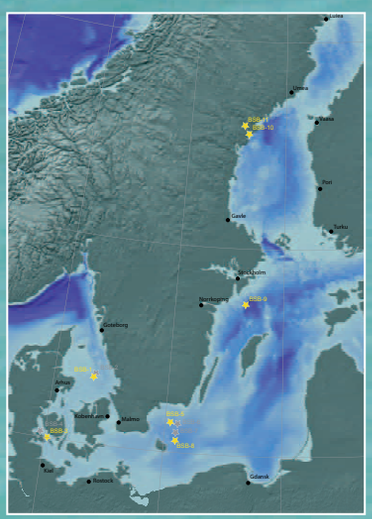
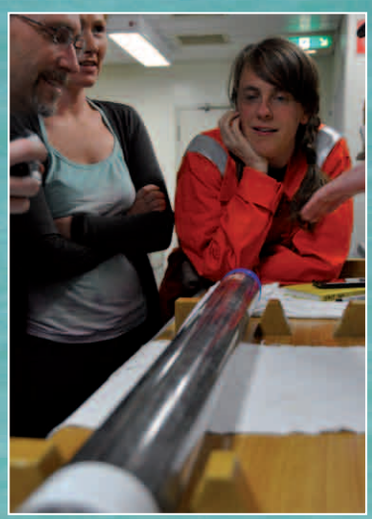
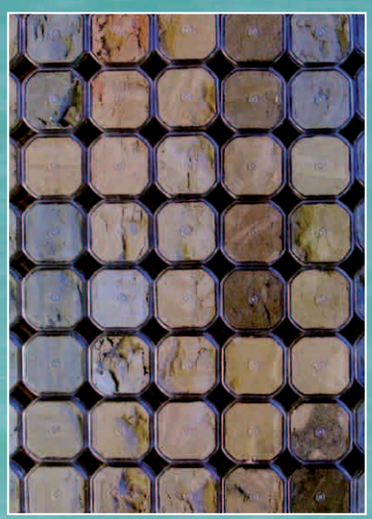
ECORD

European Consortium for
Ocean Research Drilling

ANNUAL REPORT 2012







ECORD
European Consortium for
Ocean Research Drilling

IODP
INTEGRATED OCEAN
DRILLING PROGRAM

Since 2003, European and Canadian scientists have participated in the Integrated Ocean Drilling Program (IODP) as part of the European Consortium for Ocean Research Drilling (ECORD). This major international programme now involves scientists from 26 countries including the USA, Japan, China, South Korea, India, Australia, New Zealand and Brazil. Members of the ECORD consortium are able to take part in international ocean-drilling studies within IODP that address a wide range of fundamental and applied issues that affect everyone. Research topics include global climate change, biodiversity, origin of life, natural hazards involving the study of earthquakes processes, mineral and energy resources along continental margins as well as the internal structure and dynamics of our planet.

ECORD also provides an essential role within IODP by contributing a multiple-platform approach that complements the work of the US and Japanese drillships, the *JOIDES Resolution* and *Chikyu*. These mission-specific platform (MSP) operations have allowed the ocean research community to work in key areas such as ice-covered and shallow seas, environments in which the drillships are unable to operate. To date, the ECORD Science Operator (ESO) consortium has successfully managed IODP expeditions to the Arctic, Tahiti, New Jersey and the Great Barrier Reef, and are now planning the next MSP expedition in the Baltic Sea in 2013. The exciting scientific results that have been published, or are emerging from these expeditions, emphasise the benefits of the new MSP dimension that ECORD has brought to scientific ocean drilling.

Front cover: *from left to right, Coral assemblage of the Great Barrier Reef , Heron Island (Queensland, Australia), Post-cruise Meeting of Expedition 325: Great Barrier Reef Environmental Changes (photo Carol Cotterill); Drillsite map of Expedition 347: Baltic Sea Paleoenvironment (ECORD/ESO); Christie Rowe and scientists of Expedition 343: Japan Trench Fast Drilling Project (© JAMSTEC/IODP); Core samples for paleomagnetic measurements, Expedition 342: Paleogene Newfoundland Sediments Drifts (photo Peter Lippert & IODP).*

Back cover: *Sunset seen from the JOIDES Resolution, Expedition 342: Paleogene Newfoundland Sediments Drifts (photo Cécile Cournède & IODP).*

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ECORD Annual Report 2012

October 1, 2011 – September 30, 2012

Prepared by the ECORD Managing Agency,
the ECORD Science Operator and
the ECORD Science Support and Advisory Committee

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Knuden cliff (NW Denmark): Eocene Fur Formation with marine diatomites interbedded with ash layers. (photo taken during the ESSAC field excursion by Julia Gutierrez Pastor)

1. FY2012 highlights

In FY2012, ECORD has been very active in the Integrated Ocean Drilling Program's ongoing scientific, operational, educational and outreach activities, as well as in the transition into the new, groundbreaking IODP-International Ocean Discovery Program. The **ECORD Science Operator** has been preparing to implement the current IODP's final MSP expedition, **IODP Expedition 347: Baltic Sea Paleoenvironment**, which is planned for the summer of 2013. The aims of this expedition are to record the climate changes over the last 140,000 years in six sub-basins of the Baltic Sea, close to the former Scandinavian Ice Sheet. ESO has also scoped two projects that have been highly ranked by the international Science Advisory Structure: IODP Proposal 548 - Chicxulub K-Pg Impact Crater and IODP Proposal 758 - Atlantis Massif Seafloor Processes. During its scheduled meeting on March 7-8, 2013, the new ECORD Facility Board determined the schedule of the MSP drilling proposals for the first year(s) of the International Ocean Discovery Program.

The US drillship ***JOIDES Resolution (JR)*** implemented five expeditions in the Atlantic Ocean (336: Mid-Atlantic Ridge Microbiology; 339: Mediterranean Outflow; 340T: Atlantis Massif Oceanic Core Complex; 340: Lesser Antilles Volcanism and Landslides and 342: Paleogene Newfoundland Sediment Drifts), adding more cores to the IODP Bremen Core Repository (BCR) collection. The *JR* then entered the Eastern Pacific to implement two expeditions at the start of FY 2013 (344: Costa Rica Seismogenesis Project A Stage 2 and 345: Hess Deep Plutonic Crust). The Japanese drillship ***Chikyu*** implemented two expeditions, Expedition 343: Japan Trench Fast Drilling Project, to drill and install temperature sensors across the plate boundary fault that caused the Tohoku Earthquake on March 11, 2011, and Expedition 337: Deep Coalbed Biosphere off Shimokita. Through the implementation of IODP Expedition 338: NanTroSEIZE Stage 3 - Plate Boundary Deep Riser2, the *Chikyu* continues the ambitious and long-term NanTroSEIZE project offshore Japan to better understand the generation of earthquakes in subduction zones. **Fifty-three ECORD scientists** were invited to sail on the seven expeditions that were implemented on both vessels; six ECORD scientists sailed as Co-chief Scientists.

ECORD has actively promoted scientific ocean drilling by organising booths at major international conferences (*e.g.* EGU, Goldschmidt Conference) and by financing the tours of three prominent lecturers who presented IODP science at numerous universities and institutes across Europe and Canada. Scientific ocean drilling remains highly attractive to young scientists. The three ECORD Summer Schools organised in FY2012 attracted more than 120 PhD students and early Post-doctoral researchers, among which 18 were funded by ECORD. Six ECORD Grants were awarded to graduate students to conduct research related to the Integrated Ocean Drilling Program in FY2012.

FY2012 has been the first year of the **MagellanPlus Workshop Series Programme**, now funded both by ECORD and the International Continental Scientific Drilling Programme (ICDP), with the goal of helping scientists from ECORD member countries to develop innovative drilling proposals. Two workshops have been funded in FY2012, "Records of geohazards and monsoonal changes in the Northern Bay of Bengal" and "Drilling an active hydrothermal system of a submarine intraoceanic arc volcano".

FY2012 has also been a year of preparation for the new **International Ocean Discovery Program**, which will start on October 1, 2013. The new IODP will have a different architecture and management system from the current phase. The new structure, developed by the International Working Group+ (IWG+), a committee composed of representatives from all IODP funding agencies, has a simplified and more flexible funding model that will provide better value-for-money than the current IODP and will give more independence to the platform providers, bringing greater opportunities in scientific and technological innovation. The goal to achieve greater independence at the consortium level, and in particular in the implementation of its mission-specific platform expeditions, has required ECORD's structure to be redefined in order to face the new IODP's upcoming challenges and opportunities. This represents an excellent opportunity to raise ECORD's profile, visibility and efficiency, and to better serve the community in Europe, Canada and associate partners. This new structure should enable ECORD to exercise its functions with greater versatility while also increasing its partnership opportunities with other science programmes and initiatives (*e.g.* ICDP, IMAGES, the European Multidisciplinary Seafloor Observatory (EMSO)), industry and the European Commission. A high level of technological expertise in sub-seafloor sampling and instrumentation is distributed across institutes and universities in Europe. Working towards the establishment of a Distributed European Infrastructure for Sub-seafloor Sampling and Monitoring to better co-ordinate these various entities will be one of ECORD's main goals.

Gilbert Camoin, ECORD Managing Agency Director

ECORD
European Consortium for
Ocean Research Drilling

ECORD member countries, as of March 2013 (World map credit: http://histgeo.ac-aix-marseille.fr).

2. A new ECORD in a new IODP

Scientific drillships allow scientists to access some of Earth's most challenging environments, collecting data and samples of sediment, rock, fluids, and living organisms from below the seafloor. Drilling expeditions and experiments during previous international ocean drilling programmes (the Deep Sea Drilling Program (DSDP) from 1968-1983, the Ocean Drilling Program (ODP) from 1983-2003 and the Integrated Ocean Drilling Program (IODP) from 2003-2013) have transformed the understanding of our planet by opening up new lines of inquiry and by addressing some of the most fundamental questions about Earth's dynamic history, processes and structure. Tools and methodologies that are now used across the terrestrial and marine geosciences have been developed. Equally important, scientific ocean drilling has fostered enduring international collaborations, trained new generations of multidisciplinary students and scientists, and engaged the public worldwide in scientific discovery.

Between 2010 and 2012, the Integrated Ocean Drilling Program's 25 international partners, the platform operators and the scientific leadership of the Science Advisory Structure have come together to consider the IODP experience and to design a management structure and business model for future operations. The model retains both the multi-platform capabilities and transformative science goals outlined in the new Science Plan **"Illuminating Earth's Past, Present, and Future: The International Ocean Discovery Program Science Plan for 2013-2023"** and addresses the constraints that may be faced by the main financial sponsors.

With multiple platforms, proven drilling, sampling, and long-term observational techniques, as well as the diverse range of science that can be addressed by studying the Earth beneath the sea, the new International Ocean Discovery Program (also IODP) will build on this legacy and address global challenges facing current and future generations with new research approaches, expanded scientific communities, and continued development of its unique collaborative model. The Science Plan for the International Ocean Discovery Program is designed to guide multidisciplinary, international collaboration in scientific ocean drilling during the period 2013 to 2023. This Science Plan highlights **four main themes**, each encompassing a shortlist of high-priority scientific challenges. These themes incorporate shared interests with other national and international research programmes, some marine-based *(e.g.* ocean-observing initiatives, Past Global Changes, InterRidge, InterMARGINS) and others focused on land *(e.g.* the International Continental Scientific Drilling Program).

The themes are:

Climate and Ocean Change:* *Reading the Past and Informing the Future, targets one of the most pressing questions about the climate, ocean and ice-sheet response to ongoing increase in greenhouse gases. Only scientific drilling can recover samples and data having sufficient distribution and resolution to understand the causes and impacts of global climate change in Earth's past.

Biosphere Frontiers:* *Deep Life, Biodiversity and Environmental Forcing of Ecosystems includes exploration of deep life within the sub-seafloor, facilitated by rapid developments in microbiology and related technologies. Scientific drilling will also investigate ecosystem response to environmental forcing, and the impacts of climate and ocean events on individual and whole ecosystems, including hominid evolution.

Earth Connections:* *Deep Processes and Their Impact on Earth's Surface Environment will concentrate on the links between surface, lithospheric, and deep Earth processes. Drilling is an essential tool for unraveling and understanding the geological, tectonic, geochemical, magmatic and hydrological processes responsible for development and evolution of these solid Earth systems.

Earth in Motion:* *Processes and Hazards on Human Time Scales addresses dynamic processes that occur on human time-scales, including those leading to and resulting from earthquakes, landslides and tsunamis. Scientific ocean drilling, coupled with real-time observations from individual and linked networks of long-term, sub-seafloor observatories that are installed in boreholes, will address the frequency, magnitude, mechanisms and impacts of these events.

No single platform can meet the drilling requirements of the four science themes. To maximise drilling capability, the International Ocean Discovery Program will use three primary platforms *(page 6)* , which will be operated by three independent Individual Platform Providers contributing to IODP by fulfilling objectives identified in the new Science Plan:

- The National Science Foundation (NSF) will operate the US-supplied multipurpose drillship ***JOIDES Resolution*** with enhanced capabilities since its refurbishment in 2006;

- The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japanese Agency for

Marine-Earth Science and Technology (JAMSTEC) will operate the riser-drilling-capable ***Chikyu*** for ultra-deep drilling in the ocean crust, the underlying mantle, and subduction zone environments;

• The European Consortium for Ocean Research Drilling (ECORD) will operate ***mission-specific platforms (MSP)*** *(below)* chartered on a specific project basis for drilling in technically challenging conditions, including high latitudes and shallow-water environments. Mission-specific platforms might include: specifically outfitted polar vessels, jack-up rigs, geotechnical vessels, seafloor drilling systems, long-piston coring, anchored barges, and others, as determined by scientific priorities and operational efficiency.

In addition, long-term borehole observatories provide data through which generations of researchers can build on the legacy of scientific ocean drilling, collecting new samples and deploying new instruments as technology and ideas change.

The architecture and management system of the International Ocean Discovery Program was developed by the International Working Group+ (IWG+), a committee composed of representatives from all IODP funding agencies. The architecture of the new programme - http://www.iodp.org/new-program-international-ocean-discovery-program - will maintain an overarching international umbrella and a scientific evaluation system (Science Advisory Structure), composed of experts from all IODP member countries, but will allocate more independence to the Platform Providers, providing greater opportunities in scientific and technological innovation. A simplified and more flexible funding model will provide better value-for-money than the current Integrated Ocean Drilling Program. Besides the multi-platform capabilities, the new IODP will retain the values of its predecessors, *i.e.* a bottom-up approach and a unique collaborative model for access to the data and archives.

The European Consortium for Ocean Research Drilling (ECORD), created by 12 countries in 2003 to join the international IODP programme as a single member, will be maintained for the period 2013-2023. ECORD is exclusively funded by its member countries and has co-ordinated the European contribution to IODP by initiating the mission-specific platform concept. The scientific and operational accomplishments of ECORD within IODP have been prolific and of high quality, and recognised by our global partners as a crucial contribution to the largest marine geosciences programme in the world. ECORD now has 18 member countries, with the most recent member, Poland, joining in 2011. Contacts with potential new ECORD members (Israel, Russia, Luxembourg) have been developed over the last year. ECORD will play a major role in the construction and operation of the International Ocean Discovery Program. Through appropriate formal arrangements with other IODP partners, scientists from all ECORD member countries will have access to all IODP platforms and participate in the strategic decisions of the programme. In reciprocity, access to MSP expeditions will be offered to all IODP partners.

More independence at the consortium level, and in particular in the implementation of mission-specific

The three IODP drilling platforms. From left to right, the JOIDES Resolution (Tim Fulton, IODP/TAMU), the mission-specific platform I/B Vikar Viking used during IODP Expedition 302: Arctic Coring in 2004 (M. Jacokbsson ©ECORD/IODP) and the Chikyu (K. Michibayashi ©IODP/JAMSTEC) .

