ECORD
EUROPEAN CONSORTIUM FOR OCEAN RESEARCH DRILLING

Newsletter

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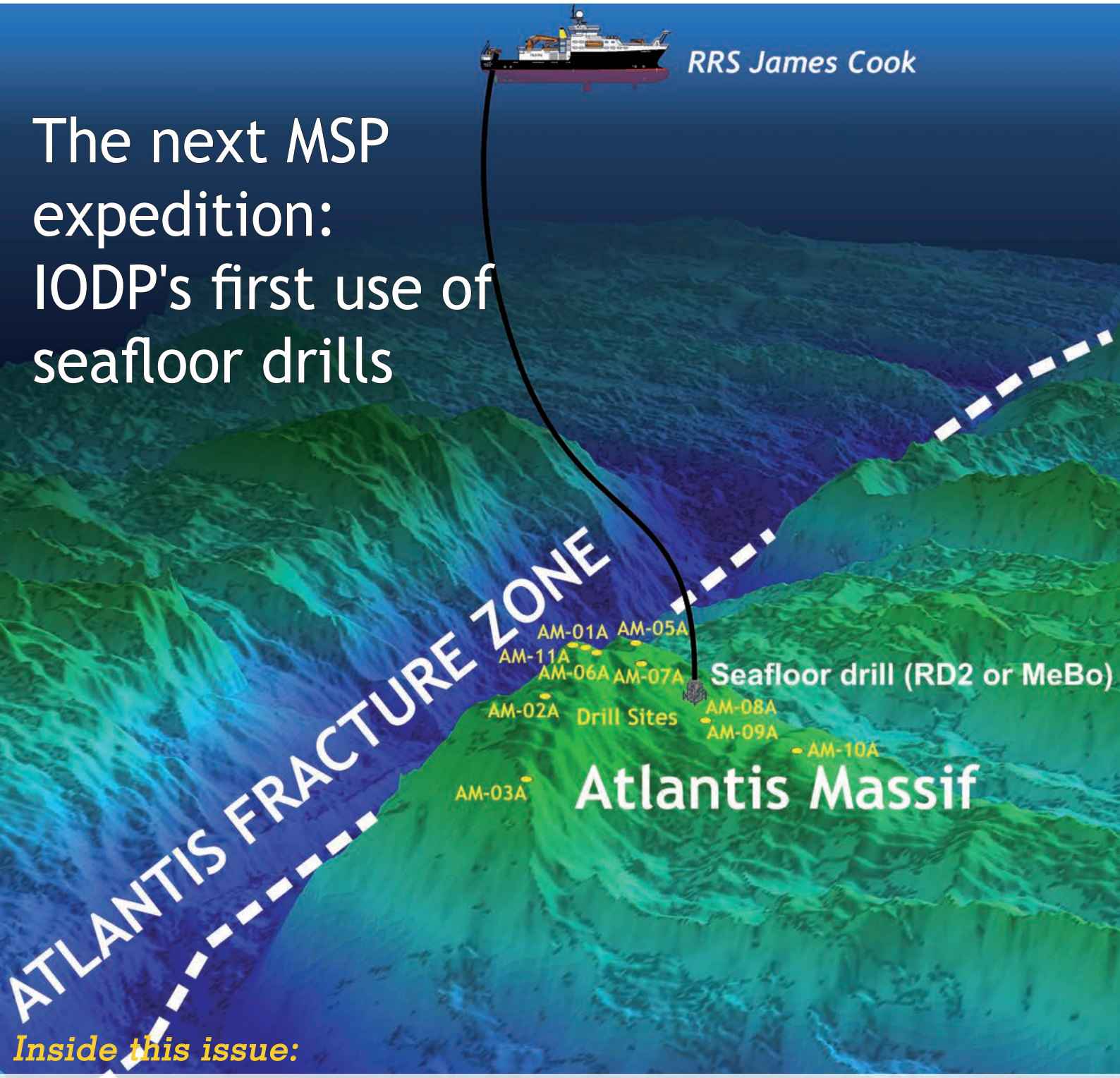
The next MSP expedition: IODP's first use of seafloor drills



Inside this issue:

IODP
INTERNATIONAL OCEAN DISCOVERY PROGRAM

Contents

The International Ocean Discovery Program (IODP) is an international research programme dedicated to advancing 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 Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Israel, The Netherlands, Norway, Poland, Portugal, 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; the People's Republic of China (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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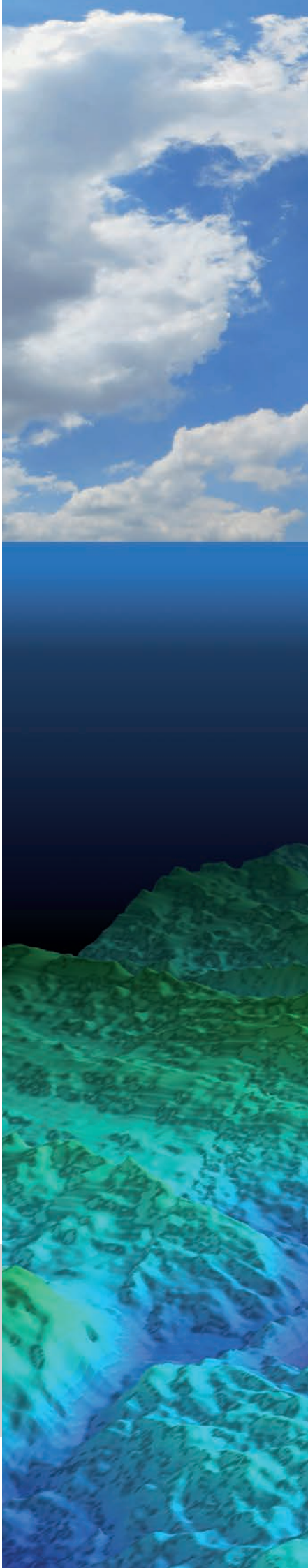
Thanks to all authors and contributors who helped prepare this issue.
Cover and photo right: artist's view of the next IODP MSP Expedition 357 Atlantis Massif Seafloor Processes (assembled by D. McInroy, ECORD Science Operator).



Gilbert Camoin

An Overview of ECORD Activities and Forward Look

Michel Diament

ECORD membership

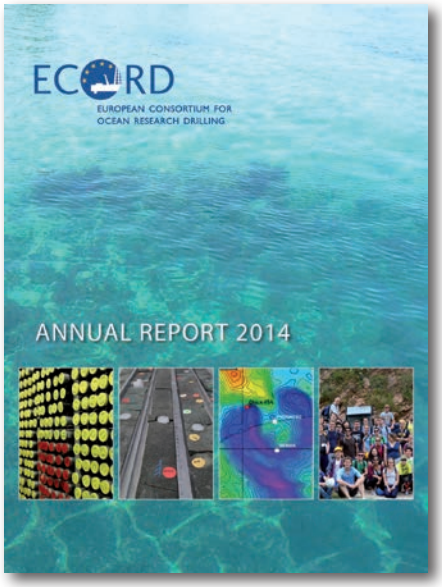
After the withdrawal of Iceland at the end of 2014, ECORD now includes 17 member countries *(back cover)* of which 13 have confirmed their participation in ECORD for a minimum of five years, and a minimum of three years for four countries (Canada, Denmark, Israel, Switzerland). Commitment of ECORD funding agencies beyond FY2018 will be based on an external evaluation of ECORD's achievements and performance in 2017. ECORD aims to increase its membership before this Triennal Review. and has maintained close contacts with Spain, with the hope to see this country back in the Consortium soon; Russia has recently been offered the status of "Accessing Member", allowing young Russian scientists to take part in the ECORD educational programme and Russian representatives to attend ECORD meetings as observers. This temporary status should allow our Russian colleagues to prepare for full ECORD membership. Preliminary contacts have been established with the Czech Republic, Turkey and Luxemburg for a possible future expansion of the Consortium.

Mission-specific platforms (MSP) expeditions

More than 80% of the ECORD annual budget, which is currently about USD 19M, concern IODP expedition operational costs. With an annual budget of USD 7.2M for MSP operations, significantly higher than during the previous programme (39 to 58% increase), ECORD demonstrates its commitment to achieving its major objective to deliver an average of one MSP expedition a year for IODP. This will be achieved by balancing the numbers of low, medium, and high-cost expeditions, and by attracting external co-funding and in-kind contributions whenever possible to provide additional funding to support MSP expeditions.

The ECORD Council has recently approved a document defining in-kind contributions for mission-specific platform expeditions that can be proposed by any IODP member or non-member country - http://www.ecord.org/about/aboutecord.html. Such in-kind contributions may include a wide array of direct operational facilities and services that ESO would normally pay for. In-kind contributions shall be rewarded by extra Science Party positions on the MSP expedition for which the contribution has been rendered.

Following a highly successful offshore phase in Fall 2013 and the Onshore Science Party at the IODP Bremen Core Repository (BCR) at the MARUM in early 2014, the outcomes of the MSP Expedition 347 Baltic Sea Paleoenvironment were reviewed by an ECORD Operational Review Committee. The committee



concluded that the expedition, which was focused on the record of climate changes over the last glacial cycle in the Baltic Sea, has been a great scientific and operational success, and proposed that the relevant review process serves as an example for future expeditions.

Over the last months, ESO has undertaken planning activities for future MSP expeditions. The next two expeditions to be implemented exemplify the relevance of external co-funding and in-kind contributions, as well as innovative drilling technology in the MSP concept. The first of these will be the IODP Expedition 357 Atlantis Massif Seafloor Processes: Serpentinization and Life *(page 5)*, which will be implemented in October - December 2015. It will be the first IODP expedition to utilise seafloor drill technology with the BGS seafloor Rockdrill 2 and the MARUM MeBo, which will be deployed from the NERC research vessel *RRS James Cook* provided as an in-kind contribution by the UK. The IODP Expedition 364 Chicxulub K-T Impact Crater, planned in early 2016 *(page 6)*, will investigate the only known impact structure on Earth that has been directly linked to a mass-extinction event. Its implementation will require significant external co-funding, probably through an in-kind contribution and/or additional cash contribution.

After IODP expeditions 357 and 364, the 5-year MSP expedition plan that has been defined by the ECORD Facility Board includes the potential implementation of an expedition on Antarctic Cenozoic Paleoclimate (IODP Proposal #813) in FY2017 and a drilling expedition in the Arctic in FY2018. The high number of MSP proposals in IODP evaluation and operational structures (ECORD Facility Board, SEP) - 20 as of November 2014 - demonstrates the great success of the MSP concept and will provide additional scientific, operational and funding opportunities in the near future. The proposals concern a wealth of science topics (climate and sea-level change, geohazards, hydrogeology, deep biosphere, ocean crust formation), various regions (Atlantic, Pacific, Arctic and Southern Ocean, Mediterranean Sea), as well as a great diversity of drilling/coring systems (drill ships, jack-up rigs, seafloor drills, long piston coring, etc.).

ECORD participation in *JOIDES Resolution* and *Chikyu* expeditions

Forty ECORD scientists, including two Co-chief Scientists, were invited to sail on five expeditions - 349 South China Sea Tectonics-CPP, 350 through 352 Izu Bonin Mariana expeditions - and 353 Indian Monsoon Rainfall - which were implemented by the *JOIDES Resolution* in the Pacific Ocean in 2014 *(page 12)*. This

strong involvement of ECORD scientists will be maintained, or even increased, on ongoing and future *JOIDES Resolution* expeditions in the Indian Ocean in FY2015 and 2016 - http://www.iodp.org/expeditions.

The remarkable intellectual contribution of the ECORD scientists to IODP is reflected by the very high number of ECORD proponents in active proposals (553, including 43 Lead Proponents, out of a total of 1,398). With six workshops organised in the frame of the MagellanPlus Workshop Series Programme, ECORD and ICDP have provided substantial support to scientists to develop innovative drilling proposals concerning diverse scientific topics and the three IODP platforms, as well as continental drilling.

ECORD collaboration with other science programmes and the EC

The new ECORD structure enables the Consortium to simultaneously exercise its functions with greater versatility and to create or improve its partnership opportunities with other science programmes and initiatives (*e.g.* ICDP, IMAGES/IMPRESS, EMSO), and the European Commission.

After the funding of the ISOLAT Workshop in the frame of the MagellanPlus Workshop Series Programme in 2013, a Multi-phase Drilling Project (MDP) was submitted to IODP - MDP-863 ISOLAT - aimed at resolving and reconstructing past atmosphere-ocean variability across the Southern Ocean and the Antarctic Circumpolar Current on orbital to sub-orbital timescales, through the acquisition of a suite of long (40-60 m) sediment cores from eight areas utilising long piston-coring technology.

