



## this issue

- Message from the Chair **P.1**
- Faculty Profile **P.1**
- Undergraduate Research **P.2**
- Alumni Profile **P.3**
- Student Profiles **P.2 & 3**

## Faculty Profile

James Tinjum

[jmtinjum@wisc.edu](mailto:jmtinjum@wisc.edu)

Assistant Professor James Tinjum spearheads a cross-disciplinary research, teaching, and continuing education program in wind power plant site civil and geological design. Tinjum, with Geological Engineering since 2008, is parlaying a wind energy workforce development grant from the Department of Energy with industry support into a multi-faceted program that conducts research on the geotechnical aspects of wind energy site design, including measurement and use of thermal resistivity dryout curves for the design of electrical collector trenches and the impact of eccentric and inclined loads on the foundation design of massive wind towers. With the evolving development of smart grids and renewable power generation in the U.S. and around the world, there will be an ever-increasing amount of high voltage transmission line construction involving buried cables. Current conductor sizing requires the buried cable to maintain a stable operating temperature. A controlling design factor is the thermal resistivity of soil used as trench backfill; i.e., the ability to transmit heat energy away from the cable. Accurately and precisely establishing the thermal properties of soil in a collector trench at a wind energy site (with kilometers of buried electrical cables in a transient, unsaturated condition) is an example application of transient heat input and dissipation. (continued on page 3)

## Message from the Chair

Welcome to our Summer 2011 issue of The Dig, the newsletter for Geological Engineering at UW-Madison. This has been an exciting year. UW and Madison were in the national news for our accomplishments and our challenges. I am glad to report that UW and Geological Engineering remain strong. Enrollments in Geological Engineering continue to rise, the curriculum remains diverse and relevant, and the research program is vibrant. Most importantly, all of our graduates have employment opportunities.

In this issue we highlight two areas of strategic importance to Geological Engineering: mining and renewable energy. Geological Engineering at UW evolved from the former Department of Mining Engineering. Maintaining this historical linkage is important. Renewable energy is a new strategic area for Geological Engineering, and fits well with our historical association with the energy industry.

The mining industry is important to the nation's future, and I am making a concerted effort to reconnect with our mining alumni and the mining industry. Two of our features in this issue are related to mining. Samuel Freitag, last year's AEG student chapter president, is our undergraduate highlight and has gone on to a position with Resolution Copper in Arizona. Dan Piette, a mining engineering graduate and CEO of Object Reservoir, is highlighted in our alumni profile. If you are a mining alum, or work in the mining industry, I would be interested in hearing from you about how Geological Engineering can serve the industry.

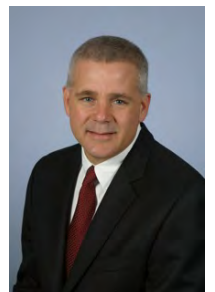
Our faculty highlight this month focuses on Assistant Professor James Tinjum, who is heading up our initiatives in renewable energy. Jim focuses on the geotechnics of wind and geothermal energy. His cutting-edge educational and research programs are growing rapidly.

We are committed to providing a quality experience for our students that provides them with skills to be successful throughout their career and the tools for life-long learning. Our ability to maintain a high level of quality is an important issue going forward, and philanthropic support from our industry and alumni is more important now than ever. We hope that you will consider supporting Geological Engineering this year. This support is used to enhance opportunities for our students and faculty, and is not used to support general operations. Information on how to help is on the back page of this newsletter.

I close with some exciting news. In September 2012, we will be hosting the first Geological Engineering reunion in Madison. More information on the reunion is on page three.

I welcome your feedback on The Dig, and if you are in Madison, please stop by for a visit. We would like to show you the exciting things our students are accomplishing in Geological Engineering.

Craig H. Benson, PhD, PE, DGE  
Wisconsin Distinguished Professor and Chair  
[chbenson@wisc.edu](mailto:chbenson@wisc.edu)  
(608) 262-7242



## Undergraduate Student Profile

Samuel Freitag

safreitag@uwalumni.com

Samuel is from Menomonee Falls, Wisconsin and just completed his degree in Geological Engineering and Geology & Geophysics in May 2011. Samuel worked under Prof. Tuncer Edil and graduate student Ozlem Bozyurt on a project to help establish an ASTM standard for the amount of woody material allowable in road base and sub-base. In summer/fall of 2009, he co-oped at Soils & Engineering Services in Madison. His job included field and laboratory testing of soil and concrete samples and geotechnical site investigations through soil and bed-rock coring. Samuel was president of the UW AEG Student Chapter in 2011 and has seen it grow from half a dozen students to over twenty. Samuel is very interested in rock mechanics, economic and field geology, and hydrology/hydrogeology. After graduating in May, he moved to Phoenix, Arizona. Samuel is now working for Resolution Copper Mining on an up-and-coming underground copper mining project.



