TEXAS

The University of Texas at Austin

PLANET TEXAS 2050

ANNUAL REPORT 2020

GRAND CHALLENGES ARE MOONSHOT GOALS

To reach those goals and address the most urgent issues affecting our society, researchers from different disciplines must share knowledge, ask questions, and tear down academic barriers.

CONTENTS

Bridging Barriers

We are bridging barriers between fundamental knowledge and real-world problems by connecting disciplines, techniques, and ways of thinking.

In 2016, The University of Texas at Austin introduced an initiative with one overarching mission: break down academic silos and foster research that addresses the toughest questions facing humanity and the world.

Bridging Barriers serves as an incubator for some of the boldest interdisciplinary projects at UT by supporting researchers from across the Forty Acres as they form broad teams tasked with identifying urgent, real-world issues — and figuring out the best way to solve them in less than a decade.

These projects are rooted in collaboration and academic freedom to produce practical solutions to social, environmental, and humanitarian crises. From artificial intelligence to climate change to health inequity, teams around campus are working on solutions to some of the greatest problems of our generation.

To learn more about Planet Texas 2050 and all of UT's research grand challenges, visit the **Bridging Barriers website.**

From the chair

Making Texas resilient is our grand challenge.

“We’re also working with community partners to develop strategies for resilience that address — rather than exacerbate — systemic inequities.”

Three and a half years ago, I helped to found Planet Texas 2050 with the aim of making Texas more resilient in the face of unprecedented demographic and climate change. We have traveled great lengths since that time. Yet the devotion, innovation, and interdisciplinary spirit in those founding meetings are evident in the successes of the past year and in the new directions we are taking in the years to come. Our grand challenge is to understand how climate change affects natural, social, and infrastructural systems, especially under the pressure of demographic shifts like those taking place in Texas. As if that weren’t enough, we’re also working with community partners to develop strategies for resilience that address — rather than exacerbate — systemic inequities.

From its inception, Planet Texas 2050 has invested heavily in science, engineering, and technology that integrates environmental and social data about past and current conditions and provides tools for assessing risks and planning for the future. Just as important, the arts and humanities have been at the heart of our work as well. They grow knowledge of the cultures, values, and identities that shape the climate experience and resilience and offer creative interventions for action.

I’m proud of the partnerships that have taken root and grown this past year with strong community advocates. These alliances, which continue to flourish and expand as Planet Texas 2050 enters its next stage, will ensure that resilience strategies are driven by the experiences and needs of communities in tandem with our team’s own expertise and resources.

In fiscal year 2021, we are launching six multi-year flagship projects that coalesce and integrate key research to give us a new strategic focus while building on our strengths, partnerships, and areas where we can contribute to real change. We are excited for you to learn about these and to follow our progress as we continue this journey.

Heather Houser
Associate Professor, Department of English
Planet Texas 2050 Chair, 2019-2020

UAIS AND

September 2016

UT envisions a campus-wide interdisciplinary grand challenge program and invites researchers to submit concept papers for topics that span all disciplines.

January 2018

Planet Texas 2050 launches. UT engineers, archaeologists, architects, humanists, geologists, computer scientists and more build a team dedicated to making Texas more resilient in the face of unprecedented growth and climate change. Year 1 projects begin.

April 2019

The inaugural Planet Texas 2050 Showcase highlights the breadth of activities underway. Topics include measuring transportation-related air pollution at city microscales; ethnographic work that examines how farmers in the Texas panhandle think about climate change; technological advances in flood modeling; and an artist's exploration of the Colorado River.

September 2019

Planet Texas 2050 kicks off Year 2 research, expanding its portfolio from eight to 25 projects.

April 2020

In the midst of a global pandemic, Planet Texas 2050 holds its second annual Research Showcase virtually. Titled ‘Rising to Resilience Challenges,’ the showcase highlights the progress of the grand challenge’s 25 funded projects with a special focus on what we might learn from the COVID-19 pandemic that will help us in future emergencies.

June 2020

The Planet Texas 2050 Organizing Committee sets in motion the process of consolidating and integrating our existing projects and bringing in new, important research opportunities to establish a powerful innovation and networking platform.

October 2020

Planet Texas announces the creation of six flagship projects that will guide the future of the grand challenge in its five remaining years. These flagship projects are end-to-end, research-to-implementation endeavors, each led by dynamic interdisciplinary teams and representing a wide swath of UT expertise across biology, computing, sustainability science, participatory methods, community planning, hydrology, civil engineering, and public health.

Drought conditions in Anson, Texas in 2009.
Photo credit: U.S. Department of Agriculture.

Texas is changing

Today, the state's population is 29 million.
By 2050, that number is predicted to double.

Add to that the environmental stress from climate change, and the things we rely on to live — water, energy, dependable infrastructure, and the ecosystems and social governance to support them — will be at unprecedented risk. Limited resources will be in even greater demand.

These are global trends, but Texas is a perfect bellwether. Our geographic location, varied landscapes, diverse communities, and social and economic conditions mean that we are experiencing many of these challenges first. From catastrophic weather events to rapid urbanization and the emergence of new, lethal pathogens, our state is a living laboratory. And with scholars across all major disciplines benefiting from the fastest supercomputer at any university, the Planet Texas 2050 team is uniquely positioned to predict future crises and help our region plan accordingly.

Our mission as a University of Texas grand challenge is to partner with community experts to discover what critical research questions remain unanswered (or unasked), and then apply those discoveries in ways that are tangible, essential, and just.

Our current trajectory is alarming, but we can still change course.

Planet Texas 2050 is an eight-year sprint to find solutions that will make our communities more resilient and better prepared. To do that, we're bringing together architects, archaeologists, climatologists, city planners, public health experts, geologists, engineers, computer scientists, artists — and more. We're examining new and complex research questions, launching educational programs, and partnering with organizations, institutions, and community groups throughout the state. Just as important, what we discover will have applications that extend far beyond our region. We'll share our findings, tools, and processes with researchers across the U.S. and the world who are facing similar challenges in the 21st century.

PLANET TEXAS 2050 HIGHLIGHTS

EXPANDING NETWORKS

37
University of Texas departments and units

100+
researchers

32
external partners

ENGAGING STUDENTS

37
student researchers

30
students enrolled in Planet Texas 2050 signature courses

IN NUMBERS | FY2020

SCHOLARLY OUTPUT & PUBLICITY

20+
team projects in first three years

16
Scholarly works

35
News articles, blog posts, & university stories

BUILDING CAPACITY

$2.4M
Awarded in external funding

Contributed expertise to more than **$10M** in externally funded projects and centers across UT and the State of Texas

Designing for a better future

At the heart of our work is novel data and model integration that helps us design solutions to problems like water scarcity and disaster recovery. The problem, however, is that data are often siloed—not only among institutions and agencies but also within bespoke models such that data can't 'talk' to each other—making it extremely difficult to properly assess complex issues let alone prevent them. But in partnership with UT's Texas Advanced Computing Center and peers across the state, our team is changing that. We're actively collecting, analyzing, assembling, and layering quantitative information, such as LiDAR imagery, with things like social vulnerability reports, historic photographs, and firsthand resident testimonials to develop tools that local leaders and legislators can use to make critical planning decisions for their communities.

