

# Ario Caves Project Expedition – 2016

## Final Report

Picos de Europa, Spain

28<sup>th</sup> August – 17<sup>th</sup> September 2016

Report compiled by Mike Bottomley



Panorama showing the Ario bowl and Cares Gorge. Photo by Duncan Simey

***This report is dedicated to our late friend Brian McGavin. Brian was a much loved friend to many of us and highly valued member of the Ario Caves Project. In addition to the contributions he made through his selfless and hardworking ethos (de-rigging Flat Iron on his own, and pushing hard cave right at the bottom of the 1,264 m deep Pozo del Xitu, amongst many others), his memory and these values will live on through the young people whom he taught and inspired, many of whom continue to contribute significantly to this and future expeditions. You are so sorely missed and it will never be the same without you.***

## **The Ario Caves Project's Mission Statement**

*To facilitate and further the exploration of caves associated in the region of Vega de Ario and the hydrology of Cueva Culiembro.*

*To investigate the potential for a hydrologically integrated, 'super deep' (over 1500m) system in the Massif Occidental of the Picos de Europa.*

*To provide a central point for organising access and collating information to these ends.*

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## Acknowledgements

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We are greatly indebted to the Federacion de Espeleologia del Principado de Asturias (FESPA) for their support with the permit application, and to the Picos de Europa National Park for granting permission for this expedition to proceed.

Aside from these, we would also like to thank the following people and companies:

- Snugpak, whose sponsorship of excellent sleeping bags was invaluable for keeping expedition members warm in underground camp.
- Lyon Equipment for their continued and extremely valuable support.
- Oxford University Caving Club (OUCC) for continued support, and loan of expedition equipment.
- Martin Laverty (OUCC) who spent a considerable amount of time and effort on producing up-to-date maps of the caves of the Ario bowl for use on this and future expeditions.
- Chris Jewell, for the loan of expedition kit (sleeping bags and mats) from the Huautla expedition store.
- Craven Pothole Club, for the loan of ladders for the last pitch in C4.
- the wardens and staff of the Refugio Vega de Ario for whose friendship and hospitality we are very grateful.



Mark Wright Training Limited



OUCC



## Summary

With a slightly larger team than last year and just under 3 weeks in the field, the expedition was successful in the following:

- Finishing the bolt climb of the upstream waterfall (30 m) to gain the continuation of the upstream master cave. Although starting out as a single, high rift streamway, this quickly divided into a number of inlets, one of which was explored to within 350 m horizontally and 150 m vertically of the end of F64, where a waterfall chamber marks the limit of exploration. Another inlet ended in an impressive, 30 - 40 m wide chamber with a 26 m high waterfall inlet and estimated 100 m high aven in the corner with a chilling draught felt at its base. However, the bulk of the water was found to enter via a too-tight rift with a powerful draught and the sound of roaring water ahead. In total, over 300 m of cave was explored (~270 m surveyed) with excellent prospects for further exploration.
- Further progress at the downstream sump (*Special Agent Sea*), where an arch was passed at approximately 30 m depth and 80 m of line laid in a large, ascending tunnel. Unfortunately, a technical issue forced a return to base and this was the only dive achieved during the expedition. However, the passage is ongoing and we are confident of a connection with 2/7 on the next expedition. A total of 130 m of line has now been laid in the sump.
- A bolt climb started close to the downstream sump, where the presence of a phreatic tunnel in the roof and increase of the draught warranted further investigation. A ~15 m bolt climb and ~20 m traverse gained an alcove below some interesting holes in the passage above. These warrant further investigation and will be a simple bolt climb to gain during the next expedition, with the hope being a high-level sump bypass to 2/7.
- Revisiting a number of sites, such as 13/9, many of which were explored to snowplugs 20 – 30 years ago, but which warranted a second look given decreasing snow levels.

In summary, this was a very successful expedition, with significant advances made both upstream towards some of the highest feeders to the Verdelluenga-2/7-Culiembro system, and downstream towards 2/7. The 2017 expedition will focus on trying to forge the link between the Verdelluenga system and F64, located at an altitude of 2,022 m, as well as pursue the other inlets, one of which carries the bulk of the water in this part of the system.

## **Background**

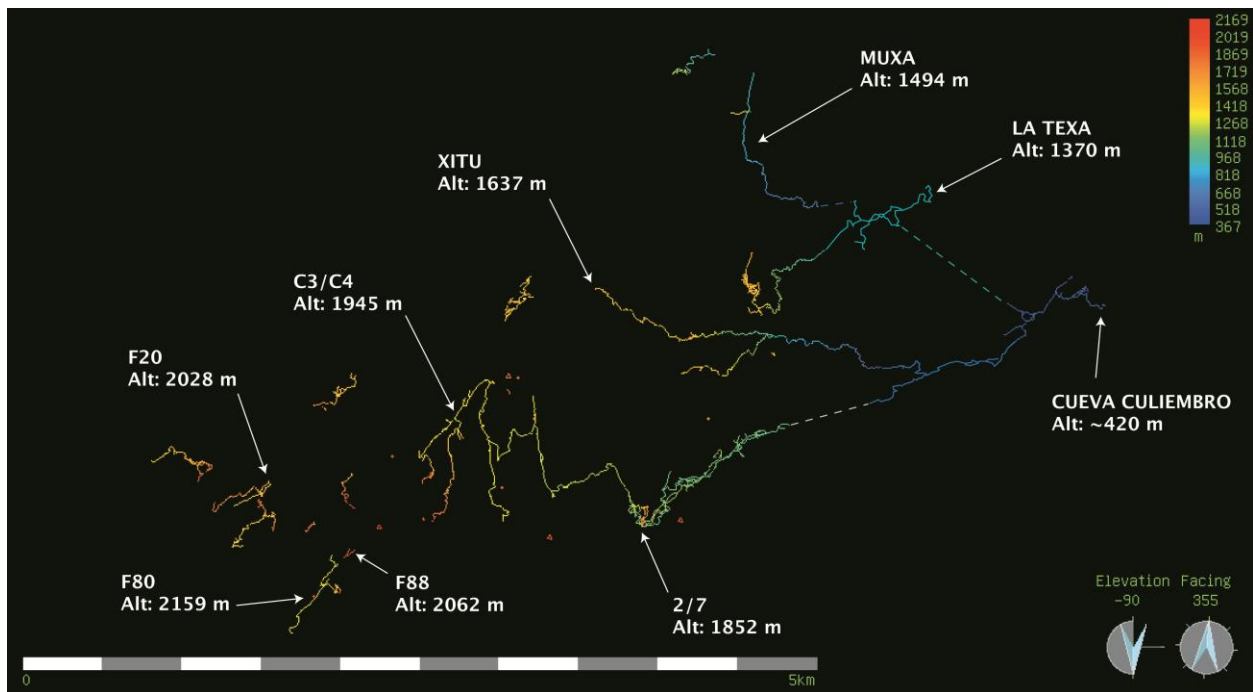
Oxford University Caving Club (OUCC) has been exploring the caves of the Picos de Europa in Northern Spain for 53 years. Since 1979, exploration has been centred around the Ario bowl of the western massif. Xitu was the first cave to be discovered in this region (area 5 in OUCC notation; hence, Xitu is 1/5). Over the next three years, it was pushed to a terminal sump at a final depth of -1135 m, the deepest cave in the world explored by a British team at that time and the first over one kilometre deep. OUCC has been one of the main driving forces behind the exploration of the caves in the Western Massif of the Picos de Europa, and the successful link between Xitu and Culiembro (first made in 2010 by members of the Cave Diving Group) was a significant step forward in their knowledge of the area.



**Plate 1** – Location of the Picos de Europa

In 2011 the OUCC expedition once again returned to Pozu'l Xitu to mark the 30th anniversary of the 1981 expedition and the 50th year of Oxford led expeditions to Spain. Despite continuous difficulties (persistent and significant storms), the cave was rigged to circa – 900 m. However, little exploration was done with the main objective being finding a dry way into the further reaches of Cueva Culiembro, and

the diving aims had to be abandoned. It was agreed before the de-rig began to return in 2012 to finish the job.



**Plate 2** – *The caves of the Ario bowl ('plan' survey by OUCC)*

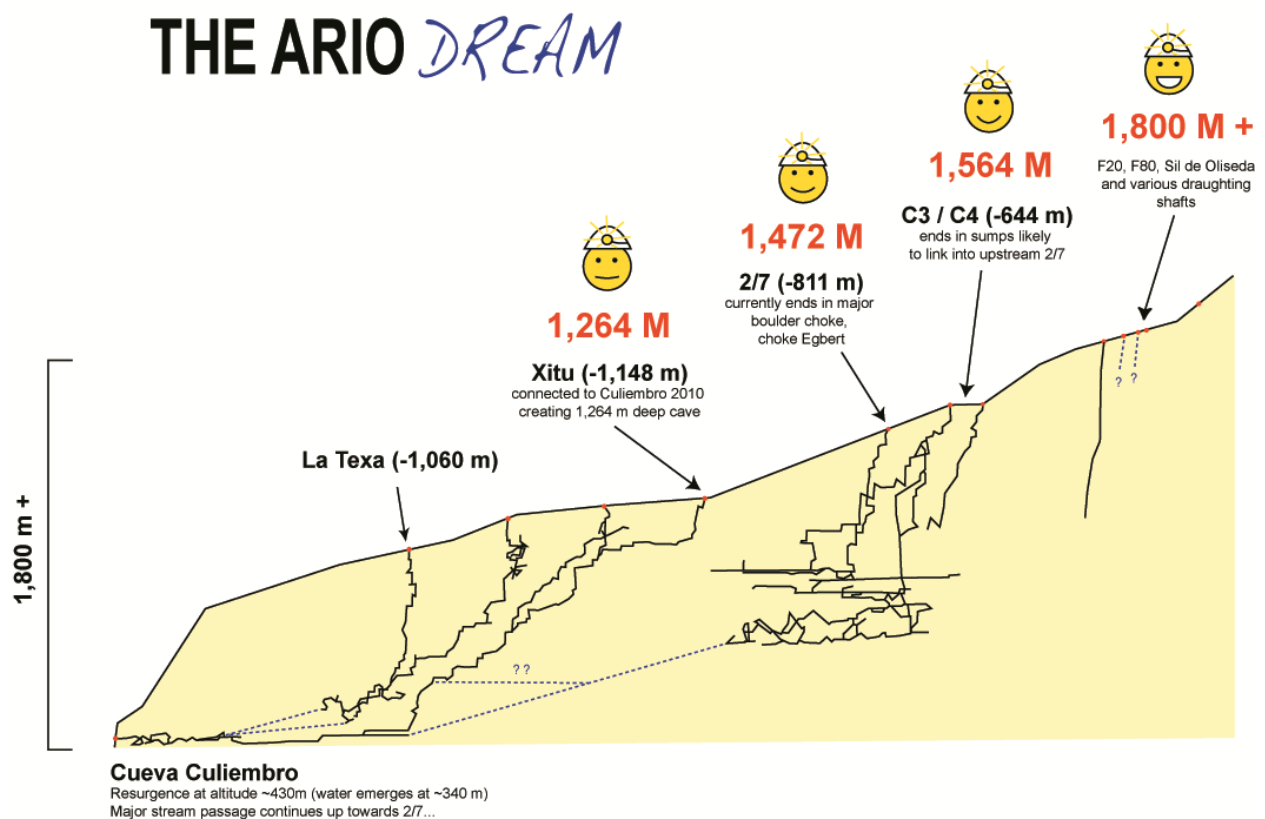
Culiembro is the resurgence cave for Xitu, Jultayu (2/7), Cabeza Muxa and likely Asopladeru la Texa. During the 2012 expedition a world record was achieved, the world's deepest cave diving traverse, where two members of the expedition successfully dived through Culiembro into Xitu and exited out onto the Ario bowl. This was then repeated in reverse in order to retrieve the diving bottles. The following year the expedition was led for the first time by a non-member of OUCC who had been attending previous expeditions. In light of the fact that it would no longer be an official University sponsored expedition, it was renamed the Ario Caves Project. The ethos, however, and the central point for information collation remained the same.

The Ario Caves Project is therefore a continuation of 50 years of Oxford University Cave Club's exploration in the Massif Occidental of the Picos de Europa. The "ACP" is an extension and expansion of this work, whose primary aim is to facilitate and further the exploration of caves associated with the Vega de Ario and the hydrology of Cueva Culiembro. The goal is ultimately of yielding a super deep system in excess of 1,800 m. This would be the deepest in Europe and one of the deeper caves of the world.

