to conduct new experiments. Will they find out the 'recipe for a disaster'? I am very excited to read their next articles and to see how they will influence the future models of subduction, but maybe we still have several years to wait!

I thank Georges Ceuleneer from IODP France: I couldn't have sailed on this expedition without his help and I am very grateful for his advice and his availability. I have also benefited greatly from thoughtful, careful reviews and suggestions for my blog posts by the Co-chief Scientists, Lisa C. McNeil (University of Southampton) and Brandon E. Dugan (Colorado School of Mines) and by the Expedition Project Manager, Katerina Petronotis. I am also especially grateful for the help I received from my co-worker Naomi Barshi during the expedition. I cannot list them all by name, but I thank all the science party of Expedition 362. I will never forget these wonderful days that I spent with you on the *JR*.

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Chikyu Onboard School 2016

Helder Pereira*

The first *Chikyu* Onboard School - <http://www.jamstec.go.jp/cdex/e/educators/chikyuschool/> - took place in early July in Shimizu Port, Japan. The participants included young scientists and educators from several IODP member countries (*below*). While aboard, the participants had a unique opportunity to learn about the *Chikyu*'s scientific research highlights, involving laboratory work relating to the actual procedures used onboard for analysing cores.

The school included a ship tour, lectures and practical exercises. During the tour we saw the riser-drilling system and learned about how it is used to collect cores. In the laboratories, we

followed the core workflow and carried out several practical exercises, such as visual core description and logging. Another stimulating activity involved extracting microfossils (*e.g.* foraminifera and radiolarians) from seafloor-sediment samples and observing them under the microscope.

The overall experience was a great one for all the participants. The young scientists had their first contact with IODP science, and were encouraged to apply to sail in a future expedition. On the other hand, the educators now have the responsibility to share what they learned and inspire the next generation of scientists.



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Communicating with scientists

IODP-Italia at the 88th Congress of the IGS

Analisa Iadanza¹ and Marco Sacchi²

After the recent launch of the website - <http://www.iodp-italia.cnr.it/index.php/it/> - IODP-Italia officially announced its renewed and upgraded involvement in ECORD-IODP to the national geoscience community during the 88th Congress of the Italian Geological Society on 7-9 September 2016 in Naples. Marco Sacchi and Annalisa Iadanza illustrated the new course of the IODP programme at the plenary session of the conference, and hosted a successful booth with the Italian shipboard scientists Karen Gariboldi, Laura De Santis, Alessio Sanfilippo and



Riccardo Tribuzio (*above*), Science and Environmental Technology). The booth was set up with IODP core replicas,

a series of posters illustrating IODP, ECORD and IODP-Italy recent and upcoming activities, and two monitors showing the location of IODP expeditions and documentaries playing in a loop. Visitors were invited to subscribe to the international and national newsletters and were stimulated by the chance to talk with IODP shipboard scientists. Opportunities to get involved in IODP-related activities for senior and early-career scientists, students and educators have been promoted throughout the year through flyers, reports, and leaflets.

ECORD and IODP-Canada at the Goldschmidt 2016

Diane Hanano³

The Goldschmidt Conferences began in 1988, and have now become the premier annual meeting in geochemistry, attracting upwards of 3,000 scientists from around the world. This year, the conference was held at the PACIFICO Yokohama Convention Centre in the historic port city of Yokohama, Japan (26 June - 1 July). As the Scientific Coordinator for IODP-Canada, I represented ECORD at the IODP section of the booth organised by the Centre for Deep Earth Exploration (CDEX) and the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) (*left*).

Poster sessions, refreshments and traditional Japanese performances drew large crowds to the exhibition hall. I spoke to conference delegates from both ECORD and non-ECORD countries including France, Germany, the Netherlands, the UK, Canada, Turkey, Tunisia, the USA, Australia, New Zealand, India, China and of course Japan. Visitors to the booth learned about the open calls, upcoming expeditions and how to get involved

in ECORD/IODP. Many joined the mailing list, picked up brochures, newsletters and giveaways, and eagerly viewed the 1/150 scale model of the *Chikyu* on display. The booth was a great opportunity to collaborate with our Japanese colleagues at CDEX/JAMSTEC.



Immediately following the conference, Dominique Weis (Canada's ESSAC delegate and ECORD Facility Board Vice-chair) and I visited the *Chikyu* drilling vessel with students, staff and faculty from the universities of British Columbia and Ottawa. We made the 2-hour journey (by bullet train!) from Yokohama to the Port of Shimizu where the ship was docked. Our tour was arranged and led by the knowledgeable Dr. Nobuhisa Eguchi, Science Operations

Manager for JAMSTEC. The group got to explore the ship's unique operational and scientific facilities including the bridge, helideck, drill floor, moon pool, core-receiving platform, laboratories and many other research and living areas. It was a fascinating day and a memorable experience for all.

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A summer of outreach with ECORD

Kate Littler*

One of the most important things we can do as scientists is to communicate our enthusiasm for science to the general public, to inspire the next generation of scientists and to increase public awareness of the pervasive role of science in everyone's lives. This is particularly important for the somewhat esoteric science of deep-sea drilling, which doesn't have the benefit of high profile TV shows or personalities to promote it to a wider audience. So with that in mind, this summer I took part in several outreach events around the SW of England, armed with a boundless enthusiasm for IODP science and some nifty core replicas representing key events in Earth's history.

The first event was a Soapbox Science event in Exeter in June, which brought together female scientists from across the region, with expertise ranging from neuroscience to geology and biology, to enthuse the hordes of Saturday shoppers. Our brief was to be "dynamic, engaging and entertaining", which is trickier than you might imagine while standing on a box in a busy shopping street with the threat of rain hanging over you. In a bid to explain what IODP science can tell us about the K-Pg mass extinction, I decided to take along a replica of the K-Pg boundary from Blake Nose, kindly provided by Patricia Maruejol at ECORD, along with some large 3-D printed foraminifers, kindly provided by colleagues at Yale and Lamont Doherty, and a layered sponge cake and some straws, kindly provided by me. With the able assistance of my colleague, Dr Clemens Ullmann, we talked and demonstrated our way through everything from the dimensions of the bolide impact, to the mechanics of deep-sea drilling, through to what we hope to learn from IODP Expedition 364 and the drilling of the

Chicxulub crater. Much fun was had by all, and the rain held off until after the event.

A few days later I helped to organise a public outreach event on the Penryn Campus, in collaboration with a colleague from the Physics department, Dr Nathan Mayne. Our theme was "Aliens, Atmospheres and Ancient Climates", where we attempted to weave astronomy and exoplanet science together with the science of paleoclimate reconstruction using IODP materials and techniques. After taking the audience through the rationale behind paleoclimate science (the past is the key to the future in the context of climate change), I explained how major events in Earth's past could be used as analogies for the anthropogenic warming and ocean acidification we're currently experiencing. The replica core from Walvis Ridge showing the massive carbonate dissolution during the Paleocene Eocene Thermal Maximum really helped to drive the point home to the crowd.



