

# *International Continental Scientific Drilling Program ICDP*

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## **Current status as of January 2019**

### **ICDP Project Schedule 2018/2019**

#### **ICDP Projects accomplished in 2018**

- Oman Ophiolite Drilling Project (OMAN)
- Drilling into Seismogenic Zones of M2.0 – M5.5 earthquakes in deep South African gold mines (DSEIS)

#### **Currently operating ICDP Projects**

- Drilling the Eger Rift

#### **Upcoming ICDP Projects**

- Geological Research through Integrated Neoproterozoic Drilling: The Ediacaran-Cambrian Transition (GRIND-ETC)
- Jurassic Earth System and Timescale (JET)
- Drilling Overdeepened Alpine Valleys (DOVE)
- Trans-Amazon Drilling Project (TransAmazon)
- A Strainmeter Array Along the Alto Tiberina Fault System, Central Italy (STAR)

### **Workshops**

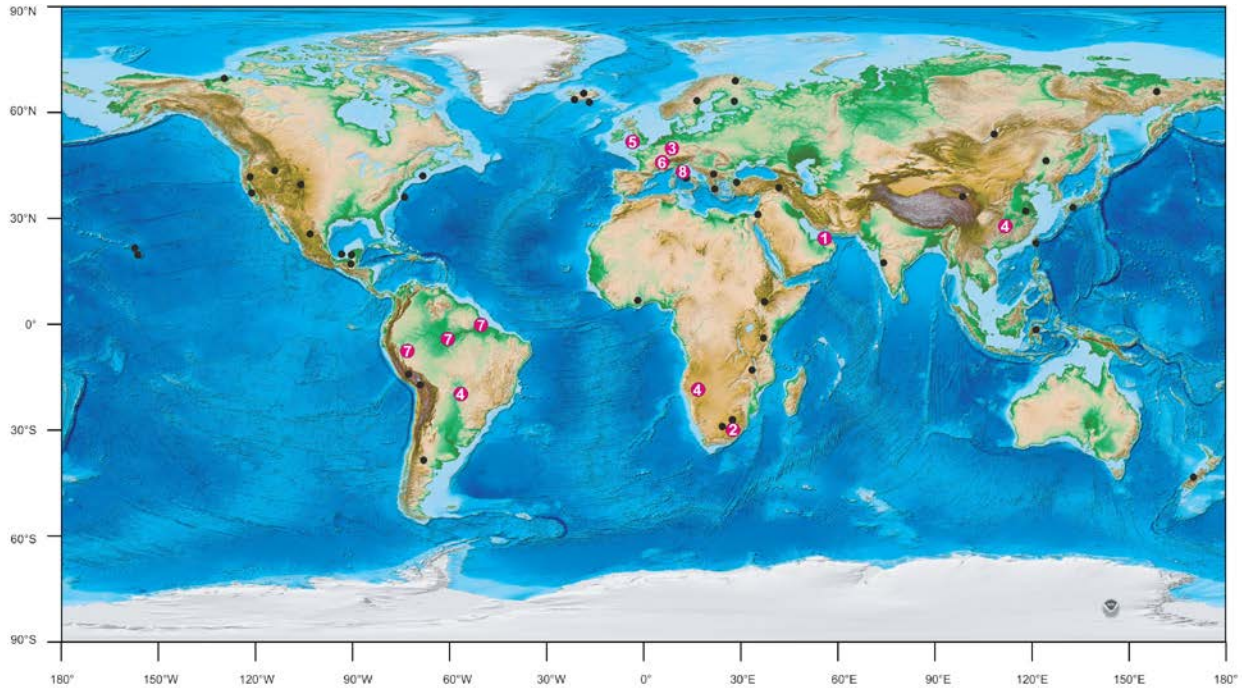
### **ICDP Outreach and Training Activities**

### **Proposal Submissions 2018**

### **New ICDP Executive Committee Chair**

### **ICDP Profile**

## ICDP Project Schedule 2018/2019



### ICDP Operations accomplished 2018

1	Oman	Dec. 2016-May 2018	Oman
2	DSEIS	June 2017-March 2018	Orkney, South Africa

### Currently operating ICDP projects

3	Eger Rift	Aug. 2018-Aug. 2019	Czech Republic
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### ICDP Projects scheduled for 2019

4	GRIND	Aug. 2019-June 2020	Namibia, Brazil, China
5	JET	May 2019-Aug. 2019	Wales (UK)
6	DOVE	May 2019-May 2020	Multinational (Alpine Valleys)
7	TransAmazon	Nov. 2019-June 2020	Brazil
8	STAR	Summer 2019	Central Italy

