2025 Climate Health Frontiers Symposium:
AI and Data for Mitigation, Adaptation, and Resilience

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SPEAKER BIOS AND ABSTRACTS

KAREN ALBRIGHT

Community CATALYST: Generating Evidence to Alleviate Climate-Induced Health Outcomes in Socioeconomically Marginalized Populations

ABSTRACT
Climate change is rapidly impacting the health of persons in the U.S., with worse outcomes in marginalized communities. It is critical that the safety net community health clinics (CHCs) serving such communities are prepared to alleviate these impacts through effective interventions. This presentation describes the aims and design of *Community CATALYST*, a three year planning grant recently funded by the National Institutes of Health to develop a Climate Change and Health Research Center that will generate the evidence these clinics need to intervene effectively. CATALYST will create a data infrastructure that will support longitudinal research on climate-induced health impacts in CHC populations by linking existing robust, geocoded research-ready EHR data with existing highly granular data on temperature spikes and air quality. Directed by a transdisciplinary team of experts in climate and health, it will conduct foundational, community-engaged mixed methods research to identify patterns of climate-induced health outcomes in CHC populations, potential interventions to target the patterns that are of interest to CHC communities and thus require future effectiveness research, and the strategies needed to support implementing such interventions.

BIO
Dr. Karen Albright is Senior Investigator and Director of Community Engaged Research at OCHIN, a nonprofit health care innovation center focused on health equity, and Associate Professor of Medicine and Director of Qualitative Research in the Division of General Internal Medicine at the University of Colorado School of Medicine. A sociologist and health services researcher, her work focuses on health disparities and the social determinants of mental and physical health among socioeconomically disadvantaged populations. She is particularly interested in understanding structural and psychosocial barriers to care and testing solutions for mitigating them using approaches that center meaningful, innovative community engagement. As MPI of Community CATALYST, she works in partnership with diverse health system stakeholders, community organizations in the field of environmental justice, and scientific experts in climate and health to develop a community-generated research agenda on interventions to alleviate climate-induced health impacts among marginalized populations.

WAEL AL-DELAIMY

Climate Change and community engagement of disadvantaged populations

ABSTRACT
Climate change impacts disadvantaged populations globally and locally, but limited research engages these communities. These are the same communities that are suffering from health inequity and suffer other socioeconomic disadvantages. The talk will focus on the work at the global level and how climate change is related to all these causes of health inequity and the challenges to engage communities of concerns as well as potential approaches.

BIO
Wael Al-Delaimy is a Multidisciplinary Epidemiologist and Professor of Public Health and Family Medicine at the University of California San Diego and a leader on Global Climate Change and Health being funded two large centers on this topic by the US National Institute of Health. His work on Climate Change is focused on solutions for disadvantaged communities through policies and interventions and capacity building. His work involves refugees, rural farming communities, indigenous populations, and minorities. Most of his climate work is in the Middle East. He led the editing and authorship of the Springer Nature Book titled Health of People Health of Planet and Our Responsibility which has reached a milestone of over ½ million online downloads. He is a consultant for the WHO, UNEP, and UNDP on Climate related work. He is a member of the Technical Advisory group for Climate Change and Health Data Ethics and also advisor to the American Psychological Association Task Force on Climate Change. He co-founded and Chair of the Board of the Society for Advancement of Science and Technology in the Arab World that is focused on Arab Diaspora Scientists.

MICHAEL BERKOWITZ

Finding the dividend: Musings on efforts to better align public health and resilience work

ABSTRACT
We are developing a shared understanding of how compounding risk factors leave communities more vulnerable to climate shocks, but the next frontier in innovation is finding ways in which resilience and public health practitioners can use complimentary systems and metrics to demonstrate the multiple benefits of holistic initiatives to unlock funding and finance and leave communities healthier and less vulnerable to disaster.

BIO
Michael Berkowitz is the Executive Director of the University of Miami's Climate Resilience Academy. He is also the Eric T. Levin Endowed Chair in Climate Resilience. The Academy is an operational unit connecting and amplifying the work the University's 12 schools and colleges. Previously he was a Founding Principal at Resilient Cities Catalyst, a global non-profit helping cities and their partners tackle their toughest challenges. In August 2013, he joined the Rockefeller Foundation to shape and oversee the creation of 100 Resilient Cities (100RC). He served as the 100RC President from 2013 to 2019. The cities in the 100RC network created more than 80 holistic resilience strategies, which outlined over 4,000 concrete actions and initiatives, resulting in more than 150 collaborations between private sector and public sector to address city challenges, including $230 million of pledged support from platform partners and more than $25 billion leveraged from national, philanthropic, and private sources to implement resilience projects. From 2005 to 2013 he worked at Deutsche Bank in a variety of risk management roles including as the global head of Operational Risk Management, where he oversaw the firm's operational risk capital planning efforts and connected the myriad operational risk management efforts group-wide. From 1998 until 2005, he was Deputy Commissioner at the Office of Emergency Management in New York City. He worked on planning initiatives, including the city's Coastal Storm, Biological Terrorism and Transit Strike plans. He also responded to major incidents including the crash of American Airlines 587, the 2003 Northeast blackout, as well as the 2001 World Trade Center disaster. Michael also sits on FEMA's National Advisory Council, the Deltares International Advisory Board, the Steering Committee of the South Florida ClimateReady Tech Hub and Geos Institute's Board of Directors.

