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Engineering Sustainable Infrastructure for the Future

Chair's Message

I am delighted you are taking a moment to read the first C&EE newsletter produced under my chairmanship. I want to thank my friend and colleague Bill Yeh for his tireless dedication and steady leadership as chair for the past five years. The department and its students will continue to benefit greatly from his insights, ideas, research, and mentorship.

J.S. Chen

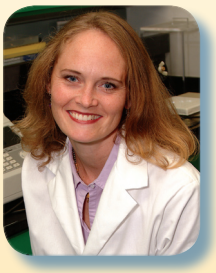
Over the last five years our research expenditures have increased steadily, our undergraduate and graduate enrollment and graduation rates have risen further, and as this and previous newsletters report in detail, our faculty have continued to collect numerous awards and honors. In 2006-2007 four faculty were appointed as editor-in-chief of major disciplinary journals, while seven of our doctoral graduates secured tenured faculty positions. Furthermore, in the past year alone C&EE faculty co-organized 14 symposia as well as delivered six plenary lectures and 14 invited keynote lectures at major national and international conferences. Finally, thanks to the exceptional efforts of a group of staff, alumni and faculty, in summer 2007 the department earned a renewed six-year ABET accreditation. I want to thank everyone who sacrificed his or her time and contributed to ABET review preparation.

See Chair, page 3

Jay Wins Teaching Award

Assistant Professor Jenny Jay is the winner of the 2007 Northrop Grumman Excellence in Teaching Award. Established in 1990 in UCLA's Henry Samueli School of Engineering and Applied Science, the annual award recognizes excellence in the art of teaching by junior faculty. A committee selected Jay based on student evaluations, personal and professional standards, teaching effectiveness and enthusiasm, and contributions to curriculum development.

The committee acknowledged Jay for "pursuing innovative teaching methods to maximize engagement and active learning by creating many opportunities for small group problem solving and integrating numerous demonstrations and field activities into normally lecture-based classes." She also was cited for introducing a new undergraduate service-learning course, *Wetlands and Water Policy*, and for substantially revising a class on *Chemical Fate and Transport in Aquatic Environments* to incorporate both environmental chemistry and transport.



Jay received the honor at the 2007 UCLA Engineering Awards Dinner in November. Previous C&EE recipients of this award include Professors Jonathan Stewart and Steve Margulis.

Read about Jenny Jay's Presidential Early Career Award for Scientists and Engineers (PECASE) and NSF CAREER award in the fall 2005 and spring 2004 newsletters, respectively, at http://cee.ucla.edu/news/newsletter.html.

Bigger, Better Student Body Boosts Dept.

The quality and quantity of students choosing to enroll in the Civil and Environmental Engineering program is on the rise, according to data collected by the Dean's office. For example, 101 new students (freshman and junior college transfers) enrolled for the 2007-2008 academic year, up substantially from the previous five-year average of 62. This volume growth accompanies an improved "take rate" – the proportion of accepted students who elect to enroll in UCLA's C&EE program. This year approximately 34 percent of those admitted actually decided to attend; the previous five-year average was just under 33 percent. In other words, many

See Enrollment, page 8

Faculty News

In June 2007 Professor J.S. Chen received the Outstanding Alumnus Award from National Central University, Taiwan, for his contributions to the field of computational mechanics. In addition, he was elected as a Member of the Executive and General Councils of the recently chartered International Chinese Association for Computational Mechanics. In the summer and fall he delivered three plenary lectures – at the European Congress on Computational Methods in Applied Science and Engineering in Barcelona, the Third Asian-Pacific Congress on Computational Mechanics in Kyoto, and the Nonlinear CAE Conference in Tokyo, as well as a semi-plenary lecture at the International Symposium on Computational Mechanics in Beijing and several keynote lectures at other international conferences.

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Professor Jenny Jay was named a Carnegie Foundation Faculty Fellow in Service Learning for Political Engagement. The foundation seeks to address the disconnect between the large number of young people involved in community service and the much smaller number who have the motivation and skills to work for systemic change through civic engagement. Jay's research group is issuing and analyzing surveys to assess the effectiveness of the community-based research component of her classes.

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C&EE Research Engineer Robert Nigbor, operations manager of the nees@UCLA earthquake engineering laboratory (http://nees.ucla.edu), recently was profiled in *New Scientist* magazine for his research on measuring the subtle shaking and vibrations of moving elevators to determine the structural weakness of buildings. Read the article at http://technology/newscientist.com/article.ns?id=dn12976.

