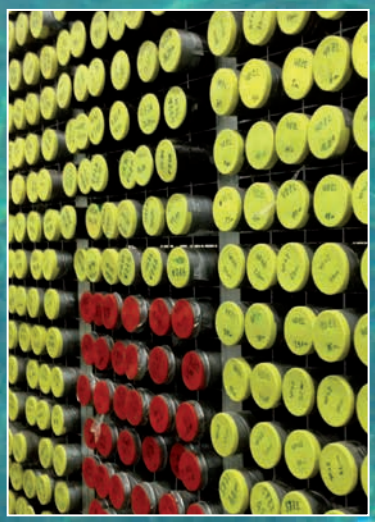
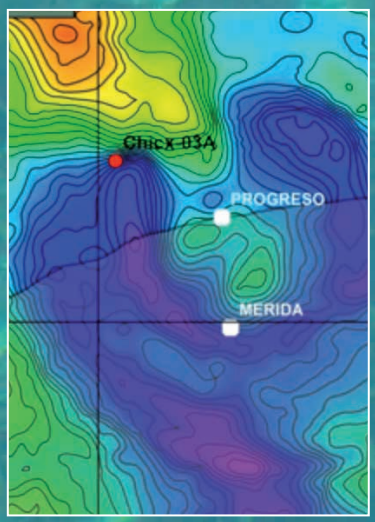
ECORD

EUROPEAN CONSORTIUM FOR
OCEAN RESEARCH DRILLING

ANNUAL REPORT 2014





ECORD
EUROPEAN CONSORTIUM FOR OCEAN RESEARCH DRILLING

IODP
INTERNATIONAL OCEAN DISCOVERY PROGRAM

From 2003 to 2013, European and Canadian scientists participated in the Integrated Ocean Drilling Program (IODP) as part of the European Consortium for Ocean Research Drilling (ECORD). ECORD co-ordinated the European contribution to the programme through the mission-specific platform (MSP) concept, which allowed the ocean research community to work in technically challenging conditions where the US drillship *JOIDES Resolution* and the Japanese drilling vessel *Chikyu* are unable to operate. The development of the MSP concept has therefore added a new dimension to ocean drilling.

The ECORD Science Operator (ESO) consortium has successfully managed five MSP expeditions for IODP to the Arctic (2004), Tahiti (2005), New Jersey (2009), the Great Barrier Reef (2010), and the Baltic Sea (2013). ECORD's scientific and operational accomplishments have been prolific and of high quality, and are recognised by our global partners as a crucial contribution to the largest marine geosciences programme in the world.

The International Ocean Discovery Program (IODP), which started on 1 October 2013, builds on this legacy and addresses global challenges facing current and future generations with new research approaches, expanded scientific communities and continued development of its unique collaborative model.

IODP now involves scientists from 26 countries including the USA, Japan, China, South Korea, India, Australia, New Zealand, Brazil and 18 ECORD countries, with Israel as its most recent member.

ECORD funds and implements MSP operations for IODP as an independent platform provider, with the aim to implement on average one expedition per year for the duration of the 2013-2023 programme. In future, MSPs might include specifically outfitted polar vessels, jack-up rigs, geotechnical vessels, seabed-drilling systems, long-piston coring, anchored barges and others, as determined by scientific priorities and operational efficiency. ECORD is now preparing for its next MSP expedition to the Atlantis Massif scheduled to begin in October 2015.

ECORD also continues to make financial contributions to the US National Science Foundation (NSF) for support and access to the *JOIDES Resolution* and to the Japan Agency for Marine-Earth Science and Technology (JAMSTEC) for support and access to the *Chikyu*. Members of ECORD can therefore take part in all IODP expeditions that address research topics such as climate and ocean change, biodiversity, sub-seafloor life, origin of life, natural hazards on human time scales, as well as the internal structure and dynamics of our planet.

Front cover: *from left to right, cores of Expedition 347 Baltic Sea Paleoenvironment at the Bremen Core Repository; working half-core sections of Expedition 351 Izu Bonin Mariana with stickers for scientist sampling (Susan Boehm & IODP); location of proposed sites for the Chicxulub K-T Impact Crater Expedition 364 (© ESO); participants of the 11th Urbino Summer School on Paleoclimatology at the K-Pg boundary in Gubbio (Italy). Background photo: blue waters of the Mediterranean Sea near Antibes.*

Back cover: *monkey's fist aboard the Greatship Manisha during Expedition 347 Baltic Sea Paleoenvironment (A. Fehr ©ECORD/IODP).*

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ECORD Annual Report 2014

1 January 2014 - 31 December 2014

Contents

1. FY2014 highlights

The first full year of the new, groundbreaking **International Ocean Discovery Program** has seen the changes to a new ECORD structure and the development of many innovations to better serve the scientific community and the programme as a whole.

ECORD membership and partnership

With Israel as its newest member, ECORD started the new IODP with **18 members** *(page 3)*. With the exception of Iceland who will withdraw from the consortium in 2015, most of the member countries have confirmed their participation in ECORD for a minimum of five years, with four (Canada, Denmark, Israel, Switzerland) participating for a minimum of three years. The commitment of ECORD funding agencies beyond FY2018 will be based on an external evaluation of ECORD's achievements and performance in 2017.

ECORD has offered the temporary status of "Accessing Member" to Russia, allowing young Russian scientists to take part in the ECORD educational programme and Russian representatives to attend ECORD meetings as observers. This will allow our Russian colleagues to form a consortium of institutions interested in joining ECORD, and to further develop discussions with governmental entities to raise a significant yearly contribution to ECORD. Preliminary contacts have been established with the Czech Republic and Turkey for a possible expansion of the consortium. Meanwhile, ECORD has maintained close contacts with colleagues in Spain in the hope that they will soon be able to re-join ECORD.

The two **Memoranda of Understanding (MoU)**, which summarise the agreement between ECORD and its partners, in Japan (JAMSTEC and MEXT) *(above)*, the USA (NSF) and their Associate Members were finalised and signed on 17 February 2014 and on 18 October 2014 respectively. ECORD's co-funding of the *JOIDES Resolution* and the *Chikyu* amounts to USD 8 M and forms the basis of these two MoUs. This significant co-funding allows berth exchanges to provide access to these platforms for ECORD scientists and access to MSP expeditions for scientists from our partner countries.

More than 80% of the ECORD annual budget, which is currently about USD 19 M, contributes to IODP expedition operational costs. With an annual budget of USD 7.2 M for mission-specific platform (MSP) operations, which is significantly higher than the previous programme budget (39 to 58% increase), ECORD has demonstrated its commitment to achieving its major objective of delivering

Dr Asahiko Taira (JAMSTEC, left, and Dr Gilbert Camoin (EMA), right sign the ECORD-JAMSTEC MoU.

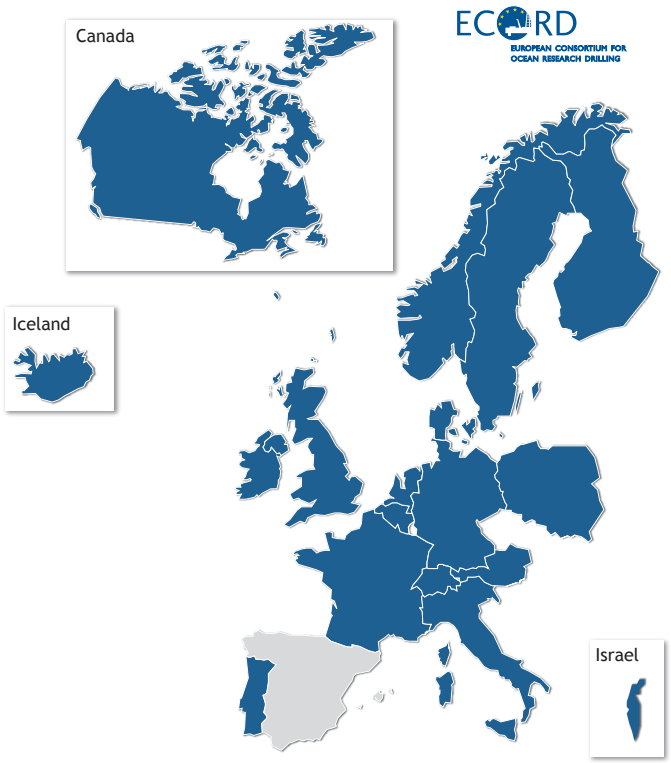
an average of one MSP expedition per year for IODP. The objective will be achieved by balancing the numbers of low, medium, and high-cost expeditions, and by attracting external co-funding and in-kind contributions whenever possible to provide additional funding to support MSP expeditions.

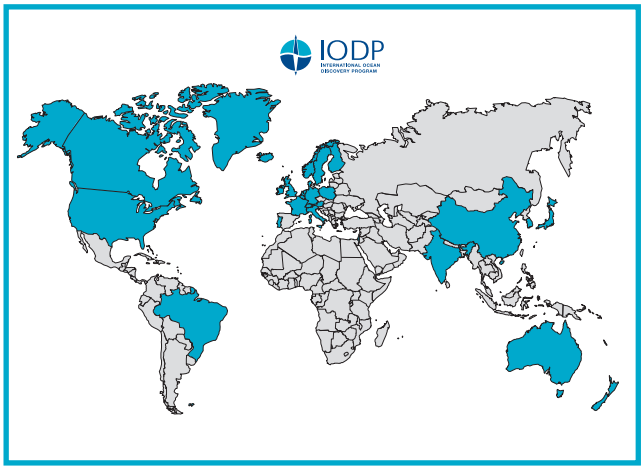
The ECORD Council has recently approved a document defining **in-kind contributions (IKC) for MSP expeditions**, which can be proposed by any IODP member or non-member country - *http://www.ecord.org/about/aboutecord.html)* Such in-kind contributions may include a wide array of direct operational facilities 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. The next two MSP expeditions already scheduled - Expedition 357 Atlantis Massif Seafloor Processes *(page 9)* and Expedition 364 Chicxulub K-T Impact Crater *(page 9)* exemplify the relevance of external co-funding and in-kind contributions as well as innovative drilling technology in the MSP concept.

At the end of December 2014 the ECORD budget showed a positive balance of USD 8.2 M, which has been carried forward to the ECORD FY2015 budget to implement the next MSP expeditions.

Operating mission-specific platforms

Following its highly successful offshore phase (12 September - 1 November 2013) and Onshore Science Party at the IODP





ECORD member countries, as of December 2014 (left); IODP member countries, as of December 2014 (above)
(map credit: http://histgeo.ac-aix-marseille.fr).

Bremen Core Repository (BCR) at the MARUM, University of Bremen, Germany (22 January - 20 February 2014), the MSP **Expedition 347 Baltic Sea Paleoenvironment** was reviewed by an ECORD Operational Review Committee on 18 November 2014. The committee concluded that this expedition, focussing 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.

In the last few months of 2014, ESO undertook planning activities for future MSP expeditions to be implemented under the International Ocean Discovery Program. The first one, **Expedition 357 Atlantis Massif Seafloor Processes**, near the Mid-Atlantic Ridge in the North Atlantic Ocean (Co-chief Scientists: G. Früh-Green and B. Orcutt), will be implemented in October - December 2015. This MSP operation will be the first IODP expedition to utilise seafloor drill technology with the BGS Seafloor Rockdrill 2 (RD2) and the MARUM Meeresboden-Bohrgerät (MeBo), which will be deployed from the UK Natural Environment Research Council (NERC) research vessel *RRS James Cook* provided as an in-kind contribution *(page 9)*. **Expedition 364 Chicxulub K-T Impact Crater** (Co-chief Scientists: J. Morgan and S. Gulick), planned in early 2016, 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.

Anticipating future MSP expeditions

At its last meeting in Bremen in March 2014, the **ECORD Facility Board (EFB)** agreed a 5-year plan for MSP expeditions by adjusting the numbers of low-, medium-, and high-cost expeditions *(page 14)*. Following Expeditions 357 and 364, an expedition to the Antarctic (Antarctic Cenozoic Paleoclimate IODP Proposal 813) is tentatively scheduled in FY2017. ESO has further scoped the platform and services required to implement this proposal. A drilling expedition to the Arctic in FY2018 would complete MSP operational plans for the first five years of the International Ocean Discovery Program.

The number of **MSP proposals** in the IODP evaluation and operational structures (EFB, Science Evaluation Panel-(SEP)) has never been so high - 20 as of November 2014 *(page 17)* - which not only demonstrates the great success of the MSP concept but will provide additional scientific, operational and funding opportunities in the near future. The proposals address a wealth of science topics (climate and sea-level change, geohazards, hydrogeology, deep biosphere, ocean crust formation), in various areas (Atlantic, Pacific, Arctic and Southern Ocean, Mediterranean Sea), as well as a great

diversity of drilling/coring systems (drillships, jack-up rigs, seafloor drills, long-piston coring etc.).

Participating in IODP expeditions

In 2014, the US drillship *JOIDES Resolution* implemented four full expeditions in the Pacific Ocean and part of a fifth one in the Indian Ocean *(pages 21-24)*:

- Expedition 349 South China Sea Tectonics (CPP);
- Expedition 350 Izu Bonin Mariana Rear Arc;
- Expedition 351 Izu Bonin Mariana Arc Origins;
- Expedition 352 Izu Bonin Mariana Forearc;
- Expedition 353 Indian Monsoon Rainfall.

Forty ECORD scientists were invited to sail on these expeditions, including two Co-chief Scientists *(page 21)*, resulting in an average of 9 on regular expeditions (*i.e.* not Complementary Projects Plans (CPP)). The *JOIDES Resolution* will implement a series of expeditions in the Indian Ocean in FY2015 and 2016 - http://www.iodp.org/expeditions - before following a path from the western and southwestern Pacific, through the Southern Ocean, and into the Atlantic Ocean to start drilling there in FY2018.

There are still uncertainties regarding the next *Chikyu* expeditions as the scheduling of riserless expeditions in Japanese Fiscal Year (JFY) 2015 is still pending, while riser drilling expeditions could be planned in JFY2016 and 2017.

Collaborating

The new ECORD structure *(page 47)* is designed to enable 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 *(page 35)*. In FY2014, ECORD has worked on three major projects related to its potential collaboration with the European Commission (EC), **(1)** working towards the establishment of a Distributed European Drilling Infrastructure for Subseafloor Sampling and Monitoring, **(2)** exploring new ways of organising its management and funding, *e.g.* possibly as a European Research Infrastructure Consortium (ERIC), and **(3)** collaborating in the "Earth Science Europe" initiative - http://www.bgs.ac.uk/earthScienceEurope.

Throughout the summer of 2014, the ECORD Science Operator and organisations involved in collaborating programmes (ICDP, EMSO and EPOS), developed a proposal to form the **Distributed European Drilling Infrastructure (DEDI)**, which was submitted to the EC in September in the frame of the EC Horizon 2020 Programme (H2020-INFRAIA-2014-2015). DEDI was proposed with the specific objective of further enhancing the scientific investigation of the solid Earth beneath the surface by providing support for transnational access to cutting edge technologies and proven scientific services to the European earth science community. Prior to the publication of the current Annual Report, the DEDI partnership were informed that the proposal had been rejected. The partnership will assess the feedback, and will consider what alternative opportunities may exist to take elements of the DEDI proposal forward.

In 2014, ECORD was at the forefront of the active collaboration between IODP and other science programmes dealing with

ECORD and IODP representatives at the Rigi near Lake Lucern during the fieldtrip of the Council-ESSAC meeting 2014.

sub-seafloor (IMAGES/IMPRESS for ISOLAT workshop) and continental (ICDP) scientific drilling and coring research (for Amphibious Drilling Proposals).

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** *(page 17)*- 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 focus areas utilising long-piston coring technology.

This year, the ongoing closer collaboration between IODP and ICDP has led to the creation of the **Amphibious Drilling Proposals (ADP)** concept in which 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 next 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 *(page 37)*. To initiate the writing and submission of such proposals, a specific annual budget has been assigned to ADPs by ECORD and ICDP for the organisation of workshops in the frame of the MagellanPlus Workshop Series Programme - http://www.ecord. org/magellanplus.html.

Engaging the community and reaching out

This year, the **MagellanPlus Workshop Series Programme,** which is designed to help scientists from ECORD and ICDP countries develop innovative drilling proposals, has been very active organising six science workshops *(page 30)*:

- Deep-Sea Record of Mediterranean Messinian Events (DREAM-II), in Paris, France;
- IODP Drilling within the Corinth Continental Rift, in Athens, Greece;
- BLACKSINK: Black Sea History of the Past 15 Ma, in Utrecht, The Netherlands;
- Accelerating Neoproterozoic Research through Scientific Drilling, in Nottingham, UK;
- Advancing Sub-surface Biosphere and Paleoclimate Research, in Seoul, South Korea;
- North Atlantic Drilling for Climate Dynamics - Filling the Oligo- Mio- Plio Gap in the North Atlantic, in Heidelberg, Germany.

The potential drilling proposals that will arise from these workshops concern diverse scientific topics and the three IODP platforms: the *JOIDES Resolution*, the *Chikyu* and the MSPs, as well as continental drilling.

This year, ECORD has promoted scientific ocean drilling at booths organised at three major international conferences (EGU, AGU, International Sedimentological Congress) where its activities are now fully integrated with ICDP under the banner of "Scientific Drilling" *(page 39)*, and through the **Distinguished Lecturer Programme (DLP)** designed to promote the scientific achievements of ocean drilling to a large audience within universities/institutes *(page 34)*. The 2013/2014 lecturers - R. Urgeles, Spain, B. Ildefonse, France, and C. Hillaire-Marcel, Canada - have visited many universities and institutes across Europe, Canada and Israel. A new phase of the programme started in the autumn of 2014 with five lecturers - C. France-Lanord, France, J. Kallmeyer, Germany, Anthony Morris, UK, Paola Vannucchi, UK and G. Uenzelmann-Neben, Germany .

Scientific ocean drilling remains highly attractive to young scientists and ECORD offers a wide array of educational activities, which are now open to IODP partners by way of an annual contribution. Two **ECORD Summer Schools** were organised in 2014, the "11th Urbino Summer School in Paleoclimatology", in Urbino, Italy, and the 8th ECORD Bremen Summer School on "Subseafloor Biosphere: Current Advances and Future Challenges", in Bremen, Germany. The summer schools attracted more than 100 PhD students and early post-doctoral researchers from 16 ECORD countries and 4 non-ECORD countries, 18 of whom were funded by ECORD through a **Scholarship** *(page 33)*. Five **ECORD Research Grants** were awarded to graduate students to conduct research on core materials and/or data related to scientific ocean drilling programmes (DSDP/ODP/IODP) *(page 33)*.

Two teachers from ECORD member countries sailed as **Education Officers** on *JOIDES Resolution* expeditions in 2014, as part of the "Teachers at Sea" programme, initiated by Ocean Leadership and sponsored by the USA - http://joidesresolution.org/node/453. Jean-Luc Bérenguer, who sailed as an Education Officer on the Expedition 345 Hess Deep in 2013, organised a teachers' workshop in Sophia Antipolis (France) entitled "Understanding Earth with Ocean Cores" *(page 40)*. This successful workshop has been used as a template for the creation of an **ECORD School of Rock**, which has been recently endorsed by the ECORD Council.

Gilbert Camoin, ECORD Managing Agency Director

Related websites:
http://www.ecord.org
http://www.iodp.org

The drill rig of the Greatship Manisha during coring operations of the Baltic Sea Paleoenvironment Expedition (B. Barker Jørgensen © ECORD/IODP).

2. Operating mission-specific platforms

The ECORD Science Operator (ESO) is the implementation arm of ECORD, and is tasked with planning and delivering mission-specific platform (MSP) expeditions for the International Ocean Discovery Program (IODP). ESO is a consortium of three European scientific institutions: the British Geological Survey (BGS); the Center for Marine Environmental Sciences (MARUM) at the University of Bremen; and the European Petrophysics Consortium (EPC). The EPC *(page 11)* comprises three European universities: the University of Leicester (UK); the University of Montpellier (France); and RWTH Aachen University (Germany).

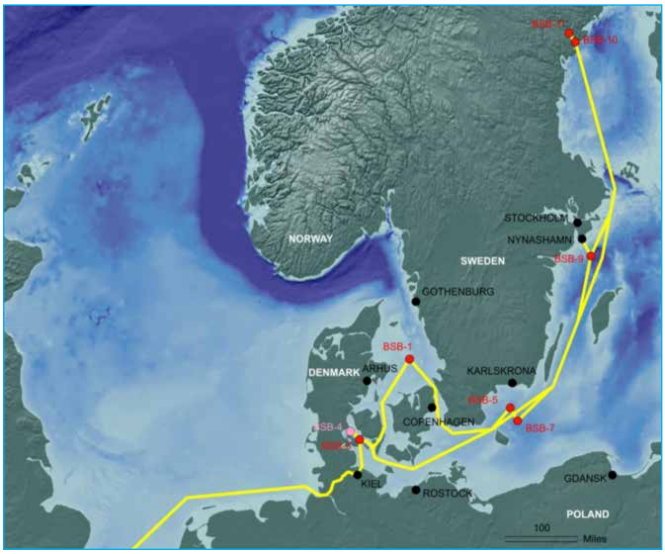
Each partner contributes specific expertise to ESO, allowing the consortium to build tailored expeditions to suit the requirements of proposals selected for implementation by the ECORD Facility Board. Such expertise includes contracting platform and drilling services, permitting, curatorial and scientific facilities provision, petrophysics and downhole logging (either contracted or provided by EPC), data management, and outreach.

