

Colorado Scientific Society

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

Structural and Tectonic Evolution of the Douglas Creek Arch, Northwestern Colorado: Implications for Petroleum Accumulation in the Uinta and Piceance Basins

by
Jeffrey W. Bader, Consulting Geologist



Douglas Creek arch looking north from Highway 139



LUSI—Long-lived mud extrusion near Surabaya, Indonesia

by
*Tom Casadevall,
USGS Emeritus*

NEW Location!!



Thursday, February 19, 2009

See map inside!!

**Colorado School of Mines—Department of Geology and Geological Sciences,
Berthoud Hall, Room 241, Golden, CO**

Social half-hour—6:30 p.m. Meeting time—7:00 p.m.

**Structural and Tectonic Evolution of the Douglas Creek Arch, Northwestern Colorado:
Implications for Petroleum Accumulation in the Uinta and Piceance Basins**

By Jeff Bader

The Douglas Creek arch is a north-south trending, faulted anticline that separates the Uinta Basin of Utah, from the Piceance Basin of Colorado. The arch is postulated to have initially formed during the Laramide orogeny as part of a broad, regional north- to south-trending uplift that extended from northwest Colorado into southern Wyoming and included the Rock Springs uplift. The axis of this structure was offset sinistrally and truncated by the late-Laramide uplift of the Uinta Mountains, thus contributing to the present orientation of the arch. Concurrently with the uplift of the Uintas, the axis of the “newly formed” Douglas Creek arch is postulated to have been offset and rotated due to sinistral-slip on an east-west trending, steeply dipping, basement-seated fault (Douglas Creek fault). Northwest-trending fractures in the Uinta and Piceance basins indicate that dextral wrenching may have occurred along the Douglas Creek shear zone during post-Laramide tectonism.

A variety of data were evaluated to assess the aforementioned hypothesis. These data were used to evaluate the genetic relationship between interpreted Precambrian basement structures and shallower structures formed in the sedimentary cover above the basement-centered shear zone during interpreted periods of late- and post-Laramide wrenching.

Results of this study indicate that the Douglas Creek fault likely has a Precambrian ancestry and has been reactivated during the Phanerozoic. Structures in the study area are consistent with periodic sinistral slip, dominantly along the Douglas Creek fault, during late-Laramide tectonism. Northwest-trending fractures flanking the Douglas Creek arch and extending into the surrounding basins are likely synthetic strike-slip faults related to dextral-slip on the Douglas Creek fault. This deformation is probably due to northwest translation of the Colorado Plateau and opening of the Rio Grande rift during Tertiary extension.

