Support and Funding of Scientific Drilling Projects

Uli Harms
GFZ German Research Centre for Geosciences
Section Scientific Drilling, Operational Support Group ICDP
Potsdam, Germany

u.harms@icdp-opnline.org

Structure of this Talk

- **ICDP Science Plan**
- **Organization of the Programm**
- **Support of Projects**
- **Instructions for Proposals**

icdp

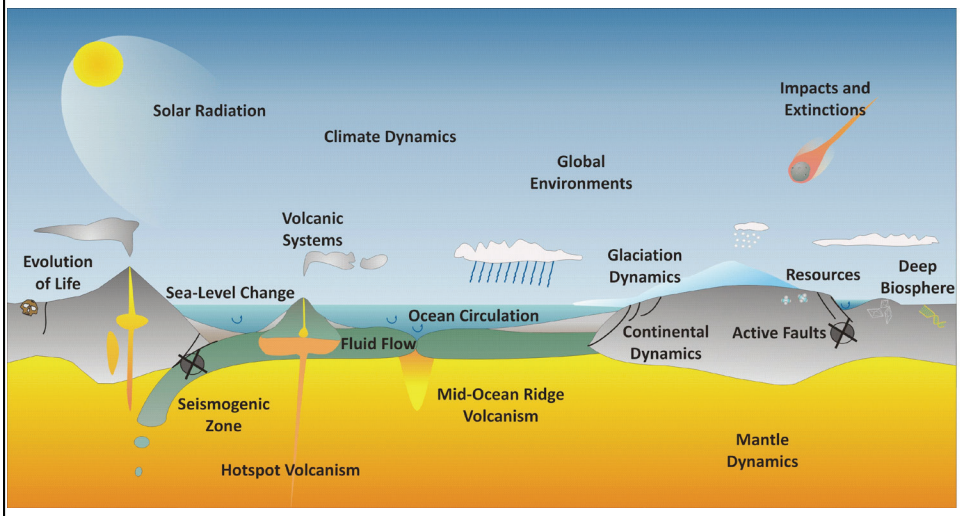
Chapter 1

Scientific Questions

The drivers of the ICDP

icdp

Key questions addressed by Scientific Drilling



International Continental Scientific Drilling

ICDP is an international program to coordinate and support scientific drilling through financial and logistical support to international science teams with a need for drilling

- addresses fundamental problems of global significance
- serves the entire Earth science community
- conducts projects through international teams of scientists at carefully selected sites around the world
- is proposal-driven and peer-reviewed
- is supported by 22 member countries through research agencies or academies

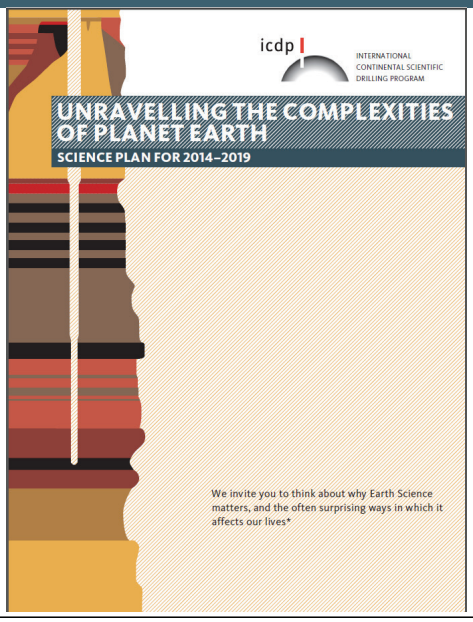
Unravelling the Complexities of Planet Earth

Target:
A new Science Plan for continental scientific drilling

Framework:
An Earth science community effort

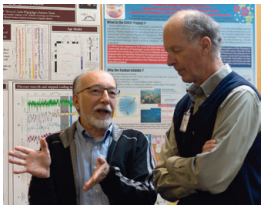
Status:
Online available
Copies printed

Take Home Message:
Get a copy or download
load the file



icdp

Community approach



Our sincere thanks go out to those who have contributed their valuable time, boundless energy and creative ideas to the conference and the White Paper.

Presenters, discussion leaders

Flavio Anselmetti,
Jean-Philipp Avouac,
Keir Becker,
Marco Bohnhoff,
Eduardo de Mulder,
Donald Dingwell,
William Ellsworth,
Guðmundur Ómar Friðleifsson,
Ulrich Harms,
Steve Hickman,
Brian Horsfield,
Roy Hyndman,
Jens Kallmeyer,
Tom Kieft,
Christian Koeberl,
Ilmo Kukkonen,
Steve Larter,
Ralf Littke,
John Ludden,
Stefan Luthi,
Jim Mori,
John Shervais,
Lynn Soreghan,
Jim Russell,
Alexander van Geen,
Jim Whitcomb,
Thomas Wiersberg

White Paper contributions

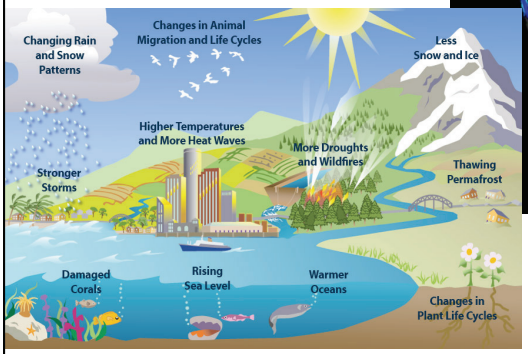
Nicholas Arndt,
Keir Becker,
Marco Bohnhoff,
Achim Brauer,
Philippe Claeys,
Andrew Cohen,
Georg Dresen,
William Ellsworth,
Guðmundur Ómar Friðleifsson,
Ulrich Harms,
Brian Horsfield,
Hans-Wofgang Hubberten,
Ernst Huenges,
Roy Hyndman,
Jens Kallmeyer,
Tom Kieft,
Carola Knebel,
Christian Koeberl,
Achim Kopf,
Ilmo Kukkonen,
Ralf Littke,
John Ludden,
Volker Lüders,
Stefan Luthi,
Jim Mori,
Karsten Pedersen,
Bernhard Prevedel,
Judith Schicks,
Lynn Soreghan,
Joanna Thomas,
Robert Trumbull,
Jim Whitcomb,
Thomas Wiersberg,
Maarten de Wit

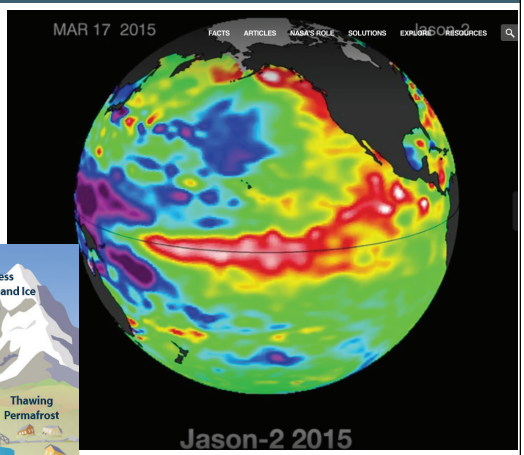
icdp

Climate Change: A current thread, lessons from the past

Observed climate change effects

US Environmental Protection Agency website





Built up of the El Nino 2015

NASA website

Ghorka Earthquake, Nepal, April 25, 2015, M 7.8

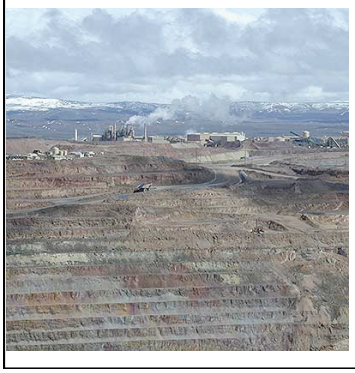
In April 2015 a major Earthquake caused 8000 fatalities, 18.000 injured people and major devastation in Nepal, India and China

Earthquakes are currently foreseeable but not predictable!
What can earth scientists do?