Finally, to round off the summer's outreach activities I represented the Camborne School of Mines in the "Earth Zone" at the annual 'Science in the Square' event in Falmouth in August (*above left*). This fantastic annual event sees families, both locals and holidaymakers, experience and learn about the science that's

going on at the University, including geology, geography and conservation biology. Up to 4,000 people attended the one-day event, where I once again used the K-Pg replica core to talk about deep-sea drilling and the extinction of the dinosaurs. It was a truly exhausting experience, but the huge amount of enthusiasm and insightful questions from the public made it all worthwhile. Bring on next year's activities!

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ECORD Summer Schools 2016

Urbino Summer School in Paleoclimatology¹, 13-29 July

"From 13 to 29 July 2016, students and scientists from around the world participated in the Urbino Summer School - Past Global Change Reconstruction and Modelling Techniques (USSP). Urbino (Italy), a World Heritage Site at the foothills of the Northern Apennines, is a very beautiful and welcoming place for this 16-day course. The sessions were led by invited speakers and leading experts in the field of paleoclimatology. A combination of lectures, practical exercises and field trips gave me new insights into past global change reconstruction and modelling techniques, helping to increase my knowledge of the driving processes and mechanisms behind global climate.



I decided to join the Urbino Summer School because it provides an opportunity for intensive training that could not be obtained at my home university."

Kim A. Jakob, Heidelberg University, Germany

"Talking to other researchers at a similar stage to myself across the field of palaeoclimate research was a wonderful opportunity to bounce ideas around, as well as getting a sense of the breadth of work being done. I took home a new sense of eagerness to crack on with my own project and, with regards to ocean drilling, a sense of what others had gained from participation in cruises".

Sarah Lucas, University of Oxford UK

"I had heard previous stories regarding how amazing an experience going to the USSP was, and was therefore eager to attend. Subsequently, I too rave about the experience to other students."

Katrina Kerr, Open University, UK

Petrophysics Summer School 2016²

26 June-1 July

Day 0: Sunday afternoon, King Richard III Hall. The city of Leicester gave its warmest welcome to 30 people from all over the world (11 countries were mentioned). A delightful taste of Britain and of the city itself. We were provided with the opportunity to visit the historical exhibition at the venue together with a refreshment where we had the time to chat and discover how interesting the work of the other researchers is.

Day 1: University of Leicester, Geology and Geography department. We started with a couple of hours introduction to petrophysics in order to create a common ground for the week with the excellent idea to have coffee breaks where we all could display a poster of our research and discuss over a cup of tea. The first day was focused on talks by industry experts, which I personally found to be greatly illuminating. New things were learnt about pressure measurements down

boreholes as well as many other topics for discussion during our evening meal at a pub.

Day 2: University of Leicester, Geology and Geography department. The lectures by IODP experts characterised the second day, an interesting perspective on the scientific aspects of logging and the related challenges. A very interesting day to think about unconventional issues that happen when doing research. In the meantime, the coffee breaks kept on going with more questions coming on the posters and with time to see the magnetic core sampler in operation. The finest Indian cuisine I ever had concluded the evening in the city centre.

Day 3: Field trip. Today we had disappointingly wet weather for what was a good idea by the very competent and committed organising team. We visited the offices and the test site of

Weatherford in the country just half an hour away from Leicester. For a novice in logging such as me, it was a very down-to-earth experience. I realised how big and resistant wirelines and instruments can be, something that definitely made me think of how hard is to fit everything into the borehole to be able to record the precious data that we viewed on a computer screen at the end of the process. At the British Geological Survey, we then had a quick look at their core repository and took part in a well-prepared exercise on linking core samples to well logging measurements.

Day 4: University of Leicester, computer room of the Geography and Geology department. Experts from Schlumberger and researchers with IODP experience introduced us to the software Techlog. A long day but the logging integration plots we displayed at the end and the experience we could take home was worth the effort of learning how to use it.

Day 5: University of Leicester, computer room of the Geography and Geology department. Techlog training continued and we also had the chance to play around with the software on our own to take out of the induction what most suited our needs. The afternoon was spent applying the information we had been given during the whole week with a well logging design session. Farewells followed.

I will take home many of the concepts that I heard during the week, well summarised in the Summer School handouts we had been given. But not only that: I will take home a very good impression of the city of Leicester and the Geology department at the University together with important connections with people that are doing research on topics that are relevant to me from all across the world.

Luca Bianchin, University of Trieste - luca.bianchin@phd.units.it



Colin G Brookes Photography

ECORD Bremen Summer School 2016³ - Submarine Geohazards: Mapping, Monitoring, and Modelling - 5-16 September

My area of research focuses on submarine landslides offshore volcanic islands and I am particularly interested in submarine geohazards. During my PhD at the Institut de Physique du Globe de Paris (France), I worked on the characterisation of a large submarine landslide deposit associated with the Montagne Pelée volcano flank-collapse events (Martinique island, Lesser Antilles). To do this, I analysed marine geophysical and Expedition 340 Lesser Antilles datasets, and undertook numerical simulations and analogue modeling experiments that allowed me to test my PhD assumptions. The ECORD Summer School 2016 perfectly fitted my area of interest and was an opportunity for me to extend my knowledge, to meet experts and to be more aware about IODP proceedings (as I have applied for two expeditions). I was especially interested in tsunami modeling and the Nankai Trough lectures gave me ideas for future work and collaboration. Moreover, the "virtual-ship experience" (*right*) was a good exercise to be prepared for future IODP expeditions.



Attending the summer school at MARUM, University of Bremen allowed me to visit the IODP Bremen Core Repository, and to find out about the submarine exploration systems, for example MeBo, that are based here. I also had the chance to meet and network with other scientists, and investigate future collaborations. All participants from the Summer School created a Facebook group so that we could keep in touch and alert each other to job postings, PhD opportunities and IODP Expedition information, and so help each other with our future careers

To summarise my take-home messages, they would be (1) be patient and persistent when submitting an IODP proposal, (2) study of submarine geohazards is evolving as fast as technology and so, is among the most challenging and important issue for research in the near future and (3) developing a network of contacts is key to success in research, and the Bremen ECORD Summer School helped us greatly in establishing networks.

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1 <http://www.urbinosp.it/>

2 <http://www2.le.ac.uk/departments/geology/research/gbrg/projects/iodp/summerschool1>

3 http://www.marum.de/en/ECORD_Summer_School_2016.html

Focusing on IODP Expedition

MSP Expedition 373 Antarctic Cenozoic Paleoclimate

The following article was written prior to ESO's announcement that Expedition 373 has been postponed. Since the expedition is expected to be scheduled for a future date, to be confirmed, this article is still of relevance to the IODP/ECORD community.