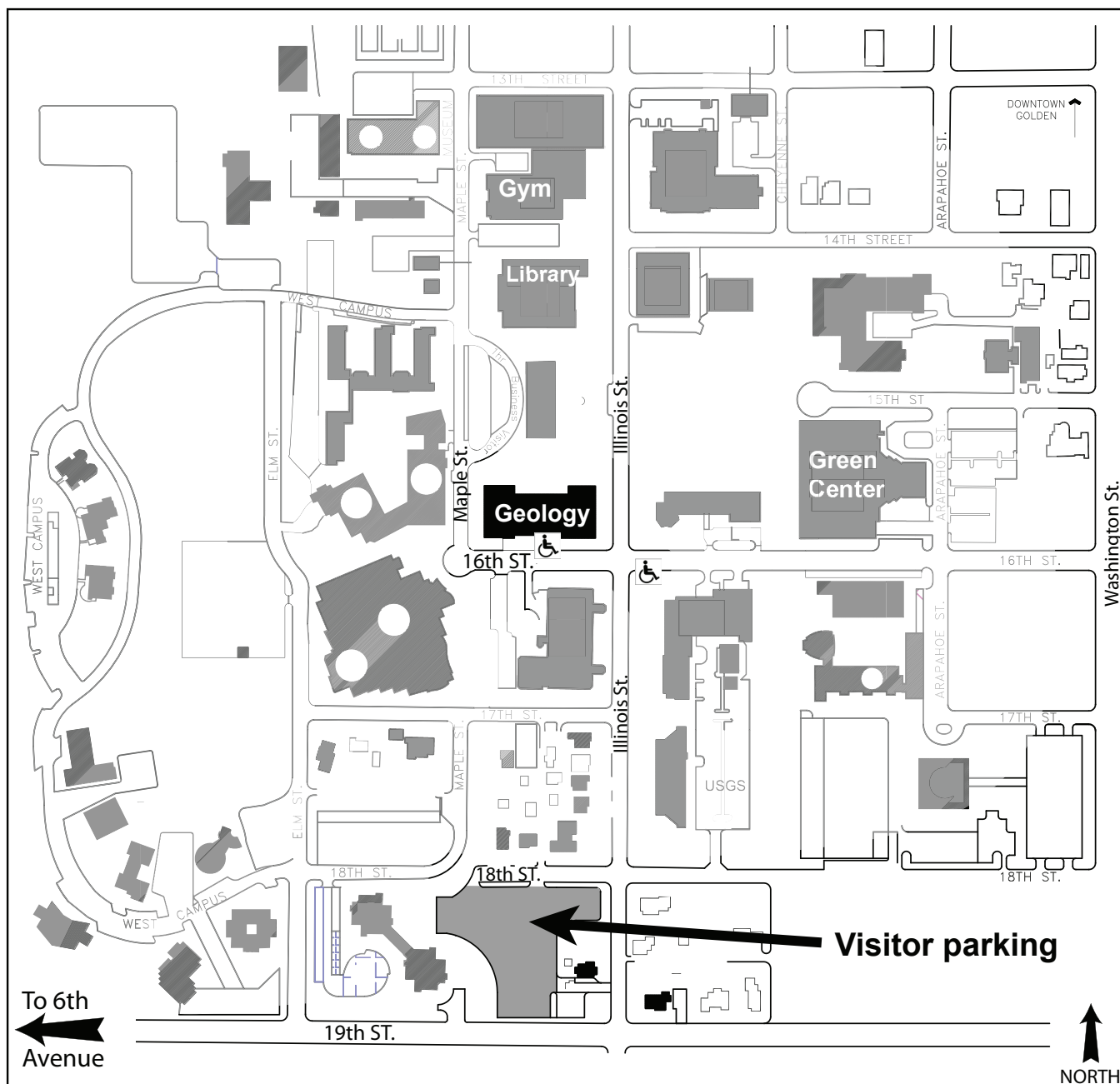
Wrenching has created enhanced permeability and numerous structural traps for petroleum accumulation across the Douglas Creek arch and in the surrounding basins. Wrench structures are identified by their distinct geometries and, using supporting subsurface data, genetic relationships regarding the fundamental origins of these features can be discerned. Knowledge of the genesis of the wrench system allows for better understanding of structures related to wrenching and thus a better potential for success in the search for oil and gas.

LUSI - Long-lived mud extrusion near Surabaya, Indonesia

By Thomas J. Casadevall, USGS Emeritus

East Java, Indonesia, is an area of active volcanism, long-term oil and gas production, and rapid urban growth near the city of Surabaya, the second largest city in the island nation. On May 29, 2006, hot, dark gray mud appeared from a fissure about 150 m distant from a gas exploration well being drilled near the village of Porong, approximately 30 kilometers south of Surabaya. Extrusion of this mud has continued for more than 32 months with average extrusion rates of between 50,000 m³ to 120,000 m³/day. The mud has covered a populated area of more than 10 square kilometers and displaced more than 30,000 people. In addition to the direct human impacts, the mud extrusion has also damaged or broken important transportation infrastructure, fiber-optic cable infrastructure, displaced an oil pipeline, and caused the closure of numerous small factories and impacted agricultural development. The mud extrusion and the resulting mud edifice is referred to locally as LUSI (Lumpur Sidorajo).

Controversy surrounds the cause of the mud extrusion. Is it related to a well blow-out owing to inadequate drilling precautions, or is it related to a M 6.3 earthquake in Central Java, on May 27, 2006, several days before extrusion began? This controversy has slowed the delivery of relief services and resettlement efforts resulting in civil protests and unrest as displaced residents seek restitution. Addressing the problems caused by the mud extrusion include so-far unsuccessful attempts to shut off the extrusion at the source and attempts to manage the extrusion of mud so that residents can live with future mud production.



CSS evening lectures: Same time....DIFFERENT place!

Starting with this month's talks, the Colorado Scientific Society evening talks will be *moving to a new location*. Talks will be held on the Colorado School of Mines campus, Berthoud Hall, Department of Geology and Geological Sciences, Room 241. **Berthoud Hall** (labeled "Geology" on the accompanying map) is at the corner of Illinois and 16th streets, near the center of the CSM campus.

