



European Consortium for
Ocean Research Drilling

Newsletter #15

November 2010



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Guido Lüniger

From the Council Chair

Scientific drilling is always an exciting and challenging business, especially in times when all three platforms of IODP can report successful expeditions. During the last months, the *JOIDES Resolution* completed Expeditions 327 and 328 and is currently sailing Expedition 329. The *Chikyu* has also recently conducted Expeditions 326 and 331. From an ECORD perspective, the successful completion of Expedition 325 - Great Barrier Reef Environmental Changes and the subsequent Onshore Science Party held in Bremen was one of this year's highlights in ECORD science operations ([pages 3 to 7](#)).

However, ECORD's plan to implement two MSP expeditions during the remaining phase of IODP had to be reconsidered. It turned out that this plan was, under the given financial conditions, too ambitious. On the positive side, the revised planning will ensure the operation of one more MSP expedition by the end of 2013.

In addition to the drilling activities, ECORD has successfully conducted three international summer schools ([pages 8 and 15](#)). Two were held in Bremen, Germany, and Urbino, Italy. The third, as a first for ECORD, was hosted in Montréal, Canada. From the 'News from ESSAC' ([pages 10 and 11](#)) I would like to welcome Carlota Escutia Dotti as the incoming ESSAC Vice-chair.

2013 is coming closer and in parallel to the proceeding IODP activities, planning of a follow-on programme is going on intensively. The IWG+ meeting in Kyoto in June was another step toward the post-2013 program. Although several issues are still under debate and a number of questions are open, the new program is taking shape. Some of the agreements reached so far, the distinction between SOC and POC will be abolished, commingled funds for integrated activities will be maintained and the SAS structure will be significantly simplified. At the heart of the new program will be the new science plan, which is in the process of being refined ([page 9](#)).

One of the most relevant issues for ECORD is the role of mission-specific platform (MSP) expeditions in the new program as well as the proposed member categories. By providing MSPs, the scientific capabilities of the program have been extended significantly. This will also be true for the new program. Regions such as the Arctic, which will receive special attention in the new science plan, will only be accessible through MSP operations. From a scientific point of view, ECORD can play an integral role in the new program. With this said, the status of the proposed European icebreaker with drilling capabilities, *Aurora Borealis*, reported on [pages 18 and 19](#), is of special importance. If built, this ship will offer unique scientific opportunities to ECORD.

Regarding the membership structure of the future program, there will be a distinction between Lead Agencies, Platform Providers and Members. Whereas Lead Agencies provide the core of platform capability and contribute amounts of money beyond that which ECORD can bring to the program, Platform Providers will provide, as well as the drilling platform, a financial contribution similar to the amount that ECORD currently contributes to the program. It is easy to see that this category is tailor made for ECORD, as we are not able to compete financially with the current two Lead Agencies. However, as Platform Provider status will offer major scientific leadership and major participation in scientific planning, it is vital for ECORD to fulfill these requirements in the future. With an eye towards the approaching renewal of ECORD as a consortium, all partners should be encouraged to sustain their participation in, and their financial support of, ECORD as an internationally recognised and truly successful story of European collaboration.

Guido Lüniger, ECORD Council Chair, April 1 to September 30, 2010 - <http://www.ecord.org/c/council.php>

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The ECORD Newsletter is published twice a year by the ECORD Outreach team - Patricia Maruéjol (EMA), Alan Stevenson and Albert Gerdes (ESO) and Jenny Lezius (ESSAC) - who are grateful to all authors for their contribution to this issue.

An electronic version is available for download at: <http://www.ecord.org/pub/nl.html>

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<http://www.ecord.org>

Front cover: The drillbit viewed from the end of the drill string during the Great Barrier Reef Environmental Changes Expedition operated by ECORD from February 11 to April 6, 2010 (photo D. Smith ©ECORD/IODP).



David McNroy



Robert Gatliff



Alan Stevenson

The Great Barrier Reef Environmental Changes Expedition (GBREC) was completed during the summer when the Onshore Science Party (OSP) was held at the Bremen Core Repository from July 2 to 16. Staff Scientist Carol Cotterill provides a personal view of some of the difficulties encountered during an MSP expedition (*pages 3 to 5*), but also reflects on the successes. ESO Curation and Laboratory Manager Ursula Röhl describes the activities during the OSP on *pages 6 and 7*.

The New Jersey Shallow Shelf (Expedition 313) is currently 10 months into the moratorium period with the science party conducting their post-expedition research. The Expedition Report editorial meeting was held at TAMU, College Station, Texas from June 3 to 7. Peer-reviewed papers from Expedition 313 are expected within the next few months, and the expedition continues to be reported at various conferences by the science party. Results from the expedition will be reported at the AGU Fall Meeting, December 13-17, San Francisco, at Special Session PP13F: Sea Level, Near-Surface Currents, and the Stratigraphic Record: Recent Results. The session will be co-chaired by the Expedition 313 Co-chief Scientists Greg Mountain and Jean-Noël Proust.

David McNroy is now into his 10th full month as ESO Science Manager and is currently working on plans for the next MSP expedition. David, Ursula Röhl, Sarah Davies (EPC Manager), Dave Smith (ESO Operations Manager), along with Yoshi Kawamura (IODP-MI Operations Manager) and other members of the ESO team, met with proponents of the Chicxulub K-T Impact Crater proposal in October to discuss plans and logistics



for implementing the expedition. A similar meeting has been set up with proponents of the Hawaiian Drowned Reefs proposal in November. Obviously there is still a lot of work to do regarding permissions to operate in these areas, and in estimating platform costs, however the meetings allow the proponents the opportunity to explain their science objectives in detail and for the ESO team to consider the practical issues that they will have to deal with if the expeditions go ahead. ESO will report the feasibility of implementing these projects to the Science Planning Committee when they meet in Edinburgh in March 2011.

Robert Gatliff, in his role as ESO Chair, has attended Operations Task Force, SASEC and IWG+ meetings in Japan and has represented ESO at ECORD Council meetings in Berlin and Paris. Robert has also taken the lead in developing the ESO input to the ECORD business plan, which takes a forward look at Europe's involvement in the post-2013 program.

As mentioned in the last newsletter, we said farewell to Dan Evans when he left BGS at the end of April and many of the ESO team attended the party that Dan arranged to mark the occasion. The party was held at Dan's golf club in Edinburgh, where he now spends much of his time! Dan continues to provide advice as required and will attend the next ESO meeting in Montpellier, France at the end of November.

David McNroy, ESO Science Manager, Robert Gatliff, ESO Chair and Alan Stevenson, ESO Outreach Manager.
<http://www.eso.ecord.org>



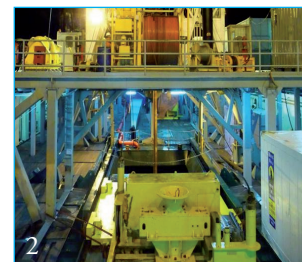
Carol Cotterill

Trials and tribulations of coring corals

Over the past two years, I have become very accustomed to the response from people when I told them that my next job for IODP was going to be on the Great Barrier Reef! Indeed, I even started to believe that working with blue skies and golden sunshine beating down on calm seas, surrounded by pristine coral reefs glistening just below the surface, and a multitude of marine life, was coming my way. After all, how bad could it be working in the Australian late summer? "How bad could it be".....five words that repeatedly came back to haunt me during the 55 days Expedition 325 was offshore!

The first indication that our logistics and planning might be subject to the wiles of a few gremlins came when the ESO Operations team arrived in Singapore for mobilisation of the 7 self-contained office and laboratory containers. Despite weekly conference calls with Singapore prior to the expedition, the estimated timeline for completion of the shipyard works was

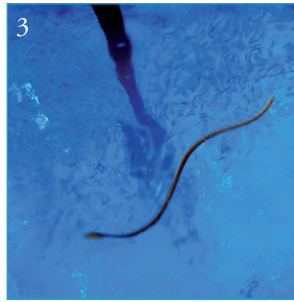
significantly behind. So how did we turn the shell we were confronted with into a working drillship (*Figures 1 and 2*) in under one month? Through hard work, huge amounts of manpower and a significant degree of patience!



Finally the ESO team managed to install the containers, monitor sea trials, and help get the vessel on her way to Australia by late January 2010.

The remainder of the ESO Operations team and offshore science party members joined the *Greatship Maya* at Townsville, boarding on a sunny humid day in February – many glad to be escaping one of the harshest European winters. Expectations and excitement were high, although the air-conditioning wasn't! As we sailed towards the first station, it dawned on us that the heat inside was extreme, and that the low 30's outside was preferable! After a very sleepless night inside a 10-deck sauna (a bit excessive even for the Norwegians onboard) the engineers managed to fix the problem, and we sailed on towards Hydrographer's Passage.

The first few "walks to work" (making our way from the superstructure along the marked walkways to the container) were unusual in the volume of bottled and loose water we encountered! Just prior to sailing, a torrential downpour had hit Townsville, resulting in the soaking of many of the supplies that were still being moved from the main deck into the superstructure. These cardboard, and now very soggy, boxes contained enough bottled water for 65 people for 6 weeks - it became quite common to find random bottles in very odd places as they escaped the confines of the boxes and floated away, borne on the geyser-like eruptions from the moonpool during periods of excessive swell! The swell through the moonpool also revealed an unusual visitor on one occasion – a rather annoyed sea snake (Figure 3) who circled its moonpool lair for hours, giving us all a good look as the swell brought it nearly level with the main deck before dropping it back again.



