



PennState
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**Earth and Environmental
Systems Institute**

EESI Does It



EESI Does It is a publication of the Earth and Environmental Systems Institute in the College of Earth and Mineral Sciences at Penn State.

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Cover Photo: Rob Nicolas (right) doing field work with Klaus Keller at the Selinsgrove, Pennsylvania research site.
Photo credit: David Kubarek



Letter from the Interim Director

Dear EESI community,
This year, EESI continued to support its research mission and sponsor events in both remote and virtual formats. This presented both challenges and opportunities and pushed us to be more creative. We held our first on-campus coffee and creamery ice cream hour and talked in Foundry Park on a beautiful fall afternoon.

The now more familiar remote world expanded opportunities to “bring” renowned scientists from around the world to the EESI community in our Earth Talks Seminar Series, while reducing the series’ carbon impact. The remote world also made it easier to organize and host DOPE labs—a science communication week for the EESI and EMS research communities. These workshops provided the opportunity for attendees to extend science engagement beyond traditional science journalism, and to increase diversity engagement in the STEM fields.

EESI has grown over the past two years, having recruited new talent. With this new generation of faculty comes exciting areas for interdisciplinary research in water science and water resources, environmental data analytics, earth system history, urban resilience to climate change, and climate dynamics. You can read more about our new faculty on page 28.

Looking toward the future, EESI plans to continue to recruit new talent that will contribute to the future of interdisciplinary earth and environmental sciences research at Penn State. Along with our partnering EMS departments and other Penn State institutes, we expect to bring new talent in the fields of climate change research, focused on climate risk and decision making, as well as climate impacts, hydrogeology, and planetary sciences.

EESI has also welcomed Dave Blehi, Clayton Gardner, Susan Kertis, Kalysta Long, Sarah Potter, and Cas Zemba to our already talented staff. You can read more about them on page 24. They are working in the beautifully renovated EESI suite, located on the second floor of the Earth and Engineering Sciences Building. Plans continue for the Joint Energy Water Collaborative Laboratory

(JEWEL) project, located on the third floor, with construction beginning early in 2023. Please do come by and make use of the new collaborative workspaces and conference room, which is fully equipped for hybrid meetings.

EESI’s student programs continue to thrive, as we welcomed six new environmental scholars this fall, the largest cohort of scholars since the program’s inception. For the first time, EESI also provided research support to students from the Marilyn L. Fogel Student Research Fund in Biogeosciences—established by Marilyn L. Fogel and Christopher Swarth. You can read about EESI’s Environmental Scholars and Fogel Fund recipients on page 7.

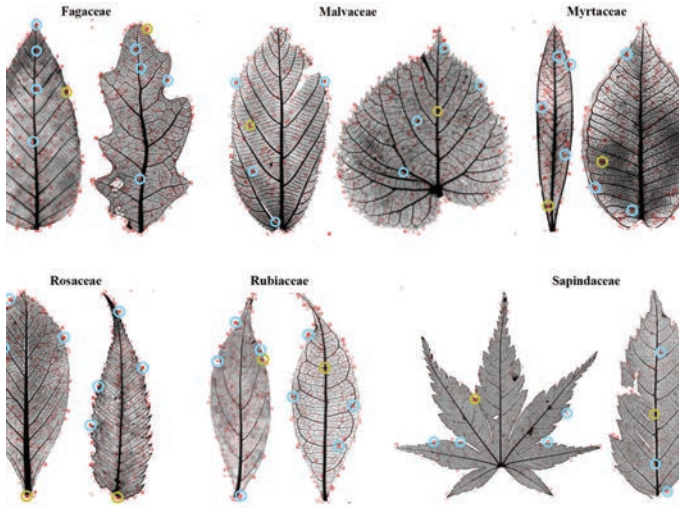
There have also been two notable departures from Penn State and the Institute. Frist, Eric Barron, Penn State’s eighteenth President, has retired. Eric came to Penn State in 1986 to lead the newly established Earth System Science Center, which eventually became EESI. Secondly, Jim Kasting, who Eric recruited to Penn State, also retired. Both have made enormous contributions to EESI, EMS, and Penn State and we wish them the best in retirement. Additionally, Sue Brantley—EESI’s director since 2003—stepped down in June and resumed her role as a faculty member in the Department of Geosciences. Sue’s visionary leadership over nearly two decades has shaped what EESI is today. I am delighted to announce that Erica Smithwick, Distinguished Professor of Geography, will be the new director of EESI beginning in January 2023 (see story on page 36). Erica has been a member of the EESI community since she came to Penn State in 2007 and has some exciting initiatives for EESI which she will share in our next newsletter.

In this new academic year, we look forward to all the exciting news and opportunities that will become available because of the hard work and dedication of our talented community. Please do visit EESI’s newly renovated suite and use it as an opportunity, and space, to gather, discuss, and collaborate on research that will continue to shape the world and our understanding of earth system science.

Sincerely,

A handwritten signature in black ink that reads "Alan H. Taylor". The signature is written in a cursive, flowing style.

Alan Taylor
Professor of Geography and Ecology
Interim Director, EESI



Decoding the leaf: scientists search for features to ID modern, fossil leaves

Machine learning programs that can classify leaves and place them in biological families may unlock new clues about the evolution of plant life, but only if scientists understand what the computers are seeing. A team led by Penn State scientists combined a machine learning approach and traditional botanical language to find and describe new features for fossil identification. The team, led by Edward Spagnuolo, a recent Penn State graduate and now an EESI Environmental

Scholar, took heat maps produced by machine learning programs—leaf images covered with small red boxes that highlight areas the computer identified as important for identification—and developed a manual scoring system to analyze these regions across different plant families.

Leaves are the most common non-microscopic plant part found today and in the fossil record, but they are also the most difficult to identify. Variation in leaf shape and venation—the pattern of veins in the blade of a leaf—is too complex for botanical terminology to capture. This research is the first of its kind in attempting to back-translate and interpret computer vision heat maps into botanical language. Read the full article at <https://bit.ly/3oXEL3D>

Historic fire regimes lay groundwork for future forest management in western US

Fires in semi-arid forests in the western United States tended to burn periodically and at low severity until the policy of fire suppression put an end to these low-intensity events and created the conditions for the destructive fires seen today. The pattern of megafire severity is largely a fuel problem, according to Alan Taylor, professor of geography and interim director of the EESI. Due to fire exclusion over the past 120 years, forests are much denser and the ground is more covered with fuel—twigs, branches, leaves, and small trees. Add the fact that in the last thirty to forty years the climate has gotten hotter and drier, and this fuel poses a risk of creating significant fires. The research team is working to provide land managers and decision makers in the West a resource that summarizes the best-available science to aid in land management decisions. Their research also addresses ongoing uncertainty over fire management approaches. Read the full article at <https://bit.ly/3BBWrJO>



Ryan Waugh



A prehistoric forest grows in Brunei

The first study of leaf fossils conducted in the nation of Brunei on the island of Borneo has revealed that the current dominant tree group, the dipterocarps, has dominated the rainforests for at least four million years, according to an international research team led by Penn State in partnership with Universiti Brunei Darussalam. The team's findings suggest that the current landscape of the island of Borneo is what was present during the Pliocene Epoch, 5.3 to 2.6 million years ago. The findings

may provide additional justification for conservation of these forests that support many critically endangered species. This marks the first demonstration that the characteristic dominant life form of Borneo and the entire Asian wet tropics, the dipterocarp trees, was not only present but dominant.

The dipterocarps are the world's tallest tropical trees, and the largest of them can reach 328 feet (one-hundred meters) in height, approximately the height of a twenty-two story building. These trees include hundreds of keystone species that support tropical Asia's critically endangered biodiversity by structuring rainforests and providing enormous food resources through pollination and their nutritious seeds. Borneo has almost 270 dipterocarp species, more than half the world's total.

Read the full article at <https://bit.ly/3zTCLQg>

Novel model can aid decisions in electricity generation, stream water quality

Switching from coal to natural gas in power plants can reduce how much sulfur dioxide is emitted into the atmosphere and ultimately how much sulfate pollution enters waterways, according to a Penn State research team led by Xianzeng Niu, assistant research professor in the EESI, and Susan Brantley, Evan Pugh University Professor, and Barnes Professor, of Geosciences.



The idea for the project arose when undergraduate students working in a geosciences class, taught by Brantley, had noticed that some streams near power plants in central Pennsylvania seemed to show improvements in water quality. The students believed that the power plants switching to natural gas may explain the positive results. Small datasets and new technologies that remove sulfur dioxide from emissions made it difficult to identify in the data the more recent shift from coal-to-natural-gas-fired power plants. Using decades worth of data from multiple government agencies, the team created a model to detect if the recent switch from coal to gas is affecting streams within a sixty-mile radius of the power plants. Read the full article at <https://bit.ly/3PXtAnE>

Studying possible links between fracking, water contaminants

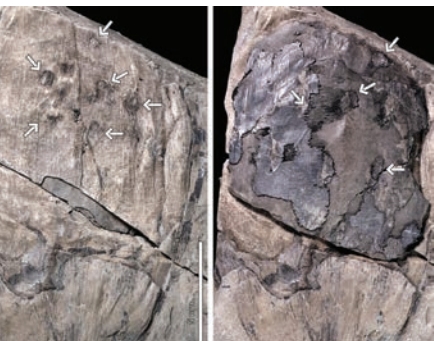
Unconventional drilling has helped Pennsylvania retain its status as a leading energy exporter, but the processes come with a host of environmental and public health concerns. A Penn State-led research team is exploring possible links between fracking and water contaminants in southwestern Pennsylvania. Examining more than 7,000 water samples from Beaver, Greene, and Washington counties for forty diverse chemical signatures that may indicate water contamination, the team aims to identify whether contaminants—like sulfate and benzen—are part of the area's background geochemistry, or if they originated from legacy acid mine drainage, or a specific phase of the fracking process. Read the full article at <https://bit.ly/3zR4kKb>



Fossil find sheds new light on Neotropical rainforests

Tiny beetles that feed on fruit from the palm family may have developed their taste for coconuts long ago, according to a Penn State-led team of scientists studying suspected insect damage in a sixty-million-year-old fossil. After finding a fossilized coconut that had clear signs of insect tunneling, the team studied the damage and was able to pinpoint the insect culprit: a group of beetles commonly referred to as palm bruchines that still eat palm fruits today. The findings represent the earliest fossil evidence of seed beetles feeding on palm fruit and shed new light on the Neotropical rainforests that emerged in modern day South America following the Cretaceous-Paleogene extinction event sixty-six million years ago that wiped out the dinosaurs and reshaped life on Earth. This kind of relationship between specific plants and insects—called specialized interactions—plays an important role in creating and maintaining plant diversity in modern Neotropical rainforests. The team's findings suggest that palm bruchines