The scientific justification for this super deep system comes from the culmination of many years of exploration, surveying, geological studies, shaft bashing, careful GPS documentation and dye tracing.

This work has uncovered many systems which, in their own right, range in depth from several hundred metres to > 1,000 m (namely C3-C4, 2/7, Xitu and Culiembro). Connecting these up is now a very real possibility, with the Verdelluenga system heading upstream into 'blank space' and the downstream end separated from upstream 2/7 by what should be a short sump. Downstream 2/7 currently ends at an enormous boulder choke – *Choke Egbert* – beyond which the main streamway appears from survey data to drop rapidly in depth over a short distance to the furthest explored point in Cueva Culiembro.

The 2014 expedition focused primarily on continued exploration in Xitu, in an attempt to find a dry way into Culiembro as well as explore the possibility of high-level passages towards 2/7. However, a number of trips were achieved to C4, which was to quickly become the next target of the Ario Caves project!



**Plate 3 - The Ario Dream** (pictorial representation based on OUCC surveys and compiled by Mike Bottomley)



## **The 2015/2016 expeditions**

The aim of the 2015 expedition was to investigate a number of leads at the bottom of Torca del Regallon, or C4 as it is commonly known. This is one of two entrances (the other being C3) to the Verdelluenga system.

The system was first explored by the OUCC via the tight and arduous C3 entrance in 1994 and 1995, and found to drop into a significant streamway – *Underground Overdrive* at approximately 600 m depth (plates 4 and 5). The streamway terminated in a large lake '*Special Agent Sea*' at its downstream end, which was later 'sailed' on an inflatable dingy and found to close in, therefore forming a terminal sump. Upstream was followed to a boulder pile.

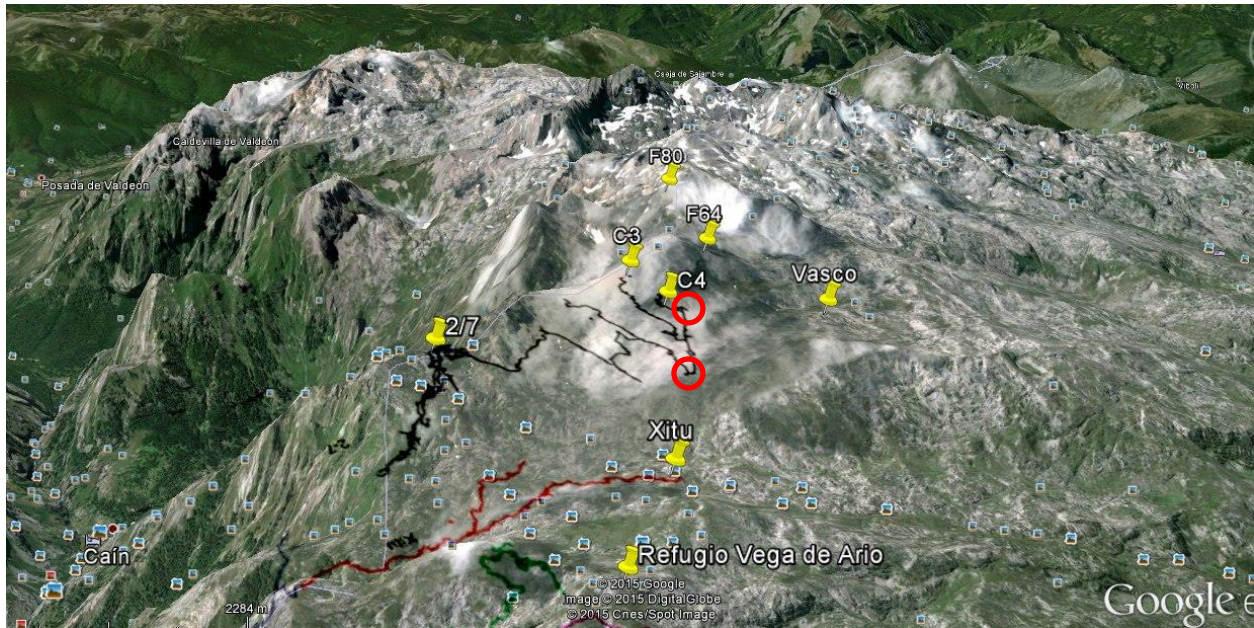
An expedition the following year succeeded in discovering an easier entrance to the master streamway, in the form of C4. During this expedition, and the 1997 expedition, various leads were examined and *Underground Overdrive* followed upstream to a ~15 m high waterfall. This was left unclimbed!

Further work in 2/7 during the 2000 expedition resulted in significant upstream extensions, which started to close the gap between 2/7 and the Verdelluenga system, and showing *Underground Overdrive* to be the upstream continuation of the 2/7 master streamway, and therefore of considerable importance. By the end of the expedition, the two ends of the survey – upstream 2/7 and *Special Agent Sea* – were found to be roughly 30 m apart.

In 2002, a Polish team led by the late Wlodek Szymanowski tackled C4 ready for an attempt on the sump. This ambitious expedition ran over a 2 week period with only 6 cavers. Despite an impressive effort, the team was stopped at *Rio Grande Rift* – a hideously tight rift barring access to *Underground Overdrive*.

No further work was done in connecting these two systems until 2014, when C4 was entered again and re-bolted down to the top of the *Monster*. Work on re-bolting and re-rigging the cave continued in 2015, when the main streamway was gained and the main leads – the upstream waterfall and downstream sump – were attacked. The upstream waterfall was climbed to a sloping ledge approximately 25 m up, and the downstream sump explored for 50 m. Due to the small team size, limited time in the field and poor weather experienced in the last few days of the expedition these were the only attempts on both leads.





**Plate 6** – Google Earth compilation for *the caves of the Ario bowl* (*'plan'* survey data from OUCC and compiled by Mike Bottomley). Both of the 'major' leads are shown in red circles, with the upstream waterfall climb leading into blank space!

## Expedition Timeline & log

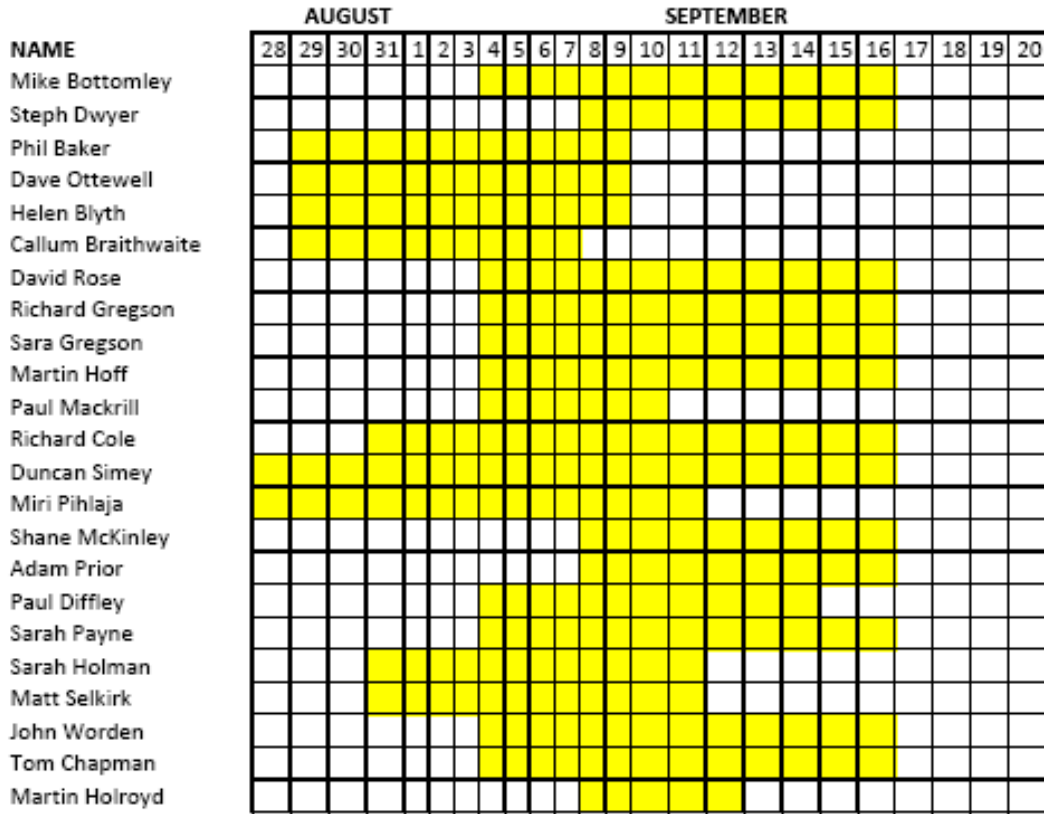


Plate 7 – Timeline for the expedition

Date	Progress
Sunday 28 <sup>th</sup> August – Monday 29 <sup>th</sup> August	Advance team (PB, DO, HB, DS and MP) leave UK in 2 cars. Arrive Cangas des Onis Monday eve and camp.
Tuesday 30 <sup>th</sup> August	Advance team arrive at Los Lagos. PB and CB head straight up the hill and mark route to C4 entrance. DO and HB wait for donkeys to arrive from the refugio, help load and accompany up the hill. DS and MP do a carry to refugio. Gear tent is pitched at the refugio, where water levels are very low (spring has dried up!)
Wednesday 31 <sup>st</sup> August	DS does another carry from Los Lagos. MP is ill with a vomiting bug and rests. PB and DO head up to C4 and re-rig the cave as far as the top of the Monster. HB and CB carry kit to C4 entrance and install tent at entrance. RC, MS and SH arrive at refugio.
Thursday 1 <sup>st</sup> September	DO and HB head into the cave early to rig the Monster and

	take in some sleeping equipment. PB and CB head in to the cave around mid-afternoon to continue rigging and set up a small camp at the base of Bugger Bognor. RC, MS and SH do a food shop, and carry from Los Lagos.
Friday 2 <sup>nd</sup> September	DS and MP do a carry of equipment to C4 entrance. RC and MS head into C4 in the evening with the ladders to finish rigging the cave. PB and CB exit the cave after their rigging trip to the bottom of Free n' easy, during which CB became ill with the vomiting bug. DO, HB and SH sort inventory of expedition equipment.
Saturday 3 <sup>rd</sup> September	RC and MS re-rig from Free n' easy to the bottom of the cave, installing the ladders on Marie Celeste, and exit the cave in the evening. CB rests as still not feeling well. PB and DO carry climbing kit required for exploration to top of the Monster. HB accompanies SH and MP on acclimatisation trip into the cave.
Sunday 4 <sup>th</sup> September	PB, DO and HB head into the cave for 2 nights to investigate the phreatic tube seen in the roof close to the downstream sump during the 2015 expedition. Also plan to mark the route down Underground Overdrive to aid future trips. MP and DS enjoy photography trip to top of the Monster. MB, PD, DR, RG, SG, SP, TC, JW and PM arrive at Los Lagos, load the refugio donkeys and carry expedition kit (including dive kit) to refugio. MB helps PM tag dive line ready for dive.
Monday 5 <sup>th</sup> September	DO, PB and HB undertake climb close to downstream sump. PB climbs to a point 10 – 15 m above floor of streamway, but a long bolt traverse is required to see if there is any continuation of the roof tube in the corner which is out of sight. They spend the night at camp at Bugger Bognor. DR, RC and SH enjoy recce to valley of dry bones and carry out digging in a number of strongly draughting shakeholes. MB, PD, JW, PM, RG and SG do a carry of expedition kit from Los Lagos.
Tuesday 6 <sup>th</sup> September	Dive gear is prepared for PM's dive. PB, DO and HB exit the cave. MB, CB and SH pack equipment and food for the underground camp, enough for 6 to camp, and head into C4. 1 bag is left at top of Monster and 2 bags at top of Growing Up. RG and SG carry dive kit to C4 entrance. DS and MP enter the cave in the afternoon for a photography trip and to carry the camping equipment rest of the way to camp. DR, SP and TC camp at C4 entrance in the evening ready for dive trip the following day. RC and PD head to underground camp for the night.
Wednesday 7 <sup>th</sup> September	MHof, RG and SG head to 13/9 to see if the snow plug is still there. Unfortunately it was. Other shakeholes nearby were investigated. MB, PB and DO have a walk to area E above top camp to find E14 and do a general recce of the area.

