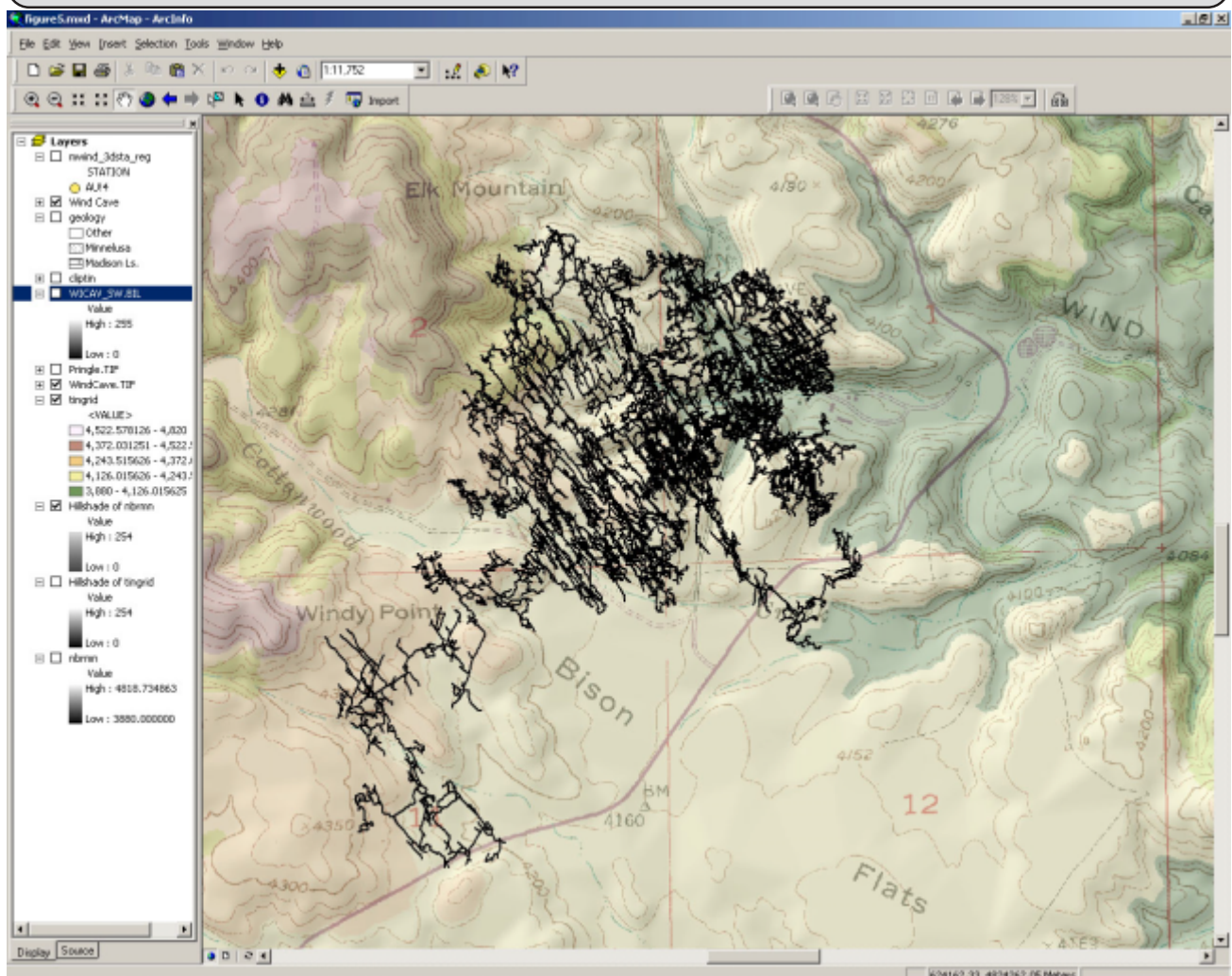
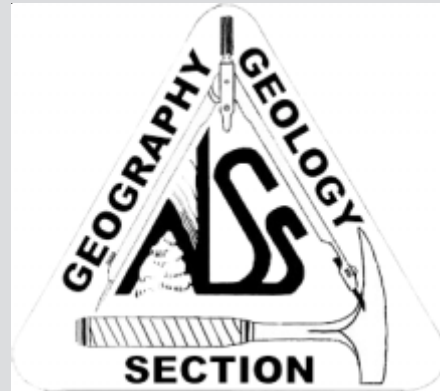


Geo²

Volume 31 No. 3, 2004



Wind Cave, SD, survey data overlain on shaded relief map created from DEM.

**Forming the NSS GIS Special Interest Group
by George Veni and Bern Szukalski
(See Page 5 inside)**



Geo²

Volume 31, Number 3, 2004

Section of Cave Geology and Geography of the National Speleological Society

GEO² (ISSN 0735-0511) is the official publication of the Section of Cave Geology and Geography of the National Speleological Society (NSS). It is published in February, June, and October of each year. One need not be a member of the NSS to belong to the Section, although such affiliation is encouraged. The Section is dedicated to the advancement of research and education, and to the fostering of interaction and information exchange among cave and karst researchers. Members and nonmembers who are interested in cave geology and geography are urged to participate in Section activities and contribute to our publications. The annual meeting of the Section is held at the NSS Convention, where a business meeting, paper sessions, field trips, and special activities are set up for Section members.

Information for Authors

The editor of **GEO²** invites contributions related to all aspects of cave geology and geography, including short articles, cover photos and other graphics, book reviews, bibliographies, news and views, maps, cartoons, research reports, notices of meetings, and other items of general interest to the membership.

Authors are encouraged to submit through electronic mail, computer disk or CD for PC. The newsletter is developed primarily with Wordperfect 9 and Adobe Pagemaker 7.0 for the PC; however, Microsoft Office 2000 and prior formats are acceptable. Rich-text is the preferred format for digital submission (*.rtf). Neatly typed copies suitable for scanning are also cheerfully welcomed. Maps and line drawings should be submitted in camera-ready condition at 100% of their publication size or in vector graphics format (.ai, .cdr, .wmf). Many bitmap photo formats can be used; best results come from images containing a minimum of 200 dpi and NOT jpegged. Please email the editor if you are unsure of your format. **All manuscripts should be sent to the editor by January 1, May 1 and September 1.**

Subscription Information

GEO² is sent to all members of the Section. The membership fee is \$12 (U.S.) a year for paper and electronic files or \$6 for electronic only and is payable to the treasurer. Ad-

dress corrections, claims for missing issues and purchases of past issues (\$4.50) should also be directed to the treasurer. Make checks payable to the NSS Section of Cave Geology and Geography.

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Officers for 2004 -2005

Executive Secretary

Dr. George Veni
George Veni and Associates
11304 Candle Park
San Antonio, TX 78429-4421
(210) 558-4403
gveni@satx.rr.com

Treasurer

Tony Troutman
PO Box 821106
Houston, TX 77282
(832) 379-9374
karst@carbonates.us

GEO² Managing Editor

Jo Schaper
46 Cedar Drive
Pacific, Missouri 63069-3414
(636) 271-8380
joschaper@socket.net

Web Page Manager

Matthew Reece
Great Basin National Park
Baker, NV 89311
Matthew_Reece@nps.gov

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Cave Geology and Geography Section
of the National Speleological Society

NSS Cave Geology and Geography Section Website
www.caves.org/section/geogeo

From The Editor



Section News You Need...