## ICDP Projects accomplished in 2018

### The Oman Ophiolite Drilling Project



The Samail Ophiolite in Oman is the world's largest, best-exposed, and most-studied subaerial block of oceanic crust and upper mantle. Observations of mantle peridotites overlying the subduction zone thrust, which carried the ophiolite onto the Arabian continental margin, reveals an unexpected reservoir of carbon, derived from subducted sediments and precipitated as carbonate minerals in the mantle wedge. This could form an important, hitherto unrecognized part of the global carbon cycle. Following ground-breaking work in the 1980's, there has been a recent surge of interest in the Samail Ophiolite as the ideal site for studying the weathering of mantle peridotite, which appears to be associated with the subsurface biosphere, thereby fueling microbial catalysis of low temperature alteration reactions. Such studies will contribute to understanding microbial ecosystems in extreme environments and the origin of life on Earth and possibly other planets. Drilling provides key data on the processes of melt extraction from the mantle, igneous accretion of oceanic crust, and hydrothermal modification of that crust. Drilling will also investigate present day alteration processes, their relationship to the deep biosphere, and their potential for accelerating carbon capture and storage via in-situ mineral carbonation and is planned at four sites at the southeast end of the Samail Ophiolite Complex, near to Muscat.



*Oman drill site (left) and scientists from the Oman shipboards science party in front of D/V Chikyu (right). Photo sources: OmanDrillProj on Twitter (left), omandrillingproject on Facebook (right)*

Phase 1 drilling operations started on December 24, 2016. 12 holes have been drilled with a total length of 3670.0 m and 2319.73 m core were obtained during Phase 1. Oman Phase 2 drilling started in November 2017 and was completed four months after with 1700 m of drilled core (100% recovery). Description of core from both drilling phases took place on board the Drilling Vessel Chikyu in summer 2017 resp. 2018. The shipboard science party of 67, including six Omani trainees, performed detailed, IODP-standard, detailed logging of 1500 m of core from 15th July to 15th September 2017.

## Drilling Seismologic Zones in Deep South African Gold Mines (DSEIS)



The DSeis project (Drilling into Seismogenic zones in deep South African Gold Mines) drilled boreholes in several deep South African gold mines to gain new insights on mining-induced earthquake nucleation and fault slip processes, the status of the stress field at great depths, deep microbiological life and the role and origin of the linked fluids. Two boreholes (817 and 700 m long) were drilled from a 2.9 km deep mining level of the Moab Khotsong gold mine in order to penetrate into the aftershock plane of the M 5.5 Orkney earthquake that occurred in August 2014 and to retrieve core, fluid, and microbial samples from the seismic active zone. The first 817 m long borehole (Hole A) was fully cored and completed in September 2017 with no evidence of intersection of the rupture zone. Geophysical borehole logging of Hole A was conducted in October 2017 (borehole diameter, natural gamma, acoustical and optical imaging, gamma density). In order to penetrate the rupture zone, Hole B (700 m long, completed at the end of March 2018) was drilled with a higher angle. At 612 m depth, Hole B core loss occurred in a 4 to 5 m long instable borehole section. The probes of the borehole survey could not pass this area of borehole instability. Therefore, it was decided to sidetrack Hole B at 544 m with. By using a triple tube coring system, the unconsolidated interval was successfully cored between Mai and June 2018. After drilling, an automated gas analytical system was deployed at Hole A to monitor the concentrations of gas released by the borehole. Gas monitoring and laboratory measurements of gases will help clarify the process of hydrogen generation, the origin of other gases, and if and how the gases may serve as feedstock for a deep microbial community.



*Left: drilling of Hole B at 2.9 km depth (Level 95) of the Moab Khotsong gold mine. Right: the science team after successful coring operations. Photo courtesy: ICDP*