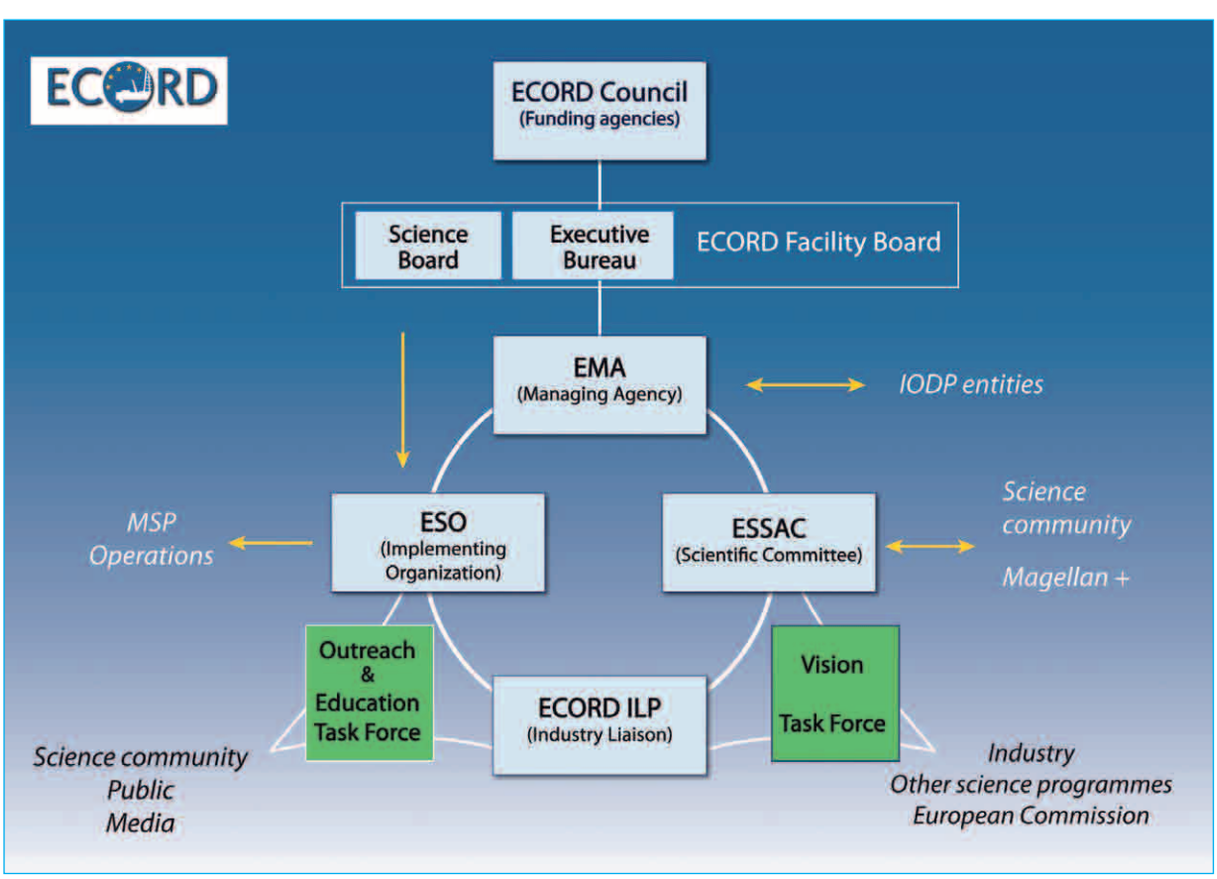
platform expeditions, has required a new ECORD structure to be defined that faces the challenges and opportunities offered by the new IODP framework *(below)*. This represents an excellent opportunity to raise ECORD's profile, visibility and efficiency, and better serve the community in Europe, Canada and associate partners. The successful parts of ECORD *(i.e.* the ECORD Council, EMA, ESO and ESSAC) have been broadened and reshaped.

The **ECORD Council**, the ECORD funding entity, will be the governing body for ECORD and will co-ordinate a common ECORD approach to IODP policy with membership from European and associate Funding Organisations. This common approach will secure an appropriate role in IODP, and is anticipated to contribute significantly to the establishment of a European Research Area and future participation in Europe's Research Infrastructures. The Chair of the ECORD Council rotates every year. The current Chair is Mike Webb (UK); Anne de Vernal (Canada) is the outgoing Vice-chair and Guido Lüniger (Germany) will become the incoming Vice-chair on October 1, 2013.

ECORD will be managed by the **ECORD Managing Agency (EMA)**. As the legal entity representing ECORD, EMA will be the contact point with all ECORD and IODP entities. EMA will pool funding from the member countries and subcontract the ECORD Science Operator (ESO). EMA will also be in charge of ECORD outreach and public relations. EMA will sign Memoranda of Understanding with other IODP partners, the National Science Foundation (NSF) representing the USA and its associate members, and the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT). The EMA Office is located in Aix-en-Provence, France, since January 1, 2012 with Gilbert Camoin as Director.

The **ECORD Science Support and Advisory Committee (ESSAC)** will be the ECORD Science Committee with responsibility for scientific planning and co-ordination. ESSAC will maximise the scientific and technological contribution of ECORD to IODP, as well as promote the appropriate representation of the ECORD scientific community in IODP expeditions and in the IODP Scientific Advisory Structure. ESSAC will also advise on requests to the European Commission and other funding entities to provide funds in support of IODP science and other European IODP-related activities. The host organisation for the ESSAC Office changes every two years. Since October 1, 2011, the office is located at the University of Granada, Spain, with Carlota Escutia as Chair.

The **ECORD Science Operator (ESO)** will be the ECORD mission-specific platform (MSP) Implementing Organisation for IODP. ESO will be in charge of contracting mission-specific platforms and related scientific support. ESO will operate in the best interests of the International Ocean Discovery Program



and all its member organisations. ESO is a consortium of European scientific institutions managed by the British Geological Survey (BGS), who are also responsible for drilling operations. MARUM, University of Bremen is responsible for core curation and analytical facilities and hosts the IODP Bremen Core Repository (BCR). The European Petrophysics Consortium (EPC) is responsible for the acquisition and scientific interpretation of core and borehole petrophysical measurements and is composed of the University of Leicester (UK), Geosciences Montpellier (France) and the RWTH Aachen (Germany).

The mandate and membership of the following ECORD bodies have been redefined:

- The **ECORD Industry Liaison Panel (E-ILP)**, the ECORD link between the scientific community and industry, will be composed of representatives from both academia and industry. The ECORD-ILP will provide support to the academic community by offering guidance in common topics of interest and identifying key links with industry in the sharing and development of deep-sea technologies.

- The **Outreach and Education Task Force (E-OETF)**, the ECORD communication entity, will co-ordinate ECORD's communication tasks, such as outreach/public information and educational activities related to IODP in ECORD countries.

Three new entities have been created within the ECORD structure:

- The ***ECORD Executive Bureau (E-EB)*** will act as the ECORD Executive entity between the meetings of the ECORD Council.

- The ***ECORD Facility Board (E-FB)*** will be the key planning forum for the mission-specific platform (MSP) expeditions through its roles in scheduling MSP drilling proposals and will advise on the long-term planning of MSP expeditions.

- The ***ECORD Vision Task Force (E-VTF)*** will be the ECORD strategic entity in charge of developing a long-term scientific and funding strategy, and in monitoring ECORD's progress towards the completion of the IODP Science Plan.

The **MagellanPlus Workshop Series Programme**, co-funded by ECORD and the ICDP, will yield a powerful springboard for the successful creation of innovative scientific proposals and will contribute to the improvement in relationships between the oceanic and continental drilling communities. This new structure should enable ECORD to exercise its functions with greater versatility while increasing its partnership opportunities with other countries, organisations and industry.

New opportunities will be created especially through the close collaboration with other science programmes and initiatives such as the ICDP, IMAGES and EMSO. The IODP Science Implementation and Policy Committee (SIPCom) and IODP funding agencies have recently agreed the possibility to implement through ECORD large-scale, multiple objective, multi-site coring proposals that are relevant both to the IODP and IMAGES science plans. One way to accomplish ECORD's objectives is to advance, grow, and share its scientific and technological resources is by opening the funding of MSP operations to additional financial sources.

One of the main goals is to develop greater links with the European Commission and to establish a **"Distributed European Infrastructure for Sub-seafloor Sampling and Monitoring (DEISM)"** involving various high-profile universities or institutes that operate and/or develop sub-seafloor sampling and instrumentation tools to investigate the sub-seafloor. The development of this network would help to operate research vessels and sampling capabilities with a cost-effective and concerted approach that maximises access to the science communiy. Such cooperation would facilitate the improvement of existing technologies through the sharing of knowledge and experience, and innovative endeavours. In October 2012, ECORD submitted the DEISM proposal to the European Commission in the frame of a Public Consultation on possible topics for future activities for integrating and opening existing national research infrastructures.

With this unique and redefined structure, ECORD is ready to open its doors to innovation and to embark on the road to a higher level of diversity and progress in ocean research. As the process of finalising the new MoUs between the ECORD participants and the NSF nears completion, ECORD is just a few steps away from completing its transition into the new, groundbreaking International Ocean Discovery Program.

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

3. Operating mission-specific platforms

Throughout 2012, staff from all ESO partner institutes have continued to work with IODP scientists to deliver the science from previous MSP expeditions as well as scoping and planning future MSP expeditions. The next, and final, MSP expedition of the current IODP will be the Baltic Sea Paleoenvironment Expedition (IODP 347), planned for the spring/summer of 2013.

Expedition 313: New Jersey Shallow Shelf

The post-expedition publication deadline for IODP Expedition 313 was August 4, 2012. The bulk of post-expedition research papers have been submitted to the electronic publication *Geosphere*, and are expected to be published under a themed special entitled "Results of IODP Expedition 313: The history and impact of sea-level change offshore New Jersey". For details see 'Selected Publications' *on page 12*.

Expedition 325: Great Barrier Reef Environmental Changes

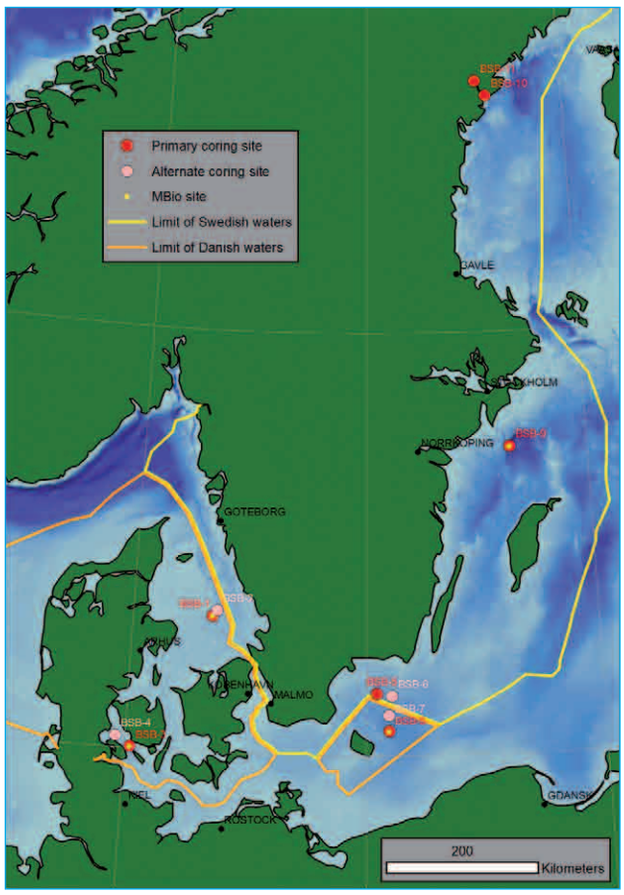
The post-expedition publication deadline for IODP Expedition 325 is March 16, 2013. The Expedition Project Manager (EPM) Carol Cotterill assisted the Co-chief Scientists to organise the Expedition 325 2nd Post-expedition Meeting at Heron Island, Queensland, Australia from July 3-7, 2012 *(below)*. Shortly after the Post-expedition Meeting, many of the Expedition 325 Scientists attended a special session at the 12th International Coral Reef Symposium (July 3-9, Cairns, Australia), which was co-organised with scientists associated with Expedition 310: Tahiti Sea Level. For details see 'Selected Publications" *on pages 12-13*.

Expedition 347: Baltic Sea Paleoenvironment

IODP Expedition 347 aims to recover sediments from the last interglacial/glacial cycle from six sub-basins of the Baltic Sea. The sedimentary records are expected to be highly sensitive to changes in climate over the last 140,000 years due to their proximity to the Scandinavian Ice Sheet. Cores will be taken from seven primary sites, with four sites important for microbiology studies *(page 10, left)*. The expedition is scheduled to start on late June, 2013. The start date will become better constrained as the ship operator completes its other contracts prior to the commencement of the MSP expedition. The expedition is expected to begin and end at Copenhagen, Denmark, and will last for a maximum of 60 days. Pre-mobilisation is likely to take place at either Falmouth in the UK or Landskrona in Sweden.

The drilling contractor for the expedition is Island Drilling Singapore Pte. Ltd., led by Andy Frazer who has previous drilling experience as a project manager with Fugro Seacore. Island Drilling have contracted Greatship Global Offshore Services Pte. Ltd. to provide the *Greatship Manisha* as the drilling platform *(page 10, right)*. The *Greatship Manisha* is a multi-purpose platform supply and support vessel, and is the near-identical sister ship to the *Greatship Maya* used for IODP Expedition 325: Great Barrier Reef Environmental Changes. The *Greatship Manisha* will be fitted with a geotechincal and

The Great Barrier Reef at low tide (photo Carol Cotterill)



Location of IODP Expedition 347 proposed sites.

coring rig supplied by Geoquip Marine (the Geoquip GMTR 120 rig), which will run the British Geological Survey Marine Wireline Core Barrel System (BGS-MWCBS), the set of coring tools used for IODP Expedition 302: Arctic Coring (ACEX). The expedition will also utilise a gravity corer to take shallow, undisturbed cores from the top metre below the sea bed.

In addition to contracting the drilling provider (with its vessel and rig sub-contracts), the ESO team are preparing for the offshore phase of IODP Expedition 347. New 20 ft (~6 metre) container labs have been purchased and outfitted, including a microbiology clean laboratory, Science Office, ESO Office and ESO Database containers. The Data Management team have been upgrading hardware and software, and have been making improvements to ESO's main database system, the Drilling Information System (DIS) *(see 'Data Management', page 12)*.

The Expedition Project Manager, Carol Cotterill, has been working closely with the ESO team at MARUM and the Co-chief Scientists Thomas Andrén and Bo Barker Jörgensen to accommodate the requirements of the proposed science programme. In particular the MARUM team have been assessing the microbiology and geochemistry requirements

The Greatship Manisha, contracted for IODP Expedition 347. (photo credit: Duivendijk.net)

of the expedition by scoping the analytical equipment needed for operations such as Expedition 347, which have a strong focus on geochemistry and microbiology, and by assessing contamination tests and developing the core flow.

Chicxulub K-Pg Impact Crater

During the first year of the International Ocean Discovery Program, ESO are planning to implement an expedition based on IODP Proposal 548: Chicxulub K-Pg Impact Crater. Due to the shallow water depths at the proposed sites (~17m), a lift-boat or jack-up rig will be required, similar to the *L/B Kayd* contracted for IODP Expedition 313: New Jersey Shallow Shelf. To prepare for a 2014 drilling campaign offshore Mexico, a hazard site survey is required to assist with the safe positioning of such a lift-boat or jack-up platform. At the end of 2012, ESO issued a tender for the provision and interpretation of the site survey (including geophysical and geotechnical surveying), and has recently been negotiating with a preferred contractor. The hazard site survey is currently scheduled to be implemented in April 2013. Once the survey is complete, and after confirmation of FY14 funding from ECORD, ESO will start the tendering procedure for the provision of drilling services with a view to implementing the drilling phase in the second half of 2014.

Scoping for future MSP expeditions

With the expedition to the Baltic Sea scheduled for 2013, and an expedition to the Chicxulub Impact Crater provisionally scheduled for 2014, the remaining IODP MSP proposals recommended for scheduling by the Science Advisory Structure and residing at the old "Operations Task Force" level are summarised in the table *page 11*. Scheduling authority for MSP expeditions transfers to the new ECORD Facility Board in March 2013.

IODP Proposal	Proposal Name	Comments
672	Baltic Sea Paleoenvironment	Scheduled to start end of June, 2013, 60 days duration.
548	Chicxulub K-Pg Impact Crater	Hazard site survey scheduled for April 2013. First MSP of the new programme, end of 2014.
758	Atlantis Massif Seafloor Processes	Potential implementation in 2015. Depends on seabed drill readiness
716	Hawaiian Drowned Coral Reefs	Potential post-2015 expeditions. No new scoping in 2012.
581	Late Pleistocene Coralgal Banks	
637	New England Margin Hydrogeology	

Atlantis Massif Seafloor Processes

The objectives of this proposal (IODP Proposal 758) can be met using a seabed drill deployed from a research vessel, and is likely to be considerably cheaper than standard MSP expeditions that normally require contracting a drilling platform from the commercial sector. ESO operations staff are continuing to evaluate all available seabed-drill options for this proposal, including the evolving RD2 (BGS) and MeBo (MARUM) seabed drills. The ESO team have been working with the proponents and others to identify new developments in seabed-drill sampling technology that are required to meet this proposal's objectives, specifically:

- ***On February 9, 2012***, BGS operations staff met with Tim Freudenthal (MeBo, MARUM) to discuss the development of the MeBo and the RD2, and how both groups at MARUM and the BGS might collaboratively develop new downhole sampling tools that can be used on both seabed drills;
- ***On April 8, 2012***, discussions continued in Bremen with MARUM and Gretchen Früh-Green, the lead Atlantis Massif proponent. The discussion centred on new sampling tools that would be developed to meet the requirements of Proposal 758;
- ***On November 8,*** 2012, the 1st ECORD Technology Panel (ETP) was convened by ESO at the British Geological Survey in Edinburgh.