	<p>Various shakeholes and rifts were investigated along the way. Some powerfully draughting shakeholes were found at the base of the sea of limestone where E14 is located, PM, MS and JW leave refugio very early for C4. Dive kit is collected from C4 entrance, and they join DR, SP and TC into the cave. After a brew at underground camp, they continue to the sump with PD and RC, minus SP who has injured her knee. PM dives and technical issue forces a return after further 80 m of line is laid in open passage. All leave dive kit and return to underground camp. Meanwhile, DS and MP leave underground camp for surface but encounter caught rope on Monster. Upon arrival back at camp, TC and MS are informed and continue on to the Monster to sort the problem. They then exit the cave along with DS, MP, PM and RC. JW, DR and PD stay at underground camp.</p>
Thursday 8 <sup>th</sup> September	<p>SD, SM, AP and SMcD arrive at the refugio after doing a food shop and carry from Los Lagos. All the dive team arrive back at the refugio at different stages throughout the day. DO and MHof go digging at one of the sites found during the previous day.</p>
Friday 9 <sup>th</sup> September	<p>MH arrives at the refugio early morning. A team meeting is had to plan the next couple of days. Food and equipment is then packed and MB, SD, MH, RC, AP and SM enter C4 to go and bring the dive kit at the sump back to underground camp. SMcD and PM assist in carrying kit to the entrance. The kit is successfully brought back to camp, and RC exits the cave leaving the others at camp. DO, PB, HB and CB leave for home.</p>
Saturday 10 <sup>th</sup> September	<p>MB and SM return to bottom of cave to continue bolt climb near the sump. MB gains high point reached by PB and then bolts ~20 m traverse into alcove, where he runs out of bolts and rope. Above is solid rock and a possible tube ~6 m up, with other interesting tubes higher up. These need to be investigated and will be an easy bolt climb to reach. They then return to underground camp. TC arrived at underground camp early in the day and continues to upstream waterfall with MH and PD. TC and MH finish the climb and gain continuation of upstream Underground Overdrive. They explore around 50 – 60 m of new rift streamway to an impressive chamber and too-tight inlet carrying the bulk of the water. PD does some filming of the exploration. They then return to underground camp for the night. PM and SP enter the cave, and meet SD and AP at underground camp. Between the 4 of them, all the dive kit is removed from the cave and they head back to the refugio.</p>
Sunday 11 <sup>th</sup> September	<p>MB, MH, TC, PD and SM exit the cave. PM, SG and others help carry the dive kit down to Los Lagos. PM leaves for home. DR, RG, SP and AP continue work in valley of dry</p>

	bones.
Monday 12 <sup>th</sup> September	Most of the team head to valley of dry bones for a day of digging and prospecting. Iron Bar Pot is the primary target for the day.
Tuesday 13 <sup>th</sup> September	<p>The weather begins to turn! ☹️ DS, MB and SD enter C4 to continue work in the new upstream extensions found by MH, TC and PD at the top of the waterfall. DS heads into the cave early, with MB and SD following a couple of hours later after enduring a thunderstorm at C4 entrance. After a brew at underground camp, the trio continued to the bottom of the cave, which was now much wetter but still perfectly safe with all ropes well away from the water. Once at the upstream waterfall, MB continued to the inlet near the big chamber which MH thought would go with a bit of hammering while DS and SD started the survey. MH was correct, and after 5 mins of hammering a further 30 – 40 m of narrow streamway was explored to a too-tight rift with a powerful draught and sound of water ahead. Returning to the top of the upstream waterfall, a narrow rift was investigated and found to lead into another significant passage. This was followed for around 50 m, still wide-open before returning to find DS and SD. A flood pulse hit while SD and DS were prusiking up the waterfall, and with water levels still increasing, it was decided to continue explorations and the survey and allow water levels to drop before returning to underground camp. The large chamber now sported an impressive ~26 m waterfall! The survey was continued into the new passage MB had just found and this was followed up a sporting streamway to another large chamber with waterfall entering. Climbing equipment would be required to scale this and so after taking a few photos the trio returned to the upstream waterfall where water levels had dropped and a return was made to underground camp for the night, pleased with the day's work!</p> <p>Also on the 13<sup>th</sup>, RG, SG, DR, SP, TC, SMcD and SM head to the Cares Gorge for a couple of days to explore leads there.</p>
Wednesday 14 <sup>th</sup> September	MB, DS and SD spend the morning sorting and packing up underground camp, before exiting the cave. RC, AP and JW enter the cave later in the afternoon and remove 4 bags from underground camp.
Thursday 15 <sup>th</sup> September	Rest day for most, on a truly unpleasant day of heavy rain and wind! Cares Gorge party arrive back at the refugio.
Friday 16 <sup>th</sup> September	TC and SM head to C4 to collect the final equipment from underground camp and de-rig the entrance series. Most others do a carry of equipment down to Los Lagos ready for leaving.

Saturday 17 <sup>th</sup> September	MB and SMcD head to C4 entrance early to collect the tent and other equipment, removing the route markers on the way back to the refugio. All other equipment was inventoried, packed up and loaded on to the donkeys and everyone leaves the hill for another year!
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## **Logistics**

Most expedition members flew to Oviedo (Asturias), Santander or Bilbao airports and then teamed up to hire cars to Los Lagos. Some expedition equipment was brought out in additional hold luggage.

In addition, three vehicles brought team members and expedition equipment including diving gear from the UK and France.

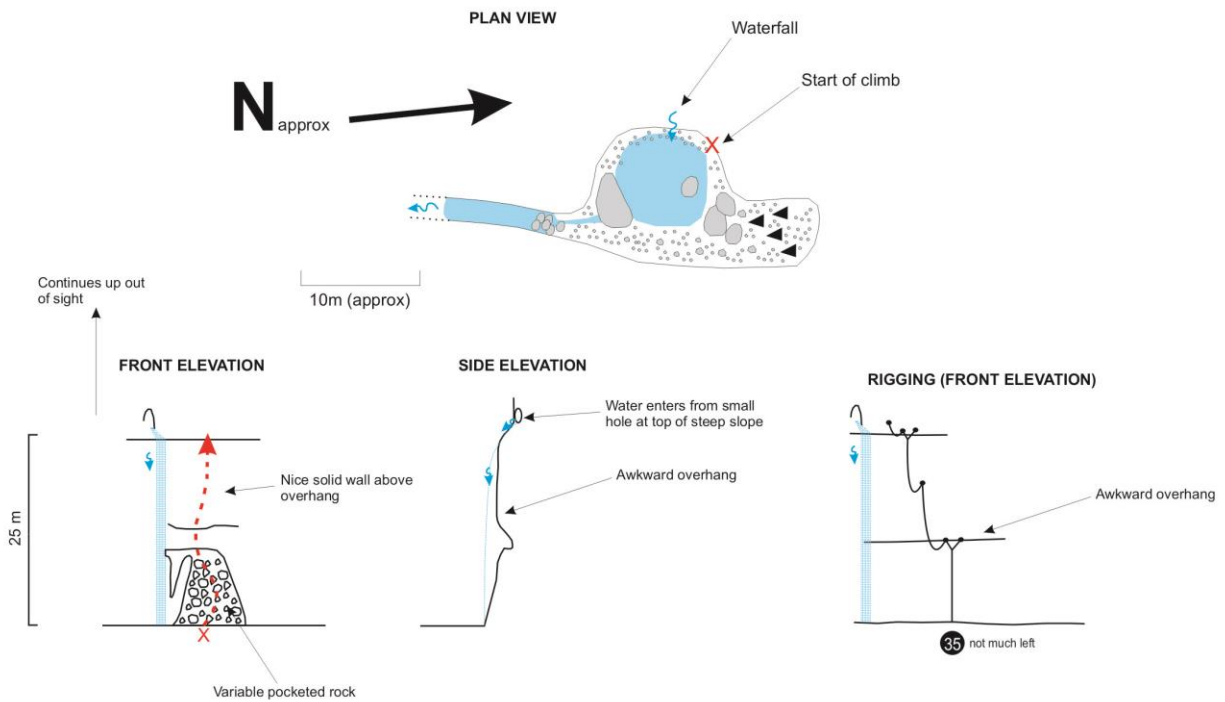
Donkeys proved to be highly invaluable this year in transporting expedition equipment up to the refugio from Los Lagos, saving manpower for the cave!



## The 2016 Expedition: Reports from the Team

The following sections of the report includes reports of the various trips that took place during the 2016 expedition, primarily in C4 but also elsewhere in the Ario bowl.

### Further progress at the upstream waterfall climb



**Plate 8** – Sketch survey of upstream waterfall (drawn by M Bottomley, 2015)

The upstream waterfall climb marked the current upstream limit to the Verdelluenga main streamway (*Underground Overdrive*) up until the 2015/2016 expeditions. During the 2015 expedition, a single bolt climbing trip saw around 25 m of progress to a sloping ledge, as shown in Plate 8 above. No further progress could be made during this particular trip due to failing drill batteries and a shortage of rope, and no further trips were made to the waterfall due to the foul weather encountered during the last few days of the expedition.

A return was made to the waterfall on Saturday 10<sup>th</sup> September 2016 by Tom Chapman and Martin Holroyd, accompanied by Paul Diffley who was going to attempt to film the climb. Thankfully the rope was found to still be in excellent condition, and so Tom and Martin were able to continue climbing from the 2015 high point. The steeply sloping ledge led after a few metres to a short vertical section into a tall, narrow rift streamway with very jagged walls and friable rock (*The Brian Broccleway*, named after the late Brian McGavin). A rope was rigged and the streamway was followed as an easy traverse to a large and impressive chamber with an unusually flat rock floor. A small dribble of water could be seen to enter from an inlet roughly 25 m up one wall, and in the corner there looked to be a significant, lofty aven. Just prior to the chamber, the bulk of the water appeared to enter from a too-tight passage, which Martin thought might go with a bit of hammering. Pleased with the new discoveries, the trio returned to underground camp.



**Plate 9** – Martin Holroyd in the new upstream extensions. Photo by Paul Diffley

The next trip to the new extensions took place on Tuesday 13<sup>th</sup> September when Duncan Simey, Mike Bottomley and Steph Dwyer went to survey and photograph the new passages, and see if any more progress could be made. An account of this trip is provided by Duncan Simey below.

*I set off up the mountain an hour ahead of Mike and Steph expecting them to quickly overtake me and they would have a brew waiting for me at camp. On the walk up, the weather was dramatic but I only received a few spots of rain while I changed into my caving gear. I made good progress down the pitches and the first surprise was that The Monster was roaring. It had previously been quiet and although the water was clear of the pitches a whistle would have been needed to communicate rope free if I'd had any caving companions. I beat Mike and Steph to camp and got the stove on. After 30mins I was beginning to get concerned and was thinking about changing into dry clothes and get into a sleeping bag to wait when I heard Steph calling from several pitches above camp. Where had they been?*

*It seems just after I went underground a thunderstorm rolled across the mountain and Mike and Steph had to flatten the entrance tent and hang on to canvas to prevent it from being blown off the mountain. It sounded properly dramatic! Although I thought I had done well getting to camp in just 2:30 hours, they had done the same trip in 1 hour - like I said, racing greyhounds.... The trip to the streamway was uneventful and the Rio Grande rift was as nasty as everyone had said it was going to be.*

*At this point all was going well. I photographed Mike climbing the waterfall pitch and Steph and I surveyed from the kink in the main streamway back into the waterfall chamber as a firm foundation for fixing the new passage. Much to my astonishment the DistoX appeared to be in calibration – result!*

*The first sign of trouble happened when I was using Steph's helmet as a survey station high up the waterfall. I took two shots and her helmet disappeared. I was trying to shout over the waterfall noise that I needed to do it again. The second attempt at shooting the leg worked. Steph was shouting a lot, but all I could think it meant was "Rope free and hurry up as I'm getting cold". Comparing notes later, this was when Steph got knocked off her feet by a flood pulse, and what she was shouting was for me not to come up or at least bring the safety kit with me which was laid by the bottom of the waterfall. I remember thinking the spray was bad and hoped the lens had remained dry for my waterfall shots as I hadn't checked. It never occurred to me there wasn't any spray when I was using the camera.*

*The climb was interesting... To keep out the water I had to hang onto rock edges. If I'd slipped I'd have swung under the full force of the waterfall. Alarm bells still weren't ringing and they should have been. I met Steph and Mike at the top of the waterfall. Mike was bouncing with excitement about finding a beautiful new passage and Steph looked worried. Mike persuaded us to squeeze through an unpromising looking tight rift which did indeed lead to a section of beautiful tubular scalloped passage, but there was water cascading from the roof which had been dry just moments earlier.*

