



MONTANA GEOLOGICAL SOCIETY

NEWSLETTER

September 2015

MGS Vol. 59 No. 5

MGS Luncheons:

Oct 21st : E.P. Preston Kerr IV
presents *Unlayering the
Shannon Formation* page 7

Oct 27th: Sam Fluckiger and
Jeff Zawilla present
*Predicting Reservoir
Heterogeneity in the Upper
Cretaceous Frontier Formation
in the Western Powder River
Basin – An Integrated
Stratigraphic, Sedimentologic,
Petrophysical, and Geophysical
Study* page 8-9

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

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MGS Members,

Wow, that summer sure blew by quickly didn't it! Seems like just yesterday I was packing away my winter coat in anticipation for the summer of Geology to begin. The cold winter winds (and fresh powder for skiing) will be here before we know it. Much like the passing of the summer, it is crazy for me to think that my time as an active MGS Officer is also beginning to wind down. Elections will be happening in the next few weeks, and after that I will be moving on from MGS President to Past President. I think back about the time that I have served, and two things that definitely stick out in my mind are the numerous service activities that he have had, and the amazing lecturers, both local, and from all over the world. For anyone that hasn't participated, in the spring the MGS volunteers at both the Billings Clinic Science Expo, and Chicks in Science. Both of the events are aimed at teaching Billings' youth about different careers in the sciences, and are A LOT OF FUN! For anyone who hasn't yet volunteered, I recommend you give it a try this year. As I mentioned previously, it is time for our annual MGS officer elections. This year we are going to be trying something different by holding our elections completely online. In the next few weeks you should get an email from our Secretary, Sarah, describing the process. In the meantime, I would like to introduce you to our upcoming candidates. Before that, I want to give a HUGE SHOUTOUT to Jessica Renstrom. She has been serving on the Board for the past two years, but will be stepping down this year as her time will be spent caring for her soon to be newborn. While she will not serve in an official capacity, she will still be active in the organization. Anyone who has worked in the MGS is familiar with the great help that she has lent the group. With that, we will be holding elections for not only Secretary, but also Treasurer. Our two candidates at the moment for those positions are Preston Kerr, of SM Energy, and Felipe Pimentel, of Sunburst Consulting. We will be in very good hands with them joining the board. In addition to that, per our new MGS Bylaws, Duncan McBane will step down, and Betsy Campen will be up for reelection. Both Duncan and Betsy have been, and continue to be huge assets to the society. Mike (Bear) Bryant will be up for election to replace Duncan. I have attached short bios for Preston, Felipe, and Bear Bryant below. Please introduce yourself at the meetings.

Once again thank you for all of your help and guidance over the years,

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MGS Officer Candidates:

MGS Secretary - Felipe grew up in South Florida with his parents and two sisters. While working in retail management and attending school at the University of Florida in Gainesville, he discovered his affinity for geology. After graduating with a B.S. he decided to trade beaches, sandals and scorching summers for mountains, hiking boots and cold winters and moved across the country to Montana to become a well-site geologist with Sunburst Consulting. He took the position of Senior Geologist with Sunburst in February 2011 and began overseeing wells from their Billings office. In July 2014, he assumed the role of Chief Development Officer. Current duties have him overseeing Williston Basin projects and facilitating the training and development of wellsite geologists. His experience includes wells in the Williston, Powder River and DJ Basins. He is a member of MGS, RMAG, and AAPG. Felipe is honored to have been nominated to serve as an officer in the MGS and looks forward to cementing its role as a promoter of science education--especially with Montana youth.

MGS Treasurer - Preston Kerr is a geologist at SM Energy Company in Billings, Montana. He received a bachelor's degree in geology from the University of Colorado, and a master's degree in geology from the University of Oklahoma. He is currently pursuing his master's degree in business administration through the University of Montana.

Upon completion of his undergraduate degree, Preston worked as a Geologist and Operations Coordinator for Richardson Operating Company in Denver, Colorado for 1 year before returning to graduate school. After receiving his master's degree, he joined SM Energy's Southern Rockies Asset Team and has been working late Cretaceous siliciclastic reservoirs in the Powder River Basin of Wyoming for the past 2.5 years. Most recently, his focus has been on the reservoir modeling and development planning of the Shannon and Sussex formations.