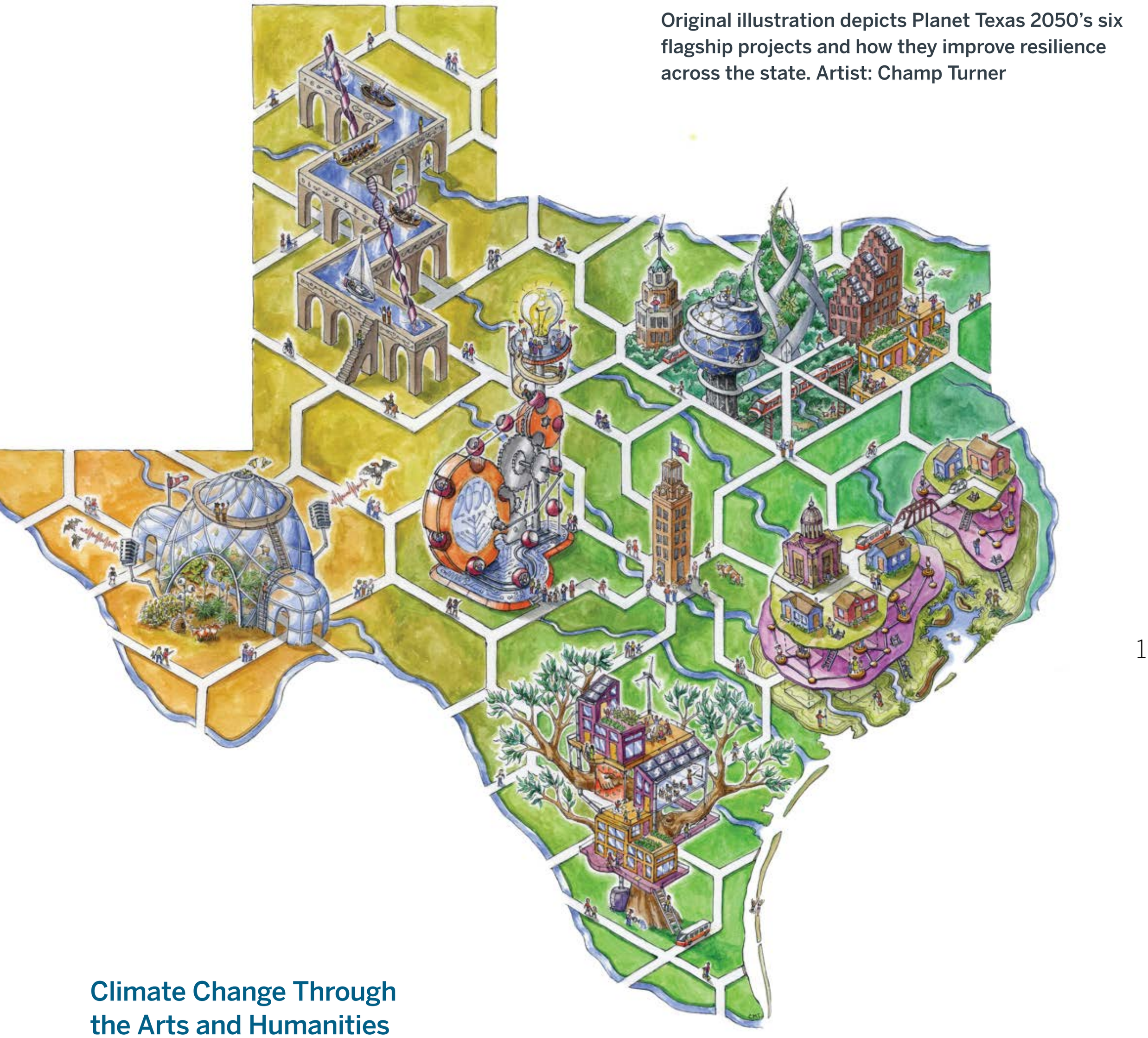
To support this work, Planet Texas 2050 has focused its efforts in four key areas, which we believe allow us to leverage our unique resources in support of our state while sharing our findings, models, and processes with colleagues throughout the world.

Complex Interactions of Human-Environmental Systems

Planet Texas 2050 researchers are looking at the ways in which humans interact with their environment — now and in the past — and how these interconnections affect health, mobility, and the availability of future resources.

Community-Engaged Resilience Research

Planet Texas 2050 has put diversity, equity, and inclusion at the center of our work. We co-design research with affected communities, and we recognize that reflecting upon the historical, sociocultural, and structural roots of inequity is fundamental to all aspects of our grand challenge.



Original illustration depicts Planet Texas 2050's six flagship projects and how they improve resilience across the state. Artist: Champ Turner

Climate Change Through the Arts and Humanities

The arts and humanities are fundamental to our mission. Planet Texas 2050 engages with artists and creators to reframe our own understanding of climate change research to develop a deeper understanding of how humans internalize these charged issues so that applied resilience strategies are more successful.

Model Integration for Decision Support

Leveraging the supercomputing power of the Texas Advanced Computing Center, Planet Texas 2050 researchers analyze data and integrate complex models that will help state and local agencies and communities make wiser decisions ahead of future climate disasters.

Our network

The Planet Texas 2050 grand challenge team includes researchers from three dozen different disciplines, including engineering, architecture, geosciences, anthropology, computer science, and the arts. We also work with partners from The Nature Conservancy, the City of Austin, and the National Hurricane Center, among many others. No single entity has the capacity to address the demographic and climatic changes happening in our state, which is why these collaborations are instrumental. The strength of our network determines the strength of our contributions.

Explore our network map or browse the team list on the Planet Texas 2050 website to see how our connections are contributing to our mission of making Texas more resilient.

Complex interactions of human-environment systems

Planet Texas 2050 researchers are looking at the ways in which humans interact with their environment — now and in the past — and how these interconnections affect health, mobility, and the availability of future resources.

The natural world and our built environment are intertwined. When we think of ‘nature,’ we may imagine such Texas vistas as the iconic Hill Country, Caddo Lake’s imposing bald cypress trees, or Big Bend National Park’s 1,500-foot-tall walls, but even the most rural places are connected in some way to human settlements.