## Currently operating ICDP projects

### Drilling the Eger Rift

The Bohemian Massif (500-250 Ma), the easternmost part of the Variscan orogenic belt, is one of the largest stable outcrops of pre-Permian rocks in Central and Western Europe. This region has persistent geodynamic activity that is clearly linked to the upper mantle, and offers a globally unique location for studying intra-continental earthquake swarm (ES) seismicity in combination with deep crust and mantle degassing as well as their interaction with the deep biosphere. The main questions regarding seismicity, microbial life and origin, and heat flow are all linked by the common questions of fluid flow, pathways, and composition. The ICDP project 'Drilling the Eger Rift' aims to develop a comprehensive laboratory at depth for the study of ES, crustal fluid flow, mantle-derived CO<sub>2</sub> and He degassing, and processes of the deep biosphere. In order to reach a new level of high-frequency, near source, and multi-parameter observation of ES and related phenomena, such a laboratory will comprise of a high-frequency 3D seismic array with a set of four shallow boreholes, combined with modern continuous real-time fluid monitoring at depth (the shallow boreholes) and the study of deep biosphere. From the microbiological viewpoint active fault zones could be seen as hot spots of microbial life in the deep subsurface compared to other continental deep biosphere ecosystems due to an intensified substrate support by the CO<sub>2</sub>-dominated fluid flow. Therefore, active fault zones provide unique conditions for studying microbial life at depths and in situ. The regular occurrence of persistent ES with known radiation effects offers the unique possibility to design and tune a borehole-based monitoring network for optimized analysis of the high frequency content of weak swarm-like seismicity, which appears clearly related to fluid-flow in the crust between 5 and 10 km depth. A 108.50 m deep pilot hole was drilled in spring 2016 to study the impact of CO<sub>2</sub>-rich mantle-derived fluids on the geo-bio interaction. In October 2018, the HQ-size borehole Studenec S3 was drilled to 400 m depth using wireline coring technique. The extracted drill core consists mainly of phyllites. Drilling of three other boreholes is scheduled for 2019.



*Eger Rift S3 drilling in October 2018 (left). Right: Science Team members with recovered core. Photos: ICDP*

## ICDP Operations scheduled for 2019

### Geological Research through Integrated Neoproterozoic Drilling: The Ediacaran-Cambrian Transition (GRIND-ETC)

The Neoproterozoic Era (1000 - 541 Ma) is one of the most dramatic in Earth history: metazoans evolved, the supercontinent Rodinia formed and broke apart, the global carbon cycle underwent high-amplitude fluctuations, oxygen concentrations rose and climate experienced at least two episodes of worldwide glaciation. However, the discontinuous and fragmented nature of outcrop-based studies has hindered developing quantitative models of Earth system functioning during that Era. The multi-phase GRIND project will rectify this scientific shortcoming by obtaining cores, each from 150 to 550 m, through the archetype successions that record the environmental and biogeochemical context during which life on Earth exploded. The specific targets of the first GRIND phase are the Ediacaran-Cambrian transition strata (560-530 Ma) of west Brazil, south China and south Namibia. The objective is to create a core network of correlative ECT strata that will enable constructing a highly resolved, temporally constrained geobiological, stratigraphic and geochemical database, as well as to provide a legacy archive for future research. The goal is to understand the drivers of the Neoproterozoic Earth system revolution: it began with simple eukaryotes that populated Earth during the preceding billion years of the Mesoproterozoic, underwent multiple Snowball Earth events, and emerged with the oxygenated, diverse ecosystems of the Cambrian. The three-nation drilling program will be undertaken sequentially: drilling in Brazil is planned for summer 2018, with successive drilling in Namibia (09/10 2019) and China (late 2019/early 2020). All cores will be split and either being archived in repositories within each of the target nations or used for research purposes by GRIND-ECT scientists and for education and training for national capacity building and outreach activities. The working half of all cores will be permanent stored in the Federal Institute for Geosciences and Natural Resources in Berlin-Spandau, Germany.

### Jurassic Earth system and Timescale (JET)

The major goal of this ICDP project is to produce a new global standard for the Early Jurassic Epoch, a time of extreme environmental change. Through the Early Jurassic there are well-documented examples of rapid transitions from cold, or even glacial climates, through to super-greenhouse events, the latter characterized worldwide by hugely enhanced organic carbon burial, multiple large-magnitude isotopic anomalies, global sea-level changes and mass extinctions. These events not only reflect changes in the global climate system but are also thought to have had significant influence on the evolution of Jurassic marine and terrestrial biota. The initial plan of re-drilling a 45-year-old borehole at the Mochras Farm on the coast of Cardigan Bay had to be revised due to permitting issues. A new site (Prees) that fulfills and even exceeds the initial science objectives will be drilled in the Cheshire Basin (Shropshire, England). Situated close to a former oil and gas exploration well, the new site allows recovering approximately 850 m of primarily latest Triassic to Early Jurassic Strata, including the Jurassic-Triassic boundary. This new approach will integrate astrochronology, chemostratigraphy, biostratigraphy, and magnetostratigraphy and, combined with data being generated from the old Mochras core, will become the international standard for these 25 million years of Earth history.