In recent months, the ongoing closer collaboration between IODP and ICDP has led to the creation of Amphibious Drilling Proposals (ADP), in which the scientific objectives can only be accomplished by drilling both onshore and offshore. ECORD intends to play a pivotal role in the development and implementation of ADPs, as demonstrated by the submission of the first proposal combining land (ICDP NADIR proposal, Lead Proponent: A. Kopf) and shallow-water (IODP 796-Full, Lead Proponent: A. Kopf) drilling on a Ligurian landslide. To initiate the writing and submission of such proposals, a specific annual budget has been assigned to ADPs by ECORD and ICDP for the organization of workshops in the frame of the MagellanPlus Workshop Series Programme.

The Distributed European Drilling Infrastructure (DEDI) proposal, including partners involved ether in ECORD or in collaborating programmes (ICDP, EMSO and EPOS), which was submitted to the European Commission in September in the frame of the EC H2020 - INFRAIA-2014-2015 has, unfortunately, been rejected. The DEDI partnership will assess the feedback, and will consider what alternative opportunities may exist to take elements of the DEDI proposal forward.

ECORD educational activities

Besides its classical educational activities (ECORD Summer Schools, ECORD Scholarships, ECORD Research Grants), which are now open to IODP partners by way of an annual contribution, the ECORD Council recently endorsed the creation of an ECORD School of Rock for teachers that will be organised in ECORD countries on a rotational model.

As highlighted by the recently published ECORD Annual Report for 2014 *(page 3)*, the first full year of the International Ocean Discovery Program will have seen the completion of ECORD's mutation and its increasing involvement in the development of many innovations to better serve the scientific community and IODP as a whole.

Gilbert Camoin, Director of the ECORD Managing Agency - camoin@cerege.fr - and Michel Diament, Chair of the ECORD Council - diament@ipgp.fr
http://www.ecord.org

A new face at the ECORD Managing Agency (EMA)

On 1 January 2015, Nadine Hallmann joined the ECORD Managing Agency (EMA) as Assistant Director at the CEREGE, Aix en Provence (France) with Gilbert Camoin as Director, and Martine Tiercelin as Secretary. Patricia Maruéjol, the ECORD Outreach Coordinator, is based at the CRPG in Nancy (France).

Following her PhD focusing on the reconstruction of Holocene climate variability and environmental changes in the North Pacific, which she obtained in 2011 at the University of Mainz (Germany), Nadine worked for three years as a Post-doctoral researcher at the CEREGE on late Holocene sea-level changes in French Polynesia.

The ECORD Managing Agency is administered by the INSU-CNRS, a French national institute, which funds and coordinates national and international programmes and large infrastructure projects in solid earth, ocean and atmospheric sciences.

From right to left: Nadine Hallmann, Gilbert Camoin and Patricia Maruéjol.


David McInroy


Sarah Davies

ECORD Science Operator
News


Ursula Röhl


Dave Smith

In the previous ECORD Newsletter (#23), we reported on our next two exciting expeditions: IODP Expedition 357 Atlantis Massif Seafloor Processes and IODP Expedition 364 Chicxulub K-T Impact Crater. Planning and preparation for these expeditions is continuing, and we are looking forward to implementing Expedition 357 in October 2015.

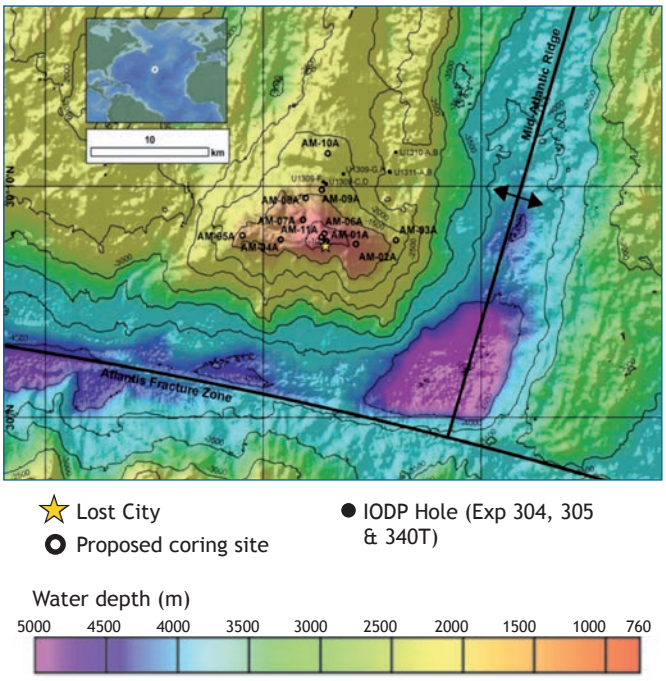
IODP Expedition 357 Atlantis Massif Seafloor Processes

Co-chief Scientists: Gretchen Früh-Green (ETH Zurich, Switzerland) and Beth Orcutt (Bigelow Laboratory for Ocean Sciences, USA)

As part of the technical build up for Expedition 357 and potential future MSP expeditions that will require the use of seafloor drills, several new technical developments are underway to enhance the capabilities of the two seafloor drills that will be deployed during Expedition 357: the BGS seafloor RockDrill 2 (RD2) and the MARUM Meeresboden-Bohrgerät (MeBo).

The first of these is the development of dual induction resistivity and magnetic susceptibility downhole logging tools for both the RD2 and MeBo. Both drills have some existing downhole logging capability through their own Spectral Gamma Ray tools. The RD2 tool has the additional capability of being able to take optical and acoustic images of the borehole wall. However, it has long been recognised that the logging capability would need to be expanded to suit the needs of IODP proposals. The joint BGS-MARUM development of the dual induction resistivity and magnetic susceptibility tools is the first step in what is hoped to be a long-term partnership in developing further downhole logging tools for seafloor drills.

In addition to the downhole logging developments, IODP Expedition 357 is driving other improvements to the seafloor drills that will provide data on borehole fluid chemistry and conditions on the seafloor in the vicinity of the seafloor drills. This information is important for this particular expedition, which is seeking to examine the hydrothermal activity across the Atlantis Massif and its relationship with chemical alternation and the activity of the deep biosphere. To that end, a borehole plugging system that is deployable from seafloor drills has been developed. The system comprises two parts, an outer pack that swells to seal the annulus between the drill pipe and the borehole wall, and a valve at the top of the drill string which allows future sampling of the borehole fluids by ROV. The internal walls of the packer and valve rods are treated with an epoxy coating to minimise the influence of steel components on the fluid chemistry and microbiology of the borehole.



Location of IODP Expedition 357 proposed sites.

As microbiological analysis is an important aspect of Expedition 357, a method is required to assess contamination of the cores from the circulating seawater that is part of the drilling process. The method being employed by the expedition is to inject a perfluorocarbon tracer (PTF) into the down-going seawater, with core confirmation assessed by analysing samples onboard for the tracer. This is normally a straightforward process on traditional drill ships, but requires some new development to use a similar system on a seafloor drill in a high-pressure environment at 800 m to 1,770 m water depth. To that end, a specialist slow-delivery pump, control system and tracer packs will be housed in pressurised containers to deliver tracer into the borehole circulation water.

The final development takes advantage of the fact that the seafloor drills can be used as vehicles to carry additional sensors and sampling equipment to the seabed to characterise bottom conditions before and after drilling. A sensor and water sampling assembly is being developed that is mounted onto the frames of the seafloor drills. A fluid entry point will be placed as close to the borehole as possible, with a pump diverting the fluids towards various sensors and water sampling bottles. The sensor package comprises conductivity, temperature and depth (CTD), dissolved oxygen, methane, pH and redox, as well as water sampling bottles.

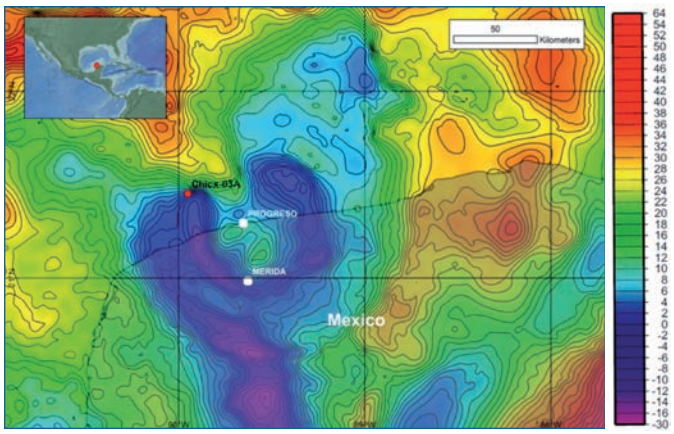


Figure 2. Location of IODP Expedition 364 proposed site, shown on map of free-air gravity (colour bar in mGal).

IODP Expedition 364 Chicxulub Impact Crater

Co-chief Scientists: Joanna Morgan (Imperial College London, UK) and Sean Gulick (University of Texas Institute for Geophysics, USA)

At the time of writing, this expedition is entering a new phase of planning as ESO enters discussions with a drilling contractor in the advanced stages of the platform tendering exercise. The Call for Scientists will be opened for the month of April 2015, with invitations expected to be issued in July.

Discussions are continuing with Mexican institutes, the Sistema de Investigación, Innovación y Desarrollo Tecnológico del Estado de Yucatán (SIIDETEY), and the National Autonomous University of Mexico (UNAM) as potential project partners. As part of the initiative to attract Mexican participation in IODP, a scientific workshop will be held in Merida, Mexico on 30-31 March, with the additional aim to conduct synergistic planning for the expedition, facilitate the permitting, and initiate public outreach and education within the State of Yucatán

David McInroy, ESO Science Manager, Sarah Davies, EPC Manager, Ursula Röhl, ESO Curation and Laboratory Manager and Dave Smith, ESO Operations Manager
http://www.eso.ecord.org

Selected 2014 publications from MSP expeditions

Looking back at the previous five mission-specific platform operations, the expedition science parties have been very active publishing the results of their research. As reported in the ECORD Annual Report for 2014, there were publications from all five MSP expeditions in the last year, with the highest number (five) from Expedition 302 Arctic Coring (ACEX) followed by four publications from Expedition 325 Great Barrier Reef Environmental Changes, two from Expedition 313 New Jersey Shallow Shelf and one from Expedition Tahiti Sea-Level. The Expedition 347 Baltic Sea Paleoenvironment Science Party published their Preliminary Report in 2014 and is available to download from http://publications.iodp.org/preliminary_report/347

Expedition 302 Arctic Coring (ACEX)

Alexanderson H, Backman J, Cronin TM, Funder S, Ingólfsson Ó, Jakobsson M, Landvik JY, Löwemark L, Mangerud J, März C, Möller P, O'Regan M, and Spielhagen RF (2014). Quat. Sci. Rev., 92, 9-31. doi:10.1016/j.quascirev.2013.09.023

Iwasaki S, Takahashi K, Ogawa Y, Uehara S, and Vogt C (2014). J. Oceanogr., 70(3), 241-249. doi:10.1007/s10872-014-0227-7

Knies J, Mattingsdal R, Fabian K, Grøsfjeld K, Baranwal S, Husum K, De Schepper S, Vogt C, Andersen N, Matthiessen J, Andreassen K, Jokat W, Nam S-I, and Gaina C (2014). Earth Planet. Sci. Lett., 387, 132-144. doi:10.1016/j.epsl.2013.11.007

Schröder-Adams C (2014). Sediment. Geol., 301, 26-40. doi:10.1016/j.sedgeo.2013.12.003

Stickley CE (2014). Nat. Geosci., 7, 165-166. doi:10.1038/ngeo2080

Expedition310 Tahiti Sea Level

Camoin G, and Webster J (2014). In: Earth and Life Processes Discovered from Subseafloor Environment - A Decade of Science Achieved by the Integrated Ocean Drilling Program (IODP). Series Developments in Marine Geology, 7, 395-441. doi:10.1016/B978-0-444-62617-2.00015-3

Expedition 313 New Jersey Shallow Shelf

Basile C, and Monteverde D (2014). Geosphere, 10(2), 207-220. doi:10.1130/GES00856.1

Fang J, Bjerrum CJ, Hesselbo SP, Kotthoff U, McCarthy FMG, Huang B, and Ditchfield PW (2014). Geosphere, 9(5), 1303-1318. doi:10.1130/GES00851.1

