

Colorado Scientific Society

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

Sand Dunes on the Great Plains and Their Not-So-Ancient History

presented by

Daniel R. Muhs

U.S.G.S Earth Surface Processes Team

The USGS National Water Quality Assessment Program and Water Quality in the Upper Colorado River Basin

by

Norman E. Spahr
U.S. Geological Survey

Thursday, September 19, 2002
Colorado Mountaineering Center
710 10th Street (NE corner with Washington)
Golden, Colorado
Social half-hour - 7:00 pm
Meeting time - 7:30



Sand Dunes On The Great Plains And Their Not-So-Ancient History

by

Daniel R. Muhs

U.S. Geological Survey, Earth Surface Processes Team

Eolian (wind-blown) deposits, such as sand dunes, are both a blessing and a curse: they contain a valuable record of past climate changes but are deposits that could be reactivated in the future, with serious consequences for the natural resources, food supply, infrastructure, and wildlife of the country. In this talk, new geologic and historic records of eolian sands of the U.S. Great Plains will be presented. In addition, I will assess the potential for renewed activity of wind-blown sediments under possible future drought conditions.

Sand dunes are extensive on the Great Plains. The Nebraska Sand Hills region is the largest sand sea, active or stabilized, in North America. Dunes also occur over large areas of eastern Colorado and New Mexico, western Kansas, and the panhandles of Texas and Oklahoma. Modern winds on the Great Plains are stronger than in most of the world's deserts. However, sand dunes on the Great Plains are inactive at present because of a sparse cover of grass and associated grassland community plants, such as sage, yucca, and cactus.

Previously, it was thought that most sand dunes on the Great Plains were last active during the last glacial period, at least 12,000 years ago. New radiocarbon ages show that most dunes on the Great Plains have been active in the past 3,000 years. In addition, accounts of early explorers show that many dunes were active during the 19th century. Examination of aerial photographs in the National Archives shows that some dunes, stable now, were active during the 1930s "dust bowl" drought. Thus, it can no longer be assumed that these dunes are ice-age features that have little threat of reactivation in the future.

Great Plains dunes have been active, therefore, under interglacial climatic conditions that are only slightly different from the present. If the dunes are reactivated in the future, either from human-caused global warming or natural climatic variation, there would be significant effects on the region. Stabilized dune fields at present form some of the most important areas of grazing land. Areas immediately downwind of the dunes are important croplands. Interstate highways and railroads are also downwind of large dune fields. Many interdune areas, particularly in the Nebraska and North Dakota, are wetlands that support wildlife. Thus, reactivation of Great Plains dunes would have significant effects on both human society and wildlife of the region.

The USGS National Water Quality Assessment Program and Water Quality in the Upper Colorado River Basin

by

Norman E. Spahr

U.S. Geological Survey

Streams and rivers in the Upper Colorado River Basin are very different in the two major physiographic provinces. In general, streams within the Southern Rocky Mountains are characterized by lower sediment and dissolved-solids concentrations, cooler temperatures, and somewhat higher gradients than streams in the Colorado Plateau. Sediment, salinity, and nutrient (nitrogen and phosphorus)

concentrations increase along the major rivers as the water flows from the upstream areas in the Southern Rocky Mountains down through the Colorado Plateau.

Coupled with the general differences due to physiography and geology are the effects of different land uses. Recreation and urban development are becoming major land-use issues throughout the basin, precious-metal mining was historically prevalent in the Southern Rocky Mountains, and intensive agriculture is located in the valleys of the Colorado Plateau.

Most of the streams and rivers sampled within the Upper Colorado River Basin met State and Federal water-quality guidelines. Major exceptions to this statement were trace-element concentrations in some streams in the Southern Rocky Mountains and selenium concentrations in some streams in the Colorado Plateau. The talk will discuss other selected findings regarding nutrient concentrations, algae, mining areas, pesticides, and herbicides.

A Note from the President

I hope everyone had a successful summer in field, office, or holiday endeavors. I, personally, was fortunate to spend field time in Peru, Australia, New Zealand, and, of course, Colorado. The fires and drought in Colorado this summer made for brown pastures, hazy skies, and interesting sunsets, and I believe we were all glad when the rains came, although even the rain caused some geological consequences. A number of exciting society events, and extra-society events, are planned this Fall. The Fall field trip is sure to be a good one, and I look forward to attending (I will bring back a report on how past president Pierce is holding up in Bozeman).

