The Rocky Mountain Section Newsletter

March 2012

Association of Environmental and Engineering Geologists

MEETING DATE

Thursday
March 22, 2012

TIME
5:30 - 9:00 p.m.

LOCATION
Colorado School of Mines
Room 243
Berthoud Hall
1516 Illinois St..
Golden, CO 80401
See map below

COST
$25 Members
$27 Non-members
No charge for students

RESERVATIONS
click: aegrms.org/rsvp
or
email:
meetings@aegrms.org

RSVP BY NOON, TUESDAY March 20TH

Student Night 2012
Thursday, March 22, 2012

5:30 - 9:00 pm
Room 243, Berthoud Hall
Colorado School of Mines
1516 Illinois St., Golden CO 80401

We have five abstracts, so Student Night will a poster format with five to ten minute oral presentations. The Grand Prize will be a Brunton GEO Transit!

There will be a
silent auction to benefit the CSM Student Chapter
Please email CSM Student Chair Elliot Matthews
(student-chair @ aegrms.org)
to arrange a donation of item(s) to the silent auction, and please come to Student Night prepared to bid on lots of fun and interesting items!

Student Night sponsors needed!
The sponsor form is on page 6, or click here:
http://www.aegrms.org/2011_Student_Night_Sponsor_Form.pdf

Words from the Chair

Greetings Rocky Mountain Section,

Student Night is this month and we are happy to welcome a good number of student presenters from both the Colorado School of Mines and the South Dakota School of Mines and Technology. Kurt Katzenstein is traveling down from South Dakota with a group of students for the event and the CSM Student Chapter of AEG is working hard with the arrangements for the meeting, including pulling together a silent auction to raise money for their chapter. The students will also be supplying anyone interested with a Resume Book full of resumes of students gearing up to interview and start their careers. We are still accepting sponsorships for this event and thank you in advance to all who donate! All proceeds go toward supporting the students in the section throughout the year.

I'd like to extend another thank you to Jenn Bauer and the AEG Executive Council, as well as to Duane Kreuger and Deb Green for attending our February meeting and lending helpful information and advice to us officers. This group of people work hard and give many personal hours to AEG, and we are grateful for their contributions and efforts. At the February meeting, Jenn Bauer shared her passion for AEG and gave a brief update on what's been going on at the National level in the Association. And thank you to all of those who graciously donated money to AEG at the last meeting - we raised a handsome sum and I'm sure it will all be put to good use!

Send me your Field Photos from 2011-2012! (chair@aegrms.org) If we receive enough responses to this call for photos, we will display all of them at the Family Night meeting in May. I think this would be a fun and educational opportunity for us to share with family and fellow section members what we have been working on over the past year or so. The photos can be interesting geology, unique wildlife or nature shots, photos taken during drilling or mapping, or anything else you can think of! Be creative and dig into your archive of pictures to share with the group.

Thank you and see you at the meeting!

Julia Frazier
Section Chair

Student Night Abstracts

FRIEDMAN, EVAN Q., Colorado School of Mines
Debris-flow hazard assessment and monitoring within the 2010 Medano Fire burn area, Great Sand Dunes National Park and Preserve, Colorado
A debris-flow hazard assessment was produced for the Medano Creek Watershed, at Great Sand Dunes National Park and Preserve, in response to the 2010 Medano Fire that burned approximately 6,000 acres in and around the park. Debris-flow probability and volume predictions were made based on implementation of empirical regression models using GIS. The models integrate data for burn severity, rainfall intensity, topographic characteristics, and soil properties into a hazard assessment for the burned basins of Medano Creek Watershed in response to short duration storm events. Model output provided park resource managers with information on potential basin-specific hazards to roads, campsites, facilities, and park visitors. Monitoring equipment installed in several basins provided information on debris-flow and sediment-laden flood response to the first significant rainfall events following the fire, throughout the spring, summer, and fall of 2011. Measurements of rainfall, observations of debris flow response, and field surveys of deposits provided the basis for model validation. Comparison of rainfall data with pressure head recorded in channels provided insight into the relative timing of flows to peak rainfall.