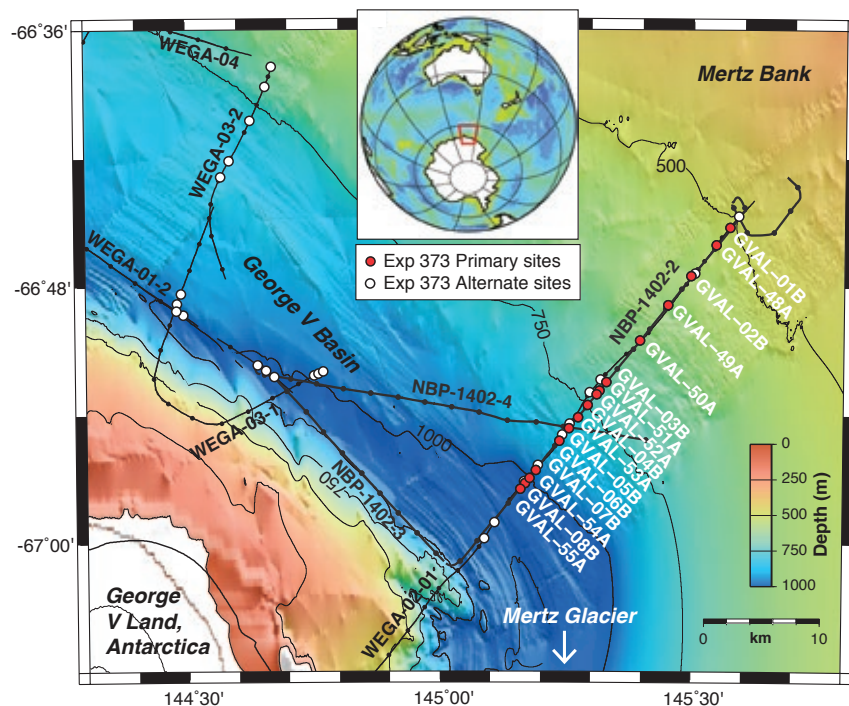
Trevor Williams¹ and Carlota Escutia²

The continental shelf of East Antarctica contains a record of Antarctica's climate and ice history from the lush forests of the Eocene greenhouse world to the dynamic ice sheet margins of the Neogene icehouse world. Early Cretaceous and Eocene organic-rich sediment have been recovered at the seabed in short piston cores and dredges.

In 2010 on the *JOIDES Resolution*, IODP Expedition 318 - http://iodp.tamu.edu/scienceops/expeditions/wilkes_land.html - recovered earliest Oligocene and early Pliocene subglacial and proglacial diamictites at shallow drilling depths. However, challenging ice and drilling conditions on the shelf resulted in poor core recovery and sites had to be abandoned before the main stratigraphic targets could be reached.

In February 2014, *N.B. Palmer* cruise NBP1402, led by Amy Leventer (Colgate University) collected high-resolution seismic reflection, bathymetry and grab sample data in the Mertz Glacier area ([map](#)); they found signs of glacial erosion in the upper package of strata along the primary site transect, and a range of Cretaceous to Eocene palynological dates from the grab samples (*Bijl and Sangiorgi, pers. comm.*), which may not be in place, having been moved downstream by ice.

In MSP Expedition 373, we plan to deploy the British Geological Survey's RockDrill2 (RD2) seabed drill from the US National Science Foundation's ice-capable research vessel *N.B. Palmer*. 50 m below the seabed without being impacted by the adverse effects of ship heave, and the ship will allow us to pass through sea ice to reach the drill sites. The expedition will drill a transect of holes to provide windows into the Eocene and possibly Oligocene stratigraphic sequence. Sedimentology, marine and terrestrial biomarker temperature proxies, and micropaleontological and palynological data will provide information on high-latitude paleoenvironments over this time interval, as the ice and climate history of the George V Land and Adélie Land margin can provide warm-world scenarios to help us to understand the limits of ice-sheet stability and Antarctic climate under future global-warming trajectories.



Bathymetric map showing IODP Expedition 373 primary and alternate drill sites and seismic profile lines (for references see Proposal 813).

Expedition objectives include investigation of:

- Antarctica's climate during Early/Middle Eocene greenhouse warmth, including cyclicity, temperatures and vegetation. Particular questions include the pole-equator temperature gradient, and a possible test of DeConto's permafrost hypothesis for Eocene hyperthermals;
- Climate cooling over the late Eocene in advance of main glacial inception. Were there precursor glaciations? How did Antarctica come to be the ice covered continent we see today?;
- The timing and environmental conditions of major ice advances over the shelf. Eocene/Oligocene ice advance (~34 Ma) and Oligocene ice/climate conditions;
- The predictions of glacial isostatic adjustment (GIA) models, as recorded in ice-proximal sediments in this area (e.g., relative sea level rise adjacent to expanding ice sheets);

Alternate sites provide options in case the primary sites are ice-covered, and these targets include Cretaceous and Miocene-Pliocene strata.

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² Instituto Andaluz de Ciencias de la Tierra - CSIC Universidad de Granada, Spain - cescutia@ugr.es

Travelling the ECORD world as a Distinguished Lecturer

Gabriele Uenzelmann-Neben*

The ECORD Distinguished Lecturer Programme (ECORD-DLP) is an initiative to present the IODP and the role ECORD plays within the programme and its structure as well as to communicate science based on IODP drilling results. The lecturer's role is to put IODP expedition results into a wider perspective for an audience not very familiar with the programme. Thus, new groups are hopefully engaged in the development of IODP proposals, the collection of pre-site survey data, participation in IODP expeditions, and the use of available IODP data and results.

As a geophysicist, I mainly contribute to an IODP expedition by providing seismic data for pre-site surveys. I may also participate in an IODP expedition as a physical properties specialist or stratigraphic correlator. But to aid the interpretation of my data, which is mainly seismic in origin, I make use of the results of IODP expeditions: physical properties measured from the cores and discrete samples (seismic velocity, density, porosity, natural gamma ray), lithology, age-depth models, sedimentology (grain size), geochemistry (carbonate and organic carbon content), and palynology. I correlate this information with the seismic data to assign ages to prominent reflectors, to understand changes in reflection characteristics, and to learn

about the timing and the nature of environmental changes in the area I am investigating.

So, to emphasize the significance of drill-site information for the reconstruction of, *e.g.*, the climatic development of a certain region via the study of seismic data, I successfully applied to become an ECORD Distinguished Lecturer for two years.

My talk was entitled "Reconstructing palaeo-circulation: Reading sediment drifts with the aid of IODP information". I use the seismic imaging of sedimentary structures such as sediment drifts to reconstruct palaeo-circulation and hence modifications in climate. I used information from ODP Leg 105 to date changes identified via the seismic data and assign possible origins, *e.g.* erosion and relocation of depocentres, which point towards changes in the pathway of the most active bottom current. I thus extrapolated the information gathered at a single location into a larger area.

The abstract of my talk attracted a large number of invitations from different ECORD member countries. Some of the institutes who invited me already had a strong link to IODP. Other institutions had not yet been involved. Although it was great to speak where there already

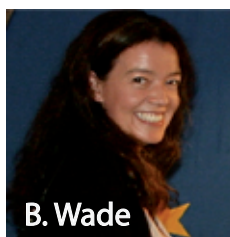
appeared to be a good knowledge about what IODP was about and hence a kind of common ground, I was delighted to be invited by institutions that are not involved in IODP. This showed the desire and interest to become involved in this exciting programme, to contribute new ideas to proposals, and to use the already available data.