While I am sure most of you read the annual meeting minutes, one item seems worthy of reiteration: our change of treasurer, and the upcoming digitization and Web archival of past issues of **Geo²**.

After eighteen years of volunteer service, Gail McCoy has stepped down as Section Treasurer. In those eighteen years, Gail went far beyond the call of duty in collecting dues, keeping the bankbook straight, maintaining membership, making sure issues of **Geo²** got to the proper recipients and countless other accounting duties, including serving as part of the corporate memory for all of us. We are all indebted to her.

In her place, Tony Troutman of Houston, Texas, becomes Treasurer. Please note the new contact information in the Officer box. From what I understand, George thought he was going to have a difficult time replacing Gail, then Tony stepped up and volunteered! Welcome aboard.

If you aren't receiving your digital copy of **Geo², please make sure my email address is in your list of allowed email addresses.** I am getting an increasing number of bounces in which **Geo²** is identified as spam. In order for digital emailing to continue, we need the help of our members. **Sometimes, I cannot even contact you to let you know of the misdelivery.**

That brings us to the never ending search for articles and photos. This issue is rather slim on photos...if you have articles with photos, or geo photos with brief explanatory text, please send them along.

Jo

Deadline for next **Geo²:
January 1, 2005
Send Articles, Photos and Stuff!**

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Missouri Speleological Survey, Inc. Announces Ken Thomson Research Award

The Missouri Speleological Survey, Inc. announces the Ken Thomson Research Award, in memory of Dr. Ken Thomson, NSS 12551FE. Ken was a long time cooperater and president of the Missouri Speleological Survey as well as being professor of geology at SMSU, and introducing hundreds of students to speleology.

This \$200 recurring stipend will be given to a college student or other speleological researcher to help defray the cost of registration and/or travel for that individual to present research findings at a speleology related professional meeting.

Selection of Thomson Research Award winners will be by the MSS Research Committee. Nominations should include a synopsis of the work to be presented as well as a brief vita sheet indicating student status or research background. More specifics on application will be available by January 2005.

The MSS is now soliciting donations in memory of Doc Thomson in support of this award. Donations are tax-deductible, and should be sent to MSS Treasurer Lisa McCann at:

Ken Thomson Research Fund
c/o Lisa McCann, MSS Treasurer
P.O. Box 10122
Springfield, MO 65808

News Notes and Upcoming Conferences

Net Resources for karst/cave related events:

UIS Calendar of Speleological Events:
<http://rubens.its.unimelb.edu.au/~pgm/uis/events.html>

National events in the U.S.A.:
<http://www.caves.org>

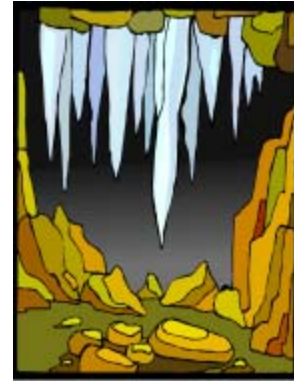
National events in the UK:
<http://www.bcra.org.uk/events.html>

Forum on Karst and World Heritage in Europe
 Postojna, Slovenia
 Nov. 3-7, 2004

Geological Society of America
2004 NATIONAL MEETING
November 7-10, 2004
Denver Convention Center
Denver, Colorado USA

www.geosociety.org/meetings/2004
(Ed note: There are plethora of cave and karst related session at this meeting. I could have filled this page with their announcements.)

2nd Nacional Congress of Geomorphology -
Geomorphology (Science and Society)
Coimbra University - Portugal
November 11-13, 2004
More information and
pre-registration at:
<http://www.ci.uc.pt/ieg/apgeom>



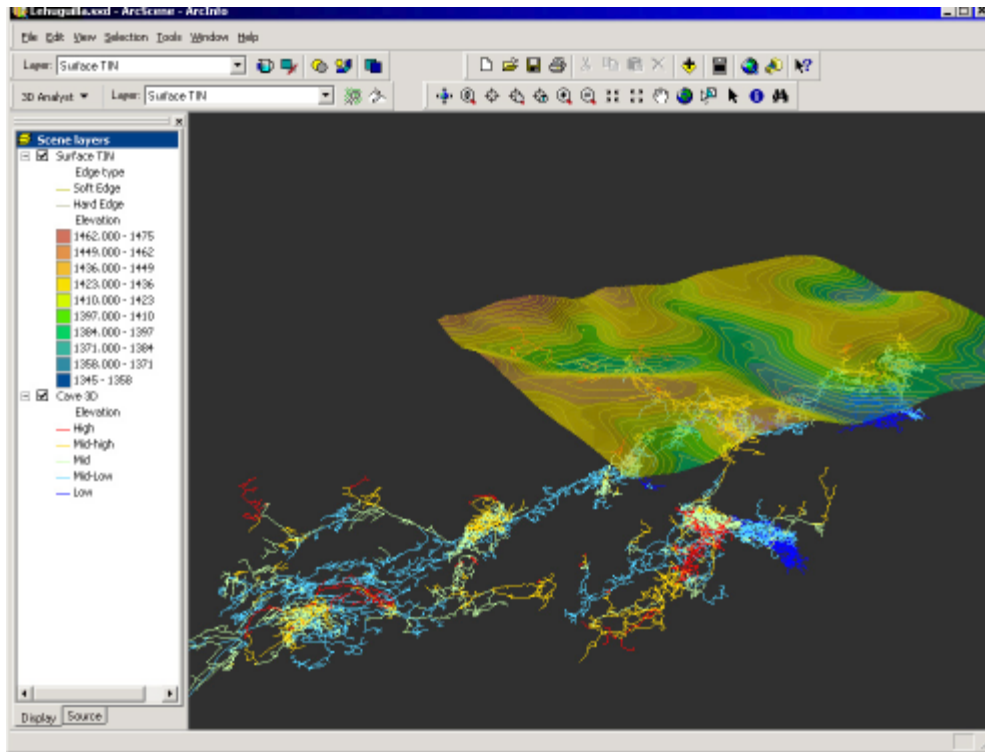
The NSS Convention
July 4-8, 2005
Huntsville, Alabama
<http://www.nss2005.com/>
<http://www.nss2005.com/sessions.htm>

14th UIS International Congress of Speleology (ICS).
August 21-28, 2005
Athens, Greece
For further information,
preregistration and paper submittal:
www.14ics-athens2005.gr

The 6th Int. Conference on Geomorphology:
Evaporite-Karst Program
Zaragoza, Spain
Sept. 7-11, 2005
<http://wzar.unizar.es/actos/SEG>
Contacts: Francisco Gutierrez, University of
Zaragoza, email: fgutier@posta.unizar.es;
Kenneth S. Johnson, Oklahoma Geological
Survey, email: ksjohnson@ou.edu

"Water Resources & Environmental
Problems in Karst - Cvijic 2005"
Belgrade & Kotor, Serbia & Montenegro
Sept. 14-19, 2005
Conference web site
www.cvijic-karst2005.org.yu
e-mail: science@cvijic-karst2005.org.yu

NSS GIS Special Interest Group Organizes by George Veni and Bern Szukalski



Complex cave systems such as Lechuguilla are more easily visualized using GIS mapping software (Screenshot by Bern Szukalski)

The NSS Section of Cave Geology and Geography sponsored a “GIS and Digital Mapping Symposium” at the 2003 Convention in Porterville, California. Bern Szukalski organized the well-attended event, which included eight oral papers and one poster. Following its success and the continued interest in geographic information systems (GIS), we discussed if there was enough interest to develop a GIS Special Interest Group (SIG). To find out, we planned a meeting under the auspices of the NSS Section of Cave Geology and Geography.