GARTNER, JOSEPH E., Colorado School of Mines
Predicting locations of postfire debris-flow incision and deposition in the San Gabriel Mountains of southern California
Debris flows following wildfire pose severe hazards to communities located adjacent to the San Gabriel Mountains in southern California. Following wildfire, timely hazard assessments are needed to identify locations where debris flows may erode channel material or deposit large volumes of mud, rock, and debris. In this study we develop a model for predicting locations where debris-flow incision and deposition are expected. This model was developed by analyzing a database of terrain characteristics associated with locations for debris-flow incision and deposition using logistic regression. Air photos document numerous debris flows that occurred in the San Gabriel Mountains following the 2002 Grand Prix fire and were used to map locations of debris-flow channel incision and deposition. A variety of terrain characteristics expected to influence debris-flow processes were calculated for each mapped point using 10 meter resolution DEMs. The model predicts the probability of debris-flow incision and deposition as a function of channel slope, planform curvature and the length of the longest upstream flow path. The model was validated using an independent database of mapped debris flow processes and found to adequately predict locations of debris-flow incision and deposition. This model may be used to provide more specific estimates of the type of debris-flow hazards that exist within a recently recently burned area and will provide insight into the terrain characteristics that influence debris-flow processes.

KOTH, KARL R, South Dakota School of Mines and Technology
Microgravity methods for Characterization of Groundwater Storage Changes and Aquifer Properties in the Karstic Madison Aquifer in the Black Hills of South Dakota
Microgravity measurements were made from 2009 to 2011 by the U.S. Geological Survey in cooperation with West Dakota Water Development District, South Dakota Department of Environmental and Natural Resources, and Lawrence County. Changes in the earth's gravitational pull were used to investigate groundwater storage changes and effective porosity in unconfined areas of the Madison aquifer in the Black Hills of western South Dakota. The microgravity data allowed groundwater storage volume to be quantified with an accuracy of about ±0.5 foot of water per unit area of aquifer.

***KOTH, KARL R* , continued.**
Gravity stations were established on bedrock outcrops in three separate focus areas for this study. The first area, Doty, is located on outcrops of the Madison Limestone and Minnelusa Formation to the northwest of Rapid City, and consists of 11 gravity stations. The second area is located to the south of Rapid City with one gravity station on the rim of Spring Canyon near the area where Spring Creek sinks into the Madison aquifer. The third area, the Limestone Plateau area, consists of a single gravity station in the northwestern Black Hills located on an outcrop of the Madison Limestone.

Comparison of the gravity measurements with streamflow in Spring Creek provided evidence that rapid storage change, responding to changes in sinking streamflow over the recharge area of the aquifer, occurred in the Madison aquifer directly below the gravity station at Spring Canyon. This rapid storage change likely was a result of groundwater movement through caverns, conduits, and fractures, which are common features in karst aquifers. Spatially and temporally separated microgravity data for the Doty focus area indicated horizontal and vertical heterogeneity of effective porosity. One such example of this heterogeneity was indicated by measurements at four gravity stations, which resulted in effective porosity values of 0.05, 0.07, 0.16, and 0.12. A decrease in groundwater storage determined by microgravity measurements during the spring recharge period for five upgradient stations in the Doty focus area indicated the possibility of a rapid release and down-gradient cascading of perched groundwater. Evidence for similar phenomena was documented for Wind Cave and Brooks Cave in the Black Hills. Absolute-gravity measurements at the station in the Limestone Plateau focus area confirmed the relation between water levels in an observation well and groundwater storage change, which resulted in an effective porosity estimate of 0.02 at a single location.

MCCOY, KEVIN, Colorado State University
CO_2 Traps: A New Tool to Monitor Natural LNAPL Loss Rates
Petroleum liquids, referred to as light non-aqueous phase liquids (LNAPLs), are commonly found beneath petroleum facilities. Frequent concerns at petroleum spill sites include expansion and/or lateral translation (i.e. stability) of subsurface LNAPL bodies. Ongoing research at Colorado State University is exploring natural rates of LNAPL losses and associated implications for management of LNAPL bodies.