Expedition 325 Great Barrier Reef Environmental Changes

Felis T, McGregor HV, Linsley BK, Tudhope AW, Gagan MK, Suzuki A, Inoue M, Thomas AL, Esat TM, Thompson WG, Tiwari M, Potts DC, Mudelsee M, Yokoyama Y, and Webster JM (2014). Nat. Comm., 5, 4102. doi:10.1038/ncomms5102

Hinestrosa G, Webster JM, Beaman RJ, and Anderson LM (2014). Mar. Geol, 353, 1-20. doi:10.1016/j.margeo.2014.03.016

Puga-Bernabéu A, Webster JM, Beaman RJ, Reimer PJ, and Renema W (2014). Mar. Pet. Geol., 50, 40-50. doi:10.1016/j.marpetgeo.2013.11.009

Zhang G, and Smith-Duque C (2014). Geochem., Geophys., Geosyst., 15(7), 3066-3080. doi:10.1002/2013GC005141

Expedition 347 Baltic Sea Paleoenvironment

Expedition 347 Scientists (2014). Baltic Sea Basin Paleoenvironment: paleoenvironmental evolution of the Baltic Sea Basin through the last glacial cycle. IODP Prel. Rept., 347. doi:10.2204/iodp.pr.347.2014


Albert Gerdes


Alan Stevenson

ECORD Outreach & Education

News and Activities


Patricia Maruéjol


Julia Gutiérrez Pastor

Since November 2014, the ECORD Outreach & Education Task Force (ECORD OETF) have organised outreach activities at AGU 2014 in collaboration with ICDP, produced and distributed ECORD/IODP resources, and distributed information to the MagellanPlus Workshops. The team met in Nancy, France, on 27-28 January to coordinate the programme's outreach and education activities for 2015. We welcomed a new member, Nadine Halllman, the new EMA Assistant Director *(page 4)*. Thomas Wiersberg, Outreach & Education Manager at ICDP also attended the meeting.

- **AGU 2014 - http://www.ecord.org/pi/booths.html** - 15-19 December 2014, San Franciso (USA). Joint ECORD/IODP-ICDP exhibition booth and townhall meeting.
- Information and support (materials, core replicas, etc.) were provided to MagellanPlus Workshops *(pages 19-20)*. The ECORD OETF also finalised the loan of a J-FAST core replica provided by CDEX/JAMSTEC. No doubt such material will be extensively requested by ECORD members.

Upcoming events and activities

The ECORD OETF will continue to promote both the IODP and ICDP programmes under the umbrella of "Scientific Drilling" at science conferences and supporting national IODP educational initiatives. To enhance further collaboration, IODP and ICDP outreach colleagues are invited to take part in each Fall meeting of the ECORD OETF. We have been tasked by the IODP Forum to produce a new IODP brochure and discussions will continue troughout this year with our partners. ECORD and ICDP will organise a joint exhibition booth and a townhall meeting at EGU2015, 12-17 April in Vienna, Austria.

Education

Markus Fingerle (German science teacher) *(page 8)* and Diane Hanano (IODP-Canada Science Coordinator) *(below and page 26)* have been invited to sail as Education Officers during Expeditions 353 and 354 repectively. Following the successful ECORD School of Rock (SOR) held in France in 2014, plans are underway to support the 2nd ECORD SOR organised by Helder Pereira (Teacher at Sea on IODP Exp 339) in Loulé, Portugal on July 2015. Classroom activities with core replicas were organised in Pau and Valbonne, France, by two French teachers, Jean Luc-Bérenguer and Jean-Noël Puig who took part in education activities onboard the *JR* and continue to bring IODP in their classrooms to explain earth science to their students.

ECORD Outreach team: Albert Gerdes and Alan Stevenson, ESO, Julia Gutiérrez-Pastor, ESSAC and Patricia Maruéjol, EMA - http://www.ecord.org/pi/contacts.html

At the core of a sea-going research expedition

Students of the Premiere S course at the Centre International de Valbonne spent one hour living at the core of a scientific expedition when the research drillship *JOIDES Resolution (JR)*, currently in the Bay of Bengal (Expedition 354 Bengal Fan - http://iodp.tamu.edu/scienceops/expeditions/bengal_fan.html), connected with the classroom for a live video broadcast.

The onboard scientists began the broadcast by clearly stating the aims of the current scientific expedition. After a guided tour of the drillship, they then answered the students' questions. It was a great moment for the students to be able to communicate with the scientists … in English!

There was a lot of enthusiasm among the audience when there was a live connection with the scientists in action working with the sediment cores freshly collected from beneath the seafloor.

Live video events from the *JR*: http://joidesresolution.org/node/1746

Jean-Luc Bérenguer, Science Teacher, International High School in Valbonne Sophia Antipolis (France), Teacher at Sea (IODP 345) and School of Rock (2009) jlbereng@gmail.com

Sailing as an educator on IODP Expedition 353 "iMonsoon" in the Bay of Bengal

On 27 November 2014, the *JOIDES Resolution (JR)* set sail from Singapore for IODP Expedition 353 Indian Monsoon Rainfall (iMonsoon). During the two-month cruise, the research vessel criss-crossed the Bay of Bengal, drilling and analysing six sites to get a better understanding of the past processes forming the Indian Monsoon - or iMonsoon for short. As a special event, the ship took one short stop in the port of Vishakhapatnam in India for an inspection by the local authorities and to bring onboard three more scientists from India.

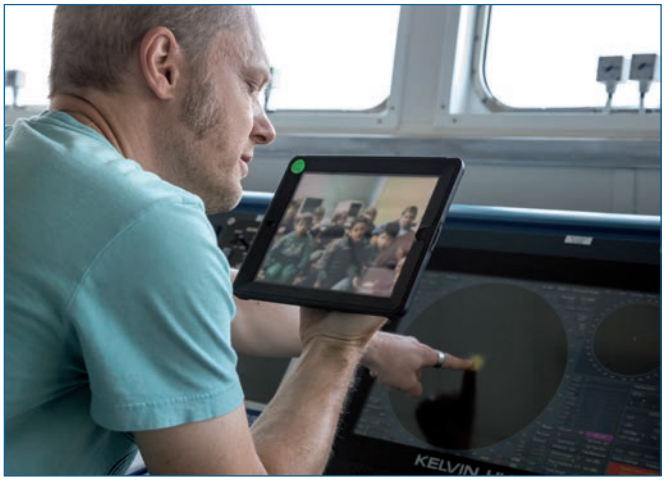
So finally there were 34 scientists representing 11 nations onboard, eager to drill for sediments. For me being part of that group, it was the first time on the *JR* - the first time on any research vessel to be honest - and it was a big honour to have been chosen. Together with my colleague Juliet Crowell from the Smithsonian Museums in Washington D.C., I was in charge of education and outreach activities on the *JR*.

Almost the whole crew of Exp353 (excluding those on duty and asleep) (photo Bill Crawford, IODP)

Our work included writing blogs about the science carried out onboard, the ship itself, its technology and the people filling it with life, which we did via facebook, twitter, instagram and the ship's official webpage http://www.joidesresolution.org.

I also took lots of pictures. Not only of the very popular sunrises and sunsets, but much more importantly pictures showing the drilling work ("Core's on deck!" being the most important call), the cores and the science related to them. These pictures, along with others from the very gifted photographer scientists onboard, and last but not least from the wonderful IODP imaging specialist Bill Crawford, were published on the internet resources, adding colourful impressions to the written information.

I also wrote articles for German newspapers and gave radio interviews. I didn't know how exciting it would be to know that there is half a state listening while you're making a phone call!



Me during a broadcast to a group of 7-year-olds in Germany, explaining the radar on the bridge (photo Bill Crawford, IODP)

The most important and fascinating part of our job was to make live video-broadcasts via internet to different schools and venues worldwide. After two months we ended up having made 78 broadcasts, more than half of them to European venues in Germany, France, Great Britain and Spain. We found it extremely satisfying to see how interested and enthusiastic the students (age 7 to 20+) were once they learned about the *JR*.

The standard procedure for a broadcast included a tour of the ship, showing the bridge, the drill floor, catwalk and the different laboratories. We mostly included interviews with scientists, especially those who were able to give a short talk in their national language, talking about their work, the reason for it and the results they had achieved so far. Although most of the student groups had loads of questions - some of them had prepared long lists in advance - we always ended up answering all of their questions, occasionally returning to specific points of interest somewhere on the ship. One of the tours was filmed by a crew from the German public television (SWR) and broadcast during the evening news.

Summarising my time on the Bay of Bengal I can say that I met wonderful people, saw breathtaking science and an extremely professional crew. I was amazed by the opportunities modern technology opens up in terms of long-range education, which was unthinkable just ten years ago.

Goodbye *JOIDES Resolution*, I will really miss you! Thanks to everybody that supported me before, during and after the cruise and made this great adventure possible!

Markus Fingerle, Peutinger Gymnasium Ellwangen/Jagst, Germany - markus.fingerle@gmx.de

ECORD Training Course 2015: "Virtual Ship Experience"
9 - 13 March, Bremen, Germany

Scientific drilling projects provide unique opportunities to gain essential skills, both in their routine applications in IODP operations as well as in advanced methods used in hypothesis testing. Such skills should form an integral part of the portfolio of all aspiring early-career scientists. As host to one of only three IODP core repositories in the world - and the only one in Europe - the MARUM, University of Bremen, Germany, is also an important hub for the next generation of IODP scientists at an early stage in their careers. A new ECORD training course now provides an opportunity to prepare them for future participation on IODP expeditions.

photo Ursula Röhl/MARUM

From 9 March to 13 March 2015, the new ECORD Training Course was held for the first time with 30 participants from nine different countries, including non-ECORD IODP member as well as non-IODP member countries. This one-week course, with a focus on the IODP core-flow procedures, was tailored to prepare the participants for sailing on an offshore drillship expedition, and to instill in them an appreciation of the high standards required in all kinds of coring projects. IODP-style lab exercises formed the foundation of the course, following the pattern of the unique "Virtual Ship" approach developed for the popular Bremen ECORD Summer Schools. The participants played a very active part, were exceptionally dedicated in contributing to practical exercises *(above)* and discussions, and also gained initial insights into the legendary multidisciplinary team effort that is crucial for the success of the ocean drilling programmes.

For the detailed programme see http://www.marum.de/en/ECORD_Training_Course_2015.html.

Ursula Röhl, ESO Curation and Lab Manager and Manager of the IODP Bremen Core Repository, MARUM, University of Bremen, Germany - uroehl@marum.de

Group photograph of participants and lecturers of the ECORD Training Course 2015 (V. Diekamp/MARUM).

Training early-career scientists in downhole logging, petrophysics and seismic interpretation

Increasingly research-funding bodies across Europe are recognising the need to train and prepare early-career scientists (graduate students, Masters students and post-doctoral researchers) for successful careers in academia and industry through the delivery of high quality technical skills training. Petrophysics and seismic interpretation are fundamental in both scientific drilling and in a range of industries, including those involved in the exploration of water resources, hydrocarbons, geothermal resources and minerals. European Petrophysics Consortium (EPC) staff are involved in the provision of such valuable training courses, either as standalone sessions or integrated within more holistic training events, such as summer schools.

The **MEDGATE Initial Training Network (ITN)**, a Marie Curie project funded by the European Commission, is one such example. Johanna Lofi and Philippe Pezard (Montpellier) provided "Downhole logging and seismic profile interpretation" training to 15 researchers (PhD students, post-doctoral researchers and senior scientists) as part of a MEDGATE ITN event coordinated by Rachel Flecker (University of Bristol). Johanna's lectures centred on the Messinian Salinity Crisis event with practical sessions examining and interpreting relevant seismic profiles. The event also gave researchers an introduction to downhole logging including information about expected logging-tool responses from evaporites. Philippe, Johanna and Alberto Malinverno (Borehole Research Group, Lamont-Doherty Earth Observatory, Columbia University, USA) will also give a 3-day course to researchers from the OGS in Trieste (Italy).