New Board Member – Mike Bryant went through the membership chairs starting in 1978. President MGS in 1980-81. Co-chairman for SW Montana field conference in 1980-81, and again NW Montana in 1984. Board of Directors for a couple of years after that. Some kind of committee chair during the AAPG section meeting in 2006 (?) here in Billings. B.S. geology University of Tulsa, 1973, Moved back to Montana same year and started with Montana Power Co., in Billings. Fourth generation oil patch in my family and worked 46 years in the petroleum business.

From the Field Trip Coordinator, Gary Hughes

I'll start out by apologizing for arranging only 1 field trip this summer. We usually strive for 2. This past summer got the best of me, so 1 field trip was all I could arrange. But what a great trip it was.

Ennis Geraghty, with Stillwater Mining Company, led an excellent field trip to the Benbow area, along the Beartooth Mountain front. Ennis presented evidence at multiple stops for more than 11 repetitions of Cambrian-Precambrian section on backthrusts along the Beartooth Front. My biggest take-away was how the layered cumulate strata of the Precambrian acted similarly to the Paleozoics strata in terms of thin-skinned tectonic behavior.

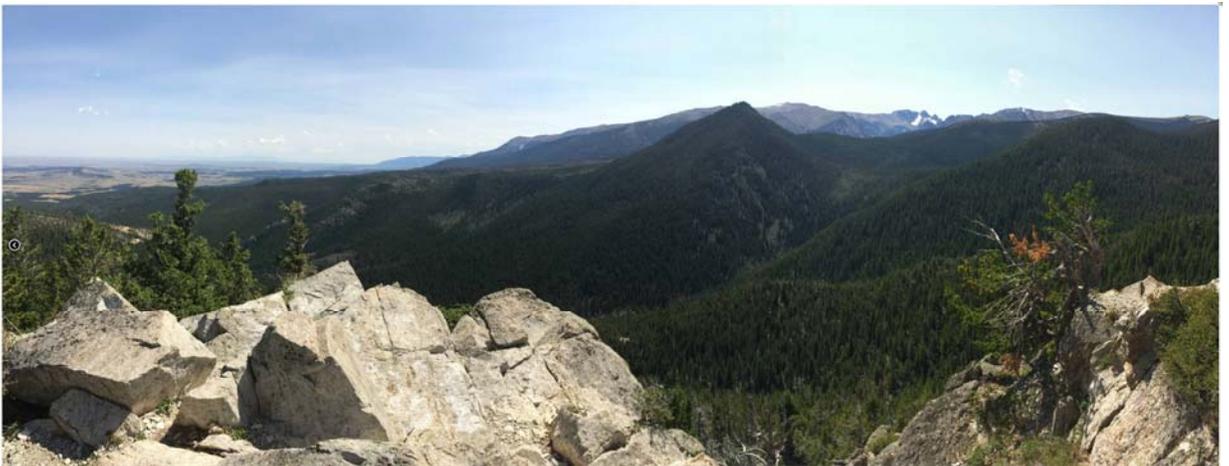


Further, for this 34+ year petroleum geologist, it was interesting to be introduced to new rock names, such as Bronzite, Norite, and Gabbronite; rock types I've always lumped as "basement". I suspect Ennis refers to Paleozoic and younger strata as "overburden."

It was also interesting to note how field geology is still irreplaceable. Observed field relations dictate core programs and initial shaft design and direction for the mining company. Someone on the trip mentioned that the best geologists in our profession have looked at a lot of rock. Ennis is definitely one of those geologists. It was great to see Ennis' hand drawn field maps and cross-sections, evidence of a perpetual evolution of ideas. Thank you Ennis for a great day of sharing those ideas, and reminding us why we all got into this in the first place.



And a final thank you to those that attended. It was a great turnout. We had 29 people attend the trip, and a total of 11 cars following Ennis up the mountain on those narrow mining roads. Many of the attendees submitted their pictures; check out the MGS website to view them.





I have ideas for next summer, which include a one day canoe/raft trip on the Missouri looking at the lower Cretaceous section, led by Bill Hansen. If you have an idea for a field trip, please let me know. If you can lead a trip, that's even better.

