



Colorado Scientific Society

*The objective of the Society is to promote
the knowledge and understanding of Earth science,
and its application to human needs*

2003 Colorado Scientific Society Student Night

Geochemical and geophysical determination of the fate of septic tank effluent in Turkey Creek basin, Colorado

*By Kathleen E. Dano (speaker), Eileen Poeter, and Geoffrey Thyne
Colorado School of Mines*



Late Quaternary paleoseismic history of the Uemachi blind thrust system in metropolitan Osaka, Japan, based on high-resolution stratigraphic analysis of fault-propagation folds

*By Eric Cannon (speaker), K.J. Mueller, Y. Sugiyama, N. Kitada, and S. Sundermann,
University of Colorado, Boulder*



Thursday, November 20, 2003

American Mountaineering Center

710 10th St. (NE corner with Washington), Golden

Social half-hour – 7:00 pm. Meeting time – 7:30 pm.

2003 Colorado Scientific Society Student Night

Abstract (Colorado School of Mines Regional Competition Winner)

Geochemical and geophysical determination of the fate of septic tank effluent in Turkey Creek basin, Colorado

By Kathleen E. Dano (speaker), Eileen Poeter, and Geoffrey Thyne, Department of Geology and Geologic Engineering, Colorado School of Mines, Golden, CO 80401

With rapid population growth in the Turkey Creek basin of Jefferson County, Colorado, water quality has become an important issue. A comparison of recent chemical data and historical data showed that surface water quality had declined at a rate three times as fast as that of the ground water. All of the 5000 homes in the basin use septic tanks for wastewater disposal. It is our hypothesis that after leaving a septic system, some of the effluent filters through the high-permeability regolith until it reaches the regolith-bedrock interface. This “perched” effluent then flows laterally down gradient and discharges into surface water with only limited treatment.

Various geophysical methods were used to locate this effluent at the regolith-bedrock interface. Where areas of saturation were detected, shallow piezometers were installed to sample the effluent plume. The samples were chemically analyzed for major and trace ions. Surface and ground water samples from the basin were then analyzed for the chemical fingerprint determined for the field site. Some surface and ground water samples do appear to be chemically altered by septic effluent. A water budget was completed for the system, allowing the velocity and other parameters of the septic effluent flowing along the regolith-bedrock interface to be calculated.

Abstract (University of Colorado Regional Competition Winner)

Late Quaternary paleoseismic history of the Uemachi blind thrust system in metropolitan Osaka, Japan, based on high-resolution stratigraphic analysis of fault-propagation folds

By Eric Cannon (speaker), K.J. Mueller, Y. Sugiyama, N. Kitada, and S. Sundermann, University of Colorado, Boulder

We analyze the growth of the Uemachi fault system in metropolitan Osaka, Japan, by using shallow continuously cored borings and a high-resolution seismic reflection profile to determine the record of large magnitude Late Quaternary earthquakes on blind thrust faults. The 45-km-long, north-trending, multi-segment Uemachi fault system manifests itself as a series of

he shallow subsurface flexures that are largely buried. The flexures are forelimbs of active fault-propagation folds formed by west- to northwest-vergent, coseismic slip on blind thrust faults.

Late Quaternary stratigraphy in the Osaka Basin is characterized by sequences of alternating marine clays deposited during marine transgressions that are interbedded with coarse fluvial sediment deposited in a floodplain during lowstands. The bases of the two youngest highstand deposits, termed the Ma12 and Ma13 marine clays, are 127 ky and 9 ky in age, respectively. We use a dataset containing several thousand boreholes that penetrate the Ma12 and Ma13 clays across the central Osaka Basin to determine the fault segment geometry and vertical uplift rates across the flexures. The uplift rate for the main Uemachi fault is approximately 0.5 m/ky using the vertical relief and age of the Ma12 clay layer across the flexure, in agreement with 0.4 m/ky for the long-term uplift rate based on vertical offset of the 1.12 Ma Ma0 clay layer found in the OD-1 and OD-2 deep boreholes.

