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Anne de Vernal

Message from the Council Chair

At the transition from the Integrated Ocean Drilling Program to the International Ocean Discovery Program, the large IODP family is strengthening with new country members: Brazil is now a full member, and ECORD will be very pleased to welcome Israel in the forthcoming months. The commitment of new members in IODP is a good sign for a promising renewal of the programme as a major international endeavour for the next decade, with research projects as exceptional as those undertaken during the current programme.

The recent activities of IODP are indeed very exciting. As an example, the MSP Expedition 310 that drilled coral reefs off Tahiti demonstrated extremely high rates of sea-level rise exceeding 4 cm/year during the last deglaciation, which raises a serious warning in the hypothesis of destabilisation of the Antarctic ice margins (Deschamps et al, 2012, [doi:10.1038/nature10902](https://doi.org/10.1038/nature10902)). As another example, the work undertaken within the framework of JR IODP Expeditions 320 and 321 in the Equatorial Pacific led to the documentation of changes in the calcium carbonate compensation depth over the past 55 millions of years, which provides clues about the relationships between atmospheric CO₂, ocean alkalinity and climate (Pälike et al, 2012, [doi:10.1038/nature11360](https://doi.org/10.1038/nature11360)). A third example may be taken from the *Chikyu* Expedition 337, which aimed to address important questions related to Earth and Life evolution through the drilling of deeply buried coal formation, and which in September reached an ocean drilling depth record of 2,466 m beneath the seafloor. Besides the recently completed expeditions, the success of the 2012 ECORD Summer Schools ([pages 8 and 9](#)) continues to demonstrate the importance of reaching out and training the new generation of scientists.

Among the forthcoming expeditions, ESO is preparing to launch the 5th MSP expedition, Baltic Sea Paleoenvironment Expedition 347, starting mid May-early June 2013 ([pages 5 and 14-15](#)). This will also be the first IODP MSP expedition to take

place in European waters, which, along with the 76 ECORD applications received by ESSAC, has strong implications for ECORD within IODP.

Building on the exceptional scientific accomplishments of the current programme, the IODP community is ready for the new challenges of the 2013-2023 programme. Given the progress made during the current IODP phase, the deep ocean drilling community is gaining confidence in meeting the extraordinary challenges of drilling down to the Earth's mantle. The challenges include not only increased target depth into the crust, but also drilling in the Arctic where the important frontiers in the scientific knowledge of the Cenozoic history need to be crossed, and sub-seafloor observatories where other deep frontiers have to be explored. As part of the new IODP organisational structure, workshops are encouraged by both the ECORD, with MagellanPlus Workshop Series ([pages 4 and 11](#)), and IODP communities in order to develop as strong as possible drilling proposals to meet the ambitious objectives of the science plan.

The overall structure of the new IODP 2013-2023 is being progressively implemented with the setting-up of committees and panels of the new Science Advisory Structure. The transition is being conducted smoothly in ECORD ([pages 3-4](#)), as well as IODP, and there is no doubt that the International Ocean Discovery Program will be fully operational before the end of 2013.

My time as ECORD Council Chair has been a real pleasure, thanks to the Council members and EMA team for their support.

I wish all the best to Michael Webb, the new ECORD Chair !

Anne de Vernal, ECORD Council Chair, from October 1, 2011 to September 30, 2012

<http://www.ecord.org/council.php>

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Gilbert Camoin

ECORD Managing Agency: A new ECORD in a new IODP



Milena Borissova

If one word was used to define the 2013-2023 phase of the ECORD-IODP programme, the word "new" would be a fitting description. While the management structure and business model for the International Ocean Discovery Program <http://www.iodp.org/new-program-international-ocean-discovery-program> retain both the multi-platform capabilities and transformative science goals that are outlined in the new science plan "Illuminating Earth's Past, Present, and Future: The International Ocean Discovery Program Science Plan for 2013-2023", the new IODP will address global challenges facing current and future generations with new multidisciplinary research approaches, expanded scientific communities and continued development of its unique collaborative model.

With its array of platforms operated by three independent Individual Platform Providers, both ECORD and IODP are on the cusp of change towards the achievement of increased funding and operational flexibility, as well as greater opportunities in scientific and technological innovation.

New ECORD structure

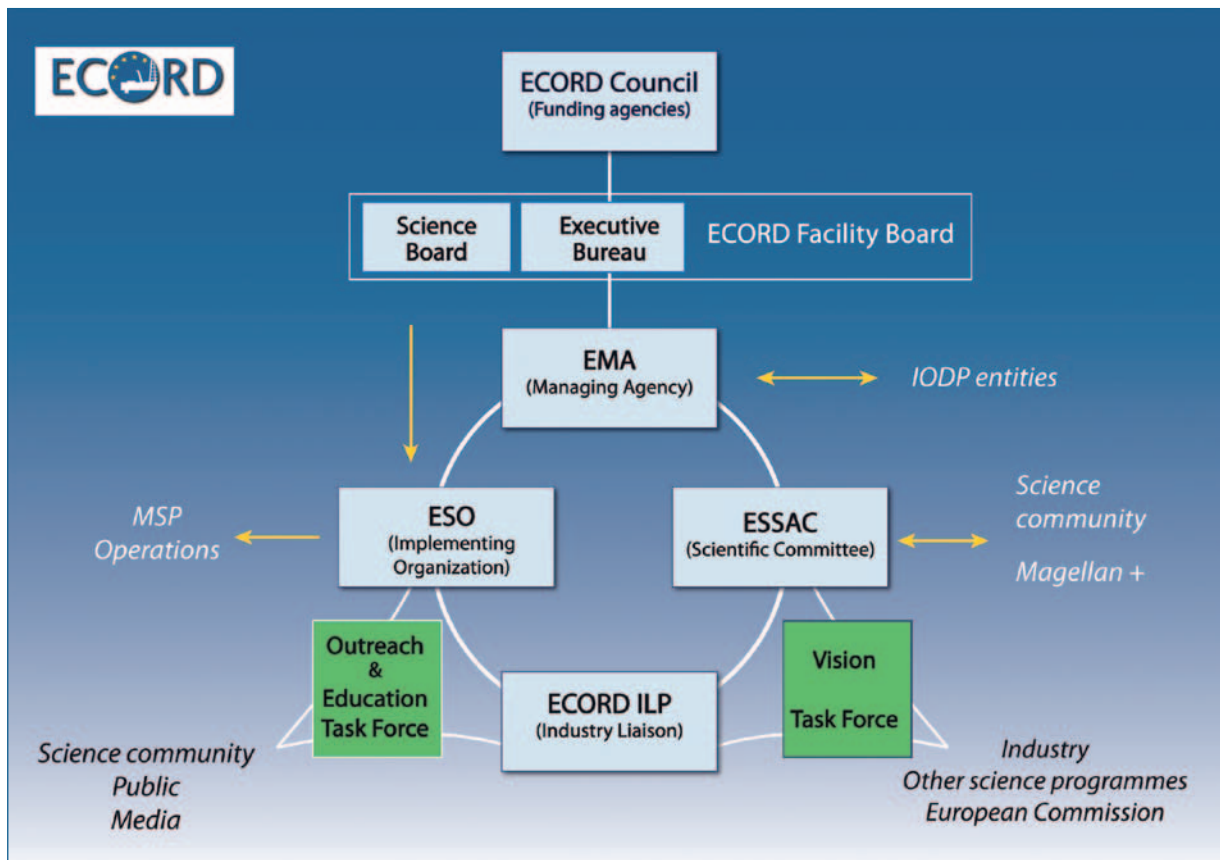
More independence at the consortium level, and in particular in the implementation of mission-specific platform (MSP) expeditions, has required a new ECORD structure to be defined (*below*), to face the new challenges and opportunities offered by the new IODP framework. The changes also present an

excellent opportunity to raise ECORD's profile and to improve its efficiency.

The successful parts of ECORD (*i.e.* the ECORD Council, the EMA, the ESO, the ESSAC) have been retained, although broadened and reshaped, whereas the mandate and membership of previous ECORD bodies have been redefined. In particular, the contribution of the ECORD Industry Liaison Panel, the ECORD link between academia and industry, will be strengthened, and the Education and Outreach group becomes the Outreach and Education Task Force, the ECORD communication entity. There are also three new entities within the structure: the ECORD Executive Bureau, the ECORD Vision Task Force - the ECORD strategic entity - and the ECORD Facility Board - the ECORD planning forum for MSP expeditions.

This new structure will not only enable ECORD to continue its existing functions with greater versatility, but also allow opportunities to be developed in partnership with other countries, organisations and industry.

The MagellanPlus Programme, co-funded by ECORD and ICDP, will yield a powerful springboard for the successful creation of innovative scientific proposals and contribute to the improvement of the relationships between the oceanic and continental drilling communities (*see pages 4 and 11*).



New opportunities

The greater operational flexibility in IODP will allow ECORD to expand the MSP concept to include seafloor drilling systems, long-piston coring, jack-up rigs and others, as determined by IODP scientific priority and operational efficiency. Long-term borehole observatories may represent an additional platform through which generations of researchers can build on the legacy of scientific ocean drilling, collecting new samples and deploying new instruments.

New opportunities will be created, especially through close collaboration with other science programmes and initiatives such as ICDP, IMAGES and EMSO. SIPCom and IODP funding agencies have accepted the possibility that ECORD could implement 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 ambitions to advance, grow, and share its scientific and technological resources is by supplementing funding of the MSP operations with additional financial sources. For example, one of the main current goals is to develop greater links with projects funded by the European Commission and to establish a "Distributed European Drilling Infrastructure" involving various Universities or Institutes that operate and/or develop tools that investigate the sub-seafloor.

The development of this network would help to operate research vessels and sampling capabilities using a concerted approach that would not only provide cost-effective use of facilities, but would also maximise their access to the scientific community and facilitate the improvement of existing technologies through the sharing of knowledge, experience and innovative endeavours.

In order to proceed with the creation of more effective and ECORD-relevant industry-related partnerships, ECORD is in the process of re-initiating the function of its Industry Liaison Panel (ILP). 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.

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 we reach the final stages of agreeing new MoUs between the ECORD participants and the NSF, ECORD is just a few steps away from completing its transition into the new, groundbreaking International Ocean Discovery Program.

Gilbert Camoin, EMA Director and Milena Borrisova, EMA Assistant Director - <http://www.ecord.org/ema.html>

MagellanPlus

The 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 MagellanPlus Workshop Series Programme will thus continue and expand 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.

Both workshops granted during the first call of MagellanPlus were held recently:

(1) Records of Geohazards and Monsoonal Changes in the Northern Bay of Bengal - Preparation of an IODP Drilling Proposal (by Volkhard Spiess, Tilmann Schwenk and Herrman-Rudolf Kudrass) 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)

(2) Drilling an active hydrothermal system of a submarine intraoceanic arc volcano (by Wolfgang Bach and Cornel de Ronde) 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).

Both reports on these workshops will be published in the next issue of the ECORD Newsletter.