*A decision was taken to get back down the waterfall immediately. But Steph and Mike quickly determined*

*it was no longer safe to use the rope as it lay under the waterfall. A quick inventory revealed that between the three of us we had only one chocolate bar, no storm shelter and Steph was soaked from getting hit by the flood pulse. Oh Shit... I was asked to place rocks in the water so we could monitor water levels and de-rig a traverse freeing up as much rope as possible. Mike attempted to rig a Tyrolean Traverse but even that didn't get us to a safe line of descent. Now what!*



**Plate 10** – Mike Bottomley on the upstream waterfall pitch. Photo by Duncan Simey

*Since we were trapped and could do nothing other than monitor the water levels, we decided to survey the passage. The chamber reported by the bolting team is HUGE. Although it is only 30 m diameter with a 26 m waterfall coming out near what appears to be the roof, on one side there is a dry plunge pool with an ice cold draught and looking up is a big black hole. With Steph and Mike illuminating from the opposite side of the chamber I could see my 50 m max range DistoX shots were only going about 1/3 of the way up what I could see and there was still a black hole above that! We are calling it 100 m+ which is conservative. The floor of the chamber is unusual as it has very little boulder debris and is largely flat*

*limestone. Generations of streamways have formed a gorge through the floor undercutting it to an extent that I estimate a 10 m cantilever at one point. We surveyed back to the pitch head and were pleased to note the water levels had dropped slightly – yay!*

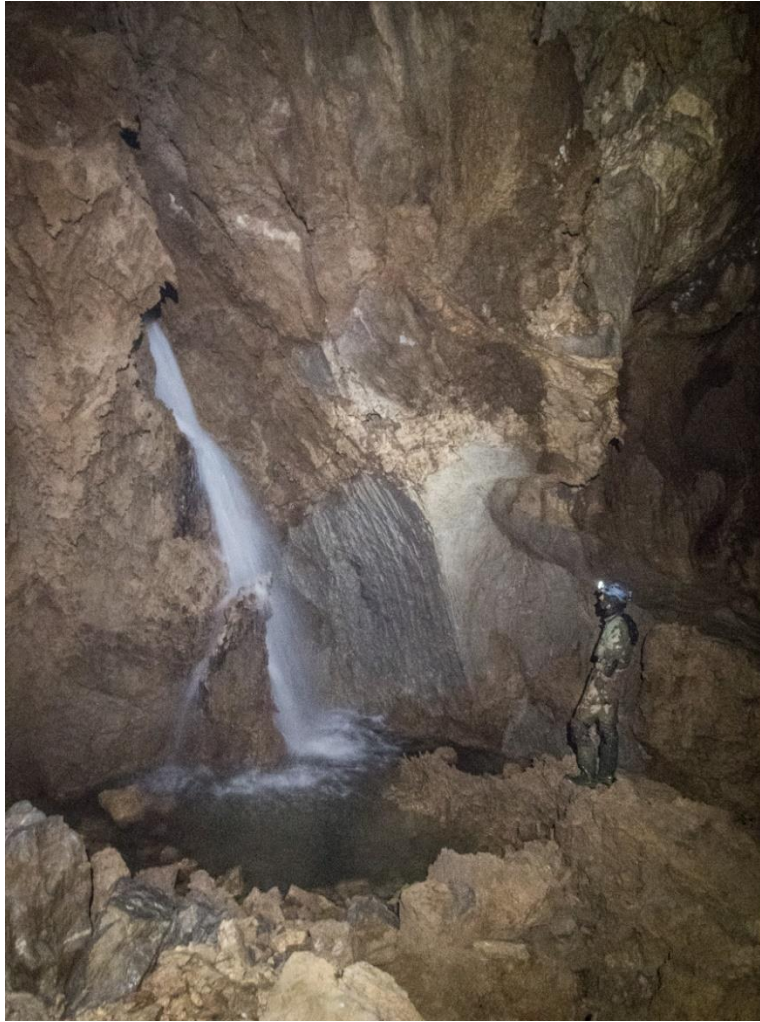


**Plate 11** – Surveying in the newly discovered chamber. Photo by Duncan Simey

*Mike had broken through the ‘hammered’ inlet noticed by Martin Holroyd and found a several tens of metres of tight gnarly passage with a promising sounding thunder of water beyond a too tight section. We didn't bother surveying it which in hindsight seems a bad decision as it is intriguing where it might be heading.*

*But the other new passage Mike had found was fantastic with a mix of tight rifts, scalloped circular tubes and intricate shard mazes. Mike and I surveyed on up the stream into virgin passage and eventually Mike reached a corner and let out a big whoop. When I reached there I saw lots of black space - another big chamber! The stream disappeared into the wall of the chamber but we didn't push it as Mike was becoming concerned we hadn't seen Steph for a while, so we concluded the survey and Mike headed off*

*to find Steph. I turned around and spotted a 10 m x 8 m black passage hole over the way we had come in. I shot DistoX readings of the passage entry and badly wanted to stick my head in for a look, but did the sensible thing and headed down to find Mike and Steph.*

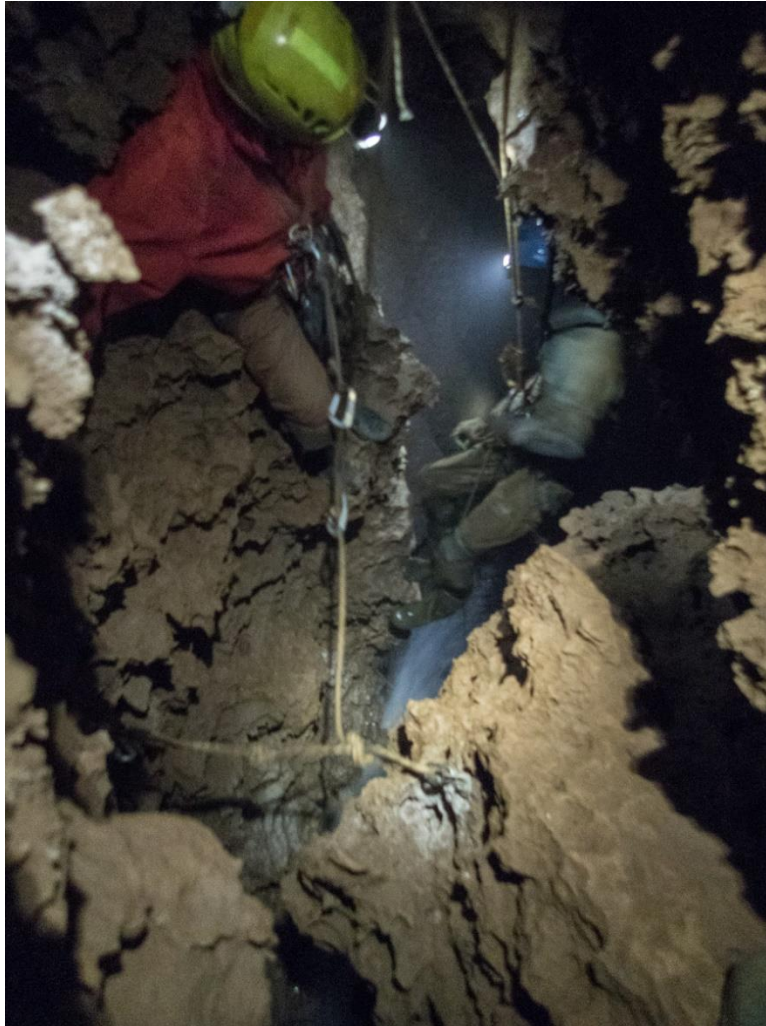


**Plate 12** – The chamber at the end of the inlet heading towards F64. Photo by Duncan Simey

*My adventures weren't quite over. I banged my helmet on the roof and my light went out. Because I was driving the DistoX I had taken off my back-up light. A moment of panic before realising they would come and look for me before long. Luckily I coaxed my light back into life but the cycle of banging my helmet and the light going out was repeated quite a few times before I met back up with them. Later inspection indicated a grain of sand had got under the battery terminal.*

*Back at the waterfall, the stream had gone down about 15 cm and it was deemed worth a go at descending the waterfall. Steph asked me what I was like coping with heavy water flow, I didn't know. I'm relieved to report I still don't know. We beat a retreat to camp where after a solid meal of pasta we all*

*slept like the dead for 9 hours. The rest of the trip out was mercifully uneventful although the Monster was rather drippy and I got quite wet. It's an awfully long way out of the cave and I found myself drawing on mental and physical reserves I never knew I had. I owe huge thanks to Mike and Steph for looking after me on what was easily the most demanding trip I have ever undertaken.*



**Plate 13** – Attempting to rig a dry route away from the flood water. Photo by Duncan Simey

*As the team departed I was asked if I would be back for the 2017 expedition and I wasn't sure how I felt. I was physically and mentally broken. Back in the UK it took a whole week before I was functioning normally. However, with hindsight it seems I enjoyed the experience and have a yearning to get back down C4, especially to enter the large passage I found and see where it goes.*

In summary, the upstream explorations had been very successful with a number of ongoing leads left for the 2017 expedition. These include:

- 26 m water fall inlet in the big chamber (*The Sanctuary*). A small quantity of water enters during dry conditions, but water volume was found to increase fairly substantially during times of flood.
- 100 m+ aven. This towering and lofty aven enters in the corner of the big chamber, and was found to have a chilling draught at its base! The rock looks solid and although a big bolting project, progress should be relatively straightforward. It was found to remain virtually dry during the flood.
- Hammered inlet (*Tinkle Tankle Passage*). This inlet enters just before the big chamber, and was first noticed by Martin Holroyd during the initial explorations who thought it would go with a bit of hammering. The inlet was hammered open by Mike Bottomley on the subsequent visit, and access gained to around 30 – 40 m of narrow rift streamway covered in ‘popcorn’ calcite. The rift soon became too tight, and no way on at higher level could be found. However, a powerful draught could be felt emanating from the too-tight rift as well as sound of roaring water ahead. More work is needed here to see if a route over the top can be found, or a capping project started in the rift streamway itself.
- Inlet 2 (*‘F64’ inlet*). Inlet 2 was missed during the initial explorations, and enters on the left (facing upstream) at a T-junction approximately 20 m upstream of the upstream waterfall. The narrow rift soon enlarged to a pleasant, sculptured streamway which led to another large waterfall chamber after around 160 m. Large black spaces in the roof noticed when looking downstream from the waterfall chamber warrant further investigation. The water volume in the streamway increased significantly during the flood from ankle deep to waist deep in places. A small aven on the right (facing upstream) roughly 30 to 40 m up the inlet is normally dry but became active during the flood, and will be worthy of investigation. The streamway appears to be heading straight for F64, the end of which is approximately 350 m horizontally and 150 m vertically away.

The survey data for the upstream extensions can be seen in Plates 14 to 16 below.



