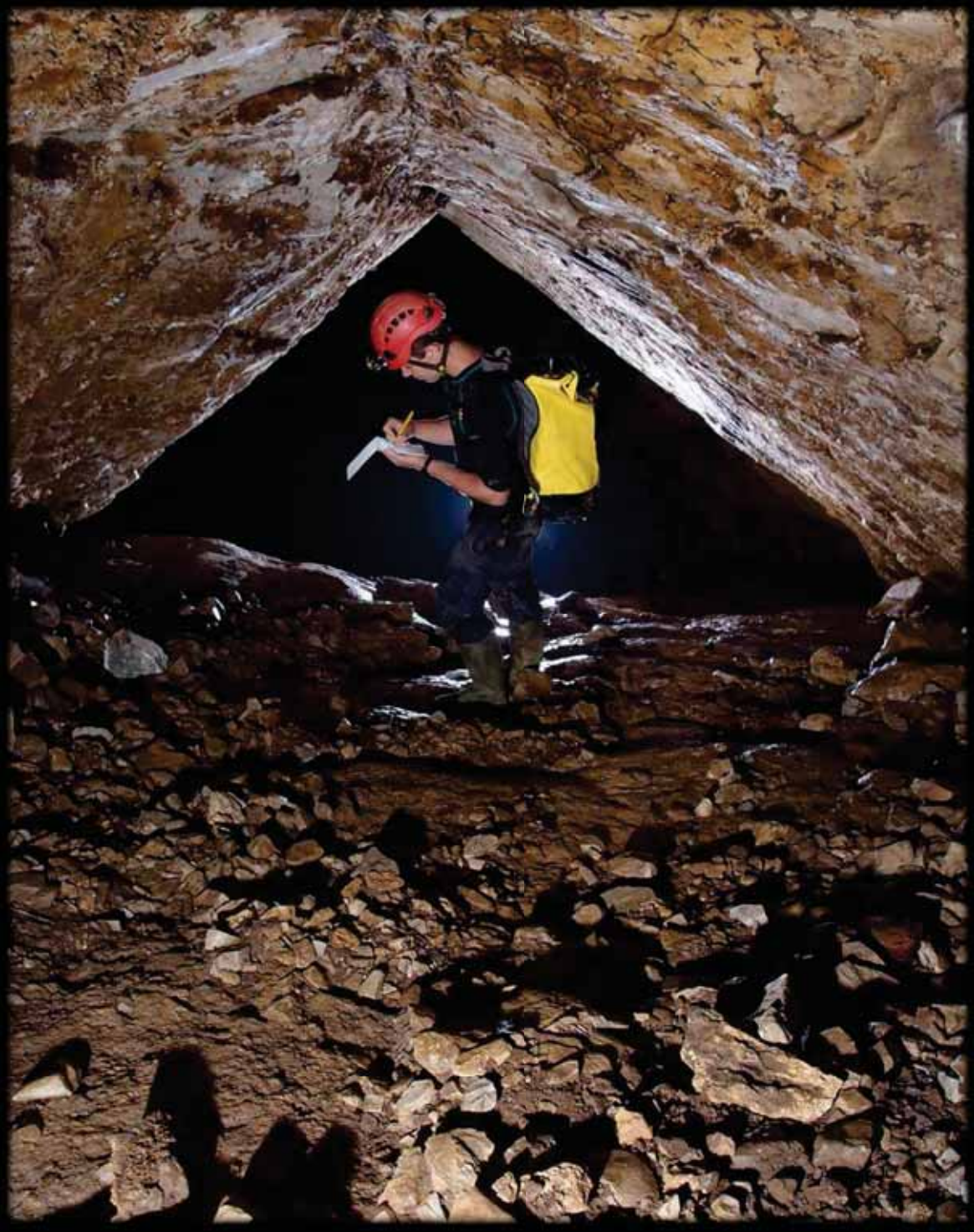
The China Caves Project Expedition Report 2014



Report to the Anlong People's Government

The Guilin Institute of Karst Geology

In association with the China Caves Project

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Introduction 项目介绍

The expedition took place between the 5th and 25th October 2014, and was based in Dushan Town, An Long County, Guizhou. The organisation was a co-operation between the An Long County government, the Institute of Karst Geology from Guilin and the UK based China Caves Project. The field team comprised eight cavers from the United Kingdom and two from the Institute of Karst Geology, assisted by officials from the local government.

The expedition received a warm welcome from An Long Government leaders and the expedition is enormously grateful for the assistance they received especially with regards to transportation and local knowledge. The rural people were also helpful in assisting team members in locating cave entrances.

2014年10月5日至25日，我们在贵州省安龙县笃山乡进行了这次考察活动。这次考察是由安龙县政府、中国地质科学院岩溶地质研究所和英国洞穴探险协会共同组织的。考察队员有八名来自英国，两名来自岩溶地质研究所。该项目得到了安龙县政府的大力支持。当地政府相关人员热情接待了考察队员，提供了无微不至的帮助，向队员详细介绍了当地地质情况和风土人情，协助解决交通问题等，在寻找洞穴入口时，当地居民也提供了许多帮助。

Figure 2- The 2014 expedition received a very warm welcome 图片2 考察队受到热情接待

Previous Exploration 早期考察

In 1986 a reconnaissance of the An Long Karst was undertaken by four British cavers led by R.G.Lewis. Mr Lewis then went on to organise a 16 person strong expedition which took place between February and April 1988. Transport routes were not as developed and travel to the area was much more time consuming than it is today. The team was split with a second group coming out in March, never the less, the group spent considerable time exploring the area.

For the first part of the expedition the team based themselves in a cave entrance at the base of the An He Doline. Here they explored all the accessible caves including Xi Nu Dong and discovered the Titan Chamber and river passage below. The team moved up to the Ban Dong Doline and began exploration there and it was not long before the two were connected. Chu Yan Dong was also descended and eventually connected to the system which was reported as now being 17.6km long and 355m deep although no survey was published by this expedition.

In the later part of the expedition the team visited many of the areas sinks. Most were found to be choked but they made a sporting descent of the Li Shu Sink to a sump. They also reported a discovery named 'Dragon Cave', which was explored for 5km but few details of the location were reported and no survey published.

We have been unable to find any formal report from this expedition although generalised articles appeared in Caves and Caving no.42 and Red Dragon no.15, where it is claimed that 30km of cave had been explored.

In 1989 a follow up expedition took place with a largely new team of cavers which was well reported in Cave Science Vol.20, No.2, November 1993. This stated that the 1988 expedition had surveyed only 22km of cave and produced some surveys but had not published them. The aim of the 1989 expedition was "to reconcile data and find missing pieces". It was thought that Dragon Cave was close to a connection with Bang Dong and a lot of effort was put into this area without success. The expedition concentrated on looking for caves which could intersect the main system and reported a number of caves. The main discovery was Chang Sha Dong, located on the line between An He and the Si Fang Resurgence, which intersected a large fossil route ending at an undescended pitch.

The expedition report outlined the geology and geomorphology of the area and published area maps together with the surveys of the Ban Dong System and Dragon cave.

In 2013 a British caving team visited Titan Chamber, Xiniu Dong as part of a wider project to laser model all the world's great cave chambers. They were accompanied by a writer and photographer from the National Geographic magazine. The expedition reported Titan Chamber having a volume of 2.53 million cubic metres and a plan area of 54.8 thousand metres squared. This confirmed Titan Chamber as one of the world's top ten largest chambers. Three members of that team returned in 2014.

1986年，由R.G.Lewis带队的四位英国洞穴探险者对安龙县的喀斯特地形进行了勘察。1988年2月至4月间，Lewis先生又组织了一支16人的考察队伍，重返该地区。鉴于当时的交通情况，考察队在路上花费的时间要比现在长得多。该考察队分为两个分队，第二分队于当年3月进入该地区，并进行了大量的考察和勘探。

首先，考察队从暗河天坑的一个洞口进入，探索了周边所有可进入的洞穴，包括犀牛洞，还发现了泰腾洞厅及其下方河道。然后，考察队转移到板洞(Ban Dong)天坑并展开勘测，不久，就把两洞连接起来，并最终将雏燕洞也与该系统连通起来。该地层总长17.6千米，深355米。遗憾的是，这次勘测活动没有发布任何调查报告。

紧接着，考察队参观了该地区许多落水洞。许多落水洞已经被沙石堵塞，但考察队员仍下到了立树(Li Shu)洞，并到达一个集水坑。队员们还报告发现了“龙洞”，并沿“龙洞”探索至5公里深处，但是没有给出具体细节，也没有发布任何调查报告。

我们找不到关于这次考察的正式报告，不过，我们在Caves and Caving第52期及Red Dragon第15期上，看到过相关报道，报道中提到考察队探索了长达30公里的洞穴。

1989年，一支主要由新队员组成的考察队进行了后续考察。Cave Science 1993年11月第20卷第2期对这次考察进行了详细报道。这次报道显示，1988年考察只探索了长约22公里的洞穴，勘探队伍写了一些调查报告，但并未出版。而1989年考察的目的是为了“整合数据，查漏补缺”。队员们认为龙洞与板洞应该相连，他们投入大量精力勘探这片区域，但没有成功。这次考察着重在寻找可连接主系统的洞穴。他们就一些洞穴作了报告，最大的发现长沙(Chang Sha)洞，地处暗河与四方泉(Si Fang Resurgence)之间，连接了一条曾经的暗河河道，但队员没有下去考察。

这次考察报告概述了该地区的地质和地貌情况，发布了区域地图和对板洞系统及龙洞的调查报告。

2013年，一支英国的洞穴探险队参观了犀牛洞泰腾洞厅，这是作为用激光模拟全世界大洞厅项目的一部分。随行的还有来自《国家地理》杂志

的一位作家和一名摄影师。这次考察报道，犀牛洞泰腾洞厅有253万立方米，地面面积为54800平方米。这使得泰腾洞厅成为世界十大洞厅之一。这支考察队伍中的3人，于2014年再次返回该地区考察。

Aims and Objectives 宗旨与目标

The aim of the expedition was to assess the potential for further cave discoveries in the karst regions of the county, especially around the Ban Dong/ Xiniu Dong System, but also in the karst surrounding An Long. It was hoped to determine the extent of the previous explorations and by using the improved rural road structure and communication lines make further new discoveries. One certain objective was the undescended pitch at the end of Chang Sha Dong which lay along the suspected line of development between An He Doline and the Si Fang Resurgence. The resurgence itself was an objective as there was little reported about it, although it must have been visited by the previous expedition.

The expedition had an interesting objective in Titan Chamber which had only been determined by modern technology. The laser scanning of Titan had revealed a passage at roof level which was not visible to the naked eye. This was probably the first time a cave objective such as this had been discovered by laser scanning!

这次考察的目的是评估安龙县喀斯特地貌未来的洞穴探索潜力，尤其是板洞和犀牛洞周边地区，以及安龙周边的喀斯特地貌区。这次勘察希望能够确定以前勘察的范围，并利用大为改善的农村道路和交通线，为洞穴考察做出新探索。其中，一个明确的考察对象是长沙洞上次未曾考察的末端。考察队认为，暗河天坑与四方泉之间，似有洞穴连接。四方泉本身也是考察对象之一，尽管以前的考察队确实对其进行了勘探，但关于它的报告极少。

这次考察还有一个有趣的考察对象，泰腾洞厅。通过最新技术对泰腾洞厅的激光扫描，显示出该洞厅顶部有一条通路。这个通道用肉眼难以看见，这可能是第一个由激光扫描发现的新洞穴目标。