Johanna Lofi provides logging operations training to PhD students at the MEDGATE ITN event, University of Montpellier, 2013 (photo Paul Meijer)

An **ECORD Summer School** organised by and held at the MARUM, Center for Marine Environmental Sciences and the IODP Bremen Core Repository, University of Bremen, Germany has run annually since 2007. The school connects early-career scientists with the IODP and raises awareness of the research possibilities within the programme. It also prepares these scientists for potential future expeditions. Since 2008, the EPC has been involved in a session teaching the principles of downhole logging and its role within the IODP framework. Each summer school focuses on a topic from the four main themes of the current IODP Science Plan (Climate and Ocean Change; Biosphere Frontiers; Earth Connections; and Earth in Motion) and the EPC tailors the downhole logging session by including data and examples from relevant past expeditions. The most recent school focused on the latest developments in the investigation of the deep marine biosphere (Subseafloor Biosphere: Current Advances and Future Challenges). Students completed a series of practical exercises to highlight how downhole measurements can provide valuable insight during expeditions that have a strong microbiology focus. Jenny Inwood and Sarah Davies (Leicester) presented petrophysical data from relevant expeditions including Expedition 336, Mid-Atlantic Ridge Microbiology.

The new **ECORD Training Course** *(page 9)* is an innovative venture developed by MARUM aimed at early-career and established scientists from academia and industry, who have an interest in scientific drilling and the development of core analysis skills. This one-week course introduces up to 30 participants to life as a scientist sailing on an offshore drillship, and provides basic training focusing on IODP core flow and shipboard scientific methods. IODP-style lab exercises underpin the training, which follows the highly successful "Virtual Ship" approach developed for the ECORD Summer Schools. As part of the introduction to general shipboard activities, downhole logging tools, measurements and data applications (Sarah Davies) are covered alongside demonstrations of shipboard physical properties measurements (Sally Morgan, Leicester) in collaboration with Holger Kuhlmann (MARUM).

National scientific research drilling training events held in the UK, France and Germany are key for raising awareness of scientific drilling and mentoring the next generation. A "Downhole Logging, Basics & Initial Interpretation" course was taught by EPC's Annick Fehr (RWTH Aachen) during 2014's German Scientific Earth Probing Consortium (GESEP). The GESEP School is a collaboration between

Jenny Inwood presenting at the ECORD Summer School, at the MARUM, University of Bremen, Germany, 2014 (photo Sarah Davies).

the International Continental Scientific Drilling Program (ICDP) and IODP, covering "Initial Drill-Core Processing, Analyses and Archiving". Seminar-style lessons with hands-on training help to prepare early-career researchers with the skills required to work in a challenging drilling environment. Louise Anderson, a former member of the EPC group, and now working as a Petrophysicist for Total E&P in Aberdeen, discussed the acquisition and interpretation of downhole measurements at the GEOCEANS Summer School in France in 2012 whilst working as an IODP Research Associate. EPC also provides work experience opportunities for students and graduates, for example Annette McGrath and Elke Hanenkamp (both Leicester) and Annick Fehr (RWTH Aachen) have mentored students working on IODP and non-IODP projects.

EPC scientists from Aachen, Montpellier and Leicester are involved in formal education ventures from undergraduate through to Masters and PhD programmes. As a key example, Christoph Clauser (RWTH Aachen) is one of the organisers of the highly regarded Masters programme in Applied Geophysics alongside IDEA League partners TU Delft and ETH Zurich.

The EPC team is committed to the provision of education and training to the wider scientific community

Annick Fehr presenting at GESEP in Erlangen (Germany), 2014 (photo Carola Knebel).

and members are available to give presentations and workshops on a range of downhole logging and core physical properties topics. If you are interested in this resource, or would like more information, please contact epc@le.ac.uk

The European Petrophysics Consortium

For more information

The three research institutions comprising the European Petrophysics Consortium (EPC), the Universities of Leicester (UK), Montpellier (France) and RWTH Aachen (Germany), have worked together for more than 25 years. The primary remit of the EPC team is to provide scientific and technical support to the IODP and ECORD via the ECORD Science Operator (ESO) and to be responsible for the acquisition and interpretation of high quality downhole logging and core physical properties data. The group also undertakes research focusing on borehole and core petrophysics data from IODP expeditions and other sources.
http://www.le.ac.uk/epc

Useful Weblinks:

ESO website: http://www.eso.ecord.org

Bremen ECORD Summer School: https://www.marum.de/en/ECORD_Summer_Schools.html

ECORD Training Course: https://www.marum.de/ECORD_Training_Course_2015.html

GESEP: http://www.gesep.de/en/homepage

IDEA League Joint Masters in Applied Geophysics: http://www.idealeague.org/geophysics/admission/index

MEDGATE: http://www.eu-medgate.net

Gretchen Früh-Green

ECORD Science Support & Advisory Committee

News

Julia Gutiérrez Pastor

Since the last newsletter, the ESSAC Office has completed its first successful year at the ETH Zurich and is continuing its efforts with education and outreach activities and staffing of expedition participants and panel members.

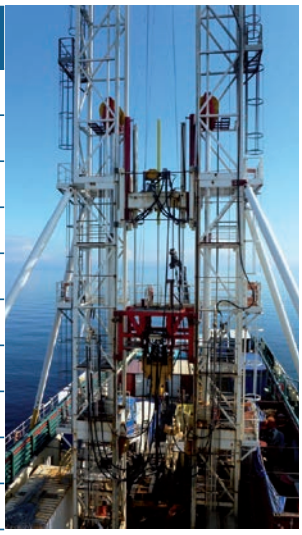
Five IODP expeditions were implemented on the *JOIDES Resolution (JR)* in 2014, and a total of 40 ECORD scientists (including seven from special calls) and 2 Co-chief Scientists were able to participate. The new year started off with the *JR* Expedition 354 Bengal Fan with 2 ECORD Co-chief Scientists, Christian France-Lanord and Volkhard Spiess, and 8 ECORD scientists onboard (including 1 from a special call). For future IODP expeditions in 2015, the *JOIDES Resolution* Science Operator (JRSO) has completed the invitation process for ECORD scientists to participate in three further expeditions: the Expedition 355 Arabian Sea Monsoon (CPP, with 5 ECORD scientists), Expedition 356 Indonesian Throughflow (with 10 ECORD scientists) and Expedition 360 SW Indian Ridge Moho (with 8 ECORD scientists and one Co-chief Scientist). We have also completed the nomination process for the *JR* Expeditions 359 Maldives Monsoon and 361 South African Climates; these expeditions include 2 ECORD Co-chief Scientists and staffing is underway. Applicants for these expeditions benefited from information provided by on-line, interactive seminars, ''webinars'', which is a new initiative organised by the Consortium for Ocean Leadership.

Since November 2014 we have completed the application and nomination processes for the next MSP Expedition 357 Atlantis Massif, which will be operated by ESO and will use seabed rock drilling technology for the first time *(page 5)*. ESSAC received 42 applications from 11 ECORD member countries for this expedition, and staffing is in progress.

Expedition 353 Indian Monsoon Rainfall: scientists carry the last "core on deck" (Bill Crawford, IODP JRSO).

IODP Expedition Drilling Schedule

Expedition	Exp #	Drillship	Dates	Co-chief Scientists
Arabian Sea Monsoon	355	*JR*	31 March - 31 May 2015	D. Pandey - P. Clift
Indonesian Throughflow	356	*JR*	31 July - 30 Sept 2015	S. Gallagher - C. Fulthorpe
Maldives Monsoon	359	*JR*	30 Sept - 30 Nov 2015	C. Betzler - G. Eberli
Atlantis Massif Seafloor Processes	357	*MSP*	*Oct - Dec 2015 (tbc)*	G. Früh-Green - B. Orcutt
Indian Ridge Moho	360	*JR*	30 Nov 2015 - 30 Jan 2016	H. Dick - C. MacLeod
South African Climates	361	*JR*	30 Jan - 31 March 2016	I. Hall - S. Hemming
Chicxulub K-T Impact Crater	364	*MSP*	*Spring 2016*	J. Morgan - S. Gulick
Sumatra Seismogenic Zone	362	*JR*	31 July - 30 Sept 2016	L. McNeill - B. Dugan
Western Pacific Warm Pool	363	*JR*	30 Sept - 30 Nov 2016	Yair Rosenthal - Ann Holbourn
Antarctic Cenozoic Paleoclimate	*tbd*	*MSP*	*tbd*	*tbd*



JR: JOIDES Resolution, MSP: mission-specific platform - http://www.iodp.org/expeditions. ECORD Co-chief Scientists are marked in blue. The derrick of the Greatship Manisha during Expedition 347 to the Baltic Sea (C. Cotterill © ECORD/IODP).

Co-chief Scientist Gretchen Früh-Green and David McInroy (ESO) also participated in the webinar for this expedition, providing information about operations and MSPs in general. In addition, a call has been issued to apply to sail on *JR* Expedition 362 Sumatra Seismogenic Zone; selection and staffing should be completed in the summer of 2015. We are pleased to see that many students and early-career scientists have the opportunity to participate in recent and future expeditions and make up around 50% of the ECORD participants in 2014 and 2015. More information about the scientific objectives and dates of all expeditions can be found on the IODP website at http://www.iodp.org/expeditions and on *table page 12*.

In the **IODP advisory panels**, ECORD has 9 members (including Dick Kroon as Co-chair) in the science sub-group and 5 members in the site-survey sub-group of the Science Evaluation Panel (SEP), which is responsible for evaluation of all IODP proposals. ESSAC has recently selected Steven Bohaty (UK), Marguerite Godard (France), Marc-André Gutscher (France) and Werner Piller (Austria) for the science sub-group of SEP to replace members who rotated off the panel last year *(table page 15)*. In addition, the ECORD Facility Board will increase its Science Board to six members starting in 2016 and a call for applications was completed at the end of 2014 - http://www.ecord.org/ecord-fb.html. ESSAC has selected, and the ECORD Council has approved, Gilles Lericolais (ECORD), Fumio Inagaki (Japan) and Stephen Gallagher (Australia) to replace members from the US and ECORD who are rotating off the board at the end of 2015. In addition, we issued a call for the ESSAC Chair 2016-2018, who will serve as Vice-chair in 2015. We are pleased to announce that ESSAC has selected, and the ECORD Council has approved, Jan Behrmann (GEOMAR, Kiel, Germany) as the next ESSAC Chair and who will take over the ESSAC Office at the beginning of 2016.

A new phase of the **ECORD Distinguished Lecturer Programme (DLP)** has started successfully with five new lectures that cover the major themes defined in the IODP Science Plan:

- Christian France-Lanord (CNRS, Nancy, France), "Himalaya: from mountains to drilling in the Bengal fan";
- Gabriele Uenzelmann-Neben (Alfred-Wegener-Institut, Bremerhaven), "Reconstructing palaeo-circulation: Reading sediment drifts with the aid of IODP information";
- Jens Kallmeyer (GFZ, Potsdam, Germany), "What controls abundance and activity of microbial life in subsurface sediments? New insights from scientific drilling";
- Antony Morris (Plymouth University, UK), "What can magnetism tell us about oceanic tectonics? New insights from scientific drilling"; and
- Paola Vannucchi (Royal Holloway, University of London, Surrey, UK), "Understanding megathrust earthquakes through ocean drilling".

To date a total of 40 DLP lectures are planned and the DLP lecturers will visit 13 ECORD countries. The schedule and more information is available under http://www.essac.ecord.org/index.php?mod=education&page=dlp.

The **ECORD/ICDP MagellanPlus Workshop Series Programme** continues to be a success and is designed to support scientists in member countries to develop new and innovative scientific drilling proposals for submission to IODP and ICDP. Currently three workshops are planned for 2015 - http://www.ecord.org/magellanplus.html *(page 18)*.

ESSAC continues to support successful initiatives to train the next generation of ocean drilling scientists through the **ECORD Summer Schools** and **ECORD Research Grants**. In 2015, young scientists will have the opportunity to participate in three summer schools sponsored by ECORD and related to marine science research and ocean drilling:

- The International School on Foraminifera (ISF), Urbino, 3-22 June, 2015 - http://www.isf.tmsoc.org;

The Urbino Summer School in Paleoclimatology (USSP) on 'Past Global Change Reconstruction and Modelling Techniques', University of Urbino, Italy, 15 July to 1 August, 2015 - http://www.urbinossp.it/;

- The ECORD Bremen Summer School 2015 'Ocean crust processes: magma, faults, fluxes and life', MARUM, University of Bremen, Germany, 31 August to 11 September, 2015 - http://www.marum.de/en/ECORD_Summer_School_2015.html.

As in past years, ESSAC will provide **ECORD Scholarships** to young scientists to attend the USSP and Bremen summer schools. ESSAC issued a call for applications for the scholarships (deadline 23 March 2015) as well as a call to host new ECORD-sponsored summer schools in 2016 (deadline 5 May 2015). The results of these calls will be announced following the next ESSAC meeting at the end of May - http://www.essac.ecord.org/index.php?mod=education&page=summer-school.