Recent work at Colorado State University has focused on developing and validating a new tool to monitor natural LNAPL losses. Passive carbon dioxide absorption traps (CO_2 traps) have been manufactured and tested in the laboratory. These CO_2 traps have been deployed at grade above LNAPL bodies at nine field sites. Results of the CO_2 trap field studies to date indicate natural LNAPL loss rates on the order of 100s to 1,000s of gallons per acre per year (gal/acre/year). Similar LNAPL loss rates have been documented by researchers at Arizona State University (Gradient method) and the University of British Columbia (Chamber method).

Per previous research at Colorado State University (Mahler, 2010), LNAPL loss rates of the order of magnitude observed at the nine field sites can reduce expansion / lateral translation of LNAPL bodies. Furthermore, losses on the order of 1,000s of gal/acre/year can rival traditional engineered remedies. Lastly, observed LNAPL loss rates are raising new questions regarding the overall longevity of LNAPL bodies. Ongoing work includes a large scale laboratory validation study, analysis of temperature effects on loss rates, and continued collection of CO_2 trap data at field sites.

Student Night Abstracts, cont.

TIRUNEH, HENOK, South Dakota School of Mines and Technology

Discontinuity Characterization Using LiDAR at the Deep Underground Science and Engineering Laboratory at the Former Homestake Mine

The Deep Underground Science and Engineering Laboratory (DUSEL), that is proposed at the former Homestake Gold Mine in Lead, South Dakota will host a number of research and experiments related to science and engineering. For this purpose the 4850 level was selected as one of the primary campus locations and large excavations were constructed alongside with the existing drifts. A detailed geotechnical investigation has been done at the Davis Campus, consisting of the new large excavations and old drifts, to characterize the rock mass as exposed on the walls. As part of the study scanning was performed using Z&F Imager 5006h terrestrial LiDAR scanner for the purpose of virtual mapping and future excavation modeling. Also a high resolution digital image was taken while collecting LiDAR data points. Benefits of using this type of data collection system include ease of operation, ability to collect data in inaccessible areas, short data acquisition time relative to manual data collection and most importantly pertinent rock mass data can be collected in much greater detail. This LiDAR data set is currently being used to characterize and study the discontinuity properties of the rock mass. Maptek 3D modeling software packages such as Vulcan 8.1.3 and I-Site Studio 3.5 are used to collect discontinuity properties directly from the 3-D model. Characterization of the discontinuities (mainly focusing on persistence and continuity) for the Davis Campus is currently an ongoing topic of research. Preliminary results for the main Davis Chamber access drift are completed and are presented. Output from this ongoing research can be used as an input into 3D discontinuum models to predict the likely behavior of the excavated walls. Moreover it can serve as a permanent database for future references.

THANK YOU to our generous 2012 Student Night Sponsors as of March 5, 2012

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ASSOCIATION OF ENVIRONMENTAL & ENGINEERING GEOLOGISTS

AEG Student Night

Thursday, March 22, 2012
5:30-9:00 PM
Room 243, Berthoud Hall
Colorado School of Mines, Golden, CO

The Association of Environmental & Engineering Geologists (AEG) represents professionals in the field of environmental and engineering geology in the greater Denver area and throughout the Rocky Mountain region. AEG is hosting our Annual Student Night Banquet, where environmental and engineering geology students from across the Rocky Mountain region will present their research as part of this well-attended networking event.

We would like to invite you to participate as a sponsor for the event. This is an exciting opportunity for you to gain recognition for your firm and support student participation in the Rocky Mountain Section of AEG. This event also serves as an excellent recruiting opportunity, as the region's best and brightest students will be in attendance. You are invited to participate at the following sponsorship levels:

SPONSORSHIP OPPORTUNITIES	
Kimberlite Level	**$500**
Rhodochrosite Level	**$250**
Molybdenum Level	**$100**
Galena Level	**$50**
Quartz Level	**$25**

All sponsors will be listed in the Student Night Program, on a poster at the meeting, in the section newsletter, and on the section website (www.aegrms.org). All students who attend this meeting receive complimentary admission so this event would not be possible without the support of our sponsors. We thank you in advance for your generous support!

