

# Association of Environmental and Engineering Geologists

The Rocky Mountain Section Newsletter

MARCH 2008

## MEETING DATE

FRIDAY  
MARCH 28th, 2008

## TIME

5:45 p.m. Social Hour  
6:30 p.m. Dinner  
7:30 p.m. Presentation

## LOCATION

CSM Student Center  
-2nd floor  
1600 Maple  
Golden, Co 80401  
See Map Below

## COST

\$25 Members  
\$27 Non-members  
STUDENTS FREE!

## RESERVATIONS

Kristi Ainslie  
(303) 440-5236  
or  
[meetings@aegrms.org](mailto:meetings@aegrms.org)  
or  
[WWW.AEGRMS.ORG](http://WWW.AEGRMS.ORG)

**BY NOON,  
TUESDAY  
March 25<sup>TH</sup>**

## STUDENT NIGHT 2008

### MORE SPONSORS NEEDED!

The annual Student Night will be this Friday March 28th. There are currently 4 students who will present poster on their ongoing research. Abstracts are located later in the newsletter.

We currently only have 15 sponsors for student night. Please consider contributing to Student Night. This is a chance to give back to the future engineering geologists. The Section provides prizes to the student presenters and also covers the cost of dinner for all of the students. All sponsors will be listed on a posterboard at the meeting, in the section newsletter, and on the section website ([www.aegrms.org](http://www.aegrms.org)). The sponsor ship form is located at the end of the newsletter. Below are the companies that have currently pledged support to Student Night. Don't let you company miss the opportunity to support Student Night!

Diamond Level	GEI Consultants, Inc. LT Environmental Inc.
Platinum Level	Michael W. West and Associates Geobruigg North America, LLC Zonge Geosciences, Inc.
Gold Level	RJH Consultants, Inc. All Service Septic Church Onsite Wastewater Consultants Colorado Geological Survey Investigative Engineers & Geologists
Silver Level	Apex Consulting Services Tunneling Solutions Steve Compton
Bronze Level	Jill Carlson TC Wait

## Words From the Chair

Wow the year is flying by! It is already Student Night time. I would first like to thank David Cushman for running the meeting and Tim Petz for being the Beverage Manager last month while I was down with the Mother of all head colds. Thanks again go out to Alyssa Kohlman of Tetra Tech for speaking about her work at the Garfield County Airport and for stepping in at the last minute. I've heard from several members that the topic was very informative and I regret that I was unable to attend.



As I've already mentioned the March 28<sup>th</sup> meeting is our annual Student Night meeting. We have several outstanding abstracts and still have room for a few more posters, so if you know of any students with work that is worthy of recognition please urge them to contact Ed Friend or myself. I also would like to urge every member to speak with their employer about becoming a sponsor for Student Night and to become sponsors on your own. Remember it is the sponsorship money raised during this event that allows AEG-RMS to provide free meeting dues for first-time student attendees and discounted dues for all other meetings. If you would like your or your company's name to appear on the Sponsor Board at the meeting we must receive your form no later than March 20, 2008. Thank you to all who have already sent in sponsor forms (a list is included in this month's newsletter)! I hope to see you all at Student Night Friday March 28th. Don't forget to RSVP by Tuesday (3/25/08) at noon.

Steve Compton, PG  
Chair AEG-RMS

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## **Field-Scale Measurement of Water Table Profiles in a Drained Slope**

Diana Cook

*Colorado School of Mines*

In 2003, Crenshaw developed a method for calculating average water table heights between horizontal drains in a slope, which relies on drain flow rates, slope geometry, and soil hydraulic conductivity. The corrugated shape of water table profiles between drains and the departure of the water table from the drain near its uphill end were verified using laboratory-scale physical and computer modeling. In 2007, a study was conducted seeking to confirm Crenshaw's findings using field-scale modeling. The test site consists of a 2H:1V, 30 x 12 ft (9.1 x 3.7 m) concrete slope representing impermeable bedrock. Five perforated pipes embedded in the concrete are used to simulate base flow recharge. The concrete was covered with a lean clay and two wick drains were installed at a spacing of 8 ft (2.4 m). Fifty standpipe piezometers were installed to measure water table profiles between and along drains. Measurements were taken during recharge and drawdown events. The test was repeated with a clayey sand. Test results generally confirm the findings of Crenshaw, with some localized variations in water table profiles. The variations are most likely due to factors such as inhomogeneity of soil properties, the development of preferential pathways, boundary effects, etc. Field testing also yielded additional information about the behavior of drained slopes that may be useful for future projects. As a result of this research, recommendations for using Crenshaw's method to estimate water table heights between short, steeply dipping drains in shallow landslides for use in slope stability analyses are provided.