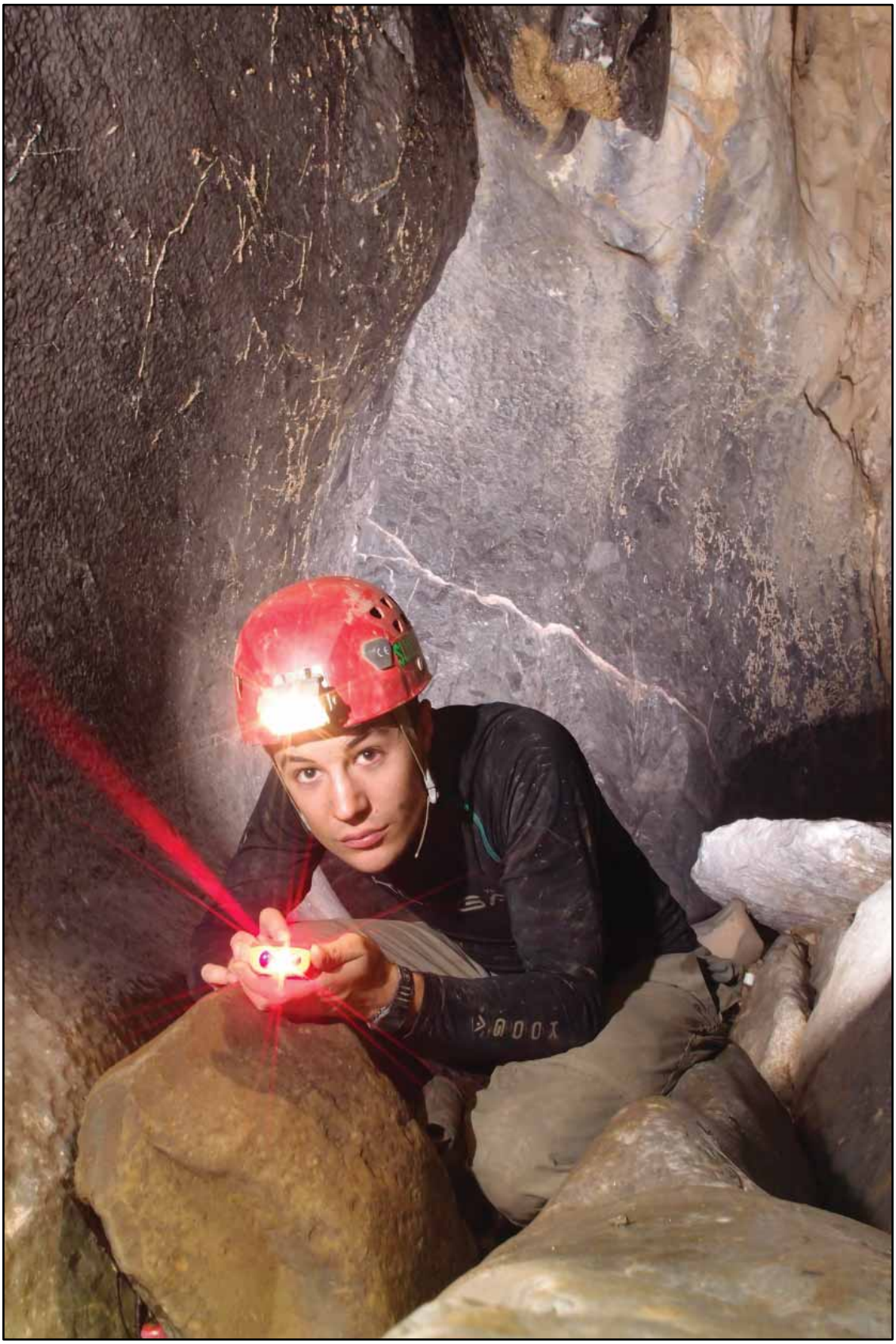

Figure 3- Surveying in Xiao Shui Dong 图片3 考察小水洞

Area Maps

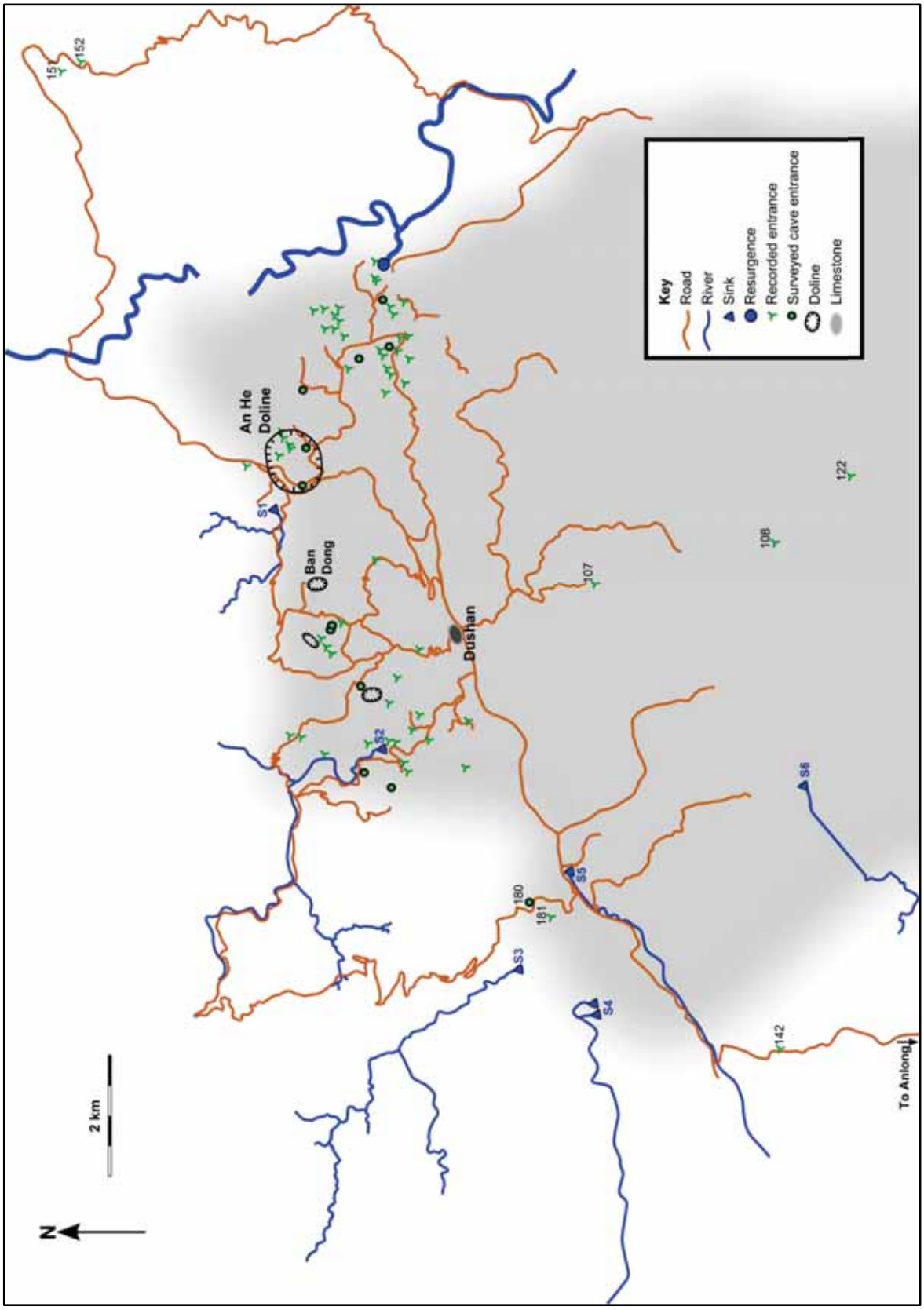

Figure 4- Area Map (Overview)

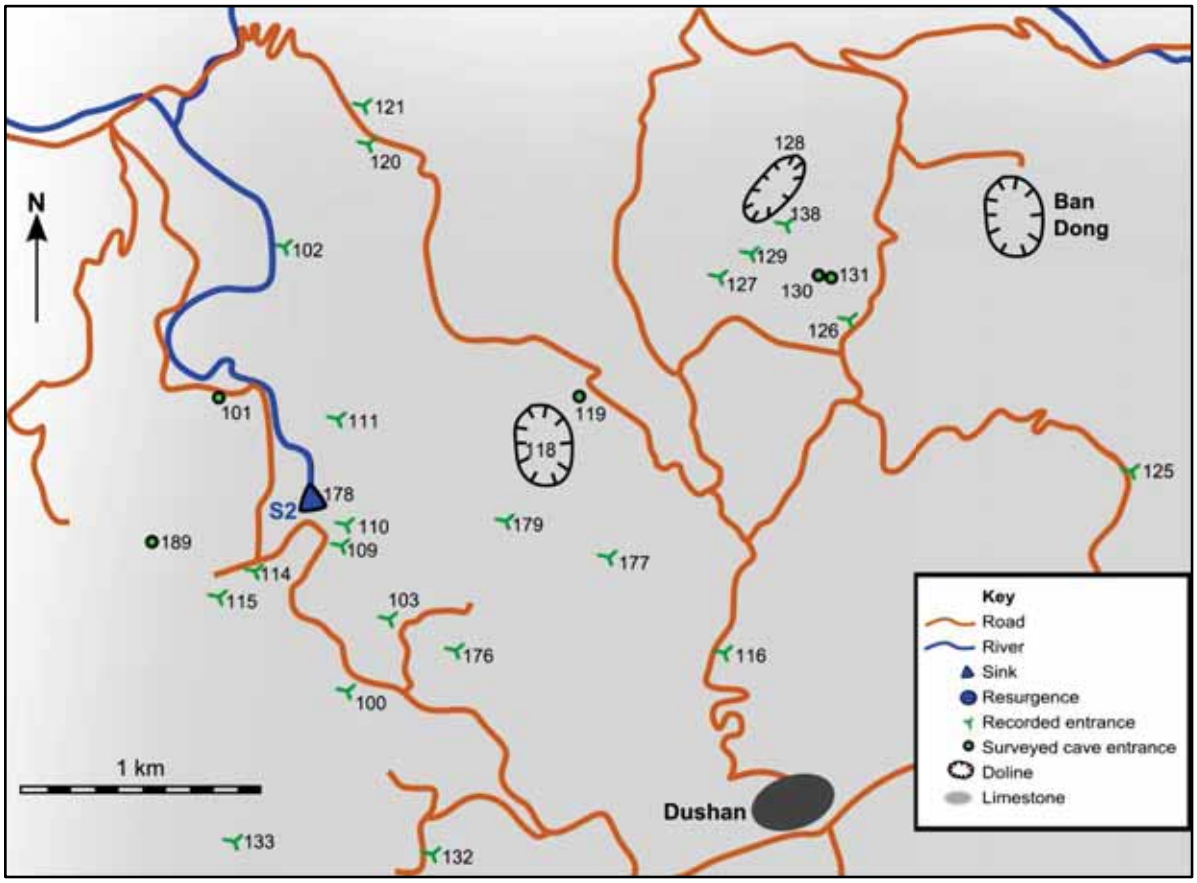

Figure 5- Area map (west)

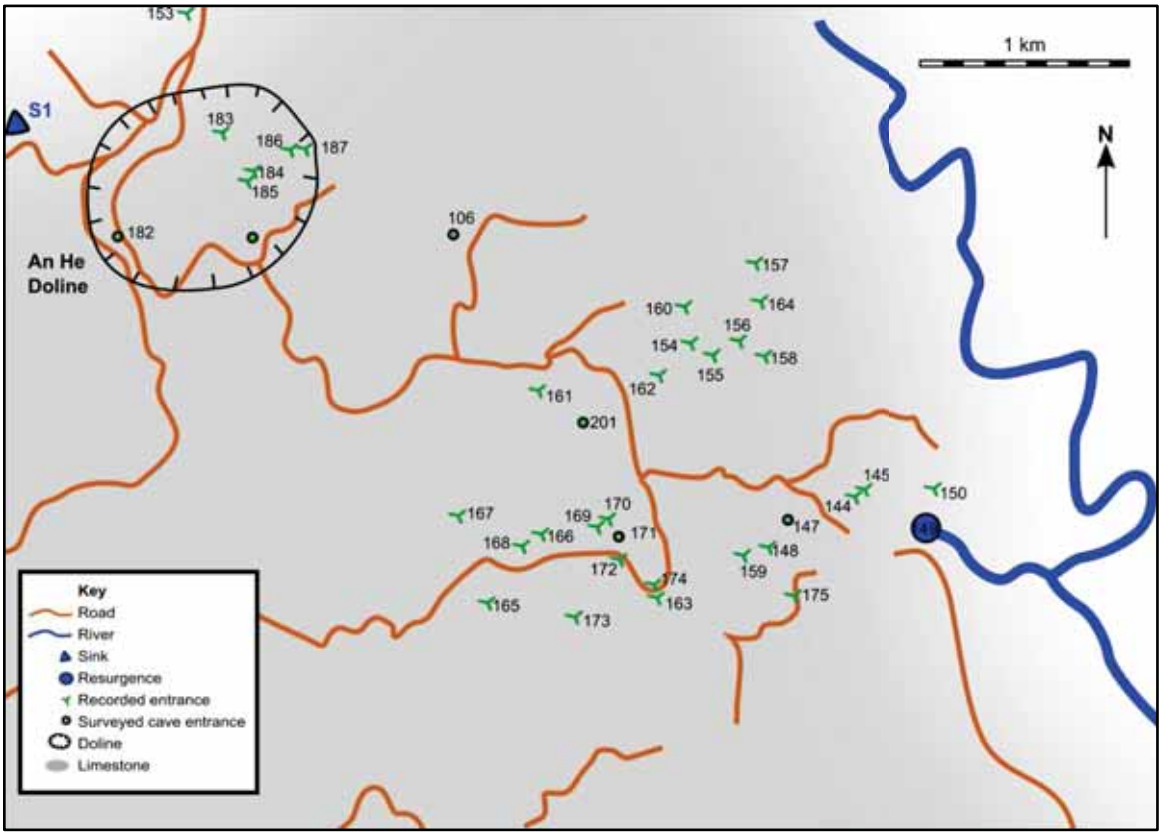

Figure 6- Area map (east)

Cave Discoveries 洞穴勘察

Most of the expedition work was centred between the Ban Dong Tiankeng and the Si Fang Resurgence. The main results in this area were:

本项目的大部分考察工作集中在板洞天坑和四方泉。这个区域的主要考察结果为：

Hei Dong 'Diamond Cave'- 25.316407°, 105.595474°

Hei Dong is located in the southern wall of the An He Doline. It has a similar altitude to Xiniu Dong, and appears to be the downstream continuation of that passage before truncation by the formation of the doline. The 50m wide entrance to Hei Dong has a flight of steps leading to the top of a debris pile upon which is sited an abandoned, traditional built house and animal enclosures. Stepping down the other side into the main 40x30m passage the route passes between huge, towering stalagmites before rising up to a narrowing after 150m. Through the obvious gap another flight of steps leads down to a junction. Left leads through several smaller gaps between speleothems into an enlarging passage, which reaches 60m wide before becoming blocked with flowstone.

Right at the junction passes through an array of speleothems before flattening out into more large passage. Gours cover the floor before a wall of flowstone is met. Climbing up the obvious route to the right leads into a chamber with a boulder choke to the left and an impressive line of large stalagmites to the right but there is no way on. Above, at roof level, daylight filters in from another entrance.

Climbing up the flowstone to the left soon arrives at a 12m pitch down. At the bottom there is evidence of nitrate works. Ahead a steep slope continues for 150m, past more huge stalagmites before choking completely. Below the pitch several routes leads down sparkling calcite flows before choking in all directions.

The cave shows evidence of extensive human activity and was certainly visited by the 1988 British expedition although no survey was published. The ease of access, scale and huge speleothems would make this cave suitable for tourist development should there be sufficient demand in the area.

Figure 7- Xiniu Entrance 图片7 犀牛洞入口

Figure 8- Entrance to Diamond Cave in the centre of shot 图片8 远处钻石洞入口

Figure 9- An Expedition Vehicle Suffers a Puncture 图片9 考察车爆胎

黑洞 — “钻石洞”

黑洞位于暗河天坑的南部山壁，与犀牛洞海拔接近，是形成暗河天坑时造成河道截断前的河道下游的延续。黑洞入口宽50米，洞口有一段台阶，通往一片废墟，这里曾是居住用房屋和动物围场，现已被遗弃。从另一侧向下走，可进入40×30米主道，穿过高耸的石笋，差不多150米以后小道开始上升且变窄。经过一道很明显的裂缝，一组台阶在尽头分开，指向不同方向，左边的台阶穿过一些钟乳石间的裂缝，指向一条越来越宽的通道，最宽处有60米，该通道最终被流石阻断。

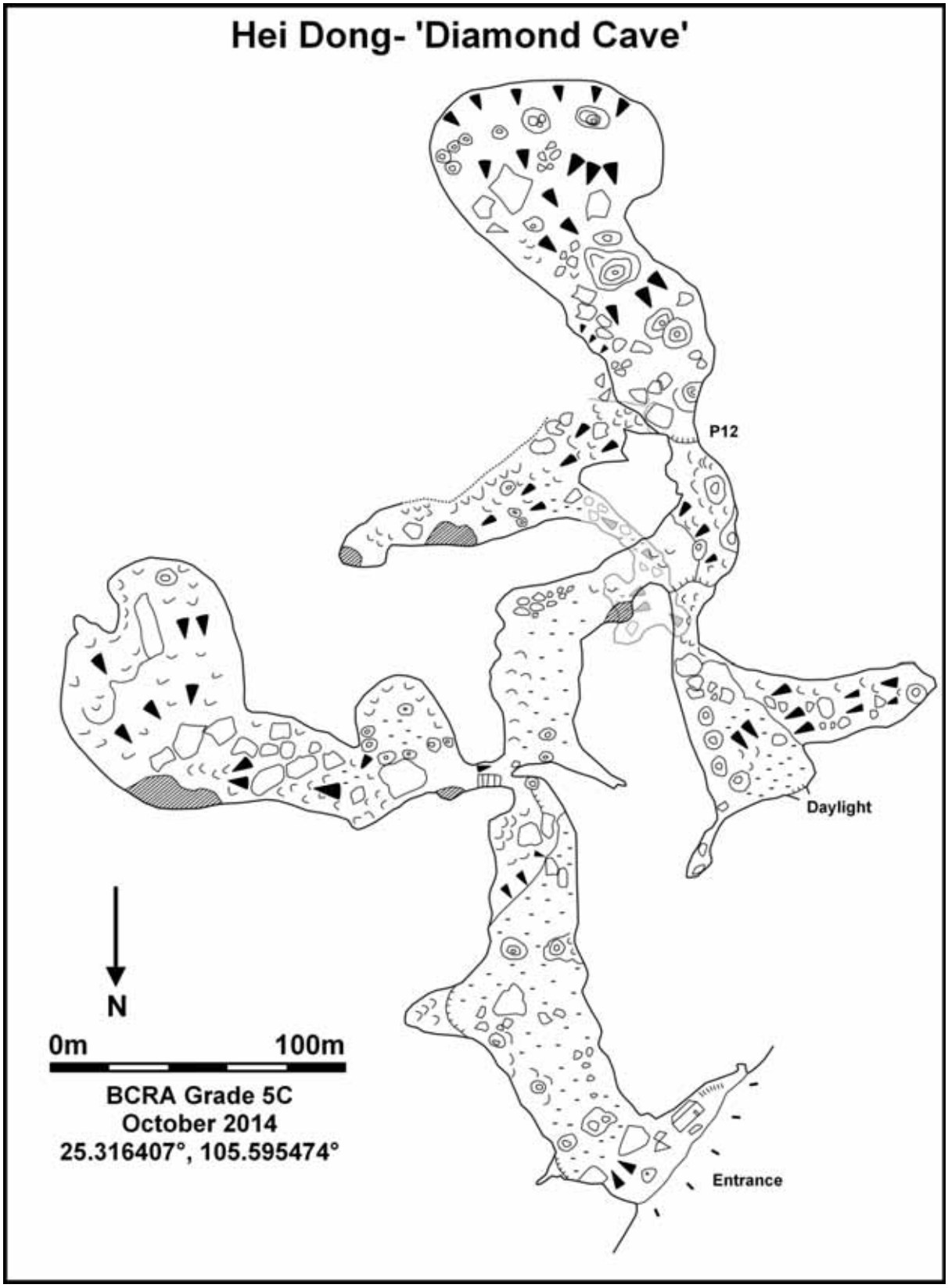

Figure 10- Hei Dong Survey

Liang Feng Dong (Dapo)- 'Concrete Cave'- 25.277503°, 105.511657°

Concrete Cave is situated by the road opposite a hydro-electric station and between a number of road-side quarries and a cement works. It is at the level of the road and a concrete surface has been laid in the entrance for 10 metres. The entrance passage is roughly 7 metres high and 10 metres wide and is followed over a boulder strewn floor for approximately 170 metres to a large junction, the boulders having largely given way to a mud covered floor. In the right hand wall there is an oxbow passage of approximately 70 metres (not surveyed as the batteries had gone on the disto and our time was up). At the junction, the large passage to the left is followed for 180 metres over mud banks and past a pool to where the passage narrows and is blocked with mud.