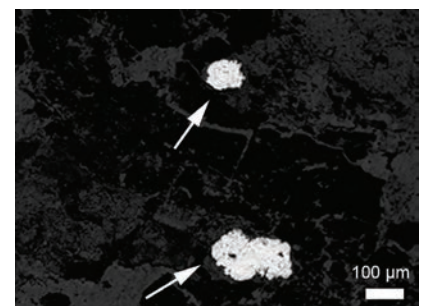
have consistently eaten palm fruits for at least sixty million years and that the specialized interactions that define modern-day Neotropical rainforests have occurred through geological time. Read the full article at <https://bit.ly/3cYXNEe>



Fossil worm dung shows traces of microscopic 'miners' in elemental silver

When one organism's trash contains traces of human treasure, look for ancient microbial activity, according to researchers who found elemental silver in fossilized worm dung. The researchers found the silver in coprolites, or fossilized feces, collected from the Ravens Throat River Lagerstätte in Canada's Northwest Territories. A lagerstätte is a deposit of exceptionally preserved fossils that sometimes includes fossilized soft tissues, or in this case fossilized worm dung. The fossils date to the Cambrian geologic period more than 500 million years ago. Today the site sits in a cold, mountainous area, but in the Cambrian period it was located near the equator and submerged under the ocean. At first, the researchers were unsure of the producer of the feces, until the scientists split and sliced through their rock samples and came across fossilized worms and worm burrows. It was then that the team realized that the flaky black patches they had were worm feces that had been preserved in burrows made deep under the ocean.

Read the full article at <https://bit.ly/3QjkkNo>



Marilyn L. Fogel Student Research Fund in Biogeosciences

In 2021 Marilyn Fogel and her husband, Chris Swarth, established The Marilyn L. Fogel Student Research Fund in Biogeosciences, aimed at getting more Penn State students engaged in interdisciplinary research. It was with great sadness that we learned she died on May 11, 2022, after a long battle with ALS. She was sixty-nine years old.

Fogel was dubbed the “isotope queen” for her scientific contributions to isotope geochemistry. Her work led to breakthroughs in multiple disciplines, including paleoecology and climate change, astrobiology, and modern ecosystem studies.

A proponent of field work, Fogel took many opportunities to get out of the lab, or office. Much of her field work included expeditions to far off places, sometimes under hazardous conditions. On one occasion she was lashed to the deck of a small ship at sea, during a hurricane. On another, she was tasked with using a rifle to fend off polar bears during an expedition to the Arctic.



The Marilyn L. Fogel Fund is dedicated to supporting research activities for both undergraduate and graduate students affiliated with EESI in the College of Earth and Mineral Sciences at Penn State. The fund has a particular emphasis on enabling field or laboratory research focused on geology, ecology, meteorology, biogeochemistry, climate science, and geography.

First two recipients awarded Fogel funding

In December 2021, the first two recipients, graduate students, Shuyu Chang and Kaitlyn Horisk were selected to receive funding.



Chang is pursuing a doctoral degree in geography under the guidance of assistant professor of geography, Kimberly Van Meter. She is also an EESI Environmental Scholars. Her project is titled “Dams, reservoirs, and nutrients in the Chesapeake Bay Watershed: past trajectories and future horizons.”



Horisk is pursuing a doctoral degree in geosciences under the guidance of assistant professor of geosciences and Wilson Faculty Fellow, Sarah Ivory. Her project is titled “Assessing changes in moisture availability in Dhofar, Oman from the mid-Holocene to present: compound specific stable isotopes from a novel archive.”

Dope Labs Science Communications Week

In spring 2022, EESI organized Dope Labs Science Communications Week at Penn State. Aimed at introducing researchers to the broader science communications community, the event illustrated how social media, storytelling, and an intentional web presence can aid scientists in networking with one another and allow them to engage with broader audiences.

The event was run by the creators of the popular Dope Labs podcast, Zakiya Whatley and Titi Shodiya, who received her bachelor's degree in material science and engineering from Penn State.

The event included a one-hour broad interest session, which was open to all individuals at Penn State, as well as four one-and-a-half-hour workshops specific to researchers.

Whatley said that in today's ever expanding, and interconnected world, "It's important for scientists to get comfortable with multiple modes of communication, especially when engaging non-expert audiences."

"It just seems like the media world is changing so fast, and there's lots of different ways to communicate," said Alan Taylor, interim director of EESI, and professor of geography and ecology. "I thought it would be very useful, particularly for graduate students, postdocs, and younger faculty who are emerging into a new media world to have some facility to communicate with broader audiences. Many who attended the workshops began to implement what they learned in their research groups increasing the impact and



Titi Shodiya was honored with Penn State's Alumni Achievement Award, which recognizes alumni thirty-five years of age and younger for their extraordinary professional accomplishments. Shodiya was also selected to deliver the commencement address for the spring 2021 graduation ceremony.

exposure of the outstanding research we do in EESI and EMS."

Shodiya, a materials scientist and engineer, focuses her efforts on making specific concepts more palatable, and consumable, to a wider range of audiences. Whatley, a molecular biologist, strives to break down barriers to, and create persistence in, STEM careers. Much of her work is targeted to populations that have been historically underrepresented within the sciences. Their podcast has been in existence since February of 2019. Learn more about, and listen to, the Dope Labs podcast at www.dopelabspodcast.com.

The College of Earth and Mineral Sciences, the EMS Energy Institute, and the college's Department of Geosciences, Department of Materials Science and Engineering, and the John and Willie Leone Family Department of Energy and Mineral Engineering co-sponsored the event.

Environmental Scholars Program

In Spring 2015 EESI revamped and redeployed its Environmental Scholars Program. The program is designed to be an opportunity for students to establish interdisciplinary relationships across departments and research groups, increase student diversity, and improve the recruiting efforts of the University.

"The program is an outstanding opportunity for the students to make connections and engage in interdisciplinary dialogue outside their home departments, through a series of special seminars and discussion groups through the year," said Peter Wilf, professor of geosciences, and current chair of the Environmental Scholars Committee. Read about the 2021-22 class on the next page and the new 2022-23 class beginning on pages 13.

2021-22 EESI Scholars

Luis Alejandro Giraldo Cerón



ABOUT

Giraldo Cerón earned his undergraduate degree from the School of Applied Sciences and Engineering University (EAFIT), in Medellín, Colombia. He is a graduate student in geosciences.

RESEARCH

Giraldo Cerón's research investigates plant-insect herbivore interactions in the modern and fossil record, as well as the evolution of modern Neotropical forests. Plants and herbivorous insects constitute approximately 70 percent of modern terrestrial biodiversity, not including microbes. Although similar statistics are expected in the fossil record, insect herbivore fossils are extremely scarce. By studying the chew marks left in fossil leaves by ancient herbivores, Giraldo Cerón seeks to understand topics such as: how plants and herbivorous insects interacted in deep time—a term that refers to the time scale of geologic events, how intensely leaves were eaten, the diversity of prehistoric insect species, the preference of leaves that were consumed, how prehistoric plants and insects were affected by climate change, and how herbivory has impacted plant diversity over time.

The specifics of Giraldo Cerón's research focus on insect herbivory of Patagonian Eucalyptus—commonly known as gum trees—leaves. Comparing his findings against modern Eucalyptus species, he is testing how insect herbivores have interacted with the plant over time—fifty-two million years to present—and space—from Patagonia to Australia, a plateau that covers nearly the entire southern portion of mainland Argentina, to Australia.

Eucalyptus is one of the most important plant genera of Australia, with immense ecological, cultural, and economic significance. Giraldo Cerón's research is providing key insights into the persistence of insect herbivore lineages associated with Eucalyptus and important information about the persistence of insect herbivore lineages associated with the plant.

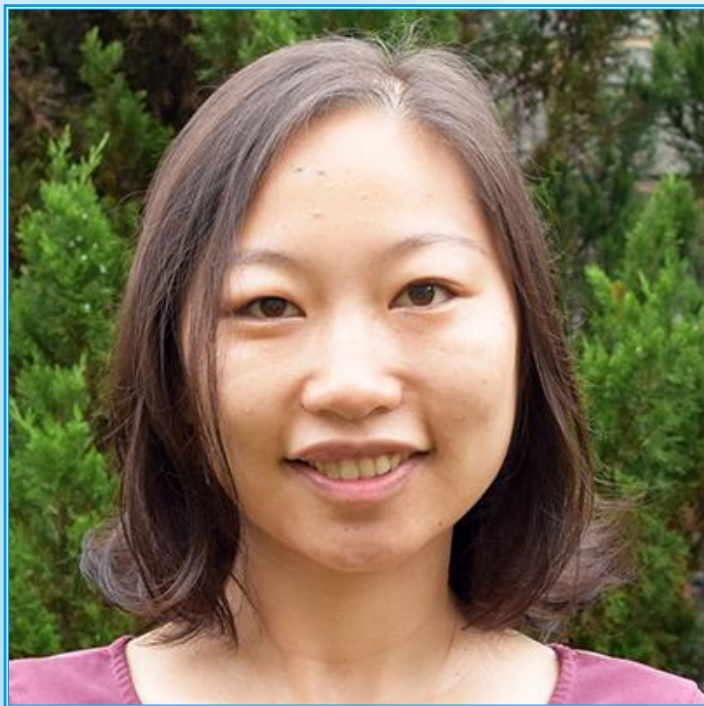
WHY PURSUE THIS RESEARCH?

“I want to be able to tell interesting stories to the public—to take the science out of scientific papers and meetings and show people how fantastic and compelling the natural world is, both today and in the deep time,” said Giraldo Cerón. “I think that we are inherently drawn upon stories that have characters that interact, and I find just that in studying plants and herbivorous insects. There is an almost infinite list of characters, both from the plant and insect world, and an equally endless set of interactions to be studied and discovered. All of this translates into a multitude of stories to be told, read, and drawn. And who does not like a good story?”

FUTURE PLANS

Giraldo Cerón strives to someday become a storytelling scientist, translating science and scientific research to the public in simple, clear, and fun ways. He hopes his career will someday lead him towards the role of a museum curator in paleobotany and paleoecology and allow him the ability to combine his passion for both science communication and research.

Shuyu Chang



ABOUT

Chang earned her undergraduate degree from the China Agricultural University's College of Engineering and her masters degree from Johns Hopkins University. She is a graduate student in geography.

