



Colorado Scientific Society

*The object of the Society is to promote
The knowledge and understanding of Earth science,
And it's application to human needs*

2003 Emmons Lecture

Drought and Global Climate Change: Is 2002 a Glimpse of the Future?

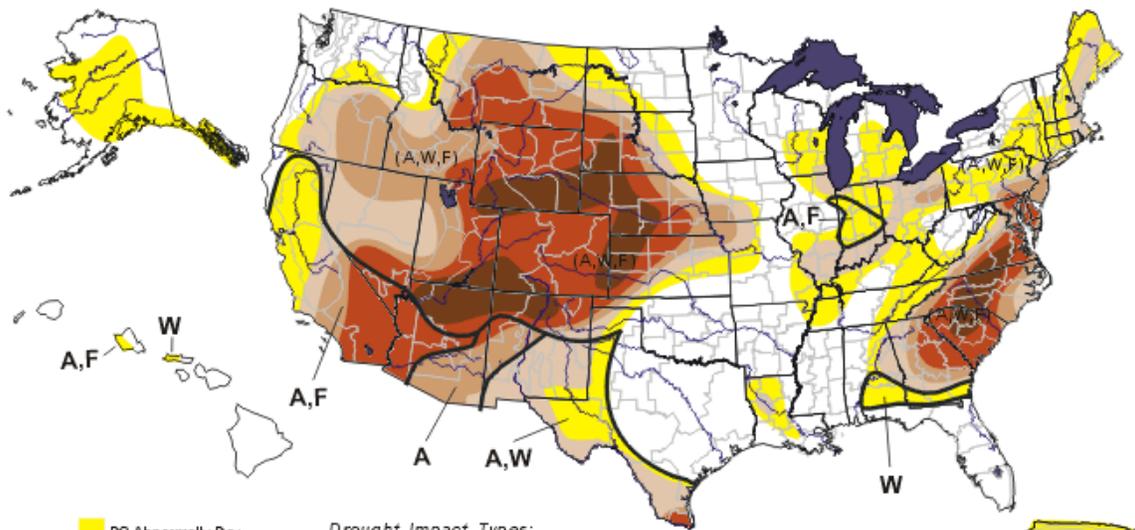
by

Dr. Kevin Trenberth

National Center for Atmospheric Research, Boulder, Colorado

U.S. Drought Monitor August 6, 2002

Valid 8 a.m. EDT



- D0 Abnormally Dry
- D1 Drought—Moderate
- D2 Drought—Severe
- D3 Drought—Extreme
- D4 Drought—Exceptional

Drought Impact Types:
 A = Agriculture
 W = Water (Hydrological)
 F = Fire danger (Wildfires)
 — Delineates dominant impacts
 (No type = All 3 impacts)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.



Released Thursday, August 8, 2002

Thursday, January 16, 2003

Metals Hall at the Green Center, Colorado School of Mines

Social half-hour – 7:30 pm. Meeting time – 8:00 pm.

Abstract

Drought and Global Climate Change: Is 2002 a glimpse of the future?

By Dr. Kevin Trenberth, National Center for Atmospheric Research, Boulder, Colorado

The atmosphere is global and Colorado's weather and climate are largely determined by influences from elsewhere. In fact the atmosphere is a "Global Commons" and serves as a dumping ground for pollution from all nations. Air over one nation is half way around the world a week later, as shown by manned balloon flights. Although rain is a remarkable cleanser of the atmosphere, some gases are not affected, long-lived, and are changing our climate. Global warming is happening. In Colorado, as in other mountain areas, this means more precipitation falls as rain instead of snow, snow melts sooner, and there is less snow pack as we go into the summer. Risk of summer drought increases. With it come increased heat waves and wildfires. Is the summer of 2002 perhaps a taste of what we can expect in the future?

In this talk we will review broad aspects of the 2002 drought and wildfires, and discuss factors that cause drought and climate change. El Niño and La Niña are factors in interannual variability and in setting up the current conditions, whereas global warming is a slow but relentless influence that will emerge more strongly as time goes on. Water will become an even more valuable resource.

