IODP: Integrated Ocean Drilling Program



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Countries participating in IODP

• ECORD consortium:

Denmark, Finland, France, Germany, Iceland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom are currently members. Austria, Belgium, Canada, Greece and Ireland have plans to join.

- Japan
- United States of America

Previous ocean drilling



DSDP Legs 1-96, Sites 1-624 (•) and ODP Legs 100-210, Sites 625-1277 (•)

A new international science program



Integrated Ocean Drilling Program Initial Science Plan, 2003-2013

- The deep biosphere and the subseafloor ocean.
- Environmental change, processes and effects.
- Solid Earth cycles and geodynamics

Mission Specific Platforms





- The European ECORD consortium of countries will offer a variety of drilling platforms.
- Operations will begin in the Arctic Ocean in late summer 2004
- These platforms will be chosen based on the science needs of the expedition.
- These platforms will be able to work where the larger drill ships cannot; in shallow water or in ice, for example.

The Chikyu



- Japan is building a new drill ship the Chikyu, which means Earth in Japanese.
- This vessel will be the biggest in the IODP fleet when it begins operations in 2006.
- This vessel is equipped with a riser, allowing drilling fluid to be circulated down the drill string, into the hole and back up to the ship.
- Can drill deeper into the seabed and into over pressured sediments.

The JOIDES Resolution



- •The United States of America will operate the JOIDES Resolution, which is the same ship used in the ODP.
- •Operations will begin on the Juan de Fuca Ridge in June 2004.
- •This drill ship does not have a riser.
- •The JR can drill in the deepest parts of the Earth's the ocean basins.

Setting up the drill string



• First, a drill bit is attached to the bottom piece of the drill string which is then lowered down into the ocean through a hole, called the moonpool, in the middle of the drill ship.

Setting up the drill string



- The drill string must be assembled one 10m piece at a time by a professional drilling crew.
- The 10 m drill pipe is lifted up into the derrick and then screwed onto the already assembled part of the drill string which is hanging below the ship.
- A motor at the top of the drill string spins the entire drill string to drill down into the seabed.

Coring tools



- A sample of sediment or rock from the seabed is collected using a variety of coring tools which move up and down on a wire inside the drill string.
- The seabed sample is collected in a 10m long clear plastic tube contained within the coring tool.
- Different kinds of coring tools and drill bits are used for different kinds of sediment or rock formations.
- An advanced piston corer (illustration) is used in soft sediments.

Keeping the ship in position



- Once the drill string is drilling down into the seabed, it is very important that the ship maintain position over the drill site!
- The ship maintains its position with the use of thrusters positioned around the hull of the ship.
- Sonar beacons placed on the seafloor are used to locate the drill site during operations.

Re-entering the hole



- Re-entry into the hole is needed when a drill bit is damaged or worn out, or if scientific monitoring equipment is to be placed in the hole.
- When required, a re-entry cone is assembled around the drill string, and then released before the drill string is pulled out of the hole.

Making use of the hole







- We can install scientific monitoring equipment into the drill hole after we have extracted the seabed samples.
- The equipment can either
 transmit data to the surface
 or data and samples can be
 extracted using ROVs at a
 later date.
 - These illustration shows a an instrument package, CORK, which monitors hydrology in the seabed, being lowered into the hole.

Making use of the hole



~7.5 rps

- We can run instruments through the drill string and into the drill hole to make a variety of measurements in situ.
- The illustration to the left shows an instrument used to make an acoustic image of the seabed structures present within the borehole.

Processing the core



Core carried from drill floor



Core measured and labeled



Core cut into 1.5 m sections



Core section split in half

Processing the core





- Once the sediment core has been split, the scientists on board make a variety of measurements on the sediments and rocks from the seabed.
- Finally, the core is sampled so that the scientists may make detailed specialized measurements back home at their research institutions.

Storing the core





- The rock and sediment cores recovered from drilling are carefully packaged in protective plastic tubes and then packed up for shipment to a shorebased core repository.
- The core repositories located in Germany, The United
 States and Japan store the sediment cores and provide
 samples to scientists from all over the world.





Life at Sea



Future expeditions





- The ECORD consortium will run a mission specific platform expedition to the Arctic Ocean in August 2004.
- The US will run 6 expeditions to the Juan de Fuca Ridge, the Mid Atlantic Ridge and the North Atlantic in 2004 -2005.

Educational resources

• Most websites are under constant development just now since the IODP just began in October 2003. So keep checking for new information!

• The European ECORD Consortium:

http://www.ecord.org/

• The US Program:

JOI US Science Support Program:

http://www.joiscience.org/USSSP/education.html

The JOI Alliance:

http://www.oceandrilling.org/

• The Japanese program:

http://www.jamstec.go.jp/jamstec-e/odinfo/cdex_top.html