ESO successfully completed the final mission-specific platform (MSP) expedition of the Integrated Ocean Drilling Program, Expedition 347 Baltic Sea Paleoenvironment, and undertook planning activities for future MSP expeditions to be implemented under the International Ocean Discovery Program. The first of these will be Expedition 357 Atlantis Massif Seafloor Processes, near the Mid-Atlantic Ridge in the North Atlantic Ocean in October to December 2015. Following Expedition 357 will be Expedition 364 Chicxulub K-T Impact Crater, an exciting project that aims to recover core samples from the crater's buried peak ring to study the mechanisms of large impact crater formation on Earth and other planets, and the effects on the Earth's environment and ecology. Additionally, ESO has scoped future expeditions for 2017 and beyond, including IODP Proposal #813 Antarctic Cenozoic Paleoclimate, which could potentially utilise seafloor drills to recover sediments expected to contain records of Antarctica's climate and ice history. Finally, ESO undertook new engineering developments to improve the capabilities of seafloor drills in preparation for Expedition 357 in Fall 2015.

MSP expedition updates

Expedition 347 Baltic Sea Paleoenvironment (Onshore Science Party)

Co-chief Scientists: Thomas Andrén and Bo Barker Jørgensen
Expedition Project Managers: Carol Cotterill and Sophie Green
Petrophysics Staff Scientist: Annick Fehr



Location map and approximate ship tracks of Expedition 347.

After its highly successful offshore phase in 2013 *(map above)*, Expedition 347 continued in 2014 with the Onshore Science Party (OSP) at the IODP Bremen Core Repository (BCR) at the MARUM - Center for Marine Environmental Sciences, University of Bremen, from 22 January to 20 February. At the 4½-week OSP, the 1,623 m of recovered cores were split and all data for IODP minimum and standard measurements were acquired by around 65 scientists and operator personnel *(page 8)*. A pre-OSP measurement programme was conducted by ESO staff from the European Petrophysics Consortium (EPC) and MARUM from 25 November 2013 to 17 January 2014, when Natural Gamma Ray (MSCL-XYZ) and Thermal Conductivity measurements were taken *(page 11)*.

The OSP utilised the various laboratories and offices at MARUM (*e.g.* core description, digital imaging, colour reflectance, split-core logging, petrophysical analyses, core sampling, CoreWall visualisation, microscopy, physical properties, geochemistry, report writing), and the University of Bremen Department of Geosciences (paleomagnetics and palynology).

The main objective of the expedition is to gain a deeper understanding of the paleoenvironmental evolution of the Baltic Sea Basin (BSB) through the last glacial cycle, from 130,000 years to the present (*i.e.* Pleistocene to Holocene). Situated in the heartland of past Scandinavian Ice Sheet advances and retreats, and subjected to repeated glaciations, the coring sites targeted unique geological, microbiological and environmental archives contained within the sediments of six sub-basins in the Baltic Sea Basin. The recovered sediment cores will aid the investigation of the environmental history and microbiological evolution of

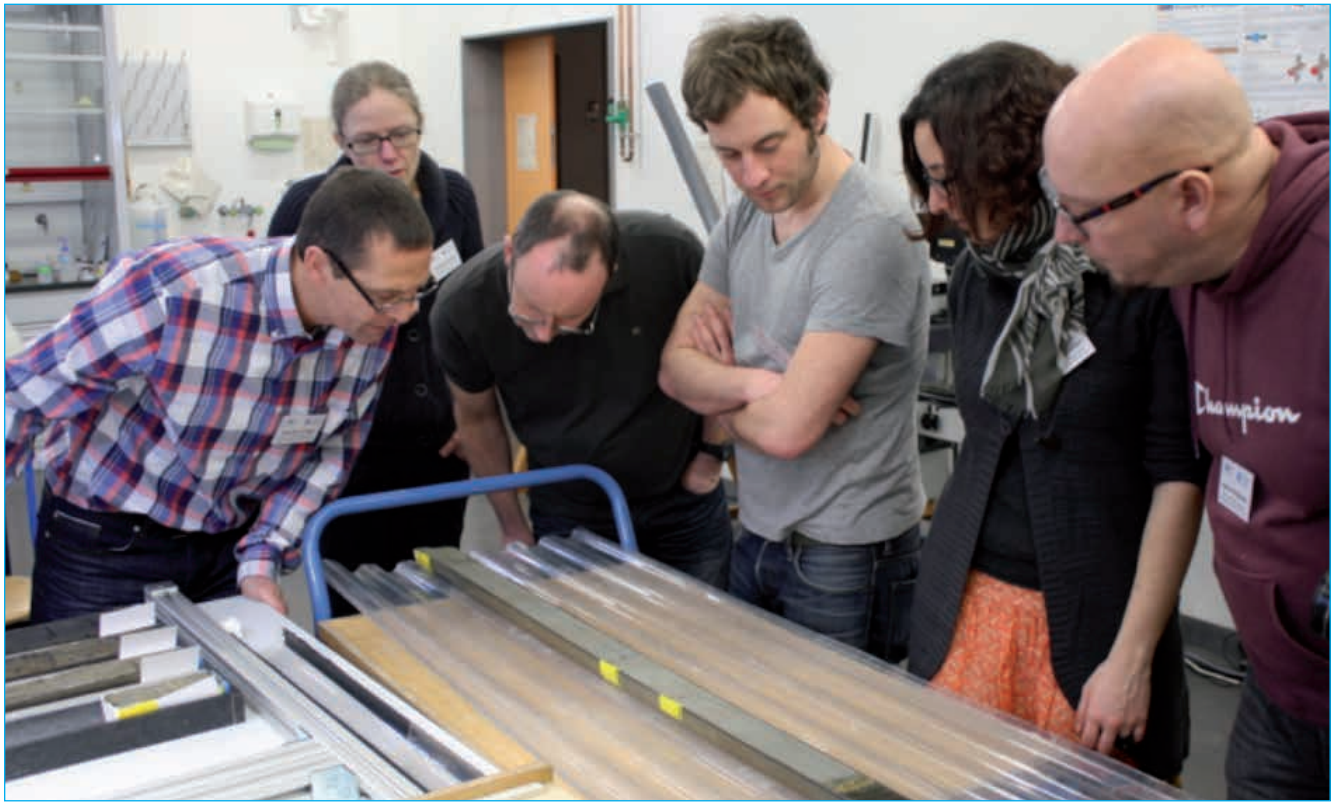
the Baltic Sea region over the last 130,000 years, from the beginning of the last interglacial period (Eemian) through the Last Glacial Maximum (about 20,000 years ago) to the present day.

Specific expedition successes are:

- Sequences cored in the Little Belt and near Anholt Island should provide a deeper understanding of the geological temperature record between 80,000 and 130,000 years ago. There are intriguingly complex lithologies that, together with the preliminary biostratigraphic and geochemical data, hold important environmental information about the glacial cycles that occurred since 70,000 years ago;
- Cores older than late glacial from Hanö Bay and Bornholm Basin will provide information on conditions during parts of the glacial cycles that occurred since 70,000 years ago;
- Glacial varve sequences recovered from Landsort Deep, Hanö Bay and Bornholm Basin will greatly improve knowledge of the deglaciation of the southern and central BSB and will provide new understanding of the behaviour of the ice sheet since 29,000 years ago;
- Cored varved sequences recovered from the Ångermanälven River estuary will give new insights into the late Holocene history of the northern part of the BSB;
- Unexpectedly long and extremely expanded Holocene sequences from the Little Belt and Landsort Deep will allow reconstructions of climate response and other external forcing mechanisms with a resolution that was previously not possible;
- Microbial cell counts are generally extremely high, particularly in the organic-rich Holocene deposits younger than ~8000 years that yielded the highest microbial abundances yet recorded by IODP. Important new information on microbial life in the deep biosphere is expected.

After the moratorium ends for this expedition (20 February 2015), the cores will remain at the BCR for long term archiving *(page 18)*, joining an archive of almost 154 km of deep-sea sediment cores from 87 expeditions.

The first post-expedition meeting (editorial) took place at Texas A&M University, College Station, from 9-13 May, supported by staff from ESO and the *JOIDES Resolution* Science Operator Publications Services (formerly the USIO Publications Services). The Expedition 347 Preliminary Report was published on 21 May - http://publications.iodp.org/preliminary_report/347/ - and provides operational details and some preliminary results including a preliminary scientific assessment. In general, the expedition was very successful and many of the research questions formulated in the original proposal will be explored and the objectives met. The Proceedings of the IODP Vol. 347 is expected to be published in February 2015. The Science Party are continuing with their post-expedition research, which is expected to lead to a first series of high-impact papers in peer-reviewed journals within the next two years. Already more than 70 paper titles have been proposed.



Expedition 347 Scientists get a first look at a freshly split core from the Baltic Sea (© ECORD/IODP).

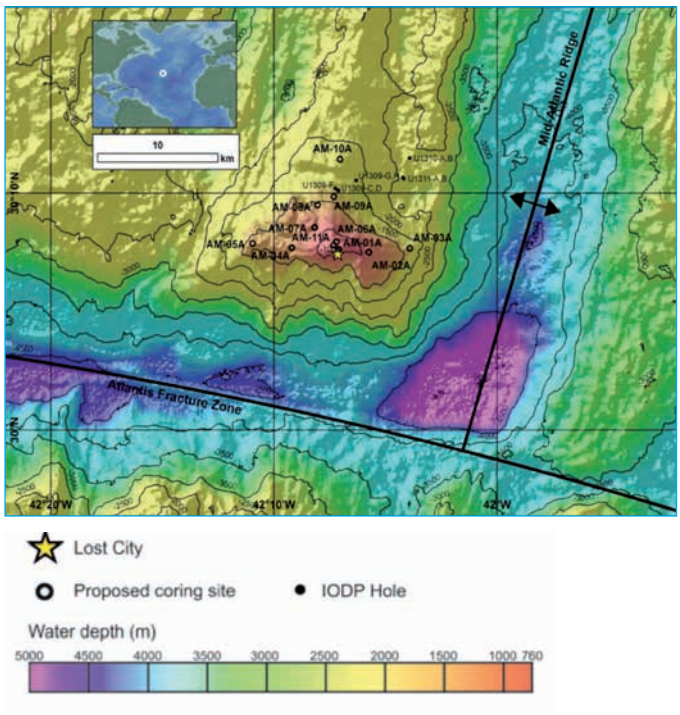
Early results from Expedition 347 have been presented by Science Party members at various conferences including the Finnish National Colloquium of Geosciences 2014, at EGU 2014, the Australian Earth Sciences Convention 2014, the 12th Colloquium on Baltic Sea Marine Geology and AGU 2014. A session proposal has been submitted for EGU 2015 in Vienna.

Expedition 357 Atlantis Massif Seafloor Processes (Planning)

Co-chief Scientists: Gretchen Früh-Green and Beth Orcutt
Expedition Project Managers: Sophie Green and Dayton Dove
Petrophysics Staff Scientist: Elke Hanenkamp

At its March 2014 meeting in Bremen, the ECORD Facility Board (EFB) *(page 14)* recommended the scheduling of an expedition based on IODP Proposal 758 Atlantis Massif in 2015 *(below)*. The objectives of the Atlantis Massif proposal can be met using a seafloor drill deployed from a research vessel, making it considerably cheaper than a standard MSP expedition, which normally requires contracting a drilling platform from the commercial sector.

Some planning and preparation for this expedition had taken place prior to the EFB motion, for example it was necessary to submit an application in March 2013 for the drilling platform, the NERC research ship *RRS James Cook (photo 1 above right)* as the drilling platform. The application was provisionally accepted and the ship is expected to be supplied by by the UK Natural Environment Research Council (NERC) as an in-kind contribution (IKC) to ECORD *(page 2)*. The final ship schedule is expected to be confirmed in early 2015.



Location map for IODP Expedition 357, showing primary sites AM-01A to -011A.

1. The RRS James Cook.

2. Deployment of the BGS RD2 (photo D. Smith, BGS).

3. Deployment of the MARUM MeBo (photo MARUM).

This expedition will be the first IODP expedition to utilise seafloor drill technology. Two seafloor drills will be carried: the British Geological Survey (BGS) Seafloor Rockdrill 2 (RD2) *(photo 2, above right)* and the MARUM Meeresboden-Bohrgerät (MeBo) *(photo 3 above right)*. The RD2 maximum penetration is 50 metres below seafloor (mbsf) while the MeBo maximum penetration is 80 mbsf. The RD2 and MeBo seafloor drills are evolving systems that are under constant development by their respective technical teams. To meet the scientific demands of IODP expeditions new capabilities need to be added to these systems, in particular downhole logging and the ability to plug and instrument boreholes.

Expedition 364 Chicxulub K-T Impact Crater (Planning)

Co-chief Scientists: Joanna Morgan and Sean Gulick
Expedition Project Managers: tbd
Petrophysics Staff Scientist: tbd

At its June 2014 meeting, IODP's Science Evaluation Panel (SEP) agreed that high priority science can be achieved by IODP Proposal #548 Addendum 4 Chicxulub Impact Crater, which proposes coring one hole to 1,200 mbsf *(page 10)*, instead of the previously proposed two holes to 1,500 mbsf. The SEP also recommended that ECORD should strongly

consider the feasibility of drilling to 1,500 mbsf to maximise scientific return.

During its July 2014 virtual meeting, the ECORD Facility Board recommended the scheduling of the Chicxulub expedition in 2016, based on the revised proposal (EFB Consensus 14-12-01). ESO then began the process of sourcing the drilling platform and services required to implement this expedition by issuing a Notice of Interest in the public procurement database of the European Union on 25 November, which invited companies to submit a letter of interest in order to receive the project's full specification to prepare a formal bid. The closing date for bids is 16 January 2015.

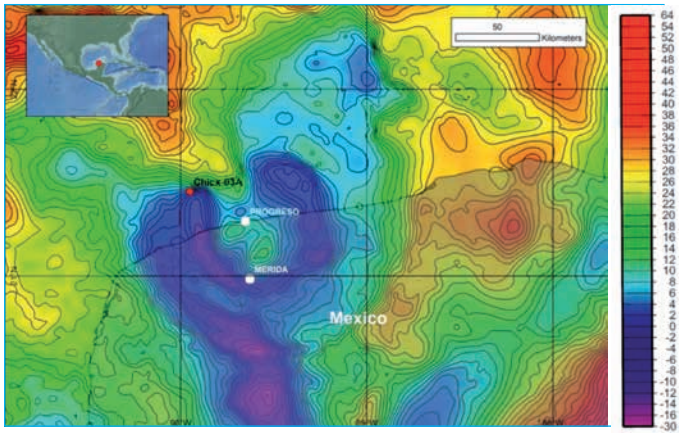
Throughout 2014, ESO was in regular contact with the Co-chief Scientists, and representatives from the National Autonomous University of Mexico (UNAM), Centro de Investigacion Cientifica de Yucatan (CICY) and Sistema de Investigación, Innovación y Desarrollo Tecnológico del Estado de Yucatán (SIIDETEY) to formulate the project's permitting and collaborative approach. Ultimately a Memorandum of Understanding between ECORD, UNAM and SIIDETEY will be agreed. A science workshop will be organised in April 2015 in Merida, Mexico. This workshop is primarily aimed at stimulating Mexican interest in the project, and for ECORD to showcase the project and its broader work in Mexico. However, some elements from the workshop are expected to feed into the expedition planning.

IODP Proposal #813 Antarctic Cenozoic Paleoclimate (Planning)

Following EFB Consensus 14-13-01 to schedule an expedition based on IODP Proposal #813 Antarctic Cenozoic Paleoclimate in January - February 2017, ESO further scoped the platform and services required to implement this proposal. ESO has been in contact with the Division of Polar Programs at the US National Science Foundation (NSF) to explore the feasibility of using the research icebreaker *Nathaniel B. Palmer,* as the drilling platform. Currently this icebreaker seems to be the only option available to implement an expedition in this part of Antarctica, therefore ESO submitted a ship-time request in December 2014 and will continue discussions in 2015 regarding the use of the vessel.

Equipment & data management

ESO has continued to implement QA/QC (quality assurance/quality control) procedures within MSP operations. Various work packages related to this topic, encompassing overall policies and procedures for QA/QC, have been completed *(e.g.* for Expedition 347).



Location map for IODP Expedition 364, showing primary site Chicx-03A.

IODP Expedition 357 is serving as a catalyst for new seafloor drill developments. A meeting with technical staff from the BGS, MARUM (MeBo group) and ANTARES Datensysteme (Germany) took place on 14 May and focussed on collaborative seafloor drill-tool development for the RD2 and MeBo systems, with ANTARES as the logging tool developer/provider. A Project Management Team meeting was then held to discuss the expedition's science requirements and how they can be achieved using seafloor drills as the primary coring tool and the carrier of new instrument assemblies. Technical developments to enhance the expedition were identified, and those that are feasible will be tested before the expedition. Technical developments for both the RD2 and MeBo that were initiated in 2014 and will continue in 2015 are:

- Dual induction resistivity logging tools;
- Magnetic susceptibility logging tools;
- Seafloor drill string plug for post-expedition fluid sampling by ROV;
- Borehole packer system (expanding packer);
- Drill-mounted tracer delivery system;
- Drill-mounted water sampling system;
- Drill-mounted sensor package - CTD/DO/CH4/pH/Redox.

The new seafloor drill developments required for Expedition 357 are being funded by the BGS and MARUM under an ECORD Engineering Development budget.

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

3. Core logging and petrophysics

The European Petrophysics Consortium (EPC) comprises three universities from across Europe, the University of Leicester (UK), Géosciences Montpellier (France) and RWTH Aachen (Germany). EPC is part of a larger, international logging consortium, which is led by Lamont-Doherty Earth Observatory (USA) and includes the University of Tokyo (Japan). The EPC central office at the University of Leicester is responsible for the overall management of the consortium, which provides operational, technical and high-level scientific support to IODP's mission-specific platform (MSP) expeditions. Specifically, the EPC is responsible for the provision of downhole logging and core petrophysical services across the wide range of geological formations drilled and sampled by MSPs *(right)*. Downhole logging data are usually the only *in-situ* measurements acquired during these projects, providing a continuous dataset that can aid in stratigraphic correlation and is especially important in the characterisation of a formation where core recovery is poor. Downhole data is intermediate in scale compared to the regional seismic dataset and the data acquired from the recovered core material. In this respect, it provides a critical link in spanning the various measurement scales utilised in all IODP expeditions.

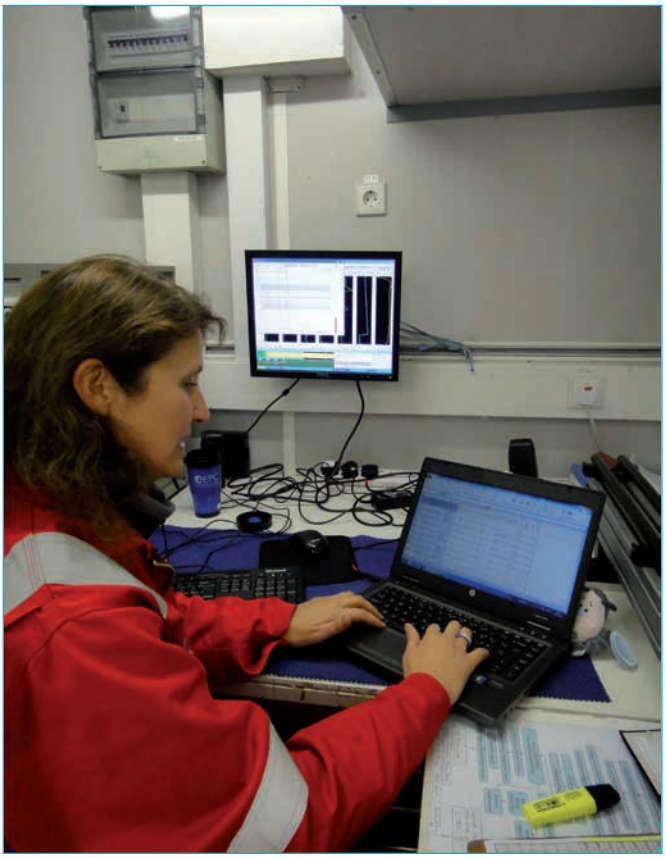
During late 2013 and into early 2014, EPC was involved in the pre-Onshore Science Party (OSP) and OSP for Expedition 347 Baltic Sea Paleoenvironment, at the Bremen Core Repository at MARUM.

The remainder of the year centred on activities wrapping up Expedition 347 and preparing and planning for Expedition 357 Atlantis Massif Seafloor Processes. EPC continue to provide petrophysical expertise to the wider IODP community, not least through representing ESO at the Science Evaluation Panel (SEP). In addition, 2014 has been a very active year for the consortium in terms of education and outreach activities.

MSP expedition updates

Expedition 347 Baltic Sea Paleoenvironment

The pre-OSP involved acquiring natural gamma radiation (NGR) and thermal conductivity measurements on whole cores from the expedition, and was staffed by three members of EPC over an 8-week period. Using a bismuth germinate (BGO) scintillation crystal in the MSCL-XYZ system, tested in 2013, resulted in a time-saving of 30 % compared with using a sodium iodide (NaI(Tl)) crystal of the same size. This enabled more rapid NGR logging of the cores for Expedition 347.



Annette McGrath working on MSCL data during the offshore phase of Expedition 347 (M. Mowat © ECORD/IODP).

During the four-week OSP, EPC coordinated and undertook further physical properties measurements on split cores and discrete samples, working alongside ESO colleagues and the Expedition 347 Science Party *(page 12)*. Following the expedition, EPC staff have worked, in collaboration with MARUM staff, on documenting the QA/QC of the downhole logging and core physical properties data arising from the expedition. The first (editorial) post-cruise meeting was attended by the Petrophysics Staff Scientist (PSS) in June, and the PSS and EPC Manager attended the expedition review in November.

