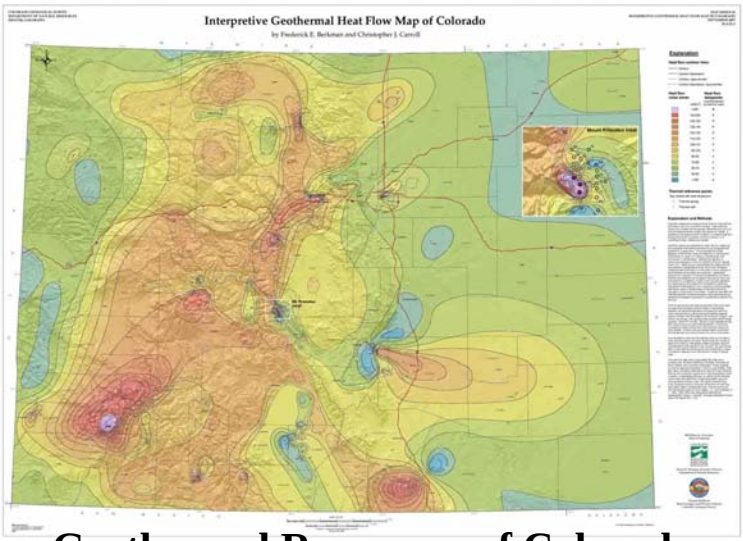
Colorado Scientific Society

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

Glacial Lake Riverton, Wind River Basin, Wyoming

Richard Pratt, Denver Museum of Nature and Science



Geothermal Resources of Colorado

Matt Sares, Colorado Geological Survey

Thursday, March 20, 2008

American Mountaineering Center
710 10th St. (NE corner 10th and Washington), Golden
Social half-hour – 6:30 p.m. Meeting time – 7:00 p.m.

Abstract

Glacial Lake Riverton, Wind River Basin, Wyoming

By Richard Pratt, Denver Museum of Nature and Science

Glacial Lake Riverton formed in the central Wind River Basin during the Bull Lake (Illinoian) glaciation around 140,000 years ago. At its maximum extent, the lake stretched 95 miles east-west, 57 miles north-south, and could have been 700 feet deep. The lake overflowed through Arminto Gap into the Powder River drainage. This eastern overflow stabilized the lake level at about 6,100 feet elevation; however, the absence of a pronounced valley or canyon indicates that the flow was never large. The west end of the lake was dominated by the Bull Lake glacier spewing icebergs directly into the lake. Erratic material in the form of large, angular, exotic drop-stones and partially sorted shoreline gravel is distributed around the lakeshore; it is particularly concentrated in the far northeast where icebergs were blown by dominant westerly winds. A fine-grained rose-pink granite and a quartz-rich spotted gneiss along with the general suite of light metamorphic rock types can be traced directly to the Bull Lake moraines that define the extent of the lake. Shoreline physiographic features are mostly obliterated by subsequent pedimentation and stream erosion except near Arminto Gap where a well-preserved beach ridge was found.

Glacial Lake Riverton drained by stream capture and diversion through Wind River Canyon. The diversion probably occurred when a southward-heading stream from the Big Horn Basin tapped through the Paleozoic karstic limestones (Madison Limestone or Bighorn Dolomite) to initiate the drainage flow. The Bull Lake (Illinoian) timing of this event has broad implications for the erosion history for both the Wind River Basin and the Big Horn Basin.

Abstract

Geothermal Resources of Colorado and the potential for electrical power generation

By Matt Sares, Colorado Geological Survey

As of 2005, renewable energy sources supplied almost 9 percent of the electrical power supply in the U.S. Of the total renewable energy sources, conventional hydroelectric energy supplied 80.8 %, biomass 9.2 %, wind 5.4 %, geothermal 4.4 % and solar 0.2 %. Most of the U.S.'s geothermal activity takes place in California and Nevada, but Alaska, Hawaii, and Utah also have some generation. New Mexico, Idaho, and Oregon have new projects underway in various stages of development.

Currently, geothermal resources in Colorado are used directly for recreation (pools/spas), greenhouse agriculture, aquaculture, space heating, and district-wide heating – but not for electrical power. Several lines of evidence indicate that the geothermal potential for Colorado may be underestimated in regard to electrical generation:

- High heat flow – Colorado has the second largest heat flow anomaly in the U.S.
- Quaternary volcanism (occurring within the last two million years) – Colorado has five such volcanoes

- Quaternary faulting (younger faults have more potential) – Colorado has over 90 such faults
- Rift zone tectonics in the San Luis Valley and upper Arkansas River basin.
- A low-velocity seismic P-wave anomaly in central Colorado, The Aspen Anomaly, indicates a significant area of less dense, warmer upper mantle. This could contribute to higher geothermal gradients in the area.