A new initiative has been added to ECORD's education activities in 2015: the **ECORD Training Course** takes advantage of the setting of the IODP Bremen Core Repository at MARUM and provides a "Virtual Drillship Experience" for scientists from academia and industry. This one-week course (9-13 March, 2015) focuses on basic training in IODP core-flow procedures and

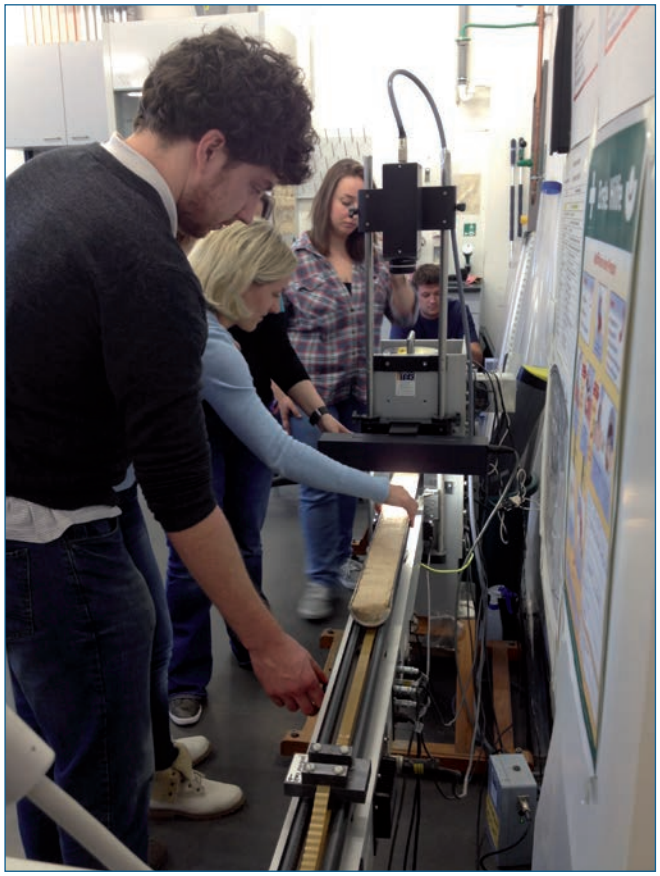
preparing participants to sail on an offshore drillship expedition *(page 9)*. IODP-style lab exercises form the basis of the ECORD Training Course and follow the pattern of the unique "Virtual Ship Experience" developed for the Bremen ECORD Summer Schools. MARUM received 56 applications from 17 countries, which attests to the immediate success of this new course - http://www.marum.de/en/ECORD_Training_Course_2015.html.

A call for applications for **ECORD Research Grants** (deadline 31 March 2015) was issued for outstanding graduate students to conduct research related to IODP. These short-term, merit-based awards contribute to travel and lab expenses and are particularly intended to support studies that promote new collaborations and/or the acquisition of new scientific expertise. Reports of previously awarded grants are posted on the ESSAC webpage - http://www.essac.ecord.org/index.php?mod=education&page=grants - and a report from Clifford Patten can be read on *page 17*.

As part of the "**Teachers at Sea" programme**, an initiative of the Consortium for Ocean Leadership, ESSAC is able to offer the unique opportunity for teachers and educators from ECORD countries to sail on expeditions onboard the *JOIDES Resolution*. Two ECORD teachers were selected for recent expeditions. Markus Fingerle (Germany) *(page 8)* participated on Exp. 353 (Indian Monsoon Rainfall) and Diane Hanano (Canada) *(page 26)* sailed on in Exp. 354 (Bengal Fan). We are looking forward to hearing about their experiences.

Further ESSAC-related activities include the EGU 2015 General Assembly Meeting (12 -17 April 2015), where we are organising a session entitled "Achievements and perspectives in scientific ocean and continental drilling" (co-organised SSP3.3/BG10/CL5/GMPV) as part of the new Programme Subgroup SSP3.3 - Ocean and continental drilling. As has now become a tradition at the EGU Meeting, more information about the new programme and possibilities to get involved will be available at the IODP-ECORD-ICDP Scientific Drilling booth in the exhibit hall and at the IODP-ICDP Townhall Meeting.

In summary, ESSAC continues to be active in science support and outreach activities and in shaping the future of ocean research. The ESSAC Office depends greatly on the active involvement of the ESSAC delegates and alternates in the numerous ranking and selection processes related to expeditions, panel membership, and education and outreach activities. We also appreciate the support, active involvement and input of the ECORD Council and the scientific community; all of which contributes importantly to the success of ESSAC as the science advisory body of ECORD.



ECORD Training School: early-career scientists learn how to operate the Multi Sensor Core Logger (MSCL) (photo Ursula Röhl/MARUM).

Gretchen Früh-Green, ESSAC Chair, and Julia Gutiérrez-Pastor, ESSAC Science Coordinator - essac.office@erdw.ethz.ch
http://www.essac.ecord.org

ECORD/IODP - ICDP at EGU 2015

IODP-ICDP session: Wed 15 April, 13:30-17:15, Room B1 & Blue Posters until 19:00
http://meetingorganizer.copernicus.org/EGU2015/session/17396
Townhall Meeting: Wed 15 April: 19-20:00, Room B10

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http://www.iodp.org/facility-boards#SEP - http://www.iodp.org/facility-boards#EPSP

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Highlights of IODP Proposal 820
Currents, monsoon and sea level in the Indian Ocean: the Neogene of the Maldives

Christian Betzler*

The Maldives carbonate edifice, which will be investigated during IODP Expedition 359, bears a unique and mostly unread Indian Ocean archive of the evolving Cenozoic icehouse world. It has great potential to serve as a key area for a better understanding of the effects of this global evolution in the Indo-Pacific realm. Based mainly on seismic stratigraphic data, a model for the evolution of this carbonate bank has been developed, showing how changing sea level and ocean current patterns shaped the bank geometries. The high-resolution seismic profiles show a dramatic shift in development of the carbonate edifice from a sea-level to a predominately current-controlled system. The stacking pattern of lower to middle Miocene depositional sequences was most likely primarily governed by fluctuations of relative sea level. This phase was followed by a two-fold configuration of bank development: bank growth continued in some parts of the edifice, whilst in other places banks drowned. Drowning steps seem to coincide with onset and intensification of the monsoon deposition of giant sediment-drifts that began at this time. The shapes of drowned banks attest to the occurrence of these strong currents *(Figure 1)*. The drift sediments, characterised by offlapping geometries, formed large-scale prograding complexes filling the Maldives Inner Sea basin *(Figure 2)*. Because the strong current swept most of the sediment around the atolls away, relict banks did not prograde, and steady subsidence was balanced by aggradation of the atolls, which are still active today. One important outcome of Expedition 359 will be ground-truthing of the hypothesis that the dramatic, pronounced change in the style of the sedimentary carbonate sequence stacking was caused by a combination of relative sea-level fluctuations and ocean current system changes. Answering this question would directly improve our knowledge on processes shaping carbonate platforms and their stratigraphic records. Our findings would be clearly applicable to other Tertiary carbonate platforms in the Indo-Pacific region, and to numerous others throughout the geological record. Drilling will also provide the cores required for reconstructing changing current systems through time, and for comparing this image with the data sets acquired in the monsoon-dedicated IODP expeditions. Furthermore, the targeted successions will allow calibrating of the Neogene oceanic $\partial^{13}C$ record with data from a carbonate platform to platform-margin series. This is becoming important, as such records are the only type that exist in deep time.

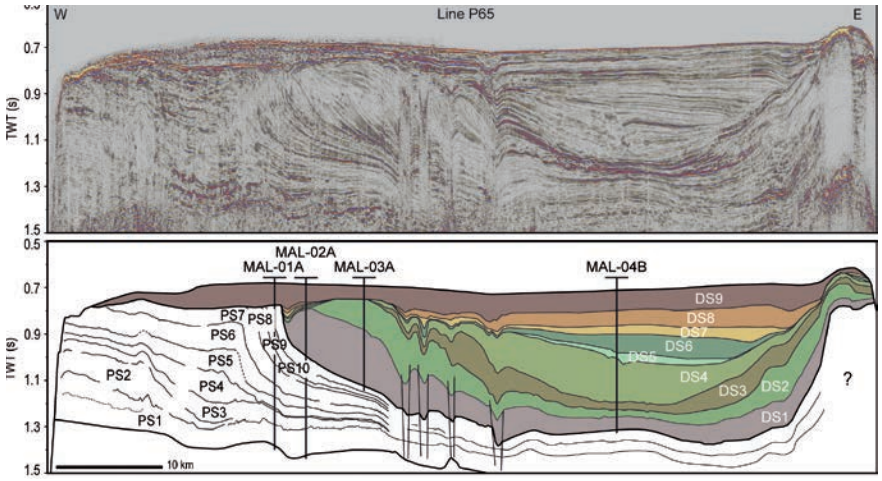

Figure 2. Seismic line P65 (northern drilling transect) with position of planned sites and line drawing showing depositional sequences and units defined in Betzler et al. (2013) and Lüdmann et al. (2013). PS refer to the sequences defined in the Miocene carbonate bank, DS to the units defined in the Miocene to Pleistocene drifts.

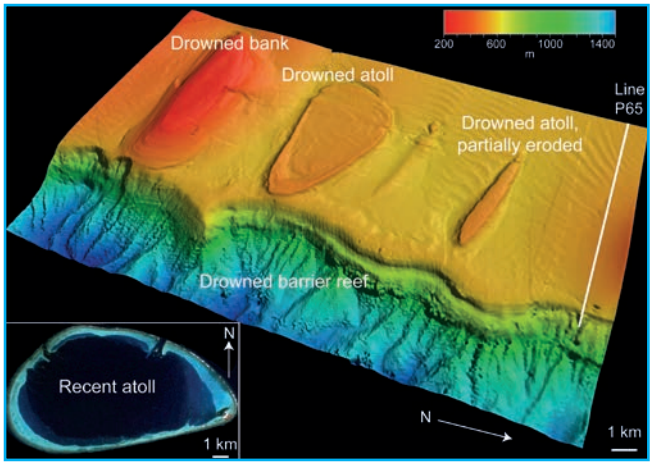

Figure 1. Multibeam map of the seafloor in the Kardiva Channel in the Maldives. The map shows a series of drowned barrier reefs, atolls and banks in water depths of 220 to 700 m. Estimated age of these structures is early to middle Miocene (Betzler et al., 2013).

Expedition 359 is scheduled for October and November 2015. Seven primary and two alternate sites were identified along two transects from the drowned banks into the drifts.

IODP Proposal 820 Proponents:
C. Betzler, T. Lüdmann, J. Reijmer, G. Eberli, P. Swart, A. Droxler, M. Tiwari, E. Gischler and C. Hübscher.

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References

- Betzler et al. (2013). Bas. Res., 25, *172-196.*
- Lüdmann et al. (2013). Mar. Petrol. Geol., 43, *326-340*

Report of ECORD Research Grants
In-situ analyses of IODP Hole 1256D sulphide population by EPMA

Clifford Patten*

Volcanogenic massive sulphide (VMS) ore deposits form from discharge of hot metal-rich hydrothermal fluids on or near the seafloor. Metal-rich fluid formation can occur by mineral reactions occurring at deep oceanic crustal such as magmatic sulphides leaching (*e.g.* Keays 1987). The extent to which this mineral reaction controls the release of metals into hydrothermal fluids is neither constrained nor quantified and investigation of this process would greatly improve our understanding of the formation of metal-rich fluids.

Located in the Cocos Plate, Pacific Ocean, IODP Hole 1256D is an ideal location to investigate the mineral reactions leading to metal-rich fluid formation. The drill core recovered a complete section of oceanic crust down to the plutonic complex (*e.g* Teagle et al. 2006). Recent investigations have shown depletions of S, Cu, Zn, Pb, Au, As, Sb, and Se in the deeper parts of the crust (Alt et al. 2010; Patten et al. sub.). This study, partly funded by an ECORD Student Research Grant, aims to determine the paragenesis of the sulphide population and its metal content in Hole 1256D using *in-situ* analyses. Both electron-probe microanalysis (EPMA) and laser ablation coupled to a mass spectrometer (LA-ICP-MS) enable determination of S, Fe, Co, Ni, Cu, Zn, As, Se, Ag, Sb, Te, Au, Hg and Pb content of sulphide minerals.

