COMPASS & TAPE

Volume 4 Number 1 Summer 1986

COMPASS & TAPE

Volume 4 Number 1 Summer 1986

COMPASS & TAPE is the quarterly newsletter of the Survey & Cartography Section of the National Speleological Society, Cave Ave., Huntsville, Alabama, 35810, U.S.A. The cost is $4.00 per year for 4 issues. Please make checks payable to Survey & Cartography Section. Include your NSS number for Section membership. Foreign members and subscribers are **welcome!** Rates are US$4.00 per year for surface mail: inquire for air rates. We regret that payment must be in US$, and checks drawn on U.S. banks. The volume runs from the annual NSS Convention: those paying later will in most cases receive all back issues with the next bulk mailing. If you are in a hurry to receive these, enclose $1.00 extra for postage. Expiration dates are printed on mailing labels. Volumes 1, 2 and 3 are available for $5.00 each.

Survey & Cartography Section - 1986/1987

Chair: John Ganter 1016 Taylor St. State College, PA 16801 814-238-0957
V-C: Dan Crowl 1170 Torrey Rd Grosse Pt Woods, MI 48236 313-881-5254
Sec: George Dasher 109 Shawnee Dr Buckhannon, WV 26201 304-472-6264
Tres: Lance Lide P.O. Box 2601 Little Rock, AR 72203 501-354-2633

Contacts

Dues, Subscriptions, address changes, etc.

Lance Lide
SACS Treasurer
P.O. Box 2601
Little Rock, AR 72203
H:501-354-2633
O:501-569-3349

Articles, Maps, Letters, Comments, Tips, Photos:

John Ganter
Editor, Compass & Tape
1016 Taylor St
State College, PA 16801
H:814-238-0957
O:814-865-6421
BITNET: GL0 @ PSUVM

Materials related to Computer Applications:

Bob Hoke
Associate Editor, C&T
6304 Kaybro St.
Laurel, MD 20707
H:301-725-5877
O:301-688-6217

COVER : A portion of SISTEMA DE CAVERNAS DEL RIO CAMUY, Puerto Rico, one of the world's classic river caves. The river flows north, towards the top of the page, and is shown as solid black. The mottled pattern shows dry parts of the cave, while the dots trace postulated flow paths. With a scale of 1:500 or 800 feet per inch, the map is about 5 times as large as the 7.5-minute USGS Bayaney quadrangle which it is based on. The complete sheet measures 10 x 31 inches, and was compiled and drawn by Thalia D. Veve in 1983, using source maps produced by the Sociedad Espeleologica de Puerto Rico. It won an award for Best Map Showing Relationship of Cave to Surface at the 1984 NSS Cartographic Salon.

CONTENTS

CAVE MAPPING IN BRAZIL

Topography In Caverns: Work Methodology

by

Claudio Jose, Mendes Pedrosa
and Nivaldo Destro

Translations by Thalia D. Veve

From the beginning of S.B.E. (Sociedade Brasileira de Espeleologia) activities a constant evolution in the methods of work has taken place. Through the acquired experience in various trips and repeated surveys in a same cavity, the efficiency or inefficiency of employed methods can be verified and perfected. In this manner, works in Speleology will suffer various modifications which will come to facilitate field work and to expedite the preparation of maps in the office.

Evolution of Cavern Topography

When we wish to perform cavern topography, in general, we can not think in the possibilities of using the instruments conventionally used in subterranean mining topography, either because of the existence of an extremely irregular relief or reduced sections. The irregularity in caverns compels us to make special use of the compass and tape, in a diligent survey which should be as precise as possible.

Through the acquired experience in such types of surveys, we can arrive at a method which seems ideal to us for a quick and efficient topography of caverns. At first, the Traditional Method was used, in which a simple traverse was made resulting in a normally open polygon. This was followed by the Method of Triangulations, which did not exclude entirely the "traditional" one. Nevertheless, both methods soon became obsolete because in narrow galleries it made the team work enormously difficult. To solve the problem we proceeded to use the Radiation Method, which consists of taking bearings and distances from one or more points adequately chosen; therefore, a perfect harmony between the topography teams and the sketchmen became necessary. In this way, we get to produce an pleasing depiction of the cave, along with an accurate traverse.

Difficulties Encountered in the Preparation of Maps

When we pass to the phase of the preparation of maps at the desk, invariably we meet the question of the map content. The cavern maps, whether the cavern is famous or not, end up being used by a most varied number of persons. From speleology specialists to curious inexperts, all make use of these maps, some for obtaining scientific information, others for knowing the general outline of the cavity. Therefore, in producing such maps, we always bear in mind making them as useful as possible for all kinds of interested persons. Our maps usually show the geographic, geologic, biological features and data and possible human structures in the cavity interior which could be useful for speleologists.

Brazil...

Bearing in mind these objectives the cartographer needs, without doubt, highly informative and simple symbols which can facilitate his/her work and improve the conditions and effects of artistic creativity.

Adequate Symbology

The question of symbols to be adopted in the preparation of a plan view is, without doubt, complex and of vital importance to obtaining a good representation of the cavern.

In general, three problems are present in the symbol lists of the various institutions dedicated to speleologic inquiry:

1.) Complex symbols - They make difficult the understanding and reduce the esthetic quality of the map.
2.) Impractical symbols - They don't succeed in giving an objective idea of what is being represented.
3.) Few symbols - The existence of a very limited number of symbols compels the cartographer to create special symbols or to omit data.

The best way for solving such problems is through the preparation of maps showing: 1.) Plan view; 2.) Longitudinal profiles, and 3.) Cross sections We understand that these three representations constitute a complete cavern map. In order to complete the map's informative effect the following inscriptions are required:

1.) Name of the cavern;
2.) Its location (District and State);
3.) Graphic Scale;
4.) Geographic and/or magnetic notation;
5.) Name of the entity that performed the cartography;
6.) List of symbology used;

In this manner we get to reduce most of the difficulties in understanding maps, making them legible and attractive.

(from ESPELEO-TEMA, No. 14, Sao Paulo, 1984, p. 63-65.)

Explorations Aided By Topography

by Wolfgang Valle Walter

Perhaps, this matter is not new for our reader, and probably this resource is utilized frequently by explorers. In our activities we met with an intricate exploratory problem, which we narrate in this article and of which solutions were clarified with the assistance of topography or a pre-survey of the cavern.

We should quote some preliminary data for having a better view, and we begin by the proper constitution of our group or CAMIN. As with a lot of other speleologic clubs it possesses a fluctuating population of curious people among the most serious and motivated speleologists, so that in our campings we generally have some 4 or 5 persons more experienced than the others. Nevertheless, we were advancing in our explorations, until we met with a cavern of great proportions for our small exploratory group.

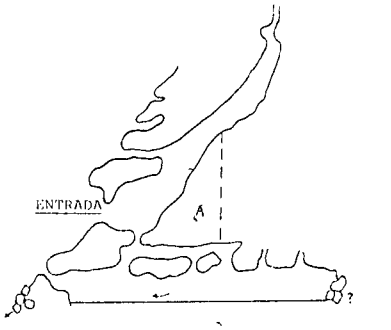
Brazil...

We are talking about the Ribeiraozinno III Cavern, resurgence of a stream whose swallet is situated 2 kms. from this point. Obviously, it quickly became the center of our attention, especially after the preliminary explorations revealed almost 800 m. of galleries and rooms, with a depth of 200 m. approximately. We enclose a sketch of the galleries' principal points.

The explorations followed animatedly until we found an impassable collapse which blocked most of the cavern, calculated as almost 1,500 m. of river galleries. At first we thought that our works would be restricted to this known part, due to the impossibility of proceeding, but later, as we familiarized ourselves with the cavern, we began to create a hypothesis about its formation, and concluded that the river once passed at least at the entrance room's level, 25 m. over its present course.

This modified considerably our exploratory plans, as there could exist other fossil galleries over that of the river. We concentrated on this new angle, but due to the nature of this resurgence, with many fallen blocks over clean galleries, and also our reduced number, we found ourselves in front of a great challenge.