In July 2007 Professor J. Woody Ju was elected as a Member of the Executive and General Councils of the recently chartered International Chinese Association for Computational Mechanics, and also was appointed as a Distinguished Fellow by the Institute of Mechanics, part of the Chinese Academy of Sciences. Ju also delivered a semi-plenary lecture at the International Symposium on Computational Mechanics in Beijing and a keynote address at the National Congress on Computational Mechanics in San Francisco.

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In September Professor Eric Hoek co-organized a Bio-physicochemical Interactions of Engineered Nanomaterials Workshop, hosted at UCLA by the California NanoSystems Institute and funded by CNSI and a UC Discovery Program grant. The workshop attracted 72 attendees from academia, industry, and state and federal government agencies. For a description, agenda, and list of speakers go to www.cnsi.ucla.edu/conferences/bio-physiochemical/.

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Listen to Prof. Hoek's podcast lecture on "Plenty of Clean Water on the NanoFrontier" through a link in the *Latest News* section of the C&EE website (www.cee.ucla.edu).

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Professors Terri Hogue (PI) and Steve Margulis (co-PI) recently received a three-year award from the National Oceanic and Atmospheric Administration's National Weather Service to improve operational hydrologic forecasts through assimilation of snow and streamflow data into the current NWS modeling system.

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Read a *UCLA Today* article about Prof. Hogue's research on post-wildfire effects on water supplies at http://www.today.ucla.edu/out-about/070925_wildfires_terri-hogue/.

T.H. Lin, 1911-2007

Tung-Hua Lin, Professor Emeritus of Civil and Environmental Engineering at UCLA, died on June 18 of heart failure. He was 96.

Born in 1911 in China, Lin received a Bachelor's degree in civil engineering from JiaoTong University in 1933. He then won a scholarship to study in the U.S., where he earned a Master's degree from M.I.T. in 1936. Returning to China in 1937 to assist in the war effort against Japan, he designed, oversaw construction, and test flew the first twin-engine aircraft ever made in China.

With his wife, Ruiyi, and three children Lin returned to the U.S. in 1949, earning a doctorate from the University of Michigan in 1953. He joined the UCLA engineering school in 1955 and became a full professor the next year.

Prof. Lin's principal contribution to the discipline related to the derivation of a method that predicts the soundness of metal structures in airplanes, buildings and bridges. His method allowed engineers to predict how stress and strain affect structures under varying temperatures and loading conditions. He also contributed to the study of composite materials and the micromechanics of metals.

Though he retired in 1978, Lin remained an active researcher into his 90s, driving to the office nearly every day. In 1990 he was elected to the National Academy of Engineering, the highest professional honor bestowed upon an American engineer. His body of work was acknowledged formally in 2001 during a two-day T.H. Lin 90th Birthday Symposium on Mechanics and Materials in San Diego, co-organized by C&EE Prof. J. Woody Ju and co-sponsored by ASCE, ASME, and the Society of Engineering Science.

T.H. Lin is survived by his daughter Rita, sons Robert and James, four grandchildren and one great grandchild. He was buried at Forest Lawn Memorial Park in Los Angeles on 21 July.

In his honor, the Lin family established the T.H. Lin Scholarship Endowment for C&EE students. Contact the C&EE Dept. or the Samueli School's Office of External Affairs to make a donation.

Matthew Chin contributed to this article. View a longer memoriam at www.engineer.ucla.edu/news/2007/lin_memoriam.htm. *Read an article on the* T.H. Lin 90th Birthday Symposium *in the spring 2002 C&EE newsletter.*

Chair *(continued from front page)*

I feel fortunate to be serving at a time of excellent and advancing department health and growth, and seek to build upon the progress without delay. Among other things the faculty and I look forward to convening with the department's Industry Advisory Board (IAB) in February 2008. I also would like to extend a welcome to Weidlinger Associates, Inc., Greenberg Farrow, and Kimley-Horn and Associates, Inc., as the newest members of our Industrial Affiliates Program (IAP). Please visit the C&EE website (www.cee.ucla.edu) to learn more about these and the rest of our corporate IAP members as well as the distinguished individuals comprising our IAB.

