

Oxford University Cave Club Asopladeru la Texa Expedition



1st July to 9th August 2005

Final Report

Report prepared by members of the Oxford University Cave Club, Asopladeru la Texa 2005 Expedition. Edited by Gavin Lowe.

This report is available online via <http://www.oucc.org.uk>. For further information and/or copies of this report, contact:

Gavin Lowe
67 Pinnocks Way
Oxford OX2 9DD
(01865) 864819
gavin.lowe@comlab.ox.ac.uk

Cover photo: Hilary Greaves crossing the pool, at the start of the extensions in Asopladeru la Texa. (Photo: John Pybus.)

Contents

1 Expedition Members	1
Expedition Committee	1
Members	1
2 Acknowledgements	2
3 Summary	3
4 Expedition diary	7
5 Asopladeru la Texa: description and rigging guide	10
6 Pozu Chicago: description and rigging guide	18
Location	18
Entrance Series	19
7 Small caves explored	21
8 Science	27
Dye tracing	27
On draughts and streamways	27
2005 observations on the Culiembro drainage	30
GPS observations of the same position over time: an assessment of GPS accuracy	33
9 Personal stories	36
Songs of Praise	36
Beyond the Pool	38
Derigging camp, 25–28 July	43
10 Medical report	46
11 Summary of accounts	47
Income	47
Expenditure	48
Personal expenditure	49

1 Expedition Members

Expedition Committee

Leader:	Gavin Lowe
Secretary:	John Pybus
Treasurer:	Gareth Phillips
Sponsorship Officer:	Rosa Clements
Equipment Officer:	Simon Goddard ¹
Assistant Equipment Officer:	Al Wilson ¹
Medical Officer:	Mike Hopley

Members

Genni Archetti ²	Anita Milicic
Chris Cooper (pod)	Xavi Mor ²
Pip Crosby	Geoff O'Dell
Pete Eastoe	Neil Pacey ⁴
Tom Evans	Lee Paskin
Dani Ferrer ²	Chris Rogers
Chris Fernau	Francesc Rubinat ³
Hilary Greaves	Marc Rubinat ³
Martin Hicks	Eduardo Ruiz ³
Keith Hyams	Harvey Smith
Martin Laverty	Pete Talling
Fleur Loveridge	John Wilcock
Paul Mackrill	Paul Windle ⁴
Lidia Mateo ²	

¹Did not travel to Spain.

²Equip de Recerques Espeleologiques del Centre Excursionista de Catalunya (ERE del CEC).

³Secció d'Investigacions Espelològiques del Centre Excursionista Aliga (SIE).

⁴Red Rose Cave and Pothole Club.

2 Acknowledgements

We would like to thank the following for their support, without which this expedition would not have been possible:

- The Federacion Asturiana Espelologia and Picos de Europa National Park for permission to cave and camp.
- The Gordon Foundation for the loan of a Land Rover;
- Oxford University Expeditions Council for financial support;
- The Ghar Parau Foundation for financial support;
- The Oxford University Society for financial support;
- The A. C. Irvine Travel Fund for personal financial support;
- The Royal Geographic Society with the Institute of British Geographers for recognition.

Many thanks also go to the following companies for food sponsorship:

Anglo-Dal	Frumba
Bahlsen	Golden Wonder
Bendicks	Haribo
Betty's of Harrogate	Humdinger Ltd
Billington's	Kavli
Burnt Sugar	Lyme Regis Foods
Colman's	Morning Foods Ltd
Community Foods	Mr Mash
Devonvale Bakery	Ringtons
Farmhouse biscuits	Sreen
Foster's Traditional Foods	

Thanks are also due to Lyon Equipment and Dragon Caving Gear for help with equipping the expedition.

Thanks are also due to the following individuals: Juan José González Suárez of the FAsE, Simon Goddard, Al Wilson, Steve Roberts (Home Agent), Lou Maurice (Dye Tracing Advisor), Josep Guarro (SIE), Paul Swire (Beardy), Helen Blyth and Stuart Marshall.

3 Summary

The Oxford University Cave Club, Asopladeru la Texa Expedition took place in the Picos de Europa in Northern Spain from the first of July to the ninth of August, and comprised 25 British and nine Spanish members. The expedition was a great success, finding significant extensions to the cave Asopladeru la Texa: 750m of new passage was explored; the depth was increased from 794m to 888m; and the depth of the Tormenta-Asopladeru system was increased from 967m to 1060m. Eighteen members of the expedition made it to the underground camp, most of them reaching the bottom of the cave. Further, a continuation was found in the cave Pozo Chicago.

Asopladeru la Texa was originally explored by the SIE from Barcelona between 1995 and 1998. They explored down to a depth of nearly 800m, where they encountered a large, deep pool. In 2003, OUCC connected Pozo Tormenta with Asopladeru. The main aim of this year's expedition was to continue exploration at the bottom of Asopladeru.

The expedition land rover and trailer left Oxford on the first of July, and, after a long drive through France and Spain, arrived at the base camp of Los Lagos two days later.



*The advanced team, about to leave.
(Photo: JP.)*

The advanced team were keen to make fast progress, and so gear was quickly carried up the hill, and caving started the next day. Neil, Mike and Pete rigged the two entrance pitches, into *El Meandro del Guaje*: a narrow rift, containing two short but narrow pitches. The next day, Gavin, Gareth and Tom continued, rigging the two large pitches beyond, *Siniestro Parcial* and *¡No Hay Cristal!* Rigging was made easier by the fact that the SIE had left rope for most of the pitches in situ, which we were able to use.

Hilary and Anita were next: they rigged along a short rift section, and then down a 50m pitch, *El Jardinet*; more rift followed, leading to a 17m pitch. The next day, Gavin and Paul rigged the following pitch, the 80m *Pozo Acrobático*; the bottom of the pitch swings into a window, leading to a series of eleven short pitches in a rift, *Pous Elèctrics*. Hilary and Lee continued the next day: they rigged down the 80m pitch beyond, followed by three shorter pitches, all in an impressive shaft; at the bottom, the cave changed character, entering a chossy, phreatic series; they rigged a traverse above a blind pot, and two short pitches.

Gavin and Paul returned the next day: they rigged five more pitches in the phreatic series, before suddenly breaking out at the top of a large chamber.

They descended two pitches, to meet the Tormenta streamway — much larger than any streamway seen higher up. Three more pitches followed, down to the impressive chamber of *Sala Ostón*. Here, the streamway descends two pitches, to meet a much larger streamway, believed to be the water from Cabeza Muxa. However, the way on is a traverse above the streamway, followed by a climb up and an aerial tyrolean traverse, leading into the large phreatic passage that was to be the site of the underground camp. The pair had time to check the way on: at the end of the camp passage, the Spanish explorers had descended a series of pitches; however, Gavin spotted a black hole on the far side of the shaft, an apparent way on.



The camp passage. (Photo: JP.)

Meanwhile, many other trips were going on, portering all the gear for the underground camp down the cave.

The first camping team, Lee and Pip went in on the tenth of July, carrying the huge amount of gear needed to establish the camp, from where the porters had left it. Lee made a bold climb and traverse, *Songs of Praise*, over the top of the pitch beyond camp. The traverse led to a series of phreatic passages, the *Mud Mines*, which they explored to the top of a 15m pitch.

The next day, they were joined by Neil and Paul. Lee and Pip descended the Spanish pitches beyond camp to the previous limit of exploration: a deep pool of water; they were able to confirm, however, that there was a way on, although it would require swimming or floating across the pool. Meanwhile, Neil and Paul rigged the pitch in the Mud Mines. Beyond was a large, very muddy, phreatic passage. They followed this, past the top of a pitch, estimated to be 40m deep, to the base of a climb. They were joined by the others, and all four of them thought they could hear a dog barking and a man shouting! They named the climb *One Man and His Dog*.

The next day, while Lee and Pip headed back to the surface, Neil and Paul bolted up One Man and His Dog. At the top, a large phreatic passage led to the top of a short pitch. While Paul started bolting, Neil returned to camp to collect more tackle. On the way back, he heard a ‘tap, tap, tap’, and saw Paul’s light above, at the top of a climb: they had gone round in a very large oxbow. The pair surveyed the new finds, back to the traverse.

The next camping team, Hilary and Gavin, started by descending the 40m pitch in the Mud Mines. Unfortunately, this just reconnected with known passage, dropping in shortly before the pool. Undeterred, the pair continued to the pool. Here, they found a small passage leading off in the other direction, which they followed, in preference to getting wet. The passage broke out into a

chamber, with passages going in both directions. Both ways descended climbs and short pitches before reuniting in another chamber. A way led down through boulders into continuing small passage. Suddenly some water was met, and the passage turned a corner through a duck; there was no way to keep dry, so Gavin ducked through, and found . . . a sump.

The next day, the pair decided that there was no option but to attempt the pool. Hilary made some floatation devices from tacklebags, dry bags and food drums, and volunteered Gavin to try them out. He floated across the pool . . . , and found a 5m diameter passage, heading off into the distance! A short pitch was descended, to meet another pool; thankfully, this was less deep than the previous, and could be easily waded, or less-easily traversed. Yet another two pools were reached, easier still. Suddenly the nature of the passage changed, as the mud was replaced by beautiful pristine calcite with stunning gour pools. The pair tip-toed through, doing all they could do minimise the damage. Two short pitches were descended, past more formations, until, over 200m from the pool, they called it a day.

Meanwhile, John and Pete had joined them at camp, and spent a day taking photos of the Mud Mines.

The next day, all four returned to the new passages beyond the pool. While John and Pete took photos of the formations, Hilary and Gavin descended two more short pitches, before, reaching a ramp leading up. At the top was a knife edge, the top of a 20m pitch. This was quickly rigged, to land in a muddy, choked area: suddenly things were looking less good. Gavin dropped a short pitch, to land in a pit, with no obvious way on. However, a strong draught blew up between the cracks in the floor. Ten minutes later, Gavin had removed the false floor, and descended onto a ledge overlooking a chamber. Hilary took over, and rigged to the bottom of the chamber. Ahead, she heard the sound of running water. Following the sound, they soon reached a small, immature and unpromising-looking streamway. They pressed on, and, 20m ahead, they suddenly broke out into larger passage, containing a big streamway. They quickly checked that the passage continued in both directions, before deciding to leave the lead for the next team.



The gour pools. (Photo: JP.)

streamway. They pressed on, and, 20m ahead, they suddenly broke out into larger passage, containing a big streamway. They quickly checked that the passage continued in both directions, before deciding to leave the lead for the next team.

The next day, Marc and Dani from the SIE headed down to camp. 10m beyond the previous downstream limit, they met a sump. In the upstream direction, they fared little-better, soon meeting a 10m waterfall.

Paul, Neil and Hilary tried to find a way on. They had brought an inflatable boat (*barco inflado*), for crossing the pool; unfortunately, it sprung a leak (*barco deflado*). They climbed up to a platform above the streamway. They also climbed up a ramp below the knife-edge pitch.



More gour pools. (Photo: JP.)

Gavin and Paul Mackrill climbed further in both these locations, attempted to scale the upstream waterfall, and climbed to a roof tube near camp. However, no way on was found.



The gear on the surface, after derigging. (Photo: HS.)

In other developments, Martin Hicks made a video of the expedition. A dye trace was attempted from the stream near camp to the new streamway, in an attempt to understand the hydrology of the cave.

The time had come to derig the cave; this was done efficiently, in three trips, until on the first of August, the twentieth-and-final tacklebag reached the surface.

Meanwhile, work was also going on in the nearby Pozo Chicago. Paul Windle and Gareth Phillips found a way over the previous limit, a too-tight rift, and reached the head of a pitch estimated as 50m deep. This pitch will take the cave to over 200m deep; our experience is that once caves reach this depth, they tend to keep going. A team will return in 2006 to continue exploration.

4 Expedition diary

Note: all trips were in Asopladeru la Texa, except where stated.

