autumn 2019

Benchmarks

DEPARTMENT OF CIVIL, ENVIRONMENTAL AND GEODETIC ENGINEERING

THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Department of Civil, Environmental and Geodetic Engineering
470 Hitchcock Hall | 2070 Neil Avenue | Columbus, OH 43210
ceg.osu.edu

On the cover: Buckeye fans fill Ohio Stadium on an autumn afternoon.
Photo courtesy of University Communications

TO ALUMNI AND FRIENDS

Dear alumni and friends,

Academic year 2019-2020 marks a special time on the Ohio State campus as we gain momentum recognizing the sesquicentennial of this storied institution. It is an important moment for reflection as we look back at the solid foundations that Ohio State has set through training and research contributions to advance society. We also look forward to the future and consider that *Benchmarks* recognizes members of the Civil, Environmental and Geodetic Engineering community who are building new foundations that we will look back to in coming decades as more institutional anniversaries are marked.

I offer sincere **Congratulations!** to Raina Rotondo as a Sesquicentennial Scholar. Raina is one of 150 Ohio State students holding this title that recognizes her potential to become an engaged citizen through leadership development opportunities. She continues a long tradition of Buckeyes since civil engineering was launched as the first professional program at Ohio State. The Alumni Achievement section details more diverse leadership that former graduates are providing in private, government and academic sectors.

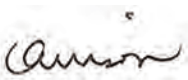
More **Congratulations!** are due to Prof. Dorota Grejner-Brzezinska, CEGE Professor and Associate Dean for Research in the College of Engineering, who earned a trifecta of awards as a National Academy of Engineering member, a University Distinguished Scholar and a Distinguished University Professor. These accolades mark the many contributions that she has made to navigation science through innovative discovery and mentorship of junior scholars in geodesy.

The CEGE department continues to expand our approaches to student development. The Mentor Program connects sophomores and juniors with alumni who can provide personalized support for professional development as students look to chart their career paths. We recognize five years of integrating Professors of Practice into our faculty ranks; instructors such as Profs. Anthony Massari and Michael Hagenberger who bring unique perspectives such as from design work in stadium construction. Quality instructional experiences are well-noted by students such as through the statics class nomination of Prof. Tarunjit Butalia for the Charles MacQuigg Teaching Award.

Please enjoy learning more about these stories in this edition of *Benchmarks*. We also report recent department news that includes new staffing to support lab operations and to enhance our graduate program experience, promotions, and research that addresses the important societal problems of climate dynamics and low energy water disinfection.

As always, I encourage you to stay in touch - keep us posted about your accomplishments, volunteer as an Industry Mentor, or support our student groups and scholarships.

All the best,

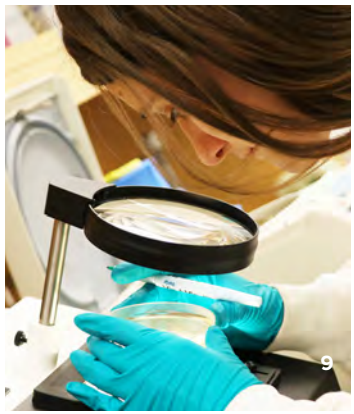


Allison A. MacKay
Chair, Department of Civil, Environmental and Geodetic Engineering

CEGExperiences

(6) Megan Patterson (center), graduate research associate, and fellow alumni enjoy the festivities at the College of Engineering's Homecoming Tailgate, October 2019. *Photo courtesy of COE Communications* **(7)** (L to R) Iona Campbell, Michael Recupero, Brian Zaborszki, Peter Dittrich, Victor Amesoeder and Mary Kate Dempsey learn about sedimentation in the Environmental Engineering 4200 Unit Operations Lab, September 2019. *Photo courtesy of Iona Campbell and Prof. Linda Weavers* **(8)** Prof. Michael Hagenberger discusses the Maji Marwa Sustainable and Resilient Community project with a television film crew, August 2019. **(9)** Visiting scholar Judith Straathof examines municipal water samples in CEGE's environmental engineering laboatory, September 2019.