The second call for submission of proposals, which closed on July 1, resulted in two workshops that will be held in spring 2013:

(1) Exploring the Cretaceous Greenhouse through Scientific Drilling (by Stuart Robinson and Timothy Bralower) April 15-17, 2013 - London, United Kingdom - <http://iodp-ussp.org/workshop/cretaceous/>)

(2) Deep-sea Record of Mediterranean Messinian events (DREAM) (by A. Camerlenghi, G. deLange, R. Flecker, D. Garcia-Castellanos, C. Hübscher, W. Krijgsman, J. Lofi, S. Lugli, V. Manzi, T. McGenity, G. Panieri, M. Rabineau, M. Roveri and F.J. Sierro), May 6-8, 2013 - Brisighella, Italy. The goal of this workshop is to gather three generations of scientists to identify locations for multiple-site riser-drilling in the Mediterranean Sea that would allow the open questions still existing about the causes, processes, timing and consequences of the Messinian salinity crisis (MSC) to be solved at both the local and planetary scale. The initiative builds on recent activities by various research groups to identify potential sites to perform deep-sea research drilling in the Mediterranean Sea across the deep Messinian sedimentary record.

MagellanPlus continued on page 11



David McInroy



Robert Gatliff



Dave Smith



Alan Stevenson

Over the last few months, ESO have been preparing for **IODP Baltic Sea Paleoenvironment Expedition 347** - <http://www.eso.ecord.org/expeditions/347/347.php>. The platform tendering exercise took place towards the end of the summer, and ESO are now negotiating with a drilling contractor to secure the platform and drilling services for the expedition. The drilling contractor and the platform cannot be announced until a contract is put in place. Anticipating a successful outcome, ESO have been moving forward with expedition planning and ESO with the Expedition Project Manager, Carol Cotterill, has been working with the Co-chief Scientists Dr Thomas Andr en and Prof Bo Barker J rgensen to finalise the expedition's scientific programme.

The Baltic Sea Paleoenvironment Expedition addresses four over-arching themes: climate and sea-level dynamics of Marine Isotope Stage (MIS) 5, including onsets and terminations; the complexities of the last glacial, MIS 4 - MIS 2; deglacial and Holocene (MIS 2 - MIS 1) climate forcing; and deep biosphere responses to glacial-interglacial cycles (*pages 14-15*).

The vessel will be a dynamically positioned geotechnical-type ship and will be equipped with a drill rig to deploy piston, extended nose and rotary-coring tools, and a suite of downhole-logging tools. The vessel will have sufficient deck space to accommodate ESO's suite of container laboratories: curation, petrophysics, geochemistry, general science, logging, ESO office, ESO database and a new microbiology container. Unlike IODP expeditions conducted by the *JOIDES Resolution* and the *R/V Chikyu*, the space restrictions on mission-specific platform (MSP) expeditions mean only some minimum and ephemeral properties are measured offshore. The full measurements programme will take place at the Onshore Science Party, held at the IODP Bremen Core Repository. The offshore phase of the Expedition is envisaged to start some time from mid-May to early June 2013, and will last for up to 60 days. The Onshore Science Party will be held a couple of months after the offshore operation has ended. The process of inviting the Science Party members has started and is expected to be completed during October.

The Baltic Sea Paleoenvironment Expedition will be the last MSP expedition of the current IODP. ESO is currently planning the first MSP expedition of the new IODP: **Chicxulub Impact Crater** (*page 16*). ESO is currently tendering for a seabed hazard survey for safe rig positioning offshore Mexico (closing date October 26), and expect to contract the survey in 2013. This

will pave the way for the Chicxulub coring operation in 2014, funding and authorisation permitting.

Looking further ahead to 2015 and onwards, future MSP expeditions will be determined by the new ECORD Facility Board (*page 3*). Potential future expeditions could be based on Proposal #758: Atlantis Massif Seafloor Processes, #716: Hawaiian Drowned Reefs, #581: Late Pleistocene Coralgal Banks, #637: New England Shelf Hydrogeology, or any newly submitted proposals. ESO are anticipating a need for seabed rock drills equipped with downhole tools and *in-situ* fluid sampling technology for future expeditions, and have been working with operations groups at the British Geological Survey, the Center for Marine Environmental Sciences (MARUM), Bremen, and others to develop such tools.

As we look forward to future MSP expeditions, a recent IODP report on citations related to the DSDP, ODP and IODP programmes from 1969 to 2011 - http://iodp.tamu.edu/publications/AGI_studies/AGI_study_2012.pdf - also provided an opportunity to look back at the success of previous MSP expeditions. The '**Ocean Drilling Citation Database**' contains 28,272 citation records and is a subset of the American Geological Institute's (AGI) GeoRef database. AGI indexes and records citation data from approximately 3,800 US and international publications and the Ocean Drilling Citation Database was created by using a series of keywords to extract citations related to the IODP and the legacy drilling programmes. A review of the records provides information on how programme-related research is disseminated into the scientific community through publications and is therefore a measure of the impact of IODP science. The report shows that between 2003 and 2011, articles and papers resulting from **Arctic Coring Expedition (ACEX) 302** have been cited more than 2,000 times by other research article - almost three times as many as the next highest number of citations. The report also shows that the ACEX expedition has produced more than 85 publications, the majority of which appear in peer-reviewed journals (others are included in the Proceedings of the IODP). This is a timely reminder of the impact of ECORD and the mission-specific platform expeditions, and demonstrates the importance of MSP expeditions to achieving the programme objectives.

David McInroy, ESO Science Manager, Robert Gatliff, ESO Chair, Dave Smith, ESO Marine Operations Manager and Alan Stevenson, ESO Outreach Manager. - <http://www.eso.ecord.org>

Information and reports of MSP Expeditions can be found at:

<http://www.eso.ecord.org/expeditions/pubs.php>

Data from MSP expeditions are available at:

<http://iodp.wdc-mare.org/>



Carol Cotterill

Corals and Conversations: Expedition 325 GBREC post-cruise meeting

Between July 3 and 6, a group of scientists found themselves on a desert island off the Queensland coast in Australia. This wasn't the result of some catastrophic shipwreck, or even banishment by colleagues due to obsessive behaviour over corals, but was in fact the post-cruise meeting for Great Barrier Reef Environmental Changes Expedition 325. The location was Heron Island and the objective was to engage each other in 3 days of scientific discussion following analysis of many of the samples taken during the Onshore Science Party held at Bremen IODP Core Repository in July 2010 (*see Newsletter # 15*).

Now many of you may remember the gremlins that stalked our every move during the offshore operations, and it seemed that Queensland's gremlins were happy to welcome us back after a two year break. The desalination plant at Heron Island failed a week before our arrival, and for a few tense days it appeared as if a year of planning was going to be scuppered at the last minute. However, in true style, all the scientists involved agreed to forego showers for 3 days in the pursuit of science!

The first day started with a brief overview of the project aims and objectives from the Co-chief Scientists Jody Webster and Yusuke Yokoyama (*photo 1*). This was followed by an impressive summary from each of the research disciplines, compiling initial findings and results covering paleoclimate, reef response and sea level (including diagenesis and fossil and microbialite assemblages), fore-reef slope science incorporating physical properties, palaeomagnetism, microbiology, slope sedimentation and diagenesis, dating and chronology based on the ^{18}O planktic record, and dating and sea level.

These informative introductory sessions were followed by a number of separate break-out sessions. The idea of the first break-out was for those scientists working within a specific discipline, for example dating, to meet and discuss results, overlaps, any issues and the publication of community papers. Each group reported back to the whole science party, and further break-out groups then naturally evolved, with collaborative papers, sample sharing, data gaps, cross-discipline research and timescales amongst many of the topics being discussed. The result from this "round robin" style of

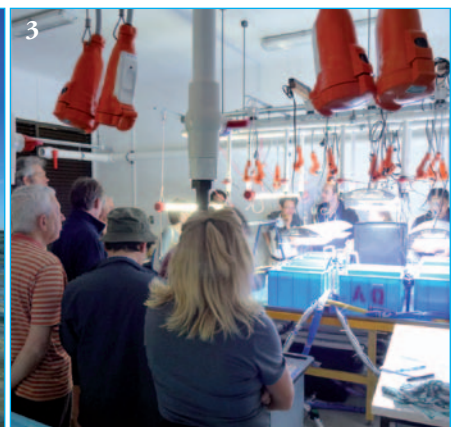
evolving break-outs was a list of more than 30 initial papers that could be produced, with further individual research building on these community-style publications.

The post-cruise meeting was pleased to welcome into the varied scientific discussions the input from four shore-based external collaborators and three PhD students from Japan and the USA. Their insights were valuable, and it is hoped that seeing the exciting science that is emerging from these fossil reefs has encouraged the students to further participate in IODP.

But scientific discussion was not the only thing distracting the Expedition 325 scientists from the lack of running water! Over the course of the three days, Jody Webster led two reef walks at low tide, enabling all to see the modern reef and coral assemblages that occupy the current reef flat and reef edge (*photo 2 and back cover*). ESO sponsored a snorkelling trip for all participants, again over the modern reef, but this time seeing it at high tide. And an ANZIC/ESO sponsored ice breaker allowed the expedition scientists to mix and chat with researchers based at the Heron Island Research Station. This led to a guided tour of the research station (*photo 3*), and some interesting discussions on their modern reef climate change experiment that is currently ongoing. Scientists at the station are analysing the response of different corals to both changes in temperature, acidity and sediment suspension in the water, using carefully controlled, and in one case time-lapse recorded, environments to assess the possible modern-day reef response to our changing climate.

I came away from Heron Island full of enthusiasm for the exciting work being undertaken, and hope that the international team of scientists found it as enlightening and encouraging as I did. The first papers are in press from Expedition 325, and if my compiled list of possible future papers is anything to go on, then the research being undertaken will give us an incredible insight into the behaviour of a reef community within a changing environment.

Carol Cotterill, ESO Expedition Project Manager
cjcott@bgs.ac.uk





Albert Gerdes



Alan Stevenson

ECORD Outreach and Education News and Activities



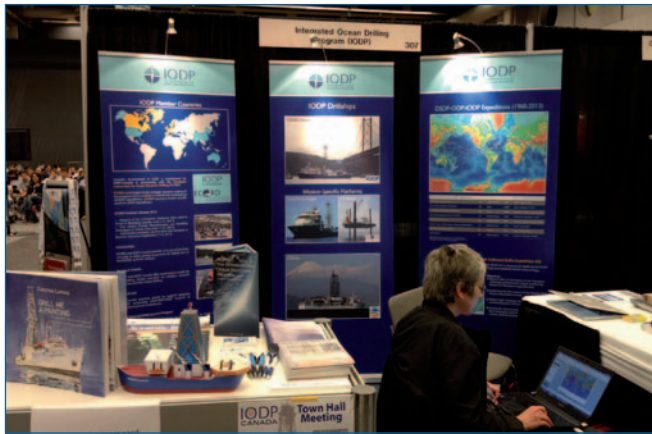
Patricia Maruélol



Julia Gutiérrez Pastor

News from the Outreach team

Since April 2012, the ECORD Outreach Team has presented ECORD-IODP exhibition booths at EGU and Goldschmidt 2012, supported the outreach activities of ECORD members and partners at JpGU and IGC, and published the ECORD Annual Report for 2011 as well as this issue of the ECORD Newsletter. The team held the ECORD Outreach and Education Task Force meeting on September 4-5, in Avignon, France, to develop plans for the outreach activities that will take place during the fall and winter of 2012/2013.