An S-wave seismic profile with sub-meter reflector resolution, located along the Yodogawa River in central Osaka, is tied to five continuously cored boreholes (lengths range from 37 to 50 m) for 250 m across the forelimb of folded late Pleistocene to Holocene sediments. Deformation recorded in growth strata suggests that the most recent earthquake on the Uemachi fault occurred between approximately 9,500 yr B.P. and 2,500 yr B.P. and resulted in 3 m of uplift. The seismic moment for this event may have been between 6.9 and 7.5 on the basis of our estimates. Assuming that 3 m of uplift occurs in a characteristic earthquake and that the fault maintains a long-term uniform slip rate of 0.4-0.5 m/ky, we estimate that in the last 1.12 Ma, the Uemachi fault may have generated approximately 140 to 190 earthquakes with a recurrence interval of 6 to 8 ky.

Student Night 2003 –Regional Oral Presentation Competitions

Eric Nelson, Department of Geology, Colorado School of Mines; and others

The student speakers this month won regional competitions held at Colorado School of Mines, the University of Colorado, and Colorado State University. The other candidates deserve recognition for their fine talks.

Colorado School of Mines: **Kate Barbá**, Geologic mapping and structural analysis in the Alma Quadrangle, Colorado: Kinematic development of Sweet Home mineralization. **Alisa Green**, Magnetotelluric crustal studies in Kenai, Alaska. **Ryan J. Kowalski**, The influence of geology and geomorphology on the Lewis and Clark Expedition.

University of Colorado: **Brian Clarke**, Cosmogenic exposure dating vertical transects in the fiord landscape of northeastern Baggin Island: Insights into glacial erosion. **Ben Lowry**, Geologic mapping of the Buena Vista East Quadrangle, Chaffee County, Colorado: techniques and further research. **Ali Jaffri**, A biostratigraphic revision of the Plio-Pleistocene Upper Siwalik deposits of the Potohar Plateau, Pakistan. **Dan Brothers**, Deep crustal structure of fast spreading crust near Hess Deep. **Arwen Vidal**, Mathematical modeling of surface water basins on Mars based on altimeter data. **Amanda Cook**, They bend but don't break: testing the physical robustness of insect cuticle to predict preservation potential.

Colorado State University: Colorado State University will not hold its competition until after this newsletter has been published. Presenters—one of which we will hear at the November CSS meeting—and their topics are as follows: **Nancy E. Brown**, Interactions between stream channel slope and particle roughness in a cellular automata. **Brian J. Kappen**, Determination of ground and surface water interaction in ephemeral wetlands through chemical and isotopic characterization, San Luis Valley, Colorado. **Kurt A. Sable**, Relative effects of lithology on fine sediment deposition in streams of the Oregon Coast Range.

President's Note

By **Jim Cappa**, Colorado Geological Survey

Colorado Scientific Society will be holding its annual Student Night this November 20th. Winners of the three regional competitions held at Colorado School of Mines, University of Colorado, and Colorado State University will present their papers and compete for cash prizes. Many of our CSS members are in academia and as such get the opportunity to work with these young scientists on a fairly regular basis. Others of us get few opportunities to see what the future of earth science will be like. Now is your chance to listen to these young geoscientists present their work.

In 1983, according to an American Geological Institute report, the number of geoscience students enrolled in participating universities reached a peak about 36,000 students. In 2001 that number declined to about 11,000 students. Part of this precipitous decline is due to loss of job opportunities in the traditional industrial sectors of oil and gas and mineral exploration. Some of the decline was offset by increases in the environmental consulting field.