RESEARCH

Many parts of the Chesapeake Bay contain excess levels of nitrogen, phosphorus, and sediment. Because of this, the Bay is listed as impaired under the Environmental Protection Agency's Clean Water Act. Chang's research is striving to develop process-based models and data-driven approaches to better understand water quality issues and support decisions being made regarding water resources across distinct spatial and temporal scales within the Chesapeake Bay watershed. Her research is exploring how human activity has changed how nutrients—like nitrogen, phosphorus, carbon, and silicon—are delivered to downstream bodies of water and the impacts these changes have on water quality in areas heavily influenced by human activity.

Combining the use of remote sensing techniques, machine learning, and hydrological modeling frameworks, Chang's research is working to address the need for a more comprehensive reservoir dataset. This comes in the form of an open-sourced, geo-referenced, database of dams found to date in the Chesapeake Bay region. The database contains the location of each dam found in the region, along with other information such as surface area, storage, watershed drainage, residence time, and discharge. The database provides the necessary information needed for communities, resource managers, and scientists, to access the functionality and impacts of dams.

Chang's analysis of the spatial and temporal variations of ecological functions in reservoirs, and the overall impact on water quality, is providing unbiased, research-based, information to foster environmentally literate populations and provide communities and individuals the resources to make decisions that incorporate ecological priorities with social needs. Better understanding of how dams control both current and future water quality will assist Chesapeake Bay communities in adaptively managing the landscape and meeting the challenges of water resources under continuous environmental change.

WHY PURSUE THIS RESEARCH?

"I love working with big data and my objective is to use new-generation, data-powered techniques in data science to better our understanding of water quality challenges and provide data support to environmental researchers and decision-makers," said Chang.

FUTURE PLANS

Chang plans to pursue a career as a professor in academia where she can teach the next generation of scientists, while also conducting research closely related to her current research.

Nicolle Di Domenico



ABOUT

Di Domenico earned her undergraduate degree from Kent State University's College of Arts & Sciences. She is a graduate student in geography.

RESEARCH

The Arctic holds more organic carbon within its soil than can currently be found within the atmosphere. Fortunately, because of the Arctic's frigid and freezing conditions, this carbon is prevented from decaying and being released. Unfortunately, the Arctic is warming faster than any other place on the planet and the risk of this carbon being released into the atmosphere is growing exponentially.

Small ice-wedge polygons landscape features control the type of carbon released from the soil. These features are managed by the soil freeze-thaw and permafrost dynamics and assert their control on carbon emissions by influencing tundra hydrology. Despite their small size, ice-wedge polygons play a large role in Arctic carbon cycling. Since ice-wedge polygons are extremely small—and highly complex at small scales—scientists have had difficulties locating them. Di Domenico's

research is working to locate these polygons within the Arctic tundra, characterize their surface hydrology over time, and use this information to draw broad conclusions about carbon cycling, as well as climate change, related to these polygon's abundance and distribution.

The rapidly changing global climate, and its impact on human life through natural disasters and other hazards, makes this research critically important. Although scientists are working to understand current climates, predict future changes, and develop preventative strategies, limited understanding of Arctic carbon cycling reduces the accuracy of current models in predicting global climate changes. Further understanding of Arctic carbon dynamics, especially related to ice-wedge polygons, reduces the uncertainty of predictive models and provides scientists with a greater understanding of Earth's ever-changing climate.

WHY PURSUE THIS RESEARCH?

"I, and other folks in EESI, have the rare opportunity to combine our interests from a variety of fields," said Di Domenico. "I enjoy coding, geology, cryosphere science, GIS, and machine learning. I'm able to learn about each of these fields by conducting my specific research. In addition to enjoying my work, the aspect which inspires me is using what I'm good at to make a difference. On a large scale, every small contribution to our global climate understanding is important. On a smaller scale, using my position to bring a female, first-generation, perspective to STEM and engage the next generation of diverse researchers also inspires me."

FUTURE PLANS

Di Domenico looks to pursue a career that would allow her to develop, or optimize, methods for large-scale remote sensing or data science tasks. After graduation, she is considering the pursuit of a career either as a technician, analyst, or in using her machine learning skills as a data scientist within industry.

Tengxiang Wang



ABOUT

Wang earned his undergraduate degree from Beijing Forestry University's College of Biological Sciences and Technology in China. He is a graduate student in geosciences.

RESEARCH

Wang's research focuses on Neogene plant diversity and vegetation in the mainland region of Southeast Asia. The Neogene Period—the second of three divisions of the Cenozoic Era—encompasses the time between twenty-three to 2.6 million years ago. Considered one of the most biodiverse regions in the world, the complex and species-rich ecosystems of Southeast Asia's mainland are heavily dependent on tropical forests. Unfortunately, due to environmental pressures created by humans, these forests are facing extinction. To conduct meaningful conservation efforts within the area, the evolutionary history of

these forests must be both known and understood. Wang's research is revealing this history through the study of plant and vegetation fossils.

“By studying the fossil plants collected from this region, we are able to tell what the ancient forest in this area looked like in the geological past and how it was related to the modern forest,” said Wang.

He hopes his research will raise awareness surrounding these ancient, and biodiverse, forests and will contribute to future decisions regarding conservation within the region.

WHY PURSUE THIS RESEARCH?

“I studied biology for my bachelor's degree and that is when I developed an interest in nature and plants,” said Wang. During my master's degree, I had opportunities to visit quite a lot of places for fieldwork and witnessed some of the natural wonders of my country. I learned that from a geologic time scale, things are changing dramatically, from sea to land, or from basin to plateau. Fossils record all these changes and tell us how everything has evolved to what it is today. These stories are worth being known by more people.”

FUTURE PLANS

Because of his desire to raise public awareness—regarding how the study of ancient environments can help impact current and future ecosystems—Wang plans to pursue a career as a curator in a museum of natural history. He hopes to support such tasks as fossil collection, the development of public education programs, and the furthering of knowledge through research.

2022-23 EESI Scholars



Joy Adul

ABOUT

Adul earned her undergraduate degree from the School of Engineering at Moi University in Eldoret,

Kenya. She is a graduate student in Energy and Mineral Engineering. Her adviser is Renee Obringer, assistant professor of energy and mineral engineering.

LABORATORY FOCUS

Research in the Obringer Laboratory investigates the impact of climate change on urban water and energy systems. The laboratory leverages data analytics and machine learning to predict and project water and electricity demand under various climate change scenarios.

INSPIRATION

“Energy poverty hits the most vulnerable hardest, especially in developing countries where its effect is most rampant and in many instances, these people are mostly women,” said Adul. “This is because they are the main consumers of energy in the household, as social norms have saddled them with the responsibility for chores such as cooking, washing, and cleaning. Moreover, due to their lower incomes, women are at a greater risk of energy poverty. They have the least resources to afford energy and the greatest need to save it. Hence, the traditional narrative of gender, energy, and poverty linkage, which must be eliminated. The paradigm shift in this tale is promoting the business case for engaging women in expanding energy access and empowering them to play a critical role in scaling up equitable, sustainable energy solutions globally. As a woman, a Ph. D. in

engineering with a focus on energy would build my expertise, allowing me to positively influence and add my voice to these critical dialogues with boldness.”

FUTURE PLANS

“Upon graduation, I plan to pursue a post-doctoral placement in sustainable energy solution-oriented research,” said Adul. “Driven by a lifelong interest in seeking a way out of the energy crisis, I am keen to continue educating myself in this subject matter, performing individual research whenever possible, and contributing to this field of knowledge.”



Samuel Cohen

ABOUT

Cohen earned his undergraduate degree from The Kenneth P. Dietrich School of Arts & Sciences

at the University of Pittsburgh. He is a graduate student in geography. His adviser is Kimberly Van Meter, assistant professor of geography.

LABORATORY FOCUS

The Van Meter Laboratory investigates the many ways in which human activity is affecting water quality and water availability across a range of different landscapes. The laboratory uses remote sensing, large-scale data analysis, and process-based modeling approaches to explore the influences of climate, land use, and management practices on water quality, especially in large agroecosystems.

INSPIRATION

“Growing up, I always had a special connection to the outdoors,” said Cohen. “I have always loved kayaking, boating, fishing, and hiking through nature. This desire culminated in my decision to dedicate my career towards the study, protection,

and restoration of our environment, particularly our water resources. Water has brought me great joy in life, and I want to ensure that joy can be experienced by future generations.”

FUTURE PLANS

“I aspire to pursue a career in the public sector, focused on researching, preserving, and restoring the environment, working at the interface of people and water,” said Cohen.



Carolina Carrion Klier

ABOUT

Carrion earned her undergraduate and master’s degrees from the Faculty of Environment and Natural Resources at the University of Friburg in Germany. She is a graduate student in geography. Her adviser is Guido Cervone, professor of geography, and meteorology and atmospheric science.

LABORATORY FOCUS

The Cervone Laboratory focuses on the development and application of computational algorithms for the analysis of space-time remote sensing, numerical modeling, and social media “Big Data” related to environmental hazards and renewable energy. The laboratory engages in issues related to the fusion of heterogeneous data at different time and space scales.

INSPIRATION

“Years of front-line conservation work have made clear how change is accelerating in ecosystems across the globe,” said Carrion. “Those experiences drive my desire to contribute to the conservation of our natural environment.”

FUTURE PLANS

“I aspire to lead a strong research agenda that contributes directly to science-informed conservation of the environment, including but not limited to, the unique ecosystems of the Galápagos Islands,” said Carrion. “I also appreciate and enjoy the opportunities that teaching provides to share my work and inspire the next generation of environmental leaders and researchers.”



Frances Meyer

ABOUT

Meyer earned her undergraduate degree from the College of Letters & Science at the University of California, Berkeley. She is a graduate student in geosciences. Her adviser is Kimberly Lau, assistant professor of geosciences.

LABORATORY FOCUS

The Lau Laboratory is focused on understanding the causes and consequences of both the absence, and addition, of oxygen in the ocean during Earth’s history. The laboratory implements a combination of research methods, including the analysis of geochemical proxies in marine sedimentary rocks—carbonates and shales—and numerical modeling. The laboratory particularly uses isotopic proxies, such as uranium, to offer a new perspective on past biogeochemical cycling and the potential to quantitatively reconstruct the redox conditions of oceans present many millions of years ago.

INSPIRATION

“Wanting to know more about our planet’s past has intrigued inquisitive minds for all of human history,” said Meyer. “My research on uranium isotopes as a proxy for redox conditions in marine basins will hopefully add another piece to the growing puzzle about our past oceans.”

FUTURE PLANS

"I plan on becoming a research scientist when I complete my Ph.D. at Penn State," said Meyer. "I see myself inspiring others to incorporate unique geochemical measurements in their research."