EGU 2012, April 22-27, 2012, Vienna (Austria)

ECORD/IODP and ICDP jointly presented ocean and continental research drilling at the EGU 2012 Conference in Vienna, Austria. The conference brought together 11,275 participants (28% of whom were students) from 95 countries. The booth not only provided a focal point for the scientific drilling community, but also for scientists from other fields of research and from non-IODP countries. The townhall meeting was very well attended and provided another opportunity to share our views on the exciting challenges that lie ahead in developing a better understanding of the Earth system and its changing environment. A press conference chaired by A. Gerdes gave the opportunity to present the challenging goals of the J-FAST Expedition to the press. ECORD and ICDP are already planning to continue this fruitful cooperation at EGU 2013.

<http://www.ecord.org/pi/egu12.html>

Goldschmidt 2012, June 24-29, 2012, Montréal (Canada)

For the second year in succession, ECORD organised a booth at the Goldschmidt Conference to help promote IODP to geochemists. The 22nd Goldschmidt meeting attracted about 3,000 participants, with about 30% student participation, and focused on 'Earth in Evolution'. The booth was jointly organised by IODP Canada (thanks to Diane, Taoufik, Olivia and Anne!) with support from IODP-MI and GEOTOP, the hosts of the conference. IODP Canada also took the opportunity to organise a townhall meeting to present programme news.

<http://www.ecord.org/pi/booths.html>

ECORD provided materials to Diane Hanano (IODP Canada) who organised the IODP exhibition booth at the GAC-MAC conference in St John's, Newfoundland ([page 23](#)).

Upcoming Events and Activities

Members of the team will be involved in upcoming activities:

- Support provided to IODP at **AGU 2012**,
- Publication of the ECORD Annual Report for 2012 and updates of brochures/flyers,
- EGU 2013, Goldschmidt 2013 and 3P Arctic 2013 ([see conferences page 13](#)).

ECORD Education

Reports of the ECORD Summer Schools 2012 have been provided by the students who received ECORD scholarships on [pages 8-9](#) of the Newsletter. The ODP/IODP core replicas have been shown at several venues such as (1) by IODP Spain at the Geological Congress in Oviedo ([page 19](#)) and are now on display at ESSAC Office in Granada, (2) by ESO in the new reception area at the British Geological Survey offices in Edinburgh ([below](#)) and (3) by IODP Canada at the Goldschmidt 2012 meeting in Montréal.



photo courtesy of F. MacTaggart, British Geological Survey.

We are pleased to announce that two ECORD teachers, Jean-Luc Bérenguer (France) and Susan Gebbels (UK), will sail as Education Officers onboard the *JOIDES Resolution* during Hess Deep Plutonic Crust Expedition 345 ([page 10](#)).

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

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http://twitter.com/#!/ECORD_outreach



<http://www.ecord.org/RSS/ecord-rss.php>

Reports of ECORD Summer Schools 2012

ECORD Summer School in Canada: Impacts of Cryosphere Dynamics from Land to Ocean July 5-21, 2012, Montréal, Canada

The joint ECORD/ICDP/IODP Canada Summer School on cryosphere dynamics took place from July 5 to 21 in Montréal, Québec, Canada. Nineteen participants gathered from universities in Canada, Sweden, Denmark, the Netherlands, the UK, Greece and Belgium, attending classes and workshops presented by invited lecturers at GEOTOP, University of Québec in Montréal (UQAM).

The first week consisted of lectures on a broad range of topics providing an excellent synthesis of current cryosphere research. The talks focused on reconstructing the cryosphere and climate change in the Cenozoic, from a number of different perspectives and timescales, using modelling, geomorphology, palaeomagnetism, and terrestrial and marine core records. Following the lectures, workshops were conducted in three groups, each of which selected a crucial question that had not yet been critically addressed. This question was then discussed throughout the session and presented to the class on the last day of the school.

During the second week, the summer school travelled to the north shore of the St. Lawrence River to take part in a 5-day field excursion. On the first stop at Baie-Comeau, the class toured a coring site in an ombrotrophic peat bog and visited a beach cross section of Holocene deposits (*right*). The group then moved to cabins located on the shore of Lac Walker, an ancient fjord now the deepest known lake in Québec. During the next few days, the participants surveyed the lake using CTD profiles, took underwater gravity cores and explored the nearshore surface sediments of the lake with a remotely operated submarine. The fieldwork also included a survey of the Sept-Îles area where students conducted sub-bottom acoustic profiling using a chirp echo-sounder, and high-resolution multibeam bathymetry, in order to characterise a submarine glacial moraine associated with the Baie-Trinité Moraine complex. On the last day of fieldwork, students were guided through outcrops of Quaternary sediments revealing the postglacial evolution of the cryosphere around the Sept-Îles area.

Upon returning from the field, students participated in a series of interactive exercises at GEOTOP, which introduced a number of proxies, geochemical and statistical methods used in palaeoclimatic research. The class became acquainted with microfossil analysis in cold-water environments (foraminifera, dinoflagellates and pollen)



through lectures and microscopy practicals. The classes continued with sedimentary analyses, seismic interpretation, time-series analysis, radiogenic isotopes and stable-isotope methods, followed by a tour of the GEOTOP isotope laboratories.

The summer school concluded with a day of presentations on the workshop questions researched by each of the three groups during the course. Finally, a summary of the fieldwork was provided by the University of Québec students.

The Montréal Summer School offered an excellent opportunity to learn about the current understanding of cryosphere dynamics and methods used to reconstruct past climatic change, and to critically assess the challenges and new developments in paleoclimatology and their impact on climate predictions. It enabled students of diverse nationalities and academic backgrounds to collaborate in a friendly, scientific setting in the field, the classroom and the laboratory. We would like to give a big thank you to all those who made the summer school a success!

Rachel North, Earth and Ocean Sciences, Cardiff University, UK, Catherine Robin, Geodetic Survey Division, Natural Resources Canada and Phoebe Chan, Department of Earth Sciences, University of Toronto, Canada - <http://www.iodpcanada.ca/news/report-on-the-2012-ecord-summer-school-in-canada>

9th Urbino Summer School in Paleoclimatology July 11-31, 2012, Urbino, Italy

Starting with the conclusions, the 9th Urbino Summer School in Paleoclimatology (USSP) was enriching in all senses. I had the opportunity to attend this course carried out in Italy thanks to an ECORD scholarship. I went as a first year PhD student of the "Grupo de Geociencias Oceánicas" of the University of Salamanca (Spain). Our group mainly focuses their efforts on the study of climate change by analysing ocean cores and sections,

using micropaleontological and biogeochemical techniques. Nevertheless, I attended the course with the aim of expanding my understanding of how the climate operates and behaves. Undoubtedly, the course covered my expectations.

A group of leading researchers gave lectures on a wide range of topics all related to paleoclimate. From the basics to the specific,

ranging from oceanic to continental proxies, they dealt with climate modeling and cyclostratigraphy and they introduced us to future research in paleoclimatology, sharing the latest outcomes of their breakthroughs. In my case, some of the lectures turned out to be crucial in gaining a broad understanding of how the system operates, and how multidisciplinary our field of study can be.

The scientists were always willing to share their experience with the students such that young researchers like me had the opportunity to receive advice about our PhD projects, and to discuss different points of view and get new opinions on our work.

But personally, the USSP was, above all, an advisable social experience. Beyond substantially increasing my network of contacts, which is always useful for a PhD student, I had the opportunity to meet excellent people from a human point of view with whom I share more than a scientific vocation. New friends that I hope to see again at future meetings or congresses.

Blanca Ausín González (University of Salamanca, Spain)
<http://www.urbinosp.it/>



Field excursion to the K-Pg boundary exposed in the Bottaccione Valley near Gubbio.

ECORD Bremen Summer School on Submarine Landslides, Earthquakes and Tsunamis September 3-14, 2012, Bremen, Germany

From September 3 to 14, 2012, the ECORD Summer School was hosted by the MARUM-Center for Marine Environmental Sciences of the University of Bremen. Thirty-one PhD students and young PostDocs from all inhabited continents attended the course to broaden their horizons on the subject in the title of the summer school.

During the two weeks we received an update on the latest on-going research within the umbrella-topic of "Submarine Landslides, Earthquakes and Tsunamis" by the invited expert lecturers during the morning sessions. Through student presentations after lunch we also shared our own projects, and the discussions during valuable tea and cookie breaks also solved many questions and found plenty of new interesting objectives to be addressed in our on-going research. Later in the afternoons we joined the "Virtual Ship" session in which we simulated shipboard work in the outstanding lab facilities of MARUM and the IODP Bremen Core Repository. This allowed us to see some of the most interesting core samples within the field of marine geology and work with the latest datasets. We also learned about ECORD and IODP structures as well as how to write a drilling proposal. A field trip to the Ems-river barrier and the Dangast Wadden Sea tidal flat, with unusually beautiful weather, provided a refreshing break from the lecture room.

The ECORD Summer School gave us a detailed insight into the on-going research within the topic of "Submarine Landslides, Earthquakes and Tsunamis" and presented a platform for every participant to meet fellow scientists from different research areas. Great organisation and instruction, open discussions with the



lecturers, the practical "Virtual Ship" sessions and the general curiosity of both students and lecturers made this course the successful, positive experience that it was for us. With regard to the combination of networking and scientific education, the ECORD Summer School in Bremen 2012 was very fruitful for us, both from a professional and social point of view, and we would strongly recommend participating in future ECORD Summer Schools.

Ana Costa, University of Lisbon, Portugal, Anna Reusch, ETH Zürich, Switzerland, Arnaud Beckers, University of Liège, Belgium, Jaume Llopart, BSCI-CSIC, Spain, and Philipp Kempf, Renard Centre of Marine Geology, Ghent University, Belgium
http://www.marum.de/en/ECORD_Summer_School_2012.html



Carlota Escutia Dotti

News from



Julia Gutiérrez Pastor

Since the last newsletter the ESSAC Office has been conducting nominations for the participation of ECORD scientists in the following **IODP Expeditions**: MSP Baltic Sea Paleoenvironment Expedition 347 (Spring-Summer 2013) with Co-chief Scientists T. Andrén and B. Barker Jørgensen, and the *JOIDES Resolution* Asian Monsoon Expedition 346 (July 29-September 28, 2013) with Co-chief Scientists R. Tada and R. Murray. A total of 76 applications from 14 of the 18 ECORD countries (and 2 from non-ECORD countries) show the strong ECORD involvement and interest in the IODP. Staffing for both expeditions is in progress at the time of writing this article. More information about the schedule and scientific objectives of both expeditions can be found in the [table below](#) and on the IODP website at <http://www.iodp.org/expeditions>.