JEFF CARNEY

JaxTwin: Future Scenarios at the Intersection of Health and Housing and Hazards

ABSTRACT
The impacts of climate change on coastal cities are rising dramatically, causing increased damage to infrastructure, reduced access to affordable housing, and threats to health and wellbeing to billions of city-dwellers worldwide. We argue that a primary challenge to effective adaptation to climate change risks stems from the deep uncertainty framing predicted impacts. Such uncertainty can undermine broad consensus and the political will to marshal substantial and sustained investment in projects. Uncertainty around climate change impacts can lead decision makers to avoid community-centered processes altogether. Though this can expedite limited implementation, it comes at the expense of public trust.

A multidisciplinary group of researchers at the University of Florida (UF) is pioneering the development of Urban Digital Twin (UDT) technologies to assist decision makers and stakeholders to envision challenges and solutions in an increasingly uncertain coastal environment. With seed funding from UF President's Strategic Initiatives, the team is actively developing JaxTwin, a prototype UDT for Jacksonville. This innovative work seeks to comprehensively analyze the city's vulnerability to hurricane-induced flooding, examining the cascading impacts on infrastructure, water quality, housing and health. This presentation will give an overview of this ongoing research effort and discuss the methodology of integrating diverse datasets with advanced simulation models. Emphasis will be placed on elucidating the potential applications of this innovative work and its broader significance for the resilience of urban landscapes.

BIO
Jeff Carney is Associate Professor in the School of Architecture and Director of the Florida Institute for Built Environment Resilience (FIBER) at the University of Florida. Jeff is a registered architect and certified urban planner working at the interface of housing, neighborhoods, and ecosystems, with a focus on climate change adaptation. Jeff's work in Florida is focused on the resilience of communities achieved through transdisciplinary and community engaged design processes. Current projects include projects to assist the Cities of Port St. Joe, Jacksonville, and Cedar Key to balance health, environment, and housing needs in the face of increased climate change risk. Additionally, Jeff is spearheading the GulfSouth Studio initiative sponsored by the National Academies of Sciences Gulf Research Program to connect community engagement, advanced computation tools, and coastal resilience in the Florida Gulf through studio design education. Most recently Jeff has co-led the JaxTwin initiative to explore an urban digital twin for the City of Jacksonville.

TIRTHANKAR (TC) CHAKRABORTY

ABSTRACT
Cities have higher temperatures compared to their background climate, often referred to as the urban heat island effect. Cities are also highly heterogeneous, leading to spatial variability in heat hazard and exposure, with warmer areas often coinciding with disadvantaged neighborhoods, particularly for U.S. cities. In this presentation, I will give an overview of our current understanding of within-city variability in urban heat hazard and exposure and their distributional inequalities in the U.S. Parallel lines of evidence from multiple methods, from satellite remote sensing data to coupled numerical model simulations, will be covered. These heat-related disparities will also be discussed with reference to parallel disparities in vegetation distribution within cities. Finally, we will explore potential disparities in heat hazard for cities in the Global South, which have different patterns of urban development from U.S. cities.

BIO
Tirthankar Chakraborty (goes by TC) is a staff scientist in the Earth System Modeling group under the Atmospheric Sciences and Global Change Division of Pacific Northwest National Laboratory (PNNL). His broad research interest is in biosphere-atmosphere interactions, and he has worked on this topic across scales using both models and observations. He completed his PhD at the Yale School of the Environment in 2021 with a focus on Earth and environmental science. For his dissertation, he developed a surface energy budget perspective to aerosol-climate interactions by combining theory and global climate modeling. As a follow-up to this research, he has worked on the role of diffuse radiation and the variability of its representation across models on the terrestrial carbon, water, and energy budgets. His master's thesis was on urban climate, particularly the urban heat island effect, which he has also continued to work on using satellite measurements, crowdsourced weather station data, and conceptual modeling frameworks. At PNNL, he is currently contributing to two multi-institutional projects, namely the Coastal Observations, Mechanisms, and Predictions Across Systems and Scales - Great Lakes Modeling (COMPASS-GLM) and the Integrated Coastal Modeling (ICoM) projects, where his role is examining the impact of urbanization on climate and extreme weather in coastal regions. He is also involved in several efforts to map heat exposure and its disparities within urban environments using various methods—from process-based models to machine learning algorithms—and global assessments of urban climate using satellite remote sensing.

SANDRAH P. ECKEL

Reductions in Satellite-based measures of Air Pollution Associated with Zero-Emissions Vehicle Adoption in California

Authors and Affiliations – Underline Presenter Name
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ABSTRACT
INTRODUCTION: Electrification of the transportation sector is a crucial climate change mitigation strategy, which is also anticipated to have important public health co-benefits due to reductions in tailpipe emissions. However, the co-benefits literature is primarily based on projections rather than observational data. We evaluated whether reductions in combustion-related air pollution from the zero-emissions vehicle (ZEV: battery electric, plug-in hybrid and hydrogen fuel cell) transition in California could be detected using newly available TROPOMI satellite measurements of tropospheric nitrogen dioxide (NO_2) air pollution.

METHODS: We combined publicly available data on the annual number of light duty ZEVs registered in California zip codes (cross-walked to zip code tabulation areas, ZCTAs) with annual average concentrations of tropospheric NO_2 averaged to California ZCTAs, from 2019 to 2023. Using 5 years of longitudinal data on 1655 ZCTAs, we conducted a two-stage data analysis. In stage I ZCTA-specific linear regression models were fitted to relate natural log NO_2 to the percent of light duty vehicles that were ZEVs, adjusting for calendar year. In stage II meta-regression was used to pool the 1655 estimated ZEV-NO_2 associations. Sensitivity analyses included additional Stage I adjustment for time-varying potential confounders (e.g., median income, gas prices, percent work-from-home) or excluding the 2020 pandemic year. Secondary analyses related: (1) 2019-2023 tropospheric NO_2 to the ZCTA-level number of internal combustion vehicles as a positive control and (2) 2019-2022 ground-level NO_2 concentrations from 101 U.S. Environmental Protection Agency (EPA) monitors to ZCTA-level ZEVs.

