



**MONTANA GEOLOGICAL SOCIETY**

# NEWSLETTER

MGS Vol. 53 No. 7

**September 2009**

**MGS Luncheon Meeting  
TUES, Sept 22<sup>nd</sup>, 2009**

**Harris Cander  
BP America**

**“Granite to Grass Roots:  
Understanding the  
Geological History of  
Unconventional Resource  
Basins from Bottom to  
Top”**

See Abstract 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

**Field Trip  
Sat, Sept 19th, 2009**

**Cascade Fire Fallout:  
Debris Flows along the  
West Fork of Rock Creek**

**Leader:  
Drew Downs, Geologist  
US Forest Service**

See Announcement on Page 2.

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## **PRESIDENT'S LETTER – PAT LEMKE**

Sept, 2009

I would like to take the opportunity to thank U of M grad student Joern Hauer for his excellent work on the stratigraphy of the Eagle Sandstone and sharing his ideas and research on the field trip August 29. I have received a number of emails stating that the trip was a great success and I would also like to thank those who were able to attend and support Joern in this way. Dr. Larry Jones from Rocky Mountain College has also made arrangements with Forest Service geologist Drew Downs to lead a field trip to study the debris flows in the West Fork of Rock Creek area in the wake of the Cascade fire of summer 2008. This should be a good opportunity to view some impressive surface processes first hand. The field trip will be Saturday September 19, and more information can be found in this newsletter issue.

The Montana Petroleum Association annual meeting is taking place the first week of September in Billings at the Crowne Plaza hotel. There are several seminars addressing pertinent Montana energy issues as well as a number of other activities and events. More information is available on their website at <http://www.montanapetroleum.org/>. The MPA should also be commended for their efforts in conjunction with the MT Board of Oil and Gas as sponsors of the Montana high school essay contest. Several thousand dollars have been awarded statewide, and this year's first place winner is Patrick McGunagle from Whitefish High School for his essay entitled “The Long and Winding Road toward Renewable Energy”. This essay and other winning essays can be viewed on the MPA website and give a representation of what tomorrow's leaders and some sharp young minds are thinking about the energy picture.

Many members and colleagues in the oil and gas industry have been extremely busy the past few weeks. Wildlife stipulations have come off and several drilling projects have been scheduled for the last quarter. With Cap and Trade legislation on the horizon, no one is exactly sure how this will affect our industry. To be sure, we are in a time of transition. For now it is business as usual as we optimistically plan for the future while moving full speed ahead to finish a strong 2009 drilling season.

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# Cascade Fire Fallout: Debris Flows along the West Fork of Rock Creek

**Leader: Drew Downs, Geologist, US Forest Service**

**Date: Saturday, September 19th**

**Two meeting options - pick the most convenient for you:**

8:00 a.m., depart from the Holiday Inn parking lot by the Convention Center, travel to Red Lodge Ranger Station by private vehicles.

9:00 a.m., depart from Red Lodge Ranger Station, west side Red Lodge.

**Caution: this trip will involve strenuous hiking in an area with no trails, large boulders, downed trees, falling trees, and unstable slopes. We do not intend to discourage participation, however we wanted to make everyone aware of the potential hazards that will be encountered on the trip**

## Abstract

The Cascade Fire started July 26, 2008 and lasted over a month burning approximately 10,200 acres of the West Fork of Rock Creek just to the west of Red Lodge, Montana. Short duration, high intensity precipitation coupled with the steep, concave slopes, lack of vegetation, coarse soil, and decreased ability for infiltration caused a number of debris flows in the small tributaries of the West Fork of Rock Creek in late July 2009. These flows clogged culverts, blocked roadways, and covered eroded trails making access to the area difficult. These events also have created a great field area to observe debris flow and alluvial fan processes and landforms.



Participants on this trip will visit a fresh and well-exposed debris flow at Blacktail Creek, where an alluvial fan at the creek mouth shows classic, abrupt downstream fining of sediment, natural levees, poor sorting, and other features of interest. Other geomorphic features that can be observed including fire-caused spalling, braided streams, late-stage dissection, and even quicksand in the immediate area.



Do you recognize these fellows?

