



Colorado Scientific Society

*In pursuit of the promotion of knowledge,
understanding of science,
and its application to human needs.*

THE USE OF IMAGING SPECTROSCOPY DATA FOR GEOLOGICAL AND ENVIRONMENTAL STUDIES

Roger N. Clark

OBSIDIAN ARTIFACTS IN PATAGONIA, SOUTHERN CHILE

Charles Stern

Tuesday, April 14, 1998

Union Square Theatre in the Sheraton Hotel

360 Union Boulevard

Lakewood, Colorado

Social Hour: 7:00 p.m.

Meeting Time: 7:30 p.m.

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Speakers' Abstracts

THE USE OF IMAGING SPECTROSCOPY DATA FOR GEOLOGICAL AND ENVIRONMENTAL STUDIES

Roger N. Clark

United States Geological Survey, Denver

The U.S. Geological Survey is using imaging spectroscopy data to assess the geological and environmental character of public and private lands in the United States. Imaging spectroscopy is a departure from traditional remote sensing concepts in that the data represent continuous spectral coverage over a selected portion of the electromagnetic spectrum. Spectroscopic processing delineates absorption features due to individual chemical bonds in surface materials and in the atmosphere and when used with image analysis, maps their occurrence and distribution. The narrow spectral channels of an imaging spectrometer form a continuous sampling of the reflectance spectrum of the Earth's surface, in contrast with the 4 to 7 discontinuous broad channels of the older imaging instruments (Landsat Thematic Mapper (TM) and Multispectral Scanner (MSS)). Analysis of imaging spectroscopy data allows minerals, vegetation types, man-made materials, water, snow, and many other mediums to be mapped if they display unique and identifiable absorption features in the 0.4 to 2.45 μm spectral wavelength region.

OBSIDIAN ARTIFACTS IN PATAGONIA, SOUTHERN CHILE

Charles Stern

Department of Geology, University of Colorado, Boulder

Patagonia is covered by large plateaus of Cenozoic basalts. Outcrops of rhyolites are unknown, but obsidian artifacts used by the prehistoric inhabitants are found in many of the archaeological sites of Patagonia, some dating back as far as 12,000 yrs. BP. Chemical finger-printing of one distinctive jet black type of obsidian suggests a single source for this material, which is widespread over a region stretching for more than 1000 miles along the Andean foothills of southern Patagonia. During field work last year, I found cobbles of this obsidian in dry stream beds crossing a fluvial-glacial plateau near the Cave of the Hands, one of the archaeological sites where obsidian artifacts are abundant. Apparently this single locality was the source of all the black obsidian in southernmost Patagonia, implying a much greater amount of cultural and material interchange than archaeologists working in this region had suspected.

New Members

The Colorado Scientific Society welcomes the following new members:

Dana K. Gotchey

Judith L. Hannah

John C. Lahr

John C. Ruckmick

Ralph R. Shroba

Kris A. Zumalt

Welcome!

Welcome!

Welcome!



President's Column

Two months ago I raised the question of whether the above objective really described the mission of our society. In my request for responses, I promised to tabulate your opinions on the mission of the society. Well, I can't say this challenge kept many people awake, furiously typing e-mails and letters. In fact, I received only two responses.

Constitution of the Colorado Scientific Society (1977)
Ken Turnbull liked the current verbiage and saw no need for change. He said the following. "It is broad. This provides a basis for a broad-based membership. It is inclusive, rather than exclusive."

Bruce Bryant offered the following. "Certainly the very general statement from the society's constitution gives us a lot of latitude, which was explored by some of the talks given last year. Yet it is true that geosciences (earth and planetary sciences) are really our bag. Over the years that I have been around, attempts to broaden the discipline base of the talks given at our meetings have been made two or three times, and they were not pursued because attendance at the meetings declined. Yet the name of the society is "Scientific" rather than "Geological." "Geological" could include the lithosphere, atmosphere and hydrosphere, since they are all part of the earth system. That, however, does not include the planets. Do we want to include the stars? Even if we can agree on these things, what type of label or stated mission would attract new members? Would a change we make now be attractive 20, 50, or 100 years from now?"