RESULTS:
Across 1655 California ZCTAs, the percent of light duty vehicles that were ZEVs was on average 1.8% in 2019 (range: 0.0 to 11.7%) and 4.4% in 2023 (range: 0.0 to 27.0%). A one percentage point increase in ZEVs within a ZCTA was associated with a 7.7% decrease in annual average tropospheric NO_2 air pollution (95% CI: 6.9 to 8.4% decrease), adjusting for calendar year. Sensitivity and secondary analyses supported the main findings.

CONCLUSION:
Using the natural experiment of the transition to ZEVs in 1655 ZCTAs in California from 2019-2023, we observed that within-ZCTA increases in ZEVs were associated with reduced annual atmospheric NO_2 air pollution, as observed from the TROPOMI satellite. Satellite data provides greater spatial coverage than the more limited network of ground-level EPA monitors. Secondary analyses confirmed the findings using ground-level EPA NO_2 observations. This work in California, a location at the vanguard of the US ZEV transition with the densest ground-level EPA air monitoring network, serves as a proof-of-principle for future work using satellite NO_2 to evaluate changes in combustion-related air pollution related to climate change mitigation measures within the U.S. and internationally.

BIO
Sandy Eckel, Ph.D. is an associate professor of Biostatistics at the University of Southern California and Director of the USC Biostatistics PhD Program. Her work has focused on statistical methods and applications in environmental epidemiology, especially for studies of air pollution health effects. Dr. Eckel is increasingly interested in climate and health solutions and decarbonizing medicine. She is part of the NIH-funded Electric Vehicle Adoption in California (EVAC) study (PI: Garcia). Together with Drs. Erika Garcia and Sam Silva, she teaches a new interdisciplinary course: “Data Science Methods for Climate Change and Health Research”.

EBRAHIM ESLAMI

Extreme Heat and Disease Burden Projections: A Case Study in Harris County, TX

ABSTRACT
This study addresses the pressing issue of extreme heat and its projected impacts on disease burden in Harris County. This collaborative project, funded by the National Association of County & City Health Officials (NACCHO) and involving Harris County Public Health (HCPH), leverages advanced climate modeling and public health data to forecast changes in morbidity and mortality rates under various climate scenarios through 2100. Utilizing the Environmental Benefits Mapping and Analysis Program (BenMAP-CE), the study integrates effect estimates with detailed demographic and environmental data, offering vital insights into the heat-related health risks at a granular zip code level. These projections underscore the critical need for robust public health strategies to mitigate the increasing health impacts of extreme heat in the region.

BIO
Dr. Ebrahim Eslami is a research scientist at the Houston Advanced Research Center (HARC), where he specializes in climate and environmental sciences. With a background in air quality and climate change science, Dr. Eslami leads innovative research projects focusing on the impacts of extreme weather conditions, such as heatwaves and hurricanes, on public health and community resilience. Holding a PhD in Earth and Atmospheric Sciences from the University of Houston, his research has significantly advanced the understanding of air pollution and climate change impacts on health, utilizing innovative data analysis and modeling techniques to enhance community resilience against environmental challenges with extensive collaboration with local government and community stakeholders as well as national organizations. His research contributes to developing strategic interventions that safeguard vulnerable communities in Houston against the escalating impacts of climate variability.

MICHEL GELOBTER

AI: A Tool for Building Community Power

BIO

Dr. Michel Gelobter is the inaugural Executive Director of the Yale Center for Environmental Justice and a senior advisor at Google X. Until recently he was the CEO of Cooler.dev and Managing Director of Reflective Earth (reflectiveearth.org). He's had a diverse career in the private, public, government and non-profit sector with a core focus on innovation, climate change, energy, and social justice. Michel co-founded a number of environmental justice, water, and oceans organizations, founded the first consumer-facing climate software company, and his government service has included a stint as a Congressional Black Caucus Fellow, staffing the U.S. House of Representatives Energy and Commerce Committee and serving as Director of Environmental Quality for the City of New York and as Assistant Commissioner for its $2 billion-a-year water utility and environmental agency.

Michel helped originate and design the world's first, economy-wide climate legislation (California's AB32) and was the founding director of the Program on Environmental Policy at Columbia University's School of International and Public Affairs. His book, Lean Startups for Social Change: The Revolutionary Path to Big Impact, was published in 2016. Michel earned his MS & Ph.D. at UC Berkeley's Energy & Resources Group and presently serves as a Board member of CERES, New Energy Nexus and co-chairs the Green Leadership Trust. He is an avid father and backpacker.

SARAH GUNTER

Rising risk, new solutions: Innovations in vector control to respond to a changing climate

ABSTRACT
Reported cases of vector-borne disease have doubled over the last two decades. In recent years we have experienced vector range expansion, introduction of invasive vector species, and identification of emerging and novel vector-borne pathogens. All of these factors have led to a change in the epidemiology of vector-borne diseases that have put new populations at risk of disease. We critically need innovative new tools to track and control transmission of these pathogens. This talk will discuss some of the research we are doing in the laboratory of Infectious Disease Epidemiology at Baylor College of Medicine to develop new ways to understand our mosquito population along the US Gulf Coast. Integrating technologies such as drone and satellite imagery and machine learning allow us to better evaluate mosquito presence, model abundance, and respond after natural disasters.

