

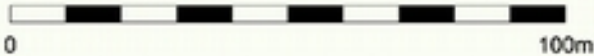
Steinbrückenhöhle (1623/204)

and surrounding area

Looser Plateau, Totes Gebirge, Austria

	Length	Depth
204 (Steinbrückenhöhle)	11682m	550m
231 (Traungoldhöhle)	229m	27m
234 (Hauchhöhle)	1009m	88m
241 (Dreieckhöhle)	54m	13m
242 (Tröpfelhöhle)	17m	10m
243 (GNDN Höhle)	53m	31m
244 (Dünne Faulpelz Höhle)	156m	51m
245 (Weizeneishöhle)	134m	19m
249 (Artischockehöhle)	64m	7m
251 (In Ihrer Gesichtshöhle)	169m	36m

Explored and surveyed by Cambridge University Caving Club 1999-2005.
 Drawn at 1:500 using TunnelX. BCA grade: 5c.
 Coordinates: Austrian national BMN grid, zone M31; MGI (Hermannskogel) datum.



Cave Surveying Workshop

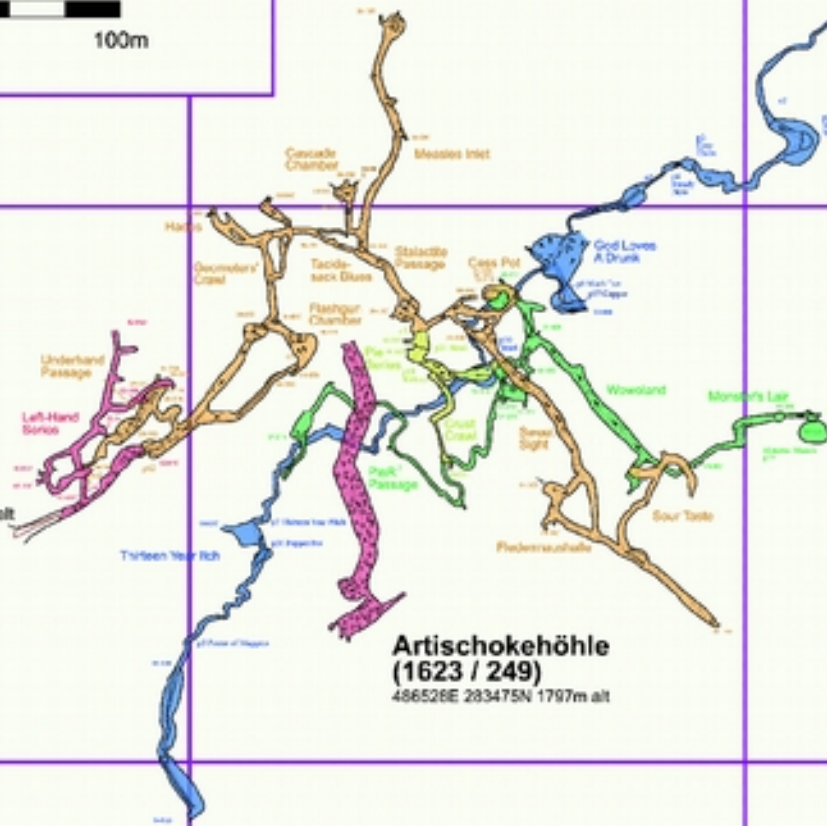


283500N

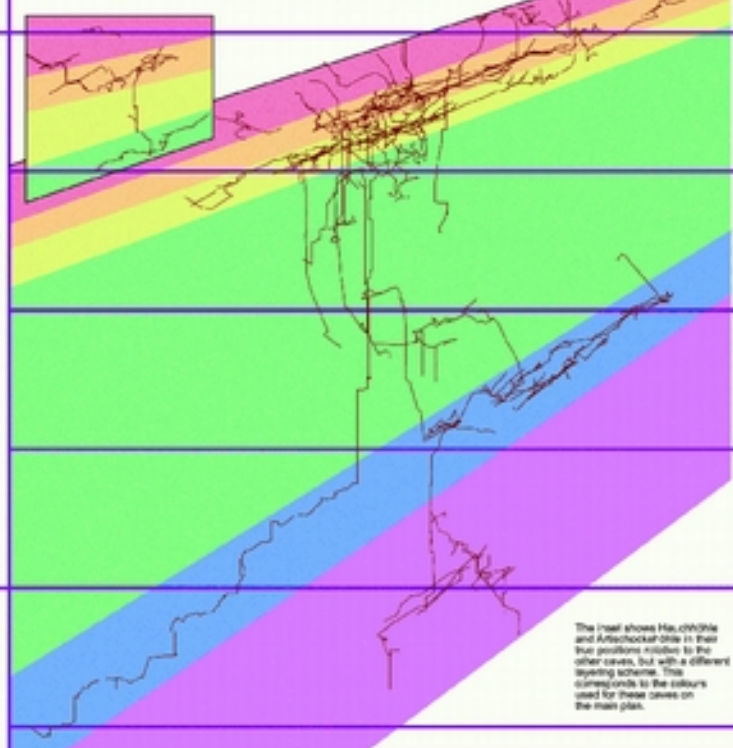
283400N

Hauchhöhle (1623 / 234)
 486486E 283441N 1784m alt

Artischockehöhle (1623 / 249)
 486528E 283475N 1797m alt



Elevation on bearing 328°, 0.25x scale



The inset shows Hauchhöhle and Artischockehöhle in their true positions relative to the other caves, but with a different leveling scheme. This corresponds to the colours used for these caves on the main plan.