1–3 July	PE, TE, MHo, GL, NP, GP	Oxford to Los Lagos, with the Landrover and trailer.
4 July	PE, MHo, NP	Rigged to top of Siniestro Parcial at –120m.
5 July	TE, GL, GP	Rigged to bottom of ¡No hay Cristal! at –240m.
6 July	HG, AM	Rigged to top of Pozo Acrobático at –320m.
6 July	RC, LP	Acclimatization trip to –240m.
7 July	GL, PW	Rigged to top of P80 at –480m.
7 July	NP, LP	Portered camping gear to –400m.
7 July	PE, TE, MHo	Portered camping gear to –120m.
8 July	HG, LP	Rigged to –640m.
8 July	RC, MHo	Portering trip to –300m.
8 July	GL	Shaftbashing in Valle Extremero; found 26/10.
9 July	GL, PW	Rigged to camp at –760m; spotted traverse over start of Spanish Pitches.
9 July	CC, AM	Surface survey from Asopladeru to Tormenta.
9 July	PE, NP	Portered camping gear to –480m.
9 July	TE, JP	Portered camping gear to –320m.
9 July	KH, CR	Dug in Butterfly Cave.
10–13 July	PC, LP	Camping trip: established camp; rigged climb and traverse, <i>Songs of Praise</i> , over Spanish Pitches; explored start of the Mud Mines; checked pool at previous limit of exploration.
10 July	PE, MHi	Photography in entrance series.
10 July	KH, MHo	Portered bags to top of Siniestro Parcial.
11–14 July	NP, PW	Explored Mud Mines: rigged pitch; climbed One Man and His Dog to discover it was just an oxbow; surveyed back to Songs of Praise.
11–12 July	RC, HG	Camp at –400m; photography; re-rigged El Jardinet.
11 July	CC, TE, CR	Rigged entrance pitches of Pozo Chicago.
11 July	KH, GL	Portered camping gear to –400m; re-rigged Siniestro Parcial.

12 July	MHo, KH, GP, CR	Dug in Butterfly Cave; cave connected to hole in cliff.
13–17 July	HG, GL	Dropped pitch from Mud Mines, to reconnect with Spanish Pitches; explored passage leading off from pool chamber, descending to sump; floated across pool to discover large phreatic passage with good formations; pushed down pitches to discover lower streamway.
14 July	CC, TE	Familiarisation trip to top of ¡No hay Cristal!
14–17 July	PE, JP	Photographed Mud Mines and formations; joined HG and GL.
14 July	RC, MHo	Shaftbashing near Asopladeru; found and explored 68/4–70/4.
15 July	PC, KH, CR	Pozo Chicago: rigged to bottom of Disposable Belays.
15 July	JW	Prospecting in Area 4.
15 July	ML	Prospecting in Area G.
16 July	MHi, FL, PT	Videoining in entrance series as far as end of rifts.
16 July	NP, PW	Shaftbashing near Ostón; found 28/13–33/13
16 July	RC, GP	Pozo Chicago: rerigged Disposable Belays; rigged next pitch.
16 July	JW	Prospecting in Area 4.
16 July	PC, CR	Prospecting in Valle Extremero and Trea area.
17 July	FL, PT	Familiarisation trip to –320m.
17 July	PC, KH, CR	Chicago: rigged to limit of exploration; investigated pushing front.
17 July	TE, MHo	Portered gear to –240m.
17 July	ML	Prospecting in Area G.
17 July	PW	Prospecting near Top Camp; found 14/8, E23 and E24.
18–20 July	DF, MR	Surveyed from bottom of Knife Pitch into lower streamway; discovered suspected sump; began bolt traverse to investigate suspected sump.

18–22 July	HG, NP, PW	Used boat to confirm that suspected sump in lower streamway is a sump; finished survey of lower streamway; climbed above lower streamway, and at bottom of Knife Pitch, looking for sump bypass.
19–22 July	MHi, GP	Videeing camp: videoed beyond the pool on first day, between camp and the pool on the second day, and around camp on both days.
19 July	GL	Prospecting in Valle Extremero and Trea area; found 26/10.
19 July	JW	Prospecting in Area 4.
19 July	GA, RC, LM	Pozo Chicago: recce trip.
19 July	ML	Prospecting in Area G.
19 July	FL, PT	Prospecting in Area 4; found 71/4 and 72/4.
20–23 July	FL, PT	Videod between camp and the pool with MHi and GP on first day; aborted exploration on second day, after PT fell into pool.
20 July	GL	Prospecting in Area E; found C23 and E18–E22.
20 July	TE, MHo	Portering of gear to brew stop at –400m.
21–24 July	GL, PM	Continued climbs above lower streamway and at bottom of Knife Pitch: no way on found; unsuccessful attempt to ascend upstream waterfall.
21 July	ML	Prospecting in Area G.
22 July	RC, JP	Surveying and photography in Chicago.
23 July	ML, GO, PW	Dug G13; gained a couple of metres length and depth to a less-promising vertical dig in rock and animal bones.
23 July	RC, CF	Shaftbasing in Ario bowl; found 78/5.
24 July	GP, PW	Pozo Chicago: pushed through rift at bottom to find top of pitch, estimated as 50m deep.
24 July	RC, CF	Recce trip.
25–28 July	PE, TE, GO, HS	Derigging camp: derigged cave back to camp on first day; carried gear up to –400m on way out.
25 July	MHi, JP	Culiembro: videoing trip.
25 July	HG, NP, PW	Shaftbashing in Valle Extremero; found 27/10–29/10.
26 July	HG, JP	Pozo Chicago: surveying and derigging.

26–28 July	NP, PW	Derigging camp: carried gear up from camp to –480m on first day; derigged out from camp to –480m on second day.
28 July	GL	Helped NP and PW with derigging from camp.
28 July	RC, CF	Finished derigging Pozo Chicago.
30 July	GL, NP, GP, HS, PW	Derigged to –240m.
1 Aug	RC, GL, NP, HS, PW	Finished derigging.
3–6 Aug	RC, GL, NP, GP, PW	Gear carried down hill.
6–9 Aug	GL, NP, GP	Returned to Oxford.

5 Asopladeru la Texa: description and rigging guide

Location

From the Ario camp, cross the ridge between Cabeza Julagua and Cabeza Verde. Follow the path as it descends, skirting to the right of the bowl containing orange rocks. Leave the path, and follow the ridge above; this ridge turns left, and descends over a rock arch to a col. Follow the path to the right, and then turn off to the left to descend a scree gully. Continue ahead, contouring across the shoulder of the hill, above a gully to the left, to reach the top of another, shallow, gully. This descends steeply, onto a steep scree slope. Descending the scree slope reaches the cave, at the top of a large gully, overlooking the hill below Ostón. GPS 0345070 4789670, altitude 1369m.

From the entrance to ¡No hay Cristal!

The entrance pitch (P36) lands on a large snow plug; this can be descended to a boulder floor; traversing above a hole reaches the top of the second pitch (P42); care: the hole connects with the pitch.

The pitch lands on a boulder slope. Descend boulder slope and short climb; care: rocks dislodged from the slope fall down the climb. A short passage leads to a 5m climb, best roped.

At the bottom of the climb is the start of a rift, *Meandro del Guaje*. A point squeeze leads to the base of an ascending ramp, which leads to the top of a 5m pitch; the pitch can be bypassed by a constriction and two short climbs. Ahead

is a second short pitch (P7), with a constriction half way down; this pitch is also free-climbable, with care. Ahead, another ascending ramp leads to an awkward manoeuvre followed by a climb down into bigger passage.

A 57m pitch, *Siniestro Parcial* follows. This lands on a ledge overlooking a chamber. [The water disappears along a rift in the chamber.] The way on is to follow a gallery leading off from the ledge, which leads, after 20m, at the top of the next pitch, *¡No hay Cristal!* (P60). The top of the pitch is a saddle-edge, which requires straddling; part way down is a three-bolt traverse along a ledge to the left.

Pitch	Rope	Rigging
Entrance pitch (P36)	45m	3 bolts at top, bolt rebelay at -8m and -12m .
Second pitch (P42)	50m	Bolt for traverse, bolt, three bolt traverse at -4m , bolt rebelay at -8m , bolt rebelay with rope protector at -11m , bolt deviation at -15m .
C5	10m	Two natural back-ups, natural belay.
P5	10m	Bolt and spike belays.
P7	12m	Natural back-up; bolt belay.
Siniestro Parcial (P57)	70m	Bolt for backup, bolt, thread deviation at -3m , bolt rebelay at -6m , bolt rebelay at -35m , spike deviation at -50m .
¡No hay Cristal! (P60)	80m	2 bolts for backup, bolt, two bolts over “saddle” edge, deviation at -10m , three-bolt traverse at -19m , bolt rebelay at -22m .

¡No hay Cristal! to Pozo Acrobático

¡No hay Cristal! lands in a boulder-floored chamber. At the end of the chamber is an awkward 8m pitch down a rift. [This pitch can be bypassed by climbing down through boulders at the opposite end of the chamber.] At the bottom of the pitch, the passage soon leads to the top of a blind pot. The way on is to turn right, and climb over or crawl under an obstruction into a small chamber, where a 6m hand-line climb ascends. At the top is another, easier, hand-line climb.

Walking forward soon reaches the top of a 50m pitch, *El Jardinet*, split by a ledge half way down. This lands in a rift, with a small stream, leading to two 6m pitches. An old Spanish brew-site is passed, before the rift opens out to the left. [It is possible to follow the water ahead for some way.] The way on is to ascend 4m (hand-line useful) into a continuation of the line of the previous rift. This rift

is narrow at first. It again opens out to the left, but the way on is to continue straight ahead, until the top of the next pitch (P17) is met.

At the bottom of the pitch, penduling reaches a traverse level, leading quickly to the top of *Pozo Acrobático* (P67). This is split by a ledge at -30m . Ten metres above the floor, swinging right reaches a draughting window, *El Fet Diferencial*. [The way on at the bottom of the pitch is blocked; the water is lost at this point.]

Pitch	Rope	Rigging
P8	10m	2 bolts.
C6 up	10m	Natural belays.
C5 up	10m	Natural belays.
El Jardinet (P50)	75m	2 bolts, bolt rebelay, bolt rebelay at -10m , descending to ledge at -25m , 3 bolt traverse, bolt rebelay to left at -35m , where rift narrows.
P6	10m	Bolt backup, bolt.
P6	10m	Two natural belays.
C4 up	8m	Natural belays.
P17	32m	Two bolts at start of ramp, bolt at -2m , bolt at -5m , bolt at -9m .
Pozo Acrobático (P67)	75m	3 bolt traverse, 1 bolt, bolt rebelay at -15m , spike rebelay on ledge, bolt rebelay at end of ledge, bolt rebelay 10m lower, bolt rebelay at -56m by window, rope tied off to natural belay.

Pozo Acrobático to Cabó Mayau

The window on Pozo Acrobático is the start of a short tube, leading to the top of a 15m pitch, slightly constricted at the top. This lands in bigger passage, from where a 22m pitch follows almost immediately. An inlet enters at this point, the site of a brew-stop in 2005.

The passage continues ahead, as a series of eight short pitches, *Pous Elèctrics* (P14, P12, P16, P6, P10, P10, P7, P4), separated by fairly easy rifts. At the bottom of the final pitch, traversing forward leads to *Cabó Mayau* (P80).

Pitch	Rope	Rigging
P15	20m	2 bolts.
P22	30m	2 bolts, bolt rebelay at -11m .
P14	20m	2 bolts on balcony.
P12	18m	2 bolts.
P16	22m	2 bolts, spike and bolt on ledge at -10m .
P6	12m	2 bolts.
P10	20m	2 bolts, spike deviation.
P10	15m	2 bolts.
P7	11m	2 bolt Y-hang.
P4	7m	Natural back-up, bolt.

Cabó Mayau to the Tormenta Streamway

Cabó Mayau descends via two ledges before opening out into a magnificent shaft. This is followed by two short pitches (P7, P5), and a bigger pitch, *La Pica* (P25).

A rift descends a short climb, and traverses over a blind pot. Ahead, the ceiling dips to meet the floor, but there is a way on through a slot to the right. Scrambling and traversing leads over a blind 15m pitch, to a 13m pitch, followed immediately by a 9m pitch. This lands in a chamber where the SIE set up a camp.

A rift is then followed to the next pitch, *El Espajo* (P31). Further rift leads to two more pitches (P6, P10), followed by more rift and two more pitches (P2, P11).

Suddenly the end of the rift is met at a balcony overlooking a large chamber, with the sound of a streamway below. An 11m pitch descends to a ledge, with a small inlet entering from above. [To the right is a blind pitch of about 12m.] The way on is through a “door”, at the top of a 27m pitch; another small inlet is met just beyond the door. The pitch lands on a large ledge at -20m , where the Tormenta water enters. A final hang down a wide rift passage lands in the streamway.

Pitch	Rope	Rigging
Cabó Mayau (P80)	105m	2 bolts, wire belay, bolt rebelay at -9m , bolt rebelay on ledge at -12m , rebelay off huge spike at -22m , spike rebelay at -35m .
P7	10m	Bolt and spike Y-hang, spike rebelay.
P5	8m	Two spike belays.
La Pica (P25)	40m	Bolt back-up, spike belay, spike belay for main hang, deviation at -6m from distant spike, spike rebelay at -15m .
Traverse	20m	Four natural belays.
P13	20m	Natural and bolt, bolt rebelay.
P9	15m	2 bolts.
El Espajo (P31)	43m	1 natural, 1 bolt, bolt and natural at balcony at -3m , bolt rebelay at -14m .
P6	10m	Bolt and natural.
P10	17m	2 bolts, bolt at -5m .
P2	5m	Bolt.
P11	15m	2 bolts.
P11	21m	2 bolts for traverse, bolt for hang, bolt rebelay at -5m .
Blind pitch (P12)	15m	Two bolts.
P27	36m	Bolt back-up, two naturals above door, bolt rebelay, bolt deviation at level of ledge, bolt rebelay 3m lower.