(1) Prof. Lisa Burris dicusses her research on developing cement formulations that feature smaller carbon footprints with guests at Ohio State's Women & Philanthropy event, September 2019. *Photo courtesy of Women & Philanthropy* **(2)** PhD student Cansu Acarturk works in CEGE's new Johnson Civil Materials Research Laboratory, October 2019. **3)** CEGE graduate students and undergraduates discuss opportunities with representatives from student teams and organizations during CEGE's Annual Welcome Event, September 2019. **(4)** Barry Tolchin, Manager, Academic Advising, and Brutus pose for a selfie at the kick-off of this year's Industry Mentor Program, September 2019 **(5)** CEGE undergraduate student Derek Gupta scales a climbing wall at Ohio State's Adventure Recreation Center. The event was hosted by Ohio State's student chapter of ASCE as a way for students to socialize and de-stress as final exams approached, October 2019. *Photo courtesy of Ohio State Student Chapter of ASCE*



CEGE APPOINTS NEW ASSOCIATE CHAIR

John Lenhart assumed the role of Associate Chair of the Department of Civil, Environmental and Geodetic Engineering, effective autumn semester, 2019. John brings a wealth of experience to this position from his long-time membership on the CEGE Undergraduate Studies Committee and leadership of program initiatives within the environmental engineering group.

John has also played an instrumental role in directing College curriculum, serving as a member of COE Engineering Curriculum Committee and as a past-chair of the College Committee on Academic Affairs. He also served as the College and Department assessment lead for environmental engineering through two rounds of accreditation.

John has also co-directed the Ohio Water Resources Center (WRC) with Linda Weavers since 2012. With Associate Director Zuzana Bohrerova, John and Linda recently guided the WRC through a strategic planning process that resulted in the Center's improved visibility and increased levels of research, scholarly, and outreach impacts.

John was promoted to the position of full professor at Ohio State, in June, 2019. In his role as Associate Chair, Professor Lenhart succeeds Michael Hagenberger, who will now serve, full-time, in the role of Associate Dean of Facilities Planning and Management for the College of Engineering.

FACULTY AWARDED TENURE

Jeffrey M. Bielicki was promoted from the rank of Assistant Professor to that of Associate Professor, in June of 2019. A member of CEGE's environmental engineering group, Prof. Bielicki is also appointed in Ohio State's John Glenn College of Public Affairs. He serves on the faculty of the Environmental Science Graduate Program and as Faculty Lead, Sustainable Energy, for the Sustainability Institute at Ohio State.

As director of CEGE's Energy Sustainability Research Laboratory, Bielicki and his team study the use of CO2 to produce and store renewable energy and how changes in environmental and economic conditions could affect energy and water systems, particularly with respect to weather, climate and land use.

Photo courtesy of University Communications.

CEGE WELCOMES NEW FACULTY

Jieun Hur joined the faculty of the Department of Civil, Environmental and Geodetic Engineering as Assistant Professor of Practice. A member of CEGE's infrastructure engineering group, Dr. Hur has experience in industry, research and teaching. She earned her BS in Architectural Engineering from Ewha Womens University, South Korea and her MS and PhD in Civil and Environmental Engineering from the Georgia Institute of Technology.

Previously appointed as Visiting Assistant Professor in CEGE, Prof. Hur is currently collaborating with faculty colleagues on an initative designed to foster greater undergraduate participation in research activities at Ohio State.

Ryan Winston joined the College of Engineering as Assistant Professor with a dual appointment in CEGE and the Department of Food, Agricultural and Bioligical Engineering (FABE). An urban hydrologist, Prof. Winston received his undergraduate degree in Agricultural and Biological Engineering from the University of Florida. Later, he earned his MS and PhD in Biological and Agricultural Engineering from North Carolina State University.

Dr. Winston is a core faculty member of the Sustainability Institute at Ohio State and was recently presented with a 2019 Excellence in Undergraduate Research Mentoring Award for his work in furthering students' research and scholarly endeavors. *Photo courtesy of Women & Philanthropy*

ACADEMIC ADVISING OFFICE ADDS STAFF, PROMOTES UNDERGRADUATE ADVISORS

Dina Galley joined CEGE as Graduate Program Coordinator in May of 2019. A graduate of Ohio State, Ms. Galley most recently served as the Graduate Program Administrator in the School of Humanities at Rice University.

Liz Riter (L) was promoted to Senior Academic Advisor and **Barry Tolchin** (middle) was named Manager, Academic Advising. Mr. Tolchin, who previously served as an undergraduate advisor, replaces **Mary Leist** (R), who was named Director, Academic Advising, of Ohio State's College of Engineering.

NEW ENVIRONMENTAL ENGINEERING STAFF MEMBER JOINS CEGE

Zhe Liu joined the department as Environmental Laboratory Supervisor in August, 2019. She spent the last decade supervising teaching and research laboratories while developing lab protocols for a broad range of samples with various analytical techniques. Most recently, she served in Ohio State's College of Food, Agricultural and Environmental Sciences.