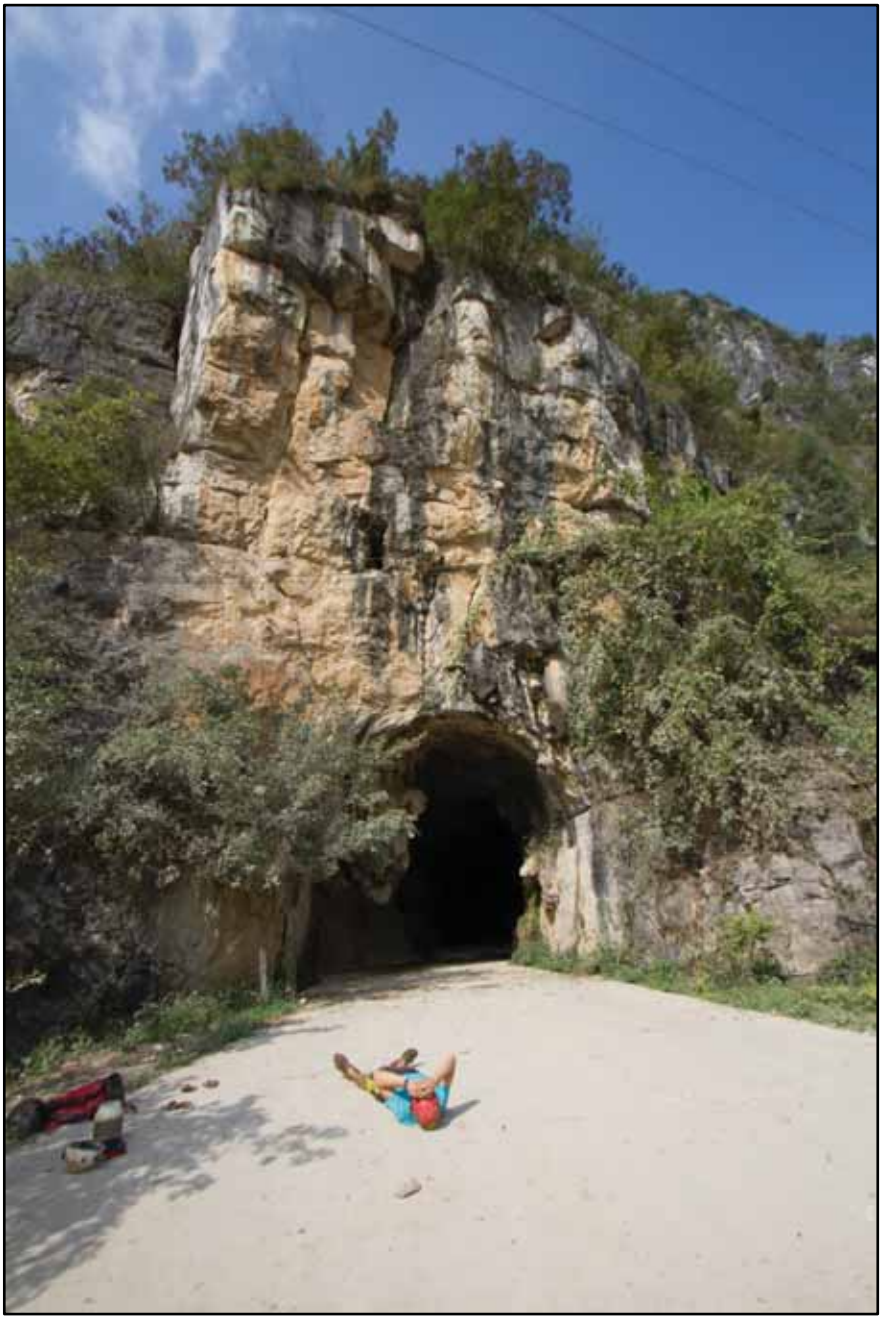

Figure 11- Entrance to Liang Feng Dong

To the right at the large junction the passage is followed almost entirely on mud-banks for 200 metres to a large drainage channel in the mud, about 5 metres deep, dropping into a muddy boulder plug. The passage can be followed up-stream on the mud-banks above the channel but these soon narrow and a slide down into the channel is necessary to reach the end in a large mud lined bowl after 150 metres. The way on from here is up the mud-slope at the back of the bowl to a mud-ridge at 6 metres, the passage beyond drops to a pitch that requires tackle to descend.

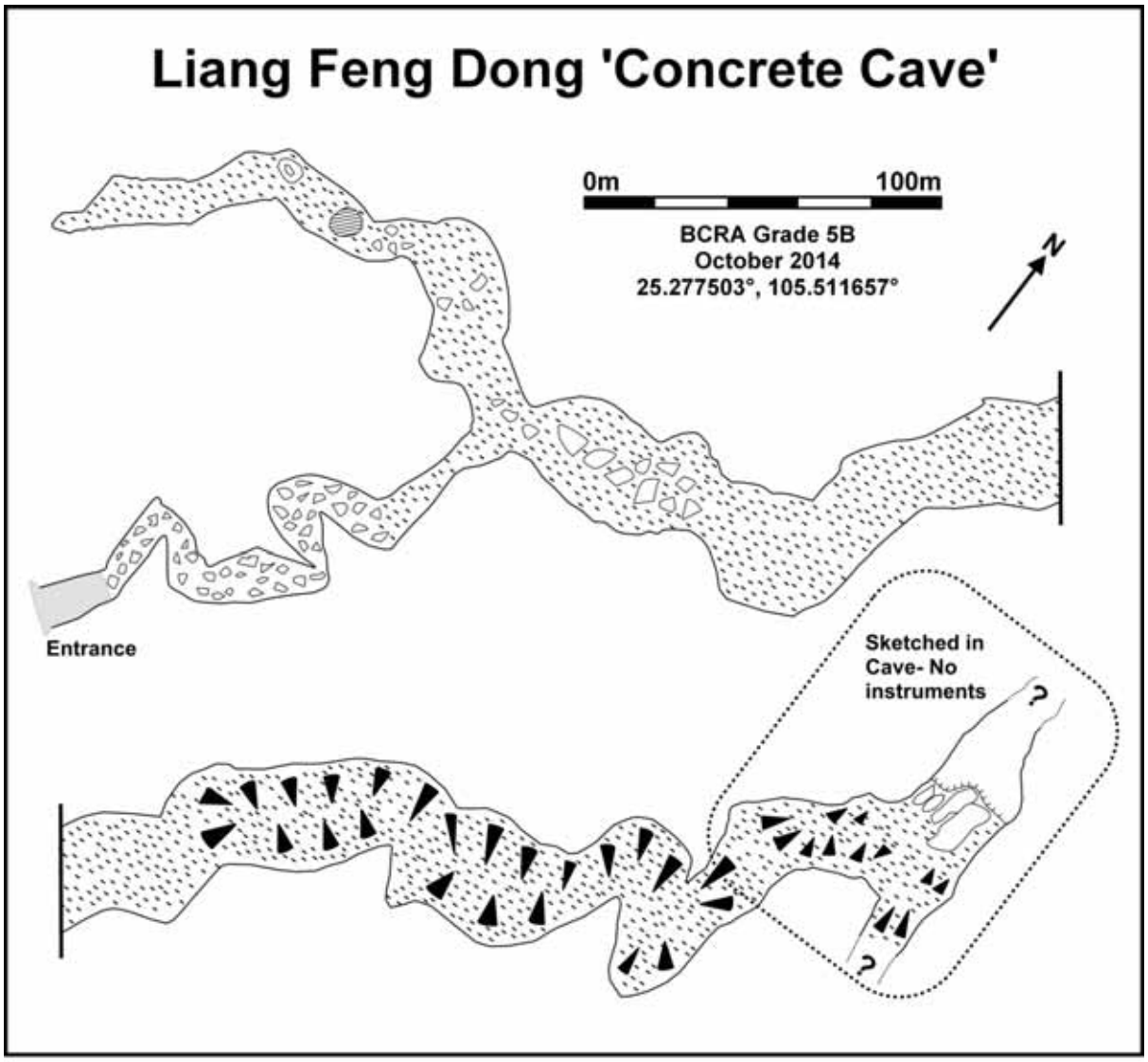

Figure 12- Liang Feng Dong survey

Luo Shui Dong- 'Prospectors Pot'- 25.300751°, 105.533609°

Luo Shui Dong is an open pothole associated with a stream sinking close to the sandstone/limestone boundary. The entrance pitch was rigged from the eastern side, although local farmers demonstrated that it was possible to climb down further on the opposite side. The pitch descends 25m through vegetation before landing on a steep slope of loose boulders. A further descent of 10m down the slope requires use of a rope before a second vertical pitch is met. This pitch is 25m deep and canyon-like in nature. At the

bottom the boulder strewn floor is clean washed and suggests a powerful stream runs in wet conditions. Around to the right a steep rift of jammed boulders leads to a vertical pitch (25m in total) landing in a 6x8m passage. This continues for 100m to a junction. Left soon terminates in a calcite slope, but right leads to a deep pitch which was not descended due to lack of time and equipment. Luo Shui Dong is located in an interesting position, whose further exploration may intersect more horizontal caves at valley level.

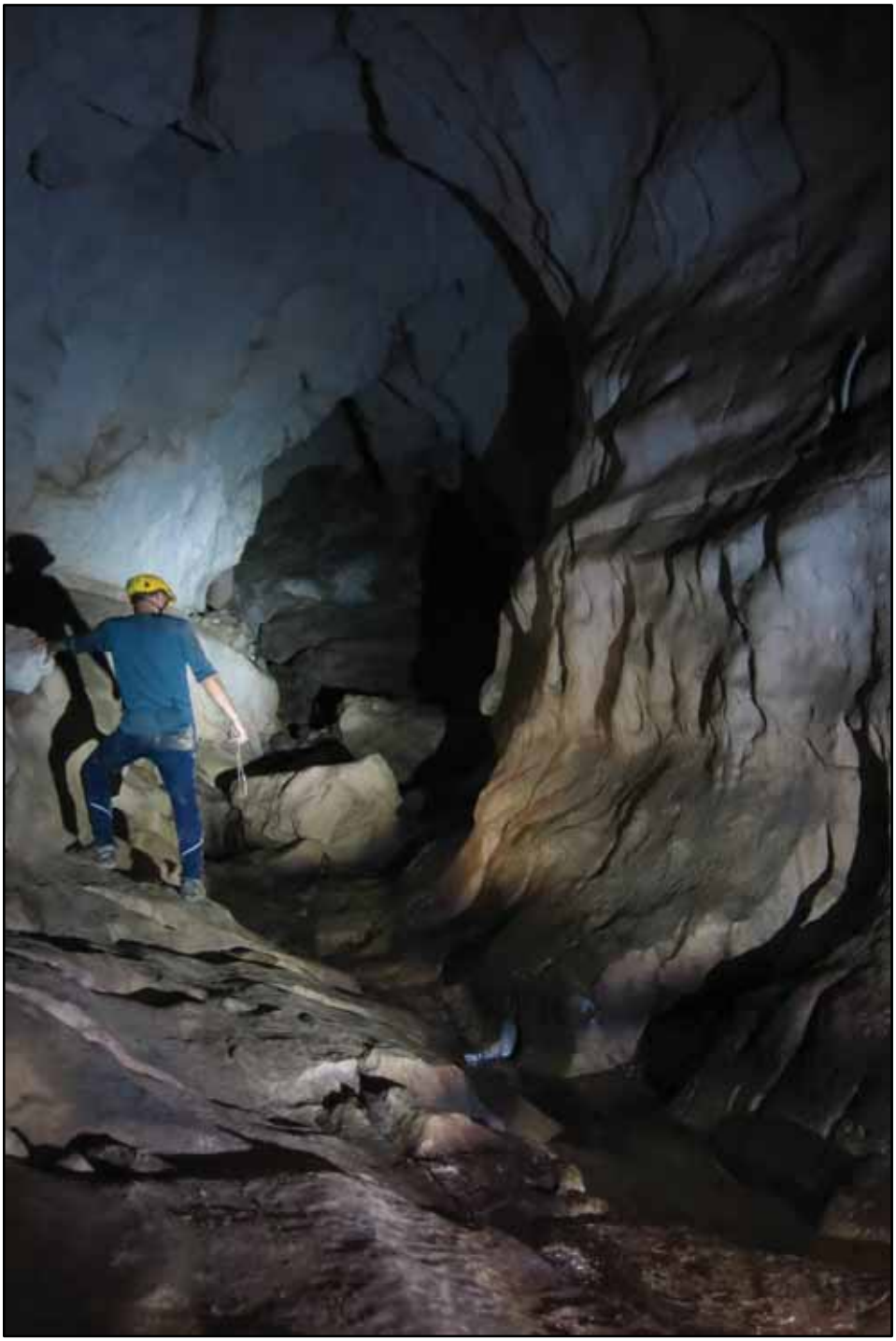

Figure 13- A caver explores in Luo Shui Dong

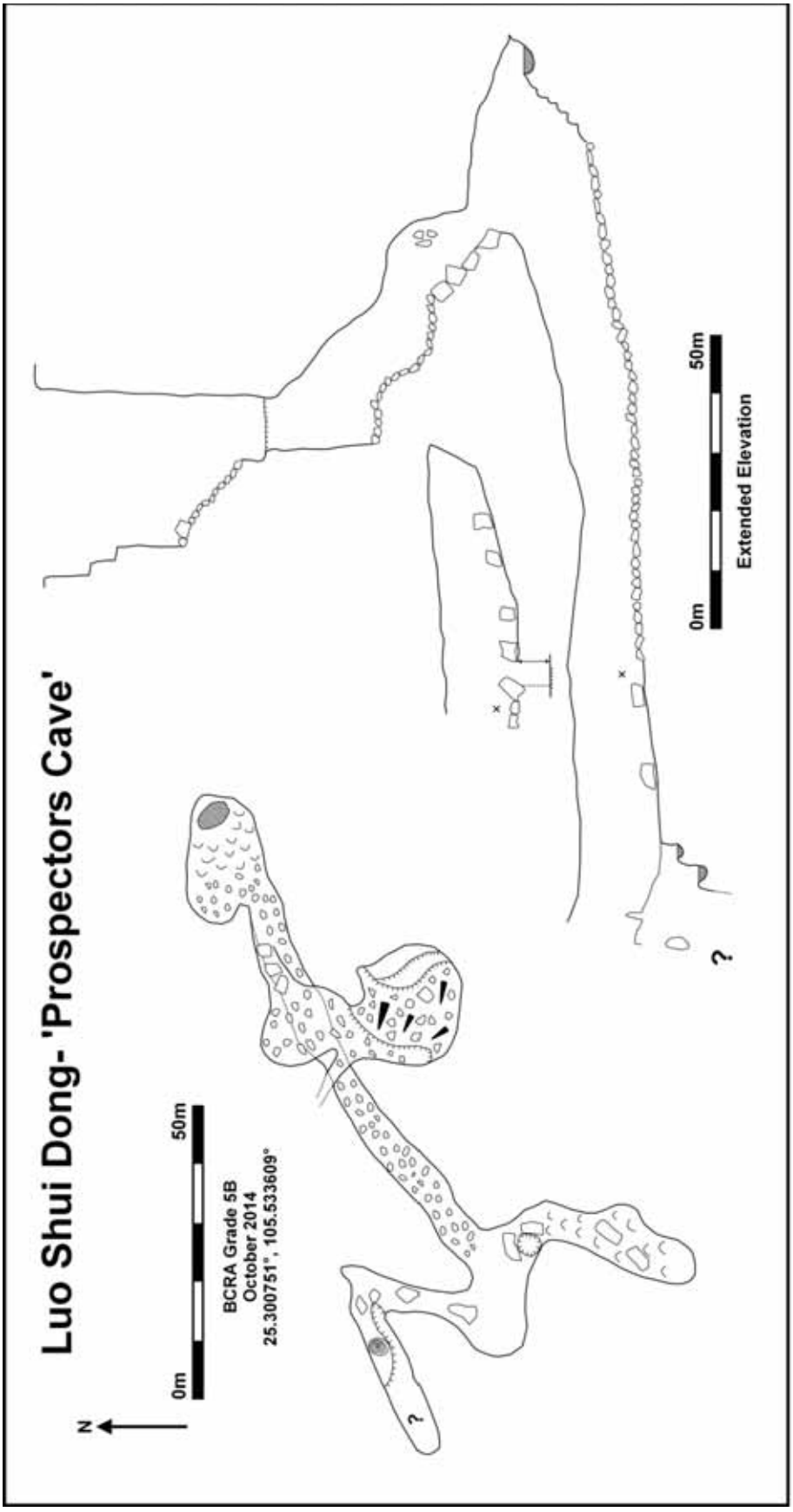

Figure 14- Luo Shui Dong survey

Liang Feng Dong- ‘Triangle Cave’- 25.289110°, 105.537041°

Liang Feng Dong or ‘Triangle Cave’ Is located approx. 5km west of the Anhe Doline and 3.9km NE of Liang Feng Dong (Dapo) ‘Concrete Cave’. Anecdotally Concrete Cave and Triangle Cave are linked making further exploration of both of these a tantalising prospect.