If so, please join The University of Montana Department of Geosciences and friends for a technical symposium, banquet, and "Belt BBQ" as we celebrate the professional contributions of

Donald Winston II  
and  
Graham R. Thompson



Don

September 11, 2009  
The University of Montana  
Missoula, Montana

September 12, 2009  
Jocko River Road, Arlee, MT



Gray



**For more information navigate to**  
[http://umt.edu/geosciences/WinstonThompsonSymposium/Winston\\_Thompson\\_evite\\_small.pdf](http://umt.edu/geosciences/WinstonThompsonSymposium/Winston_Thompson_evite_small.pdf)  
**or contact Loreen Skeel at (406)243-2341**

# MGS Luncheon Meeting Tuesday Sept 22<sup>st</sup> at 11:45AM

## Lunch will be served for \$13.00

### 2009-10 AAPG Distinguished Lecture

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HARRIS CANDER

BP America, Houston, Texas  
Funded by the AAPG Foundation

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## **Granite to Grass Roots: Understanding the Geologic History of Unconventional Resource Basins from Bottom to Top**

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The competition for unconventional resources in North America has resulted, in some cases, to acquisition of acreage prior to thorough understanding of subsurface technical risks or identification of fairway boundaries and sweet spots. Indeed, the term “resource play” implies to some that subsurface risks are either minimized or irreducible. As well, the term “unconventional gas” connotes that little is to be gained from application of conventional principles of basin evolution and petroleum generation, migration, and entrapment. Under these circumstances, the value of regional geologic understanding of an entire basin prior to acreage capture can be overlooked and the focus turned to completions technology and post-well analysis.

This lecture will discuss the importance of understanding a basin from basement to surface – granite to grass roots – in the search for unconventional fairways. The lecture will include a holistic integration of data and interpretations from basin modeling, petroleum migration modeling, gas isotope data, pressure history, seismic, and reservoir quality. Linkages will be made from microscopic scale observations to tectonic-scale processes. Examples will be given from various North American basins that illustrate how mega-scale features such as basement architecture and Precambrian rift history have a first order and transcendent effect on the evolution and occurrence of unconventional resource fairways, including a strong influence on petroleum generation and entrapment as well as changes in reservoir rock during post-orogenic uplift.

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## **Biography**

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Harris Cander works in BP America’s Exploration and Technology Group and has focused the past few years on global and domestic exploration for unconventional resources. Since joining BP (Amoco) in 1991, Harris has worked in a variety of international and domestic exploration, production, and commercial roles as well as carbon dioxide sequestration projects. Harris is the current co-chairman of the AAPG Unconventional Research Group and a past co-chairman of the AAPG Carbonates Research Group. He has published on unconventional resources, over pressure and hydrocarbon occurrence in offshore Trinidad, exploration in central Europe, and carbonate diagenesis. His talk on carbonate porosity evolution won the award for best presentation at the 1992 SEPM annual meeting. Harris received his Ph.D. in geology from the University of Texas at Austin in 1991 and MBA from Rice University in 2002. He lives in West University Place, Texas, with his wife, Chris, and children, Sasha and Joshua.

## Dinosaur Burrow Find Gives Climate Change Clues

**July 12, 2009 | Emory University**

On the heels of his discovery in Montana of the first trace fossil of a dinosaur burrow, Emory University paleontologist Anthony Martin has found evidence of more dinosaur burrows – this time on the other side of the world, in Victoria, Australia. The find, to be published this month in *Cretaceous Research*, suggests that burrowing behaviors were shared by dinosaurs of different species, in different hemispheres, and spanned millions of years during the Cretaceous Period, when some dinosaurs lived in polar environments.

### *How Polar Dinosaurs Adapted*

"This research helps us to better understand long-term geologic change, and how organisms may have adapted as the Earth has undergone periods of global cooling and warming," says Martin, a senior lecturer in environmental studies at Emory. Martin is also an honorary research associate at Monash University in Melbourne.

In 2006, in collaboration with colleagues from Montana State University and Japan, Martin identified the 95-million-year-old skeletal remains of a small adult dinosaur and two juveniles in a fossilized burrow in southwestern Montana. They later named the dinosaur species *Oryctodromeus cubicularis*, meaning "digging runner of the lair."

The researchers hypothesized that, besides caring for young in their dens, burrowing may have allowed some dinosaurs to survive extreme environments – throwing a wrench in some extinction theories.

### 'Where luck meets preparation'

A year after the Montana find, Martin traveled to the Victoria coast, which marks the seam where Australia once snuggled against Antarctica. Lower Cretaceous strata of Victoria have yielded the best-documented assemblage of polar dinosaur bones in the world.

During a hike to a remote site known as Knowledge Creek, west of Melbourne, Martin rounded the corner of an outcropping and was astounded to see, right at eye level, the trace fossil of what appeared to be a burrow almost identical to the one he had identified in Montana. "I stared at it for a long time," recalls Martin. "In paleontology, the saying, 'where luck meets preparation' really holds true."