Earth Science Week – October 13-19

Earth Science Week is a national observance that celebrates the study of geology and other Earth sciences. Each year, it focuses on a different facet of earth science, and this year the theme will be ‘Water is All Around You’; it is a timely topic given recent events in Colorado. Objectives of the week are 1) to engage students in discovering the Earth sciences, 2) to remind people that Earth science is all around us, 3) to encourage Earth stewardship through understanding, and 4) to motivate geoscientists to share their knowledge and enthusiasm about the Earth. I hope CSS members will get involved in whatever way is possible.

In Colorado, Earth Science Week is recognized by a proclamation signed by Governor Bill Owens. The week is marked by public and classroom presentations and field trips led by the Colorado Geological Survey (Mineral Resources of the Front Range and Dash for the Dinosaurs, <http://geosurvey.state.co.us>), the U.S. Geological Survey, the Rocky Mountain Association of Geologists, the Friends of Dinosaur Ridge, and other professional Earth science organizations. Its primary sponsor is the American Geological Institute. For more information, see AGI’s web site at www.earthsciweek.org.

CSM Van Tuyl lecture series focuses on Colorado Geology !

This Fall the department of Geology and Geological Engineering at CSM has arranged its Van Tuyl lecture series around a theme on Colorado geology and related issues. Topics will include Precambrian and younger tectonics, groundwater and surface water, petroleum geology, Colorado Plateau, and minerals geology. Note that the lecture series has been moved to *Friday* at 3:00pm in Berthoud Hall room 108. The series began August 29th with a talk by Bob Weimer entitled, you guessed it, “Colorado Geology”.



CSS History update

Past president Marge MacLachlan is heading up a committee working hard on an update of the CSS History volume. The committee met in May, and thanks are due to members working on the following areas:

Membership—Jim Yount; Finance—Don Sweetkind; Memorial Funds—Michelle Tuttle; Founder, fossils, inventors—Glenn Scott; Minerals—Sherm Marsh; Outreach, Signs—Paul Belanger; CSS and DMNH—Jack Murphy; Science Fair—Eric Erslev; Field trips—Sherm Marsh; Honors—Chuck Pillmore (has a asteroid named for him by Shoemaker); Tables (officers, honorary members, past-president awards, Emmons lecturers)—M. MacLachlan; Introduction—Eric Nelson; Advisor—Mike Machette.

Report on the CSS field trip to the Lyons Quarry, 11 May 2002

By Emmett Evanoff, field trip coordinator

In May, twenty-seven participants joined leaders Ted Walker, John Harms, and Ed Larson on a trip to the Lyons quarries. The first stop was the Sterling Quarry in Lyons to examine one of the oldest still-active quarries in the Lyons Sandstone. Ted and John showed the participants the features of the Lyons that led them to interpret the sandstone as being deposited as eolian sand dunes. We examined large-scale cross beds, low crested ripples, raindrop impressions, syndepositional microfaults and slump features, dune truncation surfaces and basal eolian lag deposits, all of which were used by Ted and John for their interpretation. This field trip was the first in about 15 years to examine the quarry, and we thank William Boone, owner of the Sterling Quarry, for his permission to enter the quarry. After lunch, we drove southwest of Lyons to overlook the Paleocene sill of the Andesite Quarry. Ed Larson explained the composition, origin, effects on diagenesis of the surrounding rock, and paleomagnetism of the sill. The quartz-latitude sill was emplaced during the early Paleocene and its paleomagnetic signatures indicate that it was not rotated by Laramide tectonics after its emplacement. This finding contrasts with the paleomagnetic evidence of rotation of the Ralston Dike-Sill complex that was emplaced at about the same time. The weather was cool and cloudy, but the rain did not fall until we had left the field. All had a great time during the trip!

The Colorado Geological Survey will cosponsor the Western States Seismic Policy Council annual meeting in Denver in mid-September.

Earthquake Risk: From Awareness to Action - A Mile-High Challenge

Denver, Colorado, September 15-18, 2002

The Federal Emergency Management Agency recently estimated that Colorado, which has experienced nearly 500 earthquakes of record, will suffer \$5.8 million in annualized losses from earthquakes. Earthquake-hazard professionals continue to apply their skills to help communities mitigate hazards. How should local communities address events of low frequency but high consequence, such as earthquakes? What are specific and realistic steps that a community can take to move from assessment to effective awareness to best action? The goal of this conference is to help define these steps.