The Tormenta Streamway and Camp Passage

Following the water, a short pitch is met (P4). Ahead is another short pitch on the right (P6). Penduling from the bottom reaches a dry passage leading to a window, which is the start of a 17m pitch in a large chamber, *Sala Ostón*. Two routes diverge in Sala Ostón.

[Following the water, descends a 27m pitch, *Pozo del cm³*. A 6m pitch then lands in a large streamway, believed to be the water from Cabeza Muxa. Unfortunately this streamway sumps quickly in both directions.]

The way on is to climb up to the left in Sala Ostón, and then to traverse above the streamway. A short pitch up is met, at the top of which is a tyrolean traverse across a 2m wide chasm, leading to the camp passage, a 5m diameter,

sandy-floored phreatic tube.

[To the right, a passage descends into a chamber, *Poo Corner*. Ahead are two undescended shafts.]

The phreatic tube soon ascends a steep ramp (hand-line climb); [at the top, a 5m bolted climb reaches a tube, which soon chokes.] A descending ramp (hand-line climb) continues along the main tube. This reaches a balcony overlooking a shaft.

Pitch	Rope	Rigging
P4	7m	2 bolts.
P6	10m	1 natural, 1 bolt.
P17	30m	Two naturals at start of traverse, spike for traverse, bolt belay, bolt rebelay at -4m .
Pozo del cm ³ (P27)	48m	2 bolts, 3 bolt traverse at -5m , bolt at -13m , bolt at -15m .
P6	10m	2 bolts.
P6 up	10m	Backed up to traverse, bolt, tied off to natural at bottom.
Tyrolean traverse	10m	Two bolts on each side.
Hand-line climbs	25m	Two bolts.

Mud Mines

The shaft can be crossed via a traverse *Songs of Praise*, to the left. The traverse lands on a ledge overlooking the shaft. To the left is a choke, that appears not to go. Passing behind a large boulder leads to the other side of the ledge, from where a phreatic passage continues. The passage descends a 15m pitch, followed by a 10m rift climb. Ahead leads to the top of a 40m pitch, [which reconnects with the Spanish Pitches, two pitches above the pool]. Continuing ahead leads to a complex junction, and the bottom of a pitch *One Man and his Dog*. The passage continues through an old mud sump, to emerge at the top of a 5m pitch, overlooking the previous passage near the rift climb.

Pitch	Rope	Rigging
Songs of Praise	30m	Two bolts on first ascent, bolts on ramp, spike at top for descent, natural deviation.
P15	20m	Natural belays.
C10	15m	Natural belays.
P40	50m	Bolt, natural belays for scramble to pitch head, two natural belays, bolt rebelay part way down.
One Man and his Dog (P10 up)	15m	Natural and bolt at top.

The Spanish Pitches

A 38m pitch, *Pozo del Guiz*, descends the shaft, via a large ledge. This lands in an abandoned stream passage, containing large pools. Thirty metres forward, a 3m pitch drops into a pool. Twenty metres further, an awkward climb down a flake enters larger passage, where the pitch from Mud Mines enters. This leads to two short pitches (P10, P7), down to the pool.

Pitch	Rope	Rigging
Pozo del Guiz (P38)	50m	Two bolts for sloping traverse, bolt for main hang, natural deviation at -8m , huge natural on ledge, spike deviation 5m lower.
P3	5m	Natural belays.
P10	15m	bolt, bolt at -3m .
P7	11m	2 bolts.

Underworld

At the pool, a small passage leads off, through small pools. This drops into a small chamber, with passages heading off in both directions. To the right leads down a climb to a 5m pitch into a chamber. [Alternatively, to the left, climbs and a short pitch lead to the same place.] A climb down through boulders reaches a small passage, which can be followed round several bends. Suddenly some water is met. The passage turns left through a duck, and meets a miserable sump.

Pitch	Rope	Rigging
P5	10m	Two natural backups, bolt.

Beyond the pool

It is possible to float across the pool: some type of buoyancy device is strongly recommended; it is very useful to rig a doubled rope across the pool, so that teammates can pull you across.

At the far side of the pool is the start of a 5m diameter phreatic tube, *Entrelagos*. This ascends a ramp, and then descends a 6m pitch. At the bottom of the pitch is another pool; it is possible to traverse around the right hand side. The cave turns sharply left, to the north, at this point.

The passage continues, descending a couple of ramps, before hitting a third pool after about 40m. This can be traversed on naturals on the left, but is best rigged with a rope for a tyrolean traverse. The passage then ascends a ramp to a fourth pool, much shallower than the previous.

Ahead, the passage suddenly changes character: the muddy floors are replaced by brilliant calcite surrounding gour pools. A single path has been trodden through this section to minimise damage. After 20m, two short pitches are met (P6, P5), which descend calcite walls, to a brilliant stal flow formation.

Ahead are two more short pitches (P7, P6). The passage narrows, and then ascends a steep ramp (C8), to a narrow knife edge, the top of a 15m pitch, *Knife Pitch*. Half way up the ramp, a small window looks through onto the pitch.

Knife Pitch lands in a muddy chamber. [To the right, an ascending ramp has been climbed, to a short steeper section onto a ledge. From here, a large aven ascends; the walls of the aven are covered in thick, soft moonmilk, making bolting impossible; it might be possible to climb using ice-climbing techniques.]

A muddy rift descends from the base of Knife Pitch. It is possible to rig a rope down here, past the remains of a choke, onto a ledge overlooking a chamber. A further pitch of 7m reaches the bottom of the chamber.

A small passage leads off from the chamber, towards the sound of running water. A climb down reaches a small streamway in a very immature passage. An oxbow is followed, before the passage suddenly breaks out at the top of a boulder slope, overlooking a much larger streamway.

Pitch	Rope	Rigging
P6	15m	Three natural belays.
P6	10m	Two bolts.
P5	10m	Two bolts.
P7	12m	Two natural belays.
P6	10m	Two natural belays.
C8	15m	Two bolts, one either side of ridge.
Knife Pitch (P15)	25m	Bolts shared with C8, bolt rebelay at -3m .
P15	25m	Rope backed-up to Knife Pitch, natural belay from huge boulder, bolt at -5m , bolt at -10m .
P7	12m	Rope backed up to previous pitch, thread belay, bolt deviation.

The Lower Streamway

Descending the boulder slope gains the streamway. The flow rate was estimated as 15l/s in 2005, although the clean-washed nature of the passage suggests that it often carries a much larger stream.

Downstream soon reaches a pool, easily passed to the left. However, beyond is a much larger pool. Floating across this reaches a duck into a very small sump chamber.

From the bottom of the boulder slope, the upstream passage soon chokes. However, a passage to the left from the slope bypasses the choke. This breaks out into a 10m wide, boulder-strewn passage. Ahead, a pool is soon reached, at the bottom of a waterfall, estimated as 10m high. There might be a high level passage over the streamway, reachable from the top of the waterfall. However, attempts to climb the waterfall were unsuccessful.

From the base of the boulder slope, it is possible to climb up into the choke above, to a balcony overlooking the upstream chamber. However, no routes on from here appear promising.

6 Pozu Chicago: description and rigging guide

Location

On the slope leading towards Ostón, best reached by following the Ostón path past the Roca Naranja depression, and then contouring left. GPS 0344791 4790105.

Entrance Series

The cave starts out as a rift, and the entrance is a vertical slot at the back of the indentation in slope/cliff. It's fairly narrow, but not tight. The first pitch, *Deja Vu*, is immediately down the entrance rift and was rigged off a bolt with a large chock-stone back up. Two single bolt rebelay then follow and a ledge is reached.

[Back towards the entrance a short pitch leads to a boulder filled area with no way on.] The other side of the ledge is the second pitch, *Adrenalin* (26m), rigged off a bolt and backed up by the previous pitch. This descends via a single bolt rebelay to a large boulder pile. At the edge of this is *Don't Stop! Pitch*, which was rigged with a bolted Y-hang and backed up off a large boulder. CAUTION: there are several loose rocks at the head of Don't Stop! Pitch.

Pitch	Rope	Rigging
Deja Vu (P10)	140m	Bolt, chock-stone backup, two bolt rebelay (−4m, −8m).
Adrenalin (26m)	”	Bolt from ledge, bolt rebelay next to ledge on 2nd wall (−10m).
Don't Stop! Pitch (71m)	”	Bolted Y-hang on left wall, with boulder back up, bolt rebelay (−35m).

Rift Route

At the bottom of Don't Stop! are several routes. [A climb up to the left (facing away from pitch) leads in to a parallel shaft with nothing at the bottom.] To the right is a short climb down to a rift. [Climbing down to the bottom of this rift leads to a small stream-way crawl which quickly becomes impassable.] The way on is reached by an awkward traverse along the rift at a mid level until a bolt signals a short climb down followed shortly by a pitch of approximately 30–40m, *Windy City*. The chamber at the bottom of this pitch contains a narrow, unexplored, unpromising rift off to the left (which probably reconnects) and a slippery climb up a slope to the bottom of Disposable Belays (see below).

Pitch	Rope	Rigging
Windy City	40m	Natural backup, natural Y-hang, bolted Y-hang.

Wild West Route

Returning to Don't Stop! Pitch, a number of windows are visible. Swinging into one about 5m below the rebelay leads to the fossil *Wild West Passage*. The passage begins with a rift with a calcite and boulder floor. Soon a traverse past a large column is reached. Beneath, the passage opens out but was left undescended as it was assumed that it would drop into known cave. Continuing past this leads to another traverse, lined off boulders. A second lined traverse past an impressive column leads to the top of *Disposable Belays Pitch*. [To the left, the passage continues for about 30 metres with occasional openings into tight, deep rift; after passing a fist-sized crystal formation, the passage drops down a short climb (10m handline) into a small section of rift blocked by calcite at the far end.]



Rosa Clements at the head of Disposable Belays. (Photo: JP.)

[About 35m down Disposable Belays is a large ledge, *Tacklesack Ledge*, from which a small passage quickly turns into an unpromising tight crawl. Following a traverse opposite this ledge leads to a blind pot.]

Pitch	Rope	Rigging
Traverse	50m	Rock at start of 1st traverse, rock between 1st and 2nd traverse, thread to left of Disposable Belays pitch head.
Disposable Belays (35m)	"	Y-hang from two bolts, backed up by traverse, deviation from thread (-10m), rebelay 10m from bottom.

Note: if this route is taken, Don't Stop is 45m long, and 125m of rope will suffice for the first three pitches. The Disposable Belays rope has a tendency to become muddy, so 9mm rope should not be used.

Lower cave

Disposable Belays lands at a three-way junction, with the connection to the bottom of Don't Stop! [One way from the junction leads to an unpassable rift. Another way leads to an aven.]

The way on leads to a short pitch (P5), which drops into more rift. [To the left intersects a streamway leading to an aven.] To the right reaches another junction. [Going right leads to a small passage, which goes nowhere.] Going left becomes very tight and meandering, and passes above a drop to a pitch of about 30m.

The pitch lands at another three-way intersection. [Two ways lead immediately to avens.] The rift continues tight ahead. The way on is to climb up, double-back and then traverse to a handline climb. More traversing leads to a climb and pitch down (P5).

Going left along the top of a rift leads to a climb up into a chamber. A further climb up on the right of the chamber leads past stal to the top of an undescended pitch estimated as 50m.

Pitch	Rope	Rigging
5th Pitch (P5)	10m	Single bolt, backed up from last pitch.
6th Pitch (P30)	35m	Bolt, (needs a second bolt), bolt rebelay where it opens out.
Climb (C2)	4m	Bolt belay; traverse line to next pitch.
7th Pitch (P5)	15m	Backed up to traverse; bolt; bolt rebelay at end of climbable part (rope in situ from 2005).
Climbs	5m	Belayed to stalagmite and floor (rope in situ from 2005, continued from 7th Pitch).

7 Small caves explored

The small caves below were found or explored during the expedition. All GPS coordinates given are in UTM square 30T. For explanation of the areas, please see the OUCC Shaft Bashing Guide [Low05].

Small caves explored in Area 4

⊗ 68/4

Location: About 20m above Asopladeru la Texa

Description: Entrance shaft rigged off large natural and bolt, about 15m deep. At the bottom is a small, strongly-draughting hole leading to a too-tight rift.