Part way through coring at the Hydrographer's Passage site, concerns began to build that a submarine slide off the coast of Chile as a result of a magnitude 8.8 quake on February 27 was sending

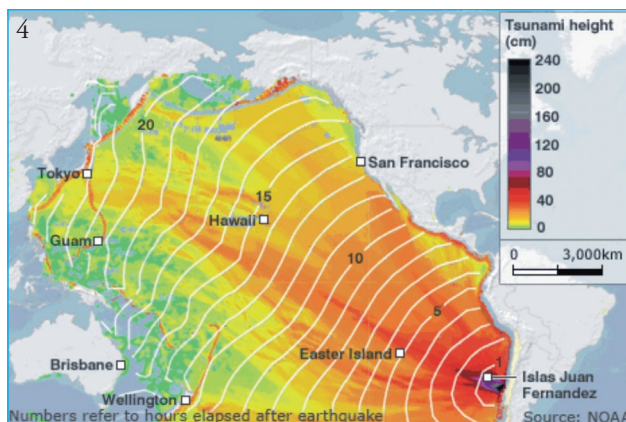


Figure 4: Chile quake tsunami spreading across the Pacific Ocean.

a tsunami out across the Pacific Ocean. Initially our interest was piqued, as family and friends began to log on to Facebook and other networking sites to discuss the impact of the earthquake. This soon turned into monitoring of the effects, as both NOAA and the Joint Australian Tsunami Warning Centre issued Pacific-wide tsunami alerts. Would it reach us here? Would we feel the effects or would the wave be dissipated? If it did reach here, how large would it be and when would it arrive?

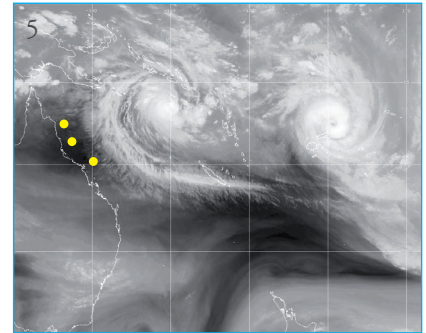
Projections had the wave passing right underneath us, although the predictions were for a negligible wave height (Figure 4). However,

with a drilling system anchoring the vessel to the seabed, we knew that we had to monitor the situation carefully to give us enough time to recover the pipe safely if required. The sun beat down on the boat deck as we assembled for a fire drill at 12:50, the predicted arrival time of the wave, and then left at 13:00 with not so much as a ripple over the usual sea swell.

Later that day, Martin Kölling, one of the geochemists onboard, showed me an interesting plot from his laptop on which he had installed a system called "SeisMac" that monitors the movement of the computer. The plot showed an increase in the average sea-swell induced fluctuations of the drill floor of approximately 0.5G (Gravitational Constant) for about 1^{1/2} minutes, which had occurred between 18 and 19 hours after the tsunami in Chile started - a wave of <5cm in the end - another gremlin beaten!

Prior to the project being given the full go-ahead discussions with the Great Barrier Reef Marine Park Authority (GBRMPA) had

covered the matter of weather, and the best time to sail. For both Hydrographer's Passage and Noggin Pass, it was agreed that October to December would be the best time to core. However, advice from the Australian Maritime Safety Authority (AMSA) suggested that the Ribbon Reef sites would benefit from the drop in the SE trades just after Christmas, with the associated reduction in swell that could have caused us problems with the shallow sites closest to the modern reef. What about the cyclone risk during that season we asked? The answer was that we'd be very unlucky to experience one in the initial 45 day survey period we had planned. Now remember those five words that I said would back come haunt me!



We were stalked by Cyclone Ului for 10 days (Figure 5). She was first identified on March 9, and in the space of 24 hours moved from a tropical storm to a category 5 cyclone – one of the fastest strengthening cyclones on record! Initially she was headed north of our position, so we decided to stay south at Hydrographer's Passage, but then she swung southwards heading straight for us (did we have a bullseye painted on the vessel that we didn't know about?) We discussed the option of moving to the more northerly



Ribbon Reef site, but then Ului changed track again, heading for a more central point along the Great Barrier Reef that would have caused excessive heave at all three geographical locations. So in the end we had to sail for shelter in the deep water at the Townsville anchorage, monitoring Ului's track every six hours, and playing a waiting game.



In all, the participants on the offshore phase of Expedition 325 experienced extreme highs and lows. From the operational frustrations associated with getting a new drillship up and running, to the cheers when a beautiful coral core emerged out of the barrel (Figures 6 and 7); from the extreme weather that went from a cyclone, lashing rain and 5 to 6m swells (Figure 8), to 52 degrees on the drill floor and a core bench so hot we tried to fry an egg on it (Figures 9 and 10); from being almost blown over by the wind on the foredeck of the boat deck, to participating in a Capoeira



class there the next day under the blazing sun reflecting off the mirror-calm waters; from running out of yoghurt (this became very important to the night shift!), to getting an unexpected run ashore to the ice cream shop; from having an HQ pipe shear, to seeing the amazing ROV imagery of the reef environment (Figure 11).

Expedition 325 certainly wasn't without its problems, as with many carbonate coring expeditions. However, the preliminary results from the splitting and sampling of the cores during the Onshore Science Party (pages 6 and 7) indicate that not only



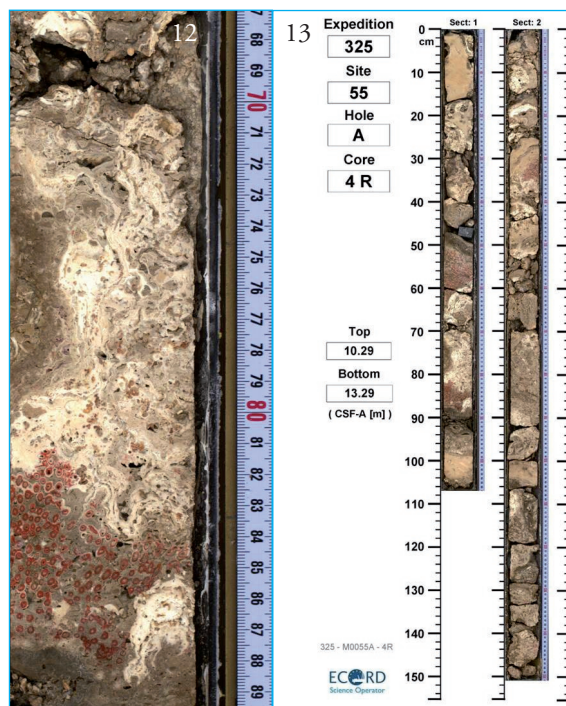
will the original objectives be met, but additional research will be forthcoming.

In summary, Expedition 325 (Figures 12 and 13):

- recovered cores from a succession of fossil reef features from 42 to 127 m below current sea level, encompassing most, if not all, of the postglacial sequence from the Late Glacial Maximum (LGM) to the present day,
- slab-sampled more than 200 massive coral colonies, including 17 *Porites*, for paleoclimate studies,
- recovered cores from holes in various water depths in three different locations in the GBR area, enabling interpretation of trends in both a broad temporal and spatial context,
- may obtain new sea-level and paleoclimate information that likely spans the LGM (MIS2), pre-LGM (MIS3), and several earlier Pleistocene periods, as indicated by preliminary dating,
- recovered a 33.3 m section of core that records near-continuous sedimentation from the fore-reef slope, providing a high-resolution record to compliment the sea-level and paleoclimate records.

In the end a triumph of determination over gremlins, glitches and weather-borne adversity!

Carol Cotterill, ESO Staff Scientist, cjcott@bgs.ac.uk





Ursula Röhl

Corals, World Cup, and heat wave Onshore Science Party of the Great Barrier Reef Environmental Changes Expedition

IODP Expedition 325 (Great Barrier Reef Environmental Changes) was the fourth mission-specific platform (MSP) expedition organised and carried out by ECORD. In the spring of this year, 34 boreholes were cored in up to 172 m water depths offshore Australia (pages 3 to 5) with the aim of establishing the course of sea-level change, defining sea-surface temperature variations, and analysing the impact of these environmental changes on reef growth and geometry for the region over the period of 20-10 ka. During the offshore phase of the expedition on the *Greatship Maya*, three primary scientific activities were conducted: ephemeral properties (pore-water chemistry, microbiology, physical properties) were measured and/or selected samples were preserved for later analysis; core logging and downhole logging was carried out; and near real-time core description was performed on cores through the liners and on core-catcher samples. The 225 m of recovered cores, dating as far back as 60,000 years into Earth's history, were then sealed and stored in temperature-controlled containers and shipped to Bremen.

Due to the nature of MSPs, e.g. space and time restrictions, cores are usually not split at sea and the major part of the science has to be conducted onshore. For this purpose the Onshore Science Party (OSP) was held from July 2 to 16 2010, in the IODP Bremen Core Repository (BCR), which is located in the MARUM (Center for Marine Environmental Sciences) building on the campus of the University of Bremen, Germany. During the OSP, 28 researchers from nine countries gathered (Figures 1 and 2) to study the cores collected during the Great Barrier Reef Environmental Changes Expedition.