We will now explain in part the big ascending room, which owes its existence to a formidable collapse of a whole massive interior, especially in its lower region (A), demonstrated by the huge blocks found.
This could have obstructed ancient galleries by which the river once passed. The idea that could be formed of the region and the underlying one, is one of a complicated ant-hill, with passages between collapses along with galleries of later development. We began a detailed investigation, but progress was poor, since notwithstanding the use of compasses, spatial orientation was lost and we then decided to survey all known segments, to see what way would be more interesting to follow.



This finished, we produced tridimensional maps which could be better adapted to reality, and a careful study guided us to new discoveries. This progress of the exploration and topography together indicate a high probability of finding a passage between the fallen blocks which would permit us to reach the inaccessible galleries. Furthermore, it represents a considerable time gain as viewed in the previous analysis of the better exploratory alternatives.

Due to the precision required to close topographic polygons, we ended up also improving the instruments and methods used in topographic work, which was presented in the XIV National Congress of Speleology in Bello Horizonte.

(from ESPELEO-TEMA, No. 14, 1984, p. 113-115.)

Backsights for Fun and Profit

by Roberta Swicegood
Arlington, Virginia

Backsights during a cave survey are frequently regarded as the province of dataphiles and computer jocks--those who worry about fraction-of-apercentage improvements in loop closures, those who insist in resurveying loops that close at more than the error inherent in survey instruments. Well in part, that's true. Backsights do distribute the error inherent in Suunto compass/clinometer combinations and allow fine-tuning of surveys. However, backsights are extraordinarily useful for any survey, because they are the first line of defense against the blunders that can happen at any time, to any surveyor.

Cave surveyors often have to read instruments or take notes while 1) clinging to precarious holds 30 feet up, 2) straining to hear voices above the roar of a 24 cfs waterfall, 3) staring at numbers after 24 hours without sleep, 4) spitting mud from licking off the eyepiece of a Suunto, 5) shivering in the first stages of hypothermia, 6) trying to keep one eye and one nostril above water, 7) admiring the echo resonating through a giant chamber, 8) dodging bats, 9) dodging rocks, 10) dodging formations, 11) swinging from a rope 200 feet above the floor. You get the idea. In such conditions, blunders are a fact of life.

I have worked on the maps for two major cave projects that routinely use backsights: Roppel Cave in Kentucky and the Rio Encantado system of Puerto Rico, about 70 miles of cave. The blunders coming out of Kentucky and the Caribbean are remarkably similar. The most common instrument-reading blunder is the 10-degrees-off reading. Instrument readers forget momentarily the way the numbers go on the card; 155 degrees is read as 145, or 165. The second most common blunder is a reading 100 degrees off. After that, the blunders are random, resulting from problems with station position, carelessness, or whatever. Sketchers, trying to do a high-pressure job requires constant speed, concentration, and vigilance, sometimes mishear or miswrite readings. The point here is that I know these blunders occur because we take backsights and have spotted (and corrected) most of them in the cave.

The mental (and monetary) cost of not taking backsights can be high. On one survey trip in Puerto Rico, we didn't bother with backsights. After I returned from the Caribbean, I began to reduce survey data. Something about this survey just wasn't right--the data did not match the sketch, and the cave was doing some near-impossible things. I made a long-distance call to the sketcher, then mailed the data, computer plots, and preliminary analysis. He called me back long distance. We discussed the situation at length, and finally decided that one of two shots had to be 100 degrees off. altered the one that allowed the best fit to the overall map. We weren't sure we were right, by any means. Costs: about $20.00 in long distance charges, and a lot of peace of mind. (We couldn't go back there the next week and resurvey the suspect section.)

I frequently hear the argument that "backsights are nice, but they take too long; there's no way to do them efficiently." There is a technique for doing backsights that does not slow the survey down at all, except when errors must be corrected.

Backsights without Slowing the Survey Down

To do this efficiently, you need at least a three-person survey team. It works best with four people, because there is less stress on the sketcher. The three-person

technique is:

1) Point sets a station in the forward direction, and the instrument reader takes readings to the forward station.

2) The instrument reader moves up to the forward station, while the sketcher stays at the rear station prepared to hold a light on the station for backsight.

3) The instrument reader takes the tape from point and secures it (stands on it, wraps it around an arm, wraps it around a rock, sits on it-- whatever it takes), then pivots and reads the backsight while point is moving to the next station. It is important for the reader to be able to ignore the tape while doing this-- a short tether may be helpful in keeping the end of the tape out of the way, yet instantly in hand.

4) The sketcher works up to the station where the instrument reader is, as the instrument reader pivots and reads the forward station which point has now set.

5) The instrument reader moves up to join point, while the sketcher remains at the rear station.

It's as simple as that. Usually, the backsight can be read before point is even in position for the next reading, and no time is lost. If a four person survey party is possible, the fourth person serves as "backlight," substituting for the sketcher at the rear station and allowing the sketcher to move freely about the passage without having to hold a light for the backsight.

Additional Tips

We have found that it is best if the foresight is read as a foresight, and the backsight as a true reading (i.e., if the foresight is 270, the backsight should be 90, not 270). This is for two reasons: instrument readers are less tempted to "match" the prior reading rather than give a true reading, and it is easier to deal with problems in the data later when shots are indicating a true direction. (Of course, this does put more strain on the sketcher, who must constantly be doing mental math to catch readings which don't agree with each other. Most sketchers who work with backsights quickly memorize the foresight/backsight pairs.)

When foresight/backsight pairs are reduced, greater loop closure accuracy will be achieved by averaging the foresight and backsight and using the average as the number; this smooths out compass/inclinometer anomolies.

The amount of divergence between foresight and backsight that is acceptable is a matter of taste and judgment. I generally consider readings within two degrees acceptable, and cheat a little and allow greater divergence when the readings are being taken from a difficult position, or up or down steep slopes. Some people, mainly interested in catching blunders, allow up to a five degree difference in the interest of not stopping the survey to re-read instruments.

The Cave Cartography Workshop: Some Observations

by Carol Vesely
Goleta, California

At this year's convention in Tularosa I was the organizer of the Beginning Cave Cartography Workshop. Since I had never lead or even participated in such a workshop before I wasn't exactly sure what to expect. I found the organizing to be both interesting and somewhat challenging. Since it is likely that other members of the Survey and Cartography section may find themselves leading similar workshops at the grotto, region or convention level, I thought it might be useful to report on some of my observations from this experience.

The Preparation

The workshop was to involve 'hands-on' experience, so each participant was assessed a $5 fee to cover the cost of materials. Two weeks in advance the convention program committee sent me a list of 32 names of those who had paid their fee. This seemed like too many people for one workshop due to limited space, materials and assistance, so I decided to hold the same workshop twice and divide the group in half.

The People

Although the title of the workshop included the word 'beginning,' this being a relative term I expected that the participants might vary greatly in both their survey and cartography experience. To get a better idea of their experience level I had everyone fill out a brief questionnaire when they first walked in the door. The 3 questions are listed below with the number of people selecting each alternative answer listed in parentheses.

1) Which of the following best describes your survey experience?

(5) I have never helped survey a cave.
(11) I have been a member of a cave survey team, but I have never been the sketcher (notekeeper).
(10) I have sketched or kept book a few times (less than 5).
(5) I have sketched many times.

2) Which of the following best describes your cave cartography experience?

(13) I have never drawn a cave map.
(8) I have drawn some sketch maps from memory, but I have not drawn any maps based on survey data.
(5) I have drafted at least one map from survey data, but not using professional drafting supplies.
(3) I have completed at least one cave map using professional drafting supplies.
(1) I have completed several cave maps using professional drafting supplies.

3) What are your goals for this workshop?

(23) To learn the basic procedure for drafting a cave map.

(20) To learn cave map symbols and how to portray cave features.
(15) To learn about drafting equipment: how to use it, where to get it
(11) To improve my drafting techniques and pick up some pointers.
(10) To get ideas from others on how to improve my cave maps.
(7) To discuss and critique different cartographic styles.

A further analysis reveals that surveying experience is correlated with cartography experience and participants varied in experience from those who had never helped survey a cave nor drawn even a sketch map (5 people) to those who had been the sketcher for many cave surveys and had completed one or more cave maps (4 people). By far the majority of people had helped survey but not sketched and had never drafted a map.