⊗ 69/4

Location: Further up than 68/4, a crack in the cliff.

Description: Handline climb down into cave. Closes down quickly.

⊗ 70/4

Location: Two holes in floor, near 69/4.

Description: The two holes connect at the bottom of their entrance pitches. A too-tight window looks through into tight passage.

- **71/4**
Location: On steep limestone slope, immediately right of path as heading down from notch in ridge from Ario bowl. 0344291 4789641, alt. 1510m.
Description: 4 to 5m deep rift pitch with undercut base. Undescended, but appears choked. No draught.
- ⊗ **72/4**
Location: Near 71/4. 0344261 4789622, alt. 1508m.
Description: Small enlargement in rift. Free climb about 4m down. Very small rift heads off. No draught.
- **73/4**
Location: Near Pozu Chicago. At the back of an indentation in the north-eastern facing steep slopes leading down towards Ostón, Canal de Culiembro and the Cares Gorge. To reach the cave take the Ostón path past the Roca Naranja depression, then contour left at about 1450m. The left hand wall (looking out) of the indentation has rillenkarrén, and there is a small stone cairn in front of the NE-facing entrance. 0344856 4790043 ±16, alt. 1467m.
Description: A vertical slot.
- **74/4**
Location: On the way back from 73/4, at the bottom of a large depression. 0344980 4789925 ±7, alt. 1431m.
Description: A large triangular cave entrance. It has a large catchment from the large depressions above it, on the hillside below the Roca Naranja depression.

Small caves explored in Area 5

- ⊗ **78/5**
Location: In the Ario bowl, towards the Refugio from the old camp site.
Description: A shaft lands on snow, rubbish and old mattresses. Round the corner is a connection to another entrance, containing more snow, possibly free-climbable.

Small caves explored in Area 8

- ⊗ **14/8**
Location: On Gustuteru, in base of cliff facing SE. 0343022 4788494, alt. 1727m.
Description: Reduces to body-sized tube, walled-off, 3m in. Good draught. Used by goats.

Small caves explored in Area 10

⊗ **21/10, La Cueva de la Mariposa**

Location: Near the end of the Extremero–Trea ridge (*The Prow*), following the line of 2/7 but beyond Huerta del Rey/Choke Egbert, a rift in the ridge reveals a hole which can be entered. 0344922 4788446.

Description: Excavated hole leads into an attractive white rift, 20m long and 10m high, which pops out into the cliff overlooking the Trea Valley.

⊗ **26/10**

Location: In the base of the Valle Extremero, about 200m above the trees, in the base of the cliff, near a large boulder. 0344884 4788961, alt. 1348m (33m accuracy).

Description: 10m long. Used as a sheep shelter.

⊗ **27/10**

Location: On the left side of Valle Extremero, near the woods, at the base of the big cliff that forms the north side of the valley. 0345262 4788803, alt. approx. 1100m.

Description: A small spring. A trickle of water flows out from between boulders, and runs 20m down a slab before sinking in scree. A spring was also reported at 0345314 4788735, alt. 1071m; it is not clear whether this is the same spring, or a related one.

⊗ **28/10**

Location: In the trees in the Valle Extremero, 20m north of the ridge on the south side of the valley, on a grassy slope, between two trees that are 5m apart. 0345461 4788470, alt. 1188m.

Description: 1m by 0.5m vertical slot leads down for 2m to a 3m long, choked chamber. No draught.

⊗ **29/10**

Location: On the ridge above 28/10, 20m north of the ridge, on a grassy, boulder-strewn slope. 0345202 4788474, alt. 1305m.

Description: Body-sized vertical slot leads down 1m to a 1m high chamber, 5m by 3m, with rocky sloping floor. Choked. No draught.

⊗ **30/10**

Location: On Cueto la Requexada, at an altitude of about 1200m, about 20m from the ridge, just below a tree. 0345438 4788443, alt. 1202m.

Description: Small hole, 2m deep, goes nowhere. It's possible that this is the same as 28/10.

Small caves explored in Area 12

- **15/12**
Location: On the flank of Cabeza Llabria, above Culiembro, at an altitude of about 835m, in the main rib on that side of the mountain, just above some trees in a small gully within the rib. The cave was spotted from the other side of the gorge, and is believed to be above the further reaches of Culiembro Cave.
Description: A circular entrance, estimated as 5m diameter.
- **16/12**
Location: About 100m above 15/12.
Description: A large rift entrance.
- **17/12**
Location: On the flank of Cabeza Llabria, towards Ostón, in a rib to the left of a fault-controlled gully, slightly lower than Ostón.
Description: A large entrance in a cliff face.
- **18/12**
Location: Just above Culiembro Cave, visible from the road.
Description: An impressive rift.

Small caves explored in Area 13

- **28/13**
Location: 6m from path, near Ostón. 0345345 4790531 alt. 1187m.
Description: Small opening 1m wide, beneath limestone roof. Can see into bedding plane. No significant draught. Large block could be passed if required; alternatively, more digging to right would create easy entry.
- ⊗ **29/13**
Location: Near Ostón. 0345626 4790494, alt. 1124m.
Description: Large entrance 5m wide by 4m high, used by cattle. Walled building at back of cave, through door. Hands and knees crawling in phreatic passage, 1m diameter, continues unexplored. Back in entrance chamber, steep climb up may have a possible way on, but does not look promising. Nothing appears to be draughting.
- ⊗ **30/13**
Location: The cave stands out when viewed from Ostón, and looks inviting. Hole in cliff, 15m up in right hand side of steep valley, second valley over from Ostón. Very difficult scramble leads to entrance set back in cliff and covered in bushes. 0345544 4789984, alt. 1044m.
Description: Entrance is 3m high by 2m wide and ends in a complete choke after a couple of metres. A small hole in the roof shows zero promise.

- **31/13**
Location: Near Ostón. 0345666 4790565, alt. 1080m.
Description: Small shaft, about 4m deep, blocked at top. Would require crowbar. Unable to see what happens off from one corner at the bottom.
- ⊗ **32/13**
Location: Near Cabeza Muxa. 0344866 4790684, alt. 1380m.
Description: Entrance 3.5m diameter phreatic tube, rising to a skylight at far end after approx. 20m. Used as a sheep shelter. Passage branches and probably goes to the surface. No draught.
- **33/13**
Location: Near Cabeza Muxa. 0344480 4790377, alt 1477m.
Description: Large open shaft with snowplug in the bottom. Visible draught, and several blowholes around the snowplug. Hole in WSW corner looks most promising. Rift in bottom is 2m wide by 17m long. Very impressive!

Small caves explored in Area C

- **C23**
Location: 5m east of the Gustuteru–Verdelluenga ridge, about 50m before El Regallon. 0342527 4788118 ±8m, alt. 1875m.
Description: A collection of interconnecting shafts, about 10m deep. Undescended.

Small caves explored in Area E

- ⊗ **E18**
Location: High on the flank of Verdelluenga, above an obvious dolomite nubble with a limestone cap, about 30m south of the nubble. 0342191 4787792 ±5m, alt. 1962m.
Description: 5m climb/pitch to snow. Shaft continues beyond snow.
- **E19**
Location: 40m SE of E18, above snow-filled shakehole. 0342172 4787757 ±6m, alt. 1968m.
Description: Cleft in rock contains two shafts. Rocks rattle down a fair way.
- **E20**
Location: 100m SE of dolomite nubble described above. 0342107 4787766, alt. 1979m.
Description: Shaft in rift with snow. There might be a continuation at the NW end.

- **E21**
Location: Just downhill from E20.
Description: 30m long, deep rift, running NNE, with snow at bottom.
- **E22**
Location: Part way down the sea of limestone below E10, many grikes converge to a gully, which leads to a 20m long shakehole. 0342056 4787862 ±12m, alt. 1910m.
Description: No obvious way in, but draughts strongly. A lot of water probably sinks here in wet weather. Worth a dig!
- **E23**
Location: Just above and to the north of col on ridge. Three shafts aligned to the north. Marked SIE ○. 0342763 4788549, alt. 1761m.
Description: The shafts are about 20m deep, to snow, and connect underground.
- **E24**
Location: In east side of shakehole. Faded SIE marking on wall. 0342492 4788328, alt. 1736m.
Description: 2m wide, 1m high passage, drops to snow. Needs a handline.

Small caves explored in Area G

- **G10**
Location: In long rift up a slope from lowest col between Ario and Area G. 0342946 4789202 ±11m, alt. 1615m.
Description: Sloping shaft, maybe 10m deep.
- **G11**
Location: Not far from Sod 3. 0342355 4790248 ±5m, alt. 1465m.
Description: Large shallow shaft, 5m by 3m by 5m deep, possibly with passage through the boulders.
- **G12**
Location: Not far from Sod 3. 0342343 4790277 ±4m, alt. 1446m.
Description: Small shaft with entrance almost completely occupied by tree, 3m by 2m by 10m deep.
- ⊗ **G13**
Location: Some 30m from the path at the foot of Sod 4. 0343268 4789396.
Description: 3m long rift cave with cold draught. Dig gained a couple more metres length and depth, leading to a less-promising vertical dig in rock and animal bones.

8 Science

Dye tracing

In order to better understand the hydrology of Asopladeru, a dye tracing experiment was carried out.

A quantity of fluorescein was placed into the streamway, just below camp, early on July 23rd. Detectors containing activated charcoal were placed in the lower streamway, and removed late on July 26th. They were subsequently analysed to try to detect fluorescence. See [MLSW88] for a description of the technique.

The results were negative: no fluorescence was detected. It is possible that the dye detectors were not left in for long enough. However, this appears very unlikely: over three days should be more than enough for a dye trace of straight-line distance about 100m. (For comparison, in 1988, the club achieved a successful dye trace from Pozo Jultayu to Cueva Culiembro, a straight-line distance of about 3km, in about two days.)

On draughts and streamways

The speleogenesis of Asopladeru is quite complex. We present some observations about the draughts and streamways in the cave, and then attempt an interpretation.

The pitch series A very strong draught blows up through the entrance series. This diminishes at about the level of Pozo Acrobatico (about -350m).

The streamway in the entrance series is lost at the bottom of Siniestro Parcial (-270m). A new streamway is met, but is lost at the swing into the Fet Differential window on Pozo Acrobatico (-360m). A new streamway is met two pitches lower, and is followed down to the confluence with the Tormenta water. At El Balcón, 20m above the confluence, two other streamways enter. It is possible that these streamways represent the water lost earlier.

It is likely that the draught in the entrance series is driven by another entrance, lower than the Asopladeru entrance, and joining at Pozo Acrobatico. Alternatively, it is possible that the draught follows the water that is lost at this point, and rejoins later.

The lower cave In the lower section of the cave, the draught appears to be brought in with the Tormenta streamway, either from Tormenta entrance itself, or a connecting entrance.

The draft then follows the streamway to Sala Ostón, then through the camp passage, and down the Spanish Pitches. A draught also blows towards the start of the Spanish Pitches from the Mud Mines area, partially coming from the 40m

pitch connecting with the bottom of the Spanish Pitches; this suggests another entrance in that area.

The draught continues along the passage beyond the pool, to Knife Pitch. Around Knife Pitch, a draught appears to come *up* through the choke leading to the Lower Streamway. It is not clear where these two draughts go to, although it is possible that they disappear up the aven at that point. This would suggest a connection near Knife Pitch to another entrance, lower than the entrances feeding the Tormenta streamway and Mud Mines.

In the Lower Streamway, the draught follows the stream, driven by the upstream waterfall.

An interesting question concerns the source of the water in the Lower Streamway, in particular, whether it is the water from Pozo Cabeza Muxa; that water is believed to be encountered below Sala Ostón. To answer this question, it is useful to consider the volumes of the streams. The lower streamway has a flow rate estimated at 15l/s, which is approximately twice the size of the Tormenta streamway. Unfortunately, no member of the expedition visited the streamway below Sala Ostón to see the size of the streamway; the Cabeza Muxa water was estimated as being 150–200l/s in 1989 [Hor91a], although 2005 was a much drier year. I suggest that the Lower Streamway is *not* fed by Cabeza Muxa, for the following reasons:

- It seems very unlikely that the streamway would have reduced in size by a factor of twenty since 1989, despite how dry it was this year.
- If the combined Cabeza Muxa and Tormenta waters were to be the source of the Lower Streamway, then Cabeza Muxa would be contributing only about as much volume as Tormenta; the drainage area of Cabeza Muxa is much larger than that of Tormenta, so it would seem unlikely that they produce the same amount of water.
- The negative results of the dye trace provide additional evidence: this is not conclusive, because it is possible that the dye detectors were not left in for long enough.