Our water sources may be nestled in distant springheads, but they eventually flow through cities and towns and into urban watersheds, where they serve residential needs and sustain urban wildlife. Greenspaces, tucked amid high rises and highways, are nevertheless havens of biodiversity and play a vital role in maintaining the health of our ecosystems. And human-built structures, such as roads, power generators, and water treatment plants, are likewise subject to nature’s often unpredictable changes.

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ntal

Spanish moss hanging from bald cypress trees catches morning light in a scenic view of the still swamp waters of Caddo Lake, on the Texas-Louisiana border. Photo credit: Lazyllama

Take, for instance, a neighborhood such as Dove Springs in southeast Austin. Because of its geological and geographic characteristics, it functions like a bowl, filling up with water that runs in from surrounding neighborhoods. When upstream urban development results in more impervious cover such as parking lots, rainwater rushes even faster into the 'bowl', creating catastrophic flooding during major thunderstorms that can threaten homes and lives. Planet Texas 2050 seeks to contribute to building a resilient Texas, but to achieve that, we need better ways of understanding these interactions between the natural world and the human-made one.

Protecting Austin Watersheds Amid Urbanization

Planet Texas 2050 grand challenge researchers are trying to understand the effects rapid urbanization will have on the natural environment. Jay Banner, a professor in the Jackson School of Geosciences, has spent the past several years studying the evolution of Austin's watersheds, tracing water as it moves from the Colorado River to treatment plants and into homes and businesses. Banner and his student research team found that some of that municipal water that comes out of our taps and faucets is leaking into Austin's rain-fed springs and streams. In fact, in some places, municipal water makes up the majority of the water flowing in these natural sources.

Banner and his team looked at the level of strontium-87, an isotope produced by natural radioactive decay, in the water. Municipal water has relatively high levels of strontium-87 compared to water in local creeks.

This high-versus-low level can be used to infer how much water is derived from natural water flow and how much is municipal water leakage and irrigation. Such is the case in the more developed parts of the Bull Creek watershed. Researchers detected higher levels of strontium-87 due to leaking pipes and home and commercial lawn irrigation — both a result of urbanization. "If the quality of that water degrades, then the plants and animals that live in the ecosystem along the water will be endangered. If we introduce harmful levels of bacteria that come from wastewater — the water that runs down the drain in our sinks and toilets that may include human waste, cleaning chemicals, or other toxins — that will degrade the habitat dramatically," says Professor Jay Banner.

Read more about this project and **explore our findings.**

Tracking the Spread of Disease in Texas

The viruses and bacteria that cause human illness are organisms that live alongside us in a natural environment that is rapidly changing because of climate change. While the factors influencing human exposure to disease are complex, we know that climate plays a crucial role in determining where disease-causing agents and the animal vectors that often distribute them can survive. Researchers Michael Shensky, GIS and geospatial data coordinator for The University of Texas Libraries, and Katherine Brown, a biophysicist and biochemist in the College of Natural Sciences, are studying the soil bacterium *Burkholderia pseudomallei,* which causes the serious disease melioidosis — an illness that is often confused with tuberculosis or pneumonia but which is resistant to most antibiotics. It's normally found in tropical and subtropical environments like Thailand and northern Australia but because of the changing climate is now present in parts of Central America, Mexico, Puerto Rico, and Texas. By examining regional soil, water, weather, and land use data, Shensky and Brown are developing maps that can identify potential ecological niches in Texas where *Burkholderia* might thrive. This approach ensures that researchers can quickly and correctly identify diseases when they begin appearing in new areas and take appropriate measures to curtail their spread. **Read more.**

Using Wastewater to Uncover COVID-19 Hotspots

When the novel coronavirus began spreading across the United States, teams of our researchers had the idea to track the virus by looking at Austin wastewater because SARS-CoV-2 is fecally shed. The project is known as “Canary,” for the birds that would signal danger to coal miners in the early 1900s. Their aim is to detect virus hotspots before they show up in diagnostic testing. Planet Texas 2050 and Whole Communities–Whole Health grand challenge researchers from the Department of Civil, Architectural and Environmental Engineering collected samples from city wastewater treatment plants and UT campus manholes and began testing it for the novel coronavirus in summer 2020. And a Planet Texas 2050 team from the Texas Advanced Computing Center is working with the

city, using its maps to determine what buildings empty into which pipes to help trace the source of the virus. Data from the wastewater sampling will feed into an early alert system that uses advanced computing tools to help with rapid evaluation of risks and to determine a response. **Read more.**

Mapping Austin’s Heat Islands

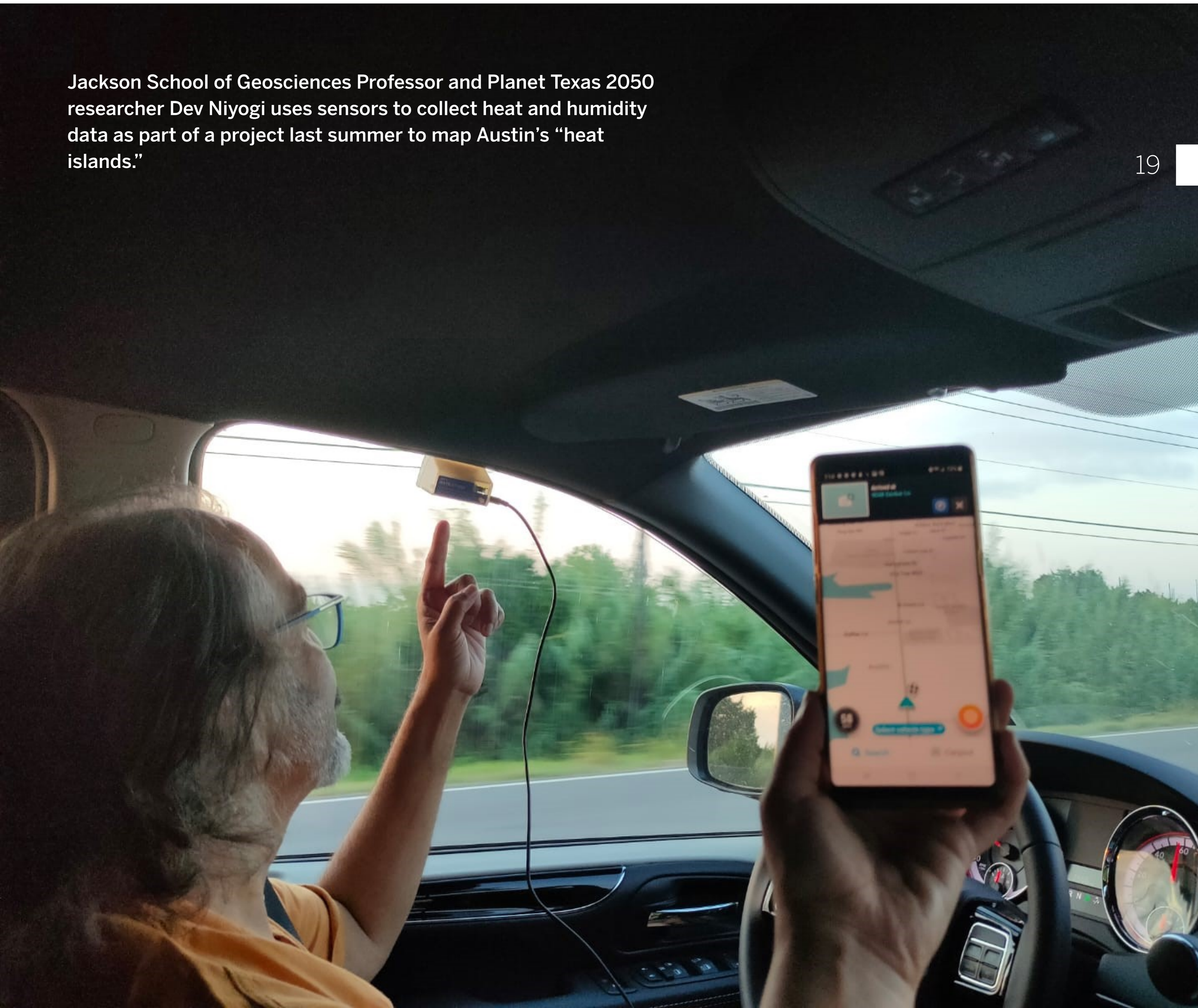
Austin typically relies on satellite data to show its “heat islands” — areas that get hotter than most and retain heat longer into the night because of the built environment. Satellites, however, can’t provide a nuanced look at these places or make sense of who is most affected. For this, the National Oceanic and Atmospheric Administration (NOAA) relies on nonprofits and city governments to arm volunteers with special heat and humidity sensors and drive or bike on preassigned routes