## **Diversion project on Spearfish Creek in the northern Black Hills, South Dakota**

Jason Van Beek

*South Dakota School of Mines and Technology*

An aqueduct has diverted Spearfish Creek to the hydroelectric power plant at Spearfish, South Dakota, since its completion 1911. This has resulted in several miles of dry streambed below the diversion, including a principal recharge zone for the Madison Limestone, a major aquifer in the area with complex hydraulic properties. Historically, this aquifer was the source of the D.C. Booth Fish Hatchery springs in the City of Spearfish, which stopped flowing five years after completion of the diversion. The environmental and aesthetic impacts to the region and, more recently, the legality of the diversion have been questioned.

For this study, the feasibility and impacts of returning Spearfish Creek to its original path were evaluated using historical records, USGS stream gauging data, hydrogeologic studies, and legal reports documenting operations of the hydroelectric power plant. The computer programs Visual MODFLOW and ArcGIS were used to develop models and estimate the length of time required for the hydraulic system to return to pre-diversion equilibrium.

Because of the complex hydrology and geology of the study area, precise values for hydraulic properties of the aquifer would greatly improve model precision and accuracy. Detailed plans for acquiring additional data through both pumping and dye tracer tests were developed. Plans for tests delineated specific locations and techniques for optimizing the determination of ground-water flow conditions with respect to the associated costs.

Study results indicated that, were the diversion removed, most aesthetic and environmental properties of Spearfish Creek would return to pre-diversion state within the first year. However, digital modeling of the area indicated that water table equilibrium and resumption of flow at the D.C. Booth Fish Hatchery springs would only be achieved after 6 to 10 years. Completion of the suggested aquifer testing would lead to more accurate and meaningful models of the area and prediction of effects to the Spearfish Creek area.

**Continued on page 4...**

## **Soil Engineering Properties of Landslide and Debris Flow Initiation Sites, Coast Range, Oregon**

Ryan Bartingale  
*Colorado School of Mines*

Hundreds of landslides occurred in the Oregon Coast Range as a result of heavy rainfall during December 2005, and January 2006. Shallow translational slides that did not mobilize into debris flows occurred adjacent to slides that produced debris flows in geologically homogenous terrain. This field setting provides an opportunity to identify physical differences between hillside materials that mobilized into debris flows and those that did not. Previous experimental work shows that the propensity of landslides to mobilize into debris flows depends on the initial porosity and grain size distribution of the material (e.g. Iverson et al., 2000 and Wang and Sassa, 2003). Initial porosity influences the likelihood of debris-flow mobilization. Upon shearing, materials more dense than a critical porosity dilate reducing pore-water pressure and thus reduce the propensity for flow. Materials less dense than a critical porosity contract upon shearing, increasing pore-water pressure, and increasing the likelihood of debris-flow mobilization. The effect of the fine-grained fraction is to generally decrease the permeability of the material which retards the dissipation of excess pore water pressures, allowing the material to partially liquefy and mobilize into a debris flow. We present field-based test results that generally support these findings.

Undisturbed samples were collected using a modified California sampler at 35 shallow landslide source areas to determine porosity and grain-size distribution. Twenty-one of the landslides mobilized as debris flows and 14 did not. The soils from all the source areas were classified as gravels. However, at a 95% confidence level, materials from debris-flow source areas contain a statistically greater fine-grained fraction of silt and clay ( $7.0\% \pm 5.0\%$ ) than the materials from source areas of landslides that did not mobilize into debris flows ( $3.7\% \pm 2.6\%$ ). Materials from debris-flow source areas have a statistically greater mean porosity ( $0.55 \pm 0.04$ ) than those from source areas that did not produce debris flows ( $0.48 \pm 0.03$ ) at a 95% confidence level. These results suggest that the spatial variability of bulk density and fine-grained fraction of landslide-prone materials has important implications for debris-flow hazard assessment.