Moreover, I am excited to announce the establishment of a Distinguished Lecture Series in Structural Engineering & Mechanics, generously sponsored by **Livermore Software Technology Corp.** and featuring prominent researchers from around the world. Our inaugural Distinguished Lecture was delivered in November by Professor Ted Belytschko of Northwestern University, who spoke about computational methods for fracture analysis at the nanoscale and macroscale. This series (and those that will be established for other civil and environmental engineering fields in the next few years) will be instrumental in enriching the research and overall intellectual experience of our current and future graduate students and faculty. Check our website soon to obtain information about the schedule and roster of upcoming speakers for this highly anticipated lecture series.

I am enthused and energized by the C&EE Department's prospects. So please keep up with our pace – more exciting initiatives promise to follow in the coming months and years. Join me and my colleagues as we endeavor to move forward into a new period of excellence.

***The C&EE Dept. thanks LSTC Corp. for its sponsorship of the* Distinguished Lecture Series in Structural Engineering and Mechanics.**

LSTC Livermore Software Technology Corp.

www.lstc.com

Sabbatical in Turkey

Beginning in June 2007 C&EE Associate Professor **Ertugrul Taciroglu** spent a six-month sabbatical in Turkey. While there he sent some of his impressions of the experience in an electronic postcard.

It wasn't all fun and games: I spent about four weeks at an army base in mid-summer, fulfilling my mandatory military service as a Turkish citizen. While there I met great people who, like me, had returned from different corners of the world, the common denominator our status as Turkish males pursuing professional careers abroad. Our group's average age was about 35 and, being average in that respect, I couldn't feel insulted as we endured the orders of twenty-something year-old sergeants with permanent grins on their faces.

The most basic skill we mastered was remaining motionless under the baking sun for four hours each day. One "comrade" with a thermometer built into his watch meticulously kept and regularly announced our exposure; the highest recording was 118°F. That's about the temperature at which asphalt starts sticking to boots, the same ones we had to clean every night. Well, we did learn other military drills, some with weapons and such, but anything more than this is classified information.

After this memorable experience, my wife Melike and I took several trips to our hometowns in Turkey's hinterland, visiting friends and family. Then it was time to settle in Istanbul, where I worked. Though not its capital, Istanbul is Turkey's most populous city, with 11 million people roaming through its ancient streets. The Bosporus Strait divides the city in two – the western and eastern parts geographically belong to Europe and Asia, respectively. Two cable suspension bridges connect the two continents, on either side of which conspicuous "Welcome to Asia" and "Welcome to Europe" signs remind motorists what the two-dollar bridge toll is for.

We usually spent our weekends strolling through Istanbul's shops and cafés, and jogged along the Bosporus on weekday mornings. Like the city, my work week was divided in two. On Mondays through Wednesdays I walked to my office at the Civil Engineering Department of Bogazici University, on the European side of Istanbul. There I taught a graduate course on Structural Mechanics. On Thursdays and Fridays I worked at my other office at the Kandilli Observatory and Earthquake Research Institute, across the Bosporus on the Asian side. At Kandilli I collaborated with colleagues on a research project involving school buildings in Turkey.

***Mission accomplished*: Ertugrul and Melike Taciroglu relax on Turkey's Mediterranean coast following the completion of E.T.'s military service.**

As you may remember, a 7.4 magnitude earthquake struck Turkey in 1999 at Izmit, the industrial heartland lying about 100 miles east of Istanbul. The disaster killed more than 17,000 people and left nearly a half-million homeless. The quake exposed fatal deficiencies in

See Sabbatical, page 7

Improving Water Resource Management from Space

In semi-arid, water-scarce regions like the western U.S., water resource managers must confront the needs of multiple stakeholders. Escalating agricultural and societal pressures on the water supply system have placed water supply issues at the forefront of political debates across the west – especially California. In the past, increased water demands generally were met by building new infrastructure to convey, store, or otherwise obtain untapped sources. However, with new sources of water dwindling, demand from nearby states rising and population growth continuing, the availability of water from traditional sources will remain relatively fixed for the foreseeable future. Implementing methods that will enhance our understanding of hydrologic processes and inform management decisions about sustainable and efficient water use is essential.

Hydrologic science currently is undergoing a revolution thanks to newly available data streams. Historically, hydrologic models designed to answer basic questions about the space-time variability of key states (e.g. soil moisture, snowpack) and fluxes (e.g. precipitation, evapotranspiration, runoff) were optimized under data-limited conditions. As a result, key aspects of the terrestrial water cycle remained poorly characterized. With the advent of remote sensing technologies and improved computational resources, however, the environment for water cycle researchers has transformed from "data-poor" to "data-rich". A flood of spatially-distributed and time-dependent data permits an increase in the scope and scale of practical problems researchers can address.