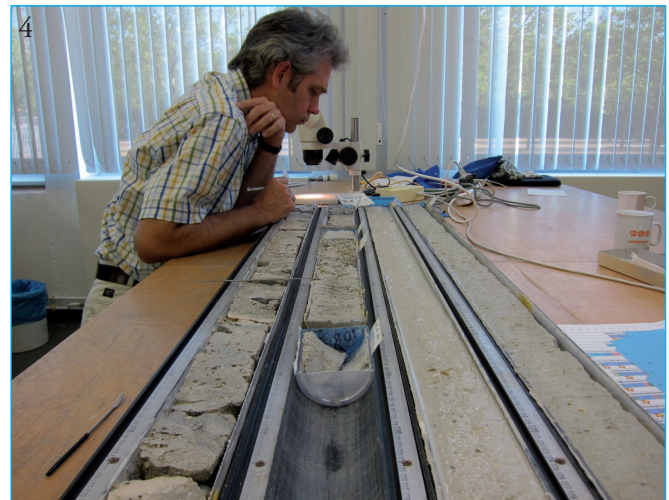
Figure 1: the science party meet in Bremen. Figure 2: the Co-chief Scientists, Yusuke Yokoyama (left) and Jody Webster (right).

The science party was welcomed at an icebreaker party on the evening before the start of the Onshore Science Party. The first two days of the OSP were dedicated to science meetings, presentation of offshore results, review of core processing and post-cruise science (including sample requests), and inspection of and training at the facilities. In contrast to standard IODP sampling parties, it was an extended experience for splitting cores and acquiring all the data for the IODP minimum and standard measurements during the following two weeks. About 68 people (scientists and operator personnel from the UK, USA, France



Figure 3: Holger Kuhlmann, ESO assistant lab manager at MARUM, displays the archive halves after the cores were split.

and Germany) formed two teams that worked 12-hour shifts throughout the OSP - with occasional breaks to enjoy (or despair over) World Cup soccer games - to analyse the cores. Concerns that the essential properties of the core material may have altered after exposure to the atmosphere were at least partially abated by the near-tropical weather prevailing in Bremen during the OSP, not greatly different from conditions around the Great Barrier Reef! Despite the heat, the participants worked hard, formed



Description of the cores - Figure 4: Eberhard Gischler, Figure 5: discussions between Hironobu Kan and Juan Braga, Figure 6: CoreWall discussion between Raphaël Bourillot and Marc Humblet.

cooperative working groups to deal with overlapping scientific interests, and came up with innovative solutions as difficulties arose. This was a critical aspect in making this OSP highly successful and to its completion within to schedule.

The participants made use of various labs in the MARUM building, some of which were devoted to office space and others to specific analyses (*e.g.*, report writing, microscopy, and physical properties measurements on discrete samples). The main BCR labs were used for detailed core description of the freshly split cores (*Figures 3, 4 and 5*), including the visualisation system CoreWall for core images and data (*Figure 6*), digital imaging, colour-reflectance measurements, split-core logging, petrophysical analyses (*Figure 7*), and extensive core sampling (*Figure 8*). Further analytical laboratories were available in the MARUM building (*i.e.*, micropaleontology and physical properties laboratories) and the Department of Geosciences (specifically the geochemistry, paleomagnetism, and mineralogical laboratories) of Bremen University.

Experienced scientists in the party who have shared a berth on the *JOIDES Resolution* for as long as two months, were probably pleasantly surprised at the lodgings provided on an MSP "cruise". Their cabin on this expedition was a comfortable hotel room in downtown Bremen, which, in contrast to a ship environment, allowed them to spend their off-shift time enjoying a variety of social and sports events, including the World Cup soccer games (*Figure 9*) as well as excellent Bremen restaurants, all of which offer very good German beer! The scientists received their samples (*Figure 10*) soon after returning home, and are now busy working on their individual analyses. New key results regarding the long-term climate and sea-level history of the planet will soon be available.

Numerous media representatives from television, radio, and newspapers attended a media conference, interviewed the Co-chief Scientists and benefited from being able to talk to scientists and operator staff while they were working in their labs (*Figure 11*).

The IODP Bremen Core Repository (BCR) has been operating for the past 16 years and presently archives a collection of more than 142 km of deep-sea sediments and hard rocks from 84 expeditions. More than two thousand scientists have visited the repository since it was established in 1994, often cooperating in week-long sampling meetings of the shipboard investigators. So far, more than 645,000 samples have been taken by the visitors and BCR staff and distributed world-wide. As a partner within the ECORD Science Operator (ESO) Consortium for IODP, the University of Bremen - www.marum.de/en/IODP_Core_Repository.html - undertakes the curation, database operations, and archiving of collected cores, as well as providing offshore (mobile laboratory containers) and onshore laboratory facilities for systematic sampling and further data gathering according to IODP minimum and standard measurements.

The IODP Expedition 325 Preliminary Report is available at http://publications.iodp.org/preliminary_report/325/index.html

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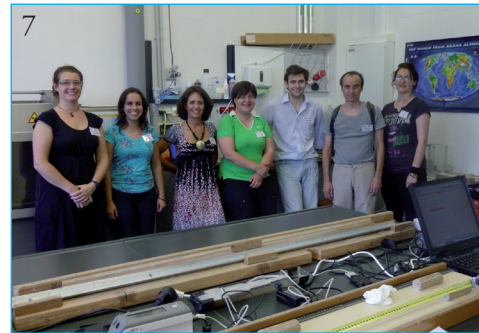


Figure 7: the Petrophysics team.



Figure 8: William Thompson (left) and Alexander Tudhope (right) sample the coral cores.



All photos © ECORD/IODP



Albert Gerdes



Alan Stevenson

ECORD Outreach and Education Activities



Patricia Maruéjol



Jenny Lezius

News from the Outreach team

The Outreach team met in Bremerhaven on August 24-25, 2010 to organise ECORD outreach activities until the end of the year and to discuss outreach prior to the annual IODP Outreach Co-ordination Group (CG) meeting in Tokyo.

In May the ECORD Outreach team were busy organising the ECORD activities at EGU 2010 in Vienna. Alan Stevenson and Albert Gerdes were also busy with outreach activities for the Onshore Science Party of the Great Barrier Reef Environmental Changes Expedition in Bremen ([page 7](#)). The team also participated in the "Naming the Post-2013 Program" brainstorming workshop chaired by Sarah Saunders (Consortium for Ocean Leadership) in Bremen in September. Alan Stevenson, Albert Gerdes and Patricia Maruéjol took part in the IODP Outreach CG meeting chaired by Miyuki Otomo, the new Outreach and Communications Manager at IODP-MI.

Past Conferences and Events

• **EGU 2010, Vienna, Austria:** For the first time, IODP and the International Scientific Continental Drilling Program (ICDP) organised a joint booth at EGU 2010. The large exhibition booth included a model of the L/B *Kayd* (drillship of the New Jersey Shallow Shelf Exp. 313), the most recent issues of ECORD, IODP and ICDP publications and attractive CoreWall demonstrations of ICDP cores. A combined ECORD-ICDP-IODP team were present and welcomed a large number of visitors to the booth. A

joint IODP-ICDP Townhall meeting attracted more than 200 participants and provided brief updates on recent achievements and future scientific drilling projects.

• **EurOcean 2010, Ostend, Belgium:** A joint Deep-Sea and Subseafloor Frontier (DS3F) - ECORD/IODP booth was organised at EurOcean 2010 on September 12-13, 2010 in Ostend. More information about ECORD at EGU 2010 and EurOcean 2010 is available at <http://www.ecord.org/pi/booths.html>

• **ECORD materials** were sent to national events and educational activities in a number of ECORD member countries:

- IODP core replicas were loaned to the Urbino and ECORD-Canada summer schools, Ciencia Viva/Fabrico in Aveiro, Leicester University and Lycée International Valbonne for teaching young scientists and students,
- National IODP flyers were set up for Canada for the *JOIDES Resolution* port-call in Victoria, and Ireland for the Geoscience 2010 Conference in Dublin,
- ECORD materials were distributed during national Earth Science meetings (GeoCanada 2010 in Calgary, Portuguese National Geological Congress, RST in Bordeaux, France, Deep-water circulation in Pontavedra) and at the IODP-STP meeting organised in Geneva by G. Gorin.