## **Colorado Rockfall Simulation Program Version 5.0**

Ryan Bartingale  
*Colorado School of Mines*

The Colorado Rockfall Simulation Program (CRSP) is commonly used to estimate the velocity, energy, and bounce heights of rocks rolling and bounding down slopes. The analysis forms a basis for selection of mitigation designs. New modeling techniques have become available since CRSP was first written in the mid 1980's. Presently, a new version of CRSP is being written based on a combination of Particle Flow Code and the Discrete Element Method for dynamic model simulation. This approach provides a more accurate approximation to the equations of motion for rock and slope interaction than employed by previous CRSP versions.

The purpose of this research is to calibrate the new program with respect to rock velocity, energy, bounce height, and roll out. Data used for program calibration includes existing rock rolling data and natural slope profiles. Rock rolling experiments have been documented using high speed cameras and reference lines which are used to estimate rock velocity and kinetic energy. Natural slopes with rockfall distribution were visited to obtain information on run out. For each slope visited a cross-section was constructed. The slope material and roughness were documented along with the size and location of each rock. Where present, rockfall scar marks on trees could be used for bounce height information.

Calibration was performed by comparing the actual data to CRSP output and adjusting the 'soil hardness' coefficient until CRSP output matched the actual data. Preliminary results have found that the program accurately estimates the velocity and kinetic energy of rocks rolling on slope material varying from soft clay to hard rock. Program calibration is currently being conducted on rock run out distance, bounce height, and rock shape.

## 2007-2008 Upcoming Meeting Presentations

Below is the tentative schedule of speakers for the 2007-2008 season. We will be adding presentation titles to future newsletters. As seen we have a few openings. If you are interested in giving a presentation please contact Steve Compton at [chair@aeqrms.org](mailto:chair@aeqrms.org).

- Apr 10, 2008 - Scott Walker
- May 8, 2008 - *Open*

If you would like to present during the 2008-2009 season, contact Steve Compton at [chair@aeqrms.org](mailto:chair@aeqrms.org) and he will get you on the schedule.

## International Year of Planet Earth

**First-ever**

**joint**

**meeting,**

**October 5-9,**

**2008**

More than 10,000 scientists, professionals, and students will gather in Houston on 5-9 October 2008 to discuss the latest research and current trends in energy, water resources, science education, earth systems, and related sciences.

This meeting is sponsored by the Geological Society of America, American Society of Agronomy, Crop Science Society of America, Soil Science Society of America, and Gulf Coast Association of Geological Societies. Also participating is the Gulf Coast Section of the Society for Sedimentary Geology and the meeting is hosted by the Houston Geological Society.

The intention of this first-ever joint meeting is to highlight and stimulate discussions in areas of common interest across the diversity of disciplines of the organizations represented. Held under the theme, "Celebrating the International Year of Planet Earth," the meeting recognizes the International Year of Planet Earth initiative, organized by International Union of Geological Sciences and the United Nations General Assembly.

The event will be held at the George R. Brown Convention Center and will feature presentations of scientific papers, hundreds of exhibits, and a myriad of distinguished lectures and special events that will engage students to professionals to scientists across the earth sciences and in every employment sector.

The scientific program features joint scientific sessions in the following topical categories:

- \*Climate Change through Time: Evidence in the Geologic Record
- \*The Impending Global Water Crisis: Geology, Soils, Agronomy, and International Security
- \*Energy Budgets and the Global Market
- \*Globalization of Biogeochemical Cycles
- \*Wetland and River Restoration: Environmental Saviors or Scientific Failures?

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# International Year of Planet Earth

## Con't from page 5

- \*Coastal Impacts: Can Massive Environmental Restoration and Coastal Engineering Protect the Gulf Coast from Future Hurricane Impacts and Rising Sea Levels?
- \*Geobiology and Biomineralization: From the Origins of Life to the Origin of Cities
- \*Emerging Trace Contaminants in Surface and Ground Water Generated from Waste Water and Solid Waste Application
- \*Carbon Sequestration: Methods, Markets, and Policy
- \*Human Influences on the Stratigraphic Record

In addition to the joint sessions, each participating scientific society will have its own sessions, symposia, workshops, field trips, tours, and special events.