## **Drilling Overdeepened Alpine Valleys (DOVE)**

The DOVE project is planning to drill a series of drill holes along and across the Alps into overdeepened valleys all the way to bedrock, in order to answer key questions on the timing and extent of past Alpine glaciations, how atmospheric circulation patterns affect the ice build-up along and across the Alps, and how mountain ranges and their foreland shaped by repetitive glaciations. In addition, overdeepened valley fills act as crucial players in natural hazard assessments, as they are influenced by a variety of mass movements and, moreover, they represent areas of high seismic risks related to their unfavorable seismic site effects. Drilling these deposits, paired with geophysical explorations and drill-hole instrumentation, will provide the means to evaluate the potential of the valley fills to serve as drinking water resources and to quantify the mentioned hazards. The drilling strategy is to perform a drilling transect with drill sites in France, Switzerland, Austria, Italy, Germany, and Slovenia. Two of these sites will be drilled in Switzerland and Germany as a proof on concept study to determine if datable material can be recovered and if proxy data for paleo-environmental interpretations can be established.

## **Trans-Amazon Drilling Project**

The Amazon of tropical South America is a key region on Earth, and its rainforests host over half of all terrestrial plant species. The forests and their biota have evolved together with the physical landscape, closely linking processes in the Earth's interior with surface climate and landscapes, ecosystems, and biodiversity. The Trans-Amazon Drilling Project will address fundamental questions about the geologic and biotic evolution of the Amazon, focusing on (1) how Cenozoic climate and geologic history, including uplift of the Andes and development of the Amazon fluvial system, influenced the origins of the Amazon rainforest and its incomparable biodiversity; and (2) the origin of the Amazonian "Pentecaua" diabase sills, one of Earth's largest intrusive complexes, and the impacts of this intrusion on the atmospheric gas composition and mass extinction at the Triassic/Jurassic boundary. It is planned to drill the entire Cenozoic sequence (and for two sites also the underlying diabase sequence) in five continental sites in four different ancient sedimentary basins that are aligned along the modern Amazon River and that transect the entire near-equatorial Amazon region of Brazil, from the Andean foreland to the Atlantic Ocean. This transect, coupled with proposed IODP sites on the Amazon continental margin, will encircling nearly 10% of Earth's equatorial circumference.

## **A Strainmeter Array Along the Alto Tiberina Fault System, Central Italy (STAR)**

The Alto Tiberina fault (ATF) in the Northern Apennines is a low-angle normal fault that is the target of The Alto Tiberina Near Fault Observatory (TABOO), a multidisciplinary research infrastructure managed by INGV and part of the European Plate Observing System. STAR will deploy a Strainmeter Array in shallow boreholes to collect data to address questions about the relationship between creep, slow slip, dynamic earthquake rupture and tectonic faulting. Understanding the physics allowing for both seismic and aseismic slip on a single fault patch, has implications for seismic hazard and risk assessment globally. STAR will consist of six 80-160 m deep vertical boreholes covering the portion of the ATF that exhibits repeated earthquakes at shallow depth (~4 km), instrumented with strainmeters, downhole seismometers and pressure transducers. Each site will be also equipped with surface GPS and a meteorological instrument allowing correlation between seismicity, degassing (CO<sub>2</sub>, Rn) measurements and subsurface strain. STAR will provide the international community an opportunity to study creep at local scale and over periods of minutes to months poorly constrained by other geophysical instruments.

## ICDP Workshops

ICDP funds workshops to support groups of international scientists with an outstanding scientific theme of socio-economic relevance that requires drilling. The workshops serve to form a broad and competent Science Team and to develop full drilling proposals to ICDP and other co-funding agencies or industry. ICDP also supports post-drilling workshops after completion of the operative work and basic core and sample description for e.g. discussing of initial results and organizing individual sampling. Over the past years, ICDP supported the conduction of workshops with a broad topical spectrum addressing various future drilling projects.

Workshops 2018 /2019	Date and Venue	Participants	Countries
Drilling Investigation of Seismogenic Crust in Oklahoma (DISCO)	May 3-5, 2018 Norman, Oklahoma, USA	53	11
Drilling Lake Nam Co, Tibetan Plateau	May 22-24, 2018 Beijing, China	52	8
Forthcoming Workshops			
Probing the Late Paleozoic Icehouse-Greenhouse Transition (DeepDust)	March 7-10, 2019 Norman, Oklahoma, USA	-	-
EMCT: Early Mesozoic, Low- to High-Latitude Coring Transect for Environmental, Climatic, Biotic, and Solar System Evolution Normal	May 11-14, 2019 St. George, Utah, USA	-	-
Scientific Drilling of Lake Tanganyika	June 17-20, 2019 Dar es Salaam, Tanzania	-	-