I hope you had a great summer. See you at the luncheons.

Gary





Glacial erratics at Froze-to-Death Lake in the Beartooth Mountains Labor Day 2015



(Goat for scale, photos Kevin Chandler)

MGS Luncheon Meeting

Tuesday, October 21st

11:45 am – Billings Petroleum Club

Please join us for lunch (\$14) 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

E.P. PRESTON KERR IV

Geologist II

SM Energy Company

Unlayering the Shannon Formation

Powder River Basin, WY



The Shannon formation is an emerging resource play in the Powder River Basin, and has been a targeted interval in the basin since the late 1800's. Historical development includes several prolific conventional fields, such as Teapot Dome and Hartzog Draw. In many cases, the term “resource play” is associated with formations that are inherently rich in TOC or are vertically proximal to a known source rock. The contemporary evolution of horizontal drilling and stimulation practices, however, has re-opened historic basins in areas that contain conventional-like carrier beds that were once deemed too tight to be developed with vertical wells. The Shannon formation in the Powder River Basin is not juxtaposed against an obvious source rock, nor is it inherently rich in TOC; but it does exhibit ubiquitous oil saturation and has proven to yield economic returns through unconventional development. Lithologically, the formation is comprised of thin to thick bedded shallow marine sandstones that are often heavily bioturbated, and encased above and below by marine mudstones and siltstones.. Further, log correlations and historic Shannon production trends indicate that higher flow regime clastics were predominantly deposited in a series of NW-SE orientated sand bodies, which act as stratigraphic sweet spots. This talk will be structured to cover three methodologies that allow for a better description of the Shannon reservoir and associated petroleum system: 1) Described “core facies,” and their implications to depositional environment. 2) The establishment of electric “log facies” and the tie to their respective “core facies.” 3) Stratigraphic implications of associated “log facies” mapping.

Biography

Preston Kerr is a geologist at SM Energy Company in Billings, Montana. He received a bachelor's degree in geology from the University of Colorado, and a master's degree in geology from the University of Oklahoma. He is currently pursuing his master's degree in business administration through the University of Montana.

Upon completion of his undergraduate degree, Preston worked as a Geologist and Operations Coordinator for Richardson Operating Company in Denver, Colorado for 1 year before returning to graduate school. After receiving his master's degree, he joined SM Energy's Southern Rockies Asset Team and has been working late Cretaceous siliciclastic reservoirs in the Powder River Basin of Wyoming for the past 2.5 years. Most recently, his focus has been on the reservoir modeling and development planning of the Shannon and Sussex formations.

MGS Luncheon Meeting

Wednesday, October 27th

11:45 am – Billings Petroleum Club

Please join us for lunch (\$14) 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

SAM FLUCKIGER* , ANDY HENNES* , JEFF ZAWILLA* , MICHAEL HOFMANN#

*SM Energy Company, #AIM GeoAnalytics

Predicting Reservoir Heterogeneity in the Upper Cretaceous Frontier Formation in the Western Powder River Basin – An Integrated Stratigraphic, Sedimentologic, Petrophysical, and Geophysical Study

Understanding how stratigraphic and sedimentologic heterogeneity is reflected in wireline logs and seismic attributes is crucial to predict areas of better reservoir development in tight oil plays. This study explores the predictive capability of an integrated geologic, petrologic, petrophysical and geophysical model based on detailed facies analysis of thirteen sediment cores expanded over 400 wireline log suites and 440 square miles of 3D seismic in the western Powder River Basin, Wyoming. The integrated model is focused on the upper Cretaceous (Turonian) Wall Creek member of the Frontier Formation which varies in thickness from <10m to 60m across this area, and contains a complex assembly of lithofacies, ranging from fine-grained mudstones to coarse grained sandstones, with the latter forming the legacy conventional reservoir facies. A total of twelve distinct core facies and three sub-facies were identified based on grain size, physical and biogenic sedimentary features, ichnology, and petrology. Propagation of the core facies at wireline log resolution across a geographically significant and well resolved area was accomplished by employing a principle component analysis technique utilizing standard wireline log suites. The initial twelve core facies were upscaled to nine uniquely identified log (electro) facies based upon their statistical occurrence within each individual log facies. Log facies were subsequently upscaled again into six seismic facies based upon elastic parameters. Favorable elastic and geomechanical properties distinctly correlate to net pay facies derived by wireline logs which in turn correlate to coarser-grained sandstone facies. A simultaneous, geostatistical, prestack seismic inversion was conducted on a 3D seismic volume and probability volumes of encountering each seismic facies in addition to a most likely seismic facies volume were analyzed. The fully integrated results from core to log to seismic facies along with 3D seismic inversion-derived reservoir parameters calibrated to well control offer an added geologic comprehension of the stratigraphic architecture and reservoir distribution in the Wall Creek member as well as highlighting areas of better reservoir development potential thereby demonstrating the significant value of this integrated approach.