Lake Dillon, Colorado, August 8, 2002
Courtesy R. Anthes



Biographical Information

Dr. Kevin Trenberth is Head of the Climate Analysis Section at the National Center for Atmospheric Research (NCAR) in Boulder, CO. From New Zealand, he completed a first class honors degree in mathematics at the University of Canterbury, Christchurch, New Zealand, and obtained his Sc. D. in Meteorology in 1972 from Massachusetts Institute of Technology, Cambridge, Massachusetts. Following several years in the New Zealand Meteorological Service, he joined the Department of Atmospheric Sciences at the University of Illinois and became a full Professor in 1984, before moving to NCAR in 1984. From 1991 to 1995 he served as Deputy Division Director of the Climate and Global Dynamics Division.

He was named a Fellow of the American Meteorological Society (AMS) in 1985, the American Association for Advancement of Science (AAAS) in 1994, and an Honorary Fellow of the New Zealand Royal Society in 1995. In 2000 he received the Jule G. Charney award from the AMS. Trenberth has been prominent in the Intergovernmental Panel on Climate Change Scientific Assessment activities, was a convening lead author for the 1995 Scientific Assessment and lead author for the 2001 assessment. He has served as an editor and associate editor for several professional journals. He edited *Climate System Modeling*, published by Cambridge University Press. He has published over 300 scientific articles or papers, including 30 books or book chapters, and has given many invited scientific talks as well as appearing in a number of television, radio programs and newspaper articles.

Trenberth has served on a number of advisory committees and panels including those of the National Academy of Sciences. He recently served as an advisor on climate observations in setting up the President's Climate Research Initiative.

His main interests are in climate variability, including El Niño; global climate change, including global warming; and the hydrological cycle, with an emphasis on analyzing observational data to understand what happens in the real world.

Colorado Scientific Society, January 2003 President's Note

Jim Cappa

I am very proud to have been chosen and even elected to be the President of the Colorado Scientific Society for 2003. It is indeed a great honor to join the list of Presidents of this society, especially our first president, Samuel Franklin Emmons.

Emmons was born in Boston, attended Harvard University, and graduated in 1861 at the outbreak of the Civil War. During the war years he studied at the École des Mines in Paris and the prestigious Bergakademie in Freiburg, Germany. He returned to the United States after the war to join Clarence King's Geological Survey of the 40th Parallel. In 1879, Emmons was appointed by Clarence King, the first director of the United States Geological Survey, to be in charge of the Rocky Mountain Division in Denver. It was during this time in 1882 that he, along with other scientific and mining notables, founded the Colorado Scientific Society. Also during this period he published his first major scientific work on the Leadville district, The Geology and Mining Industry of the Leadville District in 1882 (U.S. Geological Survey Annual report no. 2).

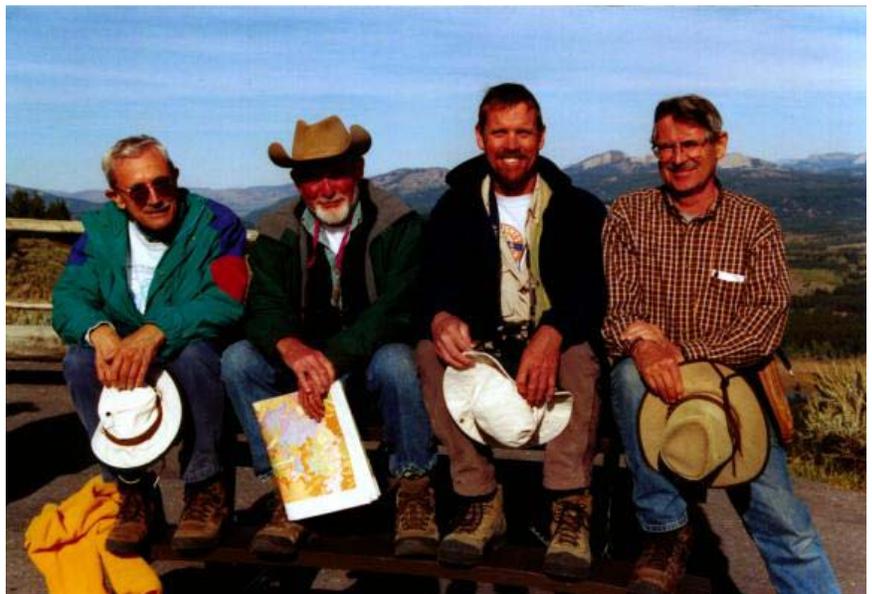
I recently had the opportunity to read parts of Emmons' great descriptive work on the Leadville district, Geology and Ore Deposits of the Leadville District, Colorado (U.S. Geological Survey Professional Paper 148). Emmons' descriptions of the mines and ore bodies, and irreplaceable maps of mines now long abandoned and inaccessible, are an invaluable addition to the literature of this is now largely deserted (except for the EPA), world-class mining district. In my opinion, Emmons had a pretty good handle on the origin of these ore deposits. I am indeed humbled to follow in the footsteps of this great and energetic scientist.