Triangle cave was found early on in the expedition and a cursory look confirmed that it was a substantial entrance passage with a good draught. Other prospects in the area meant that exploration of Triangle Cave was left until the penultimate day.

The large entrance passage narrows after approx. 100m and continues at large proportions for a further 200m before degrading into a network of tall, narrow rift passages, many of which still remain unexplored. It was on the way out of the cave after running out of time that a steep and very slippery mud slope was climbed to reveal a further way on behind large fallen blocks. The passage behind the blocks reached over 60m upwards and light could be seen entering somewhere near the top. The exploration of this northward trending passage was cut short when the team were extremely pushed for time but it was left open at a corner turning to the west.

There were several areas within Triangle Cave where pools of water could be reached below the main cave development. Most notably were those found by climbing through a complicated choke into the base of a large surface shaft. In this area thorough exploration of the lower water filled passages would require swimming or the use of a boat.

Triangle cave is most memorable for the extremely thick, glutinous mud which covers the floors of most passages. A trip into the cave will result in a lengthy cleaning job.

Figure 15- Entrance to Liang Feng Dong 'Triangle Cave'

Figure 16- Liang Feng Dong (Dapo) survey

Mu Jia Wan Dong –'Frank's Cave'- 25.314803°, 105.605679°

The large entrance led down to a sand-floored chamber with light entering from another entrance. Following the obvious passage over a couple of climbs lead to the limit of the first reccee trip, a rift overlooking a ~4 m climb down into a larger chamber. This is relatively straightforward when roped, and the chamber can be followed to the south west to a decorated corner, with an obvious smaller continuation. At this point in the cave there is calcite covering the walls, floor and ceiling, and several climbs immediately terminating, and no ongoing passage.

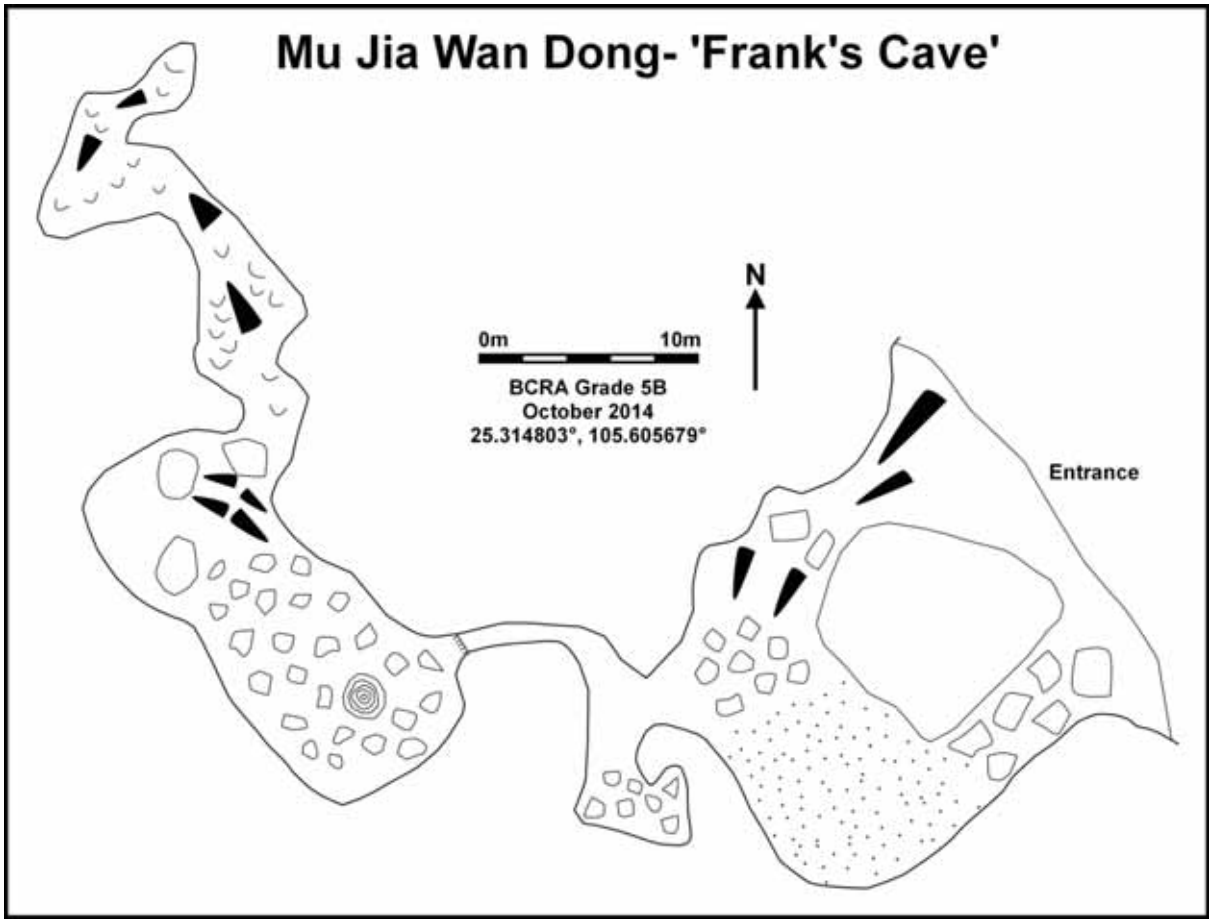

Figure 17- Mu Jia Wan Dong survey

Xiao Shui Dong – 'Deep Vein Dong'- 24.988267°, 105.592140°

South East of An Long County Town, Xiao Shui Dong was investigated. This proved to have an impressive entrance shaft of 246m and was further explored to a depth of 432m before rope ran out. This cave continues and is of great interest as the presumed resurgence is 12km away to the south west and over 200m deeper. Further exploration may reveal significant discoveries in this area.

The first trip down Xiao Shui Dong was a day trip from Dushan, with little idea of what to expect apart from vertical. It turned out this was all we needed to expect. The entrance requires navigation to the (hopefully) dry river bed, the debris present and the scale of which indicate that a significant quantity of water disappears there in the wet season. A stick is pretty vital to avoid being snared in the large spiders webs, and attracting attention from their pretty significant guardians.

Figure 18- Entrance of Xiao Shui Dong in the base of a cliff at the end of a blind valley

Figure 19- One of the many spiders at the entrance of Xiao Shui Dong

Belaying at the right hand side of the entrance led down to an obvious ledge about 30 m down, immediately dropping off into blackness below. Given the scale of the shaft, it's remarkably featureless, but a series of about 7 rebelays of roughly equal spacing finally lead to another ledge large enough to stand on. Further rebelays allow progress down the last short section to the floor, and the welcome relief of being able to walk around, 250 m below the surface.

The smooth boulders on the floor indicate the scale of the water that must be present during part of the year, and it certainly wouldn't be a place to be when anything more than drips are falling down the shaft. After initially looking like a blind shaft, a large phreatic-looking continuation was soon found with a significant draught blowing out towards the entrance of the cave, which remained the case throughout the exploration. This passage soon dropped away, and marked the limit of the exploration on the first trip, given we had to be derigged and back up at the road by 5:30, which we managed. Just.

Figure 20- Smooth worn walls in Xiao Shui Dong

Further exploration obviously wasn't possible during day trips from Dushan, and we were grateful to Zhang Hai for arranging for accommodation for a team of three of us, which served us very well, but wasn't exactly what we were used to!

Continuing from the previous limit, the pitch was dropped past some remarkably sharp flakes on the wall into a boulder-floored chamber with impressive calcite veins in the wall. Two shorter pitches followed in what felt like a large rift, before the passage took a sharp left turn at a rock lip. This rift section had a fair amount of debris from the surface, particularly shoes, again indicating the volume of water that must be present at some point during the year.

Figure 21- A caver at the top of Marble Step pitch in Xiao Shui Dong

The short drop that followed proved to be a bit of an obstacle in the exploration as it was immediately evident that swimming would be required to cross the pool at the bottom. Only one of the team needed to subject themselves to the somewhat chilly water, and the exploration of the second day down Xiao Shui Dong ended at this point, once more at the head of another pitch.

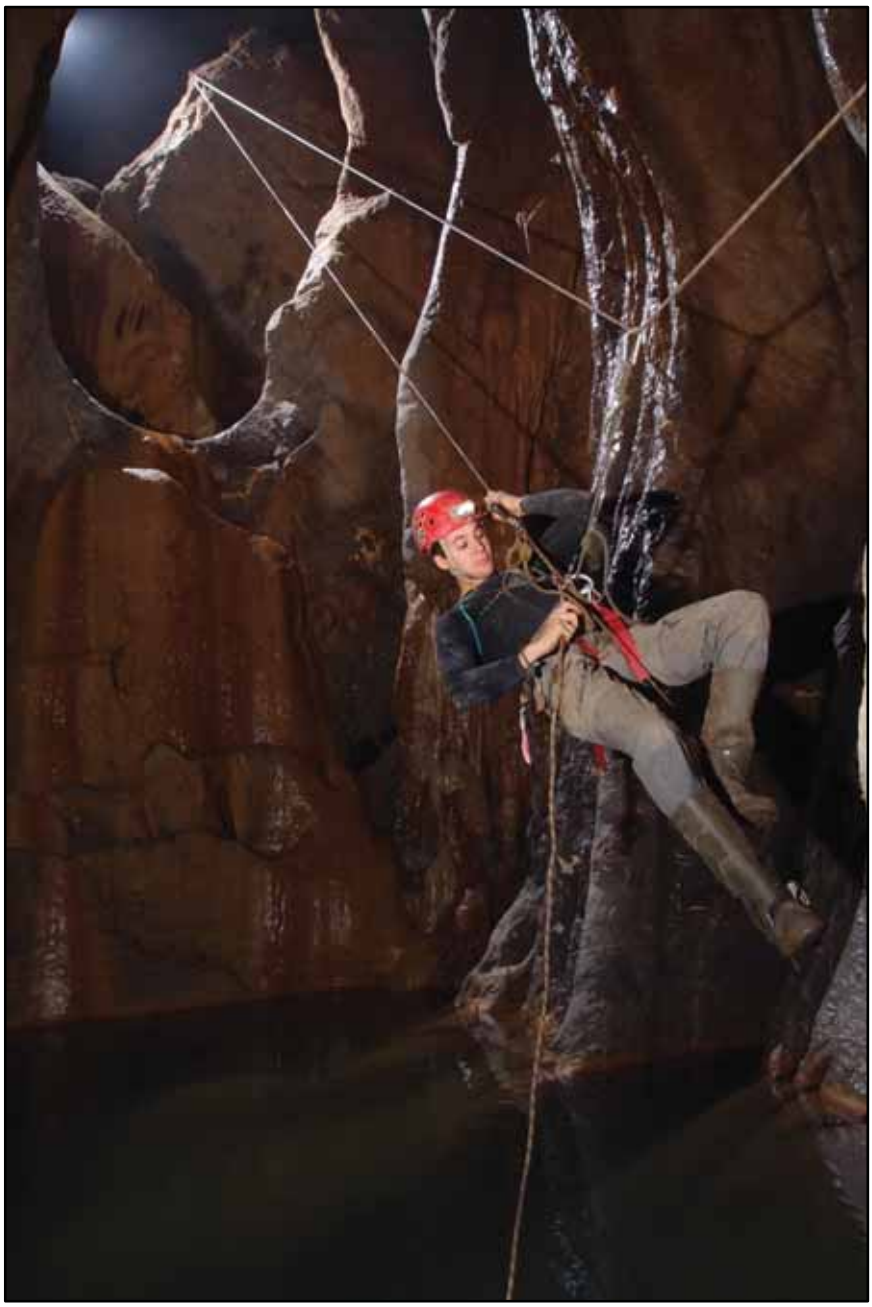

Figure 22- Tyrolean over a pool in Xiao Shui Dong

The third and final trip descended this pitch to a muddy floored chamber with more shoes, crickets, and a pool in which a crab was briefly seen. The floor of the cave immediately dropped away beyond the pool to an unknown depth, with the ceiling rising out of sight above the drop. This was the limit of exploration in 2014, but it is certainly a cave worthy of a return.

The cave holds little prospect of development for tourism due to the huge vertical entrance, but the final depth of 432 m reached, with ongoing passage and a strong draught means it is likely there is a lot of passage beyond, given the possible resurgence locations.

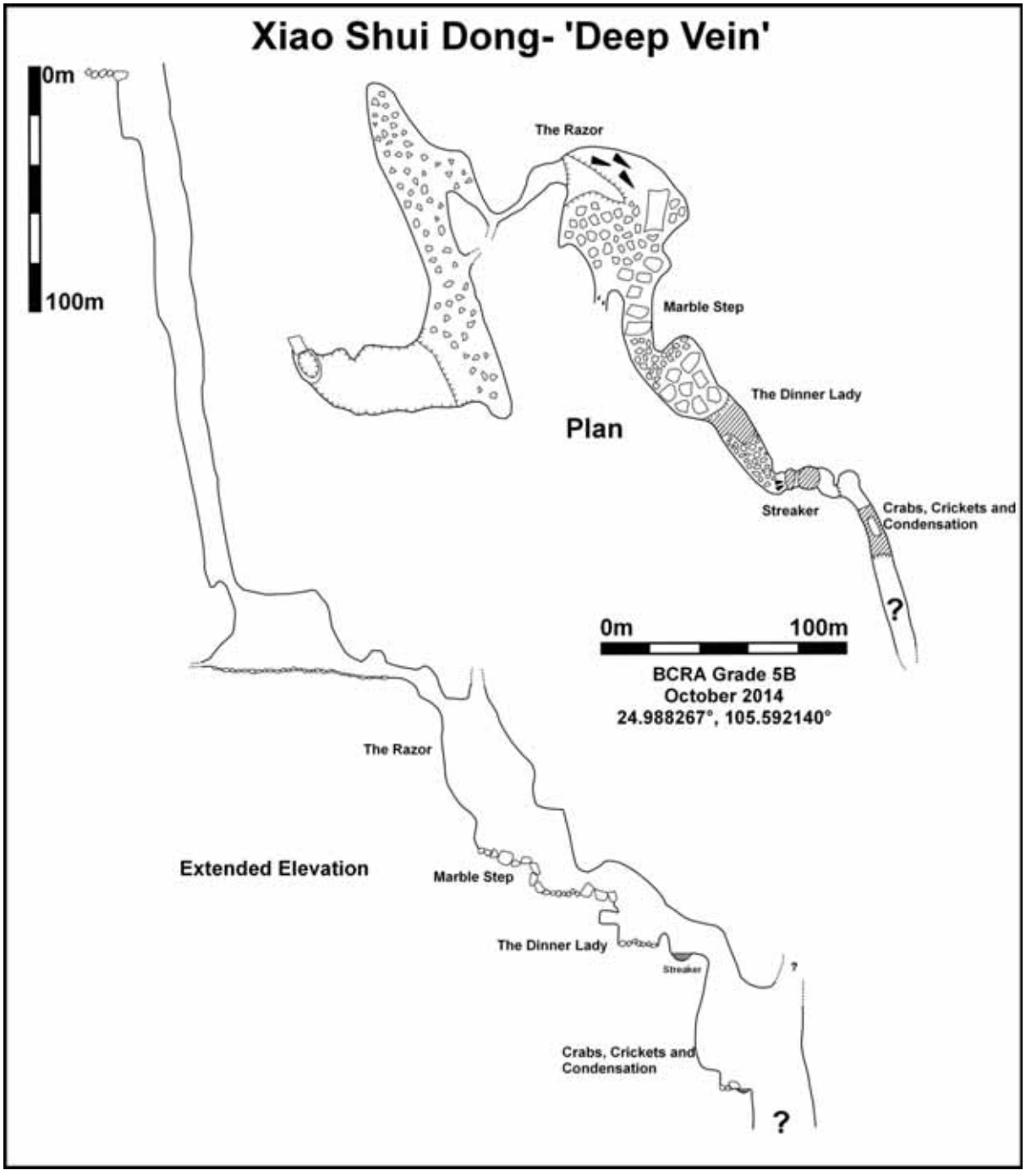

Figure 23- Xiao Shui Dong survey

Dashi Dong- 'Boulder Surprise'

The Boulder Surprise surface location lies mid-way up a series of limestone terraces a short walk from the nearby village. As the name suggests a boulder covers the entrance hole which leads down several meters to a steeply sloping ramp. This ends at a 40+ meter shaft broken by a ledge some four meters below the end of the ramp. Rigged off naturals, a short traverse gives a clean descent which lands on an open platform which itself sits ~7 meters above the floor of a flowstone decorated chamber. Halfway into the chamber two large merged stal bosses block the way and must be climbed up to the right hand side to gain

access to the remainder of the adequately proportioned chamber. Behind the bosses a jumble of large boulders hide a route into the depths below. Climbing down two or three of these boulders leads to a short drop which requires a leap of faith onto another large boulder at which point another cavity within a boulder choke is gained. Straight on leads to a drop in the floor of two metres with good foot and hand holds. This descends into a mud covered false floor passage which has another very slippery 2.5m drop at the end. The base of this leads into another small cavity; stooping height with a narrowing crawling passage off to the left and a wider one lead to the right.