Resources, Energy and Environment

Gold King Mine in Colorado

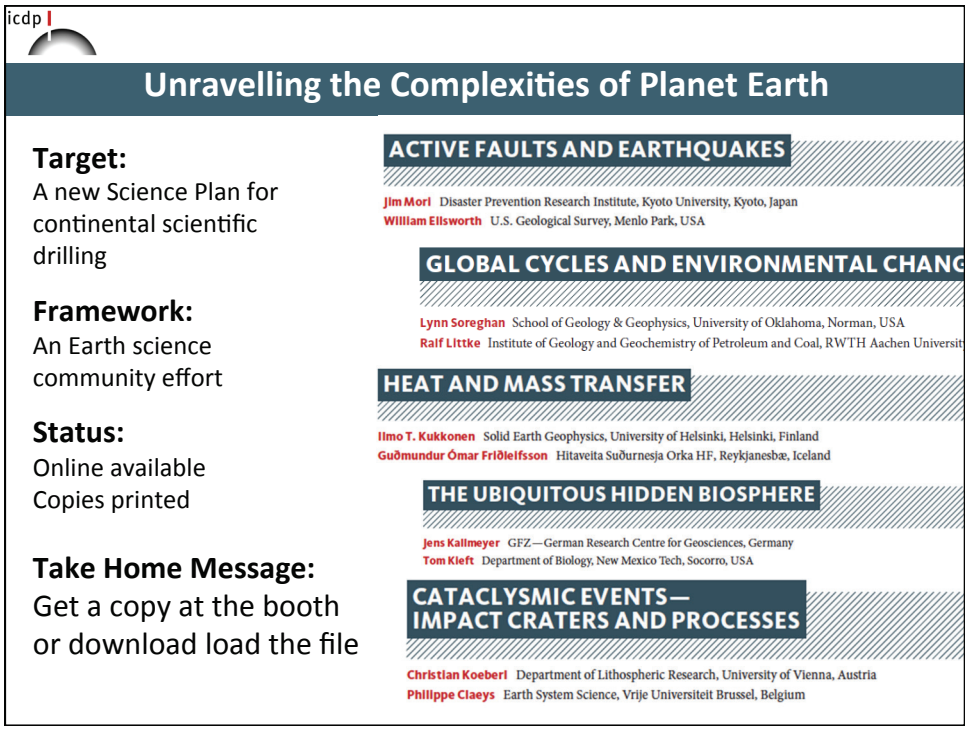
EPA, Environmental Protection Agency



Newmont's Gold Quarry ore roaster in Nevada is a significant source of mercury air pollution

www.earthworksaction.org/


icdp
INTERNATIONAL
CONTINENTAL SCIENTIFIC
DRILLING PROGRAM
NOW: NEW CALL FOR PARTICIPATION
PROFILE
SUPPORT
PROJECTS
PROPOSALS
MEMBERSHIP
SOCIETAL CHALLENGES
Motivation
Climate and Ecosystems
Sustainable Georesources
Natural Hazards
PROGRAM
Strategy
Benefits
How ICDP runs
Cooperation in scientific drilling
History
SOCIETAL CHALLENGES
Sustaining economic growth without threatening the environment, supplying an expanding world population with industrial raw materials, energy, and potable water, meeting the challenges posed by global change, safeguarding society from natural disasters, and developing efficient urban infrastructures for transport and housing: these are the fundamental challenges faced by society in the 21st century.
The challenges are inextricably linked with the dynamics of planet Earth in its broadest sense; not just the solid Earth surface on which we live, but with the chemical reactions, physical movements and biological interactions taking place below and above that surface. The breadth of time and space is enormous, and degree of complexity immense.


icdp
Unravelling the Complexities of Planet Earth
Target:
A new Science Plan for continental scientific drilling
Framework:
An Earth science community effort
Status:
Online available
Copies printed
Take Home Message:
Get a copy at the booth or download load the file
ACTIVE FAULTS AND EARTHQUAKES
Jim Mori Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan
William Ellsworth U.S. Geological Survey, Menlo Park, USA
GLOBAL CYCLES AND ENVIRONMENTAL CHANG
Lynn Soreghan School of Geology & Geophysics, University of Oklahoma, Norman, USA
Ralf Littke Institute of Geology and Geochemistry of Petroleum and Coal, RWTH Aachen Universit
HEAT AND MASS TRANSFER
Ilmo T. Kukkonen Solid Earth Geophysics, University of Helsinki, Helsinki, Finland
Guðmundur Ómar Friðleifsson Hitaveita Suðurnesja Orka HF, Reykjanesbæ, Iceland
THE UBIQUITOUS HIDDEN BIOSPHERE
Jens Kallmeyer GFZ—German Research Centre for Geosciences, Germany
Tom Kieft Department of Biology, New Mexico Tech, Socorro, USA
CATACLYSMIC EVENTS—IMPACT CRATERS AND PROCESSES
Christian Koeberl Department of Lithospheric Research, University of Vienna, Austria
Philippe Claeys Earth System Science, Vrije Universiteit Brussel, Belgium

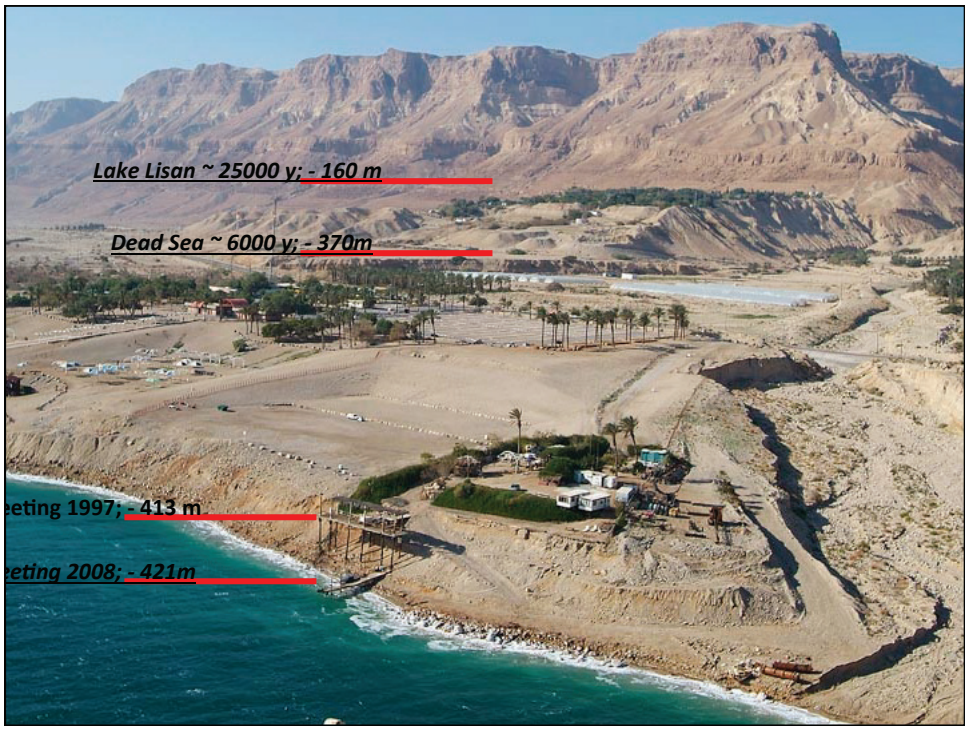
icdp

International Continental Scientific Drilling Program

GLOBAL CYCLES EFFECTING CLIMATE AND ENVIRONMENTAL CHANGE

Lynn Soreghan Conoco-Phillips School of Geology & Geophysics, University of Oklahoma, Norman, USA
Ralf Littke Institute of Geology and Geochemistry of Petroleum and Coal, RWTH Aachen University, Aachen, Germany

- Well-preserved records with rapid changes provide excellent opportunities to understand earth system dynamics at different timescales
- Lake drilling should be coupled with numerical modelling of climate control processes
- Past ICDP sedimentary drillings should lead to a roadmap, based on a new critical integration of those results, for future drilling at world-class sites.



GLOBAL CYCLES EFFECTING CLIMATE AND ENVIRONMENTAL

Fundamental Open Questions

- How did Earth's climate system behave during warmer/high-CO2 worlds?
- How did Earth's climate system behave during glacial cycling in cold worlds, and during icehouse-greenhouse transitions?
- What are fundamental processes, feedbacks forcing climate transitions, decadal to million-year and beyond?
- How fast did permafrost and gas hydrate stability react on changing climate and vice versa?
- What were biotic responses to major environmental changes (e.g., climatic, super-eruptions, impacts), at timescales from decadal to million-year and beyond?
- How did oxygenation of the atmosphere evolve?
- What are the key processes characterizing Earth's Critical Zone?