I was warmly welcomed at every place I visited, and the organisation of my visit was always smooth from pick-up at the airport/ train station/hotel, to the occasional side programme. I usually gained a good overview of the institutions and the work carried out by meeting many people. The audiences at my talks were quite diverse, ranging from students to lecturers and teachers; often neighbouring institutions had been invited to listen as well. My impression was that the correlation of IODP results with seismic data especially caught the attention of the audience.

In addition to promoting IODP, being a Distinguished Lecturer was a great way of advertising my own work and getting in touch with scientists I may later collaborate with. I liked it tremendously! And I hope the people I visited and presented my science to enjoyed it as well.

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Host an ECORD Distinguished Lecturer in 2016-2017



B. Wade



M. Lever



M. Conin



G. Fröh-Green

<http://www.ecord.org/education/dlp/>

Calendar of Workshops and Conferences

2016 12 - 16 December AGU 2016 San Francisco, USA fallmeeting.agu.org/2016 ----- 2017 25-29 February Caldera Drilling - Campi Flegrei MagellanPlus Workshop Naples, Italy www.ecord.org/science/magellanplus 20 - 24 March 48th LPSC The Woodlands, TX, USA www.hou.usra.edu/meetings/lpsc2017/ 23 - 28 April EGU 2017 Vienna, Austria www.egu2017.eu	14 - 18 May GAC-MAC Kingston, ON, Canada www.kingstongacmac.ca 20 - 25 May JpGU-AGU 2017 Chiba, Japan www.jpogu.org/meeting_e2017 17 - 21 July International Clay Conference Granada, Spain www.16icc.org/ 6 - 11 August AOGS 2017 Singapore www.asiaoceania.org/society/index.asp 13 - 18 August Goldschmidt 2017 Paris, France goldschmidt.info/2017	10 - 12 October IMS 2017 Toulouse, France www.sedimentologists.org/ims2017 22 - 25 October GSA 2017 Seattle, WA, USA www.geosociety.org/meetings/2017/ 31 Oct - 3 November 3P Arctic Calgary, Canada www.3parctic.com 11 - 15 December AGU 2017 New Orleans, LA, USA meetings.agu.org ----- 2018 8 - 13 April EGU 2018	Vienna, Austria www.egu.eu 11 - 17 August Goldschmidt 2018 Boston, USA goldschmidt.info/2018/ 13 - 18 August ISC 2018 Québec, Canada www.isc2018.org/ 4 - 7 November GSA 2018 Indianapolis, IN, USA www.geosociety.org/meetings/2018/ 10 - 14 December AGU 2018 Washington DC, USA meetings.agu.org
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2017 ECORD & IODP Meetings

SEP 10-12 January La Jolla, CA, USA	Chikyu IODP Board 15-16 March Kobe, Japan	JOIDES Resolution Facility Board 16-17 May Arlington, VA, USA
ECORD Outreach & Education Task Force #11 26-27 January Aix en Provence, France	EPSP 2-3 May College Station, TX, USA	IODP Forum September 2017 Shanghai, China
ECORD Facility Board #5 8-9 March Hannover, Germany	ESSAC #8 9-11 May Graz, Austria	Joint ESSAC & ECORD Council #5 October 2017 Edinburgh, UK

The Batsheva de Rothschild Workshop on Live Foraminifera

Sigal Abramovich*

Today the field of foraminiferal research is extremely diverse and interdisciplinary: new state-of-the-art biological and geochemical methodologies are combined to understand the biogeochemical signals that may be obtained from foraminiferal CaCO_3 shells.

A diverse group of scientists came together on 10 September 2016 at the Inter University Institute in Eilat, Israel, to share ideas and expertise. The meeting entitled "The Batsheva de Rothschild Workshop on Live Foraminifera" brought together leading foraminiferal researchers with expertise covering all existing geological and biological disciplines as well as young researchers and students. Practical sessions were a core aspect of this meeting, designed to introduce the wide spectrum of experimental approaches and methodologies in detail, guided by the organisers and invited guests. Also important was to showcase the spectacular array of foraminiferal diversity and habitats that exist in the Gulf of Aqaba-Eilat. Ninety participants from 18 countries attended the meeting. Another unique aspect of the meeting was a special foraminiferal art exhibition (*right*) that was sponsored by the Paul Brönnimann Foundation.



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Reports of MagellanPlus Workshops

Brazilian Equatorial Margin II (BEM II) - 30 March -1 April 2016, Ubatuba (Brazil)

Convenors: Francisco Hilario Bezerra, Luigi Jovane, Paola Vannucchi and Helenice Vital

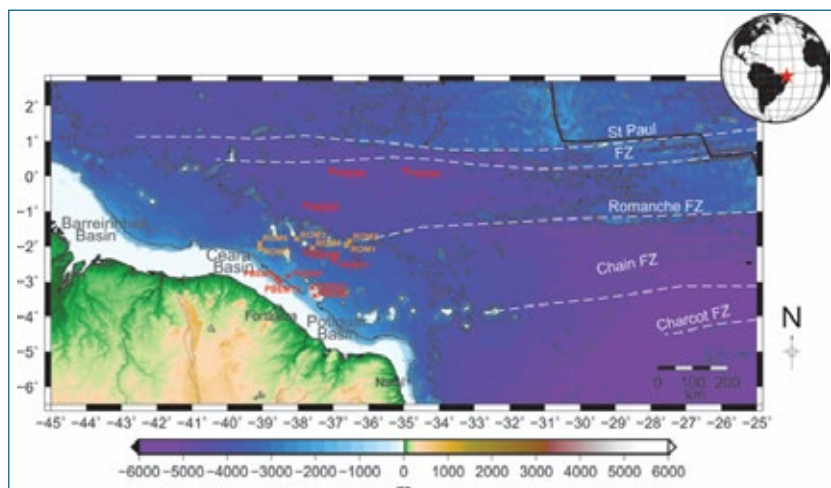
The MagellanPlus BEM II workshop held in Ubatuba, Brazil, in March-April, brought together scientists interested in offshore exploration of the Brazilian Equatorial Margin (BEM). BEM II followed the BEM I meeting that was organised in Maresias, Brazil in 2014. BEM offers a unique opportunity for scientists to focus on a margin that has maintained a stable intertropical latitude since its formation in the Early Cretaceous, and has contributed to the reconfiguration of the world's ocean circulation. Furthermore, BEM is shaped by the interaction of the continental margin with transform faults/fracture zones, so it remains a rare seismically active intraplate environment. Among the different themes discussed at the BEM I meeting, two themes were developed to the stage of submission of two pre-proposals in October 2014: 875-Pre, the Cenozoic Paleooceanography of BEM (P-BEM), and 882-Pre, the Tectonics of BEM (T-BEM). P-BEM focuses on unravelling the Cenozoic paleoclimate and paleoceanographic record in the inter-tropical latitudes, while T-BEM aims at understanding the role of transform faults/fracture zones in the evolution of continental margins. Following the encouragement of the IODP's Science Evaluation Panel, the goal of this BEM-II workshop was to move forward with

organizing, coordinating and writing the two full proposals for drilling in the Brazilian Equatorial Margin. The MagellanPlus BEM II workshop was also an outstanding opportunity to build upon the Brazilian community's knowledge of the equatorial margin and to review the large amount of industry-related datasets available from the submarine margin. CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) and FAPESP (Fundação de Amparo à Pesquisa do Estado de São Paulo) research foundations also sponsored the workshop, which resulted in 45 attendees from 9 countries. The outcome was an open discussion and sharing of data and new results that gave a clear focus for building on this knowledge to explore and develop a drilling strategy to recover the critical record of the BEM.