The Lower Streamway appears to sometimes carry a much larger streamway: the boulders are clean-washed, and in places scoured. I conjecture that it sometimes acts as a flood overflow for the Cabeza Muxa water, although no water was flowing that route this year (given the negative dye-tracing results).

The question then arises as to the source of the Lower Streamway water. Given its location and orientation, it is likely to be fed from the area to the north, around Cabeza Chica and/or Ostón, thereby draining an area to the east of Cabeza Muxa. It is possible, although unlikely, that Pozo Chicago could form a feeder to this system. Finding a way in to the Lower Streamway, above the upstream waterfall, would be an exciting prospect: there appears to be a high level above the streamway, although climbing up to it proved infeasible.

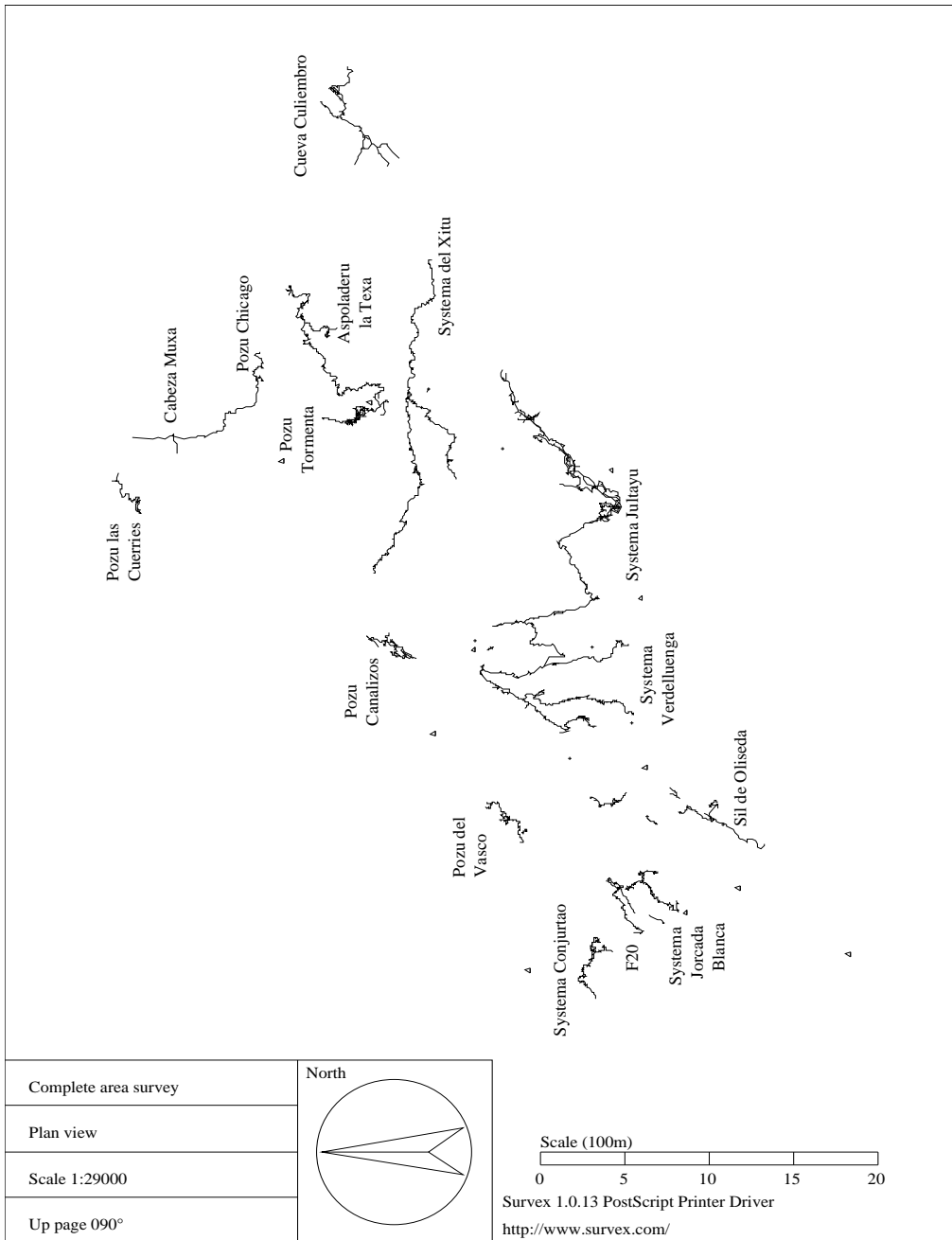


Figure 1: Area survey

It is worth noting that the sump at the bottom of the Lower Streamway does not appear to back-up much. This is not the case for Cabeza Muxa, which reportedly backs up 40m above the sump. This suggests that the sump might either be short or of low resistance, and that diving it would prove fruitful: however, portering diving bottles down Asopladeru would be a serious undertaking.

It is also worth noting that the Lower Streamway is approximately 130m below the streamway below Sala Ostón. This suggests that the gradient of the water table is quite steep in this area, having been nearly horizontal since Cabeza Muxa.

2005 observations on the Culiembro drainage

John Wilcock

Introduction Oxford University Cave Club has long studied the underground catchments of the resurgence at Culiembro. These studies have involved not only underground exploration and cave survey, but also hydrological studies by dye tracing, geological and geomorphological studies, surface survey, surface walking with observation of karst features, and dowsing. To these has now been added GPS, which has made location of karst features and dowsing reactions so much easier.

Published hydrological work from OUCC includes [Gal84, Win86, Hor91a]. This article will consider dowsing results, updated to 2005. Earlier work is summarised by [Wil91, Wil95], and the results up to 2005 may be seen in Figure 2. It is seriously suggested that dowsing practitioners detect a geophysical field of presently unknown origin, perhaps very small distortions of a magnetic or electric field. While the nature of this postulated field and the method of its detection by the human body are still obscure, it is suggested that previously-published dowsing results in several caving areas of Britain, France and Spain, of which many have been later confirmed by caving exploration, do justify the practice. Many details of such studies could be given, but it is relevant in this article only to mention an example in the Picos: Pozo Cabeza Julagua (8/11), dowsed in 1992 to its resurgence in the valley of Mohandi, was confirmed by through exploration in 1993. This is not the place to describe theories of detection and the ongoing experiments which have been carried out with and on dowzers: suffice it to say that practical results seem to justify the practice, but the method is neither proven nor disproven: the jury is still out.

Results and discussion The findings to 2005 in the Ario and Area 4 regions of the Cares catchment are summarised in Figure 2. On previous expeditions 2/7 was thought to continue from Choke Egbert under Valle Extremero and beyond the Cabeza Verde–Cabeza Llambria ridge to the region of 7/4, and then to join

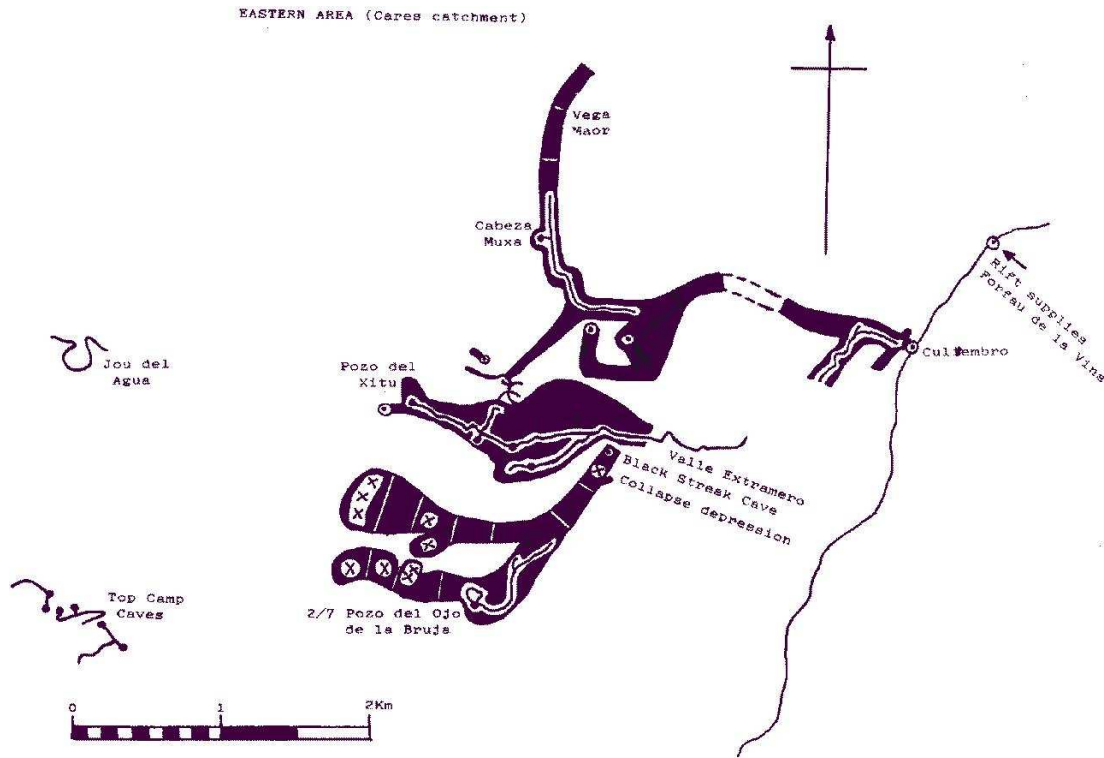


Figure 2: The Cares catchment

the waters of Cabeza Muxa towards Culiembro. This seemed plausible at the time because there was a strong downsing reaction in the bowl of Area 4. With the discovery of Tormenta it is now seen that the strong reaction is due to that cave. Where then does 2/7 go? Considering the geology [Ros91], it seems that a likely route is down a fault below Choke Egbert, and then along another fault parallel to, but not joining Xitu, to finally reach Culiembro. The Culiembro survey does in fact show two risings that may be from Xitu (northernmost) and 2/7 (southernmost).

In the Ario bowl are several linked reactions (see Figure 3), which have been previously published [Wil91]. Added to these is now a wide reaction that runs from the depression immediately east of the Ario Refugio, and trends NE to join the Cabeza Muxa reaction. The funnel-like shape of this reaction is normal, since the reaction on the surface widens as the cave position below ground surface deepens as the ridge is climbed; the position of the cave passage is taken as the centre line of this reaction. Thus it is predicted that all the caves of the Ario depression join Cabeza Muxa. These caves, despite their proximity to Ario camp, have not really been properly explored. The snow plug in one of them is used as the camp water supply, and there is at least one cave near the old campsite in the Ario bowl that has a pitch with a reported 3-second drop. It is not possible to explore the reactions south of the Ario camp, since the very strong reaction

CAVES OF THE ARIO DEPRESSION

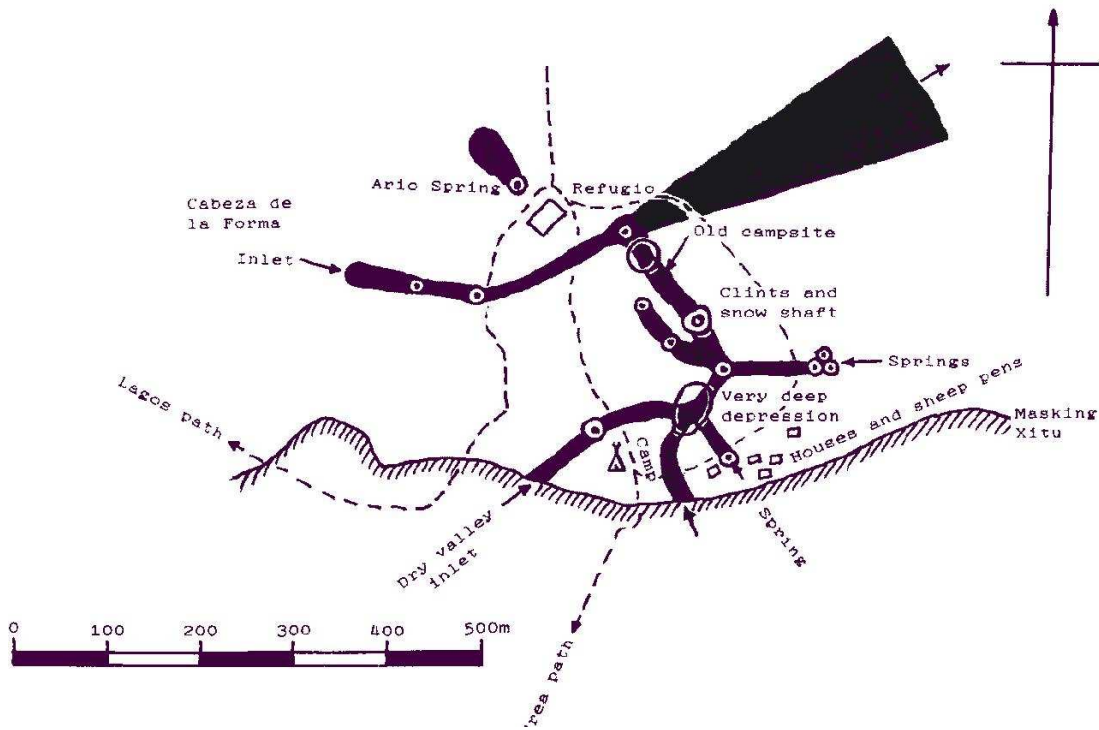


Figure 3: The Ario depression

from Xitu masks everything.