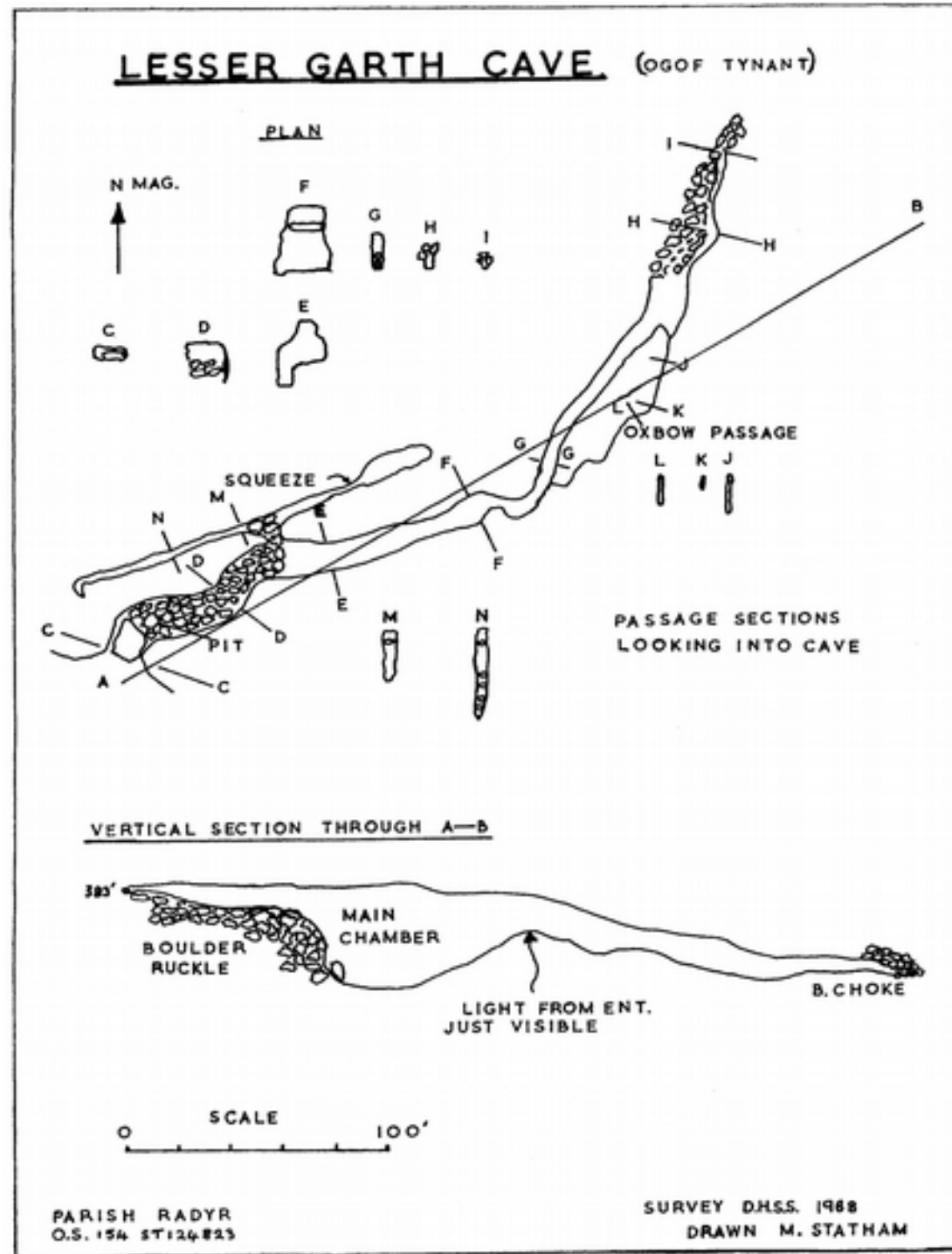
Surveying Caves

Why?

- To find your way in newly discovered cave
- To read others' surveys better when you're navigating
- To understand the formation of the cave, the hydrology, geological patterns, and the karst in general
- To predict where new important discoveries could be made
- To keep track of new leads

Outline

- Surveying Part I: in the cave
- Surveying: practical part
- Surveying Part II: after the cave
- Surveying: computer practical



Gradings of surveys

<http://www.bcra.org.uk/surveying/>

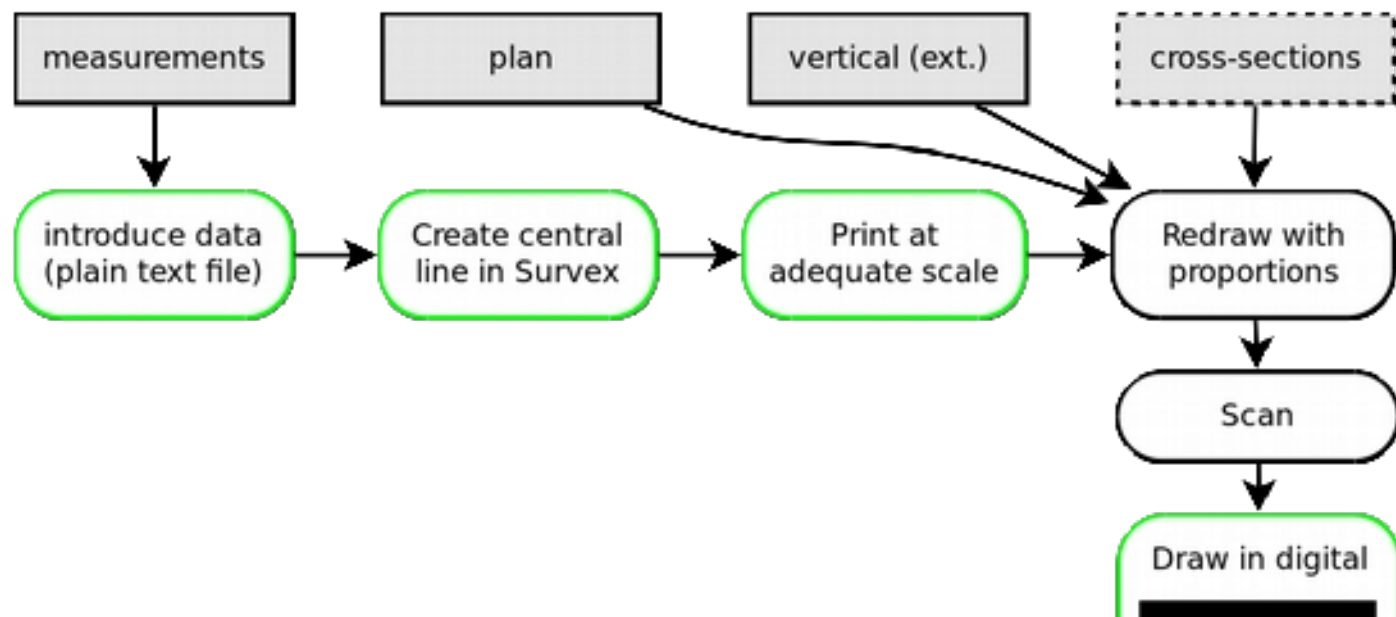
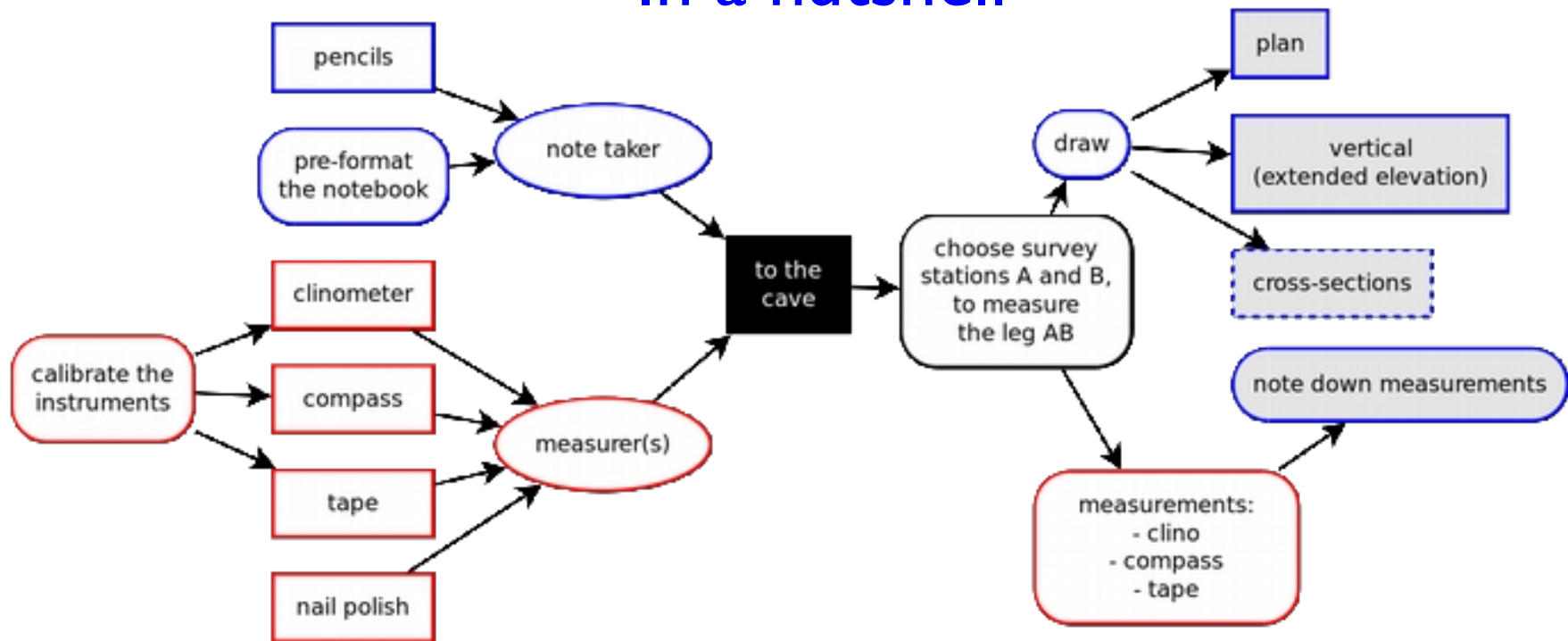
Table 1: BCRA gradings for a cave line survey (MEASUREMENTS)

