

In search of molybdenum

Corey Archer and colleagues sailed into the wilds of Sweden and the Amazon to collect river water and the trace metal isotopes it carried.

What was the objective of the work?

The goal of the work was to quantify the riverine isotopic budgets of a few key trace metals entering the oceans. In particular the isotopic composition of riverine molybdenum was a missing data piece in the puzzle of reconciling global oceanic budgets. A few surprising results on a couple of old samples lying around led us to undertake this larger survey.

Why did you choose this particular location for the fieldwork?

The very nature of the study involved acquiring samples from as many rivers as possible. This undertaking was therefore quite difficult logistically — and expensive! It was something which we obviously could not do on our own. We therefore relied on a combination of samples collected during previous fieldwork, and the generosity of colleagues who thoughtfully collected samples for us when they were anywhere near a river! Without this, and the assistance of the myriad of people we encountered along the way, much of this work would not have been possible. We did, however, choose two locations to sample ourselves: the Kalix river system in northern Sweden, because of its relatively undisturbed nature and because it has been the subject of several previous geochemical studies; and the Amazon, as no global river story would be complete without data from the world's largest river.

What sorts of data or samples were you after?

We collected bottles of river water for analysis, and later filtered the particulate matter from each sample.

Did you encounter any difficulties?

Sampling rivers is at the very bottom end of the technological scale. One needs

only a river, a bottle, in some cases a boat, and willing participants! However, it was not all plain sailing, quite literally



Sailing the Amazon. A small offshoot of the Solimões River offers a calm detour from the busy Amazon waterways.

in one instance. As we travelled to the Amazon, rumours of the dangers of piranha and the dreaded Candiru fish, and even pirates abounded! Fortunately, we encountered none of these along the way. But frightening fish aside, we did have some difficulties of a human nature. One of our Amazon expeditions was almost severely cut short as our hired boat ran full speed into a parked — and unlit — barge in the middle of the night. Luckily the ensuing panic was fairly short-lived as the crew realized that we weren't sinking, and that all of the damage to our vessel was above the water-line. They concluded that it was safe to continue, although at that point not everyone fully shared their confidence!

Was it straightforward to process and transport the samples?

After collecting each sample, it was important to get it filtered as soon as possible, and then to ensure that the filtered water was acidified to prevent any adsorption to the walls of the bottle. We therefore had to carry makeshift filtering apparatus and concentrated acid with us at all times. Filtering turned out to be particularly slow as we forgot our

vacuum pump and thus had to rely on a peri-pump to provide the suction for our vacuum filtration kit, which was extremely cumbersome. Owing to the number of samples and the slow speed of the filtration process, we were filtering practically 24 hours a day. Fortunately, this was mainly done in the comfort of our hotel room. The samples could then be returned to the lab for full analysis at a later date.

What was the highlight of the expedition?

For me this work had two highlights. The first was crossing the Arctic Circle in northern Sweden, and then experiencing near, but not quite, 24-hour daylight. The pristine nature of the vast and mostly unpopulated terrain was truly spectacular. The second highlight was flying into Manaus, where the Negro and Solimões rivers meet to form the Amazon. The sheer size and scale of these rivers, especially from the vantage point of the plane, was simply breathtaking, even with my expectations of something amazing.

This is the Backstory to work by C. Archer and D. Vance, published on page 597 of this issue.