The workshop comprised a series of 6 scientific oral sessions with posters followed by break-out group discussions stimulated by key insights captured by rapporteurs during the sessions. The meeting culminated with plenary and break-out sessions in which seismic data from the BEM region was presented, key research questions were revised, new questions identified and possible drilling targets discussed. A two-day post-workshop discussion

was organised to enable the conveners and principal proponents of the two initiatives, P-BEM and T-BEM, to review and synthesise the wider group consensus and start the actual writing of the full-proposals.

As a result of this MagellanPlus workshop, the proponents received a clear mandate from the attendees to work toward the development of the two P-BEM and T-BEM full proposals. (right). The scientific importance of the BEM and the expertise of the scientists working on the proposals give these projects a high credibility profile. However, while key areas and general strategies have been identified to answer the scientific questions, there remains a major challenge that needs to be overcome before these two proposals will be ready to be considered for actual drilling. More site-survey work is still needed to better define the identified ideal target locations for drilling. In particular most of the ideal drilling sites sit in an abyssal environment where geophysical information is good enough to design the drilling strategy and main targets, but not to characterize the anticipated drilling conditions according to IODP standards. Those working on seismic data in collaboration with Brazilian proponents agreed to work together to pursue a necessary site-survey campaign that will be scheduled within the year following the workshop.



Location of drilling sites identified during the BEM II workshop and included in P-BEM and T-BEM (ROM) proposals.

A final important component of the success of the workshop was the high profile contributions given by scientists not previously involved in IODP projects and by early-career researchers, particularly from Brazil. The Atlantic Ocean offshore Brazil is a main exploration target for industry, yet it is poorly understood by academia. We look forward to learning much more about the equatorial Atlantic through the development of these drilling projects in the years to come.

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Antarctica's Cenozoic Ice and Climate History: New Science and New Challenges of Drilling in Antarctic Waters - 9-11 May 2016 (College Station, TX, USA)

Convenors: L. De Santis, T. Williams, K. Gohl, R. Larter, M. Weber, T. van de Flierdt, S. Bohaty and C. Hillenbrand

One of the most significant and pressing challenges for climate predictions is to resolve the unknown contribution of continental ice sheets to future sea-level rise. The marine-based West Antarctic Ice Sheet (WAIS), with much of its bed >1,000 metres below sea level, has the potential to provide a major contribution to sea-level rise over the next century and beyond. Therefore, understanding underlying processes, thresholds, and magnitudes of previous WAIS retreats and collapses, when global temperature and atmospheric CO₂ levels were higher than today, is essential to guide numerical model improvement and better predict future sea-level rise. These scientific issues are highlighted in Climate and Ocean Change Challenges 1 and 2 of the 2013-2023 IODP Science Plan and the Denver-2012 prioritisation of that plan by the US IODP community.

The USSSP and MagellanPlus-funded Antarctica's Cenozoic Ice and Climate History workshop (Texas A&M University, 9-11 May 2016) is part of a coordinated plan developed since 2009 by the Past Antarctic Ice Sheet Dynamics (PAIS) research programme

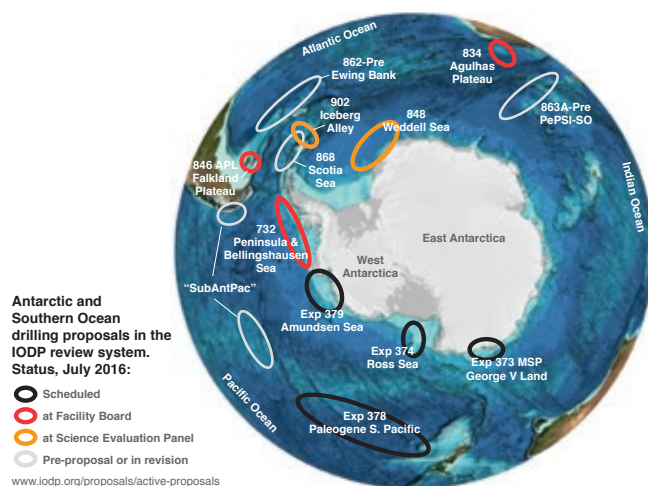
through the Scientific Committee on Antarctic Research (SCAR; www.scar.org), an International Council for Science (ICSU) committee, to stimulate Antarctic Margin Drilling Proposals. The workshop discussed the status of the Antarctic and Southern Ocean proposals currently in the IODP review system and highlighted the requirement of geographically diverse drilling transects because recent observation and modeling studies reveal a heterogeneous response of the Antarctic Ice Sheet to oceanic and atmospheric forcing.

Three drilling proposals (751 in the Ross Sea; 839 in the Amundsen Sea; and 732 in the Bellingshausen Sea and Antarctic Peninsula), approved by the Scientific Evaluation Panel and under consideration for scheduling by the JOIDES Resolution Facility Board (JRFB) at the time of the workshop, form a coherent West Antarctic Margin Portfolio of drillsites, that will illuminate the spatial and temporal variations of past Antarctic Ice Sheet dynamics and guide modeling skills for future predictions, by (1) reconstructing the orbital-scale Cenozoic dynamics of the WAIS,

(2) identifying drivers and their thresholds, especially of ocean forcing, for past WAIS retreat, and (3) assessing relationships between the Antarctic cryosphere, ocean circulation, and global climate. This is particularly timely because the 2015 UN Climate Change Conference in Paris requested that IPCC write a special report by 2020 to assess the climate impacts of climate stabilization at +2°C and +1.5°C, and the response of Antarctic Ice Sheets will comprise an important component of this report. The IODP expeditions will provide near-field ice-sheet data to complement and constrain the far-field sea level and paleoceanographic data obtained by expeditions in the Southern Ocean.

The workshop also addressed problems related to implementing drilling expeditions around Antarctica, like the presence of sea ice, and proposed a strategy in a report to the JRFB to drill the three WAIS proposals over three successive austral summer field seasons. The decision of the JRFB at their meeting, held in the week following the workshop, was that the Ross Sea proposal is now scheduled in early 2018, the Amundsen Sea proposal is scheduled for early 2019 (*page 4*), and the planned ship track returns to the South Atlantic and possibly Antarctica such that the Antarctic Peninsula proposal 732 could be drilled in early 2020. This is partly dependent upon the readiness of proposals in the South Atlantic Ocean, and indeed there are several South Atlantic proposals in the IODP system. The PAIS programme is now engaging actions to stimulate and help these proposals to progress.