- **Grade 1** - Sketch of low accuracy where no measurements have been made
- **Grade 2** (use only if necessary, see note 7) - May be used, if necessary, to describe a sketch that is intermediate in accuracy between Grade 1 & 3
- **Grade 3** - A rough magnetic survey. Horizontal & vertical angles measured to $\pm 2.5^\circ$; distances measured to ± 50 cm; station position error less than 50cm.
- **Grade 4** (use only if necessary, see note 7) - May be used, if necessary, to describe a survey that fails to attain all the requirements of Grade 5 but is more accurate than a Grade 3 survey.
- **Grade 5** - A Magnetic survey. Horizontal and vertical angles measured to $\pm 1^\circ$; distances should be observed and recorded to the nearest centimetre and station positions identified to less than 10cm.
- **Grade 6** - A magnetic survey that is more accurate than grade 5, (see note 5).
- **Grade X** - A survey that is based primarily on the use of a theodolite or total station instead of a compass, (see notes 6 and 10 below).

Table 2. BCRA gradings for recording cave passage detail (DRAWINGS)

- **Class A** - All passage details based on memory.
- **Class B** - Passage details estimated and recorded in the cave.
- **Class C** - Measurements of detail made at survey stations only.
- **Class D** - Measurements of detail made at survey stations and wherever else needed to show significant changes in passage dimensions.

In a nutshell



Station	Lat	Long	Height	Remarks
10-10	1022	102	450	
10-11	1020	102	450	
10-12	1020	102	450	
10-13	1020	102	450	
10-14	1020	102	450	
10-15	1020	102	450	
10-16	1020	102	450	
10-17	1020	102	450	

Station	Lat	Long	Height	Remarks
11	1020	102	450	
12	1020	102	450	
13	1020	102	450	
14	1020	102	450	
15	1020	102	450	
16	1020	102	450	
17	1020	102	450	

Apfelstadel 6/10/2007
 Translocation
 SW 1/2 N Rio Winkel
 Gestein - unter
 Harven - topf
 20m - abwärts
 from 1/3 of person away
 10m - 1/2 - 1/3
 Typ - Dim 100 cm
 (red line)

Apfelstadel 20770
 Winkel 407107
 10.10.2007
 10.11.2007
 10.12.2007
 10.13.2007
 10.14.2007
 10.15.2007
 10.16.2007
 10.17.2007

Run	Type	Camp	Clear
1-10	6/10	100	215
1-11	7/10	092	212
1-12	2/15	353	200
1-13	2/15	162	228
1-14	4/10	078	230
1-15	4/10	20	27
1-16	13/10	552	16
1-17	2/10	076	162
1-18	5/10	036	01
1-19	2/10	031	04

Station	L	R	W	D	Remarks
1-10	4	2	5	105	
1-11	112	002	2	009	
1-12	1	0	1	105	
1-13	0	112	15	18	
1-14	0	1	005	10	
1-15	0	16	1000	100	
1-16	0	0	0	0	
1-17	0	0	0	0	
1-18	0	0	0	0	
1-19	0	0	0	0	

Long of ground
 Down top (Red line)
 Station of top
 Station of top

1-10	326	-23 V
1-11	325	-23 V
1-12	144	+22 V
1-13	146	+23 V

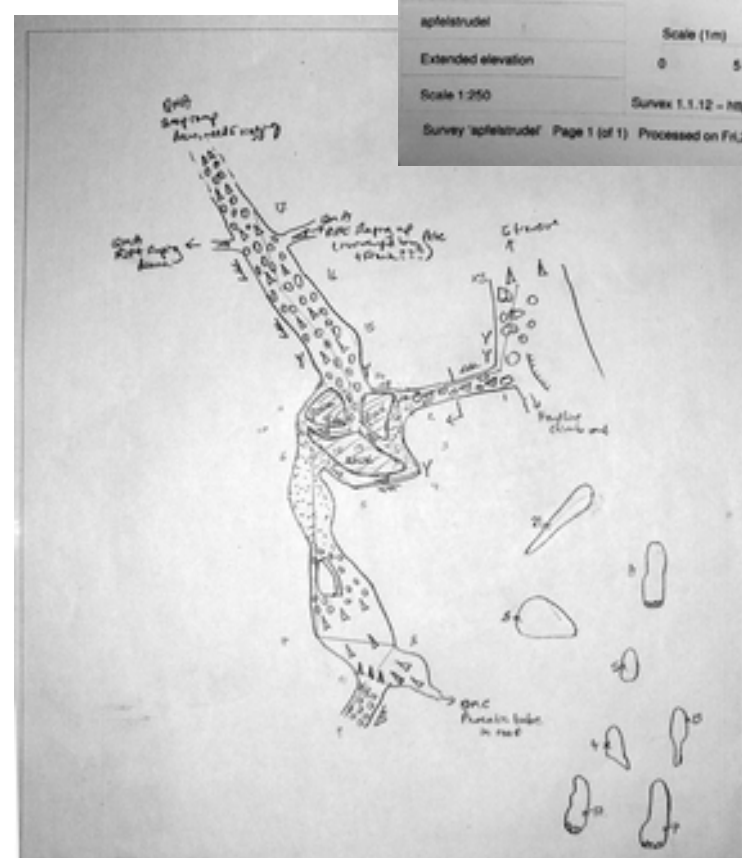
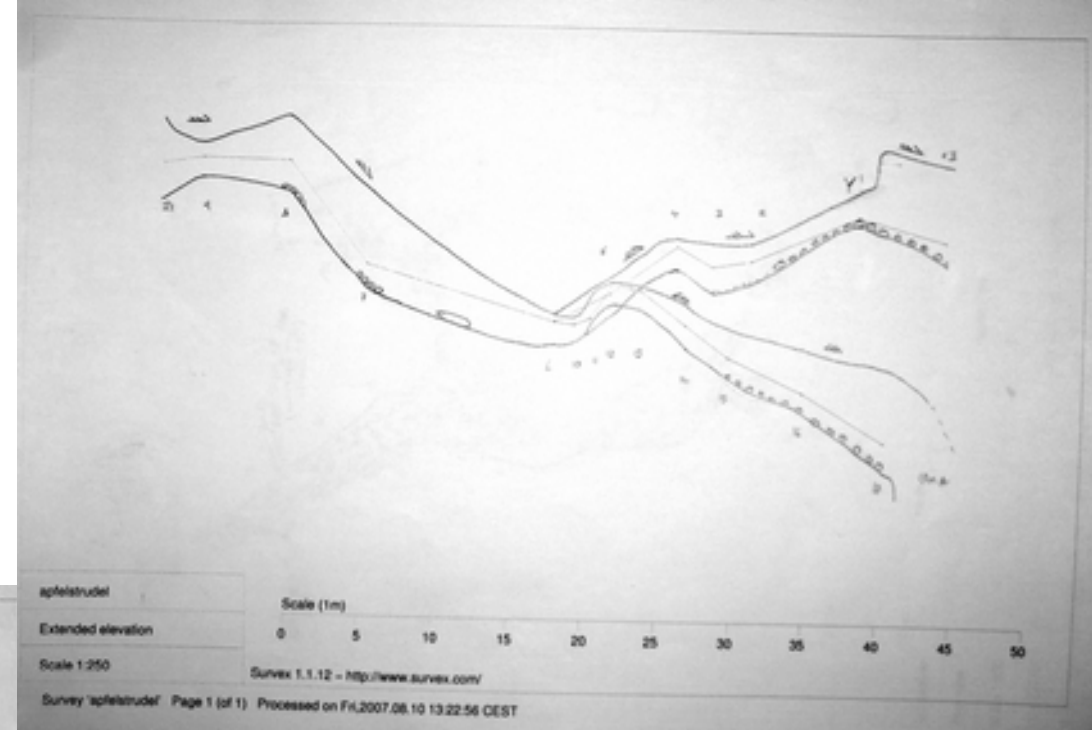