Those with virtually no experience were naturally most interested in learning basic drafting procedures and the symbols used to represent cave features. On the other hand, the most experienced people were interested in improving their techniques and discussing various cartographic styles. With such a wide range of experience it was a challenge to try to provide something for everyone.

The Materials

Since this was to be a 'hands-on' workshop and a $5 fee was charged, I was able to buy some materials for map-making. I bought: vellum graph paper, mechanical pencils, rulers, t-squares, protractors, mylar drafting film, 3 Rapidograph pens, ink, transfer letters, erasers, etc. Naturally, I was not able to buy one of each item for everyone so I supplemented these supplies with some of my own. Most of the non-perishable supplies remain and can and should be used for future workshops. The following is a list of materials remaining:.

4 Protractors (semi-circular, clear plastic)
3 T-squares (12" long, clear plastic)
6 Rulers (12" long, inch and centimeter scales, clear plastic)
16 Erasers (plastic - half size)
12 Pencils (yellow mechanical)
3 Pens (Rapidograph - sizes: 1, 0, 00)
1 Ink (bottle)
1 Mylar (roll of mylar drafting film 2' x 15')

The Workshop

During the first hour of the workshop I lectured on the basic procedure for map drafting, trying to use numerous examples and visual aids. Bob Richards generously loaned me a couple dozen overhead transparencies which we had used for a regional presentation on cartography in the past. I also provided several handouts including: 1) list of supplies needed to draft a map and approximate prices 2) list of information to be included on a map and map salon criteria 3) list of NSS cave map symbols 4) list of AMCS map symbols.

During the remaining two hours each person worked on one of three possible projects. The projects had been geared to people of different experience levels. Each project included an introduction sheet which briefly described the project, its goals, the materials needed and the steps to follow. Also included were several additional data sheets and portions of maps as required.

Project #1 was to draw a simple cave map. A xerox of several pages of a survey book showing the notes and a sketch of the cave was included. The object was to make a

line plot, then sketch in the walls and floor detail on graph paper and finally ink the map onto drafting film. Many details of the cave were deliberately omitted and little written notes such as: 'skylight here' or 'bedrock floor' were included so that people would have to determine what symbol to use on their maps. As with all three projects, no one was expected to finish in the time allotted.

Project #2 was designed for those who already knew how to plot data and sketch a first draft. These people were provided with a first draft of a cave map and their goal was to plan the layout of the final draft and ink and letter it.

Project #3 was the to work on an effective presentation of a very complex, multiple level maze cave. Three levels and cross sections were provided on separate sheets of paper and had to be integrated in some way, that showed the complex relationship of the passages: a real challenge for even the most experienced.

While people were working on their projects I had the opportunity to circulate around the room answering questions and offering suggestions. Ten minutes before the end of the session I asked each person to take a turn and show everyone their project and discuss what problems they had, what they learned, what had been the most difficult, etc.

An Evaluation

Because I held the workshop twice the second group had the advantage of the experience I had gained from leading the first one. Each workshop was actually quite different. Overall, I wish I could have provided more emphasis on portraying complex passages and using symbols to represent the cave but this is difficult to do and perhaps it is outside the domain of such a workshop.

I think people generally benefitted from the projects but probably each could have been improved. Project #1 was the most popular, with about 2/3 of the group choosing to try to draft a simple cave map from start to finish. All the data necessary for drawing a line plot of 8 stations was provided. Many people seemed to have the most difficulty deciding at what scale to draw the map and then deciding where on the page to place the first station. One participant suggested later that these decisions could be made much faster if people worked together on this part. No one who worked on this project got as far as the inking stage and some didn't even manage to finish their lineplot. However, the majority managed to draw most of their first draft of the cave. In retrospect perhaps 8 stations is too much and 4 or 5 would have been sufficient. Also I had wanted to use data from 'real' caves and thus had chosen two small 'room' caves which included splay shots. Probably a cave with a single meandering passage would have been a better selection.

Project 2, which emphasized layout and inking was the second most popular. Some people didn't get past the layout stage and thus never got to try using the drafting pens. Perhaps I should not have emphasized layout as much since this is a 'more advanced' consideration, but I feel that good cartographers should be aware of layout from the beginning and that good drafting skill is something that is more difficult to teach and must come from extensive practice. Amazingly, a few people managed to layout, ink and partially letter their maps in the two hour time period.

Only three people chose the third, most advanced project which was to try to portray a complex, multilevel section of cave in an effective, understandable way. It's a shame more people didn't attempt this challenge but perhaps individuals with this level of experience should not be in a 'beginners' workshop.

For all three projects I chose to use notes and sketches of 'real' caves which I had surveyed to provide a more genuine experience. In retrospect I'm not sure this was the best choice. If I had completely invented the cave and notes then I could have simplified or enhanced the information thus providing the participants with a broader experience. Some people had difficulty interpreting the notes. I deliberately did not try to make them look as neat and perfect as a final draft of a map since cave notebooks seldom look that good. Part of the problem with interpretation may be due to the inexperience of the group and part to the fact that they had never actually been in the cave which was shown in the notes. Perhaps the ideal situation would be to hold the beginning survey workshop at an actual cave near the start of the week and then have people bring their notes to the cartography workshop and actually draft the map. This would be much more satisfying and instructive and it would be very interesting to compare the results.

Finally, I wish I had created a questionnaire to hand out at the end of the workshop asking for criticisms and suggestions but I didn't. So if there's anyone out there reading this who would like to comment on the workshop I'd be glad to hear from you. My address is: 408 Ellwood Beach Dr. #3, Goleta CA. 93117.

Acknowledgements

I'd like to thank the following people who contributed to this workshop: Bob Richards for use of the transparencies and pens. Peter Bosted and Rich Breisch for entrusting me with their drafting pens. And most of all Bill Farr for his constant support and assistance.

Submitting Material to C&T

Short items, tips, etc. are needed and very welcome- they can be in any legible form. Remember to ALWAYS cite sources completely and to include complete addresses for products, etc. Illustrations are valuable- try to send clean, sharp copies or originals.

Longer reports and articles will NOT be re-typed. Please send one of the following media:

Disks: Mail 5 1/4-inch SS or DS, SD, DD or Quad-Density DOS diskettes with ASCII text or Wordperfect files. Line length should be under 60 characters. To mail a diskette, simply cut a piece of cardboard from a box, tape it around the disk, and put it in an envelope. Very simple, very light, very cheap to mail. Your disk will be returned promptly. Sorry, modem service is not available, but you can try getting GL0 @ PSUVM on BITNET.

Hard Copy: If you have a non-DOS machine or a typewriter, by all means send printed text. It should be in black ink, fixed pitch (no proportional spacing) and double-spaced. This will be scanned with a Kurtzweil character reader, so it should be very clean: typewriter or daisy-wheel preferred. Dot-matrix is OK, but it should be large and highly legible. 'Fancy' fonts or other abominations are not acceptable- here or anywhere else. If you can send a good photocopy of dot-matrix it would be appreciated: this fills in the dots for better scanning and will save me a trip to the copier.

Always try to incorporate graphic materials in your writing. Maps, charts, tables, graphs, photos (color or black and white: makes no difference), etc. will explain your ideas with clarity. Camera-ready copy is preferred.

Thanks for taking the time to read this. Following these guidelines will make the production of C&T more efficient and allow time to be spent on important areas, rather than drudgery. Questions? Contact me via the means listed inside the cover. <--- John Ganter, Editor.

One Student's View: The Cartography and Survey Workshops NSS Convention '86

by Lorna Greenway
Phoenix, Arizona

I enjoyed both workshops. However, I found the Beginning Cartography workshop, led by Carol Vesely, to be much more challenging than I had expected. Also, I was somewhat frustrated with the length of time I took to draw a good line plot of the particular cave I chose to map. The data used in the survey book was presented in a different manner than I had been exposed to previously. So I had to modify that which I already knew and understood and rid myself of some preconceived notions about mapping.

The cartography workshop was originally scheduled only for Monday afternoon, but due to the number of students who had preregistered, and those on the waiting list, a second class was held Friday morning. I attended the first class on Monday, which probably was not in my best interests because I was tired and did not do as well as I would have liked.