It was never my intention to initiate a major change in the society's name or mission. I merely wanted to get people thinking, and hopefully acting to keep the society healthy. As of February 10th of this year, the Colorado Scientific Society had 339 members. This included 147 regular members who had paid their 1998 dues, 85 regular members from 1997 who hadn't paid their 1998 dues, 26 corresponding members (mostly from other states), 26 student members, 18 complementary members (free memberships to students with CSS research grants, RMAG, etc.) and 37 honorary members (largely ex-presidents) who are not required to pay yearly dues. This is down from the

high of 548 members in 1984. While the oil bust of the mid-80s caused a steep decline in this number, the society has been consistently decreasing by about 10 members per year since 1990.

Our slowly diminishing membership should be a source of real concern for the society. From an economic point-of-view, continued membership decreases may require a dues increase to support our current level of activity. To me, however, this is a trivial concern relative to the prospect of seeing the society stagnate. It is true that geoscience jobs in the Denver area and traditional geological positions within the USGS have declined over the last decade. From my university perch, however, it seems that local geoscience hiring is quite healthy. And just consider the outstanding response to Bill Hotchkiss' excellent avalanche safety trips. The first trip was almost canceled due to a low enrollment from the society. At the last minute, **Mike Machette** and **Karl Kellogg** decided to broadcast the notice throughout the USGS and within days they had a waiting list of 40 people, enough to run a second trip!

Perhaps we all need to be more vocal in promoting the society. We need to remember that we have no lasting claim to the broader geoscience niche. In the March newsletter of the Rocky Mountain Association of Geologists, President **John Oty** noted that RMAG is getting more diversified, with 25% of their membership in fields other than oil and gas. He saw the possibility that RMAG could be "an umbrella organization with divisions representing different (geoscience) disciplines." This sort of diversity is precisely what we currently offer. The need for a general geoscience society in the Rocky Mountains is clear. If we join together in soliciting new members and supporting society activities, we can ensure that the Colorado Scientific Society will serve the geoscience and general communities for many years to come.

*Eric Erslev, Department of Earth Resources
Colorado State University*



Interesting Websites

Each month we enhance our speakers' abstracts with information concerning websites that offer science over the Internet. This month, we direct your cyber-attention to sites related to spectrographic research and obsidian studies. Roger Clark's spectrometry group at the USGS has a website at:

<http://speclab.cr.usgs.gov/>

There are several data-rich websites associated with obsidian and archeology on the Web. An old friend (Gordon Shackley) from my days in volcanic research is involved with most of them. Check them out at:

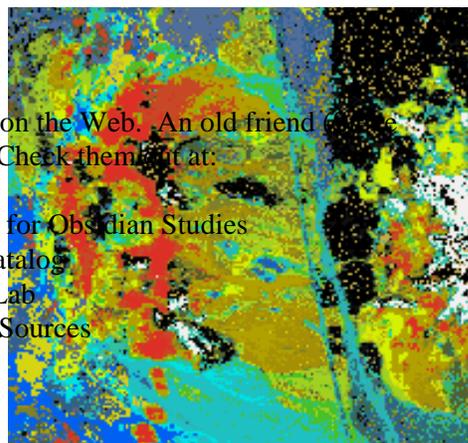
<http://www.peak.org/obsidian/obsidian.html> - International Association for Obsidian Studies

http://www.peak.org/~skinnrcr/s_home.html - IAOS Obsidian Source Catalog

<http://www.peak.org/~skinnrcr/obsidian.html> - NW Research Obsidian Lab

<http://obsidian.pahma.berkeley.edu/SWOBSRCS.HTM> - SW Obsidian Sources

Dave Nealey



Museums and News

Friends of Dinosaur Ridge - for information call 697-DINO. Visitors' Center is located at 16831 West Alameda Parkway (north side of Alameda, just west of the C-470 overpass). Open 9 a.m. to 4 p.m. weekdays and weekends. Fireside chats are held at the Morrison Town Hall, 110 Stone Street in Morrison starting at 7 p.m.

Morrison Natural History Museum - is open 1-4 p.m., Wednesday through Sunday. The Museum is located on State Highway 8, 1/2 mile south of Morrison. Fireside chats are cosponsored periodically by Friends of Dinosaur Ridge (see above).

GeoExposition - is sponsoring the *Spring Gem and Mineral Show in the Rockies*, April 17-19, at the Holiday Inn Denver North and at the Travelodge Hotel (I-25 & I-70). Call 978-9926 for details.

Earth Science Meetings and Talks

Colorado Scientific Society's regular meetings are held the 2nd Tuesday of the month (unless otherwise advertised). Social time begins at 7:00 p.m. and program is at 7:30 p.m. For information, contact Eric Erslev at (970) 491-6375 or erslev@cnr.colorado.edu.

