Core sampling in Western Sumatra, Indonesia

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Abstract

Researchers from The Australian National University, Canberra in collaboration with the Indonesian Institute of Sciences, are conducting a series of climatic studies of the South East Asian monsoonal margin. The focus is to collect core samples from coral reefs (Sunda Strait) and stalagmites (Western Sumatra). I was appointed the research party's caving consultant. This paper is a brief outline of the caves we visited in June-July 2012 and our activities. At the stage of writing, the palaeoclimatic data are still pending.

Introduction

From the outset I wish to state that I am not a climate researcher and know little of the technology that is involved in analysing stalagmite core samples and palaeoclimate. The Indonesian archipelago and to some extent northern Australia is on the South East Asian monsoonal 'edge'. This expedition was an initial investigation to find suitable sites for palaeoclimate sampling to determine if the Toba supereruption (a massive volcanic eruption in Sumatra between 67,00 & 75,000 yrs ago) had climatic effects which may have influenced early human dispersal in Australasia, and to investigate Indian Ocean Dipole rainfall extremes in southern Australasia.

We understand that caves are a true window into the past and that their development and secondary deposition is greatly influenced by weather conditions on the surface. Climate changes over thousands of years are expected to show in the secondary deposition record of stalagmites. Stalagmites formed well inside a cave, far from any entrance effects, and in upper chambers away from stream way effects, are of great value in such studies.

Planning

I was approached by the Australian National University (A.N.U.) to join a research group who were planning to spend 5 weeks in Indonesia in conjunction with LIPI (The Indonesian Institute of Sciences) to collect core samples of coral and stalagmites for future climatic studies. Planning pre-trip was difficult, with limited information on Sumatran caves, limited information on the group's caving abilities and a brief list of caving gear left over from previous cave research groups sitting in Bandung, about 3 hours drive from Jakarta.

FIGURE 1 *The Golden Stairway, Banta cave, Western Sumatra*

Cave reports were available from Covington from an American Expedition in 2000 (Covington, 2000), and several French expeditions (Caving Association of Pyrenean, 1995, 2000, 2003, 2005), plus basic cave statistics from Dunbar (Dunbar, 2004). The French report resulted in some confusing translation after running through a Google translation program! These reports were more a story of the groups' exploration and although they gave some details of what each cave involved, they gave no indication of stalagmite occurrence and scant details on upper passages and chambers that might contain suitable sampling sites.

It was decided to avoid any challenging vertical caves and to target caves that seemed to have some length and 'sounded' like they may have upper sections.

One major challenge needed to be overcome just one-week before I left Australia: I received an email from Indonesia stating that all the batteries sitting in Bandung were faulty. Urgent emails went out to anybody I knew in Australia who used the same system, but fortunately Garry Smith came to the rescue and managed to secure an adequate quantity of batteries for me, just in time.

Jakarta

My time with the group was 3 weeks, some of which was to be spent in Jakarta obtaining the necessary permits. I needed to obtain a research permit, an extended visa called a "kitas", a police travel permit, a letter from the Indonesian Home Office to be shown to local authorities and a Police Identification to also be shown when demanded.

I was supposed to be met in Jakarta by a local who would assist me in getting around the various government departments (my Bahasa is non-existent), however the local contact failed to appear. So armed with the address of the research permit place RISTEK (The Ministry of Research and Technology), I grabbed a taxi and commenced my quest. In brief, it wasn't a brief process, and the permits I did obtain took 4 days, with others that "may take another week", so after I had obtained the most important documents, it was decided that we really needed to head up to Western Sumatra and do some work. Incidentally, the Indonesians that I was working with were amazed that I got through the permit process all by myself; I found the best approach is to ask lots of questions and find someone who wants to practice their English: Indonesians are extremely friendly and willing to assist. A quick trip out to Bandung with one of the A.N.U. researchers sorted out what gear we thought we might need to be driven for 3 days to the area of caves we had targeted. We Australians (2 A.N.U.researchers and myself) took the easy option and flew up to Padang, to be met by our local contact from a university there who was to coordinate with any locals.

FIGURE 2 *Core sampling*

The caves we targeted

Payakumbuh town: Peyangang Cave. This is a bird's nest collector site (for bird's nest soup from swiftlet nests). Locals and government officials are very protective of such sites, as the collecting of bird nests is very lucrative. On our first trip we went 350m in, encountering considerable mud and slippery surfaces; several rock falls to climb over, with only 2 samples taken from a high ledge involving a tape climb.

On the following day we went about 2km in, but found very few stalagmites with only 2 more samples.

We next went to Banta cave which was a 30 minute walk through the jungle and turned out to be an impressive entrance chamber that was quite photogenic, with a lower level involving a difficult climb down. We managed to obtain a few good stalagmites for samples, this time well away from the entrance. We discovered a long stalagmite that had fallen and broken- the locals were very keen to "reconstruct" this for a photo before removing it from the cave for future sampling. A further day in Banta Cave gave us what should be some excellent core samples.

Nearby was an active quarry that had revealed a small cave which was about to be destroyed by the quarrying operations, so we used the opportunity to remove several stalagmites that had originally been some distance from the surface. It seems sacrilegious to be 'breaking" speleothems, but I had to remind myself that they were only going to be destroyed anyway!