Development of diagnostic and predictive frameworks for characterizing the mean hydrologic cycle and its natural variability is a crucial first step in understanding how it may be altered under (anthropogenic) climate change. C&EE Professor Steve Margulis has engaged this challenge in a research program advancing a novel approach that will impact the assessment and management of water resources. He is testing an innovative "data assimilation" framework designed to merge models and disparate data streams to obtain optimal real-time estimates (i.e. maps) of hydrologic states, such as soil moisture content or water stored in mountain snowpacks. The approach aims to provide such estimates across a wide spatial range, from local agricultural fields to entire watersheds, or from mountain slopes to region-wide basins. The anticipated result is a tool for better optimization of, for example, irrigation scheduling or streamflow forecasting.

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Soil moisture is a key state variable in hydrology because it can influence flooding during precipitation events, impact future weather/climate patterns (positively or negatively), and supply crops/vegetation during growing seasons. However, *in situ* networks of soil moisture profile sensors are prohibitively expensive and face logistic constraints over field-scale or larger domains due to temporal and spatial variations in soil and vegetation properties, rendering diagnosis of soil moisture from sparse point observations impossible. Alternatively, physically-based models of the evolving land surface state (based on water and energy balance equations subject to meteorological and soil parameter inputs) can provide more soil moisture estimates, but are generally subject to significant model input errors.

In response, Prof. Margulis has been testing the feasibility of a data assimilation method that combines remote sensing observations with physically-based land surface models to estimate rootzone (upper one or two meters of soil) moisture. He first tested the approach in the southern Great Plains of Oklahoma using data from a focused field campaign to assess the potential of future space-borne remote sensing missions. *This NASA-funded work was the first to prove the assimilation approach* (using microwave measurements taken from an aircraft-mounted sensor) *effectively could provide accurate mapped estimates of rootzone soil moisture over large scales (10, 000 km^2) at a moderate resolution (4 km^2).* In 2008 the European Space Agency will launch a space-borne platform with the ability to take similar measurements on a global scale. Results from data assimilation using these measurements should yield unprecedented soil moisture estimates that provide crucial inputs for weather/climate and/or flood prediction models.

Knowledge of rootzone soil moisture also can help determine crop evapotranspiration (a proxy for water consumption) and thus contribute to greater irrigation efficiency. In California, water for agriculture constitutes over 40 percent of all water used and roughly 75 percent of agricultural and urban demand.

See Margulis, page 5

Remote Sensing in Hydrology

Remote sensing usually refers to data collected by sensors on space-borne satellites. Satellite sensors do not measure hydrologic states (i.e. soil moisture, snow water content) directly, but instead electromagnetic radiation at particular wavelengths (or frequencies) emitted and/or reflected from the earth's surface. Measurements in distinct parts of the electromagnetic spectrum (visible, infrared, microwave) are sensitive to different land surface (i.e. moisture, snow cover, vegetation, temperature) and atmospheric (i.e. clouds, precipitation) features and are available at varying sampling frequencies and spatial resolution. The most invaluable aspect of all remote sensing techniques is their ability to measure phenomena over large spatial scales that are not possible from point-scale observations. Remote sensing measurements used in isolation, however, are limited by their indirect connection to the target variable and the potential discrepancy between the measurement resolution and hydrologically relevant scale. In any remote sensing analysis the researcher employs radiative transfer models to relate the hydrologic variable of interest to the measured quantity, then attempts to invert the relationship directly with a remote sensing retrieval algorithm. Data assimilation methods merge remote sensing observations with physically-based hydrologic and radiative transfer models to obtain real-time maps of hydrologic states/fluxes within the system of interest.

Margulis

(continued from page 4)

Accordingly, the development and implementation of more efficient irrigation practices (extending beyond traditional farm-based hardware investments) could augment urban supplies and reduce over-watering, yielding economic (better crop growth) and environmental (less harmful runoff of pesticides, fertilizers and other pollutants) benefits. However, empirically derived equations, formulated to estimate transpiration by a particular crop on a given day, generally do not take into account specific crop or soil states. The real-time mapped estimates produced from data assimilation provide information that can facilitate more precise agricultural irrigation at the farm level and assessment of water needs at the regional level.

