International Continental Scientific Drilling Program

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ICDP goals
and project examples
Themes of the ICDP

- Climate Dynamics & Global Environments
- Active Faulting & Earthquake Processes
- Impact Structures
- Convergent Plate Boundaries & Collision Zones
- Hotspot Volcanoes & Large Igneous Provinces
- Volcanic Systems & Thermal Regimes
- Geobiosphere & Early Life
- Natural Resources

International Continental Scientific Drilling Program
Lake Peten Itza Drilling Project

Workshop in August 2003
Full Proposal submitted 2004
Drilling started Feb 3, 2006
Drilling ended, Mar 8, 2006

1. Paleoclimatic history of the northern lowland Neotropics
2. Paleoecology and biogeography of the Maya tropical lowland forest
3. Biogeochemical cycling in deep lake sediments
San Andreas Fault Observatory at Depth (SAFOD)

Test fundamental theories of earthquake mechanics
Establish a long-term observatory in the fault zone
Since 1993
PH 2003
MH 2004/05/07
Volcano and geothermal drilling
a major theme of the ICDP

- Caldera with resurgent dome uplift
  LONG VALLEY (geothermics, hazard)
- Hot spot ocean island shield volcano
  MAUNA KEA (plume history)
- Subduction-induced andesitic-dacitic volcano
  UNZEN (conduit, degassing, history)
- Mid ocean ridge volcanism
  ICELAND (supercritical fluids)
Unzen Volcano Drilling Project, Japan
Unzen Volcano Drilling Project, Japan

Science Workshop 1997
Technical Workshop 2000
Drilling 2003/4
International Continental Scientific Drilling Program
Hawaii Scientific Drilling Project

Study of plume-related chemical, physical and volcanological processes

1999, Mar-Sep: 3100 m
2004/2005: Plan 4500 m

Propsl Dossec 1987
Pilot Well 1993
Propsl ICDP 1996

International Continental Scientific Drilling Program
Hawaii Scientific Drilling Project

Cores recovered: Highly fragmented pillow lavas, breccias, and rubble

II. Drilling Phase
October 25, 2004: Rig Up
December 15, 2004: Coring Start
Final depth: 10,958 ft = 3340 m

III. Drilling Phase
November, 2006: Rig Up
December 8, 2006: Coring Start
Possible IDDP Drill Site at Krafla
Planned ICDP projects
Mutnovsky Volcano Drilling Project
V-Mutnovsky Site: 12 MWe PP put in operation since 1999

Dachny Site: 50 MWe PP put in operation since 2002
Probing the connection: A dynamic system perturbed by geothermal production, earthquakes, eruptions, and experiments in MSDP

The concept is to drill the fracture zone between the active magma system and the geothermal field, in order to test the relationship between the two systems.
Mutnovsky drilling has the potential to combine 3 lines of “thermal regimes” investigations

- The magma-hydrothermal connection (chemical and structural evidence) - IDDP
- A new P-T conduit environment (fumaroles demonstrate hT, shallow magma degassing - USDP
- Volcano stratigraphy & magmatic history of arc-volcanic center - HSDP (OIV), USDP (BAV)
Experiments and goals

• Coring and fluid sampling.
• Monitoring of T & P of fluids and hydraulic properties as well as the related seismicity.
• Other issues: metal transport, mineral deposits, microbiology, geothermal utilization.
• Borehole - surface experiments with P and tracer tests while tracking changes in crater (fumaroles) and geothermal field; use of earthquakes & eruption to assess connectivity and mass and heat transport.
• Installation of instrument package in the borehole for improved monitoring of Mutnovsky.
Campi Flegrei Caldera
Deep Drilling Project
Campi Flegrei Caldera Deep Drilling Project
Funding through ICDP
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
Project Funding through ICDP

Two Ways of Funding:

1. Leg = Financial Support
2. Leg = Operational Support through the ICDP Operational Support Group at GFZ Potsdam
Operational Project Funding

Through ICDP Operational Support Group

Main Functions:

- Provide technical & managerial assistance to PI’s
- Support for engineering drill site operations
- Support for scientific field facilities such as downhole geophysics and mobile field lab
- Provide a readily accessible ICDP data management system
Operational Project Funding

Operational Support Group Infrastructure:

- Drilling equipment and engineering.
- Downhole logging tools, instruments, cables, winches.
- Drill site science and tools, mobile field lab, core logging, core scanning, on-line fluid analysis.
- Information and data management system, Drilling Information System, WWW
- Training and Courses
ICDP Equipment Pool
organized by Operational Support Group at GFZ

Lake Drilling Tool
GLAD800

Data Management System

Slimhole Sondes & Downhole Logging

5.5 km Wireline Drillstring

Core Scanning & Logging

International Continental Scientific Drilling Program
ICDP Training Course at Unzen Volcano
Shimabara, Japan; November 10 – 14, 2003

Education and Outreach in ICDP
# ICDP Membership

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