Representatives of the media are cordially invited to attend and participate in scientific sessions, field trips, and other special events. Eligible media will receive complimentary registration and are invited to use onsite newsroom facilities while at the meeting.

Eligibility for media registration is as follows:

- \* Working press representing bona fide, recognized news media with a press card, letter, or business card from the publication.
- \* Freelance science writers, presenting a current membership card from NASW, ISWA, regional affiliates of NASW, ISWA, CSWA, ACS, ABSW, EUSJA, or evidence of work pertaining to science published in 2007 or 2008.
- \* PIOs of scientific societies, educational institutions, and government agencies.

Representatives of the business side of news media, publishing houses, and for-profit corporations must register at the main registration desk and pay the appropriate fees.

Journalists and PIOs must pay for any short courses or field trips in which they wish to participate.

Media registration will begin in June 2008. Contact Ann Cairns, GSA Director of Communications/Marketing/Sales, or Sara Uttech, ASA-CSSA-SSSA Communications Program Manager, for additional information or assistance.

What: Joint Annual Meeting of the Geological Society of America, Soil Science Society of America, American Society of Agronomy, Crop Science Society of America, and the Gulf Coast Association of Geological Societies with the Gulf Coast Section of SEPM, hosted by the Houston Geological Society

When: 5-9 October 2008

Where: George R. Brown Convention Center, Houston, TX, USA

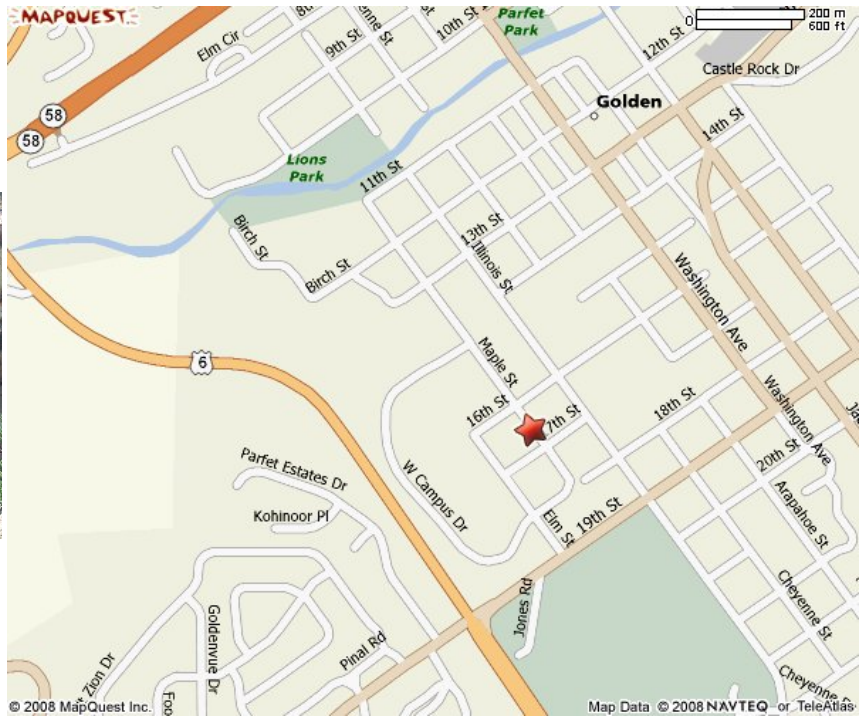
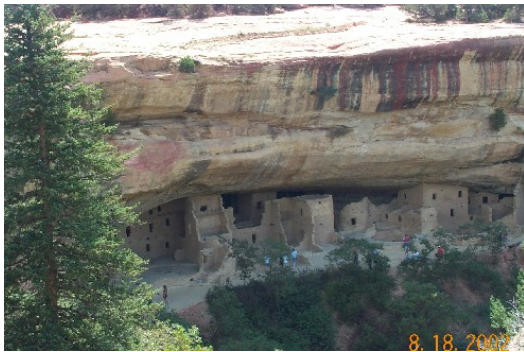
For information about the meeting or sponsoring scientific societies, go to:

<https://www.acsmeetings.org>

<http://www.geosociety.org>

<http://www.soils.org>

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