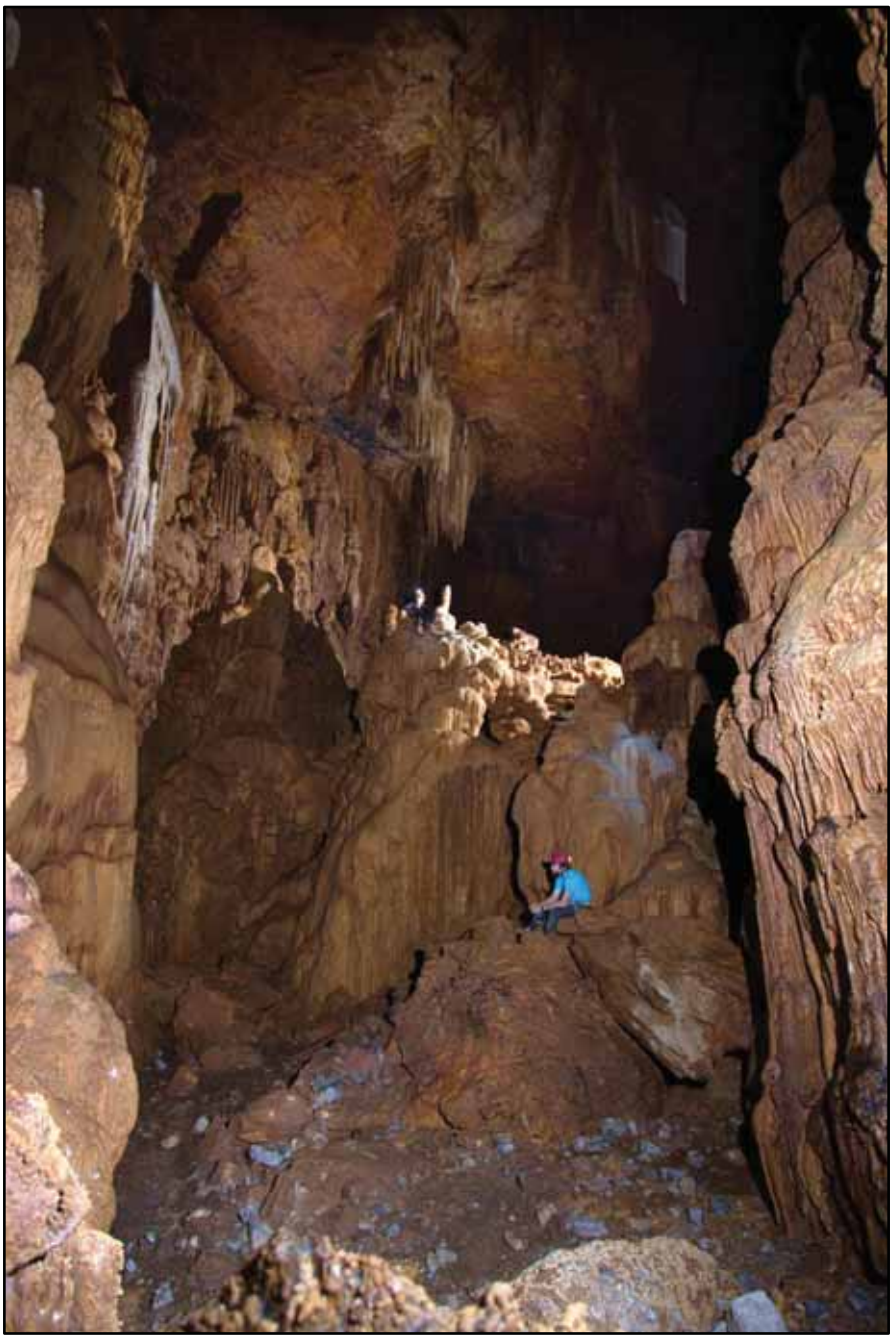

Figure 24- Jerky Pocket Nuts in Boulder Surprise

To the right after a brief stoop the passage opens into a long chamber (Snail Hall) with large stalagmites hanging from the ceiling on the right hand side. At the back of the chamber a mud slope rises up and then drops down again to meet the back wall of the chamber which abruptly ends. In places the ceiling is high with an obvious shaft against the back wall. This was measured at over 40m in height. The floor of the chamber is mud covered and characterised by hundreds of very small millimetre scale snail shells.

To the left the passage continues for a few metres before turning 90 degrees to the right at which point it drops down a pitch of several metres to a calcite floor. Impressive floor to ceiling columns sit atop what is a large stal boss which steeply slopes into the chamber. At the base lie a number of big boulders. Scrambling down these you reach the natural limestone/calcite covered floor. Between two of the large boulders at what feels like the natural end of the chamber a small squeeze is obvious. The way on becomes too small.

Chang Sha Dong- 'Barnstormer Pitch'- 25.304066°, 105.611642°

One of the expeditions certain objectives was the undescended pitch at the end of Chang Sha Dong which lay along the suspected line of development between An He Doline and the Si Fang Resurgence. This had been found at the end of the 1989 expedition but lack of time meant that it remained undescended.

Several members of the team found the largest and most westerly entrance into this cave on the first day in the field. The entrance was an open shaft of around 40m x 20m. This was rigged from a boulder on its lowest side and a descent through vegetation for 20m ended on a vertical rock lip with a further 30m free hang to the floor. This pitch ended on a large rubble cone in the centre of a vast, sunlit chamber some 150m across. The way on from this chamber to the head of the Barnstormer pitch was found through a narrowing in the north west corner. The ongoing passage was vast by any standards, over 100m wide in some places and easy to become disorientated in.

The Barnstormer pitch was rigged from the top of a steep calcite and rubble slope to a wide ledge above the deep vertical drop. The next 30m of descent was down flowstone pillars requiring re-belays bolted into calcite of dubious strength. A final free hang of 40m finished at a flowstone floor. From the floor to the roof in this area was around 150m. The chamber was thoroughly scoured for any continuation, the southern end provided the best prospects but the vast quantities of flowstone choked every way on. The chamber at the base of the pitch was extremely attractive but its inaccessibility would not make it a viable tourist site.

Figure 25- A caver descends the lower portion of the Barnstormer Pitch

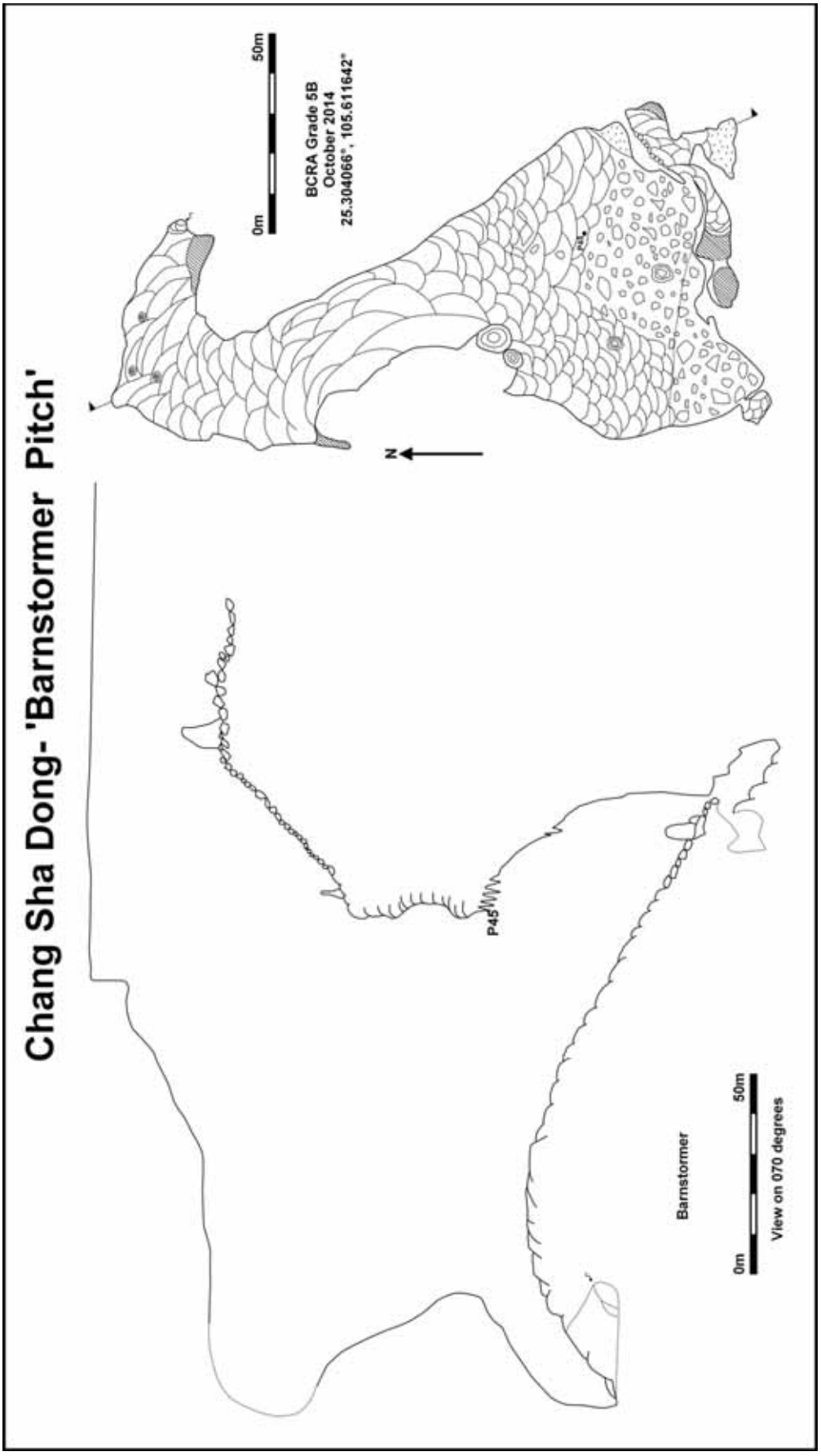

Figure 26- Chang Sha Dong Survey

Figure 27- Nitrate works in Chang Sha Dong

Xiniu Dong- Titan Chamber Extensions- 25.314945°, 105.588632° 犀牛洞－泰腾洞厅的延伸部分

The 2013 laser scanning expedition had revealed a possible ongoing passage high in the roof of Titan Chamber at the north eastern corner. This formed one of the main objectives for exploration during the 2014 expedition.

Accessing the chamber requires a 45 minute caving trip and descent of a 150m pitch. It is possible to climb un-assisted to a ledge at the foot of a steep wall below the roof passage. From here it required a 35m rightward ascending bolt climb to gain initial access into the ongoing passage. From the top of the climb, later called Laser's Leap after the technology that discovered it, a steep descent down a muddy floored slope led into Star Chamber. The chamber is generously proportioned and four ways on were discovered.

2013年，激光扫描探测发现泰腾洞上方东北角，可能有一条通道。这成为了我们考察队2014年的主要目标之一。

要进入泰腾洞厅，必须先下到150米深的地方，该过程大约需要45分钟。不借助任何帮助的条件下，可以爬到顶端通道下方，陡峭的岩壁底部的一个壁架上。从此处向右索攀35米，可以进入到通道的延伸部分。从攀爬处的顶端通过一个泥泞且陡峭的斜坡可以下降到星洞，这个地方以发现

它的这项技术命名为镭射跳。星洞十分宽敞，而且目前已发现了四个入洞通道。

Figure 28- Star Chamber- Xiniu/ Titan Extensions 图片28 犀牛/泰腾洞厅的延伸

The first series of exploration was down the obvious passage ion the north wall of the chamber. This phreatic tube descended for approx. 150m before meeting a parallel ascending tube which terminated back in Star Chamber. This loop was called The Magic Roundabout.

A similar descending phreatic passage to the east of the Magic Roundabout terminated at a lowering of the roof with a small pool of water issuing from it. This water disappeared into a tight rift a short way back down the passage. The main easterly passage from Star Chamber was explored for over 300m to a large stal flow running in from the roof. This was climbed for a vertical height of 70m before all avenues of continuation were exhausted. This large passage, known as Dressed For The Beach was a spectacular place and was thoroughly enjoyed by those team members who explored it.

The final lead from Star Chamber was found in the north west corner by climbing a vertical bank of compacted sand, using a bolting hammer to cut steps, hence the name Pickaxe Passage. Pickaxe Passage exhibited a strong draught and was followed downwards in much the same way as the Magic Roundabout before turning west under a low arch and into

Hypodermia Passage. This section of cave had a spectacular mud cracked floor decorated with long (300mm+) Aragonite crystals and delicate calcite formations on the walls.

第一系列的考察是从洞厅北面侧壁最显眼的通道进入。经潜水层通道下降约150米，就可以看到平行的上升通道，这个通道可以回到星洞。这个回路叫做魔术回路。

另一个相似的向下蔓延的潜水层通道，通向魔术回路的东面，最终到达一个岩壁顶有水流出的地方。流出的水消失在通道里的一个很小的裂缝里。我们进入星洞，对向东蔓延的主通道进行勘测，我们已经勘测到了超过300米的地方，并看到从洞顶流下一条很大的钟乳石柱。在所有延伸的小路走完之前，我们需要爬上垂直70米的高度。这个大通道被称作海滩盛装，是一个极为壮观的地方，考察队员完全被迷住了。

星洞的最后一条通道是在西北角，需要攀爬一个垂直的压得很实的沙堆，这个过程需要用锤子凿出台阶，因此这个通道得名为鹤嘴锄通道。鹤嘴锄通道里有很强的气流而且向下的路径和魔术回路很相似，之后转向西面穿过一个低拱形的岩壁进入到高热通道。这部分山洞十分壮观，脚下是带有裂缝的泥地，散落着长近300毫米的文石晶体，墙壁上也有精美的方解石。

Figure 29- Aragonite Crystals in Hypodermia Passage 图片29 文石晶体

At a prominent corner the main passage continued to the south and ended with two possible tight continuations, one of which would require a short bolt climb to reach. On the same corner a low passage quickly opened up to the west and 30m on from this point the distant rumble of a large underground river could be heard.

A short pitch led to the top of a wide sandy funnel with three passages heading off, two to the south and one to the north. A deep pitch in the bottom of the funnel was rigged and descended for 30m on the first attempt before running out of rope.

On the return trip to this point the team split into two and whilst the deep pitch was being descended and re- rigged with more rope the other half of the team surveyed over 300m of cave passages at the top of the sandy funnel. The most southerly of these passages terminated at a choke which was calculated to be in, or very close to the known edge of

Titan Chamber. The northern trending passage finished at a pitch down which became muddy and constricted and an unclimbed pitch upwards.

The large pitch was a total of 60m to the floor of a wide passage with several more continuations. The descent of a steep boulder and mud floor from the base of the pitch led towards the deafening roar of a wide river. The river flowed form a sump approx. 120m to the west and passed through a slight constriction over a short cascade before entering a turbulent lake. This lake is around 100m in length and 60m wide. A strong draught blows across it and these lower parts of the cave are unusually hot and humid. This was called Growler in the Mist.

It was not possible during the course of the expedition to explore the further reaches of the lake, it would require the use of an inflatable boat to reach the furthest point and search for ongoing passage beyond. A large scale photograph was taken which gives some clues as to what happens but it is still inconclusive.