Biography



Samuel David Fluckiger is a senior Petrophysicist at SM Energy Company in Billings, Montana. He received a bachelor's degree in geology from Utah State University, and a master's degree in Geophysics from the University of Utah.

Upon completion of his undergraduate degree, Sam worked as a wireline field engineer for Schlumberger Oilfield services offshore in the North Sea, based out of the Netherlands, Holland. Following his work as a field engineer Sam transferred to the Schlumberger research center (SDR) in Ridgefield, Connecticut U.S.A. working as a research scientist focused on logging measurements. From there, Sam transitioned into a role as an interpretation and development Petrophysicist based in Doha, Qatar in the Middle East. During this time he

focused on developing a market for new technologies as well as providing operational support for wireline engineers working offshore in the Persian Gulf. After spending several years in the Middle East and starting a family Sam decided it was a good time to go back to school and get his Master's degree. Schlumberger graciously offered to fund this endeavor in 2006 and provided an opportunity for internship at TerraTek, an unconventional core analysis company they had acquired earlier that year. After completing his master's degree in 2008, Sam went from interning at TerraTek to full time employment as a Petrophysicist focused on core-log integration. In 2010, Sam was promoted to manager of the petrology and Petrophysics departments within TerraTek where he remained until accepting an offer from SM Energy in December of 2012. In his current role as a Senior Petrophysicist for SM Energy Sam supports two separate asset teams, each having three to four geologists working prospects in the Powder River and Williston Basins. Additionally he supports an exploration team looking for play potential throughout the many basins within the Rocky Mountain Region. His day to day activities are focused primarily on the development of comprehensive reservoir models through the integration of core, log and seismic data.



Jeff has been a seismic interpreter in the oil industry for 18 years working in the Rocky Mountains, Anadarko Basin, North Slope of Alaska, and Caspian Sea for SM Energy, EOG Resources, Phillips Petroleum, and Arco. He specializes in 3D seismic reservoir characterization and integration of seismic data with other geologic and engineering parameters. Jeff has lived in Montana for 4 years and enjoys numerous outdoor recreationally activities that “Big Sky Country” offers.



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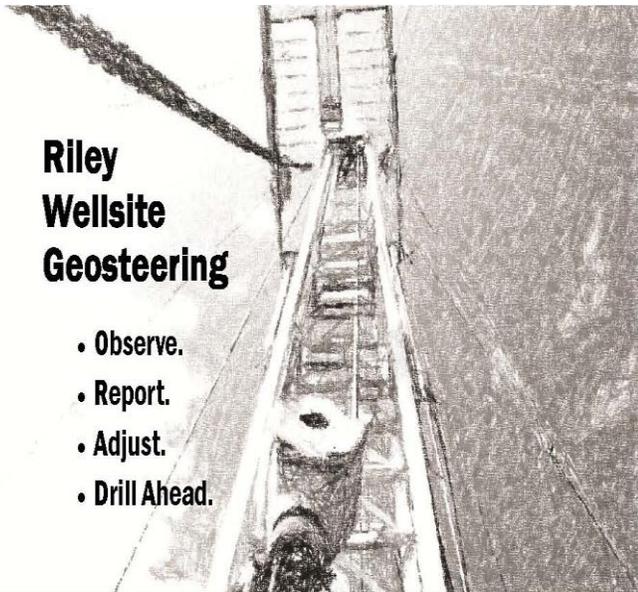
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