every morning, afternoon, and evening during the hottest days of the year. The information they gather is run through computer models to produce a more refined view of the temperature range in different parts of town. Jackson School of Geosciences Professor and Planet Texas 2050 researcher Dev Niyogi took part in last year’s NOAA study. After, he "groundtruthed” the data and found that the heat maps did not match the lived experiences of Austin residents.

"This highlights a clear need for generating additional multi-scale maps and developing confidence with the users and decision makers. Often, cities monitor where they think a problem exists, and these monitored spaces receive investment; however, city perception may differ from reality, causing investment not to reach those experiencing the greatest burden,"

Niyogi says. With the new maps and our researchers' insights, the City of Austin can invest in solutions such as green infrastructure, misting facilities at bus stops, or cooling centers to provide some relief from the heat.

Learn more about this work and **view the City of Austin's urban heat island map built using Dev Niyogi's data.**

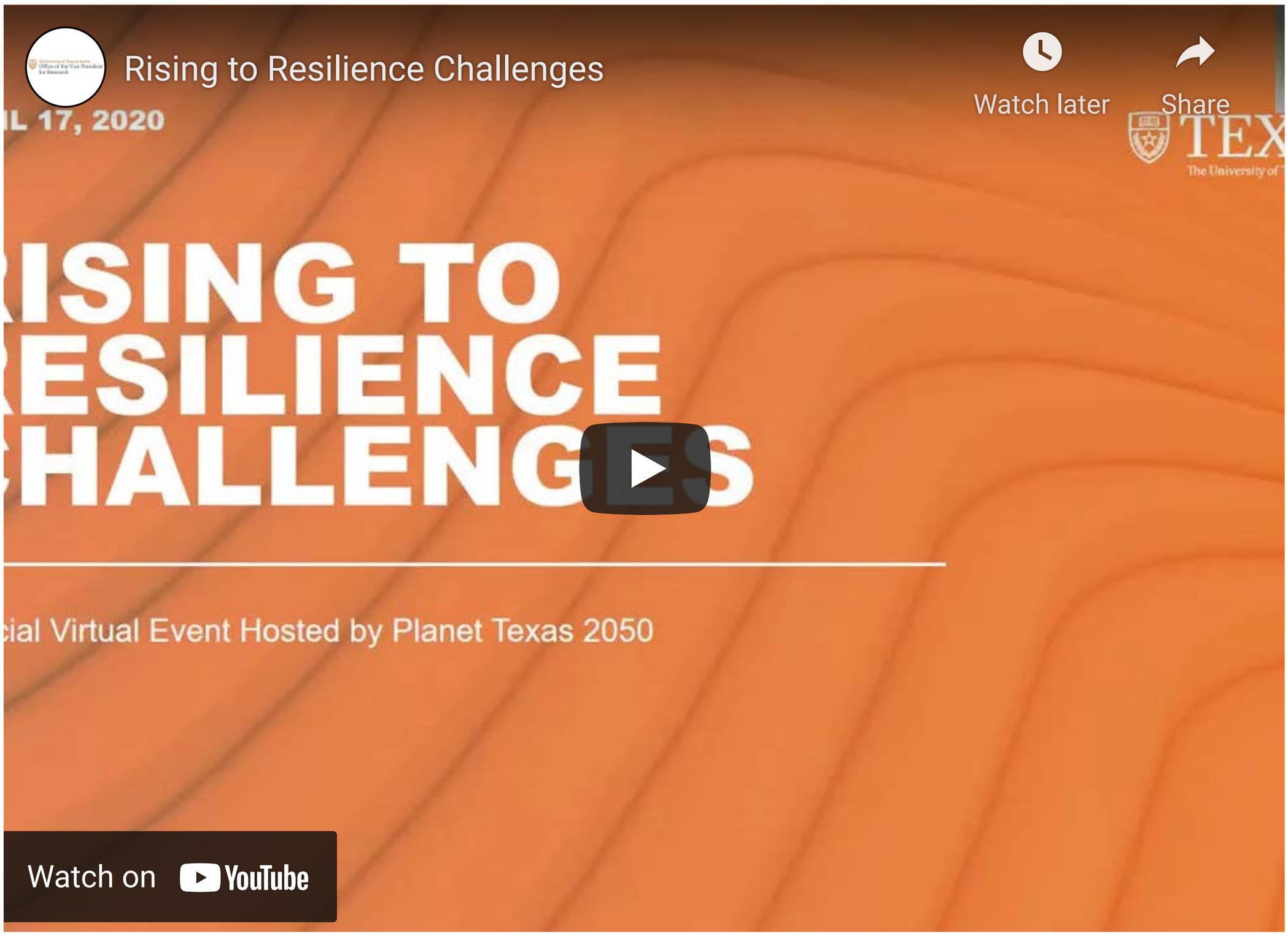


Jackson School of Geosciences Professor and Planet Texas 2050 researcher Dev Niyogi uses sensors to collect heat and humidity data as part of a project last summer to map Austin's "heat islands."