Carol began the workshop with reminders that 1) No one method is the absolute method for use in drafting a map 2) Each cartographer has a different purpose in making his/her map, with different details to emphasize, etc. 3) The importance of drafting the map to justify the time spent in surveying the cave.

After receiving basic information about the steps involved in drafting a map and the visual hierarchy of information to be presented in the map, each student chose one of three projects to work on: Project 1- Draft a simple cave map, Project 2- Ink an already-drawn map, or Project 3- Transfer a final map onto mylar. We then picked up handouts particular to the project each of us had chosen and worked on those projects for about 1 1/2 hours. At the end of that time, we spent about 20 minutes individually showing our projects and having everyone in class critique our work. This was a valuable part of the class. Most suggestions given will help me to do a better job on my next map.

Both workshops, Beginning Cartography and Beginning Survey were well done. However, there must be more coordination between those who scheduled the workshops and the Survey & Cartography Section. The SACS Session and the Section Meeting were held Monday morning, followed by the Beginning Cartography workshop that afternoon, and then the Beginning Survey workshop Thursday afternoon. I would have gotten more out of attending all four programs had they been scheduled in exact reverse order. All information would have been presented in a more logical order, therefore being easier to understand , and much more useful to me as a novice surveyor and cartographer.

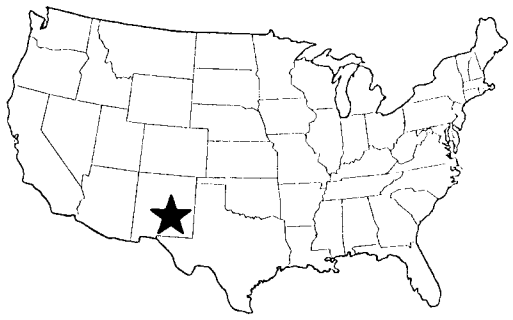
Charlie Bishop discusses a transparency listing the steps involved in Cave Surveying.

Nancy Pistole explains her cartographic decisions to the class as Prof. Vesely looks on.

Survey & Cartography Session

1986 NSS Convention, Tularosa, New Mexico

Briefly noted by John Ganter



A Look At Compass & Clinometer Error in the OTR Survey Course ---> John Ganter

For several years, Bob Hoke and Tom Kaye organized instrument courses at the annual West Virginia 'Old Timers Reunion' for cavers to run around with their cave survey instruments in an attempt to see who could achieve the best closure.This talk summarized some findings from an unpublished statistical study by the author: see also Bob Hoke (1983) CAS Newsletter #12, p. 7-13.

Briefly, it's easy to detect, and correct for, systematic errors between instruments resulting from slight differences in manufacture. There seem to be some vague correlations between shot length and inclination, and random error, but more work needs to be done with larger samples to pin this down.

Laser Profiles of Cave Passages ---> Bob Buecher Tucson, Arizona

Bob began by explaining that he had wanted to use a laser in cave surveys for some time, but that only advances in the last few years had made them affordable. With this he turned on the unit he had along, a rectangular aluminum box about 8 inches long, mounted on a tripod. This laser is fairly low voltage, so it can be powered by a 6 volt battery. It produces a bright half-inch spot when beamed across the room, with a gradual decrease in brightness and a broader spot up to a couple of hundred feet.

The laser has been used as a complement to normal cave surveys, mostly in Carlsbad Caverns. This has involved various methods of triangulation, and also the use of an optical rangefinder in some cases. Bob showed a number of slides depicting the laser in use, diagrams of the triangulation methods, and a naked-eye sketch vs. laser profile of a large pit-- the laser really helps!

Making Communicative Cave Maps ---> John Ganter

This was a run-through, with transparencies, of the article in the Spring '86 C&T. Symbology was emphasized in anticipation of the perennial NSS Cave Map Symbols debate, with questions and discussion following.

Computer Applications Session

A Computer-Aided Cave Map ---> Miles Hecker Casper, Wyoming

Miles began by explaining that he had set out to draft a large cave map in completely digital form. His first step in tackling Fossil Mountain Ice Cave (3 miles) was to edit and analyze the already-entered survey data with CAVE, a PC-compatible program which he has written. Along the way he found a great number of loop closure errors tracable to poor data entry. His conclusion is that most of the time this error is the result of recording or transcription blunders.

The next step was to upload the data to a larger computer, because a cave this size represents about 1/2 megabyte of data. Apparently, the data model is just an array, so 6 meg RAM was required for its manipulation. A one mile cave could perhaps be handled on a PC with Autocad (a commercial computer-aided-drafting package). The software that Hecker used was DOGS (Design Oriented Graphics Simulation), which is a fairly powerful 2 and 3-D drafting package for mini-computers. The stick figure of the

survey traverse is in 3-space, while walls, detail and text occupy one plane.

Miles' methods for inputting the non-mumerical data were quite interesting. For cross sections, he attempted to digitize directly from the survey book. For rocks, he came up with 4 generic types, developing a macro to scale them to whatever size was needed. Then he wrote a room-filling algorithm that can fill a room with rocks or whatever on command, with weighted randomness. This, he explained, was because the survey sketch never bears any resemblance to the cave anyway! Gotcha, nodded the audience, as your reporter suppressed an urge to ask why we didn't just use fractals to create the whole cave. It would probably look better, plus we wouldn't have to worry about all this dirty surveying.

Bob Buecher with his Laser, on table. '186,000 miles per second is not just a good idea- IT'S THE LAW' reads his shirt. We C what he means.

Miles Hecker discusses his Fossil Mountain Ice Cave map, produced with the aid of a CAD/CAM system.

Map-Aid for Cave Maps

by Richard Market

Princeton, Indiana

Ever use a copy of a map in a cave only to have it get wet and the ink to become illegible, or the paper to fall apart? You can protect those and many other maps, guides or charts by coating them with Crystal Clear Krylon. This is sold along with Krylon spray paints in most hardwares and department stores. Coat both sides with a heavy coat. On the ink side you will have to use two coats, the first being light to prevent the ink from smearing. Test a sample first.

We tested 4 maps by taking them on a 23 hour cave trip. Then after the trip the maps were submerged in water for 5 minutes. Then the maps were rubbed off with a towel. They were extremely flexible, but still readable. After drying, the maps were as good as they were before being submerged. This is a great way to help protect your maps for in-cave use.

(from THE PETROGLYPH, vol 21:2, December, 1985, p. 3.)

9th International Congress of Speleology

1 - 7 August 1986 **Barcelona, Spain**

Correspondent: Bob Thrun Adelphi, Maryland

For cave map enthusiasts, the 9th ICS was not very interesting. There was no Map Salon. There were no maps posted on walls. There was one new piece of hardware, and there were two interesting publications. There were not even any old items of hardware on display.

The one new piece of hardware shown was a Yugoslavian clinometer. It consisted of a specially marked protractor and a pendulum. There was a button that released or locked the pendulum. It had a sight that provided an apparent dot on the target.

The Burgos (Spain) cavers who are working on the 90- kilometer Ojo Guarena system had a thick book of map quads. It started with overall maps and topo maps with the cave passage shown. Next there were a series of plan view quads. Where there were multiple levels (as many as five), there was a quad showing all the levels as different kinds of dotted lines. Then there were individual quads for each level. At the end were profile foldouts. The book was approximately 12 by 16 inches by an inch thick. They also had a proof copy of a book about the cave. It will have many color pictures.

The book Topografia Espelogica, by Albert Martinez i Ruis is the best book on cave mapping that I have seen. It was printed in 1983, so it is not exactly new, but I had not seen it before. The book is profusely illustrated, with 234 figures in 118 pages. The first part of the book consists of pictures and descriptions of every known surveying instrument. The author claims that Bruntons are too fragile for cave surveying. I get the impression that he has not personally tried all of the instruments he describes. There are examples of many kinds of map projections, as well as the fidelity of detail on maps. Note taking and drafting are discussed. I don't agree with all the methods shown, but I must admire the scope of the book. It cost 750 pesetas (about US$4.00). It is written in Catalan, the language of Catalonia in northeastern Spain. The language resembles both French and Spanish.

U.S.G.S. Consolidates Facilities

The U.S. Geological Survey has begun consolidating its facilities for nationwide distribution of maps, scientific books and reports, and general-interest publications into a single building in suburban Denver, in a move expected to save up to $1 million per year in operating costs.