The purpose of the meeting was to determine if there was sufficient interest to form a SIG, and if so, what should be the SIG’s purpose. About 25 people showed up and the general consensus was that people were interested in developing a

means of exchanging information to facilitate problem solving, whether in learning how to use some particular software or in applying the software to cave and karst studies. In some ways the SIG would function as a self-help forum, having information at hand that others could learn from, while facilitating communication between interested people. The SIG would not be focused on any particular brand of software although software-specific issues would be covered as needed.

We discussed various learning mechanisms and ways of communicating, such as discussion lists, workshops at conventions, and how-to web resources. Some attendees discussed problems in learning GIS, questions about projection and datum difficulties, and the need for better, focused help topics.

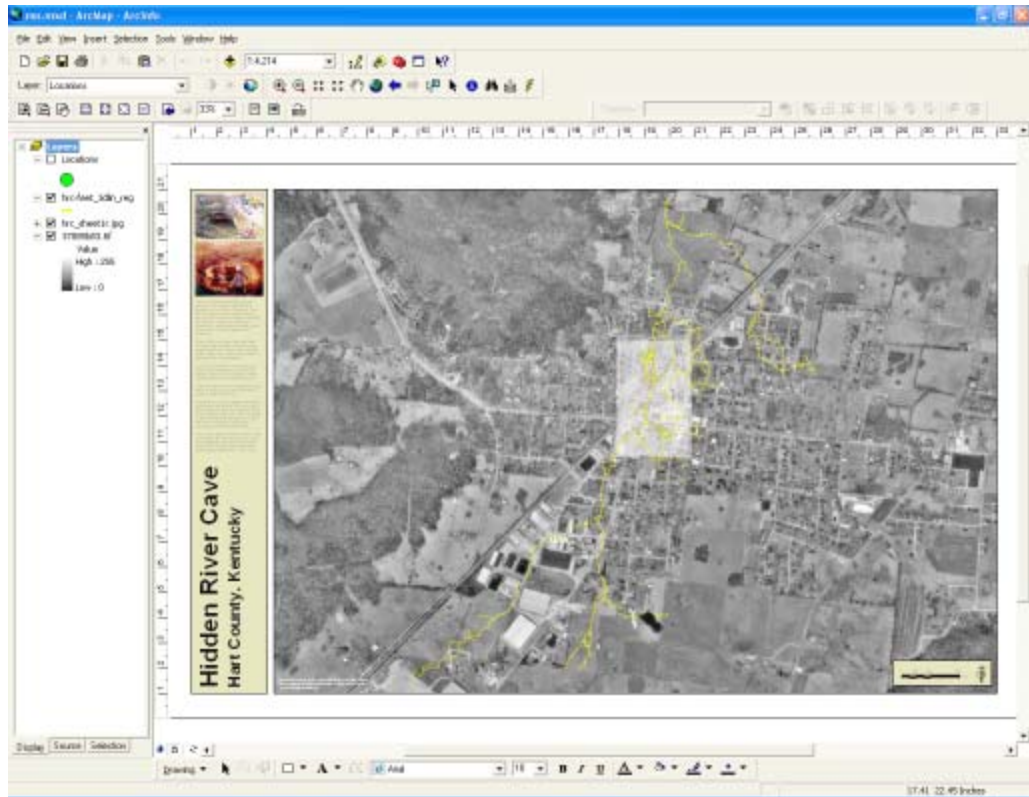
While the meeting was organized under the banner of the Geology and Geography Section to get it started, we talked about whether the SIG should be “housed” in the Section, some other Section, or remain independent. No firm decision was reached but the general consensus was that the SIG should either be independent or under the Geology and Geography Section (Geography is the “G” in GIS, generally speaking).

Those present at the meeting agreed that the group should meet again at next year’s NSS Convention in Huntsville. Several other worthwhile actions and directions were discussed, but no one volunteered to coordinate those efforts. If anyone is interested, please contact us.

In the meantime, Szukalski summarized the results of the meeting and e-mailed them to the attendees, while Veni posted a summary on Cavers’ Digest, announcing the formation of the SIG and that the NSS Section of Cave Geology and Geography will be hosting GIS information on its website.

If anyone has or knows of “how-to” or other problem-solving information on the Internet, especially with regard to cave and karst research, please send the web address to Section Web Editor Matt Reece at: mreece@caves.org. GIS is not limited to the geosciences and has broad applications

Urban planning is greatly facilitated when the map you have shows multiple layers.
(Screenshot by Bern Szukalski)



to the other sciences as well as cave exploration. The Geology and Geography Section is simply only offering its website as a convenient place to post the GIS information and welcomes input from any interested person.

Following are some good resources for the ESRI Cave/Karst GIS community. Users of other GIS and digital mapping products are encouraged to send their information to Matt for the website.

The ESRI Cave and Karst Web site:
<http://www.esri.com/karst>

At the bottom of the above web page, you’ll find a way to subscribe to the ESRI Cave and Karst eNewsletter, and also to back issues. The newsletter comes out intermittently, and you won’t get

spammed with ESRI advertising. There's also a discussion forum link (not very active, but you never know).

Virtual Campus, with online courses covering a variety of software; introductory courses are all free:
<http://campus.esri.com>

The Virtual Campus also has "campus clubs" covering special interests. There is a cave and karst club, though it is not active (but you never know). Lots of other clubs are active.

<http://campus.esri.com/campus/community/index.cfm?CFID=2891350&CFTOKEN=40049234>

General user discussion forums: Ask questions, get answers.
<http://support.esri.com/index.cfm?fa=forums.gateway>

An excellent set of technical resources is the ESRI Knowledge Base and Support Center:

The Support Center
<http://support.esri.com/>
Knowledge base:
[http://support.esri.com/](http://support.esri.com/index.cfm?fa=knowledgeBase.gateway)

[index.cfm?fa=knowledgeBase.gateway](http://support.esri.com/index.cfm?fa=knowledgeBase.gateway)

A gateway to all sorts of resources, including documentation, scripts, FAQs, etc.

ArcUser

<http://www.esri.com/news/arcuser/index.html>

ArcUser is an excellent user-oriented publication with lots of articles that explain how to do things, and even a few cave and karst related reports from time to time. You can subscribe to ArcUser and ArcNews for free. The "New to GIS?" link on the above web page points to some very good resources and the Top 10 suggestions for new GIS users: <http://www.esri.com/news/arcuser/newtogis.html>

Minutes of the NSS Section of Cave Geology and Geography Annual Meeting,

**NSS Convention, Marquette, Michigan
14 July 2004**

Submitted by George Veni

Section Executive Secretary George Veni called the meeting to order at 12:25 p.m.

Treasurer's Report

Treasurer Gail McCoy could not attend but sent the following report for 30 July 2003 through 22 June 2004:

Initial Balance	\$3,316.21
Income:	
Dues	\$570.00
Expenses:	
AGI dues	-\$42.00
Geo ² postage	-\$172.96
Geo ² printing	-\$421.78
PageMaker software	-\$43.30
Final Balance	\$3,206.17

Gale also reported that after 18 years as Section Treasurer, she was resigning the position. She coordinated with Gale Beach to collect dues in her absence from the Convention.

