



MONTANA GEOLOGICAL SOCIETY

NEWSLETTER

November 2015

MGS Luncheons:

NOV 9th : Dr. John M. Holbrook presents *New views on old surfaces and the evolving evolution of the sequence stratigraphic paradigm* page 3

DEC 8th : Gary Hughes presents *The Crazy Mountains Basin: Geology at its Best* page 4

Members can RSVP by email or by calling Doretta Brush at Ballard Petroleum 406-259-8790

All meetings are held at the Billings Petroleum Club at 11:45 a.m. unless otherwise noted

MGS HOME PAGE:

<http://mtgeo.org>

MGS EMAIL:

montanageologicalsociety@gmail.com

Other Announcements:

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MGS Members

This past Saturday (Oct. 31st) I took a group of boy scouts to a slot canyon in the Pryor Mountains. My goal was to make sure that we all returned safely (it's amazing how creative 13-year-olds can be in hurting themselves) but as a group our goal was to learn how to climb and rappel in a technical environment using rope, anchors and harnesses.

The adventure was what attracted the boys to the activity, but once out in the mountains their curiosity about the natural world around them was sparked and all the questions started. "What kind of rock is this?" (chert), "How about this rock?" (still chert), "Why is this mountain here?" "What kind of fossil is this?" (another brachiopod), "What is this rock?" (chert again) "That's a fault? Why?" "Are both these red and black rocks chert?" (yes).



Scout climbing along slots within the Madison Group

We saw rugose and tabulate corals, piles of brachiopods, bryozoans, climbed through a beautifully exposed Laramide thrust fault and picked up massive piles of chert. If I had asked the boys before we started if anyone wanted to learn about geology while hiking through the desert, no one would have taken me up on the

offer. But the curiosity is there, as is the need in our society to better understand Earth processes. **So the question we must ask ourselves as members of Montana's largest Earth science based service organization is what we can do to enable people to dig into geology.** There is a huge need for this and the curiosity of young minds is already there!

MGS Vol. 59 No. 6



Top of Madison Group showing Mississippian age carbonates down cut over Mesozoic sediments due to Laramide age Sykes Mountain thrust



Scouts climbing along slots within the Madison Group

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Recently I have spent significant time on college campuses and it is disappointing to see how hard it is for different science departments to attract students. When asked, many potential students tend to shy away from or drop out of these programs because of a perception that science is too hard or has too much math. But kids that have been involved in science from an early age don't struggle with these perceptions because they already know how to think creatively and enjoy observing the world around them.



Mississippian age karst exposed by canyon, rapidly cut through and now forming natural bridge

In the MGS board meeting last week we created a new position for educational outreach. While we still don't have a catchy name for the position (chief rocklicker? No wait, that's me... How about educational jefe?), we do have an eager volunteer who has agreed to accept and develop the position. Anna Phelps is a part of the STEM Billings Advisory Council, a group of energy business people from the Billings area who want to inspire and educate Billings youth about STEM careers. She will be an integral part of our board meetings to work towards bridging the gap between the MGS, schools, and service organizations in Montana. Please welcome her to the position and support her by volunteering for upcoming

activities. Anna could use your help with the STEM Flight Event on Nov. 14th which you should have noticed in your inboxes a couple days ago.

Since I'll be writing these President Letters for the next year, let me quickly introduce myself. I grew up on a Utah dairy farm surrounded by naked rocks and decided studying rocks was more exciting than milking cows. I got my Bachelor's and Master's degrees in Geology from BYU before moving to Houston to work for BP. It didn't take me long to decide that the Rockies was the place for me, so I moved back and have been working oil and gas fields here for eight years. Like Mark, Sarah and Preston, I am a member of the SM Energy mafia that has infiltrated the MGS. I have five kids, a foreign exchange student and am a scoutmaster for 14 boy scouts that like to pick up a lot of chert.



Riley and kiddo (Liana) hiking in Hoodoos near East Rosebud



STEM Billings is hosting their first event on November 14 at McKinley Elementary School. The event topic is FLIGHT and will include hands-on activities that focus on the principles of flight. Kids will make their own airplanes and hot air balloons and learn from passionate experts about different aviation topics. Volunteers will help with hands-on learning groups for balsa wood gliders, lunar landers and hot air balloons. The event will take place from 1 PM to 4 PM and is open to all 3rd, 4th, and 5th graders in the Billings area. Registration is \$20, which covers materials and supplies.

STEM Billings is a group of local education and business leaders who are committed to growing future innovators, creators, and leaders through community-wide engagement and visionary thinking. STEM Billings activities are those that are already taking place in the community, some of which our companies do already with partner schools. The efforts are now taking a step forward with some signature, community wide events.

To register for the November 14 FLIGHT event, go to:
<http://stembillings.weebly.com/registration.html>

MGS Luncheon Meeting

Monday, November 9th

11:45 am – LOCATION UPDATE:

★ Community Room, Billings Public Library ★

Please join us for lunch (\$10) and the talk (no charge)

RSVP – montanageologicalsociety@gmail.com, or 406-259-8790

An email reminder will be sent 3 days prior to the talk



JOHN M. HOLBROOK

Ph.D

Professor of Geology, TCU

New views on old surfaces and the evolving evolution of the sequence stratigraphic paradigm

Sequence stratigraphy is an evolving field that has thus defied all attempts at formalization. Part of this resistance to stability is because central assumptions core to the science maintain scrutiny and occasionally undergo either modification or full refute. Of the three master surfaces that bind systems tracts (i.e., the subaerial unconformity [SU]; maximum regressive surface [MRS]; and maximum flooding surface [MFS]), two have recently seen substantive modification. Changes in assumptions for development of the SU and the MRS not only change their interpretive meaning, but also change how these surfaces are mapped. Newer views on scour of the sequence-bounding “subaerial unconformity” show that it does not actually record a surface of exposure and near complete bypass of sediment at lowstand as originally presumed, but rather records a composite surface formed by lateral migration and incision of rivers that ‘cut-and-cover’ the subaerial unconformity throughout regression.

This cut-and-cover process means that fluvial sediment is deposited above this surface throughout the regressive and transgressive phase. This has ramifications for interpretation of these surfaces and their bound deposits. First, since deposition occurs continuously over the SU during its formation, the subaerial unconformity is neither subaerial or an unconformity, is laterally diachronous, and can also have rocks above that are locally older than rocks elsewhere below. Second, since transport of sand lags transport of suspended load, regressive fluvial sediments disproportionally sequester the sandy fraction, and the assumption that large wedges of sandy sediment are deposited at lowstand is challenged. Lastly, the MRS is above the fluvial strata capping the SU and is not the same as the SU updip of lowstand onlap. These implications do not negate the usefulness of these surfaces, but do modify how these surfaces are used and sequence stratigraphy is executed.

Biography

John M. Holbrook does fundamental research and private consulting (petroleum and environmental industries) within the fields of sedimentary geology and stratigraphy. His specialization is sequence stratigraphy and fluvial stratigraphy and he is a Professor at Texas Christian University (since 2011). He holds the following degrees: B.S. University of Kentucky; M.S. University of New Mexico; Ph.D. Indiana University. He worked from 1992-2004 at Southeast Missouri State University, University of Texas at Arlington (2004-2011), and has been a guest professor at Enugu State, Nigeria; St Petersburg State, Russia; and University of Texas at Dallas. His professional affiliations include GSA, SEPM, AAPG, AGU, and he has served those organizations in the following capacities: GSA Council ‘11-‘15; President GCSSEPM

2010; Vice-chair Missouri Board of Geologist Registration 2002-2004; Chair GSA Sedimentary Geology Division and SEPM Counselor (Research Counselor) 2008-2010; SEPM Annual Meeting Organizing Committee (Funding Coordinator 1998 & 1999; Oral Technical Chair, 2008; Poster Chair, 2010); AAPG Distinguished Lecturer 2015-2016. He has worked on numerous funded industry and research stratigraphic projects globally and sat proposal review panels for PRF, NSF, and USGS. He is one of two Principle Investigators for the Fluvial Research Group (FRG) industry consortia administrated at the University of Leeds and is the U.S. coordinator.

MGS Luncheon Meeting

Tuesday, December 8th

11:45 am – Billings Petroleum Club

Please join us for lunch (\$14) and the talk (no charge)

RSVP – montanageologicalsociety@gmail.com

An email reminder will be sent 3 days prior to the talk



GARY HUGHES

Geologist Generalissimo Jefe Mayor
SM Energy Company

The Crazy Mountains Basin: Geology at its Best

Central Montana

The Crazy Mountains basin and surrounding areas offer something for every geologist. Any hard rock geo will lose himself in the 2+ billion years old Precambrian metamorphics along the Beartooth Front; particularly within the Archean Stillwater complex where multiple metal zones form a unique and very rare deposit. The sedimentologist and stratigrapher can enjoy any number of relationships in the sediment package, from the Paleozoic section up through the early Tertiary strata. Paleozoic rocks are a bit thinner compared to equivalent rocks to the southeast in the Bighorn Basin. Specifically, the Permo-Penn strata are continually truncated northward to a feather edge. In addition, the upper Cretaceous through early Tertiary sediments are more than 15,000 feet thick and record the un-roofing of uplifts to the west that was accompanied by volcanic activity in the Elkhorn Mountains.

The Crazy Mountains basin is a haven for any structural geologist. The western side of the basin lies in a complex structural area that was impacted by both Cordilleran (Sevier) and Laramide structural styles. Along the northern and southern margins of the basin, one can observe the interplay of Laramide “thick skinned” uplifts and left-lateral strike-slip lineaments creating world class structural interpretation challenges.

Of all the geological professions, petroleum geologists have been the most disappointed in the Crazy Mountains basin. Many “sheep herder” anticlines along the basin margins are devoid of production. Other closures produce dry gas and smaller amounts of oil from lower and upper Cretaceous sandstones. Recent attempts to define basin-centered shale gas plays have perpetuated the disappointment. As a glimmer of hope, an under-explored structural zone that resides in immediately east of the deep basin may offer potential for combination traps formed within the Cretaceous Dakota, Frontier, and Eagle sandstones.

About Gary Hughes:

Gary Hughes received his B.A. degree in 1976 from Augustana College in Rock Island, IL and his MS degree in 1980 from Montana State University, Bozeman, MT. He worked at Texaco, Inc. in Denver, CO for 14 years, working most of the Wyoming and Montana basins. He moved to Billings, Montana in 1994 to work for NARCo, a subsidiary of Montana Power. There he worked the Green River and Anadarko basin. In 2000 and for the next 10 years, Gary started Hughes Exploration, Inc. providing geological consulting services across various Rocky Mountain basins and developing and selling prospects. From 2010 to the present, Gary works in a full time position at SM Energy.

MGS MEMBERSHIP RENEWAL

Its that time of year again--membership renewals for 2016. This year we are able to offer quick and easy renewal online via **PayPal**. You can even pay as a guest if you don't have a PayPal account. Instructions for PayPal renewal are located on page 5.



Of course you can still renew via mail. Please print off the renewal form on page 6, fill it out and mail it in along with your dues for 2016 to the PO Box below. Be sure to update your contact information for our records if you have recently moved or changed employment.

We appreciate your efforts to help maintain and grow the association and look forward to another great year!

Best Regards,
The MGS

Please mail your form and dues to the address below:

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To become a member or update your contact information, apply online at:

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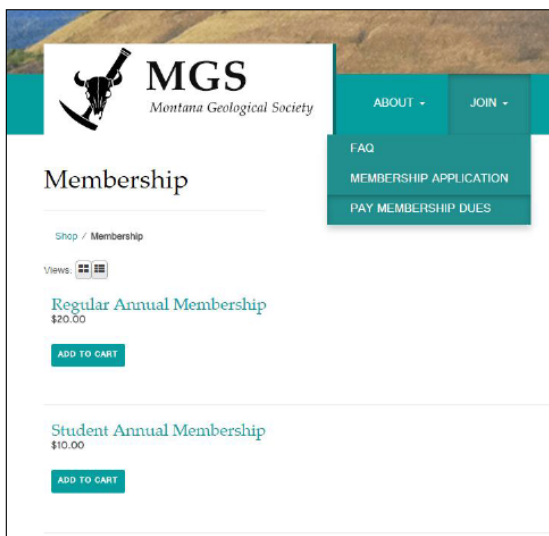
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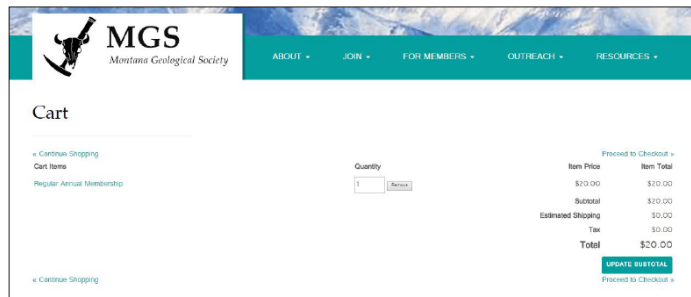
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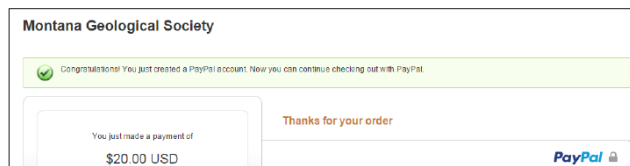
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It's just that easy!

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MONTANA GEOLOGICAL SOCIETY

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Cordially invites you to the
2015 Oilies Christmas Party



Where: **The Petroleum Club**

Crowne Plaza Hotel – 22nd Floor
27 N. 27th St, Billings, MT

When: **Thursday, December 17th, 2015**
5 pm to 10 pm

What: Live music, food, beer and wine.
Cocktails available for purchase

**Come eat, drink and be merry while making
great industry contacts.**

Should you or your company care to make a donation towards this event, please contact your society.





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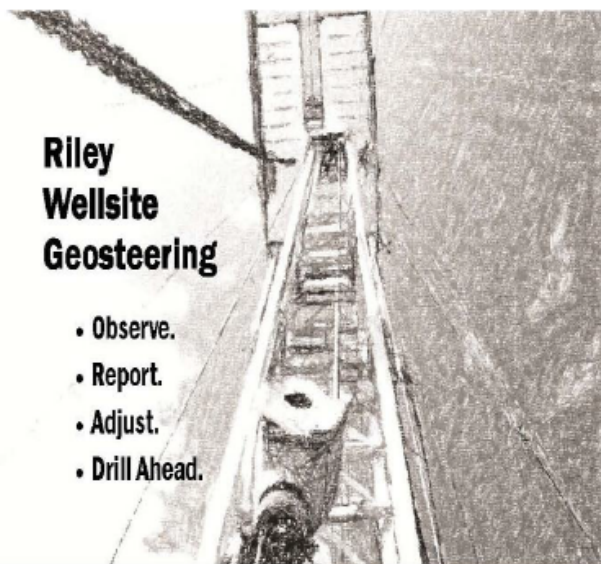
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