Coring climate change

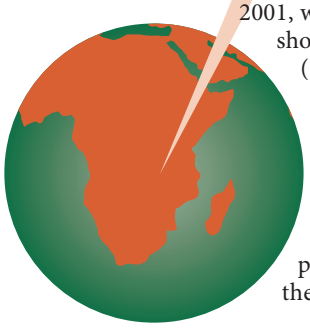
In their pursuit of palaeoclimatic reconstruction, Andrew Cohen and colleagues experienced the 'Eureka!' highs and dangerous lows of sediment coring in Lake Tanganyika, East Africa.

What was the objective of the work?

We wanted to document the palaeoclimate history of the Lake Tanganyika region in East Africa. The work formed part of the Nyanza Project, a research training programme that aimed to bring together a team of US and African scientists and students to study tropical lakes. We were interested in everything from twentieth-century climate change and its implications for the lake's fish and water resources, to the much longer records of climate history preserved deep within the lake sediments. One of the fantastic things about the Nyanza Project was that it delved into so many interwoven strands of geoscience and biology. You'd be hard pressed to find a location more conducive to this kind of research than Lake Tanganyika, with its great antiquity and enormous numbers of endemic species, as well as its current problems related to fishing, watershed deforestation and climate change.

Why did you choose this particular location for the fieldwork?

Lake Tanganyika is the largest lake in the African Rift Valley and, at about ten million years old, is one of the oldest lakes in the world. It is also extremely deep and contains extensive sedimentary deposits, up to five kilometres thick in places. We first became interested in coring Lake Tanganyika because earlier data indicated its promise to provide a very long palaeoclimate record for tropical Africa. However, during our first coring expedition in 2000, it became evident that laminated sediments were accumulating annually in this area. These would be ideal for studying the history of recent global change impacts on the tropics, and specifically on this lake's ecosystem. The original cores, collected in 2000 and 2001, were relatively short, so with James (Jim) Russell as our project palaeoclimatology mentor, we returned to the region in 2004 to collect longer piston cores from the same sites.



Peter Swarzenski setting up a multicorer at Lake Tanganyika, East Africa, to collect sediment cores to document the lake's climate and environmental history.

What sorts of data or samples were you looking for?

We carried out various activities during our 2004 lake cruise. Kiram Lezzar (our geology mentor) and Jean-Jacques Tiercelin performed seismic imaging of the lake bottom, which enabled us to identify the best locations to core, and Jim, Kiram and I supervised coring of the sediment. Our students collected limnological data, including measurements of oxygen, nutrients and chlorophyll. These data enabled reconstruction of regional patterns of circulation, nutrient mixing and productivity, which helped us to interpret the core records.

Were there any low points?

The scariest moment of our expedition was on the last night of our 2004 cruise. It was late and everyone was tired, but we knew it was going to be our last chance to get an important core. We successfully managed to insert the corer into the lake sediments, but when we tried to remove it using a winch, it wouldn't budge. We were effectively anchored to the lake bottom. Our options were limited and all bad! Finally, we made the controversial decision to pull the corer out using the ship's power, rather than the winch. In this situation, the coring cable can snap under the strain. A recoiling, broken cable is extremely dangerous. We moved all crew and students out of harm's way, but someone had to stay at the winch to monitor and operate it, and at the same time watch for the cable. That someone was me. When everyone was clear, I signalled to the captain to slowly back the ship away from the corer. For what seemed an eternity (but was really just a few seconds), I watched and listened as the tension increased on the cable. Finally, the corer eased its way out of the mud. Relieved, we were free to head back to our field base with sweat-laden brows and high-fives all round.

What was your personal highlight of the expedition?

Back in 2000, after returning to our field base to open our first cores taken from Lake Tanganyika, I had a 'Eureka!' moment. We discovered that the core we had collected was not only laminated (and therefore very promising for palaeoclimate studies), but also contained some obvious and significant structure to the laminations. Such structure might indicate important variability in environmental change related to cyclic variation in both productivity and precipitation. The students gathered around the core and we began to speculate about what the laminations might tell us. It was a wonderful moment for me, as an educator and director of a research training programme, to see both the new discovery and the impact it was having on so many young and inquisitive minds. That core set the stage for much of the subsequent work carried out during our 2001 and 2004 coring expeditions.

This is the Backstory to the work by Jessica Tierney and colleagues, published on page 422 of this issue.

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