## ICDP Outreach and Education Activities

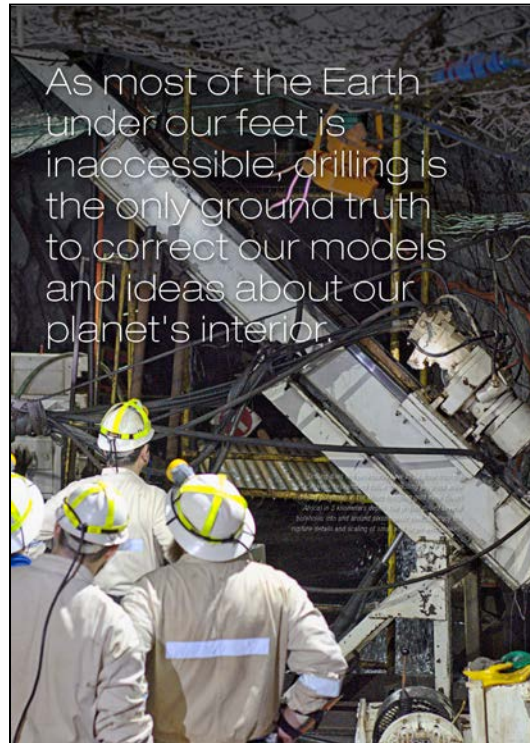
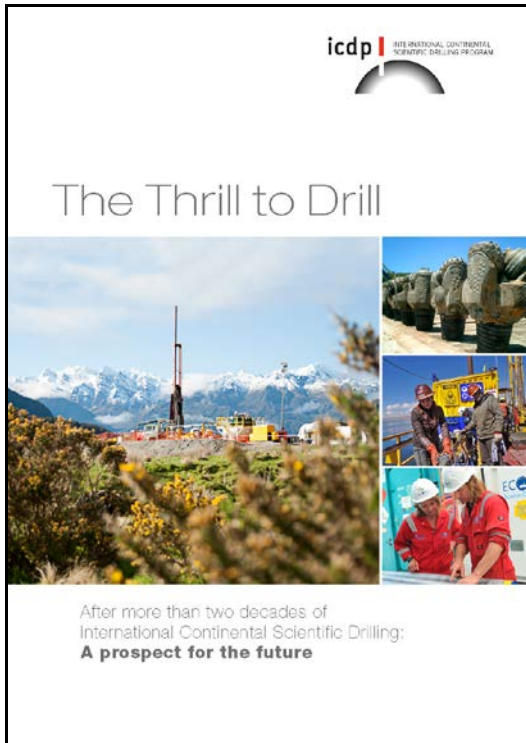
### Publications



Issue 24 of the IODP-ICDP program journal SCIENTIFIC DRILLING was published by Copernicus Publications in October 2018. The volume includes two Science reports, one Progress report, one report on Technical Developments, and five Workshop Reports.



## New Edition of the ICDP Brochure “The Thrill to Drill”



As most of the Earth under our feet is inaccessible, drilling is the only ground truth to correct our models and ideas about our planet's interior.

The ICDP brochure "The Thrill to Drill" is intended to draw the attention of the interested public and stakeholders to continental scientific drilling. The latest, meanwhile third, edition has been condensed to 20 pages and was completely redesigned. It is available as PDF on the ICDP website; printed versions are available upon request.