ECORD Outreach team: Patricia Maruéjol, EMA, Alan Stevenson and Albert Gerdes, ESO and Jenny Lezius, ESSAC
<http://www.ecord.org/pi/promo.html>

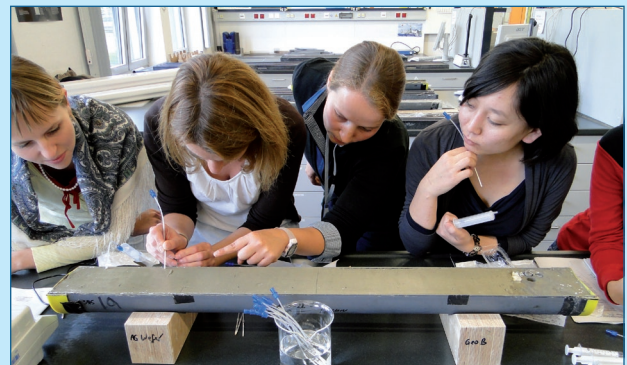
ECORD Summer Schools 2010

Dynamics of Past Climate Changes, September 13-24, 2010, Bremen

What controls past climate changes? How can we assess and explain these changes? And from that, what are the implications for future climate change? To find answers to these important questions, I and nearly thirty other students from all over Europe attended the ECORD Summer School 2010 'Dynamics of Past Climate Changes' in Bremen. The really high-quality lecture sessions were held by some of the world's leading paleoceanographers and climatologists. They gave us a broad but also detailed insight into climate variability on seasonal to tectonic timescales, on possible forcing mechanisms, climate responses, and still open questions. In addition we had the opportunity to present our own research projects and receive valuable feedback from the experts. During the "Virtual Ship" week, practicals and lab turns within the facilities of the IODP core repository provided us with new skills for a variety of shipboard scientific methods needed to assess climate changes in the sediment record. The weekend field trip to the late Quaternary landscapes of Bremen rounded up the well-organised programme.

This summer school was a great experience. Not only did it significantly improve my skills and knowledge but it also gave me the opportunity to meet, exchange and discuss with other motivated young scientists in my field.

I wish to thank ECORD for providing me with financial support and would like to finish my report with an excerpt from a poem of



Students learn how to sample pore water from a sediment core at the ECORD Bremen Summer School 2010 (photo J.-R. Riethdorf).

my fellow summer school attendant Rachel Brackenridge that perfectly sums up the aim and topic of this summer school:

*We conclude after debate that no one model is right,
But that results good and bad can give us insight,
To climate in the future and in the past,
Next Ice Age predictions have been amassed.*

*Jan-Rainer Riethdorf, ECORD Scholarship Awardee 2010,
jriethdorf@ifm-geomar*

Reports of ECORD Summer Schools continued on page 15



Catherine Mével

From the ECORD Managing Agency Director

The fourth MSP expedition was successfully conducted by the ECORD Science Operator this year. Implementing the Great Barrier Reef Environmental Changes Expedition turned out to be quite challenging, due to the difficulties of contracting a drilling platform in this part of the world (*pages 3 to 5*). We know from past experiences that corals reefs are difficult to drill because of the nature of the rocks. However, at the end of the Onshore Science Party, the scientists were quite confident that the cores collected would bring invaluable information about the last deglaciation (*pages 6 and 7*) that will expand the time window investigated during the Tahiti Sea-Level Expedition.

We are now approaching the end of the current phase of ocean drilling. ECORD had hoped to implement two more major MSP expeditions. However, in the current funding system as agreed in the memorandum signed between ECORD and the Lead Agencies, ECORD provides most of the Science Operations Costs to the commingled funds (3 participation units, *i.e.* US\$16.8 M per year), which leaves little money (~1 participation unit) in Platform Operation Costs to implement expeditions. Modifying this ratio of 3:1 would have put the whole program at risk, in particular by decreasing the IODP-MI budget, which supports the integrated activities (proposal evaluation, publications, databases, core curation, etc.) that are essential to the program. Therefore, after discussion with the Lead Agencies, the ECORD Council decided not to modify this ratio and to conduct only one major MSP expedition and, budget permitting, to consider implementing a cheaper one using a seabed rock drill if the science objectives can be met. There will be a pause in MSP expeditions in FY11. The

expedition(s) that will be implemented later is still pending and will be decided next year, in consultation with SPC and the Operations Task Force.

Meanwhile, the architecture, funding scheme and Science Advisory Structure for the new program are slowly taking shape. A major decision made by the International Working Group + was to progressively phase out the current panels of the Science Advisory Structure and set up the new structure as soon as possible. The details of the new structure are still being finalised, but building on the report of the Triennium Review Committee - <http://www.iodp.org/triennium-review/>, it has already been decided that the current three-tier system of SSEP, SPC and SASEC will be simplified into a two-tier system (Evaluation and Implementation).

The last SASEC meeting will be held in June 2011. The first call for proposals for the new program will be launched next year, when the new science plan is available, with an October 1 deadline. Proposals will be evaluated by the new panels set up in the fall of 2011. Hopefully, everything will be in place next year for a smooth transition to the new phase.

However, the ECORD funding agencies have not yet made their final decision on their participation in the new phase. A number of factors will influence this decision. It is the role of the scientific community to convince them that continued access to scientific ocean drilling is crucial to the study of the Earth system.

Catherine Mével, ECORD Managing Agency Director
<http://www.ecord.org/ema.html>

The evaluation of the scientific impact of ECORD on IODP

ECORD has now been running for almost 7 years. Scientists from ECORD member countries have largely contributed to the success of IODP. They have played an active role in strategic scientific decisions, they have submitted exciting drilling proposals implemented by the program, and they have shared their expertise, knowledge and enthusiasm with international science parties during drilling expeditions. In parallel, the ECORD Science Operator, by providing access to mission-specific platforms (MSPs), has opened new opportunity for research in areas inaccessible to the *Chikyu* or the *JOIDES Resolution*.

We are now in the process of preparing for the new phase of ocean drilling. To help ECORD funding agencies make their decision on participating in a future phase of ocean drilling, the ECORD Council recognised the need for an evaluation of the scientific accomplishments of ECORD in IODP. This means a thorough assessment of the scientific impact of ECORD scientists in IODP, as well as the role of MSPs in the overall scientific achievements of the program. The first evaluation of ECORD was conducted in 2006 as part of the EC-funded ECORD-Net project activities. This evaluation was at the beginning of the program, and the aim was to assess

the efficiency of the ECORD structure. The outcome of the evaluation was quite positive. The second evaluation will build on the first report, and will mostly concentrate on science, although it will also address the efficiency of MSP operations conducted by the ECORD Science Operator. Finally, an assessment of the new science plan for the future ocean drilling program is also planned, with a particular evaluation of the need for a strong MSP program to address the scientific objectives.

To conduct this very important task, an independent evaluation committee of seven well-respected scientists not involved in IODP has been set up with the help of Academia Europea. It is chaired by Arne Bjorlykke from the Museum of Natural History in Oslo, who was a member of the first ECORD evaluation committee and therefore will ensure continuity. The committee will first meet during early February next year, and will deliver its report by June. The report will be distributed to the funding agencies and will be publicly available. It will be an essential milestone in helping ECORD member countries make their decision about the future.

Catherine Mével, ECORD Managing Agency Director



Rüdiger Stein

News from



Jenny Lezius

The ESSAC Office has now been located at the Alfred Wegener Institute for Polar and Marine Research in Bremerhaven, Germany for one year - already half-time of our office work here at AWI!! As the ESSAC Chair, I can say that all office activities are running very well. Special thanks to Jenny, our very active and well-organised Science Coordinator! So what has happened since the publication of the last ECORD Newsletter?

During the last few months, we issued calls for six expeditions: **Deep Hot Biosphere Expedition 331**, **Riserless Observatory 2 Expedition 332**, **Inputs Coring 2 & Heat Flow Expedition 333**, all with the *Chikyu*, and **Costa Rica Seismogenesis Project (CRISP) Expedition 334**, **Superfast Crust 4 Expedition 335**, **Mid-Atlantic Microbiology Expedition 336**, all with the *JOIDES Resolution*. The US and Japanese Implementing Organisations (IOs) have completed staffing for expeditions 331 and 332 and issued a short-term call for expeditions 333 and 334. ESSAC has completed the selection of ECORD scientists for expeditions 335 and 336, and the staffing is still in progress. More information about the scientific objectives, precise dates, and official notification of all these expeditions can be found in the [table below](#) and on the IODP website at <http://www.iodp.org/expeditions/>.

Several changes have taken place within the **Science Advisory Structure (SAS)** (see [table page 14](#)). Neal Watson (UK) has been nominated as the new ECORD EDP member, replacing John Thorogood (UK). Peter Clift (UK) is the new ECORD member within SSP, replacing Neil Mitchell (UK). Within STP, Georges Gorin (Switzerland) rotated off, Douglas Schmitt (Canada) is now upcoming Vice-chair, and Nathalie Vigier (France) is a new ECORD member. Hugh Jenkyns (UK) and Gilbert Camoin (France) rotated off the SPC and were replaced by Heiko Pälike

(UK) and Javier Escartin (France). Michael Enachescu (Canada) resigned from EPSP and was replaced by Martin Hovland (Norway). The ECORD Council has already approved these changes.

Deep Earth Academy, the teaching initiative of the US Consortium for Ocean Leadership, has just completed the **2010 School of Rock (SOR)**, which took place onboard the *JOIDES Resolution* during IODP Expedition 328 - Cascadia ACORK. Two teachers from ECORD took part in this event. Further information is available on the website of the Consortium for Ocean Leadership at <http://www.oceanleadership.org/education/deep-earth-academy/educators/school-of-rock/2010-school-of-rock/>.