1st ECORD Technology Panel (ETP): fluid and microbiology sampling from seabed drills

ETP meetings will be convened by ESO when there is a technological development, identified through project scoping, required to implement one or more proposals. The first ETP meeting was convened to address the requirement of IODP Proposal 758, Atlantis Massif Seafloor Processes to sample fluid chemistry and microbiology from a seabed drill. The meeting was primarily an information gathering exercise for ESO, and in the first instance was focussed on meeting the minimum requirements of IODP Proposal 758. The meeting participants also considered how to enhance an expedition based on IODP Proposal 758 to provide more of the legacy data expected by IODP (minimum measurements). Lastly, the participants considered future developments that may lead to providing and testing new tools that the microbiology and geochemistry community can use on future expeditions. The outcome of the meeting was a prioritised list of seabed-drill developments to be considered by the ESO and MARUM operations teams.

Preparing for Arctic drilling

ESO has continued to assist ECORD in preparing for potential Arctic and Antarctic drilling campaigns in the new IODP. Even with the success of IODP Expedition 302: Arctic Coring (ACEX), the geodynamics and paleoenvironment of the Arctic Ocean are still largely unknown, and the Arctic is one of the key scientific targets of the new Science Plan. There are currently seven active and three inactive proposals in the Arctic, and two active proposals in the Antarctic. Building on ECORD's initiative to explore all avenues of operating an Arctic scientific drilling campaign in the future, ESO staff have participated in industry and scientific Arctic workshops, specifically:

- ***D. McInroy*** gave a talk entitled "The First Deep Coring in the Central Arctic Ocean: The Drilling of the Lomonosov Ridge by the IODP" to the Finding Petroleum: Exploring the Arctic Conference, at the Geological Society of London UK, October 11, 2011;
- ***D. McInroy*** gave a similar talk at the Magellan Workshop Series "Overcoming Barriers to Arctic Ocean Scientific Drilling: the Site Survey Challenge", Copenhagen, Denmark, November 1-3, 2011;
- ***D. Smith and D. McInroy*** met with representatives of Stena, operators of the icebreaking drillship *Stena DrillMAX ICE*, Stockholm, Sweden, January 10, 2012;

• ***D. Smith*** attended the Arctic workshop "Co-ordinated Scientific Drilling in the Beaufort Sea", Kananaskis, Canada, February 13-15, 2012.

Data management

The ESO's Data Management team, through the IODP Data Management Co-ordination Group, have maintained dialogue with IODP-MI and the other Implementing Organizations regarding standard terminology and dictionaries for use in IODP, exchange of data, the Scientific Earth Drilling Information Service (SEDIS), the Sample and Data Request system (SaDR) and the Central Inventory (CI). In preparation for Expedition 347 and future operations, software and hardware have been upgraded including:

• The Drilling Information System (DIS) has been updated to the most recent version (v3.0) on state-of-the-art servers;

• Improvements to the database and front-end user interface of the Curation DIS by Smartcube (sub-contracted to handle DIS development);

• The upgrade of the NAS system capacity from 1.5 (3.0) TB to 6 (12) TB;

• The purchase of new small ZEBRA label printers were purchased to equip the curation and geochemistry containers;

• The setup and testing of the network system of the curation and geochemistry containers;

• The planning of the IT infrastructure of the new Science Office, ESO Office and ESO Database offshore containers;

• The development of the ExpeditionDIS for Expedition 347: Baltic Sea Paleoenvironment. This version of the DIS will be continuously adapted according to further discussions with the Co-chief Scientists and the Expedition Scientists.

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

Selected publications arising from MSP expeditions in 2012

Expedition 325: Great Barrier Reef Environmental Changes

Bridge, T.C.L., Fabricius, K.E., Bongaerts, P., Wallace, C.C., Muir, P.R., Done, T.J., and Webster, J.M., 2012. Diversity of Scleractinia and Octocorallia in the mesophotic zone of the Great Barrier Reef, Australia. Coral Reefs, 31(1):179-189. doi:10.1007/s00338-011-0828-1

Exon, N., 2010. Scientific drilling beneath the oceans solves earthly problems. Aust. J. Marit. Ocean Aff., 2(2):37-47. http://www.geosci.usyd.edu.au/documents/news/IODP_AJMOA.pdf

Gischler, E., submitted. Microfacies and diagenesis of older Pleistocene (pre-BM), GBR, Australia (IODP Exp. 325). Sedimentology.

Jovane, L. and Herrero-Bervera, E, submitted. On the paleomagnetic and rock magnetic constraints regarding the age of IODP 325 Hole M0058A. In Jovane, L., Herrero-Bervera, E., Hinnov, L.A., and Housen, B.A. (Eds.), Magnetic Methods and the Timing of Geological Processes. Spec. Publ. - Geol. Soc. London.

Mills, H.J., Reese, B.K., and St. Peter, C., 2012. Characterization of microbial population shifts during sample storage. Front. Extreme Microbiol., 3:49. doi:10.3389/fmicb.2012.00049

Expedition 313: New Jersey Shallow Shelf

Basile, C., and Monteverde, D., submitted. Bedding attitudes as a sequence stratigraphy proxy: a case study from borehole images, Hole M28, IODP Leg 313. Geosphere.

Browning, J.V., Miller, K.G., Sugarman, P.J., Barron, J., McCarthy, F.M.G., Kulhanek, D.K., Katz, M.E., and Feigenson, M.D., submitted. Chronology of Eocene-Miocene sequences on the New Jersey shallow shelf: implications for regional, interregional, and global correlations. Geosphere.

Fang, L., Bjerrum, C.J., Hesselbo, S.P., Kotthoff, U., McCarthy, F.M.G., Huang, B., and Ditchfield, P.W., submitted. Carbon-isotope stratigraphy from terrestrial organic matter through the Monterey Event, Miocene, New Jersey margin (IODP Expedition 313). Geosphere.

Kotthoff, U., McCarthy, F.M.G., Greenwood, D.R., Müller-Navarra, K., and Hesselbo, S.P., submitted. Vegetation and climate development on the Atlantic Coastal Plain from 33 to 13 million years ago (IODP Expedition 313). Palaeogeogr., Palaeoclimatol., Palaeoecol.

McCarthy, F.M.G., Katz, M.E., Kotthoff, U., Drljepan, M., Zanatta, R., Williams, R.H., Browning, J.V., Hesselbo, S.P., Bjerrum, C., Miller, K.G., and Mountain, G.S., submitted. Eustatic control of New Jersey margin architecture: palynological evidence from IODP. Geosphere.

Miller, K.G., Browning, J.V., Mountain, G.S., Bassetti, M.A., Monteverde, D., Katz, M.E., Inwood, J., Lofi, J., and Proust, J.-N., submitted. Sequence boundaries are impedance contrasts: core–seismic-log integration of Oligocene-Miocene sequences, New Jersey shallow shelf. Geosphere.

Miller, K.G., Browning, J.V., Mountain, G.S., Bassetti, M.A., Monteverde, D., Katz, M.E., Inwood, J., Lofi, J., and Proust, J.-N., submitted. Sequence boundaries are impedance contrasts: core–seismic–log integration of Oligocene-Miocene sequences, New Jersey shallow shelf. Geosphere.

Nilsson, A., Lee, Y.S., Snowball, I., and Hill, M., submitted. Magnetostratigraphic importance of secondary chemical remanent magnetizations carried by greigite (Fe3S4) in Miocene sediments on the New Jersey Shelf (IODP Exp. 313). Geosphere.
van Geldern, R., Stadler, S., Hayashi, T., Boettcher, M.E., Mottl, M.J., and Barth, J.A.C., submitted. Stable isotope geochemistry of pore waters and marine sediments from the New Jersey shelf: methane formation and fluid origin. Geosphere.

Expedition 310: Tahiti Sea Level

Camoin, G.F., Seard, C., Deschamps, P., Webster, J.M., Abbey, E., Braga, J.C., Iryu, Y., Durand, N., Bard, E., Hamelin, B., Yokoyama, Y., Thomas, A.L., Henderson, G.M., and Dussouillez, P., 2012. Reef response to sea-level and environmental changes during the last deglaciation: Integrated Ocean Drilling Program Expedition 310, Tahiti Sea Level. Geology, 40(7):643-646. doi:10.1130/G32057.1

Deschamps, P., Durand, N., Bard, E., Hamelin, B., Camoin, G., Thomas, A.L., Henderson, G.M., Okuno, J., and Yokoyama, Y., 2012. Ice-sheet collapse and sea-level rise at the Bølling warming 14,600 years ago. Nature (London, U. K.), 483(7391):559-564. doi:10.1038/nature10902

Durand, N., Deschamps, P., Bard, E., Hamelin, B., Camoin, G., Thomas, A.L., Henderson, G.M., Yokoyama, Y., and Matsuzaki, H., submitted. Comparison of ^{14}C and U-Th ages in corals from IODP#310 cores offshore Tahiti. Radiocarbon.

Felis, T., Merkel, U., Asami, R., Deschamps, P., Hathorne, E.C., Kölling, M., Bard, E., Cabioch, G., Durand, N., Prange, M., Schulz, M., Cahyarini, S.Y., and Pfeiffer, M., 2012. Pronounced interannual variability in tropical South Pacific temperatures during Heinrich Stadial 1. Nat. Comm., 3:965. doi:10.1038/ncomms1973

Heindel, K., Birgel, D., Brunner, B., Thiel, V., Westphal, H., Gischler, E., Ziegenbalg, S.B., Cabioch, G., Sjövall, P., and Peckmann, J., 2012. Post-glacial microbialite formation in coral reefs of the Pacific, Atlantic, and Indian Oceans. Chem. Geol., 304-305, 117-130.

Pretet, C., Samankassou, E., Felis, T., Reynaud, S., Böhm, F., Eisenhauer, A., Ferrier-Pagès, C., Gattuso, J.-P., and Camoin, G., in press. Constraining calcium isotope fractionation ($\delta^{44/40}Ca$) in modern and fossil scleractinian coral skeleton. Chem. Geol.

Seard, C., Borgomano, J., Grandjeon, D., and Camoin, G., in press - Impact of environmental parameters on coral reef development and demise. Forward modelling of last deglacial reefs from Tahiti (French Polynesia). Sedimentology.

Thomas, A.L., Fujita, K., Iryu, Y., Bard, E., Cabioch, G., Camoin, G., Cole, J.E., Deschamps, P., Durand, N., Hamelin, B., Heindel, K., Henderson, G.M., Mason, A.J., Matsuda, H., Ménabréaz, L., Omori, A., Quinn, T., Sakai, S., Sato, T., Sugihara, K., Takahashi, Y., Thouveny, N., Tudhope, A.W., Webster, J., Westphal, H., and Yokoyama, Y., 2012. Assessing subsidence rates and paleo water-depths for Tahiti reefs using U-Th chronology of altered corals. Mar. Geol., 295298:8694. doi:10.1016/j.margeo.2011.12.006

Woelkerling, W.J., Bassi, D., and Iryu, Y., 2012. Hydrolithon braganum sp. nov. (Corallinaceae, Rhodophyta), the first known exclusively fossil semi-endophytic coralline red alga. Phycologia, 51, 6, 604-611.

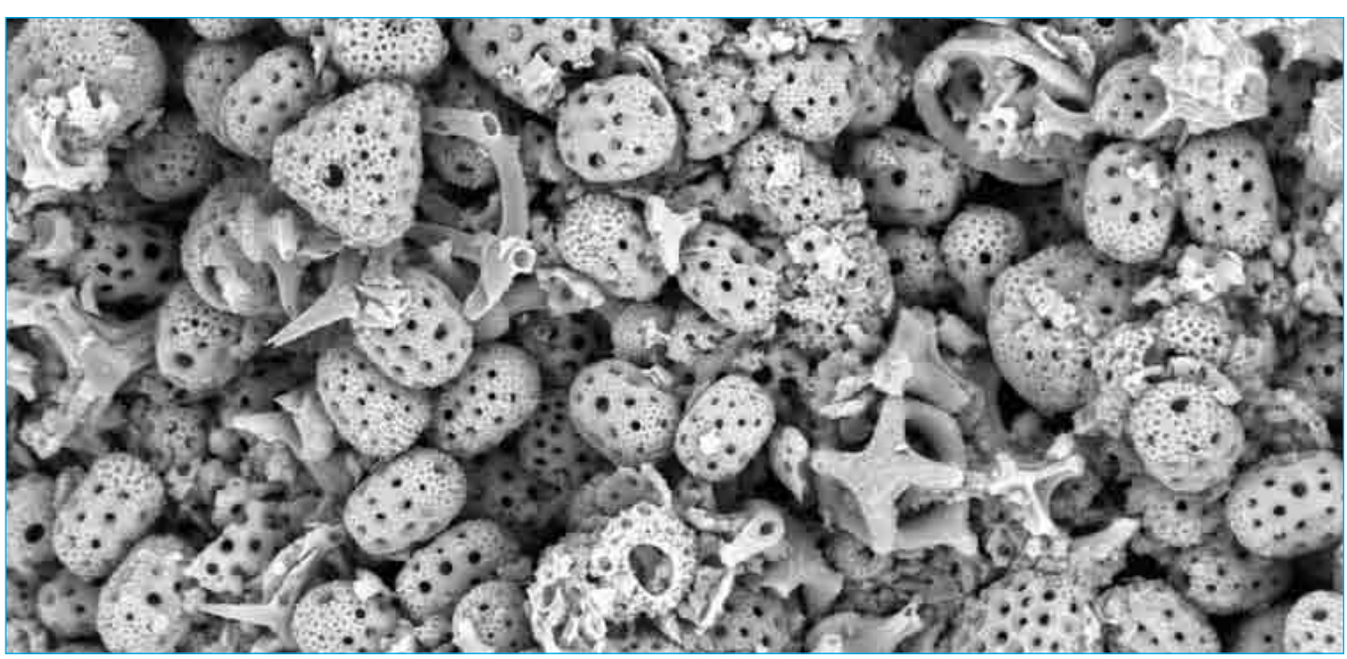
Expedition 302: Arctic Coring (ACEX)

Barke, J., van der Burgh, J., van Konijnenburg-van Cittert, J.H.A., Collinson, M.E., Pearce, M.A., Bujak, J., Heilmann-Clausen, C., Speelman, E.N., van Kempen, M.M.L., Reichart, G.-J., Lotter, A.F., and Brinkhuis, H., 2012. Coeval Eocene blooms of the freshwater fern Azolla in and around Arctic and Nordic seas. Palaeogeogr., Palaeoclimatol., Palaeoecol., 337–338:108-119. doi:10.1016/j.palaeo.2012.04.002

Minakov, A.N., and Podladchikov, Y.Y., 2012. Tectonic subsidence of the Lomonosov Ridge. Geology, 40(2):99-102. doi:10.1130/G32445.1

Stickley, C.E., Koç, N., Pearce, R.B., Kemp, A.E.S., Jordan, R.W., Sangiorgi, F., and St. John, K., 2012. Variability in the length of the sea ice season in the middle Eocene Arctic. Geology, 40(8):727-730. doi:10.1130/G32976.1

Suto, I., Kawamura, K., Hagimoto, S., Teraishi, A., and Tanaka, Y., 2012. Changes in upwelling mechanisms drove the evolution of marine organisms. Palaeogeogr., Palaeoclimatol., Palaeoecol., 339-341:39-51. doi:10.1016/j.palaeo.2012.04.014



Expedition 302: Arctic Coring, SEM image of ebridians preserved in mid Eocene sediments of the Arctic Ocean (image by Richard Pearce/Alan Kemp, National Oceanography Centre, Southampton, UK).

4. Downhole measurements and petrophysics

The European Petrophysics Consortium (EPC) involves three European universities, Leicester (UK), Montpellier (France) and RWTH Aachen (Germany). The EPC central office is located at the University of Leicester and is responsible for the management of the consortium. EPC links into an international logging consortium and its combined petrophysical expertise is available to all scientists involved in IODP. The EPC team provide high-level scientific and technical support to the IODP and ECORD across the range of highly variable environments drilled by the non-riser and mission-specific platforms (MSP).

