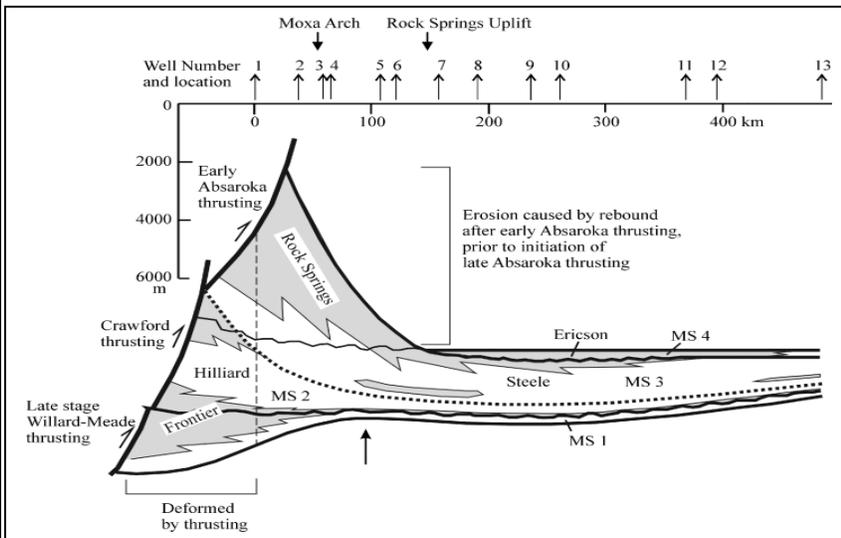




# Colorado Scientific Society

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



## Late Cretaceous subsidence in Wyoming

By Dag Nummedal,  
Colorado School of  
Mines  
(rescheduled from February)



Mesa Verde National Park

## USGS project **FRAME** (**F**raming **r**esearch in support of **a**daptive **m**anagement of **e**cosystems)

By Christine Turner,  
USGS

**Thursday, March 16, 2006**  
American Mountaineering Center  
710 10<sup>th</sup> St. (NE corner with Washington), Golden  
Social half-hour – 6:30 pm. Meeting time – 7:00 pm.

## **Abstract**

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### **Late Cretaceous Subsidence in Wyoming**

By Dag Nummedal, Colorado Energy Research Institute, Colorado School of Mines

The Farallon plate convergence with the western margin of North America during the late Cretaceous directly controlled rates and patterns of subsidence across the Rocky Mountains and Great Plains, through three linked mechanisms: 1) dynamic subsidence related to mantle convection above the subsiding slab – this subsidence mechanism operated on a wavelength of a few 1000s of miles and was in-phase along strike across most region, 2) flexural subsidence in the retroarc foreland basin landward of the Sevier orogenic belt – operating on a wavelength of less than 200 miles and probably asynchronous along strike, 3) dynamic subsidence or uplift related to plate convergence rate and subduction angle – in control of the temporal distribution of basement involved (Laramie) tectonism.

Quantitative modeling of subsidence induced by Sevier-belt flexure allows this component to be subtracted from the total subsidence across the region. One such detailed

separation exercise has been performed across southern Wyoming, demonstrating that the Sevier-belt flexure influenced only the western parts of the Greater Green River basin, and that late Cretaceous subsidence from there eastward to Iowa was dominantly a product of dynamic subsidence. 3D modeling of the flexural forebulge in response to Sevier and Wind River thrusting demonstrates that this tectonic feature migrated southeastward in response to shortening on the Wyoming-Idaho salient of the Sevier thrust and the Wind River thrust, but rarely extended much farther east than the (tectonically younger) Rock Springs uplift.

This quantitative subsidence reconstruction reveals that most of the late Cretaceous Western Interior Seaway lay well to the east of the Sevier foreland basin; a finding that also is supported by mapping the forebulge as a zone of thin strata throughout the region.

## **Abstract**

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### **USGS project FRAME (Framing research in support of adaptive management of ecosystems)**

By Christine Turner, George Leavesley, Richard Zirbes, and Roland Viger, USGS  
George San Miguel, National Park Service, Mesa Verde National Park  
Jim Chew, USDA Forest Service, Missoula, Montana  
William Romme, Department of Forest, Rangeland, and Watershed Stewardship, CSU  
Lisa Floyd-Hanna, Prescott College, Arizona  
Mark Miller, National Park Service, Kanab, Utah  
Neil Cobb, Merriam-Powell Center for the Environment, Northern Arizona University  
Kirsten Ironside, Northern Arizona University

Project FRAME is transforming the way that science is linked to natural resource management decision-making on federal lands. It does so at a time when federal land managers are called upon to

make science-based decisions and to optimize the management of multiple resources under increased public scrutiny. Federal land managers need an adaptive management framework to accommodate

changing conditions through the use of the appropriate science and consensus-building processes.

The FRAME project strategy is to couple the adaptive capabilities of the USGS Modular Modeling System (MMS) with accepted principles of collaboration. Our approach is to collaboratively engage the resource managers, modelers, and scientists in framing the science issues and in developing the appropriate science models to address the natural resource management issues. Through a multidisciplinary USGS project that includes partners from other agencies (NPS, BLM, BIA, and USFS), universities and research institutes, we have been focusing our initial efforts

on natural resource and fire-management issues at Mesa Verde National Park. The principal models initially being used are the PRMS (Precipitation-Runoff Modeling System), and the SIMPPLLE model (SIMulating Patterns and Processes at Landscape Scales). Also being incorporated are results from a newly developed empirical sedimentation model related to post-fire runoff and erosion. Through the collaborative modeling effort at Mesa Verde, we have now developed a transportable methodology for collaboratively modeling integrated science for adaptive, multi-objective resource management that is applicable across a wide range of ecosystems.