Two sedimentary basins in Colorado indicate potential for geothermal resources at depths in the range of existing oil and gas wells. Oil and gas fields in the Denver Basin have recorded bottom-hole temperatures that range between 200-250°F at roughly 10,000-11,000 feet. Similarly, bottom-hole temperatures in the San Juan Basin south of Durango have recorded temperatures ranging from 150 – 250°F at depths of between 6,500 – 9,000 feet. Twenty of these wells have temperatures of 250°F or more

The Colorado Geological Survey, using data from thermal springs and wells, mineral exploration holes, and geothermal test holes, has constructed statewide maps of geothermal heat flow and geothermal gradient to identify the most prospective areas for geothermal resource development. These maps can be used to assist in identifying locations for conventional shallow hydrothermal systems as well as areas where enhanced geothermal system technology can be applied to tap deeper geothermal resources, 10,000 to 30,000 feet deep in the earth's crust.

The pool at Ouray

President's Notes, March 2008

By Matt Morgan

We had an outstanding turnout for the February program at the American Mountaineering Center. Over 55 members and non-members saw the lecture by Dr. Peter Molnar who presented "The Gradual Closing of the Indonesian Seaway and the Onset of Northern Hemisphere Ice Ages", a topic which is both quite relevant to the "Global Warming" debate and scientifically controversial. What made the night very special was the after the lecture, a large majority of the attendees stayed around to mingle and chat. In my view, this was due to 1) the lecture topic, which brought out the great numbers and, 2) the smaller and more "friendly" room that made it easy to network. We were unable to hold our meeting in the large auditorium due to a scheduling conflict. In the future, we may hold the regular meetings in this smaller room, which by no means will diminish the

prestige of the CSS. In fact, it may gain us a new foothold!

Having relevant and newsworthy topics brought out several non-members that came to me afterward and said they would like to join. They stressed the importance of having timely scientific presentations, which will be a focus for 2008. However, we will mix in some not-so-scientific presentations to keep things fun.

Also, the next few months will be a busy time for the CSS. We will have Family Day in April and field trips in May and June. Stay tuned for more details!

Spring Field Trip

New Insights into the Geologic and Geomorphic Evolution of South Park Basin

When: Saturday, May 17
Departure Site: Cold Springs Park-N-Ride, Lakewood @ 7:30 am
Field Trip Leaders: Cal Ruleman[1], Bob Kirkham[2], Bob Bohannon[1], Lyndsay Ball[1],

We will begin this field trip by traversing the southern Front Range, following Highway 285 to our first stop at Kenosha Pass. Here, we will observe probable Quaternary normal faulting and structural relationships involving tensional faulting overprinting pre-existing Laramide structures. Continuing to the southwest, we will proceed to look at the Elkhorn thrust, high frequency footwall folding, and syn-tectonic conglomerates. We will also look at new geophysical and hydrological data that constrain the configuration and the extent of the fault zone, and briefly discuss its implications for fluid flow in the South Park basin.

In the afternoon we will examine late Eocene to Miocene volcanic and sedimentary rocks in southwestern South Park and discuss the structural deformation that affects them. Evidence of regional and local evaporite dissolution and collapse, including salt springs, sinkholes, large topographic depressions, and synclines will also be viewed. One field trip stop will briefly describe new information on Late Paleozoic stratigraphy and how that data has led to the discovery of major east-west-trending, Laramide-age faults. If time permits, our last stop will be in a Pleistocene paleovalley that was abandoned at the end of the Pleistocene or early during the Holocene.

[1]U.S. Geological Survey, Denver, CO
[2]Consulting Geologist, Alamosa, CO

Sack lunches and transportation will be provided.

Check the next issue for costs and registration

Needed--Science Fair Judges

A series of science fairs for younger students in **Denver Public Schools** are going to be held in April and May. These science fairs are organized by Community Resources, Inc., a non-profit organization that provides educational enrichment support to DPS schools. Each of these will take place on a weekday morning, typically from approximately 8:30 to 11:00. If you are willing to help at one or more of these, please contact Sue Edwards at Community Resources, Inc., Sue_Edwards@dpsk12.org or call 303-782-0975.

DPS School Science Fairs 2008
April 17 Godsman Elementary, 2120 W. Arkansas Ave.
April 22 Steele Elementary, 320 S. Marion Parkway
April 24 Bryant-Webster K-8 School, 3635 Quivas St.
April 30 Valverde Elementary, 2030 W. Alameda Ave.
May 1 McMeen Elementary, 1000 S. Holly St.
May 10 DPS District Science Fair (held at Place Middle School, 7125 Cherry Creek North Dr.)