During the workshop, some classic DSDP, ODP and IODP Antarctic sediment cores were laid out and examined, so that the participants could see some of the material on which much of the scientific knowledge of Antarctic climate history is based. The core examination also enabled direct conversations between



young scientists and more senior scientists (many of whom worked on the cores and in the seismic data tied to these cores), transmitting expertise, generating ideas, and encouraging the young scientists to join the Antarctic drilling community by applying for future IODP expeditions.

The workshop organisation and the US participation was funded by the USSSP. MagellanPlus supported the participation of 8 European lead/co-proponents of IODP proposals, early- and mid-career scientists and 3 Ph.D students. A total of 84 participants attended the workshop, including early-career to senior scientists, students, expedition proponents and IODP operators.

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MagellanPlus Workshop Series Programme



Upcoming Workshop:

Caldera Drilling - Campi Flegrei
 25-28 February 2017, Naples, Italy

Next call for proposals

open until **15 January 2017**

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



News from ECORD Member Countries

Switzerland

We are pleased that two young scientists from Swiss universities were invited to join IODP expeditions in 2016. **Lorenzo Lagostina** (ETH Zurich) is currently sailing onboard the *Chikyu* as a microbiologist for Expedition 370 T-Limit of the Deep Biosphere off Muroto (10 September -10 November 2016). **Philip Eickenbusch** (ETH Zurich) has been invited to sail on Expedition 366 Mariana Convergent Margin & South Chamorro Seamount, also as a microbiologist, departing in December on the *JOIDES Resolution*.

The **Swiss community** also continues to be active in representing ECORD



Microbiologists Maija Raudsepp and Lorenzo Lagostina cut a whole round sample from a core section (© JAMSTEC/IODP).

in the advisory committees, with Andrea Moscariello (University of Geneva) as chair of the ECORD Industry Liaison Panel; Stefano Bernasconi (ETH Zurich) as a member of the MagellanPlus evaluation committee; and Samuel Jaccard (University of Bern) as member of the Science Evaluation

Panel. After finishing her two-year term as ESSAC Chair and host of the ESSAC Office, Gretchen Früh-Green (ETH Zurich) now acts as ESSAC Vice-chair.

For the second time, **SwissDrilling.ch** is going to have a booth at the annual Swiss Geoscience Meeting, which is held on 18 and 19 November in Geneva. The booth will present past and future Swiss IODP and ICDP activities to the geoscience community of Switzerland and inform young researchers how to become involved in scientific drilling.

Mareike Trauerstein, SwissDrilling Coordination Office.
<http://www.swissdrilling.ch>

Canada

Man-Yin Tsang, a Ph.D student at the University of Toronto, is currently sailing onboard the *Chikyu* as a sedimentologist for Expedition 370 T-Limit of the Deep Biosphere off Muroto (10 September -10 November 2016). Another Ph.D student, **Margaret Cramm** from the University of Calgary, is simultaneously carrying out shore-based work on the cores as a microbiologist at the Kochi Core Center. **Richard Grieve** (Adjunct

Professor, University of Western Ontario and Emeritus Scientist, Natural Resources Canada) was invited to collaborate as an impact petrologist in the onshore phase of Expedition 364 Chicxulub K-Pg Impact Crater (September-October 2016).

Earlier this year, **Calvin Campbell**, a Research Scientist at the Geological Survey of Canada - Atlantic, was selected to serve on the IODP Science Evaluation Panel (SEP). As a site-characterisation specialist,



Sedimentologists Man-Yin Tsang and Stephen Bowden describe the lithology of a split core (© JAMSTEC/IODP).

Calvin provides the panel with expertise in deep-water sedimentary processes and marine geological hazards.

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Sweden

The Swedish news item begins with the appearance of **Professor Jan Backman** (Stockholm University), who is a stalwart of Swedish involvement in DSDP, ODP and IODP (Jan has sailed eight expeditions as a Nanofossil Biostratigrapher and one as Co-chief Scientist) pictured together with the other biostratigraphers of the IODP Expedition 362 Sumatra Seismogenic Zone, which ended in October 2016 (*right*).

Somewhat younger Swedish-based participants in ECORD activities have been on the move to present results of their post-cruise research. For example, **Elinor Andrén, Thomas Andrén and Falkje van Wirdum** (all based at Södertörn University) attended the 13th Colloquium on Baltic Sea Marine Geology (12-16 September in Gdansk, Poland) and presented post-cruise data from Expedition

347 Baltic Sea Paleoenvironment. Along a similar vein, Elinor and Falkje attended the 24th International Diatom Symposium in Quebec, Canada in August.

Nadine Quintana Krupinski (Lund University) also presented her Expedition 347 studies of foraminiferal geochemistry at the 12th International Conference on Paleoceanography that was held in Utrecht, The Netherlands, in August. She was joined by **Bryan Lougheed** (Uppsala University), who is helping several Expedition 347 scientists to construct age-depth models and co-authored a poster presentation. **Abigail Barker** (Uppsala University) attended the post-cruise meeting of Expedition 350 Izu-Bonin-Mariana Rear Arc, which was held in Marrakesh, Morocco in early May and gave an invited presentation of her results at



(photo T. Fulton, IODP JRSO)

the Goldschmidt Conference held in Yokohama, Japan, in late June.

As an example of the value of the ocean drilling community's curation system, samples from ODP Leg 171B (Blake Nose Palaeoceanographic Transect) provided the basis of a study of the oceanic silica cycle, which was recently published by researchers from Lund University (Fontorbe et al. 2016, EPSL vol. 453, 67-77).

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Portugal

Following the departure of Telmo Carvalho from FCT, **Rita Silva Carvalho**, the current head of FCT's Ocean Office, was nominated in April 2016 as the new ECORD Council Alternate.

In May 2016, ESSAC Delegate, Antje Voelker, and ESSAC Alternate, Cristina Veiga-Pires, hosted the 6th **ESSAC meeting in Faro**, southern Portugal. During the field trip (*right*), the delegates visited outcrops of Miocene, Cretaceous and Triassic rocks along the Algarve coast.



During the field trip of the 6th ESSAC meeting attendees and their field guides study Cretaceous rocks near the town of Albufeira.

Helder Pereira, the high-school teacher from Loulé (Algarve) who has been very active in IODP-

related outreach activities, was invited to attend the *Chikyu* Onboard School 2016 in Japan in early July 2016 (*page 12*). Helder was the sole participant from an ECORD country.

Vitor Magalhaes from IPMA's Marine Geology Division was invited to sail on Expedition 366 Marina Convergent Margin (December 2016 - January 2017).

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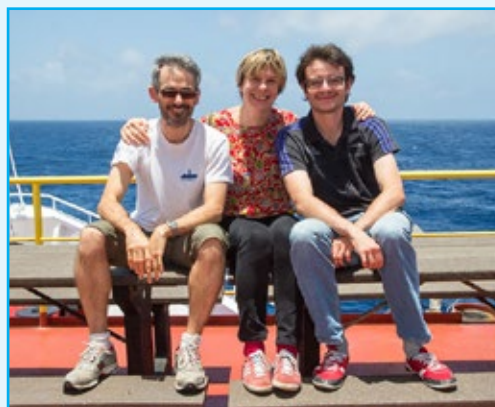
France

Eric Humler, Deputy Director of the Institut National des Sciences de l'Univers of CNRS (INSU-CNRS), is the new ECORD Council Delegate. Eric is an Igneous Petrologist who has taken part in many oceanic cruises.