Within the **Science Advisory Structure (SAS)**, J. Geldmacher, V. Heuer, and L. McNeil have been nominated as the new ECORD Proposal Evaluation Panel (PEP) members replacing T. Ferdelman, J. Koepke and D. Hodell, who rotated off. For the Site Characterization Panel (SCP) M. Huuse and D. Mosher have been nominated to replace P. Clift and R. Urgeles ([page 12](#)). The ECORD Council had previously approved this change. We welcome the new members and thank those rotating off for their service to ECORD and IODP.

The second phase of the **ECORD Distinguished Lecturer Programme (DLP)** ended this summer with a total of 30 lectures given in institutions from 13 ECORD countries and 2 non-ECORD countries. We thank the ECORD Distinguished Lecturers 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?"), and 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"), for their service bringing the exciting scientific discoveries of the IODP to the geosciences community. Following the October 2012 meeting, ESSAC will announce the new phase of DLP lectures and will issue a call for institutions to host the DLP lecturers.

We are continuing the successful ECORD initiatives to train the next generation of ocean drilling scientists, the ECORD Summer Schools and the Grants. 18 young scientists from 9 ECORD countries were selected from 83 applicants to be funded by ECORD to attend one of the three **ECORD-sponsored Summer Schools**: "Past Global Change Reconstruction and Modeling Techniques" (Urbino, Italy; July 11-31, 2012); the "Submarine Landslides, Earthquakes, and Tsunamis" (MARUM, Germany, September 3-14, 2012); and the "Impacts of the Cryosphere Dynamics from Land to Ocean" (Montréal, Canada, July 5-21, 2012) ([pages 8-9](#)). At its May meeting, ESSAC decided to fund the Urbino Summer School in 2013 along with a Summer School on "Deep-Sea Sediments: From Stratigraphy to Age Models", which will be organised in Bremen. A new call for applications for ECORD-sponsored summer schools in 2014 will be issued by the ESSAC Office at the end of this year.

During the ESSAC May meeting, six scientists were awarded an **ECORD Grant**. These are merit-based awards for outstanding graduate students to conduct research related to the IODP and consist of small and short-term grants, which should cover travel and lab expenses. The awardees were selected from a total of 20 applicants from 8 ECORD countries and one non-ECORD country.

IODP Expedition Drilling Schedule

Expedition	Exp #	Drillship	Dates	Co-chief Scientists
Lesser Antilles Volcanism and Landslides	340	JR	March 3 - April 17, 2012	O. Ishizuka - A. Le Friant
Japan Trench Fast Drilling Project	343	Chikyu	April 1 - May 24, 2012	J.J. Mori - F.M. Chester
Paleogene Newfoundland Sediment Drifts	342	JR	June 2 - August 1, 2012	R. Norris - P. Wilson
Deep Coalbed Biosphere off Shimokita	337	Chikyu	July 6 - Sept 15, 2012	K. U. Hinrichs - F. Inagaki
NanTroSEIZE Plate Boundary Deep Riser 2	338	Chikyu	Oct 1, 2012 - Jan 13, 2013	G. Moore - M. Strasser B. Dugan - K. Kanagawa
Costa Rica Seismogenesis Project 2 (CRISP)	344	JR	Oct 23 - Dec 11, 2012	R. Harris - <i>tba</i>
Hess Deep Plutonic Crust	345	JR	Dec 11, 2012 - Feb 12, 2013	K. Gillis - J. Snow
S Alaska Tectonics Climate and Sedimentation	341	JR	May 29 - July 29, 2013	J. Jaeger - S. Gulick
Asian Monsoon	346	JR	July 29 - Sept 28, 2013	R. Tada - R. Murray
Baltic Sea Paleoenvironment	347	MSP	Spring-Summer 2013	B.B. Jørgensen-T. Andrén
NanTroSEIZE Plate Boundary Deep Riser	348	Chikyu	<i>tbd</i>	M. Kinoshita - H. J. Tobin



JR: *JOIDES Resolution*, MSP: *mission-specific platform*. Sailing dates may change slightly - <http://www.iodp.org/expeditions>. ECORD Co-chief Scientists are marked in blue. Co-chief Scientist Fumio Inagaki during Expedition 337 (© JAMSTEC/IODP).

ESSAC has recently been involved in the selection of two teachers to participate in the **Teacher at Sea Program**, an initiative of the Deep Earth Academy/IODP-US Implementing Organization. Two ECORD teachers, Susan Gebbels and Jean-Luc Bérénguier, will be participating in Expedition 345 aboard the *JOIDES Resolution*.

The ESSAC activities are developing in parallel with the ECORD and ICDP sponsored Magellan Plus Workshop Series. Four **MagellanPlus** workshops will be held between 2012 and 2013 (*page 4 and below*). For more information regarding these workshops and contact information for participation visit <http://www.essac.ecord.org/index.php?mod=workshop&page=call-workshop>. Of relevance to ECORD/IODP science is the Antarctic and Southern Ocean Drilling workshop held in Portland, USA, July 13-14, 2012. The workshop reviewed outstanding scientific questions aimed at improving our understanding of ice-sheet dynamics during past warm world conditions that can be addressed by drilling. A co-ordinated strategy for submission of IODP proposals to IODP, including MSP proposals, was developed.

All the work conducted by the ESSAC Office could not have been achieved without the hard work of Julia Gutiérrez Pastor, the ESSAC Science Co-ordinator, and of the ESSAC delegates, as well as the strong support from Gilbert Camoin (EMA) and the ECORD Council members. We look forward to continuing this constructive and efficient cooperation between all of us during the coming months. A year from now, the International Ocean Discovery Program (IODP) will be launched (*pages 2 to 4*). The new programme architecture will maintain an overarching international umbrella and an international scientific evaluation system, but will allocate more independence to the platform providers. In this context, ESSAC activities during the next months will also involve a more active role in defining, with the other ECORD bodies, ESSAC's role in the new ECORD structure and the long-term vision for ECORD science in the new IODP.

Carlota Escutia Dotti, ESSAC Chair, and Julia Gutiérrez Pastor, ESSAC Science Co-ordinator
<http://www.essac.ecord.org>

Continued from page 4

The MagellanPlus Workshop Series Programme supports workshops that are expected to lead to or foster high-quality and innovative scientific drilling proposals. The programme has two calls annually; deadlines are February 1 and July 1. Proposals are reviewed by the MagellanPlus Steering Committee (MSC), with the advice of external reviewers where applicable. Proponents will be notified of the outcome within two months following the submission deadline.

Proposals should include complete and realistic scripts for the proposed workshop, and a funded workshop must be executed within nine months after notification of funding. A typical workshop is expected to take place over 2-4 days, and have 20-35 participants. The workshop should be located close to a convenient air and/or train hub and have relatively low-cost facilities. The participation of young scientists will be

particularly encouraged. International experts of the relevant disciplines are expected to be invited to the workshops to provide scientific input to the workshop themes and enable international collaboration. Priority is given to proponents from ECORD and ICDP member countries.

The next deadline for submission of workshop proposals is **February 1, 2013**. The contribution of the MagellanPlus Workshop Series will not exceed 15,000 Euros per workshop. The proponent is encouraged to seek co-funding from other sources.

Contact magellan.plus@bgr.de or **check** <http://www.essac.ecord.org/index.php?mod=workshop&page=workshop>

Jochen Erbacher, Chair of the MagellanPlus Workshop Series

Recent publications that include ECORD authors

- Hayman, N.W., Byrne T.B., McNeill L.C., Kanagawa K., Kanamatsu T., et al (2012) Structural evolution of an inner accretionary wedge and forearc basin initiation, Nankai margin, Japan. *EPSL*, 353-354, 163-172, [doi:10.1016/j.epsl.2012.07.040](https://doi.org/10.1016/j.epsl.2012.07.040)
- Pälke, 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](https://doi.org/10.1038/nature11360)
- 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](https://doi.org/10.1016/j.epsl.2012.06.003)
- Stickley, C.E., Koç, K., 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](https://doi.org/10.1130/G32976.1)
- Camoin, G.F., Sear, C., Deschamps, P., Webster, J.M., Braga, J.C. et al (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](https://doi.org/10.1130/G32057.1)
- 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](https://doi.org/10.1038/nature11300)
- Felis, T., Merkel, U., Asami, R., Deschamps, P., Hathorne et al (2012) *Nature Comms*, 3, 965, [doi:10.1038/ncomms1973](https://doi.org/10.1038/ncomms1973)

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Workshop and Conference Announcements

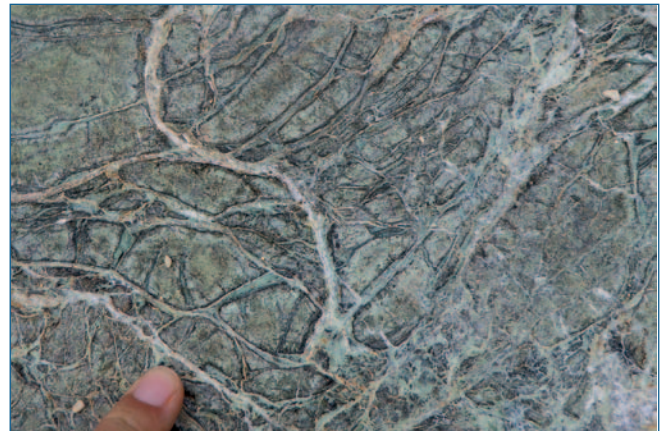
- ◆ MagellanPlus Workshop Series <http://www.essac.ecord.org/index.php?mod=workshop&page=workshop>
- ◆ ECORD DLP 2012-2013 <http://www.essac.ecord.org/index.php?mod=education&page=dlp>
- ◆ Ocean Networks Canada Workshops <http://www.oceanobservatories.org/2012/workshop-announcement-ocean-networks-canada>
- ◆ AGU 2012 Fall Meeting, December 3-7, 2012, San Francisco, USA <http://fallmeeting.agu.org/2012/>
- ◆ EGU 2013, April 7-12, 2013, Vienna, Austria <http://www.egu2013.eu>
- ◆ IODP Workshop: Chikyu +10, April 21-23, 2013, Tokyo, Japan <http://www.iodp.org/chikyu-plus-ten>
- ◆ OTC 2013, May 6-9, 2013, Houston, USA <http://www.otcnet.org/2013>
- ◆ JpGU 2013, May 19-24, 2013, Makuari Messe, Japan http://www.jpгу.org/meeting_e/index.htm
- ◆ Goldschmidt 2013, August 25-30, 2013, Florence, Italy <http://www.goldschmidt.info/2013>
- ◆ 3P Arctic 2013, October 15-18, 2013, Stavanger, Norway <http://www.3parctic.com>

Workshop Report

◆ Serpentine Days Workshop*, September 2-6, 2012, Porquerolles Island, France Convenors: Muriel Andréani (Univ. Lyon), Anne-Line Auzende (IMPMC Paris), Isabelle Daniel (Univ. Lyon) and Adélie Delacour (Univ. Toulouse).