Apfelstadel 20770
 Winkel 407107
 10.10.2007
 10.11.2007
 10.12.2007
 10.13.2007
 10.14.2007
 10.15.2007
 10.16.2007
 10.17.2007



Station of top
 Station of top

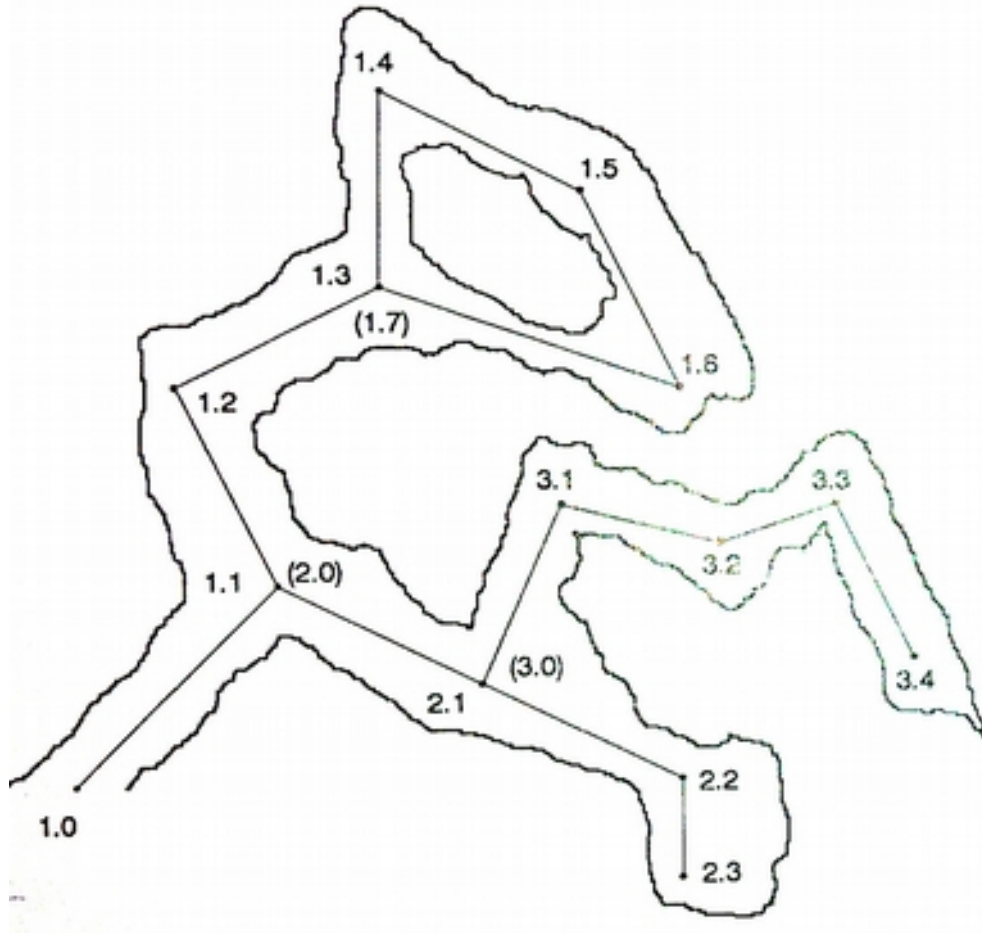
1-10	326	-23 V
1-11	325	-23 V
1-12	144	+22 V
1-13	146	+23 V



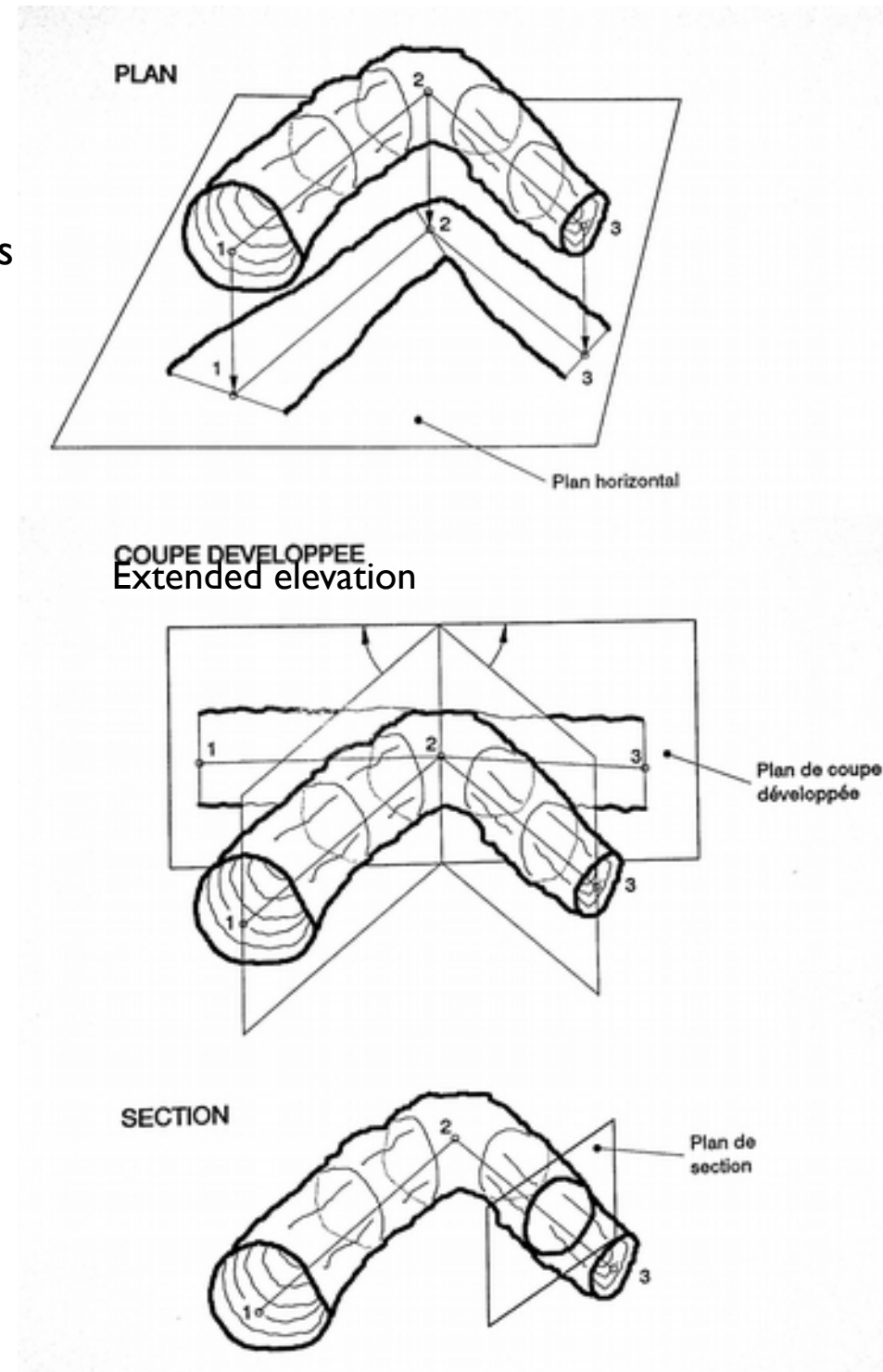
Surveying Part I: In the cave.

How do you draw a survey?