Future Scientific Targets:

- Lacustrine records, including additional Quaternary records
- Drilling to access Earth's deep-time climate and biotic record
- Drilling to access Earth's earliest paleoenvironmental and paleobiological records (e.g. oxygenation).
- Drilling to access the Critical Zone
- Permafrost and gas hydrates

Hominin Sites and Paleolakes Drilling Project: 5 Sites

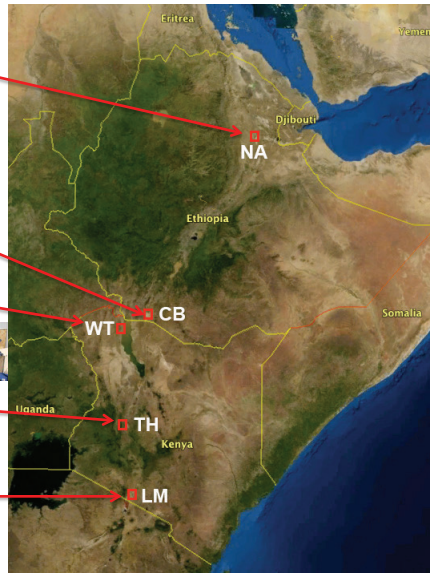
Northern Awash River
Drilling in March 2014
180 m / 160 m Oso Isi site;
243 m Weranso site

Chew Bahir, Ethiopia
Pilot core in March 2014
Drilling in November 2014
reached 250 m

West Turkana, Kenya
Drilled in July 2013
215 m core

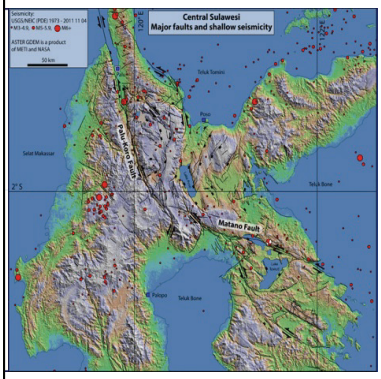
Tugen Hills, Kenya
Drilled in June 2013
228 m core

Lake Magadi, Kenya
Drilling in June 2014



icdp

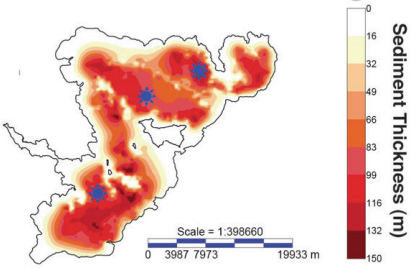
Lake Towuti Drilling Project

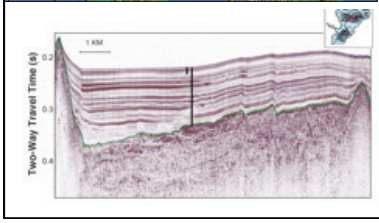


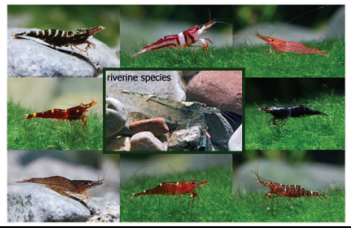
Drilling Targets

- Site 1: Central Towuti. Primary paleoclimate site, low turbidite activity
- Site 2: Deep basin: History of Matano/Mahalona discharge
- Site 3: Southern Towuti: "most ultramafic", oldest sections

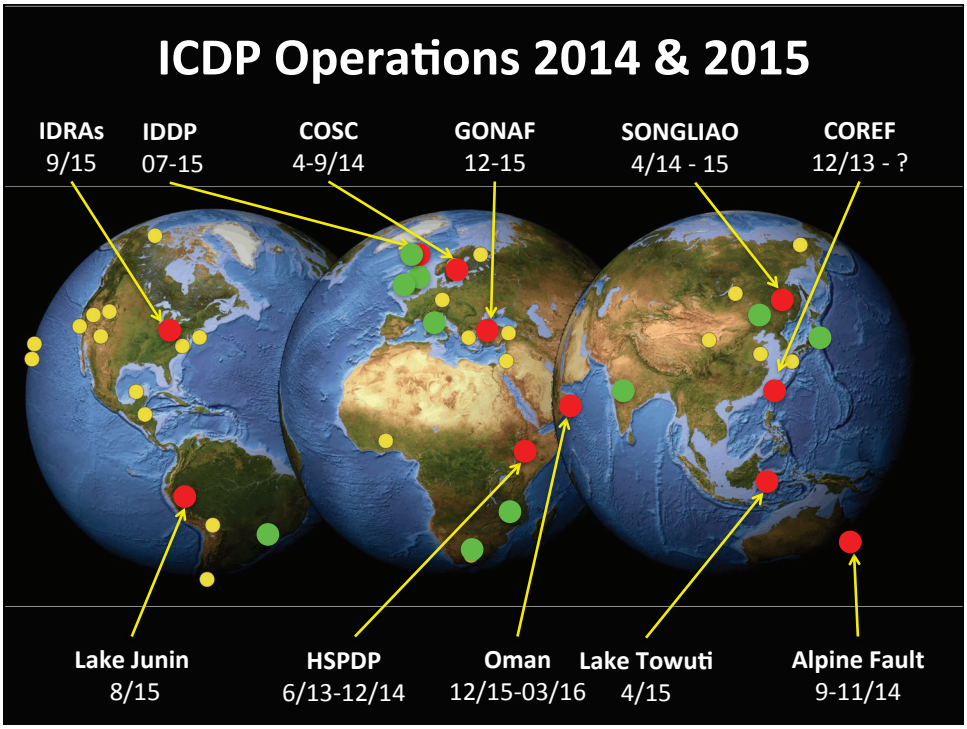
TOWUTI DRILLING PROJECT







ICDP Operations 2014 & 2015



icdp

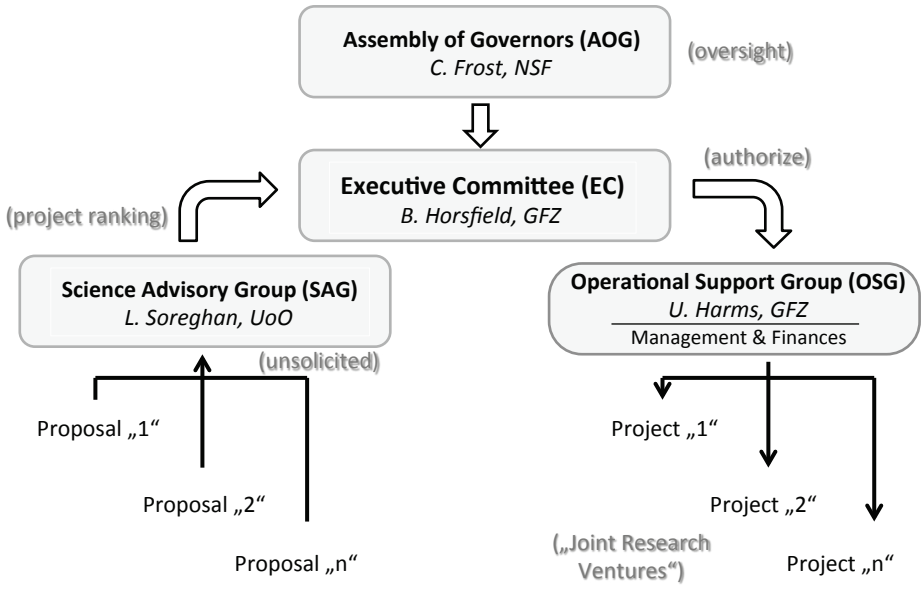
Chapter 2

How ICDP works

Organization of the Program

icdp

Organizational Structure



SCIENCE ADVISORY GROUP

Provides in-depth scientific Evaluation of all Pre-, Workshop and Full Proposals

Assigns Priority based on scientific Quality, expected Impact on Science, as well as Outreach and Educational Potential

Comments on scientific-technical Planning of Full Proposals

Provides Comparison and Ranking of Full Proposals

EXECUTIVE COMMITTEE

Responsible for Program Operation and Management

Decides on Pre-, Workshop and Technical Proposals

Reviews Feasibility of Full Proposals (operational, technical, managerial and financial)

Recommends Funding of Full Proposals

Prepares Annual Program Plan and associated Budget

Provides Long-range Program Plan

ASSEMBLY OF GOVERNORS

Provides financial and scientific Oversight

Determines Program Policies

Decides on EC recommended Full Proposals

Decides on Expenditure of ICDP Funds

Decides on Annual Program Plan and associated Budget

Discusses Long-range Plan

Funding Strategy

ICDP funds are granted for project development and drilling-related expenses, but not for science support

- Foster International Co-operation and Project development through workshops
- Form partnerships with other scientific, private, governmental or industry groups for project funding
- Direct money to drilling operations, scientific-technical on-site support, facilities and data management

Criteria for Selection of ICDP Projects

• **Global Criterion**	Problem of Global Significance "World-Class" Geological Site
• **International Criterion**	Broad International Collaboration Best Possible Science Team Pooling of Resources and Technology
• **Societal-Needs Criterion**	Relevance of Problem to Society Collaboration with Industry
• **Need-for-Drilling Criterion**	Proof of Necessity for Drilling
• **Depth-to-Cost Criterion**	Balancing of Costs and Drilling Design