Serpentinisation is a widespread process that occurs in many geological settings wherever warm aqueous fluids react with ultramafic mantle rocks or olivine-rich magmatic rocks. In recent years, there has been an increasing interest in serpentinisation not only within the Earth Science community, but also among biologists, organic chemists and industries (H_2 production, prebiotic molecules, deep life, CO_2 storage, etc.). The 'Serpentine Days' workshops were organised to gather specialists from all these various disciplines interested in the serpentinisation process and its numerous fundamental and societal implications. This year, the workshop attracted 90 participants from 12 countries to present and discuss the following subjects: serpentinites in oceanic and subduction context, prebiotic environment, life in serpentinising systems, and societal implications (CO_2 storage, H_2 production and asbestos remediation). Forty-five talks, including eight keynote presentations, and 40 posters were presented during the workshop. Participation of young researchers was strongly encouraged and almost a third of the presentations were given by this group.

The objectives of the workshop were to establish the state-of-the-art in each major research field and to identify emerging questions that are to be addressed in future years through new collaborations and projects. Our objectives were reached, and discussions emphasized the strong need for natural observatories with multidisciplinary investigations to go a step further in our understanding of serpentinisation-related processes. Indeed, natural serpentinising systems are dynamic, strongly heterogeneous and integrate the interactions between rocks, fluids and the biosphere. This complexity renders serpentinisation very difficult to investigate and/or to reproduce in the laboratory. Two targets have therefore been identified by the community as the most relevant for such natural laboratories: (1) the Atlantis Massif, located at $30^\circ N$ along the Mid-Atlantic, hosting the Lost City hydrothermal system (IODP proposal 758), and (2) the Oman



Outcrop of serpentinites with cross-cutting veins of carbonates from the Oman ophiolite (photo M. Andréani).

ophiolite, displaying evidence for active, alkaline, H_2 and CH_4 seepages in low-temperature springs, where CO_2 is also efficiently mineralised. A clear request was also made for the use of drilling not only for pertinent rock recovery and downhole analyses, but also for *in-situ* experiments and long-term monitoring.

The results of the 'Serpentine Days' workshop were subsequently presented during the ICDP-Deep Carbon Observatory (DCO) workshop held in New York one week later to prepare the ICDP proposal for drilling in Oman. The implication of several participants in these two workshops coming from earth and life sciences, and from the oceanic and continental fields, is that it demonstrates the commitment of the "serpentine community" to ensuring co-ordination and knowledge transfer during future drilling projects.

**Funded by DCO, SFMC, IMPMC, INSU-CNRS and IODP
<http://www.sfmc-fr.org/spip.php?article131>*

IODP Expedition 347: Paleoenvironmental evolution of the Baltic Sea Basin through the last glacial cycle

Thomas Andr en¹, Bo Barker J rgensen², Carol Cotterill³ and Sally Morgan⁴

The Baltic Sea Basin (BSB) is a brackish sea located in northern Europe (Figure 1). Its location, in the heartland of past Scandinavian Ice Sheet advances and retreats, has resulted in the formation of a rare geological and microbiological archive, with a unique high-resolution paleoenvironmental record.

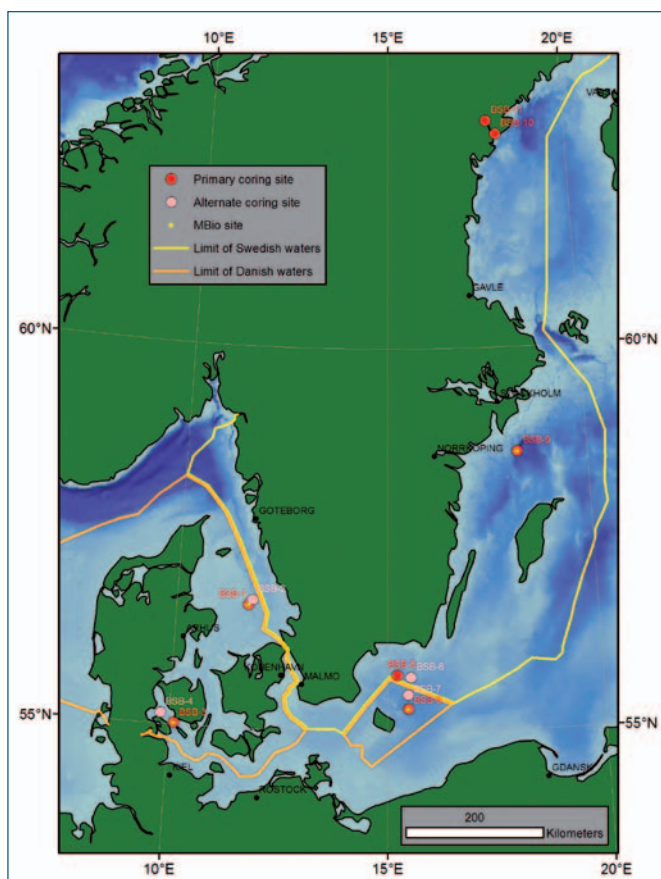


Figure 1: Location of the proposed sites for Expedition 347. MBio = Microbiology.

The sediments within this largest of the European intracontinental basins have been subjected to repeated glacial fluxes, sensitivity responses to sea level and gateway threshold changes and large shifts in sedimentation patterns, which when coupled with high sedimentation rates (1-5 m/ky), gives scientists an unparalleled insight into four overarching themes:

- **Coupling of the North European terrestrial record with the North Atlantic climate record through analysis of MIS 5.** The main aim of this theme is to understand the history of the BSB during the last interglacial period (Eemian interglacial) 130,000 years ago, with a particular focus on how it terminated in the onset of the last ice age (Weichselian glacial). This will make it possible to make some predictions about the future of the Baltic

Sea. In addition, information about the climatic development of the region will be acquired, allowing the coupling of the North European terrestrial and North Atlantic climate records (Figure 2).

- **The complexities of the Weichselian glacial period, covering MIS stages 4 - 2.** During the most recent glacial, the Baltic Sea Basin was intermittently free of ice, at which point lakes occupied the basin. This theme will focus on the advances and retreats of the Scandinavian Ice Sheet (SIS) between 100,000 and 20,000 years ago. Most notably, it is hoped to better understand whether the SIS was an active player in climate fluctuations or whether it simply responded to those climate changes. It is clear from site-survey data that the final ice advance over the southern Baltic did not disturb the lake deposits. Drilling of these deposits will provide new and exciting information on the climatic development of a previously poorly understood time period.

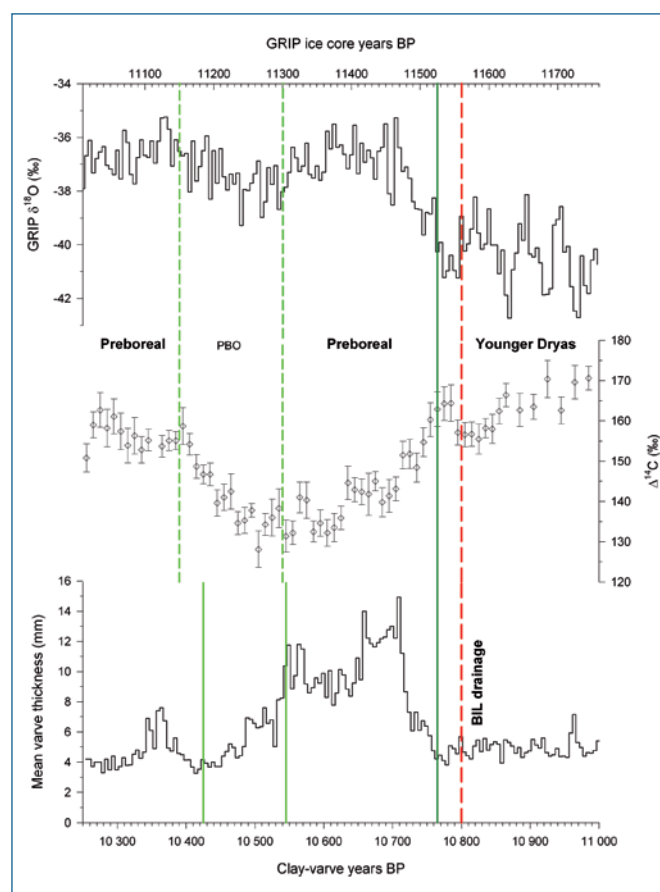


Figure 2: Illustration of the correlation between the Baltic Sea varved clays and the ¹⁸O curve from the Greenland GRIP ice core (Redrawn after Andr en et al., 2002).

- **Deep biosphere responses to glacial - interglacial cycles.**

This theme aims to better understand how the present and past microbial communities have responded to the environmental and depositional history of the BSB during the transitions between glacial and interglacial periods (Figure 3). Specifically the expedition will study the microbiological and biogeochemical responses to major shifts between limnic, brackish and marine phases, and also shifts between marine and terrestrial material.

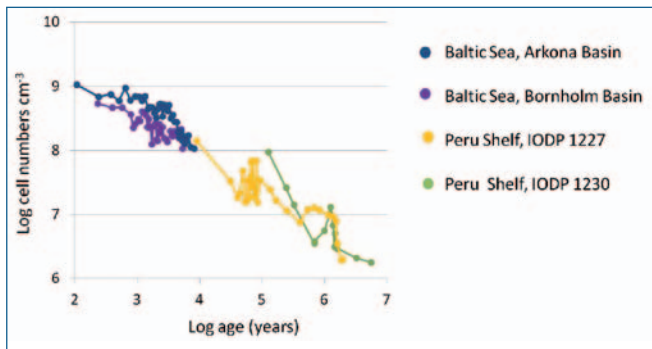


Figure 3: Microbial cell numbers in marine sediments from the Baltic Sea (R. J. Parkes, unpublished) and the Peru shelf (ODP, Leg 201) plotted against the age of the sediment. The double-log plot illustrates how cell numbers decrease with increasing age of the buried organic matter. Few data exist for the time window 10^4 - 10^5 years covered by the Baltic Sea Paleoenvironment Exp. 347.

- **Glacial and Holocene climate forcing.** This theme will elucidate the history of the BSB during the last 20,000 years and show how the ecosystem has responded to climate changes prior to any anthropogenic influence. The opportunity to recover sediments from deeper than 20 m below the seafloor will greatly expand the record recovered to date. A unique series of annually varved sediments from the Ångermanälven River will provide a high-resolution dataset including proxies for both precipitation and temperature.