GREJNER-BRZEZINSKA BECOMES FIRST WOMAN FROM OHIO STATE TO BE NAMED TO THE NATIONAL ACADEMY OF ENGINEERING

Dr. **Dorota Grejner-Brzezinska**, Lowber B. Strange Endowed Professor and Chair, was recently recognized for her considerable achievements in teaching, research, scholarship and service. On October 6, 2019, she was formally inducted into the National Academy of Engineering. Prof. Brzezinska, Associate Dean for Research in the College of Engineering, is the 13th faculty member and first woman from Ohio State to be elected to the Academy.

Membership in the Academy is widely regarded as one of the highest honors bestowed on an engineer, a fact alluded to by NAE president John L. Anderson during his remarks at this year's ceremony. "The process is very selective," he stated. "It's not easy being elected to NAE membership, so we are inducting very special people today."

Dr. Brzezinska's influential research in the fields of geodetic engineering and satellite navigation helped advance GPS and image-based navigation for consumer, government and military applications. Her research continues to push boundaries as SPIN Lab, the Ohio State research group she co-directs with research professor **Charles Toth,** is investigating the use of artificial reality, in the absence of satellite imaging, for navigation and positioning.

In recognition of her status as a leader in scholary endeavors and research pursuits, Ohio State named Brzezinska as both a Distinguished Scholar and Distinguished University Professor during autumn semester.

The latter designation, awarded by the Office of Academic Affairs, is a title given to no more than three university faculty members each year. Ohio State's Board of Trustees made Dr. Brzezinska's designation as Distinguished University Professor a permanent one during its meeting on November 21, 2019.

She described receiving multiple awards as "a very humbling experience" and was quick to share credit for her success with current and former students and collaborators. In an interview with engineering major and Society of Women Engineers officer Allison Whitney, Prof. Brzezinska stated that reaching such career milestones "is never the accomplishment of one person."

Laura Arenschield, University Communications, contributed to this article.
Photo courtesy of University Communications.

BUTALIA RECOGNIZED AS OUTSTANDING TEACHER

Each year, undergraduate students in the College of Engineering nominate and select for recognition, an instructor who has demonstrated outstanding teaching ability and a willingness to help students achieve their educational goals.

Dr. Tarunjit Butalia, research associate professor, was presented with the Charles E. MacQuigg Award for Outstanding Teaching at the 22nd Annual College of Engineering Distinguished Faculty Awards event held on April 25, 2019. Students from Ohio State's Engineers' Council attended the event to present the award to Prof. Butalia. The Engineers' Council is comprised of student representatives from organizations, clubs, project teams and honoraries affiliated with the College of Engineering.

A past recipient of numerous academic awards, Professor Butalia was particularly moved by this recognition. "This has to be the best award I have ever received – nominated and selected by students!" he said. "Teaching the student leaders of today and tomorrow is not a responsibility for me – it is an honor."

Students appreciate Butalia's hands-on approach to the challenging coursework he presents in engineering classes. "I teach the students from their perspective and I get to know each one personally," he added. "They put in the hard work but I see it as my responsibility to motivate them to do better."

Prof. Butalia (center) celebrates with COE Engineers' Council students Matt Thurman (L) and David Kormos (R) at this year's event.
Bottom photo courtesy of COE Communications

Karen Dannemiller (R) demonstrates the SmART Form application for a film crew from a Columbus TV station.

CEGE RESEARCHER NAMED EARLY CAREER INNOVATOR

Professor **Karen Dannemiller** was named the 2019 Institute for Materials Research Early Career Innovator on May 9, 2019. Dannemiller, an assistant professor in CEGE's Environmental Engineering group, was also named as a finalist for the same award, given on a university-wide basis, by Ohio State's Office of Research.

The citation recognizes university researchers who, though their work, support economic development in Central Ohio via the commercialization of university intellectual property, licensing of technologies, invention disclosures and patent applications and awards.

Dannemiller and her team of researchers from the Indoor Environmental Quality Laboratory have developed SmART Form, a smart phone application that enables users to easily detect formaldehyde in the indoor environment.

STADIUM SCIENCE

Sports facilities encompass full breadth of civil and environmental engineering fields

Under the Ohio Stadium rotunda, Michael Hagenberger (L) and Anthony Massari (R) discuss their arena building experiences, November, 2019.

Ask a Buckeye the first thing that comes to mind when you say "Saturdays in autumn" and she will likely respond "football."

During each home game, thousands of fans pack Ohio Stadium and the surrounding areas to cheer their beloved Buckeyes on to victory. An Ohio State home game provides opportunities for enthusiasts to enjoy their favorite sport, for friends and family to spend time together and for alumni to reconnect with the university.

For **Michael Hagenberger** and **Anthony Massari**, these contests also offer the professors of practice an opportunity to discuss their experiences designing and building arenas and stadiums with students.