The consolidation will result in phasing out the USGS Eastern Distribution Branch, which has facilities in Arlington and Alexandria, VA. The phaseout began April 21, 1986 and is scheduled to be completed by September 30, 1986. Mail order processing was discontinued July 1. Map distribution services for all states will now be provided by the USGS, Map Distribution Section, Federal Center, Box 25286, Denver, CO 80225.

(from the MAP GAP #21 (North American Cartographic Information Society), June/July 1986.

Cart Salon Entries, 1986

Compiled by John Ganter

Arizona			
Pyeatt Cave	Cochise Co.	Lang Brod	
BELIZE			
Kangaroo Cave	Toledo Dist.	Peter Bosted	
California			
Amargosa River Cave #1	Inyo Co.	Bob Richards	(MT)
Banished River Cave	Santa Cruz Co.	Peter Bosted	(HM)
Chrome Cave	Amador Co.	Marianne Russo	(HM)
Mammoth Cave	Madock Co.	Charmaine Legge, Bruce Rogers	
Mercer Caverns	Calaveras Co.	Bruce Rogers	(HM)
Silver Shadow Cave	San Bernardino	Bob Richards	(MT)
Florida			
Caves of Florida Caverns State Park	Jackson Co.	Gary Maddox	(MT)
Indiana			
Cane Creek Cave **	Orange Co.	Scott Fee	
Kentucky			
Roaring Spring Cave	Trigg Co.	John Ganter	(HM)
Oklahoma			
Barney Creek Cave	Major Co.	Sue Bozeman	
Slot Cave	Major Co.	Sue Bozeman	
Valley View Cave	Blaine Co.	Sue Bozeman	
MEXICO			
C. de Agua de la Silleta	S.L.P.	Terri T. Sprouse	
Cueva de los Muertos			
Sotano de San Marcos	Tamaulipas	Peter Sprouse	(MEDAL)
Sotano de Tlamaya	S.L.P.	John Ganter	(MT)
Missouri			
Cave Resource Inventory, Phase 2. Ozark-St. Francis National Forests (13 caves, 3 topos)		Bob Buecher	(HM)
Fisher Cave **	Franklin Co.	Tex Yokum	(HM)
New Mexico			
Queen of the Guadalupes	Eddy Co.	David Jagnow	(MT)
Spirit World (Carlsbad)	Eddy Co.	Bob Buecher	
South Dakota			
Stagebarn Crystal Cave	Meade Co.	Mike Hanson	

Virginia		
Starnes Caverns	Giles Co.	Laurence Britt
West Virginia		
Bag System	Greenbrier	Bill Balfour
Cricket Cave	Greenbrier	George Dasher (HM)
Smokehole Caverns	Grant Co.	Bill Balfour
Spout Cave	Greenbrier	George Dasher
White's #2 Cave	Greenbrier	George Dasher
Wyoming		
Fossil Mountain Ice Cave	Teton Co.	Miles Hecker (HM)

Notes: ** = No state identified on map: compiler's guess.

HM = Honerable Mention
MT = Merit Award
Medal= Overall Winner

1986 Cartographic Salon

By Ernst H. Kastning

The 9th Annual Cartographic Salon was held at the NSS Convention in Tularosa, New Mexico, June 26, 1986. Twenty-nine maps were entered by 19 cartographers. Maps of caves of 12 states, Mexico, and Belize were submitted this year. The judges of the Salon were William Elliott, Dale Pate, and Carol Vesely. The awards were as follows:

Category	Award	Map	Cartographer
0-0.5 km	Merit Award	Queen of the Guadalupes	David Jagnow
	Merit Award	Amargosa River Cave No. 1, Calif.	Bob Richards
	Merit Award	Silver Shadow Cave, Calif.	Bob Richards
	Honorable Mention	Chrome Cave, California	Marianne Russo
0.5-3 km	Merit Award	Sotano de San Marcos, Mexico	Peter Sprouse
	Honorable Mention	Vanished River Cave, Calif.	Peter Bosted
	Honorable Mention	Cricket Cave, West Virginia	George Dasher
	Honorable Mention	Mercer Caverns, California	Bruce Rogers
	Honorable Mention	Fisher Cave, Missouri	Gregory "Tex" Yokum
Over 3 km	Merit Award	Sotano de Tlamaya, Mexico	John Ganter
	Honorable Mention	Roaring Spring Cave, Ky.	John Ganter
Non-Traditional	Merit Award	Caves of Florida Caverns State Park, Florida	Gary Maddox
	Honorable Mention	Sylamore Cave Resource Inventory, Arkansas	Bob Buecher
	Honorable Mention	Fossil Mt. Ice Cave, Wind Cave System, Wyoming	Miles Hecker
Overall	Medal	Sotano de San Marcos, Mexico	Peter Sprouse

Reprinted directly from the NSS NEWS, August 1986, p. 297.

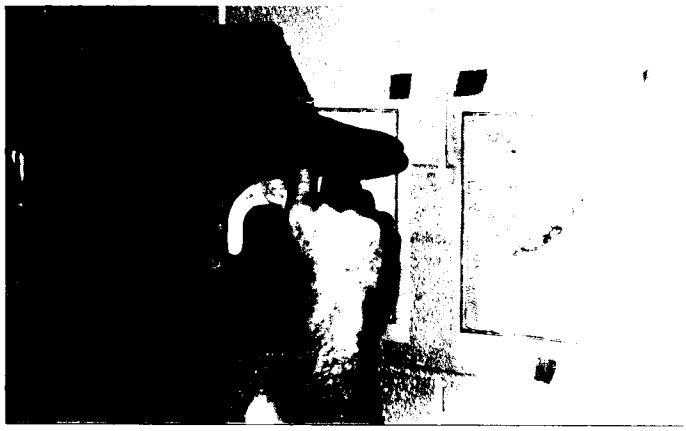
Exhibitions (Non-competitive)

Climax Cave, Decatur Co., Georgia. Florida State Cave Club. Computer line map.

Guangdong, China. Mo Zhong Da. Poster exhibit of maps, photos and text giving locations and predominant characteristics of some of China's karst areas. Several nicely hand-colored cave maps with abundant geological and interpretive information were included.

Paul Penley Cave System. Bland Co., Virginia. Ed Devine. Computer line maps of cave and topography viewed with 3-D glasses to get an illusion of depth.

North Canyon, Snedegars Cave. Friars Hole Cave System, Pocahontas/Greenbrier Cos., West Virginia. Roy Jameson. Interpretive thesis maps showing stages of speleogenesis, structural contours, etc. in topographic and isometric block diagram form.



ABOVE: Terry Raines views one of Ed Devine's anaglyphic cave maps.

LEFT: Carol Vesely explains the Judge's thoughts on a Salon entry.

A Short History of Cave Surveying

by Bill Torode
Huntsville, Alabama

1900 - Person walks through cave, goes home, sketches out what he saw.

1940 - Person sketches passages and takes compass directions in cave, map laid out at home.

1960 - Cave mapper measures passages with a measuring tape, takes compass readings, draws up map at home.

1980 - Cave mapper measures passages with a measuring tape, takes compass readings, and declination. Data fed into computer, computer draws line map.

1990 - Cave surveyor uses sonar measuring device and directional gyroscope, voice recording on tape, map drawn by computer at home.

1992 - Same equipment as above, recording unit plugged into computer which draws map.

1995 - Speleologist walks through cave, broadcasts to unit at home via satellite, which draws cave map at same time.

2000 - Mobile unit flies through hollow spaces, transmits data to home unit, which produces map at same time.

2002 - Satellite flies over earth, x-rays caves stereoscopically, makes recording of each cave on holographic plate. All caves recorded in 24 hours. Technical mistake made in instrument setting, caves recorded by mistake, technician reprimanded.

How to Draft a Cave Map Without Touching A Pen

by Tim Glover
Tallahassee, Florida

Well, it finally happened. Now I don't have an excuse for not drafting cave maps. Not being artistically inclined, for years I have shied away from drafting up surveys I have helped with. I rationalized this by convincing myself that any cave worth surveying deserves a top-notch drafting job. Then I found out about a program called Prodesign II, which runs on the IBM-PC. It is written by American Small Business Computers, of Pryor, Oklahoma, and makes a microcomputer into a computer-aided drafting station.