The central line



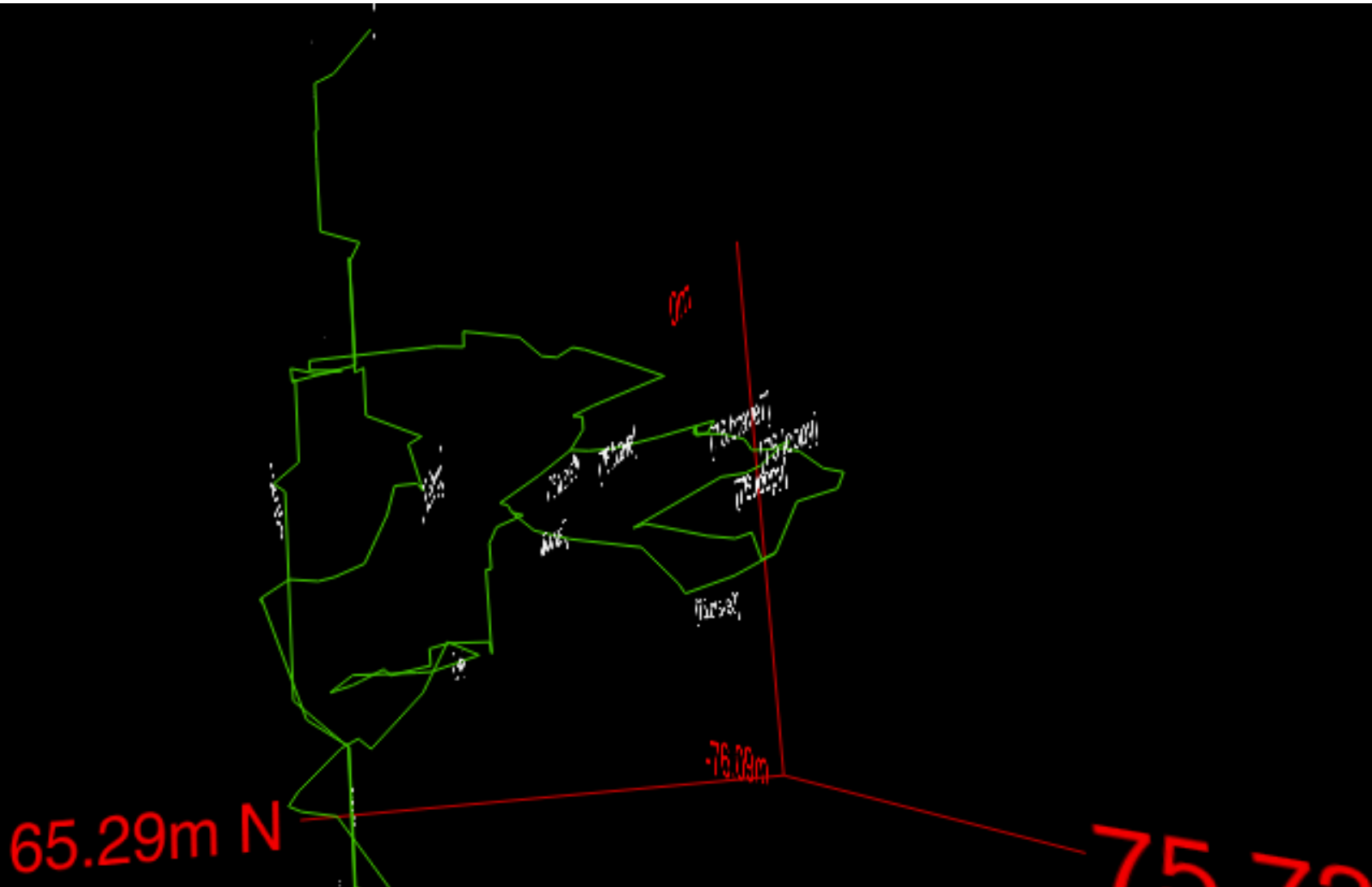
The views



Central line

https://dm516.user.srcf.net/loser/squiggle_76.html

https://dm516.user.srcf.net/loser/squiggle_all.html



Part I: In the cave. The central line - MATERIAL

pencils

pre-format
the notebook

clinometer

compass

tape

nail polish

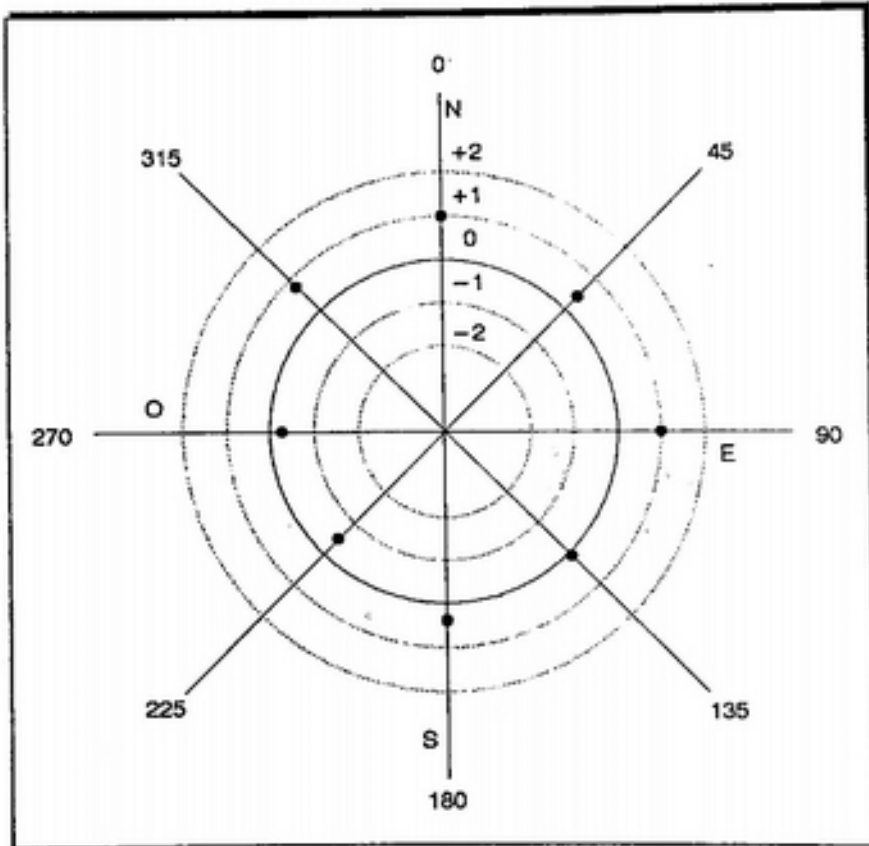


Fig. 3.12 Représentation graphique des directions mesurées avec un compas

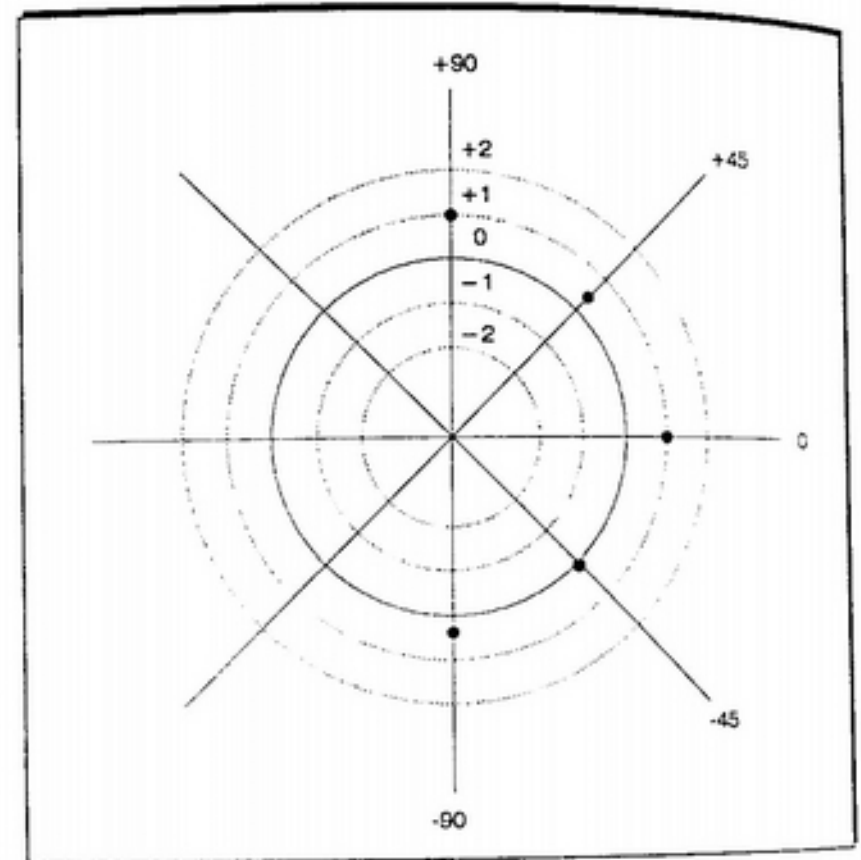


Fig. 3.13 Représentation graphique des angles mesurés avec un clisimètre

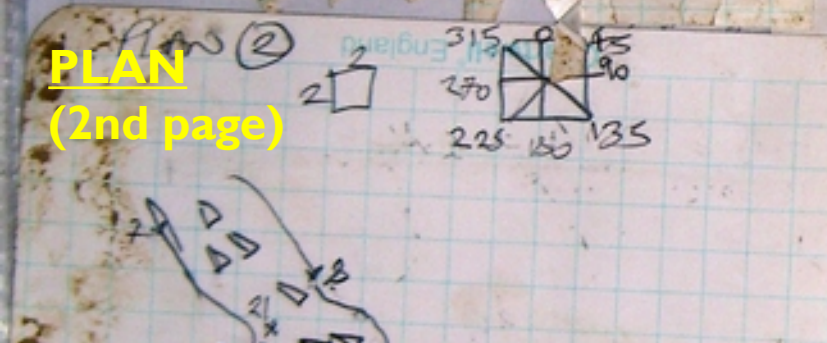