In general, the scales from microwave sensors are too coarse for precision (farm level) irrigation applications. In a new project sponsored by the UC Water Resources Center, Margulis is extending his method by taking higher resolution remote sensing measurements (from existing space-borne NASA satellites) from the visible/near-infrared part of the spectrum. The project, undergoing preliminary testing in agricultural regions in Ventura County and the Imperial Valley, will assimilate data to more finely estimate soil moisture and crop states, with the expectation that the approach will assist in the optimization of irrigation and crop yield.

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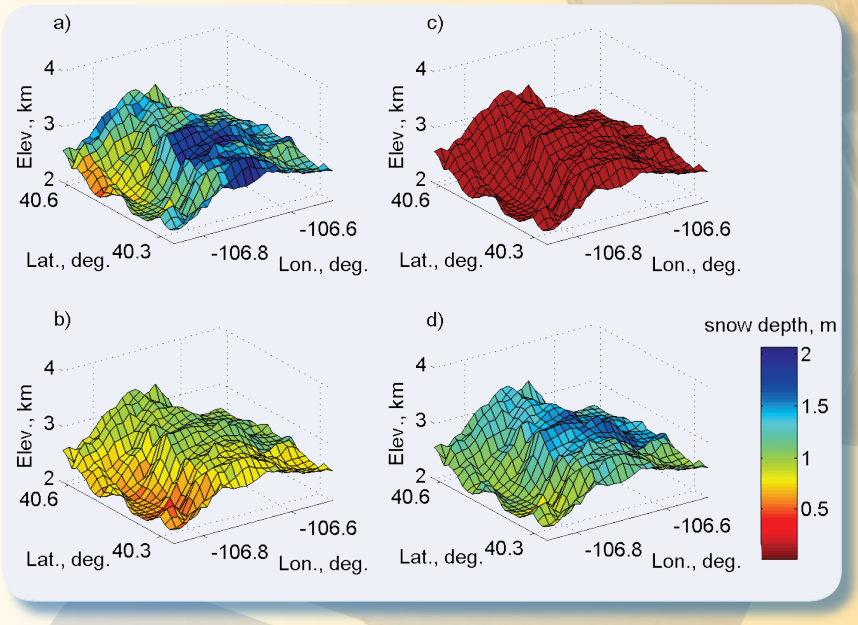
In the western U.S., snowpacks are a primary source of water, storing it during winter and gradually releasing it during spring and summer. Runoff from snowmelt fills rivers and recharges aquifers, ultimately supplying over half of annual water consumption in the region. As a large population center in a semi-arid climate, Los Angeles is even more dependent – snowmelt from the eastern Sierra Nevada Mountains and streamflow from the Colorado River (originating from Rocky Mountains snowmelt) constitute 85 percent of the city's overall supply.

Consequently, water resource planners expend considerable effort estimating water stored in snowpacks in order to predict spring snowmelt and resulting streamflows. Important decisions affecting reservoir management, hydroelectricity generation, and irrigation policies rely on such estimates. The task becomes urgent in the context of widespread declines in the winter snowpack of mountain ecosystems in the western U.S. in recent decades, associated with increased winter temperatures. A slight upward change in temperature in cold land regions can alter the equilibrium hydrologic state of those areas, perturbing mountain precipitation patterns, the freeze/thaw cycle and the timing of seasonal runoff events, ultimately increasing the frequency of floods yet leading to an aggregate reduction in water availability. The ability to spatially characterize mountain snow accumulation, distribution and variability time series could lead to a seasonally integrated metric of the hydrologic branch of the climate system, and thus provide an excellent proxy to assess climate change.



A series of snow depth maps at 1 km resolution over a 25 km x 25 km domain in the Rabbit Ears Pass of the Colorado Rockies depict spatial snow depth estimates a) *under idealized true conditions,* b) *using a physically-based model,* c) *from remote sensing retrieval, and* d) *as a result of data assimilation merging of model and remote sensing observations. The assimilation estimates most closely capture true SWE. In isolation the remote sensing map poorly characterizes the SWE mean state due to coarse measurement scale (and deep snowpack), but provides a vital data stream for incorporation into the assimilation framework.*

Unfortunately, many cold land regions are in undeveloped areas with limited *in situ* measurement capabilities. The traditional approach to snowpack characterization involves monthly snow surveys during the winter accumulation season and comparison with historical records of snowpack and spring streamflow. Errors result because ground-based measurements are sparse and, where available, fail to capture substantial spatial and temporal variations (in topography, vegetation, wind patterns) – even among sites very close together – and therefore do not represent basin-wide snow characteristics. Physically-based snow process models do have the potential to track evolving snowpack dynamics, but generally suffer due to a lack of input (i.e. precipitation) data. At the same time, simple empirical statistical models rely on the assumption that the historical record is a robust indicator of current conditions – an increasingly untenable supposition under climate change. Finally, remote sensing observations typically perform poorly in isolation due to coarse resolution and unknown dynamics of the snowpack (relating principally to snow grain evolution).