Expedition 357 Atlantis Massif Seafloor Processes

Preparations for Expedition 357 Atlantis Massif Seafloor Processes *(page 9)*, continued and developed further this year. The EPC Manager attended the Project Management Team meeting in Edinburgh in May and EPC worked with the Expedition Project Managers on the Scientific Prospectus, as well as scoping for radiation permits. EPC will work closely with the BGS and MARUM as they develop the downhole logging tools to be deployed from the two seabed rockdrills that are planned to be used as part of this expedition *(page 9)*.

The Expedition 347 physical properties team (A. Fehr © ECORD/ IODP).

Expedition 364 Chicxulub K-T Impact Crater

EPC continue to scope the downhole logging options for Expedition 364 Chicxulub K-T Impact Crater *(page 9)* in collaboration with BGS. Permitting for the Standard Multi-Sensor Core Logger's (MSCL) radioactive source is being investigated.

Equipment & software updates

Following Expedition 347 and looking to the next MSP, Expedition 357 Atlantis Massif Seafloor Processes, EPC has focused on updating and improving their facilities and operating procedures. The thermal conductivity system (TK04) has been updated to run on Windows 7 for future MSPs. EPC and Geotek Ltd (UK) have made plans to refurbish the petrophysics container which houses the MSCL systems utilised offshore during MSPs. Refurbishment is underway, and the new design will have improved and increased core storage, an extended standard MSCL (MSCL-99) with capability to include a double magnetic susceptibility loop option, and the potential to extend sensor capability further in the future. The container will maintain the option for a second 'fast-track' MSCL (MSCL-152), as successfully used on Expedition 347. The EPC Standard Operating Procedures for discrete P-Wave measurements (MSCL-DPW), the natural gamma ray logger (MSCL-XYZ) and MARUM's digital line scanner have been refined.

EPC's downhole logging equipment, including its stackable ultra-slimline tools purchased in 2012, has been fully tested during operations associated with the International Continental Scientific Drilling Program's (ICDP) Alpine Fault Drilling project in New Zealand.

One of the EPC's main log processing and interpretation software packages, Schlumberger's GeoFrame, has now been superseded by Petrel and Techlog. EPC have installed these new packages and are working to migrate IODP legacy GeoFrame projects for archival purposes. Development of a graphical user interface (GUI) has been completed to enable more efficient and effective plotting of petrophysical results. Transfer of this statistical code from the existing programme into Matlab is in progress, with most aspects having been tested.

Personnel & organisation

EPC continued to represent ESO as the operations watchdog and observer on the Science Evaluation Panel (SEP) at their meetings, in January (Scripps, La Jolla, USA) and June (Rutgers, New Jersey, USA). Members of EPC also attended the ECORD Facility Board meeting in Bremen (March).

Personnel changes, and changes to some of the fundamental software packages that EPC use as described in the previous section, have focused training activities into key areas during 2014. Some personnel have received software training in the fundamentals of Petrel, Python Plotting, programming in Matlab and Techlog, while others have attended focused petrophysics training courses. In preparation for future IODP MSP expeditions, Elke Hanenkamp (EPC Research Associate) received MSCL training at Geotek Ltd and also sailed as the MSCL operator on a 6-week NERC research cruise (JC106, BRITICE–CHRONO project) around Ireland in summer 2014.

EPC Management from University of Leicester is now split between Sarah Davies and Sally Morgan. Sarah remains the EPC Management Lead within ESO while Sally will be responsible for the day-to-day management of the IODP Research Associates at Leicester, Aachen and Montpellier and will oversee all EPC staffing and operational aspects of expeditions in relation to EPC.

Jenny Inwood, an IODP Research Associate, returned from Maternity Leave in May, and from November 2014 will be on a one-year secondment to a NERC-funded post-doctoral position; however Jenny remains part of EPC and will provide advice and support as required.

EPC Manager, Sarah Davies, was an invited member of the committee for the Review of ICDP Operational Support Group - Downhole Logging that took place in April.

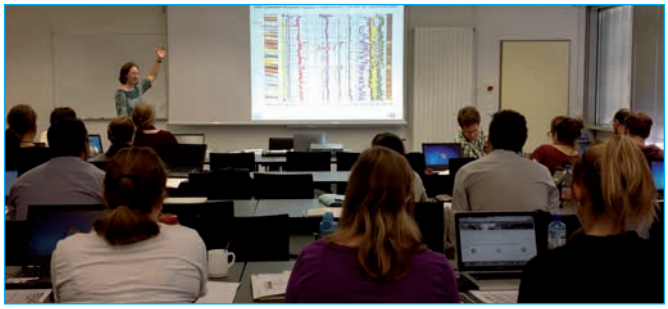
Sally Morgan has been appointed the UK-IODP Knowledge Exchange Fellow. This is a part-time, 3-year appointment that is aimed at enhancing engagement between the UK-IODP scientific community and industry. As part of this initiative, Sally is an observer on the ECORD Industry Liaison Panel *(page 37)*.

EPC is part of an international consortium for logging, established in 1992. The consortium, led by the Borehole

Research Group at Lamont-Doherty Earth Observatory (USA), and involving the University of Tokyo (Japan), has provided shipboard logging services and skilled Logging Staff Scientists across the IODP drilling platforms, sharing experience and expertise across IODP. Until October 2014, EPC has had a special arrangement with the US Implementing Organisation (USIO) to sail Logging Staff Scientists on *JOIDES Resolution* expeditions. In 2014, EPC provided the Logging Staff Scientist for Expedition 352, Izu-Bonin-Mariana Forearc *(page 23)*, from July to the end of September. The reorganisation within the USIO (now *JOIDES Resolution* Science Operator (JRSO)), which took effect from October 2014, has changed the arrangements for provision of logging personnel.

Education & outreach

2014 has been busy for EPC with activities at workshops, summer schools, a careers day, and conferences. EPC personnel have provided training for early-career scientists at the Medgate European Project *(below)*, the German GESEP School, the ECORD Summer School *(above)*, and a practical for undergraduates at the University of Leicester. The London Petrophysical Society invited the consortium to present on 'life as an academic petrophysicist' at their careers day in November 2014. Expedition 347 staff from EPC were involved in the 'Media Day' that took place during the OSP in Bremen *(page 39)* and helped ECORD and ICDP outreach staff with logging demonstrations at the EGU 2014 conference in Vienna.



Jenny Inwood teaching on a downhole logging session at the 2014 ECORD Summer School (S. Davies © ECORD/IODP).

Related website:
http://www2.le.ac.uk/departments/geology/research/gbrg/iodp/epc

Johanna Lofi (left) training PhD students on logging operations during the MEDGATE Initial Training Network event, University of Montpellier. (Photo Paul Meijer).

4. Anticipating future MSP expeditions

ECORD Facility Board

The ECORD Facility Board (EFB) is the planning forum for the mission-specific platform (MSP) expeditions. The EFB is responsible for determining the operations schedule in order to implement science proposals forwarded by the Science Evaluation Panel (SEP), based upon science priorities, geographic distribution and costs. Furthermore, the EFB is responsible for advising on the long-term planning of MSP expeditions.

The EFB proposed the following changes to ECORD Council:

- The addition of one more Science Board member *(page 47)* taking the total number 6;
- Setting fixed Science Board quotas of three members from ECORD countries (including a Chair from an ECORD country), two members from the *JOIDES Resolution* Consortium (one US and one non US), and one member from IODP-*Chikyu* (Japan);
- The call for new members should by published about 18 months ahead;
- Selected incoming members should join one EFB meeting as observers to help prepare for taking up their position on the EFB;
- Nomination of the incoming Chair should be made at the EFB meeting one year before the start of her/his term.

During its annual meeting held in Bremen in March 2014 , the EFB decided the scheduling of MSP expeditions for the next years. Five proposals had previously been forwarded to the EFB by the Proposal Evaluation Panel (PEP) in 2012.

Proposal 548 Chicxulub K-T Crater (Morgan et al.)

This proposal aims to drill the impact crater to study impact dynamics mechanism, the peak-ring lithology and formation, the impact effect on the deep biosphere, the extent of the hydrothermal system, the energy and mass extraction of the impact, and the biotic recovery. The plan is to drill one hole in 17 m water depth with 1,500 m penetration using a liftboat or jack-up platform. The EFB scheduled this proposal to be implemented in spring 2016.

Proposal 581 Coralgal Banks (Droxler et al.)

Proposal 581 aims to drill drowned coralgal reefs that have grown during the first part of the last sea-level transgression on top of a lowstand siliciclastic paleo-coastline that developed during the Last Glacial Maximum (LGM) offshore Texas in the Gulf of Mexico. The objectives are to decipher the sea-level record and reef development from the late Glacial to the Younger Dryas. The plan is to drill seven holes at 60-70 m water-depth and with 75-100 m penetration using a geotechnical ship with a drill rig. The EFB did not schedule an expedition based on this proposal and asked the proponents if it would be possible to achieve their objectives by reducing their proposed penetration depths.

Proposal 637 New England Hydrogeology (Person et al.)

Drilling is aimed to investigate the distribution of the fresh-brackish-salt water on the New England shelf, its mechanisms and time of emplacement, as well as the quantity of fluid, chemical and nutrient fluxes. The objective is to understand the relationship between hydrogeochemistry, fluid flow and microbial activity by drilling 18 sites at 18-109 m water depths and with 350-800 m penetration, using a large liftboat or industry rig. ESO estimated that the operation would take about 5 months. The EFB did not schedule an expedition based on this proposal and asked the proponents to provide ESO with feedback on how the expedition costs could be reduced if some of the sites are changed. EFB also recommended that the proponents seek external co-funding.

Proposal 716 Hawaiian Drowned Reefs (Webster et al.)

The objectives of Proposal 716 are to study the nature of sea-level change in the central Pacific over the past 500 kyr, the response of coral-reef systems to abrupt changes in environment, and its subsidence history. The plan is to drill 11 sites in 134 to 1,154 m water depth and with 150 m penetration, using a geotechnical ship with a drill rig (or a seabed drill with sufficient penetration depth). Deeper holes can possibly be drilled with the *JOIDES Resolution (JR)*. The EFB did not schedule an expedition but considered this proposal to have a high priority for scheduling after 2015 by using a seabed drill, provided that the proposed science objectives are met. Three options were offered to the proponents **(1)** accept the low recovery results risks in a JR operation, **(2)** wait until the MeBo200 drill being developed at the MARUM in Bremen, Germany, is in operation, or **(3)** identify alternative drilling scenarios.

Proposal 758 Atlantis Massif (Früh-Green et al.)

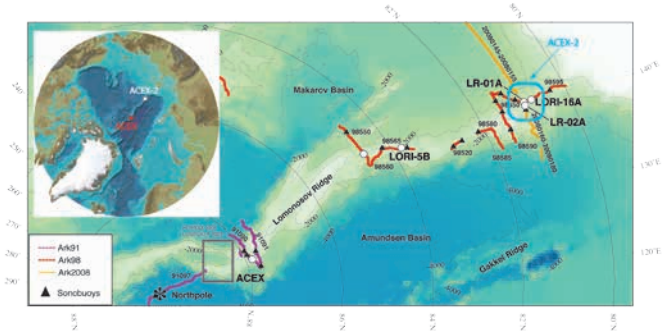
The aim is to explore the sub-surface of this hydrothermal field (metamorphic core complex) in the South Atlantic and study the serpentinisation (fundamental understanding), the deformation and alteration processes of different lithospheric ages and rock types, as well as the microbial activity. The plan is to drill 10 sites *(page 9)* at 750 to 1,770

metres water depth and with 50 to 100 m penetration, using a seabed-drilling system (MeBo and/or the British Geological Survey's RockDrill 2 (RD2), *(page 9)*. The EFB scheduled this expedition in 2015.

Unlike the situation at the EFB meeting in March 2013, the constraints given by the ECORD budget in the new IODP and the cost estimates for expeditions became better known in early 2014, allowing the EFB to reconsider the five proposals summarised above. In addition, two proposals, 708 Central Arctic Paleoceanography and 813 East Antarctic Paleoclimate, were forwarded by the SEP and were considered for potential scheduling at the 2014 EFB meeting:

Proposal 708 Central Arctic Paleoceanography (Stein et al.)

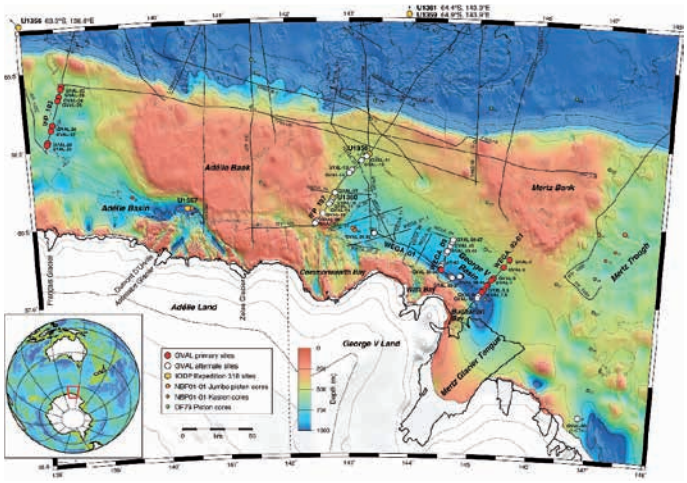
The overall goal is the recovery of a complete stratigraphic sedimentary record on the southern Lomonosov Ridge to reconstruct the continuous long-term Cenozoic climate history of the central Arctic Ocean at high resolution with a special focus on the Neogene and the Pleistocene. Key objectives are related to the reconstruction of the history of circum-Arctic ice-sheets, sea-ice cover, Siberian river discharge, as well as deepwater circulation and ventilation and their significance within the global climate system. The plan is to drill at one primary drill site *(below)* with three holes down to about 1,220 m below seafloor to recover multiple sections of the sediment sequence to ensure a complete recovery.



Map indicating seismic profiles (bold numbers AWI lines) and location of IODP Expedition 302 (ACEX) drillsite and the new proposed (ACEX-2) drillsites on the Lomonosov Ridge (primary site LR-01A and alternate sites LR-02A, LORI-5B, and LORI-16A). Grey box shows HOTRAX study area (for references see Proposal 708).

Proposal 813 East Antarctic Paleoclimate (Williams et al.)

This proposal aims to drill the shallowly-buried strata along the George V and Adélie Land shelf of East Antarctica to obtain a record of Antarctica's climate and ice history from the Eocene to the Neogene in order to investigate



Proposal 813-Full East Antarctic Paleoclimate (Williams et al.): Transects of primary and alternate sites along existing seismic lines with a total of 18 primary and 29 alternate sites up to 80 m penetration (353-1407 m WD).

Antarctica's role in icehouse and greenhouse climates. The plan is to drill two transects *(above)* of shallow (~80 m) holes using seabed-drilling systems. The EFB scheduled an expedition based on this proposal to be implemented in 2017.

Given the current ECORD budget and its expected projection until 2018, the EFB developed a mid-term schedule covering the first 5 years of IODP until 2018. The budget constraints allowed the EFB to recommend the scheduling of one high-cost drilling expedition within this 5-year operational plan. Since drilling in the Arctic Ocean is a high priority for ECORD, as expressed in the ECORD Memorandum of Understanding and in the ECORD business plan ('The Future of ECORD: 2013-2023'), the EFB recommended the scheduling of a high-cost Arctic expedition in 2018, or in 2017 if the budget permits. The decision on whether proposal 708, or another successfully evaluated Arctic proposal, can be scheduled will likely be made at the next EFB in March 2015.

Only relatively inexpensive expeditions can be scheduled for the other years from 2015 to 2018. The EFB therefore decided to schedule a seabed drilling expedition to the Atlantis Massif in 2015, and to conduct a Virtual Conference after the SEP meeting in June 2015 in order to discuss options for further low-cost expeditions in 2016 and 2017. By carefully considering a single-hole strategy outlined in a requested Addendum of Proposal 548 Chicxulub Impact Crater and supported by SEP, the EFB decided at its Virtual Conference (28 June - 15 July) to schedule an expedition to Chicxulub Crater for 2016 and recommended to the ECORD Council a limit on the ECORD contribution to this expedition in the order of USD 8.5 M. The EFB also accepted a revised

drilling strategy as outlined in a requested Addendum and scheduled a low-cost expedition to drill the East Antarctic shelf (Proposal 813) in 2017.

The schedule of MSP expeditions by proposal number is summarised in the table *below*:

2014	no MSP expedition
2015	758 Atlantis Massif Seafloor Processes (MeBo & RD-2)
2016	548 Chicxulub K-T Impact Crater (drill platform)
2017	813 East Antarctic Paleoclimate (RD-2)
2018	Arctic (open)

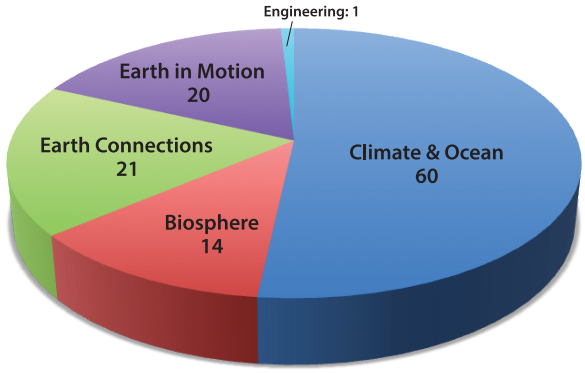
MSP proposals at the Science Evaluation Panel

IODP has two advisory panels, the Science Evaluation Panel (SEP) and the Environmental Protection and Safety Panel (EPSP), which evaluate and advise all proposals in terms of science and drilling technology regardless of the platform that could be used (*JOIDES Resolution*, *Chikyu* or MSPs). ECORD has 14 members on the SEP including Dick Kroon, the Co-chair of the science sub-group, and four representatives at the EPSP.

The SEP currently consists of a sub-group of scientists who twice a year evaluate the proposals in terms of scientific excellence. A second sub-group reviews the site-survey data packages and verifies completeness and adequacy of the data submitted by proponents to the IODP Site Survey Data Bank.

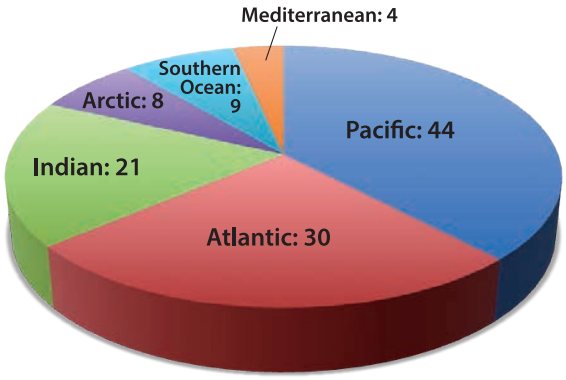
The number of proposals submitted in 2014 is healthy. 19 new proposals were submitted on 1 October 2014.

There are 116 active proposals in the archives of the IODP Science Support Office (as per 1 October 2014). The proposal objectives are divided into themes according to the IODP Science Plan for 2013-2023 in *figure 1 above right*. More than half of the proposals are in the Climate and Oceans theme, whereas the others are distributed almost equally among the Earth in Motion, Earth Connections and Biosphere themes.



1. Active proposals by IODP science themes (n= 116).

The geographical distribution of the proposals shows that the largest number (44) have drilling objectives in the Pacific, followed by 30 proposals in the Atlantic, 21 for the Indian Ocean, and several others in the Arctic, Southern Ocean and Mediterranean *(figure 2 below)*.

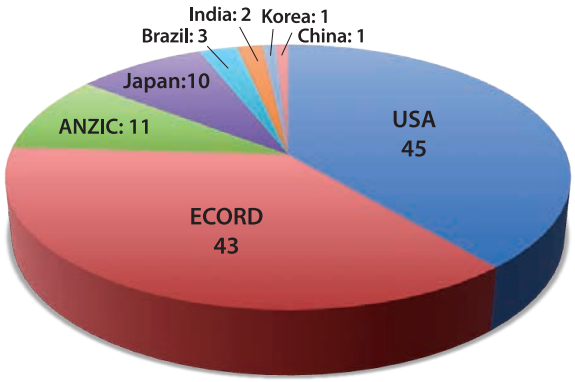


2. Active proposals by geographic distribution (n= 116).

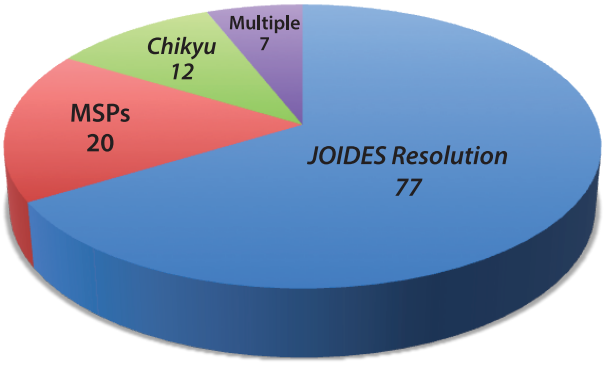
ECORD's outstanding scientific contribution to IODP is demonstrated by the 43 lead proponents from ECORD countries and a further 553 proponets involved in the 116 active proposals on *figures 3 and 4, page 17*. 43 proposals are ready to be selected for drilling by the three IODP Facility Boards.

There are currently a total of 20 active mission-specific platform proposals (as of January 2015) *(figure 5 page 17)*, 13 of which are residing at the SEP *(table page 17)* and seven at the ECORD Facility Board *(page 14)*.