The second phase of the ECORD Distinguished Lecturer Programme 2008-2010 has ended. The series have been very successful, with a total of 46 talks in 12 ECORD and non-ECORD countries by the 2008-2010 lecturers Peter Clift, Achim Kopf and John Parkes. At its spring meeting, ESSAC elected **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 Weisert** (ETH Zurich, Switzerland, "Carbon cycle, oceans and climate in the Cretaceous: lessons from Ocean Drilling (DSDP to IODP) and from records on continents") to be the 2010-2012 ECORD Distinguished Lecturers ([page 11](#)). Although the deadline for the first call to host a lecture has already passed, ECORD still invites colleges, universities and non-profit organisations in ALL European countries (and Canada) to apply via e-mail at essac.office@awi.de to host a lecture. Applications from non-traditional IODP and ECORD audiences within the European Community are especially welcome.

IODP Expeditions Drilling Schedule

| Expedition | Exp # | Drillship | Dates | Co-chief Scientists |
|---|-------|-----------|-----------------------------|-----------------------------|
| Juan de Fuca | 327 | JR | July 5 - Sept 5, 2010 | A. Fischer - T. Tsuji |
| Cascadia ACORK + School of Rock 2010 | 328 | JR | Sept 4 - Sept 18, 2010 | E. Davis |
| South Pacific Gyre | 329 | JR | Oct 8 - Dec 12, 2010 | S. D'Hondt - F. Inagaki |
| Louisville | 330 | JR | Dec 12, 2010 - Feb 11, 2011 | A. Koppers - T. Yamazaki |
| Deep Hot Biosphere | 331 | Chikyu | Sept 1 - Oct 3, 2010 | K. Takai - M. Mottl |
| NanTroSEIZE-2 Riserless Observatory | 332 | Chikyu | Oct 25 - Dec 12, 2010 | A. Kopf - E. Araki |
| NanTroSEIZE-2 Subduction Inputs 2 & Heat Flow | 333 | Chikyu | Dec 13, 2010 - Jan 10, 2011 | T. Kanamatsu - P. Henry |
| CRISP | 334 | JR | March 15 - April 16, 2011 | P. Vannucchi - K. Ujiie |
| Superfast IV | 335 | JR | April 16 - May 19, 2011 | D. Teagle - B. Ildefonse |
| Mid-Atlantic Microbiology | 336 | JR | Sept 17 - Nov 20, 2011 | K. Edwards - W. Bach |
| Shimokita Coal-Bed Biosphere | 337 | Chikyu | March 15 - May 21, 2011 | K. U. Hinrichs - F. Inagaki |
| NanTroSEIZE-3, Plate Boundary Deep Riser-2 | 338 | Chikyu | Aug 10, 2011 - Jan 10, 2012 | tba |
| Mediterranean Outflow | 339 | JR | Nov 20, 2011 - Jan 20, 2012 | tba |



From <http://www.iodp.org/expeditions> - JR: *JOIDES Resolution* - ECORD Co-chief Scientists are in blue - The *JOIDES Resolution* in Papeete, Tahiti, during the Expedition 329 port-call (photo L. Toffin, IODP/TAMU).

In 2010, three **Summer Schools** were funded by ECORD:

- Ocean and climate changes in polar and subpolar environments, Montréal, Canada (June 27-July 12),
- Dynamics of Past Climate Changes, Bremen, Germany (September 9-24) and
- The Urbino Summer School in Paleoclimatology - Past Global Change Reconstruction & Modelling Techniques, Urbino, Italy (July 9-29).

ECORD provided scholarships to allow young scientists to attend one of the ECORD Summer Schools 2010. From the 47 applicants for **ECORD Scholarships**, ESSAC decided to fund 15 students from ECORD and non-ECORD countries with amounts between €500 and €1500. Reports on each summer school written by the awardee students can be read on [pages 8 and 15](#).

ECORD sponsored merit-based awards for outstanding graduate students to conduct research related to the Integrated Ocean Drilling Program. ESSAC received applications from highly qualified graduates, from which young researchers have been awarded an **ECORD Research Grant** of around €2000 each to cover travel and lab expenses.

As part of the **ESF Magellan Workshop Series**, the workshop "Volcanic basins: scientific, economic and environmental aspects" took place in Vienna, Austria, on May 9-10, 2010 and

was convened by Nicholas Arndt ([page 12](#)). A call for future ESF Magellan workshop proposals is open with a deadline of November 15, 2010. Details are available on <http://www.esf.org/magellan>.

During the EGU 2011 in Vienna, we will organise a special **Interdivision Session** dealing with major achievements and perspectives in ocean and continental drilling. Details including deadlines are available on the EGU 2011 web site at: <http://meetingorganizer.copernicus.org/EGU2011/session/6436>.

Finally, while preparing the next ESSAC meeting to be held on October 25 to 27, 2010 in Zürich, Switzerland, we - Jenny as Science Coordinator and myself as Chair - would like to thank all the ESSAC delegates and the other IODP/ECORD bodies for active cooperation during the last months. As already stated last time, such a constructive and efficient cooperation between all of us is so important for the planning phase of the new post-2013 scientific drilling program. Discussions and input for the future of IODP are needed now!

Rüdiger (Rudy) Stein, ESSAC Chair and Jeannette (Jenny) Lezius, ESSAC Science Coordinator
essac.office@awi.de
<http://www.essac.ecord.org>

ECORD Distinguished Lecturer Programme 2010-2012

ECORD invites you to host a lecture.

Since 2007, the European Consortium for Ocean Research Drilling has sponsored the ECORD Distinguished Lecturer Programme, an initiative for a lecture series to be given by leading scientists involved in the Integrated Ocean Drilling Program. The programme is designed to bring the exciting scientific discoveries of the IODP to the geosciences community in ECORD and non-ECORD countries.

2010-2012 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, Pacific Center for Isotopic and Geochemical Research, University of British Columbia, Canada
 "What do we know about mantle plumes and what more can we learn by IODP drilling?"



Helmut Weissert, ETH Zürich, Switzerland
 "Carbon cycle, oceans and climate in the Cretaceous: lessons from ocean drilling (DSDP to IODP) and from records on continents."

Applications to host a Distinguished Lecturer are accepted from any college, university or non-profit organisation in ALL European countries and Canada. Applications from non-traditional IODP and ECORD audiences within the European Community are especially welcome.

Apply via e-mail to essac.office@awi.de

Further information at <http://www.essac.ecord.org/index.php?mod=education&page=dlp>

Workshop and Conference Announcements

- ◆ **ESF Magellan Workshop Series** <http://www.esf.org/magellan>
 - Geological carbon capture & storage in mafic and ultramafic rocks: Role of oceanic and continental scientific drilling - January 8-12, 2011, Muscat, Oman
- ◆ **ECORD Distinguished Lecturer Programme**
<http://www.essac.ecord.org/index.php?mod=education&page=dlp>
- ◆ **AGU 2010, December 13-17, 2010, San Francisco, USA** <http://www.agu.org/meetings/fm10>
 - Special Session PP13F, *co-chaired by G. Mountain and J.N. Proust* - December 13, 2010
 - IODP Townhall meeting, December 14, 2010
 - Union sessions U42A & U43A - *Frontiers in scientific ocean drilling* - December 16, 2010
- ◆ **EGU 2011, April 3-8, 2011, Vienna, Austria** <http://meetings.copernicus.org/egu2011/>
 - IODP-ICDP Interdivision Session - [session/6436](#) - *convened by R. Stein*
 - Deep Sea Frontier - [session/6953](#) - *convened by A. Kopf*
 - Cenozoic Antarctic and Southern Ocean climate evolution - [session/6405](#) - *co-convened by C. Escutia Dotti and H. Brinkhuis*
 - Future perspectives for European polar research - [session/7655](#)

Reports of Magellan Workshops

- ◆ **Volcanic basins: scientific, economic and environmental aspects, May 9-10, Vienna, Austria**
Convenor: Nicholas Arndt - arndt@ujf-grenoble.fr

At both margins of the northern Atlantic, sedimentary rocks are overlain by flood basalts and are invaded by basaltic intrusions. The magmatic rocks are parts of the North Atlantic Volcanic Province, which initially erupted onto the continents in Greenland and Ireland and subsequently into the sedimentary basin that developed as rifting proceeded some 55 million years ago. Sequences of submarine eruptions, observed as seaward-dipping reflectors in seismic profiles, occur in the north, central and southern Atlantic and parts of the Indian Ocean margin. Older examples of large igneous provinces are preserved on the continents, as, for example, in the East Siberian sedimentary basin and the Siberian flood basalt province.

Large igneous provinces (LIPs) are of major interest to academic and industry geologists for several reasons:

- their origin is the subject of intense debate amongst scientists; one school argues that they formed through melting in large mantle plumes and are a manifestation of an unusual style of mantle dynamics; the other relates them to normal plate tectonic processes,
- the large petroleum reservoirs occur off the coasts of Norway, Brazil, Angola, NW Australia in basins invaded by basaltic intrusions. The intrusions complicate interpretation of seismic profiles and constitute a special type of petroleum trap. Intrusion of basaltic magma influenced the development and maturation of the petroleum deposits,
- the world's richest Ni-Cu-platinum-element deposit, at Noril'sk-Talnakh in Russia, is hosted by basaltic intrusions in the Siberian sedimentary basin; similar deposits are a target of major mineral exploration in other regions,
- eruption of flood basalts and the intrusion of magma into sedimentary basins impacted global climate.