## ICDP Best Practice Brochure (ICDP Primer)

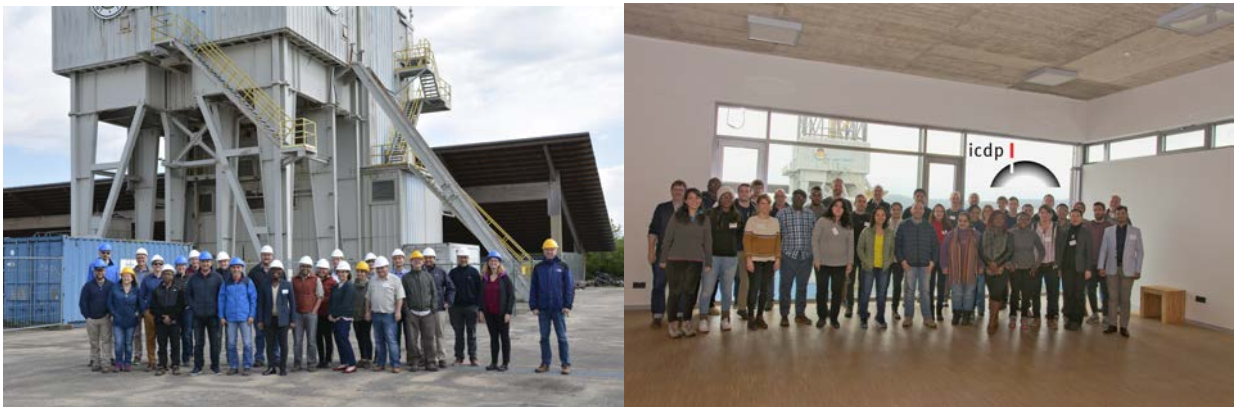


The Operational Support Group experts have summarized their know how on preparing and conducting scientific drilling projects in the so-called ICDP Primer. A new edition of this brochure was published in November 2018. This fourth edition contains one completely new chapter (*Workshops to Prepare Drilling Projects*). The chapter *Site Selection and Pre-Site Surveys* was updated and divided into two new chapters: *Pre-Site Survey in Lake Drilling Projects* and *Pre-Site Survey in Crystalline Rock Coring Projects*.

## ICDP Training Courses

Two ICDP Training Courses were held in 2018. 22 Principal Investigators, project managers and leading scientists of upcoming continental scientific drilling projects met for the ICDP Training Course on Planning, Management and Execution of Continental Scientific Drilling Projects from May 15-17, 2018, at the GeoZentrum KTB in Windischeschenbach, Germany. This training course touched upon relevant aspects for managing a scientific drilling project, including proposal writing & multi-source fundraising, drilling engineering basics, HSE (Health, Safety, Security and Environment), on-site project management, sample handling & curation, downhole logging planning & execution, and outreach.

The annual ICDP Training Courses on continental scientific drilling was held again at the KTB GeoZentrum from November 18-23. The initial plan was to holding this training course in Wales (UK) during drilling at the Mochras site (JET), however, due to permitting issues drilling was postponed. 30 Participants from 18 countries followed lectures and performed practical exercises on project planning and management, drilling engineering, sample handling, storage and curation, on-site studies, downhole logging, data management, outreach and post-drilling measures.



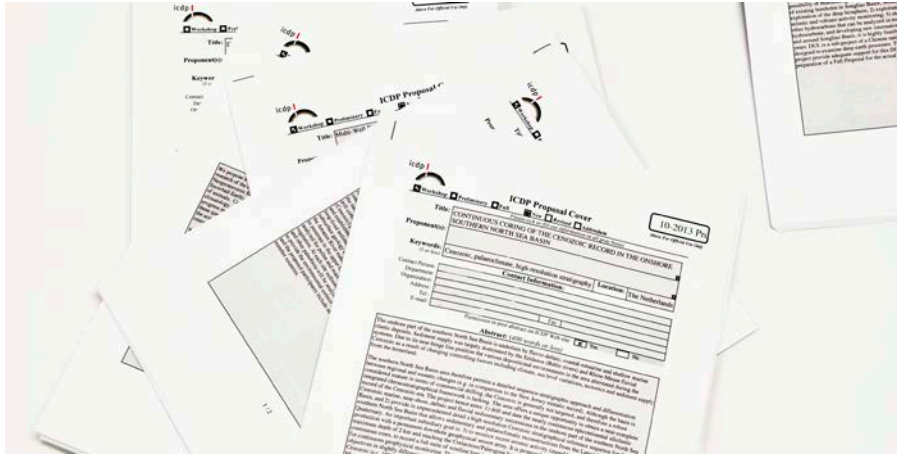
*ICDP drilling management training course (left) and training course on continental scientific drilling (right). Photos: ICDP (Thomas Wiersberg)*

## ICDP at Conferences and other outreach activities

ICDP was presented at the 2018 EGU General Assembly in Vienna with a joint IODP-ICDP booth, Town Hall meeting, and a scientific session. At the 2018 AGU Fall Meeting in Washington, a joint Town Hall meeting with CSDCO (Continental Scientific Drilling Coordination Office, Mineapolis, USA) was held and a joint IODP-ICDP booth attracted the attention of AGU participants.

## ICDP Proposal Submission 2018

With twelve Full Proposals, seven Workshop Proposals, and one Pre-Proposal submitted by January 15, 2018, the number of submitted Full Proposals reached a new peak in the history of ICDP.