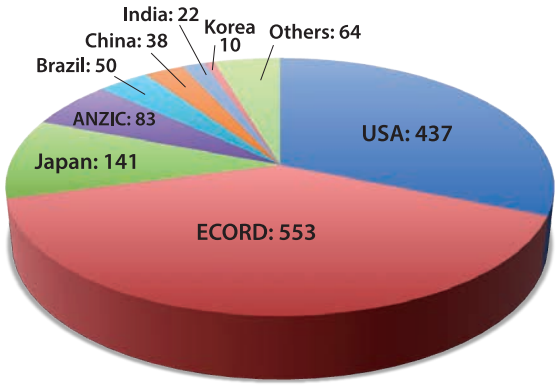
The objectives of the MSP proposals are quite diverse in terms of science topics, drilling tools, geographical areas and collaboration with other programmes (International



3. Active proposals distribution by IODP member countries (n= 116).



5. Distribution of proposals by platforms (n= 116). Multiple proposals include 1 MSP + JR and 6 Chikyu + JR.



4. Geographic distribution of 1,126 proponents for 116 active proposals.

Marine Process Reconstruction Study (IMPRESS), ICDP), and form a solid basis to address the scientific objectives of the IODP Science Plan for 2013-2023.

The new Amphibious Drilling Proposals (ADP) whose scientific objectives can only be accomplished by combining land and shallow-water drilling *(page 36)* are now in operation. The first ADP proposal concerns a Ligurian landslide (796-Full; Lead Proponent: A. Kopf, *table below*).

Related websites:
http://www.ecord.org/ecord-fb.html
http://www.iodp.org/active-proposals
http://www.iodp.org/facility-boards#SEP

MSP Proposals under review at SEP

Proposal #	Short title	Lead Proponent	Country Lead Proponent	Ocean/Sea	Platform
879-Full	Corinth Active Rift Development	McNeill	UK (ECORD)	Mediterranean	drillship
866-Pre	Japan Trench Paleoseismology	Strasser	Switzerland (ECORD)	Pacific	long-piston coring
ADP*/796-Full	Nice Amphibious Drilling Ligurian Landslide	Kopf	Germany (ECORD)	Mediterranean	Geotech rig, Mebo
730-Full	Sabine Bank Sea Level	Taylor	USA	Pacific	MeBo200
863-MDP**	ISOLAT S Ocean Paleoclimate	Peterson	USA	Southern Ocean	long-piston coring
852-Pre	North Sea GlaciStore	Stewart	UK (ECORD)	Atlantic	drill rig
812-Pre	Ross Sea Glacial History	Wilson	USA	Southern Ocean	seabed drill
806-Pre	Beaufort Gas Hydrates	Paull	USA	Arctic	geotech rig
797-Pre	Alaska Beaufort Margin	Ruppel	USA	Arctic	drill rig (or *JR*)
680-Full	Bering Strait Climate Change	Fowell	USA	Arctic	liftboat, jack-up
761-Pre	S Atlantic Bight Hydrogeology	Wilson	USA	Atlantic	geotech rig, jack-up
756-Pre	Arctic Ocean Exit Gateway	Jakobsson	Sweden (ECORD)	Arctic	drill rig (*JR ?*)
750-Pre	Beringia Sea Level History	Polyak	USA	Arctic	drill rig (*JR ?*)

** ADP: Amphibious Drilling Proposal, ** MDP: Multi-phase Drilling Project, JR: JOIDES Resolution,*

5. Archiving IODP cores at Bremen Core Repository

The Bremen Core Repository (BCR) at the MARUM, University of Bremen, Germany, is one of three IODP core repositories. The others are the Gulf Coast Repository (GCR) at Texas A&M University in College Station (USA) and the Kochi Core Center (KCC) in Kochi (Japan). According to IODP convention and practice, the BCR hosts all cores recovered since the beginning of scientific ocean drilling from the Atlantic and Arctic Oceans as well as the Mediterranean, Baltic and Black Seas. The BCR is also responsible for organising and hosting the Onshore Science Parties and providing mobile labs for mission-specific platform expeditions (MSPs).

As of January 2015, the BCR contains almost **154 km** of deep-sea cores from 87 expeditions. During 2014, a total of **74,460 samples** (of which about 5,840 samples from Exp. 347 were taken on the ship) were taken at the BCR as a result of **310 requests** (of which 191 were submitted by scientists from ECORD member countries) during FY2014. The relatively new procedure of sampling all BCR cores using the Drilling Information System (DIS) database and Curation DIS has proven to be an efficient tool for this purpose.

MSP expedition updates

Expedition 347 Baltic Sea Paleoenvironment

The Onshore Science Party (OSP) for Expedition 347 Baltic Sea Paleoenvironment was held at the BCR/MARUM from 22 January to 20 February 2014 *(page 7)*. 65 participants (science party members as well as ESO staff) from 12 countries attended *(below)* and a total of 26,834 samples were taken. Expedition scientists made extensive use of analytical equipment in the MARUM labs. Following the expedition, BCR/MARUM staff worked in collaboration with the EPC to document the quality assurance and control (QA/QC) of all data acquired.

Expedition 357 Atlantis Massif Seafloor Processes

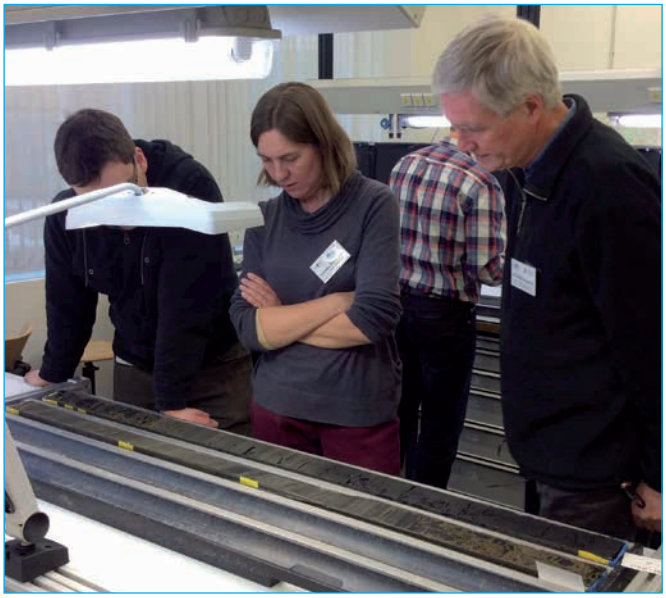
Preparations for Expedition 357 have continued during the year *(page 9)*. The BCR Manager attended the Project Management Team meeting in Edinburgh in May and the BCR/MARUM have worked with the Expedition Project Managers on the Scientific Prospectus. The BCR/MARUM staff members visited the *RRS James Cook* in the UK to plan an efficient core flow and laboratory infrastructure for the expedition.

Expedition 364 Chicxulub K-T Impact Crater

BCR/MARUM also started to consider the core curation and core flow-laboratory options for Expedition 364 Chicxulub K-T Impact Crater *(page 9)*, in collaboration with ESO partners.

Within the ESO QA/QC (quality assurance/quality control) procedures for MSP operations, work packages related overall policies and procedures for QA/QC have been completed, for example for geochemistry data for past MSP expeditions.

Ongoing activities at the BCR/MARUM include the maintenance and upgrade of laboratory containers and equipment, including analytical instruments in operation



Scenes from the Onshore Science Party for Expedition 347 held at BCR/MARUM (left, U. Röhl © ECORD/IODP; right, C. Cotterill ECORD/IODP).

during OSPs. Online tutorials for both the offshore phase and the OSP of MSP expeditions are constantly revised and improved - http://www.marum.de/en/Offshore_core_curation_and_measurements and http://www.marum.de/en/Onshore_Science_Party_OSP.html.

Sample & data management

The summer of 2014 was primarily dedicated to digitizing (as searchable pdf files) all hard-copy sample requests and related paperwork filed in the BCR. Over 3,100 sample requests were scanned, with an average number of around 8 to 10 pages, dating back to the opening of the repository in 1994. These files will be linked to the sample request front-end page in the Drilling Information System (DIS) to make them available (to BCR/MARUM staff only) at the push of a button. They contain vast amounts of detailed information that is not recorded in the basic DIS request table. This work is an element of the CurationDis improvement project, which is still ongoing.

All BCR samples (over 1.5 million samples/more than 5,600 sample requests by more than 3,000 individual scientists) are entered into a database that is accessible to the general public for post-moratorium samples (web interface for curatorial data - http://iodp-dis2.marum.de/BCRDIS/

Use of the new 'IODP Sample and Data Request' (SaDR) system by the general science community has continued to function well. It is now being used for requests for samples from all DSDP and ODP Legs as well as all IODP expeditions.

The Scientific Earth Drilling Information Service – SEDIS - http://sedis.iodp.org/ - is being upgraded with a new search engine for the Pangaea system *(above right)*

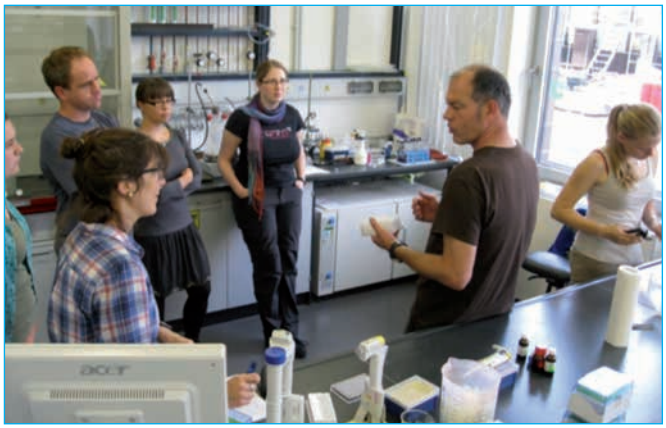
Personnel & organisation

The BCR Manager was involved in three working groups (leading one) of the International Ocean Discovery Program regarding the new **(1)** *JOIDES Resolution* and **(2)** MSP standard measurement procedures and **(3)**) the new IODP Sample, Data, and Obligations Policy.

Education & outreach

During the year core material was provided for numerous course studies for different purposes by various instructors. These included core descriptions and visual illustration of geoscientific concepts. Through these efforts, numerous young emerging scientists have been exposed to and inspired by materials from IODP. In most cases the students were visitors to the BCR, but in special cases the cores were transported to schools within Germany, where they were shown and discussed in their scientific context.

Equally important for informing and educating the general public of our goals and scientific and technical achievements are the frequent visits by representatives of the television, radio and print media. Among the visitors in 2014, were a group from the 2014 General Meeting of SCOR (Scientific Committee on Ocean Research) held at MARUM, the Ambassador from New Zealand, His Excellency, Mr. Rodney Harris, the German Federal Minister for Education and Research, Prof. Johanna Wanka, the German Undersecretary of State, U. Beckmeyer, Deputy Director, Research & Development Center for Ocean Drilling Science (ODS) at Japan Agency for Marine-Earth Science & Technology (JAMSTEC), Moe Kyaw, ECORD Facility Board Chair Karsten Gohl (AWI), and delegations from Japan, South Korea, South Africa, and Taiwan.



The BCR is also an ideal place to train students, with the opportunity to work on real cores and have access to laboratory facilities. The ECORD Summer School in Bremen, has been organised annually since 2007, and presents a new theme each year that relates to the IODP science plans. In 2014, it was dedicated to the topic of "Subseafloor Biosphere: Current Advances and Future Challenges" *(above and page 32)*.

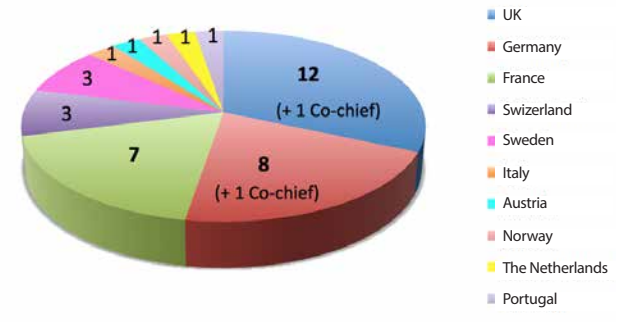
Related website:
http://www.marum.de/en/IODP.html


Baltic Sea
Indian Monsoon
S China Sea
Izu-Bonin Mariana
87°30'
130°
140°
IODP, ODP, DSP drillsites
IODP planned for 2015-2016
IODP completed in 2003-2014
ODP (1985-2003)
DSDP (1968-1983)

6 . Participating in 2014 IODP expeditions

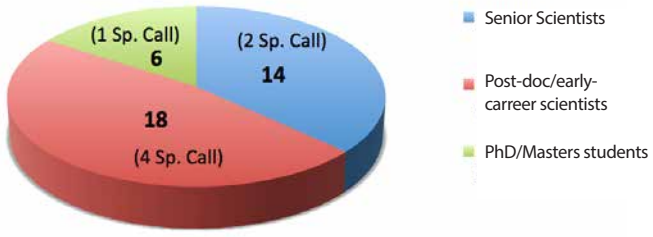
IODP expeditions - http://www.iodp.org/expeditions - provide ECORD scientists with an excellent opportunity to participate in international multidisciplinary ocean drilling projects and to have priority access to unique samples and data. ECORD, as a contributing member of IODP, is entitled to an average of **eight scientists for each expedition**. Scientists are chosen following an open call for applications and a competitive selection process, which involves nominations by ESSAC and discussions with the implementing organisation, the two expedition Co-chief Scientists and the IODP member countries/consortia. Participation of ECORD scientists is proportional to financial contributions of the member countries ("quotas" *page 41*). Selection of the science team is, therefore, based on both scientific merit and a time-average country quota. However, it is possible for ECORD scientists to participate in expeditions without counting towards country quotas. For example, country quotas are not affected in cases where a specific expertise is necessary for an expedition and ECORD scientists sail as the result of special calls, and/or in the event that drilling occurs in the territorial waters of an ECORD member country and ECORD scientists participate as observers.

In FY2014, a total of **five expeditions** were implemented on the *JOIDES Resolution (JR)*. A total of **40 ECORD scientists** were invited to participate, including **two Co-chief Scientists** *(below)*.



Distribution of participants based on country affiliations (Expeditions 349 to 353).

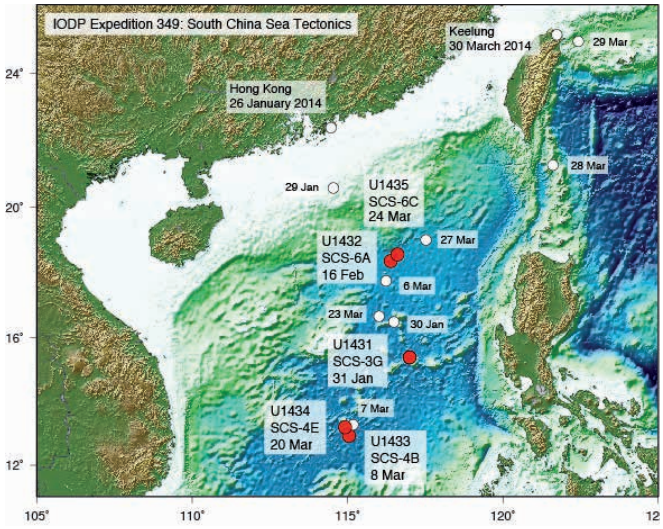
Seven of the 40 scientists participated as the result of special calls. We are pleased to see that many students and early-career scientists had the opportunity to participate in *JR* expeditions and made up more than 60% of the ECORD participants in 2014 *(above right)*.



Distribution of participants based on academic position (Expeditions 349 to 353).

Expedition 349 South China Sea Tectonics, 26 January - 30 March 2014

Expedition 359 implemented IODP Complementary Project Proposal (CPP) 735 to investigate South China Sea (SCS) tectonics and provided an important opportunity to better understand complex patterns of continental margin breakup and basin formation. The South China Sea is situated at the junction of the Eurasian, Pacific, and Indo-Australian plates and is a critical site linking some of the major western Pacific tectonic units.



This expedition was particularly aimed at elucidating the history and mechanisms of the opening of the SCS, the sedimentary and paleoceanographic responses to the formation of this ocean basin, the mantle source and magmatic processes forming the ocean crust basement, and the geodynamic implications for the tectonics of the region. **Five deep basin sites were cored** *(above)*; three of which cored into sedimentary rocks and oceanic igneous basement

near the former spreading centre, and two sites were near the northern continental/ oceanic boundary. A total of 1,524 m of sediment and 78 m of oceanic crust were recovered. Ongoing studies of magnetisation, mineralisation, and geochemical compositions of the basement basaltic rocks will shed light on deep mantle processes and the formation of oceanic crust. In addition, physical and sedimentological studies aim to produce a 3D sedimentation and subsidence model and evaluate the paleoceanographic and climatic responses to the tectonic events in the SCS.

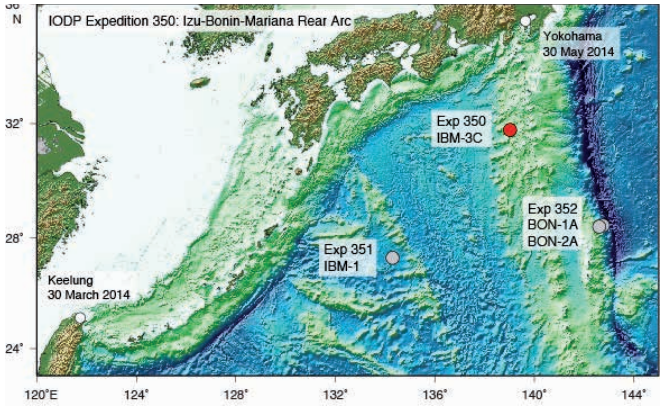
ECORD participants (Expedition 349)

Rui Bao	ETH Zurich	Switzerland
Anne Briais	GET, Toulouse	France
Ivan Hernández Almeida*	University of Bremen	Germany

* Participation resulting from a special call

Expedition 350 Izu-Bonin-Mariana: Rear Arc, 30 March - 30 May 2014

The Izu-Bonin-Mariana (IBM) Project "Comprehensive Understanding of Arc Evolution and Continental Crust Formation" resulted in three expeditions in 2014 to the Izu-Bonin-Mariana arc onboard the *JOIDES Resolution*: Expedition 350 IBM Rear Arc, Expedition 351 IBM Arc Origins, and Expedition 352 IBM Forearc *(page 23)*. The overarching aim of these three expeditions was to investigate the genesis and evolution of continental crust in this convergent plate margin.



Expedition 350 focused on the magmatic history of the Izu-Bonin-Mariana rear arc and **cored two sites and seven holes** *(above)*. One site (U1436) yielded a rich, relatively complete record of Late Pleistocene forearc sedimentation, strongly influenced by frontal arc explosive volcanism. The second site (U1437) was chosen to provide a temporal record of rear-arc magma compositions, allowing comparison with the previously drilled forearc magmatic record, and determination of across-arc geochemical variation throughout the history of the arc system. Variations in five time periods, from the upper Miocene to late Pliocene-

Expedition 349: Rui Bao, ETH, Switzerland in front of archive core sections in the core lab (William Crawford, IODP/TAMU).

Recent, are being investigated using standard igneous geochemical tools and geochronology, paleontology, paleomagnetism and absolute dating of zircons. Three main hypotheses about crustal genesis and mantle evolution of the rear-arc system will be tested **(1)** geochemically asymmetric crust in the rear arc is either a fundamental trait of crust in oceanic arcs or a secondary trait that develops only after back-arc spreading; **(2)** non-steady state events, such as rifting, play a major role in the evolution of arc crust; and **(3)** the origin of the Izu rear-arc seamount chains is related to mantle convection patterns.

Expedition 350: Julia Ribeiro, University of Texas at Dallas, USA, and Julien Berger, GET-Toulouse, France), mark core for samples. (Tim Fulton, IODP/TAMU).

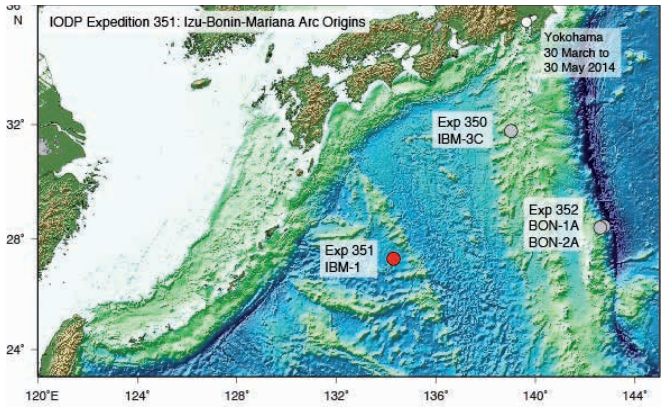
ECORD participants (Expedition 350)

Abigail Barker	Uppsala University	Sweden
Julien Berger	GET, Toulouse	France
Manuela Bordiga*	Uppsala University	Sweden
Cédric Hamelin	University of Bergen	Norway
Eleanor John*	Cardiff University	UK
Ann-Sophie Jonas	CA University, Kiel	Germany
Sue Mahoney	University of Bristol	UK
Julie Schindlbeck	GEOMAR, Kiel	Germany
Maryline Vautravers*	University of Cambridge	UK

* Participation resulting from a special call

Expedition 351 Izu Bonin Mariana: Arc Origins, 30 May - 30 July 2014

The primary objective of Expedition 351 was to determine the nature of the crust and mantle in the Izu-Bonin-Mariana system prior to the onset of subduction during the middle Eocene. One prime site was targeted in the Amami Sankaku Basin *(below)*, located approximately 100 km west of the northern portion of the Kyushu-Palau Ridge, a remnant arc of the intra-oceanic IBM arc on the northern Pacific plate.