A current conference agenda is posted on the WSSPC website at <http://www.wsspc.org/events/ac2002/schedule.htm>. Field trip descriptions are also online at <http://www.wsspc.org/events/ac2002/fieldtrip.htm>. Reservations may be made by calling the Brown Palace at 1-800-321-2599 or 303-297-3111 and asking for the WSSPC Annual Conference rate.



Joint U.S. Geological Survey-Colorado Geological Survey Assessment of Wildfire-Related Debris-Flow Hazards, Missionary Ridge Fire, Durango, Colorado

Susan H. Cannon, U.S.G.S Hazards Team

Other hazards, such as flooding and debris flows, become the focus once the smoke from wildfires clears!! A recent collaboration between the U.S. Geological Survey and the Colorado Geological Survey has resulted in the timely release of an emergency assessment of the potential debris-flow response of the basins burned by the Missionary Ridge fire. This fire burned from June 9 through July 15, 2002, in the steep, mountainous terrain outside Durango, Colorado. The assessment provides a range of possible peak discharges that can be generated from each of the burned basins in the event of the 25-year, one-hour storm. The assessment is based on a model for debris-flow peak discharge as a function of storm intensity, basin area, basin gradient, and burned extent that was derived from analysis of data measured from burned areas throughout the western U.S. A map showing the results of this assessment has been distributed to emergency-response and water resources-management personnel to aid in the design of mitigation measures and the planning of evacuation timing and routes. In addition, CGS personnel worked closely with the La Plata County emergency Manager, engineers from the NRCS, and affected citizens to assist with map interpretation and debris-flow hazard mitigation decision making.

A PDF file of the report and map is located at <http://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-02-0323/>; it is available for viewing and downloading.

In addition to the emergency assessments, USGS and CGS personnel are installing recording rain gages, establishing and monitoring channel cross sections, and collecting samples in basins burned by both the Missionary Ridge fire and the Coal Seam fire near Glenwood Springs, Colorado. These activities will collect additional measurements of the magnitude of the debris-flow response relative to the rainfall input, basin characteristics, and material properties. This information will be used to better define the conditions and processes that lead to post-wildfire debris-flow activity.

The USGS and CGS are involved in other post-wildfire assessment and monitoring efforts. More on these specific efforts to follow!

Mr. Wyoming Has Passed Away

The Colorado Scientific Society mourns the passing of famous Rocky Mountain geologist J. David "Dave" Love, who died Friday, August 23, 2002 in Laramie, Wyoming.

Dave, 89 years old, was born in Riverton, Wyoming in 1913. Dave received his B.A. in geology and chemistry in 1933 and his M.Sc. in 1934, both from the University of Wyoming. He received his Ph.D. in 1938 from Yale University.

Dave was a full-time member of the U.S. Geological Survey from 1942 to 1987 and an emeritus scientist until his death. He worked on strategic minerals during and after World War II, and from then on, concentrated on the geology of the entire state of Wyoming. He published geologic maps of the entire state, first in 1955 and revised in 1985; currently, 43 quadrangle maps of various areas of the state are being prepared for publication. In addition, he was the author of more than 250 geologic publications, articles and lectures.

Dave Love (continued)

Known to all his associates as “Mr. Wyoming,” Dave was recognized by the Department of the Interior by both Meritorious and Distinguished Service awards and as a Legendary Geoscientist by the American Geologic Institute.

Dave is survived by his wife of 62 years, Jane, four children and seven grandchildren. A memorial service is scheduled for Saturday, October 12, 2002 at 11:00 a.m. at the United Presbyterian Church, 11th and Grand, Laramie, Wyoming. In lieu of flowers, memorial gifts may be made to any of the following:

The J. David Love Field Scholarship
Wyoming Geological Association
c/o Kent Sundell
5034 Alcova Rte. Box 12
Casper, WY 82604

The Museum of the American West
636 Lincoln
Lander, WY 82520

The University of Wyoming Geological Museum
Box 3006
Laramie, WY 82071

Laramie Plains Museum
603 Ivinson Ave.
Laramie, WY 82070



Condolences may be addressed to the Love family at The Regency, 2621 East Sheridan St., Laramie, WY 82070 or by telephone, (307) 745-4436.