Even if you can't draw a straight line, this program will allow you to produce first class drafting in only a short time. When used for cave mapping, all you have to do is enter the x-y coordinates of the survey points and tell the program to draw a line through them. (In the near future I hope to modify our Florida State Cave Club data reduction program "Quickplot" to output this in Prodesign-compatible form.) Then you "draw" passage detail around the survey trace just like you do in "real" drafting. The real advantages of Prodesign II come into effect when you go to the next steps- including passage details and symbols, and lettering of the final map.

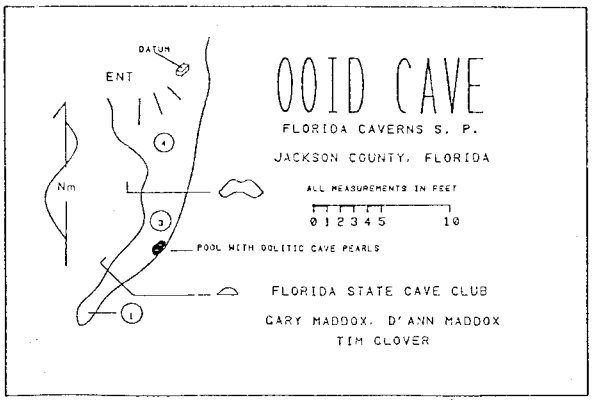
In both cases the computer makes your job much easier. In the first place, you can temporarily "blow up" a section of the map-to-be and work at a much larger scale, thereby receiving all the benefits of working on a large-scale map without the hassle of photo-reduction to get it down to publication size.

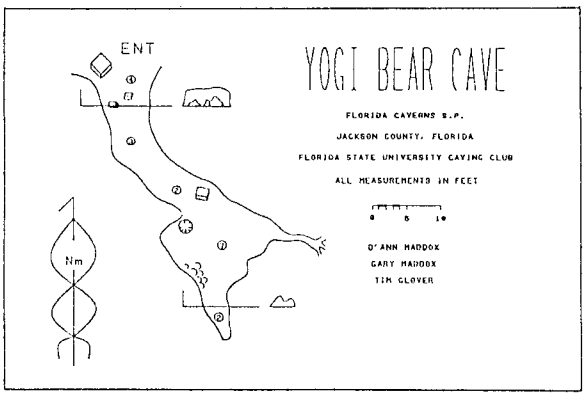
Lettering is also made much easier by the vast number of type sizes available. Any size letters from unreadably small to larger than the map can easily be used. And they will ALWAYS be straight and level. No more words drooping at one end.

The finished map can be output at any scale on a number of output devices, including the standard dot matrix printer, pen plotters and color printers.

I'm not sure this method is a lot faster than the conventional method of map drafting --three small caves took me 5 hours-- but the results are far superior to what I would be able to do by hand.

(from the FLORIDA STATE CAVER, vol 17:3, 1986, p. 3-5.)





3-D Cartography for the Rest of Us

by Gary R. Schaecher
Little Rock, Arkansas

Ever since purchasing an Apple 512K Macintosh computer, I've had many thoughts of how to apply its superb graphics to cave mapping. Cave cartographers have used computers for years to reduce raw survey data, adjust closure error, maintain databases of survey information, and a few lucky people have used them to drive expensive plotters to plot their survey traverses. Two areas where computers have not been widely applied are: 1) the actual drafting of finished maps including lettering and 2) the production of 3-D models of caves that can be scaled, rotated and otherwise manipulated. For several years cave cartographers who have made use of computers have talked and dreamed about making these capabilities affordable and easy to use by everyone else. This article is a discussion of how the 3-D modeling problem has been resolved using a very popular personal computer along with some very affordable

With access to a 512K Macintosh computer with two disk drives, the programs Multiplan or Excel, Switcher, MacView, and a special spreadsheet template, any cave cartographer can produce a 3-dimensional model of a cave survey as a byproduct of entering the raw survey data for reduction to latitude and departure coordinates.

While anyone who has used personal computers will be familiar with electronic spreadsheets like Multiplan, Excel and Visicalc, the programs Switcher and MacView are specific to the Macintosh. Switcher is a program that allows up to three programs to exist in memory at the same time on a 512K Macintosh. With one key sequence the user can switch instantly between the programs. As we shall see, this capability, coupled with the Macintosh's unique ability to transfer information between programs via its Clipboard, allows the user to only enter his/her survey data once to produce several useful products. MacView is a relatively unknown graphics program owned by United Software of America that is not advertised in computer magazines. It is basically the same program as Appleworld, a 3-D program for the Apple II computers; it has been ported over to the Macintosh with some additions and changes.

The Cartesian Coordinate system used by MacView is not the same as the latitude and departure system used to plot survey data by hand. To convert the latitude and departure data normally used by cave mappers it is necessary to write a spreadsheet that generates two sets of coordinates. One set is the set of latitude and departure coordinates, with elevation changes and survey totals, and another, the set of coordinates which is compatible with MacView.

In a typical session one launches both MacView and Multiplan, with Switcher to alternate between them, and a second disk for storing data files in drive 2. Next the special spreadsheet is loaded, opened, and the entrance coordinates are set at 0,0,0 if this is the first session. Next one enters the raw survey data. Every time a new survey line is begun one has to set the starting coordinates for the first station to the coordinates of the starting point. The spreadsheet is presently set up to handle about 100 stations at a time, but one can fill it as many times as one wishes. This same spreadsheet written for Excel can handle thousands of stations in a large database. Once data has been entered you simply select the x,y and z integer coordinates for the 3-D program and copy them to the Clipboard. The coordinates for 15 to 20 stations can be transferred at a time. With one key sequence, the user switches to MacView. In MacView, data is pasted into an edit sheet that has cells very similar to Multiplan or Excel. Place the cursor where you want the data to begin and select Paste. With the

simple addition of an NA command (New Line-Absolute Coordinate) for your first station, followed with an A command (absolute coordinate) for each subsequent point, the program will now draw the survey line in the graphics window behind the edit window whenever it is selected. One merely keeps adding new survey lines and extending old ones until all your data for that cave has been entered. When you are finished, you have a highly-useful 3-D model of your favorite cave system. Remember to save both the spreadsheets and the MacView edit sheets periodically and with slightly different names.

Once in MacView your plot will appear initially in plan view. From the plan view your survey can be rotated in any direction, tumbled on any axis, enlarged, perspective can be changed, the entire map can be scaled to where it will fit on any piece of paper, zoomed into, and most usefully, it can be copied and pasted into MacPaint or MacDraw where lettering, fine details, walls, and other graphic symbols can be added. If the survey is copied into a program such as MacDraw, the map can be printed in very large sizes, up to 4 ft. by 8 ft. Explorers may find the new perspectives available a valuable aid in looking for new passages. This isn't to mention the invaluable new insights the cave geologist gains as he/she sees the cave from the new viewpoints. To add other types of information to this visual data base, additional edit sheets can be opened in MacView where supplemental data can be entered and stored separately from the cave's survey data. For example, the author has used other MacView sheets to hold data for surface surveys and digitized topographic maps. These other data files can be opened and loaded on top of your cave survey as you need to layer information on top of the cave system; they can also be removed just as easily. Since only a few months have been spent exploring the possible uses of this system, it is most likely dozens of other applications and features will be uncovered through experimentation.

MacView mathematically defines a cube of space 64,000 units on a side. With one unit equal to one foot this gives us a space twelve miles on a side. Of course if we had a cave that long in several dimensions we wouldn't have any room to back up and view it. But, for most of us, our caves, even the quite large ones, will fit in MacView. The number of total points that can be stored in a MacView file is in the thousands, the upper limit is limited by how much RAM your system has. I'm sure a 4 megabyte MacPlus could handle everything except possibly Mammoth Cave! More than one cave system can be shown in a single graphic window: just reference it's entrance to the entrance (0,0,0) of the first cave. This is great for checking out how far one has to go to make a 'big' connection.