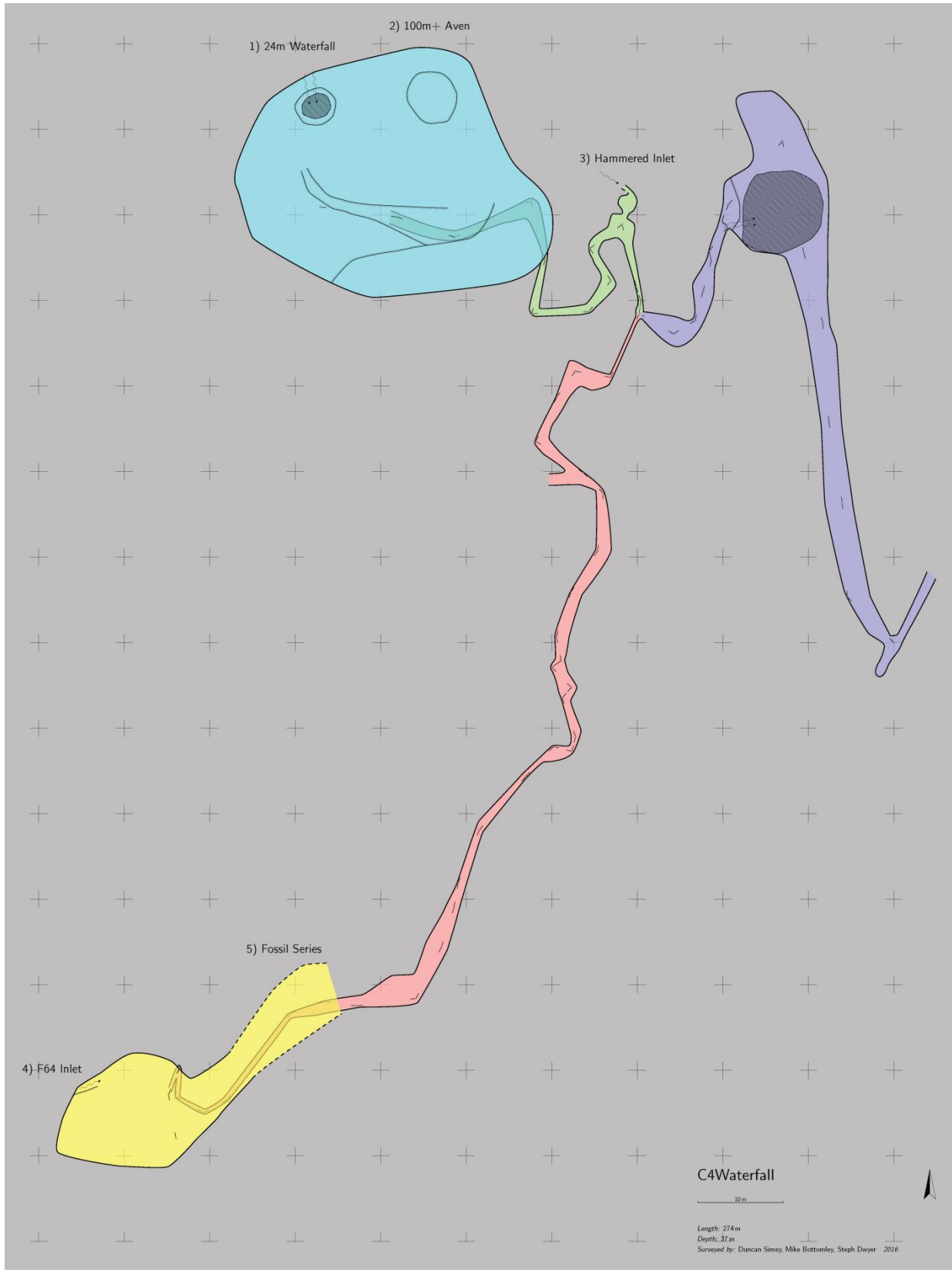


Plate 14 – Plan survey of upstream waterfall series (*Underground Hyperdrive*). Drawn by D Simey.

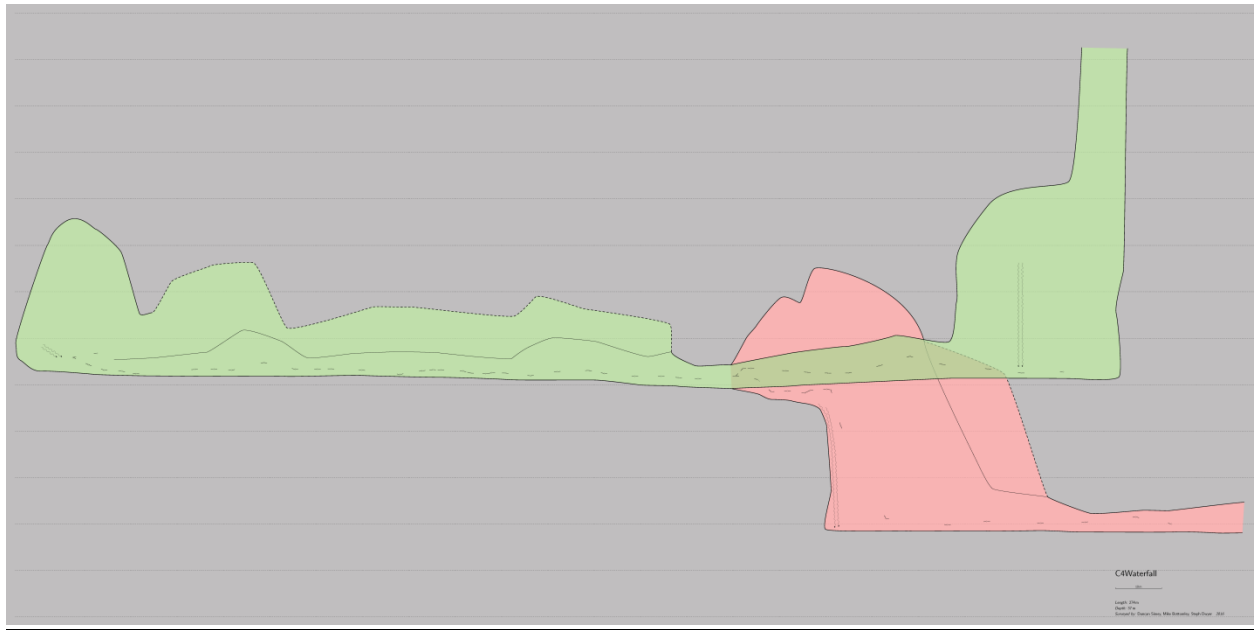


Plate 15 – Elevation survey of upstream waterfall series (*Underground Hyperdrive*). Drawn by D Simey

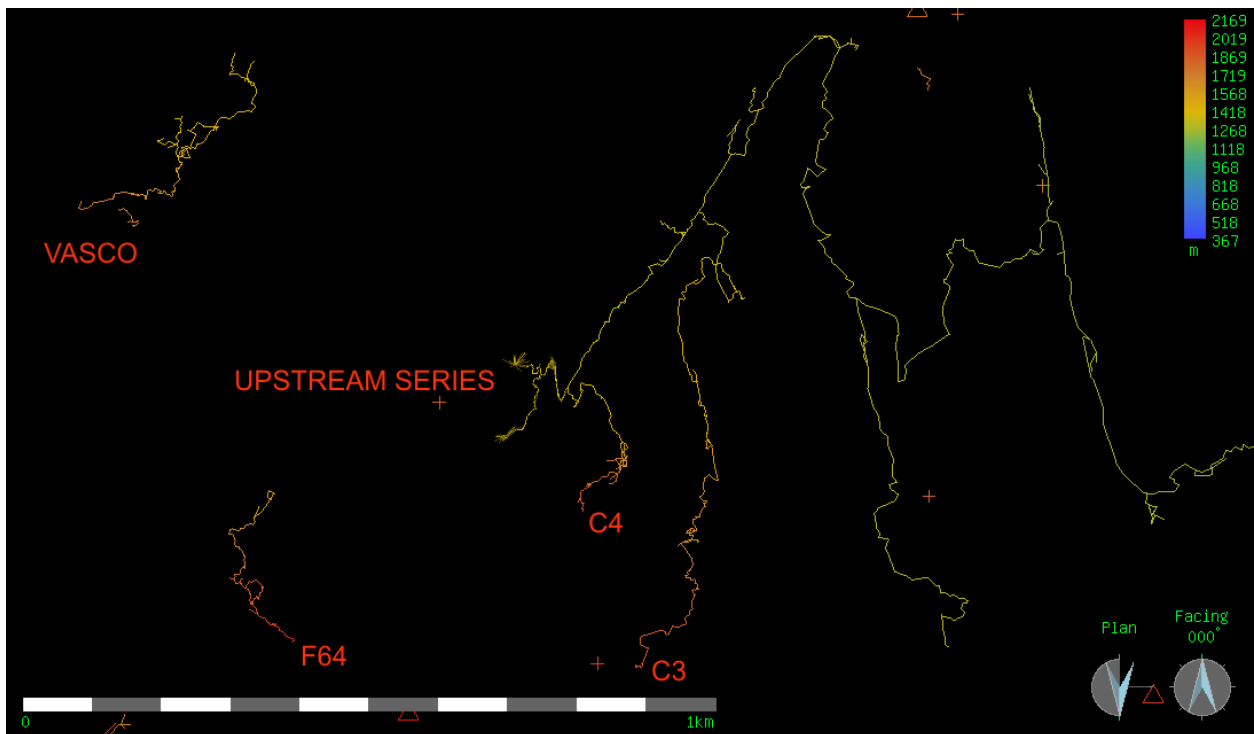
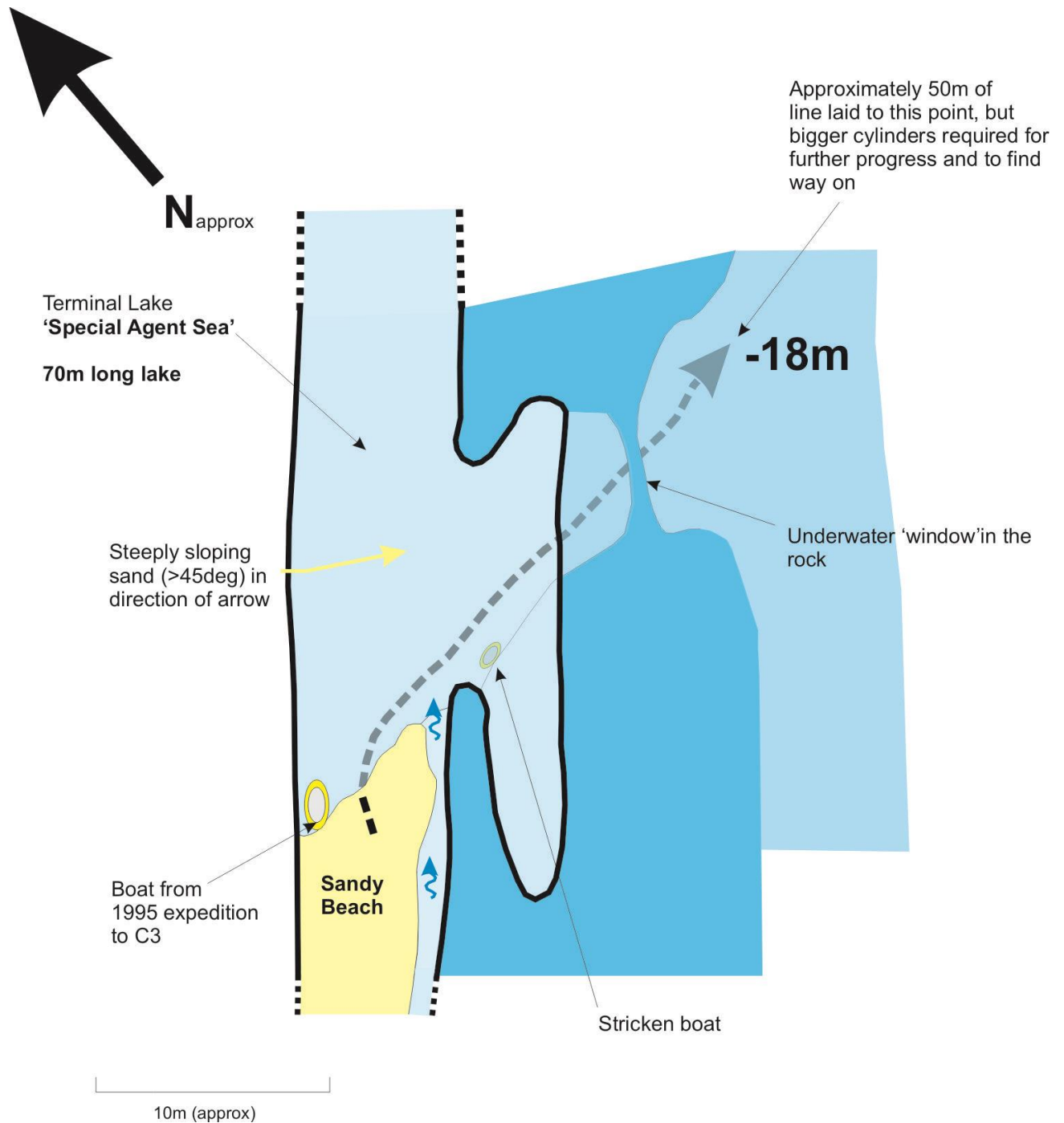


Plate 16 – Overall plan survey showing the trend of the new upstream waterfall series (compiled by Duncan Simey from OUCC data and survey data from the 2016 expedition)

### Diving Special Agent Sea



**Plate 17** – Sketch of dive (based on Paul Mackrill's sketch and notes. Drawn by M Bottomley, 2015)

Plate 17 shows the results of the dive carried out by Paul Mackrill during the 2015 expedition, where a thorough search of the sump was carried out and 50 m of line laid towards a promising continuation. Paul Mackrill provides an account of the 2016 explorations below.