Six holes were occupied during the expedition with a total of 189 cores recovered. Drilling in a water depth of 4,720 m, and a sediment thickness of more than 1,300 m above basement imposed significant technical challenges. Furthermore typhoon Neoguri with its 200 mph winds on 5 July resulted in an abrupt stop to coring for a few days. Once coring resumed, the sediment-basement contact was identified and ~150 m was cored into basaltic basement, reaching a total depth of 1611 mbsf for this site. Studies of the sediment (oceanic crust Layer 1) and igneous basement (Layer 2) are being conducted to **(1)** identify and model the subduction initiation process and initial arc crust formation, **(2)** determine the Paleogene compositional evolution of the IBM arc, and **(3)** establish the geophysical properties of the Amami Sankaku Basin.

Expedition 351: Paleomagnetism samples taken from core for study. (Marco Maffione & IODP/TAMU).

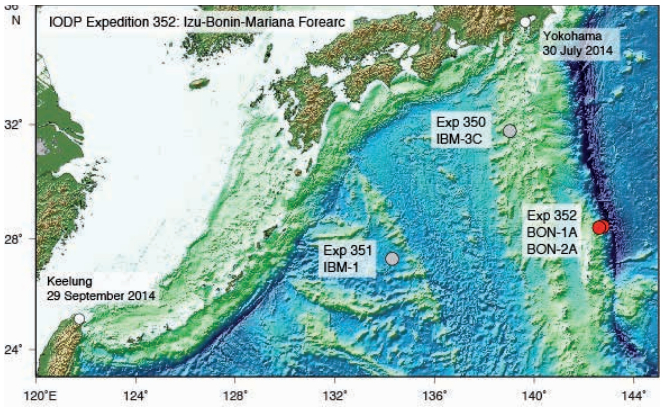
ECORD participants (Expedition 351)

Philipp Brandl	University of Erlangen, Nürnberg	Germany
Sev Kender	BGS Keyworth	UK
Marco Maffione	University of Utrecht	Netherlands
Anders McCarthy	University of Lausanne	Switzerland
Antony Morris	Plymouth University	UK
Ivan Savov	University of Leeds	UK
Clara Sena*	University of Aveiro	Portugal
Cees van der Land*	University of Newcastle	UK

* Participation resulting from a special call

Expedition 352 Izu Bonin Mariana: Forearc, 30 July - 29 September 2014

Expedition 352 drilled into volcanic sequences of the outer IBM forearc to examine early processes in magmatic evolution, volcanic chemostratigraphy and arc crustal accretion associated with the initiation of subduction at an intra-oceanic convergence plate margin. **Four sites were drilled** *(below)* with the goal of penetrating >1.0 km sequences of lavas to obtain, and ultimately date, a complete volcanic stratigraphy that records the transition from spreading to arc volcanism - and thus, the birth of an island arc.



Further objectives of this expedition were to test the hypothesis that forearc basalt (FAB: a distinctive type of basaltic rock of the IBM forearc) lies beneath boninites and to understand chemical gradients within these units and across their transitions. Although investigations are still at an early stage, preliminary results include: the first confirmation of *in-situ* FAB as the first magmas to erupt during subduction initiation and the recovery of a wide range of lava types that vary geochemically with depth, including varieties that are transitional towards both boninite and MORB. The results of this expedition will also provide important information to understand how mantle melting processes evolve during and after subduction initiation and to test the hypothesis that the forearc lithosphere created during subduction initiation is the birthplace of supra-subduction zone ophiolites, such as Pindos in Greece, Mirdita in Albania, Semail in Oman, and Troodos in Cyprus.

Expedition 352: Deployment of the re-entry cone at Hole U1440B. (Tim Fulton, IODP/TAMU).

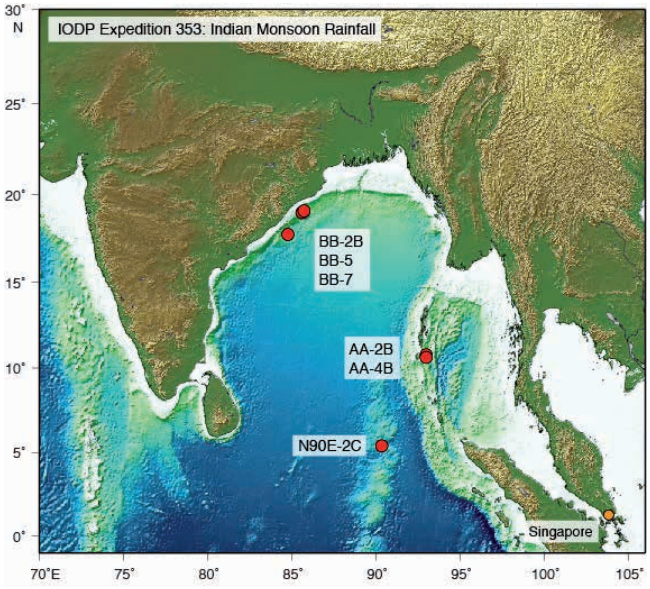
ECORD participants (Expedition 352)

Julian Pearce, *Co-chief Scientist*	Cardiff University	UK
Renat Almeev	University of Hannover	Germany
Claire Carvallo	UPMC, Paris	France
Marguerite Godard	Geosciences, Montpellier	France
Maria Kirchenbaur	University of Cologne	Germany
Walter Kurz*	University of Graz	Austria
Steffen Kutterolf	GEOMAR	Germany
Julie Prytulak	Imperial College, London	UK
Alastair Robertson	University of Edinburgh	UK

* Participation resulting from a special call

Expedition 353 Indian Monsoon Rainfall, 29 November 2014 - 29 January 2015

The primary goal of Expedition 353 was to obtain sediment sections from within the core region of Indian monsoon precipitation to explore how monsoon patterns have influenced global ice volume and greenhouse gas concentrations over geologic time. **Six primary sites** in the Bay of Bengal and Andaman Sea were targeted *(top, right)* for drilling to recover Upper Cretaceous - Holocene sediment sections that record erosion and runoff signals from river input to the Bay of Bengal as well as providing important information about the resulting north-south surface water salinity gradient. Analysis of sediment sections from the Mahanadi Basin (northeast Indian margin), the Nicobar-Andaman Basin (Andaman Sea), and the northern Ninetyeast Ridge (southern Bay of Bengal) will be used to understand the physical mechanisms underlying changes in monsoonal precipitation, erosion, and run-off across millennial through tectonic timescales. These sites will provide crucial new information within which to interpret differences among existing results from previous monsoon-themed drilling expeditions in the Arabian Sea (ODP Leg 117), the South China Sea (ODP Leg 184), and the Sea of Japan (Integrated Ocean Drilling Program Expedition 346).



Milos Bartol (Paleontologist, Uppsala University, Sweden) and Karen Gariboldi (Paleontologist, Università di Pisa, Italy) prepare smear slides from the sample to be examined for microfossils under a microscope. (Liping Zhou & IODP)

ECORD participants (Expedition 353)

Wolfgang Kuhnt, *Co-chief Scientist*	CA University, Kiel	Germany
Pallavi Anand	The Open University	UK
Milos Bartol	Uppsala University	Sweden
Clara Bolton	CEREGE	France
Karan Gariboldi*	Pisa University	Italy
Ed Hathorne	GEOMAR	Germany
Kate Littler	University of Exeter	UK
Philippe Martinez	EPOC, Univ. of Bordeaux	France
Oscar Romero	MARUM	Germany
Samuel Taylor	IPG, Paris	France

* Participation resulting from a special call

Sunrise over the Philippine Sea during Expedition 351 Izu Bonin Mariana Arc Origins (photo Mohammed Aljahdali & IODP).

7. Selected IODP publications from ECORD scientists

Publications related to MSP expeditions

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). An Arctic perspective on dating mid-late Pleistocene environmental history. 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). Alkaline leaching characteristics of biogenic opal in Eocene sediments from the central Arctic Ocean: a case study in the ACEX cores. 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). Effect of early Pliocene uplift on late Pliocene cooling in the Arctic–Atlantic gateway. Earth Planet. Sci. Lett., 387, 132-144. doi:10.1016/j.epsl.2013.11.007

Schröder-Adams C (2014). The Cretaceous Polar and Western Interior seas: paleoenvironmental history and paleoceanographic linkages. Sediment. Geol., 301, 26-40. doi:10.1016/j.sedgeo.2013.12.003

Stickley CE (2014). Palaeoclimate: the sea ice thickens. Nat. Geosci., 7, 165-166. doi:10.1038/ngeo2080

Expedition310 Tahiti Sea Level

Camoin G, and Webster J (2014). Coral reefs and sea-level change. 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). Bedding attitudes as a sequence stratigraphy proxy: a case study from borehole images, Integrated Ocean Drilling Program Expedition 313, Site M28. 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). Carbon-isotope stratigraphy from terrestrial organic matter through the Monterey event, Miocene, New Jersey margin (IODP Expedition 313). 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). Intensification of the meridional temperature gradient in the Great Barrier Reef following the Last Glacial Maximum. Nat. Comm., 5, 4102. doi:10.1038/ncomms5102

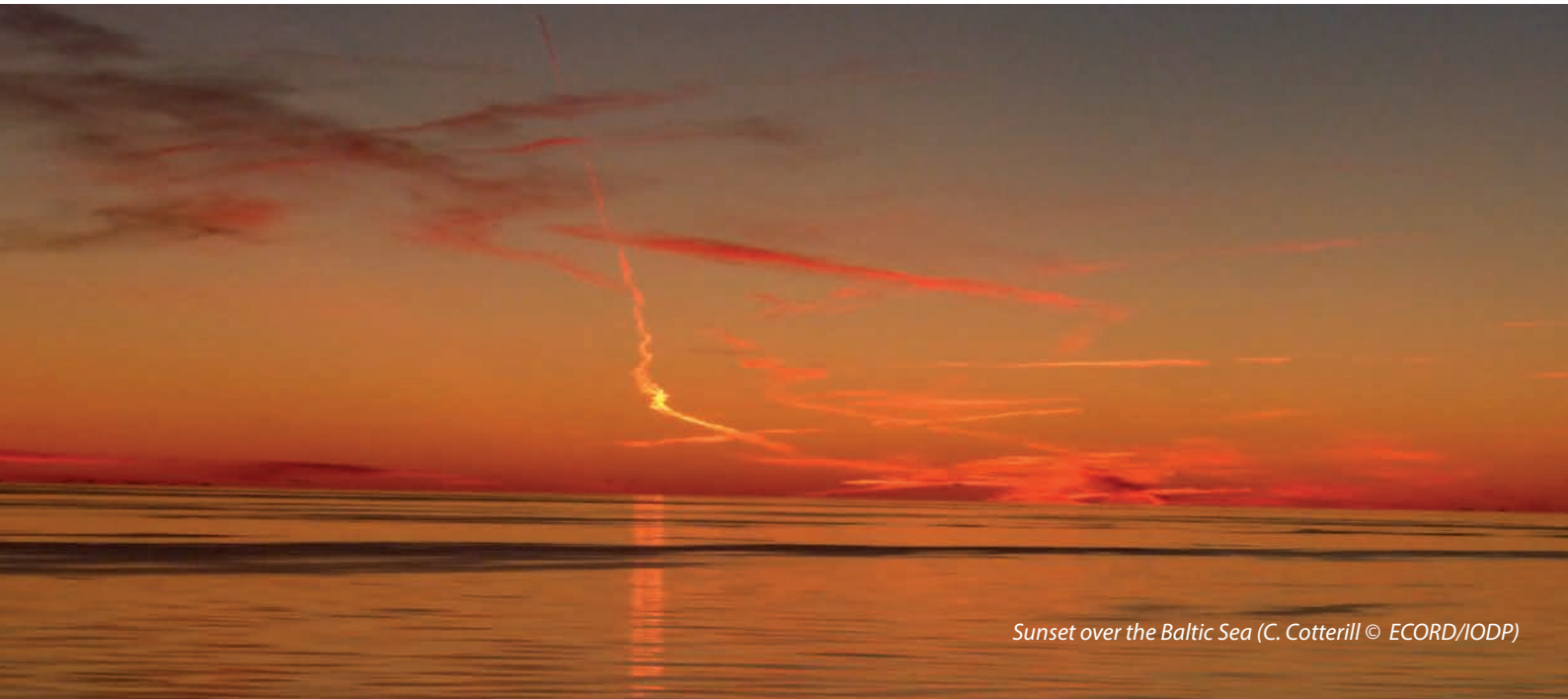
Hinestrosa G, Webster JM, Beaman RJ, and Anderson LM (2014). Seismic stratigraphy and development of the shelf-edge reefs of the Great Barrier Reef, Australia. Mar. Geol, 353, 1-20. doi:10.1016/j.margeo.2014.03.016

Puga-Bernabéu A, Webster JM, Beaman RJ, Reimer PJ, and Renema W (2014). Filling the gap: a 60 ky record of mixed carbonate-siliciclastic turbidite deposition from the Great Barrier Reef. Mar. Pet. Geol., 50, 40-50. doi:10.1016/j.marpetgeo.2013.11.009

Zhang G, and Smith-Duque C (2014). Seafloor basalt alteration and chemical change in the ultra thinly sedimented South Pacific. 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



Sunset over the Baltic Sea (C. Cotterill © ECORD/IODP)

Publications related to *JOIDES Resolution* and *Chikyu* expeditions

Bahr A, Jiménez Espejo FJ, Kolasinac N, Grunert P, Hernández-Molina F, Röhl U, Voelker A, Escutia C, Stow DAV, Hodell D, and Alvarez-Zarikian CA (2014). Deciphering bottom current velocity and paleoclimate signals from contourite deposits in the Gulf of Cádiz during the last 140 kyr: An inorganic geochemical approach. Geochem., Geophys., Geosyst., 15(8), *3145-3160*. doi:10.1002/2014GC005356

Beltran C, Rousselle G, Backman J, Wade BS, and Sicre MA (2014). Paleoenvironmental conditions for the development of calcareous nannofossil acme during the late Miocene in the Eastern Equatorial Pacific. Paleoceanography, 29(3), *210-222*. doi: 10.1002/2013PA0025062014

Boscolo Galazzo F, Thomas E, Pagani M, Warren C, Luciani V, and Giusberti L (2014). The middle Eocene climatic optimum (MECO): A multiproxy record of paleoceanographic changes in the southeast Atlantic (ODP Site 1263, Walvis Ridge). Paleoceanography, 29(12), *1143-1161*. doi: 10.1002/2014PA002670

Bottini C, Erba E, Tiraboschi D, Jenkyns HC, Schouten S, and Sinninghe Damsté JS (2014). Climate variability and relationship with ocean fertility during the Aptian Stage. Clim. Past Discuss., 10, *689-738*. doi:10.5194/cpd-10-689-2014

Bowles MW, Mogollón JM, Kasten S, Zabel M, and Hinrichs K-U (2014). Global rates of marine sulfate reduction and implications for sub-sea-floor metabolic activities. Science, 344, 889-891. doi: 10.1126/science.1249213

Carpentier M, Weis D, and Chauvel C (2014) Fractionation of Sr and Hf isotopes by mineral sorting in Cascadia Basin terrigenous sediments. Chem. Geol., 382, *67-82*. doi:10.1016/j.chemgeo.2014.05.028

Castelain T, McCaig AM, and Cliff RA (2014). Fluid evolution in an Oceanic Core Complex: A fluid inclusion study from IODP hole U1309 D-Atlantis Massif, 30 degrees N, Mid-Atlantic Ridge. Geochem. Geophys. Geosyst., 15(4), *1193-1214*. doi:10.1002/2013GC004975

Channell JET, Wright JD, Mazaud A, and Stoner JS (2014). Age through tandem correlation of Quaternary relative paleointensity (RPI) and oxygen isotope data at IODP Site U1306 (Eirik Drift, SW Greenland). Quaternary Sci. Rev., 88, *135-146*. doi:10.1016/j.quascirev.2014.01.022

Ciobanu M-C, Burgaud G, Dufresne A, Breuker A, Rédou V, Ben Maamar S, Gaboyer F, Vandenabeele-Trambouze O, Sebastian Lipp J, Schippers A, Vandenkoornhuyse P, Barbier G, Jebbar M, Godfroy A, and Alain K (2014). Microorganisms persist at record depths in the subseafloor of the Canterbury Basin. The ISME Journal, 8, *1370-1380*. doi:10.1038/ismej.2013.250

Coggon RM, Rehkämper M, Atteck C, Teagle DAH, Alt JC, and Cooper MJ (2014). Controls on thallium uptake during hydrothermal alteration of the upper ocean crust. Geochim. Cosmochim. Ac., 144, *25-42*. doi:10.1016/j.gca.2014.09.001

Colin C, Siani G, Liu ZF, Blamart D, Skonieczny C, Zhao YL, Bory A, Frank N, Duchamp-Alphonse S, Thil F, Richter T, Kissel C, and Gargani J (2014). Late Miocene to early Pliocene climate variability off NW Africa (ODP Site 659). Palaeogeogr. Palaeoclim. Palaeoecol., 401, *81-95*. doi:10.1016/j.palaeo.2014.02.015

Conin M, Bourlange S, Henry P, Boiselet A, and Gaillot P (2014). Distribution of resistive and conductive structures in Nankai accretionary wedge reveals contrasting stress paths. Tectonophysics, 611, *181-191*. doi:10.1016/j.tecto.2013.11.025

Dinarès-Turell J, Westerhold T, Pujalte V, Röhl U, and Kroon D (2014). Astronomical calibration of the Danian stage (Early Paleocene) revisited: Settling chronologies of sedimentary records across the Atlantic and Pacific Oceans. Earth Plan. Sci. Lett., 405, *119-131*. doi:10.1016/j.epsl.2014.08.027

Dorador J, Rodriguez-Tovar F, Hernández-Molina FJ, Stow DAV, Alvarez-Zarikian C, and IODP Expedition 339 Scientists (2014a). Digital image treatment applied to ichnological analysis of marine core sediments. Facies, 60(1), *39-44*. doi:10.1007/s10347-013-0383-z

Dorador J, Rodriguez-Tovar F, Hernández-Molina FJ, Stow DAV, Alvarez-Zarikian C, and IODP Expedition 339 Scientists (2014b). Quantitative estimation of bioturbation based on digital image analysis. Mar. Geol., 349, *55-60*. doi:10.1016/j.margeo.2014.01.003

El Azzouzi M, Bellon H, Coutelle A, and Rehault JP (2014). Miocene magmatism and tectonics within the Peri-Alboran orogen (western Mediterranean). J. Geodyn., 77, *171-185*. doi:10.1016/j.jog.2014.02.006

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Photo Cédric Hamelin & IODP

8. Engaging the community

A major responsibility of ECORD is to promote and facilitate scientific ocean drilling within its member countries. The Science Support and Advisory Committee of ECORD, ESSAC, has in response established activities that foster the coordination of the science community, the development of drilling proposals (MagellanPlus Workshop Series Programme) and the education and training of future generations of scientists (ECORD Summer Schools, Scholarships, Research Grants and Distinguished Lecturer Programme).

Engaging scientists in the development of future drilling proposals

The ECORD/ICDP MagellanPlus Workshop Series Programme is designed to support European, Canadian and Israeli scientists to develop new and innovative science proposals for IODP and ICDP. The current programme continues as well as broadens the original European Science Foundation (ESF) Magellan Workshop Series Programme by integrating both marine and continental drilling and coring to address future challenges in Earth, Life and Environmental sciences. Two calls for workshops are issued annually. Six MagellanPlus workshops took place in 2014. These workshops were co-funded by other programmes and organisations (*e.g.* ICDP, DCO, JAMSTEC, J-DESC, NERC (UK), The Hellenic Centre for Marine Research, NASA, NSF, University of Heidelberg, ESF Researching Network Programmes, etc.).

Deep-Sea Record of Mediterranean Messinian Events (DREAM-II), 20-23 January 2014, Paris (France)

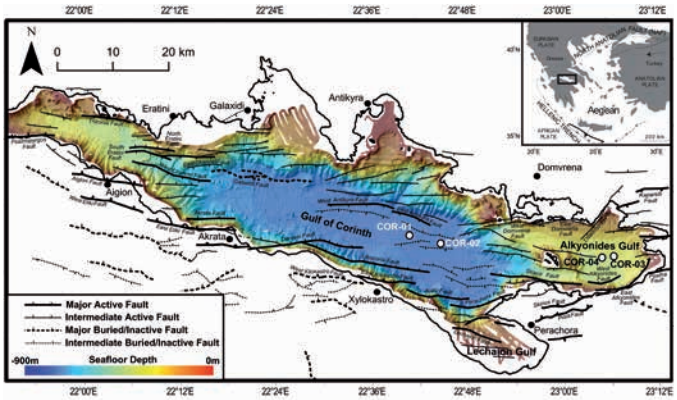
Conveners: G. Aloisi and Co-proponents

The DREAM II MagellanPlus workshop was a follow-up to the DREAM workshop held in 2013. The goal of the initiative is a Multi-phase Drilling Project (MDP) to address a variety of scientific themes that include the formation of one of the largest salt deposits (salt giants) in Earth's history, and includes the tectonic, hydrological and biological consequences of this extraordinary event. **38 scientists** from **nine countries** participated in this workshop including a representative from the oil industry. **Two drilling proposals, 857 "DREAM Mediterranean Salt Giant" and 857A "DREAM: Deep Surface Connection"** were submitted to IODP.