Microscopy observations and *in-situ* analyses enable the sulphide population to be classified in five different groups *(Figure 1)*:
(1) Pyrite fronts; occur in the volcanic section on the border of alteration halos and are characterised by pyrite and marcasite. They form partly by remobilisation of S from the rock; **(2)** Low temperature sulphides; also occur in the volcanic section mostly as disseminated grains or in veins. They

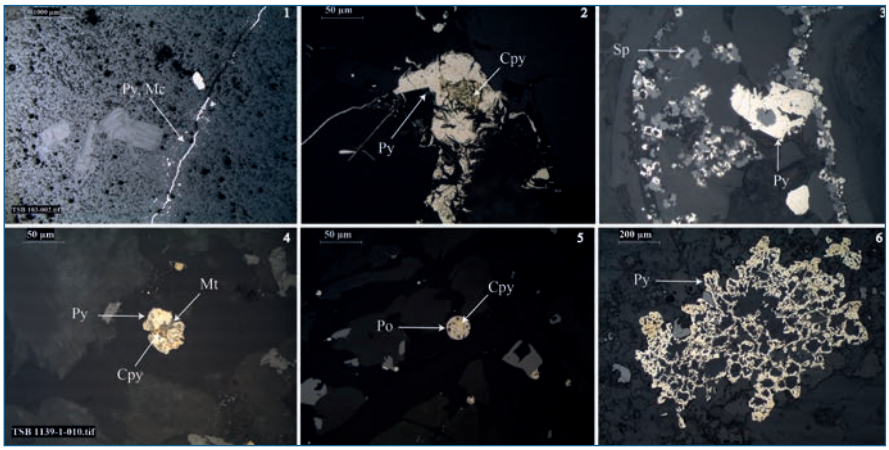

Figure 1. Sulphide population at IODP Hole 1256D. (1)pyrite front, (2) low-temperature sulphide,(3) high-temperature sulphide, (4) metasomatised sulphide, (5) primary magmatic sulphide, (6) patchy sulphide. Py: Pyrite, Cpy: Chalcopyrite, Sp: Sphalerite, Mc Marcasite, Mt: magneitite, Po: Pyrrhotite.

are characterised by pyrite and chalcopyrite and are related to seawater-derived fluid circulation; **(3)** High temperature sulphides; occur in the transitional zone and the upper sheeted dykes mostly in veins or in breccias. They are characterised by pyrite, sphalerite and chalcopyrite. These sulphides are interpreted as precipitating from mixing of cold seawater-derived fluids with hot rising hydrothermal fluids; **(4)** Metasomatised sulphides; occur in the sheeted dykes and the plutonic section. They are characterised by pyrite, chalcopyrite, millerite and magnetite. These sulphides are interpreted to form by oxidation of primary magmatic sulphides by hydrothermal fluids and show partially leached textures; **(5)** Magmatic sulphides; occur throughout all of the lithological units and are characterised by pyrrhotite, chalcopyrite and pentlandite. They are interpreted to be relics of primary magmatic sulphides that were present before hydrothermal alteration; **(6)** Patchy sulphides; characterised by pyrite and marcasite

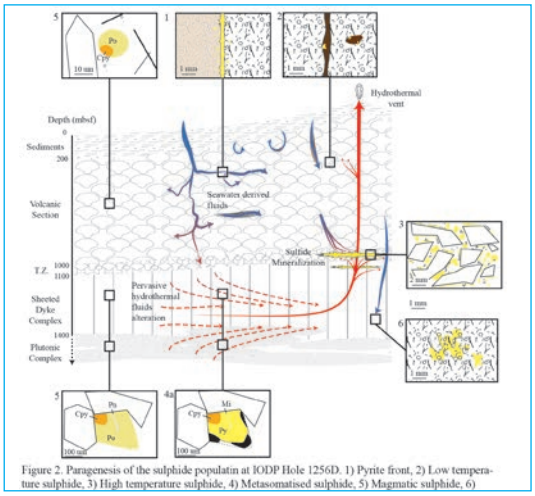

Figure 2. Paragenesis of the sulphide population at IODP Hole 1256D. (1) Pyrite front, (2) Low-temperature sulphide,(3) High-temperature sulphide, (4) Metasomatised sulphide, (5) Primary magmatic sulphide, (6) Patchy sulphide.

replacing the silicate matrix in a web-like pattern and are interpreted to form from late stage seawater circulation.

The sulphide paragenesis in the oceanic crust in IODP Hole 1256D is summarised in *Figure 2*. Trace-element concentrations of the different sulphide groups suggest that primary magmatic sulphide are first metasomatised by

hydrothermal fluids and then leached. During these processes, metals hosted in the primary sulphides are progressively released into the hydrothermal fluids contributing to the formation of metal-rich fluids. High temperature sulphides that precipitate from mixing of rising hydrothermal fluids with cold seawater show the highest metal concentrations.

Acknowledgements
EPMA analyses were carried out at Uppsala University, Sweden; and LA-ICP-MS analyses were carried out at Stockholm University, Sweden.

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Calendar of Workshops and Conferences

2015

2 - 4 February
MagellanPlus Workshop South Atlantic Drilling
Newcastle, UK
www.ecord.org/magellanplus.html

12 - 17 April
EGU General Assembly 2015
Vienna, Austria
egu2015.eu

3 - 7 May
AGU-GAC-MAC-CGU
Montréal, QC, Canada
ja.agu.org/2015

5 - 8 May
MagellanPlus Workshop IMAGE Project
Rabat, Morocco
www.ecord.org/magellanplus.html

24 - 28 May
JPGU 2015
Chiba, Japan
www.jpgu.org/meeting_e

31 May - 3 June
AAPG 2015
Denver, CO, USA
ace.aapg.org/2015

10 - 12 June
MagellanPlus Workshop Mantle, Water and Life
Lyon, France
www.ecord.org/magellanplus.html

13 - 16 May
Indian Ocean Crust & Mantle Drilling Workshop
Woods Hole, MA, USA
http://web.whoi.edu/indian-ocean-drilling/us-china-international-ocean-discovery-program-workshop/

16 - 18 July
MagellanPlus Workshop, Submarine Paleoseismicity
Zurich, Switzerland
www.ecord.org/magellanplus.html

19 - 24 July
Polar Marine Diatom Workshop
Salamanca, Spain
http://polarmarinediatomworkshop.org/2015.Salamanca.html

27 July - 2 August
XIX INQUA 2015
Nagoya, Japan
inqua2015.jp

2 - 7 August
AOGS 2015
Singapore
http://www.asiaoceania.org

16 - 21 August
Goldschmidt 2015
Prague, Czech Republic
goldschmidt.info/2015/

29 Sept - 2 Oct
3P Arctic
Stavanger, Norway
www.3parctic.com

14 - 18 December
AGU Fall Meeting
San Francisco, CA, USA
meetings.agu.org

2016

26 July - 1 June
Goldschmidt 2016
Yokohama, Japan
goldschmidt.info/2016

27 Aug - 4 Sept
35th IGC
Cape Town, South Africa
www.35igc.org/

Reports of MagellanPlus Workshops

:: North Atlantic Drilling for Climate Dynamics: Filling the Oligo-Mio-Pliocene gap in the North Atlantic – 15-17 September 2014, Heidelberg (Germany)

Convenors: O. Friedrich, R.D. Norris, P.A. Wilson and B.N. Opdyke

This workshop brought together specialists from various fields to develop a drilling proposal to fill the "Oligo-Miocene Gap" that exists in our understanding of the function of Earth's systems. We propose to establish the first continuous high-deposition record of the Oligo-Miocene through new IODP drilling in the North Atlantic to allow the development of a continuous Neogene cyclostratigraphy and to enhance our knowledge of Oligo-Miocene ocean-ice-climate dynamics. The workshop was held in Heidelberg from 15-17 September 2014 funded by ESF (EARTHTIME EU), NSF, and the ECORD MagellanPlus Workshop Series Programme. 24 participants from six countries (Australia, France, Germany, The Netherlands, United Kingdom, and United States) attended the workshop, including several early-career researchers. We discussed certain aspects of Cenozoic paleoceanography and paleoclimate and how the gaps in the Oligo-Miocene could be filled using scientific drilling.

The participants of the workshop in alphabetic order: Markus Badger (University of Bristol), Ian Bailey (University of Exeter), Helen Beddow-Twigg (University of Utrecht), Steven Bohaty (NOCS), Clara Bolton (CEREGE), André Bornemann (BGR), Anja Crocker (NOCS), Oliver Friedrich (University of Heidelberg), Jens Grützner (AWI), Timothy Herbert (Brown University), Ann Holbourn (University of Kiel), Pincelli Hull (Yale University), Diederick Liebrand (NOCS), Peter Lippert (University of Utah), Lucas Lourens (University of Utrecht), Mitch Lyle (Oregon State University), Richard Norris (Scripps Institution of Oceanography), Bradley Opdyke (ANU), Jörg Pross (University of Heidelberg), Yair Rosenthal (Rutgers State University), Phil Sexton (The Open University), Michael Stärz (AWI), Thomas Westerhold (MARUM), Paul Wilson (NOCS).

The first day was devoted to overview presentations of major scientific themes and questions to set the ground for the following group discussion that took place on the same day. During the discussion, the potential to propose a new IODP expedition to Newfoundland was evaluated. Furthermore, potential links to the existing IODP pre-proposal 851 (Cenozoic Evolution of the North Atlantic - the Western Atlantic Latitudinal Transect) were discussed.

The workshop showed that there is a major, persistent gap in recovery of high-deposition records of Oligocene-Miocene age in the North Atlantic. This gap persists despite the importance of this area and time interval for understanding the evolution of the cryosphere, Northern Hemisphere ecosystem structure, and the history of ocean productivity and chemical balances. Our new pre-proposal therefore focuses on Oligocene-Miocene objectives, particularly the Middle Miocene Climatic Optimum (15-17 Ma). This drilling strategy acknowledges the importance of focusing on extreme climate dynamics (such as the abrupt warming and carbon-cycle dynamics of the middle Miocene).

The following two days of the workshop were dedicated to the development of scientific questions and text writing as well as figure drafting for the planned pre-proposal. During this phase of the workshop, analysis of existing seismic data for the SE Newfoundland Ridge (available from previous IODP Expedition 342) was used to identify 15 primary and alternate drill sites that could cover the entire Oligocene-Pliocene sequence with high deposition rate sections. These prospective drill sites also span an ~1,800 m depth transect, including abyssal sites at up to 5 km water depth. All but three of these sites would be drilled entirely with APC to depths of ~250 m.

Immediately following the workshop, on 18-19 September 2014, the convenors continued to work on the proposal structure, site forms, cover sheets and editing text in order to submit an IODP pre-proposal. As a direct outcome of the workshop, IODP pre-proposal 874-pre was submitted on 1 October 2014 to drill Neogene Newfoundland drift sediments.

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:: Drilling the Cretaceous Palaeogene Tropical South Atlantic - 2-4 February 2015, Newcastle (UK)

Convenors: T. Wagner and T. Dunkley Jones

The Cretaceous rift basins of the tropical South Atlantic were globally significant sites of organic carbon production, biotransformation and burial. These conditions changed irreversibly with the opening of the Equatorial Atlantic Gateway (EAG) in the late Cretaceous, a fundamental reconfiguration of the world's oceans and climate. Large uncertainties still remain regarding the exact timing of the EAG opening, the tectonic and subsidence history of the tropical South Atlantic, and the effects of EAG opening on tropical South Atlantic climate and ecosystems.

Participants of the workshop: Front (from left), José Magalhães (UFPE, BRA); Carlos D'Apolito (Birmingham, UK); Haydon Mort (UFPE, BRA); Obinna Chudi (Edinburgh, UK); Onos Esegbue (Newcastle, UK); Ignace Schmiermann (Shell NIGERIA); Christian Heine (Shell, NL); Jessica Whiteside (Southampton, UK); Claire Loptson (Bristol, UK); Kara Bogus (IODP-TAMU, USA); Sev Kender (Nottingham); Sandra Arndt (Bristol, UK); Stephanie Grimshaw (BG Group, UK); Karlos G. D. Kochhann (Kiel, GER); Julia R. de Rezende (Newcastle, UK). Top row (from left): Mohammad Alaween (Newcastle, UK); Kirsty Edgar (Bristol, UK); Alex Dickson (Oxford, UK); Christian Maerz (Newcastle, UK); Tom Dunkley Jones (Birmingham, UK); Tom Wagner (Newcastle, UK); Tiago Alves (Cardiff, UK); David Naafs (Bristol, UK). Not on the group photo: Andrea Moscariello (Geneva, CH); Neil Mitchell (Manchester, UK); Ana Suárez-Suárez (Newcastle, UK); Ian Head (Newcastle, UK); Wen Shi (Manchester, UK); Pim Van Bergen (Shell U.K.); Sadat Kolonic (Shell NIGERIA

On a global scale, tropical climate conditions are poorly constrained during the Cretaceous and Paleogene greenhouse intervals, with an urgent need for new high-quality multi-proxy climate data collection from continental margins and corresponding deep-sea sites. Furthermore, the recovery of sedimentary sequences down to deep subsurface organic rich strata (black shale) provides new constraints on the deep biosphere biogeochemical processes that link microbial communities, organic carbon diagenesis and fluid migration into active petroleum systems.