**Plate 18** – Paul Mackrill preparing for the dive. Photo by Paul Diffley

*I don't take unnecessary risks in life.*

*The aim of the dive was to connect C4 to 2/7 to create one huge system from the two major cave systems.*

*I normally have two completely independent dive tanks each with it's own demand valve. I carry a tank on each of my sides under my armpits, sidemount. Today I luckily had a 3<sup>rd</sup> small tank for decompression.*

*From the huge lake I followed a steep loose sandy slope down to an arch deep down at -30 metres, in water at 5 deg C.*

*On the descent I had been able to attach the line to the various protrusions on the walls. Last year's line was still intact. When diving last year I had started to rise up and tied off the line away from the main route. Before I continued I put an arrow on the new line to be sure of finding the correct exit on the way back. The passage beyond this point turned into a vertical rift with a steeply sloping sandy floor pointing directly at the arch at -30m.*

*Beyond the arch the passage roof became smooth with a wide arch of about 4 / 5 metres across. There was nowhere to belay the line and I had to lay it on the sandy slope. The way on was a promising passage that rose steeply with the dunes in the white sand pointing the way onwards.*

*Unexpectedly the passage widened, blackness stretched out to my right. It might go deep again. I was about 130m from my base and 18 meters underwater with a solid rock roof over my head. I felt good and I might make the connection.*

*Then all hell let loose. One of my breathing systems began failing on me. I had no time to lose. I had laid a thin white guide line marked with tape arrows showing me the way home. I rammed the line reel into the loose floor to fix it and turned back. That movement had turned the visibility from crystal clear to the zero [what you'd have if you put your head in a pot of gravy]. I had to feel my way now.*

*In the zero visibility I hit the roof and found myself jammed in a corner, the open passage was to my right. I cleared the obstruction and swam on, still 80 m from free air. I kept going.*

*Then the second breathing system failed.*

*On surfacing I had two empty tanks and I was breathing from the third tank. I'd had double catastrophic failure. At no point did I think I'd die. I just kept dealing with each problem as it arose.*

*On return to France I had all the valves and tanks analysed. What had actually happened is the first stage had frozen. I had thought it was the second stage [the one in my mouth] that had jammed open as I'd had problems in the past. I had tried getting the valve to close by taking it out of my mouth and purging it holding it in all orientations. I then decided to breathe from this dying valve.*

*This was an error. The free flowing valve created such a lot of bubbles and noise that I didn't realise until much later that the second tank was also in full free flow. Soon after I discovered this the first tank ran out of air and I found the second tank was also empty [I got a mouth full of water]. I finished using the air from the 3<sup>rd</sup> tank.*

*I had used the fact that I had a third tank to ignore normal shutdown procedures. This could have been very serious because the fault was due to wet air freezing in the first stage and it could easily have happened in the third tank as well had I used it.*

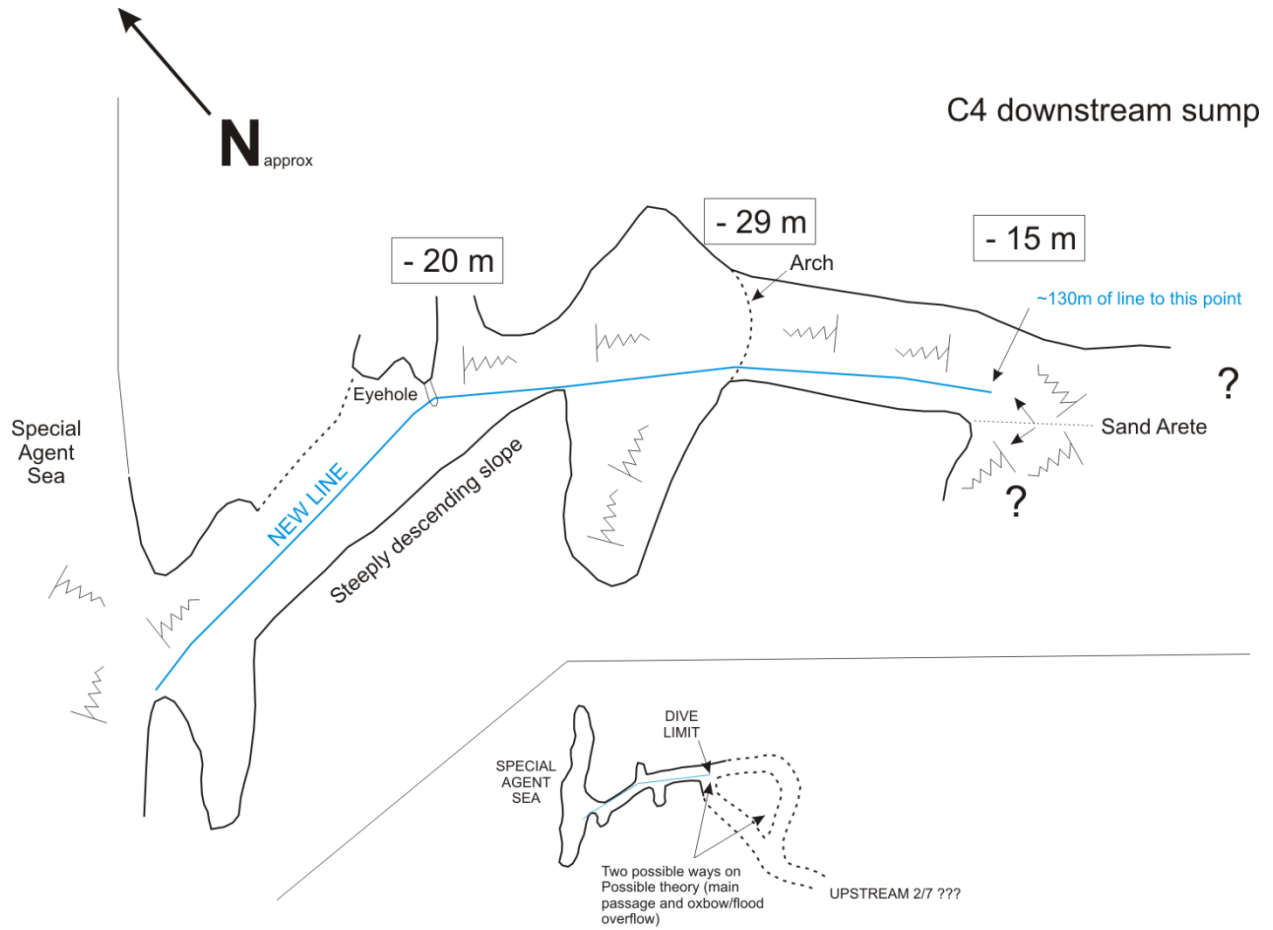
*When at the far point in a dive exploration dealing with a single failure is difficult. I had missed identifying two faults.*

*I also took a risk by not making a decompression stop. I discovered the second failure as I was ascending and I decided the surface was the safest place to be. I had been at an average depth of -18 m for 25 minutes which for an altitude dive is equivalent to diving being at almost 25 m, so at the edge of the decompression limits.*

*As for the dive, the way on is open in two directions at -18 m. It keeps rising and there is a passage on the right. I think the right hand route is the normal flow direction arriving in the passage described as “deep water before climbing up and over to the sump”. I think the passage above is the flood rising. However I didn’t have much time to look due a few technical hitches.*



**Plate 19** – Paul Mackrill diving into *Special Agent Sea*. Photo by Paul Diffley



**Plate 20** – Sketch of sump (top) and theory as to what lies beyond the current limit (below). Sketch by Paul Mackrill (Re-drawn for report by M Bottomley)

More dives are planned for the 2017 expedition, where a concerted effort will be made to push the downstream sump to a connection with 2/7.

## **Tackling the head of the Monster: C4 rope snag and accidental stranding**

*This year saw the re-rigging of the top pitch of the 160 m Monster Pitch; previously it had been necessary to cross from one side of the stream to the other as it cascades over the lip at the head of the shaft but a route was pioneered which followed the stream right (looking downstream), so avoiding the worst of the water.*

*The re-rig was extremely successful, it utilised sound rock which was uncovered from beneath the piles of loose choss that extend below the large open passage above and to the right of the pitch head, to provide a traverse, followed by a "Y" hang, that drops you neatly down for approximately 8 m to a deviation. This deviation gives you a 2 - 3 m offset and 6 m below it you pass a second deviation, with a further 1.5 – 2 m offset, below the second deviation is approximately another 8 m to the first of many rebelay (this one is another "Y" hang. Both deviations take you further out, away from pitch head and help to keep you away from the descending stream - they also keep you neatly on the top face of sloping diagonal flake (whilst in descent anyway!).*

*This rigging worked really well with no apparent problems, everything seemed good - that is, until Miri & Duncan came to exit the cave after a two day camp. They had photographed their way up the Monster but when Miri reached the rebelay below the deviation, she noticed a problem. The rope above her was completely taught and ran straight up through both deviations but then immediately after the highest one, went completely horizontal for 3 m and was held in place below the sloping flake by some sharp looking undercuts. From the undercuts, it then went vertically straight up to the top "Y" hang. Miri felt that even if she was able to get onto the taught rope (with no loop available, or slack to pull one down), the undercuts could well have been sharp enough to cut or severely damage the rope. She took some photographs of the snagged rope and wisely decided to descend with Duncan back to camp.*

*Plainly the last person to ascend the pitch above Miri had passed both deviations but after passing the upper one, had swung out horizontally across the face of the flake instead of balancing on its sloping upper face. It wouldn't have been obvious at the time, or when looking back down the pitch, that this had caused a problem. Everything would have looked normal from above, all be it the rope was no longer on the top of the flake but it would not have appeared caught across the face by the undercuts.*

*When Matt and I arrived at camp we were met by Miri & Duncan, both were a little disappointed at having prussicked a couple of hundred metres - only to have to abseil back to their start. They were resigned to a long wait for help to arrive from above but in really good spirits and supplied us with very welcome feast of hot drinks, cheese and chorizo!*

*Neither Matt, nor I was keen on an enforced stay at what was going to be a very crowded camp (the diving team would be returning from the sump later); so after studying the photos of the snagged rope, we hatched a plan.*

*There was a 60 m dynamic rope at camp, we figured that we wouldn't need all of it, so promptly cut it in half and decided that we'd at least attempt to climb the upper pitch of the Monster to free the snagged*



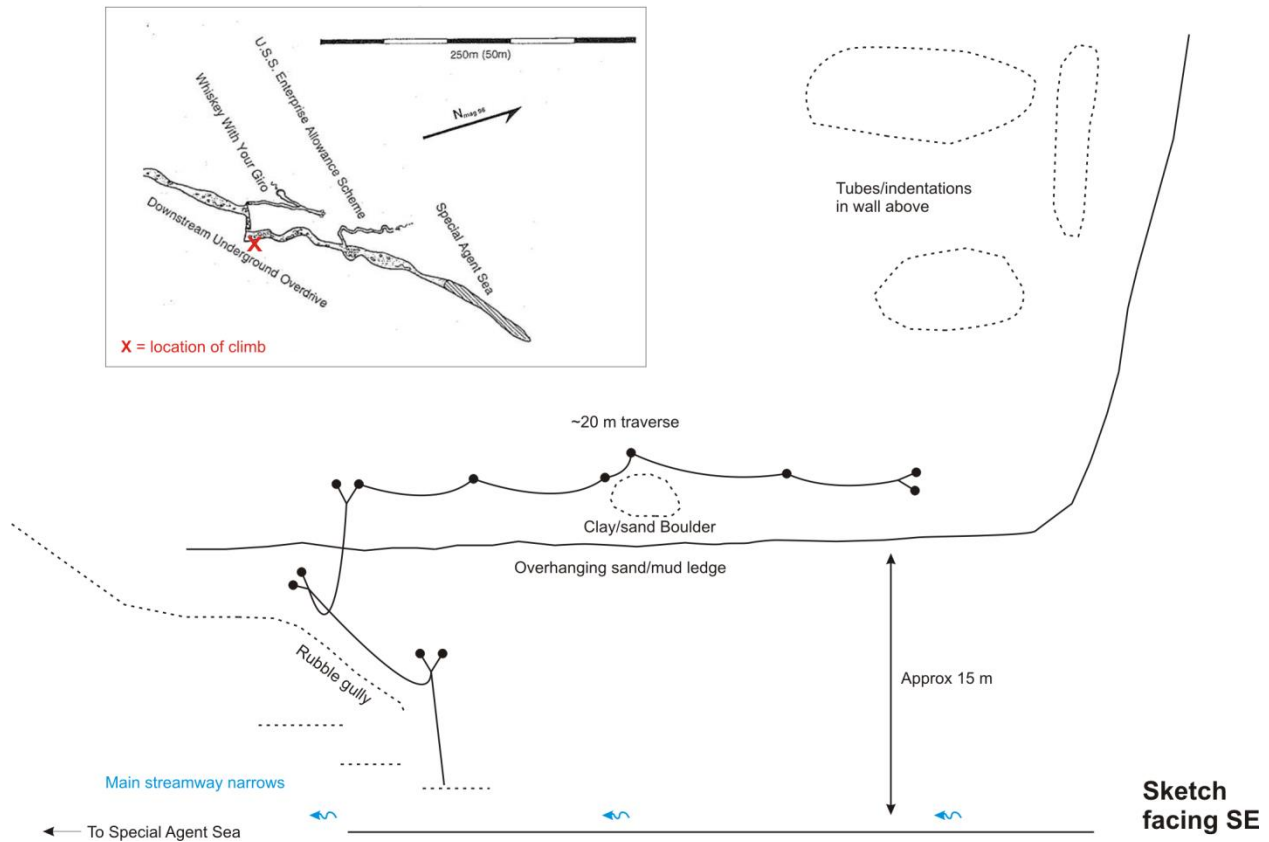
*rope. With half a plan we set off from camp, Matt following close behind carrying both our personal tackle bags and me with the rope.*