Elections:

Although elections are usually held at the end of the Section meeting, Veni felt it was important to fill the Treasurer's position and not leave it to the end where there may not be sufficient time to find someone. Tony Troutman generously volunteered to serve as Treasurer and was rapidly elected by acclamation. George Veni was reelected as Executive Secretary by acclamation. Matt Reece was reappointed as Web Editor, and Jo Schaper was reappointed as Editor of Geo².

Editor's Report

Editor Jo Schaper reported that *Geo²* is now up-to-date. She thanked the people who contributed material and reminded everyone that a continued inflow of materials is needed for the newsletter. She plans to publish future issues on time, even if she only has little information.

Web Site Editor's Report

Editor Matt Reece reported that the Section's web page had been down due to problems with the NSS server. Those problems have been recently fixed so the Section's web page is again accessible. Matt plans to compile a list of karst human resource information for students for the website. The Section's web site can be accessed through the NSS web page or directly at <http://www.caves.org/section/geogeo>.

Committee Reports:

Cave Geology: Bette White reported that one new issue of this irregularly published series will be produced and then, unless someone steps forward to be the new editor, the series will be discontinued.

Huppert/Quinlan Award: Roy Jameson reported that he has been too busy during the past year to continue his investigation for the Section on possibly establishing an award named in memory of George Huppert and Jim Quinlan. He plans to look into it further during the coming year.

Long & Deep Cave lists: Bob Gulden was not able to attend the meeting, but sent in an e-mail report stating that the lists continue to grow and are updated almost weekly on his web site at <http://www.pipeline.com/~caverbob/>. Links to the site are available on the NSS and Section web sites.

National Karst Map: David Weary gave a progress report on the U.S. Geological Survey's Karst Applied Research Studies Through geologic mapping (KARST) Project. To date, meetings have been held in Colorado and Kentucky that were attended by rep-

resentatives from 16 states, the National Park Service, and other organizations to establish personal contacts, and facilitate data support, suggestions, and regional perspectives on the map and karst-related issues. The KARST Project has developed a GIS version of the 1984 "The Engineering Aspects of Karst" map, available on the web at <http://nationalmap.usgs.gov/>. A prototype for the National Karst Map, a 1:1,000,000 scale digital karst map of the Appalachian Highland states has been constructed and is in an initial review stage. Maps of the individual states are available for public review and comment at the following website: http://geology.er.usgs.gov/eespteam/EESPT_Projects.html. Data for additional states and territories will be added as they become available. Weary also announced that a karst map of Ohio is available at <http://www.ohiodnr.com/geosurvey/pub/msmaps.htm>.

Symposia and workshop planning: Art Palmer volunteered in early 2004 to coordinate planning the Section's annual symposia and/or workshops. These events have been offered since 1995 as a supplement to the regular geoscience sessions to focus on a particular research topic or to provide practical information on conducting certain research. A symposium planned for the Michigan convention had to be cancelled, and there was insufficient time to schedule another by the time Art took over this task. He reported that he has several prospects lined up for the next few conventions.

Other Reports:

AAAS: Dan Chess was not present and had not submitted a report. Penny Boston said that she and Kathy Lavoie were initially looking at hosting a combined karst biology-geology session at the AAAS meeting in the spring of 2005, which they've pushed back to 2006 due to illness by Lavoie. Boston will contact Chess to discuss the idea and to possibly arrange the details.

AGI: Harvey DuChene was not present and had not submitted a report. However, Hazel Medville had attended the AGI Leadership Conference and e-mailed the following report:

On May 6th and 7th, I attended a meeting of the AGI (American Geological Institute) which was basically a meeting of the presidents and CEOs of the member societies. The major issues discussed were outreach to the public and K-12 education (the NSS is actually doing better than many in this area); GeoScienceWorld.org undergraduate geoscience programs; and the federal government science program.

GeoScienceWorld.org is an AGI sponsored web site for society juried technical publications. It will be indexed and members of the societies using this method of publication will have password protected access to their society publications and for an additional fee to the newsletters of other societies. Libraries and others will subscribe to the service; individuals may order individual re-prints of interesting articles. The profit will be divided among the AGI societies contributing to the service. It will cost something for each year of publications added to this service; a full set of historic publications in PDF format can be indexed for a set fee of \$100 if added by this summer and at a higher cost later. There is a web site with the same name as the organization.

AGI will be outlining a series of course/skill descriptions for undergraduates planning careers in geoscience. We'll need a contact for karst oriented careers. The time line is to have a straw man by the November general meeting

The federal science program was described by staffers on the White House and House science and technology committees. They both said that scientists need to get political! In other words if we want to get our programs recognized, we need to lobby and make the lobbying professional. I did meet the AGI government liaison person and plan to spend some time with her in lobbying and perhaps attending some meetings.

Some other points:

- *Societies consider their annual meetings as profit centers which help support their programs.*

- *Many of the societies are losing membership partially because of the decline of geology majors.*
- *Publication of the journals is getting too expensive for many of the societies, and they are planning to go to electronic publishing*
- *Mineralogical Society of America has experienced growth that they attribute to their web site, a lecture series at rock shows, and changes in their requirements for new members (it may be worth checking if they would carry the book Cave Minerals in their bookstore business@minsocam.org).*
- *AAPG [American Association of Petroleum Geologists] and other some of the other member societies (through AAPG) offer health insurance (it ain't cheap), but it may be a service that we can offer our members; besides traditional US health insurance they offer an overseas policy.*
- *There is an annual meeting of state legislators this year in Salt Lake City in July after the [NSS] convention; I may help man an AGI members' booth. I'll see if I'm contacted; if I am, I'll need annual reports and pamphlets to hand out. (And maybe a copy or two of Cave Minerals for a door prize.)*

Hazel was present at the meeting and summarized her e-mail. She also discussed a "geocareers" initiative that Penny Boston and Louise Hose offered to examine for promoting karst geoscience careers.

Encyclopedia of Caves: Dave Culver and Will White reported that orders are now being accepted for the encyclopedia, which should be available soon.

Friends of Karst: Will White asked if there was interest in continuing this loose-knit group of karst scientists. The group originated as a means of exchanging ideas and information through informal and occasionally formal meetings, but that now seems to be accomplished by the plethora of karst conferences. Louise Hose announced that she was considering hold-

ing a Friends of Karst meeting in Mexico at Cueva de Villa Luz. This produced a round of approving nods and comments, answering Will's question that people would like the Friends of Karst to continue.

Journal for Cave and Karst Studies: New editor Malcolm Field announced that the funding issues recently raised about the Journal have been resolved and funds are available. Unresolved issues involve the role of the National Cave and Karst Research Institute in supporting the Journal, and the Journal's availability in digital form in addition to and/or instead of its traditional paper format.

Journal for Cave and Karst Studies, Geoscience Editor: Ira Sasowsky was not present, but Malcolm Field reported the continued receipt of diverse and quality geoscience manuscripts for the Journal.

Karst Waters Institute: Dave Culver and Will White announced that Special Publication 9, the proceedings of the 2003 epikarst conference, has been published and is available. An upcoming conference to examine new fields of karst research and possible funding sources is under consideration.