Eric Nelson and his officers (many of whom are continuing on—I am very grateful for that) did a great job of guiding this society through 2002, our 120th year. Eric started some great new programs, especially new outreach and education efforts. I hope to continue to build on these efforts in 2003.

I, and the recent past presidents, am concerned about our membership. I would like to see our membership actually grow. That may be a difficult thing to do while we are seeing enrollment in the Earth Sciences programs at our local universities and colleges decline. I welcome any ideas from the membership on this topic.

I look forward to an exciting year as president with great talks every month, informative and fun field trips, and an entertaining Family Night. Call me or email me any time with your comments, constructive criticisms, and great ideas. Thanks again for electing me president.

Four past presidents of the Colorado Scientific Society photographed on the 2002 fall field trip to Jackson Hole. From left to right: Bruce Bryant, Jack Reed, Eric Nelson, and Ken Pierce.



Announcement of the Western Interior Paleontological Society Founders Symposium for 2003: Volcanoes, Camels and Carnivores, the Eocene/Oligocene Story, March 29-30.

The transition between the Eocene and Oligocene epochs was marked by the greatest single drop in global temperature in the Cenozoic. This temperature drop was forced by a series of geologic events that included a major bolide impact in the late Eocene, a very large number of huge volcanic eruptions in western North America, and the splitting of Australia and Antarctica. This last event isolated Antarctica from warm water currents and started extensive glaciations in the southern continent. All of these events cooled the Earth from a greenhouse world to the beginnings of our modern icebox world. Marine life and land plants were greatly affected by this change, but mammal faunas in North America showed little change across this climatic transition.

The Western Interior Paleontological Society (WIPS) will host a two-day symposium on the Eocene to Oligocene transition, especially as it is reflected in the western United States. The first day of the symposium will include speakers who will discuss topics related to the geologic and biologic changes across the boundary. These speakers will include Dr. Emmett Evanoff (CU Boulder) on the geologic history of the transition, Dr. Edwin E. Larson (emeritus, CU Boulder) on the North American volcanism during the transition, Dr. Herbert Meyer (Florissant Fossil Beds National Monument) on the floral changes across the boundary, and Carrie Herbel (South Dakota School of Mines and Technology) on the mammal faunas across the boundary. Several other speakers will give talks, and an exhibit of paleontological art and institution posters will also be on display during the first day. The second day's activities will include workshops focused on such topics as the White River Formation, the Green River Formation, the Florissant fossil beds, the Creede lake beds, and paleontological preparation techniques. Additional speakers, such as Dr. Russell Graham and Dr. Kirk Johnson from the Denver Museum of Nature and Science, Tom Steven of the U.S.G.S., and Dr. William Weber of the University of Colorado Museum, will give short talks on topics related to the workshop topics.