IODP Drilling within the Corinth Continental Rift - co-funded by NERC, 11 - 14 February 2014, Athens (Greece)

Conveners: L. McNeill and Co-proponents

In mid-February, **36 participants** from **six countries** met in Athens for a two-day meeting and one-day field trip to the Corinth Rift Zone, which was followed by one day of proposal preparation by a sub-set of participants. Presentations included keynotes on global rift questions, modeling techniques for rift processes knowledge of the Corinth Rift chronostratigraphy, fault basin evolution, sediment flux history and modeling potential, seismology and deep crustal structure and the application of drilling to regional hazard assessment. A representative from ESO provided information and constraints concerning drilling in this environment. The drilling site locations *(above)* were defined, scientific aims generated and eventually **Proposal 879 Corinth Active Rift Development,** *(page 17)* to drill within this rift system was submitted to IODP on October 2014.



Fault map of the Corinth Rift system, Greece , showing proposed IODP drillsites (courtesy L. McNeill and co-proponents).

BLACKSINK: Black Sea History of the past 15 Ma, 27-28 February 2014, Utrecht (The Netherlands)

Conveners: I. Vassiliev and Co-proponents

The BLACKSINK MagellanPlus workshop brought together **22 participants** with various expertise, *e.g.* stratigraphy, geochemistry, biogeochemistry, tectonics and paleontology, to work toward an MSP expedition in the Black Sea. The aim was to decipher the time control on recurring events, and their impact on regional paleoclimate and paleoenvironment, and better understand interactions between the Mediterranean Sea and the World Ocean during the past 15 Myr. Scientific foci were **(1)** Deep undeformed Miocene - Pliocene - Recent sequences; **(2)** Continental margin erosion; **(3)** Basement - sediment unconformities, and **(4)** Targets back in time. A review of the main multi-channel seismic data sets from various areas was conducted during the workshop as well as the identification of potential priority areas to drill, the need for further site surveys, and assessments of DSDP 42B results. It was decided to write **two pre-proposals** , 1-"Black Sea since the Quaternary" and 2 -"Deep Time - Deep Biosphere Black Sea'"

Accelerating Neoproterozoic Research through Scientific Drilling, 17-19 March 2014, Nottingham (UK)

Conveners: D.J. Condon and Co-proponents

This workshop gathered **49 participants** from **14 countries**, centred on establishing sites to initiate a scientific research drilling initiative to increase the number of records, globally, for Neoproterozoic research *(right)*. This research aims to answer a range of broadly profound to detailed questions, such as: Why did complex macroscopic life evolve on Earth some 600 Ma; or: How do different yet broadly coeval stratigraphic sections with distinctly different proxy records relate to one another? Participants identified some high-priority sites, and discussed the need for the establishment of operating and management mechanisms for undertaking continental drilling, which must match in scope and spirit that of IODP (in its key role in elucidating the co-evolution of Cenozoic climate and life); the requirement of realising open-access data acquisition and archiving, and coordinating multiple drilling projects funded by different national sources (ICDP plus industry, NASA , funding agencies, etc.).

Advancing Sub-surface Biosphere and Paleoclimate Research, 21-23 August 2014, Seoul (South Korea) -

Conveners: J. De Leeuw, H.J. Mills and Co-proponents

This workshop was born from discussions at many meetings particularly *Chikyu*+10 in April 2013. **28 scientists** from **10 countries** including a representative from the ECORD Science Operator attended the meeting. During the workshop, a community discussion was held to develop shared sampling and long-term storage strategies for microbiological drilling and to implement these through standardisation protocols for drilling platforms. Where possible the diversity of drilling operations was taken into account. Background information was given on the state of deep-life components and organic proxy-based paleoclimatology within the long-term plans for IODP, ICDP, DCO, and IMPRESS. These discussions were useful to develop standardised protocols using a three-level approach to improve the expectation of biological research for future drilling operations. The recommendations and protocols defined during the workshop will be used to write a handbook for microbiological and organic proxy-based paleoclimate drilling, sample processing and long-term storage.

North Atlantic Drilling for Climate dynamics – Filling the Oligo - Mio- Plio Gap in the North Atlantic, 15-17 September 2014, Heidelberg (Germany)

Convenors: O. Friedrich & Co-proponents

Twenty-four specialists in paleoclimatology, paleoecology, geochemistry, bio-cyclo-magnetostratigraphy and geophysics were brought together to lead the development of an IODP pre-proposal supported by seismic data. This pre-proposal will target the recovery of sediment sections in the North Atlantic to enable development of a sophisticated orbital model and elucidate Oligo-Pliocene ocean ice climate dynamics. The following specific themes were addressed **(1)** filling the Oligo-Mio-Plio sequence gap in the North Atlantic with high-quality sections of a continuous sequence record of the past 35 Ma **(2)** the evolution of northern hemisphere cryosphere; **(3)** the development of the carbonate-compensation depth during this time span and how it compares to the equatorial Pacific record (IODP Exp. 320 and 321); **(4)** the history of Atlantic overturn; **(5)** the timing of the initiation of massive drift sedimentation in the Neogene and **(6)** the interaction between climate and ecosystem change in the North Atlantic. **Proposal 874 "Neogene Newfoundland Sediments Drifts"** was submitted to IODP on October 2014.

Ediacaran fossils dated at ~565 Ma, some of the oldest macroscopic fossils known and which pre-date the Cambrian explosion by some 35 Ma.

Related website: http://www.ecord.org/magellanplus.html

Training young scientists in ECORD Summer Schools

Besides fostering the coordination of the science community, ECORD is training the next generation of scientists. The ECORD Summer Schools, initiated in 2007, are well established and are attended annually by many Masters and PhD students as well as postdoctoral research fellows from ECORD member countries and beyond. Two summer schools were sponsored by ECORD in 2014.

Urbino Summer School field trip to the K-Pg boundary exposed in the Bottaccione valley near Gubbio (photo courtesy I. Niezgodzki).

11th Urbino Summer School in Paleoclimatology, 9-24 July 2014, Urbino, Italy,

The Urbino Summer School in Paleoclimatology (USSP) is organised every year by an international consortium of scientists and is hosted by the Faculty of Sciences and Technology at the University of Urbino. The school is open to students from ECORD member countries, and anywhere in the world, and is designed to provide training in many different areas of paleoclimatology, including biogeochemical cycling and paleoceanography, continental systems, and aspects of deep time climate modeling. The 11th USSP held in 2014 focused on past climate dynamics with special emphasis on the analysis of the long-term carbon cycling and its implications in the understanding of present and future climates. The course included lectures, field trips *(above)* and exercises organised by a pool of 33 international scientists. The summer school brought together 72 students from 13 ECORD member countries (Austria, Belgium, Canada, Denmark, France, Germany, Italy, Netherlands, Norway, Poland, Portugal, Sweden, UK) and four non-ECORD member countries (New Zealand, Greece, Spain and USA).

Related website: http://www.urbinossp.it/

8th ECORD Summer School on "Subseafloor Biosphere: Current Advances and Future Challenges", 22 September-2 October 2014

As in past years, the ECORD Bremen Summer School was held at the IODP Bremen Core Repository (BCR), taking advantage of the "virtual ship" facilities at the repository and the laboratory facilities at MARUM. The summer school focused on the geomicrobiology of the deep biosphere and was organised around a week of theory and a week of practical laboratory methods *(below)*. The first week featured talks by experts in the fields of microbiology, geology and geochemistry on topics dealing with diversity, distribution and limits of microbial life, and geochemical processes within seafloor sediments and the oceanic crust. In addition, case studies and results from various drilling expeditions offered insights into scientific questions and the structure of IODP. The second week focused on practical and laboratory work. The students were introduced to first-hand shipboard

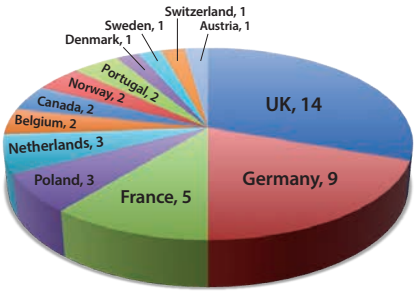
methodology, which included cultivation techniques, characterisation of microbial activity, drill-core description, core scanning, and downhole logging. This summer school brought together 21 instructors from six countries as well

as 29 PhD students and young postdoctoral researchers from 11 ECORD member countries (4 Germany, 3 Norway, 2 Austria, 2 Poland, 2 Denmark, 2 UK, 2 Israel, 1 Belgium, 1 Switzerland, 1 Finland and 1 Italy) and 4 non-ECORD member countries (4 from USA, 2 from China, 1 from Chile and 1 from Turkey).

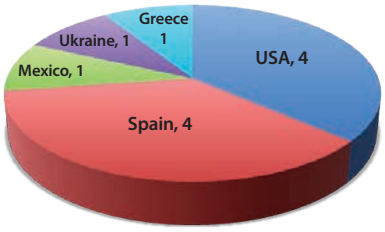
Related website: **https://www.marum.de/en/ECORD_Summer_School_2013.html**

ECORD Scholarships

ECORD Scholarships provide support to outstanding students to attend the ECORD-sponsored summer schools, and a total of 70 applications were received in 2014. The Urbino Summer School in Paleoclimatology (USSP) received a total of 57 applications: 46 from 13 ECORD member countries and 11 from five non-ECORD member countries *(figures 1 & 2 below)*.



1. Distribution of ECORD applications to the Urbino Summer School 2014 (n = 46) .



2. Distribution of non-ECORD applications to the Urbino Summer School 2014 (n = 11) .

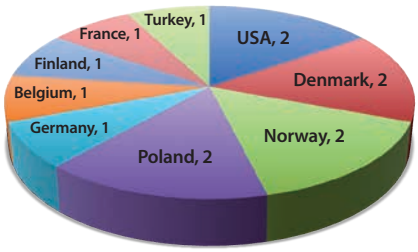
Fourteen students from ECORD member countries were funded to attend: 6 from the UK, 2 from Germany 2 from France, 1 from Belgium, 1 from Portugal, 1 from Poland and 1 from Canada *(table top right)*.

The Bremen Summer School received a total of 13 applications: 10 from 7 ECORD member countries and 3 from 2 non-ECORD member countries *(figure 3 right)*.

Four students from ECORD member countries were funded to attend the Bremen Summer School: 2 from Denmark, 1 from Finland and 1 from Norway *(table right)*.

ECORD Scholarship Awardees - 11th Urbino Summer School

Chloé Amberg	University Lille1	France
Diksha Bista	Dalhousie Univ., Halifax	Canada
Anieke Brombacher	NOC, Southampton	UK
Miros Charidemou	Cardiff University	UK
Dominik Hülse	University of Bristol	UK
Ann Sophie Jonas	CA Kiel University	Germany
Igor Niezgodzki	ING Cracow	Poland
Dulce Oliveira	CIIMAR, Univ Porto	Portugal
Robert Owen	University of Oxford	UK
Richard Smith	NOC, Southampton	UK
Stef Vansteenberge	Vrije Universiteit Brussels	Belgium
Madeleine Vickers	Plymouth University	UK
Marc Wengler	AWI - Bremerhaven	Germany
Zhaojie Yu	University Paris-Sud, Orsay	France



3. Distribution of ECORD and non-ECORD applications to the Bremen Summer School 2014 (n = 13) .

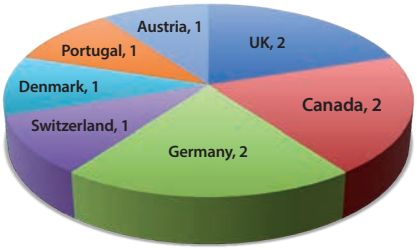
Scholarship Awardees - 8th Bremen Summer School

Karen Marie Hilligsøe	Aarhus University	Denmark
Marion Juassi	Aarhus University	Denmark
Pauliina Rajala	VTT Technical Research Centre of Finland	Finland
Rui Zhao	University of Bergen	Norway

Related website: http://www.essac.ecord.org/index.php?mod=education&page=scolarships

Sponsoring research for young scientists: ECORD Research Grants

ECORD supports outstanding early career scientists by sponsoring merit-based awards for research that is directed toward scientific objectives of past or up-coming DSDP / ODP / IODP expeditions (core material and data). The aim of this endeavour is to foster participation of young scientists in ocean drilling research and encourage them to develop their own projects and to collaborate with other research groups outside of their home institutions. Ten applications from seven ECORD member countries were submitted in 2014 *(figure 4 page 34)* from PhD students and post-doctoral researchers; five grants were awarded: 2 UK, 1 Austria, 1 Germany and 1 Portugal *(table page 34)*.



4. Distribution of ECORD Research Grants (n = 10)

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ECORD Research Grants 2014

Adele Cameron	Open University	UK
Lyndsey Fox	University of Leeds	UK
Angela Garcia Gallardo	University of Graz	Austria
Juliane Müller	AWI-Bremerhaven	Germany
Clara Sena	CESAM - Univ of Aveiro	Portugal

Related website: **http://www.essac.ecord.org/index.php?mod=education&page=grants**

Promoting IODP science through the ECORD Distinguished Lecturer Programme

The ECORD Distinguished Lecturer Programme (DLP) is designed to bring the scientific achievements of ocean drilling to a broad audience within universities/institutes in ECORD member countries. ESSAC selects "Distinguished Lecturers" who then tour ECORD member countries, and on occasion non-ECORD countries, to present the exciting discoveries from one of the four main scientific themes addressed by the IODP Science Plan - http://www.iodp.org/science-plan-for-2013-2023. Any university or institution in an ECORD member country may apply to host a lecturer.

A new phase of the programme started in the autumn of 2014. ESSAC has selected five renowned scientists, who will visit various institutions in Europe, Canada and Israel in 2015 and will present the following lectures:

- **Christian France-Lanord** (Centre de Recherches Pétrographiques et Géochimiques, CNRS, Nancy, France) - Himalaya: from mountains to drilling in the Bengal fan;
- **Jens Kallmeyer** (GFZ German Research Centre for Geosciences, Helmholtz Centre, Potsdam, Germany) - What controls abundance and activity of microbial life in subsurface sediments? New insights from scientific drilling;
- **Antony Morris** (School of Geography, Earth and Environmental Sciences, Plymouth University, UK) - What can magnetism tell us about oceanic tectonics? New insights from scientific drilling;
- **Gabriele Uenzelmann-Neben** (Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven, Germany) - Reconstructing palaeo-circulation: Reading sediment drifts with the aid of IODP information;
- **Paola Vannucchi,** (Earth Sciences Department, Royal Holloway, University of London, Surrey, UK) - Understanding megathrust earthquakes through ocean drilling.

Related website: **http://www.essac.ecord.org/index.php?mod=education&page=dlp**

Group of the ECORD Summer School 2014 in Bremen (Volker Diekamp, MARUM).

9. Collaborating

ECORD and the European Commission

In FY2014, ECORD has worked on three major projects related to its potential collaboration with the European Commission (EC) **(1)** Working towards the establishment of a Distributed European Drilling Infrastructure for Subseafloor Sampling and Monitoring, **(2)** exploring new ways of organising its management and funding, e.g. possibly as a European Research Infrastructure Consortium (ERIC), and **(3)** collaborating in the Earth Science Europe initiative.

EC H2020 Proposal - Integrating and Opening Research Infrastructures of European Interest

In an effort to win the EC's support for scientific drilling in Europe, the ECORD Science Operator formed a partnership with other research institutes and SMEs *(table below)* to answer a call under the European Union's Horizon 2020 Research and Innovation Programme. The call targeted by the partnership was "Integrating and Opening Research Infrastructures of European Interest", specifically addressing the domain "Research infrastructures for ocean drilling".

Throughout the summer of 2014, the partnership developed a proposal to form the **Distributed European Drilling Infrastructure (DEDI)**, which was submitted to the EC in September. At the time of writing, the DEDI partnership had learned that the DEDI proposal had been rejected, and was awaiting the formal evaluation summary report for feedback. The DEDI partnership will assess the feedback, and will consider what alternative opportunities may exist to take elements of the DEDI proposal forward.

The Distributed European Drilling Infrastructure was proposed with the specific objective of further enhancing the scientific investigation of the solid Earth beneath the surface by providing support for transnational access to cutting edge technologies and proven scientific services to the European earth science community. DEDI was also designed to foster and improve European collaboration between DEDI partners, research groups and industry in the development and sharing of new, innovative technologies for specialist sub-surface sampling, measurements, downhole logging and long-term monitoring.

Specific objectives of DEDI were to:

- Foster synergies and pool resources in scientific drilling and monitoring by setting up a website, common mechanisms and policies for access, and all other technical requirements for transnational use;
- Develop a sustainable sample and data curation management plan for all future projects where DEDI would be involved;
- Improve existing technologies and complement those with innovative new tools and services to ensure the wide acceptance and versatile use of the Research Infrastructure (RI), thus preparing the way for a larger offer of Access Activities in the near future,
- Bring continental and ocean drilling communities closer together and collaborate with their counterparts in ESFRI (e.g. EPOS, EMSO, etc.) in order to enhance the attractiveness of the drilling infrastructure to any scientist in Europe;
- Establish effective knowledge exchange and engagement with industry partners for DEDI and its users;
- Demonstrate the efficient use of DEDI by setting up a first amphibious research project along a vulnerable continental margin in the Western Mediterranean Sea, involving a close collaboration between ICDP, IODP and EMSO at this EMSO site;
- Establish a business plan for a sustainable DEDI within the European landscape of research infrastructures.

1 (Coordinator)	British Geological Survey (BGS), Natural Environment Research Council (NERC)	U.K.
2	MARUM - Center for Marine Environmental Sciences, University of Bremen	Germany
3	University of Leicester	U.K
4	CNRS Montpellier (Geosciences Montpellier)	France
5	French Research Institute for Exploitation of the Sea (IFREMER)	France
6	Iceland Geosurvey (ISOR)	Iceland
7	German Research Centre for Geosciences (GFZ)	Germany
8	Centre Européen de Recherche et d'Enseignement de Géosciences de l'Environnement (CEREGE)	France
9	Develogic GmbH	Germany
10	Imageau *	France
11	nke instrumentation *	France
*Small and medium enterprises (SMEs)		

List of DEDI participants

European Research Infrastructure Consortium (ERIC)

The ECORD Council working group set up in 2013 has continued to explore new ways of organising its management and funding, *e.g.* possibly as a **European Research Infrastructure Consortium (ERIC)**. The working group evaluates the potential benefits as well as the potential constraints for ECORD in developing such an entity in various domains, among which are to secure long-term financial commitment, to increase ECORD visibility, to benefit from VAT exemption, to acquire a legal capacity, and to improve the ECORD's coordination and governance. The ERIC working group will pursue its investigations in 2015 before reporting to the ECORD Council.

Earth Science Europe initiative

ECORD has been involved in the activities of the Earth Science Europe initiative whose overarching aim is to create a forum and a voice for Earth Sciences in Europe. The second Earth Science Europe meeting entitled "Towards an Earth Model" was held in Paris on 2-3 April 2014 and was primarily focused on the science challenges that can be addressed in global earth sciences models. Breakout groups, including representatives of the major earth science programmes, earth science labs and industry, addressed most of the following key questions :

- How can earth science data contribute to earth system models in terms of the solid earth component underpinning these models and can we in Europe lead on this thinking?
- How do we as a European community contribute to global models such as global strain models, global sedimentation, global volcano models, deep Earth models, palaeoclimate etc.?
- How can we engage with private sector sponsors and the EC to underpin this sort of knowhow?
- What should be the form and role of this group?

A brochure was published soon after the Town Meeting *(above right)* and is available on the Earth Science Europe website http://www.bgs.ac.uk/EarthScienceEurope.

The next step will be to define a Roadmap with the aim to establish an Earth Science Forum or Board, an umbrella to represent the whole Earth Science community and to be recognised by the EC.

ECORD and other science programmes

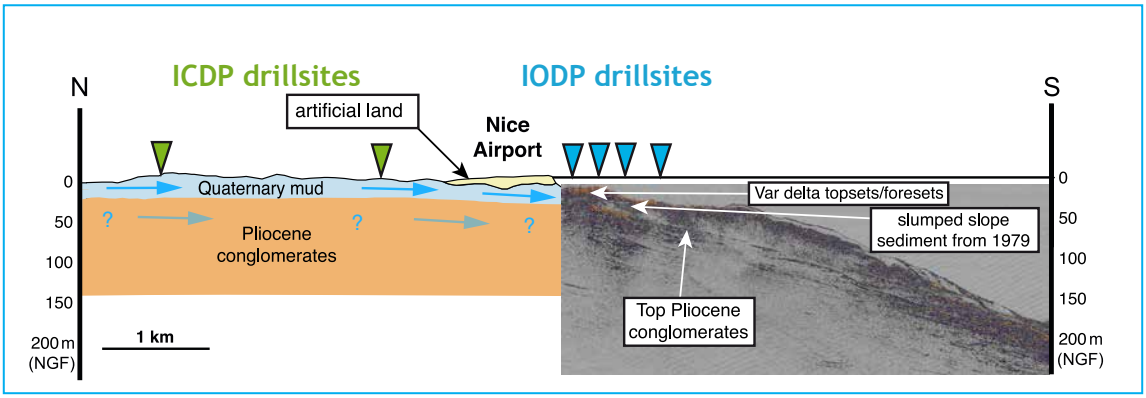
This year ECORD has been very active in promoting close collaboration and partnership opportunities with other science programmes dealing with subseafloor (IMAGES/IMPRESS) and continental scientific drilling and coring

research (ICDP). Recent developments have demonstrated that ECORD is at the forefront of active collaboration between IODP and these programmes.

IODP, ICDP, EMSO and EPOS have been involved in the Distributed European Drilling Infrastructure (DEDI) H2020 proposal that was submitted to the EC in September 2014. Despite the rejection of the proposal, the DEDI partners will consider alternative opportunities that may exist to take elements of the DEDI proposal forward.