Denver International Petroleum Society (DIPS) meets the 2nd Friday of each month at the Wynkoop Brewing Co., 18th and Wynkoop Streets. Reception begins at 11:30 a.m., luncheon at 12 p.m., program at 12:30 p.m. Make reservations (required) by calling Kristine Peterson (303) 980-6770. Reservations accepted after 8 a.m. on Friday until 10:30 a.m. on Wednesday prior to the meeting. Cancellations accepted until 11:00 am Wednesday prior to the meeting. Cost: \$13 for lunches; talk only is available for \$2 (make checks payable to "DIPS"). Contact Keith Murray at (303) 986-8554 for information.

Denver Region Exploration Geologists' Society (DREGS) meets in the Mutual Consolidated Water Building, 12700 West 27th Avenue, Lakewood. Social hour 6:00-7:00 p.m. Technical presentation at 7:00 p.m. Meetings are normally scheduled for the first Monday of each month. For information contact Jim Cappa, (303) 866-2611.



Colorado School of Mines Van Tuyl Lectures, Berthoud Hall, room 108, 4:30 p.m.

For information call the Dept. of Geology at (303) 273-3800.

Colorado School of Mines Carl Heiland Lectures and other Talks

For information contact Michelle Szobody (303) 273-3451. Refreshments are served immediately following the lecture.

April 10 — Linda Foulk, Senior Geologist, Schlumberger Wireline & Testing, Denver, 4:00 p.m., Room 204A, Brown Building, **“Integration of Image and Anisotropy Logs to Optimize Production, Antelope Creek Field, Duchesne, Utah”**

April 15 — Dr. Walter Alvarez, Professor of Geology and Geophysics at the University of California at Berkeley, **“T. rex and the Crater of Doom”**, 7:00 p.m. in Bunker Auditorium of the Green Center Building, located along Arapaho Avenue between 15th and 16th Streets in Golden. The public is invited. Sponsored by Sigma Xi.

April 17 — Friedrich Roth, 4:00 p.m. Room 204A, Brown Building, **“GPR antenna positioning using inertial motion sensors”**

April 24 — 4:00 p.m., Metals Hall, Green Center, Paul Murray, **“Using near-surface seismic for fracture detection: Shear-wave studies in North Star Preserve, Aspen, Colorado”**

Colorado State University Geology Lectures

All presentations are at 4:00 p.m. in room 316 of the Natural Resources Building. Call the Dept. of Earth Resources at (970) 491-5661 for further details.

April 17: — Jill Baron (Natural Resources Ecology Lab, CSU), **“Summary of the Status of Rocky Mountain Water Quality”**

April 24 — Barbara John (Univ. of Wyoming), **“Magmas and Fault Zones”**

Denver Mining Club meets Thursdays from 11:30 a.m. to 1:00 p.m. at the Country Harvest Buffet at Villa Italia, 7200 W. Alameda Avenue, Lakewood. For more information contact Dick Beach at (303) 986-6535.

April 16 — Gary Baughman, Dir., Office of Special Programs and Continuing Education, CSM, **“Review of CSM Critical Programs”**

April 30 — Jan Krason, President, GeoExplorers, Inc., **“Diamond and Gold Mining in Venezuela”**

USGS Geologic Division Colloquium talks are held in the Eugene Foord conference room, Bldg. 20, Denver Federal Center. Contact Pat Poole (303) 236-5438 for exact times and additional information.

April 30 — Poster Review in Lecture Halls A and B, Denver Federal Center. Contact Pete Modreski at 236-5639.

Geological Society of America

April 7-9, Cordilleran Section Meeting, California State University, Long Beach, California.

CSS Avalanche Safety Seminars-A recap

The Society was fortunate to have Dr. Bill Hotchkiss, Scientist Emeritus with the USGS Water Resources Division, lead field seminars on avalanche safety for the Society on February 22nd and March 29th. Bill is a member of the National Ski Patrol and a co-founder of the National Avalanche School. He has given avalanche seminars all

over the Rocky Mountains and is regarded as an expert in the field. The seminars were specially suited to the recreational skier or snowshoer who is unfamiliar with snow avalanche safety techniques and equipment (probably 75% of CSS members).