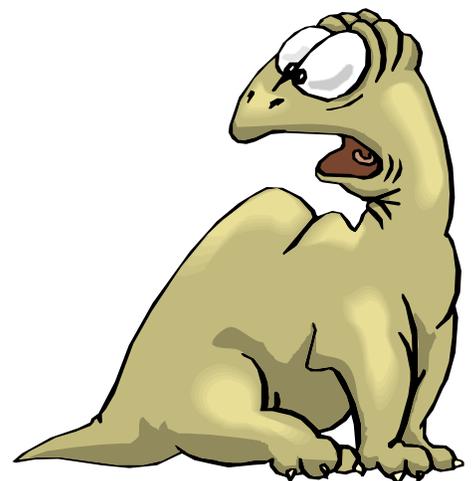
The symposium is open to all people interested in the Eocene-Oligocene transition or in an ancient analogue for major global climatic changes. The symposium will occur on Saturday, March 29 and Sunday, March 30 at the Green Center on the campus of the Colorado School of Mines, Golden, Colorado. The cost for the symposium is \$40 per day (\$80 total) for those who preregister. To learn more about the symposium and how to preregister, contact the WIPS website at www.wipsppc.com or contact Kathy Brill, symposium registrar, either at 303-444-2644 or kathy@zots.com.

Paleontology at Dinosaur National Monument

John Harper, Pennsylvania Geological Survey

The following is a very disturbing issue for the geological sciences, and especially for paleontology. The information comes from a friend in the Society of Vertebrate Paleontology and has been corroborated by Dr. Ken Carpenter, Curator of Lower Vertebrate Paleontology at the Denver Museum of Natural History.

The Superintendent of Dinosaur National Monument, who has been on the job for a grand total of eight months, announced to all park staff that he will be abolishing the two paleontology positions at Dinosaur National Monument because paleontology is not a significant resource issue for him (!!!). This will mean the end of a 50-year old paleontology program which has produced the spectacular wall of fossils within the visitor center as well as abundant Mesozoic fossils from elsewhere in the Monument. The Monument will go from having an active excavation and



research program on Mesozoic vertebrates to a caretaker policy, a step back to the 1930's. Thus the premiere fossil park of the National Park Service will have no program for protecting and understanding the resource for which the Monument was established in 1915. In addition, there will be no paleontology program in the soon-to-be-built museum and exhibit facility and collections building. Does this sound right to you?

If you value the dinosaurs at Dinosaur National Monument and you want to see the Monument continue to protect and explore one of the greatest windows we have onto the world of the dinosaurs, then this is your opportunity to speak up and stop this madness. Write to the following people, as well as your own US senators and representatives, and ask that the paleontology program not be phased out and eliminated at Dinosaur. Ask that the Monument reinstate its research grade scientist position and continue to fully support the paleontology program, especially with the new facility being built in the next few years. This insanity can be reversed, but you need to be heard. Anyone - scientists, amateurs, dinosaur lovers - anyone who likes visiting the National Park Service parks and monuments, can and should express concern. Don't email messages - they do not carry as much weight with an agency as a personally written letter, even if it is a short one. And the sooner the better.

This would be a tragedy to say the least.

Letters should be addressed to:

Fran Mainella
Director, National Park Service
1849 C St., NW
Washington, D.C. 20240

U.S. Senator Robert Bennett

431 Dirksen Building
Washington, D.C. 20510-4403



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EXAMPLES OF GEOCORPS PROJECTS

- ** Research, develop, and present interpretive programs for visitors
- ** Develop and lead hands-on educational activities for K-12 students
- ** Excavate and prepare fossil specimens
- ** Conduct stream surveys and watershed assessments
- ** Monitor glacier movement
- ** Assess soil compaction, trail conditions, and erosion and sedimentation
- ** Map geologic features

WHAT PEOPLE ARE SAYING ABOUT GEOCORPS

"Our children did the Junior Geologist program with Angela Coleman. She did a wonderful job teaching them and us about Colorado Plateau geology. It was a highlight of our trip. It's staff like Ms. Coleman who make trips to our national parks both pleasurable and educational."