Volcanic-sedimentary sequences at continent margins have been targeted by numerous expeditions of the Ocean Drilling Program (ODP) (*e.g.* Legs 104, 120, 152, 163, 183) as well as by dredging and geophysical studies of national oceanographic programs. Both onshore and offshore segments of large igneous provinces have been explored by drilling.



The Antrim basalts in Northern Ireland, part of the North Atlantic Volcanic Province.

The workshop included three separate but related activities: (1) a half-day session at the European Geosciences Union called "Large Igneous Provinces and Mass Extinctions" convened by Henrik Svensen and Lindy Elkins-Tanton, (2) a one-day workshop on the Siberian traps funded by an NSF grant, and (3) a two-day workshop on "Volcanic basins: scientific, economic and environmental aspects" funded by the ESF Magellan Workshop Series. Combining the three activities attracted a large group of high-level, multinational scientists to Vienna.

Outcomes of the workshop

The main scientific outcome of the workshop was the exchange of new information and interpretations during four days of seminars and talks and active discussion. These covered the complete range of disciplines, from field and structural geology, volcanology, igneous and metamorphic petrology, paleontology, geochemistry and geophysics, petroleum and mineral deposits studies and atmosphere and climate modelling. The subjects included: quantification of

the amount and types of thermogenic gases released from aureoles around intrusions; the mechanism of emplacement of intrusions beneath flood volcanic provinces; the causes of flood volcanism and the nature of the mantle source; the timing of flood volcanism and mass extinctions.

Another level of interaction involved discussions between scientists from universities, governmental organisations and industry about how to develop the applied aspects of the programme.

Mark Cooper from the Northern Ireland Geological Survey gave an overview of the geophysical and geochemical data obtained during the Tellus programme and described how these data improved our knowledge of the magmatic and tectonic history of the Antrim basalts (*see photo*), part of the North Atlantic Volcanic Province. He also described activities of mineral exploration companies in the region and a cooperative research program between the Universities of Grenoble, Glasgow and Oslo, the Northern Ireland Geological Survey and Lonmin, a mineral exploration company.

Alexander Polozov of the Institute of Geology of Ore Deposits in Moscow described iron deposits in magnetite pipes in the Siberian flood volcanic province. He related textures and structures in these pipes to escape vents of thermogenic gases released from contact aureoles surrounding sills and described modelling of the process by geologists and physicists of the University of Oslo.

Steve Barnes of the CSIRO described the development of tools that can be used for the exploration for magmatic Ni-Cu sulfide deposits and discussed how they could be applied to the North Atlantic Magmatic Province.

Sverre Planke of the Volcanic Basin Petroleum Research organisation described his work on the petroleum fields off the coast of Norway and the influence that magmatic intrusions have on the formation of, and exploration for, these deposits.

Dougal Jerram gave an overview of the Academia-Industry partnerships that are being developed at Durham University and discussed how participants of the workshop might become involved.

Full reports of the Magellan workshops are posted on:
<http://www.esf.org/magellan> (click on 'Science Meetings')

Magellan Workshop Series Programme up to 2011 and beyond

The ESF Magellan Workshop Series Programme has been extended by six months! The programme will now run until July 31, 2011. A call for workshops has been launched. Priority will be given to strategic workshops, which explore the future expansion of European scientific coring, particularly the integration of marine and continental coring covering scientific topics such as: Earth's Surface Environmental Change, Processes and Effects, The Deep Biosphere & Sub-Sea-floor Ocean, Solid Earth Cycles & Geodynamics, which are outlined in the programme.

Priority will be given to workshops that take place in countries that financially support the programme (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, the Netherlands, Norway, Portugal, Sweden and Switzerland). The contribution of the Magellan Workshop Series will not exceed €20,000 per workshop. Applications were received until **November 15, 2010**. For further information about the application procedure, please check the ESF website at www.esf.org/magellan or, if you have any inquiries, please feel free to contact me or the administrator at ESF, Ms. Ellen Degott at edegott@esf.org

In August 2010, 18 representatives from 12 European countries representing ECORD, ICDP and IMAGES met in Burkheim, SW Germany, to discuss the future of the ESF Magellan Workshop Series Programme after it ends in 2011. It has been decided that a proposal for a succession programme will be submitted in 2010. The new programme will not only focus on the European perspectives of marine scientific drilling but will equally be open to proposals supporting European aspects of scientific, marine and continental scientific drilling. A proposal entitled "Workshops on Scientific Drilling (Magellan Plus Workshop Series)" was submitted at the end of September



Participants of the ESF meeting in Burkheim, Germany, visit the geology of the Kaiserstuhl volcano.

2010. The lead proponent is Lucas Lourens, the Netherlands, supported by Marit-Solveig Seidenkrantz, Denmark and Ales Spicak, Czech Republic, representatives from seven other European countries, and the current Magellan Programme Steering Committee.

The new Magellan Plus Workshop Series Programme, if funded, will provide an enabling programme for co-ordinated workshops to stimulate and nurture high-quality and innovative European scientific drilling initiatives and proposals that conduct excellent and societally relevant science. Such a programme will help to secure Europe's leadership in international scientific drilling.

Jochen Erbacher, Chair of the Magellan Steering Committee
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Continued from page 8

ECORD Summer Schools 2010

Ocean and climate changes in polar and subpolar environments, Québec, Canada June 27 - July 12, 2010

The ECORD summer school in Québec, Canada, was a great mixture of lectures, labs and field trips about various subjects that corresponded well to the wide-ranging backgrounds of the 19 participants. After meeting the great organising team at the Université du Québec à Montréal (UQAM) we drove over to the Université du Québec à Rimouski (UQAR) to get prepared for our two-day cruise on the *Coriolis II* in the Saguenay Fjord and St Lawrence Estuary. We explored the evidence of past glacial activity and features of a polar environment hands-on by taking samples with a box and piston corer (box coring), discussing the high frequency seismic images of the upper sediment layers and witnessing the water temperature hypoxia. We worked in a team to describe a core and prepare probes for further analysis of the species' content as well as creating a cruise report and presentation. At our next stop in Québec City at the Institut National de la Recherche Scientifique (INRS) we were introduced to the impressive X-Ray fluorescence ITRAX core scanner. The following lectures and labs both there and back in Montréal covered paleomagnetism, computed tomography images of sediment cores acquired by the CAT-Scan, marine reflection seismic data interpretation and ODP drilling history and techniques. We then concentrated on biomarkers of sea-ice and sea-surface conditions by obtaining paleoclimate information from transfer functions applied on diatom and dinocyst populations and from isotopes of foraminifers. Later on we were introduced to the facts of rapid sea-ice cover decrease, the impacts of warming on permafrost and gas hydrate distributions and the discussion on the opening of the Arctic and on current systems



Students sample sediments onboard the R/V Coriolis II.

with knowledge obtained from Arctic sedimentary cores. I was very much impressed by the number of excellent lecturers who travelled long distances to present their talks and have discussions with us. The atmosphere in the group was very friendly and the field trips to coastal areas, high-altitude environments and fossil carrying quarries completed and balanced the subjects taught. I would like to thank ECORD for their financial support.

Romina Gebrmann, ECORD Scholarship Awardee 2010
rgehrman@uwic.ca

7th Urbino Summer School in Paleoclimatology, Urbino, Italy July 10 - 29, 2010

Last July, fifty of my fellows and I had the opportunity to attend the 7th Urbino Summer School (Italy) entitled "Past global change reconstruction and modeling techniques". The first week focused on the carbon cycle, (cyclo) stratigraphy, ocean acidification and the different paleoclimate archives. We performed exercises on data analyses and sediment description. We then went on a fieldtrip to Gubbio to observe the so-called K/T boundary. This extensive introduction allowed everyone to reach the same level of knowledge for the following two weeks. The second week was dedicated to geochemical proxies and modeling as well as orbital forcing. The last week was marked by the Cioppino workshop dealing with the 'Transient changes in past warm climates', which included general circulation models at different time periods and the modeling of ice-sheet dynamics. The event was also the occasion to reward Robert DeConto (University of Massachusetts) with the Montefeltro Medal. Congratulations Rob!