PARKING: the only parking lot for visitors is a large lot at the corner of 19th Street and Illinois Street; from there it is a short two-block walk north to the geology building. On-street parking spaces may be available along Illinois Street, 16th Street, and 17th Street. A few "handicapped" spaces are in front of the building, with a few more "kitty-corner" to the SE on 16th.

GETTING TO THE LECTURE ROOM: Room 241 is located on the second floor of the geology building, at the north end, in what used to be the geology museum. From the entrance on the east side of the building (off Illinois Street), you will find stairways a short distance along the first floor corridor; ascend to the second floor and proceed almost all the way down the hallway (heading west). Room 241 will be on the left side, near the end of the hallway.



**Western Interior Paleontologic Society's
Founders Symposium 2009
March 14–15**

Saturday, 8 a.m. to 5 p.m.

Reception/Art Exhibit to follow
American Mountaineering Center,
Golden, Colorado

Sunday, 8:30 a.m. to 4 p.m.

National Center for Atmospheric Research &
Nat'l Oceanic and Atmospheric Administration
Boulder, Colorado

Learn more and register at:
<http://wipsppc.com/symposium.php>

**MINERALOGY & MICROSCOPY OF
ORE DEPOSITS**

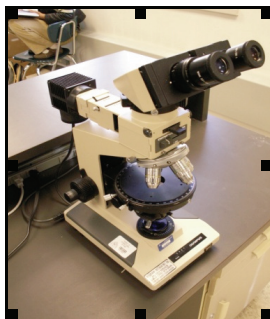
**A Short Course at the
Colorado School of Mines
March 9–13, 2009**

Schedule/Course Fee

Class will meet each day
from 9 to 5. The general
schedule will include 30
minutes of illustrated
lectures alternating with
60 minutes of microscope
work.

Course fee is \$995.

Contact: Dr. Lufkin, 303-997-7365;
lufk3@comcast.net; www.johnlufkin.com



**American Mountaineering museum
hosts map exhibition**

Colorado Scientific Society members and
their families will want to attend a remarkable
exhibition of rare maps devoted to mountains
and mountain regions of the world.

The exhibition explores the ways in which
topography has been viewed and mapped
throughout history. This exhibition includes
some of the more important maps in the his-
tory of world cartography, as well as maps
from the exploration of the western United
States. Highlights of the exhibit include a map
from the Lewis and Clark Expedition, world
maps from the 15th to 18th centuries, Zebulon
Pike's map of the exploration of the South-
west, and maps by Golden's own Hal Shelton.
The exhibition draws from the collection of
Wesley A. Brown, a prominent map collector
from Denver, and from the Henry S. Hall, Jr.,
American Alpine Club Library and Colorado
Mountain Club Collection.

The Mountaineering Center has asked the
Colorado Scientific Society for volunteers
willing to speak about maps or help during the
exhibition. Interested members should contact
Sue Henley, volunteer coordinator.

On High: Cartography of Topography

Exhibit opens January 23 and runs
through May 31, 2009

Hours: Tuesdays-Saturdays, 10 a.m.-6 p.m.;
Thursdays, 10 a.m.-7 p.m.

Adults: \$6.50

Children: \$4.50



For more information, visit www.bwamm.org



The CSM Geology Museum now has a sales shop with mineral specimens as
well as books and other items. It's located on the lower floor of the Museum, at
the southwest corner of 13th and Maple Streets, Golden. Hours 9 a.m. to 4 p.m.,
Monday through Saturday; 1 to 4 p.m. Sundays. Admission is free. A new exhibit
about meteorites and Colorado meteorites was also recently completed in the museum.
See <http://geology.mines.edu/museum/>



ANNOUNCEMENT: 2009 Geology and Resources Conference

Hosted by: American Institute of Professional Geologists, AIPG Colorado Section, Grand Junction Geological Survey, Mesa State College

Join us in beautiful western Colorado's mountains, canyons, and incredible geology for a diverse program of scenic field trips, technical presentations, and social events. The formal sessions will begin on Monday, October 5 and will end Wednesday, October 7. Sessions will include a full day and two half days with field trips in the afternoon. There will be additional full and half-day field trips throughout the meeting, as well as pre and post 2-day field trips.

