Pictures courtesy B&N Nordsjöfrakt and Swedish Polar Research Secretariat.

NATURAL ENVIRONMENT RESEARCH COUNCIL

ACEX

Arctic Coring Expedition

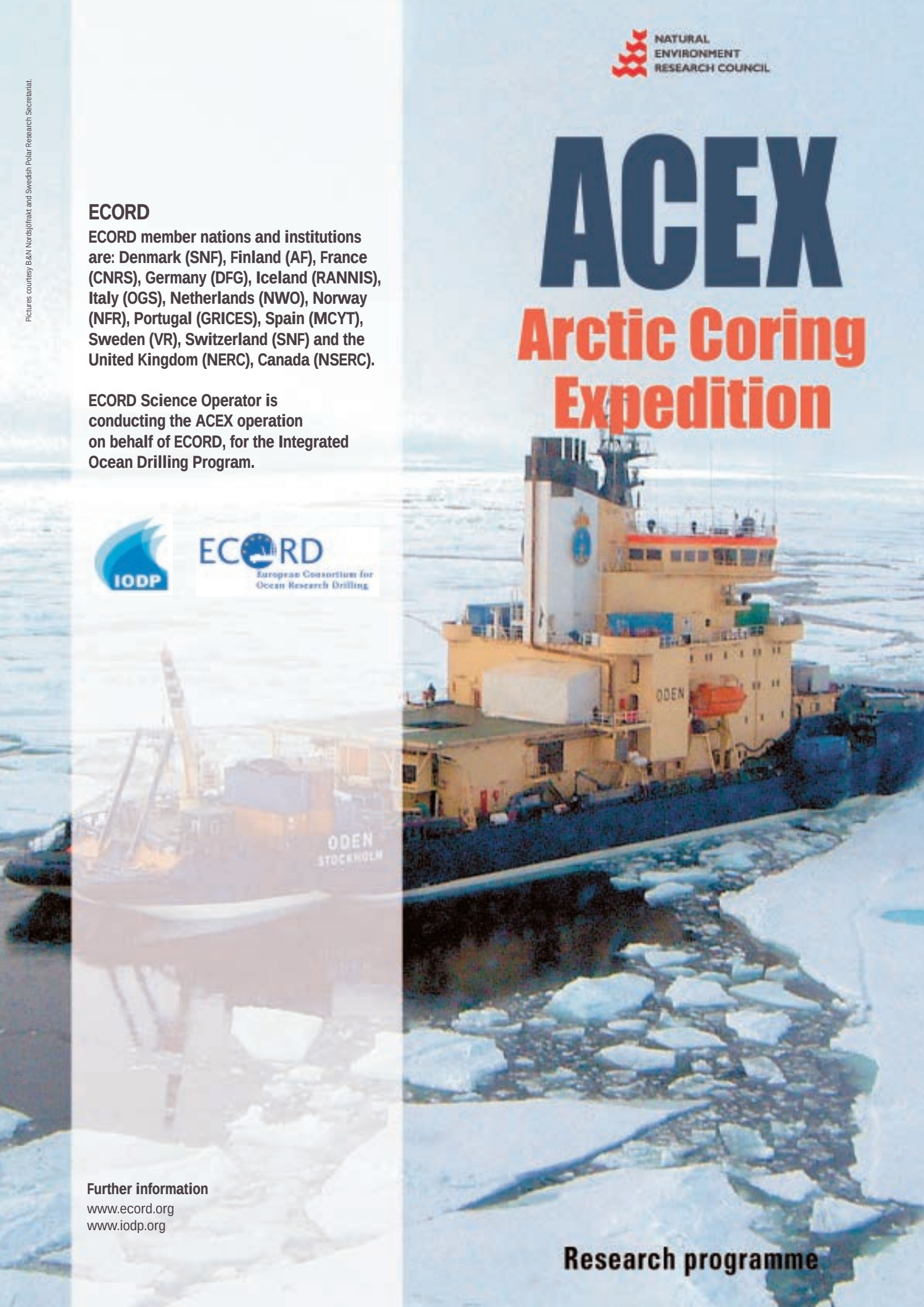
ECORD

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ECORD Science Operator is conducting the ACEX operation on behalf of ECORD, for the Integrated Ocean Drilling Program.