These realities provide another opportunity to prove the benefits of a data assimilation framework, this time in a way that allows optimal merging of basin-scale remote sensing data with snow process models during the winter accumulation phase. The goal is to bridge the disconnect between scale extremes and obtain robust mapped estimates of distributed snowpack attributes – notably the water stored in snowpack, or snow water equivalent (SWE) – as well as a process-based understanding of future water availability.

In a line of research earning him a NASA New Investigator Program award in 2004,

See Snow Water, page 6

Alumni News

Allen Yourman (MS 1978) is a founding principal of Diaz Yourman & Associates, a geotechnical engineering consulting firm in Santa Ana. Celebrating 15 years, the firm provides geotechnical services for infrastructure, commercial and industrial projects. In 2003-2004 Allen served on the committee that established the annual Kenneth L. Lee Lecture Award, organized by C&EE Professor Jonathan Stewart and administered by the geotechnical group of ASCE's Los Angeles section.

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Recent graduate **Sejin Oh** (PhD 2007) has begun working as a Research Scientist at Lawrence Livermore National Laboratory, a research and development institution for science and technology applied to national security and managed by the Univ. of California. This permanent staff assignment propels Sejin above the standard post-doc fellow designation for new hires.

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Dave Steingart (BS 2004) is a project engineer for Shimmick Construction Co., a heavy-civil engineering contractor. He currently is working on a seismic retrofit of the Big Tujunga Dam in Los Angeles County, aimed at increasing the dam's storage capacity four-fold and in the process restoring its original design volume of 6000 acre-feet.

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A senior engineer with Hatch Mott MacDonald, an engineering consulting firm in San Jose, **Andrew Liu** (MS 2001) manages a geotechnical design group for the tunnel segment of the Silicon Valley Rapid Transit Project (BART to San Jose). The $5 billion, 5.25-mile long underground segment (of a total 16-mile extension project) is a joint venture between HMM and Bechtel.

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Dongdong Wang (PhD 2004) is an Assistant Professor of Civil Engineering at Xiamen University in China. His research interests are in computational mechanics with applications to shell structures, composite materials, micro-mechanics, and soil mechanics. In 2007 he received the Young Investigator Award in Computational Mechanics from the Asian Pacific Association of Computational Mechanics.

Snow Water (continued from page 5)

Prof. Margulis has been performing feasibility tests and obtaining mapped estimates of SWE in mountainous watersheds. In one project collaborating with UCLA PhD Michael Durand, Margulis conducted separate feasibility tests focused on data from the NASA Cold Land Processes Experiment region in the Colorado Rockies and data from Mammoth Mountain in the California Sierras. *This work was the first to show the feasibility of the approach to effectively map SWE over large scales (approx. 625 km²) at a relatively high resolution (1 km²) using multi-frequency, multi-scale remote sensing observations.* In these tests, SWE was estimated over the region to within approximately six percent of actual (idealized conditions) SWE.

Project member Dr. Michael Durand (foreground) and a research assistant demonstrate the difficulty of obtaining in situ *measurements of snowpack.*

In a related project, Margulis and Dr. Noah Molotch are using remotely sensed snow covered area images to retrospectively reconstruct SWE maps across large basins in the Rio Grande headwaters. While these results cannot provide real-time estimates of SWE that can be used in water resources planning, they do provide key diagnostic insight into historical trends and spatial patterns concerning snowpack variables not possible from *in situ* measurements. This has motivated a new NSF-funded project with Molotch using the same techniques to identify inter-annual precipitation and snow accumulation patterns in the Sierra Mountains watersheds. The approach will integrate an important additional constraint into the assimilation framework and ultimately facilitate finer SWE estimates in other regional and global locations.