A View Through the Brown Cloud

by Lisa Ramirez Bader



Welcome back everyone! Did all the fieldwork warriors return safely? Or did some of you find the opportunity to leave a colleague out in the middle of nowhere just too irresistible? I'll admit to being sorely tempted one summer in Wyoming whilst field assisting my ex-hubby. His field photos had come out overexposed the previous summer and I was trying to explain “how to fool the camera meter” so it would expose correctly when pointed at bright white cliffs. Silly me. I quickly learned my lesson so now when given the choice I'd preferably wrastle a het-up rattler than a male ego! At least a rattlesnake takes a happy snap with the best of intentions and then slithers off to go about its

horizontal business. The male ego goes for the jugular, and then proceeds to follow you around for the rest of the day like a cloud of No-see-ums. Sheer exhaustion eventually wears you down until you finally hear yourself saying those magical words, “Yes Dear, you are _____ (fill in the blank with praise and terms of admiration) and I must be _____ (fill in the blankety-blank).” I'm sure you field gals have been here at least once. Have an amusing story to share? Send it to me!





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 Colorado 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 Eric Nelson at (303) 273-3811, enelson@mines.edu

Denver Mining Club meets every Thursday (except when noted) at China King 12037 West Alameda Pkwy., Lakewood, 11:30 a.m.-1:00 p.m. September 5.—Francis F. Pitard, Francis Pitard Sampling Consultants. **Practical and Theoretical Difficulties When Sampling Gold.** September 12.—James A. Cappa, Chief, Mineral Resources Section, Colorado Geological Survey. **Colorado Minerals and Mineral Fuels Activity.** September 19.—Ken Chlouber, Colorado State Senator and Candidate for Congress from Colorado's First Congressional District. **Legislative Issues Important to the Mining Industry.** September 26.—Betty Gibbs, President, Gibbs Associates Co. **Mine Computing - What Works, What Doesn't.** See past and future DMC talks at the web site: <http://www.china-resources.net>.

Denver International Petroleum Society 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 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. For information contact Jim Piper, (303) 932-0134, 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. 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 required for talk only---cost is \$3. Meeting location: Denver Petroleum Club, Anaconda Tower, 555-17th St, 37th floor September 6, 2002 "**High-Speed, Automated Inversion Modeling of the SP Log... Resurrecting a Forgotten Measurement**" Speaker will be Jeff Arbogast September 20, 2002 "**Managing Exploration Risks: Lessons Learned from Surface Geochemical Surveys and Post-Survey Drilling Results**" Speaker will be Deet Schumacher.

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. Web page: <http://www.colorado.edu/GeolSci/>.

Friends of Dinosaur Ridge; 7:00 pm at Red Rocks Elementary School in Morrison, CO. Saturday, Sept. 14, 2002 - 5:30pm **Archeology and Human History of Dinosaur Ridge**, Kevin Black of the Colorado Historical Society. **Friday, Sept. 20 - 6:30pm Morrison, CO: Birthplace of the Jurassic Giants**, Dr. Robert T. Bakker, ; **Saturday, Sept. 21 - 8:30am-1:30pm, The Geology of Bear Creek Canyon**, A tour in the Dinosaur Ridge shuttlebus to view the geology between Morrison and Evergreen.; **Wednesday, Sept. 25 - 7:00pm, A Dinosaur Tracker Looks at Evolution**, Dr Martin Lockley. Join now. Web page: <http://www.dinoridge.org/>.

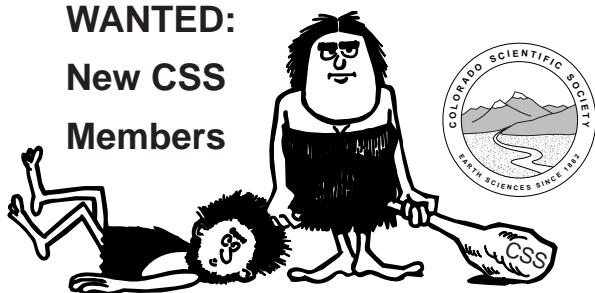
Colorado School of Mines, Van Tuyl Lectures; September 27 Rolf Topper Project Manager/Hydrologist, Colorado Geologic Survey, **Colorado's Fractured, Crystalline-Rock Aquifers.** Web page: http://www.mines.edu/Academic/geology/van_tuyl/van_tuyl.1.shtml.

For a constantly updated geo-calendar online, visit the Colorado Geological Survey at <http://geosurvey.state.co.us>

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

<http://www.coloscisoc.org>

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Program: Donna Anderson, CSM, 273-3883, dsanders@mines.edu
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