BIO
Dr. Gunter is an assistant professor at Baylor College of Medicine and Texas Children's Hospital in the National School of Tropical Medicine where she serves as the director of the Infectious Disease Epidemiology laboratory. Her research centers on investigating the emergence of vector-borne and neglected tropical diseases and the development of innovative new tools to control transmission.

MEREDITH JENNINGS

Community-Driven Science for Action: Mapping Urban Heat Islands in Our Region

ABSTRACT
While summer 2024 averaged the warmest in recorded history, urban areas with dense development often experience the highest temperatures compared to more natural landscapes. Dr. Meredith Jennings from HARC will talk about recent community science efforts to measure urban heat islands in the region. This valuable data collected by residents will point out which neighborhoods need more ways to cool off and beat the heat, including extra tree canopy and greenspace. More information on the project can be found at www.h3at.org

BIO
Dr. Jennings received her Doctorate from the University of Miami from Rosenstiel School of Marine and Atmospheric Science. Professional interests include building cross-disciplinary partnerships and programs that promote community resilience and lessen the impact of climate change. Since joining HARC in 2018, Dr. Jennings has provided program management, technical analysis and stakeholder engagement to support projects such as the City of Houston Climate Action Plan (released April of 2020); the Houston Harris Heat Watch program (2020 and 2024); and more recently, several local Inflation Reduction Act programs including the regional Climate Pollution Reduction Grant (CPRG) Climate Action Plans, the Texas Solar for All Coalition, and the “ForUsTree” initiative to plant trees and support green workforce development in underserved communities. Dr. Jennings is a Certified Climate Change Professional.

SHUHAB KHAN

Hurricane Beryl on Texas Barrier Islands

ABSTRACT
This talk presents a stunning showcase of high-resolution images that illustrate the dramatic transformations of the Texas coast over time. Discover the fascinating story of Hurricane Beryl and its powerful storm surge, which lefta lasting impact on coastal dunes and vegetation. Given the extreme weather events, rising sea levels, land subsidence, and human activities in this region, there is an urgent need for coastal conservation and monitoring.

BIO
Dr. Shuhab Khan is a professor in the Department of Earth and Atmospheric Sciences at the University of Houston. He is a Fellow of the Geological Society of America. His recent research interests focus on utilizing remote sensing and geospatial modeling to address fundamental questions across various geological and environmental disciplines.

AMIN KIAGHADI

The application of machine learning in extreme hydrological events: convergence research team is required

Amin Kiaghadi, Texas Water Development Board
Clint Dawson, University of Texas, Austin
Wei Lee, University of Texas, Austin

ABSTRACT
The increasing frequency and intensity of extreme weather events necessitate a deeper understanding of the underlying causes driving these phenomena and how we could become more resilient against them. In the past decade, we have observed a tremendous increase in the application of Artificial Intelligence (AI) and data in addressing extreme hydrological events. However, less attention has been paid to the fact that AI and machine learning (ML) applications should be grounded in a solid understanding of the physical processes at play. Utilizing AI/ML merely as buzzwords to attract attention can lead to misguided efforts and nonreliable solutions. Thus, to fully unlock the true power of AI/ML in exteme hydrologic challenges, it is critical to pursue a multidisciplinary approach that integrates the expertise of data scientists, computer scientists, earth scientists, and engineers. This collaboration ensures that AI/ML models are sophisticated in their computational capabilities and robust in their alignment with physical realities. By leveraging the strengths of diverse fields, we can develop AI/ML models that are both innovative and scientifically sound. This presentation focuses on the application of ML in flood prediction and mitigation, a pressing issue given the increasing occurrence of devastating floods worldwide. A surrogate ML model that outperformed traditional hydrologic/Hydraulic (H&H) models by incorporating large, yet simple datasets will be discussed. The developed model using the Long short-term memory (LSTM) approach has demonstrated significant improvements in predicting flow rates by using rainfall as the sole input data, allowing for better preparedness and response strategies. The model could generate results in minutes rather than hours or days required for classic H&H models. Furthermore, this approach is not solely reliant on ML algorithms; we evaluated the capability of the developed model in capturing the physics of the rainfall-runoff phenomena and guided the algorithm to take advantage of the science of hydrology. The results showed superior and faster results compared to the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model.
The work presented in this presentation was developed in 2020 at the University of Texas in Austin and thus, none of the findings and information discussed in this presentation are not reflecting the official policy, opinions, views, or express statement of the Texas Water Development Board official

BIO
Dr. Amin Kiaghadi is currently the manager of the coastal science program at the TWDB. He is also the project manager for the Texas Integrated Flooding Framework (TIFF) planning project. Dr. Kiaghadi earned his Ph.D. in Environmental Engineering from the University of Houston (UH) in 2018. He also holds a master's degree in water

resources (2013) and a bachelor's degree in civil engineering (2010). Furthermore, Dr. Kiaghadi spent two years as a joint-appointed postdoctoral fellow at the Oden Institute for Computational Engineering and Sciences at the University of Texas at Austin and the Department of Civil and Environmental Engineering (CIVE) at UH.