Studying the Past to Plan for the Future

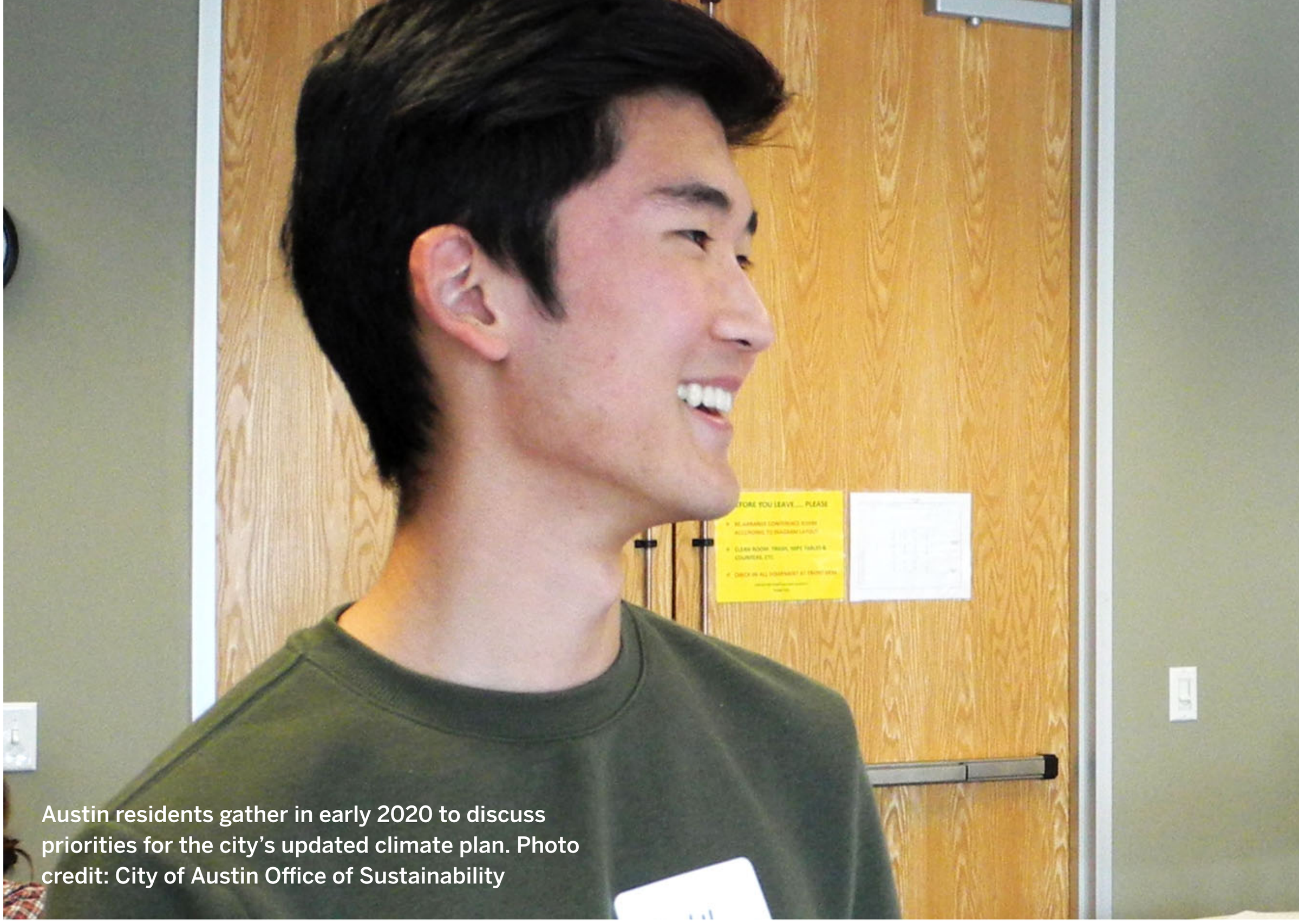
Over the centuries, changes in sea level, droughts, erosion, sedimentation, or flooding have caused settlements to be abandoned. Ruined towns and cities bear witness to environmental changes that left them uninhabitable. For two years, Department of Classics Associate Professor Adam Rabinowitz has led teams of researchers on archaeological investigations to explore the ruins of Histria, an ancient Greek and Roman city near the mouth of the Danube River in present-day Romania. Their aim is to understand how past urban societies thrived or broke down in the face of environmental challenges and population shifts, with the goal of applying that insight to understanding the changes that are happening in Texas now.

In the past year, researchers brought their findings from archaeological investigations into the lab in order to understand health, economic equity, and migration patterns through the molecular analysis of human remains. They examined teeth from Late Roman burials at Histria for oxygen and strontium isotopes, together with isotopes from springs and geological deposits in the region, to understand how people resettled from one place to another. They also analyzed carbon and nitrogen isotopes in the bones of the same individuals to find out what they were eating and whether socio-economic inequality was reflected in nutritional status. And a program of genetic analysis is under way to uncover familial relationships among those buried at the site across several hundred years, during a time when new groups were arriving from both the Mediterranean and the steppe to the north. This work has laid the foundation for the new "Stories of Ancient Resilience" flagship, which launched in September. (See the Looking Ahead section to learn about our new flagship projects.) **Read more.**



Rising to Resilience Challenges

COVID-19 has provided a new lens through which to view disaster resilience, and the Planet Texas 2050 community of researchers and stakeholders have been eager to reflect on how we can learn from the coronavirus crisis to better prepare the next time disaster strikes. In April 2020, Planet Texas 2050 hosted a virtual conference to showcase our research on past societies and resilience, new ways of understanding current experiences of disaster, and emerging tools and technologies that are giving us a clearer picture of coming disasters. We are collectively living a case study of disaster response and resilience, and nothing is going to look quite the same when this crisis is over.



Austin residents gather in early 2020 to discuss priorities for the city's updated climate plan. Photo credit: City of Austin Office of Sustainability

Community-engaged resilience research

Planet Texas 2050 has put diversity, equity, and inclusion at the center of our work. We co-design research with affected communities, and we recognize that reflecting upon the historical, sociocultural, and structural roots of inequity is fundamental to all aspects of our grand challenge.

There is no single best way to fight climate change. Mounting evidence indicates that climate resiliency is a social, political, and economic issue in addition to a scientific one. In fact, many of the technical solutions we require already exist. Rather, what we urgently need is a better understanding of how humans experience climate change and what motivates us as individuals and members of society to change. To learn this and to develop social solutions, we must engage with communities in our research. We believe that our research is only truly good if it's helpful, and it can only help people if the communities we aim to serve are involved in asking the questions, identifying and collecting the data, and developing potential solutions.