Preparations for future expeditions

For ECORD MSP expeditions, EPC is responsible for the acquisition of downhole-logging data and core petrophysics measurements and data interpretation. The Petrophysics Staff Scientist for Expedition 347: Baltic Sea Paleoenvironment, Sally Morgan, has worked with Geotek to develop a system dedicated to rapid magnetic susceptibility logging of cores using two loop sensors to enable timely stratigraphic correlation and rapid logging of cores taken for microbiological analysis. The Multi-Sensor Core Logger (MSCL) 152 was installed in the dedicated 20 ft (~6 metre) Petrophysics Container laboratory that will be offshore during the expedition *(above)*. Tests are also ongoing to replace the existing NaI scintillation crystal used in the NGR (MSCL-XYZ) with a BGO crystal. If these tests are successful, it will enable more rapid NGR logging of whole round cores for the Baltic project. These new ventures expand EPC's capabilities for core logging and discrete measurements during the offshore and onshore phases of IODP MSP expeditions. As part of the preparations for IODP Expedition 347, Sally Morgan gave a presentation on downhole logging and core petrophysics at the Baltic Sea Marine Geology Colloquium held in Helsinki, Finland, during September 2012.

EPC works with staff from the IODP Bremen Core Repository (BCR) to ensure that QA/QC (quality assurance/quality control) procedures are developed prior to MSP operations and are followed during data acquisition. Collaboration between EPC and the BCR during the onshore phase of expeditions has proven to be a successful model for efficient use of petrophysics analytical equipment, staff expertise and data generation.

EPC has ordered a suite of stackable logging tools from ALT (Advanced Logic Technology), including state-of the-art slimhole imaging tools, for use in future expeditions to increase our capability from single-run tools. The new tools include caliper, natural gamma ray, resistivity (induction), sonic, borehole imaging (acoustic & optical), Idronaut (borehole fluid characterisation with p, T, Cw, Eh, pH) and magnetic susceptibility.

The refitted Petrophysics Container ready for IODP Expedition 347. The new MSCL 152 is desk-mounted on the right (photo taken by John Roberts, Geotek).

Expedition 313: New Jersey Shallow Shelf and Expedition 325: Great Barrier Reef Environmental Changes

Two publications involving EPC scientists have been accepted by the Geological Society of America online journal, *Geosphere*, on data from IODP Expedition 313 *(see page 12)*

- Lofi J., Inwood J., Proust J.N., Monteverde D., Loggia D., Basile C., Hayashi T., Stadler S., Fehr A., Pezard P. Fresh and salt water distribution in passive margin sediments: insights from IODP Expedition 313 on the New Jersey margin.
- Miller K.G., Browning J.V., Mountain, G.S., Bassetti M.A., Monteverde D., Katz M.E., Inwood J., Lofi J., Proust J.N. Sequence boundaries are impedance contrasts: Core-seismic-log integration of Oligocene-Miocene sequences, New Jersey Shallow Shelf.

At the second Post-cruise Meeting for Expedition 325 in Australia, (July 2012), IODP Research Associates presented research using the downhole and core-logging data. Their research uses core-log integration, and the characterisation and identification of significant boundaries in the analysis of fore-reef deposits (M0058A) and through sediments from the Last Glacial Maximum (M0054B).

Johanna Lofi (EPC Montpellier) and Trevor Williams (USIO), Logging Staff Scientists on IODP Expedition 339: Mediterranean Outflow (photo Lucas Lourens &IODP).

Professional development

IODP Research Associates taught sessions to early-career scientists on the acquisition and interpretation of downhole measurements during the 2012 ECORD Summer School and the Geoceans Summer School in Brest. At the UK IODP Student Conference, one of the IODP Research Associates worked as a Senior Scientist/Mentor advising postgraduate students on all aspects of designing a logging programme for a variety of IODP expeditions. Dr Nicola Pressling, a NERC Research Fellow from the UK National Oceanography Centre, visited the Borehole Computing Laboratory to reorient core using FMS images working alongside the IODP Research Associates on a collaborative IODP sample request. To continue their own professional development, EPC members completed a variety of external professional courses relating to offshore working, scientific drilling and analytical skills, including offshore survival training (BOSIET (HUET)) and attending the International Continental Scientific Drilling Program (ICDP) training course and a Matlab course. A number of petrophysics seminars have been held in-house and EPC members from Leicester regularly attend the London Petrophysical Society Workshops and seminars covering topics including NMR interpretation techniques, pressure and sampling, practical wellsite petrophysics, and carbonate petrophysics.

Contributing to *JOIDES Resolution* expeditions

EPC is part of an international consortium for logging that was established in 1992. The consortium is led by the Borehole Research Group at Lamont-Doherty Earth Observatory (US) and also involves the University of Tokyo (Japan). These institutes provide shipboard logging operations and skilled Logging Staff Scientists on each IODP drilling platform sharing experience and expertise across IODP. EPC has a special arrangement with the US Implementing Organization (USIO) to contribute to logging activities associated with *JOIDES Resolution* expeditions. In 2011-12, EPC provided the Logging Staff Scientists for three expeditions: Expedition 339 Mediterranean Outflow (November 17, 2011-January 17, 2012) *(above)*, Expedition 340 Lesser Antilles Volcanism & Landslides (March 2-April 17, 2012) and Expedition 342 Paleogene Newfoundland Sediment Drifts (June 2-July 30, 2012) *(See pages 21, 22, 24)*.

Related website:

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

Presentations by EPC Members on IODP expedition data from October 2011 to September 2012

Morgan, S. Downhole Logging and Core Petrophysics: IODP Expedition 347, Baltic Sea Paleoenvironment. 11th Baltic Sea Marine Geology Colloquium, Helsinki, Finland. September 19-21, 2012.

McGrath, A., Inwood, J., Morgan, S., Davies, S.J. 2012. Correlating geochemical, sedimentological and petrophysical changes through the Mid-Miocene Global Cooling event in New Jersey Shallow Shelf cores (IODP Expedition 313). The UK-IODP Student Conference, September 9-11 and the UK-IODP National Conference September 12, 2012.

Anderson, L., Morgan, S., Inwood, J., Webster, J. and Lado Insua, T. Lithostratigraphic Reconstruction in Coral Sequences (IODP Expeditions 310 and 325). 2012. 12th International Coral Reef Symposium, July 9-13, 2012, Cairns, Australia. Presented in the "Reef response to sea-level and environmental changes" mini-symposia.

Davies, S., Anderson, L., Inwood, J., McGrath, A., Morgan, S., Pezard, P., Lofi, J., Fehr, A., Bosch, F. and Clauser, C. 2012. Downhole logging and core petrophysics technologies. The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

Fehr, A., Pechnig, R., Inwood, J., Lofi, J., Bosch, F. and Clauser, C. 2012. Thermophysical properties derived from lab measurements and downhole logging at New Jersey shallow shelf (IODP Expedition 313). The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

Inwood, J., Lofi, J., Basile, C., Bassetti, M. A., Bjerrum, C., Davies, S., Hayashi, T., Mountain, G., Mottl, M., Otsuka, H., Proust, J. N., Stadler, S. and Valppu, H. 2012. Insights into sequence stratigraphy, fluid flow processes and sediment structure using downhole logging analyses from the New Jersey Shallow Shelf (IODP Expedition 313). The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

Inwood, J., Morgan, S., McGrath, A., Davies, S., Foster, H. and Lofi, J. 2012. Characterization of New Jersey Shelf Sedimentation using geochemical and physical properties: IODP Expedition 313. EGU General Assembly 2012, Vienna, Austria.

McInroy, D., Smith, D., Roehl, U. and Davies, S. 2012. MissionSpecific Platform expeditions within the IODP. The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

McGrath, A., Inwood, J., Morgan, S., Davies, S., Anderson, L., Foster, H., Lofi, J. and Fehr, A. 2012. Correlating geochemical, petrophysical and sedimentological changes through the mid-Miocene global cooling event in New Jersey shallow shelf cores (IODP Expedition 313). The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

Pezard, P., Denchik, N., Henry, P., Kopf, A. and Sultan, N. 2012. Downhole hydrogeophysical observatories for shallow applications: case of the Nice Landslide Subsurface Instrumentation Project. The Deep-Sea and Sub-Seafloor Frontiers Conference, Sitges (Barcelona), Spain, 2012.

Lofi J., J. Inwood, J.N. Proust, D. Monteverde, D. Loggia, C. Basile, C. Bjerrum, H. Otsuka, T. Hayashi, M. Mottl, S. Stadler, P. Pezard, 2012. Passive margins and fresh water: highlights from Expedition 313 on the New Jersey margin. Invited speaker - Journées Scientifiques d' IODP France, Paris, France.

Proust J-N. , M-A Bassetti, C. Basile, J. Lofi, M. Rabineau, G. Mountain & Expedition 313 Science Party, 2012. Architecture sédimentaire des marges passives et niveau marin global. Résultats de la campagne de forage de la plate-forme peu profonde du New Jersey - Expédition IODP-ICDP 313. Journées Scientifiques d' IODP France, Paris, France.

Anderson, L.M., Ehmann, S., Pressling, N., Inwood, J., Morgan, S., Davies, S.J. and the Expedition 330 Scientists. 2011. The Volcanic Architecture of Rigil (Hole U1374A) and Burton Guyots (U1376A), IODP Expedition 330. AGU Fall Meeting, San Francisco, USA.

Ehmann, S., Anderson, L.M., Hoerdt, A., Leven, M., Virgil, C. and the Expedition 330 Scientists. 2011. Three-component magnetic downhole measurements on the Rigil and Burton Guyots, Louisville Seamount Trail, IODP Expedition 330. AGU Fall Meeting, San Francisco, USA.

Fehr, A., Bosch, F.P., Inwood, J., Lofi, J., Morgan, S., Anderson, L.M., Davies, S.J., Pechnig, R. and Clauser. 2011. GGE as part of European Petrophysics Consortium: Activities for IODP Expedition 313 and 325. IODP/ICDP Kolloquium in Münster (D) (March 14-14, 2011).

Fehr, A., Pechnig, R., Inwood, J., Lofi, J., Bosch, F. and Clauser, C. 2011. Studies on thermophysical properties at New Jersey Shallow Shelf (IODP Expedition 313). AGU Fall Meeting, San Francisco, USA.

Garing, C., Dweik, J., Luquot, L., Pezard, P., Gouze, P. 2011. Integrated study of petrophysical properties of highly heterogeneous Miocene reefal carbonate rocks. AGU Fall Meeting, San Francisco, USA.

Morgan, S., Inwood, J., Foster, H., McGrath, A., Davies, S.J. and Lofi, J. 2011. Correlating chemical and physical signatures through the Mid-Miocene Global Cooling event in New Jersey Shallow Shelf cores (IODP Expedition 313). AGU Fall Meeting, San Francisco, USA.

5. IODP Bremen Core Repository

The IODP Bremen Core Repository (BCR) at the MARUM, University of Bremen, Germany, is one of the three IODP core repositories, along with the Gulf Coast Repository (GCR) located at the Texas A&M University in College Station (USA) and the Kochi Core Center (KCC) in Kochi (Japan). According to IODP agreements, the BCR hosts all cores recovered since the beginning of scientific ocean drilling from the Atlantic and Arctic Oceans as well as the Mediterranean and Black Seas. The BCR also organises and hosts the Onshore Science Parties (OSP) of mission-specific platform (MSP) expeditions, as well as the offshore curation and analysis during all MSP expeditions operated by ESO.

The BCR currently (February 2013) holds almost **152 km of deep-sea cores from 86 expeditions**. During FY2012, a total of 82,724 samples were taken as a result of 226 requests, 148 of which were submitted by ECORD scientists. 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.

The Sampling Party for Expedition 339: Mediterranean Outflow was held at the BCR from June 9 to 17, 2012. The Sampling Party was attended by 47 participants (science party members as well as shorebased scientists) from 13 countries *(below)* and a total of 37,362 samples were taken.

All BCR samples (1,387,672 samples/5,034 sample requests/2,798 individual scientists including samples taken earlier at the East Coast Repository for legacy cores that are now at BCR) are entered into a database that is accessible for the general public for post-moratorium samples (web interface for curatorial data: http://134.102.249.79/BCRDIS/).

CoreWall-Corelyzer initially used during MSP Onshore Science Parties (OSP) has been continuously undergoing improvements. The CoreWall hardware is permanently installed in the BCR lab and we are continuing to explore new ways to integrate Corelyzer into our daily normal operations, including education and outreach.

Participants of Sampling Party for Expedition 339 held at BCR in June 2012. (photo Carlos Alvarez Zarikian/IODP)

Arrival of IODP cores from Expedition 339: Mediterranean Outflow at Bremen Core Repository (February 2012).

A cumulative length of about 11 km of new cores from two IODP expeditions, Expedition 339: Mediterranean Outflow (816 boxes, *above*) and Expedition 342: Paleogene Newfoundland Sediment Drifts (503 boxes) arrived at the BCR during 2012 and were transferred to the reefer (refrigerated core store).

The new MARUM II building, which contains a 440 m^2 core reefer, opened in the spring of 2011. After all of the non-IODP cores (University of Bremen Geosciences Department (GeoB) piston and gravity cores) were moved out of the existing BCR reefer in the MARUM building to the new reefer, it was necessary to build new racks with specific dimensions for holding cores from DSDP/ODP/IODP expeditions, to increase our capacity to store IODP cores (providing about 40 km of additional capacity). The new rack construction was completed in August 2012.

BCR staff, in cooperation with the other IODP core repositories, contributed to the evaluation of the new IODP Sample and Data Requests (SaDR) system for sample request submission by scientists. After assessing the latest test version, a list of suggestions for improvements were provided and compiled with those of the other repositories to deliver a user-friendly and efficient system for submitting sample requests.

ESO continues to implement QA/QC (quality assurance/ quality control) procedures during MSP expeditions. The various elements of this work, encompassing overall policies and procedures for QA/QC, are either in progress or already completed *(e.g.*, for geochemistry data in the database of past MSP expeditions). ESO is currently investigating their potential implementation during MSP expeditions and also scoping similar procedures for analytical equipment and instrumentation.

Other ongoing activities at the BCR throughout 2012 are the improvement of the online tutorials for both the offshore phase of MSP expeditions and the Onshore Science Party (OSP), the maintenance and upgrade of the laboratory containers and equipment used offshore, plus the analytical instruments used during OSPs.

The BCR is also an ideal place to train students. In 2012, the ECORD Bremen Summer School was dedicated to "Submarine Landslides, Earthquakes and Tsunamis" *(see page 29)*.

Due to the BCR's location in the same building as the MARUM, University of Bremen, and its proximity to the university's Department of Geosciences, the facility continues to receive frequent requests for tours by visiting scientists, officials and general public. In 2012 the repository has also provided core material for numerous course studies for a wide range of purposes, including instruction on core descriptions and the visual illustration of geo-scientific concepts. Through these efforts, many young emerging scientists have been made aware of the potential of IODP cores to inspire their research. In addition, there were the usual visits to the BCR by school classes, but in special cases selected cores were sent to schools within Germany, where they were shown and discussed in their scientific context. Equally important for informing and educating the public of ECORD and IODP's scientific and technical achievements are the frequent events attended by representatives of the television, radio and print media.

Other visitors to the BCR in 2012 included a group of database representatives from Lamont-Doherty Earth Observatory (LDEO), participants of the kick-off meeting of the EC-funded project COOPEUS (strengthening the cooperation between the US and the EU in the field of environmental research infrastructures), a delegation from the German Research Foundation, including the head of the marine research group Dr. Harald Leisch, and two delegations from China and one from Turkey.

Scientists participating in the Bighorn Basin Coring Project (BBCP) held their Science Party at BCR and MARUM (January 9-27, 2012) using procedures similar to those of the MSP expedition science parties.

The 2012 DEBI-RCN meeting "Ocean Crust Processes and Consequences for Life"- http://www.darkenergybiosphere.org/RCN/meetings/2012.html - was held at the MARUM, University of Bremen, with a training workshop and a visit to the BCR to show and study rock samples.