VIPIN KUMAR

Knowledge-Guided Machine Learning: Accelerating Scientific Discovery and Addressing Global Environ-mental Challenges

ABSTRACT
Climate change, loss of bio-diversity, food/water/energy security for the growing population of the world are some of the greatest environmental challenges that are facing the humanity. These challenges have been traditionally studied by science and engineering communities via process-guided models that are grounded in scientific theories. Motivated by phenomenal success of Machine Learning (ML) in advancing areas such as computer vision and language modeling, there is a growing excitement in the scientific communities to harness the power of machine learning to address these societal challenges. In particular, massive amount of data about Earth and its environment is now continuously being generated by a large number of Earth observing satellites, in-situ sensors as well as physics-based models. These infor-mation-rich datasets in conjunction with recent ML advances offer huge potential for understanding how the Earth's climate and ecosystem have been changing, how they are being impacted by humans actions, and for devising policies to manage them in a sustainable fashion. However, capturing this potential is contingent on a paradigm shift in data-intensive scientific discovery since the “black box” ML models often fail to generalize to scenarios not seen in the data used for training and produce results that are not con-sistent with scientific understanding of the phenomena.

This talk presents an overview of a new generation of machine learning algorithms, where scientific knowledge is deeply integrated in the design and training of machine learning models to accelerate scien-tific discovery. These knowledge-guided machine learning (KGML) techniques are fundamentally more powerful than standard machine learning approaches, and are particularly relevant for scientific and engi-neering problems that are traditionally addressed via process-guided (also called mechanistic or first prin-ciple-based) models, but whose solutions are hampered by incomplete or inaccurate knowledge of phys-ics or underlying processes. While this talk will illustrate the potential of the KGML paradigm in the con-text of environmental problems (e.g., Ecology, Hydrology, Agronomy, climate science), the paradigm has the potential to greatly advance the pace of discovery in any discipline where mechanistic models are used.

BIO
Vipin Kumar is a Regents Professor and holds William Norris Chair in the department of Computer Sci-ence and Engineering at the University of Minnesota. His research spans data mining, high-performance computing, and their applications in Climate/Ecosystems and health care. His research has resulted in the development of the concept of isoefficiency metric for evaluating the scalability of parallel algorithms, as well as highly efficient parallel algorithms and software for sparse matrix factorization (PSPASES) and graph partitioning (METIS, ParMetis, hMetis). He has authored over 400 research articles, and co-edited or coauthored 11 books including two widely used text books

``Introduction to Parallel Computing", "Intro-duction to Data Mining", and a recent edited collection, “Knowledge Guided Machine Learning”. Kumar's current major research focus is on knowledge-guided machine learning and its applications to under-standing the impact of human induced changes on the Earth and its environment.. Kumar’s research on this topic has been funded by NSF’s AI Instititues, BIGDATA, INFEWS, STC, GCR, and HDR programs, as well as ARPA-E, DARPA, and USGS. He also served as the Lead PI of a 5-year, $10 Million pro-ject, "Understanding Climate Change - A Data Driven Approach", funded by the NSF's Expeditions in Computing program (2010-2015).

Kumar has been elected a Fellow of the American Association for Advancement for Science (AAAS), Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), and Society for Industrial and Applied Mathematics (SIAM). Kumar's foundational research in

data mining and high performance computing has been honored by the ACM SIGKDD 2012 Innovation Award, which is the highest award for technical excellence in the field of Knowledge Discovery and Data Mining (KDD), the 2016 IEEE Computer Society Sidney Fernbach Award, one of IEEE Computer Socie-ty's highest awards in high performance computing, and Test-of-time award from 2021 Supercomputing conference (SC21)

DEBRA MURRAY

From Data to Discovery: Leveraging the *All of Us* database for Climate Health Research

ABSRACT
NIH's *All of Us* Research Program gathers health data (electronic health records, Fitbit, genomic, and survey data) from one million or more people. The *All of Us Evenings with Genetics* Research Program at Baylor College of Medicine wants to increase the number of diverse researchers that will use the All of Us data to ask questions of interest to their communities, promote responsible and ethical use of the data, and accelerate the impact of the research on communities historically left out of research studies. We will introduce the *All of Us* database to conference attendees and present relevant projects conducted by the *All of Us* Biomedical Researcher Scholars Program.

BIO
Debra Murray, Ph.D., a leader in equity, mentoring, and research education, is a 2021 recipient of the Norton Rose Fulbright Faculty Excellence Award in Educational Leadership. She was awarded the All of Us Evenings With Genetics Research Program from the NIH All of Us Research Program. Dr. Murray is Director of Genetics/Genomics Education Programs in the Human Genome Sequencing Center, and an Associate Professor in the Molecular and Human Genetics Department and co-Director of the Office of Community Engagement and Equity at Baylor College of Medicine (BCM). She provides faculty training opportunities and medical genetics' training programs for M1/M2 students. She is a member of the Engagement, Communication, and Education (ECE) Team that provides community engagement research for the Intellectual and Developmental Disabilities Research Center (IDDRC) and Education Core Director of the NCI P20 BCM/Texas Southern University Partnership Collaborative Union for Cancer Research, Education and Disparities (CURED).