Summary

While this personal computer can't quite generate those nice flicker free movements on the screen that we see in the automobile advertisements on television, the day has arrived when useful and highly detailed 3-dimensional projections of our cave surveys can be easily and affordably produced on the Macintosh computer with some very simple software. The new Apple computer based on the 68020 which rumors say will be released this fall should undoubtedly produce results only formerly available on very expensive mini-computers. Of course, similar programs may allow other PCs to produce the same results. In the case of the Macintosh, no 'special program' had to be written nor are we forced to buy a bunch of expensive add-on cards from third party vendors to turn our PC into the real computer the manufacture should have delivered in the first place. The advantages of the approach discussed in this article are obvious:

1.) Data is entered only once;
2.) Two sets of useful data is produced from the raw data One set allows accurate hand plotting for map production. The other set allows a 3-D map of our survey to be produced.

3.) Permanent records of our survey are available for disk or hard copy.

4.) Maps can easily be lettered and reduced for publication or for topo-overlays.

5.) New cavers and mappers can quickly be oriented to complex 3-dimensional caves.

6.) Data for this system can be imported from MS-DOS, C/PM, DIF flles, and SYLK flles.

7.) The expense of the hardware and software is substantially less than other possible systems.

8.) No long period of software development was necessary.

9.) The 68000 CPU on the Macintosh is fast enough that we get reasonably smooth movement.

10.) Multiple data files of different types of information can be layered over our base survey.

11.) With MacPlot these 3-D images can be printed on a wide variety of commercial plotters.

The Macintosh and the Switcher program belong to Apple Computer, Inc., Multiplan and Excel are products belonging to Microsoft, Inc., MacView is a product of United Software of America. MacView retails through the mail for a suggested price of $79.95 and can be ordered by phoning (212-687-5000) and asking the Computer Factory for their software store. The special template for Multiplan that reduces raw survey data into latitude and departure coordinates and 3- D MacView coordinates is available on request for a nominal fee of $9.95 that includes shipping. Send a blank 400K disk to Gary R. Schaecher, 1400 Old Forge Dr. #1905, Little Rock, AR 72207, or call (5O1)-225-7421 eveninqs.

WT/Surface/Survey/2

	2	3	4	5	6	7	8
2						X	Y
3	STATION	FIELD NOTES & COMMENTS	DISTANCE	AZIMUTH	VERTICAL	TOTAL	TOTAL
4	NUMBER				ANGLE	DEPARTURE	LATITUDE
5	0	2nd Surface Survey West of	.00	START COORDINAT		-2050.33	-343.76
6	1	Wind Tunnel	33.50	318.00	-3.00	-2072.72	-318.90
7	2	N. Along Upper Road	83.00	8.00	-3.00	-2061.18	-236.82
8	3	Sta. #2 is Side Road in Woods	98.00	257.00	-7.00	-2155.96	-258.70
9	4		100.00	258.00	-7.00	-2253.04	-279.34
10	5		100.00	266.00	-10.00	-2351.28	-286.21
11	6	Survey cont. down side road	100.00	267.50	-12.00	-2449.00	-290.48
12	7		100.00	283.50	-9.00	-2545.04	-267.43
13	8		94.00	275.00	-10.00	-2637.26	-259.36
14	9		101.00	248.50	-10.00	-2729.81	-295.82
15	10	Sta.9 at T in side Rd. Down Rt.	53.40	339.00	-13.00	-2748.46	-247.24
16	11		100.00	356.00	-12.00	-2755.28	-149.67

WT/Surface/Survey/2

	8	9	10	11	12	13	14	15
2	Y	Z		3DX	3DY	3DZ		
3	TOTAL	TOTAL	TOTAL HOR	STARTING	STARTING	STARTING		
4	LATITUDE	VERTICAL	DISTANCE	COORDINATE	COORDINATE	COORDINATE		
5	-343.76	229.98	0.00	-2050	344	-230		
6	-318.90	228.23	33.45	-2073	319	-228		
7	-236.82	223.88	116.34	-2061	237	-224		
8	-258.70	211.94	213.61	-2156	259	-212		
9	-279.34	199.75	312.86	-2253	279	-200		
10	-286.21	182.39	411.35	-2351	286	-182		
11	-290.48	161.60	509.16	-2449	290	-162		
12	-267.43	145.95	607.93	-2545	267	-146		
13	-259.36	129.63	700.50	-2637	259	-130		
14	-295.82	112.09	799.97	-2730	296	-112		
15	-247.24	100.08	852.00	-2748	247	-100		
16	-149.67	79.29	949.81	-2755	150	-79		

Excel template set up for editing and reducing survey data.

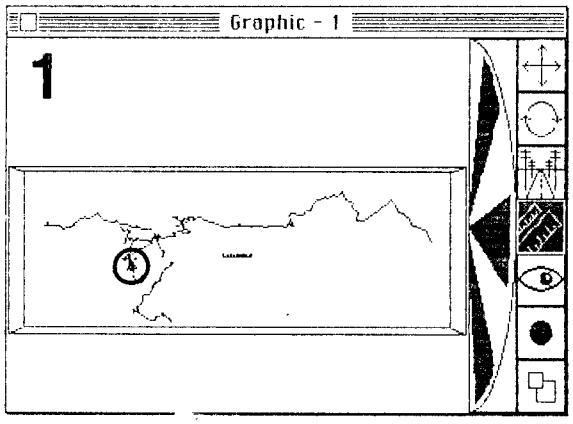
Results are transferred by Cut and Paste (arrows) to...

WINDTUNNEL CAVE

	Cmd.	Line	X	Y	Z
181	A		-1052	401	29
182	A		-1064	406	28
183	;ABOVE IS UPPER BALCONY IN ANNIVERSV				
184	;BELOW IS INTO NEXUS ROOM AREA				
185	NA		-1346	173	-58
186	A		-1346	173	-79
187	A		-1379	166	-80
188	A		-1386	173	-76
189	A		-1386	173	-48
190	A		-1438	198	-38
191	A		-1453	170	-47
192	A		-1471	169	-49

the MacView Edit Window. The NA indicates a new traverse line (see text).

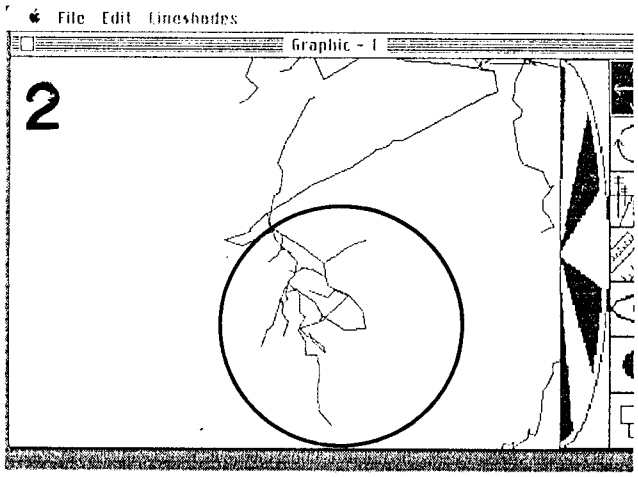
Next, the visual display..

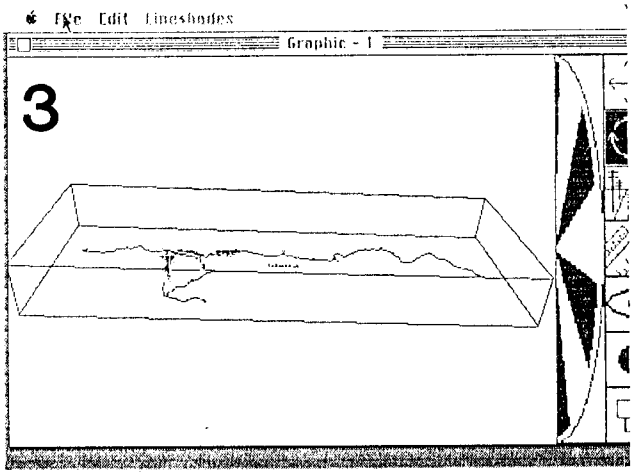


1.) MacView displays a plan of Wind Tunnel Cave, Arkansas.

2.) A zoom enlargement of the area circled above.

3.) Rotation for a perspective view of the cave.