Spring Getaway

John Lufkin is hosting a hiking retreat in northern Costa Rica, March 17-25. The cost is $2050, including airfare, 7 nights' lodging in a cabin in Finca La Anita, all meals, a 4-wheel drive vehicle, hiking trips and boat rides. Geology will not be the focus of the trip. Trip is limited to 20 participants. Contact John Lufkin, 303-284-2646, lufk3@comcast.net. Website: www.laanitarainforest.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 Matt Morgan, at 303-866-2066, matt.morgan@state.co.us

Denver Mining Club meets every Monday (except when noted) at Country Buffet near Bowles and Wadsworth (at 8100 W. Crestline Ave., in the shopping center) 11:30-1:00. Mar 10, Dani Wright, Ur-energy, "The 2009 global uranium symposium.: Mar 17, Robert Melin, "Another silver prospect." Mar 31, Jim Burnell, "Strategic minerals: can Colorado help?" http://china-resources.net.

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 10, Willy Lynch, ESRI, "How to use GIS with mine and geology data". 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 reservations. Web page: http://dwls.spwla.org.

Rocky Mountain Association of Geologists (RMAG) Reception at 11:30, lunch at noon, talk at 12:30. Reservations by recording at 303-623-5396 until 10:30 a.m., Wed. before the luncheon. Cancellations until 11:00 a.m. on Wed. at 303-573-8621. Luncheon is $20 payable to RMAG at the door. Talk only (no res)—cost is $3. Location: Denver Marriott, 17th & California. Mar 7, Ed Coalson, "Paradox Basin, Ismay and shale gas plays". Web page: http://www.rmag.org.

Rocky Mountain SEPM Reception at 11:30, lunch at noon, speaker at 12:30. Reservations: steve.stancel@anadarko.com, 720-929-6536, before noon of preceding Friday. $15.00 lunch, $3 talk only. Wynkoop Brewing Company, 1634 18th St., Denver. Mar 25, Tony D'Agostino, "Age, sequences, depo-models, and biofacies: US Mississippian shale-gas basins." Web page: www.rmssepm.org.

University of Colorado at Boulder, Geological Sciences Colloquium Wednesdays, 4:00-5:30, Rm. 380.Refreshments at 3:30 on the 3rd floor. Mar 12, Tony Ekdale, Univ. of Utah, "Invertebrates in vertebrates: the sights and sounds of trace fossils in unusual habitats." 303-492-8141. Web page: http://www.colorado.edu/GeolSci.

Colorado State University, Dept of Geosciences, Rm 320 Warner College of Natural Resources Bldg, Fridays, 4:10 pm. 970-491-5661. http://welcome.warnercnr.colostate.edu/geo-training/index.php

Friends of Dinosaur Ridge. Web page: http://www.dinoridge.org. Admission is free, but donations are welcome. Visitor's center, 16831 W. Alameda Parkway 7:00 p.m. For more information contact the FODR Visitor Center at (303) 697-3466 or cloverknoll@comcast.net .

Denver Museum Nature and Science. Mar 12 Subhankar Banerjee, "The myth of wilderness: climate change and the Arctic's indigenous people", Ricketson auditorium, 7:00 p.m., $12 member, $15 non-member.

Colorado School of Mines, Van Tuyl Lectures Thursdays from 4-5 p.m. in Berthoud Hall room 108.
http://www.mines.edu/academic/geology.html

USGS Geologic Division Colloquium. Thursdays, 1:30, Foord Room, Building 20, Denver Federal Center. Mar 13, Jeff Pigati, USGS, "Snails, cienegas, and the science of paleowetland deposits." For more information contact: Peter J. Modreski, U.S. Geological Survey, Denver, Colorado tel. 303-202-4766, fax 303-202-4767 email pmodreski@usgs.gov.

Café Scientifique, Wynkoop Brewery, 6:30-8:00, Mar 18, Jim McMillan, NREL, "Cellulosic biofuels: why putting transportation vehicles on a high fiber diet makes sense." Free, except for beer. http://www.cafescicolorado.org

Colorado School of Mines. Short course, "Ore microscopy and ore petrology", Mar 10-14, taught by Dr. John Lufkin and Dr. Murray Hitzman. Cost: $900. Contact mhitzman@mines.edu, 303-384-2127.

University of Northern Colorado Short Course, ESCI 575, Mar 8-9, "Earth materials in human and animal health", instructor Ulli Limpitlaw, 1 hr graduate credit, $219. ulli.limpitlaw@unco.edu

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

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