A dowsing reaction was also obtained for Pozu Chicago, but this is within the Cabeza Muxa reaction. Being right over the sump of Cabeza Muxa, it is likely that Pozu Chicago will join this system.

Conclusions The conclusions from this dowsing work, if the dowsing results can be considered to be at least a basis for a hypothesis, are that:

- the caves of the Ario depression join Cabeza Muxa;
- 2/7 drops down a fault in the region of Choke Egbert, and then follows a parallel fault to Xitu on the way to Culiembro;
- Pozu Chicago is within the reaction for Cabeza Muxa, making it likely that it will join this system.

The surveyed course of Tormenta has also been followed by dowsing reactions on its way to Cabeza Muxa and Culiembro. Further exploration will either confirm or deny these hypotheses, but they are published for the record.

GPS observations of the same position over time: an assessment of GPS accuracy

John Wilcock

Introduction Global Positioning System (GPS) devices are used by members of the expedition to help record cave locations, and also to avoid getting lost at night and in fog. See [Wik05] for background on the GPS system.

Conduct of the Experiment John Wilcock undertook an experiment to ascertain the accuracy of GPS devices. GPS observations were taken every half hour during daylight on two consecutive days, 21st and 22nd July 2005, from the SE corner of the Ario camp cooking shelter. Observations taken included UTM Eastings, Northings, Altitude, Accuracy, and number of satellites used in the calculation.

Results Concerning the Garmin eTrex 12-channel, the Median and Mode Eastings/Northings positions were identical at 30T 0344003 4789259, and Altitude had Median 1618m and Mode 1619m. Standard Deviations were Eastings 2.8m, Northings 2.7m, and Altitude 6.1m, Eastings/Northings position being more accurate than Altitude, which is calculated on the basis of the World Standard Geode 84 ellipsoid that approximates to the earth's surface. Because there is an inherent error in the geometrical calculations between the satellites, separate figures were calculated for (Position + Accuracy) and (Position - Accuracy). Standard Deviations were then calculated for these ranges, being 3.6m for Eastings, 3.6m for Northings, and 6.9m for Altitude. The number of satellites ranged from 5 to 9 (Median 6.5, Mode 7).

The Garmin eTrex Venture observations were not identical: the Median and Mode positions were 30T 0344004 4789257, Altitude 1617m and 30T 0344003 4789257, Altitude 1618m. Standard Deviations were much worse than for the Garmin eTrex 12-Channel, being 5.6m for Eastings, 7.6m for Northings, and 8.4m for Altitude. Why this should be is unclear; the difference is more likely to be in the software than in the hardware of the meter.

Figure 4 gives a scatter plot of the GPS observations, with a control circle based on Median Position + Accuracy + 1SD. Anything within the control limits is 'normal' and the behaviour is stable. The exceptional points, on 21.07.05 at 1100, 1130 and 1330, and on 22.07.05 at 0730, 1800 and 2030, all have a lower number of satellites in view (5 to 7), some with weak transmission, and of poor geometry. Figure 5 shows Eastings, Northings and Altitude, respectively, with control plots of (Position + Accuracy + 1SD) and (Position - Accuracy - 1SD).

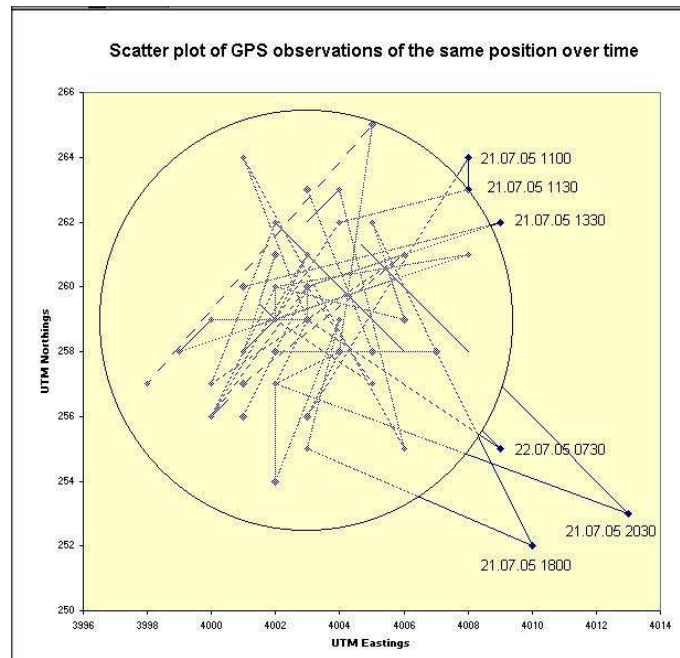


Figure 4: Scatter plot of GPS readings

Conclusion This GPS analysis has shown that the Garmin eTrex Venture is significantly less accurate than the Garmin eTrex 12-channel; why this is so is unclear, but it may be related to the software. The Garmin eTrex 12-channel generally gives Eastings and Northings location within a confidence limit of the claimed Accuracy (5.9 ± 1.8) plus a standard deviation of 2.8, a total of 10.5m. However, the Altitude has a confidence limit of 13.8m. The Garmin eTrex Venture generally gives Eastings and Northings location within a confidence limit of the claimed Accuracy (5.3 ± 0.8) plus a standard deviation of 7.6, a total of 13.7m. However, the Altitude has a confidence limit of 14.5m.

It is recommended that whenever a GPS observation is recorded, for example to locate a new cave entrance, that the claimed 3D Accuracy should also be recorded. This figure can be obtained from the GPS meter. To this claimed Accuracy should be added a confidence figure of $\pm 3\text{m}$ for the Eastings and Northings, and a figure of $\pm 7\text{m}$ for Altitude.

The number and position of the satellites should also be recorded, and a note made when the number of satellites is seven or less. If this is the case, the number of satellites positioned on the periphery of the field of view, for which the meter has weak reception, should be noted, and the geometry of the strong satellites should also be noted: if they are in line or in a tight grouping a poor calculation of position is to be expected, particularly for altitude.

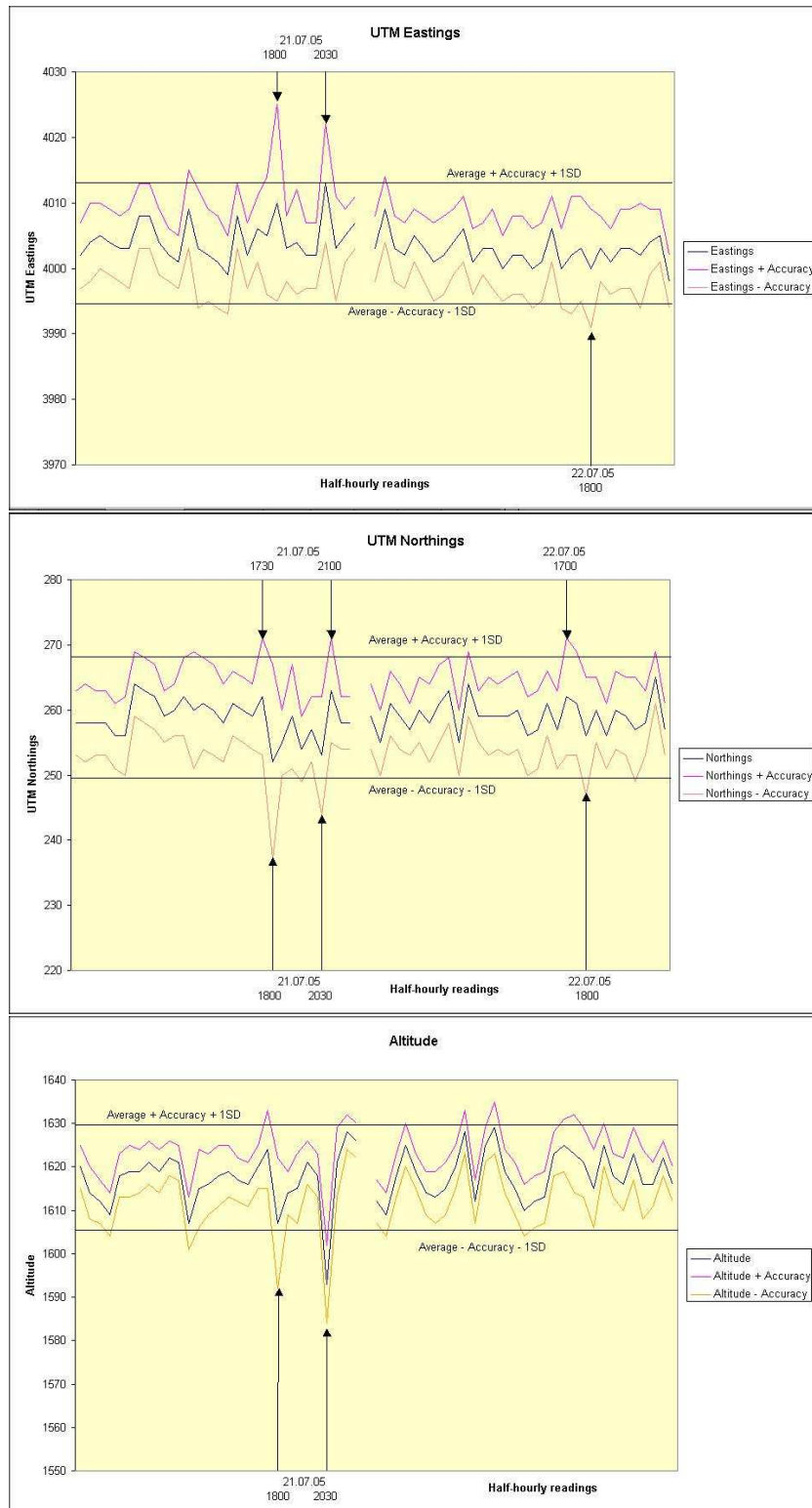


Figure 5: Plot of Eastings, Northings and Altitude

9 Personal stories

Songs of Praise

Pip Crosby

Despite only being on expedition for ten days, I was determined to get down to see the bottom of Tormenta. So, a day after arriving, keeping my fingers crossed that I'd be able to get out of the cave, I grabbed the nearest enthusiastic looking person (Lee), waved goodbye to my boyfriend, and headed off to the joyful squalor of underground camp.

The plan was to take things very easy, given my complete lack of fitness. Heavily laden with all kinds of sponsorship goodies and camping gear, Lee and I potted gently down to where Gavin had planned to set up camp, and then spent a happy evening doing the interior decorating. The passage down at camp was gorgeous — a high, arching roof with a comfy sandy floor and handy bits of rock to balance candles on. The traverse down to the streamway took some getting used to, but we grew to love it and couldn't bring ourselves to re-rig it.

Our objective for day two was just around the corner from camp. The main way on to the terminal pool lead down an enormous, gaping maw. Just visible across the pitch was a triangle of black space — could it be a high-level bypass to the pool? Our job was to bolt across and check out the lead.

On first sight of the task ahead of us, my heart sank. The traverse was huge, and the rock looked pretty chossy. It would take days of arduous hand bolting to take the direct route from one side of the pitch to the other. As Lee and I wandered around the area trying to decide which side of the chamber to start bolting, a cunning plan emerged. Lee, with his excellent climbing skills, would attempt to follow a sloping ridge up to a point where we could then abseil down and swing into the triangle of black space. I liked this plan. It had all the advantages of someone else doing the scary stuff.

After I'd taught him how to put in a bolt, Lee headed off up the climb, leaving me belaying, eating Haribo and singing random songs to keep warm. Every now



The Songs of Praise Traverse.
(Photo: JP.)

and then, songs would be interrupted with sounds of rocks falling down the enormous hole beneath us, followed by copious profanities made unintelligible by the echoes in the chamber. Five hours later, Lee reached the high point of the traverse and started to try and reverse his route. This turned out to be scarier than the initial climb, so when he finally reached solid ground, we decided it was high time to pop back to camp for a cup of tea and some Frumboost.