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Understanding fundamental hydrologic processes over large scales is necessary for adopting more sustainable water resource strategies, particularly as economic and political demands related to the allocation of scarce water supplies increase under the effects of climate change. Previously discrete, local water issues increasingly are viewed as connected and in the context of broader weather/climate patterns and ecosystem behavior, requiring solutions at regional and global scales. Until recently, real-time knowledge of the evolving states and fluxes in the hydrologic system was limited due to sparse data. Remote sensing provides a valuable enabling technology to compensate for this deficit. The new imperative for hydrologists is to optimally merge this rich data source with other data and hydrologic models. Prof. Margulis' results show that data assimilation provides the best method to convey the most accurate information available to water resource planners. The method will allow us to view yet unseen processes and ultimately will contribute to improved water management in California, the western U.S. and, inevitably, other semi-arid regions around the globe.

For more information on Steve Margulis and his group's research go to www.seas.ucla.edu/~margulis/.

Grad Students Awarded

Two C&EE PhD students have won fully-funded NASA Earth System Science Fellowships.

Bart Forman received a three-year award for the research proposal "Development of a multi-scale remote sensing data assimilation tool for ensemble-based estimates of surface forcing fields for use in distributed land surface models." He is working with Professor Steve Margulis on the project.

Jonghoun Kim received a two-year award for the research proposal "Integrating MODIS and AMSR-E products for daily evapotranspiration estimates." She is collaborating with Professor Terri Hogue on the project.

Sabbatical

(continued from page 3)

material quality and construction practices, prompting city and federal government officials to take serious, if belated, action.

With financial support from the city of Istanbul, Kandilli, Bogazici University, and the U.S. National Science Foundation, several colleagues and I embarked on a project focused on seismic collapse risk assessment of non-ductile school buildings. We surveyed candidate buildings, performed necessary preliminary calculations, and made other logistical preparations. Within the next year we will perform forced-vibration and quasi-static field tests on a few structures drawn from a collection of 20 soon-to-be-vacated school buildings scheduled to be replaced with new earthquake-resistant structures. This batch of buildings represents those facing the most severe risk of collapse. However, many more structures in the greater Istanbul area await initial evaluation and inevitably will require retrofitting and replacement.

As it turns out, most of the vulnerable structures here in Turkey possess characteristics similar to the bulk of reinforced concrete structures built in the U.S. prior to the 1970's. Consequently, my hope is that the international cross-fertilization of ideas, insights and techniques with my Turkish colleagues ultimately will enhance our collective understanding of the behavior of non-ductile buildings both in Turkey and the U.S. and prevent future loss of life.

As I depart Turkey and return to UCLA around the time this goes to press, I feel gratified that my sabbatical was time very well spent, and look forward to returning to Turkey soon to continue the work begun on this important project.

- E.T.

EWB News

The UCLA chapter of Engineers without Borders (EWB) is very pleased to introduce itself to the pages of the C&EE newsletter and share its news. The mission of EWB-USA, our parent organization, is to partner with disadvantaged communities to improve quality of life through the implementation of environmentally and economically sustainable engineering projects, at the same time developing internationally responsible engineering students. The student-run EWB-UCLA strives to uphold this vision and generally focuses its efforts on health, access to water, and structural needs. Furthermore, we encourage local community awareness of environmental/global issues through outreach and education programs at inner-city Los Angeles high schools.

Our members, roughly half of whom are C&EE undergraduate and graduate students, participate in a variety of projects worldwide. Here we spotlight two ongoing efforts: the implementation of a drinking water system in Guatemala and the construction of a school in Thailand.

Inadequate facilities and overcrowding challenge the educational needs of children in rural areas worldwide. In September 2007 a three-member EWB-UCLA team traveled to No Lae village, Thailand, to conduct an initial construction site assessment for a proposed schoolhouse. The team partnered with local non-governmental agencies and community members to formulate a strategy for designing and building a suitable structure. A discussion of the project's parameters and requirements ultimately led to an agreement for EWB-UCLA to produce a final design for construction and dedication on a return trip in mid-2008.