Reconstruction of climatic variability based on cores acquired during this expedition will be of significant importance both regionally and globally. Analysis of terrestrial, marine and ice archives combined with numerical modelling (e.g. Levine and Bigg, 2008) have shown that the North Atlantic Ocean circulation plays an important role in the global climate systems, affecting North America and Europe in particular. The position of the BSB, with a watershed drainage area roughly four times the size of its 373,000 km² area, halfway between North Atlantic Greenland and Asia, represents a depositional sink with the ability to record the high-resolution and complex continental responses to oceanic and climatic forcings and links to the Asian monsoon system (e.g. Wang et al., 2001).

To date, knowledge of the development of the BSB is based on a combination of remote sensing methods, short cores (up to 20 m long, covering mainly the Late Pleistocene and Holocene) and regional interpretations, largely based on the terrestrial

geological record. In 2004 a group of scientists, predominantly from the Baltic states, submitted a pre-proposal to IODP with a view to extending knowledge of the marine record back to 130,000 years. This pre-proposal was ultimately submitted as a proposal (#672) and received a positive evaluation from the IODP Science Planning Committee (SPC) who recognised it as being strongly related to the Initial Science Plan. And so Expedition 347 was born, being led by Co-chief Scientists Thomas and Bo, with Carol as Expedition Project Manager and Sally as Petrophysics Staff Scientist. Unlike the other IODP platforms, MSPs have both an offshore and an onshore phase. The offshore phase to the Baltic Sea is planned to take place in spring/summer 2013 and will involve coring and logging activities as well as the acquisition of essential ephemeral measurements and microbiological sub-sampling. The Onshore Science Party (OSP) will take place at the Bremen Core Repository and will likely be scheduled in the fall of 2013. During this phase the cores will be split, described and sampled.

IODP Expedition 347 will be the fifth mission-specific platform (MSP) expedition managed by the ECORD Science Operator (ESO) and will utilise the services of a geotechnical drillship to core and wireline-log six of the sub-basins within the BSB (page 5). To obtain the most complete record of the paleoceanographic and microbiological history recorded within the sediments from the last 130,000 years, a series of holes will be cored at six sites in different water depths (Figure 1), adopting an offset coring methodology, to ensure as complete a composite section as possible is recovered at each site. These records will be supplemented by a series of short cores that will capture an undisturbed record of the water / sediment interface and upper 0.75m. Four sites (BSB 1, 3, 8 and 9) have been identified as being critical for the investigations into the response of the deep biosphere to the climatic changes within this basin, and so at each of these sites an additional hole will be cored and dedicated to microbiological sampling.

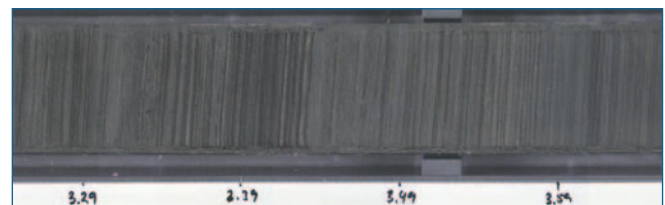


Figure 4: Example of laminated sediments from the Littorina Sea (Photograph courtesy of Thomas Andrén).

BSB 1 or alternate (Anholt Loch) and BSB 3 or alternate (Little Belt) will target Eemian interglacial records whilst also providing a deglacial - Holocene sequence encompassing the time period of linkage between the BSB and the open Atlantic oceanic system. Hanö Bay and Bornholm Basin (BSB 5 and 8 respectively or alternates) will highlight the development of a southern Baltic Sea lake that existed from the Eemian interglacial to ice advance over the area in the Weichselian, in both littoral and deep phases (Figure 4).

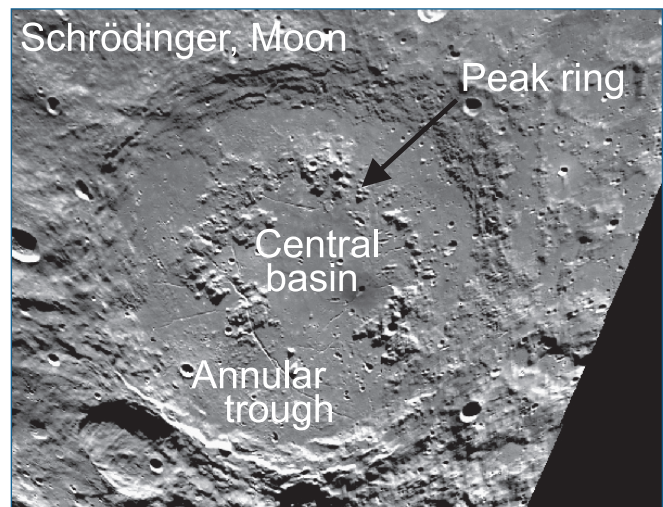
Highlights of IODP Proposal

Chicxulub: Drilling the K-Pg Impact Crater (IODP #548)

Joanna Morgan¹ and Sean Gulick²

The Chicxulub impact crater in Mexico is unique. It is the only known terrestrial impact structure that has been directly linked to a mass extinction event; it is the only one of the three largest impact structures on Earth that is well-preserved; and, it is the only known terrestrial impact structure with an unequivocal topographic peak ring. Peak rings are a semi-continuous annulus of rugged mountains internal to the main crater rim, and are common features of large impact craters on silicate bodies such as the Moon (*right*), Venus and Mercury. Despite their widespread occurrence, the exact nature and formational mechanism of peak rings are unknown. Two strongly advocated models for peak-ring formation are (1) the hydrodynamic collapse of centrally uplifted material (*Morgan et al., 2000; Collins et al., 2002*) and (2) the nested melt-cavity model (*Head, 2010; Baker et al., 2011*). These two models give different predictions about the origin and physical state of the rocks that form a peak ring.

Proposed drill hole **Chicx-03A** (*below*) will sample the peak ring, and ascertain whether the rocks originate from the lower, mid, or upper crust, whether they are parautochthonous or allochthonous, and determine the degree of brecciation and shock levels that these rocks have been subjected to. **Chicx-04A** (*below*) will sample the outer edge of the peak ring and penetrate a suite of dipping reflectors that may represent a lithological and/or structural boundary. The recovered core and logs will allow us to constrain models of peak-ring formation and these results, in turn, will improve our understanding of how large-scale impact cratering shaped planetary surfaces and upper crusts early in solar system history and how cratering changes the conditions and subsurface habitats for life. Other targets for the drilling include: the PETM boundary, investigating the extent and duration of hydrothermal circulating fluids and their relationship with microbiology; determining whether the post-impact sediments are low or high energy deposits, and examining how life recovered after the impact.



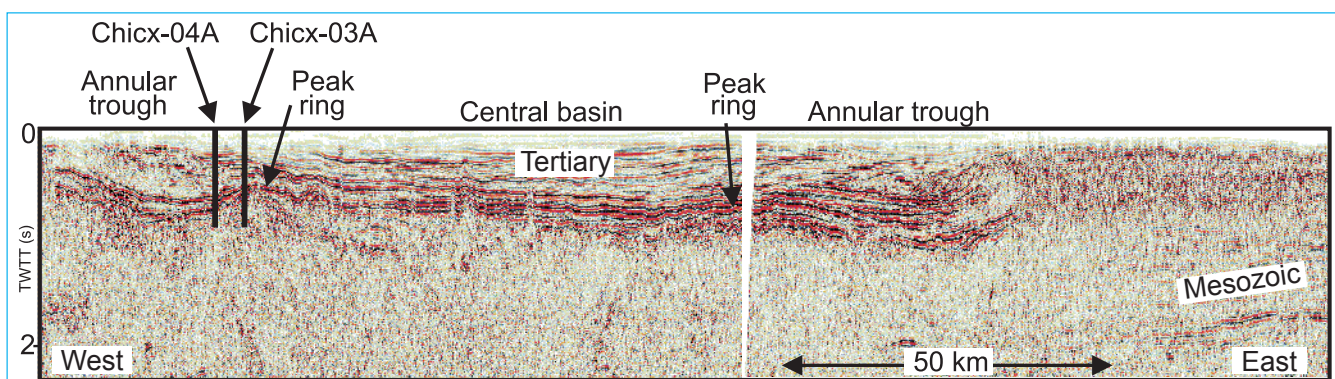
Schrödinger is an example of a peak-ring basin on the Moon. The topographic profile across Chicxulub would have looked like this 65 Ma.

Several companies have indicated to the ECORD Science Operator (ESO) that they are interested in undertaking the hazard survey to take place in the first half of 2013. Drilling is provisionally scheduled for 2014 (*See page 5*).

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² Institute for Geophysics, University of Texas at Austin (UTIG)

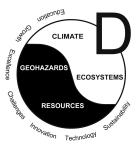
IODP #548 Proponents: Joanna Morgan, Sean Gulick (*Co-chief Scientists*), L. Alegret, I. Arenillas, J. Arz, P. Barton, G. Christeson, P. Claeys, C. Cockell, G. Collins, K. Goto, R. Grieve, C. Koeberl, D. Kring, T. Matsui, J. Melosh, C. Neal, R. Norris, E. Pierazzo, M. Rebolledo-Vieyra, U. Reimold, U. Riller, P. Schulte, J. Urrutia-Fucugauchi and M. Whalen.



In seismic reflection sections across Chicxulub, reflective Tertiary sediments cover the original crater floor. Onshore drilling suggests that the K-Pg boundary is at the base of this reflectivity. The impact basin includes a peak ring rising hundreds of metres above the crater floor with a similar morphology as peak rings on other planetary bodies.

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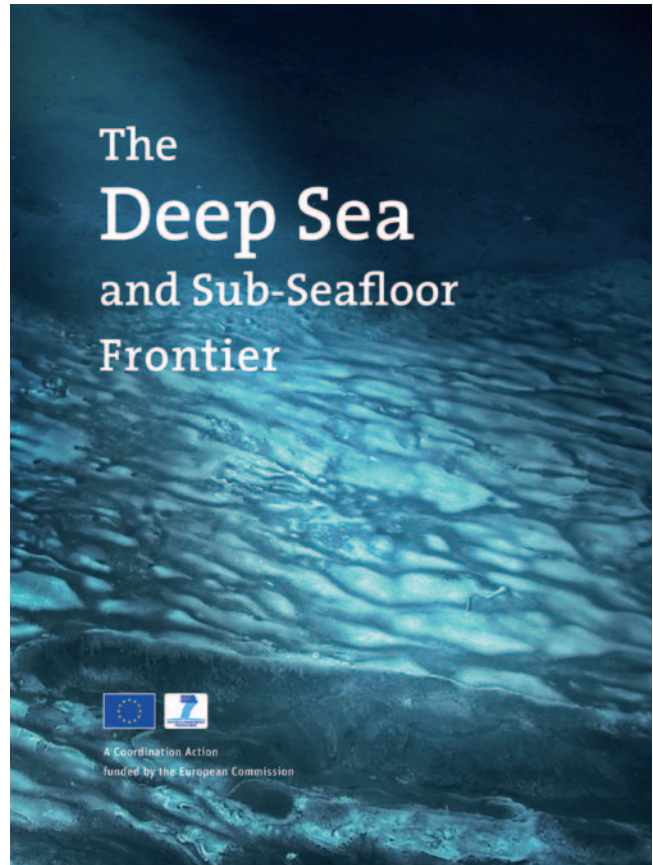
A Roadmap for the next 10-15 years of Deep Sea & Sub-Seafloor Research

Achim Kopf

The Deep-Sea and Sub-Seafloor Frontier project (DS³F) brought together scientists from Europe's major ocean research centres and universities to identify the primary issues that need to be addressed in sub-seafloor sampling with relevance to deep-sea ecosystems, climate change, geohazards, and marine resources in the next 10-15 years. It aimed to provide a pathway towards sustainable management of oceanic resources in the broadest sense on a European scale and to develop sub-seafloor sampling strategies for enhanced understanding of deep-sea and sub-seafloor processes by connecting marine research in life and geosciences, climate and environmental change, with socio-economic issues and policy building. Based on the above, a structure of nine work packages (WPs) was set up. They included three WPs focusing on life sciences (WP1 to 3) and another three leaning towards geosciences (WP4 to 6). WP 7 and WP8 address the infrastructure that is necessary to achieve the objectives of the previous 6 WPs. Everything is held together by a ninth WP comprising the management, outreach, and interfacing between science and policymaking.