ICDP Membership

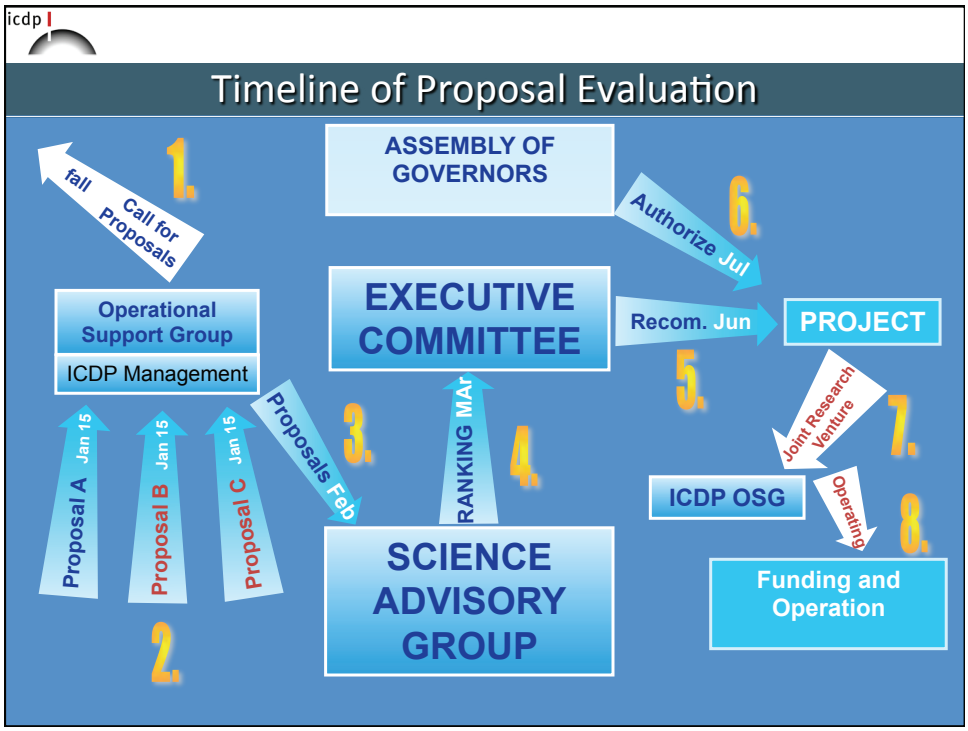
Member Countries
- Germany
- USA
- Japan
- China
- Canada
- Austria
- Norway
- Mexico
- Poland
- Czech Republic
- Iceland
- Finland

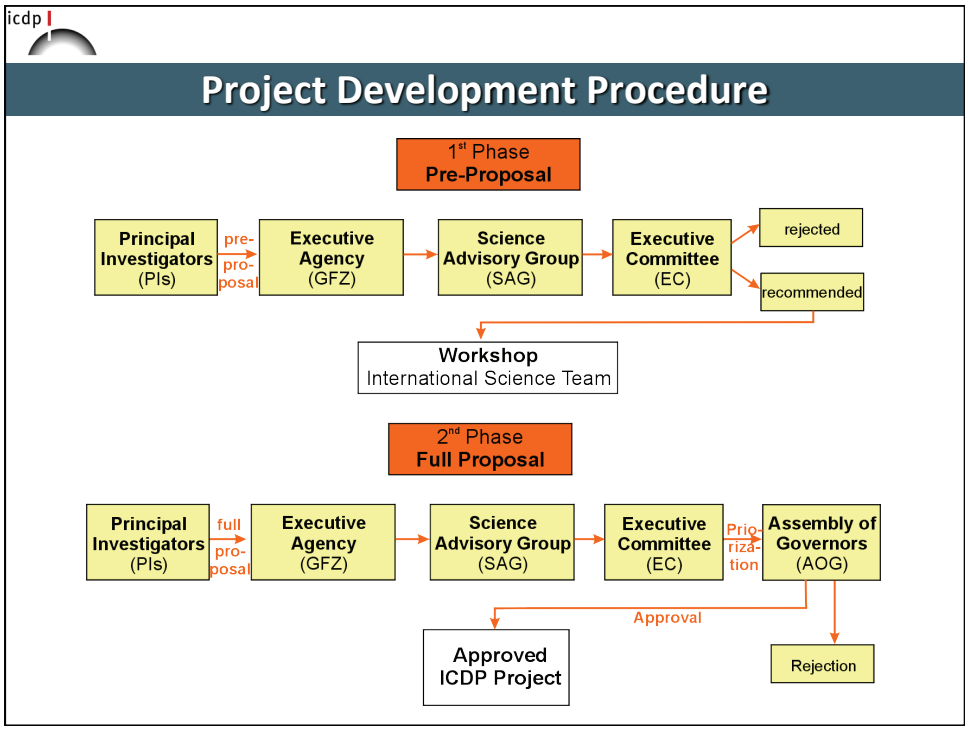
Member Countries
- Italy
- Spain
- Sweden
- Switzerland
- New Zealand
- France
- Israel
- India
- Netherlands

Member Organizations
- UNESCO

Member Countries
- Great Britain
- South Korea
- Belgium

Interests
- South Africa
- Denmark
- Australia
- Brasil
- Colombia
- Russia
- Turkey
- and others


icdp
Timeline of Proposal Evaluation
ASSEMBLY OF GOVERNORS
1.
fall
Call for Proposals
6.
Authorize Jul
EXECUTIVE COMMITTEE
Recom. Jun
PROJECT
Operational Support Group
ICDP Management
5.
Joint Research Venture
7.
Proposals Feb
3.
RANKING MAr
4.
Proposal A Jan 15
Proposal B Jan 15
Proposal C Jan 15
ICDP OSG
Operating
8.
Funding and Operation
2.
SCIENCE ADVISORY GROUP


icdp
Project Development Procedure
1st Phase
Pre-Proposal
Principal Investigators (PIs)
pre-pro-posal
Executive Agency (GFZ)
Science Advisory Group (SAG)
Executive Committee (EC)
rejected
recommended
Workshop
International Science Team
2nd Phase
Full Proposal
Principal Investigators (PIs)
full pro-posal
Executive Agency (GFZ)
Science Advisory Group (SAG)
Executive Committee (EC)
Prio-riza-tion
Assembly of Governors (AOG)
Approval
Approved ICDP Project
Rejection

Chapter 3

How Projects are Supported

Funding and Resources Available

Project Funding through ICDP

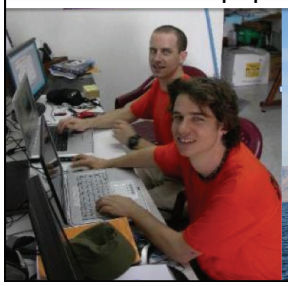
ICDP Funding:

1. Leg = Financial Support
   for operations, not for science
2. Leg = Operational Support
   Operational Support Group – OSG of ICDP at GFZ in Potsdam

icdp

Operational Support Group (OSG)

- Support in planning, engineering and management
- Provides drilling and field lab equipment
- Conducts downhole measurements
- Provides data management system
- Conducts Training Courses
- Provides equipment pool



icdp

International Continental Scientific Drilling Program

ICDP Primer

Planning, Managing, and Executing Continental Scientific Drilling Projects

First Edition
November 2013

ICDP Primer
Planning, Managing and Executing Continental Scientific Drilling Projects

ICDP Operational Support Group

Core group of scientists and engineers at GFZ
Main task is to support the EC and ICDP projects

K. Behrends	Dank bank and web, programming
R. Conze	Data and information management
T. Gorgas	On site staff scientist, data management (new)
U. Harms	Project management, program finances, proposals
C. Knebel	Panel and science coordination
J. Kueck	Geophysical borehole logging and testing
S. Pierdominici	Borehole log interpretation (new)
B. Prevedel	Drilling engineering and long-term monitoring
T. Wiersberg	Education & outreach, gas geochemistry

Most of OSG is GFZ funded, 2.5 FTEs are currently funded by ICDP

ICDP co-financed Drilling Projects

Total costs vs. ICDP Contribution

ICDP co-funded Drilling Projects (2005-2010)

Project	Total Funds	ICDP Funds	ICDP %
Malawi	1.840.000	760.000	41
Qinghai	1.550.000	550.000	36
Peten Itza	950.000	500.000	53
Chesapeake	1.750.000	970.000	55
SAFOD	22.000.000	2.200.000	10
FAR DEEP	970.000	550.000	57
Iceland	3.000.000	150.000	5
Potrok Aike	2.300.000	1.300.000	57
El´gygytgyn	10.200.000	2.500.000	25
New Jersey	8.700.000	500.000	6
Lake Van	1.400.000	870.000	62
Snake River	5.640.000	1.000.000	18
Dead Sea	2.500.000	920.000	37
Total	**62.800.000**	**12.770.000**	**20**

Range of Funding

How much can my project get?