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

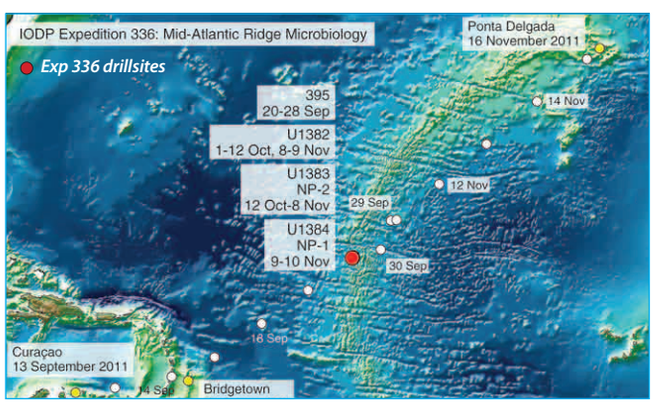
6. Participating in IODP expeditions

Participation in IODP expeditions is an excellent opportunity for scientists to be involved in international multidisciplinary teams and to have priority access to unique samples and data. As a contributing member of IODP, ECORD is entitled to an average of eight scientists on every IODP expedition. Sailing scientists are selected following an open call for applications, nomination by ESSAC of potential participants, and discussions between the Implementing Organization, the two appointed Co-chief Scientists and the IODP member countries/consortia. For ECORD, member country rights are proportional to their financial contribution to the consortium ("quotas"). Selection of the science team is therefore not only based on scientific merit but must also fulfil country quotas. On rare occasions, ECORD scientists participate in expeditions that do not count towards their country quota. For example, when specific expertise is needed for an expedition that has not been fulfilled by any of the IODP member countries applicants through special calls, and/or when scientists sail as invited observers when drilling takes place in territorial waters of an ECORD country.

In FY2012, a total of seven expeditions were implemented on both the *JOIDES Resolution* (five) and the *Chikyu* (two). A total of **53 ECORD scientists** and **two observers** were invited to participate, including **six Co-chief Scientists**.

Expedition 336: Mid-Atlantic Ridge Microbiology *JOIDES Resolution*, September 1 - November 17, 2011

The primary scientific objective for Expedition 336 was to understand how seawater circulation affects microbial and geochemical processes in the uppermost basement. For this it was proposed to recover sediment and basement cores and to install new Circulation Obviation Retrofit Kits or 'CORKs' at the North Pond region of the Atlantic Ocean (22°45'N, 46°05'W) in 4414–4483 m water depth. This area is known to be a site of particularly vigorous circulation of seawater in permeable 8 Ma basaltic basement underlying a <300 m thick sedimentary sequence.

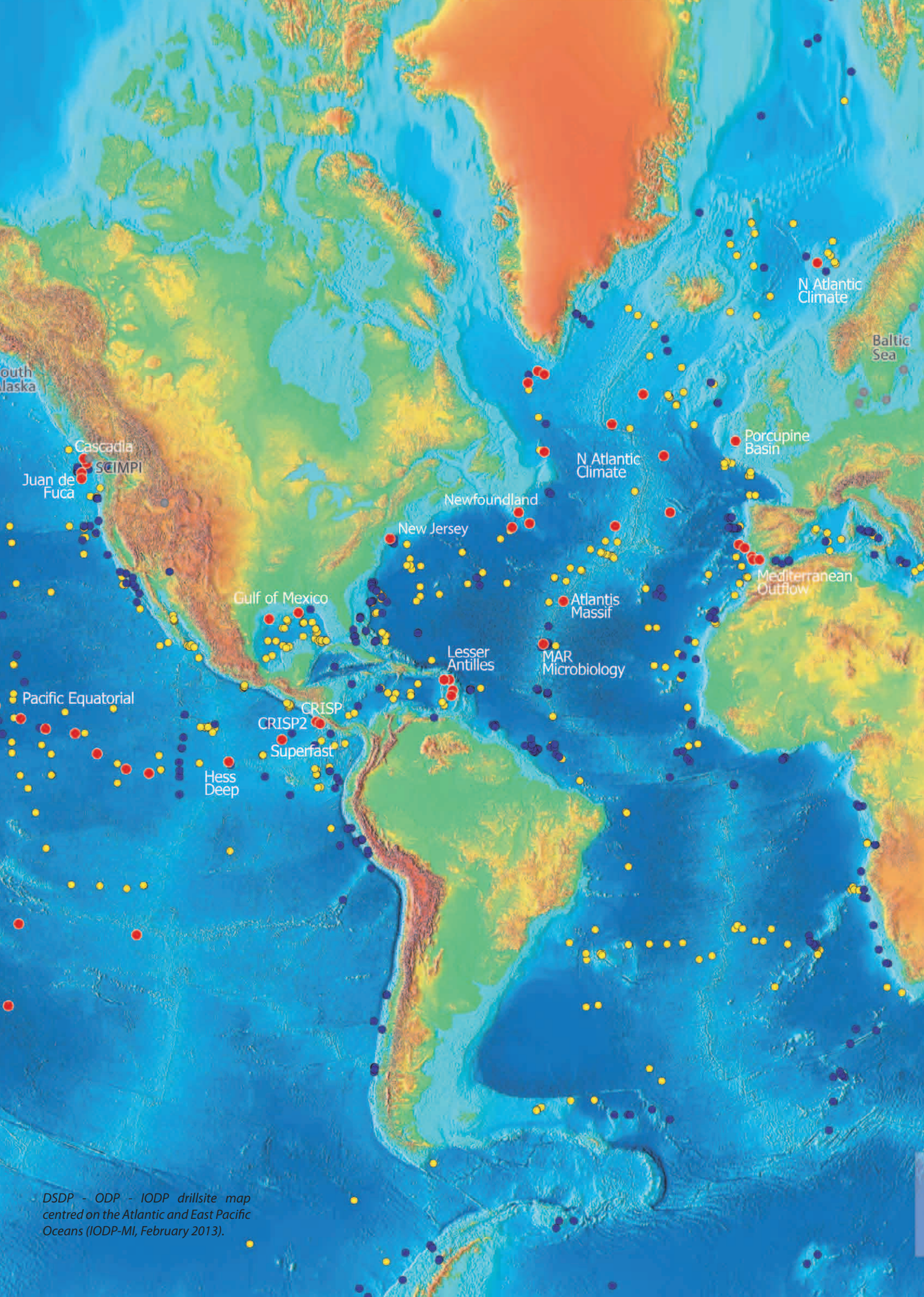


Kentaro Nakamura, Paul Le Campion, Yumiko Harigane and Wolfgang Bach examine a core before it is split (photo William Crawford, IODP/TAMU).

Sediments recovered during Expedition 336 were intensely sampled for geochemical pore-water analyses and microbiological work. In addition, high-resolution measurements of dissolved oxygen concentration were performed on the whole-round sediment cores. Coring at the sediment/basement interface recovered <1 m of brecciated basalt with micritic limestone. The upper oceanic crust yields a number of volcanic flow units with distinct geochemical and petrographic characteristics. Two fully functional observatories were installed in two newly drilled holes (U1382A and U1383C) and an instrument and sampling string were placed in an existing hole (395A). These installations are intended for future observatory science targets. The CORK observatory in Hole U1382A has a packer seal in the bottom of the casing and monitors/samples a single zone in the uppermost oceanic crust extending from 90 to 210 metres beneath the seafloor. Hole U1383C was equipped with a three-level CORK observatory that spans a zone of thin basalt flows with intercalated limestone, a zone of glassy, thin basaltic flows and hyaloclastites, and a lowermost zone of more massive pillow flows with occasional hyaloclastites in the upper part.

ECORD participants (Exp. 336)

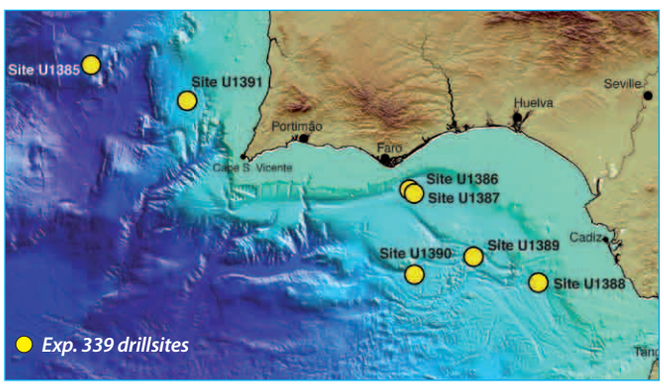
Wolfgang Bach, Co-chief Scientist	MARUM, University of Bremen	*Germany*
Nicolas Backert	University Lille 1	*France*
Steffen Leth Jørgensen	University of Bergen	*Norway*
Paul Le Campion	IPG-Paris	*France*
Beth Orcutt	Aarhus University	*Denmark*
Victoria Rennie	University of Cambridge	*UK*
Olivier Rouxel	Ifremer	*France*



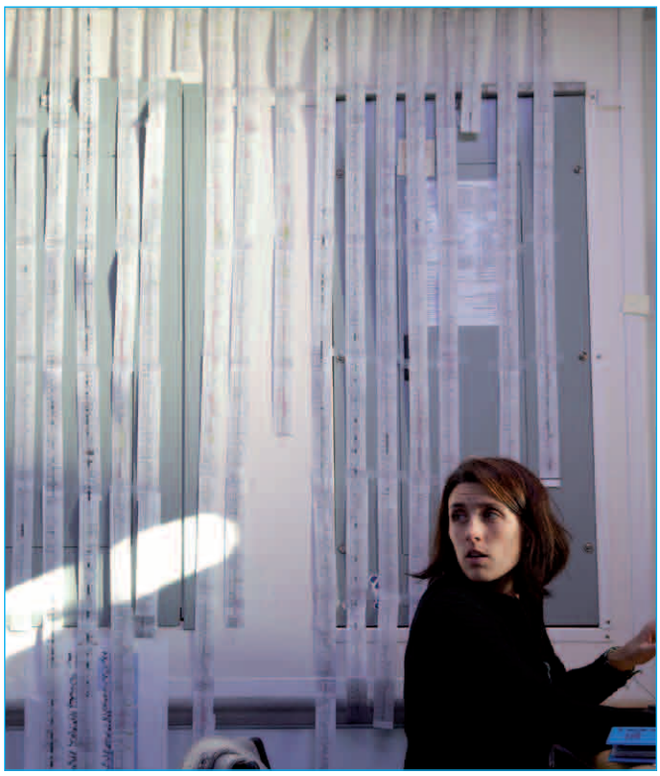
DSDP - ODP - IODP drillsite map centred on the Atlantic and East Pacific Oceans (IODP-MI, February 2013).

Expedition 339: Mediterranean Outflow, *JOIDES Resolution*, November 17, 2011-January 17, 2012

Drilling in the Gulf of Cádiz and off the West Iberian margins during Expediton 339 aimed to investigate the Mediterranean Outflow Water (MOW) through the Strait of Gibraltar gateway and its influence on global circulation and climate. The Gulf of Cádiz is also a prime area for understanding the effects of tectonic activity on the evolution of the Strait of Gibraltar gateway and margin sedimentation.



Expedition 339 drilled seven sites with 5,447 m of total length of recovered core. Drilling penetrated into the Miocene at two sites in the Gulf of Cádiz, when the sedimentary record shows a strong MOW signal following the opening of the Strait of Gibraltar gateway. Preliminary results indicate contourite deposition from 4.2 to 4.5 Ma, although subsequent research will establish whether this deposition dates from the first onset of MOW. During the Pliocene and the Pleistocene, sediments record changes in bottom-current intensity linked with the intensity of the MOW. There is significant climate control on the evolution of MOW and bottom-current activity as shown by a remarkable record of orbital-scale variation in bulk-sediment properties of the contourites at several of the drift sites. However, from the closure of the Atlantic-Mediterranean gateways in Spain and Morocco around 6 Ma to the opening of the Strait of Gibraltar gateway at 5.3 Ma, tectonic pulses, linked with small movements of the African and Iberian plates, affected margin development, downslope sediment transport, and contourite drift evolution.

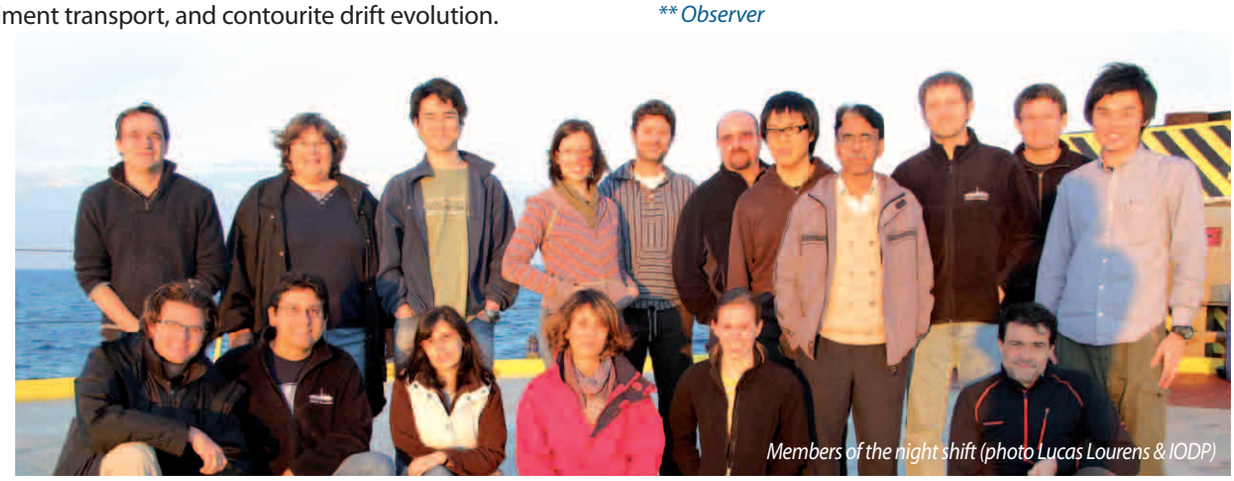


Expedition 339 Science Party member Emmanuelle Ducassou; on the wall are the single most-used item by the scientific party, the meticulously hand drawn core logs. (photo John Beck, IODP/TAMU)

ECORD participants (Exp 339)

Francisco J. Hernández Molina, Co-chief Scientist	University of Vigo	*Spain*
Dorrik A.V. Stow, Co-chief Scientist	Heriot-Watt University	*UK*
André Bahr	University of Frankfurt	*Germany*
Emmanuelle Ducassou	EPOC, Univ Bordeaux 1	*France*
José-Abel Flores*	Salamanca University	*Spain*
Patrick Grunert	University of Graz	*Austria*
David A. Hodell	University of Cambridge	*UK*
Lucas Lourens	Utrecht University	*Netherlands*
Maria F. Sanchez Goni	EPOC, Univ. Bordeaux 1	*France*
Francisco J. Sierro Sánchez	Salamanca University	*Spain*
Antje Voelker	LNEG	*Portugal*
Estefania Llave Barranco**	IGME	*Spain*
Ana Cristina Freixo Roque**	LNEG	*Portugal*

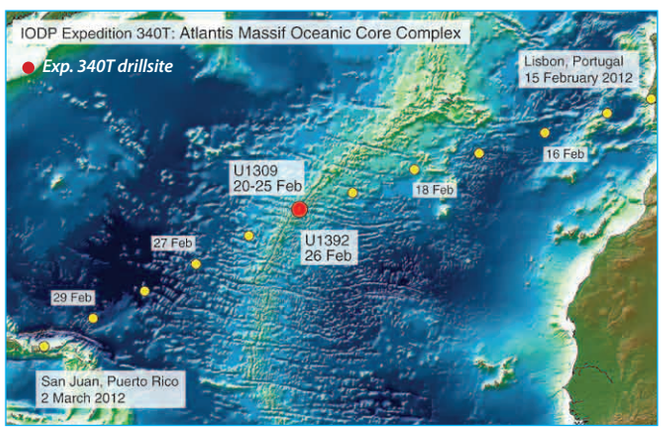
** ECORD scientist - no country quota*
*** Observer*



Members of the night shift (photo Lucas Lourens & IODP)

Expedition 340T: Atlantis Massif Oceanic Core Complex, *JOIDES Resolution*, February 15 - March 2, 2012

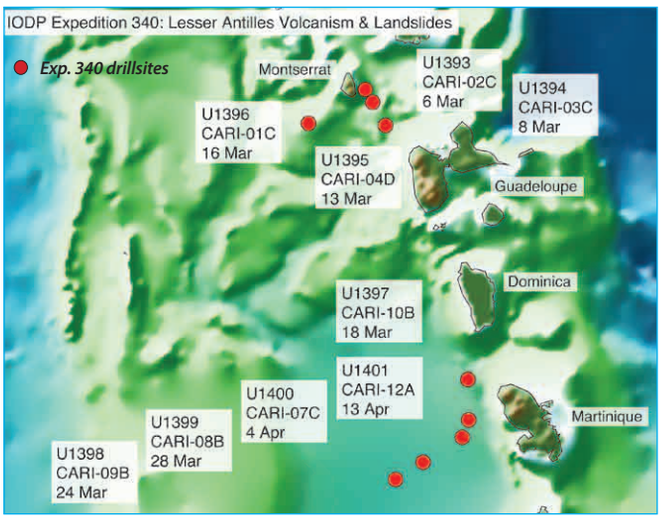
Expedition 340T aimed to test the hypothesis that highly altered intervals and/or fluid-bearing fault zones at depth might be responsible for impedance contrasts within the footwall of the Atlantis Massif oceanic core complex, thus allowing interpretation of the reflectivity patterns in terms of hydration pathways within young oceanic crust.