The outcome of 8 expert workshops and two larger meetings in Brussels and Sitges during the 30-month Coordination Action can be summarised as follows:

- The deep sea and its sub-seafloor contain a vast reservoir of physical, mineral and biological resources that are rapidly coming into the window of exploitation. Assessing the opportunities and the risks involved requires a serious commitment to excellent deep-sea research.
- There are numerous areas in this field in which Europe has cutting-edge technological potential. These include drilling and monitoring technology in the field of renewable energies such as geothermal, offshore wind and seafloor resources. Scientific ocean drilling will continue to play a valuable role, for example in the exploration of resource opportunities, in obtaining estimates for ecosystem and Earth climate sensitivity, or in improving understanding about the controlling factors governing processes and recurrence intervals of submarine geohazards.
- In Europe, there is also the scientific expertise needed to define a framework for policymakers for environmental protection measures and to carry out ecological impact assessments before,



during and after commercial exploitation. Taking up these societal challenges will strengthen European scientific and educational networks and promote the development of world-class technology and industrial leadership.

The White Paper is now available in printed form or can be downloaded from the project's website, where additional information can also be found at <http://www-deep-sea-frontier.eu>

For details, you may also contact the Co-ordinator:
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A Letter from Canada

A brief history of ocean drilling in Canada

Canada, bordered by the Pacific Ocean in the west, the Atlantic Ocean in the east and the Arctic Ocean in the north, has long held a deep interest and active role in the marine sciences. Canada's involvement in scientific ocean drilling dates back to the early days of ODP, when Canada joined ODP as a full member from 1985 to 1988. From 1989 onwards, Canada became part of an entity called the Pacific Rim Consortium (PACRIM) with Australia, Korea and Taiwan. This was an exciting and busy time for ocean drilling science in Canada - 135 Canadian scientists (16 Co-chiefs) sailed on 79 of the 110 ODP legs, and 16 proposals with Canadian proponents were drilled (including 5 in Canadian waters).

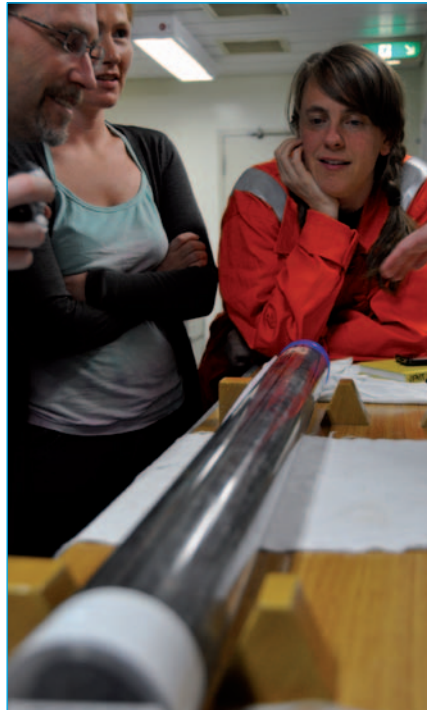
Canada joined IODP in 2004 through membership in ECORD, supported by the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Canadian Consortium for Ocean Drilling (CCOD), comprised of 13 Canadian universities.

Canadians at Sea

Within the current programme, 11 Canadian researchers have participated as shipboard scientists on 9 IODP expeditions across the full range of drilling platforms including the *JOIDES Resolution* - Anne de Vernal (North Atlantic Exp. 303), Neil Banerjee (Expedition Project Manager, Superfast Spreading Exp. 309 & 312), Michael Riedel (Co-chief Scientist, Cascadia Margin Exp. 311), Taoufik Radi (Bering Sea Exp. 323), Earl Davis, Martin Heesemann and Michael Riedel (Cascadia ACORK Exp. 328), the *Chikyu* - Gordon Southam (Deep Hot Biosphere Exp. 331), Christie Rowe (right) and Tian Sun (Japan Trench Exp. 343), and the mission-specific platform *L/B Kayd* - Francine McCarthy and Heather Schijns (New Jersey Exp. 313).

At least two more Canadians will sail before the end of the current IODP. Kathy Gillis has been selected as Co-chief Scientist of Exp. 345 (Hess Deep).

Kathy was the principal proponent of this proposal, which will enable further drilling and expansion of results obtained during ODP Leg 147, where Kathy also sailed as Co-chief. Next summer, Guillaume St-Onge will participate in Exp. 341 (Southern Alaska Margin).



Christie Rowe during J-FAST Expedition 343 (© JAMSTEC/IODP).

Canadian contributions to IODP

Canadian scientists are very active in the ocean drilling community, and many are proponents of active drilling proposals. Canadians organised the recent IODP workshop "Coordinated Scientific Drilling in the Beaufort Sea" (*ECORD Newsletter #18*), which was attended by more than 70 scientists from several European, American and Asian countries. The workshop aimed to define the scientific questions and drilling strategies required to assess environmental change and geohazards in the Beaufort Sea.

Canadians have held important positions on numerous ECORD committees and within the IODP Science Advisory Structure. Currently, Anne de Vernal is completing her term as Chair of the ECORD Council (*page 2*), and will continue as Vice-chair until April 2013.

Doug Schmitt is the present Chair of the Scientific Technology Panel (STP), and David Mosher was recently appointed to serve on the Site Characterization Panel (SCP) (*page 12*).

Training the next generation

Outreach and education have always been important aspects of IODP in Canada. The CCOD coordinates exhibition booths at national and international conferences such as GeoCanada, GAC-MAC (*page 23*), Goldschmidt (*page 7*) and AGU, and organises public events and tours of IODP drillships during portcalls in Canada, most recently in Victoria BC in 2010. As an ECORD Distinguished Lecturer for 2010-2012, Dominique Weis has traveled to 12 institutions across Canada and Europe.

Two ECORD Summer Schools (2010 and 2012, *page 8*) have been organised in Québec, attracting students from around the world. Both schools addressed ocean and climate changes in polar to sub-polar environments and involved lectures, workshops, field and lab work. The CCOD offers numerous summer school scholarships, research awards and conference travel grants for students and young scientists.



Drillship JOIDES Resolution in Victoria, British Columbia, in 2010.

For more information please visit www.iodpcanada.ca.

Diane Hanano (CCOD Scientific Coordinator), Anne de Vernal (ECORD Council Chair, CCOD Chair) and Dominique Weis (ESSAC Delegate)

News from ECORD member countries

Sweden

Baltic Sea Paleoenvironment Expedition 347.

The Swedish IODP community was pleased to find out that Thomas Andrén (Södertörn University) has recently accepted an invitation to be a Co-chief Scientist on Baltic Sea Paleoenvironment Expedition 347, which will take place in 2013. As expected, the ECORD call to take part in this expedition triggered a large number of applicants by Swedish based scientists to take part in the expedition Science Party, with interests that covered all the aims of the initial proposal.

In the build up to this eagerly awaited expedition, Ian Snowball (Uppsala University and Lund University) participated in a two-week long German funded research cruise on *R/V Poseidon* in the Baltic Sea in June 2012. This cruise, led by Helge

Arz and Matthias Moros (both at the Leibniz-Institute for Baltic Sea Research, Warnemünde, Germany), included the recovery of the uppermost eight metres of sediment from the two proposed IODP drill sites in the Ångermanälven River estuary (*left*).

Paleogene Newfoundland Expedition 340.

Last, but not least, Claudia Agnini, who is affiliated to the Department of Geological Sciences at Stockholm University, sailed as a nannofossil paleontologist on Paleogene Newfoundland Sediment Drifts Expedition 342 and reports that the expedition was very successful, unexpectedly recovering Neogene and Mesozoic units in addition to the targeted Paleogene. Claudia will undertake her post-cruise work in Stockholm.

*Ian Snowball,
Sweden's ESSAC
Delegate*

Deployment of a 'Fram Lot' short corer from R/V Poseidon under rather calm conditions in the Ångermanälven estuary in June 2012 (photo Ian Snowball).

Spain

IODP-ICDP Spain participated in the VIII Spanish Geological Congress in Oviedo, Spain, (July 17-19, 2012) with a booth and a Round Table. With more than 600 geologists participating in the Congress, the **IODP-ICDP booth** was very well attended by scientists from all fields of geosciences. They were greeted by M. Pedrosa (IODP Spain) and J. Gutiérrez Pastor (ESSAC) (*below*) who provided them with ECORD-ESSAC- IODP-ICDP materials (flyers, posters, stickers, ECORD Newsletter, and *Scientific Drilling* issues) and information (core replicas, calls to upcoming expeditions and workshops, scholarships and grants, 'Teacher-at-sea program'). In addition, two screens were continuously running ECORD, IODP and

ICDP videos. IODP-ICDP Spain thanks P. Maruéjol and T. Wiersberg for providing materials for the booth.

The **Round Table** entitled 'The IODP (oceanic) and ICDP (continental) Drilling Programs in Spain: Advances and Prospects' was led by M. Comas (IODP Spain President). Lively open-floor discussions followed reports provided by M. Comas, J. Gutiérrez Pastor (Role of ESSAC in ECORD/ IODP), J. Hernandez Molina (Mediterranean Outflow Exp.) M. José Jurado (NanTroSEIZE Exp.) and B. Valero and J. Pares (ICDP Spain).

*Julia Gutiérrez Pastor
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Ireland



The Geological Survey of Ireland (GSI) and the Marine Institute celebrated its **2012 INFOMAR seminar** - <http://www.infomar.ie> - with a two-day event on October 11-12 at University College Cork, Ireland, just after the GeoSeas International Workshop. The seminar presented an update on Ireland's national seabed mapping programme including survey

operations and coverage, future plans, associated research, along with poster sessions and vessel tours. During the event, IODP related activities were presented and posters displayed with the aim to engage Irish scientists.