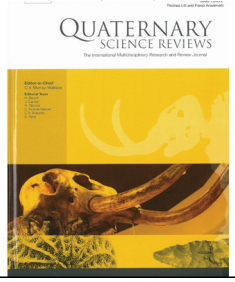
There is no fixed lower limit but projects requesting less than about $200 K from ICDP have neither been proposed nor funded.

There is also no upper limit, but $1,500 K was the limit so far, per year/project phase

Timing of Projects: From Proposal to Published Results

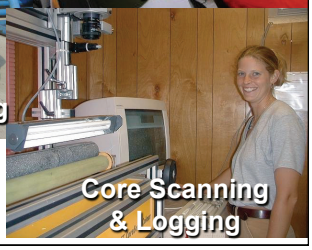
Lake Van Example

WS Proposal:	2005
Workshop:	2006
Full Proposal:	2007
Approval:	2007
Drilling Plan:	2009
Operations:	2010
Publication:	2014



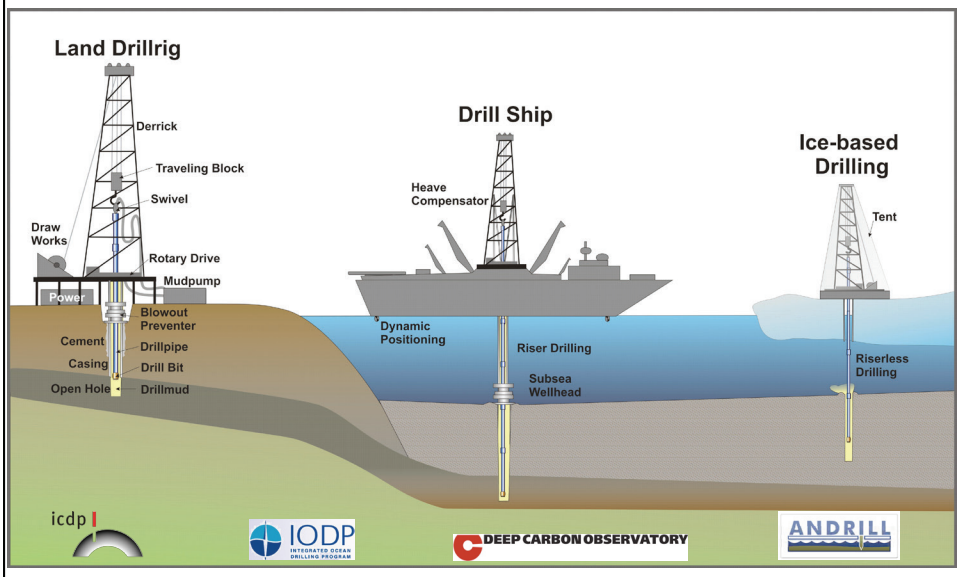
2. Leg = Operational Support

ICDP Equipment Pool organized by OSG



ICDPs Deep Lake Drilling System

Cooperation with other programs

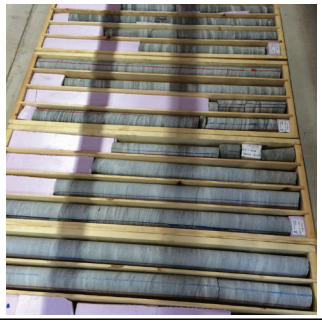


Core Curation

COSC Sampling Party in Berlin

2.- 6. February 2015

c. 30 participants



Chapter 4

How to Prepare a Proposal to ICDP

How to prepare a **successful** proposal to ICDP

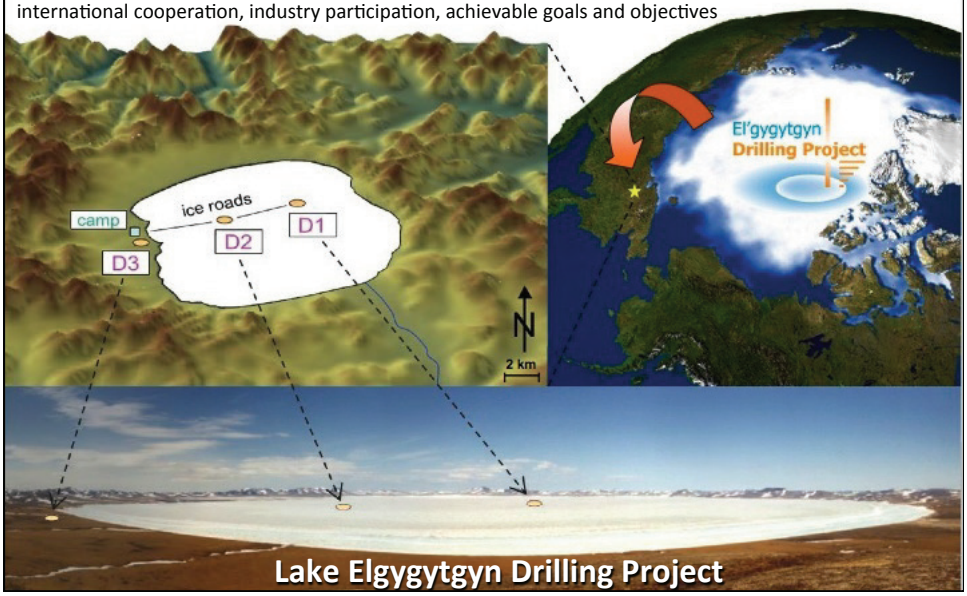
What is important for a successful proposal?

Your guess here:

?
?
?
?
?
?
?
?
?

An Outstanding Idea

Important key location, geological significance, societal relevance, testable hypothesis, excellent team, international cooperation, industry participation, achievable goals and objectives



Funding Scales in Big Science Programs

- Large Hadron Collider, 20 Nations, **4 Bio €**, search for atomic substructure (found Higgs Boson this year!)
- ITER Fusion Reactor, 33 Nations, **10 Bio €**, fusion as energy source
- Human Genome Project, 6 Nations, **2,7 Bio €**, deciffering the human genes
- IPCC, 130 Nations, **60 Mio €**, Coordination of Climate Research Results
- Geo-Programs 2009: IODP = **300 Mio €**; ICDP = **3 Mio €**

Note: Don´t be afraid because of high drilling costs!

SAG Guidelines for Proposals to ICDP 1

Full Proposals

Proponents who have previously submitted a workshop proposal, or who have otherwise demonstrated that they have had meetings or discussions to ensure a science review of the topic and a broad international participation, may submit a full proposal.

Full proposals should **not exceed 30 pages in length**, including text, tables, figures, and references, and they must include the items listed below, some of which will not count against the page limit.

Note: Full details are at:
www.icdp-online.org/proposals

SAG Guidelines for Proposals to ICDP 2

A drilling proposal must include the following information:
1.State the scientific objectives and explain how those objectives relate to, or advance ICDP's scientific themes,
2.Justify the need for drilling to accomplish the scientific objectives,
3.Explain why the drilling site/topic is of global and far-reaching importance (ICDP does not consider topics of only local relevance)
4.Note the societal relevance of the project;
5.Discuss the expected scientific outcome of drilling and any subsequent work required to complete the overall project
6.Identify an international science team that is balanced in both expertise and geographical representation (with preference to ICDP member states or those in membership negotiations) Proposals from single PIs, or those representing only one country, will not be considered;
7.Present a well-defined strategy for addressing the scientific objectives through drilling, logging, testing or other down-hole measurements,
8.Describe the proposed drill sites, provide maps, seismic sections and other geophysical data, penetration depths, expected lithologies, and available site-survey data, as well as relevant information on prior drilling operations.

SAG Guidelines for Proposals to ICDP 3

9. Include standard two-page curriculum vitae and short list of relevant publications of the lead proponents,
10. Describe briefly any relationships to other international geoscience programs.

Items 9 and 10 do not count against the 15/30 page limit.

Full Proposals must include the following information as well, which does not count against the page limit:

- ***A detailed budget plan, management plan, permitting plan and authority, environmental impact review, safety review, as well as a specific drilling, testing and logging schedule.***
- ***In addition to item 8 above, describe in detail the available site-survey data and any plans for acquiring additional data, and discuss how the drilling targets relate to those data,***
- ***Describe any special logistical requirements or potential natural hazards.***

Note: Full details are at: www.icdp-online.org/proposals

SAG Guidelines for Proposals to ICDP 4

Summary

1. Introduction (Location and Background Information; History)
2. Geology Study Area
3. Previous and Relevant Work
4. Importance of Study Area
5. Motivation and Goals of the Drilling Project
6. Proposed work
   - 6.1 Site Selection and Drilling Strategy
   - 6.2 Site Survey Information (seismic profiles, etc., in appendix)
   - 6.3 Geophysical Downhole Logging and Log Interpretation
   - 6.4 Initial Field-based Core Logging, Analysis, etc.
   - 6.5 On-site Core Storage, Logging and Processing
7. Expected Benefits of the Proposed Work (Scientific Benefits; Societal Benefits)
8. Project Management (PIs and their roles and responsibilities)
9. Project Collaborators/Science Team
10. Time Table
11. References

Appendix (site surveys, permits & environ. issues, detail budget, CVs of PIs, etc.)