## Geological Engineering Undergraduate Research

by Sabrina Bradshaw sbradshaw@wisc.edu

GLE undergraduates have the opportunity for a hands-on research experience with Geological Engineering. Our undergraduate researchers have the opportunity to perform laboratory and field studies, gain experience in technical presentation and writing, and form academic collaborations with graduate students, faculty, and staff, all while exploring advanced topics in Geological Engineering. Currently we have 13 undergraduate students working on a wide variety of projects such as fatigue testing of recycled materials employed in road subbase/subgrade conditions, to measuring the performance of geosynthetic clay liners under aggressive leachate conditions in waste containment systems, and characterizing the source of silica constituents of diatomaceous soils to infer engineering properties.

Each year we host a GLE undergraduate research seminar series where the students have an opportunity to present their research to fellow

GLEs. This year we also had two students, Ross Tipton and Melissa "Missy" Setz participate in the campus wide Undergraduate Research Symposium. This venue showcases undergraduate creativity, achievement, research, service-learning and community-based research from all areas of study at UW including the humanities, fine arts, biological sciences, physical sciences, and social sciences. Missy presented her research project "Using Lithium Bromide for Bentonite Exchange Complex Determination" and Ross presented his work on "The Performance of Geosynthetic Clay Liners Prehydrated with Subgrade Pore Water and Permeated with Aluminum Processing Residue".

Missy and Ross, along with their fellow GLE undergrad researchers, Cole Christiansen and Megan Jehring, received funding for their research by writing and submitting proposals to the Shell Undergraduate Research Grant program. Megan's

research focus was on "Determination of Diatom Concentration in Natural Soils and Sediments" and Cole's was "Effectiveness of Bentonite as a Seal in Monitoring Wells". Missy, Ross, Cole, and Megan will culminate their research experience by publishing journal articles or submitting technical reports to their research sponsors.

Our undergraduate research program is expanding and we plan to start sending students to professional meetings to gain more experience in technical presentations while also delivering their work to industry and academic peers. The students will have the opportunity to develop their professional network and open up doors to their career in Geological Engineering. If you would like to support the undergraduate research program, please contact GLE Chair, Craig Benson, at [chbenson@wisc.edu](mailto:chbenson@wisc.edu).

## It's a Small World After All

By Joe Scalia, GLE PhD Student  
[scalia@wisc.edu](mailto:scalia@wisc.edu)

While taking a brief respite from graduate research by traveling to Hawaii, swimming in the Pacific was on my itinerary, but a chance encounter with a Geological Engineering alumni most certainly was not.

In June, fellow Geological Engineering graduate student Nikki Woodward and I visited Oahu. During the trip, an avid triathlete friend convinced us to participate in a 1.6-mile ocean swimming

competition at Kailua Beach Park. The race consisted of about 125 participants swimming through unending waves, dodging coral, and sprinting up the beach to the finish.

While mingling and enjoying snacks after the race, the winner of the men's 36-40 age group approached us and asked if we had gone to Wisconsin (an exceedingly strange question had I not donned my official GeoEngr Bucky t-shirt during the awards ceremony). Coming across another Badger at a triathlon-type event is not uncommon, but running into a Badger at a small open water swim in Hawaii was surprising. To our astonishment, he con-

tinued the conversation by asking if we were in fact Geological Engineers.

This laudable ocean swimmer turned out to be Geological Engineering BS and MS alumni Aaron Sundberg. Not only that, Aaron and I had the same co-advisor in Professor Tuncer Edil. Aaron is a recent Hawaii transplant via Seattle and is currently the Hawaii Area Manager at Hayre McElroy and Associates. Turns out, Aaron and our friend have been participating in all the same triathlons since Aaron moved to Oahu. The world truly is a very small place!

## Alumni Profile– Dan Piette



Dan Piette received his degree in Mining Engineering in 1980. Since then, he has followed a career that started in the mining world,

but quickly moved into the software domain.

In his first job with Exxon in Houston, Dan worked copper and zinc in New Mexico, as well as oil shale in Colorado.

In 1982, the opportunity to work for a small software company focused on financial analysis of oil and gas deals started him on a path of start-up companies in the oil field service space.

Firmly believing one can learn more from failures than successes, Dan aggressively pursued many small companies that had a high chance of failure, but if successful, would show a high return, much like mining.

Dan was an early employee of Landmark Graphics, a company that helped invent the field of computer aided exploration. While with Landmark, he worked in Houston, Caracas, and Singapore, performing roles as varied as salesman, sales manager, and general manager. Landmark was ultimately sold to Halliburton, at which point he decided to pursue other opportunities.

One of those opportunities was Bell Geospace, a company that used data collected by an instrument invented for

stealth submarine navigation for oil and gas exploration. Dan served initially as Chief Operating Officer, and then became President and CEO as the company worked through challenging financial times.

Subsequent to Bell Geospace, Dan worked for OpenSpirit, a venture funded company where he was President and CEO. The company grew to a size where it was attractive to a large Silicon Valley middleware company – TIBCO, and the company was sold.

Currently, Dan is President and CEO of Object Reservoir, a company reinventing itself as the premier shale gas reservoir modeler.