Previous EWB-UCLA projects in Guatemala have allowed us to form strong relationships with key local activists and exposed us to other needs where our engineering ingenuity might be of service. In March 2007 11 of us traveled to Chocantiry, a rural village in Guatemala, to ascertain the feasibility of developing an accessible groundwater-fed water storage system. (Currently residents walk up to two miles to access water that may not be clean.) Though a site assessment favored this technically optimum solution, a rigorous survey of the community's fiscal capacity to operate and maintain such a system after installation regrettably did not warrant its implementation. This disappointed us, but the hard lesson in the economic sustainability aspects of the engineering enterprise sent us back reluctantly to the drawing board. Currently we are formulating a design for a lower-cost (in terms of money and energy) system oriented around catch basins and rainwater retention systems in hopes of addressing the bulk of Chocantiry's drinking water needs in 2008.

ENGINEERS WITHOUT BORDERS

As the Guatemalan experience demonstrates, tackling real-world problems requires more than just civil and environmental engineering expertise and presence in the field. The multiple project management and evaluation skills EWB-UCLA members learn and employ better prepare them for life beyond UCLA's borders – and the cultural enlightenment is priceless.

We welcome new members – with or without engineering experience – who would like to assist us in our ongoing fundraising, marketing and communications activities. Everyone has something to contribute, so please get involved. Email us at ewbucla@gmail.com if you are interested in our mission or attending one of our Tuesday evening meetings, or visit www.seas.ucla.edu/ewb to obtain more information on all our projects and join our email list.

- Bart Forman, Guatemala Project Lead

Christine Lee contributed to the development of this article for the newsletter.

ASCE News

UCLA's student chapter of the American Society of Civil Engineers kicked-off the 2007-2008 academic year with its first annual Officer Retreat, held at the Deer Springs Mountain Retreat in the San Bernadino Mountains. The chapter's 35 officers spent a weekend participating in a host of activities intended to build teamwork, trust, and leadership skills as well as several workshops that allowed officers to brainstorm, set goals, schedule events and budget for the year.

In October and November ASCE's 100-plus members participated in social events as well as socially conscious service. The former included the Notre Dame vs. UCLA tailgate, the now-quarterly Student-Professor BBQ hosted by Prof. Jonathan Stewart and – to generate interest in next spring's regional conference – a Concrete Canoe Kickoff BBQ at UCLA's Marina Aquatic Center. The latter featured a Heal the Bay Adopt-a-Beach event, where members joined a cleanup effort at Dockweiler State Beach and a follow-up beach bonfire, as well as volunteer gardening work at Wattles Farm, Hollywood's community garden. These events also engaged our mentorship program by connecting veteran members with ASCE's more recent initiates, helping form bonds, friendships and team spirit that will be essential as we look forward to the Pacific Southwest Regional Conference.

Of course our ASCE team already is working hard in advance of the annual PSRC, to be hosted by Cal State Northridge in April 2008. As most readers know, our members spend months preparing for the conference's various competitions that test collective analytical, creative, and even physical skills. These include concrete canoe construction, steel bridge fabrication, surveying skills tests, concrete bowling ball and Frisbee design, and other events related to transportation, geotechnical and environmental engineering.

Finally, ASCE will host its annual C&EE Career Fair on 30 January at UCLA's Ackerman Grand Ballroom. As the fair continues to grow, we eagerly seek to accommodate new companies who might be interested in our talented students. This year we expect over 50 firms and 250 students to attend.

If you or your company has an interest in participating in the career fair, the regional conference, one of our general meetings or any of our future events please contact us at asce@seas.ucla.edu or visit our website at www.seas.ucla.edu/asce. There you can read our own newsletter and locate contact people for all of our activities.

- Kilty Inafuku, ASCE Historian

Enrollment

(continued from front page)

more students are here – and, at an increased rate – more would rather be here than at competing schools.

Our selective freshmen and transfers will earn degrees at an equally selective engineering institution. The average GPA of this year's incoming freshmen is 4.19, up from the previous five-year average of 4.15. Furthermore, though aggregate SAT scores are difficult to compare due to the addition of a third section and a scoring system change before the 2006 application year, we know the average math SAT score for this year's new students is 724, up from the previous five-year average of 720.

These numbers suggest what faculty have always known – C&EE undergraduates are of the highest caliber. Says Professor and department Vice Chair Jonathan Stewart, "These statistics indicate a healthy C&EE program that provides an outstanding engineering education that is strongly competitive, both within California and nationwide."

Published every fall and spring, the C&EE newsletter is designed and edited by Mike Gaetani, *except "Sabbatical in Turkey," edited by Ertugrul Taciroglu. The editor thanks Kathleen Kelleher for technical assistance. This and previous newsletters can be viewed at* www.cee.ucla.edu.

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