We only have to look around us at the CSS meetings to gain an understanding that the geologic workforce is aging. Many of us will be retiring from the workforce in the next 10 to 15 years. The flow of new graduates coming into geoscience has decreased. In a positive note for persons planning careers in geoscience, there will be more job opportunities than there will be scientists to fill them. We as geoscientists owe it to ourselves and our science to ensure a steady flow of enthusiastic young geologists ready to go to work in our agencies, businesses, and schools.

At the Colorado Geological Survey we use funding from the Association of American State Geologist's Mentored Field Experience Program to employ undergraduates in our geological mapping program. This helps to ensure that a steady stream of trained field geologists will be there for the future jobs. The CGS has employed students from Colorado State University, University of Colorado, Colorado School of Mines, Colorado College, Western State University, Adams State University, and Fort Lewis College.

So what is my pitch here? I urge you all to come to our annual Student Night this November 20th. Hear what these young geoscientists have to say about their work and let them know we care about the future of geology. And, last but not least, hear three great talks from the winners of the regional competitions at University of Colorado, Colorado State University, and Colorado School of Mines.

Colorado and the K/T boundary

From Rock Talk, a publication of the Colorado Geological Survey

Did you know how important Colorado is to the Cretaceous/Tertiary (K/T) boundary story? In the 1940s South Table Mountain (near Golden) was the first place in the world where the K/T boundary was described in terrestrial rocks: it divided dinosaur bones below from mammal bones above. This site is so significant that the National Science Foundation held its 50th birthday party on the outcrop at South Table Mountain in 2000.

In 1980 scientists proposed that the Cretaceous Period ended on Earth with the impact of an asteroid or comet traveling at 100,000 miles per hour. Colorado sites and geologists played key roles in proving the impact hypothesis, locating the crater at Chicxulub on the Yucatan Peninsula of Mexico, and proving that Chicxulub was the source of the impact debris. The existence of an iridium anomaly at the K/T boundary in coal-swamp deposits in Colorado proved that the iridium anomaly was not just some phenomenon created by seawater, but was fallout from an extraterrestrial event. Indeed, Colorado has the highest iridium anomaly ever measured in terrestrial rocks. Colorado sites also showed the presence of shocked quartz grains that could only be caused by impact. The size of the shocked quartz fragments and the existence of two layers of fallout debris in Colorado sites also indicated to crater searchers that the impact must have been located near North America.

Once Chicxulub was proposed as the site of impact, Colorado once again provided key evidence confirming it. The nail was put in the coffin by comparing the lead-loss of zircons from Chicxulub's rocks with the lead-loss of zircons in the K/T boundary layer from a number of sites. Most of these samples were from Colorado. Colorado also provided the world with its first known, shocked zircon grains.

Southern Colorado's dozen sites that preserve the K/T boundary layer are so important that the Smithsonian Institution archived a 2 ½-ton sample of the K/T boundary from south of Trinidad and has it on display in Washington, D.C. A good place to observe the K/T layer is in Trinidad Lake State Park where a new information sign designed by Chuck Pillmore was recently erected on the Long Canyon Trail.

Traces of catastrophe: Short course at CSM

Jared Morrow, Department of Earth Sciences, University of Northern Colorado

On Saturday and Sunday, Nov. 22-23, 2003, Dr. Bevan French, Smithsonian Institution, will teach a course entitled "Traces of Catastrophe" at the Colorado School of Mines (Berthoud Hall, Room 108). This course is an introduction to terrestrial impact craters and impact shock metamorphism. General registration fee is \$80; student registration fee is \$50; the registration deadline is November 15, 2003. For more information and a registration form, see:

http://esci.unco.edu/faculty/morrow/TOC%20Course/TOC_homepage.htm.

Job opening for senior geologist

Passed along by **Jim Cappa**

Senior Geologist for Dallas, Texas office; salary + bonus commensurate with experience.

Aggressive, privately held oil and gas company is seeking a highly motivated, experienced geoscientist with tight gas or shale gas experience.