Edward Spagnuolo



ABOUT

Spagnuolo earned his undergraduate degree from the College of Earth and Mineral Sciences at Penn State. He is a graduate student in geosciences. His adviser is Peter Wilf, professor of geosciences.

LABORATORY FOCUS

The Wilf Laboratory uses fossil plants to investigate ancient ecosystems, past environmental change, biogeography, and the evolution and extinction of plants and plant-insect associations. The laboratory emphasizes questions with relevance for modern climate change, biodiversity, biogeography, conservation, and ecology. Field areas significant to the laboratory include Patagonia, the western interior of the United States, several southeast Asian countries, and southeastern Pennsylvania.

INSPIRATION

"I have always been interested in paleontology," said Spagnuolo. "To me, paleontology, and geology as a whole, is a real-life form of time travel in which you can peer into the past and study how the world has changed and why the life around us today is the way it is. Today, all terrestrial life is tied to plants, and studying how plants evolved throughout time is critical in understanding how ecosystems change over time."

FUTURE PLANS

"After earning my Ph.D., I am interested in pursuing a research career in paleontology in a museum or university setting using fossils to study plant evolution and biogeography," said Spagnuolo.



Miranda Sturtz

ABOUT

Sturtz earned her undergraduate degree from the College of Liberal Arts and Sciences at the University of Iowa. She is a graduate student in geosciences Her adviser is Christopher House, professor of geosciences.

LABORATORY FOCUS

he House Laboratory focuses on questions related to geochemical signatures of microorganisms. The laboratory does this by growing diverse microorganisms to study both the gases and chemicals they produce, and the other ways they leave traces of their metabolism.

The laboratory also investigates aspects of the biochemical origin of life. Through these studies, the laboratory investigates the fate of organic molecules under ancient Earth conditions and the potential reactions that may have been critical steps in the development of life at the dawn of the Solar System.

INSPIRATION

"I initially wanted to explore the medical field in college and chose to pursue a degree in microbiology," said Sturtz. "I found that while I love microbiology, I did not desire to continue with medical research past my undergraduate studies. I discovered the field of astrobiology after taking a few geoscience classes and when looking into institutions for pursuing a Ph. D. I found that

astrobiology was a way for me to combine my knowledge of microbiology and my growing love for the Earth sciences. My specific research topic on the origins of life and early Earth came about when talking to my upcoming adviser and the suggestions over directions I would be able to take in astrobiology in his lab.”

FUTURE PLANS

“My current plans are to continue doing research in astrobiology or related fields, after graduate school,” said Sturtz. “As of now, I am aiming to have a research position at NASA or in academia.”

Awards, Honors, and Achievements

Faculty Achievements

Jennifer Baka was promoted to associate professor of geography.

Susan Brantley, Evan Pugh University Professor of Geosciences and former director of EESI, was named the inaugural recipient of the Dr. Hubert Barnes and Dr. Mary Barnes Professorship in Geosciences. She was elected a 2021 member of the American Academy of Arts and Sciences, and a foreign associate of the French Academy of Sciences. She also received the Vernadsky Medal from the International Association of GeoChemistry and was named an Evan Pugh University Professor by Penn State.

Kenneth Davis, professor of atmospheric and climate science, received the Wilson Award for Outstanding Service at the College of Earth and Mineral Science’s Wilson Awards Celebration.

Christopher House, professor of geosciences and director of the NASA Pennsylvania Space Grant Consortium, was named director of the Consortium for Planetary and Exoplanetary Sciences and Technology.

Kimberly Lau, assistant professor of geosciences, received the Pre-tenure Excellence Award from the Geobiology and Geomicrobiology Division of the Geological Society of America. She also received the GSA’s 2022 Young Scientist Award, known as the Donath Medal.

Michael Mann, former distinguished professor of atmospheric science at Penn State and now at the University of Pennsylvania, received the 2022 recipient of the Leo Szilard Lectureship Award from the American Physical Society.

Timothy White, research professor in EESI, was elected a Fellow of the Geological Society of America.

Peter Wilf, professor of geosciences, received the Wilson Award for Excellence in Research at the College of Earth and Mineral Science’s Wilson Awards Celebration.

Student Achievements

Shuyu Chang, an EESI Environmental Scholar, was named a recipient of the inaugural Marilyn L. Fogel Fund. Chang, also earned grand prize in the Interdisciplinary Team category of the 2021 AGU Michael H. Freilich Student Visualization Competition.

Nicolle Di Domenico, an EESI Environmental Scholar, received a National Science Foundation (NSF) Graduate Research Fellowship to study climate change in icy regions by using data from the WorldView-3 satellite and machine learning to map the polygonal ground.

Edward Spagnuolo, **a recent geobiology graduate** of the College of Earth and Mineral Sciences, and EESI Environmental Scholar, received a NSF Graduate Research Fellowship.



A Conversation with Sue Brantley

Reflecting on nearly two decades as EESI's director

Sue Brantley, Evan Pugh University Professor and Barnes Professor of Geosciences, began her role as EESI's director in April of 2003. After nearly two decades she stepped down June 2021 and resumed her role as a faculty member in the Department of Geosciences. Below is a conversation with Brantley about her time as director.

Q Can you share some of the initiatives or changes you implemented after taking over as director of the EMS Environment Institute, the precursor to EESI, in 2003?

A I really wanted to take some of the original ideas of the Earth System Science Center (ESSC), the global interdisciplinary outlook, and bring in more faculty so it could benefit more faculty on campus and allow more people to benefit from that kind of thinking. We started something called earth systems ecology and started a push to bring in ecologists. That was a big paradigm change for our college in many

ways, because our college had always been about physical sciences. By recognizing that you can't understand the earth system as a global system without life scientists, we needed to bring in ecologists. For example, we hired Erica Smithwick, now a distinguished professor of geography (and soon-to-be director of EESI), and Jennifer Balch, who is now at the University of Colorado Boulder. In the last decade and a half, we also developed the field of critical zone science – the science of Earth's surface, studied as one entity.

I also started thinking about having more interactions with some of the departments in the



college that had not traditionally had interactions with the institute, or at least with ESSC. So, we made inroads into interactions with faculty in the Department of Energy and Mineral Engineering. In particular, we started working with Seth Blumsack, professor of energy and environmental economics and international affairs, and started to help him create an ongoing seminar series and colloquia. We started to try to broaden what we were doing in ways into life sciences and into other departments as well.

Q How did the renaming of the institute to EESI come about and what was the rationale behind the name EESI?

A Early in the Earth System Science Center's history, when Dr. Barron was director, he was told by the University that he had to change the name to the Environment Institute. When I came in, we were told that because there was an Environment Institute in every college, and each needed to be differentiated, that we should think about a new name.

We chose the Earth and Environmental Systems Institute for a number of reasons. First, it emphasized the Earth, which had always been central to the institute from the very beginning.

It also brought in the environment, which brings in these life sciences issues that I've mentioned. We also made sure to include systems within the title, because that is what had distinguished our worldview—looking at systems in their entirety and not splitting apart different pieces.

Lastly, I chose the name EESI because the acronym obviously sounds like EASY. I wanted



Sue Brantley teaching at the Shale Hills Critical Zone Observatory (top photo); Brantley with former President Penn State Eric Barron and former director of the original Earth System Science Center (bottom photo).

it to convey an entity on campus that would help faculty and help students in whatever research service or education initiatives they had.

Q Can you share the thought process behind the expansion of EESI's research focus, not only including global climate change in earth's system history, but also energizing the area of biogeochemical cycles?

A Just as earth system science articulated that the Earth system needed to be studied as a system, I started articulating that the Earth's surface also needed to be studied as a system. So, we began calling the Earth's surface the critical zone—the outer edge of the vegetation canopy right down to the depths of groundwater. We worked very hard to grow critical zone system science, which grew to the point where nationally tens of millions of dollars were being spent over decades, at the National Science Foundation (NSF), to establish a system of critical zone observatories. Today, scientists worldwide brand themselves as interested in studying the critical zone.

For a long time, Penn State ran a critical zone observatory at Shale Hills, out of the Shavers Creek Environmental Center. Although the observatory no longer exists as an NSF-funded entity, Shale Hills is still run as a research and education facility and has benefited countless students and scientists from all around the world, especially those here at Penn State.

NSF now maintains critical zone science with a new program called Critical Zone Network, or CZ net. The program has continued to grow, with involvement from several of our faculty here at Penn State. In addition, EESI's biogeochemistry focus grew through the research of Erica Smithwick and her work on landscape ecology, Ken Davis, professor of atmospheric and climate science, and his work on measuring trace gases—many of which are mediated by biological processes in the critical zone—and various other people. Alan Taylor, professor of geography, is also very involved and has worked for a long time on forests and forest ecosystems and their interaction with air, water, and climate fire, and other different entities. These faculty began strengthening the biogeochemistry program and continued to make it stronger.

We also have a very close relationship with NASA's Pennsylvania Space Grant Consortium, and they pushed the hiring of some astrobiologists and microbiologists. We have also worked to establish connections with those hires, some who are

EESI associates, like Chris House, professor of geosciences, and some who are not, like Jennifer Macalady, professor of geosciences, and Kate Freeman, Evan Pugh University Professor of Geosciences. These interactions between efforts in astrobiology and critical zone science, have built lots of interactions.

Our efforts have culminated with the most recent hiring of Kim Van Meter, assistant professor of geography, who is looking at the critical zone. She is mainly focusing on human impacts, with humans now the biggest driver of change of the Earth's surface. Kim has a huge footprint in terms of her research both nationally and internationally. In thinking back about these efforts, I should make one additional and important observation: many of EESI's search committees for earth system ecologists were led by EESI's own, Alan Taylor.

Q For years EESI's slogan has been "Science Informing Solutions." What exactly does this mean, and why is this so important for the institute, and for scientists as a whole?

A EESI's work is in fundamental science, but it's fundamental science that can have a real impact on how society can handle some of its problems. We started articulating this in the last five to ten years, as a result of the growing frustration from scientists.

The fact is that we have gained an understanding of the Earth's system at a very deep level, yet we can't always get decision-makers to learn from what we have learned. There are reasons for this both on the side of the decision-makers, as well as scientists that society was not listening to the science.

So, we started pushing this idea that scientists really need to think about whether they are asking the right questions. A lot of those questions should be about science that informs solutions. Are we learning from stakeholders what solutions are needed and what questions need to be addressed? Can we articulate what we're doing in ways that are compelling and can be taken in by decision-makers, and by society at large, to create change?