****

A Note on the Petro-Sonde

Bill Mixon and others have voiced considerable skepticism about the Petro-Sonde device (C&T, Spring 1986, pp. 87-88), to the extent of suggesting that it may be high-tech fraud. I have learned of testing being done by at least two karst researchers, and will try to obtain details for publication. Meanwhile, caveat emptor. <--JG.

****

Minutes of the 1986 SACS Annual Meeting

Submitted by George Dasher, Secretary.

The 1986 meeting of the Survey and Cartography Section of the N.S.S. was held in conjunction with the annual Convention of the National Speleological Society on Monday, June 23, at the Tularosa High School in Tularosa, New Mexico.

In attendance were 22 members and friends of the Section. They were:

Dave Allured	Fred Grady	Jeffery Lory
Vi Allured	Robert Green	Chris Parsons
Roger Bartholomew	Lorna Greenway	Rocky Parsons
Michael Beer	Paul Hill	Sandy Parsons
Robert Buecher	Bob Hoke	Sue Sparrold
George Dasher	Frank Hutchison	Bob Thrun
Doug Dotson	Tom Kaye	
John Ganter	Ray Keeler	

The Chairman, John Ganter, called the meeting to order at 12:27.

The Vice-Chairman, Ray Keeler gave a report on the SACS Session, which took place on Monday morning. The Secretary, George Dasher, gave no report: the 1985 minutes had been printed in COMPASS & TAPE and had thus been available for inspection. Because the Treasurer was not present, John Ganter gave the Treasurer's report, which had arrived a few minutes before via Air Mail. SACS has about $700 in inventory, of which about $290 is in capital. SACS spent about $900 in printing this year and took in about $935 in membership dues.

John Ganter moved that we officially thank the Treasurer, Lance Lide, for his hard work during the past year. This was seconded by Frank Hutchison and passed unanimously.

John Ganter gave the Editor's Report. Volume 3, Number 4 of C&T was mailed just before the Convention.

There were two announcements. Doug Dotson is selling copies of his cave surveying program, SMAPS, for $35. Carol Vesely was teaching a cave cartography course during the 1986 Convention.

Old Business followed. Ray Keeler gave a report on the **SACS "Surveying Book."** Previously the Executive Vice-President of the N.S.S., John Scheltens, had asked for immediate action; however, Ray Keeler bailed out of the editor job because he did not have the time. Linda Starr wrote a letter to various members of SACS asking for help and George Dasher canvassed the 1985 OTR for an editor. George had previously rewritten much of Lang Brod's original manuscript. Bob Hoke stated that the second edition of the Missouri cave surveying book is presently for sale. Doug Dotson moved that SACS officially drop the project. Bob Hoke seconded this motion and it passed unanimously.

Next was **New Business.** Rich Breisch, the Computer Applications Section Treasurer had asked in a letter before Convention for SACS to fill subscriptions of the CAS newsletter with C&T. John Ganter asked Bob Hoke (present CAS Newsletter

Editor) if he would be an Associate Editor of C&T. Bob agreed to this. Bob said that CAS will probably be terminated this year. CAS would like to give each of their member's subscription money to: 1.) the Save-The-Caves Fund, 2.) back to the member, or 3.) convert it to SACS.

Paul Hill made a motion that we accept the CAS proposal. Ray Keeler seconded and the motion was passed unanimously.

Next, the **1987 Convention Cartography Seminar** was mentioned; however, Carol Vesely, who is in charge, was not present, so the matter could not be discussed.

Discussion followed in regard to this year's **International Congress of Speleology.** Bob Thrun and Paul Hill volunteered to be the SACS correspondents. John Ganter said that he had received a reply to a query which stated "Cartography Salon at International is cancelled because of difficulties in organization".

The **N.S.S. Cartography Salon** was discussed next. The chairman of that committee, Ernst Kastning, resigned at the beginning of the summer. John Ganter stated he felt the Salon was very biased and should be non-competitive. It was unfortunate that neither the Salon Chairman or last year's judges were present. George Dasher made two motions: 1.) that the N.S.S. continue the Cartography Salon with SACS commendations on a job well done; and 2.) that John Ganter take back the Medal award he received at the 1985 Convention.

Paul Hill seconded George Dasher's first motion. There was much discussion. George Dasher, Bob Hoke, and Ray Keeler felt that there would be fewer submittals without competition. It was generally felt that cave maps should be displayed at each convention and that the Salon was the method to do it. Ray Keeler called the question and the motion passed unanimously.

Robert Green seconded George Dasher's second motion. Again, there was much discussion. The vote was 3 for, Rest Against, No abstentions. The motion failed. (Secretary's Note: After lengthy discussions with two of the 1985 judges, and the Salon chair, John Ganter later took back his Medal.)

The question was asked who gets the **cave maps donated to the NSS.** John Ganter made the motion that SACS recommends that the maps be donated to the N.S.S. library in Huntsville. Dave Allured seconded the motion and it passed unanimously. Frank Hutchison suggested that the Secretary check into what happens to the Salon's maps. (Secretary's Note: I did this and discovered that Ernst Kastning is currently holding all maps donated to the N.S.S. via the Salon.)

John Ganter moved that because of a lack of action by the **N.S.S. Cave Map Symbols Committee,** that the N.S.S. adopt the 16 cave map symbols printed in the last issue of C&T. John would like to see this happen by January 1, 1987. This motion was seconded by Doug Dotson. The introduction of official cave symbols has been charged to GEO2 and SACS by the N.S.S. BOG. Bob Thrun, who is the chairman of the symbols committee, gave his point of view and said that he was the bottle neck. Bob stated he had mailed the final voting one week previously. John Ganter stated that Bob Thrun is moving damn slow [Ed. note: The individual in question does not recall using this exact wording] and that the committee is an embarrassment to the N.S.S. There was much discussion and the question was finally called. The vote was 3 for, Rest Against, No abstentions. The motion failed.

Ray Keeler made a motion that SACS recommend that the BOG **disband the NSS Symbols Committee** and form a new committee to generate new map symbols. Dave Allured seconded the motion.

Survey & Cartography Section of the
National Speleological Society
Lance Lide, Treasurer
P.O. Box 2601
Little Rock, AR 72203

Nonprofit Bulk Rate Permit #307
Forwarding & Return Postage Guaranteed.
Address Correction Requested.

SACS Annual Meeting Minutes

continued...

Tom Kaye amended the motion so that SACS recommend the NSS have no official symbols. The Chair elected for discussion on the amendment without a second. After the discussion, the amendment died for lack of a second.

Doug Dotson made a motion identical to the Tom Kaye amendment. Ray Keeler seconded this motion. Dave Allured made a resolution that Doug's motion be voted on with "No Debate". George Dasher seconded this resolution. The "No Debate" resolution passed unanimously and the Doug Dotson motion failed unanimously.

Paul Hill then made the amendment that we strike the words "New Committee" from Ray Keeler's motion. There was no second.

Ray Keeler had a Point of Information. SACS had to be out of the classroom by 2 pm. George Dasher called the question. Ray Keeler seconded. The Chairman called the question. The vote was 5 in favor, 7 opposed, 0 abstentions. The Ray Keeler motion to disband the N.S.S. Symbols Committee failed.

George Dasher moved that the BOG replace Bob Thrun with John Ganter as Chairman of the Symbols Committee by the Fall BOG. There was some discussion and then George withdrew his motion.

Dave Allured motioned that SACS suggest that an appropriate response to the problem is to bolster the Symbols Committee with fresh members and an enthusiastic chairman. Mike Beer seconded. Dave then changed his motion to SACS recommends that John Ganter should join the Symbols Committee. This was ok with Mike Beer. There was little discussion. The vote was 1 opposed, 1 abstention, and the rest in favor. The motion passed.

Next was the **Election of Officers.** Bob Hoke made the motion that, with the exception of the Vice-Chairman, SACS continue with their present slate of officers. There was no second, but the motion was passed unanimously.

John Ganter recommended that Dan Crowl be made Vice-Chairman of SACS. This too passed unanimously. Ray Keeler moved that the 1986 meeting of SACS be closed. The time was 1:57 pm.

(Secretary's Note: On Friday, the N.S.S. BOG appointed Bill Nelson as the new chairman of the Map Salon.)