Park Visitor about Angela Coleman, 2002 participant at Capitol Reef National Park



A View Through the Brown Cloud

by Lisa Ramirez Rukstales

Happy New Year! Welcome back to all you holiday mall warriors. I hope everyone survived with familial ties and credit ratings intact. Hopefully someone took up my shopping slack and kept our Bushwhacked economy in the black. Unfortunately for local retailers I was sidelined with pregnancy-induced swollen ankles. Their loss wasn't my bank account's gain though. Who knew that sending out hubby to do the shopping would result in that timeworn game of "one for them and TWO for us!"

Even the household feline scored a pressure-sensitive, heated, fleece bed. Purrrrr. (A great way to keep her off the couch I might add.) The New Year was rung in at the Neil Diamond concert. What a flashback! The average age of the Pepsi Center crowd was at least 50 which was nice since it means everyone was "too old" to stand up during the entire concert and this old pregnant lady could see the show while seated. Another blessing, Neil no longer wears his shirt unbuttoned to the navel. Welp, this last year has zipped by just like my dad said it would when I was a kid wishing for time to go faster. I hope everyone kept their New Year's resolutions within reason and 2003 proves to be a healthy and prosperous year. Cheers!



The Colorado Geological Survey Wonders, "Did You Know?"

By Vince Matthews

- That the Rocky Mountains have fifty-eight peaks over 14,000 feet high, all of them in Colorado?
- That Colorado has 740 peaks between 13,000 and 14,000 feet high?
- That Colorado has the highest average elevation of any state (6800 feet), with more than two vertical miles between its lowest and highest points?
- That Grand Mesa is touted as the world's highest flat-topped mountain with 380,000 acres, heights above 10,500 feet, and more than 300 lakes.
- That the oldest rock in Colorado is a 4.8 billion-year-old meteorite, that the oldest crustal rocks are 2.7 billion years old, that the youngest volcanic rock is only 4,132 years old, and that the deepest rock came from the mantle more than 20 miles deep?
- That Colorado is the birthplace of the Rio Grande, Colorado, North and South Platte, Arkansas, San Juan, Dolores, Gunnison, and Yampa rivers?
- That Madam Curie won a Nobel Prize using Colorado uranium?



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. **An Evolving Understanding between Mineral Deposits and Global Tectonics.** January 6 -- Dick Hutchinson, Fogarty Professor of Geology (Ret.), Colorado School of Mines. **Planned "No Waste Mining" at the Blue Puma Mines, Park County, Colorado.** January 13.--Lindsey V. Maness, Jr., Geologist. **The Colorado Mineral Belt Revisited.** January 27.--Anna Wilson and Paul Sims, U.S. Geological Survey. For additional information contact Dick Beach, (303) 986-6535 .

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. **Structural and Tectonic Setting for Porphyry Mineralization in Peru: Comparison with North America,** January 7 (**Tuesday**)--William A. Rehrig & James Hardy (Consulting geologists). 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. **Well Log Normalization: Different Concepts Give Different Results,** January 21- Dan Shier, Energy Data Services. 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. **New Technology for Oil and Gas Exploration,** January 17 -- Terry Donze, Independent. 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. Web page: <http://www.colorado.edu/GeolSci>. January talk titles have not yet been announced.

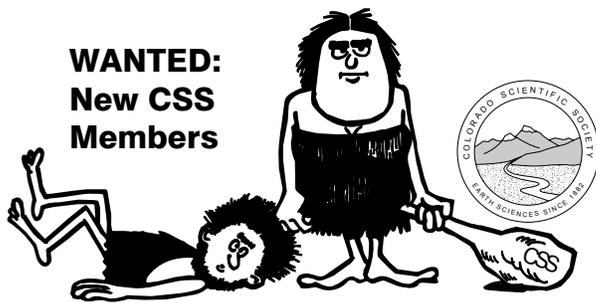
Friends of Dinosaur Ridge; 7:00 pm at Red Rocks Elementary School in Morrison, CO. Join now. Web page: <http://www.dinoridge.org>.

Colorado School of Mines, Van Tuyl Lectures Fridays from 3:00PM to 4:00PM in Berthoud Hall room 108: January talks have not yet been announced. Web page: <http://www.mines.edu/academic/geology/calendar/vantuyl.html>

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

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