Our technical program covers diverse geoscience topics including road construction through mountains and landslides, the impacts of energy development (petroleum, coal, and uranium), resource and reserve classification (it's been 100 years since H.H. Hoover defined proved ore), permitting issues, and geoscience software, its use and misuse. For more info. go to: http://www.aipg.org/2009/GJ_home.htm

Student Research Grants

By Matt Morgan

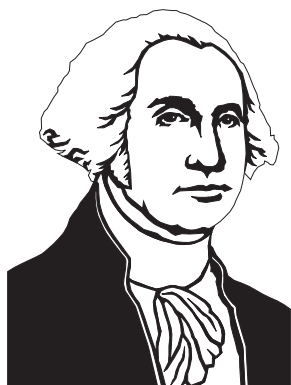
Over the past few weeks I have been working on updating the student grants documents. Our finances are in a good position this year, having generated about \$14,500 in interest and dividends. As a result, we can give out some very nice awards. Several grants ranging from \$600 to \$1,000 each will be awarded for field-oriented research on geology, geochemistry, and geophysics on the Rocky Mountain region. In addition, grants as large as \$600 are awarded for engineering geology research and one or more grants for as much as \$1,200 is offered for studies on the Heart Mountain fault in northwestern Wyoming or for Quaternary studies with no geographic restriction.

The grant announcements were sent to dozens of universities in the western region, including all of the 4-year universities in Colorado, New Mexico, and Wyoming. The deadline for receiving the grant award applications is March 31, 2009. Applications for these grants and more information can be accessed from the CSS website at <http://www.coloscisoc.org/grants/grants.html>



President's Message *by Don Sweetkind*

The big excitement for February is that we are moving the location of our evening talks to the geology building on the School of Mines campus. CSM and the geology department have extended a gracious welcome to us and have provided us with a spectacular lecture room for our evening talks.



Our move to this new "home" was precipitated by a price increase at the American Mountaineering Center, and by many of your comments regarding the auditorium at the Mountaineering Center being too large, too hard to hear the speaker, and not conducive to socializing.

Once you see the lecture hall in Berthoud Hall, I think you will agree that it represents a positive change. Hopefully this location within the geology department will provide some energy with increased interaction with CSM faculty and students. See you at the new location!

CSS Fall Field Trip and Braddock Peak Update

by Jim Cole

The CSS Fall 2008 field trip to the Never Summer Mountains included summaries of some new studies of the Oligocene intrusive and volcanic rocks. The trip was also organized in honor of Prof. Bill Braddock's (CU-Boulder) career investigations of the northern Front Range and Rocky Mountain National Park. Following Bill's untimely passing in 2003, several former students undertook the long process of designating a mountain peak in his honor. Braddock Peak in the northern Never Summer Mountains was officially designated by the U.S. Board of Geographic Names on September 8, 2008, the day following the CSS field trip.

For more information about Braddock Peak and the surrounding geology, see USGS Open-File Report 2008-1360 (the field trip guidebook).
<http://pubs.usgs.gov/of/2008/1360/>

The area is also covered in the new geologic map of the Estes Park 30' x 60' quadrangle (Cole and Braddock, 2009, USGS Scientific Investigations Map 3039), which will be available in March 2009. The extensive report that accompanies this map formally designates the Oligocene igneous rocks of the Never Summer Mountains as the "Braddock Peak complex."

(A big "Thank You" to Ulli Limpitlaw for providing these photographs.--ed.)



CSS members at Lake Agnes.

SciSoc'ers looking at volcanic rocks in the Never Summer's.



CSS field trip gang at the Grand Ditch in RMNP.





Earth Science Meetings and Talks

Newsletter items must be received by the 25th of each month.