Dr. Massari, an assistant professor of practice and director of CEGE's capstone program, complimented Ohio Stadium's time-tested design. "Most modern stadiums follow the traditional design of the 'Shoe," he explained. Massari noted that planners of modern facilities must focus even more on establishing a suitable location for the arena to facilitate safe travel to and from events. "In building MetLife Stadium (NJ), it was critical to provide light rail

access to the stadium," he recalled. This made travel from neighboring New York City more efficient while minimizing the environmental impact on surrounding neighborhoods.

TBDBITL performs Script Ohio during an Ohio State night game. *Photo courtesy of University Commincations.*

Hagenberger, who assisted with the building of, PNC Arena in Raleigh, NC and the Xcel Energy Center in St. Paul, MN, among others, stated that his experience in the field helped him learn about how the objectives of his job affected those of other professionals collaborating on the project. "It's where I learned about relationship building and how to be a thoughtful engineer," he said.

In fact, Hagenberger delayed his enrollment in graduate school so that he could see the PNC project to its conclusion. Looking ahead to his career as an educator, he knew that there was much value to gain while working on-site. "Now, those are the experiences I pass along to my classes."

Massari, whose other projects included Hard Rock Stadium in Miami, FL the Barclays Center in Brooklyn, NY, said that these large-scale projects are different from his other work in building high-rise buildings. "Both act as incredible aggregators of people," he said. "The amazing thing about arenas is that you can see all of the participants, how everyone interacts with and enjoys the facility all at once."

Learn more at ***https://ceg.osu.edu/news/2019/12/stadium-science***

"THE FATHER OF THE STADIUM"

PROFESSOR PLAYED PIVOTAL ROLES IN OHIO STATE ENGINEERING AND ATHLETICS

Professor Thomas Ewing French dedicated his professional life to the advancement of engineering education and service to Ohio State. An avid supporter of Buckeye athletics, he also played a crucial role in providing the impetus for the construction of Ohio Stadium.

French joined the Ohio State faculty after graduating in 1895 with a degree in mechanical engineering. A highly skilled draftsman, he chaired the Department of Engineering Drawing from its inception in 1906 until his retirement in 1942.

Construction of exterior arches and c deck support beams, 1921, *Photos courtesy of University Archives*

He served as Ohio State's faculty representative to the Big 10 Conference from 1912 until his death in 1944. A speech that French gave in 1915 was widely considered to be the unofficial kickoff for Ohio State's efforts to build a larger stadium on campus.

He was an active participant in the planning and construction of Ohio Stadium, including securing renowned architect and fellow alumnus Howard Dwight Smith to design the structure.

Learn more Ohio Stadium history at ***library.osu.edu/blogs/ohiostadium/***

STUDENT ACHIEVEMENT

EDUCATION FOR CITIZENSHIP

Buckeye engineer honors Ohio State's rich history through service and leadership

Raina Rotondo seemed destined for a career in engineering. "As a child, I always gravitated toward toys or DIY programs (on television) that focused on construction and problem solving," she recalled. "Civil engineering is part of who I am."

The fourth year senior from Green, Ohio, also believed strongly in service to others. A member of Ohio State's Mount Leadership Society Scholars Program, she regularly volunteered for community service projects on campus and beyond. Now, as a newly-named Sesquicentennial Scholar, she and 149 fellow students will further demonstrate Ohio State's land-grant mission of service to the community through leadership development and service-learning opportunities.

Created to honor the university's 150th year, the Sesquicentennial Scholar Program's membership features students from nine countries, 22 states and 42 Ohio counties. In a statement to the campus community, Ohio State President Dr. Michael V. Drake described the Scholars as "the next generation in Ohio State's proud tradition of service and excellence."

Once selected, Raina was eager to begin her tenure in the program. "This is an exiting opportunity for me and all Buckeyes to embrace the ongoing mission of global citizenry, leadership and education," she stated. She intends to pursue a career as a civil engineer while honoring her commitment to improving the quality of human lives and the environment. "I am bursting with pride over being a Buckeye," she offered. "I hope to succeed as a meaningful campus ambassador and community leader who will exemplify the values and commitment to others that Ohio State has fostered in me."