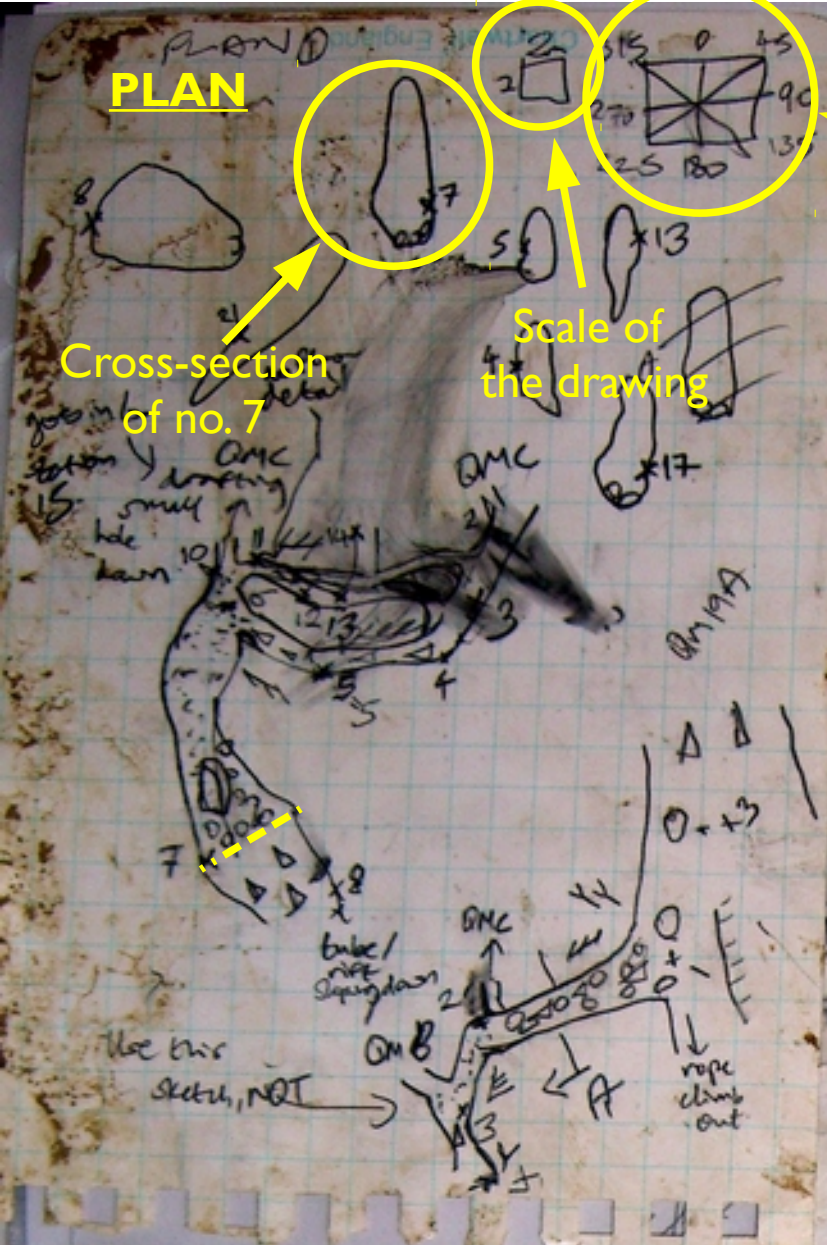
Part I: In the cave. The central line - NOTES

JOB (CAVE?): Snail Cave					DATE: 01/04/2002	SHEET No: 1	passage detail information			
stat'n nos.	clino	length	compass	drawings		<<-	->>	↑	↓	
1	2	-02/5	6/20	221/5		2/6	1/4	3/4	0/6	
2	3	-03/0	12/65	240/0		2/4	1/9	3/6	0/8	
3	4	+11/5	18/30	185/0		3/7	1/2	3/0	0/7	
4	5	+06/0	14/60	223/5		2/4	1/8	4/2	0/6	
5	6	+21/5	08/75	244/0						
6	7									
7	8									
8	9									
10	11									

Station	Tape	Compass	Clino	←	→	↑	↓

Figure 6. Two suggested record sheet designs.