The other passages at the base of the pitch into Growler in the Mist were explored to conclusions although there is a possibility that there may be more accessible passage with the use of aid climbing techniques into the roof of an aven.

In total just over 3km of new cave was surveyed beyond Lasers Leap. This survey was tied into the surface with a 2km centreline survey to the entrance of Xiniu Dong.

在一个突出的拐角，主通道继续向南延伸，最后可能分成两个狭窄的通道。其中一个要用索攀一小段距离才能到达。在相同的拐角处，较低的通道通向西面，在30米处可以听见地下河流巨大的流水声。

通过一个短坡可以到达宽阔的沙质通风井的上端，这个通风井连接着三个通道，其中两个延伸向南，一个延伸向北。我们第一次尝试进入到了通风井里面30米处，直到绳索用尽。

回程经过此处时，我们分成了两队，其中一队下到更深的地方勘探，用了更多的绳索重新装配。另一队进入到沙质通风井上的通道勘测了300米的洞穴通道。这些通道的最南面最终到达一个阻风口，我们推测这个阻风口可能在泰腾洞厅里或是靠近泰腾洞厅的已知的边缘。向北延伸的通道最终到达一个泥泞狭窄的空间，上面可能还有一个向上的通道，但我们没有攀爬。

大陡坡距离一个很宽的通道的地面有60米，并向多处延伸着。顺着陡峭巨石的倾斜面和斜坡下的泥地可以到达一个奔流咆哮的大河。这条河从大约120米处的集水坑流下，并且向西流，经过一个狭窄的区域，从小瀑布流下，最终汇入水流湍急的湖。这个湖长约100米，宽60米。一股很强的气流从湖面吹过，洞穴中这些较低的地方超乎寻常的闷热潮湿。这里被叫做“雾霭中的怒吼(Growler in the Mist)”。

在这次勘测中，我们无法到达湖泊的更深处；要想到达湖泊最里面，探寻更深的通道，就需要充气船。我们使用了很多闪光灯，拍摄了一张照片，来展示湖面的情况，但具体细节有待考证。

其它可以到达“雾霭中的怒吼”的通道都已被发现，尽管有可能还有一些可以借助辅助攀岩工具从竖井进入的通道未被发现。

从“镭射跳”那里继续探测到的新洞穴总长超过3000米。该探测数据与犀牛洞地面入口处2公里的中心线勘测图连接。

Figure 30- Rigging a pitch at the end of The Tedium Of Life- Lasers Leap Extensions

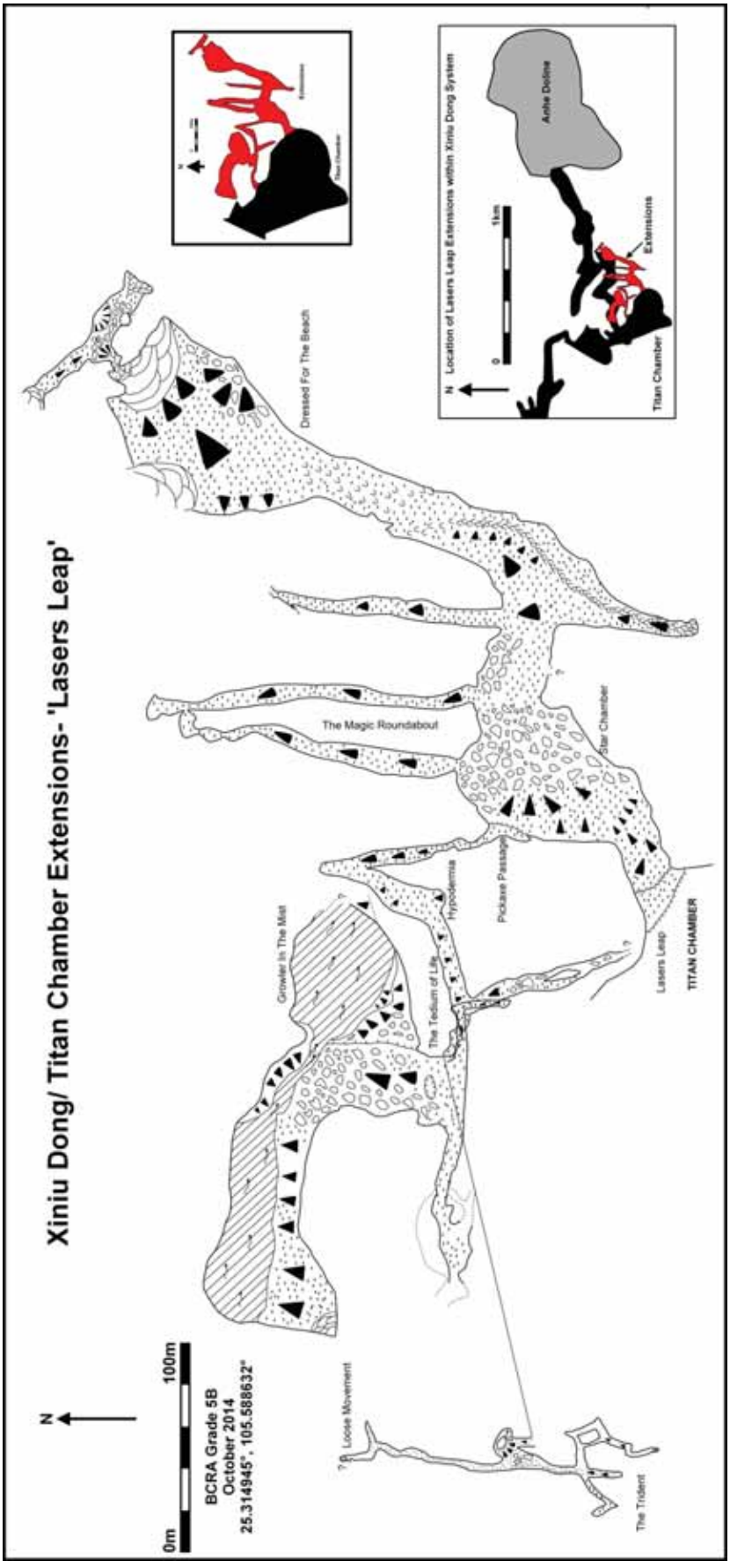

Figure 31- Xiniu Dong / Titan Chamber Extensions Survey- Plan

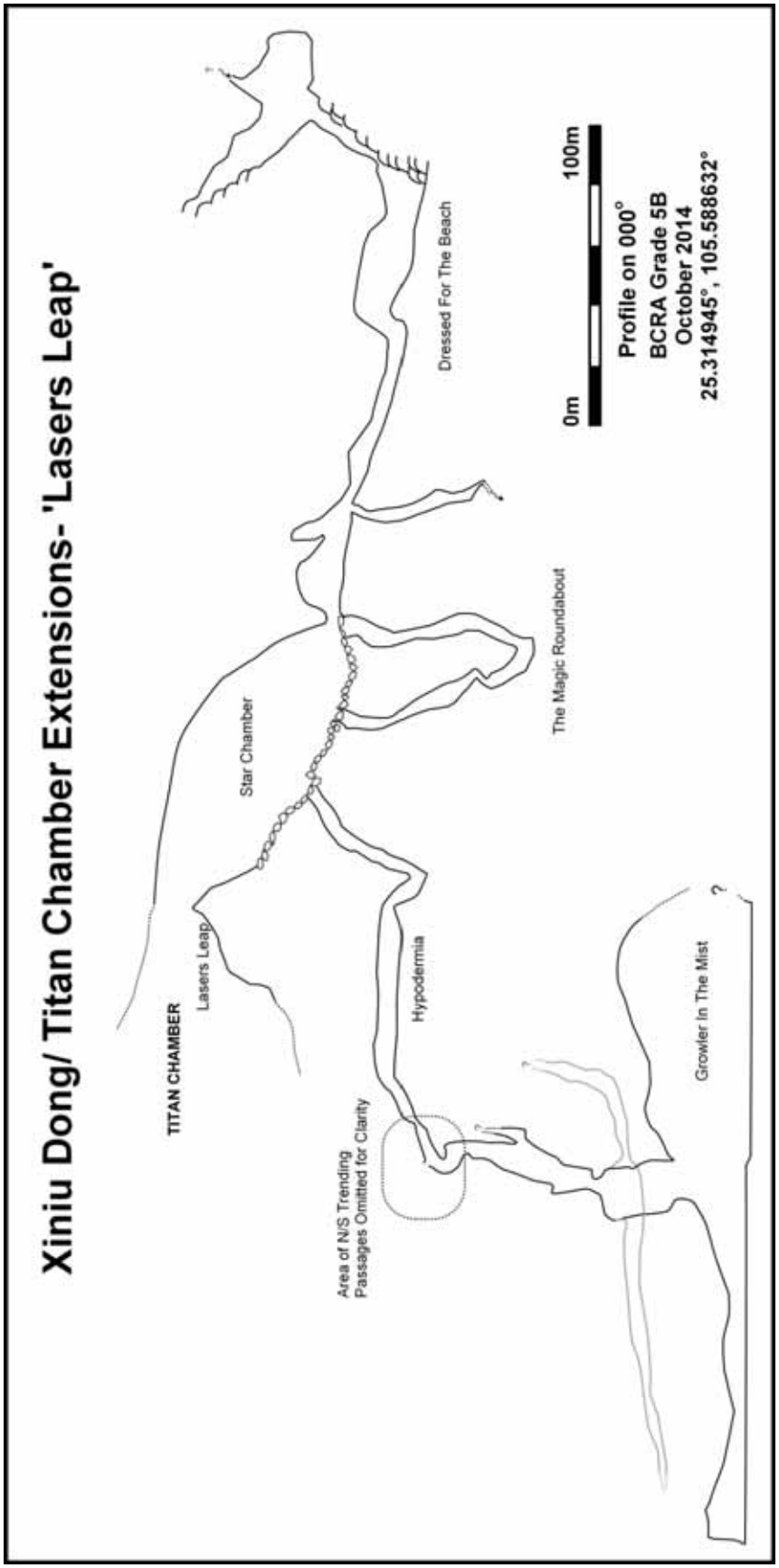

Figure 32- Xiniu Dong/ Titan Chamber Extensions Survey- Elevation

Li Jia Wan Dong- 25.310740°, 105.562185°

Li Jia Wan Dong (Li Family Remote Cave) was found by a surface prospecting team with the assistance of the family who were farming the area. Topographically it is one of the highest entrances explored at an altitude of approx. 1350m. This cave was explored over the course of two days by two team members with the assistance of a Chinese caver who had joined the expedition for a short period.

Figure 33- Stopped for lunch in Li Jia Wan Dong

Figure 34- Formations in Li Jia Wan Dong

The cave has two entrances a short distance apart. The entrance chosen for exploration was rigged with two short pitches to a 30m long ledge with a 25m pitch to the floor rigged from the western end. A steeply descending calcite slope terminated at a depth of 91m at a pool of water. The cave was very well decorated with calcite flowstone, stalagmites and columns. A series of passages were explored, surveyed and photographed over the course of the day. All possible leads were pushed to a conclusion, most of which were choked with calcite. There was evidence of nitrate mining in some of the explored passages. Almost 500m was surveyed in this beautiful cave.

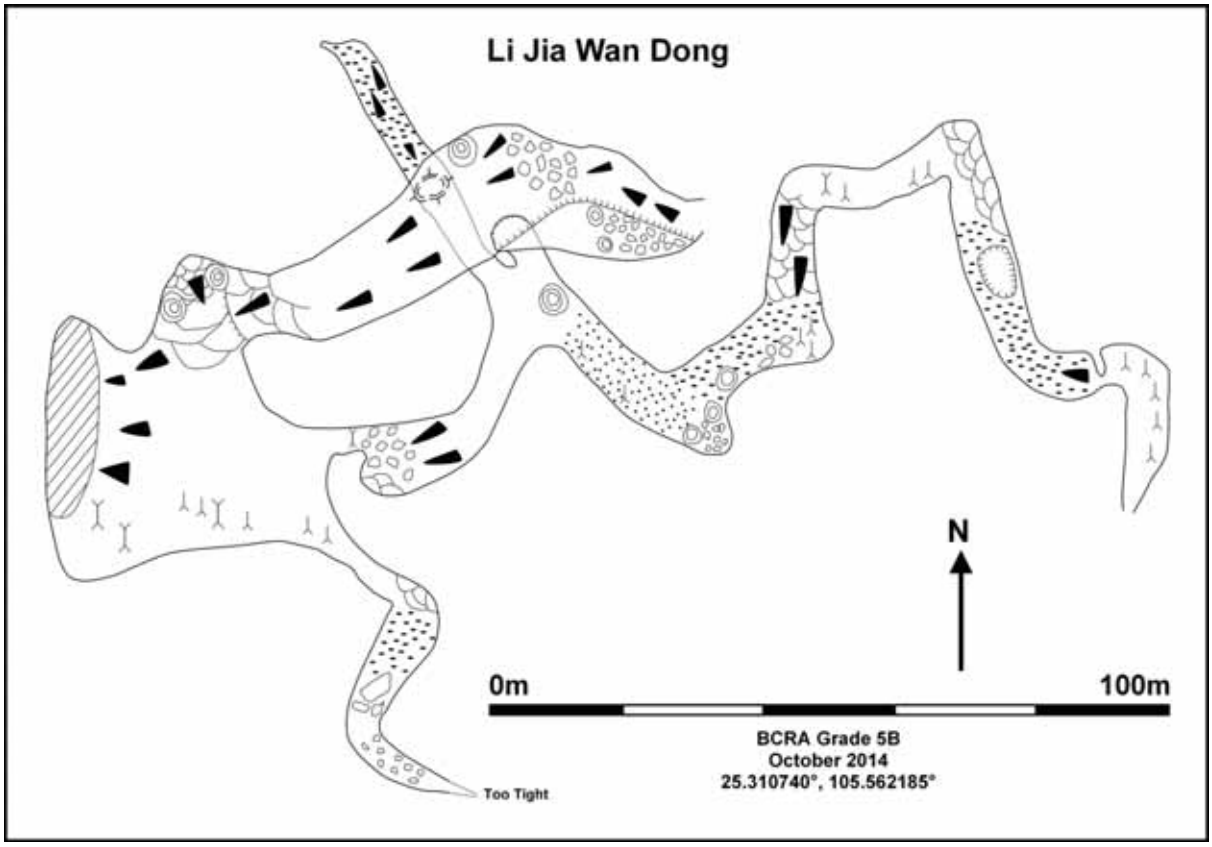

Figure 35- Li Jia Wan Dong survey

Dao Dong- 'Resurgence Cave'- 25.301841°, 105.622254°

The Resurgence Cave is located ~2km west of the main area resurgence. There are two entrances immediately adjacent to each other, one heads north and the other to the east.

The initial reccee of these two entrances identified the eastern entrance as leading to an underground river and the north trending cave as concluding after less than 100m. When the team returned to survey and further explore the caves, a large continuation of the northerly entrance was found heading in a westerly direction. This was initially missed as it was disguised behind a 30m high stalagmite!

600m of cave was surveyed in the northern entrance to a point overlooking a deep body of water with a strong draught blowing over it. The pitch down to the water was not descended nor the lake explored due to lack of time, it was the last day of the expedition.

The eastern entrance was followed to a junction. South of the junction the large underground river was accessed which runs from west to east. At the easterly most point the river sumps under a solid wall. An inflatable boat was used to attempt a look upstream but the current proved difficult to negotiate and the attempt was abandoned. The upstream continuation of this large river remains unexplored.

Figure 36- Exploring the River in Dao Dong

Back at the junction the cave continues to the east in giant proportions until it ends in the bottom of a doline. The sandy beach and lake surrounded by heavy vegetation in the bottom of the doline made for a very atmospheric spot. This can be accessed form the surface via a series of small tracks and is easily accessible to local people.