(Above, top) Raina Rotondo relaxes at Mirror Lake. (Bottom) Ohio State's Sesquicentennial Scholars gather in Ohio Stadium to celebrate the beginning of the university's 150th year. *Group photo courtesy of Sesquicentennial Scholars Program*

BUILDING BRIDGES

Industry Mentor Program kickoff event takes place in unique location

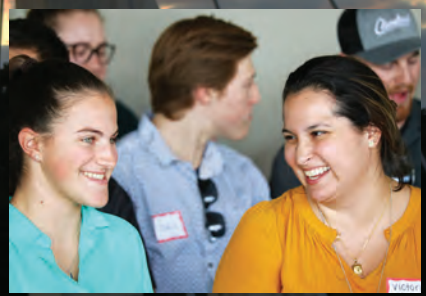
Runners and cyclists who filled the Olentangy Trail on a sunny and pleasant September afternoon craned their necks to get a closer look at the large group seated beneath the Lane Ave. bridge.

The gathering was the brainchild of Cornell Robertson, who wanted to bring together, "in the field", CEGE students and faculty, along with alumni and industry professionals, to celebrate the start of the new academic year at Ohio State.

A proud alumnus, Robertson (BS CE '92) was no stranger to holding public events. As Franklin County Engineer, he oversaw a team that built and maintained the region's roads and bridges and actively pursued outreach and engagement opportunities in the community. He shared his idea with Barry Tolchin, CEGE's Manager of Academic Advising and coordinator of the department's Industry Mentor Program and department chair Allison Mackay. Both enthusiastically agreed to hold the yearly welcome event for CEGE's Industry Mentor Program on the multi-use path that lies beneath the Lane Ave. Bridge.

"The Ohio State University holds a very special place in my heart," Robertson said. "We want to see students develop into future leaders through these educational opportunities." Although site visits were a common element of the mentor program, this one was unique. "It was not just an opportunity to tell students about a project that we did," stated Franklin Co. Bridge Design Engineer Ed Herrick (BS CE '00). "The idea was to get their eyes on the project and, in this case, even their hands."

Students learned how the bridge and the Olentangy River Restoration projects came to life Tolchin said. "It was an embodiment of the purpose of the mentorship program itself - helping students engage with civil and environmental engineers in a way they may not be able to through their coursework."



(Top row) Cornell Robertson (R) celebrates with Brutus Buckeye (Middle row, L) Ed Herrick (middle) speaks to attendees as cyclists pass by (Middle row, R) Mentor George Butzer (HyperSphere, Inc.) mingles with students (Bottom row, L) Dean David Williams offers remarks during the program (Bottom row, R) Student Sydney Stahl (L) and mentor Victoria Werth (CESO, Inc.) share a laugh during the kickoff celebration

TRIO OF CEGE GRADS HONORED BY COLLEGE OF ENGINEERING

Three Buckeye engineers were recognized for their career and scholarly achievements at the 22nd Annual Excellence in Engineering and Architecture Alumni Awards on October 4, 2019.

Peggy Agouris (MS '88, PhD '92, geodetic science) received the Distinguished Alumni Award for Academic Excellence.

Dr. Agouris is the sixth provost of the College of William & Mary. She has authored more than 100 scholarly articles and has received more than $35 million in external research funding for her research. *Photo courtesy of Peggy Agouris*

Joining his colleague in the academic category was **David C. Kraft** (PhD '64, civil engineering).

Dr. Kraft is professor emeritus of civil engineering and engineering management at the University of Kansas, where he served as dean of engineering, and VP and director of the Center for Research Inc.
Photo courtesy of COE Communications

James W. Smith (BS '81, civil engineering) received the Distinguished Alumni Award for Career Achievement.

He serves as chief executive officer of Elford, Inc., central Ohio's largest, locally owned and operated construction firm. Mr. Smith also serves on the boards of Elford and the Builders Exchange Foundation and is a member of CEGE's External Advisory Board.
Photo courtesy of COE Communications

ERDAL JOINS BLACK & VEATCH

Dr. Zeynep Erdal (MS '95 civil engineering) will focus on global "one water" solutions as Integrated Solutions Leader in Black & Veatch's Water Business. In a press release dated July 4, 2019, Erdal was described as an "industry leader with a strong vision." Based in the company's Irvine, California office, Erdal will address "environmental, technical, funding and regulatory challenges in the water cycle through planning, implementation, asset management and digital innovation." *Photo courtesy of Black & Veatch*

CIVIL GRAD TO LEAD ODNR ENGINEERING DIVISION

Jeremy Wenner (BS '06 civil engineering) was named Chief of the Division of Engineering for the Ohio Department of Natural Resources (ODNR) on September 4, 2019. An employee of the department since 2006, Mr. Wenner has worked on a number of critical dam rehabilitation projects, including the recently completed Buckeye Lake project, located east of Columbus. *Photo courtesy of ODNR*

BUTCHER NAMED CITY MANAGER

Greg Butcher (BS '88, civil engineering) was hired as city manager of Pickerington, Ohio on August 23, 2019.