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

Significant progress has been made in IODP-ICDP collaboration over the last few months through constructive and practical developments. During its first meeting that was held on 27-28 May held in Busan, South Korea, the IODP Forum recommended **(1)** that calls for proposals by IODP and ICDP encourage projects that include both offshore and onshore boreholes to achieve common scientific goals of the two programs, and **(2)** that a joint IODP/ICDP group be formed that would clarify procedures for coordinated reviews of joint proposals. This recommendation was presented by Gilbert Camoin (EMA) and Guido Lüniger (ECORD Council Chair) at the June 2014 meeting of the ICDP Assembly of Governors (AOG) in Prague, Czech Republic on 4-6 June 2014 and was subsequently endorsed. The ICDP AOG also accepted the proposition to consider single combined documents for such joint proposals called "Amphibious Drilling Proposals"



Composite cross section of the Ligurian amphibious drilling profile, combining geological information onshore with marine seismic profiles. Black vertical lines indicate locations of existing groundwater wells. Triangles represent the (sometimes projected) sites proposed for drilling (Green: ICDP, blue: IODP). Marine seismic reflection profile with top of Pliocene conglomerates underlying the slumped as well as deltaic sediments composed of permeable Holocene sand interbedded with clay. Blue arrows mark Var river discharge and groundwater flow in Quaternary and Pliocene (?) units.

(i.e. proposals in which the scientific objectives can only be accomplished by drilling both onshore and offshore). The ICDP AOG also agreed to a proposal to assign USD 10,000 per year to ECORD for the organisation of workshops dedicated to amphibious projects in the frame of the MagellanPlus Workshop Series Programme.

The guidelines for joint Amphibious Drilling Proposals developed by the joint ICDP-SAG IODP-SEP committee (K. Miller, P. Francus, F. Anselmetti, J. Erbacher, and S. Gulick) have been reviewed by the SEP and will now be discussed by the Facility Boards. A first "Amphibious Drilling Proposal" concerning the Ligurian landslide (796-Full; Lead Proponent: A. Kopf) has been submitted and concerns combined land and shallow-water drilling, illustrating that ECORD will play a pivotal role in the development of ADPs and, hence, of the collaboration between IODP and ICDP *(page 17)*.

ECORD and industry

In 2014 the ECORD Industry Liaison Panel (ECORD-ILP) activities were focused on three areas:

- Ensuring active participation of industry representatives at MagellanPlus workshops,
- Involving and educating a larger number of possible industry partners on ECORD/IODP activities,
- Organising at least one ECORD-ILP annual event.

As a result, industry representatives took part in the MagellanPlus workshop organised by the DREAM community *(page 30)* in Paris in January 2014. This event benefitted from the very active participation of one industry operator in the Mediterranean (Anadarko) and the contribution from a service company expert (Beicip) who helped the scientific community focus on practical aspects of drilling deep holes in subsalt environments.

The ECORD-ILP was also involved in the preparation of a MagellanPlus workshop on the Atlantic Margin, which took place in early 2015.

A larger network of potentially interested participants in the ECORD-ILP was identified through meetings at international congresses. This led to an increase in industry representatives on the ECORD-ILP from seven to nine members with the addition of two important service companies that may help enable access to sub-surface and survey data.

The annual ECORD-ILP meeting was organised in Edinburgh, UK with the assistance of the ESO staff at the British Geological Survey (BGS). The event was attended by a small number of industry participants (ENI, ExxonMobil, ION Geophysics) who contributed very actively to the discussions. During the meeting drilling projects in the Arctic, Mediterranenan and South Atlantic Margin were presented. JAMSTEC was also represented by N. Eguchi who focused on the capability and possibilities offered by the *Chikyu* drillship. The meeting included an interesting and instructive visit to the BGS where a number of drilling and downhole-logging tools were displayed along with mobile containers used for analysis during mission-specific platform expeditions.

In 2015, the ECORD-ILP will commit further effort to participating in industry-focused congresses to promote contacts with industry representatives. The process of identifying projects that are of potential interest to industry will also be improved in order to bring such projects to the attention of the ECORD- ILP members.

Related websites:
http://www.ecord.org/about/aboutecord-EC.html
http://www.ecord.org/ecord-ilp.html

French science teachers take part in the first "ECORD School of Rock" organised in Valbonne Sophia-Antipolis, France (photo Jean-Luc Bérenguer).

10. Communicating

Promoting the activities and accomplishments of the IODP to large audiences is a major and constant goal. Within ECORD, responsibilities for outreach and education activities are distributed between EMA, ESO and ESSAC. Each office maintains its own website: EMA manages the ECORD website - http://www.ecord.org - which provides access to general information about ECORD and details about publications and resources; the ESO website - http://www.eso.ecord.org - gives information specifically related to mission-specific platform (MSP) expeditions and the ESSAC website - http://www.essac.ecord.org - describes opportunities to participate in IODP expeditions and educational events such as the ECORD Summer Schools and Distinguished Lecturer Programme (DLP).

The **ECORD Outreach and Education Task Force** *(page 47)* met twice during 2014 to coordinate the programme's outreach activities, in Bremen, Germany in February, and in Zurich, Switzerland, in September. ECORD outreach activities were focussed on promoting the programme through participation at selected conferences, publishing the various newsletters *(right)* and promotional materials and also developing activities in relation to recent expeditions. To enhance coordination between ECORD, IODP partners and ICDP, outreach colleagues at the USIO, CDEX and ICDP were invited to attend the September meeting in Zurich.

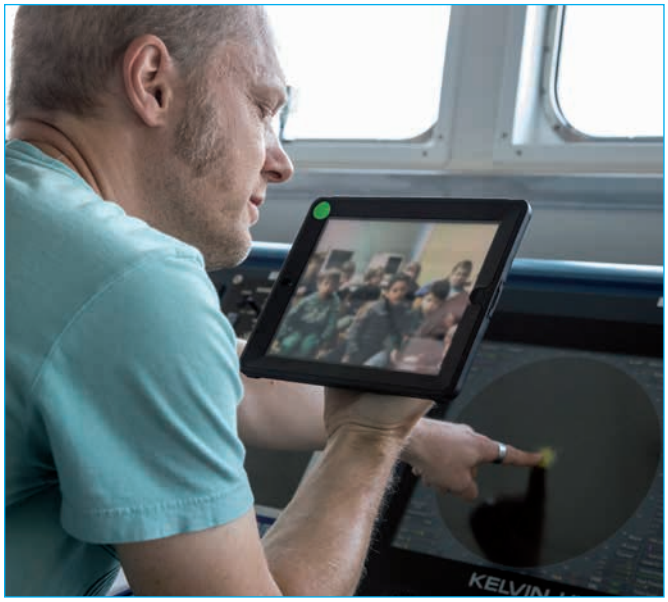
During the year, ECORD outreach staff continued to promote both the IODP and ICDP programmes under the umbrella of "Scientific Drilling" at science conferences. To help us reach new scientific audiences, a joint IODP-ICDP booth was organised at the International Sedimentological Congress (ISC) in Geneva and at AGU in San Francisco *(page XX).* ECORD also took part in the Townhall meeting organised during AGU 2014. However, the main event for ECORD was the European Geosciences Union (EGU) Conference in Vienna, Austria in April at which ECORD and the ICDP jointly sponsor a booth and support a Townhall meeting. The success of these joint events will lead to similar collaboration in 2015 at EGU and AGU. ECORD also sponsored a student's programme entitled "Jumping on the Employment Express" on 9 June at the Goldschmidt 2014 Conference in Sacramento, USA.

Two international media events focusing on the very first results of the Baltic Sea Paleoenvironment Expedition were organised by ECORD. The first one took place in Bremen during the Onshore Science Party on 13 February. As a result about 130 articles were published mostly in German,

Danish and Swedish media outlets. The other media event, "Looking into the past to predict future climate: new results from the IODP Baltic Expedition", was held on 29 April 2014, in coordination with the press team at EGU 2014 in Vienna, Austria.

ECORD supported various member countries, Italy (Geoscienze 2014 in Milan), France (Earth Sciences Meeting in Pau), Canada (GSA 2014 in Vancouver), in organising successful exhibition booths at science conferences. ECORD information was also widely distributed at the ECORD-ICDP MagellanPlus Workshop Series *(page 30)* and the 2nd post-cruise meeting of Expedition 339 Mediterranean Outflow in June in Tarifa (Spain). During the spring and summer ECORD also provided information to be displayed by outreach colleagues in Japan at the Japan Geoscience Union Meeting in Yokohama and in the AOGS Conference in Sapporo, and in Australia at the Australian Earth Sciences Convention.

The **ECORD Newsletter** *(above)* is published twice yearly to coincide with the EGU and AGU conferences (spring and fall of each year). The newsletter provides the main published source of general ECORD information and also includes reports on recent outreach activities. Leaflets explaining the programme objectives and the latest information resulting from the five completed MSP expeditions are included in an ECORD folder, which is continuously updated. A new ECORD-ICDP flyer was distributed at the AGU conference to



Markus Fingerle (Education Officer, during a live broadcast from the Bridge of the JOIDES Resolution. Here he points out the radar screen to a classroom at Klosterfeld School in Ellwangen, Germany. (William Crawford, IODP JRSO) .

Lesley Allen (Education Officer) works on a project in the downhole measurements laboratory during Exp 350 (Randy Gjesvold, IODP/TAMU).

better explain the connections between the two scientific drilling programmes. Videos of the Baltic Sea expedition were posted online on https://www.youtube.com - channel ECORDESO.

Two teachers from ECORD member countries, Lesley Allen (Truro College, UK) and Markus Fingerle (Peutinger Gymnasium, Germany) *(above)*, were invited to sail on a two-month expedition as Education Officers onboard the *JOIDES Resolution* during Expedition 350 Izu Bonin Marian Rear Arc and Expedition 353 Indian Monsoon Rainfall respectively *(pages 22 and 24)*. Both teachers co-ordinated education activities with colleagues and scientists onboard the *JOIDES Resolution* to bring geosciences to many school classrooms, with live ship-to-shore broadcasts.

To support science education, several IODP resources and educational activities are made available to the general public in ECORD countries. Replicas of drilling cores from ODP/IODP expeditions were loaned for teaching in a high school in Valbonne, France, the University of Algarve, Portugal and the 10th Urbino Summer School. The replicas were also displayed at public events organised during the IODP-ICDP Colloquium in Erlangen, Germany, and at Researcher's Night at Haifa University, Israel.

An exceptional outcome of the 'Teachers at Sea' programme was an IODP-France-sponsored workshop for teachers entitled “Understanding Earth with Ocean Cores”, which was held in Sophia Antipolis (France) on 9-11 April 2014. This workshop was initiated and organised by Jean-Luc Bérenguer, who sailed as an Education Officer on Expedition 345 Hess Deep Plutonic Crust. The workshop was attended by two other Education Officers, Susan Gebbels (UK) and Helder Pereira (Portugal). Forty teachers participated in this very successful workshop, which was also supported by the French Ministry of Education. ECORD recognised this successful educational experience as a major contribution to the education and outreach objectives of the programme and supported that it should be shared and developed accross all ECORD countries as the "ECORD School of Rock" (ECORD SOR). Plans are underway to run the next ECORD SOR in Portugal in 2015.

ECORD continues to share information by posting news and photographs on our official social media outlets twitter - https://twitter.com/ecord_outreach and facebook - https://www.facebook.com/essac.ecord. Conveying information to the science community and wider public in this way is especially useful during major events. We continued compiling activity metrics from all our websites, and use these to improve posts and increase our outreach.

Related websites:
http://www.ecord.org/pi/promo.html
http://www.essac.ecord.org/index.php?mod=education

@ECORD_Outreach **ESSAC ECORD**
YouTube ECORDESO channel

11. FY2014 and FY2015 budgets

ECORD

FY2014 ECORD budget

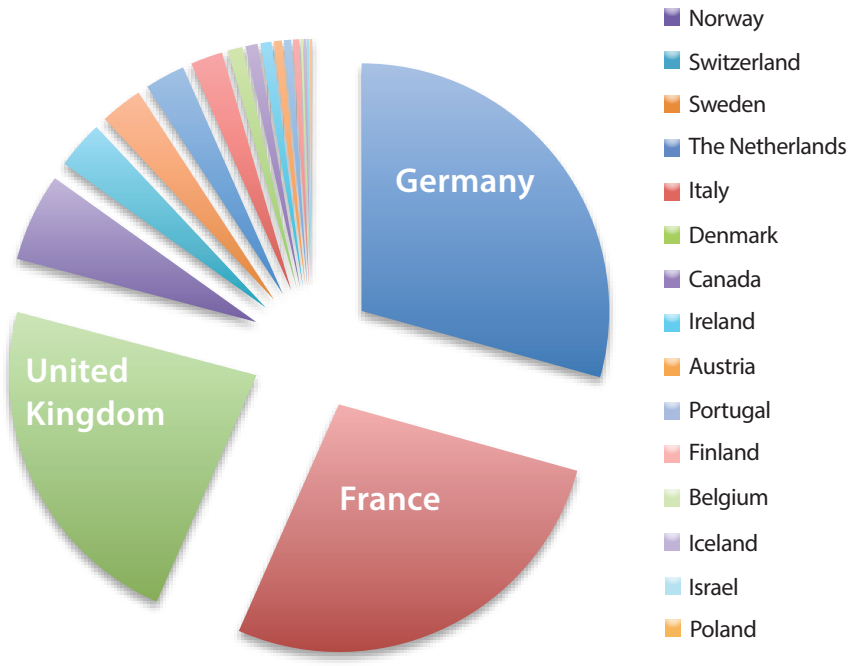
In FY2014, which has been the first year of the International Ocean Discovery Program, the total ECORD budget amounted to USD 19.097 M *(table below)*, showing a decrease of 3.8 % compared to the FY2013 budget, which was the last year of the Integrated Ocean Drilling Program. However, this budget must be seen as a minimum budget as the opportunity for members to make direct cash and/or in-kind contributions will allow them to increase their contributions to the programme if they choose.

Austria	100,000
Belgium	30,000
Canada	150,000
Denmark	184,000
Finland	80,000
France	5,212,080
Germany	5,600,000
Iceland	30,000
Ireland	137,000
Israel	30,000
Italy	400,000
The Netherlands	500,000
Norway	1,100,000
Poland	30,000
Portugal	90,000
Sweden	528,000
Switzerland	600,000
The United Kingdom	4,296,400
Total	**19,097,480**

ECORD member country contributions for FY2014 (USD).
The amount in USD is based on exchange rate applicable at the time of the payment by the relevant partner.

The three major ECORD contributors – Germany (USD 5.6 M), France (USD 5.2 M) and UK (USD 4.3 M) - provide 80% of the total ECORD budget, despite a decrease of the UK contribution (USD 4.3 M vs USD 5.6 M in the previous programme).

Most of the ECORD members have maintained their contribution to the programme and a few of them have increased it (Finland, Italy, Netherlands and Switzerland). Israel joined the International Ocean Discovery Program in October 2013. Canada has decreased its contribution over the last two years while identifying new funding sources.



Relative breakdown of ECORD member country budget contributions for FY2014.

At the start of the International Ocean Discovery Program, ECORD had 18 member countries as Spain decided not to join the programme. Iceland has decided recently to terminate its participation in IODP at the end of FY2014.

The contributions to the budget are unevenly distributed between the member countries, from USD 5.6 M to USD 30,000 *(above right)*. On the basis of their contributions, each ECORD member country receives a quota to participate in IODP expeditions

The table on *page 42 (top left)* summarises the ECORD budget for FY2014. The FY2013 expenses are given for comparison.

With contributions of USD 7 M to the NSF and of USD 1 M to JAMSTEC to support the *JOIDES Resolution* and the *Chikyu* operations respectively, ECORD has significantly decreased its external costs and increased its annual budget available for MSP operations with the aim to implement one mission-specific platform expedition every year on average for the International Ocean Discovery Program. 80% of the ECORD budget concern direct operational costs.

ECORD FY2014 budget *(in USD)*			
	FY14 Income	FY14 Expenses	FY13 Expenses
FY2013 balance	1,615,180		
FY2014 contributions	19,097,480		
ECORD-NSF MoU		7,000,000	13,055,771
ECORD-JAMSTEC MoU		1,000,000	
ESO		3,131,775*	15,995,785**
EMA		318,090	379,730***
MagellanPlus		91,770	65,000
ECORD Outreach		74,770	-
ESSAC		364,238	285,702
Support to SEP Co-Chair		93,864	n/a
BCR		147,284	n/a
Total	20,712,660	12,491,791	
FY2014 balance	8,220,869		

** 15 months (10/13 to 12/14)*
*** including expedition 347 costs*
**** including ECORD outreach costs*

Austria	100,000
Belgium	30,000
Canada	150,000
Denmark	170,000
Finland	80,000
France	5,200,000
Germany	5,600,000
Ireland	140,000
Israel	30,000
Italy	400,000
The Netherlands	500,000
Norway	1,100,000
Poland	30,000
Portugal	90,000
Sweden	528,000
Switzerland	600,000
The United Kingdom	4,300,000
Total	**19,048,000**

ECORD member country contributions for FY2015 (in USD).
The amount in USD is based on exchange rate applicable at the time of the payment by the relevant partner.

The changes in the functioning of the new programme have implied additional costs, such as the direct support of the Bremen Core Repository and the support of the SEP Co-Chair, Dick Kroon. Some other costs have increased, such as the budget of the outreach activities due to all costs being transferred to ECORD in the new programme, and that of the ESSAC Office due to its new location in Switzerland. In addition, the ECORD Council has approved an increase in the MagellanPlus budget, with the new opportunities to fund travel costs of ECORD scientists to attend IODP-related workshops in non-ECORD countries. The BCR and ESO budgets concern 15 months of activities as the ECORD Council has decided to set the beginning of each fiscal year to January for FY2014 onwards.

With a positive balance of USD 1,615,180 carried over the new programme, the ECORD budget shows a positive balance of USD 8,220,869 at the end of FY2014. This sum will be carried forward to the ECORD FY2015 budget.

FY 2015 ECORD budget

In FY2015, the expected total amount of the 17 ECORD members' contributions is about USD 19.048 M *(table top right)*.

The table *(right)* summarises the expected ECORD budget for FY2015 during which the Expedition 357 Atlantis Massif Seafloor Processes will be implemented. A positive balance of USD 11,978,792 is expected at the end of FY2015 and will be carried forward to FY2016 when the next MSP expedition is implemented.

ECORD FY2015 budget *(in USD)*		
	Income	Expenses
FY14 balance	8,220,869	
FY 14 contributions	19,048,000	
ECORD-NSF MoU		7,000,000
ECORD-JAMSTEC MoU		1,000,000
ESO		6,040,000*
EMA		275,846
MagellanPlus		87,570
ECORD Outreach		58,500
ESSAC		369,620
Support to the SEP Chair		93,864
Support to the ECORD-ILP Chair		12,510
BCR		352,167
Total	27,268,869	15,290,077
Expected FY15 balance	11,978,792	

**including Expedition 357 costs*
The amounts in USD are subjected to exchange rate fluctuations.

Budgets of ECORD Entities

ECORD Managing Agency (EMA)

The table *below* summarises the EMA budget for FY2014 and for FY2015 as approved by the ECORD Council in October 2014 for the period 1 January 2015 - 31 December 2015 and also shows the evolution of the EMA budget over the last two years. All predicted expenses will remain generally stable with the exception of an increased budget (+5%) for the MagellanPlus Workshop Series Programme and the newly funded ECORD Industry Liaison Panel Chair's travel. The budget for travel has been decreased (-10%).

EMA budget for FY2014 and FY2015

	FY2014*		FY2015**		Variance (%)
	€	USD	€	USD	%
Salaries					
Outreach Coordinator	46,000	63,480	46,000	57,546	-
Assistant Director	46,000	63,480	46,000	57,546	-
Total	**92,000**	**126,960**	**92,000**	**115,092**	
Compensation for the Director	46,000	63,480	46,000	57,546	-
Travel	50,000	69,000	45,000	56,295	**-10**
Meetings	**5,000**	**6,900**	**5,000**	**6,255**	**-**
Consumables	**5,000**	**6,900**	**5,000**	**6,255**	**-**
Support for IODP/ECORD meetings	**7,500**	**10,350**	**7,500**	**9,382**	**-**
MagellanPlus	**66,500**	**91,770**	**70,000**	**87,570**	**5**
Support to the ECORD-ILP Chair	**0**	**0**	**10,000**	**12,510**	
Overheads	**25,000**	**34,500**	**20,000**	**25,020**	**-25**
Total	**297,000**	**409,860**	**300,500**	**375,926**	**2**

** 1€ = 1.38 USD; ** 1€ = 1.251 USD (5 October 2014)*

Details of the ECORD outreach budget is managed by the ECORD Outreach and Education Task Force *(page 47)* are given in the table *below*.