*The plan was to attach the dynamic rope to the "Y" hang below the snagged rope, then for me to climb/prussick (gently) up, whilst self belaying through my stop. Any fall would have been quite scary but hopefully not too damaging and I would be able to use the two deviations as runners for the dynamic rope. I have to say it worked - although I did have a pretty dry mouth and according to Matt I sounded quite stressed when I answered his question as to how I was getting on! I'd envisaged being able to flick the rope free after passing the first deviation; in-fact even after the second deviation I still couldn't and the undercuts were well out of my reach. It was time to modify the plan slightly, I took in all my weight through the stop, with the dynamic rope now running down to me via the top deviation and was then able to abseil across the face of the flake and finally release the snagged rope. Job done, quick inspection of it revealed no obvious damage, so I clipped my jammers on and we were virtually out.....apart from a 250 m 'ish prussick!*

*We left the dynamic rope in situ just in case and as reminder to take care on this pitch. Can the problem be alleviated for next year - yes almost certainly. We could merely use the dynamic as a type of cantenary cable, clipping a cowstail into it to avoid going across the face of the flake. We could add a third deviation above the top one, although the angle may be rather severe, or we could convert the upper deviation into a rebelay without too much loop. It's hard to be certain without actually being there exactly which option will work best but we probably should do something to avoid an unwitting repeat drama.....!*

*Tom Chapman (2016)*

## Bolt climbing near the downstream sump



**Plate 21** – Sketch of climb in *Underground Overdrive*. Drawn by Mike Bottomley

During the 2015 expedition, a phreatic tube was noticed in the roof of *Underground Overdrive* roughly 150 m before *Special Agent Sea*, which appeared to both coincide with a change of passage direction and increase in draught. As such, it was felt this area warranted further investigation. It would appear that the roof tube was also noticed during the 1997 expedition, during which the draught was traced up some avens above *A Hard Days Knight* - a high-level chamber found by climbing up at the junction with the '*USS Enterprise Allowance Scheme*' inlet. However, a dark void beckoned from the roof which certainly hadn't been investigated previously, and since this was opposite the roof tube it was decided to take a look to see.

Phil Baker, Dave Ottewell and Helen Blyth went to investigate the lead on Monday 5<sup>th</sup> September during a trip to mark the route through *Underground Overdrive* to make route finding easier for future trips to the sump. A climb was undertaken to a point roughly 10 m above the floor, from where a long traverse

would be required to gain the corner opposite the roof tube. It was decided that a smoke test would be useful before committing to what looked to be a complex climb.

The area was next examined by the team who went to retrieve the dive kit from the sump on Friday 9<sup>th</sup> September. All agreed that the draught did strengthen considerably in the passage below the roof tube, but the smoke test carried out suggested the draught to disappear downstream as opposed to in the roof. Nevertheless, the void in the roof did look interesting and so it was decided to finish the climb.

Mike Bottomley & Shane McKinley returned the next day after spending the night at underground camp. Mike climbed with Shane belaying, with straightforward progress back to Phil's high point placing a small number of bolts for protection. Mike then bolted the traverse, which didn't take too long given the excellent rock and a substantial sloping ledge to progress along. However, since the ledge was overhanging and looked to be made up entirely of mud and sand, care was needed.

The traverse was roughly 20 m long, and led into a corner of the rift below some interesting holes and indentations in the wall above. One of these did look like a continuation of the phreatic roof tube, but it was difficult to ascertain from below whether it carried on or closed down. Unfortunately, a lack of bolts and rope curtailed further progress, but since the first roof tube looked to be only 6 to 8 m up, only one more climbing trip should be required during the 2017 expedition to thoroughly check this area. There didn't appear to be a draught here, but given the very large size of the rift it would be difficult to be sure. A superb view back down the rising phreatic tube could be seen from Mike's high point at the end of the traverse.



**Plate 22** – Overlaying the survey data onto topographical and geological maps reveal a fault (thick black line) crossing at the location of the downstream sump climb ('kink' in *Underground Overdrive*). From maps created by Martin Laverty (OUCC)

## **The Valley of the Dry Bones**

It had long been an enigma, investigated sporadically by Oxford University Cave Club expeditions for at least 20 years – ‘The Valley of the Dry Bones’, a line of mysterious shakeholes emitting a strong draft near the path from Ario to the Canal de Trea, close to the edge of the Cares Gorge. In 2016, the Ario Caves Project team paid it some serious attention. It is now evident that it deserves a whole lot more.

The actual ‘Valley’, a straight ravine in the hillside, is quite short – no more than 100 metres long. At the bottom end, in the side of a low cliff about 200 metres from a bend in the Trea path, is the first Dry Bones entrance OUCC examined, ‘Jenga Pot’. As with all the holes associated with this feature, to say it emits a draft is a large understatement. In fact, blowing out from Jenga on a warm, September day is a bitterly cold wind, a few degrees above zero degrees Celsius. If you stick your head down the hole, you will hear what sounds like a roaring stream. It isn’t: the sound is being produced by the movement of the air. This, it seems clear, must be coming from somewhere deep within the mountain.

Jenga Pot has a bolt by the entrance and consists of a short pitch down into a boulder choke in very loose rock. Valiant attempts to pass this were made by OUCC in the nineties, but it seemed that major engineering would be needed to make further progress. Just uphill from it is another, apparently promising hole, which follows steeply angled, thin bedding planes underground. Beyond a squeeze, it too ends in a choke, which must be very close to Jenga. Here again the draft is formidable, blowing plants about by the entrance.

At the top of the Valley is a round hole excavated by the ACP in 2014, with a large rubble spoil heap next to it. This looked promising. A short drop in what looked like water-worn rock dropped into a rift. However, this too soon degenerates and is choked by loose rock. After a day spent digging in this hole in 2016, a small group of us formed the view that the entire Valley is formed above a large choke. On that basis, the higher up one went, the more loose rock there would be to dig through. The 2014 diggers thought the top entrance was a good project, but we felt this was too optimistic.

However, it is clear that the Valley itself is just a part of a major fault that extends from far up the mountain, from the rocky basin below the summit of Jultayu, the Jou de Jultayu. By following the line of weakness downhill, in 2016 we discovered further entrances, all emitting the same, remarkable draft, some distance below the end of the Valley – in other words, closer to the Trea path.

The most interesting is located next to an iron stanchion poking out from the hillside, and has been named, at least for now, Iron Bar Pot. So far, this appears to be entirely in solid rock. We fixed a bolt to facilitate hauling buckets of spoil and removed several tonnes of rock from the entrance climb, a drop of about 4 metres. At the bottom is a narrow slanting fissure from which emanates the draft. It will require enlargement, but it merits further work. Other entrances were discovered on both side of the fault line and some distance above it. In one, stones rattled down a narrow fissure for several seconds.

The potential of this area appears to be considerable. The Valley of the Dry Bones lies in an area within about 200 metres of both the lower reaches of 2/7 and Pozu del Xitu. There are no major inlets on the true left bank of the 2/7 stream passage, the major collector for this part of the Picos. But if the Dry

Bones fault does represent a 'third system' draining the Jou de Jultayu, it may join the 2/7 stream below its current terminus at Choke Egbert. It may thus permit a connection to Cueva Culiembro, where the way on beyond the four main streamway sumps was left wide open by a Cave Diving Group team in 2010. If we are lucky, this putative system might also a way to reach the downstream end of Choke Egbert from below, and hence, perhaps, to pass this longstanding obstacle.

It will be worth expending further effort to try to find all this out, both in and around Iron Bar Pot and, potentially, in the Jou de Jultayu.

*D Rose (2016)*

### **Two new finds of variable impressiveness**

**0343088 4788933 - Adult Supervision Pot**, found on a return to the lower end of the valley below and North of Pico Gustuteru where DO, MB and PB had already located three surface sites of potential interest with hammer, bar and DO for location guidance and hammering. Dave and I pulled some rocks out of the hole he was most interested in due to the chilly draught which was very evident on a day with high surface temperatures but less so in cooler conditions. When I climbed up the Western wall of the valley, a more appealing site revealed itself; loosely perched triangular rock floor between the one solid wall, a pile of larger boulders and the flattening out of the valley flank. The black space below the solid wall revealed a slight void beneath the moss-covered rocks of the floor, through a thin enough gap that it could never have been previously visited by a human, which dropped to a snow pile some metres beneath.

MH returned with SH the following day, to spend a long time hammering down the obstructing rock which was preventing access to squeeze under the four foot cubed rock to gain the broader section of the shaft. One natural anchor round huge boulders was used in conjunction with one through-bolt placed in the solid wall to produce adequate but distinctly sub-optimal rigging. This was still something of a fight in a borrowed SRT kit and several attempts were required before the final, successful one.

A descent of around 8m while looking up at the rope rubbing above was enjoyed to land on the snow patch which occupied most of the floor. The marbled walls of the Western side of the shaft were particularly fine but the obvious drainage exit was to the Eastern side, closest to DO's original site. Scope for further progress minimal; some serious attention to modify the four foot cube rock and improve the rigging would be advisable but with the 80% coverage of the floor with snow and the rocks plugging the apparent direction of drainage, it would at best be a long-term dig and further work on DO's site next door would be a better use of time.