As a member of an integrated team, this position requires:

- Acting as project geologist for operated and non-operated wells.
- Taking a lead role in all aspects of pre-well planning, daily drilling activity and post well evaluation.
- Integration of geological data, well log interpretation, structural and stratigraphic mapping, core description and interpretation, and physical log interpretation.

Candidates must have a minimum of 7 years in the petroleum exploration industry with focus on tight gas or shale gas experience. BS and/or Masters Degree in Geology or Geophysics is also required. Salary and bonus commensurate with experience. Relocation assistance provided. Excellent benefits package.

Qualified candidates should immediately fax or email a resume to J Mar & Associates, (972) 732-8301, (800) 864-9043, Fax (972) 732-1378; Email corporate@jmarassociates.com



A View Through the Brown Cloud by Lisa Ramirez Rukstales

Arnold Schwarzenegger is governor of California, and he still can't dress himself. The fashion police should have arrested him as he dashed about the Capitol lobbying for fire funds in BROWN shoes that totally clashed with his outfit. Did Maria forget to lay out his wardrobe the night before? Some first lady she's turning out to be. I'll bet she doesn't even have a decent psychic to turn to for advice! Our local politics has been deadly dull by comparison. Steve Burkholder is once again mayor of Lakewood thanks to doing a good job during his previous term, but also due in part to a lack of serious contenders. I had a flashback reading their platforms. I was once again a bell-bottomed teenager reading MAD Magazine! Questions were put to the candidates and John H's answer to Community Involvement was "It isn't because I haven't tried"; definitely a plea for the sympathy vote, and Linda Lou's answer to Education was "Just finished the Homeland Security Specialist Program." Gosh Linda, looks like you took the Girl Scout's motto, "Be Prepared" a little too seriously. Scarily enough, each of these solon-hopefuls received over 3,000 votes! Isn't democracy wonderful???



Earth Science Meetings and Talks



Newsletter items must be received by the 4th of each month. Items may include special events, open houses, etc...thanks!

Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the American Mountaineering Center in Golden (unless otherwise advertised). Social time begins at 7:00 p.m. and talks start at 7:30 p.m. For information, contact Jim Cappa at (303) 866-3393, jim.cappa@state.co.us

Denver Mining Club meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave.) 11:30 a.m.-1:00 p.m. November 10—**Computer-aided Design and High Precision Systems in Open-pit Drilling and Blasting**, Dick Hutchinson, Bill Wilkinson, Managing Consultant, Mining, Mincom Co. November 17—**The Klondike Gold Rush, Alaska to Dawson, Yukon, 1898**, Rick Rand, Tour Director, Tauck World Discovery Co. November 24—**Where to Invest: Ranking Countries for Political Risk**, Barney Guarnera, President and CEO, Behre Dolbear and Company, Inc.

Denver International Petroleum Society meets the second 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 leaving message at (303) 623-5396. 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: \$15 for lunches; talk only is available for \$2 (make checks payable to "D.I.P.S."). 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. November 10.—**Context, characteristics and genesis of the Salta sediment-hosted stratiform copper-silver mineralization, northwestern Argentina**, Alex Brown, École Polytechnique, Montréal, Québec. For information contact Jim Piper, (303) 932-0137, or the website <http://www.dregs.org>.