To fill the critical shortfall in detailed and high-quality information from the Cretaceous EAG and the northern sub-basin of the South Atlantic, two IODP pre-proposals have recently been developed, targeting these fundamental challenges from an African and tropical South American perspective;

- The Nigeria Transform Margin proposal (pre-840) linking comprehensive palaeo-environmental studies with cutting-edge research of an active petroleum system, and
- The Equatorial Atlantic Gateway proposal (pre-864) identifying the Pernambuco Plateau on the northeastern Brazilian continental shelf, as a strategic location immediately adjacent to the proposed final opening segment of the EAG.

Both drilling proposals investigate key periods of earth-ocean history, with a focus on global climate perturbations (OAEs, hyperthermals) within the context of the opening of the EAG and the flooding of the northern South Atlantic sub-basin, (ii) constrain the tectonic evolution of the EAG and its global implications for both the connectedness of Late Mesozoic oceans, as well as the geodynamic controls on the South Atlantic rift and passive margin development, and (iii) pioneer microbial studies that explore the biogeochemistry associated with petroleum systems, including source rocks and sediments charged with hydrocarbons.

With financial support from the ECORD/ICDP MagellanPlus Workshop Series Programme, a two-day workshop was hosted on 2-4 February 2015 in Newcastle, UK. 32 experts from 8 countries, 14 research institutions and representatives from two major oil companies, Shell and BG, joined the workshop to evaluate and further improve the strategy and focus of both IODP pre-proposals, making this event an excellent example of an integrated and truly joined industry-academia partnership.

Building on a number of plenary sessions, the team split into breakout groups addressing central challenges including ''paleoclimate and biogeochemistry'', ''marine biota'', ''deep biosphere'', ''tectonic models'', and ''site selection, drilling plans and risk assessment''. The constructive discussions and clearly defined action plans constitute a critical step towards the development of competitive full proposals, with submission dates targeted later in 2015 and 2016.

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"Earth and Life Processes Discovered from Subseafloor Environments"

by R. Stein, D. Blackman, F. Inagi and H.C. Larsen, Editors

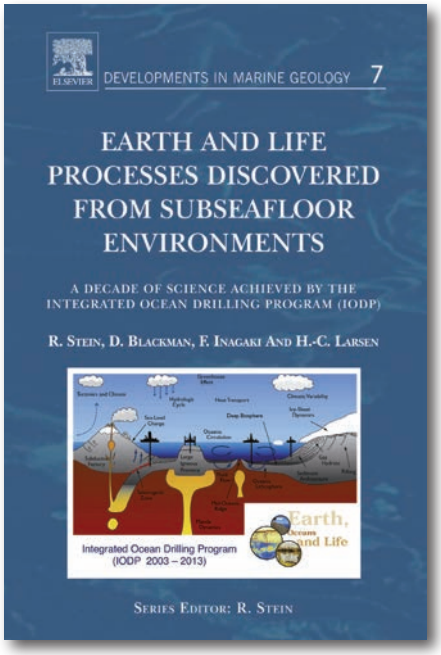
Elsevier, 2015, Developments in Marine Geology, volume 7, 804 pp

A new phase of scientific ocean drilling started in 2003 with the Integrated Ocean Drilling Program (IODP). This book presents the major scientific accomplishments of IODP in the following decade (2003-2013) during which the programme implemented 51 expeditions in all oceans. In contrast to its predecessors, IODP provided access to three different types of platforms, opening most oceanic environments to drilling and therefore expanding the scientific goals of the programme scientific community. The book is organised such that it parallels the science plan that had been developed by the international science community. The contributions are written by a selection of over 50 participants to the expeditions.

The first chapter summarises the **scientific highlights**. It presents the results obtained in the science initiatives defined by the science plan, and emphasises the scientific advances accomplished during this decade of scientific drilling.

The second chapter concerns **Sub-seafloor Life and the Biosphere**. Although this theme was briefly addressed at the end of the previous Ocean Drilling Program (ODP), it was only within IODP that a systematic approach was developed. This chapter is definitely the most original, since a new science has emerged. It provides a state of the art synthesis of our current knowledge. Several sections explore various aspects of sub-seafloor life such as evaluating the biomass and its metabolic functions, the genetics of microbial communities and their energetic constraints, and life in extreme environments. Finally the geochemical consequences of the presence of microorganisms in the sediments are evaluated.

Chapter 3 addresses **Environmental Changes, Processes and Effects**. It is dedicated to the contribution of ocean drilling to our knowledge of past climate fluctuations, a scientific approach traditional to ocean drilling. However, access to "mission-specific platforms" provided a wealth of new data for this particular theme, through drilling in shallow waters and ice-covered areas. Climate fluctuations are considered at various periods and time scales, from the Cainozoic to the last deglaciation. A number of questions are addressed, such as long-term changes (in the Arctic and the Antarctic, the Equatorial Pacific and around Newfoundland), high-resolution records (in the North Atlantic and the North Pacific), interaction between climate and tectonics with the creation of the Himalayas, and reconstruction of past sea-level changes (in continental margins and in tropical coral reefs).



The fourth chapter addresses the **Solid Earth Cycles and Geodynamics**. The first section summarises the progress accomplished in our understanding of the ocean lithosphere architecture at fast versus slow spreading ridges. Particular emphasis is given to building the lower crust. A second section addresses the hydrology of the ocean crust, and the consequences of its alteration. It describes active *in-situ* experiments as well as long-term monitoring that give constraints on fluid flows. The third section addresses intra-plate volcanism and hotspot trails, and how they relate to large-scale mantle movements.

The final chapter is devoted to **Subduction Zones**. The first section summarises what has been learned during this phase of ocean drilling. Most of the efforts were dedicated to drilling the accretionary Nankai Trough subduction zone off Japan, combining standard drilling with the *JOIDES Resolution* and the riser drilling vessel *Chikyu* specifically built by Japan. Ten expeditions drilled a series of holes across the area, including into the incoming sediments and the splay fault. A shallow transect in the erosive Costa Rica margin was drilled as a first step towards a future project. Drilling into the Japan Trench was scheduled in response to the 2011 Tohoku earthquake to sample the slip fault and measure the residual heat. The second section of the chapter is fully dedicated to seismogenic processes at the Nankai Trough, and the knowledge obtained from *in-situ* measurements and long-term borehole monitoring. Finally, a comprehensive synthesis discusses fluids in the fore arc region.

A very useful appendix summarises in one page the accomplishments of all the expeditions implemented during the decade.

In summary, this book is an invaluable contribution to Earth sciences. It presents the cutting edge science obtained by the international scientific community based on data obtained by scientific drilling and covering the four themes addressed by IODP. It demonstrates that ocean drilling remains an essential tool to obtain original datasets. It also shows that the scope of scientific ocean drilling has evolved, with access to new environments, an emphasis on active processes through *in-situ* measurements and long-term monitoring, and a particular focus on the subseafloor biosphere, linking life with geological processes. It will be extremely useful to students, lecturers and scientists. Unfortunately the paper copy is in black and white, which makes some of the figures extremely confused. The electronic version is available in colour and the difference in readability is obvious. The reader is therefore not recommended to buy only the printed copy. This book is definitively indispensable for a full appreciation of the contribution of scientific ocean drilling to our understanding of the Earth system.

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D/V Chikyu: Past and future science in scientific ocean drilling

Sean Toczko[1] and Nobu Eguchi[2]

The *D/V Chikyu* *(right)* is a scientific drilling vessel of the Japan Agency for Marine-Earth Science and Technology (JAMSTEC), and is equipped with industry-standard tools and riser drilling technology, allowing record scientific drilling depths and downhole logging capabilities. The shipboard science teams can collect high-quality wire-line logging data as well as well-preserved core samples. JAMSTEC's Center for Deep Earth Exploration (CDEX) operates and provides logistical and science support for International Ocean Discovery Program (IODP) expeditions. Launched in 2002, *Chikyu* has been working in support of the IODP community since 2007, beginning with IODP Expedition 314, the kick-off NanTroSEIZE project. Since then, *Chikyu* has participated in 14 IODP expeditions, ranging from simple engineering projects (IODP Exp 326, Exp 326 Scientists, 2011) and installing sub-seafloor long-term borehole monitoring systems (LTBMS) (*e.g.* IODP Exp 332, Kopf, et al., 2011; and Exp 343-T, Chester, et al, 2012), to ground-breaking science drilling in search of microbial communities in hydrothermal vents (Exp 331 Deep Hot Biosphere, Takai, et al., 2011),

Drillship Chikyu (© JAMSTEC/IODP).

deep sub-seafloor coalbeds (Exp 337 Deep Coalbed Biosphere, Inagaki, et al., 2013), recovering core samples from mega-earthquakes in ultra-deep ocean drilling (Exp 343 Japan Trench Fast Earthquake Drilling Project, Chester, et al, 2012), and comprehensively drilling and sampling an active seismogenic accretionary complex as part of the Nankai Trough Seismogenic Zone Experiment (Exp 314, 315, 316, 319, 322, 326, 332, 333, 338, 348 NanTroSEIZE) *(below left)*.

Sampling party during Expedition 348 (© JAMSTEC/IODP).

Some purely operational results from these expeditions include over 40 km of boreholes drilled, collecting 4.8 km of core samples, with an average core recovery of 74%. Logging while drilling (LWD) data covered just over 16 km. The deepest water depth *Chikyu* drilled in (6928.5 meters below sea level) was during IODP Exp 343 (Japan Trench Fast Earthquake Drilling Project) *(photo page 23)* -, where 5 holes were drilled in water exceeding 6,880 mbsl. This expedition sampled and instrumented the fault zone from the 11 March 2011 Tohoku-oki mega-earthquake. LWD data from Hole C0019B (6,889.5 mbsl) extended 850.5 metres below the seafloor (mbsf) for a record 7,740 mbsl. The borehole observatory recorded the residual heat signature from the earthquake in the fault zone before it decayed beyond detection limits. Part (~1 m) of the slipped fault itself, highly sheared clay from the plate boundary

décollement, was also recovered via coring (Chester, et al., 2013). The evidence suggesting that the fault slipped all the way to the Japan Trench has had ramifications for studies of other subduction zones around the world.

Chikyu has drilled 3 Sites in riser mode: Site C0009, Site C0020, and Site C0002. Of these, Site C0002, Hole P currently holds the record in scientific ocean drilling, reaching 3058.5 mbsf (Tobin, et al., 2015) into the Nankai accretionary prism. The NanTroSEIZE Project is now refining operational requirements for the next scientific targets of penetrating and sampling the megasplay fault zone. The project is also now finalising plans to install a long-term borehole monitoring system (LTBMS) next year at Site C0010, where a branch of the megasplay fault reaches the seafloor.

In 2010, CDEX hosted the CHIKYU+10 International Workshop, to set the stage for the next decade of *Chikyu* exploration. Six themes (Active Faults, Earth's Mantle, Deep Life, Continent Formation, Sediment Secrets, and Blue Sky) provided a framework for future *Chikyu* drilling projects, *e.g.* the Deep-sea Record of Mediterranean Messinian events (DREAM) proposal. CDEX and *Chikyu* are looking forward to the next 8 years of the current IODP decadal plan with great optimism and excitement, and are always looking to offer opportunities for scientists to sail aboard and discover.

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Team of the Expedition 343 Japan Trench Fast Earthquake Drilling Project (© JAMSTEC/IODP).

Unravelling the Workings of Planet Earth

ICDP's new Science Plan

The International Continental Scientific Drilling Program (ICDP) has spent the last two decades investigating the hidden world beneath our continents. It is the international platform for scientific drilling on land. It is an efficient organisation with an average annual budget of about USD 5M and further third-party expenditure on drilling projects that more than doubles this yearly investment. The programme brings together scientists and stakeholders from 22 nations to work together at the highest scientific and technical level. More than 33 drilling projects and 76 planning workshops have been supported to date.