RESERVATIONS

☐ Individual or ☐ Corporate sponsorship

☐	Kimberlite Level ($500)	Name of Sponsor	_____
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Please RSVP your sponsorship by email, mail or fax no later than **Friday, March 9, 2012.**
Email StudentNight@aegrms.org, fax this form to 303.866.4445, Attn: Jill Carlson, or mail, along with your check (or you may pay for your sponsorship at the meeting) to:

AEG-RMS
P.O. Box 280663
Lakewood, CO 80228-0663

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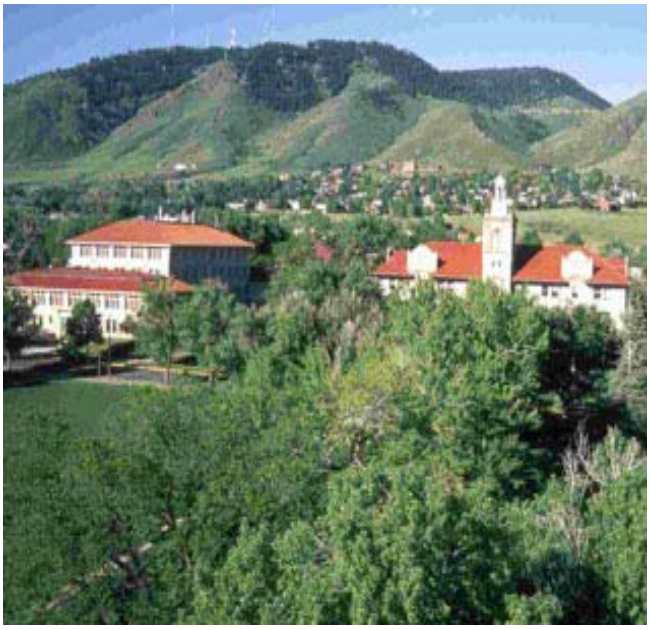

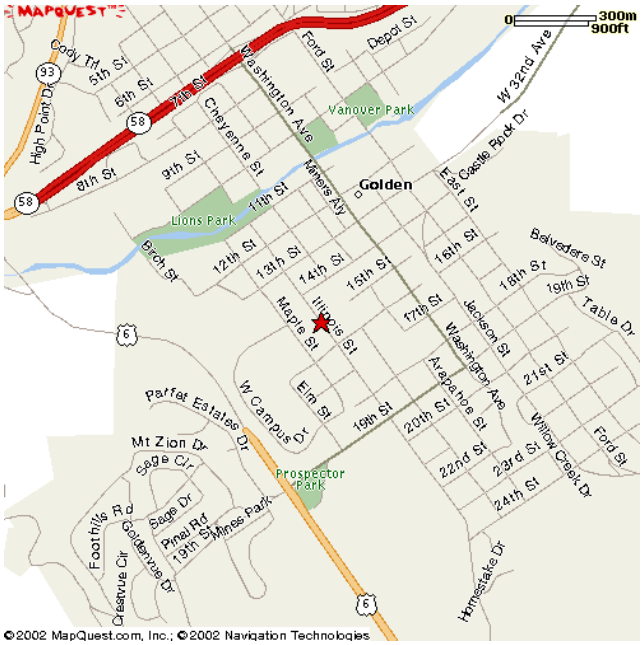

Upcoming Meetings

www.aegrms.org

April 12 — Jamey Turner and Mark Zellman, Fugro Consultants
Empirical Lithology and Shear-Wave Velocity Relationships
American Mountaineering Center, Golden

May 10 — Section Meeting and Family Night,
Speaker Sam Bartlett, Dinosaur Ridge
The Future of Dinosaur Ridge

August (Date TBD) — Hanging Lake Field Trip
Darin Duran, Ed Church and Jon White