I was up next, using every bit of jamming gear I had, plus a few slings, to try and get up the route that Lee had just free-climbed. It scared the life out of me, and I had a rope to hold on to. With Lee just behind me, I dropped a rope down and swung onto a sloping ledge covered in boulders

and mud. Still attached to the rope, I crawled gingerly up to where the ledge flattened out — black space beckoned. Finally convinced that the floor wasn't just about to give way under my feet, I came off the rope and began to explore. Although any large passage straight ahead appeared to be choked, a small passage, muddy but draughting, lay off to the right. Sliding down it, I came to another small pitch. With no spare rope, light problems, and worrying about getting back across the traverse, we decided to call it a day.

We were joined at camp by Neil and Paul, who were thrilled to hear of our success. Spotting the chance of getting out of crossing the Songs of Praise traverse again, we offered them our lead, and spent our third day underground rigging down to the bottom of the known cave and looking for potential pool bypasses further down the cave. Hearing a shout for more rope, we braved the traverse once more to take supplies to Neil and Paul in their newly discovered, and aptly named, *Mud Mines*.

The cave here seemed almost sponge-like, with small passages diving off in all directions. Neil and Paul showed us two potential leads, both with good draughts. As we sat around trying to figure out if we were directly above the passage down to the pool, we all stopped talking. All of us had heard a dog barking. Caves sometimes play weird tricks with acoustics, but this had all of us trying to work out how close we were to the surface?

After a final night at camp, Lee and I bade farewell to the others and headed for the surface. Despite not having found a great deal, both of us were proud of what we'd achieved.

Underground Camping Song:

Pack up your pit set in your tackle sack, and abseil down.
While you've a Petzl torch to light your way,
There's no need to frown.
What's the use of sunlight,
When mud can make you brown?
So, pack up your pit set in your tackle sack and abseil down.

Beyond the Pool

Hilary Greaves

6pm. I staggered into Ario, having just returned from a camp at -400m with Rosa. Boots off, time to relax and feel good about having worked hard enough getting into and out of the cave that I could legitimately do nothing for the next few days. A couple of minutes later, a cup of tea landed in my right hand, and I began applying it to my face. Gavin bided his time.

“Doyouwanttogocamping?” he asked a few seconds later, almost, but not quite, too fast for my rapidly chilling out mind to process.

Urgh. I suppose so. I suppose that's some part of what I came to Spain for. “When?”

“Tomorrow.”

Urgh. I imagine the Great Expedition Plan has a damn good reason for this totally unreasonable request. “Who with?”

“Me.”

This was some compensation; I could think of worse people to go camping with. (Gavin and I had been old caving buddies from before I moved to the States, and, more to the immediate point, he likes packing all the bags, doing all the rigging and carrying all the tackle.) “Sure.”

We'd be the third full underground camp of the expedition: Lee and Pip had gone down two days previously, Paul and Neil yesterday. There were four pit sets at camp, and Pip and Lee were on a three-night camp, so if Gavin and I went down the next day, Pip and Lee would be on their way out and we'd fit straight into their spaces at camp, so the expedition wouldn't be wasting any underground camp man days. There were other people around who hadn't been camping yet, but they, I gathered, were all avoiding going camping with Gavin because they were scared of not being good enough to cave with him. (Freaks. This was a bizarre attitude, as far as I could see. Did they not understand the not-having-to-carry-their-fair-share-of-tackle point, or something?) So, I was It. (The aforementioned damn good reason.) Ask not what your expedition can do for you That was that, then.

The Spanish team that had explored Asopladeru La Texa in 1998 had found one sump at -760m , and one ‘pool’ at -837m , the 1998 limits of two separate streamways. One of the main inspirations of this 2005 expedition had been the

possibility that the ‘pool’ was just that — not a sump. This, we hoped, could lead us straight into blank mountain ... and ultimately to Culiembro. It was just a matter of crossing the water, and walking into the wide open passage that surely lay beyond. Our underground camp would be at -700m , in a large sandy passage just above the first streamway; the pool was a short 20 minutes caving beyond.

On our way into the cave, Gavin and I met Lee and Pip, prussiking out from their camp. After rigging a (VERY impressive) traverse to complete the route from camp to the pool, they had gone to look at the pool, but didn’t fancy crossing it. So, they’d spent the second pushing day of their camp doing other stuff instead, investigating the high level series. Pip was enthusiastic, though.

“You know what I’m like with water Hils, but seriously, I almost took off my furry and jumped in — it looks *really* good.”

Oh my God ... I do seem to have a bit of a habit of finding myself, by sheer fluke, on trips that scoop some of the best pushing leads on every Picos expedition I go on, and it was starting to sound as though this one would be no exception.

“I think I’m probably stupid enough to do that,” I said to Gavin after Pip and Lee had continued on their way. [Translation: This sounds like a TOP lead, I am dead excited and I cannot wait to go for it.]

“Well, one of us will be,” he returned with a slight grin. [Translation: Fight you for it.]

Shit. This is the *disadvantage* of caving with Gavin.

24 hours later, I was pretty pessimistic about the prospects for the pool. The first day of our underground camp, Gavin and I had been down to check it out. Crouching on dry land on the near side, I had shone my mini dive light across the pool. There was a smallish archway, where the ceiling lowered, leaving an airspace roughly 1m high by 2m wide above the water level. It was difficult to see clearly what happened beyond the arch, but, tracing the line where the walls met the water with my brightest spot, I was pretty sure I could see blank wall all the way around. Investigating this lead would likely be short, cold, wet, disappointing and extremely unpleasant. Still, it would be a cool thing to *have* done. And it had to be done. And Paul and Neil wouldn’t go near water for love nor money, so this one was going to be ours.

There was an intriguing side-passage that offered some chance of a bypass, though, so we spent the rest of that day exploring that. (It eventually terminated in a comically miserable, scrotty duck that led round a corner to an even scrottier sump. This, at the time, was the deepest point either of us had ever been to, which I thought was very appropriate and Gavin claimed to be pissed off about.)

The next day we returned to the pool, armed with all the tacklesacks, Daren drums, drybags, gaffer tape and string that our high-tech operation would require. I knew perfectly well who was going to win our little fight over who got to play boatman. This was Gavin’s expedition; he had done all the slaving over the paperwork mountains and “cat herding” required to get this show on the

road during the previous 12 months; I, meanwhile, had not lifted a finger in the organisation, been totally non-committal (if not downright negative) about whether I was coming at all, tried my very best to escape from caving expeditions altogether and do something different for once this summer, and then caved in and jumped on the trip at the last minute, after there was no preparation work left to be done. There was no way I could even try to put up a fight for the glory trip. I just had to double-check that we were in fact on the same page as regards the psychology of this situation. “You do actually want to do it, don’t you,” I stated. “I think I’d rather go myself because I think I’d be calmer that way,” Gavin explained. This was an absolutely infuriating reply, but what the hell.

While Gavin went back to collect some of the kit that we’d stashed in the side-passage the previous day and take off his SRT kit, I fashioned the boat materials into some semblance of a raft for him, and tied a 25m rope to a rock on the nearside of the pool. We made some plan about communication, I forget what. Then Gavin took the other end of the rope, launched himself onto the raft and floated off towards the archway.

He made some gasping noises and some splashing noises. Shortly afterwards the splashing stopped and I gathered that Gavin was on dry land the other side. I had almost given up on this; bonus!!!

Gavin went off to explore and I think I fell asleep, huddled against a rock. Some minutes later I was woken up by Gavin making some noises.

“Blurglewurrrrrgemmmhumaspdofihaskjsn,” he said.

The communication situation was hopeless; the waters were lapping against the edges of the pool, generating enough noise to fill the chamber I was in with echoes, and some drips from the pitch above were adding percussion. Gavin didn’t seem to have any trouble hearing me, but I couldn’t decipher a word he was saying. This didn’t stop him from continuing his report at some length with some excitement, though. I gathered that something cool was probably up.

“Does - - - it - - - go?” I eventually called into the blackness, cutting off Gavin’s soliloquy and trying to set the communication pace and simplicity level by example.

“Yes!” shouted Gavin.

I got that one. “Shall - - - I - - - follow?”

“Yes!”

I gathered my shit together, noting with some amusement that I had just been in the situation of having to reduce Gavin to monosyllables, and then it was

my turn on the raft. Going across second, I had the easy job. Gavin had had a hard time propelling himself through the water at more than a snail's pace without falling off the raft, but all I had to do was lie there, fending off walls from time to time while Gavin hauled in the line from the far side. My legs were in the water up to my upper thighs, but my torso stayed almost completely dry. Soon I was on the other side. A dry, sandy, 5m diameter phreatic tube led off uphill. God, this was enormous. And draughty. This really didn't feel like the kind of passage that was about to close down right round the corner. Gavin grinned. Apparently he thought the same.



Crossing the pool. (Photo: JP.)

Gavin had rigged a short pitch round the corner before returning to update me; now we set off together, carrying all the rope and rigging gear we had brought with us from camp, which wasn't much. We took turns rigging pitches and taking the lead stomping into new passage. The passage was gorgeous; there were a few pools that we had to traverse around and then mostly the passage alternated between horizontal phreas with spotless white gour-pool floors and pitches of about 5m. Some time later we stopped, I forget whether we had run out of rope, rigging gear, bolts, time, energy or all five, and we surveyed back to the pool and headed home for a big pile of pasta 'n' sauce.

The next day we were up at 7am, and were soon back at the pushing front for more. The pitches kept on going. Soon we reached 'Knife Pitch': a 45 degree ramp up to a knife-edge and an abrupt 15m drop. Of all the pitch-heads in all the 1800m deep caves in the world, this was not the most relaxing one to wait at while someone else placed bolts. I clipped myself into a long safety line so that I could be out of Gavin's way, and huddled on the knife-edge, trying not to fall asleep and topple over while I waited for him to finish the bolt. God, it's draughty up here. At least I was dry; this time I had decided to take the 'soft option', and take all my clothes off to float across the pool in just my oversuit, carrying my warm stuff in Daren drums and wrapping up again once safely on the other side.

At the bottom of Knife Pitch things started to get more complicated. By the time I got to the bottom of the pitch, Gavin was furtling around in a rift, occasionally throwing things and cursing. Gradually the noises got quieter. I crawled into my orange survival bag and fell asleep again. Some time later — an hour? two hours? — he re-emerged, saying that he'd moved a polystyrene boulderchoke and rigged down through the rift, but at the sharp end things were getting shitty, he wasn't sure what to rig the last hang from and also he was running out of rope, rigging kit and bolts.

It was getting close to turn-around time, but we figured I might as well go and have a look and see if I could do anything with the sharp end. I abseiled down through Gavin's shitty rift, and found his last belay. Hmm. Yes, I could see what he meant. The walls were of choss and the floor appeared to be of calcite but, closer inspection revealed, was of tightly packed mud, and the floor sloped downwards for 10m or so (just far enough to make continuing the previous hang, which dropped out of the rift, totally infeasible) before abruptly dropping what looked to be another 5m. Indeed, there was nothing even half-decent to rig off in sight. Gavin had tied the rope to a wire wrapped around a calcite/mud lump a few metres back from the edge (one-quarter decent), but there was nothing better. Oh what the hell, I thought, they don't call it exploration rigging for nothing, this is my last day of camp, and it looks as though the rope will just about reach using the current rig. I lobbed the rope over the edge and gingerly abseiled to the floor.

I was in a small muddy chamber with a boulder-strewn floor. I ducked under a low section and entered another, similar chamber. Something caught my ear. I listened: water, I was pretty sure, running water, not much of it but definitely some ... now I started getting excited. The character of the passage suddenly changed; I climbed through a catchy crystal window and found myself staring down a small climb. The sound of water below me was pretty clear now. I went back to the pitch and yelled up to Gavin, and he came down to join me.

We took it in turns leading into the new stuff. It was much smaller than the passage we'd been in before, not a great deal more than body-sized, but correspondingly the draught was noticeable, blowing in our faces. The climb led down to a series of small, phreatic tunnels, with projections sticking out of the walls all over the place. The water trickled along at the bottom of the phreas. The way on was obvious: we just followed the draught. After 20m or so, Gavin, I think, had got pissed off with the projections and stopped to take his SRT kit off, while I had gone for the impatient, it's-me-against-this-rock-and-I-know-who's-more-determined tactic, so I was ahead when suddenly the passage opened up and ... fuck!!!

I shouted something along those lines to Gavin, along with some recommendation to the general effect that if I was him I'd get here yesterday and come check this out. I was standing at the top of a dead easy 2m climb at the bottom of which was ... an enormous passage, 5m wide by perhaps 20m high, and carrying a truly sizeable streamway.