I think that a lot of this has come from climate scientists who have been beating the drum, talking about global climate change, and yet, still seeing climate change denial. There's so much frustration among scientists that we really started pushing this idea that scientists need first to listen and then to know how to communicate. And so that's really what we mean by science informing solutions.

Q Is there anything that you would like to comment on, or other reflections over your tenure as the director that you'd like to share?

A I haven't really talked about a major undercurrent of my time as director, which was to create an institute that would make it easy for people to do what they do.

Penn State brings in wonderful researchers, students, and staff, and I wanted to make it easy for those people to succeed. So, we hired, maintained, and treated our staff very well, and our staff were superb. Staff are probably the base of any institute, largely because they can really make an institute function well. I think we had the best staff at the University.

Beyond making something that made it easy for faculty, students, and staff to succeed, I also wanted to make an environment that was nurturing, or comfortable. I wanted it to feel like a place that was very supportive of new ideas and new approaches, and even failures. If you're going to try new things, sometimes you're going to fail. So, I tried to create that kind of environment.

I'm very proud of EESI's climate, especially the past few years, because I think we not only made it easy for folks to get their work done, but we also created an extremely supportive environment for

people to come in and get their work done. When you do those two things it helps you attract better people, it helps you attract better students, and it helps you come up with better ideas. You feel like you can brainstorm and develop ideas that are maybe not right, but when you vet them with other smart and supportive people, maybe those ideas grow into something really interesting.

One of the culminations of this was the renovations that we did that tried to make EESI's physical facility more inviting, interactive, and supportive. I hope once we come out fully from the pandemic, and once the building is no longer surrounded by construction on all sides—because it's almost like right now EESI is like this flower in the middle of a moat of construction—I hope that the new physical attributes of the institute, and the new director, will come together to maintain that easy characteristic of the institute, like getting work done, being supportive, and helping people move together.

I'm proud of how we did that! I feel like when you're asked to be a director, the University is making a gamble on you, the college is making a gamble on you, and I was very honored to be asked. I was lucky to be in that seat for such a long time, and to work with such fantastic colleagues. The colleagues at EESI are the greatest, and as I've said, I think the staff are the greatest too.

**Thank
you,
Sue!**



Focus on Robert Nicholas

Assistant director of EESI, director of the Penn State Center for Climate Risk Management (CLIMA), and associate research professor of atmospheric science

A part of EESI for the past eleven years, Rob Nicholas currently serves as EESI's assistant director. Seeking to understand and project climate extremes, Nicholas' research focuses on the question of bias and uncertainty in observations and climate projections. Working to propagate his work through impacts, he strives to communicate useful climate information to stakeholders and decision makers at the local, regional, and national level.

Nicholas' path to get where he is today is an interesting one. Attending Bucknell University, he earned his bachelor of science degree in physics, followed by a master of arts in teaching at Colgate University. He began his career as a high school teacher at Olney Friends School, a small boarding school in Barnesville, Ohio. Due to the school's small size—at the time fewer than fifty students—he often found himself wearing multiple hats. While at the school he taught physics, chemistry, and mathematics, while also serving as the school's boys dormitory head, soccer coach, gardener, IT director, and even dean of students. He worked at the school for five years.

After leaving the boarding school, Nicholas took a laboratory instructor's role in the department of physics at Bates College in Lewiston, Maine. It was there, after a chance meeting with a Penn State meteorologist, that his career shifted and pointed him towards a career as a climate scientist. Following a seminar on atmospheric acoustics by Denny Thompson, now professor emeritus, Nicholas asked they could meet to learn more. Thompson helped him understand how atmospheric science could be a career path that brought together his interests in physics and the environment. By the end of the conversation, he had made the decision to pursue graduate work in



the field. Nicholas earned his Ph.D. in atmospheric science from the University of Washington in 2011.

Nicholas came to Penn State as a postdoctoral scholar in 2011, working under the direction of associate professor of geosciences, Klaus Keller, who is now the Hodgson Distinguished Professor of Engineering at Dartmouth College. Alongside Keller, Nicholas contributed to a proposal for a large National Science Foundation (NSF) award. "Our proposal was really exciting but both of us felt like this was a long shot," said Nicholas. "In the end more than three-hundred multi-institution proposals were received." With less than a one percent chance of success, their proposal was selected as one of the two proposals to be funded.

This funded proposal became the Network for Sustainable Climate Risk Management (SCRiM). Originally only a five-year project, Keller and Nicholas were able to extend the project to operate for seven years. Over that time, SCRiM hosted summer schools, organized summer research experiences for undergraduates, and produced a documentary film, while also conducting stakeholder and decision-maker focused research in New Orleans. "One thing that's been a

wonderful legacy of SCRiM is that it provided a foundation that enabled us to launch other projects such as MARISA, PSIRC, and the new BSEC project,” said Nicholas.

More information regarding SCRiM can be found at <https://scrim.psu.edu>.

The Mid-Atlantic Regional Integrated Sciences and Assessments (MARISA) Program

Nicholas has served as a MARISA researcher since its inception in September of 2016. Originally a five-year grant from the National Oceanic and Atmospheric Administration (NOAA), the program received a second five-year grant in 2021 to continue and to expand its work. MARISA is led by the non-profit RAND Corporation, in partnership with researchers at Penn State, Johns Hopkins University, Cornell University, Virginia Institute of Marine Science at William and Mary, Morgan State University, and Carnegie Mellon University.

The goal of MARISA is to support research and outreach to help improve decisions regarding climate change in the Mid-Atlantic region. The program works with stakeholders and decision makers to identify the information needed to help communities become more climate resilient. Much of MARISA’s work involves translating the best available science for its partners but new research is also an important part of the program. Additionally, the program produces tools to support these stakeholders and decision makers.

More information regarding MARISA can be found at <https://MidAtlanticRISA.org>.

The Penn State Initiative for Resilient Communities (PSIRC) Program

Nicholas serves as one of PSIRC’s four co-leads. Through their work in SCRiM and MARISA, Nicholas and his fellow researchers came to understand how important flooding was as a climate resilience challenge. At the time, though, most of the research and resources directed at flooding prioritized coastal communities impacted by sea level rise and storm surge. Pennsylvania has fairly little exposure to coastal flooding but it does suffer severe flooding each year from riverine and stormwater flooding, and the issue had received much less attention, especially in rural

communities. Many of these communities simply do not have the capacity for mitigating the risk of flooding and implementing effective adaptation measures.

Launched in January 2019, PSIRC has been supported by a Strategic Plan seed grant from the Penn State Provost. The idea behind the program was to focus on these smaller riverine communities to understand the flood-related issues they face and to identify potential solutions to make them more resilient to flooding in the future. The program provides an environment of shared discovery where people can come together to address local resilience challenges of small, riverine communities vulnerable to flood risk.

To pilot this approach, PSIRC has been working with the Borough of Selinsgrove, Pennsylvania, which lies along the Susquehanna River. Selinsgrove has experienced many catastrophic flooding events over the past century, including those caused by Hurricane Agnes in 1972 and Tropical Storm Lee in 2011. “If you’re going to tackle these problems there’s only so much that we can figure out on our own,” said Nicholas. “Ultimately the goal is to help these communities become more resilient, and so you absolutely need to engage with the communities.”

Working alongside Selinsgrove’s Borough Council, borough manager, flood task force, members of the business community, engaged residents, and SEDA-COG, PSIRC is conducting the research the community needs to better manage the risk of flooding in a changing climate. “We’ve been working with these stakeholders to better understand how flooding works in Selinsgrove,” said Nicholas. “How do people currently manage these risks and how do they adapt and respond when flooding happens? We’re trying to make sense of whether those strategies are going to work going forward when we expect flooding to be more severe, due to more frequent and more intense rainfall.”

Learn more about the program at <https://psirc.psu.edu>.

The Baltimore Social-Environmental Collaborative (BSEC)

The newest addition to Nicholas’ research portfolio is his involvement with The Baltimore Social-Environmental Collaborative (BSEC). Inspired to provide knowledge that informs equitable



Changes to the 100-year flood zone in the Borough of Selinsgrove, PA

Kelsey L. Ruckert & Robert E. Nicholas
updated 2 May 2022

Earth and Environmental Systems Institute, The Pennsylvania State University, University Park, PA, 16802, USA
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- Borough of Selinsgrove
- 100-year flood zone (1% annual probability) common to all revisions since 1982
- Removed in 2007
- Removed in 2021
- Added in 2007
- Added in 2021



Data sources: FEMA Flood Map Service Center; PennDOT; PAMAP Program, PA Department of Conservation & Natural Resources, Bureau of Topographic & Geologic Survey

Basemap imagery: Google Satellite

Projection: PA State Plane North (ft), NAD83 [1:14,000]

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note: This map has not been peer reviewed.

Map showing update to the 100-year flood zone in Selinsgrove, Pennsylvania. Map produced from research conducted through the Penn State Initiative for Resilient Communities (PSIRC) Program.

solutions that can strengthen community-scale resilience, the project is people-centered and transdisciplinary. The project prioritizes community issues, such as human health and safety, affordable energy, and transportation equity, as well as government issues, like clean waterways, decarbonization, and functioning infrastructure. The project designs observation networks and models that will deliver the climate science capable of supporting those issues.

Currently there are twenty Penn State faculty, including four EESI associates, Ken Davis, Chris Forest, and Antonia Hadjimichael, contributing to the project, including Nicholas. BSEC provides resources and tools, similar to that of the MARISA Program, to the stakeholders and decision makers of Baltimore, Maryland, but also seeks engagement from urban communities to advance the science of urban systems. The project is addressing issues such as the urban atmosphere and questions like, how buildings work? How city infrastructure works? How ecosystems in and around the city work?

Collaborators on the project include researchers from Johns Hopkins, University of Virginia, and two minority-serving institutions: Morgan State and University of Maryland Baltimore County (UMBC). In addition, the project will partner with many grass-roots community organizations within the Baltimore metro area.

“The partnerships with Morgan State and UMBC, both minority-serving institutions, are an essential part of this project, not only for the research but for their community ties,” said Nicholas. “Engaging with these institutions is something that’s a real priority for Penn State. We want to create opportunities for URM students to come to PSU to successfully pursue advanced science education. Established relationships and collaborative research with minority serving institutions is a great way to do that.”

Learn more about the project at <http://bit.ly/3YuONT9>.

View Nicholas’ personal webpage to learn more about him: <https://eesi.psu.edu/~ren10>.

New EESI Staff

EESI is fortunate to have exceptionally talented, dedicated, and hardworking staff working alongside our faculty associates to further the mission of the institute.

EESI was thrilled to be able to bring six new staff members on board. Learn more about EESI's newest staff.