National Cave and Karst Research Institute: Director Louise Hose reported on NCKRI's progress, which included a nearly year-long effort to seek the cave and karst community's input on the future of NCKRI, its appropriate range of activities, and how it could be most effectively structured. The National Park Service (NPS) is moving NCKRI towards a "jointly administered" structure in which New Mexico Tech will plan, coordinate, and administer the Institute and its programs while the NPS will have ultimate responsibility and retain indirect control. A NCKRI corporation with a governing board comprised of representatives from partner organizations will likely be established over the next year. Construction of the Institute's headquarters should begin in late 2004 and be completed after about 18 months.

Thesis List: Betty Wheeler was not present and did not submit a report. George Veni said he e-mailed Betty about possibly placing the list on Alexander Klimchouk's *Speleogenesis* website, where a similar digitally searchable list is planned, but he hadn't heard back from her.

UIS Commission on Cave Mineralogy: Carol Hill was not present but e-mailed that she had nothing new to report.

Old Business:

1) Following last year's meeting, Doug Soroka received some useful input for producing a set of "karst cards" akin to the cave biology cards he produced for the Biology Section. Unfortunately, an injury and recuperation side-tracked Doug, but he hopes to make progress on this next year.

2) Ray Scheinfeld provided a summary of his findings for people receiving continuing geoscience education credits for giving papers at the NSS geoscience sessions and symposia. He found 31 states require registration of geoscientists, and six have pre-approved lists of organizations whose conferences qualify. The NSS, as a member of the American Geological Institute which is pre-approved, qualifies for those states. Ray will prepare a report for publication in *Geo*².

3) George Veni resurrected the topic of digitally archiving back-issues and future issues of *Geo*². The Section agreed that it would be a good idea and to post those issues on the website in PDF format. Should the web space be exceeded, a list of digitally available issues would be listed and could be e-mailed by request. Matt Reece agreed to coordinate the effort by compiling the more recent issues that are available digitally. After the meeting, Peggy Palmer volunteered to scan all of the remaining issues for archiving as PDFs.

4) John Hoffelt provided an update on proposed changes to the U.S. Clean Water Act that would

define most karst waters as “isolated” and thus exempt from protection under the Act.

New Business:

1) George Veni reported that the NSS is planning to bid at the 2005 International Congress of Speleology (ICS) in Athens, Greece, to host the 2009 ICS in San Antonio, Texas. Registration for the 21-28 August 2005 Athens ICS is available at: <http://www.14ics-athens2005.gr/english.php>

2) Bill Halliday made the following motion, which was passed by a unanimous vote of the members present:

Motion on the geological significance of lava tube caves and related geodiversity:

The Section endorses and supports the following recommendations of the XI International Symposium on Vulcanospeleology held in May 2004:

1) The highest national and international institutions should recognize the relevance of the geological heritage of volcanic caves. In particular, geodiversity in and around volcanic caves should be given high priority in conservation management plans.

2) As part of the natural patrimony, volcanic caves should be considered a key factor in sustainable economic development of volcanic areas.

3) Studies in volcanic caves need to be strengthened, with particular attention to mineralogy of speleothems, cave microbiology, and other research areas of outstanding importance.

4) Because of the environmental sensitivity of many volcanic caves, it is very important to develop and elaborate monitoring of indicators of environmental quality.

5) Official entities should assure an equilibrium between tourism and conservation of the vulcanospeleological patrimony.

6) A broad data base should be developed for the 100 most important volcanic caves of the world.

Announcements

George Veni announced that the next in the “Sinkhole Conference” series is being planned for 2005 in San Antonio, Texas. Edwards Aquifer Authority has offered \$20,000 to sponsor the event, but a date has not yet been set due to a pending response by the Geo-Institute which is now coordinating the meetings.

John Fish’s 1977 dissertation, *Karst Geomorphology and Hydrogeology of the Sierra de El Abra and Valles-San Luis Potosi Region, Mexico*, has been published and is available for sale from the Association for Mexican Cave Studies.

Bill Halliday announced that the 10th International Conference on Vulcanospeleology will be held in South Korea in 2006.

Bern Szukalski announced that the first meeting of a GIS Special Interest Group will be held the next day (the results of that meeting are published in this issue).

The meeting was adjourned at 1:50 p.m.



***Remember Geo²
Send Articles to
joschaper@socket.net***

Report On The XI International Symposium on Vulcanospeleology by W.R. Halliday

Held in May, 2004, the 11th International Symposium on Vulcanospeleology was highly successful. Following a tradition begun in 1972 when the first such symposium was held during a National Speleological Society convention in the town of White Salmon, WA, it convened in the rural seacoast town of Madalena on Pica Island in Portugal's Azores Archipelago 1000 miles west of the Portuguese mainland. About 70 attended, from 14 countries.

USA attendees included Diana Northup and Kenneth Ingham (New Mexico), and Harry Shick and myself from Hawaii. Other well-known speleologists included Paolo Forti (Italy), Stephen Kempe and George Szentes (Germany), Hubert and Erica Trimmel (Austria), Chris Wood (England), Greg Middleton (Australia), Jan Paul and Bep van der Pas (Netherlands), Pedro Oromi (Spain), Arni Stefansson (Iceland) and numerous Portuguese biologists and geologists. The meeting was strongly supported - financially and otherwise - by the Portuguese regional department of the environment and the official conclusions of the symposium (below) clearly were pleasing to that agency. Together with Paulo Forti, Pedro Oromi and three distinguished Portuguese biospeleologists and geologists, I served on the Scientific Committee. Per National Speleological Society President Scott Fee, I also officially represented the National Speleological Society.

For political reasons, two keynote speeches were in Portuguese (one was on a mainland karstic cave) but the other 29 papers were presented in fluent English. Three posters also were presented. Topics included exploration, geology, biology, mineralogy, climatology, and conservation and management. Three speakers were unable to attend but two of their papers were presented by others; only the Costa Rica paper was not presented. Especially notable were biospeleological overview papers by Pedro Oromi

and Paulo Borges which clearly demonstrated successive population splitting among cave invertebrate populations of Atlantic islands.

Diana Northup presented an excellent preliminary paper on microbiology in New Mexico lava tube caves. Kyung Woo presented a proposal for a world heritage park in a wedge of Korea's Cheju Island; unfortunately it proposed to omit Bilemot Cave, the island's largest and most important geologically. My papers were on an unusual Hawaiian lava tube cave with an incipient hornito, and on speleothemic minerals deposited as condensates from vapor. A 68-page Abstracts volume was provided. The Proceedings will be published in electronic form.

Other activities included several official receptions and/or dinners, wine tastings (the island's rejuvenated wine industry proved extremely popular), a visit to a museum of the old whaling industry, an opportunity to climb Pico volcano mostly in clouds with wind-whipped rain), and a meeting of the US Commission on Volcanic Caves. The latter approved Chenju Island, Korea, as the site of the 12th international symposium probably in 2006).

Pico is the second largest in the archipelago, but has less than 15,000 inhabitants. The town of Madalena is on the seacoast at the base of 7750-foot Pico stratovolcano where some 70 lava tube caves with lengths up to 5.15 km are known. Where not cleared for vineyards or pastures, the lower elevations are densely vegetated and others undoubtedly exist. Several are associated with hornitos or tumuli, and many of their features differ from those in Hawaii and the American mainland.