**Adult Supervision Pot**

grid ref:0343088 4788933

plan view

**Plate 23** – Survey of Adult Supervision Pot (Drawn by Martin Hoff)

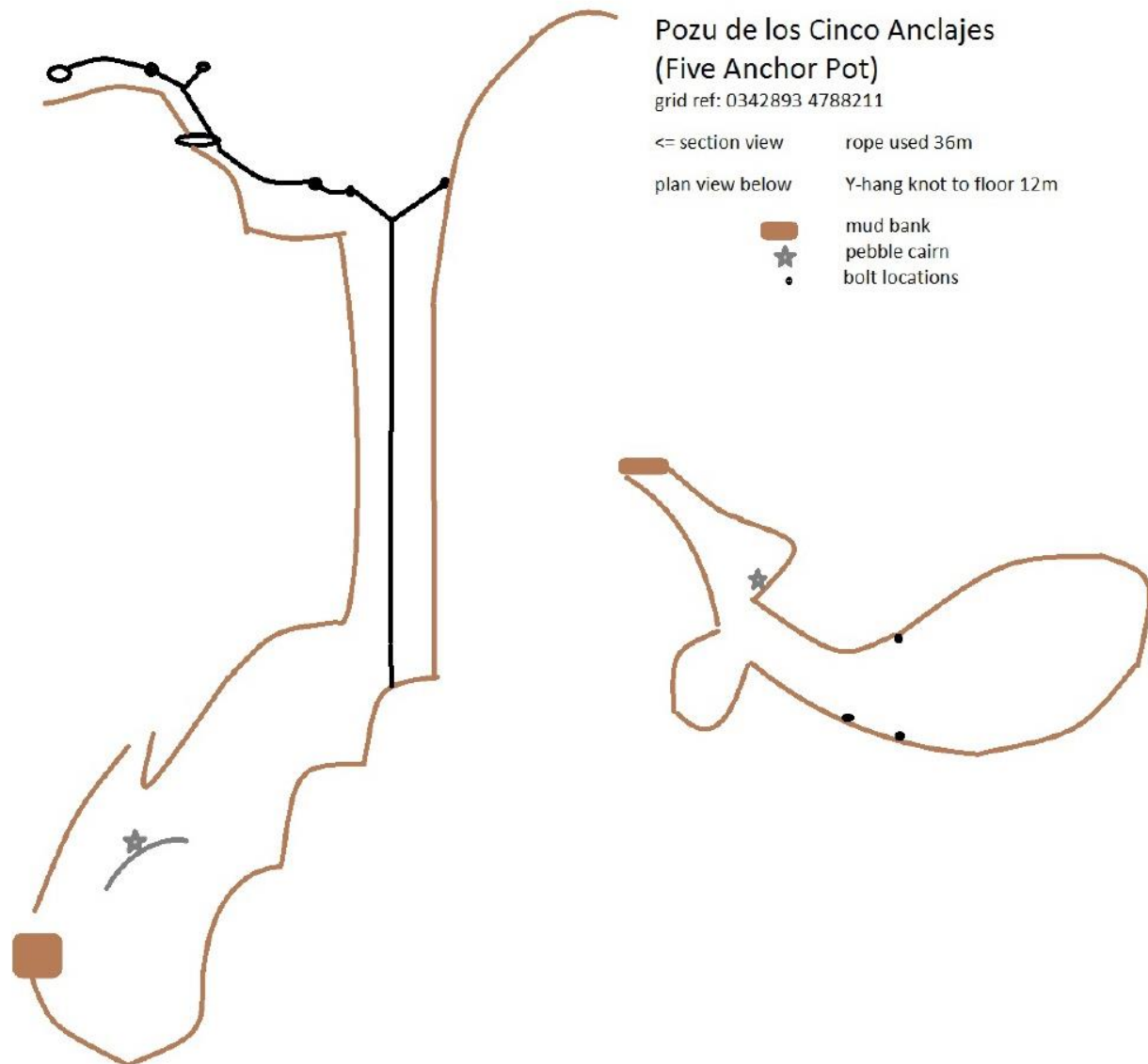
**0342893 4788211 Pozu de los Cinco Anclajes (Five Anchor Pot)** , found while quartering the area around C4 on surface walks to improve understanding of the surface topography and cave entrance locations. A gaping entrance two metres wide and several metres across found at the upper edge of a well water-worn exposed limestone surface feature, this appealing entrance allowed for a nine second rumble when rocks were thrown down the entrance in the right place, though the conjectured possibility that they could just be rolling down a slope of other rocks later proved correct. Despite the obvious appeal of the site, no markings or other artificial rigging signs were visible and the closest identifiable waypoint from the collected grid ref and GPS data was over 100m away.

Resembling a four-sided funnel in a well rounded off surface feature, options for naturals for a starting point for rigging were minimal. One sketchy natural at a distance was rigged to a pair of through-bolts in exposed limestone surfaces to enable safer descent down to the upper ledge level. A third bolt in the right hand (W) wall provided enough security to reach the right point for two further bolts to provide a broad Y-hang between the two walls, each arm of the Y being about a metre long. It would be a stretch for anyone much under six feet tall to rig comfortably.

Descent from the Y-hang between glistening green walls to a smooth mud floor, broken with short rock steps and leading to the slope of rocks that depth-testing rocks had rolled down. Further downslope reached an apparent junction, left was just an aven reaching halfway to the surface, right turned a corner and dropped down into a mud-floored chamber only a few metres across. At the deepest point of the chamber, the mud rose up the other side to build a mud bank which looked like it blocked further progress. Plenty of washed grass debris, and a small rock cairn was left on a mud bank to the right when descending. Total depth around 25 m below the Y-hang, the rope descent being 12 m Y-hang knot to

floor. All nuts were removed from through-bolts and sole scope for progress is to embark upon removal of the mud bank to see how far it stretches.

If neither of these sites is an obvious must-return-immediately prospect, the ease of identifying unexplored sites, even after all the traffic that the area has had over the decades, should be recognised as being of interest.



**Plate 24** – Sketch survey of Pozo de los Cinco Anclajes (drawn by Martin Hoff)

*M Hoff (2016)*





*Egbert* although this would still involve a fairly long trip. A climb was started during the 2016 expedition, which should be simple to finish during the 2017 expedition in order to investigate some holes and indentations in the wall (as shown in Plate 21). If these leads close down, then it would be interesting to look at the avens located above 'A Hard Days Knight' (the chamber found during the 1995 expedition, and up which the draught was traced during the 1997 expedition), which may provide a higher-level route into 2/7, as there are avens dropping in on both sides of the sump (e.g. *Pieces of 22* in upstream 2/7) and so a high-level passage linking vertical development on both sides of the sump could exist. 27/9 is an interesting pothole with a strong draught which will be worth pursuing as it is currently about 100 m deep, and could well be heading towards the avens above 'A Hard Days Knight' or 'Pieces of 22' as suggested by its location on the surface.

The new upstream series of *Underground Overdrive* – *Underground Hyperdrive* – contains a number of excellent leads for the 2017 expedition. One of these is a long inlet, which appears to be heading straight for the end of F64, roughly 350 m away, and looks to be roughly aligned on the fault which controls the main *Underground Overdrive* streamway. We already know that the F64 streamway definitely flows to *Underground Overdrive*, from the results of a dye trace carried out during the 1996 expedition. The other inlet, *Tinkle Tankle Passage*, appears to carry the main flow of water in normal conditions and has a powerful draught, but is very small and immature, suggesting there could be a larger, higher-level passage which has not yet been discovered. It is possible that the 26 m waterfall inlet and huge aven discovered in the main chamber (*The Sanctuary*) could lead into passages associated with this inlet, coming in from the large blank area to the north. The nearest major system is Vasco, located approximately 700 m to the north-west.

However, it is possible that the hammered inlet and huge aven are related to F64 and/or other potholes entering the system at this point – the chilling draught felt at the base of the huge aven points to a surface connection. If this was the case, then the inlet currently heading towards F64 may be associated with an undiscovered cave entering from Area E on the flanks of Verdelluenga.

### **Other work carried out during the 2016 expedition**

A number of other sites were also visited during the expedition, including 13/9 – a massive shakehole located at 0343108 4787889 (OUCC shaftbashing guide grid reference). Any cave associated with 13/9 could well drop into *Canals on Mars* in upstream 2/7, but a visit by Richard & Sara Gregson, and Martin Hoff on Wednesday 7<sup>th</sup> September found it to be snow plugged beneath a ~25 m pitch.

Mike Bottomley, Phil Baker and Dave Ottewell enjoyed a day examining the sea of limestone that flows down from the summit of Verdelluenga and which contains the entrance to F64 amongst many others in Area E which are logged in the OUCC shaftbashing guide. The entrance to E14 was found and judging by its description would be worthy of a look during the 2017 expedition, as it is poised over the end of F64

and ends in a too-tight rift with a pitch beyond and sound of running water. Numerous shakeholes below E14 were examined, and many found to draught very strongly!



**Plate 26** – Dave Ottewell at entrance to E14. Photo by Mike Bottomley

## Expedition accounts

The table below summarises the accounts as 'handled' by the expedition (*personal items such as flights, hire cars etc not included*):

ITEM	INCOME	EXPENDITURE
Expedition fee (£75 each)	£1,575.00	
Ghar Parau Grant	£400.00	
Equipment expenditure		£1,856.03
Communal food (£25 each)	£575.00	£414.41
Donkeys to bring equipment up the hill (£100 per time)		£300.00
Additional fee to cover unexpected expedition outlays (£15 each)	£345.00	£286.00
<b>TOTAL</b>	<b>£2,895.00</b>	<b>£2,856.44</b>

## Objectives 2017

Below is a brief summary of the main objectives for the 2017 expedition, which is hoped, will take place during June/July:

- Establish a camp in *The Sanctuary* (the large chamber found during the 2016 expedition). This will provide an excellent base for multi-day pushing trips in the new upstream extensions as well as the downstream sump. The main leads in the new upstream extensions include:
  - 1) 26 m waterfall inlet (bolt climbing project)
  - 2) 100 m+ aven (major bolt climbing project)
  - 3) waterfall climb at end of *F64 inlet* (bolt climbing project)
  - 4) Possible capping project in *Tinkle Tankle Passage* if way over top of too-tight rift cannot be found
- Diving *Special Agent Sea*. The camp in *The Sanctuary* can be utilised for this, and so gives chance for several dives if required. Prospects are very good for a connection with 2/7.
- Complete bolt climbing project in vicinity of phreatic roof tube, located ~ 150m upstream of *Special Agent Sea*, which ended this year beneath interesting tubes and indentations in the wall above. Examine avens above *A Hard Days Knight* if this lead closes down.

- Have another look at the end of 27/9, which is currently around 100 m deep and may link in with avens either side of *Special Agent Sea* (most likely *Pieces of 22*, a dry inlet on the 2/7 side of the sump).
- Have another look at current limit of *E14*, which is likely to drop into the end of F64 or just beyond. Currently ends at a too-tight rift, beyond which is a pitch and sound of running water.
- Continue work in the Valley of the Dry Bones when possible (i.e. days off from working in C4).
- Continue re-investigating known sites from the OUCC shaftbashing guide, particularly ones which ended in snowplugs 20 to 30 years ago. For example, F88.

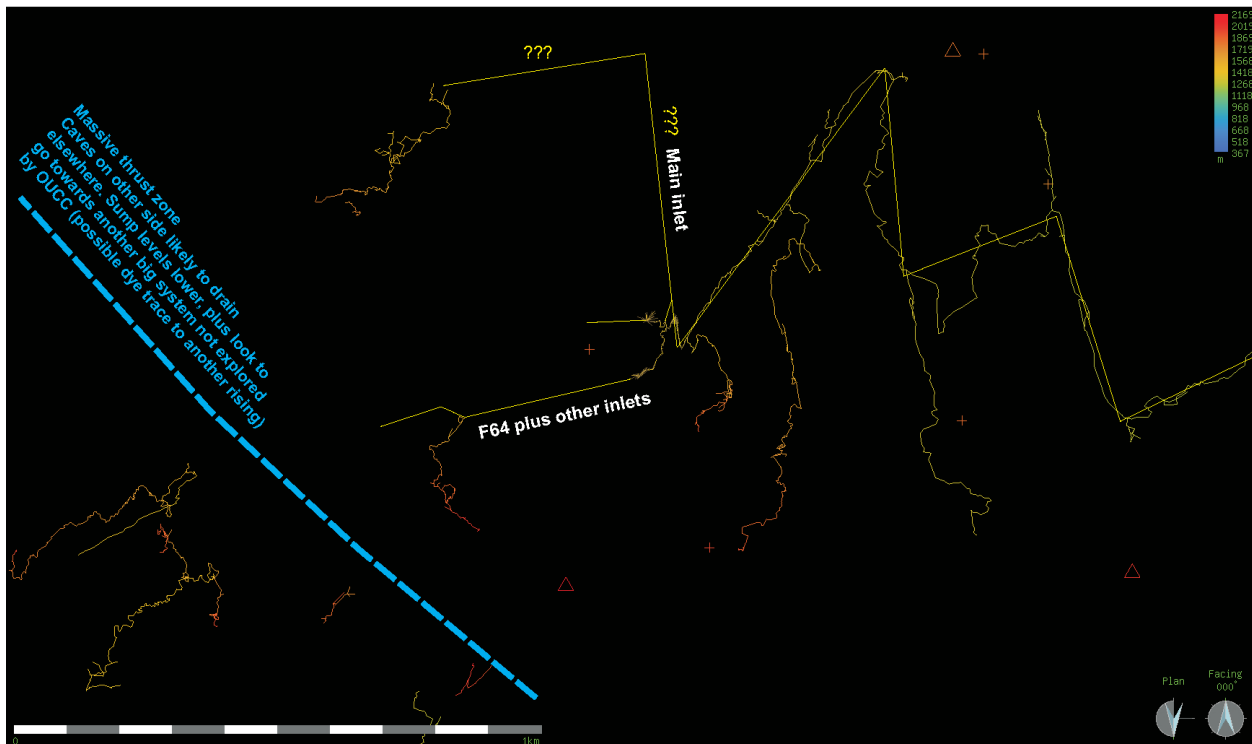


Plate 27 – One theory as to what ‘may’ lie ahead. Artistic license by M Bottomley

### Further information

Further information can be found at the following links:

[www.ariocavesproject.com](http://www.ariocavesproject.com)

[www.oucc.org.uk](http://www.oucc.org.uk)

[www.facebook.com/ArioCavesProject](https://www.facebook.com/ArioCavesProject)