Mr. Butcher has a long history of public service, having held the position of Engineer in neighboring Violet Township for 18 years prior to accepting his new leadership position.

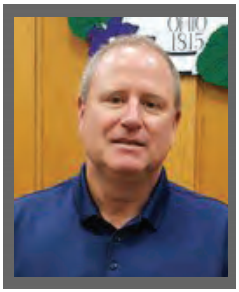


Photo courtesy of G. Butcher

ESGP ALUM BEGINS POSTDOCTORAL STUDIES

Jonathan Ogland-Hand (PhD '19, environmental studies graduate program) will follow his passion for addressing climate change to the Swiss Federal Institute of Technology. "I feel really fortunate to be able to continue the research direction that I started at Ohio State," he said.

Ogland-Hand investigates ways of using geologically-stored CO2 to generate electricity and store energy. "My research and experiences as a PhD student at Ohio State prepared me well for my post doc at ETH Zurich."

RESEARCH

NOT JUST ANOTHER DAY IN THE OFFICE

LIVING LAB FUELS RESEARCH INTO GREENHOUSE GASES

Canoes filled with young people cut gracefully through the water on a pristine summer morning. The students smiled and laughed as they navigated the wetlands of Old Woman Creek National Estuarine Research Reserve. This was no pleasure cruise, however. The students were commuting to work.

The 574-acre wetland preserve, a transition zone where a fresh water river meets Lake Erie, served as a laboratory for researchers in CEGE's Ecohydrometeorology Research Group. Professor **Gil Bohrer** and his team investigated the carbon budget of these wetlands, which capture and store carbon dioxide, but also produce and release methane, a greenhouse gas could potentially have a bigger impact than carbon dioxide on global warming.

Soil microbes produce methane in order to metabolize carbohydrates (sugar) in the oxygen-deprived environment of the wetlands. "My research focuses on how the interplay between plants, soils and water affects ecosystem functioning in wetland ecosystems," stated **Jorge A. Villa**, Visiting Assistant Research Professor in the Ecohydrometeorology Lab. Villa noted that there is a tremendous amount of uncertainty regarding the net rate of methane exchange between the wetlands ecosystem and the atmosphere and the role of different environmental factors that control this rate.

To monitor this exchange of greenhouse gases, researchers maintained a network of sensors that monitored Old Woman Creek's air movement and gas concentrations, water levels and temperature, and dissolved gas concentrations in the water and mud. Fluctuations in these parameters, combined with the types of plants in the environment, can greatly affect how much methane the wetlands' soil releases.

Villa is confident that lessons learned from research in this unique environment will lead to enhanced wetland management and help sharpen the big picture regarding climate change. "Integrating wetland ecosystem services into land-use decision making is becoming increasingly commonplace as a means to promote conservation and to build resilience to land use and climate change," he said. Learn more at **ecohydrometeorology.engineering.osu.edu/**

(Clockwise from top) Recent CEGE grad Madison Evans installs a soil temperature probe; Gil Bohrer perfoms maintenance on the meteorological and carbon measuring station; Jorge Villa paddles during his daily commute.

Photos courtesy of Ecohydrometeorology Lab

A SUSTAINABLE SOLUTION FOR SAFER DRINKING WATER

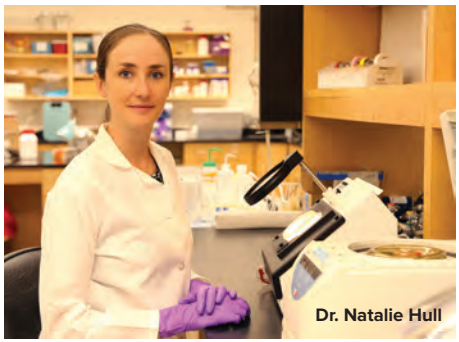
CEGE RESEARCHER ADDRESSES DISINFECTION IN SMALLER WATER SYSTEMS

Most of us don't think a glass of water could make us sick, but depending on where your H2O comes from, it could.

People who get their water from rural, small water systems are at a greater health risk of exposure to bacterial and other harmful pathogens, said researcher **Natalie Hull**, an assistant professor in CEGE. In 2015 alone, nearly 21 million Americans relied on community water systems that violated health-based quality standards, according to a study in the *Proceedings of the National Academy of Sciences*.

"A lot of small water systems in the United States struggle with disinfection compliance," explained Hull. "These health-related disinfection violations disproportioinately affect small systems, so we're interested in finding a more accessible, sustainable water treatment solution."