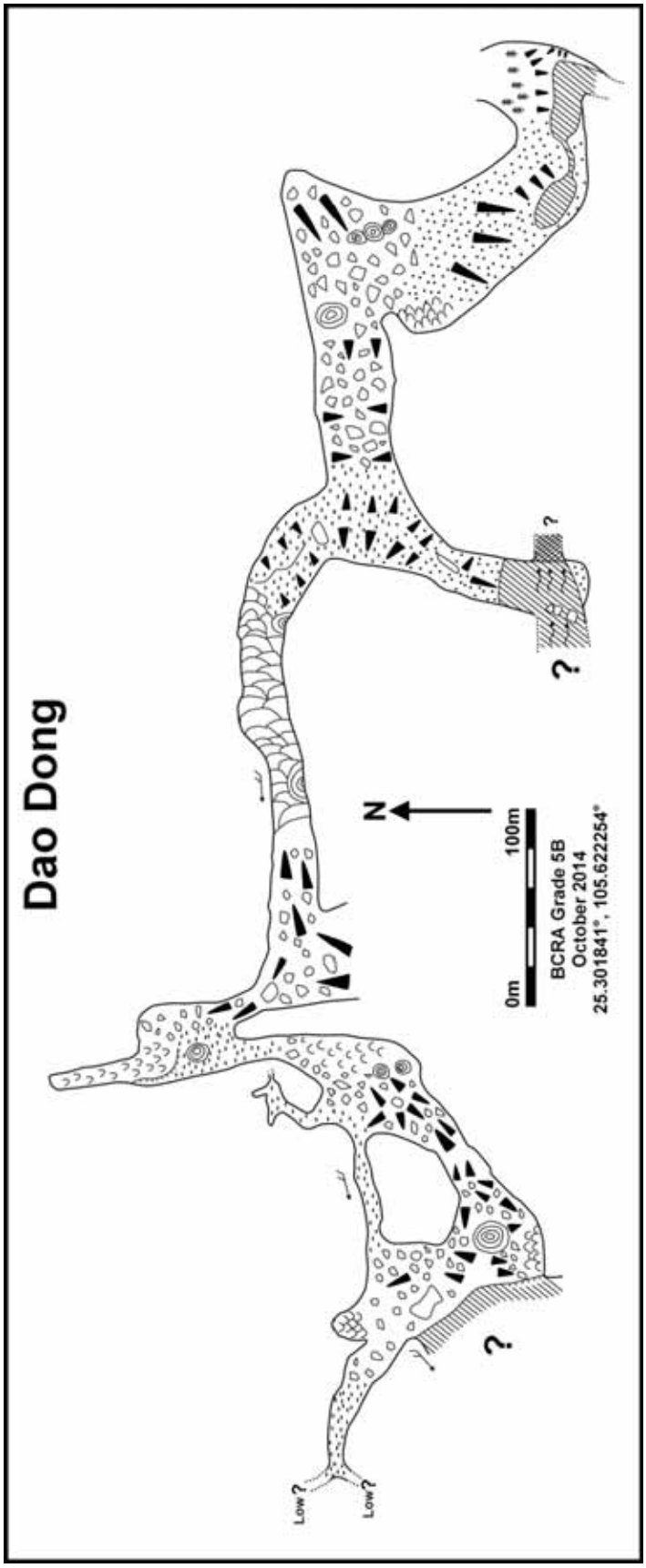

Figure 37- Dao Dong Survey

Feng Dong- 25.306218°, 105.552101°

Feng Dong is a very impressive entrance descending steeply under the hillside near the Gan Dong Tiankeng. During the exploration evidence was found that this had been visited by a previous expedition. The large descending entrance passage ended in a big, high roofed chamber with a very small inlet entering from the east and sinking in a too tight rift in the west.

The mist in the atmosphere made observation of the chamber walls difficult but it is possible that there is a large continuation at high level on the opposite wall to the entrance passage.

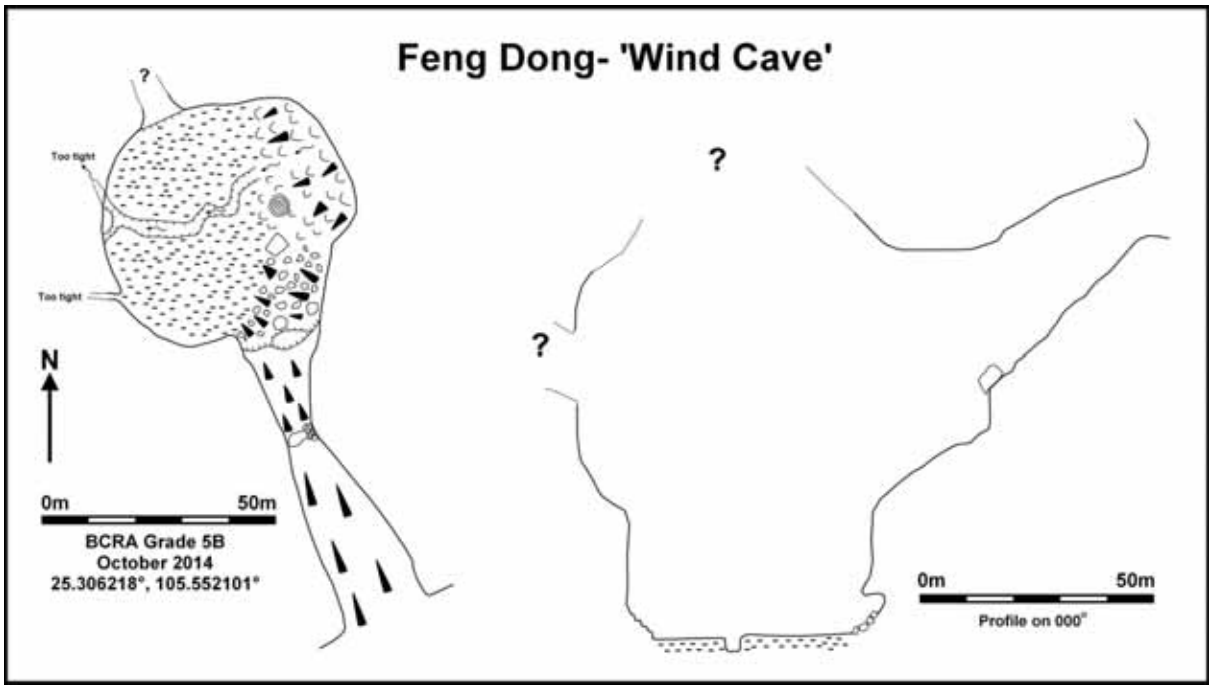

Figure 38- Feng Dong Survey

Other Features of Interest

Over the course of the expedition many features of interest were explored in addition to cave entrances. The area of exploration is fringed on its northern and western sides by a series of river sinks, some of which are extremely large. These sinks are numbered anti clockwise from the resurgence and are shown on the area map.

Si Fang Resurgence- 'R'

Si Fang Resurgence. A large river, estimated at 15-25 cumecs during the dry season, wells up from boulders. Several other entrances behind give access to the active river which is not fully explored.

Sink 1- 'S1'

Was not visited by our team but the sink is visible from the ridge of the An He Doline. Reports from the 1989 expedition suggest that it is choked with mud and vegetation.

Sink 2- 'S2'

Was visited several times by our team although the sink was not entered. There was clear evidence of flooding with water backing up to a depth of 20m.

Sink 3- 'S3'

Was close to Liang Feng Dong although the sink itself was not visited. A power plant appears to be associated with this sink.

Sink 4- 'S4'

Appears to be a very large double sink. It was not visited by our group but it is hard to imagine it was not visited by the 1988/9 teams.

Sink 5- Li Shu 'S5'

Is the Li Shu which sinks under the Dushan to An Long road. It was explored to a sump in 1988 but no other detail of the cave was reported.

Sink 6- 'S6'

Is the most southerly sink. It was not visited by our group.

Ban Dong Doline

The Ban Dong Doline is an impressive tiankeng granting access into the Titan/ Xiniu/ Ban Dong System. Limited time was spent exploring this feature and only a cursory look at the system was made form here.

Figure 39- The precarious path to the base of the Ban Dong Doline

Tables of Discoveries

Surveyed Caves

Chinese Cave name	Alternative Names	Coordinates	Ref. No	Length metres
Dashi Dong	Boulder Surprise	Unknown	48g-i8-123	286.83
Chang Sha Dong	Barnstormer	25.304066°, 105.611642°	48g-i8-201	910.83
Xiniu Dong/Titan Extension	Lasers Leap	25.314945°, 105.588632°	48g-i8-182	3003.6
Li Jia Wan Dong	Remote Family	25.310740°, 105.562185°	48g-i8-130	498.89
Mu Jia Wan Dong	Franks Cave	25.314803°, 105.605679°	48g-i8-106	101.54
Feng Dong	Wind Cave	25.306218°, 105.552101°	48g-i8-119	285.52
Hei Dong	Diamond	25.316407°, 105.595474°	48g-i8-188	1523.23
Liang Feng Dong (Dapo)	Triangle Cave	25.277503°, 105.511657°	48g-i8-101	729.2
Xiao Shui Dong	Deep Vein	24.988267°, 105.592140°	48g-i8-141	608.34
Liang Feng Dong	Concrete Cave	25.289110°, 105.537041°	48g-i8-180	527.18
Titan to Xiniu Dong Entrance	Centreline	25.314945°, 105.588632°	N/A	2027.69
Luo Shui Dong (Prospectors)	Prospectors	25.300751°, 105.533609°	48g-i8-189	308.11
Dao Dong	Resurgence	25.301841°, 105.622254°	48g-i8-147	1523.70
Total				12334.66

All Recorded Entrances

Cave no	On map	Chinese name	Alternative or survey name	Description	Surveyed
100	✓			Large alcove above road	
101	✓	Liang Feng Dong	Cool wind or Triangle cave	See survey and description	✓
102	✓	Yin Dong	Silver Cave	25m tall and 3m wide entrance	
103	✓	Shu Jia Dong		100m long tiankeng. House in entrance above. Can climb to bottom.	
104		Jian Jian Dong		NE of 103. Entrance behind prominent tree. Not visited.	
105		Dayan Dong		No description	
106	✓	Mu Jia YanDong		See survey and description	✓
107	✓	Lou Niu Dong	Falling Cow Cave	Shaft not descended	
108	✓	Niu Wo Dong	Cow Orifice Cave	Shaft at western edge of field. Not descended	
109	✓	Tian Xia Qiao Dong		Flood sink	
110	✓			Tall entrance in cliff above 109. Not visited	
111	✓	Yan Dong		Entrance near main sink (178). Not visited	
112				Entrance near 111	
113				Entrance near 111	

114	✓		Quarry House Cave	20x20m entrance with house next to quarry road	
115	✓			Entrance 30m up cliff near 114. Not visited	
116	✓	Sun Jia Wan Dong	Mushroom Cave	Cave houses mushroom farm next to road	
117				No description	
118	✓	Gan Dong		Tiankeng (100m deep?)	
119	✓	Feng Dong	Wind Cave	See survey and description	✓
120	✓	Chu Yan Dong 1	Smoke Cave	Entrance explored in 1988 and connected to Ban Dong.	
121	✓	Chu Yan Dong 2	Smoke Cave	Entrance explored in 1988 and connected to Ban Dong.	
122	✓	Luo Niu Dong	Falling Cow Cave 2		
123		Dashi Dong	Boulder Surprise	See survey and description	✓
124	✓	Ban Dong		Tiankeng entrance to main system explored in 1988	
125	✓	Chuan Dong		Big Arch feature	
126	✓	Shan Wang Dong		Shelter/Shrine 10m across	
127	✓	Luo Jia Wan Dong		Small pit not descended	
128	✓	Diao Hui Dong		Tiankeng 150x70m across	
129	✓	Luo Jia Dong		Large overhanging shaft with trees at base. Not descended	
130	✓	Li Jia Wan Dong 1		Alternative entrance to 131	
131	✓	Li Jia Wan Dong 2	Luncheon Cave	See survey and description	✓
132	✓		Children Cave	10m long cave at edge of field	
133	✓	Liang Feng Dong		30x30m entrance approx 150m long, including climbs up at the end	
134		San Cheng Dong		Seen across the valley from 133. Entrance on three levels.	
135		?			
136		?			
137		?			
138	✓			Small hole near lip of 128	
139	?	Shan Yang Dong	Goat Cave	Small entrance up cliff at top of scree slope. Not fully explored but no draught	
140	?			Small shaft in bamboo thicket. Rubbish dump	
141	?	Xiao Shi Dong	Deep Vein	See survey and description	✓
142	✓			Obvious entrance in hillside on road from Dushan to An Long	
143		Chao Tian Dong		Possibly near 118	
144	✓	?			
145	✓	?			
146		?			
147	✓	Dao Dong		See survey and description	✓
148	✓			Large square entrance feature above Si Fang Resurgence. Alcove	
149	✓	Si fang		Si Fang Resurgence	
150	✓			Draughting hole next to track down to resurgence. Partly explored.	
151	✓			Entrance seen from road but outside area	

152	✓			Entrance seen from road but outside area	
153		?			
154	✓	Lu Jia Yan Dong		Low wide arch, 13x4m, 25m to end	
155	✓			Small entrance 15m up cliff which appears choked	
156	✓			Double entrance with houses in	
157	✓			Toilet pit	
158	✓	Chao Tian Dong		Beyond 156, not explored	
159	✓	Bai Niba Dong		Large entrance only seen from afar	
160	✓			Small entrance below path	
161	✓	Da Liu Yan	Big Tree Cave	Not visited	
162	✓	Da Dong - Xiao Dong		Two caves connected	
163	✓			Small hole surrounded by wall, 5m deep	
164	✓	Jiu Jia Wan Dong		Small shaft	
165	✓			Shelter	
166	✓	Sang Zi Dong		Located mid hill	
167	✓	Mao Po		Located high on hill	
168	✓	Tang Jia Wo Dong		30m pit in bamboo	
169	✓			Small 7m wide entrance	
170	✓			Shelter	
171	✓		Gardeners Cave	Hidden entrance	
172	✓	Niu Chaun Dong		Through cave next to road	
173	✓			Short cave	
174	✓			Small cave	
175	✓			Small cave	
176	✓	Chaun Dong		20x20m entrance with houses in entrance	
177	✓	Baye Dong		Tiankeng with lower archwat leading into bottom	
178	✓	Tian Xia Qiao Dong		Main S2 river sink	
179	✓	?			
180	✓	Liang Feng Dong (Dapo)	Concrete Cave	See survey and description	✓
181	✓			Large entrance feature visible in cliff. Not visited	
182	✓	Xinu Dong		Entrance explored in 1988 and connected to Ban Dong. Access to Titan Chamber	✓
183	✓			Flood rising at bottom of An He Doline	
184	✓			Flood sink for 183. Access to main underground river.	
185	✓			Short dry cave above 184	
186	✓			Small cave on slope below 187	
187	✓			Hole below yellow cliff. Not explored	
188	✓	Hei Dong	Diamond Cave	See survey and description	✓
189	✓	Luo Shui Dong	Prospectors Cave	See survey and description	✓
190				190-200 entrances in S2 valley. All seen from afar and not visited	

191					
192					
193					
194					
195					
196					
197					
198					
199					
200					
201	✓	Chang Sha Dong	Barnstormer Cave	See survey and description	✓

Figure 40- A Shared Fashion Sense

Future Prospects 前景展望

The expedition left behind some superb opportunities for further exploration in the main area if interest surrounding Dushan and also in the form of Xiao Shui Dong further to the south.

Most caves that were explored were pushed to a conclusion but where this is not the case, possible leads are described in the body of this report and shown on the surveys. The most notable of these are as follows;

Dao Dong

Dao Dong was explored and surveyed on the final day of the expedition. The major river was found at one location but due to lack of suitable equipment, experience and time it was not explored upstream. Additionally the body of water found at the western end of the cave warrants further exploration, the draught observed on the day leads the expedition to believe that open passage lies beyond. This may prove to be a possible link to the main river just upstream of where it is encountered elsewhere in the cave. Some low mud floored passages to the north of the body of water extend to the furthest western most point within the cave but these were not pushed to a conclusion due to lack of time.

Xiniu/ Titan- Growler in the Mist

Growler in the Mist in the Lasers Leap extensions represents an interesting challenge for future exploration. It is another lead requiring negotiation of a large river and requires at least 2 hours to reach by a fast team who know the route.

Liang Feng Dong (Dapo) and Liang Feng Dong- (Concrete Cave and Triangle Cave)

These caves are of particular interest because of the anecdotal connection between the two. The straight line distance between the two entrances is over 4000m. Both caves were explored towards the end of the expedition when time ran out and both were left ongoing.

Xiao Shui Dong

Although not in the main target area, Xiao Shui Dong is an exciting prospect. The large dimensions and vertical nature of the cave create an exciting trip. The strong draught and open passage at the limit of exploration are tantalising. This coupled with the hypothesised depth and horizontal potential of another ~200m vertically and several kilometres horizontally makes it a worth target for the future. There was no other prospecting undertaken in this area, the heavily wooded slopes and valley bottoms are a great contrast to the relatively sparsely vegetated Dushan area and would make searching for new entrances especially difficult.