[www.objectreservoir.com](http://www.objectreservoir.com)

## Coming in September 2012!

The inaugural Geological, Mining, and Geo-Engineering Alumni Reunion Conference will be held September 12-15, 2012 on the UW-Madison campus. Join us for technical sessions related to the great projects that UW alumni are working on, research trends and topics, and tours as well as catching up with old friends and colleagues. More information and details coming soon. To be placed on a list for email updates, contact Beth Johnson ([ekjohnso@engr.wisc.edu](mailto:ekjohnso@engr.wisc.edu)).

## James Tinjum (continued from page 1)

Determining the maximum heat input rate of backfill without initiating thermal drying is pivotal for engineering design because an uncontrolled increase in thermal resistivity causes a rise in cable temperature, leading to potential cable failure. Tinjum's research in this area seeks to transform our understanding of the interactions of soil type, compaction, thermal loading, and, especially, transient/hysteretic moisture conditions on soil thermal resistivity. This project is systematically evaluating and modeling thermal conduction phenomena with transient moisture flow for the direct application of geotechnics in sustainable energy practice.



Tinjum's involvement in wind energy extends well beyond geological engineering – he also directs a very popular series of 2- and 3-day continuing engineering education short courses that are offered across the U.S. These

course titles include Wind Energy Site Design and Construction, Wind Turbine Foundation and Tower System Design, and Wind Energy Balance-of-Plant Design. His first continuing education course in wind energy was so popular (over 90 participants) that Tinjum soon offered a 3-credit, semester-long design offering of the course in Geological Engineering. True to form, GLE401 was massively popular during the first offering in the fall of 2010 and enrolled students represented not only Geological Engineering, but also Civil and Environmental, Mechanical, Electrical, Material Science, and Nuclear Engineering. The class is on the docket again for Fall 2011 and, because the course is filled to an in-class capacity

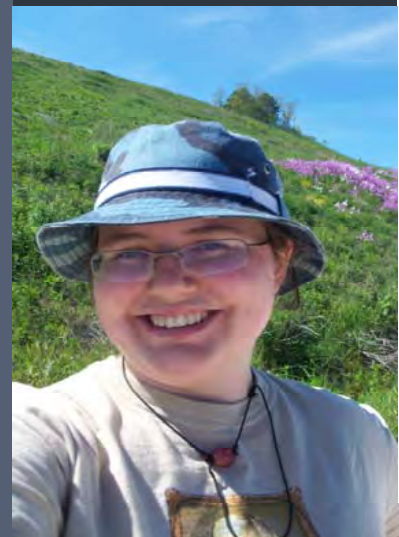
of 40, it will also be offered as a distance education class such that anybody in the nation (or world) can enroll.

## Graduate Student Profile

Erica Hagen

[ehagen@wisc.edu](mailto:ehagen@wisc.edu)

Erica Hagen is a MS student in Geological Engineering studying the regional effects of bluff protection projects on Lake Michigan high bluff shores. Bluff instability causes damage to property values and can annihilate homes. Bluff recession rate on these glacial high bluffs has reached as high as 0.5 meters per year and property owners must choose how to deal with the regional processes affecting their property. Many property owners consider taking measures to protect their property from bluff recession. These measures include: regarding bluff slope to a stable angle, constructing toe protection structures, seeding the bluff face with native plants to prevent surface erosion, and using geosynthetics to stabilize plants and soil against surface runoff. The processes that drive bluff instability can vary in range from localized instability to regional effects. How does protecting one property affect the regional stability? Erica, with Professors Dante Fratta and Chin Wu, have been using geophysical methods to analyze the regional response to one property bluff protection and enhancement structure in Ozaukee County to develop a better model for a regional bluff protection solution.





Our students and faculty benefit greatly through program enhancements that gifts from our alumni make possible. We truly appreciate your continued support.

For gifts to be used within Geological Engineering (#12233414):

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Phone \_\_\_\_\_  
Email \_\_\_\_\_

- My/our contribution is enclosed. \$ \_\_\_\_\_
- I/we pledge \$ \_\_\_\_\_ which will be paid in \_\_\_\_\_ annual installments of \$ \_\_\_\_\_, beginning \_\_\_\_\_ (year). Please send me/us an annual pledge reminder in \_\_\_\_\_ (month).
- My company will match this gift. (Company form enclosed).
- Please charge my gift of \$ \_\_\_\_\_ to my: \_\_\_\_\_  
 \_\_\_Mastercard \_\_\_Visa \_\_\_Discover \_\_\_AmEx

Please make checks payable to UW Foundation– Geological Engineering Fund

Please mail to:  
Geological Engineering  
c/o Craig Benson  
2218 Engineering Hall  
1415 Engineering Drive  
Madison, WI 53706

Exp Date: \_\_\_\_/\_\_\_\_/\_\_\_\_  
Cardholder's Name: \_\_\_\_\_  
Signature: \_\_\_\_\_

For more information or online giving options, visit Support GLE at [www.gle.wisc.edu](http://www.gle.wisc.edu).



Scan me with your Smartphone!

