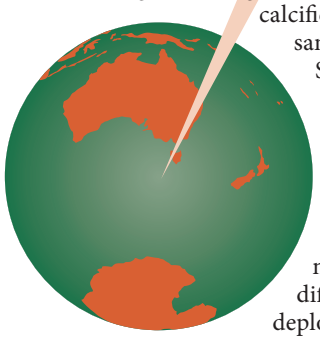
Sounding sediments

Andrew Moy and colleagues studied foraminifera in sediments, and made their own contributions to the sea, in their attempt to understand calcification in the Southern Ocean.

What was the objective of the work?
Initially we wanted to document patterns of deep-sea calcium carbonate dissolution during the Pleistocene era (1.8 million to 10,000 years before present) using foraminifera shell weights. Along the way, however, we discovered that changes in shell weight correlated with changes in surface-ocean pH, and we realised that our records could provide insights into the effect of ocean acidification on present-day foraminifera. Laboratory experiments have shown that shell formation in foraminifera — calcifying microzooplankton — is sensitive to changes in ocean chemistry. This observation helped us develop a research proposal to document the potential impact of increasing anthropogenic carbon dioxide emissions on marine plankton in the Southern Ocean.

Why did you choose this location?
The Southern Ocean was an easy choice. We had already deployed sediment traps in regions of the Southern Ocean where acidification is strongest, and we also had an ongoing coring program focused on understanding past changes in Southern Ocean chemistry and circulation.

What sorts of samples were you after?
In this project the fields of geology, palaeoclimatology, palaeontology, biology and geochemistry came together to provide us with insights into modern ocean acidification. Using a combination of deep-sea cores, Holocene surface sediments and sediment-trap data collected over the last eight years we were able to better understand the influence of natural and anthropogenic change on foraminiferal calcification in the same region of the Southern Ocean.



Did you encounter any difficulties?
Sediment-trap moorings are notoriously difficult to deploy and, more importantly, to recover — particularly in the rough Southern Ocean. Thus there were years in which we couldn't recover any samples. Similarly, coring in the Southern Ocean can be a real challenge, and our geological dataset represents years of hit-and-miss efforts. But, after ten years and over a dozen voyages later, we had a complete data set.

ACE CRC

Onboard the *Aurora Australis* — scientists successfully retrieving a sediment trap from the Southern Ocean.

Any low points?
Moorings are recovered by means of an acoustic release, and communication with these releases is by hydrophone. Standing on the deck of the rolling recovery ship, headphones on, waiting for the traps to reply — and hearing nothing — was a low point.

What was the highlight of the expedition?
Every successful core and sediment-trap retrieval was a highlight!

Did you learn anything new about yourself or your team members?
Yes — how long it took each of us to get our sea legs. Many of us made our own personal contributions to particulate fluxes in the ocean.

Was it straightforward to get the samples back to the lab?
Quarantine officials often looked at our samples with extreme suspicion, perhaps because they resembled soil samples.

Did the trip give you any ideas for future research projects?
Our next task is to document the response of other calcifying organisms — such as pteropods and coccolithophorids, one of the most common plants on the planet — to ocean acidification.

This is the Backstory to the work by Andrew Moy and colleagues, published on page 276 of this issue.