Identifying such a solution was a focus of a recent study Hull co-authored with colleagues from the University of Colorado, Boulder. In the journal *AWWA Water Science*, Hull and colleagues reported that disinfection by ultraviolet (UV) light via light-emitting diodes (LEDs) may be a sustainable option for small water systems.



Dr. Natalie Hull

Unlike the traditional chlorination process that many systems use today, UV disinfection requires no chemical additions, causes no taste or odor issues, has no harmful effect from overdosing and does not cause pipe corrosion.

The team conducted a year-long implementation of the first commercially available, UV LED water treatment reactor in a small system in Colorado. Measuring key indicator bacteria, researchers compared results from the UV LEDs to traditional chlorine disinfection. The UV reactor performed equally as well as the chlorination system for disinfection of the indicator organisms, meaning it could be a viable option for municipal water treatment.

Next steps will also include anaylsis of monitoring techniques used by small systems. "Not only are we looking at a more accessible water treatment technology, but we're looking at a more accessible monitoring technology as well," Hull said.

Learn more at ***u.osu.edu/hull.305/***

Adapted from an article by Meggie Biss, COE Communications
Photo courtesy of COE Communications

OUTSIDE THE CLASSROOM

CEGE students, faculty and staff pursue a myriad of interests, both inside and outside of the classroom. In this periodic feature, we ask a graduate student and his faculty advisor the question ***"What did you do this past summer?"***

Marcos Miranda

PhD student, Environmental Sciences Graduate Program

I spent the summer working at Los Alamos National Laboratory as a part of the Mickey Leland Energy Fellowship. Sponsored by the U.S. Department of Energy, the program provides real-world, hands-on research experiences for future STEM professionals.

Under the direction of Dr. Richard Middleton, I worked with a team of researchers to further develop SimCCS software. SimCCS is a decision support tool that determines how to optimally deploy CO2 capture and geologic storage over many potential locations.

I developed a case study for the Gulf Coast region that expanded the SimCCS decision network to include Co2-based geothermal electricity, which we are actively investigating in Ohio State's Energy Sustainability Research Laboratory. It was a unique experience and I learned a lot during my time in New Mexico.

Jeffrey Bielicki

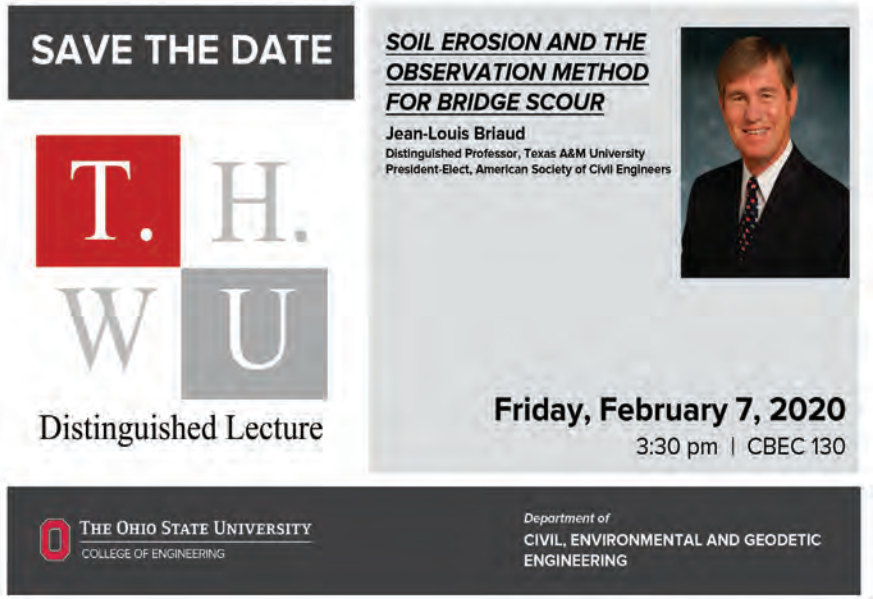
Associate Professor, CEGE & The John Glenn College of Public Affairs

After I turned in my dossier for promotion and tenure, I asked, 'what's next?' So I decided to bide the time of uncertainty about my future, by training for, and running, a marathon. I picked the Honolulu marathon (I knew that the trip to Hawaii would make my family very supportive of the time I'd take to do all of the runs in order to properly train for it).

Along the way, as it got easier and easier to run longer and longer, the marathon didn't feel like it was big enough. That's when I decided that I'd run 50 half or full marathons in 50 states over 50 months. I've knocked off seven thus far (HI, TX, AL, NC, OH, IN, KY).