During the two seminars, participants dug snow pits, practiced searching for buried victims with transceivers (beepers), and learned the basics of identifying “avalanche danger signals.” Topics discussed included snow metamorphism and stratigraphy, avalanche dynamics, and safe winter travel in the backcountry. In addition, we stopped just west of Empire to look at the famous Beaver Dam avalanche site, where several

people were killed getting footage for a Disney movie more than 20 years ago.

Compared to the cost of similar seminars we’ve seen advertised, these were a bargain at only \$20.00 each. We appreciate Bill Hotchkiss’ efforts for the Society and encourage those of you unfortunate enough to have missed these seminars to “stay tuned” next winter. (Bill can be reached via email at hotch@usgs.gov.)

Spring Field Trip

GEOLOGICAL HIGHLIGHTS OF THE COLORADO SPRINGS AREA

The 1998 spring field trip will be a single day excursion to the Colorado Springs area on Saturday, May 16. Trip leaders will be Eric Leonard, Paul Myrow, Christine Sidoway, and perhaps others from Colorado College; and highlights will include recent interpretations of the history of the Rampart Range, Cambro-Ordovician stratigraphy, and structural features in the Garden of the Gods. We’ll meet at the Cold Springs Park-and-Ride, near the south-east corner of 6th Avenue and Union Street, at 0730. We’ll be back around 1800.

The cost of the trip includes transportation by 15-passenger vans equipped with CB radios, beverages,

snacks, field guide, and good fellowship. Not included is lunch; participants need to bring their own. Enrollment will be limited to 36 people. Guests are welcome. Although no strenuous hiking or climbing are anticipated, participants should wear sturdy footgear suitable for any terrain.

To register for the trip, complete the form below and send it by 1 May, along with a \$32 check made payable to the Colorado Scientific Society, at the address below. If you do register by the 1 May deadline, you can assume you are included as a participant, unless you are otherwise informed sometime before 16 May. For additional information, contact Lee Shropshire at 970-351-2285 or 352-8778.

COLORADO SCIENTIFIC SOCIETY 1998 SPRING FIELD TRIP REGISTRATION FORM

Name _____ Phone Number _____

Address _____

Name(s) of Guest(s) you plan to bring _____

To register, please send by 1 May 1998, this completed form and a check in the amount of \$32 per person, made payable to the Colorado Scientific Society, to: K. Lee Shropshire, Department of Earth Sciences, University of Northern Colorado, Greeley, CO 80639.



Invitation to Join the Colorado Scientific Society

The Society is dedicated to the advancement of science through open forums and activities. We sponsor lectures, field trips, student scholarship grants, and discussions of scientific matters of public concern.

I hereby apply for _____ membership in the Colorado Scientific Society.
(Regular, Corresponding, Student)

(Last Name)	(First Name)	(Middle)
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(Address)	(Telephone, with area code)	(e-mail)
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(City)	(State)	(Zip)
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(Company/Agency/University)

(Mailing address if different than above)

School	Degree	Year	Major
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Main Scientific Interests

DUES—Your dues are for the calendar year and help support the newsletter, monthly meetings, two field trips each year, family night, and the Emmons Lecture.

Regular Member (\$15) _____
Corresponding (outside Denver metro area) Member (\$10) _____
Student Member (\$5) _____

Please make your dues payable to Colorado Scientific Society. Thank you!!

The success of certain Colorado Scientific activities depend on your volunteer help. Please circle those activities for which you can provide assistance. We will pass your name on to the appropriate Committee Chairperson.

<i>Arrangements</i>	<i>Fund Raising</i>	<i>Newsletter</i>	<i>Publicity</i>
<i>Best Paper Award</i>	<i>History</i>	<i>Outreach</i>	<i>Science Fairs</i>
<i>Field Trips</i>	<i>Membership</i>	<i>Program</i>	<i>Web Site</i>

I certify that all statements in this application are correct and, I agree to promote the objectives of the Society and to abide by its Constitution, Bylaws, and Rules.

Applicant's signature

Date

Colorado Scientific Society, P.O. Box 150495, Lakewood, CO 80215-0495



Colorado Scientific Society Officers, Councilors, and Chairpersons

OFFICERS

President: Eric Erslev, CSU, (970) 491-6375
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Past President: Karl Kellogg, USGS, 236-1305

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1997-1999: Michelle L. Tuttle, USGS, 273-8626
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1998-2000: Eric Nelson, CSM, 273-3811
1998-2000: Ted Ball, Consultant

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Webmaster	Randy Schumann, USGS, 236-1525



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