WILLIAM PERKISON

Development of system-based digital decision support (“Pocket Ark”) for post-flood enhanced response coordination and worker safety

ABSTRACT
Background: Climate change has led to an increase in the frequency and severity of natural disasters, posing significant health and safety risks to reconstruction workers. These workers, often from vulnerable populations, face multiple hazards in post-disaster environments. Pocket Ark (PA) is an innovative, evidence-based digital decision support tool designed to enhance response coordination and worker safety during the pre-deployment, deployment, and post- deployment phases of disaster recovery. PA integrates advanced digital health technology within a robust framework based on dissemination and implementation (D&I) science. Utilizing the systematic approach of Intervention Mapping, PA addresses critical gaps in safety training and operational coordination for reconstruction workers. This study demonstrates the effectiveness of digital tools in promoting safety practices and implementing effective interventions in real-world settings.
Methods: The development of Pocket Ark adhered to the six steps of Intervention Mapping: (1) assessing needs and developing a logic model of the problem, (2) creating matrices of change objectives, (3) selecting theory-based methods and practical applications, (4) producing program components, (5) planning for adoption, implementation, and sustainability, and (6) planning for evaluation. Stakeholder engagement, including collaboration with worker advocacy groups and pilot testing with day laborers, ensured the tool's relevance and adaptability. Pilot testing involved pre- and post-intervention assessments to evaluate knowledge gains and practical application.
Findings: Pilot testing indicated significant improvements in participants' safety knowledge post-intervention, with a mean difference score of 3.20 ($p=0.0054$). Despite challenges such as literacy barriers, the usability of PA was well-received, and participants valued the content's relevance and importance. Based on feedback, adjustments were made to incorporate audio features and simplify navigation, enhancing accessibility. High-quality data from these pilots highlight the tool’s potential to improve safety behaviors and health outcomes for reconstruction workers.
Implications for D&I Research: Implications for D&I Research: Pocket Ark represents a significant advancement at the intersection of occupational health, disaster response, and digital health interventions. By providing real-time decision support, comprehensive safety training, and efficient coordination, PA can significantly reduce injury rates and improve operational efficiency in post-disaster
scenarios. This study contributes valuable insights into the practical application of digital health tools for vulnerable worker populations, advancing the science and practice of occupational safety in disaster contexts.

BIO
William “Brett” Perkison, M.D., MPH, FACOEM, is an Assistant Professor on faculty at the University of Texas School of Public Health where he is the director for the UT

Occupational and Environmental Medicine residency program, assistant director for the UTHealth Employee Health Department, is active in a variety of research projects and maintains a clinical practice in primary care and occupational and environmental medicine. He obtained his medical degree at UTMB Galveston and completed residencies in Family Medicine at Baylor College of Medicine and Occupational and Environmental medicine at the UT School of Public Health. Prior to joining the UT faculty, he has had extensive experience managing occupational health services in both the energy and health care industries. During his career he has also had involved in leading disaster response efforts in the Houston area for numerous flooding events, including for Hurricanes Katrina, Ike, and Harvey.

He is currently involved in research projects primarily in the areas of disaster response and diabetes prevention. His current work includes developing a disaster response e-learning tool for construction workers deployed to communities affected by flooding that provides both health and safety education as well as logistical, and security support.

SEQUOIA RILEY

Reducing Energy Burden and Flood Damage Using Energy-Water-Nexus Approach

Sequoia Riley, Houston Advanced Research Center
Vatsal Bhuva, Houston Advanced Research Center
Carlos Gamarra, Houston Advanced Research Center
Marina Badoian-Kriticos, Houston Advanced Research Center

ABSTRACT
This paper presents an innovative, original approach to co-design retention ponds and floating photo voltaic solar plants as a water-energy nexus approach to reduce flooding and energy burden for one location. Case-study analysis was conducted in Waimanalo, Hawai'i. A flood model—from a previous study—was used to provide a potential location for a retention pond and floating solar photovoltaic panels. This study found the co-design of retention ponds and floating PV solar can not only reduce future stormwater runoff by up to 50% but provide a total of 50% of onsite solar energy at a neighborhood scale, demonstrating how clean energy and green infrastructure can help advance environmental and social justice. Several takeaways from this study were taken into account and things to consider for a follow-up paper. One of the major challenges was finding a potential suitable location. Overcoming this challenge required using Google Maps and the flood model to pinpoint high flood accumulation and searching for a large green space that is in close vicinity to a developed neighborhood.

BIO
Dr. Sequoia Riley is a Research Associate focused on the Water, Climate, and Energy nexus. Her research interests include environmental planning and management, green infrastructure, flood disaster risk management, and adaptive governance in the context of urban and rural planning, focusing on flood sustainability, resilience, and climate equity. She also works with the DOE's Southcentral Onsite Energy Generation Technical Assistance Partnership, conducting outreach and engaging with policymakers, utilities, and other key stakeholders to accelerate pathways for integration of clean onsite energy technologies.

Dr. Riley completed her Doctor of Philosophy at the University of Hawai'i at Mānoa. She served as a graduate research assistant at the National Preparedness Disaster Training Center (NPDTC) from fall 2018 to spring 2022, and as a post-doctorate fellow in summer 2022.

Dr. Riley received an M.Sc. in Marine Resource Management from Texas A&M University-Galveston, and a B.Sc. in Marine Science (with a minor in Applied Mathematics) from Coastal Carolina University.

MEGAN ROSE

Code Green: AI Solutions for Houston's Climate Health Crisis

BIO
Megan Rose is the Senior Director of Strategic Initiatives at Center for Houston's Future, where she spearheads initiatives focused on Health and Health Equity in the Greater Houston region. As the primary author of several influential reports on healthcare topics, she has examined the economic and equity aspects of maternal health, climate health, and AI in healthcare. An alumna of the Kelley School of Business at Indiana University, Megan also holds degrees from the Bauer College of Business and the Hobby School of Public Affairs at the University of Houston. Her diverse professional background includes roles in strategy and project management at AT&T, Goldman Sachs & Co., and in private consulting. Driven by a commitment to building healthy, vibrant, and equitable communities, Megan leverages her multifaceted expertise to bridge the gap between research, policy, and practical implementation in the healthcare sector, catalyzing change based on her reports' findings.