Guidelines for Reviewers (vs Guidelines for Proposers!)

- Overview of project/workshop goals and strategy (What are they proposing to do and why?).
- Proposal history (previous submissions as pre or full proposals. Is proposal result of ICDP-funded workshop?).
- Quality of science to be addressed (fundamental issues of global significance; also considering need for drilling and societal relevance).
- Qualifications of proponents (experience and productivity of PIs, breadth and international diversity of science team/workshop attendees, sound project management plan).
- Adequacy of site characterization (Is drilling target already well defined? Are permitting and environmental approvals in hand?).
- Technical feasibility (Are we confident project will succeed? Is operational plan logical and well thought through? Is prior experience of PIs or input from OSG well utilized?).
- Cost effectiveness (Is the budget carefully prepared? Is there an efficient drilling/testing/sampling plan? Does it take advantage of existing holes, cost sharing or linkages to industry?).
- Summary recommendation by SAG (approve, approve with caveats, modify and resubmit, reject).

Note: Reviewers have a different perspective – their guidelines differ!

Some examples from successful proposals

But whatever is being presented hereafter:

There is no:

According to the book

Schema F

icdp

Style

1.Consult guidelines and/or precedence

Issues: paper format (letter/A4), printing size, fond, fond size, distance between lines, max. & min length, color vs b/w, figures in text or appendix……

and several others…….

Note: Reviewers are short in time! An appropriate style can make the difference

Organization

General content issues

Simplify for the reviewer who is far away from your subject without annoying the reviewer who is your competitor in your subject

Stand back every second paragraph, imaging you explain the issue to your granny or a politician.

Is your wording and your explanations
really saying what you want to say?
Does the content comply with guidelines?

and several others……

Note: Reviewers are just human beings

Summary/Abstract

YOU! HAVE! 2 MINUTES! ONLY!

to convince the reviewers of your proposal in a well written, easy to understand, logical and enthusiastic summary

Short, precise,
answering the main questions
a reviewer will pose

Note: "The 7 W" - What, Where, Why, When, How, Who, Wherefrom?
From golden rules for news

New York City in an Ice-free World
with sea level 73 m above present.

icdp

Summary/Abstract

We propose to drill a 1.4-km-deep corehole into the central crater of the XYZ impact structure on the XY Peninsula of area, country. The buried, late age XYZ impact structure is among the largest and best preserved of the known impact craters on Earth. It is characterized by a central crater surrounded by a less deformed annular trough that is xy km in diameter at its outer margin. The proposed drill site is at location. The proposed corehole will concurrently address three project objectives: 1) understanding the processes and products of an impact into a multi-layer, marine target, 2) understanding the consequences of the impact for groundwater resource management, and 3) understanding post-impact Cenozoic sea-level changes, stratigraphic sequences, and climate variability. Objectives 1 and 3 address geologic problems of global importance and interest. Objective 2 addresses a societal issue (resource management) that has transfer value to groundwater issues near impact structures in similar hydrogeologic settings. Studies of the XYZ impact structure will complement ICDP drilling projects for the larger and older Chicxulub crater (Mexico) and the younger and smaller Bosumtwi crater (Ghana).

The XYZ Impact Crater Project has completed the preparatory fieldwork for the proposed drilling. Commercial and Survey marine seismic-reflection surveys that cross the XYZ crater have been analyzed in published reports. Onshore high-resolution reflection surveys have been completed on xyz and west of XYZ within the impact structure and across its outer margin. The xyz agencies have drilled eight coreholes within the impact structure's outer annular trough or at its outer margin. These coreholes are relatively shallow (730 m or less) but provide excellent background information for planning a deep hole that will address the three major objectives outlined above.

This proposal requests funding for a project workshop in xy. The workshop will bring together an international group of scientists interested in the project's three scientific objectives to create a detailed listing of research topics, research teams, and a draft Full Drilling Proposal to ICDP. We anticipate that funding for the drilling of the xy corehole in xy will be a collective effort among xy, the yz and the ICDP

What and Where

Why

How

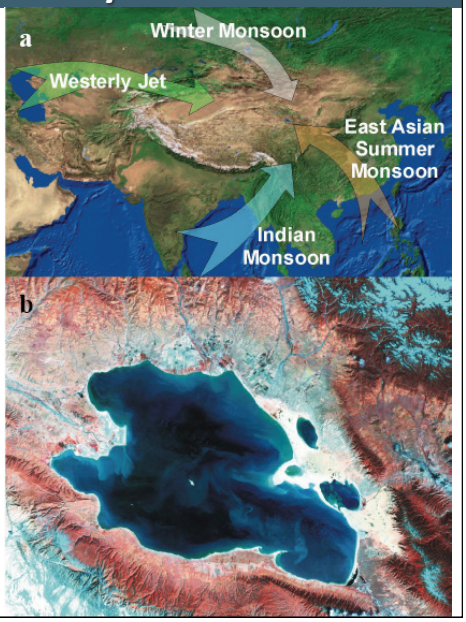
Who and Whatfore

icdp

Importance of Study Area

Interaction of climate systems on Tibetan Plateau documented in sediments in Lake Qinghai (right)

Caldera and Volcano endangering dense habitation in Naples (lower)



icdp

Motivation & Goals of the Drilling Project

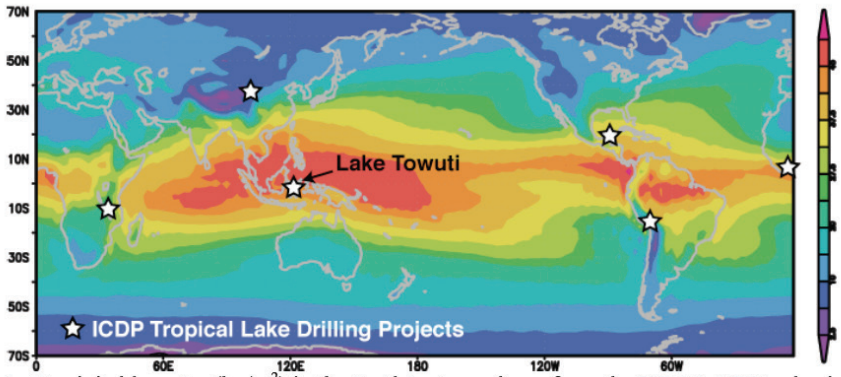
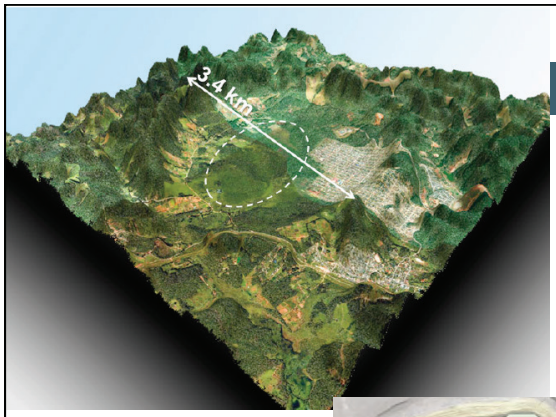


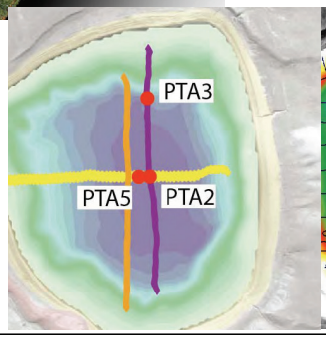
Figure 1. Precipitable water (kg/m^2) in the Earth's atmosphere, from the NOAA-ESRL physical sciences division. Stars mark the locations of past ICDP lake drilling projects (Malawi, Qinghai, Petén-Itzá, Titicaca, and Bosumtwi, left to right), with Lake Towuti labeled.

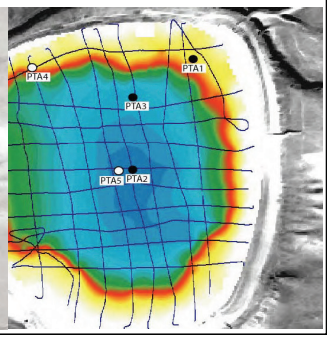


Site Survey

Imaging the area and conect it to (regional) (e.g. seismic) data

Map of multi-channel airgun lines (above) and 3.5 kHz lines (below) with bathymetry and locations of proposed drillsites.