## New ICDP Executive Committee Chair

The ICDP Executive Committee and Assembly of Governors have appointed Marco Bohnhoff as the new chair of the Executive Committee. Previous EC Chair Axel Liebscher resigned from the position at his own request in order to be able to face new professional challenges in the field of nuclear waste disposal management. Marco Bohnhoff is Professor for Experimental and Borehole Seismology at the Free University Berlin and head of the Section 'Geomechanics and Scientific Drilling' at the GFZ German Research Centre for Geosciences. He has extensive knowledge in the field of scientific drilling and brings ICDP experience through his role as Principal Investigator in various ICDP projects, including the Geophysical Borehole Observatory at the North Anatolian Fault (GONAF), Deep Drilling at Koyna for Reservoir Triggered Seismicity, and a STRainmeter ARray in shallow boreholes of the northern Apennines (STAR). Marco stated that he is far from being idealistic but a true believer that the ICDP philosophy of co-mingled international funding is the right way to go and that ICDP is a blueprint of how to tackle ambitious challenges in a globalized multipolar world.



Photo credit: Juliane Kueppers, Freie Universität Berlin

## ICDP Profile

Scientific drilling is an indispensable tool of modern Earth Science research because it provides the only means of obtaining direct information about on-going processes below the surface of the Earth and at depth. Drilling allows determining *in-situ* properties of solid materials and fluids, and permits testing of hypotheses and models derived from surface and remote sensing observations. Drill holes may be used as a natural laboratory for experiments and observatories for long-term monitoring of ongoing active geological, microbiological processes. Earth drilling, therefore, plays a critical role in scientific research directed towards improving our understanding of the workings of our planet and has a key role in solving urgent societal problems.

Multinational efforts in continental scientific drilling have been coordinated by ICDP since 1996. The concept for this program was developed in response to the geosciences community's need for scientific drilling as an essential tool to achieve a better understanding of fundamental Earth processes and structure. The program is based on comingled funding and international cost sharing, joint efforts of international science teams, as well as technology and knowledge sharing. The program concentrates on topics of high international priority, and drilling projects are conducted at locations of global geological significance. The organization is simple and flexible, comprises an independent science review board and executive and oversight committees. Administration assistance and substantial operational support are provided voluntarily by the German Research Centre for Geosciences – GFZ in Potsdam. Funding is provided by a growing number of member countries, usually through corresponding national funding agencies.

ICDP fosters proposals through international workshops that assist researchers in the development of a drilling proposal. To date, 89 of these workshops have been funded and have resulted in a total of 45 ICDP supported, successfully executed, drilling projects. Thematically the activities have focused on paleoclimate investigations, earthquake and volcano research, impact events, geodynamics, and potential energy resources (see below for current and future themes). Many scientific results from these drilling and Earth observation projects have been published in high-ranking scientific journals. Training of on-site scientists in engineering, on-site science and data management technologies are also important components of ICDP's strategy to foster the success of ICDP-related drilling proposals. The journal "Scientific Drilling" (jointly issued with the International Ocean Discovery Program IODP), serves to communicate developments from current projects as well as workshop reports and announcements for future scientific-drilling related activities.

### Global Partners

ICDP has currently (as per December 31<sup>st</sup>, 2018) 21 members including 20 countries (namely: Germany, USA, Japan, China, Austria, Norway, Czech Republic, Iceland, Finland, Israel, Italy, Spain, Sweden, Switzerland, New Zealand, France, India, the Netherlands, the United Kingdom, and Belgium) and UNESCO as member organization. Expressions of interest in membership and/or negotiations are currently underway with Australia, Brazil, Russia, Turkey, Portugal, Denmark, among others. The German Research Centre for Geosciences - GFZ in Potsdam is the Executive Agency of the ICDP and acts on behalf of the ICDP members.



### Support Level

Drilling projects are an integral component of major geoscience research programs, including comprehensive pre-site investigations, accompanying laboratory studies, drilling (directly supported by ICDP), and measurements and tests in the drill hole. Drilling programs are costly and only realizable to a limited extent by any entity acting alone. International cost sharing, optimal utilization of all available resources, incorporation of international leading experts, and application of the existing knowledge combined with selection of optimal drilling locations (“World Geological Sites”), are all essential elements of the international continental scientific drilling program ICDP.

ICDP is financed through the annual contributions of its members. The membership fees vary and are based on a number of criteria that include economic factors, scientific impact and manpower and population of the respective country. The members USA and Germany provide \$1,000,000, Japan \$350,000, while China, France, United Kingdom and India contribute about \$200,000. The smaller European countries contribute amounts between \$20,000 and \$70,000 annually. The ICDP funds are used, for the most part, for co-funding of approved ICDP projects and for executing ICDP workshops and training courses. In addition, funds cover expenditures for the maintenance of the ICDP Equipment Pool and the ICDP Drilling Information System (DIS). The annual membership income to support ICDP activities is approximately \$3.5M.