Dave Blehi

ABOUT

Blehi is the marketing and communications specialist for EESI. He is originally from Short Gap, West Virginia. He joined EESI in April 2022

BEFORE EESI

With both parents not only attending, but also meeting at Penn State, it was a given that Blehi would eventually make his way to the University for his undergraduate studies. He earned his degree in agricultural business management, from the College of Agricultural Sciences, in 2006.

Blehi began his professional career with the Boy Scouts of America, as a district executive in the Baltimore Area Council. In this role, he served territories within the greater Baltimore area and was responsible for all aspects and operations of the Boy Scouts of America. After working in Baltimore for five years, Blehi was promoted to a senior district executive in the Juniata Valley Council, which manages the organization within the Centre, Huntington, Mifflin, and Juniata counties of Pennsylvania.

Blehi began working at Penn State in 2017 in the Eberly College of Science's Department of Biochemistry and Molecular Biology. Among his duties, he coordinated the department's annual international Summer Symposium in Molecular Biology as well as several smaller conferences. He also served as the department's communications coordinator, producing videos, taking photos,

managing websites, and spearheading departmental campaigns.

OUTSIDE OF WORK

A kid at heart, Blehi loves all things Disney, Marvel, and Star Wars. Both he and his wife, Beth, enjoy vacationing at Walt Disney World, as often as they can afford, and consider themselves to be "Disney Foodies." Already having a love of cooking and baking, Blehi enjoys attempting to recreate Disney recipes at home.



Clayton Gardner

ABOUT

Gardner is the education program coordinator for the NASA PA Space Grant program. He is originally from Howard, Pennsylvania and joined EESI in September 2022.

BEFORE EESI

Gardner, a 2018 graduate of Lock Haven University, earned his bachelor of science degree in secondary education and teaching, with a specialty in physics. He has spent countless hours in the classroom teaching engineering and physics courses to grades eight through twelve. Among the courses he taught were Introduction to Engineering, Introduction to Engineering Design, Principles of Engineering, and Civil Engineering and Architecture. Although he enjoyed teaching each of his courses, his favorite course was Civil Engineering and Architecture. "I loved teaching

that class,” said Gardner. “There were so many situations where I could actually see lightbulbs go off in my student’s heads.”

OUTSIDE OF WORK

When he is not in the office, you can find Gardner outside enjoying activities such as hiking, camping, biking, and kayaking. As a self-proclaimed techie, he also enjoys playing video games with friends on his self-built gaming PC. “I’ve always been interested in technology, but really got into it in college,” said Gardner. “I started building my gaming system so that my friends and I could keep up our gaming.” His preferred genre of video game: strategy based.

Additionally, Gardner serves his local community as a volunteer firefighter, a role he has held since 2009.



Susan Kertis,

ABOUT

Kertis is the operations specialist for the NASA PA Space Grant program. She is originally from Holmes, Pennsylvania and joined EESI in March 2022.

BEFORE EESI

Prior to coming to EESI, Kertis spent time working in both industry and higher education. In her industry career, she held several positions including the roles of sales and marketing representative for Fisher Scientific, as well as project manager for the Vanguard Group.

Kertis came to Penn State in 2017 and took the role of center coordinator for the Center for e-Design, a National Science Foundation Industry-University Cooperative Research Center. She then moved to the College of Agricultural Sciences where she first served as a proposal and award generalist and then moved into the role of conference planner.

OUTSIDE OF WORK

When Kertis is not in the office, she enjoys taking part in all the outdoor activities and opportunities that central Pennsylvania has to offer. Whether it be cross-country skiing in the winter, hiking, kayaking, or biking in the summer, or gardening, you can often find her outside, and rarely in one place. Kertis also serves as a member of the Lemont Village Association, which endeavors to preserve historic Lemont.

While at Penn State, Kertis has volunteered her time on various committees across the University. She has served as a proposal reviewer for the Equal Opportunity Planning Committee (EPOC), has worked as a volunteer for both the Penn State Forum Speaker Series and the Network of Academic Corporate Relations Officers (NACRO) Communications Committee, and is currently on Penn State Military Appreciation Week’s Finance and Development sub-committee.

Always looking for opportunities to learn more, Kertis has acquired her Fundraising Leadership certification from Penn State’s World Campus and is currently working towards her certification in project management.



Kalysta Long

ABOUT

Long is a financial assistant for EESI. She is originally from Aaronsburg,

Pennsylvania and joined EESI in November 2022.

BEFORE EESI

Prior to coming to EESI, Long was employed as a receptionist at Penn State Health, an affiliate of Penn State. In her role, Long was tasked with providing customer service and working with patients to coordinate their care. She also gained valuable experience in the financial operation of her unit.

OUTSIDE OF WORK

Long, and her boyfriend, Derek, recently celebrated the exciting milestone of purchasing their first house, located in Spring Mills, Pennsylvania. Living with them are a few furry pets: their dog, Tootsie, a chihuahua mix; their cat Smokey; and their rabbit, Diesel.

When she is not in the office, Long enjoys spending her time with both family and friends, going out for drinks every now and again. A state park enthusiast, she loves visiting as many parks as she can and enjoys the experience of hiking through nature.

Currently, Long is working towards earning her associate degree in labor and human relations through Penn State's World Campus. She is very passionate about supporting people who feel uncomfortable in their work environment due to poor management or poor climate. Long remembers feeling this way in her past positions and looks forward to the opportunity of ensuring that people do not work under these conditions.



Sarah Potter

ABOUT

Potter is the education program coordinator for Landscape-U. She is originally from Halifax, Pennsylvania and joined EESI in May 2022.

BEFORE EESI

Potter graduated from Penn State in 2002, earning her bachelors of science degree in agricultural education and obtaining certifications in general science, agricultural science, and environmental science. After graduating, she and her husband, Joshua, made their way to Maine where Potter initially worked at the Remick Country Doctor Museum and Farm in Tamworth Village, New Hampshire. There she helped educate the public on the values and significance of the medical practice and agricultural way of life of a country doctor. Potter eventually made her way into a

more formal classroom and served as a high school science teacher for four years, teaching chemistry, physics, and geosciences.

After moving back to the State College area, Potter worked as a pre-school teacher. Having small children at the time, she wanted an opportunity to work but also spend time with her kids. Her next career change took her into the world of non-profit management, serving as the executive director of Out of the Cold, a homeless shelter program in Center County. Potter's compassion for others, organizational skills, and leadership allowed her to build the program and expand the organization's potential to help those who are the most in need. After several years in this role, Potter made the decision to leave Out of the Cold and return to her educational roots.

OUTSIDE OF WORK

When not at the office, Potter loves spending time with her husband, Joshua, and her two teenage children, Ellory and Lucy. An active member within the community, she is passionate about finding ways to serve others and has served on the boards of several local non-profit organizations and her local church. In the little free time that she does have, Potter enjoys gardening and landscaping in her yard, going for walks, hiking, and reading.



Cas Zemba

ABOUT

Zemba is the grants and proposal coordinator for EESI. Originally from Milwaukee, Wisconsin, Zemba joined EESI in October 2021.

BEFORE EESI

Zemba has an interesting, and storied, career path. They earned their degrees from Penn State in anthropology, and classics and ancient mediterranean studies. Prior to their role in EESI, Zemba worked as an archeologist for several companies around the globe. As a specialist in

stone tool types, they have worked throughout the United States, and their work was largely focused in the Appalachia region and the Southwest. They have also been part of large projects in countries such as Belize, Mexico, and Israel.

As a result of COVID-19, and the corresponding travel risks, Zemba was forced to stay closer to home and forgo working on the projects they had been accustomed to. Because of this, they took employment as a butcher at a local slaughter and processing plant. In their role, they spent time in all three phases of operation. Regarding their time there, they said, “It was an eye-opening experience into the supply chain issues that pressured our local farmers and processors, and probably the toughest job I ever worked.”

OUTSIDE OF WORK

In December of 2020 Zemba married their wife, Dani. Although the pandemic presented unique challenges, they recall “the memory of being in a tux and combat boots, standing in a foot of snow while our friend livestreamed the ceremony to Facebook from six feet away.” In March, the two welcomed their son, Luka, into the world. “He is an absolute delight, and we have already put him in many silly outfits,” said Zemba. “We do not intend to stop doing so.”

Both Zemba and their wife Dani are medieval historical reenactors, specializing in making mead and honey liqueurs and late medieval sword-fighting. “I’m currently best with a rapier but have been picking up German longsword as a secondary style,” said Zemba. “I also shoot traditional archery with an Eastern Steppe-style recurve.”



EarthTalks Spring Speaker Series features the exploration of our solar system

We now live in a golden age of solar system exploration. With a dozen NASA missions currently in development—as well as spacecraft actively on Mars, near Jupiter, and in the Kuiper belt—the current scale of mission activity is unprecedented and brings forth a new era of comparative study of varied worlds at the systems level.

Given EESI’s history of understanding the Earth as a system, the spring 2023 EarthTalks speaker

series is intended to provide a venue for the expansion of participants’ horizons into the solar system.

The spring series resumed on Jan. 9 and will continue through April 24. Talks take place at 4 p.m. on Mondays in 112 Walker Building and also be viewed via Zoom. Learn more at <https://bit.ly/31947No>

Photo credit: NASA/JPL/ASU



New EESI Faculty Associates

EESI is one of the nation's leading institutes in earth and environmental sciences research. Engaged with some of the most pivotal problems and solutions of our time, EESI's faculty comprise a diverse—and world-renowned—list of individuals, all engaged in transdisciplinary research that looks at environmental impacts and what mechanisms create environmental variability over timescales spanning days to billions of years.

With the addition of the institute's newest associates, EESI continues to bolster its research portfolio. Through expertise in environmental analytics, Earth history, and novel data science techniques, these faculty are working to further the institute's efforts to turn scientific data into informed solutions.

Our newest EESI associates are:

1. Antonia Hadjimichael, assistant professor of geosciences
2. Kimberly Lau, assistant professor of geosciences
3. Laifang Li, assistant professor of meteorology and atmospheric science
4. Renee Obringer, assistant professor of energy and mineral engineering
5. Kimberly Van Meter, assistant professor of geography
6. Shujie Wang, assistant professor of geography

Read their bios on the following pages to learn more about them.



Antonia Hadjimichael

Hadjimichael is an assistant professor of geosciences. Prior to Penn State, Hadjimichael was a postdoctoral fellow in the

Department of Civil and Environmental Engineering at Cornell University.

WHY PENN STATE AND EESI?