Luo Shui Dong

Another cave of interest, the entrance of Luo Shui Dong is 693m from the entrance of Liang Feng Dong (Concrete Cave) and the continuing passage and draught make the prospect of a connection an interesting one.

Other New Caves

Aside from the prospects left underground there are undoubtedly excellent opportunities to continue to find surface entrances. Many of those discovered in 2014 are near to roads and tracks but these routes are by no means exhausted. There are large areas of land still left unexplored by cavers within the project area and it is anticipated that many more caves remain waiting to be discovered and explored.

未来勘测目标

由于行程与时间关系，考察队未能进一步考察笃山周围的主要区域以及小水洞的南面的形成。这些都是日后进一步考察的极好课题。我们考察的大部分洞穴已经到了通道的尽头，没有探索到尽头的也已经在这份报告和勘测图中描述并显示。其中值得一提的洞穴有：

倒洞

倒洞是在我们这次考察的最后一天勘测的。我们已经发现主河流，但是由于缺少相关设备，经验以及时间，我们未能勘查它的上游。此外，我们在洞穴尽头的西面发现了水流，这需要进一步勘测。当天发现的通风井让我们相信后面一定有一个开放通道。这也许和主流域的上游相连，并且在洞里某个地方相汇。一些连通河流北面的很低的泥泞通道可以延伸到洞穴内西面最远的一些地方，由于勘测时间有限，我们未能到达尽头。

犀牛洞／泰腾－雾霭中的怒吼

镭射跳延伸的部分－雾霭中的怒吼的发现，对于未来进一步的勘测是一项有趣的挑战。需要渡过那条大河，熟知路径的最快的团队也需要至少两小时才能到达。

凉风洞（混凝土洞和三角洞）

据说这两个洞相连，这让我们对这两个洞特别感兴趣。两个洞口的直线距离超过4000米。这两个洞是在考察末期才进行勘测的，因此未能全部完成。

小水洞

尽管小水洞不在我们这次考察的目标范围，但其勘测会很激动人心。洞穴的大面积和垂直的特点让这个洞充满刺激。在勘探结束时，强气流和开放的通道几乎与我们只是一步之遥。这个洞估计垂直高度200米，水平长度有几千米，使得这个山洞成为未来值得勘探目标之一。我们在这个区域没有进行过其它勘探，因为浓密的森林斜坡和幽深的山谷不利于发现新的洞穴入口，这和笃山其它植物生长稀疏的地方形成了鲜明的对比。

落水洞

另一个让我们感兴趣的洞穴是落水洞，从凉风洞（混凝土洞）的入口到落水洞的入口有693米，连续不断的通道和气流让我们觉得他们极可能相连。

其他新洞穴

除了地下勘测之外，继续寻找地面的入口无疑也是很棒的体验。2014年所发现的洞穴入口，大多靠近公路和小道。即使是这些，我们也没有尽数探索，我们推测还有很多洞穴等待着我们去发现和勘测。

Figure 41- An Unusual Feature in Chang Sha Dong Makes an Unlikely Seat

Conclusions 项目结论

The team are deeply indebted to those parties who helped to make the expedition possible. The An Long People's Government and the Karst Institute of Guilin were particularly accommodating and without their support it would not have been possible.

The majority of caves explored during the three weeks in the field were found by a dedicated team of surface prospectors. It took a while to develop an understanding of the area and the availability of roads and tracks accessible by vehicle. The 2014 team undoubtedly had a great advantage over the previous 1988 and 1989 expeditions with the vastly improved road networks. By plotting the roads and tracks on an area map of the discoveries it becomes immediately evident that most of what was discovered was found within a short walk from one of these access points. Indeed many cave entrances were spotted from moving vehicles. Often these were entrances high up in the cone karst and as the expedition progressed the team began to realise that these caves were frequently much older in nature and often choked with calcite or sediment. That is not to say that these higher level caves were any less vast in size or spectacular in nature than those found at a lower level.

The assistance of the local people was frequently sought and often led to surprise discoveries such as Boulder Surprise or Li Jia Wan Dong. Occasionally the information given by local people could be misleading or confusing or extremely selective but without their help finding entrances would be much more difficult.

In contrast to the caves found at high level the team encountered many fascinating intermediate level caves, some of which reached depths approaching, or in some cases arriving at base level where the large underground rivers were observed.

The exploration frequently required the use of climbing and abseiling techniques which the team were well equipped for. One of the more problematic elements was the exploration of the underground rivers. In both Growler in the Mist in Xiniu and at two points in Dao Dong exploration was halted by water obstacles. The team were ill equipped and lacking in experience to tackle these river obstacles and this is something that would need to be addressed by any future teams visiting the area.

One of the aims of the 1989 expedition was to connect Dragon Cave with Ban Dong. Despite numerous efforts the team of 2014 were not able to locate the entrance of Dragon Cave in the field. Subsequent enquiries lead the expedition to believe that they may now know the entrance and it would certainly be an interesting cave to visit in the future.

Although most of the river sinks in the area were visited throughout the expedition, few were ever thoroughly explored for accessible cave. As a result of this it is still unclear how the hydrology of the area works. This is certainly one element still requiring more work to further our understanding.

The only available survey of the Ban Dong/ Xiniu system is severely lacking in detail. Given that this represents nearly 18km of cave passage the re-survey of the system should be made a high priority for the future. The re- survey would inevitably reveal further leads in the system and it would be surprising if new cave passages were not discovered during this process.

Prospects for Tourism

Though the prospects for tourism and the development of public show caves and adventure or sport caving do not look so encouraging in the light of this report, the team are very optimistic that future expeditions will reveal exciting prospects for An Long County. Along with the work carried out by previous expeditions, the 2014 expedition has made a systematic study of the caves identified through local knowledge and those found through prospecting trips. The surveys and entrance location data will provide valuable evidence for the search of other caves and cave systems. This is essential knowledge for cave exploration and preliminary study shows that the An Long region has great potential for substantial new discoveries. All further expeditions, and ultimately the tourism prospects for the area, will benefit enormously from this data. The 2014 expedition was made possible by the An Long County Government, the people of Dushan and the local farmers in the district. These, along with the survey data, have established a strong, supportive network for further cave exploration. This can be seen as the foundation for cave based tourism in the area. Cavers and tourists from both home and abroad will come to recognise An Long as centre of spectacular caves.

本次考察能取得了一定的成绩，这是和多方的支持分不开的。我们尤其感谢中国地质科学院岩溶地质研究所和安龙县人民政府为我们提供的巨大帮助，没有他们的支持，就不会有本次的探险考察活动。

我们在这三周里考察的山洞，绝大多数都是由经验丰富的地表勘探团队发现的。我们曾花了一段时间来了解该地区的路况和车辆通行情况。非常庆幸的是，这里的公路状况已极大改善，2014年的考察队无疑比1988和1989年的考察队更具优势。

通过在地图上绘制考察路线，我们意识到，本次考察的大部分洞穴的入口，距离公路或乡村小路都很近，有的就是我们在行驶的车上发现的。通常入口都在岩溶锥的顶端，随着一步步的深入探察，我们发现这些溶洞历史久远，被天然碳酸钙和沉积物堵塞，但这并不代表与中下层岩溶洞相比，上层岩溶洞的面积就小，景色就不壮美。

我们通常都会寻求当地人的帮助，结果往往令人惊喜，例如李家湾洞的“巨石惊喜(Boulder Surpise)”。有时候当地人提供的信息可能会产生误导，令人困惑，但如果没有他们的帮助，要发现岩洞入口就更困难了。

除了那些上层岩溶洞，考察队还发现了很多很有意思的中层岩溶洞。其中有些的深度接近，甚至抵达了地下河的位置。

通常考察工作要求团队具备良好的攀爬和延绳下降技巧，这些技巧我们的队员都能熟练掌握，但地下河流的考察相对而言就困难多了。在犀牛洞的中段和倒洞的两段，因为地下水的阻碍，队员设备不完善又缺乏经验，勘探工作不得不终止。但这也告诉我们，这是将来考察队必须解决的问题。

1989年考察的目的就是将龙洞和板洞连接起来，但2014考察队尽其全力，还是没能定位龙洞的入口。一系列后续调查让考察队员们相信，他们可能知道了入口的大致位置。这一岩洞，值得我们进一步考察。

考察队在整个勘探过程中，遇到很多积水处，由于缺乏潜水设备，我们没能进一步探索，所以，这些地区的水文情况仍未明朗，这也是接下来需要更加努力的地方。

我们目前所编写的有关板洞-犀牛洞系统的勘测报告，仍然缺失详细信息。这条洞穴通道已知长约1万8千米，再度调查应列为将来勘探的首要任务。再度调查肯定能提供更多线索，开发更多更长的洞穴通道。

UCLAN Confucius Institute Geography Conference
兰开夏中央大学孔子学院中国人文和自然地理年会

This annual Confucius Institute conference on the geography of China is aimed at students from local schools, sixth-form colleges and undergraduate students from the University of Central Lancashire studying Asia-Pacific studies as well as Chinese. This year the conference attracted 150 students from local schools and colleges and 20 students from the university. The two speakers from the university gave lectures on tourism and water resources in China. Frank Pearson was a guest speaker and was asked to give an illustrated lecture on the recent China Caves Project Expedition to An Long County in Guizhou Province. The conference organiser, Ms Feixia Yu, had asked for the lecture to be more about the practical application of geography in China, as the other two lectures were more theoretical.

The lecture introduced the location of the expedition based in the fengcong karst region of An Long County, Guizhou Province. This region was placed in the wider geological context of China, particularly the south-west, including the karst regions of Yunnan and Guangxi Provinces. A brief account of the fengcong and fenglin karst development of the area was provided with explanations of tiankeng / doline formation. Further information on the human geography of Guizhou was provided, on population size, administrative divisions, ethnic minorities, transport, industry, manufacturing, mining, quarrying and agriculture; the focus throughout being An Long County and the base of the expedition, Dushan Town.

The expedition origins and aims were outlined and the members of the expedition were introduced. Apart from one notable exception, the team were young cavers, most not much older than the students attending the conference. It was stressed that a number of the expedition members had studied geography and some of them were pursuing careers in geology, the motivation for this was the exploration of caves both in the UK and abroad. The role of the An Long County Administration and the Guillin Karst Institute of Geology was also placed at the heart of the expedition as without their help and support the expedition would not have taken place. The logistics of such an expedition are just as important on a practical level as the actual exploration itself: gaining permission to survey and map parts of country you are visiting is crucial, as is transporting a mountain of caving equipment across the world and then from your base into the cave. An Long County provided the 4X4 cars and drivers essential for getting the team to normally inaccessible areas, they also arranged excellent accommodation at the hotel in Dushan Town and hospitality in An Long City. The expedition would survey all the new cave it discovered and pass on all the information gathered to the An Long County Administration, who hoped that caves would be discovered that could become the basis for a show cave or for adventure caving, as the administration was looking to exploit their spectacular landscape for tourism.

The rest of the lecture addressed the various aspects of the expedition itself. Prospecting for caves was as much about reading the landscape, having a good grasp of karst landforms and processes, as talking to local farmers and asking for the location of caves that they knew about. Both of these approaches were essential, though the contact with the local farmers was often a highlight of the day as their hospitality and generosity was magnificent.

The prospecting team had to keep ahead of the caving team and provide a continuous supply of cave leads.

The practice of cave surveying was exemplified with completed surveys, cave survey notes and sketches, a 3D laser scanned video recording of Titan Chamber and a number of photographs of the team members surveying in the caves, illustrating the challenge of recording such vast and irregular spaces.

The bulk of this section was of course on the actual cave exploration and the process of caving, what it is like and what kind of environment it is. Discussion and photographs of all the main discoveries and what was required to find and survey them made up this part of the talk. The photographs of the An Long County caves were spectacular and as they were projected onto 3 giant screens around the room, well presented to the appreciative audience.

The feedback from the students was very positive. They had been given an insight into a largely unknown part of China by way of an expedition into even wilder recesses of it. However unfamiliar caving in An Long County might be, the application of the geographic principles and processes they have been studying, as well as great adventure and exploration, has clearly motivated them to further their studies and visit China, and in particular An Long County and Guizhou Province.

兰开夏中央大学孔子学院中国人文和自然地理年会，是为当地高中生和兰开夏中央大学亚太研究专业与汉语专业的学生举办的。150名来自当地高中的预科学生以及20名大学生，参加了2014年的年会。兰开夏中央大学的两名代表就中国水资源和旅游业做了讲座，本次考察队员之一弗兰克· 皮尔森作为特邀嘉宾，介绍了中国岩洞考察队近期在中国贵州省安龙县进行的洞穴项目。会议主办方兰开夏孔院的余斐霞院长在筹备阶段就建议，该讲座应重点介绍地理学在中国岩洞探索方面的应用。

弗兰克· 皮尔森的讲座介绍了在贵州省安龙县的喀斯特峰丛地区进行的勘探。他简述了峰丛和峰林岩溶洞的形成，解释了天坑形成的原因，讲座还介绍了贵州省的人文地理，包括：人口规模、行政区划、少数民族、交通、工业、制造业、采矿业、采石业和农业，重点介绍了安龙县和勘探基地笃山镇的情况。

讲座概述了本次勘探的起因和目的，介绍了相关成员的情况，除了其中一个成员之外，团队成员都较为年轻，不比在座的学生年长多少。值得一提的是，勘探队的许多成员都曾学习地理，一些还在地理领域谋求发展，这一项目的动机是在英国和其他国家探索洞穴。安龙县政府和桂林岩溶地质研究所是这次勘探的关键，没有他们的支持与帮助，本次考察就不会成行。勘探的后勤工作和勘探本身一样重要：获准调查，绘制地图。同样跨国输送大量勘探设备，然后从基地到洞穴运送设备，也得到了后勤部门的大力支持。

安龙县提供了四轮驱动越野车和专门司机确保团队到达难以进入的地区，并在笃山镇为团队提供良好膳宿，在安龙市进行了热情款待。勘探队需要调查所有已发现的新洞穴，并向安龙县政府提交收集的相关信息。因为安龙县机关希望这些洞穴可供展示或探险，并开发为旅游景点。

讲座剩余部分介绍了勘探的其他方面，勘探洞穴需要通过阅读相关材料，掌握喀斯特地貌及其形成过程，还需要向当地农民了解洞穴情况，这两个方面都很有必要。与农民建立沟通往往还得到很热情的款待。地表考察队行动要先于洞穴考察队，并不断向后者提供信息。

洞穴考察实践通过完整的考察报告、洞穴考察笔记和草图、泰腾洞厅三维激光扫描视频记录以及团队成员的工作照片，证实了要记录面积如此之大和地貌如此之特殊的洞穴是非常有挑战性的。

讲座主要部分当然是展现勘探过程和工作环境，主要包括对考察内容和发现结果的讨论和照片，以及整个项目队考察队队员各方面素质的要求和各个阶段的准备工作。安龙县洞穴的照片令人赞叹，投射在三面大屏幕上，完美呈现给了在场的观众。

学生反应热烈，勘探队对深山处的调查，让他们对中国大片未知的领域有了深入了解。尽管在安龙县的洞穴探索离他们很遥远，但是所应用的正是他们所学的地理原理，还有其中的探险都能激发学生进一步深入学习，甚至亲自前往中国尤其是贵州省的安龙县进行调查。

Figure 42- Market Day

Team members 考察队队员

Expedition participants 此次考察参与者-:
Tim Allen, Jane Allen, Mark Richardson, Frank Pearson, Billy Pearson, Mark Sims, Chris Haigh, Rowan Scott, Zhang Yuanhai and Erin Lynch.

Acknowledgements 鸣谢

The expedition wishes to thank:

Anlong Bureau of Land & Resources
Anlong People's Government
Dushan town people's government,
Dushan Xiangtingyan Hotel
Institute of Karst Geology, Guilin, China

考察队在此感谢以下机构与个人：

安龙县国土资源局

安龙县人民政府

笃山乡人民政府

笃山香庭院饭店（音译）

中国地质科学院桂林岩溶地质研究**所**

This report is translated by Liu Qiannan, Huang Yiru, Wang Yueyang and Wang Linxi, and supervised by Yu Feixia and Xu Han from the Confucius Institute at University of Central Lancashire.

本考察报告由英国索尔福德大学刘倩男、黄意如、王月阳、王琳茜翻译；由兰开夏中央大学孔子学院余斐霞、徐菡审译修改。

Table of Figures

图1-壮丽的风景