This was the end of our trip. Time was up, we were out of gear, we were low on food, we would soon be low on energy; we certainly didn't feel like breaking out the survey kit; this one was for the next team. This, actually — the knowledge that we were handing over a lead as top-notch as this to our successors — itself filled me with a sweet sense of satisfaction. I didn't need to scoop the streamway. Our trip, from its miserable beginnings in The Underworld, swimming exploits across the pool, a couple of days of rigging pitches, digging through chokes and

now out into this, had been absolutely perfect, and this was a perfect note to end on. My place in the world was perfect, yes, that was it. We checked 5m upstream and 5m downstream to confirm that we really were in a streamway, and turned tail. Those who came later, explored beyond our limits and found what was 20m further downstream would be forgiven for not believing this, but we kept our innocence, returning to camp tired and exhilarated to share our tale.

Derigging camp, 25–28 July

Harvey Smith

Team: Pete Eastoe, Tom Evans, Geoff O’Dell, Harvey Smith.

Mission: Tom to do first camping trip; Geoff and Harvey to see bottom of cave; Pete to see the end he didn’t quite get to previously; de-rig back to camp; consume as much spare food in cave as possible; Tom and Pete to eat the mountain of sweets!

Pre-amble: I imagined myself arriving at Ario, and Gavin greeting me with “Ah, Harvey, put your rucksack down, you’re going caving.” Hence was planning to psyche myself up during ascent of Sod 4 to explain that I really wasn’t fit enough to drag myself out of a 900m deep cave. Foiled. Before I got there Tom and Pete came bouncing down the path to greet me, and caught me completely off guard with enthusiasm to go to underground camp. “You’re coming with us tomorrow, it’s in Gavin’s schedule.” Resistance was futile. If Tom and Pete were happy to follow me out at a snail’s pace, then I knew I wouldn’t be able to resist the opportunity to see the bottom of the cave I was assuming I wouldn’t get a chance to. And if I was going, Geoff had no excuse not to either.

Day 1: No probs getting to camp, with Pete and Tom leading one crock each.

Day 2: Trip to bottom of cave. ‘Boat’ now down to 3 tackle sacks with 5 Daren drums’ worth of air. (Presumably the blue life-boat tied to it inflated automatically in an emergency?) The crossing provided Pete with opportunity to have a bath and wash his hair — daily washing routine not neglected just because underground. Gour pools fantastic — everything John Pybus’s photo-e-mail suggested. Fortunately Pete not influenced by the lyric “G’s for the gour pools we wash ourselves in”. Hang-man’s noose over sump pool a splendid touch. De-rigging accomplished with only a small bit of excitement when Tom found rope above boat rubbed through to the core. Pete proved that, as ever, washing on expedition is a bad idea — since being too fit to break into a sweat, he never warmed up after immersion. However, Geoff and Harvey de-rigging and Tom and Pete carrying stuff back to camp made for an efficient exercise.

Day 3 (and 4): To balance fitness levels, Geoff and Harvey took the lightest tackle sacks they could find, Pete and Tom took the heaviest. Food at brew-stop was good plan, as the crocks reaching knackeredness by then. Geoff’s jammer

starting to slip hampered progress further up, but we all made it out in the end. [Exactly 15 hours as predicted by me.] The breaking dawn as we exited the cave was awe-inspiring. Geoff and Harvey even found enough dregs of energy to stagger back to Ario, but *only just!*

Postscript: The most impressive thing about the trip for me was Tom and Pete. My previous trip with them was to teach them SRT, and I remember saying that next time I caved with them they'd probably be expedition hardened cavers leading *me* underground. Prediction turned out to be 100% correct. I was well impressed with their competence, given the short span of their caving career, but most of all by their sound attitude to doing adventurous things safely, and looking after fellow team members. Pete naturally ended up as the team leader, since he knew the way to the bottom of the cave, and had bags of spare energy to look after us all, and he lead the trip very effectively. And we did make a good team — each of us had different abilities, experience, energy or knowledge to contribute, and between us we completed the mission 100% successfully. Including the application of youth to convert an unbelievable quantity of sweets into useful work.



Pete Eastoe, on the surface after the trip. (Photo: HS.)

Derigging camp

Tom Evans

I was excited because this trip would be the biggest I had ever done. We planned to go to the bottom of the cave from where we would be derigging back to camp. We would have two nights underground, one the day we went down, then one when we went down beyond camp to the bottom of the cave, then we would be coming back out of the cave. On this trip I would be almost doubling my personal best depth and also camping underground for the first time. It was a good team because we had the experience of Geoff O'Dell and Harvey Smith, and Pete Eastoe who had already been to camp once already so he would be showing us the way.

The trip got off to quite a good start setting off into the cave by lunch. We had a fairly efficient trip down, dividing into pairs, Pete and Harvey, and me and Geoff. This helped us make better progress because we wouldn't have to wait so much for the rope to become free. We stayed within shouting distance most of the way as well. At the brew stop we all met up and had some soup which was nice, helping to keep us warm and also providing a rest before we pushed on to camp. We finally arrived at camp around seven in the evening, Harvey and Pete

had got there before us and had already collected water and started boiling a brew.

I found the camp pretty comfortable, having dry clothing and dry furry suits at camp. I even slept well having a warm sleeping bag within a bivibag to keep it all dry. Being underground for a few days was strange because there were no clues to whether it was night or day, the cave remaining the same for both. Time only passed on our watches. De-hydrated food proved to be quite a luxury also, I never thought that the first meal I would have in a cave would be pasta with a pesto sauce!

The second day was the best part of the trip, going to the bottom of the cave then derigging back to camp. I was a bit nervous of crossing the lake at first, being worried about how cold and wet I might get. But I actually managed to stay quite dry, hoisting myself right on top of the improvised raft of tackle sacks and Daren drums, so only my legs below my knees were in the water! I think because of my fear of getting cold and wet I managed to stay the driest of the party. On from the pool there were several more which could be crossed without getting very wet by walking around the sides of them. We then came to the gour pools, which were the prettiest thing I had ever seen in a cave, with thousands of little crystals in each pool glittering, reflecting and diffracting the light of our LED head lights back at us. The photos of the gour pools, though pretty, could never do them justice because of the way the light changed as one moved across the pools. I felt very privileged to see these gour pools, which had probably been developing over thousands of years and only having been seen by around a dozen people altogether on this expedition. I was pleased to get right to the bottom of the cave on the expedition, being 888m underground where the terminal sump was.

Going back up to camp went fairly well, carrying the tackle up between us. The most eventful and frightening part for me was coming up from the pool crossed by the raft, where there was a short pitch. As I came up towards a deviation I suddenly saw that the rope above me had been rubbing, and to such an extent that it was through to the core of the rope. I passed this using my extra jammer on my long cow's tail, which I was very thankful for at the time. Then I isolated this section of rope with a knot.

The next day was the trip out. We didn't leave until early afternoon, so we didn't think we would get out in the light, though we did! On the trip out we carried a couple of tackle bags each up to the brew stop at about -400m. We went fairly slowly coming out, partially because some of us were tired, and also because Geoff's jammer was starting to slip which made his progress more tiring and slower. We were all very happy to come out then. As I said we came out in the light but it was the light of dawn not the light of the evening! We had caved through the night. It was lovely to come out at dawn, because there was a beautiful sun rise and a nice orange-red light. From the cave entrance we saw rebeccas (a mountain deer) which was nice. We also met Gavin who had brought

his rescue runner. He rightly thought that since we hadn't got back to camp by the morning that we would miss our call out, though fortunately a rescue wasn't necessary!

10 Medical report

Mike Hopley

As in previous years, expedition members attended a first-aid training course. As medical officer, I attended additional medical courses.

Our first-aid equipment remained largely unchanged, although we reduced the volume of equipment taken; last year we took excessive supplies. We reorganized our medical kits somewhat. A rescue first-aid kit was installed at the underground camp, and a further rescue first-aid kit was stored on the surface. As before, all members were issued with small personal first-aid kits to carry underground and on surface trips.

There were no serious incidents. One member had a problem with grit or crystal in his eye, causing extreme pain, temporarily stopping him from seeing out of both eyes, and caused a very sore lesion. His eye was cleared with water and eye irrigation fluid to allow him to continue.

Several people suffered strain injuries. These ranged from mild to moderately severe. No gastro-intestinal infections were reported; I believe good expedition hygiene contributed towards this. As is to be expected, some people also experienced minor superficial wounds (small cuts, grazes, and bruises) or mild sunburn.

The severity of strain injuries varied greatly depending on the treatment applied for them. The recommended treatment was rest, but some patients preferred to use ibuprofen painkillers as a method of avoiding rest; in one case, this led to aggravation of the injury.

11 Summary of accounts

All figures are in UK pounds.

Income

The expedition was well supported by external grants. Most other income took the form of contributions from expedition members.

Grant income		
Oxford University Expeditions Council	860	
UK Sport Fund	250	
Ghar Parau Foundation	250	
Oxford University Society	200	
Oxford University Sports Federation (first aid)	300	
Subtotal	<u> </u>	1,860
Personal contributions		
Deposits ¹	2,651	
Kitty contributions ²	1,438	
Travel contribution	450	
Gear order payments	2,200	
First aid course charges	105	
Subtotal	<u> </u>	6,844
TOTAL		<u>8,704</u>

¹Most members paid a deposit of £80 (students and unwaged) or £120 (workers); those staying for less than 10 days paid a daily charge of 10% of the normal rate. The Spanish members made a joint contribution of 300 Euros.

²Members paid a kitty contribution of 30 Euros per week to cover food and other living expenses while in Spain.

Expenditure

Group equipment		
Rope	201	
Rigging gear	366	
Underground camping gear	335	
Surveying equipment	335	
Rescue stretcher	450	
Misc caving gear	102	
Surface camping	52	
Photography	51	
Computing	249	
First aid and medical	211	
Subtotal	<u>2,352</u>	
Personal gear orders		2,200
Transport		
Ferry	297	
Fuel	402	
Tolls	33	
Accessories and trailer repairs	85	
Trailer fund	250	
Return of Land Rover	15	
Subtotal	<u>1,082</u>	
Kitty expenditure		
Food in Spain	973	
Food from UK	42	
Petrol for stoves	38	
Misc	58	
Subtotal	<u>1,111</u>	
Medical training		1,125
Publications		
Prospectus	100	
Report	400	
OUCC Proceedings	100	
OUEC Bulletin	100	
Subtotal	<u>700</u>	
Administration		57
TOTAL		<u>8,627</u>
SURPLUS		77

The surplus will be passed on to the 2006 Expedition.

Personal expenditure

This section gives the average costs of an Expedition member.

Deposit	100
Travel to Spain	120
Kitty	60
Personal gear ³	200
Insurance	30
TOTAL	<u>510</u>

References

- [CS86] *OUCC Proceedings 12*, edited by Ursula Collie and Steve Roberts, 1986. http://www.oucc.org.uk/procs/proc12/proc12_conts.htm.
- [Gal84] Water Tracing in the Western Picos de Europa, Steve Gale, in [Sin84].
- [Hor91a] Hydrology, Dave Horsley, in [MMH91].
- [Hor91b] Some Thoughts on the Hydrology of the Ario Area, Dave Horsley, in [MMH91].
- [Low05] *Oxford University Cave Club, Expedition Shaft-Bashing Guide*, Gavin Lowe, <http://users.comlab.ox.ac.uk/gavin.lowe/Caving/Spain/total.pdf>, 2005.
- [MMH91] *OUCC Proceedings 13*, edited by Ursula Mead, Mike Mead and Dave Horsley, 1991. http://www.oucc.org.uk/procs/proc13/proc13_conts.htm.
- [MLSW88] *Application of dye-tracing techniques for determining solute-transport characteristics of ground water in karst terranes*, D. S. Mull, T. D. Liebermann, J. L. Smoot, and L. H. Woosley, 1988. <http://www.karstwaters.org/files/dyetracer.pdf>.
- [Ros91] Geology, Phil Rose, in [MMH91].
- [Sin84] *OUCC Proceedings 11*, edited by John Singleton, 1984. http://www.oucc.org.uk/procs/proc11/proc11_conts.htm.
- [Wik05] *Global Positioning System*, Wikipedia, <http://en.wikipedia.org/wiki/GPS>.

³The figure for personal equipment is intended to cover only the cost of *sustaining* a set of personal expedition equipment through an expedition, i.e. wear and tear; it therefore significantly understates the amount spent by individuals on building up personal equipment stores, estimated at £1,000 each.

- [Wil91] Dowsing the Picos, John Wilcock, in [MMH91].
- [Wil95] 1995 observations on the Culiembro drainage, John Wilcock, in press.
- [Win86] Dye-Tracing, Hilary Winchester, in [CS86].