Unsurprisingly, the communities that will suffer the most are the same communities that have been battered by storms year after year and decade after decade, subjected to environmental contamination and discrimination in resource allocation. Their desire for safe, healthy, and vibrant neighborhoods is a perpetual uphill battle. For Planet Texas 2050 researchers, this work comes along with an obligation to understand these historical inequities and to advocate for just outcomes.

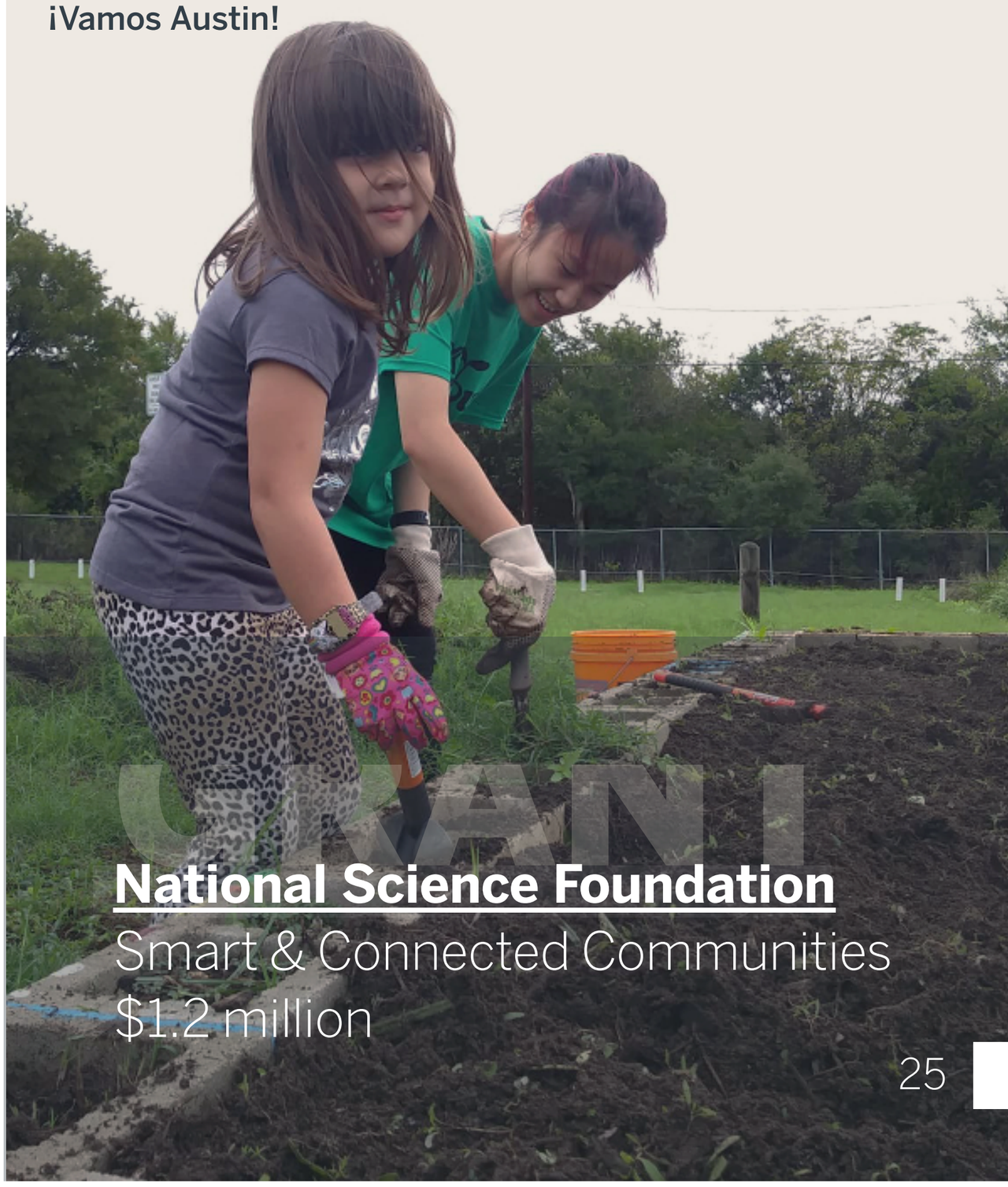
Working Hand-in-Hand to Fight a Climate Crisis

With support from a National Science Foundation grant, Planet Texas 2050 is working in tandem with communities to design solutions to climate-related challenges in their neighborhoods. Led by Architecture Assistant Professor Katherine Lieberknecht, researchers will combine high-quality weather, pollution, and traffic data with residents' lived experiences in an effort to make the Dove Springs neighborhood in southeast Austin — known for frequent and dangerous flooding — better prepared to withstand and recover from these climate threats.

The project is a collaboration among neighborhood residents, UT, the City of Austin, community organization Go! Austin/¡Vamos! Austin (GAVA), and St. Edward's University. Together, we will creatively examine long-standing problems in neighborhoods like Dove Springs, which tend to experience worse outcomes in response to climate-related issues because of lower socioeconomic status and unequal investment in stormwater infrastructure. Our researchers will train "climate navigators" — between 20 and 40 Dove Springs residents — to gather

Three days after floods devastated communities around the Onion Creek area, residents continue the clean-up. Photo credit: J. Sanhueza-Lyon/KUT News

personal narratives, photos, videos, and sound recordings of things like flooding and traffic hazards in order to build a robust data portal. We will then take this qualitative data, analyze it, and transform it into statistical, mathematical, and computational information that can help the city design solutions. For example, if residents upload several photos of a neighborhood detention pond filling with water, researchers could use machine learning to show how fast the water would rise in a future storm. This could help the city decide where to make stormwater improvements by showing them information they often miss in outdated flood maps that don't account for localized flooding. **Read more.**



Children garden at Pleasant Hill Elementary in South Austin while their parents organize. Photo credit: Go! Austin/ ¡Vamos Austin!

National Science Foundation
Smart & Connected Communities
$1.2 million

"Planet Texas 2050 research is essential to understanding and strengthening social networks and to building capacity so that community members can prepare for, respond to, and recover from increasing rainfall, heatwaves, droughts and grassfires."