SANDY SCOTT

National Service: Preparing the Clean Energy and Public Health Workforce of the Future

ABSTRACT
The cumulative scientific evidence is clear: Climate change poses a grave threat to human well-being and planetary health and is already having dire consequences today, from extreme heat to unhealthy air to floods, fires and hurricanes increasing in frequency and severity. While climate change is a major crisis that must be averted, it also provides a tremendous opportunity create millions of jobs and build a new clean energy future. As we stand at the hallway point in the “decisive decade” for global climate action, there are signs of hope, optimism, and progress. The historic investments made through the Bipartisan Infrastructure Law and Inflation Reduction Act have sparked a manufacturing boom and new era of innovation in renewable energy, electric vehicles, batteries, and grid modernization that will have a transforming impact for decades to come. This era of innovation is also spawning new partnerships between business, labor, higher education, and government and new workforce development strategies including apprenticeships, pre-apprenticeships, credentialling, streamlined federal hiring pathways, and more.

AmeriCorps and its vast network of state and local partners plays a key role in driving this innovation and preparing the future clean energy and public health workforce. As the federal agency for national service and volunteering, AmeriCorps has invested in conservation, clean energy, public health, and disaster response project for 30 years. Last year AmeriCorps invested $145 million in conservation, clean energy, and resilience projects, supporting more than 14,000 members engaged in a wide range of projects including preserving public lands and waters, restoring watersheds, preventing wildfires, weatherizing homes, installing solar panels, creating city greenspaces, reducing food waste, responding to disasters, building community resilience, and more. AmeriCorps members receive extensive training and hands on experience that can lead to clean energy, public health, and climate resilience careers. Working hand in hand with thousands of partners, AmeriCorps has increased its focus on providing workforce pathways, including launching interagency partnerships like FEMA Corps, Forest Corps, Working Lands Conservation Corps, and Public Health AmeriCorps that have an explicit focus on strengthening workforce pathways to in-demand careers - particularly for young people from underserved and frontline communities.

Tackling the climate crisis and building the clean energy future will require creative solutions, new partnerships, and sustained action by all sectors: nonprofit and faith-based organizations, schools and higher education institutions, government at all levels, businesses—and ultimately individual citizens. Young people have a vital role to play and are answering the call. Growing up in a world with increased risks from fires, floods, extreme heat, and other dangers, they could be angry or despondent. But they have rejected that – choosing action over apathy, service over self, and hope and possibility over doom and gloom. AmeriCorps is proud to partner with organizations across the

country to empower young Americans to do this hard and important work and build the clean energy economy of the future.

BIO
As Senior Advisor in the Office of Strategic Partnerships at AmeriCorps, Scott co-leads the agency's climate change initiatives; develops interagency collaborations; and advises the CEO on policy, strategy, partnerships, and engagements. He has served at AmeriCorps since 1995 in a variety of positions including Director of Public Affairs, State Commission Liaison, Press Secretary, Director of Government Relations, and Senior Writer. In 2020 he served on a year-long detail as Director of Government Affairs and External Relations at the National Commission on Military, National, and Public Service. Prior to AmeriCorps, he worked on Capitol Hill for seven years as a professional staff member of the House Natural Resources Committee and as a legislative assistant for a Member of Congress from Minnesota. He has also worked in environmental and civic engagement organizations in Texas and California. Scott has a master's degree in public administration from the Harvard Kennedy School of Government and bachelor's degree in political science from Yale University. In his spare time, Sandy plays guitar and blues harmonica in several bands in the Washington, D.C. area.

IMRAN SHEIKH

Artificial Intelligence and Public Health: Preparing for Tomorrow's Challenges Today

BIO

Imran Shaikh is an accomplished public health professional with extensive management experience, as well as substantial expertise in epidemiology, informatics, medicine, and infection control. He is a medical graduate from India and practiced medicine for a few years. Dr. Shaikh then completed his master's in public health from San Diego State University. Subsequently, he worked in clinical research with the University of California, San Diego, and at MD Anderson before joining Houston Health Department in 2015. He currently serves as the Division Manager of Data Services Program.

SAM SILVA

Enforcing Equity in Neural Climate Emulators

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ABSTRACT
Neural network emulators have become an invaluable tool for a wide variety of climate prediction tasks. While showing incredibly promising results, these networks do not have an inherent ability to produce equitable predictions. That is, they are not guaranteed to provide a uniform quality of prediction along any particular class or group of people. This potential for inequitable predictions motivates the need for explicit representations of fairness in these neural networks. To that end, we draw on methods for enforcing analytical physical constraints in neural networks to bias networks towards more equitable predictions. We demonstrate the promise of this methodology using the task of climate model emulation. Specifically, we propose a custom loss function which punishes emulators with unequal quality of predictions across any prespecified regions or category, here defined using human development index (HDI). This loss function weighs a standard loss metric such as mean squared error against another metric which captures inequity along the equity category (HDI), allowing us to adjust the priority of each before training. Importantly, the loss function does not specify a particular definition of equity to bias the neural network towards, opening the door for custom fairness metrics. Our results show that neural climate emulators trained with our loss function provide more equitable predictions and that the equity metric improves with greater weighting in the loss function. We empirically demonstrate that while there is a tradeoff between accuracy and equity when prioritizing the latter during training, an appropriate selection of the equity priority hyperparameter can minimize loss of performance.