INSU-CNRS are supporting two young French researchers, who recently sailed on the *JOIDES Resolution*. **Julien Crespín** (EPOC Environnements et Paléoenvironnements Océaniques et Continentaux, Bordeaux) on Expedition 361 Southern African Climates and **Hugo Poudroux** (Géosciences Rennes) (*above right*) on Expedition 362 Sumatra Seismogenic Zone, both of whom received a two-year post-doc contract to finalise their post-cruise research projects.

French teachers continue to be active in IODP educational activities onboard the *JOIDES Resolution*. After Michelle Darrieu, who sailed on Expedition 359 Maldives Monsoon and Sea Level, and Marion Burgio, who sailed on Expedition 360 SW Indian Ridge Lower Crust and Moho, **Agnès Pointu** (Lycée Louis de Broglie, Marly-le-Roi) took part in Expedition 362 as an Education/ Outreach Officer (*above right and page 11*).

The **IODP-France Scientific Days** will be held at the CNRS headquarters, Paris on 29 and 30 November 2016. More than 100 participants have signed up to attend this event, which will be an opportunity to highlight the



French participants in Expedition 362: left, Sylvain Bourlange (Université de Lorraine), Agnès Pointu (Lycée Louis de Broglie) and Hugo Poudroux (Géosciences Rennes) (photo T. Fulton, IODP/JRSO).

"good health" of the French IODP community and also to present the salient results of recently completed IODP expeditions.

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Italy

Last September IODP-Italy organised an ECORD/IODP exhibition booth at the 88th Congress of the Italian Geological Society in Naples (*page 13*). **Sergio Andò** (University of Milano Bicocca), a participant in Expedition 355 Arabian Sea Monsoon, gave a presentation titled "Raman Spectroscopy: an essential tool for future IODP expeditions" at EGU 2016. **Alessio Sanfilippo** (University of Pavia) represented the igneous petrologists at the Editorial Meeting for Expedition 360 SW Indian Ridge Lower Crust and Moho, held in May. **Laura De Santis** and **Nigel Wardell** (OGS Trieste) joined the EPSP meeting held in College Station in July, to illustrate the safety and



environmental issues associated with Proposal 751-Full2 West Antarctic Ice Sheet Climate (Ross Sea). Laura De Santis, who also co-convoked the MagellanPlus workshop "Antarctica's Cenozoic Ice and Climate History" (*pages 21-22*), has recently been appointed Co-chief Scientist of Expedition 374 Ross Sea West Antarctic Ice Sheet History, scheduled for January - March 2018.

Three Italian scientists have been invited to sail on IODP expeditions

367-368 South China Sea Rifted Margin (February to June 2017): **Claudia Lupi** (University of Pavia), Nannofossil Micropaleontologist, **Jacopo Boaga** (University of Padova), Petrophysicist, and **Sara Satolli** (University of Chieti-Pescara), Paleomagnetist.

Alessia Cicconi was selected as an ECORD participant in the School of Rock 2016 "Exploring Ocean Cores and Climate Connections from Antarctica across the Southern Ocean", onboard the *JOIDES Resolution*, in Cape Town, South Africa, from 29 May - 6 June 2016.

Marco Sacchi, Council Delegate
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Annalisa Iadanza, IODP-Italia
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Norway

In Norway we are happy to report that Norwegian scientists are applying to sail and participate in IODP expeditions in increasing numbers. The national ESSAC representatives will continue to keep informing the scientific community of any IODP news, and encouraging Norwegian participation.

Helga Kleiven, *ESSAC Delegate* kikki@uib.no and **Katrine Husum**, *ESSAC Alternate* - katrine.husum@npolar.no



Polar bear on ice flow in the Fram Strait (photo Katrine Husum).

Spain

After several years of budgetary problems, the Ministerio de Economía y Competitividad (MINECO) decided to fund Spain's participation in ECORD starting in 2016. We are now reorganising the national committee, which plans new actions and activities and addresses financial support for a national office and science activities. In the meantime, information about IODP opportunities is being distributed to the community through the IODP-ICDP mailing list of nearly 960 subscribers.

F. J. Rodríguez Tovar (Univ. de Granada) was invited as a shore-based paleontologist for Expedition 364 Chicxulub K-Pg Impact Crater; and **C. Escutia** (IACT-CSIC), was invited as one of the Co-chief Scientists of Expedition 373 Antarctic Cenozoic Paleoclimate. Spanish scientists participated in the MagellanPlus Antarctica's Cenozoic Ice and Climate History ([page 20-21](#)) in May 2016, in College Station, TX, USA.

IODP-ICDP Spain recently organised a scientific session and a Round Table during the **IX Geological Congress in Huelva** (12-14 September). We also displayed ODP-ICDP core replicas in a booth, and IODP

was the topic of one of the plenary lectures delivered by C. Escutia. ECORD Council Delegate, J. R. Sanchez Quintana (MINECO), and S. Luthi (ICDP) assisted in both the scientific session and Round Table activities.

IODP polar drilling has been the topic of Open House activities ([above](#)) and a 5-day research activity within the framework of the PIISA Project (Initiation to Research and Innovation in Secondary Schools of Andalucía) entitled "Back to the Future: How the Sedimentary Record of Paleoclimate and Antarctic



Ice Sheet Dynamics can Inform the Future". These activities were held at the Spanish Research Council - Instituto Andaluz de Ciencias de la Tierra hosted by C. Escutia, A. Salabarnada, A. López-Quirós and D. Evangelinos. In addition, the scientific outcomes of Expedition 318 Wilkes Land, investigating past climate warming and ice-sheet stability were, featured in two Spanish TV programmes.

Carlota Escutia, *ESSAC Delegate* - cescutia@ugr.es - and **José Ramón Sanchez Quintana**, *ECORD Council Delegate*

Austria

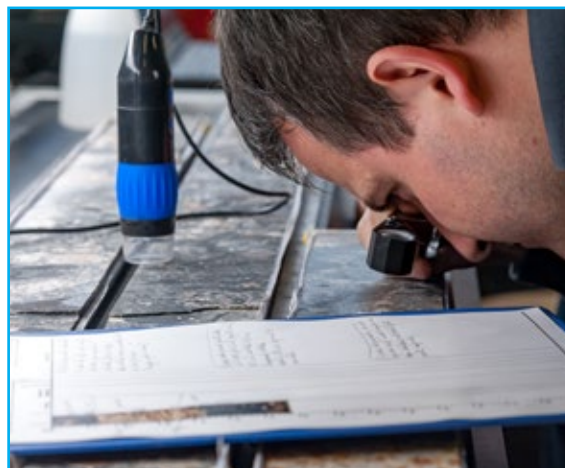
On 30 May, a symposium was organised at the Austrian Academy of Sciences in Vienna as the first public event of the **IODP and ICDP community in Austria** - http://www.oeaw.ac.at/geok/texte/icdp-iodp_2016-05-30_programm.pdf. The expedition science-related oral presentations by Patrick Grunert (University of Graz), Michael Strasser (University of Innsbruck), Walter Kurz (University of Graz), Werner E. Piller (University of Graz), and Ludovic Ferrière (NHM Vienna) were underpinned by a presentation from Rudy Stein (AWI Bremerhaven) on more general aspects of IODP, and highlights from his long-term involvement in the programme. The symposium clearly demonstrated the excellent performance of Austrian scientists within the programme and the value gained from being a member of ECORD/IODP.