ICDP's White Paper **'Unravelling the Workings of Planet Earth'** presents the new Science Plan for the international earth science community. It also serves as a docking station for the national funding agencies that provide co-mingled funding alongside ICDP. This third Science Plan came about by engaging the international science community and it sets out some of the big questions that confront the earth sciences and suggests ways to answer them wherever appropriate by scientific drilling.

This White Paper comprises **five major geosystem themes**, namely active faults and earthquakes, global cycles, heat and mass transfer, the deep biosphere, and cataclysmic events. In each case the state-of-the-art, fundamental open questions, and future scientific targets are presented by leading experts. Drawing attention to integrating scientific endeavour and societal need is a cornerstone of the new Science Plan. Minimising the risk of natural disasters, supplying an ever-growing world population with raw materials, energy, and clean drinking water, and addressing the threats posed by global change; these are some of the fundamental challenges facing mankind in the 21st century. All of these challenges are inextricably linked with the workings of planet Earth.

The need to drill has never been greater. Improved coordination between the marine, terrestrial and ice-coring communities as well as the research and private sector communities is required. ICDP therefore seeks increased collaboration with other scientific programmes. The first important steps have already been made together with the International Ocean Discovery Program (IODP), our marine counterpart, with a prime focus on "amphibious drilling", where not only land meets sea, but also where ICDP meets IODP. Amphibious Drilling Proposals (ADPs) *(page 4)* are those in which the scientific objectives can only be accomplished by drilling both onshore and offshore. The two programmes will assess, fund and execute these proposals jointly - a logistical challenge for the evaluation systems that are part and parcel of the individual programmes.

ICDP is a **science-driven organisation**; the notion that industry membership would change that principle is unfounded. Symbiotic, transparently regulated and operational cooperation on a science and technology level makes good sense. This now occurs primarily in the form of contractor-client relationships, whereas ICDP and industry would both benefit substantially from a relationship based on scientific and technological collaboration on a mutual and balanced give-and-take basis. A very promising area of industry involvement lies in technological development, where ICDP sees great potential in collaborating on issues such as high-pressure/high-temperature measurement logs, fluid and biological sampling tools, permanent downhole monitoring and more.

Public outreach and teaching are strong components of ICDP's profile, and are expanded further in the Science Plan. We are making a significant difference by educating the public about the Earth's sub-surface, providing confidence that we know enough about the upper kilometres in order to provide resilient solutions to infrastructure and resource development. A strong education programme will inspire young people and help create the next generation of scientists who will be needed to specialise in geology, geophysics, geochemistry and geomicrobiology.

We cordially invite you to read our White Paper to gain more information. It can be downloaded from www.icdp-online.org. You will discover why earth science matters, and uncover the many surprising ways in which it affects our everyday life.

Carola Knebel - knebel@gfz-potsdam.de and Thomas Wiersberg - wiersberg@icdp-online.org

News from ECORD Member Countries

Finland

Ninna Immonen (Thule Institute and Department of Geosciences, University of Oulu) successfully defended her PhD Thesis "Glaciations and climate in the Cenozoic Arctic: evidence from microtextures of ice-rafted quartz grains" successfully in autumn 2014. Her PhD thesis is related to the IODP Arctic Coring Expedition (ACEX) 302, which was drilled in 2004, as well as materials of the Arctic Ocean 96 Expedition (AO96) (core 96/12-1pc) from the Central Arctic Ocean.

Finnish participants of IODP Expedition 347 Baltic Sea Paleoenvironment'' (Outi Hyttinen and Aarno Kotilainen) have continued their work on expedition material. The preliminary results were presented at the 2nd Finnish National Colloquium of Geosciences, Helsinki, Finland, 4-5 March 2015, and also to the staff of the A.P. Karpinsky Russian Geological Research Institute (VSEGEI), St. Petersburg, Russia on 27 January 2015.

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France

IODP Expeditions. Local newspapers in Martinique have rapidly announced the exceptional achievements of Expedition 340 Lesser Antilles Volcanism and Landslides. Last January a media conference was given by Anne Le Friant (IPGP, Paris) during the post-cruise meeting of the expedition. From the detailed study of tsunamigenic island-arc landslide deposits, it is suggested that the largest-scale seafloor sediment failure is due to the propagation of a decollement from proximal areas loaded by a volcanic debris avalanche.

The Izu-Bonin-Mariana (IBM) Arc Expeditions (350 and 352) aim to understand intra-oceanic arc systems from subduction initiation to arc maturation and crustal growth with Julien Berger (GET, Toulouse), Exp. 350 IBM Rear Arc; Claire Carvallo (UPMC, Paris) and Marguerite Godard (Géosciences Montpellier), Exp. 352 IBM Fore-Arc. Despite difficult conditions, Exp. 353 Indian Monsoon Rainfall collected sediments to understand interactions between climate and tectonics in the Bay of Bengal with Clara Bolton (CEREGE, Aix-Marseille), Philippe Martinez (EPOC, Bordeaux), and Samuel Taylor (IPGP, Paris). Exp. 354 Bengal Fan recently ended with promising results on interactions between the growth of the Himalayas and Tibet, the development of the Asian monsoon, and processes affecting the carbon cycle and global climate, with Christian France-Lanord as Co-chief Scientist (CRPG, Nancy), Albert Galy (CRPG, Nancy), Pascale Huygue (ISTerre, Grenoble) and Laure Meynadier (IPGP, Paris).

French IODP representatives. The IODP SEP committee recently welcomed Marc-André Gutscher (IUEM, Brest) and Marguerite Godard (Géosciences Montpellier). Since January 2015, Michel Diament is the new ECORD Council Chair and Gilles Lericolais a new member of the ECORD Facility Board.

Anne Le Friant, left, with G. Boudon, right (photo France-Antilles, 2015).

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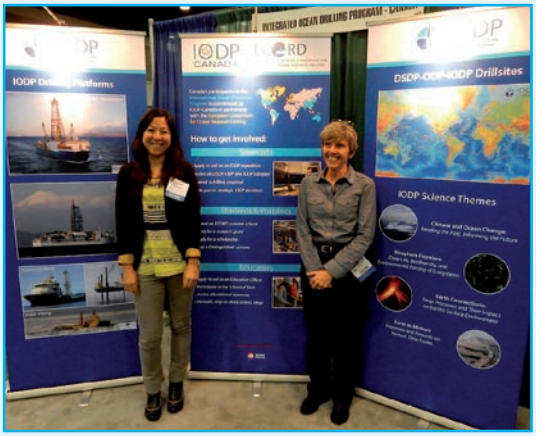
Canada

Meetings & conferences. IODP-Canada had a successful booth at the Geological Society of America Annual Meeting in Vancouver on 19-22 October 2014 - http://community.geosociety.org/gsa2014. The conference attracted over 6,000 delegates and had a very high level of student participation. Visitors to the booth were treated to an ACEX core replica and a variety of IODP/ECORD materials and give-a-ways. We are now gearing up for another booth, to be shared with ICDP-Canada, at the AGU-GAC-MAC-CGU Joint Assembly in Montréal on 3-7 May 2015 - http://ja.agu.org/2015.

IODP Expeditions. Scientific Coordinator Diane Hanano is sailing as ECORD Education Officer on Expedition 354 Bengal Fan from 29 January to 31 March 2015. Diane is responsible for communicating the onboard science to students, educators, researchers and other audiences around the world. When not running up to see the "core on deck," she has been busy blogging http://joidesresolution.org/blog, posting social media updates and giving live video broadcasts with schools and museums.



Left, Diane Hanano and right, Dominique Weis, ESSAC Delegate, in the booth at GSA 2014.

Diane Hanano, CCOD Scientific Coordinator
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Sweden

Meetings & workshops. A busy first half of 2015 for Sweden saw The Swedish Research Council (VR) host the ECORD Council in Stockholm on 12 March, while Uppsala University are planning the ESSAC meeting scheduled for the 18-20 May. At the end of March, the Swedish ESSAC alternate, Jorijntje Hendriks, took part in a Swedish/American (USA) workshop that was held in the picturesque medieval city of Sigtuna, near Stockholm. This workshop focussed on future Arctic research that could utilise the icebreaker *Oden* (used in the ACEX expedition in 2004), with the Swedish ECORD Council member, Magnus Friberg, responsible for the collaboration.

Expedition 347 Baltic Sea
Paleoenvironment remains firmly in our memory and the Swedish Co-chief Scientist Thomas Andrén, and participating Swedish scientists Elinor Andrén and Ian Snowball, were proud to see the return of their investments in the form of the published proceedings - http://publications.iodp.org/proceedings/347/347title.htm

Milos Bartol onboard the JR during Exp.353 (photo Bill Crawford, IODP/TAMU).

IODP Expeditions.
Taking advantage of modern communication systems, Abigail Barker, a participant on Expedition 352 Izu-Bonin-Mariana Rear Arc, organised a 'ship-to-shore' event for undergraduate students in Uppsala. The most recent scientist to wave the Swedish IODP flag was Milos Bartol, who is pictured above preparing smear slides onboard the *JOIDES Resolution* during Expedition 353 Indian Monsoon Rainfall *(above)*.

Ian Snowball (ESSAC Swedish delegate) - ian.snowball@geo.uu.se

The Netherlands

Meetings & Workshops. The IODP-NL annual meeting was held on 13 March 2015 at Utrecht University and was well attended by more than 50 graduate students and staff members. Special guest was Tony Morris (ECORD-DLP), who gave a keynote on oceanic tectonics from a (paleo)magnetism point of view. At the end of the meeting, the IODP-Person of the year 2013 and 2014 were awarded to Caroline Slomp and Marco Maffione, respectively. The IODP-Person of the year award was set up in 2005 to acknowledge scientists for their major achievements as Dutch representatives within ODP/IODP and is symbolised by an Elmo. In imitation, an IODP-NL Special Award was handed over early this year to Jochen Erbarcher (BGR) to thank him for his leading role within the ECORD-funded MagellanPlus Workshop Series Programme. So be aware that Elmo goes abroad!

One MagellanPlus-funded workshop, **BLACKSINK**, took place in Utrecht on 27-28 February 2014 - http://www.ecord.org/magellanplus.html - and one ICDP-affiliated workshop, CONOSC, was held in Driebergen on 18-21 March 2015 - http://conosc.geo.uu.nl.

IODP Expeditions. We are pleased that three Dutch scientists are expected to sail on the upcoming IODP Expeditions 356, 359 and 360.

Lucas Lourens, ESSAC Delegate, and Chair of the MagellanPlus Workshop Series Programme
http://www.iodp.nl/

Switzerland

IODP Expeditions. We are pleased that three young scientists from Swiss universities were able to participate on *JOIDES Resolution* expeditions in 2014. Two of the Swiss scientists participated on Expedition 349 South China Sea Tectonics, Rui Bao (ETH Zurich) as an organic geochemist and Iván Hernández Almeida (University of Bern) as a radiolarian specialist (resulting from a special call). Rui Bao also won the competition to design the expedition logo - congratulations! In addition, Anders McCarthy (University of Lausanne) sailed as an igneous petrologist on Expedition 351 Izu-Bonin-Mariana Arc Orgins. Reports of the participants' experiences can be found on the Swiss Drilling webpage.

A highlight for Swiss IODP in 2015 will also be Expedition 357 to the Atlantis Massif, with Gretchen Früh-Green as Co-chief Scientist.
Scientific Drilling was a central theme at the 19th International Sedimentological Congress held in August 2014 in Geneva and at the Swiss Geoscience Meeting in Fribourg in November 2014.

Swiss representatives in IODP. The Swiss community also continues to be active in representing ECORD in the advisory committees, with Andrea Moscariello as chair of the ECORD Industry Liaison Panel and Gretchen Früh-Green as ESSAC Chair. Michael Strasser has just finished a three-year term on the Science Evaluation Panel (SEP). Sadly Michi will be leaving Switzerland and the Swiss IODP board to take a faculty position in Austria. We would like to warmly thank Michi for his untiring efforts, enthusiasm and dedication to promoting IODP within Switzerland. We wish him all the best and are sure to be hearing more from him in the future with a new role in scientific drilling in Austria.

Gretchen Früh-Green, ESSAC delegate and ESSAC Chair and Silvia Spezzaferri, ESSAC Alternate
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