BIO
Sam J Silva is an assistant professor of Earth Sciences, Civil and Environmental Engineering, and Population and Public Health Sciences at the University of Southern California. Prior to his current position, he worked as a research data scientist at the Pacific Northwest National Laboratory, a U.S. Department of Energy research laboratory. His research is focused on air pollution and climate change, with particular interest in the convergence of traditional computational methods with modern data science and artificial intelligence techniques.

MATTHEW TEJADA

The Promise and Peril of AI and the future of Environmental Health Protection

BIO
As the chief visionary and strategist for NRDC’s advocacy to protect human health, Matthew Tejada oversees NRDC's clean air, water, toxics, and adaptation programs. He is also responsible for leading, scaling, and operationalizing the teams, structures, partnerships, and policy initiatives needed to tackle major health threats facing communities.

Prior to joining NRDC, Tejada served most recently as the deputy assistant administrator for environmental justice within the U.S. Environmental Protection Agency's (EPA) Office for Environmental Justice and External Civil Rights. In his 10-plus years with the EPA as the senior career executive in charge of the environmental justice program, Tejada led all aspects of environmental justice work throughout the agency and in coordination with other federal agencies, including the development of an array of grants and technical assistance vehicles, and the creation and deployment of a nationally consistent screening and mapping tool that highlights environmental justice issues across the United States. His work also directed community engagement, outreach and communication, and management of the National Environmental Justice Advisory Council.

Previously, Tejada was the executive director of Air Alliance Houston, an environmental justice organization that works to reduce the public health impacts from air pollution in the Houston and Texas Gulf Coast regions. His background also includes working as a public advocate with the Texas Public Interest Research Group—where he managed several advocacy programs focused on consumer, health, and environmental issues, including federal ozone NAAQS review and urban transit planning—and served as a volunteer teacher of English as a foreign language in the U.S. Peace Corps in Bulgaria.

Tejada earned his bachelor’s degree in English from the University of Texas, Austin, and also holds a master’s degree in Russian and East European studies, as well as a PhD in modern history from St. Antony’s College, University of Oxford. He is based in the Washington, D.C., office.

ALEXANDER TRAVIS

A One Health Approach to Climate Change and Public Health

ABSTRACT
Climate change represents profound new challenges to public health in both the breadth and scale of its impacts, which are often borne disproportionately by the most vulnerable populations. We see these impacts every day, ranging from the effects of extreme storms and wildfires, to the emergence and spread of infectious diseases. The One Health paradigm arose from an understanding that human health depends on the health of the environment, and that to tackle complex challenges such as climate change, we must not only work across disciplines and professions, but across all sectors and scales. Nature-based solutions that integrate civil engineering, land use, and public health offer a One Health approach that can be utilized by diverse government agencies and municipalities. Identifying and testing possible solutions requires highly transdisciplinary, holistic models that combine diverse datasets, such as climate, air and water quality, human behavior, human and animal health, land use, and ecology.

BIO
Alexander J. Travis, PhD, VMD, professor; founding director, Cornell Public Health; and founding chair, Department of Public & Ecosystem Health, whose transdisciplinary faculty are organized around central challenges such as tackling emerging health threats including climate change and emerging infectious diseases. Dr. Travis performs interdisciplinary research linking the health of people, animals, and the environment. His lab work led to both a diagnostic test used in human fertility and a nanobiotechnology platform for point-of-care diagnosis of brain injuries, cancer, and viral infections. His field work focuses on mitigating climate change and biodiversity loss while building community resilience and emergency preparedness. He works on climate change locally serving on Ithaca's Sustainability and Climate Justice Commission, regionally as a sector advisor on the NYS Climate Impact Assessment, and nationally on the ASPPH Climate Change and Health task force. He currently serves as PI on one of the NIH Climate Change and Health research centers. He did his undergraduate training at Princeton University, and his training as a veterinarian and research scientist at the University of Pennsylvania.

XINYUE YE

Simulating the Impact of Compound Flood Risks on Coastal Land Use Patterns

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ABSTRACT
Coastal communities are increasingly vulnerable due to sea level rise and population growth. Managed retreat is a widely recognized strategy offering multiple benefits for community adaptation, yet few studies have examined the combined effects of sea level rise, population migration, and managed retreat on community resilience. This study developed a comprehensive parcel-level land use change model, incorporating various components and scenarios of land use and flood risk mitigation in Galveston County, Texas. By integrating population change forecasts and future extreme events modeling using empirical datasets, our model illustrates a dynamic and evolving landscape in response to environmental changes in this highly vulnerable coastal community in the US. Our findings provide valuable insights into the efficacy of future urban development patterns and community flood risk management under conditions of population growth, sea level rise, and managed retreat strategies. The validated model shows high accuracy and offers a reliable approach for future urban planning. The developed cadastral parcel-based model, reflecting land ownership, facilitates coastal land management in response to sea level rise.

BIO
Dr. Xinyue Ye is the Harold Adams Endowed Professor in Urban Informatics at Texas A&M University. His research integrates computational social science, urban data science, and geospatial artificial intelligence to address issues ranging from infrastructure resilience and climate change to social justice and community perceptions, underscoring the dynamic interplay between technology, policy, and human behavior in shaping sustainable and livable cities. His current research is centered on urban digital twins and precision public health, emphasizing real-time 3D modeling and AI-enabled participatory planning, as well as urban climate science, with a focus on downscaling climate data to the built environment scale.