After a rest day doing some sightseeing we headed for a cave called Ayr Lulus (which means escaping water) which was quite a long walk through the jungle, involving a difficult climb down, with a huge entrance chamber, but the cave closed down to a tight stream way soon afterwards. We only found stalagmites close to entrance, which generally is not a good sampling site as deposition is greatly influenced by entrance factors; however 2 core samples were taken, but likely to be poor.

We then moved about 3 hours south to a small town called Sisawah. Considerable negotiation with the local authorities occurred in Bahasa, with us nodding now and again. A home stay was arranged about 1km from town. Our hosts spoke no English, but seemed pleased to have us stay. There was no running water and electricity had only just been connected a short time earlier, so it was still a novelty, but appreciated for charging up batteries. Food was brought each morning and evening from the village downstream, no doubt using the same water that emerged from a nearby cave, that we washed in and for ablutions. I found it amazing that no one fell ill. Within one hundred metres of our living quarters was Mantu Cave, which we penetrated about 800m and obtained 5 mini-cores, and 1 stalagmite as sample. This cave is about 3.5km long.

The following day we climbed steeply up a hill adjacent to our house to Kompe Cave; it had four levels, with the bottom

FIGURE 3 *Hairy Mary (Thereupoda longicornis)*

needing SRT gear, some huge chambers with thousands of bats, a couple of snakes and some sort of insect that seemed to find their way into any orifice available, but unfortunately no stalagmites.

A two kilometre walk to the other side of the village took us to Ngalau Banta Bung cave, which has been used as a training cave by local caving clubs. This was another stream way, with some crawling, but the water temperature was quite pleasant. Fortunately this cave had a few upper levels so we managed to obtain 3 core samples.

That evening some of the locals arrived at our home stay and much heated discussion ensued. Apparently there had been some sort of misunderstanding about what we had been up to and one local landowner thought we were planning to destroy his cave. We ended up having several stalagmite samples confiscated and paying a small fine ($30) as compensation. It certainly pays to have a local liaison person who speaks Bahasa as we had no idea what was going on.

That ended our caving, so all that remained was to pack up all samples for shipping back to Australia and fly back to Jakarta.

At the stage of preparing this paper, our samples were still in Indonesia, no doubt tied up in Indonesian red tape, so no analysis of our samples has been possible.

Environmental issues

I found Indonesia attitudes to caves to be quite environmentally insensitive. Caves are seen as a resource for bird's nests, and this is regulated in an attempt to ensure sustainability, however the rubbish left from this activity is considerable. I saw no track marking or management infrastructure to ensure low impact in caves. It even appeared that cave visitors did not consider water quality for the villagers further downstream. At rest stops, locals think nothing of leaving their litter, so as the experienced caver present I did my best to influence a better appreciation of the cave environment.

Caving standards

Overall, the caving itself was quite easy, with warm temperatures, but lots of mud and water to contend with. It was decided to avoid any serious vertical access as a number of the group did not possess such skills and considerable training and equipment would have been required. Often on challenging climbs I would place a hand line for the group and talk the non-caves through such a climb. I was amused that some of our local village guides would climb something I would not even consider, and at other times they seemed terrified of something that I thought quite easy.

The language barrier was a source of constant frustration, with lots of misunderstandings and time wasted.....but then most things happen in Indonesian time anyway!

I found our Indonesian team a fantastic group of people; always cheerful, prepared to work and assist in any way possible. Some of them did have previous caving experience and they all seemed to enjoy it.

Core sampling

Core sampling involved using a heavy duty rechargeable drill with a barrel bit. As the barrel is drilled into the base of a stalagmite, water is pumped to keep things cool. Cores of above 12mm were drilled between 5 and 15cm deep, sometimes not coming out as one piece, but it was easy to put the 'jig saw' back to work out the sequence. Each core was bagged and labelled and the core site photographed with its number.

Generally the better sample sites were deep into the cave, high up from the stream way, usually towards the back of upper galleries. Sometimes the most motley-looking stalagmites would give the best looking core sample. A limited number of stalagmites were removed for further sampling back in the lab. Any removals were not in 'plain sight'.

The overall experience

My understanding is that this was a preliminary expedition to determine good sampling sites for future studies.

Naturally such an ambitious research project involves many problems, particularly when negotiating with a foreign government and local officials. A good working relationship with Indonesian research organisations to gain sponsorship, support and local contacts is essential.

On the ground problems included finding a local who could assist in finding cave entrances and even with government permits, further negotiation with local government officers. Having a Bahasa Indonesia speaker was absolutely essential, but even then it is easy to have misunderstandings.

I found the whole experience an interesting one, but many times frustrating. Gaining the appropriate permits was a long and confusing process, and all too often time seemed lost before actually getting into a cave and ultimately very few good sampling sites were found.

Our lack of information on what was actually in the caves we targeted also hampered our success at finding good sampling sites. All my expenses to and from Indonesia were paid, together with permit fees and most day to day expenses whilst on the expedition, but no actual remuneration was sought nor offered. I feel that very few cavers with adequate experience would be available for such expeditions- perhaps only students and retirees, so further expeditions of this nature face a challenge in finding a caver to assist.

The future

For future core sampling, I recommend involvement with Indonesian cavers: perhaps with Australian cavers who known what makes a good sampling site spending some time locating such sites before the core samplers and researchers arrive. This would save the research group a great deal of time and should result in optimal quality samples.

It was fun and some could argue a 'cheap holiday' and a wonderful introduction to the real Indonesia, working and living

with locals. The two A.N.U. researchers returned to Australia in one piece, apart from many bruises and sore muscles, so I guess I did my job adequately!

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