A pre-symposium field excursion visited the island of S. Jorge (where a new cavern insect was found in Algar do Montoso, a volcanic pit 140 m (about 425 feet) deep. During the symposium were field trips to major caves of Pico, and also to Faial

(Continued on page 19)

What is (was?) *Cave Geology*?

by Will and Bet White

Thirty years ago many graduate schools required study of at least one foreign language in their advanced degree programs. Those graduate students interested in caves and karst sometimes chose karst papers for either practicing translation or as their language exam. It seemed like a good idea to capture these translations and make them available to members of the Section of Cave Geology and Geography. It was to provide a medium for sharing research published in languages other than English that *Cave Geology* was invented as a second publication in parallel with *Geo*².

As the years went by, *Cave Geology* expanded its scope to include bibliographies and one field trip guidebook. However, at the same time graduate schools relaxed their foreign language requirements and the supply of translation has nearly dried up. For the past ten years there has been less and less justification for trying to maintain the publication. We have made the decision that enough is enough. There is under construction a final issue which will be a another bibliography of cave and karst papers in the mainstream scientific literature. This also may be the last of its kind. Paper bibliographies have given way to computer searchable data bases. When Volume 2, Number 6 is published we will close the books.

In the meanwhile, all of the previous issues are available. The list of published issues follows. Cave Geology and Geography Section members are urged to complete their collections.

CAVE GEOLOGY Prices Effective: August 2004 Volume 1, Numbers 1-10 and Volume 2, Numbers 1-5

VOLUME 1, NUMBERS 1-10

- 1(1) 1975 SOLUTION OF CALCIUM CARBONATE AND THE FORMATION OF KARREN by Alfred Bögli. Alfred Bögli was among the first to recognize the importance of carbon dioxide content, solution kinetics, and flow behavior in the surface and underground sculpturing of the limestone surface. His nomenclature for karren landforms is widely used. 28 pp **\$1.25+postage**
- 1(2) 1975 ON THE MORPHOLOGY OF THE MITCHELL PLAIN AND THE PENNYROYAL PLAIN OF INDIANA AND KENTUCKY by Herbert Lehmann. The late Dr. Herbert Lehmann was a major figure in the systematic studies of karst landforms throughout the world. The present paper on the Interior Lowland Karst of the United States was based on observations made there in the middle 1960's. THE MAJOR CAVES OF FRANCE AND THEIR RELATIONSHIPS WITH CLIMATIC FACTORS by Jean Corbel. Jean Corbel was an early exponent of climate as a key parameter in explaining karst landforms. This paper is one of his few analyses of cavern development in light of his climatic theories. 26 pp **\$1.25+postage**
- 1(3) 1976 ACTUAL STATUS OF THE QUESTION OF MOONMILK by Bernard Gèze. This paper is a summary of important French work on the hydrated carbonate minerals, known as moonmilk, carried out in the middle to late 1950's. THE PHYSICO-CHEMICAL EVOLUTION OF MOONMILK by Reno Bernasconi. Reno Bernasconi has studied and reported the chemical and physical properties of moonmilk. 31 pp **\$1.25+postage**
- 1(4) 1978 SOME FUNDAMENTAL PROBLEMS OF KARST by Josip Roglic'. Josip Roglic' of the University of Zagreb has been an important spokesman for Yugoslavian karst research for many years - here he has followed the evolving pattern of ideas on karst landforms. THE ORIGIN OF PITS by Bernard Gèze. Bernard Gèze **Geo**² Vol. 31 No. 3

provided a useful classification of vertical solution features, including vertical shafts and solution chimneys.

32pp **\$2.50+postage**

- 1(5) 1978 LIMESTONE CAVES OF NORDLAND by Gunnar Horn. Gunnar Horn wrote the definitive work on Norway's most famous karst area. Nordland is an area just south of the Arctic Circle containing most of the known caves of Norway and one of Norway's largest coastal glaciers - Svartisen. This work, published posthumously in 1947, consists of an eight-page introduction and the section on speleogenesis. CAVE SCIENCE WITH CONSIDERATION OF KARST PHENOMENA by Walther Von Knebel. Von Knebel's book is a very clear statement of the arguments and disagreements over the nature of the karst groundwater that took place in Europe during the early decades of this century and to which he brought a unique speleological point of view.
39 pp **\$3.00+postage**
- 1(6) 1979 THE GYPSUM CAVES OF THE UKRAINE by V. N. Dublyanskii. During the many years when Hölloch Cave in Switzerland and the Flint Ridge Cave System in Kentucky competed for the honor of "longest cave in the world", there was a little-noticed contender from the Soviet Union steadily moving up in the race. Cavers began to hear of a Russian Cave, Optimistitcheskaya. Optimistitcheskaya and its nearby neighbor, Ozernaya, are different from the long United States and Swiss caves; they are tightly packed networks in gypsum. An account of the large gypsum caves of the USSR is given in this original text. ON THE QUESTION ABOUT THE ORIGIN OF THE SALT COMPOSITIONS OF KARST WATER by S. A. Durov. There has been much interest recently in the possible role of sulfide oxidation and sulfuric acid as an alternate chemical mechanism for the development of caves. Durov's paper is one of the earliest accounts of sulfide and sulfate solution chemistry in karst systems.
27 pp **\$2.75+postage**
- 1(7) 1980 THE CRYSTALLINE STRUCTURES OF THE CAVES OF BELGIUM by W. Prinz. Stalactites, stalagmites, and associated calcite deposits form the principal attractions of the underground environment, prized by scientists, conservation buffs, and sport cavers alike. Prinz's detailed description of the crystalline arrangement has not been superseded in the 75 years since this monograph was written.
67 pp **\$3.50+ postage**
- 1(8) 1983 THE STRUCTURE, ACTIVITY, AND EVOLUTION OF A DOLINE by Daniel Aubert. Aubert provides a detailed picture of the internal structure of a doline obtained by a very straight forward method of excavating a trench down to bedrock. Various soil types and an interpretation of the mechanisms of doline formation is given. AN APPRAISAL OF SURFACE SOLUTION IN THE JURA by Daniel Aubert. Aubert analyzed infiltration waters in a doline at various depths through the soil infilling the rubble zone. These numbers provide a measure of the rate of solution of the limestone surface. ON FLUORESCENCE TESTS AT GREAT DISTANCES by E. A. Martel. An historical piece: Martel describes his recommended methods for fluorescein dye tracing, 1913 edition. SCIENTIFIC EXPLORATION OF CAVES by E. A. Martel. E. A. Martel spoke to the International Geographical Congress with an agenda for exploration and research on American caves. Although written in 1904, the agenda has a very modern tone and indeed it is only within the past decade that most of studies recommended by Martel have actually been accomplished.
30 pp **\$2.25+postage**
- 1(9) 1984 CAVE AND KARST-RELATED PAPERS IN THE MAINSTREAM SCIENTIFIC LITERATURE: A BIBLIOGRAPHY by William B. White and Elizabeth L. White. A bibliography of about 1000 references to cave and karst-related papers in geochemistry, geomorphology, hydrology, mineralogy and crystallography, physical speleology, and sedimentation for a 27-year period 1957 through 1983.
101 pp **\$4.75+1.80 post.**
- 1(10) 1985 MIXTURE-CORROSION - A CONTRIBUTION TO THE KARSTIFICATION PROBLEM by Alfred Bögli. An application of 1960's "textbook" physical chemistry to the origin of karst features: Bögli recognized subtle points that mixing of saturated waters could, in certain circumstances, produce undersaturated water and thus additional solution. SUBTERRANEAN CONFLUENCES by M. Bleahu. An interpretation of passage intersections in terms of various mechanisms of enlargement.
26 pp **\$1.50+postage**