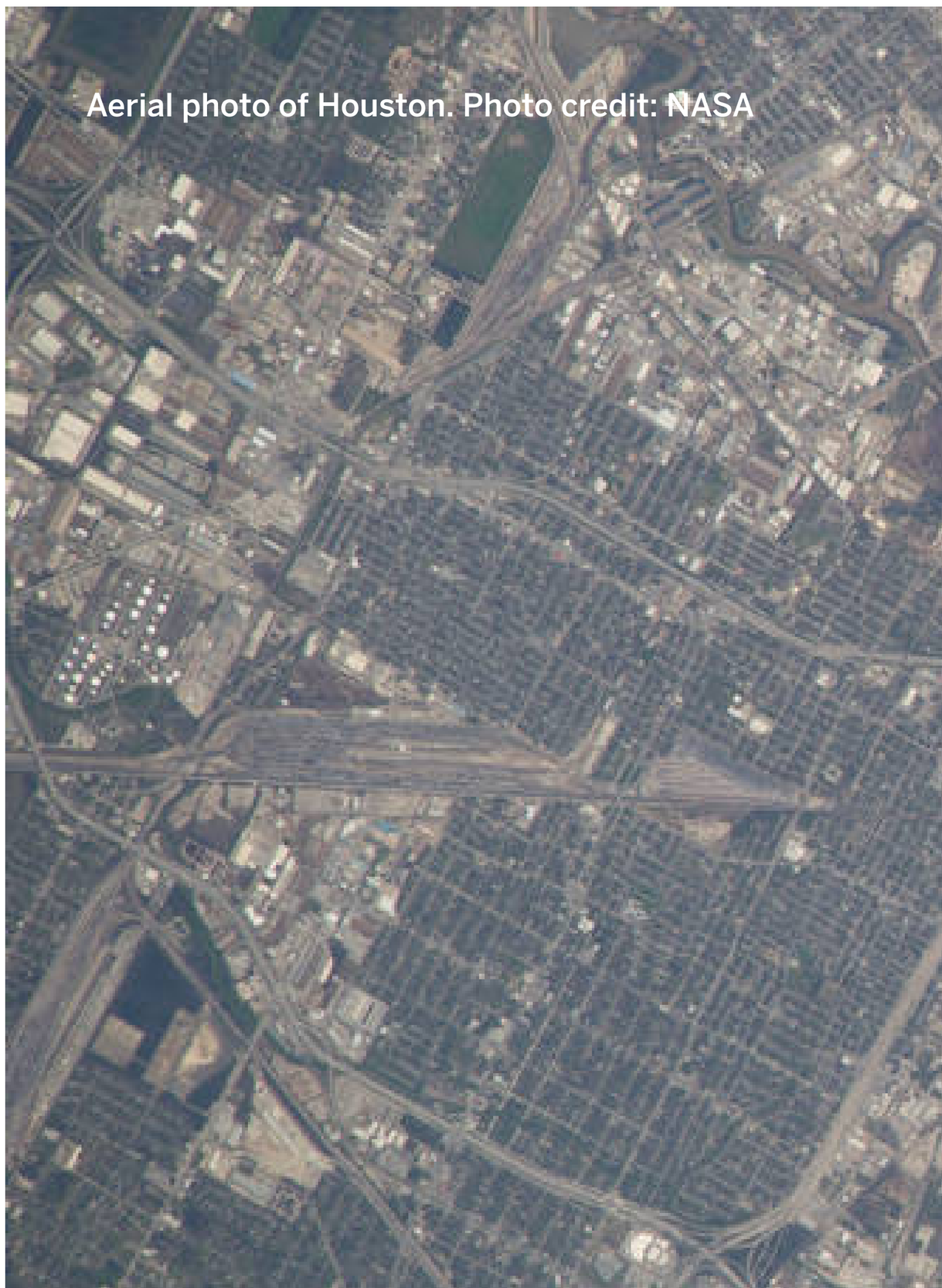
— Marc Coudert
Environmental Conservation Program Manager
City of Austin Office of Sustainability

Urban Planning for an Uncertain Future

How cities address inequality in their planning efforts varies widely. Oftentimes, we encourage people to adapt, and while it's true that all of us have to make modifications in response to climate change, many social scientists worry that this tactic can perpetuate inequity when the same communities — especially low-income or communities of color — are the ones most frequently asked to do the adapting. To be able to ensure that climate action plans do not do more harm to already vulnerable communities, we need to evaluate them and speak to the involved planners, practitioners, and residents to understand their experiences and the trade-offs they are observing. This is especially important in Texas, where urban adaptation planning is not large scale but is locally led and driven in each city.

In this project, our researchers are asking how cities like Houston and San Antonio are planning for climate change. We are looking at how flooding and heat risks vary across these cities and asking if those risks are higher in areas with greater racial and economic segregation. We're also investigating how cities are preparing for climate change especially with regard to how it affects residents, public health, and infrastructure.

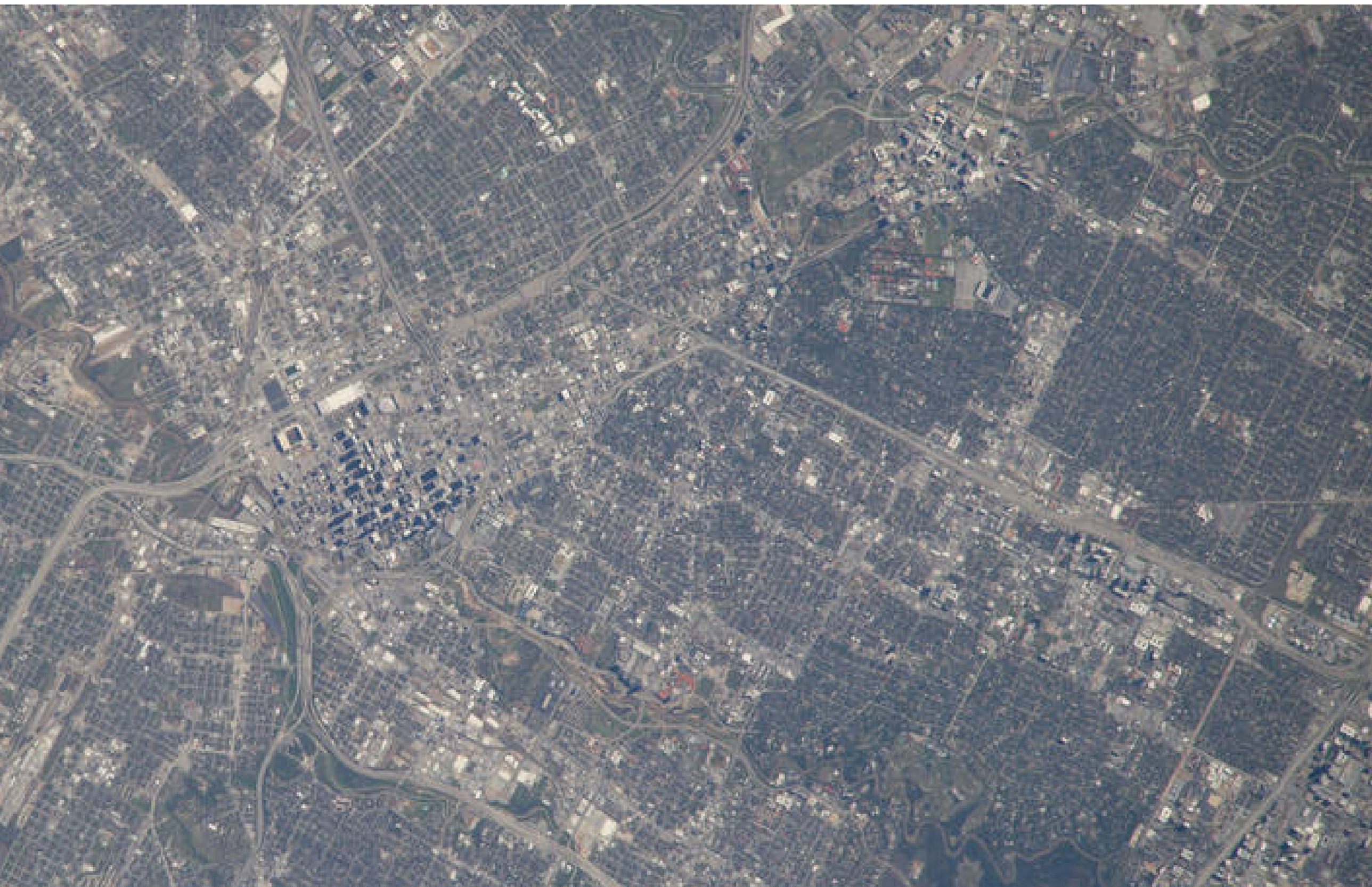
Finally, we're asking planners and community members about their perception of existing social inequalities, what they're concerned about in terms of unequal climate vulnerability, and how they are working towards climate equity. The project, led by School of Architecture Associate Professor Robert Paterson, Community and Regional Planning Assistant Professor Miriam Solis, and graduate student Deidre Zoll, can be used to help other cities and communities in Texas as they make choices about how we respond to climate change.