Michal Szpak from Dublin City University (DCU) took part in the South Pacific Gyre Sub-seafloor Life Expedition

329. The expedition studied the largest of the World's oceanic gyres previously not targeted by scientific drilling. Expedition findings revealed an ultra-oligotrophic, organic carbon limited system with extremely low metabolic activity and unprecedented dissolved oxygen penetration through the sedimentary column. Researchers from DCU aim to characterise the

organic carbon on a molecular level and understand why it is not utilised by scarce microorganisms of the South Pacific Gyre. Findings of this research might have implications on how scientists perceive the deep biosphere and its activity.

On the other hand, Ireland, through GSI, is now looking into **Arctic research** and preparing an international expedition for the summer of 2014 onboard the *R/V Celtic Explorer*. Scientists will investigate the most recent deglaciation and its impact on shallow reservoirs of gas beneath the continental slopes, the effects of climate change on the release of methane currently trapped as free gas, and gas hydrates in marine sediments.

Xavier Monteys (ESSAC) and Koen Verbruggen (ECORD Council), Geological Survey of Ireland

Portugal

IODP sediments used in outreach activities. Sediment material collected during North Atlantic Climate Exp. 306 and Mediterranean Outflow Exp. 339 was used to explain differences in deep-sea sediment colours and textures to the general public, especially younger people (*below*), during the "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. As well as the sediment cores, visitors could also study different microfossil groups under the microscope, including a Tertiary foraminifer sample from Exp. 306, or could see photos showing the work at sea (including onboard the *JR*). The activities, performed by members of the Paleooceanography Group of the Unidade de Geologia Marinha (UGM) of LNEG at the invitation of Ciência Viva,

were well attended and both children and parents enjoyed the hands-on experience of washing a sediment sample or studying the different shapes and forms of the microfossils under the microscope.

JR Lisbon visit in FCT Newsletter. The January port call of *JOIDES Resolution* was part of the May 22, 2012 edition of the online newsletter published by the Fundação para a Ciência e a Tecnologia <http://newsletter.fct.pt/h/n1/joides-resolution>.

Scientists participate in sampling party.

The sampling party for Exp. 339 took place at the Bremen Core Repository (BCR) between June 9 and 17, 2012. As members of the Exp. 339 science party, Antje Voelker, Cristina Roque, Teresa Rodrigues and Emilia Salgueiro (all UGM-LNEG) participated in the sampling party and helped to collect the 38,298 samples taken during those days.

Antje Voelker, Portugal's ESSAC Delegate

Catarina Cavaleiro (UGM-LNEG) explaining to her young audience that Saharan dust contributes to deep-sea sediments and their colour (photo courtesy Ciência Viva).



United Kingdom

The UK has approximately 700 students and scientists engaged in IODP-related research. Over the past year, 16 UK scientists have participated in eight expeditions, two serving as Co-chief Scientists - <http://www.bgs.ac.uk/iodp/newsletters.html>

While the final structure of the international programme is taking shape, the UK-IODP domestic research programme (the largest of its kind in the UK) is also

going through a renewal process. All signs are positive that the programme will continue to enable UK scientists to take advantage of the opportunities provided by IODP *e.g.* post-cruise funding, site-survey grant rounds, hosting and attending IODP-related meetings/workshops.

In September, UK-IODP hosted two conferences. The three-day, 2012 UK-IODP Student and Early-Career Scientists Workshop was the

first of its kind in the UK, and was a great success for the 50 participants. The 2012 UK-IODP General Conference was a day of excellent talks covering the diversity of research conducted within IODP, including a poster session, and discussions about the future of the international and domestic programmes <http://www.bgs.ac.uk/iodp/meetings.html>

UK-IODP new faces.

We have several new UK scientists in the ESSAC and IODP Science Advisory Structure (SAS). Current

members are: *ESSAC-Bridget Wade* (Univ. of Leeds), *PEP chair-Dick Kroon* (Univ. of Edinburgh), *PEP-Stuart Robinson* (UCL), *PEP-Lisa McNeil* (Univ. of Southampton), *SIPCom- Paul Wilson* (NOCS), *SCP-Mads Huuse* (Univ. of Manchester), *STP-Cedric John* (Imperial), *EPSP-Bramley Murton* (NOCS).

Dayton Dove, UK-IODP Science Programme Co-ordinator

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France

The **IODP-France Days** meeting was held in Paris on April 10-11 (*below*) and brought together French scientists involved in scientific drilling and representatives of funding and government agencies. About 80 people attended this meeting as well as the French team onboard the *JOIDES Resolution* (Lesser Antilles Exp. 340) who joined the discussions through a video conference. The objectives

of the meeting were (1) to identify the standing scientific and societal challenges that scientific ocean drilling can and must contribute to take up at the beginning of the 21st century, (2) to enlighten specific and outstanding contributions (past, present and future) of French scientists to the programme, and (3) to expose the current and future structure of IODP and the increasing role of ECORD in the forthcoming decade (2013-2023).

IODP-France Days were a great success, thanks to the high quality of the talks and debates. Fourteen percent of the participants were young scientists and 7% were from industry. Leaders of the funding agencies were not only impressed by the outstanding quality of the scientific results and the increasing involvement of young scientists in the programme, but also by the emergence of many new targets. They formally expressed their conviction that it was essential for France to maintain a high level of commitment to IODP.

TOTAL/IODP-France/INSU-CRNS meeting.

To evaluate potential collaboration between the French academic community and the industrial group TOTAL in the frame of the IODP Science Plan, a meeting took place on July 24 at CNRS Headquarters in Paris with TOTAL and ECORD/IODP representatives and scientists. As several scientific questions and geographic areas

are of great interest for both parties it was discussed how TOTAL could collaborate on specific projects at (1) proposal level, by sharing data and the ability to conduct site surveys, organising workshops or participating in IODP workshops, and (2) after IODP expeditions by supporting doctoral or post-doctoral works with research grants. It was agreed that TOTAL's involvement in IODP is welcome as long as the public character of data and results acquired during the cooperation is guaranteed.

As a TOTAL/IODP-France/INSU collaboration appears very promising, a workshop grouping French industrial and academic communities is planned in 2013 to pursue the discussion about well-identified projects.

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Norway



Bjørn Olav Steinsbu defended his PhD degree at the University of Bergen, Norway on August 29 with the thesis "Characterization of microorganisms from marine hydrothermal systems". Bjørn Olav participated on Juan de Fuca Exp. 301 and South Pacific Gyre Subseafloor Life Exp. 329 as a microbiologist. Bjørn Olav did his degree at the Centre for Geobiology at the Department of Earth Science in Bergen, a Norwegian Centre of Excellence led by Prof. Rolf Birger Pedersen.



Helga (Kikki) Kleiven will be the new ESSAC delegate for Norway. Kikki is an Associate Professor in marine geology at the University of

Bergen, Norway. Since participating as a 'marine tech' on Leg 162 she has built a career using ODP cores to reconstruct climate variability and ocean currents through the Pliocene and Pleistocene in the North Atlantic, South Atlantic (Leg 177) and southeast Pacific (Leg 202). Her current work focuses on detailed reconstructions of the present and last interglacial in cores from the Eirik and Gardar sediment drifts in the North Atlantic.



Katrine Husum will be the new alternate ESSAC delegate for Norway. Katrine is a marine micro-paleontologist at the University of Tromsø, Norway. Her work includes three overall themes: (1) paleoceanography and paleoclimate in subarctic and arctic regions from Pliocene to recent, (2) Circum-Arctic

Plio-Pleistocene biostratigraphy and (3) proxy development. Katrine has been both a participant and leader of several marine geological expeditions. She also sailed as a paleontologist (foraminifers) during Bering Sea Exp. 323. Her current work focuses on Holocene paleoceanographic records from the polar North Atlantic in addition to reconstructions of surface water changes during MIS 11 and the Plio-Pleistocene in the Bering Sea.

Since both Helga and Katrine represent universities and departments with strong histories in ODP/IODP, their number one goal is to promote IODP participation from Norwegian researchers, help initiate Norwegian led drilling proposals and ensure that a new generation of scientists join the IODP family.

Helga (Kikki) Kleiven, Norway's ESSAC Delegate

Germany

German ECORD membership beyond 2013 is approved! In July, the Senate of the German Research Foundation, DFG, approved a proposal by IODP Germany to continue German membership in ECORD beyond 2013. For the next five years, Germany will be able to keep its level of contribution pending on the commitment of the other ECORD members. With this early decision, the DFG and IODP Germany hope to foster the positions of the other ECORD members during their ongoing negotiations with their funding agencies.

DFG not only decided to continue its involvement in IODP via ECORD. A second part of the proposal, requesting a continuation of the DFG priority programme, has also been granted. This enables



Co-chief Scientist Kai-Uwe Hinrichs and scientists of the IODP Deep Coalbed Biosphere Expedition 337 onboard the Chikyū (©JAMSTEC/IODP).

the annual funding of scientific ocean drilling related research with currently up to 2.3 Million euros. A similar proposal by ICDP Germany was granted during the same meeting. With this, the retention of Germany's strong IODP and ICDP community is guaranteed!

BGR in Hannover will continue to co-ordinate Germany's activities in ECORD and IODP.

Jochen Erbacher, Co-ordinator of IODP-Germany and Guido Lüniger, Council Delegate - iodp@bgr.de <http://www.bgr.bund.de/IODP>

Canada

IODP Canada presents IODP and ECORD at GAC-MAC.

IODP-Canada had an exhibition booth at the joint annual meeting of the Geological Association of Canada and the Mineralogical Association of Canada (GAC-MAC) on May 27-29, 2012 (photo, right). This year, the conference was held in St. John's Newfoundland, and over 900 Earth scientists were in attendance. Some popular topics of discussion at the booth were drilling

in the Arctic Ocean, Canada's role in the programme post-2013, and the upcoming Newfoundland Sediment Drifts Expedition 342. Many outreach materials (e.g. New Science Plan, Scientific Drilling) were distributed and subscribers to the Canadian mailing list increased by about 10%.

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Continued from page 15

The Landsort Deep (BSB 9) is an excellent sediment trap, preventing sediments from glacial erosion, thereby providing not only a record of early Weichselian development, but also expanded late Weichselian and Holocene sequences. The Ångermanälven River Estuary (BSB 10 and /or 11) is known to have a high-resolution record of Holocene varved sequences that can be correlated to Swedish Time Scale (STS) late glacial varve chronologies, providing a unique record of Holocene sedimentation and access to proxies for temperature (pollens) and precipitation (river discharge).

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A view of the Baltic Sea near the Kalmar Strait (Kalmarsund) between mainland Sweden and the island of Öland. The small island on the horizon is Blå Jungfrun (Blue Virgin Island) (photo Thomas Andrén).



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The cover photograph shows the drillsites of the Baltic Sea Paleoenvironment IODP Expedition 347. Above is a coral assemblage of the Great Barrier Reef seen at low tide, see page 6 (photo Carol Cotterill).