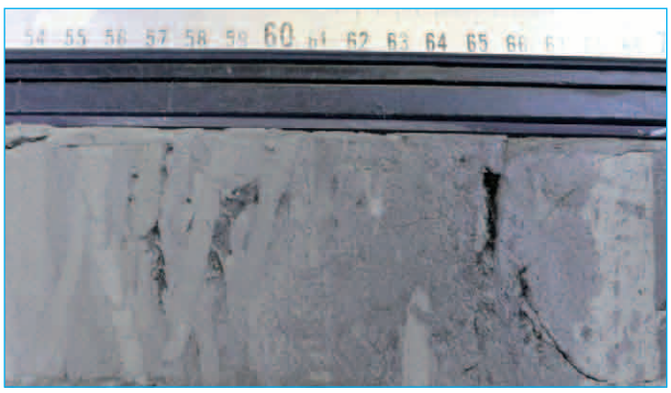
Borehole logging in IODP Hole U1309D has been conducted on the domal core of the Atlantis Massif just west of the spreading axis of the Mid-Atlantic Ridge. Drilling confirms that borehole velocity of altered olivine-rich troctolite intervals at Site U1309 is sufficiently distinct from surrounding rock (VP ~0.5 km/s slower) to produce a multichannel seismic reflection given their several tens of metres thickness. Sonic logs obtained during Expedition 340T will allow analysis of the relationship between lithology and velocity in the section deeper than 800 metres beneath the seafloor, where the least altered rock was recovered from Hole U1309D.

Expedition 340: Lesser Antilles Volcanism and Landslides, *JOIDES Resolution*, March 3 - April 17, 2012

Expedition 340 aimed to further understanding of the constructive and destructive processes related to island-arc volcanism. Styles of magmatism and eruptive activity are diverse in this geological setting not only between different arcs, but also between the different islands that make up an arc. These studies are relevant because of the association of volcanic activity in island arcs with potentially large geohazards (explosive eruptions and tsunamis). The Lesser Antilles arc lends itself well to achieving this combined record, offering a diverse range of magmatic and eruptive styles across a relatively small geographic area. In addition, the frequency of flank collapse events that result in the deposition of debris avalanches is high, with the style of flank collapse varying along the arc.



Expedition 340 involved drilling marine sediment and volcaniclastic material at nine sites. Despite the significant difficulties in drilling through the highly heterogeneous sediment, a total of 2,384 m of core was recovered. The cores will be utilised to further investigate magmatic evolution and eruptive activity along the Lesser Antilles arc, to reach a better understanding of the mechanisms involved in both the transport and deposition of volcanic debris avalanche deposits and to assess the potential for volcanic hazards associated with these avalanches.



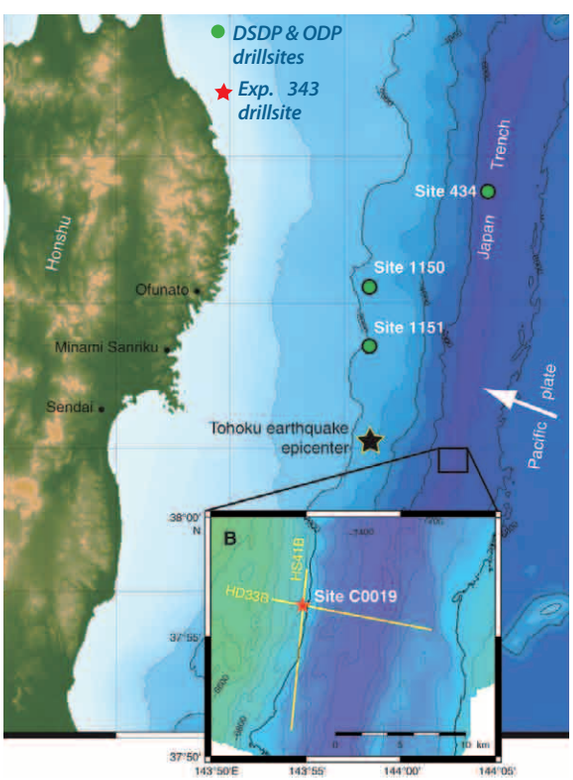
Hemipelagic sediments (light) interbedded with volcanic-rich sediments (dark) are overprinted by bioturbation (Expedition 340).

ECORD participants (Exp. 340)

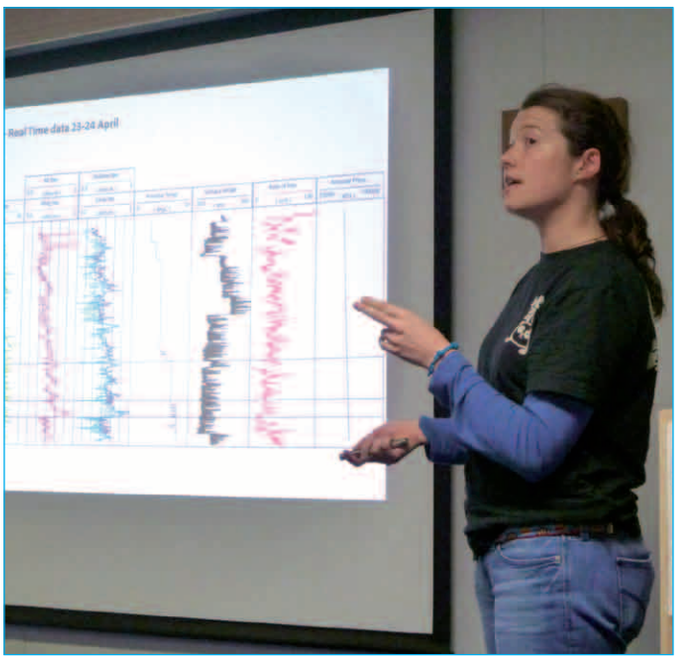
Anne Le Friant, Co-chief Scientist	IPG-Paris	*France*
Georges Boudon	IPG-Paris	*France*
Christoph Breitkreuz	T. Univ. Bergakademie Freiberg	*Germany*
Sara Lafuerza Colas	IPG-Paris	*France*
Martin R. Palmer	University of Southampton	*UK*
Peter J. Talling	University of Southampton	*UK*
Benoît Villemant	IPG-Paris	*France*
Deborah Wall-Palmer	Plymouth University	*UK*

Expedition 343: Japan Trench Fast Drilling Project, *Chikyu*, April 1 - May 24, 2012

The main goal of the JFAST Project is to understand the very large (30 to 50 metres) fault slip that occurred on the shallow portion of the subuction zone during the 2011 Tohoku earthquake. This large slip was the main source of the devastating tsunami that caused so much damage and loss of lives along the northeast coast of Honshu, Japan. In order to understand how the fault moved with such large displacement in this region, the JFAST Project aimed to **1)** sample the fault in order to analyse the physical properties of the fault zone, and **2)** make temperature measurements to estimate the frictional stress during the earthquake. Fault temperature rises rapidly from frictional heat when earthquakes occur, but the heat is absorbed by the surrounding strata over a period of several years and the temperature returns to the original level, so it is vital to measure the temperature as soon as possible after the earthquake.



The drilling site is located off Oshika Peninsula, just west of the axis of the Japan Trench *(above)*. The primary drillsite is at 6,910 metres water depth, and *Chikyu* was to drill as much as 1,000 metres below the seafloor to reach the fault zone. The use of about 8,000 metres of drill string is a great scientific, engineering, and record-setting challenge.



Louise Anderson explains the first data set of real-time LWD (Logging While Drilling) data to the science party of Expedition 343 (© JAMSTEC/ IODP).

During Expedition 343 *Chikyu* drilled two boreholes and collected geological samples and geophysical data to analyse the physical properties of the fault zone. However, the temperature sensors were not deployed because of delays caused by technical problems and bad weather. Additional expedition days were provided in Expedition 343T to reattempt observatory deployment. Expedition 343T met the challenge of measuring temperature directly from the fault zone by installing temperature sensors across the plate boundary where the science team infers the fault slipped during the 2011 Tohoku earthquake. The recorded data should help to understand why such large earthquake slip occurred that generated the devastating tsunami.

There is a plan in place to return to the site to extract the instrument string from the borehole, using a remotely operated vehicle (ROV) in the very deep water. Recovery of the instrument string will be the final major challenge in an attempt to better understand the dynamics of seismic slip.

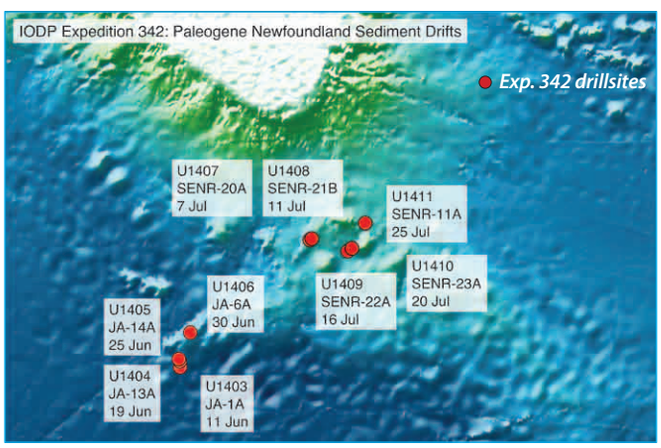
ECORD participants (Exp. 343)

Louise Anderson	University of Leicester	*UK*
Jan Behrmann	GEOMAR	*Germany*
Marianne Conin	CEREGE-CNRS	*France*
Becky Cook	University of Southampton	*UK*
Matt Ikari	MARUM,University of Bremen	*Germany*
Francesca Remitti	University of Modena	*Italy*
Christie Rowe	Mc Gill University	*Canada*
Tianhaozhe Sun	University of Victoria	*Canada*

Expedition 342: Paleogene Newfoundland Sediment Drifts, *JOIDES Resolution*, June 2 - August 1, 2012

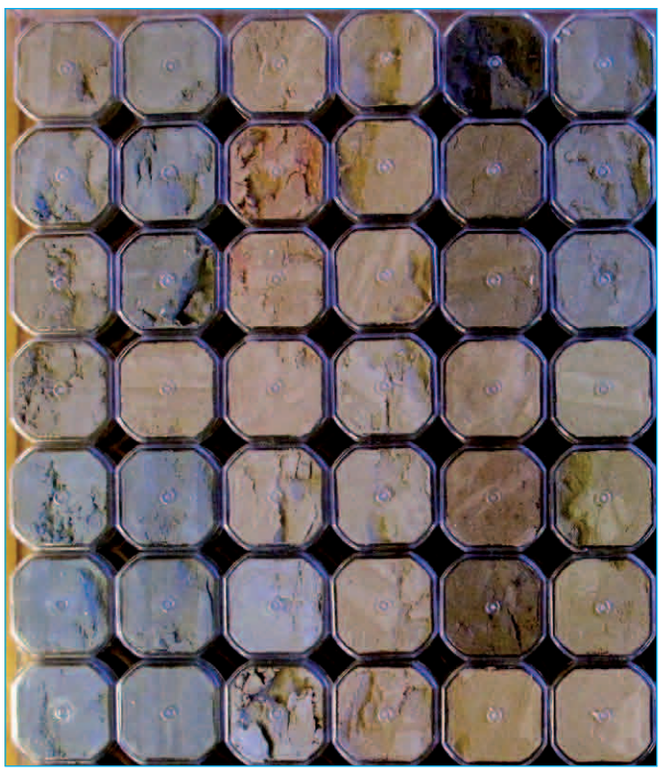
Expedition 342 was designed to recover Paleogene sedimentary sequences to reconstruct the Paleogene carbonate compensation depth (CCD) beneath the flow of the Deep Western Boundary Current in the northwest Atlantic Ocean. In addition, two operational days were dedicated to a sea trial of the Motion Decoupled Hydraulic Delivery System (MDHDS) developmental tool.

Expedition 342 recovered sequences with sedimentation rates high enough to enable studies of the dynamics of past abrupt climate change, including both transitions



into "greenhouse" and "icehouse" climate states, the full magnitudes of hyperthermal events, and rates of change in the CCD. Notable findings include the discovery of intermittent calcareous sediments in the Cretaceous, Paleocene, and early to middle Eocene at 4.5 km paleodepth, suggesting a deep Atlantic CCD during these times. Sediment records provide evidence of carbonate deposition events following the Cretaceous-Paleogene (K-Pg) boundary mass extinction, the Paleocene/Eocene Thermal Maximum, and the Eocene-Oligocene transition. These deposition events may reflect the rebalancing of ocean alkalinity after mass extinctions or abrupt global climate change; intervals during which the CCD appears to have been markedly shallow in the North Atlantic include the Early Eocene Climatic Optimum, the late Eocene, and the middle Oligocene. An unexpected finding was the recovery of a number of Cretaceous "critical boundaries." These include the K/Pg boundary, the Campanian-Coniacian interval, the Cenomania-Turonian boundary and oceanic anoxic event (OAE) 2, and the Albian/Cenomanian boundary OAE 1d.

A sea trial of the MDHDS with the temperature-dual-pressure probe (T2P) was conducted at Site U1402 on the New Jersey margin. The benefit of this system is the complete decoupling of the penetrometer from the drill string, negating the effect of ship heave on the quality



Core samples for paleomagnetic measurements (cryogenic magnetometer) during Expedition 342 (photo Peter Lippert IODP/TAMU).

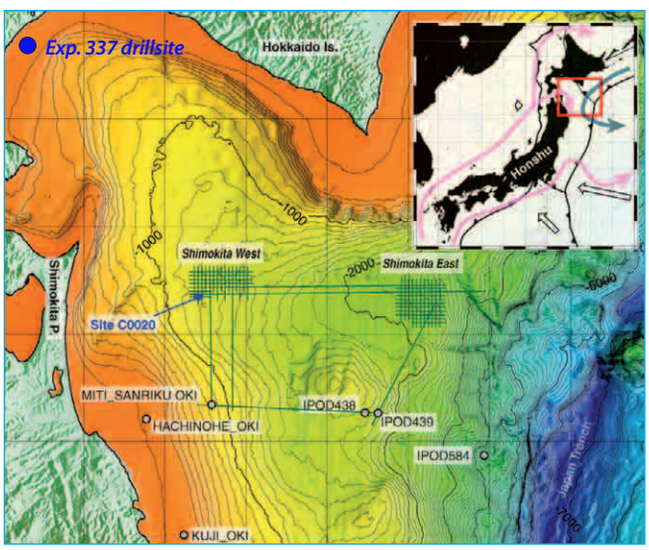
of data. The trial achieved successful deployment and acquisition of *in-situ* data with complete decoupling from the ship. We now have a dependable method to deploy pore-pressure penetrometers successfully, which will allow the rapid measurement of *in-situ* pressure in sediment. This new capability opens an exciting range of future science for the drilling programme.

ECORD participants (Exp. 342)

Paul Wilson, Co-chief Scientist	University of Southampton	*UK*
Claudia Agnini	Stockholm University	*Sweden*
André Bornemann	University of Leipzig	*Germany*
Slah Boulila	University Pierre et Marie Curie	*France*
Paul R. Bown	University College London	*UK*
Cécile Cournède	CEREGE-CNRS	*France*
Oliver Friedrich	University of Frankfurt	*Germany*
Diederik Liebrand	University of Southampton	*UK*
Philip Sexton	The Open University	*UK*

Expedition 337: Deep Coalbed Biosphere off Shimokita, *Chikyu*, July 25 - September 30, 2012

Expedition 337 aims to clarify deep underground biological activity that is believed to play an important role in the system of carbon cycling below the seafloor. Understanding the system of carbon cycling, including methane hydrates and natural gas, below the continental coastal seafloor is an important scientific area for understanding past global



environmental warming events, ecosystem changes, and for building a future sustainable low-carbon society. Along with collecting physical data on the formations at the sea area offshore of Hachinohe, core samples were collected from 1,276.5 m to 2,466 m below the seafloor.

Deep-sea formations reveal strata of fossilised bivalves and molluscs, coal strata from part of one 7m-thick formation and shallow-water to terrestrial strata of thin coal seams in fine-grained sandstone layers. Cutting-edge research is being conducted merging earth and life sciences to assess the activity of underground microorganisms involved in producing methane hydrates and natural gas originating in coal beds under the deep seafloor. This includes analysing microbial DNA and microbial culture experiments to investigate their metabolic function and evolutionary processes.