(R) Jeffrey Bielicki, with his son, enjoys a post-race snack in San Francisco.
Race photo courtesy of Jeffrey Bielicki

UPCOMING EVENTS



Please join the Department of Civil, Environmental and Geodetic Engineering for an engaging presentation by ASCE President-Elect and 2020 T.H. Wu Distinguished Lecturer Professor **Jean-Louis Briaud**.

More information at

ceg.osu.edu

RSVP to

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Benchmarks

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We welcome your comments and questions about *Benchmarks*.
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Keep in touch

Update your alumni information at **https://osu.az1.qualtrics.com/jfe/form/SV_1zRsDLsz7hiaOI7**

Social media: facebook.com/CEGE-at-Ohio-State

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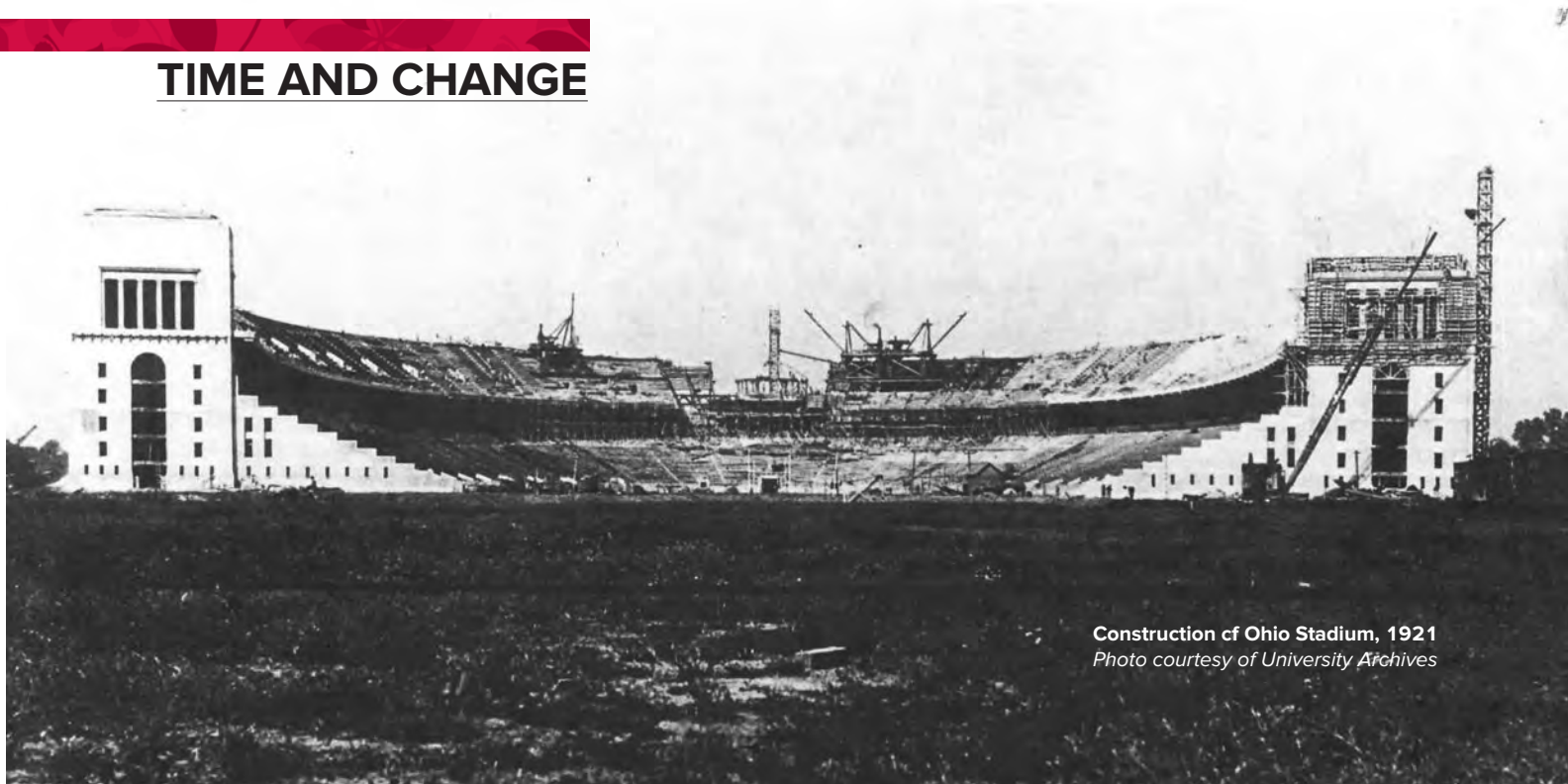
TIME AND CHANGE



Construction cf Ohio Stadium, 1921
Photo courtesy of University Archives