Active involvement of Austrian scientists in IODP projects and

proposals in 2016 include the participation of **Ludovic Ferrière** (NHM Vienna) in the Onshore Science Party of Expedition 364 Chicxulub K-Pg Impact Crater (*right*).

Michael Strasser (University of Innsbruck) is a lead proponent in Proposal 835-Full2 Tracking Tsunamigenic Slips Across and Along the Japan Trench (JTRACK) and **Werner E. Piller** (University of Graz) is lead proponent in Proposal 875-Full Cenozoic Paleooceanography of the Brazilian Equatorial Margin (PBEM).

Walter Kurz (University of Graz) will participate in Expedition 366 Mariana Convergent Margin & South Chamorro Seamount scheduled for December 2016



(photo V. Diekamp, ECORD/IODP)

to February 2017 as an Igneous/Metamorphic Petrologist.

In addition, two early-career scientists applied for Expedition 369 Australia Cretaceous Climate and Tectonics demonstrating the still growing interest of Austrian scientists in the programme.

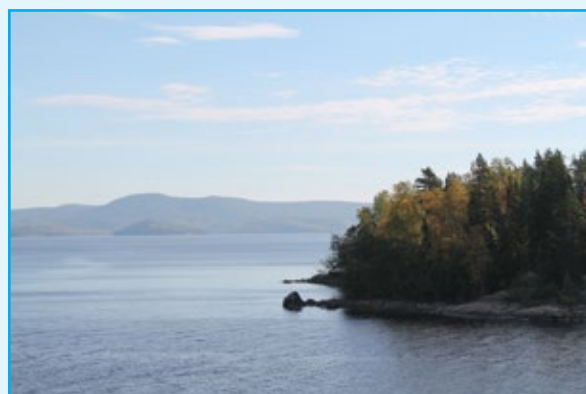
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Finland

The year started with the 32nd Nordic Geological Winter Meeting in Helsinki, organised by the Finnish Geological Society, the University of Helsinki and the Geological Survey of Finland. In the marine geological session, some preliminary results relating to the IODP **Expedition 347 Baltic Sea Palaeoenvironment** were presented.

The ongoing research project CISU (Climate - ice sheet - sea interactions - evolution of the Baltic Sea Basin over the past 60,000 years), led by **Prof. Aarno Kotilainen**, presented Expedition 347 based material both in August at the International Geological Congress (IGC), in Cape Town, South Africa, and in September at the 13th Colloquium on Baltic Sea Marine Geology in Gdansk, Poland.

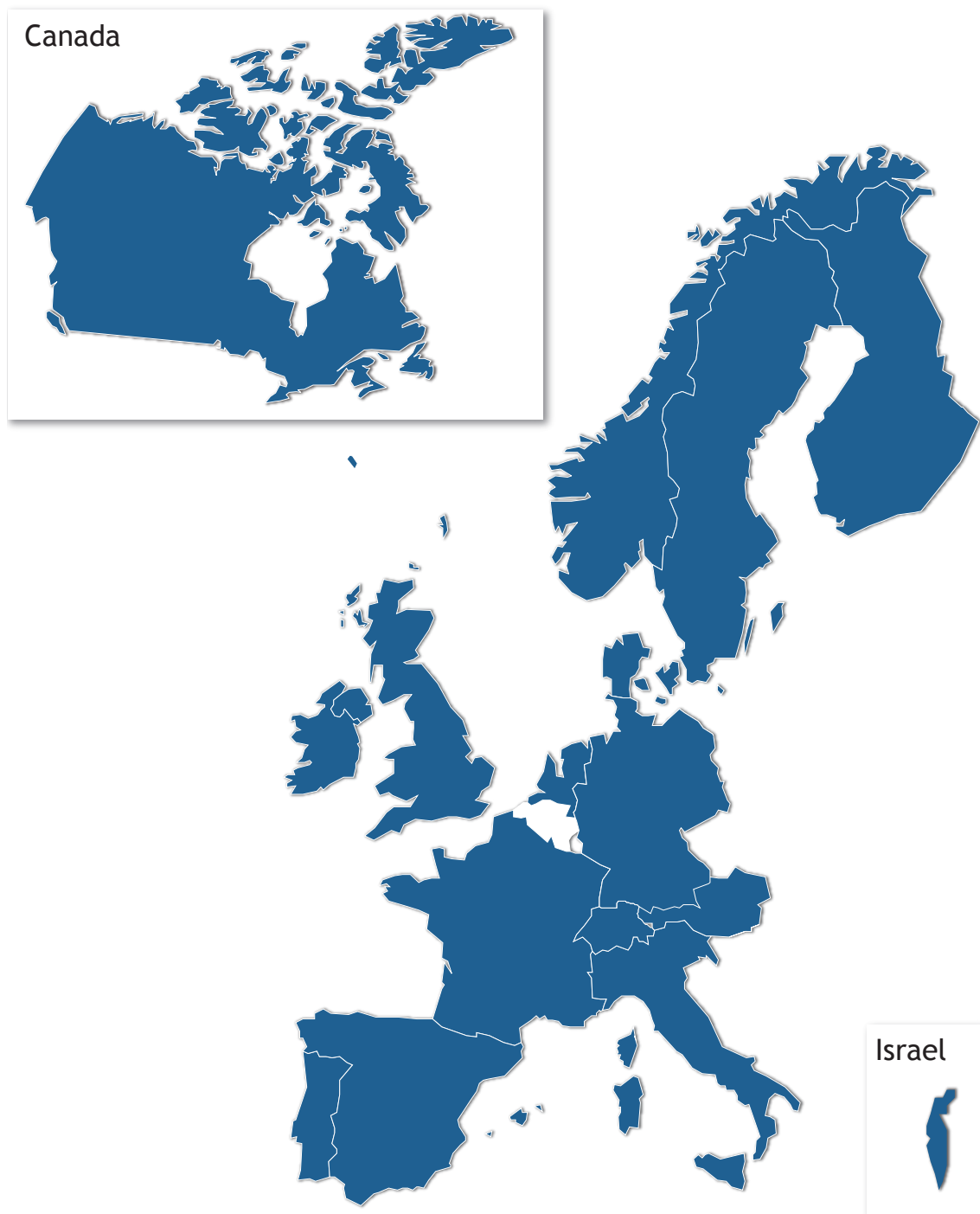
Outi Hyttinen and **Joonas Virtasalo**, respectively ESSAC Delegate and Alternate, participated in the



Expedition 347 Baltic Sea Palaeoenvironment (A. Kotilainen, ECORD/IODP).

Finnish Marine Research Infrastructure (FINMARI) research days (2-3 November) in Tvärminne, Finland.

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