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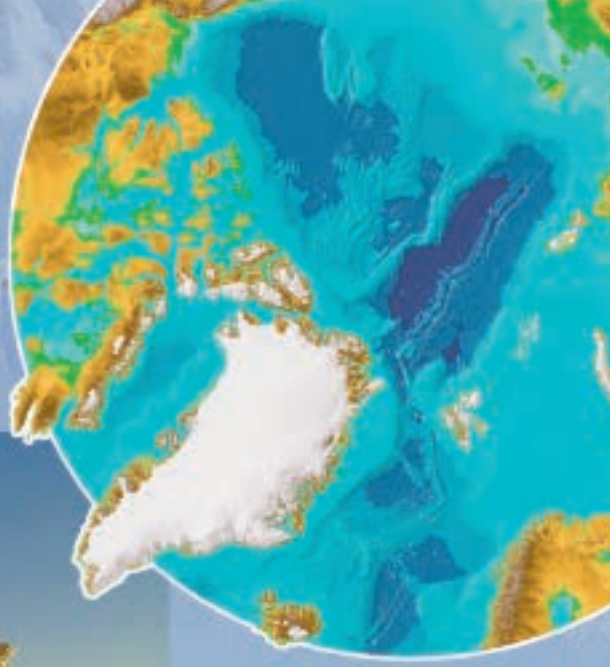
ECORD European Consortium for Ocean Research Drilling



Further information
www.ecord.org
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Research programme

ACEX, the Arctic Coring Expedition



Rising sea levels threaten millions of people around the world, which is why understanding how global warming could affect the Polar ice sheets is one of today's most vital scientific issues.





But when, how and why did the Arctic ice form in the first place? What effect has the Arctic Ocean had on past global climate and ocean currents? These questions have puzzled scientists for many years, and now we have the opportunity to help to answer them and to better to understand the processes causing the ice sheets to diminish.

So far we only have a detailed understanding of the latter stages of the ice age. This comes chiefly from the Greenland ice cores which tell us of the last 250,000 years of Arctic history. The only detailed global climate data for earlier times comes from cores collected deep from beneath the ocean floor. However, no one has ever collected cores from deep beneath the floor of Arctic Ocean.

Coring in Arctic ice

An international team is now close to collecting the first climate records from beneath the Arctic Ocean, and to finding a missing piece of the puzzle. ACEX, the Arctic Coring Expedition, could tell us about the changes that have taken place in the Arctic Ocean over the last 50 million years.

The challenges to working in the Arctic Ocean are many: it is covered year round in moving ice over a metre thick; daytime temperatures are commonly below zero celsius; the ocean floor is up to 4 kilometres depth; and it is so remote from logistical support. This is one of the most hostile places on Earth to undertake a scientific operation.

One place that is accessible to deep coring is the crest of the Lomonosov Ridge. This subsea mountain ridge rises as high above the ocean floor as the Alps do above Europe, and crosses the Arctic Ocean from Siberia to Greenland. At 87° 40' North, just 250 kilometres from the North Pole, the flat-topped ridge rises to 800 metres below sea level and its uppermost portion comprises 450 metres of layered sediments. Cores from here should produce pristine climate records for the last 50 million years: from ancient greenhouse climates, through a slow cooling leading to the beginning of the ice ages to the present day.

A fleet of icebreakers, to be directed from the Swedish vessel Oden, is being prepared to undertake the operation during summer 2004. Conventional coring vessels cannot withstand the enormous pressure from the ice, so an icebreaker, the VIDAR Viking, will be adapted to carry a rig capable of coring to nearly 2000 metres below sea level. A third high-powered icebreaker, the Sovietsky Soyuz, will lead the fleet through the ice to the coring sites.

Some of the Arctic's most experienced seafarers will spend seven days travelling from the edge of the Arctic ice to the far north. Once on site Oden and Sovietsky Soyuz will work together to break up ice floes and push them away to keep an ice-free channel around the Viking so that it can keep station above the drill hole without being pushed off by the moving ice. Observations from helicopters and analysis of satellite imagery will allow the team to monitor ice movements. Over 21 days it is hoped to core deeply enough to recover the climate records and, hopefully, to sample the underlying harder rocks of the Lomonosov Ridge.

Why now?

In December 2003, 13 nations formed the European Consortium for Ocean Research Drilling (ECORD). ECORD was created to make European scientific excellence available to the Integrated Ocean Drilling Program (IODP), which also involves scientists in the USA, Japan and China. IODP is one of the largest global scientific programmes, and is now capable of exploring the rocks and sediments beneath all the Earth's oceans.

To achieve ACEX's objectives, ECORD has developed the ECORD Science Operator (ESO) to draw upon the pooled experience of some of Europe's premier geological, marine and polar science institutes. ESO consists of the British Geological Survey, the University of Bremen and the European Petrophysics Consortium, all working closely with the Swedish Polar Research Secretariat and GFZ Potsdam.