VOLUME 2, NUMBERS 1-5

- 2(1) 1988 CAVE AND KARST-RELATED THESES IN U.S. AND CANADIAN UNIVERSITIES: 1899-1988 by G. Huppert. A bibliographic listing of 725 theses, listed alphabetically by author - indexed by thesis area, by university, and by key words;
84 pages **\$4.50+1.80 post.**

Abstracts from the 12th Symposium on the Geology of the Bahamas and Other Carbonate Regions

Compiled by John Mylroie

The 12th Symposium on the Geology of the Bahamas and Other Carbonate Regions was held at the Gerace Research Center on San Salvador Island, Bahamas, June 3-7, 2004. This Symposium, begun in 1982, is held every even-numbered June. The tone of the Symposium is set by the choice of keynote speaker. Previous Symposia had keynote speakers such as carbonate geologists Bob Ginsberg, Gene Shinn and Noel James, or paleontologists such as the late Steve Gould. For 2004, Len Vacher of the University of South Florida was the keynote speaker. Dr. Vacher is well known for his work on the geology and hydrology of Bermuda and other carbonate environments. His selection attracted people who work on the hydrology of carbonate islands from around the world, and resulted in the submission of abstracts on island cave and karst development from the Bahamas, Cuba, Florida, and the Mariana Islands of the Pacific. Scientists from Germany, Bulgaria and France joined US and Bahamian scientists for presentations, field trips, and discussions. Reproduced here are 20 abstracts from that meeting. While some have only a peripheral connection to karst, most deal with cave and karst research directly. Given the limited audience present at the Symposium, these 20 abstracts are being reprinted in GEO2 to make them available to the cave and karst scientific community.

(Ed Note: *Abstracts from this symposium will be published in alphabetical order on a space available basis over the next few issues of Geo². Thanks to John Mylroie for getting them together and sending them along.*)

STUDYING THE “PLUMBING” ON COLUMBUS’ ISLE: EIGHTEEN YEARS OF HYDROLOGIC RESEARCH ON SAN SALVADOR ISLAND, BAHAMAS (AND STILL GOING STRONG!)

Davis, R. Laurence Dept. of Biology and Environmental Sciences, University of New Haven, 300 Boston Post Rd. West Haven, CT 06516 (rldavis@newhaven.edu)

On January 1, 1986, I first set foot on San Salvador Island. I wanted to determine what hydrologic conditions were like when sea level was six meters higher than present. I still don’t know, but eighteen years later my colleagues and I have made a start towards understanding the island’s “plumbing” as it stands today. This paper reviews some of our findings.

My first collaborator was Rob Johnson. We quickly found that the standard Ghyben-Herzberg-Dupuit model didn’t apply here. Our 1989 paper proposed a new model that included discontinuous fresh-water lenses under the consolidated dune ridges, many of which were disrupted by subsurface conduits that crossed beneath them

to feed the inland lakes. This work led to a study with botanist Paul Godfrey that used careful surveying and mangrove succession to reveal a record of rapid modern sea level rise (~2.2 mm/yr). The long term (4000 yr) average was 0.6 mm/yr.

In 1992, Club Med opened. Water demand increased six-fold. The source was a well field adjacent to the airport. My students and I began to study this along with Jeffrey Niemitz and his students from Dickinson College. With increased pumping, salinities had almost doubled. Island residents now had to use bottled water. We hypothesized that a conduit ran under the well field, further disrupting the water quality. Currently, one of my students is studying the aquifer’s petrology, while another (Shannon Pociu) has completed a management plan (presented at this meeting) that should provide short-term production-water quality improvement.

Despite high surface water salinities, there are fresh-water wetlands. Based on Cara Gentry’s work (presented at this meeting) we hypothesize that these are “perched” on paleosols or micritic zones. Our study of the well-field aquifer petrology supports this idea.

Finally this, and all other non-coastal island research, is included in Robinson and Davis' GIS (2000). This data base has already helped launch several interdisciplinary studies that should bear fruit in the near future.

Despite the eighteen years of work, we still have only a partial picture of San Salvador's "plumbing". Future work will include a look at the conduit-fed ponds south of the field station; a large wetland north of South Victoria Hills, discovered in April, 2004; a conduit discharging fresh water under the cliffs at Grotto Beach; a series of circular cattail marshes on the east side, and finally (and perhaps most importantly) how all of this relates to the problem of providing a secure, high quality water supply for island residents and visitors.

MIXING CORROSION IN CaCO_3 - CO_2 FRESH WATER -FRESH WATER AND SEA WATER-FRESH WATER MIXTURES: AN EXPERIMENTAL INVESTIGATION.

Dreybrodt, Wolfgang, and Vosbech, Katrin Karst Processes Research Group Institute for Experimental Physics University of Bremen 28359 Bremen, Germany

When aqueous H_2O - CaCO_3 - CO_2 solutions with differing P_{CO_2} , saturated with respect to calcite mix the mixed solutions can become undersaturated with respect to calcite. This effect called mixing corrosion is important in the speleogenesis in eogenetic rocks. In carbonate islands fresh waters with differing P_{CO_2} and saturated with respect to calcite, when they mix at the water table can cause the evolution of caves. At the halocline mixing of seawater with saturated freshwater of the freshwater lens can create flank margin caves.

Mixing corrosion has been predicted theoretically from the physical chemistry of aqueous solutions. We present the first experimental verification, which gives information on the degree of undersaturation Δc_{eq} , but also provides the dissolution rates. Such experiments have been performed as batch experiments using either synthetic calcite or natural limestone as reactant. We have used freshwater mixtures A and B ($P_{\text{CO}_2}=0.05$ atm and $c_{\text{A}}^{\text{eq}}=3.83$ mmole/l, and $P_{\text{CO}_2}=0$ atm, $c_{\text{B}}^{\text{eq}}=0.13$ mmole/l with volume ratio $V_{\text{B}}/V_{\text{A}}=0.3$) and also mixtures of synthetic sea

water with solution A with volume ratio $V_{\text{sea}}/V_{\text{A}}=0.087$. When using synthetic calcite as reactant one finds Δc_{eq} in agreement with thermodynamic theory and the dissolution rates are given by $R=3.10^{-7}(1-\Delta c/\Delta c_{\text{eq}})^{1.1}$ mmole $\text{cm}^{-2}\text{s}^{-1}$ for the fresh water mixture, but for the sea water fresh -water mixture one finds $R=2.1 \cdot 10^{-8}(1-\Delta c/\Delta c_{\text{eq}})^{1.5}$ mmole $\text{cm}^{-2}\text{s}^{-1}$. Δc is the concentration of calcium dissolved by mixing corrosion.

Natural limestone, however, shows a different behaviour. The dissolution rates in the sea water mixture are significantly lower and exhibit a highly non linear rate law given by $R=1.5 \cdot 10^{-8}(1-\Delta c/\Delta c_{\text{eq}})^{8.4}$ mmole $\text{cm}^{-2}\text{s}^{-1}$.

These data are important for modelling karst evolution on islands. Such models, however, have to consider that mixing of the saturated solutions has to be on the molecular scale. Therefore modelling using dispersion- advection equations with dispersivities on the scale of cm or more higher overestimate the amount of dissolved limestone.

¹Ersek, Vasile, ¹Myloie, John E., ²Carew, James L., and ¹Kirkland, Brenda L.