Considering herself to be an interdisciplinary scientist—whose work hinges on connections with other experts across various fields such as water resources, earth science, and decision making under uncertainty—Hadjimichael was attracted to Penn State, and EESI, because of the multidisciplinary nature of the research being conducted and emphasis on collaboration across colleges and departments.

RESEARCH SUMMARY

Hadjimichael’s research investigates the interactions between humans and the earth systems and the effect each has upon the other, particularly in the domain of water.

How much water the world has, where it is, and when it will be there, is central to several risks society faces today. Alone, environmental occurrences such as the drought currently ravaging the western United States and affecting the water supply for millions of people, and the significant flooding being experienced throughout the country, have serious impacts on human life, and the basic services and amenities people depend on.

Hadjimichael’s research takes information derived from earth system models and uses it to identify how the world is changing and how these changes will impact human systems, specifically those related to water resources. Her goal is to learn how societies will be most affected by different stressors, how current infrastructure, institutions, and adaptive capacities will shape these impacts

on different communities, and how tradeoffs across societal objectives should be balanced.

To provide meaningful insights, she is navigating many questions related to highly uncertain future conditions. When is the next drought going to happen? How much will our city’s population grow in the next thirty years? How will energy demands change over time? Concurrent to these questions are also an array of possible actions to be taken. Should our infrastructure expand? How much water do we need to conserve? The combination of the two makes it very difficult for public utilities, and agencies, to analyze future impacts and identify solutions.

Relying on tools like machine learning and visual analytics to discover consequential scenarios and adaptive options, Hadjimichael uses structured simulation experiments administered on high performance computing resources—such as those provided by Penn State’s Institute for Computational and Data Sciences—to explore this large space of potential outcomes and provide meaningful insights for decision makers.

RESEARCH INSPIRATION

Hadjimichael came to this place in her career through both happenstance and curiosity. Her graduate work—focused on the management of urban wastewater—was not overly related to her current work, but it triggered an interest in how water resource decisions are made, the uncertainty that confounds them, and the broader relationships between humans and environment.

Her postdoctoral fellowship was really what inspired her to pursue her current research. It exposed her more formally to the topic of water resources planning and human-natural system interactions.

“One of my favorite things about being in this research area is that water affects everyone,” said Hadjimichael. “So even though there are technical aspects and complex topics, most people I talk to can see how my research relates to them and to society’s challenges. Framing the problem is the problem—these decisions are the crux of making this research credible and relevant.”

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Kimberly Lau

Lau is an assistant professor of geosciences. Prior to Penn State, Lau was an assistant professor in the Department of Geology and Geophysics at the University of Wyoming.

understanding of the evolution of planetary environments and can reveal insights into the potential of life on other planets.

RESEARCH INSPIRATION

Lau has always been fascinated with climate change and the evolution of life and the planet itself. She finds her inspiration in being able to study how the two are intertwined and learning potentially valuable lessons that can be applied to the future.

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WHY PENN STATE AND EESI?

As a sedimentary geochemist — who uses isotopes and modeling to understand the controls and feedbacks on biogeochemical cycles in Earth’s past—Lau chose Penn State, the College of Earth and Mineral Science, and EESI because of the impressive array of geochemical instrumentation and support that was readily available. She was also drawn to Penn State’s long history and excellence in earth system science.

RESEARCH SUMMARY

Lau’s research investigates how environments and cycles of biogeochemical elements have changed in Earth’s oceans over geologic timescales. She is particularly interested in the oxygen levels in the ocean and how they have fluctuated during the Phanerozoic Eon and Neoproterozoic Era, how these levels relate to animal evolution and extinction, and other resulting geologic processes such as weathering, nutrient availability, climate change, and volcanism. Additionally, her research seeks to develop and interpret sedimentary geochemical records to reconstruct environmental conditions.

Lau believes that studying Earth’s history creates opportunities to understand how the planet may respond to stresses, such as climate change, over long-time scales of one million years or longer. Additionally, this history provides an



Laifang Li

Li is an assistant professor of meteorology and atmospheric science. Prior to Penn State, Li was a research scientist at Duke University's Nicholas School of the Environment

Li's research investigates how the AMOC has changed over time and its modulation of sea surface temperature signatures in the subpolar North Atlantic. Using observation-based datasets and climate model output, and factoring several physical constraints of ocean heat balance, she can estimate the strength of the ocean circulation and its contribution to energy redistribution in the climate system. If ocean currents in the AMOC slow, warmer waters from the tropics will no longer make their way to higher latitudes and will result in colder temperatures. Additionally, if these warmer waters cannot make their way north, and are trapped in the tropics, the resulting higher temperature of the water could create larger scale storms that could impact the region.

Li believes that with a better knowledge of the ocean she and other researchers can better prepare society for the short-term and long-term impacts of climate changes, such as sea-level rise, ocean acidification, more extreme heatwaves, more frequent and severe droughts, and stronger damages from storm surges.

WHY PENN STATE AND EESI?

Recognizing its excellence as the leading institution in climate research, Li chose Penn State because it was where she saw her greatest ability to generate impacts within her field and on society. She saw EESI's collaborative nature and interdisciplinary atmosphere as an opportunity to be surrounded by, and work with, the best researchers within their respective disciplines who would help make her both a better scientist and person.

RESEARCH SUMMARY

Li's research seeks to understand the role of the ocean within the climate system. She has a significant interest in the oceanic heat uptake process, including the Atlantic Meridional Overturning Circulation (AMOC), air-sea interactions, and the oceanic water cycle.

The oceans are the planet's largest water and heat reservoirs. They are extremely important in modulating climate variability as well as directing the response of the climate system due to society's use of fossil fuels. Acting like a conveyor belt, the AMOC pushes both warm and cool temperature waters north and south. As waters warm in the tropics, they are pushed north at a slow rate. As it moves further north into higher latitudes, this water begins to warm the air, therefore establishing higher latitude temperatures. As the water moves through higher latitudes, and is cooled by the atmosphere, it sinks to deeper depths and then begins its slow journey back towards the equator. This process is cyclical as once these waters are warmed, they are again pushed north.

RESEARCH INSPIRATIONS

Li's path to her current career began in the second grade. After an unexpected rain ruined her weekend plans to visit an amusement park, she grimly asked her father where the rain had come from. Her father responded, "You should grow up to study meteorology and discover the answers for yourself."

Li's original goal was to become an oceanographer. While an undergraduate, she had the opportunity to participate in a research cruise where, unfortunately, she realized that she was susceptible to sea sickness. Realizing it was the wind causing the waves that were making her sick, she became interested in topics such as why and how conditions become windy, what factors contributed towards creating unfavorable weather conditions, and how research may have the ability to better predict these conditions in the future.

Through the advice of her father, coupled with an unfortunate sea experience, Li has established a career in the study of climate science and today identifies herself as both an oceanographer and a climatologist.

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Renee Obringer

Obringer is an assistant professor of energy and mineral engineering. Prior to Penn State, Obringer was a postdoctoral fellow in the National Socio-

Environmental Synthesis Center at the University of Maryland.

WHY PENN STATE, AND EESI?

As a researcher whose interests lie at the nexus of data analytics, people, urban infrastructure, and climate change, Obringer’s interests span multiple disciplines. A large reason she chose Penn State, and to become an EESI associate, was the opportunity to conduct interdisciplinary research that fosters and encourages work across boundaries.

RESEARCH SUMMARY

Obringer’s research leverages data science methods to better understand the impact of weather and climate on critical infrastructure systems. In particular, her research investigates the impact of climate change on urban water and energy systems. Using data analytics and machine learning, she is working to predict and project water and electricity demand under various climate change scenarios. Her research has shown that climate change is very likely to cause significant increases in both water and electricity demand in the future and that this increased demand on the water supply and power grid will ultimately create increased stress on society’s infrastructure.

Climate change is one of society’s most pressing challenges. Its impacts are felt in nearly every aspect of society, ranging from agriculture to social equity. Helping to further scientific understanding of climate change and its impacts, Obringer’s

research is assisting policymakers and utility managers to prepare for the future. She and her research don’t stop there—instead she is working to communicate these impacts to the general public. Her goal is to make climate change a more tangible concept. Her hope is that if more people understand climate change, and how it will impact the world and their families, then more people can contribute to the fight against it.

RESEARCH INSPIRATION

Obringer was originally inspired by large-scale international studies on climate change. Although she believed these studies to be critically important, she did not think they were easily communicated to the general public. There was a need for climate change research, but on scales that most people could relate to, such as their own cities, towns, households, and families. Her work is continually inspired by those climate activists and journalists who, through various movements, are trying to address local climate change issues. Because these individuals are often deeply involved within their communities, and working towards equitable action at the local level, she hopes that her research can help them work towards their goals, and in turn make a difference.

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Kimberly Van Meter

Van Meter is an assistant professor of geography. Prior to Penn State, Van Meter was an assistant professor in the Department of Earth and Environmental

Sciences at the University of Illinois at Chicago.

WHY PENN STATE AND EESI?

As a water system scientist—who studies the many ways in which human activity is affecting water quality and water availability across a range of different landscapes—Van Meter chose Penn State because of the vibrancy of its research programs and the strong interdisciplinary emphasis among its departments and institutes.

RESEARCH SUMMARY

Van Meter works within the domain of water systems science. Much of her work focuses on changes in land use and management that negatively affect water quality and aquatic ecosystems. A particular focus of her research investigates the water dynamics of large agroecosystems where humans have extensively modified the landscape for row crop agriculture, and where continued application of chemicals is used to fertilize crops, as well as kill weeds and insects. Additionally, her research strives to understand and better quantify the ways in which nature-based solutions, such as wetlands, can not only improve water quality but also provide a range of other ecological benefits in complex, multi-functional landscapes.

Van Meter’s research is uncovering the long-term fate of the chemicals used in large agroecosystems and exploring the implications these chemicals have on water quality. Her research utilizes a variety of tools ranging from data-driven, machine learning, approaches to fine-scale process-based modeling, as well as remote sensing data to better characterize changes in both land use and water quality.

For decades, the Chesapeake Bay has seen nutrient pollution. This has driven the growth of harmful algae and the development of oxygen-depleted dead zones within the Bay. For this reason, Van Meter’s work regarding the degradation of water quality in both coastal and inland water is of the utmost importance. “In my research, I am committed to providing science-driven insight into ways in which we can reduce the runoff of contaminants to downstream waters and to improve water-quality outcomes,” said Van Meter.

RESEARCH INSPIRATION

Van Meter’s professional career did not begin in the area of water system science. Graduating from the University of Iowa with her bachelor’s degree in English Literature, she began her career as science writer. Years ago, she had the opportunity to take part in a citizen science program called IOWATER, sponsored by the Iowa Department of Natural Resources, which trained individuals to test water quality in streams, rivers, and lakes near their homes.