## **Colorado Scientific Society President's Note—March 2006**

*By Chuck Kluth*

When mapping in the field, we often use remote data such as air photos to leverage our observations. We really don't have much choice, because some places are hard to get to, and because we have time constraints on our work. There are section meetings coming up for the GSA (Gunnison) and the AAPG (Billings) that I view as a way to leverage my understanding of the geology of the region.

Section meetings are often the forum for student studies and professional projects that won't get national meeting space because someone judged them as of "too local in interest". Most of the time, that's right, but it makes the work no less important. These meetings are full of great information on the

area where we live. And for anyone interested in Rocky Mountain geology it's a very valuable way to leverage our understanding. The presenters at the regional meetings have gone to places where we probably aren't ever going to have time to get to, and made detailed observations. If you don't agree with the interpretations, you can construct your own. And you have a much better chance of cornering the presenters in the hall or the bar to get your questions answered, than in a national meeting. Sort of like a larger-scale version of the CSS meetings.

So I'd encourage you to go onto the web pages for those meetings, and see about attending. Leverage your observations and expand your understanding.

## MARK YOUR CALENDARS

April 20 is **Family Night** and it will be held at the National Renewable Energy Laboratory in Golden. Come see NREL's 12-step program to break the US addiction to oil (and on a reduced budget!) Look in April's newsletter for more details.

## WANTED

Science-minded volunteers to help at area science fairs. These are beneficial events for the schools and students, all of whom will very much appreciate the help of anyone who can volunteer to do this.

<b>April 13</b>	Valverde Elementary	2030 W. Alameda Ave.
<b>April 20</b>	McMeen Elementary	1000 S. Holly
<b>April 26</b>	Valverde Elementary	2030 W. Alameda
<b>May 4</b>	Steele Elementary	320 S. Marion Parkway
<b>May 6</b>	DPS District Fair	Place Middle School, 7125 Cherry Creek N. Drive

Contact Debbie Turner, Community Resources, Inc., 303-782-0975 or [Debbie\\_Turner@dpsk12.com](mailto:Debbie_Turner@dpsk12.com)

# Earth Science Meetings and Talks

*Newsletter items must be received by the 25th 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 6:30 p.m. and talks start at 7:00 p.m. For more information, contact Chuck Kluth, CSM, 303- 904-2939, [kluth@earthlink.net](mailto:kluth@earthlink.net)



**Denver Mining Club** meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave.) 11:30-1:00. Mar 6, Guy Johnson, mineral economist, "Coal: A good neighbor-an industry review". Mar 20, Ed Raines, "Mining history, geology and mineralogy of the Breckenridge gold deposits, Summit County, CO". <http://china-resources.net>.

**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, luncheon at noon, program at 12:30. 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. Mar 13, William Langer, USGS, "Industrial minerals and the exploration geologist". 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. Call Eleice Wickham at 303-573-2781 for res. <http://dwls.spwla.org>.

**Rocky Mountain Association of Geologists (RMAG)** Social at 11:30, lunch at noon, talk at 12:30. Reservations are taken at 303-623-5396 until 10:30 am, Wed. before the lunch. Cancellations are taken until 11 am on Wed. at 303-573-8621. Lunch--\$20 at the door. Talk only (no res)— \$3. Location: Denver Petroleum Club, Anaconda Tower, 555-17th St, 37th floor. Mar 17, Janok Bhattacharya, AAPG dist. lecturer, "Applying deltaic and shallow marine outcrop analogs to the subsurface." <http://www.rmag.org>

**Rocky Mountain SEPM** Reception at 11:30, lunch at noon, speaker at 12:30. Reservations, Dave Uhl:303-389-5092 before noon of preceding Friday. \$15.00 lunch, \$3 talk only. Wynkoop Brewing Company, 1634 18<sup>th</sup> St., Denver. [David.uhl@EnCana.com](mailto:David.uhl@EnCana.com).

**Co-AIPG** 11:30-social, noon-1:30-lunch and speaker. Cost-\$25. University Club, 1673 Sherman St, Denver. Mar 21, Mark Nesbitt, Natural resources attorney, "The uranium mining industry: past, present and future". Reservations: Tom Cavanaugh, 303-458-5550, [tcavanaugh@ascg.com](mailto:tcavanaugh@ascg.com).

**University of Colorado at Boulder, Geological Sciences Colloquium** Wednesdays, 4:00-5:30, Rm. 180.Refreshments at 3:30 on the 3rd floor. Mar 22, Dr. Marin Clark, Caltech, "Geomorphology and tectonic emergence of the Shillong Plateau". 303-492-8141. Web page: <http://www.colorado.edu/GeolSci>.

**Friends of Dinosaur Ridge.** Fireside chats at Morrison Town Hall, 7 p.m. Mar 23, Bob Patten, "Peoples of the Flute—Clovis Man in Colorado". Web page: <http://www.dinoridge.org> . Admission is free, but donations are welcome. For more information contact the FODR Visitor Center at (303) 697-3466.

**Colorado School of Mines, Van Tuyl Lectures** Fri, from 3-4 p.m. in Berthoud Hall, Room 108. Mar 8, Ken Deffeyes, Princeton, "Dolomite as a petroleum reservoir rock, beginning with F.M. Van Tuyl and ending with today in Ghawar" . Mar 29, Nicholas Christie-Blick, Columbia, "Observations from the Basin & Range province pertinent to the interpretation of regional detachment faults." <http://www.mines.edu/academic/geology>.

**USGS Geologic Division Colloquium.** Thursdays, 1:30 , Foord Room, Building 20, Denver Federal Center.. Contact: Pete Modreski, USGS, 303-202-4766, email [pmodreski@usgs.gov](mailto:pmodreski@usgs.gov).

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

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