Drillship on ice

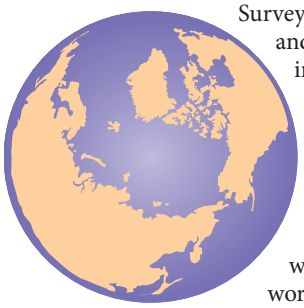
Kate Moran and Jan Backman took an ice-hardened drillship, two icebreakers and two helicopters to the high Arctic to recover many million-year-old sediments from the Lomonosov Ridge.

What was the objective of the work?
The goal of the Arctic Coring Expedition was to reconstruct the past 60 million years of environmental change in the Arctic by recovering the first-ever long sediment core of deep-sea marine sediments from the Arctic Ocean.

Why did you choose this particular location for the fieldwork?
Planning the expedition with Jan Backman of Stockholm University, we selected this site on the Lomonosov Ridge (a submarine ridge that is currently the focus of sovereign territory claims by a few Arctic nations!), because it has a thick sequence of sedimentary layers covering its crest. We thought that this blanket of sediments should hold a record of the Arctic's past climate.

What sorts of data or samples were you after?
We collected cores of sediment and rock, but of course the cores also contain fossils, organic matter, fluids and even microorganisms. After core recovery, we also sent special tools deep beneath the seafloor to measure the physical properties of the borehole left behind.

Did you encounter any difficulties?
Before we could sail, we had to convince the decision makers to take on the risk of the expedition: to fund us for drilling in Arctic sea ice, which had never been done before. As a result of more than six years of meticulous planning, we did manage to keep the drillship in one location for many days, in the middle of moving heavy sea ice. But once we knew we could handle the ice, we found that our drilling system had not been tried by the British Geological Survey in cold climates and problems arose, including freeze-up of the coring tools. Thanks to a fantastic and adroit team of experienced Arctic explorers, we got the drills to work in time.



MARTIN JAKOBSSON

Arctic action. A helicopter and the drillship, *Vidar Viking*, join forces to extract a paleoclimate record from beneath the ocean floor.

Did you have encounters with dangerous animals? Any low points, close misses?
Polar bears are at the top of the food chain there and scientists look like lunch to them. So while we were on site with our drillship fixed in the ocean, a few curious polar bears wandered over. We had a warning device that established a perimeter around the ship, and we kept a few shotguns on the rig floor and the bridge. We had to chase off a few bears who got too close.

What was the highlight of the expedition?
The first real highlight for me was seeing the fantastic technical team of ice-breaker captains, sea-ice experts, officers, meteorologists and telecommunications folk, among others, who worked on three separate ice breakers (and had never worked together before) to keep the drillship on location in the most severe summer-time ice conditions I'd ever seen. It was magical. After this, more highlights followed — recovering the sedimentary record at all, finding that it spanned the Palaeocene–Eocene Thermal Maximum (~55 million years ago) and uncovering a myriad of surprises that had been hidden in the sediments.

Was it straightforward to get the samples onboard and from there to the lab?
Our logistics were amazing. In addition to three ships, we had two helicopters that transferred people and materials among the three vessels. In fact, my daily commute for my 12-hour work shift consisted of 90-second helicopter rides between the ship where I lived and the drillship. I brought my coffee with me to work, and also ferried sediments back for preliminary analyses. The main analyses took place onshore several months later in Bremen, Germany.

Did the trip give you any ideas for future research projects?
We've just scratched the surface, if you will, of what lies beneath the Arctic Ocean floor. More complete climate records are waiting to be recovered, studies of gas hydrates in the Arctic must be completed, and investigating the slowest spreading centre on Earth — the Gakkel Ridge — is another of the many things to do.

Kate Moran of the University of Rhode Island, USA wrote this Backstory to the work by Brian Haley and colleagues, published on page 68 of this issue.