RESEARCH PROGRAMME

NERC will invest £12.5 million in the Integrated Ocean Drilling Program between 2003 and 2008. To see which organisations are involved in the programme, visit www.nerc.ac.uk/funding/earthsci/IODP

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Further information
http://bgs.ac.uk/iodp

Other websites of interest
Integrated Ocean Drilling Program
www.iodp.org
http://web.ig.utexas.edu/imi/

European Consortium for Ocean Drilling
www.ecord.org

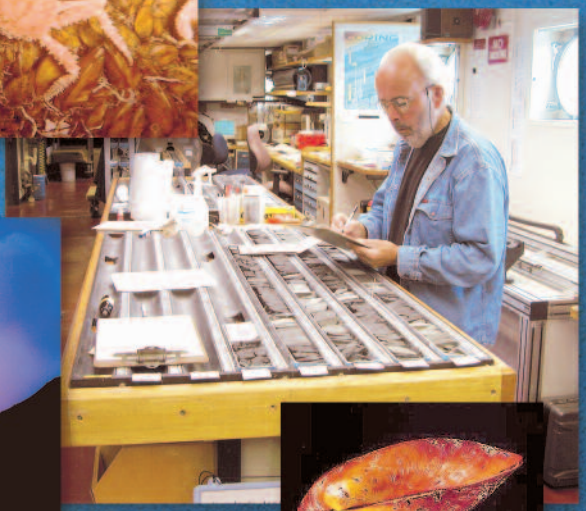
JAMSTEC (Japanese Marine Scinece and technology centre) Ocean Drilling in the 21st Century (OD21)
www.jamstec.go.jp/jamstec-e/odinfo

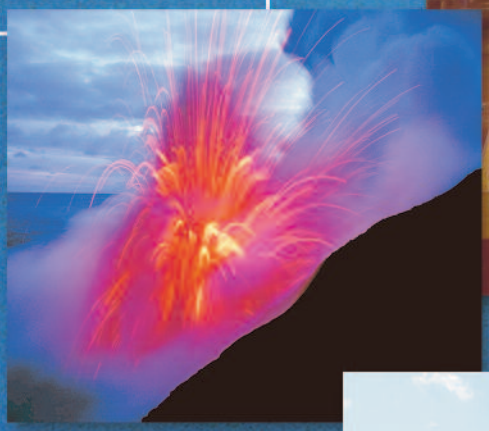
Science Advisory Structure office for the Integrated Ocean Drilling Program
www.isas-office.jp

Integrated OCEAN DRILLING Program

NATURAL ENVIRONMENT RESEARCH COUNCIL

Unchartered subterranean environments





Buried in unexplored seafloor sediments and the crust below is a rich history of the Earth: the waxing and waning of glaciers, the creation and ageing of oceanic lithosphere (the hard rock crust), the evolution and extinction of micro-organisms, and the building and erosion of continents. Scientific ocean drilling has revealed much about the Earth's dynamic nature. However, we are only just beginning to recognise that plate tectonic processes and the accompanying changes in ocean circulation and climate have greatly affected biological evolution and biogeochemical cycling.

The Natural Environment Research Council (NERC) Integrated Ocean Drilling Program is part of an international scientific research programme involving Europe (ECORD, European Consortium for Ocean Research Drilling), the United States and Japan. Research focuses on a wide range of fundamental and applied issues, such as global climate change, biodiversity, natural hazards involving earthquakes and volcanic processes, sustainable mineral and energy resources, as well as the internal structure and dynamics of our planet.

To investigate these previously undiscovered environments requires more than one drill ship. The USA and Japan have committed two ships and Europe is providing others for drilling in shallow water and ice-covered regions.

The deep biosphere and sub-seafloor ocean

New evidence suggests that vast microbial populations may live within a broad range of temperatures and pressures deep within the ocean's sediments and crust. Could they be driving processes such as the formation of fossil fuels, mineral and ore deposits? What influence does this largely unexplored habitat have on the rest of the planet? These organisms may also be a resource for new biotechnical applications, such as water treatment and enhanced oil recovery.

Every one million years the entire volume of the oceans moves through the seafloor. Yet we know little about the depth, extent and consequences (physical, chemical and biological) of fluid flowing in the oceanic crust and upper mantle. Huge deposits of gas hydrates (ice-like solids of methane and water) have been found in ocean sediments. Researchers know that the stability of hydrates depends on pressure and temperature; changes in sea level or ocean temperature could lead to a rapid release of this methane and accelerate climate change. We don't know exactly how much hydrate is trapped in oceanic sediments and we know little about its formation, stability, or how it will respond to environmental changes.

Environmental change, process and effects

Studies of sedimentary cores from the oceans have indicated that the pace of climate change has varied over time. Researchers need to know more about what initiates these changes, how they develop and what circumstances amplify or reduce the climatic effects of events, such as earthquakes. Ocean drilling has barely studied ice-covered environments, like the Arctic, and extremely shallow environments, such as reefs. What will these environments tell us about our past and future climate? The Arctic in particular is thought to be one of the most sensitive indicators of climate change. With more information about these environments, we can produce a more sophisticated analysis of the causes, rates, sequencing and severity of change in the Earth's climate system.

Solid Earth cycles and geodynamics

Destructive events such as earthquakes, volcanic eruptions and tsunamis, bring to our attention the vast amount of energy stored within the Earth. These events are all part of the solid Earth cycle: the creation, ageing and recycling of oceanic crust. Increasing evidence suggests that these events have not been constant. What causes and controls the frequency of events such as earthquakes and volcanic eruptions? How do these events influence our global environment? Is it possible to predict when and where these events will occur?

Related work elsewhere

The Integrated Ocean Drilling Program has strong ties with other NERC programmes, such as Rapid Climate Change and Ocean Margins (LINK). UK researchers will seek to collaborate with scientists from the European Union, United States and Japan. The programme also has strong ties with organisations such as the British Geological Survey, British Antarctic Survey, Southampton Oceanography Centre, the Hadley Centre and Tyndall Centre for Climate Change Research. The programme has strong and growing links with industry, in the fields of deep water drilling techniques and 3D seismic data.