ECORD outreach budget for FY2014and FY2015

	FY2014*		FY2015**		Variance (%)
	€	USD	€	USD	%
Exhibit booths at conferences	**20,460**	**28,235**	**14,400**	**18,000**	**-29,6**
Publications	**14,000**	**19,320**	**14,000**	**17,500**	**-**
Overheads	**2,500**	**3,450**	**4,000**	**5,000**	**60**
Other costs	**7,600**	**10,490**	**3,200**	**4,000**	**-58**
Shipping costs	**2,900**	**4,000**	**2,000**	**2,500**	**-31**
Travel costs	**10,000**	**13,800**	**9,200**	**11,500**	**-8**
Total	**57,460**	**79,295**	**46,800**	**58,500**	**-18,5**

**1€ = 1.38 USD; ** 1€=1.25 USD (5 October 2014)*

ECORD Science Support and Advisory Committee (ESSAC) *(table below)*

ESSAC budget for FY2014 and FY2015	FY2014 (€) Jan-Dec 2014	FY2015 (€) Jan-Dec 2015	Variance (%)	Notes
Salaries				
Science Coordinator	94,000	95,000	1.1	1
Family allowance	5,900	6,015	1.9	2
Compensation for the Chair	50,000	50,000	-	
Assistant for publication database	-	11,000	-	7
Total salaries/compensation	**149,900**	**162,015**	**8.1**	
Office costs	**11,000**	**6,000**	**-45.5**	
Travel				
Chair	11,000	10,000	-9.1	
Science Coordinator	6,000	6,000	-	
Invited speakers to ESSAC meetings	4,000	3,000	-25	3
ESSAC Liaison to SEP meetings	6,000	5,000	-16,7	
Conference travel support	5,000	3,000	-40	4
Total travel	**32,000**	**27,000**	**-15.8**	
Support to ESSAC meetings				
ESSAC May meeting	2,000	2,000	-	
ESSAC October meeting	2,000	2,500	25	
Total meetings	**4,000**	**4,500**	**12.5**	
Education & Outreach				
ECORD Distinguished Lecturer Programme	18,000	18,000	-	
ECORD Summer Schools	20,000	20,000	-	
ECORD Training Course	--	7,500		
ECORD Scholarships	15,000	15,000	-	
ECORD Research Grants	15,000	15,000	-	
Teachers at sea (travel support)	3,000	0		
Workshop scientist support	-	5,000		
Total Education & Outreach	**68,000**	**80,500**	**18.4**	
Total costs excluding salaries	**115,000**	**118,000**	**2.6**	
Total ECORD contribution in €	**264,900**	**280,015**	**5.7**	5
Total ECORD contribution in USD	**361,986**	**369,620**	**2.1**	6

[1] *Salaries set by ETH Human Resources; assumes 100% position = 114,600 CHF, 1 € = 1.21 CHF. Includes all social costs, insurance and employer contributions (17.71%).*

[2] *Family allowance set by Swiss law: 4409.00 CHF 1st child; 2847.00 CHF 2nd child.*

[3] *Invited speakers : Presentations of expedition results, proposed expeditions, workshop results, etc.*

[4] *Travel support for keynote and invited speakers at the ECORD-ICDP Special Session, EGU Vienna.*

[5] *No overhead charged by the ETH.*

[6] *End USD amount subject to exchange rate fluctuations. FY 14 based on 1 € = 1.3665 USD, FY15 based on 1 € = 1.32 USD*

[7] *New item after ECORD meeting, Oct 2014, to provide salary to set up a professional database for ECORD publications.*

- ***ECORD Science Operator (ESO)*** *(table below)*

ESO FY2014 expenditure breakdown *(in USD)*				
	2014 Annual Program Plan Budget	**2014 Actual Operating Budget**	**2014 Expenditure**	**Variance**
Management and administration				
Personnel	744,718	744,718	814,696	-69,978
Travel	348,000	348,000	202,139	145,861
Supplies	21,250	21,250	15,250	6,000
Shipping	0	0	329	-329
Communication	0	0	1,750	-1,750
Equipment	22,250	22,250	16,846	5,404
Other	42,500	42,500	71,906	-29,406
Total	**1,178,718**	**1,178,718**	**1,122,918**	**55,800**
Technical, Engineering and Science Support				
Personnel	1,119,496	1,119,496	1,029,719	89,777
Travel	130,500	130,500	127,694	2,806
Shipping	0	0	12,445	-12,445
Communication	0	0	27	-27
Contractual services	25,000	25,000	15,000	10,000
Equipment	0	0	45,449	-45,449
Other	903,500	903,500	801,210	102,290
Total	**2,178,496**	**2,178,496**	**2,031,545**	**146,951**
Core Curation				
Personnel	84,595	84,595	84,595	0
Travel	6,000	6,000	7,210	-1,210
Supplies	2,000	2,000	2,000	0
Shipping	5,000	5,000	5,000	0
Total	**97,595**	**97,595**	98,805	**-1,210**
Data Management				
Personnel	174,919	174,919	165,961	8,958
Travel	48,000	48,000	12,059	35,941
Supplies	6,000	6,000	0	6,000
Contractual Services	75,000	75,000	0	75,000
Equipment	33,400	33,400	13,595	19,805
Total	**337,319**	**337,319**	**191,616**	**145,703**
Publications				
Contractual Services	**150,000**	**150,000**	**0**	**150,000**
Outreach				
Personnel	92,992	92,992	127,510	-34,518
Travel	36,000	36,000	12,230	23,770
Supplies	12,000	12,000	1,126	10,874
Shipping	0	0	26	-26
Total	**140,992**	**140,992**	**140,892**	**100**
Total	**4,083,120**	**4,083,120**	**3,585,776**	**497,344**

Bremen Core Repository (BCR) *(table below)*

BCR budget for FY2014 and FY2015					
	FY2014*		FY2015**		Variance (%)
	€	USD	€	USD	%
Salaries					
Personnel (1.6 FTE)	172,446	237,975	153,013	191,419	-19.6
Student workers	9,420	13,000	11,910	14,900	14.6
Travel	**3,841**	**5,300**	**4,237**	**5,300**	**-**
Supplies	**5,435**	**7,500**	**5,995**	**7,500**	**-**
Shipping	**14,493**	**20,000**	**15,987**	**20,000**	**-**
SEDIS web portal maintenance & service 24/7 (incl. 0.08 FTE)	**10,352**	**14,286**	**9,935**	**12,429**	**-13.0**
Indirect costs	**86,394**	**119,224**	**80,431**	**100,619**	**-15.6**
Total	**302,381**	**417,285**	**281,508**	**352,167**	**-15.6**

** 15 months (1/10/2013 to 31/12/2014); 1€ = 1.38 USD*
*** 12 months; 1€ = 1.251 USD*

The reefer (refrigerated storage area) of the IODP Bremen Core Repository in the MARUM building (photo Albert Gerdes).

12. ECORD Entities & ECORD in IODP panels

As defined in the ECORD Memorandum of Understanding, ECORD comprises **six entities and two task forces** *(below)*.

The **ECORD Council** is the funding entity for ECORD and provides oversight for all ECORD activities.
Chair: Guido Lüniger (Germany)
Vice-Chairs: Michael Webb (UK) & Michel Diament (France)
Council Core Group: Anders Kjaer (Denmark) and Martina Kern-Luetschg (Switzerland)
http://www.ecord.org/c/council.php

The **ECORD Executive Bureau (E-EB)** acts as the executive entity between the meetings of the ECORD Council. The E-EB is composed of the Council Chair and Vice-Chair, the Council Core Group, the EMA Director and the Chairs of ESO, ESSAC and ECORD-ILP.

The **ECORD Facility Board (EFB)** is the planning forum for MSP expeditions and is responsible for scheduling drilling proposals and for advising on the long-term planning of ECORD's activities and functions. The EFB is composed of the ECORD Executive Bureau and a Science Board.
Chair: Karsten Gohl
Members of the Science Board: Antonio Cattaneo (France), Dominique Weis (Canada), Marta Torres (USA) and Gerald R. Dickens (USA).
http://www.ecord.org/ecord-fb.html

The **ECORD Managing Agency (EMA)** is the management entity of ECORD and represents ECORD in all IODP entities. EMA is the fund holder for the consortium in IODP and provides oversight of ESO and ESSAC.
Director: Gilbert Camoin (France)
Assistant Director: Milena Borissova (France)
Outreach Coordinator: Patricia Maruéjol (France)
http://www.ecord.org/ema.html

The **ECORD Science Operator (ESO)** is the operational entity and is responsible for the implementation of MSP expeditions.
Chair: Robert Gatliff (UK)
Science Manager: David McInroy (UK)
Operations Manager: Dave Smith (UK)
Expedition Project Managers: Carol Cotterill (UK) and Sophie Green (UK)
EPC Manager: Sarah Davies (UK)
Curation and Laboratory Manager: Ursula Röhl (Germany)
Data Management Manager: Hans-Joachim Wallrabe-Adams (Germany)
Outreach Manager: Alan Stevenson (UK)
Media Relations: Albert Gerdes (Germany)
http://www.eso.ecord.org

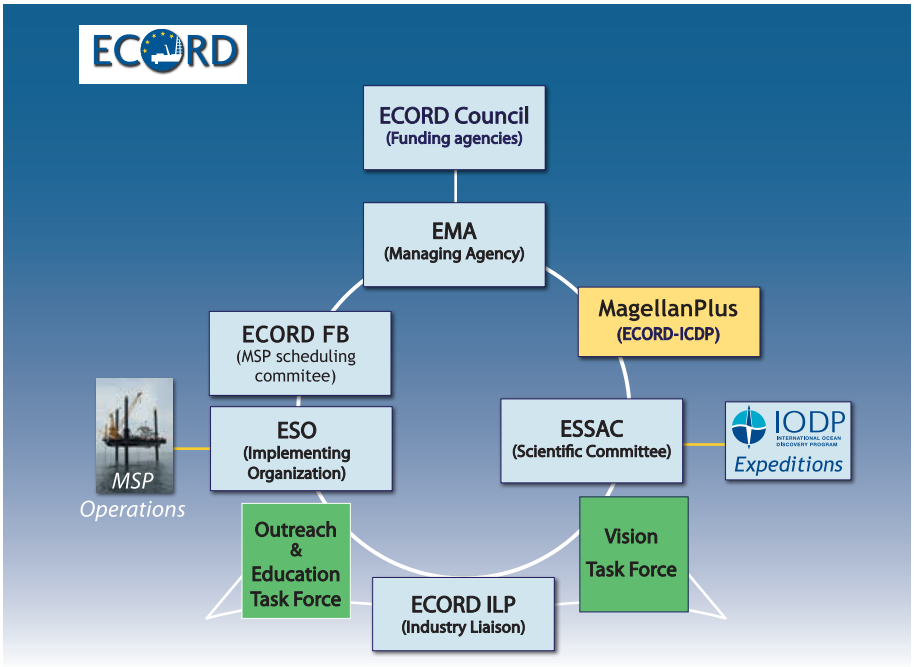
The **ECORD Science Support and Advisory Commitee (ESSAC)** is the science committee and is responsible for the scientific planning and co-ordination of ECORD's contribution to IODP.
Chair: Gretchen Früh-Green (Switzerland)
Vice-Chair: *tbn*
Science Co-ordinator: Julia Gutiérrez Pastor (Switzerland)
http://www.essac.ecord.org

The **ECORD Industry Liaison Panel (ECORD-ILP)** is the link between academia and industry, fostering and promoting scientific and technological collaboration.
Chair: Andrea Moscariello (Switzerland)
http://www.ecord.org/ecord-ilp.html

The **ECORD Outreach & Education Task Force (E-OETF)** coordinates ECORD's communication tasks, such as outreach/public information and educational activities related to IODP in ECORD countries. The E-OETF is composed of the EMA Outreach Coordinator (Chair), ESO Outreach and Media Relations Managers, ESSAC Chair and Science Coordinator and EMA Director and Assistant Director.

The **ECORD Vision Task Force (E-VTF)** is the ECORD strategic entity in charge of developing a long-term scientific and funding strategy, and monitoring ECORD's progress towards achieving the objectives of the IODP Science Plan. The E-VTF is composed of the ESSAC Chair, the EMA Director and Assistant Director, the ESO Chair and Outreach Manager and the ECORD- ILP Chair.

Contact ECORD: http://www.ecord.org/contact.html



The **International Ocean Discovery Program (IODP)** is composed of three platform providers (NSF-USA for *JOIDES Resolution* , MEXT/JAMSTEC - Japan for *Chikyu* and ECORD for MSPs), three Facility Boards, two IODP advisory panels, a Science Support Office and the IODP Forum. The ECORD participation in the IODP entities in 2014 is listed below.

The ***JOIDES Resolution* Facility Board - *JR*FB** is the planning forum for expeditions using the *JOIDES Resolution*.
ECORD Members of the *JR*FB: Gilbert Camoin (France), Heiko Pälike (Germany)
http://www.iodp.org/facility-boards#JRFB

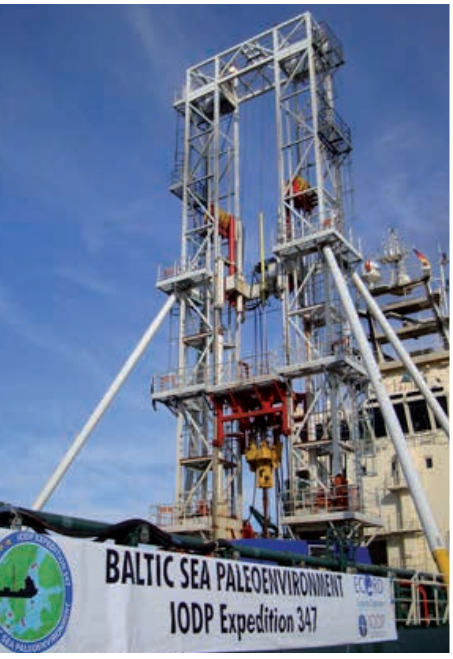
The ***Chikyu* IODP Board - CIB** is the planning forum for expeditions using the platform *Chikyu*.
ECORD Members of the CIB: Gilbert Camoin (France), Heinrich Villinger (Germany)
http://www.iodp.org/facility-boards#CIB

IODP advisory panel: Science Evaluation Panel (SEP) evaluates the scientific objectives and relevance of proposed expeditions using all IODP platforms.
SEP ECORD Members: Dick Kroon (UK, Co-chair), Serge Berné (France), Adélie Delacour (France), Jörg Geldmacher (Germany), Verena Heuer (Germany), Mads Huuse (United Kingdom), Sebastian Krastel (Germany), Lisa McNeill (United Kingdom), Dave Mosher (Canada), Matt O'Regan (Sweden), Stuart Robinson (UK), Michael Strasser (Switzerland), Nabil Sultan (France), Gabriele Uenzelmann-Neben (Germany)
http://www.iodp.org/facility-boards#SEP

IODP advisory panel: Environmental Protection and Safety Panel (EPSP) evaluates the environmental protection and safety of proposed expeditions using all IODP platforms.
EPSP ECORD Members: Martin Hovland (Norway), Philippe Lapointe (France), David Long (UK), Dieter Strack (Germany)
http://www.iodp.org/facility-boards#EPSP

The **IODP Forum** represents the overarching umbrella of the programme and provides advice to IODP Facility Boards on platform provider activity.
Chair: Keir Becker (USA)
ECORD attendees at the first IODP Forum in Busan, Korea: Gilbert Camoin (France), Jochen Erbacher (Germany), Bob Gatliff (UK), Karsten Gohl (Germany), Dick Kroon (UK), Werner Piller (Austria)
http://www.iodp.org/iodp-forum

http://www.iodp.org




IODP drillships: from left to right, the Greatship Manisha during portcall of Expedition 347 Baltic Se a Paleoenvironment (D. Smith ©ECORD/IODP), the JOIDES Resolution (photo Wiliam Crawford, IODP/TAMU) and the Chikyu (© JAMSTEC/IODP).

List of acronyms

ACC: Antarctic Circumpolar Current
ACEX: Arctic Coring Expedition
ADP: Amphibious Drilling Proposal
AGU: American Geophysical Union
AOG: Assembly of Governors
AOGS: Asia Oceania Geosciences Study
AWI: Alfred-Wegener-Institut
BCR: Bremen Core Repository
BGO: Bismuth germinate
BGS: British Geological Survey
BSB: Baltic Sea Basin
CDEX: Center for Deep Earth Exploration
CEREGE: Centre Européen de Recherche et d'Enseignement des Géosciences de l'Environnement
CESAM: Centre for Environmental and Marine Studies
CIB: *Chikyu* IODP Board
CICY: Centro de Investigacion Cientifica de Yucatan
CIIMAR: Interdisciplinary Centre of Marine and Environmental Research
CNRS: Centre National de la Recherche Scientifique
CPP: Complementary Project Proposal
CRPG: Centre de Recherches Pétrographiques et Géochimiques
DCO: Deep Carbon Observatory
DEDI: Distributed European Drilling Infrastructure
DIS: Drilling Information System
DLP: Distinguished Lecturer Programme
DREAM: Deep-sea Record of Mediterranean Messinian Events
DSDP: Deep Sea Drilling Project
EC: European Commission
E-EB: ECORD Executive Bureau
EFB: ECORD Facility Board
ECORD-ILP: ECORD Industry Liaison Panel
E-OETF: ECORD Outreach & Education Task Force
E-VTF: ECORD Vision Task Force
ECORD: European Consortium for Ocean Research Drillling
EGU: European Geosciences Union
EMA: ECORD Managing Agency
EMSO: European Multidisciplinary Seafloor Observatory
ENI: Ente Nazionale Idrocarburi
EPC: European Petrophysics Consortium
EPOC: Environnements et Paléoenvironnements Océaniques et Continentaux
EPOS: European Plate Observing System
EPSP: Environmental Protection and Safety Panel
ERIC: European Reseach Infrastructure Consortium
ESF: European Science Foundation
ESFRI: European Strategy Forum on Research Infrastructures
ESO: ECORD Science Operator
ESSAC: ECORD Science Support and Advisory Committee
ETH: Eidgenössische Technische Hochschule
FAB: Forearc basalt
FTE: Full-time equivalent
FY: Fiscal Year
GCR: Gulf Coast Repository
GESEP: German Scientific Earth Probing Consortium
GET: Géosciences environnement Toulouse
GFZ: Deutsches GeoForschungsZentrum GmbH: Gesellschaft mit beschränkter Haftung
H2020: Horizon 2020
IBM: Izu-Bonin-Mariana
ICDP: International Continental Scientific Drilling Program
IFREMER: Institut Français de Recherche pour l'Exploitation de la Mer
IMAGES: International Marine Past Global Changes Studies
IMPRESS: International Marine Process Reconstruction Study
ING: Institute of Geological Sciences
IODP: Integrated Ocean Drilling Program (2003-2013) & International Ocean Discovery Program (2013-2023)
IPG: Institut de Physique du Globe
ISOLAT: Integrated Southern Ocean Latitudinal Transects
ISC: International Sedimentological Congress
ISOR: Iceland GeoSurvey
JAMSTEC: Japan Agency for Marine Earth Science and Technology
J-DESC: Japanese Earth Drilling Science Consortium
JFY: Japanese Fiscal Year
JOIDES: Joint Oceanographic Institutions for Deep Earth Sampling
JR: *JOIDES Resolution*
JRSO: *JOIDES Resolution* Science Operator
JRFB: *JOIDES Resolution* Facility Board
KCC: Kochi Core Center
LGM: Last Glacial Maximum
MARUM: Center for Marine Environmental Sciences, University of Bremen
MDP: Multi-phase Drilling Project
MeBo: Meeresboden-Bohrgerät
MEXT: Ministry of Education, Culture, Sports, Science and Technology
MoU: Memorandum of Understanding
MSCL: Multi-Sensor Core Logger
MSP: Mission-specific platform
NASA: National Aeronautics and Space Administration
NERC: Natural Environment Research Council
NGR: Natural Gamma Radiation
NOC: National Oceanography Centre
NSF: National Science Foundation
ODP: Ocean Drilling Program
ODS: Ocean Driling Science
OSP: Onshore Science Party
PEP: Proposal Evaluation Panel
PSS: Petrophysics Staff Scientist
QA/QC: Quality assurance/quality control
RD2: Rockdrill 2
RI: Research Infrastructure
RRS: Royal Research Ship
RWTH: Rheinisch-Westfälische Technische Hochschule
SaDR: Sample and Data Request
SAG: Science Advisory Group
SEDIS: Scientific Earth Drilling Information Service
SCOR: Scientific Committee on Ocean Research
SCS: South China Sea
SEP: Science Evaluation Panel
SIIDETEY: Sistema de Investigación, Innovación y Desarrollo Tecnológico del Estado de Yucatán
SMCS: Sample Management and Curation System
SMEs: Small and medium enterprises
SOR: School of Rock
UNAM: Universidad Nacional Autónoma de México
UPMC: Université Pierre et Marie Curie
USIO: US Implementing Organization
USSP: Urbino Summer School in Paleoclimatology
TAMU: Texas A &M University
VTT: Technical Research Centre of Finland

FY2014 ECORD Members

Austria: Österreichische Academie der Wissenschaften (ÖAW)
Belgium: Vakgroep Geologie - Bodemkunde (UGent)
Denmark: Forsknings- og Innovationsstyrelsen
Canada: Université du Québec à Montréal - Centre GEOTOP-UQAM-McGill
Finland: Suomen Akatemia
France: Institut National des Sciences de l'Univers - Centre National de la Recherche Scientifique (INSU-CNRS)
Germany: Deutsche Forschungsgemeinschaft (DFG)
Iceland: Rannsóknamiðstöð Íslands (RANNIS)
Ireland: The Geological Survey of Ireland (GSI)
Israel: Mediterranean Sea Research Center of Israel (MERCI))
Italy: Consiglio Nazionale delle Ricerche (CNR)
The Netherlands: Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO)
Norway: Forskningsrådet
Poland: Panstwowy Instytut Geologiczny - Panstwowy Instytut Badawczy (PIG-PIB)
Portugal: Fundação para a Ciência e a Tecnologia (FCT)
Sweden: Vetenskapsrådet (VR)
Switzerland: Fonds National Suisse (FNS)
The United Kingdom: Natural Environment Research Council (NERC)

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