Growing up in Iowa, a state famous for its rich croplands, Van Meter experienced firsthand the poor water quality caused by continued, and intensified, row crop agriculture. Inspired by the IOWATER program and appalled at the poor state of Iowa’s surface water, she made the decision to further her education. She earned master’s degrees in both chemistry and environmental engineering from the University of Iowa and her doctoral degree in earth and environmental studies from the University of Waterloo, in Ontario, Canada. Inspired by a citizen science program, Van Meter has spent her career researching water quality challenges in human-impacted landscapes.

“Water is fundamental to life, to health, and to equity,” said Van Meter.

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Shujie Wang

Wang is an assistant professor of geography. Prior to Penn State, Wang was a postdoctoral research assistant at the Lamont-Doherty Earth Observatory in Columbia University's Climate School.

Wang's research focuses on the mass balance and ice dynamics of the Antarctic and Greenland ice sheets. These ice sheets hold more than 99 percent of the freshwater ice found on Earth. Additionally, their melting has the potential of raising global sea levels by approximately 230 feet. Her work seeks to understand how different processes control the loss of mass in ice sheets, the controlling factors of ice sheet stability, and how these ice sheets change over space and time in a warming climate. Wang's work is crucial in generating reliable projections of future sea-level rise, both as they change over time in various warming scenarios, and is working to inform the scientific community and general public.

Wang's research is currently investigating and tracking the cracks on Antarctic ice shelves, which is critical to understanding how ice breaks off from glaciers and generates icebergs.

WHY PENN STATE AND EESI?

As a researcher who is interested in cryospheric studies, remote sensing, and machine learning, Wang made the choice to come to Penn State, and work within EESI, because she believed both would provide a rewarding environment for her to conduct her interdisciplinary work.

RESEARCH SUMMARY

The cryosphere—the frozen water part of the Earth system—plays a vital role in the global climate, and therefore society. Changes in the cryosphere, such as glacier retreat, melting ice sheets, and sea ice shrinkage, are important indicators of climate change and have profound implications on sea-level rise, water resources, agriculture, and biodiversity. Wang's research utilizes a combination of remote sensing methods, data-driven algorithms, and numerical modeling techniques to understand these changes and investigate their interactions with the atmosphere, ocean, biosphere, and human systems.

RESEARCH INSPIRATION

Wang was initially inspired to pursue a path towards her current research by the breathtaking images of Antarctica. This, coupled with her innate curiosity and drive to push the boundaries of scientific discovery, has led her to where she is today. Wang's motivation to continue her research is quite simply, "It's the beauty and complexity of the science involved that keeps pushing me forward," she said.

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Support EESI

The Earth and Environmental Systems Institute brings together scientists studying environmental science that crosses human to geologic timescales and transcends from fundamental to applied science. Its diverse and world-renowned faculty members are engaged in innovative and collaborative transdisciplinary research on questions related to our environment and how humans interact with the environment. To help support our mission (and help EESI do it), please consider donating to the Institute at raise.psu.edu/eesi.

Remembering Patryk Soika

In January of 2022, the EESI community lost a friend and dedicated member of the staff, Patryk Soika. His loss is felt by everyone who had the privilege of knowing him.

Patryk considered himself, and strived to be, a true renaissance man. True to the definition, Patryk was a man of many interests and passions and an expert in many. Whether it was beer, food, technology and gadgets, science fiction, mythology, music, pop culture, *Star Wars*, *Star Trek*, or comic books, Patryk was interested in learning, and experiencing, as much as possible. He was an emphatic *Green Lantern* fan, and in an interview, Chris Brida, friend and now director of Development and Alumni Relations in the College of Earth and Mineral Sciences, recalled the countless back-and-forth conversations he had with Patryk over who would win in a fight between *Green Lantern* and *Superman*.

When it came to his extensive knowledge, he held no ego, nor did he expect someone to know all that he did in order to have a conversation. “He had the ability to speak to others about his interests, or about the things he was very knowledgeable about, and come down to their level in order to bring them into that world and make them more comfortable with it,” said friend and coworker, Francisco Tutella.

Prior to coming to Penn State, Patryk held many positions and had a storied career within the downtown State College area. Before he became the reliable go-to “IT Guy” in EESI, he worked as a bartender, cab driver, barista, musician, and manager of a coffee shop, the State Theatre, and a downtown bottle shop. A man about town, there was a time when Patryk knew everyone. Like in the famous TV show, *Cheers*, “You’d go downtown and play pool with him, and all you would hear is Patryk, Patryk, Patryk, I mean—at every bar,” said friend and coworker, John Miley.

Patryk’s work personality differed from the outgoing persona he had outside of the office. He kept more to himself but still loved interacting with people and enjoyed when they would come to his office and grab a snack from his infamous candy bowl. “If you went over to his office and started to talk, you never knew where the conversation was going to go, but you knew it was going to be a great conversation,” Tutella said. Patryk was also the office problem solver. “If someone brought him a problem, he loved

taking the time to think it through, figure it out, and test things before he gave them a solution,” Tutella said.

Those who knew Patryk remember fondly his white motor-scooter, trimmed in orange.

Because of his love of *Star Wars*, he was often seen riding with his Luke Skywalker X-Wing Starfighter helmet. In truly the most benign act of defiance one could imagine, Patryk would ride his scooter over the IST bridge every year on Thanksgiving. Knowing he was not supposed to, he would ride over the completely empty bridge and allow himself to be “bad” for just one day. It was one of his favorite simple pleasures.

Patryk was a genuine individual who sought to know more about you. He was a loving and compassionate friend, who was beloved by many, and was understanding of those around him.

A renaissance man in every way, Patryk can be remembered best by his outlook on life saying, “If you want to borrow a little optimism now and then, I remembered to put some fresh raspberries in my grocery order. Simple pleasures, dude. Fresh fruit is fairly solid evidence that the world is still a good place. It isn’t perfect, but it’s where they grow the raspberries and the mangoes.”

Because the Arboretum was one of Patryk’s favorite places, EESI arranged for a bench to be placed there in his honor. On June 3, a memorial service was organized—at the bench—to allow friends and colleagues the opportunity to remember, and honor, their friend. The bench is located in the new pollinator and bird garden in view of the Joel N. Myers Sundial. If you would like to honor Patryk by making a donation in his name, you can do so by visiting <https://bit.ly/3PYkhUw>.





Smithwick appointed new director of Earth and Environmental Systems Institute

Erica Smithwick, distinguished professor of geography, has been named director of the Earth and Environmental Systems Institute at Penn State, effective Jan. 1.

Smithwick joined the Penn State faculty in 2007 and is excited for this new opportunity with the Earth and Environmental Systems Institute (EESI).

"I have been a faculty associate with EESI since I first came to Penn State," said Smithwick. "EESI has helped with my research, and I was excited for the opportunity to give back and to help keep that research mission going. The EESI family gave me a space at Penn State that allowed me to feel welcome, but also provided me with a research platform. Having the opportunity to serve the EESI family in this new capacity is really exciting."

Smithwick is assuming the role from Susan Brantley, Barnes Professor of Geosciences and Evan Pugh University Professor of Geosciences, who stepped down in June 2021 after nearly two decades as director.

"Sue's legacy at EESI is incredible and she leaves big shoes to fill," said Smithwick. "Not only was she steadfast in her commitment to providing research support to EESI faculty associates, but she was also very supportive personally of individuals within the institute, which helped to cultivate the EESI family. That balance of being a science leader in her own right and also being able to lift up others is an incredible inspiration."

"I am very pleased to see Erica take this position and create more opportunities for environmental scientists and engineers on campus," said Brantley. "With her track record, the next few years will be exciting."

Alan Taylor, professor of geography and ecology, served as interim director from July 2021 to December 2022.

"Alan led with a steady hand and through the transition, and I am really grateful for what he's done for the institute," said Smithwick. "I think

I'm going to be in good hands as he hands me the baton."

Smithwick was appointed as an associate director of the Institutes of Energy and Environment (IEE) in 2019 and served as the director of the Ecology Institute from 2017 to 2021, both of which foster interdisciplinary environmental research. She also is the founding director of the Center for Landscape Dynamics, which connects science to management.

"My main role at IEE is leading the climate consortium initiatives," said Smithwick. "Another reason that I was excited about the EESI director position is that the College of Earth and Mineral Sciences is a leader in climate and sustainability research, and I felt that this was a good space for the college and EESI to lead in some of the ideas that I know are being discussed at the University level. I will remain as associate director at IEE with a partial appointment to help foster these collaborations."

Smithwick also served as an Administrative Fellow for the 2021-22 academic year under Lora Weiss, Penn State senior vice president for research. Smithwick said she felt that it was a unique mentoring and leadership opportunity and gained valuable experience by shadowing an upper-level administrator on a day-to-day basis.

"My connections and partnerships across the University are really going to help me in this role,"

said Smithwick. "These experiences will help me to make connections where we need to across the University. I'm excited to help our junior faculty, for example, be part of interdisciplinary teams across the University, but also within our college."

Smithwick is on the Intercollege Graduate Degree Program in Ecology graduate faculty and is excited to help make the college's research and the educational mission more connected. She is the lead principal investigator for Landscape-U, a \$3 million grant funded by the National Science Foundation focused on transdisciplinary graduate training in regenerative landscape science.

She has an active research portfolio and her laboratory group, LEAPS: Landscape Ecology at Penn State, is actively involved in understanding how a wide range of disturbances, especially fire, affect ecosystem function at landscape scales. Current research is focused on the influence of these changes on socioecological resilience and sustainability, with special attention to protected area management in Africa and the United States.

Smithwick earned her bachelor of science degree in geology and environmental studies from Tufts University, her master's degree in forestry and resource conservation from the University of Montana, and her doctorate in forest science and ecology from Oregon State University.



Renovation Updates

Renovations to create collaboration space for JEWEL are well underway. The former server room for the college, as well as some underutilized open spaces, are being transformed into modern collaboration areas and meeting spaces to support research efforts. The new work spaces are anticipated to be available by the of April.

Map showing renovation area around the Earth and Engineering Sciences Building.



PennState
College of Earth
and Mineral Sciences

Earth and Environmental Systems Institute

Earth and Environmental Systems Institute
2217 Earth-Engineering Sciences Building
University Park, PA 16802-6813

Rob Nicholas is part of a team whose research is helping communities make better decisions by improving the characterization of flood risks and providing tools to help with the design of risk management strategies. In Selinsgrove, Pennsylvania, the researchers are analyzing how a community along the Susquehanna River can manage flood risks.