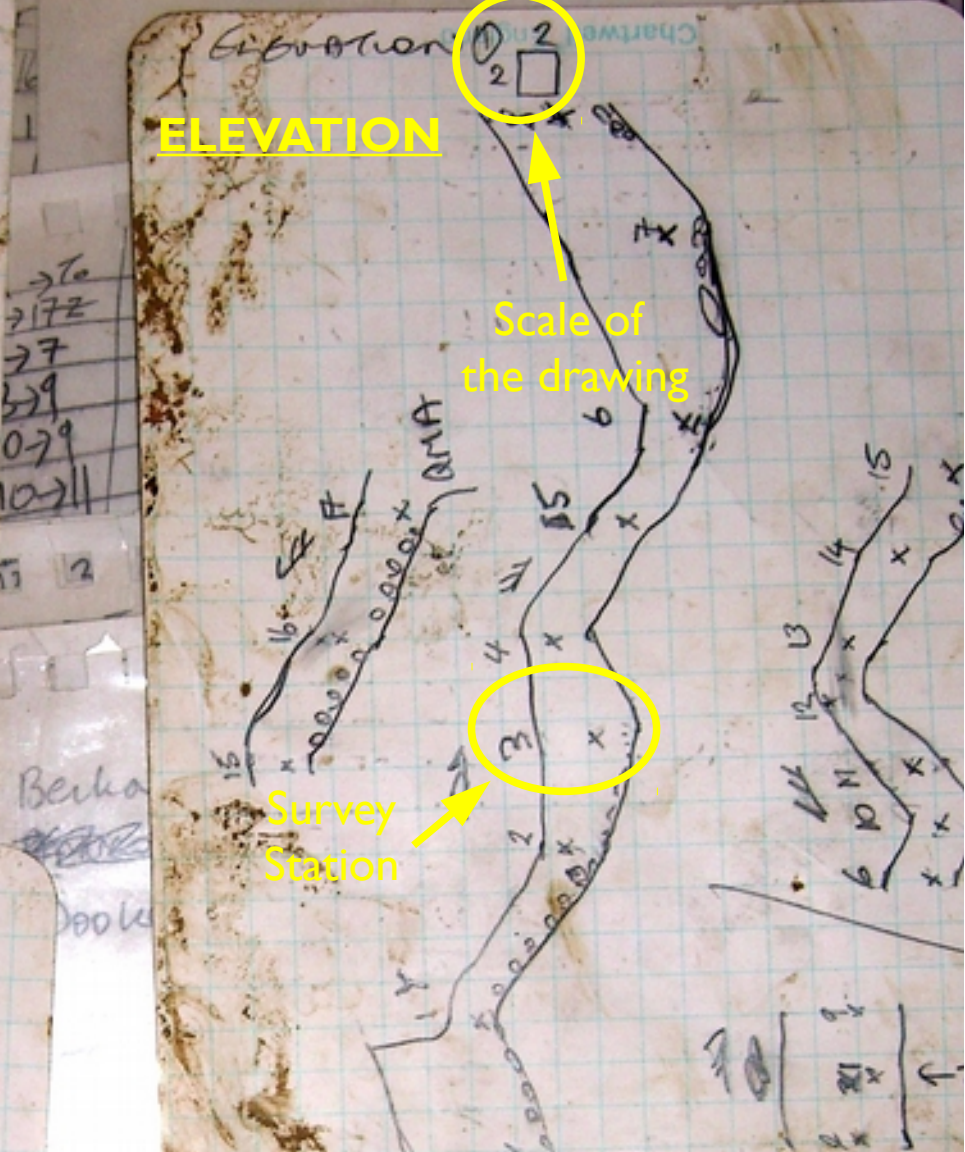
Part I: In the cave.
Drawings



PLEASE USE!
Apfelstüdel
Tunnocks
Notes - Becka
Tape - Marvin
Insts - Jon

2007#153
6/8/2007

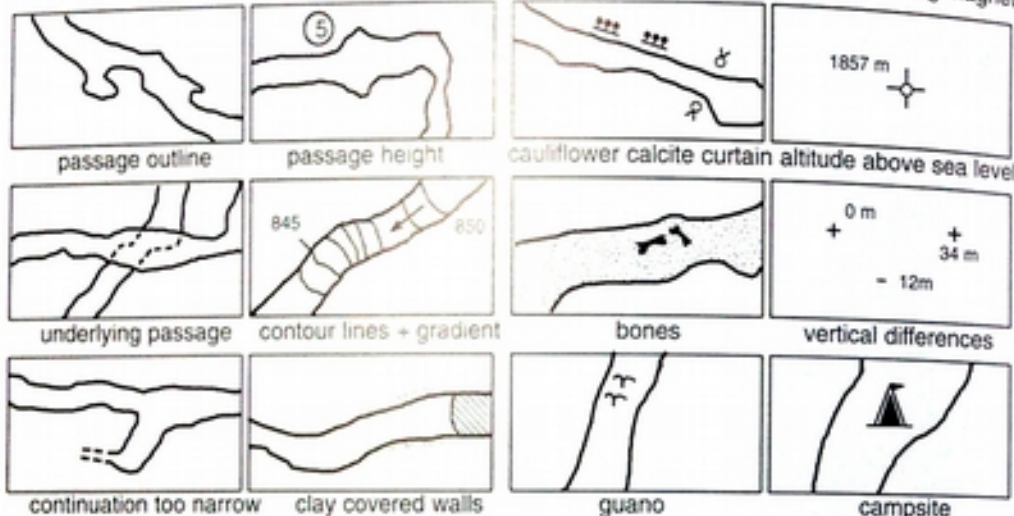
and
30m+
over



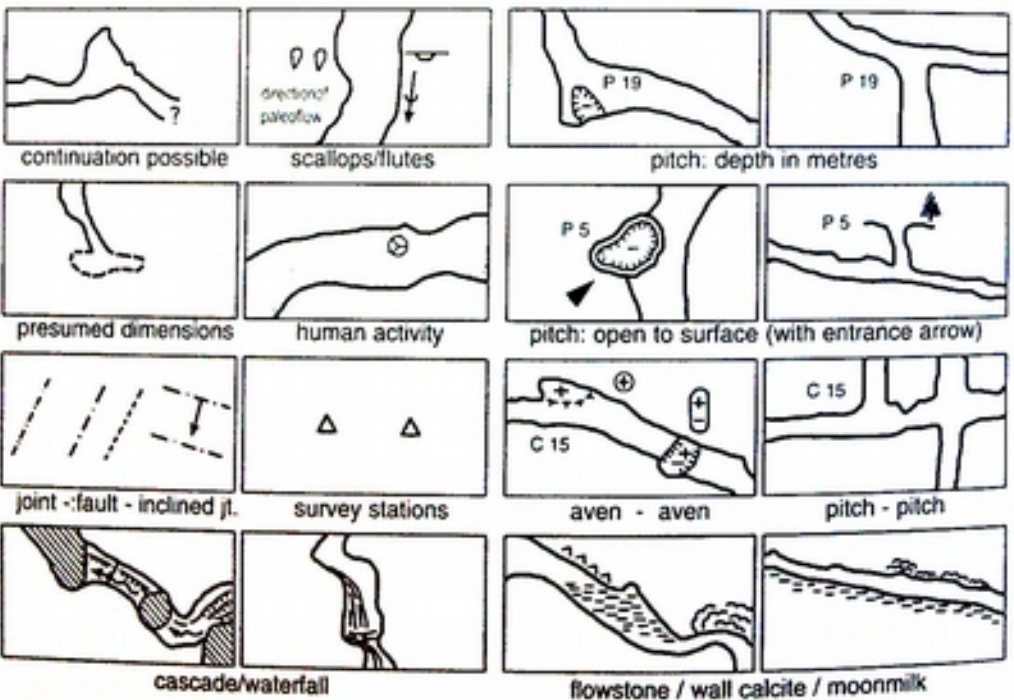
Part I: In the cave.