The probable burrow etched into the Early Cretaceous outcrop is about six-feet long and one-foot in diameter. It gently descends in a semi-spiral, ending in an enlarged chamber. Martin later found two similar trace fossils in the same area.



### Last period of global warming

The Victoria fossils are about 110 million years old, around the time that Australia split with Antarctica, and dinosaurs roamed in prolonged polar darkness along forested southern Australia river plains. It was one of the last times the Earth experienced global warming, with an average temperature of 68 degrees Fahrenheit – about 10 degrees higher than today.

During the polar winter, though, the temperature could plunge below freezing. Previously, researchers theorized that the small dinosaurs in the region survived harsh weather by sheltering beneath large tree roots or in hollows. Martin's find, however, indicates that they may have dug into the soft banks of rivers flowing out of the rift valley.

The age, size and shape of the likely burrows led Martin to hypothesize that they were made by small ornithomimid dinosaurs – herbivores that were prevalent in the region. These ornithomimids stood upright on their hind legs and were about the size of a large, modern-day iguana.

"It's fascinating to find evidence connecting a type of behavior between dinosaurs that are probably unrelated, and lived in different hemispheres during different times," Martin says. "It fills in another gap in our understanding of the evolution of dinosaurs, and ways they may have survived extreme environments."

### An eye for subtle clues

A specialist in trace fossils – including tracks, scat and burrows – Martin is known for detecting subtle paleontology clues. He also identified the first tracks of a large, carnivorous dinosaur in Victoria, and the first fossil crayfish burrows from the same area.

Martin teaches a seminar at Emory on modern-day animal tracking, a skill that he says aids him in finding signs of prehistoric life. "It's important to do as much field work as possible, because it gives your mind a better library of search images," he says.

**6th Annual Gary Kabeary  
Memorial Golf Tournament**  
(Formerly known as MGS/MAPL Golf Tournament)

The Gary Kabeary Memorial Golf Tournament was held July 10<sup>th</sup> at the Laurel Country Club. There was a great turnout and everyone had a wonderful time celebrating. Thanks to the support of all those who participated we managed to raise \$780 for the Montana Geological Society.

**1st Place Team:**

Eric Fee, Bruce Carlson, Brian Carlson, and Tim Keating

**2nd Place Team:**

John Hauptman, Craig Grassel, Reed Snider, and John Fredlund

**3rd Place Team:**

Given Chase, Tom Kabeary, Tim Kabeary, and Louie Moore

**Special thanks to Keven Reinschmidt for organizing the tournament, and to all those who sponsored this great event in Gary's name.**

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**A heartfelt thank you from the MGS to:**

**Montana & Wyoming Oil Company**

**for their generous donation in the memory of  
former MGS President and all around  
Geo-legend Herb Hadley.**

**Rob, Carol, and Melodee your spirit of generosity and  
kindness of heart are an inspiration to us all.**

**On behalf of all of us at the Montana Geological Society**

**THANK YOU**

# MGS Calendar and Reminders

- August 26-28 Summer NAPE Expo, Houston, TX** Register online at [www.napeexpo.com](http://www.napeexpo.com)
- Sept 2 Petroleum Industry Appreciation Day Luncheon** 11:30 AM Crowne Plaza Hotel, 3<sup>rd</sup> Floor Grand Ballroom C, Keynote Speaker: Niger Innis, National Spokesman, Congress of Racial Equality. Keynote address: "Energy Challenges and Their Impact to the Poor. Contact the Montana Petroleum Association for more information. MPA PO Box 1186 Helena, MT 59624; (406)442-7582; [mpa@montanapetroleum.org](mailto:mpa@montanapetroleum.org)
- Sept 14 PTTCRockies and RMAG Meeting** Unconventional Reservoirs: Oil and Gas Shales and CBM. Marriott Hotel - Downtown Denver. Register online at [www.rmaga.org](http://www.rmaga.org) or contact Sandi Pellesier, (303)573-8621, [admin@rmaga.org](mailto:admin@rmaga.org)
- Sept 21-25 AAPG Fall Education Conference** Theme: The Business of Petroleum Exploration in Unconventionals

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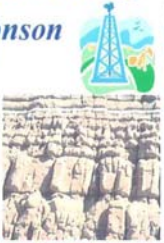
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**Submission deadline for the MGS Newsletter is the 20<sup>th</sup> of each month. Submit requests to Newsletter Editor.**

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