I really appreciated the lectures and discussions on specific topics such as the oceanic anoxic events, Paleocene-Eocene thermal maximum and African humid period, to which I was not familiar. Furthermore, each participant presented a poster during the Cioppino workshop. It was a great moment of sharing where I could get better acquainted with my colleagues and their research. We were then assigned to a group to work on a specific geologic period. In my case, it was the Holocene. The objective

was to provide general background by explaining the main climatic events and the role of various oscillations (e.g., ENSO, NAO, AO, PDO). I am grateful to the organising committee, Simone Galeotti, Henk Brinkhuis and Stephen Schellenberg, as well as all the teachers. Thanks to them, I learnt a number of new topics and met fantastic people that I now consider friends. It was a real pleasure to be there. I look forward to cooperating with them in the future. I truly enjoyed this mixing of culture and ideas. Likewise, my gratitude goes to ECORD for their financial support, which allowed me to attend this wonderful summer school. I wish to everyone to live an "adventure" like this one. *You will not forget it!*

Sophie Bonnet, ECORD Scholarship Awardee 2010
s.bonnet@wanadoo.fr



A Letter from the Netherlands

Dutch involvement in IODP

The Netherlands Organisation for Scientific Research (NWO/www.nwo.nl/nwobome.nsf/pages/NWOP_56HCSJ_Eng) has funded the involvement of Dutch scientists in the ocean drilling program (DSDP/IPOD/ODP/IODP) from its start, resulting in 36 shipboard and shore-based participants, three of whom were Co-chief Scientists. More than 250 first- and co-authored papers were, at least in part, based on ocean-drilling material and were published in internationally peer-reviewed journals. Over the years, scientific ocean drilling has gained considerable status within the Dutch geosciences community. The main research focus has been on the reconstruction of climate variability during Cenozoic and Cretaceous times using a variety of biological and geochemical proxies. During the annual IODP-NL meetings, new scientific results are presented by staff members, PhD- and MSc students. Information is also communicated about upcoming expeditions and other ECORD IODP-activities, such as summer schools and the ESF Magellan Workshop Series. The yearly highlight is the announcement of a Dutch 'IODP person of the year', who receives a special award for his/her IODP-related scientific achievement - www.iodp.nl. To date, six Dutch scientists have participated in IODP Expeditions 302, 308, 310, 318 and 321.

Arctic Coring Expedition (ACEX)

In the summer of 2004, the first-ever deep drilling of the central Arctic Basin was carried out by an ECORD-led IODP MSP operation, during which ~200m each of Neogene and Paleogene deposits were drilled, allowing a first glimpse of the Cenozoic history in the Arctic Ocean. Dutch scientists (onboard Henk Brinkhuis, complemented later by many colleagues from Utrecht University and the Royal Netherlands Institute for Sea Research, NIOZ) were actively involved in producing amazing stories about the ancient Arctic Ocean floor, which eventually led to the publication of a dedicated *Nature* volume. Paleogene highlights included stunning concentrations of the freshwater fern *Azolla* during the middle Eocene (~50 Ma), suggesting that fresh surface water settings characterised the Arctic Basin. Moreover, palynology revealed the successful recovery of the Paleocene - Eocene transition. During this time of super-greenhouse conditions (~ 55.5 to 53 Ma) these records show the Arctic as a subtropical ecosystem and indicate the occurrence of palm trees at that time.

Pacific Equatorial Age Transect (PEAT) Exp 320-321

In March-July 2010, two successive IODP expeditions on the refurbished *JOIDES Resolution* recovered a complete sediment section recording the last ~50 million years from the equatorial Pacific. Appy Sluijs (Utrecht University) joined Exp. 321 as a sedimentologist. The study region is a unique place in the Pacific because plate tectonic processes are causing the relatively thick sediment bulge of biogenic-rich deposits from the currently narrowly focused zone of equatorial

upwelling to slowly move away from the equator preventing the older strata to be deeply buried. Core recovery exceeded expectations, including a new all-time depth record to a total depth of 414.4 m. Overall, the recovered section allows for highly detailed reconstructions of marine carbon cycling, calcite compensation and climate throughout the Cenozoic in this critical region.

Wilkes Land Antarctica, Expedition 318

Carlota Escutia Dotti (Granada University) and Henk Brinkhuis were the European Co-chief Scientists on the Wilkes Land Glacial History Expedition 318 that sailed in early 2010. Despite negotiating icebergs, near gale-force winds, snow and fog, they managed to recover approximately 2,000 m of sediment core. Other Dutch participants were Sandra Passchier (sailing for USA) and Peter Bijl from Utrecht University. The cores tell the story of Antarctica's transition from an ice-free, warm, greenhouse world (dated ~53 Ma) to an ice-covered, cold, icehouse world, similar to today. The sediments and microfossils preserved within the cores document the onset of cooling and the development of the first Antarctic glaciers and the waxing and waning of ice sheets. Cores from one site resemble tree rings – unprecedented alternating bands of light and dark sediment preserve seasonal variability of the last deglaciation that began some 10,000 years ago. Post-cruise sampling has just been completed and the first results are expected soon.

Outreach and spin-off

To promote the field of paleoclimatology and Dutch IODP participation, a team from Utrecht University (Lourens, Sluijs, Brinkhuis and others) entered a prestigious national Dutch competition between universities and research institutions with an outreach plan aimed at high schools and won a K€100 grant starting in 2007. The programme was subsequently developed with the help of the Zcene company - <http://zcene.nl> - and was launched in 2008 at more than 200 high schools in the Netherlands with great success (www.expeditiebroeikaswereld.nl).

Furthermore, following the success of a short film clip based on ACEX, Zcene was hired by the Consortium for Ocean Leadership to develop outreach. This resulted in excellent documentation of the PEAT expeditions, and more recently the Wilkes Land Expedition, see <http://www.youtube.com/user/OceanLeadership>.

IODP has provided Dutch scientists with a unique platform to build a wide international network of intensive collaboration. Building on the success of its IODP membership, a support group of geoscientists in the Netherlands has recently applied for Dutch membership of the International Continental Scientific Drilling Program.

From members of the Netherlands IODP Committee: Henk Brinkhuis, Lucas Lourens (ESSAC), Josef Stuefer (ECORD Council), Jan de Leeuw (SASEC) and contributions by Appy Sluijs and Peter Bijl.



Icebergs ahead of the JOIDES Resolution during the Wilkes Land Exp. 318 (©IODP-USIO).



Peter Bijl (Utrecht University) preparing samples for palynological investigations during the Wilkes Land Expedition 318 (©IODP-USIO).



www.expeditiebroeikaswereld.nl



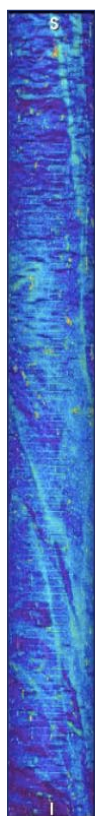
Unique storage of core samples and data by the IODP core repository at the Kochi Core Center, Japan

Kochi Core Center (KCC) has housed one of the three IODP core repositories in the world since September 2007. About 83.3 km of DSDP/ODP cores, so-called legacy cores, and about

8.4 km of IODP cores are being curated at 4°C and 80% humidity in the reefers at the KCC. For the cores collected during the IODP Bering Sea Expedition 323, a large-scale sampling party was held recently at the repository and a record number of samples (ca. 53,000) were taken by the science party members and KCC staff. It was a great exercise in terms of extraordinary co-ordination among the curatorial and other staff of the two IODP Implementing Organisations (IOs), CDEX/KCC and USIO/Gulf Coast Repository. The KCC will receive the cores of the IODP Great Barrier Reef Environmental Changes Expedition 325 from the Bremen Core Repository (BCR) next year when the moratorium period ends. This transfer of cores between IODP

core repositories will be achieved by a significant co-ordination between staff at the ECORD Science Operator (ESO) at BCR and CDEX/KCC.

For the first time in the scientific ocean drilling program, cuttings were collected during the IODP NanTroSEIZE Stage 2 - Expedition 319 (Philippine Sea). The cuttings are millimetre-scale chunks of lithified material and rocks recovered on the drill floor of the ship by drilling operations using the riser technique. The cuttings are being curated at the KCC in "wet" form - cuttings submerged in drill mud - and "dry" form - washed and dried cuttings. The cuttings are available to researchers from all over the world for research work in the same way that the solid cores can be accessed.



An example of the XCT image of a core section. Such 3D images of core sections can be generated with the data available from the Virtual Core Library and are accessible through the KCC web site.

With its unique sample-storage facility, the KCC stores aliquots of recently collected IODP cores in a -80°C freezer and also in liquid nitrogen cooled tanks (-160°C) for promoting research in the field of geomicrobiology. These aliquots are known as Routine Microbiological Samples (RMS). Aseptic handling of the RMS is of prime importance for researchers, and the KCC has already begun a 3-year long feasibility study for curation of such samples in order to provide high-quality samples to researchers around the world.



Kochi Core Center, Japan.



A view of the legacy cores racked in the reefer at the KCC.



Handling a deep frozen RMS at the KCC.

The IODP cores collected by the Japanese drilling vessel *Chikyu* are scanned using an XCT scanner before the cores are split onboard the ship. The data files generated from the scanner are large, a few hundred megabytes for a 1.5m-long core section. The KCC has set up a Virtual Core Library (VCL) to facilitate worldwide distribution of these data files to researchers. These data are expected to create new science when used in combination with other shipboard-measurement data as well as data obtained from chemical analyses of discrete core samples, and thus contribute to our current understanding of the Earth and its environment.

For the analysis of core samples, the KCC is equipped with state-of-the-art analytical instruments such as the XCT scanner, XRF core logger, MSCL, Mass Spectrometers, ICP-MS, GC-MS, automated cell counter, DNA sequencer, etc. and

these can be utilised by researchers from around the world in collaboration with Japanese scientists.

Lallan Gupta, IODP Curator at the Kochi Core Center.
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The Centre for Deep Exploration (CDEX) is the IODP Japanese Implementing Organization for Chikyu expeditions.