ECORD participants (Exp. 337)

Kai-Uwe Hinrichs, Co-chief Scientist	MARUM, University of Bremen	*Germany*
Stephen Bowden	University of Aberdeen	*UK*
Marshall Bowles	MARUM, University of Bremen	*Germany*
Clemens Glombitza	University of Potsdam	*Germany*
Guy Harrington	University of Birmingham	*UK*
Verena Heuer	MARUM, University of Bremen	*Germany*
Mark Lever	Aarhus University	*Denmark*
David Limmer	University of Aberdeen	*UK*
Yu-Shih Lin	University of Bremen	*Germany*
Doris Reischenbacher	University of Leoben	*Austria*

Co-chief Scientists Kai-Uwe Hinrichs and Fumio Inagaki, and scientists of Expedition 337 say goodbye at the end of Chikyu-TV live broadcast. (© JAMSTEC/IODP)

Selected publications with major ECORD contributions arising from *JOIDES Resolution* and *Chikyu* expeditions

Publications related to MSP Expeditions (302, 310, 313 and 325) are listed on pages 12-13

Bailey, I., Foster, G.L., Wilson, P.A., Jovane, L., Storey, C.D., Trueman, C.N., Becker, J., 2012. Flux and provenance of ice-rafted debris in the earliest Pleistocene sub-polar North Atlantic Ocean comparable to the last glacial maximum Earth and Planetary Science Letters 341-344, pp. 222-233

Boutt, D.F., Saffer, D., Doan, M.-L., Lin, W., Ito, T., Kano, Y., Flemings, P., (...), Moe, K.T., 2012. Scale dependence of in-situ permeability measurements in the Nankai accretionary prism: The role of fractures. Geophysical Research Letters 39 (7), art. no. L07302

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Conin, M., Henry, P., Godard, V. and Bourlange, S., 2012. Splay fault slip in a subduction margin, a new model of evolution, EPSL, 341-344, 170-175, doi:10.1016/j.epsl.2012.06.003

Crocket, K.C., Vance, D., Foster, G.L., Richards, D.A., Tranter, M., 2012. Continental weathering fluxes during the last glacial/interglacial cycle: Insights from the marine sedimentary Pb isotope record at Orphan Knoll, NW Atlantic. Quaternary Science Reviews 38, pp. 89-99

Dubois, N., Mitchell, N.C., 2012. Large-scale sediment redistribution on the equatorial Pacific seafloor. Deep-Sea Research Part I: Oceanographic Research Papers 69 , pp. 51-61

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Manga, M., Hornbach, M.J., Le Friant, A., Ishizuka, O., Stroncik, N., Adachi, T., Aljahdali, M., (...), Wang, F., 2012. Heat flow in the Lesser Antilles island arc and adjacent back arc Grenada basin. Geochemistry, Geophysics, Geosystems 13 (8), art. no. Q08007

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Mazaud, A., Channell, J.E.T., Stoner, J.S., 2012. Relative paleointensity and environmental magnetism since 1.2Ma at IODP site U1305 (Eirik Drift, NW Atlantic). Earth and Planetary Science Letters 357-358 , pp. 137-144

Naafs, B.D.A., Hefter, J., Acton, G., Haug, G.H., Martínez-Garcia, A., Pancost, R., Stein, R., 2012. Strengthening of North American dust sources during the late Pliocene (2.7Ma). Earth and Planetary Science Letters 317-318, pp. 8-19

Nicholl, J.A. L.,Hodell, D. A., Naafs, B. D. A., Hillaire-Marcel, C., Channell, J. E. T., and Romero, O., 2012. A Laurentide outburst flooding event during the last interglacial period. Nature Geoscience, DOI: 10.1038/NGEO1622

Pälike, H., Lyle, M.W., Nishi, H., Raffi, I., Ridgwell, A. et al., 2012. A Cenozoic record of the equatorial Pacific carbonate compensation depth. Nature, 488, 609-614, doi:10.1038/nature11360

Pressling, N., Morris, A., John, B.E., MacLeod, C.J., 2012. The internal structure of an oceanic core complex: An integrated analysis of oriented borehole imagery from IODP Hole U1309D (Atlantis Massif). Geochemistry, Geophysics, Geosystems 13 (4) , art. no. Q04G10

Pross, J., Contreras, L., Bijl, P.K., Greenwood, D.R., Bohaty, S.M. et al., 2012. Persistent near-tropical warmth on the Antarctic continent during the early Eocene epoch. Nature, 488, 73-77, doi:10.1038/nature11300

Sassa, K., He, B., Miyagi, T., Strasser, M., Konagai, K., Ostric, M., Setiawan, H., (...), Tutumi, S., 2012. A hypothesis of the Senoumi submarine megaslide in Suruga Bay in Japan-based on the undrained dynamic-loading ring shear tests and computer simulation, Landslides 9 (4), pp. 439-455

Schreck, M., Matthiessen, J., Head, M.J., 2012. A magnetostratigraphic calibration of Middle Miocene through Pliocene dinoflagellate cyst and acritarch events in the Iceland Sea (Ocean Drilling Program Hole 907A)Review of Palaeobotany and Palynology 187, pp. 66-94

Tauxe, L., Stickley, C.E., Sugisaki, S., Bijl, P.K., Bohaty, S.M., Brinkhuis, H., Escutia, C., (...), Yamane, M., 2012. Chronostratigraphic framework for the IODP Expedition 318 cores from the Wilkes Land Margin: Constraints for paleoceanographic reconstruction, Paleoceanography 27 (2), art. no. PA2214

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Zhang, G., Smith-Duque, C., Tang, S., Li, H., Zarikian, C., D'Hondt, S., Inagaki, F., and IODP Expedition 329 Scientists, 2012. Geochemistry of basalts from IODP Site U1365: implications for magmatism and mantle source signatures of the mid-Cretaceous Osbourn Trough. Lithos, 144–145:73–87. doi:10.1016/j.lithos.2012.04.014

Operations Superintendent Steve Midgley (USIO-TAMU) on the drill floor during a ship tour, Expedition 342 (photo Annick Fehr & IODP).

7. Engaging the community

One of ECORD's main responsibilities is to promote and facilitate ocean drilling within its member countries. The scientific committee of ECORD, ESSAC, has developed a number of activities that contribute to co-ordination of the science community, the preparation of drilling proposals (MagellanPlus Workshop Series Programme) and the training and education of future generations (ECORD Summer Schools, Scholarships, Grants and Distinguished Lecture Programme, and Teachers at Sea).

MagellanPlus Workshop Series Programme

The ECORD/ICDP MagellanPlus Workshop Series Programme is designed to support European and Canadian scientists in developing new and innovative science proposals for submission to IODP and ICDP. The programme continues and expands the success of the previous ESF Magellan Workshop Series Programme, through the integration of continental and marine drilling and coring to meet future challenges in Earth, Life and Environmental sciences. The programme has two calls annually. Two workshops were sponsored during FY2012:

Records of Geohazards and Monsoonal Changes in the Northern Bay of Bengal - Preparation of an IODP Drilling Proposal with the aim of optimising an existing proposal for drilling the geohazard and paleoclimate history in the Gulf of Bengal, October 8-10, 2012, Bremen - Convenors: Volkhard Spiess, Tilmann Schwenk and Herrman- Rudolf Kudrass

Drilling an active hydrothermal system of a submarine intraoceanic arc volcano with the aim of preparing a proposal for IODP to drill into an active hydrothermal system hosted by a submarine intraoceanic arc volcano, November 15-17, 2012, Lisbon - Convenors: Wolfgang Bach and Cornel de Ronde

Related website: http://www.essac.ecord.org/index.php?mod=workshop&page=call-workshop

ECORD Summer Schools

Training the next generation of scientists in ECORD member countries is a major goal. Initiated in 2007, the ECORD Summer Schools are now well established and attended by a large number of PhD students and Post-doctoral researchers from member countries and beyond. In 2012, three summer schools were sponsored by ECORD.

ECORD Summer School on "Past Global Change Reconstruction and Modelling Techniques", Urbino, July 11-31, 2012

This summer school is organised every year under the auspices of the University of Urbino to train a group of students from ECORD member countries, USA, and beyond. The school is designed to train the students in reconstructing past global environmental changes by using the paleoenvironmental indicators in sedimentary strata and modeling. The courses include lectures, field trips and exercises organised by

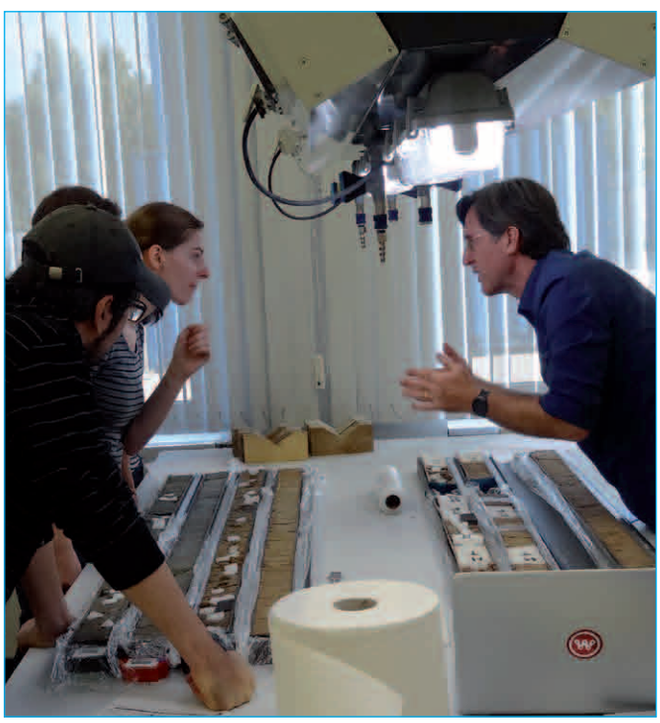
2012 Urbino Summer School: students and teachers during the field excursion to the K-Pg boundary exposed in the Bottaccione Valley near Gubbio.

instructors drawn from an international pool built up to include the top scientists in their field. In 2012, the summer school brought together 64 students from Europe, Canada and three non-ECORD countries, USA, New Zealand and Mexico (17 UK, 11 Germany, 8 Netherlands, 4 France, 2 Italy, 2 Spain, 1 Canada, 1 Denmark, 1 Sweden, 13 US, 3 New Zealand and 1 Mexico).

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

ECORD Summer School on "Submarine Landslides, Earthquakes, and Tsunami, Bremen, September 3-14, 2012

Held at the IODP Bremen Core Repository (BCR), the ECORD Bremen Summer School takes advantage of the "virtual ship" facilities associated with the core repository. Students work on real cores stored at the BCR using the laboratory facilities



2012 Bremen Summer School: Harold Tobin discusses with a group of students during the "virtual ship" session.

available at MARUM *(above)*. The summer school brought together 31 PhD students and young Post-docs from Europe, Canada and two non-ECORD countries, Israel and Australia (8 Germany, 3 Canada, 3 Portugal, 3 Switzerland, 3 UK, 2 Belgium, 2 France, 1 Ireland, 1 Italy, 1 Norway, 1 Spain, 1 Israel, 2 Australia).

Related website: http://www.marum.de/en/ECORD_Summer_School_2012.html

ECORD Summer School on "Impacts of the Cryosphere dynamics from Land to Ocean" Montreal, July 5-21, 2012

Held at Geotop-UQAM, the ECORD-Canada 2012 Summer School aimed to provide in-depth insights into the various methods used for investigation of environmental,

2012 ECORD/IODP Canada Summer School: Holocene deposits shown on a beach cross section during the excursion at Baie-Comeau (northern shore of St Lawrence River).

hydrological and climate changes in an Arctic-subarctic context using terrestrial, lacustrine and oceanic records. The summer school is centred on four days of fieldwork on the north shore of the St. Lawrence River *(above),* in the Sept-Îles area, complemented with classes given by international invited lecturers, workshops involving the students, and four days of hands-on exercises. The summer school brought together 19 students from Europe, Canada and one non-ECORD country, Greece (12 Canada, 2 UK, 1 Belgium, 1 Denmark, 1 Netherlands, 1 Sweden and 1 Greece).

Related website: http://www.geotop.ca/en/37-etudier-au-geotop/cours-speciaux/590-ecole-dete-2012.html

ECORD Scholarships

ECORD also sponsors a Scholarship Programme that helps students to participate in the ECORD Summer Schools. In 2012, ESSAC received 83 applications. Eight students were funded out of 35 applicants for the for the Urbino Summer School: 3 from the UK, 2 from Germany, 2 from the Netherlands and 1 from Spain. Six students were funded out of 20 applicants for the ECORD Bremen Summer School: 2 from Belgium, 1 from UK, 1 from Switzerland, 1 from Portugal and 1 from Spain. Four students were funded out of 20 applicants for the ECORD-Canada Summer School: 2 from the UK, 1 from Canada, and 1 from Denmark.

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

Group photo of ECORD Bremen Summer School during the excursion to the coastal infrastucture protection along the North Sea (photo Volker Diekamp © ECORD/MARUM).

ECORD Grants

ECORD sponsors merit-based awards for outstanding early-career researchers to conduct research related to the IODP. Research may be directed toward the objectives of upcoming or past DSDP/ODP/IODP expeditions (core material and/or data). The aim of the awards is to encourage young scientists to develop their own project and to become familiar with ocean drilling. Twenty applications were received in 2012, and six grants were funded (3 France, 1 UK, 1 Germany, 1 Denmark).

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

ECORD Distinguished Lecturer Programme

The Distinguished Lecturer Programme (DLP) is designed to promote the scientific achievements of ocean drilling to a large audience within universities/ institutes in ECORD member countries. ESSAC selects the three "Distinguished Lecturers" who then tour ECORD member countries, and occasionally non-ECORD countries, to present the exciting discoveries from one of the three main scientific themes addressed by the IODP Science Plan. Any university in an ECORD member country may apply to host a lecturer. The following ECORD Distinguished Lecturers visited 30 universities in Europe, Canada and Israel during 2012.

- ***Kai-Uwe Hinrichs*** (MARUM, University of Bremen, Germany): Benthic archaea - the unseen majority with importance to the global carbon cycle revealed by IODP drilling.
- ***Dominique Weis*** (PCIGR, University of British Columbia, Canada): What do we know about mantle plumes and what more can we learn by IODP drilling?
- ***Helmut Weissert*** (ETH Zurich, Switzerland): Carbon cycle, oceans and climate in the Cretaceous: lessons from Ocean Drilling (DSDP to IODP) and from records on continents.

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

Teachers at Sea

In 2012, ESSAC was involved in the selection of two teachers to participate in a two-month expedition as an Education Officer. This initiative of the US Consortium for Ocean Leadership aims to 1) Provide teachers with an opportunity to participate in seagoing research experiences aboard the *JOIDES Resolution*, working side-by-side with scientists, using current state-of-the-art approaches to solve scientific problems of global interest, and gaining first-hand knowledge of the results of seagoing science expeditions; 2) Translate scientific results into useful teaching resources, such as classroom curriculum materials and 3) Disseminate these resources into classrooms across the country. ESSAC received eight applications (4 UK, 1 Italy, 1 Austria, 1 Spain, 1 France) and two ECORD teachers, Susan Gebbels from the UK, and Jean-Luc Bérenguer, France, were selected to participate in Expedition 345: Hess Deep Plutonic Crust aboard the *JOIDES Resolution*.

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

8. Reaching out

Promoting the activities and accomplishments of the Integrated Ocean Drilling Program to large audiences is a major and constant goal. At the ECORD level, responsibilities for outreach 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 the structure of 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 events such as the ECORD Summer Schools and Distinguished Lecturer Programme (DLP).

The ECORD Outreach and Education Task Force *(page 7)* met twice to co-ordinate the programme's outreach activities, in Granada, Spain in February 2012 and in Avignon, France in September 2012. As there were no MSP expeditions during the year, ECORD outreach activities were mainly focussed on promoting IODP through participation at selected conferences and *JOIDES Resolution's* port calls in Portugal, and the various newsletters and promotional materials.

In late 2011/2012, ECORD outreach staff participated in IODP booths at the American Geophysical Union (AGU) Fall Meeting in San Francisco, USA in December 2011, the European Geosciences Union (EGU) Conference in Vienna, Austria in April 2012 and the Goldschmidt Conference in Montréal, Canada in June 2012 *(left)*. The main event for ECORD is the EGU Conference in Vienna at which IODP sponsors a booth and also supports a Townhall meeting and organises a media conference to promote Expedition 343 *(page 23)*. In 2012, the EGU booth and Townhall Meeting were joint ventures with the International Scientific Continental Drilling Program (ICDP). The success of these events will lead to similar collaboration in 2013.

IODP booth at the Goldschmidt Conference in Montréal, Canada.