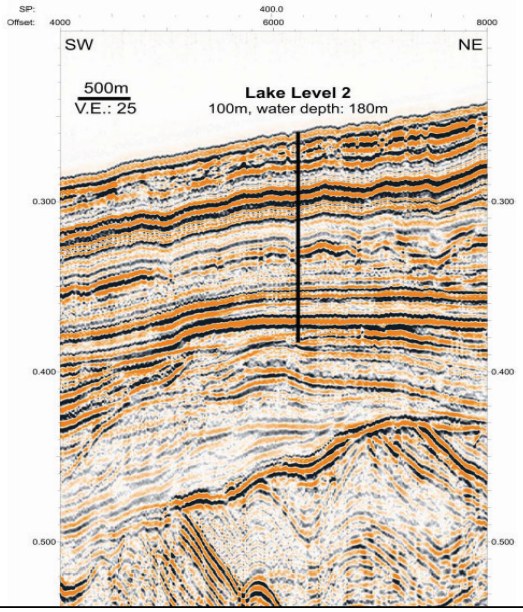




Geophysical Site Surveys

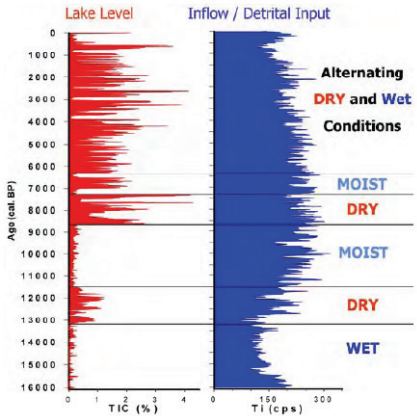
Example of high-resolution seismic profile of lake sediments with projected planned well

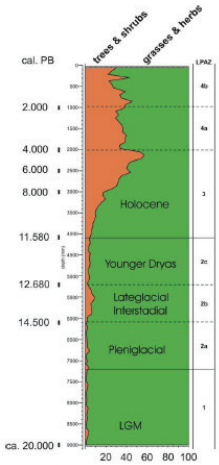
Note: Target and depth must be depicted clearly or a convincing Plan B must be presented



Short core investigations and age control

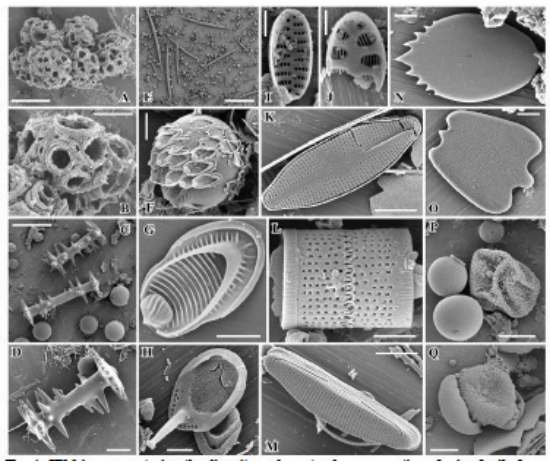
Piston cores investigated in detail show sensitivity of sediments and chronology





A: Total inorganic carbon (TIC) and Titanium (Ti) records for the late Weichselian and Holocene as indicators for lake level fluctuations (TIC) and detritic sediment input (Ti), published prior to full proposal application. B: Pollen distribution arboreal vs non-arboreal

Other Site Survey



High resolution SEM photos showing excellent preservation of microfossils from mid Tertiary Lake

Expected Benefit

Expected Benefits of the Proposed work

The scientific rationale and goals ……site were comprehensively discussed in the previous sections. ……..

This lake project will advance and improve the current scientific knowledge:

- Paleoclimatology of the Region
- Paleoseismicity and its relation to the history of volcanism
- (Paleo) Limnology and lake ecology and its coupling on (paleo) climatology
- Development of agriculture and early human societies.
- Scientific and educational spin-off to our local partner University.

The recent lake level rise induces severe flooding that is a major threat to municipal properties and agricultural land and cause tremendous financial damage. Our proposed work to reconstruct the environmental and geological history of the lake will characterize the natural variability of environmental and ecological change on short as well as on long time scales.

Therefore our research will add to the scientific rational for decision makers and stake holders to take future actions of how to deal with ongoing climate change and its natural variability.

Cost estimat for drilling

Budget Plan for Text

Items	in million $	in million $
1. Drilling preparation		**Subtotal 1.4**
Access road construction	0.2	
Widening forest-road	0.7	
Preparing land, water lines and pools, compensation of trees	0.5	
2. Drilling operation		**Subtotal 6.8**
Rig-up	0.4	
Drilling 0-1,100m	2.0	
Drilling 1,100-2,200m	2.0	
Sidetrack drilling	1.5	
Rig-down	0.3	
Coring instrument rental fee 0.5		
Land recovery	0.1	
3. Logging		
Logging-while-drilling or tough-logging		**Subtotal 0.6**
Depth 0-1,100m	0.3	
Depth 1,100-2,200m	0.3	
Total		**8.8**

Detailed Technical Plan

Index

Cost Summary and Comingled Funding

Summary of costs for a Lake Drilling

1. Drilling operations Costs (US $)
1.1 Drilling contract 1.683.848
1.2 Core shipping and handling 156.512
1.3. Downhole logging 44.550
1.4 Premobilisation trips of PIs 34.476
1.5 Operations crew travel costs 54.869
Subtotal "drilling operations" 1.974.255

2. Operation Support Group (OSG)
2.1 Transport of the GEOTEK MSCL 12.120
2.2 DIS adaptation and implementation 13.000
2.3 Training courses 4.820
Subtotal "OSG" 29.940

Total costs of Project 2.004.195

Table: Splitting of the costs between ICDP and national funding agencies

Country Percentage Amount (US $)

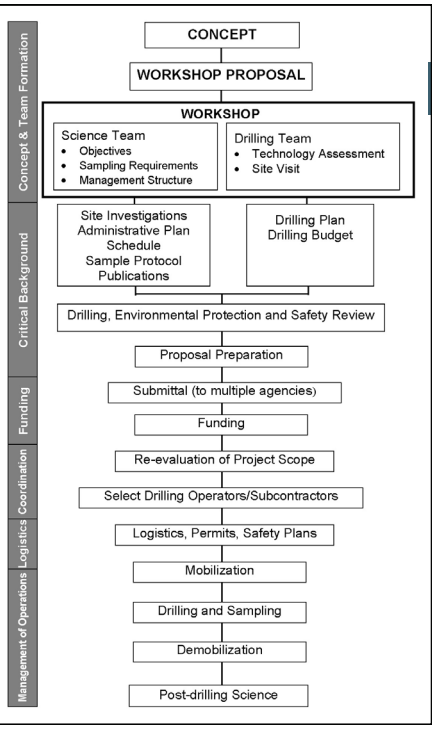
Drilling operation 1.974.255
ICDP funding 70% 1.381.979
National funding 30% 592.277
Country 1 3% 59.228
Country 2 12% 236.911
Country 3 3% 59.228
Country 4 6% 118.455
Country 5 6% 118.455
OSG support 29.940

Total costs of Project 2.004.195
Note: numbers are real!

Management Plans

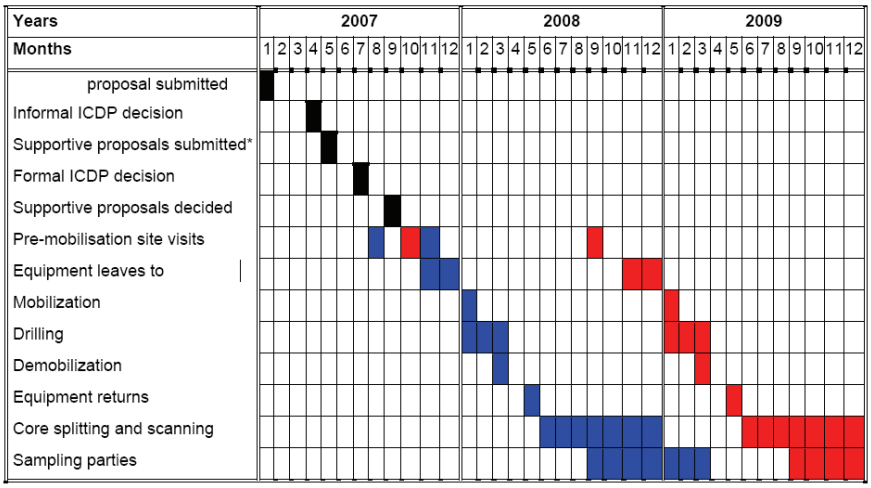
Detailed planning of total project, responsibilities management and budget and funding required

Note: ICDP proponents will be in charge for all operations



icdp

Time Schedule



*to DFG, NSF, NSERC, SNF and VR

Work schedule with milestones for the process of funding (black), a fast track option for drilling in 2008 (blue) and a slow track option for drilling in 2009 (red).