Bonnie Wolff-Boenisch

Towards new frontiers: drilling in the polar realm

Although it is agreed that the Arctic and the polar Southern Ocean are critical to our understanding of climate and tectonic evolution, until today they remain largely *terra incognita*. The first scientific deep-sea drilling expedition in the central Arctic was carried out only in 2004. IODP Expedition 302, better known as the Arctic Coring Expedition (ACEX), was a huge scientific success for the program. The new unexpected research results opened the door just enough to give us a preview of the exciting discoveries awaiting us.

Nevertheless, drilling in polar oceans is still a considerable technical and operational challenge because of the extreme environmental conditions and the associated very high costs in general, and particularly due to the rare scheduling of isolated expeditions - on average every decade. This situation is in contrast to the important number of polar-related proposals sent to IODP in recent years (cf. INVEST White Papers Stein and Coakley, 2009; De Santis et al., 2009; Wolff-Boenisch et al., 2009) and to the societal relevance of the polar regions.

Based on the need for acquiring scientific drilling data from polar basins on the one hand (Kristoffersen and Mikkelsen, 2004; Nansen Arctic Drilling Program, 1992), and on the other, the urgent need for nearly all research disciplines working in the polar realm to obtain year-round data (Thiede and Egerton, 2004), the European Polar Board established an initiative to develop a plan for a novel research icebreaker with state-of-the-art riserless drilling technology: the *AURORA BOREALIS (AB)* (Figure 1).

With the *AB*, routine scientific deep-sea drilling during the summer months would become possible for the first time in drifting pack ice without additional support of icebreakers. Model tests in

ice tanks in Finland and Germany have proved that the vessel could be dynamically positioned in closed sea-ice cover with a thickness of two metres and more – a novelty in ship construction. But the *AB* is also a multipurpose vessel able to operate during any season of the year in polar

The earlier science plan for *AURORA BOREALIS* (Thiede and Egerton, 2004) will be reviewed and updated by a multi-disciplinary international Science Advisory Panel during a dedicated meeting in mid-November 2010.

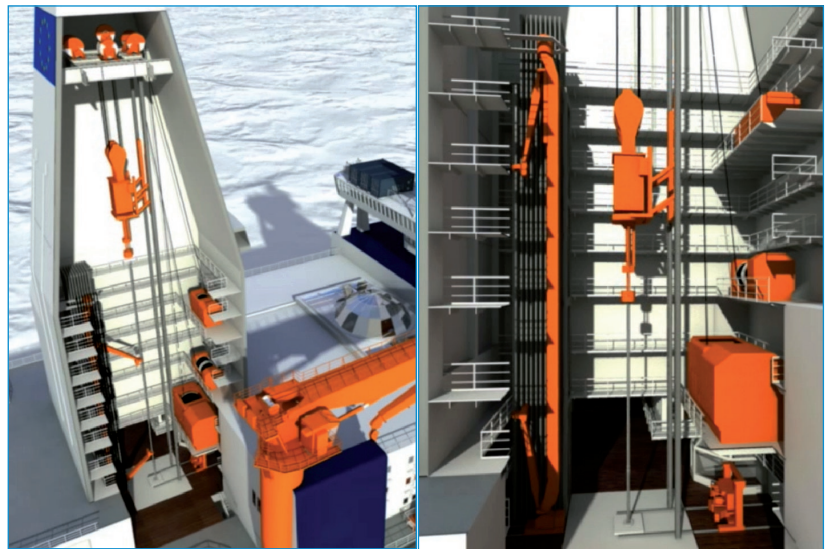


Figure 1: View into aft moonpool section with enclosed drilling rig. 6000 m drill pipe stored in vertical pipe racker, tools and cover storage and maintenance located to the aft (left), laboratory and catwalk to the front and back (right, behind the driller's cabin).

waters because it meets the specifications of the highest ice-class (see comparison in Figure 2). Another special feature is that its stern section is specifically designed to deploy seismic equipment in ice-covered waters.

The European Research Icebreaker Consortium *AURORA BOREALIS* (ERICON AB) endorses that the deep-sea drilling component of *AURORA BOREALIS* shall be implemented in close cooperation with IODP and ECORD as a polar-dedicated research platform for the ocean basins in high latitudes. In this context the governance and legal system are currently under development. Scientific access to the vessel will be based on a competitive proposal review and evaluation system.

The construction and operation costs have been validated by an external Financial Advisory Panel, consisting of experts from ship operators of European research vessels and from IODP and ECORD. The construction costs of M€790 will be met by an international consortium of European countries. The established running costs of M€40 per year take into consideration the financial support to the core management structure and would include nine-month scientific operations plus one drilling expedition per year. Modeled expedition scenarios show that the average costs for a polar drilling expedition will be considerably lower in this set up than the ACEX set up, with one drilling ship and two icebreakers, and support will provide an additional nine months scientific, operational and

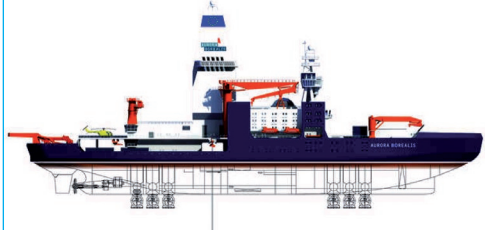
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|  | <p>AURORA BOREALIS PC 1, highest polar class Autonomous drilling operation in ice Length 200 m Breadth 49 m Displacement 65 000 tons</p> |
|  | <p>Stena DrillMAX ICE PC5, polar class 5 Ice reinforced only, needs icebreaker support Length 228 m Breadth 42 m Displacement 98 000 tons</p> |
|  | <p>Chikyu No autonomous operation in ice Length 210 m Breadth 38 m Displacement 59 600 tons</p> |

Figure 2: AURORA BOREALIS compared to the commercial drilling vessel Stena DrillMAX ICE and the riser drilling vessel Chikyu (photo credits: <http://www.stena-drilling.com/sub.asp?m=drilling&p=ice> and © JAMSTEC/IODP).

technical capability offshore for the non-drilling communities, with a maximal berthing capacity of 120 personnel (science party, technical support and crew). The final business plan, which will include the cost-sharing and participation model, is likely to be drafted in January 2011 in line with the timeline of the project.

The critical role of the Arctic and the Southern Ocean in climate evolution demand joint strategic planning and sharing of infrastructures. The development of a new European Research Icebreaker and deep-sea drilling vessel could be such a joint cooperation. The AB offers potential for new science far

beyond the capabilities of any individual nation. These increased capacities in multidisciplinary research, such as climate change, biodiversity, geohazards or long-term monitoring, would produce a data set indispensable for understanding the evolution of the Earth's climate and the northern hemisphere's plate tectonic and paleogeographic evolution.

To date, there are no ships anywhere in the world, even commercial drilling ships such as the *Stena DrillMAX ICE* (Figure 2), that have the required capabilities.

Bonnie Wolff-Boenisch and the European Research Icebreaker Consortium AURORA BOREALIS (ERICON AB)

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For further information:
www.eri-aurora-borealis.eu

ECORD Industrial Liaison Panel

A number of years ago, the British member of ODP set up a UK Industrial Liaison Panel (UK ILP). The objective was to share experience and knowledge between academia and industry with the aim of benefiting deep-sea drilling science and technology. The UK ILP has been quite successful in facilitating the sharing of data, and the panel was maintained when IODP followed ODP and UK joined ECORD. In 2009, ECORD Council endorsed the suggestion of UK to enlarge its scope and make it an ECORD Industrial Liaison Panel (ECORD ILP).

The ECORD ILP continues to act as a link between academia and industry forging and fostering mutually beneficial relationships. The panel mainly comprises representatives from interested industries/companies (Europe and wider international). It also includes liaison with the IODP Engineering and Development Panel (EDP) - www.iodp.org/edp - to provide the ILP with a link to international IODP-related technology development - *see table below*.

The panel's terms of reference include providing support and offering guidance to the academic community on the appropriateness of the program for meeting industrial and related

scientific objectives. The ILP seeks to maximize economic benefits by sharing resources, such as manpower, the drilling of sites, the development of joint drilling and sampling technologies, core and data analysis, and improved downhole measurement and observatory capabilities. Finally, the aim is to facilitate the development of joint academic and industry drilling proposals from the ECORD countries.

At its first meeting in 2009, the panel decided that to increase efficiency it should focus on a specific topic. All participants agreed that the Arctic is one of the last frontiers, and of common interest to academia and industry. ECORD Council approved the idea of joining efforts on this particular area, which will be a key component of the science plan for the future phase of ocean drilling.

Taking advice from the ECORD ILP, as well as from key figures in the Arctic academic community, Dayton Dove, the Science Co-ordinator of the UK IODP, has prepared a brochure to stimulate industry interest in scientific drilling in the Arctic. This brochure (*above*), which is about to be finalised, will be distributed to all industry contacts. The plan is to organise a workshop between industry and academia representatives with the aim of identifying objectives of common interest that could result in joint initiatives. The workshop will be a follow up of the Arctic workshop held in Bremerhaven in the fall of 2008 that resulted in the submission of drilling proposals to IODP. To make this workshop a success, we need to bring together the key players. Any suggestions for possible participation will be most welcome.

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<http://www.ecord.org/ecord-ilp.html>



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