

Sailing for stretched lithosphere

Having managed to get themselves and all their instruments on board a ship not too far away from an imminent war zone, Jenny Collier and colleagues enjoyed the serenity of life at sea as they investigated the rifted continental margin of India.

What was the objective of the work?

We wanted to investigate what happens when continental lithosphere is stretched and broken to form a passive margin, which is a topic of considerable debate. Our idea was to fire compressed air ‘shots’ into the lithosphere and record the seismic response with seismometers deployed on the seabed. The analysis of such data reveals the structural complexities of the lithosphere very well.

Why did you choose this particular location for fieldwork?

Most of the observational data we have comes from the passive continental margins bordering the north and central Atlantic Ocean because they are within easy reach of the home ports of most European and North American research vessels. However, all of these previously studied margins formed under the same conditions. We wanted to test our ideas of which factors control the splitting of continents by studying a margin from a geographically different area. We chose this part of the Indian margin as it formed by rapid rifting.

How long did it take to plan the fieldwork?

Two years elapsed between getting the project approved and setting sail. We wanted to use a particular vessel, the RRS *Charles Darwin*, which was already in the Indian Ocean and had the scientific capability that we needed. Unfortunately, we had to join a rather long waiting list. Coordination was a nightmare — our scientific instruments were all in different parts of the world, taking part in experiments that were also subject to scheduling changes. When we finally had our chance, the

build-up to the Iraq invasion resulted in several changes to our port of embarkation. It was a huge relief when we finally set sail with all the equipment onboard!



BOB WHITWORTH

All aboard — the ocean-bottom seismometers on the deck of the RRS *Charles Darwin* in Muscat, Oman at the start of the cruise.

How did you like work on a research vessel?

Being on a ship for six weeks was a unique experience. I became totally immersed in my work, oblivious to what day of the week it was, and I had a real sense of being on an adventure. There was great camaraderie among the 40 or so people on board. When things went wrong the technical staff in particular showed enormous resourcefulness, fixing things even when they didn't have the right spare parts or equipment. I particularly liked being out on deck at night — the unrestricted horizon and lack of background light in the middle of the ocean made for an amazing starscape.

Any close misses?

When we finished firing the shots, we went back to each of the ocean-bottom instruments to collect the data they had recorded. This involved sending a radio signal from the ship telling the instrument to cut its link to its bottom weight so that it could float up to the sea surface, a process that can take up to two hours. Unfortunately we had one instrument that wouldn't communicate with us at all. The radio receiver could have failed or the instrument could have fallen over and been covered by sediment. However, being optimists, as

well as knowing our insurance policy, we went back to the location a few days later. To our relief, we found the instrument bobbing about on the sea surface. Given that each instrument costs about £50,000, the excursion was well worth it.

Was anything particularly memorable about the expedition?

Our cruise started in Oman and ended in the Seychelles so we sailed across the equator. It is an ancient maritime tradition that all ‘first timers’ such as myself must be initiated in a ‘crossing-the-line ceremony’. Novice sailors are brought before Neptune and his Court for judgement of their sins and are punished and then cleansed by being submerged in a vat of sea water. My transgressions involved ‘stealing Neptune’s seabed secrets’ and ‘disturbing the peace of the deep with my noisy bangs’. Following the ordeal we all received a certificate declaring our new status in the brotherhood of trusty sailors. The crew went to a great deal of trouble in dressing up and decorating the front deck for the occasion, making it a truly memorable experience.

This is the Backstory to work by Jenny Collier, Timothy Minshull and colleagues, published on page 463 of this issue.