Figure 14: Most commonly used US agreed symbols for cave surveys. (abridged version, see p. 21, item 5 for internet reference for full version)

Symbols

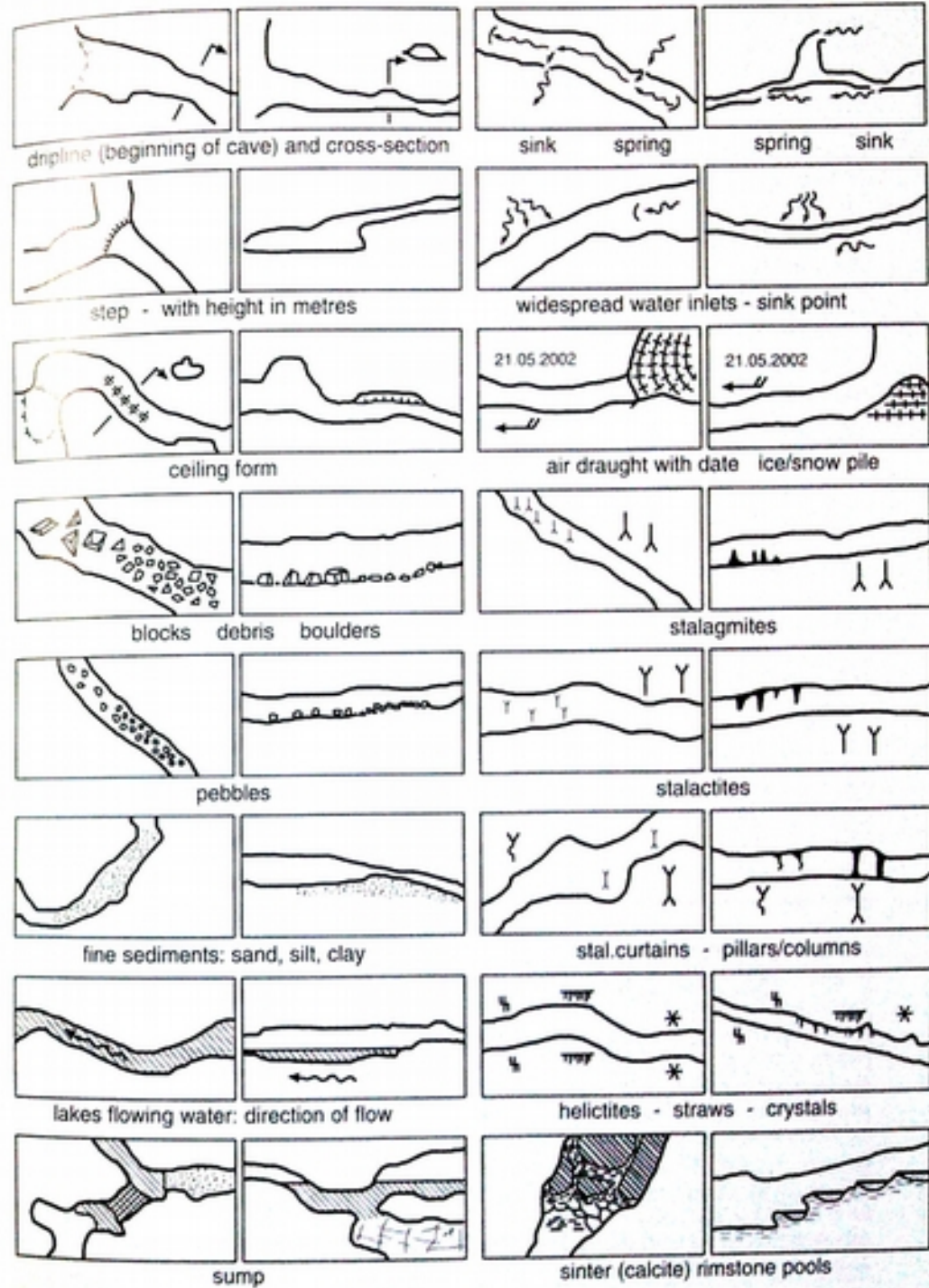


PLAN / ELEVATION



PLAN / ELEVATION

PLAN / ELEVATION

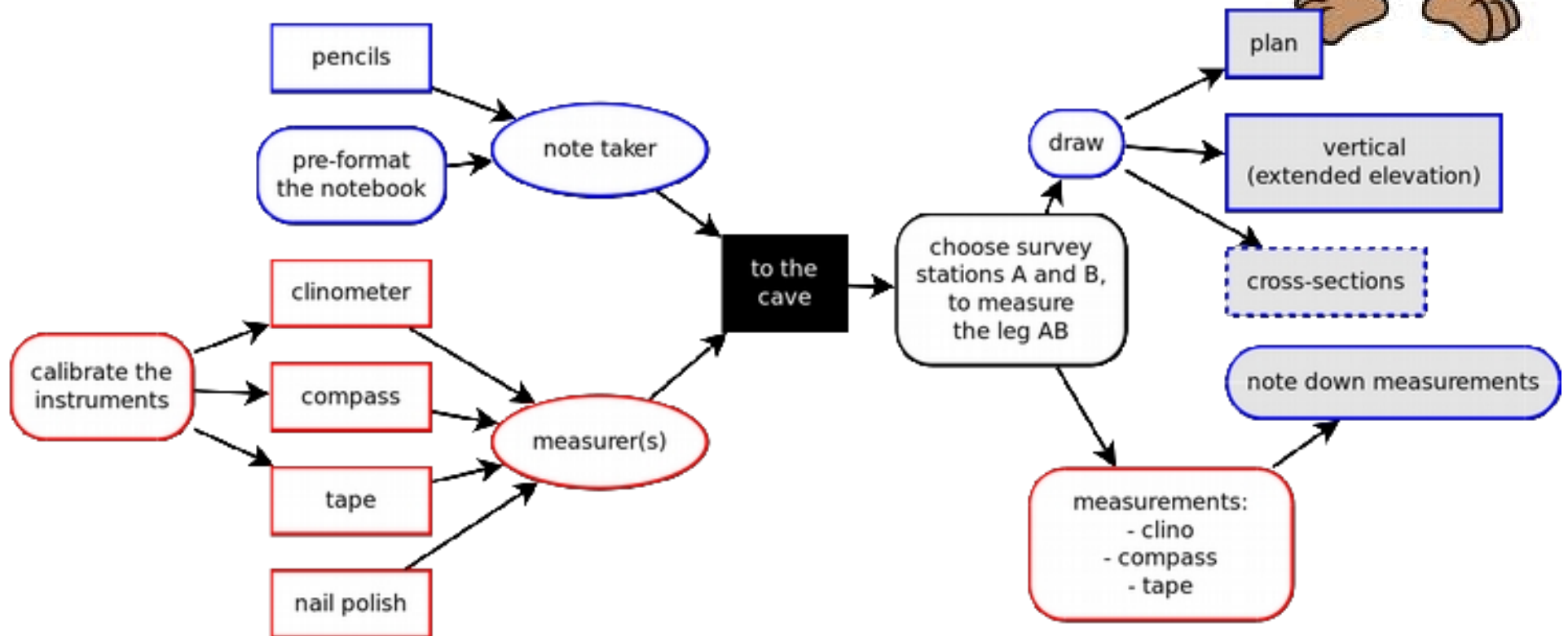


Before the cave. **Calibrate the instruments!**

- **Clino:** measure one leg from both survey points.
Both readings should be the same but with opposite sign
- **Compass:** measure one leg from both survey points.
Both readings should differ exactly by 180 degrees
- **Tape:** note down how many centimetres are broken, if any.
If very old, compare against a new one to check that it hasn't stretched

Part I: In the cave. SUMMARY

1. Calibrate the INSTRUMENTS
2. Preformat the NOTEBOOK
3. Select surveying stations (STICKY DOTS)
4. Measure and note down the measurements
5. Draw plan and vertical (and cross-section?)



Further

- Entering data for Survex: <http://survex.com/docs/manual/datafile.htm> ,
<http://survex.com/docs/manual/svxhowto.htm>
- CUCC Expo Handbook - Surveying: <http://expo.survex.com/handbook/survey/index.htm>
- BCRA Survey grades: <http://www.bcra.org.uk/surveying/>
- Wikipedia: http://en.wikipedia.org/wiki/Cave_survey
- DAY, Anthony (2002). Cave Surveying [Cave Studies Series 11]. Buxton: British Cave Research Association.
- Cave Surveying Groups: <http://csg.bcra.org.uk> , <http://cavesurveying.org.uk> ,
<http://www.uisic.uis-speleo.org/wgsurmap.html>
- Cave surveys of the UK: <http://cavemaps.org/>
- List of cave symbols: <http://www.carto.net/neumann/caving/cave-symbols>
- Avoiding errors in cave surveying: <http://www.sghbern.ch/page/hrh/avoiding.html>
- <http://www.utgrotto.org/articles/SurveyBasics.asp>