Denver Well Logging Society (DWLS) meets on the third Tuesday of each month, Sept. through May. Lunch and a technical talk at the Wynkoop Brewery begins at 11:30 a.m., 18th and Wynkoop Sts. in Denver. Subject matter usually deals with the application of well logs to oil and gas exploration. November 18, 2003—**Sloping Invasion Profiles Derived From Shallow Wireline Logs**. Maria Gabriela Briceño, Colorado School of Mines. Call Elice Wickham at 303-573-2781 for reservations. Web page: <http://dwls.spwla.org>.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30 a.m., lunch at 12:00 p.m., talk at 12:30 p.m. Reservations are taken by recording at 303-623-5396 until 10:30 a.m., Wed. before the luncheon. Cancellations are taken until 11:00 a.m. on Wed. at 303-573-8621. Luncheon cost is \$20 payable to RMAG at the door. Reservations are not November 21—**Almond Formation: Leads in the Red Desert, Wyoming**, Roger Dickinson, Consultant, Web page: <http://www.rmag.org>.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30 p.m., Rm. 180. Refreshments at 3:30 p.m. on the 3rd floor. For info., call 303-492-8141. November 12—**Geology, age and origin of Akilia supracrustal rocks, West Greenland**, Craig Manning, UCLA. November 19—**The 2003 GSA Birdsall-Dreiss Lecture: Hydrogeology and the weak nature of plate boundary faults**, Barbara Bekins, USGS Menlo Park. November 26—TBA. Web page: <http://www.colorado.edu/GeolSci>.

Friends of Dinosaur Ridge; 7:00 pm at Red Rocks Elementary School in Morrison, CO. Join now. Web page: <http://www.dinoridge.org>.

Colorado School of Mines, Van Tuyl Lectures Fridays from 3:00PM to 4:00PM in Berthoud Hall room 108: Web page: <http://www.mines.edu/academic/geology/calendar/vantuyl.html>

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

<http://www.coloscisoc.org>



OFFICERS
President: Jim Cappa, CGS, 866-3293, jim.cappa@state.co.us
President-Elect: Emmett Evanoff, UCB, 492-8069, evanoff@colorado.edu
Treasurer: Don Sweetkind, USGS, 236-1828, dsweetkind@usgs.gov
Secretary: Lisa Finiol, CSM, 567-2403, lfiniol@mines.edu
Past President: Eric Nelson, CSM, 273-3811, enelson@mines.edu

COUNCILORS
2001-2003: Graham Closs, CSM, 273-3856, lcloss@mines.edu
2001-2003: Parker Calkin, UCB, 442-2184, calkin@spot.colorado.edu
2002-2004: Jim White, UCB, 492-5494, jwhite@colorado.edu
2002-2004: John McCray, CSM, 384-2181, jmccray@mines.edu
2003-2005: Chuck Kluth, CSM, 303-904-2939, kluth@earthlink.net
2003-2005: John Lufkin, 216-1076, Lufk3@aol.com

COMMITTEE CHAIRPERSONS

Best Paper Award: Mark Hudson, USGS, 236-7446, mhudson@usgs.gov
Database Manager: Cynthia Rice, USGS, 236-1989, crice@usgs.gov
Field Trips: Emmett Evanoff, UCB, 492-8069, evanoff@colorado.edu
Graphics: Karen Morgan, CGS, 866-3529, karen.morgan@state.co.us
History: Marjorie E. MacLachlan, USGS-retired, 986-7192, jcmemaclachlan@aol.com
Membership: Jim Yount, USGS, 236-5397, jyount@usgs.gov
Memorial Funds: Eric Nelson, CSM, 273-3811, enelson@mines.edu
Newsletter Editor: Mary-Margaret Coates, TECH Edit, 422-8349, mmcoates@att.net
Assoc. Editor: Scott Minor, USGS, 236-0303, sminor@usgs.gov
Assoc. Editor: Van Williams, USGS, 236-1289, vwilliam@usgs.gov
Assoc. Editor: Vince Matthews, CGS, 866-3028, vince.matthews@state.co.us
Outreach: Sue Hirschfeld, 720-565-9302, egdoc@ix.netcom.com
Publicity: Mearl Webb, 810-1296, mf_webb@msn.com
Science Fair: Chuck Weisenberg, 238-8806, cweisnbrg@aol.com
Webmaster: Bill Wingle, 720-544-8830, wwingle@uncert.com

**** STOP!** Don't recycle this until after the talk! Please help us with publicity by posting at least the front page of this Newsletter on a bulletin board. *Thank you!!*