¹ Department of Geosciences Mississippi State University Mississippi State, MS USA 39762 myloie@geosci.msstate.edu

²Department of Geology College of Charleston Charleston, SC USA 29424

Determining the source of insoluble residues (IR) in paleosols from the Bahamas and the Commonwealth of the Northern Mariana Islands (CNMI) may provide paleoclimatic information because paleosol formation is related with atmospheric circulation patterns and dust load. Given that the Bahamas spent the vast majority of the Quaternary as high, exposed platforms during glacio-eustatic sea-level lowstands, the IR in their paleosols may represent a signature for glacial climatic conditions in the IR source areas.

The Bahamian samples were collected on a north-south transect which was long enough to identify potential differences in source areas, as well as to ascertain any influence on paleosol geochemistry caused by climatic differences. Using the $\text{Al}_2\text{O}_3:\text{TiO}_2$

ratio, which remains relatively constant over time, we compared the Bahamian paleosols with potential sources of IR. Likely IR sources are North African dust, Lesser Antilles ash, and North American loess. The data indicate that African dust is the main component of the IR in Bahamian paleosols. However, ~30% of our samples had $Al_2O_3:TiO_2$ ratios above the range of African dust and below the range of Antilles ash. Because of the geochemical similarities between North American loess and African dust, no identifiable contribution of North American loess was detected. However, based on other studies, it is likely that loess is a minimal component in the Bahamian paleosols.

The geochemistry of the paleosols in the CNMI is highly variable. Because the studied islands all lie within 1° of latitude of one another, it is unlikely that this variability was caused by climatic factors. The $Al_2O_3:TiO_2$ ratios of the exposed volcanic rocks is significantly higher than that of most carbonate paleosols. This may indicate that a combination of volcanic ash, Asian dust, and sediment eroded from local volcanic outcrops are probably the major sources of IR in the paleosols.

CONDUITS IN UNCONFINED FLORIDAN AQUIFER SYSTEM OF WEST-CENTRAL FLORIDA, MORPHOLOGIC CONSIDERATIONS

Florea, Lee, and Vacher, H. L. Karst Research Group Department of Geology University of South Florida

Conduits within the unconfined Floridan Aquifer of West Central Florida have both horizontal and vertical components. Vertical portions of conduits visually correlate to fractures, and these fractures tend to be the dominant control of conduit directionality as shown by a collection of several Florida cave maps. Length weighted rose diagrams of passage directions reveal a NW -SE and NE-SW pattern of conduit directions statistically similar to results found in remote sensing studies of photo-linears. Horizontal solution features occur at consistent horizons as shown by cave surveys and observations of quarry high-walls. These patterns further demonstrate that horizontal solution features can be pervasive and laterally continuous. Their control is presently unknown, but is potentially the result of some

combination of lithology, fracture density, and water table position.

Conduit morphology is traditionally classified from observations in telogenetic karst. In telogenetic karst aquifers matrix permeability is low due to burial diagenesis and secondary permeability is provided by fractures and bedding planes associated with uplift. Classification is based upon the type of recharge to the aquifer (allogenic or hypogenic) and whether the conduit is fracture or bedding plane controlled. Recent observations in eogenetic karst do not fit these classifications. In eogenetic karst, associated with young carbonates at or near their environment of deposition, matrix permeability is high (up to four orders of magnitude greater than in telogenetic karst) and only lithologic changes, not bedding planes, are present. We suggest that a more appropriate classification scheme is one that incorporates aspects of recharge type and fracture density as well as the diagenetic age of the rock. In this case, the conduits within the unconfined Floridan Aquifer represent a mid-point on a range between Plio-Pleistocene karst on young carbonate islands and Paleozoic karst in the Appalachian lowlands.

THE GEOMORPHOLOGICAL AND HYDROLOGICAL CONTROLS OF FRESH WATER WETLANDS ON SAN SALVADOR ISLAND, BAHAMAS

Gentry, Cara L., and Davis, Dr. R. Laurence Dept. of Biology and Environmental Sciences, University of New Haven, 300 Boston Post Rd., West Haven, CT 06516

San Salvador, Bahamas is dominated by large, shallow inland lakes bounded by lithified carbonate dunes. It has a tropical savanna climate with a winter dry season. The water budget is negative which, when combined with the island's low elevation and extensive karst, results in conditions that favor saline to hypersaline water in the lakes. Nevertheless, exploration of the island's interior has shown that, despite these conditions, there are many freshwater wetlands. The purpose of this study is to account for their presence and to determine how they fit into the island's hydrologic regime.

The island is composed entirely of young carbonates. There are three recognized stratigraphic units, two Pleistocene and one Holocene. The Pleistocene units are capped by micritized paleosols that form hard, impervious crusts. These crusts may play a role in the formation of the freshwater wetlands. Six wetlands ranging from fresh to slightly brackish were examined over four field seasons from 2002 to 2004. Field work was carried out at the beginning of the year's dry season and again near its end. Rock thin sections, water chemistry, and water level data were collected at each site. During the dry season, water levels declined and dissolved solids increased. This suggests that the wetland system is evaporation dominated. The wetland areas were at least partially underlain by micritic paleosols. Short time interval data logging of water levels in the wetlands did not show a clear tidal signal. The wetlands themselves are located in shallow depressions.

We hypothesize that the geology and geomorphology of the areas surrounding the freshwater wetlands work like a natural "catch" basin. Rainwater first infiltrates the thin soil layer and is then transported by interflow along the impervious paleosol. The water then pools in the lowest areas, perched on the paleosols, and finally evaporates during the dry season.



(Halliday--from page 12)

Island, a 30-minute boat trip farther west; afterwards were visits to S. Miguel site of the University of the Azores, in Ponta Delgada which has a downtown cave), Terceira (home of Os Montanheiros the well-organized caving club of the archipelago, with some 50 significant caves on that island), and Graciosa, the site of the unique Furna do Enxofre, an enormous

underground cavity with its own fumarole and mud volcano some 200 feet below the surface.

The official conclusions of the symposium were the General Recommendations as endorsed by the Geology and Geography and Conservation and Cave Management Sections at the Marquette convention (*Ed. note: see Geo Section minutes for their text*) and these Special conclusions:

1. A new species of troglobitic insect (*Trechus* n. sp.) was discovered during the presymposium field trip to do Montoso on S. Jorge Island. This is the second species of this genus found on this island.

2. The Azorean vulcanospeleological patrimony was recognized as world-class, emphasized by the listing of Algar do Carvao as one of the world's ten most important volcanic caves in terms of cave murals.

C, Further recommendations relative to the vulcanospeleological patrimony of Azores.

1. Additional field research is needed in bryology, biospeleology, mineralogy, microbiology and general vulcanospeleology,

2. A Global Management Plan should implement conservation management measures which will protect volcanic caves and pits of the Azores.

3. Conservation management measures should be created for ten high priority caves and pits of the Azores, based on modelling procedures developed by GESPEA using the data base IPEA (Survey of the Azorean Volcanic Caves).

Because of the unusual length and diverse content of the Abstracts volume, editors of the newsletters of the National Speleological Society sections on Geology and Geography, Cave Biology and Conservation and Management may wish to publish only short excerpts from it. Together with this report, I will provide photocopies of the entire volume for their review and consideration. On request, I will provide photocopies of names and addresses (including e-mail addresses) of registrants.

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Correction Requested

Inside Geo²:

