



MONTANA GEOLOGICAL SOCIETY

NEWSLETTER

MGS Vol. 54 No. 7

September 2010

**MGS "Beer Thirty" Mtg.
Friday, Sept 17th, 2010
4:30 pm**

**Jim Sears
University of Montana**

**"Rafting Siberia in search
of the other half of the Belt:
Implications for the origins
of the Montana Rockies"**

See Announcement on Page 3

**Field Trip
Sat, Sept 25th, 2010**

**Meandering River
Deposits, Modern
and Ancient**

**Leaders:
Larry Jones &
Gary Thompson**

See Announcement on Page 4

Members who do not
receive an e-mail reminder
can RSVP 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

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PRESIDENT'S LETTER

Andrew Urie

Okay, wow, what happened to the summer? For those of you who live outside the state and don't follow the weather of the entire country like my Father seems to, it's been a wet, mostly cool, very short summer here in Big Sky Country. I personally came to this realization while returning from a brief Holiday weekend on the Montana trail in Anaconda, Fairmont, and Missoula. It was a really nice trip but on Monday afternoon while my wife and I were driving back to Billings I noticed that the Absaroka, Crazy, and Beartooth Mountains were all sporting a fresh coating of crystal white snow. That means only one thing, fall has officially arrived and it's time for the MGS Newsletter once again. So I hope you all enjoyed your summer, however short or long it was and are ready for a great season of MGS activities!

Were getting things kicked off early and with a bang in a sign of things to come for the year. Up first, we have Dr. Jim Sears from the University of Montana dropping by in just a few weeks for an afternoon discussion. Jim is an expert in Rocky Mountain tectonics and structural geology and a fascinating outside the box thinker. If you haven't had a chance to meet Jim or hear him lecture I strongly encourage you to stop by on the 17th of September at the P-Club. You can find more information inside.

Also in September Dr. Larry Jones will be leading a field trip to follow up on his fluvial geology discussion from his luncheon talk in March. Larry will take us to a few stops looking at both modern and ancient fluvial systems in outcrop. It should be a great one day trip. Again you can find a short description and schedule inside the newsletter. And that is just the beginning, we had a great turnout for the annual Kabeary Memorial Golf Tournament, coming up we have a full slate of AAPG Distinguished Lecturers penciled in for the year, and were working on a few other exciting opportunities that you'll hear more about as the year progresses.

But here is where it gets tricky, we also need your help. As you know the society is run by the Board of Directors and a group of elected volunteers. Every year we must choose a new candidate for the Officers rotation so I'm asking for suggestions. If you know of anyone that may be a good candidate to join the ranks of the Officers of the MGS please email me. Elections will be held at the first AAPG Distinguished Lecture Luncheon later in the year.

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President's Letter continued...

With that, it's time to put my nose to the grindstone. I look forward to seeing you all again this season and working to make the MGS a vibrant and rewarding society for all its members. As always drop me an email with any question of suggestions. I'm always looking for a few good ideas. Thanks!

Take care of yourselves and each other,

Andrew

Ancient Mantle Rocks and the Geochemistry of Early Earth Researchers use hydrogen isotopes to identify ancient mantle rocks under Baffin Island

Scientists have discovered a new window into the Earth's violent past. Geochemical evidence from volcanic rocks collected on Baffin Island in the Canadian Arctic suggests that beneath it lies a region of the Earth's mantle that has largely escaped the billions of years of melting and geological churning that has affected the rest of the planet. Researchers believe the discovery offers clues to the early chemical evolution of the Earth.

"This was a key phase in the evolution of the Earth," says co-author Richard Carlson of the Carnegie Institution's Department of Terrestrial Magnetism. "It set the stage for everything that came after. Primitive mantle such as that we have identified would have been the ultimate source of all the magmas and all the different rock types we see on Earth today."

Carlson and lead author Matthew Jackson (a former Carnegie postdoctoral fellow, now at Boston University), with colleagues, using samples collected by coauthor Don Francis of McGill University, targeted the Baffin Island rocks, which are the earliest expression of the mantle hotspot now feeding volcanic eruptions on Iceland, because previous study of helium isotopes in these rocks showed them to have anomalously high ratios of helium-3 to helium-4.

Helium-3 is generally extremely rare within the Earth; most of the mantle's supply has been outgassed by volcanic eruptions and lost to space over the planet's long geological history. In contrast, helium-4 has been constantly replenished within the Earth by the decay of radioactive uranium and thorium. The high proportion of helium-3 suggests that the Baffin Island lavas came from a reservoir in the mantle that had never previously outgassed its original helium-3, implying that it had not been subjected to the extensive chemical differentiation experienced by most of the mantle.

The researchers confirmed this conclusion by analyzing the lead isotopes in the lava samples, which date the reservoir to between 4.55 and 4.45 billion years old. This age is only slightly younger than the Earth itself. The early age of the mantle reservoir implies that it existed before melting of the mantle began to create the magmas that rose to form Earth's crust and before plate tectonics allowed that crust to be mixed back into the mantle.

Many researchers have assumed that before continental crust formed the mantle's chemistry was similar to that of meteorites called chondrites, but that the formation of continents altered its chemistry, causing it to become depleted in the elements, called incompatible elements, which are extracted with the magma when melting occurs in the mantle. "Our results question this assumption," says Carlson. "They suggest that before continent extraction, the mantle already was depleted in incompatible elements compared to chondrites, perhaps because of an even earlier Earth differentiation event, or perhaps because the Earth originally formed from building blocks depleted in these elements."

Of the two possibilities, Carlson favors the early differentiation model, which would involve a global magma ocean on the newly-formed Earth. This magma ocean produced a crust that predated the crust that exists today. "In our model, the original crust that formed by the solidification of the magma ocean was buoyantly unstable at Earth's surface because it was rich in iron," he says. "This instability caused it to sink to the base of the mantle, taking the incompatible elements with it, where it remains today."

Some of this deep material may have remained liquid despite the high pressures, and Carlson points out that seismological studies of the deep mantle reveal certain areas, one beneath the southern Pacific and another beneath Africa, that appear to be molten and possibly chemically different from the rest of the mantle. "I'm holding out hope that these seismically imaged areas might be the compositional complement to the "depleted" primitive mantle that we sample in the Baffin Island lavas," he says.

Source: <http://geology.com/press-release/ancient-mantle-rocks/>



MGS “Beer Thirty”
Friday September 17th

4:30 pm – Billings Petroleum Club

Please join us for free beer and appetizers before, during, and after the talk



JIM SEARS, PHD

Professor of Structural Geology
University of Montana, Missoula

**Rafting Siberia in search of the other half of the Belt:
Implications for the origins of the Montana Rockies**

The Belt strata of the Montana Rockies originated in a rift basin in the interior of a supercontinent. That continent split apart, and half of the Belt strata drifted away. Sears makes the case that the other half of the Belt is in Siberia, and that the continental separation happened in the early Cambrian through Permian as Siberia slid along coast-parallel transform faults to its eventual collision with the Ural Mountains. The separation opened the marine basin that evolved into the Cordilleran continental shelf and later into the Rocky Mountains.

Biography

Dr. Sears received his BS degree in Geology from Northern Arizona University in Flagstaff, Arizona in 1971, his MS degree in Geology from the University of Wyoming in Laramie in 1973 and his PhD in Geology from Queen's University in Kingston, Ontario in 1979. He has been a professor of structural geology at the University of Montana for 28 years. He won the University Distinguished Scholar Award in 2008.

His current research interests are in tectonics of northeast Russia, thrust kinematics of the northern Rocky Mountains; restoration and tectonic interpretation of the Precambrian Belt basin; influence of the Belt basin on the Paleozoic stratigraphy and sedimentology of the Helena embayment; history of rifting along the western margin of Laurentia; Precambrian plate restorations; the origin of hotspots; and Middle Miocene and younger extensional tectonics of SW Montana as related to the Yellowstone hotspot. He believes in field geology, mapping, and combined stratigraphy, sedimentology and structural analysis. He also directs the University of Montana field geology course in the Dillon area of SW Montana.



MGS Field Trip

Saturday Sept 25th

Meandering River Deposits, Modern and Ancient

Leaders:

Lawrence S. (Larry) Jones & Gary Thompson

This trip is a follow-up to the MGS St. Patrick's Day talk given by Larry Jones about fluvial reservoir geometries and subsurface fluvial correlation. Participants will visit two of the localities described in the talk. At the first stop, an actively meandering reach of the Clark's Fork will be used as the basis for a discussion of fluvial processes and to show meso-scale geometries common to meandering rivers. At the second stop, a fresh road cut exposes a complex mosaic of lithologies and geometries that participants will attempt to interpret. This road cut provides a graphic example of the reasons why attempts at subsurface fluvial correlation can result in weeping, wailing, gnashing of teeth, and self-inflicted hair loss. A final stop will show some well-developed lateral accretion surfaces from several small channels in a fluvial? tidal? deltaic? portion of the upper Eagle Sandstone.



LOGISTICS:

- Meet at Holiday Inn (Convention Center, North Side of complex) Parking Lot at **7:45 AM-Saturday, Sept. 25th**.
- Bring a lunch.
- Private vehicles will be used; Car pooling will be decided that morning. Volunteer drivers will be needed.
- We will **leave at 8 AM** and meet field trip leaders at Riverside Park in Laurel at 8:30 am.
- Plan on being out most of the day.
- No long Hikes involved.

Contact Gary Hughes with questions: 406-861-2072 cell, ghughes@sm-energy.com

7th Annual Gary Kabeary Memorial Golf Tournament

(Formerly known as MGS/MAPL Golf
Tournament)



The Gary Kabeary Memorial Golf Tournament was held July 9th at the Laurel Country Club and was a great success. There was a fantastic turnout with 94 golfers taking a swing. Thanks to the support of all those who participated we managed to raise \$1000 for the Montana Geological Society.

1st Place Team:

Don Skadeland, Chris Forsberg, Kim Hennessy, Ron Santi

2nd Place Team:

Tucker Hayes, Robbie Balsam, Andy Balsam, Jacob Knox

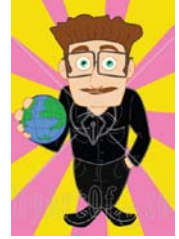
3rd Place Team:

Sam Diemart, Ryan Kabeary, Dona Kabeary, John Pannell

**A special thanks to Keven Reinschmidt for
organizing the tournament.**

And a BIG THANK YOU to the sponsors. We had an all time high for flag sponsorships and donations this year! If you see these folks around, please thank them for their support!

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Announcing the.....

MGS Teacher of the Year Award!

The MGS would like to recognize outstanding K-12 earth science teachers in Montana and reward them for all their hard work. Each year the most deserving candidate will be selected by the MGS Board and Officers

to receive **\$250** from the MGS. Winning at the MGS level qualifies the candidate to submit their application at the regional level to the RMS-APPG (Rocky Mountain Section AAPG). Candidates will receive **\$300** from RMS-AAPG for submitting their application and the winning candidate at the regional level will receive an additional **\$200** and will represent the RMS-AAPG at the national level. Winners at the national level will receive a **\$5000** award (\$2500 for the teacher and \$2500 for their school) from the AAPG (American Association of Petroleum Geologists).

That's the potential for **\$5750** in cash awards!

We need you, the MGS members, to get the word out and **nominate** deserving Earth Science teachers.

A completed nomination form (*see following page*) is all that we need to get the process started. So PLEASE! nominate, or get someone you know to nominate a teacher that deserves to be recognized. Members and Candidates will find that the nomination/application process is simple and the paperwork is minimal.

What better way to promote the earth science in the state of Montana than to reward and show appreciation toward those who do it everyday?



**Nomination form for
Montana Geological Society
K-12 Earth Science Teaching of the Year Award***

**\$250 award for successful applicant and eligibility to apply for additional awards up to \$5000 through the American Association of Petroleum Geologists (AAPG)*

Teacher Contact Information

Name of Teacher	
School	
School Address	
City ST ZIP Code	
Home Phone/Work Phone	
E-Mail Address	

Teaching Information

Current Position & Grades Taught	
Number of years teaching	
Other subjects taught	
Degree(s) and Year Earned	

Qualifications for Nomination

- Minimum of three years teaching experience at any K-12 level.
- Teaching at least one unit per year on natural resources. Natural resources are defined as Earth materials used by civilization and include: 1) Organic materials such as petroleum, natural gas and coal, 2) Inorganic substances such as mineral ores, building stone and aggregates, 3) Energy resources from the earth such as geothermal energy.

Basis for Nomination: Describe qualifications of candidate. Use additional pages if necessary

Nominated By:

Name _____ Phone Number _____

Email Address _____

On the Rocks

MGS Officers Andrew Urie and Andy Hennes got out on the rocks this past July during the RMAG/COGA meeting in Denver. The well attended Niobrara field trip visited an outcrop of the entire section along the Front Range just outside Boulder, CO, as well as a freshly blasted wall at a portland cement quarry outside of Lyons, CO.

Please submit your own photos and stories when you were found on the outcrop. We would like to share them in the newsletter.



CALL FOR MISSING ROAD LOG BINDER

PLEASE HELP!

The MGS is missing 1 volume of a 2 volume set. These volumes are a compilation of MGS Road Logs through 1986 in older black 3-ring binders. The missing volume contains road logs from 1968 – 1986 and was loaned out some time ago.



If you have any information on the whereabouts of the missing binder please contact:

Duncan McBane

Phone: (406) 247-8719,

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MGS Calendar and Reminders

- Sept. 12-15 [AAPG International Conference & Exhibition](#) – Calgary, CA
- Sept. 17 **MGS Beer Thirty - Jim Sears, University of Montana, Rafting Siberia in search of the Belt**
Petroleum Club, Billings, MT
- Sept. 25 **MGS Field Trip – Larry Jones & Gary Thompson, Meandering River Deposits; Modern and Ancient**
Billings, MT
- Sept. 28-29 [PTTC Completion & Stimulation of Horizontal Wells in Tight](#) , Denver, CO
- Oct. 12-13 [PTTC Low Resistivity, Low Contrast Pays](#), Golden, CO
- Oct. 13 **MGS Luncheon – Steve Sturm , Schlumberger, Specialty Log Evaluation of the Bakken**
Petroleum Club, Billings, MT
- Oct. 21 **MGS Luncheon – Peter Larson, Washington State University, Yellowstone Paleo-Hydrothermal Events,**
Petroleum Club, Billings, MT

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Submission deadline for the MGS Newsletter is the 20th of each month.
Submit requests to Newsletter Editor.
Andy Hennes
ahennes@sm-energy.com 245-6248

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