Colorado Scientific Society's regular meetings are held the 3rd Thursday of the month at the Colorado School of Mines Geology Building in Golden (unless otherwise advertised). Social time begins at 6:30 p.m. and talks start at 7:00 p.m. For more information, contact Don Sweetkind, at 303-236-1828, dsweetkind@usgs.gov

Café Scientifique Wynkoop Brewery, evening science talks at 6:30. Free, except for beer. <http://www.cafescolorado.org>

CO-AIPG (American Institute of Professional Geologists, Colorado Section) 11:30 a.m. social gathering; Noon luncheon and subsequent speaker presentation. **Feb. 17**—The Honorable John Hickenlooper, Mayor, City and County of Denver, CO, "Comments on the Current Scene (tentative)." 2009 luncheons to be held at the Petroleum Club (in the Denver Athletic Club building), 1325 Glenarm Street, Denver. Please make an advance reservation so seating and food preparation are adequate to cover attendance. Cost is \$25 with advance reservation and \$30 at the door. Paid parking is available along the street (metered) or in the adjacent parking lots and parking structure. Contact Jim Russell by Noon on Feb. 12 for reservations or via e-mail at csmmminer@msn.com

Colorado School of Mines, Van Tuyl Lectures Thursdays from 4–5 p.m. in Berthoud Hall room 241. **Feb. 19**—Alexis Stichter, CSM M.Sc.-Geochemistry, 2003, Post-Doc Candidate, University of Wyoming, TBA; **Feb. 26**—Michael Hendricks, CSM M.Sc.-Geology, 1978, Ph.D. Geology, 1983, Bakken Exploration (Larry Meckel), "Where are we now and where are we going?" **Mar. 5**—Marjorie Levy, AAPG Distinguished Lecturer (Nikki Hemmesch), TBA. <http://www.mines.edu/academic/geology>

Colorado State University, Dept of Geosciences, Rm 320 Warner College of Natural Resources Bldg., Mondays, 4:00 p.m. 970-491-5661. **Mar. 9**—Graham Baird, Geosciences, Univ. of N. Colo., TBA. <http://welcome.warnercnr.colostate.edu/geotraining/index.php>

DIPS (Denver Intl. Petroleum Society) **Feb. 13**—Sven Egenhoff, Asst. Professor, Colorado State University, Fort Collins, CO, "Cyclicality in an isolated carbonate platform: Its influence on lagoonal and margin architecture, and relevance for reservoir characterization in the Dolomites of Northern Italy." Regular meetings held 2nd Friday of the month at Wynkoop Brewing Company, 1634 18th Street, Denver. Gather at 11:30 am; Lunch served at Noon; Presentation at 12:30. Lunch price: \$15 for members, \$18 for non-members, \$3 talk only. Please e-mail Bob Zilinski, at rezilin@aol.com or call him at 303-885-0615 to make reservations before Wednesday, noon, Feb. 11, 2009.

Denver Museum of Nature and Science **Feb. 12**—7:00 p.m., The Evolution of Charles Darwin, by Duncan M. Porter, Ph.D. Ricketson Auditorium; use Ricketson evening entrance. \$12 member, \$15 non-member. **Feb. 25**—7:00 p.m., 60 Minutes in Space. Gates Planetarium; use Ricketson/evening entrance. Free. <http://www.dmns.org/main/en/General/Education/AdultProgram/Lectures>

Denver Region Exploration Geologists' Society (DREGS) meets in the Mutual Consolidated Water Building, 12700 West 27th Avenue, Lakewood. Social 6:30–7:00 p.m. Presentation at 7:00 p.m. Meetings are normally scheduled for the first Monday of each month. 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 11:20 a.m., 18th and Wynkoop Sts. in Denver. Call Sarah Voight at 720-946-1374 by prior Thursday for reservations. **Feb. 17**—Russell W. Spears, ExxonMobil Production Company, "Where 'Classical' Petrophysics Goes Wrong: A Case Study in a Mature South Texas Gas Field." <http://dwls.spwla.org>

Friends of Dinosaur Ridge <http://www.dinoridge.org>. Admission is free, but donations are welcome. 16831 W. Alameda Parkway. Talks at 7:00 p.m. Visitor Center (303) 697-3466 or contact Beth Simmons at cloverknoll@comcast.net for info.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30, lunch at noon, talk at 12:20. Reservations by recording at 303-623-5396 until 10:30 a.m., prior Wed. Luncheon \$30. Talk only (no res.)—\$5. Location: Marriott City Center, 17th & California. <http://www.rmag.org/events>

Rocky Mountain SEPM 11:30 Reception, lunch at noon, speaker at 12:30. Reservations: luncheons@rmssepm.org, before noon of preceding Friday. \$20.00 lunch, \$3 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. **Feb. 24**—Harvey R. DuChene, "Tectonic influences on Speleogenesis in the Guadalupe Mountains, New Mexico and Texas." <http://www.rmssepm.org/luncheons.shtml>

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