The philosophy of ICDP support for projects is based on the “comingled funding” principle. This means that the ICDP is usually one of several funding partners in a joint drilling project. The financial contribution by ICDP to directly support a drilling project varies between about 5% to about 70% (in rare cases) of the total operational costs. Usually national funding agencies or other sources of support for scientific drilling provide the remainder of the funding for the drilling project.

The program is based on a reliable budget with regular financial contributions by the member institutions, strict expense policies including moderate project funding with no long-term financial commitments and very low program administration costs. This allows for attracting new Earth science communities through opportunities to get workshop and project proposals funded. ICDP’s organization, its financing through commingled funding, and the bottom-up project policy, which is relying on unsolicited proposals and thus driving the program at large, is serving as a model for other programs.

### ICDP Organizational Structure and Management

**The Assembly of Governors (AOG)** provides financial and scientific oversight of the ICDP. It determines the program policies, decides on EC-recommended full proposals and allocates the amount of commingled ICDP funding for each individual drilling project. In addition, the AOG decides on the annual program plan, associated budget and discusses the long-range plans of the ICDP as they are prepared and proposed by the EC.

**The Executive Committee (EC)** is responsible for the operation and management of the program. It decides on workshop and technical proposals, reviews the operational, technical, managerial and financial feasibility of full proposals, recommends funding of full proposals to the AOG, assembles the scientifically prioritized projects into an annual program plan with an associated annual budget and prepares the long-range program plan that constitutes the ICDP program. The EC is made up of one appointee from each ICDP member country and nominated by the respective funding partners of the

program. EC members typically are science managers with expertise in drilling and/or coordination of major research projects. The chair of the EC (Executive Chair) represents the ICDP internationally and has the executive responsibility for carrying out the program. The executive chair plays a key role as the international spokesperson and ambassador for the ICDP. Tireless efforts to attract membership of an increasing number of countries have resulted in a strong growth of the scientific community for drilling.

**The Science Advisory Group (SAG)** is an independent body of internationally renowned experts in the research fields covered by the program. Its task is to carry out thorough scientific evaluations of all pre-proposals, full proposals and workshop proposals as they are submitted to the ICDP. The SAG also assigns priority on each proposal based on expected scientific impact, outreach and educational potential. The SAG recommendations are the primary input to the EC as it develops projects for both annual and long-range programs. The SAG has developed the following set of evaluation criteria:

- Quality of Science
- Need for Drilling
- Qualifications of Proponent
- Societal Relevance
- Budget
- Responsiveness to previous recommendations
- Technical Feasibility
- Adequacy of Site Characterization
- Cost Effectiveness
- Project Organization

**The Operational Support Group (OSG)** plays a major role in supporting the management of the program and in providing expertise and stability to planning and operation of the overall program. The German Research Centre for Geosciences (GFZ) in Potsdam handles the administration of the program, including financial accounting and contractual support. Currently the GFZ finances from its own budget a group of six scientists, engineers and technicians who compose the core of the ICDP Operational Support Group and are based at the GFZ. The OSG serves to support the following functions:

- Providing technical and scientific liaison to SAG and EC
- Developing Joint Research Ventures for each project authorized by the EC
- Managing and supporting the Secretariats for AOG and EC
- Assisting in contracting and permitting
- Supporting scientific and engineering drill-site operations
- Supporting field facility for core and sample description and management
- Providing all data collected during each project through a readily accessible data management system for ICDP projects, the Drilling Information System (DIS)
- Preparing – through ICDP's DIS - Initial Reports that describe drilling, engineering, sample and core description, and also procedures for each project
- Providing training courses in scientific drilling prior to and during drilling projects
- Organizing outreach activities on major international geoconferences (AGU, EGU, IGC)
- Editing the IODP-ICDP journal 'Scientific Drilling'
- Developing, purchasing and maintaining an ICDP Equipment Pool comprising scientific-technical instruments and tools for on-site use during ICDP projects

- Providing management support for individual ICDP projects
- Providing and operating ICDP equipment

Management of ICDP activities at the GFZ takes place by the following personnel:

- Prof. Dr. Marco Bohnhoff (EC Chair)
- Dr. Ulrich Harms (Executive Secretary and Head of the ICDP Operational Support Group).

*Credits: Topographic/Bathymetric world map (Page 2) with courtesy from NOAA*