ECORD staff also helped their outreach colleagues in Japan, the USA and Australia to co-ordinate booths at the Offshore Technology Conference (OTC) in Houston, USA, the Japan Geoscience Union Meeting in Chiba, Japan and a joint IODP-ICDP booth at 34th IGC Conference in Brisbane, Australia. In May 2012, ECORD provided promotional materials when the Canadian office of IODP organised a booth at the Geological and Mineralogical Associations of Canada (GAC-MAC) in St John's, Newfoundland.

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 ECORD activities in general and includes updates on outreach activities. ECORD also produces leaflets/flyers explaining the programme objectives and the latest information resulting from the four MSP expeditions carried out so far. The ACEX and Tahiti expedition leaflets were updated during 2012.

Catarina Cavaleiro (UGM-LNEG) explains deep-sea sediments to a young audience at "Tardes oceânicas: 20.000 Léguas submarinas: A Exploração do Oceano Profundo" on May 19, 2012 in the Pavilhão do Conhecimento of Ciência Viva in Lisbon (photo courtesy Ciência Viva).

In addition to the outreach resources, ECORD co-funded a video that explains the scientific outcomes of IODP Expedition 337: Shimokita Coalbed conducted onboard the *Chikyu*. The final version of the film, entitled 'Looking for Life' is expected to be produced in 2013.

In January 2012, ECORD took part in the successful *JOIDES Resolution* port calls in Ponta Delgada, Los Azores, and Lisbon, Portugal. ECORD provided support and guidance to the Consortium for Ocean Leadership/ USIO teams and organised a media conference and VIP reception and session in Lisbon. The offer to visit the drillship *JOIDES Resolution* was well received, with a total of 858 visitors, including not only students and teachers but also high-level representatives from ECORD member countries *(below)*, as well as senior politicians, members of the media and university colleagues from Portugal, Spain and other ECORD countries.

For the first time, an ECORD teacher, Helder Pereira (Secondary School at Loulé, Portugal), was invited to sail on a two-month expedition as an Education Officer onboard the *JOIDES Resolution* during Expedition 339 *(pages 21 and 29)*. Helder co-ordinated education and outreach activities such as live ship-to shore events *(above right)* that reached more than 1,200 participants from ECORD countries, USA and Japan, blog posts on the *JR's* web portal, developing classroom activities related to the expedition's scientific objectives as well as tours of the ship during the *JR's* portcalls in Portugal. Ship-to-shore conferences organised

Credit John Beck, IODP/TAMU

Ship-to-shore video conducted by Helder Pereira, Education Officer during IODP Expedition 339.

during IODP Expeditions 340, 342 *(pages 22 and 24)* also allowed ECORD educators and students to be connected to the scientific and technical teams while at sea.

To support science education, several IODP resources and educational activities have been made available to the general public in ECORD countries. Sediment cores collected during Expedition 306: North Atlantic Climate 2 and Expedition 339: Mediterranean Outflow were used during an exhibition conducted by Ciência Viva in Lisbon *(left page)*. Replicas of drilling cores from ODP/IODP expeditions conducted by the *JOIDES Resolution* were loaned to high-schools in Valbonne, France and the University of Lund. About 400 students had the opportunity to look at a core replica that includes evidence of the K/T event (ODP Leg 171), the sequence of basalts, vein complex and gabbros in the oceanic crust (IODP Expedition 312: Superfast Spreading Rate Crust 3) and the paleoclimatic events recorded in marine sediments drilled during IODP Expeditions 302 (Arctic Coring Expedition) and 310 (Tahiti Sea Level). ODP/IODP core replicas have also been shown at several venues such as by IODP Spain at the Geological Congress in Oviedo, by ESO in the new reception area at the British Geological Survey offices in Edinburgh and by IODP Canada at the Goldschmidt 2012 meeting in Montréal. Some of the core replicas are now on display at the ESSAC Office in Granada and IODP Canada's office in Montréal.

Related websites:
http://www.ecord.org/pi/promo.html
http://www.ecord.org/edu/education.html

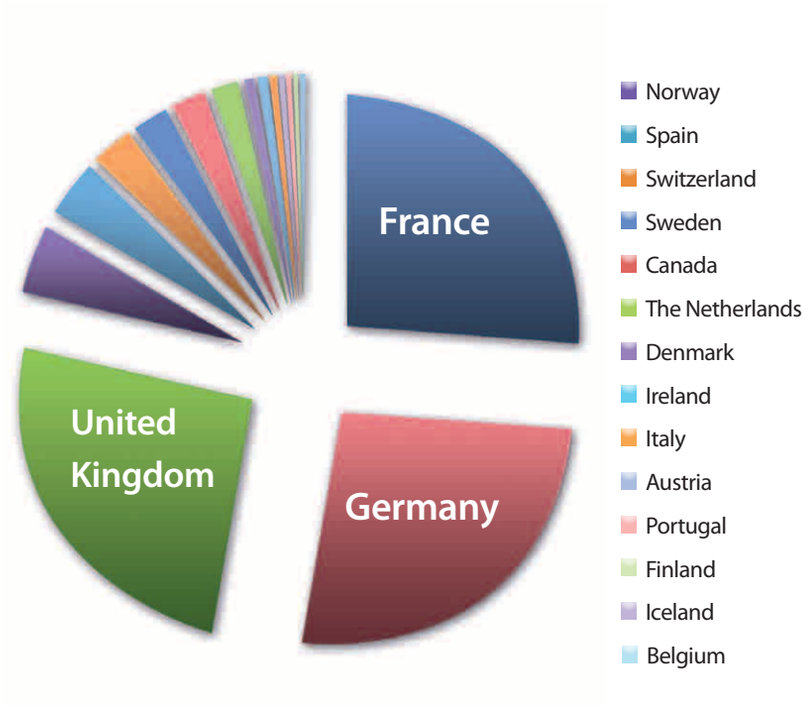
9. FY2012 ECORD budget

ECORD is currently funded exclusively by its member countries.

In FY2012, the total ECORD budget amounted to USD 20.29 M instead of the 21.37 M that ECORD had anticipated. This was due to the payments from Spain and Belgium not being received and the lower French contribution than in the previous years *(table above)*.

Austria (FWF)	50,000
Austria (ÖAW))	50,000
Belgium	0
Canada	500,000
Denmark	170,000
Finland	66,380
France	5,288,540
Germany	5,600,000
Iceland	30,000
Ireland	123,103
Italy	100,000
The Netherlands	388,126
Norway	1,100,000
Poland	30,000
Portugal	95,469
Spain	0
Sweden	528,000
Switzerland	565,470
The United Kingdom	5,600,000
Total	**20,289,978**

ECORD member country contributions for FY2012 (USD).



The ECORD member countries contributions vary widely, from USD 5.3-5.6 M for the three major contributors to USD 30,000 for the two smallest *(above right)*.

The ECORD member country quotas are calculated on the basis of their financial contributions. According to the Memorandum signed with the Lead Agencies of IODP, the NSF and MEXT, ECORD makes an annual contribution of USD 16.8 M to the IODP commingled funds to support "Science Operation Costs" (SOCs) *(table right)*. These SOCs include support to the Central Management Office (IODP-MI) as well as to platform providers to cover the science support activities (analytical facilities, core curation, data management, etc.). As one of the three platform providers, the ECORD Science Operator therefore receives money from the commingled funds to cover science costs associated with mission-specific platform expeditions. This budget is negotiated between ESO and the Central Management Office and specified in the IODP Annual Program Plan. The remaining ECORD budget is used to support the MSP "Platform Operation Costs" (POCs), as well as the ECORD Managing Agency and the ECORD Science Support and Advisory Committee.

ECORD FY2012 budget *(in USD)*		
	income	**expenses**
FY11 balance	8,256,947	
FY 11 Spain ***(1)***	762,000	
Interests	301,250	
FY12 contributions	20,289,978	
ESO ***(2)***		12,162,157
SOCS to NSF ***(3)***		13,837,361
ESSAC		206,980
EMA		321,382
MagellanPlus		65,000
Total	29,610,175	26,142,880
FY2012 balance	**3,467,295**	

(1) *to be received*
(2) *9,199,518 (POCs) + 2,962,639 (SOCs)*
(3) *16,800,000 -2,962,639 (SOCs for ESO)*

To simplify the money flow, it was agreed in 2010 by ECORD, NSF and MEXT that the SOCs allocated to the ECORD Science Operator will be paid directly from the ECORD budget and deducted from the ECORD contribution to the commingled funds.

After paying its contribution to IODP commingled funds, ECORD's remaining budget does not allow the implementation of one MSP expedition every year. Funds must therefore be accumulated over several years and carried forward. The last MSP expedition was conducted in FY2010. In FY2012, the ECORD Science Operator has requested the budget to implement the final expedition of the current phase of IODP to be conducted in FY2013.

The tables *below and page 36* detail ESO's actual expenditure during the same period.

ESO FY2012 overall expenditure *(in USD)*				
	FY12 Annual Program Plan budget	**FY12 expenditure**	**FY12 obligated carry forward**	**FY12 variance[1]**
Science Operation Costs (SOCs)	2,962,639	1,162,476	1,161,079	639,084
Platform Operation Costs (POCs)	9,199,518	9,012,006	0	187,512
Grand Total	**12,162,157**	**10,174,482**	**1,161,079**	**826,596**

[1] *Underspent is retained by ECORD*

ESO FY2011 SOC expenditure breakdown *(in USD)*				
	FY12 Annual Program Plan budget	**FY12 expenditure**	**FY12 obligated carry forward**	**FY12 variance**
Management and administration	**839,070**	**455,404**	**280,600**	**103,066**
Salaries and fringes	592,070	329,788	189,600	72,682
Travel	192,000	99,017	66,000	26,983
Supplies	15,000	7,509	7,500	-9
Shipping	0	560	0	-560
Communication	0	1,030	0	-1,030
Contractual services	0	0	0	0
Equipment	15,000	7,500	7,500	0
Other direct costs	25,000	10,000	10,000	5,000
Technical, Engineering and Science Support	**1,562,556**	**462,585**	**643,550**	**456,421**
Salaries and fringes	601,656	337,305	249,100	15,251
Travel	77,500	51,901	27,750	-2,151
Supplies	73,400	0	36,700	36,700
Shipping	0	0	0	0
Communication	0	21	0	-21
Contractual services	40,000	25,799	20,000	-5,799
Equipment	750,000	858	300,000	449,142
Other direct costs	20,000	46,700	10,000	-36,700
Core Curation	**83,429**	**41,700**	**41,729**	**0**
Salaries and fringes	67,929	33,950	33,979	0
Travel	7,000	3,500	3,500	0
Supplies	2,500	1,250	1,250	0
Shipping	6,000	3,000	3,000	0
Communication	0	0	0	0
Contractual services	0	0	0	0
Equipment	0	0	0	0
Other direct costs	0	0	0	0

Table continues on page 36

Data Management	**336,884**	**126,780**	**170,350**	**39,754**
Salaries and fringes	176,884	94,900	66,350	15,634
Travel	39,000	18,738	6,500	13,762
Supplies	6,000	0	6,000	0
Shipping	0	0	0	0
Communication	0	0	0	0
Contractual services	75,000	248	75,000	-248
Equipment	40,000	12,894	16,500	10,606
Other direct costs	0	0	0	0
Outreach	**140,700**	**76,007**	**24,850**	**39,843**
Salaries and fringes	100,700	58,387	19,100	23,213
Travel	28,000	13,354	5,750	8,896
Supplies	12,000	0	0	12,000
Shipping	0	271	0	-271
Communication	0	141	0	-141
Contractual services	0	3,855	0	-3,855
Equipment	0	0	0	0
Other direct costs	0	0	0	0
Grand Total	**2,962,639**	**1,162,476**	**1,161,079**	**639,084**

ESO FY2012 POC expenditure breakdown *(in USD)*				
	FY12 Annual Program Plan budget	**FY12 expenditure**	**FY12 obligated carry forward**	**FY12 variance**
Management and administration	**286,593**	**131,939**	**0**	**154,654**
Salaries and fringes	166,593	96,099	0	70,494
Travel	93,000	8,830	0	84,170
Supplies	6,000	6,000	0	0
Shipping	0	0	0	0
Communication	0	0	0	0
Contractual services	0	0	0	0
Equipment	6,000	6,009	0	-9
Other direct costs	15,000	15,000	0	0
Technical, Engineering and Science Support	**8,912,925**	**8,880,067**	**0**	**32,858**
Salaries and fringes	139,225	89,976	0	42,249
Travel	22,000	10,116	0	11,884
Supplies	0	0	0	0
Shipping	0	0	0	0
Communication	0	170	0	-170
Contractual services	0	25,132	0	-25,132
Equipment	0	2,973	0	-2,973
Other direct costs (Baltic platform advance)	8,751,700	8,751,700	0	0
Grand Total	**9,199,518**	**9,012,006**	**0**	**187,512**

Annex - List of Acronyms

ACEX: Arctic Coring Expedition

AGU: American Geophysical Union

BBCP: Bighorn Basin Coring Project

BCR: Bremen Core Repository

BGS: British Geological Survey

BOSIET: Basic Offshore Safery Induction and Emergency Training

CCD: Carbonate compensation depth

CDEX: Center for Deep Earth Exploration

CORK: Circulation Obviation Retrofit Kit

DEBI-RCN: Dark Energy Biosphere - Research Coordination Network

DEISM: Distributed European Infrastructure for Sub-seafloor Sampling and Monitoring

DIS: Drilling Information System

DLP: Distinguished Lecturer Programme

DSDP: Deep Sea Drilling Project

E-EB: ECORD Executive Bureau

E-FB: ECORD Facility Board

E-ILP: ECORD Industry Liaison Panel

E-OETF: ECORD Outreach & Education Task Force

E-VTF: ECORD Vision Task Force

EC: European Commission

ECORD: European Consortium for Ocean Research Drillling

EGU: European Geosciences Union

EMA: ECORD Managing Agency

EMSO: European Multidisciplinary Seafloor Observatory

EPC: European Petrophysics Consortium

EPM: Expedition Project Manager

ESF: European Science Fundation

ESO: ECORD Science Operator

ESSAC: ECORD Science Support and Advisory Committee

ETP: ECORD Technology Panel

FY: Fiscal Year

GAC-MAC: Geological Association of Canada - Mineralogical Association of Canada

GCR: Gulf Coast Repository

HUET: Helicopter Safety and Escape Training

I/B: Ice Breaker

ICDP: International Continental Scientific Drilling Program

IGC: International Geological Congress

IODP: Integrated Ocean Drilling Program and International Ocean Discovery Program

IODP-MI: Integrated Ocean Drilling Program Management International, Inc.

IWG+: International Working Group Plus

J-FAST: Japan Trench Fast Drilling

JAMSTEC: Japan Agency for Marine Earth Science and Technology

JOIDES: Joint Oceanographic Institutions for Deep Earth Sampling

JR: *JOIDES Resolution*

K-Pg: Cretaceous-Paleogene

KCC: Kochi Core Center

L/B: Lift Boat

LDEO: Lamont Doherty Earth Observatory

LWD: Logging While Drilling

MARUM: Center for Marine Environmental Sciences, University of Bremen

MDHDS: Motion Decoupled Hydraulic Delivery System

MeBo: Meeresboden-Bohrgerät

MEXT: Ministry of Education, Culture, Sports, Science and Technology

MOW: Mediterranean Outflow Water

MSCL: Multi-Sensor Core Logger

MSP: Mission-specific platform

MWCBS: Marine Wireline Core Barrel System

NanTroSEIZE: Nankai Trough Seismogenic Zone Experiment

NERC: Natural Environment Research Council

NGR: Natural Gamma Radiation

NSF: National Science Foundation

OAE: Ocean Anoxic Event

ODP: Ocean Drilling Program

OSP: Onshore Science Party

OTC: Offshore Technology Conference

POCs: Platform Operation Costs

QA/QC: Quality Assurance/Quality Control

RD2: Rockdrill 2

ROV: Remotely Operated Vehicle

RWTH-Aachen: Rheinisch-WestfaelischeTechnische Hochschule Aachen

SaDR: Sample and Data Request

SEDIS: Scientific Earth Drilling Information System

SEM: Scanning Electron Microscope

SOCs: Science Operation Costs

TAMU: Texas A & M University

UQAM: Université du Québec à Montréal

USIO: US Implementing Organization

ECORD Members

Austria: Österreichische Academie der Wissenschaften (ÖAW) and Fonds zur förderung der Wissenschaftlichen Forschung (FWF)
Belgium: Fonds Wetenschappelijk Onderzoek - Vlaanderen (FWO)
Denmark: Forsknings- og Innovationsstyrelsen
Canada: Natural Sciences and Engineering Research Council of Canada (NSERC)
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)
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)
Spain: Ministerio de Ciencia e Innovación (MICINN)
Sweden: Vetenskapsrådet (VR)
Switzerland: Fonds National Suisse (FNS)
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