icdp

Permitting

Environmental Impact

Safety / Medivac

Note: ICDP proponents have to take care as Principle Investigators

Permit from resource owner
Status 15.01.2004 : Granted (HS)

Permit from land owner (Private)
Status 15.01.2004 : In progress

Environ. Impact Assessment (Planning Agency)
Status 15.01.2004 : Approved : 17/5/2000 and 27/9/2002

Drilling Operations Permit (Health & Safety Inspectorate)
Status 15.01.2004 : In progress

Construction Permit (Community Council)
Status 15.01.2004 : In progress

Outreach and Societal Relevance

Importance for society in the host country or in general

Typical Review comments 1:

Flaws in site characterization, target imaging, siting:

- Insufficient seismic or other geophysical data and proper imaging
- Existing data or borehole logs are not taken into consideration
- Positioning of drill site not explained

Key methods of investigations not proven:

- Lake sediments geochronology is not sure

Science team shortfalls:

- No international group
- Missing expertise
- Team leaders are not from ICDP member countries
- Key science issues not represented by team expertise
- No new, complementary, or interesting studies included
- No coordination with other initiatives (IODP)
- Educational efforts and incorporation of young scientists or scientists from the region not considered
- No CVs included

Typical Review comments 2:

Scientific objectives improperly laid out and other shortfalls:

- Poorly focussed reasoning
- Not enough details
- Too long proposal
- Measurements inappropriate or impossible due to temperature or downhole logging impossible due to prior casing

Technical feasibility and drilling cost uncertainties:

- Missing or unconvincing technical plans
- Costs not properly explored or not tightly constrained
- Safety issues not considered

Managerial issues not addressed:

- Detailed management plan missing
- Budget and co-funding plan missing

Cooperation and outreach shortfalls:

- Interaction with IODP, ANDRILL not explained, regional institutes, authorities, press, students, population not involved or addressed

Prerequisites for Success

- A bright scientific idea to study processes or/and test important hypothesis that are only accessible through drilling
- Drilling at Sites of global scientific importance and societal relevance as examples for comparable settings
- Excellent geophysical and geological site surveys to justify drilling target, drilling depth, and to reduce drilling risks
- Technical feasibility and budget realities
- Environmental and societal compliance
- Acceptance and support through national authorities early in the project planning phase
- High degree of international cooperation in best possible ScienceTeams with excellent educational potential

Organizational Prerequisites

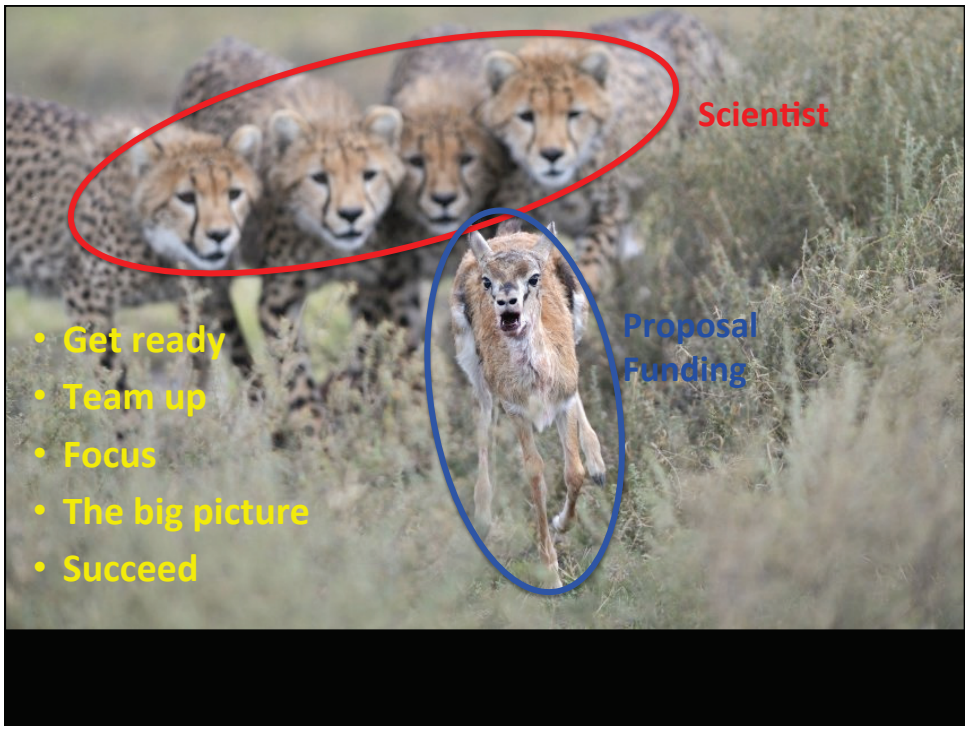
- Successfull application to ICDP plus other agencies to collect Commingled Funding / Cooperation with Industry
- Scientific leadership coupled with team capabilities and excellent communication skills of Lead Pis
- Home Institutes and National Support and Acknowledgement
- Formation of a Workable Scientific Team
- Communication and Planning Skills in PI Group and in the Scientific Team - Constant information, reminders, commendations
- Experience with Drilling Projects and Large / International Projects
- Engineering Support and good Relation to Drilling Contractors
- Sufficient Contingency Funding / Risk Margin

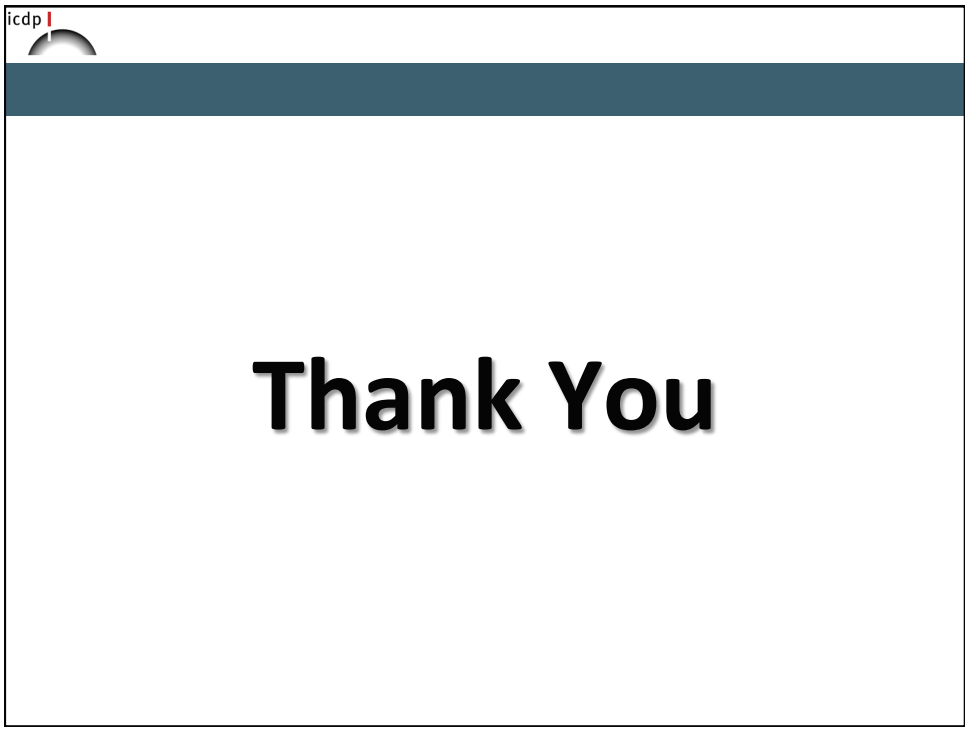
Main Reasons to Fail

- Proposal does not comply with ICDP criteria or is not well written
  (THIS IS THE BEST SITE FOR.....is missing; working hypothesis not laid out)
- No sufficient pre-site survey or proof of key methods
  (geochronology missing in lakes, no industry data included)
- SAG and EC recommendations neglected in follow-up Proposals
- Not enough scientific impact through PI Group, often coupled with missing international participation
- Lack of support (non ICDP) or competitors and opposers, team problems
- No coordination with IODP, not sufficient interdisciplinarity (biology)
- Not enough patience and persistence for the timely preparation and lobbying necessary for costly international projects

Pathways to get funded

- Definition of a hypothesis, testing needs drilling
- Search for appropriate funding
  1. **What sources exist (ICDP, IODP, national agencies, industry)**
  2. **What does each agency fund (science, operations, men, tools)**
  3. **What are the thematic foci, rules and regulations**
  4. **What is the reality of funding and who is in charge**
- Contact funding agencies
- Contact successful applicants
- Seek alliances
- Write joint proposal
- Submit according to rules, repeat if necessary
- Get funded!
- Establish a **Joint Research Venture** with ICDP to get money and support




icdp
Thank You