Aerial photo of Houston. Photo credit: NASA

"We are collaborating with Planet Texas 2050 researchers because we believe this partnership has the potential to advance our agenda: to push for fast-tracked and equitable infrastructure improvements and better protocols for disaster preparedness and response. If institutional leaders want to know how to address the biggest problems of our generation, like climate change, they have to figure out a way to follow the lead of people most directly impacted. They will need organizers to communicate across sectors and populations. We need UT to legitimize our demands to the people who can't hear us yet. Planet Texas 2050 provides the needed data to accompany the lived experience of residents, which together can move our city, county, state, nation, and private stakeholders to action."

— Carmen Llanes Pulido
Executive Director
Go Austin! /¡Vamos Austin!



Planet Texas 2050 has partnered with some of the biggest nonprofits, government entities and academic institutes in Austin.

Our Partners

Some of the biggest nonprofits, government entities, academic institutes, coalitions, multinational corporations, and data and research centers in Austin and around the world have supported Planet Texas 2050's work by partnering with us on research projects, providing funds or in-kind gifts, hosting guest lectures, developing educational content, and publicizing our events and opportunities. We thank them for their interest, engagement, and commitment to building resilience in our communities amid the devastating effects of climate change.

Austin Technology Incubator
Austin Youth River Watch
City of Austin
Community Powered Workshop
Dow Chemical Company
EcoRise
El Ranchito
Experimental Civics
GAVA (Go Austin!/¡Vamos Austin!)
Global Dataverse Community Consortium
Institute for a Disaster Resilient Texas, Texas A&M University
Indigenous Cultures Institute
Kealing Middle School, Austin Independent School District
Laboratory of Tree-Ring Research, University of Arizona
McCallum High School, Austin Independent School District
Michael & Susan Dell Center for Healthy Living
Montopolis Music
Museum of South Texas History
National Center for Atmospheric Research
National Hurricane Center
The Nature Conservancy
Oaks and Prairies Joint Venture
Osher Lifelong Learning Institute
Southeast Texas Regional Advisory Council (SETRAC)
Southeast Texas Regional Flood Coordination Study
Texas Data Repository Steering Committee
Texas Department of Emergency Management
Texas General Land Office
Texas Low Income Housing Information Service (Texas Housers)
Texas Water Development Board
The Austin Common
U.S. Defense Advanced Research Projects Agency (DARPA)

Cockrell School of Engineering graduate student Bing Han demonstrates a Planet Texas 2050 VR game for his professor, Fernanda Leite, and classmates. Photo credit: Amy Best

Climate change through the arts and humanities

The arts and humanities are fundamental to our mission. Planet Texas 2050 engages with artists and creators to reframe our own understanding of climate change research to develop a deeper understanding of how humans internalize these charged issues so that applied resilience strategies are more successful.

Planet Texas 2050 takes a much broader view than most scientific research teams because we also seek to understand how art, culture, and communication contribute to resilience. We are grappling with one of the grand challenges of our time, and Planet Texas 2050 is addressing an equally large academic challenge: how to integrate scientific and humanistic disciplines, quantitative and qualitative modes of inquiry, and academic and community expertise to create solutions to problems that cannot be addressed by technology alone.

Culture, beliefs, and human social behavior are just as central to achieving our goals as 'traditional' scientific approaches are. We support creative expression and difficult conversations about the climate crisis and look for ways to integrate these insights into our work while providing an outlet for communities struggling in the face of increasing climate uncertainty. The COVID-19 pandemic is a reminder that scientific advances will only be part of a successful response to urgent and dire challenges. The other elements will lie in the spheres of culture, perception, imagination, racial justice, and social dynamics.

Escaping a Climate Emergency

The devastating effects of climate change can be hard to process by simply reading a news article or viewing a statistic. We learn better when we experience something. Design can translate complicated data and information into a visual — even visceral — experience that teaches us something new by immersing us in it. The College of Fine Arts and Texas Performing Arts worked with the Planet Texas 2050 grand challenge team to teach courses in which students learned to build climate-themed, immersive experiences using rich information sources about air and water quality, agriculture, geology, and weather patterns.

Students and faculty came together with skills in game design, set design, projection and lighting, sound, art, and engineering to develop and construct a fully operational escape room prototype that places participants in the shoes of scientists on an observational platform in the middle of the Gulf of Mexico during a devastatingly powerful hurricane that's quickly intensifying. They were asked to transmit critical storm surge data from monitoring instruments to an onshore disaster center in time to warn residents while coordinating their own helicopter rescue before evacuation becomes impossible.

The escape room was developed by students enrolled in seven courses spanning multiple disciplines, including courses from the Department of Theatre and Dance and from Arts and Entertainment Technologies in the School of Design and Creative Technologies. Texas Applied Arts and Texas Performing Arts supported the project by offering facilities and fabrication space, as well as supporting staff. At the same time,

faculty consulted with Planet Texas 2050 researchers from the Marine Science Institute, the Center for Water and the Environment, and even UT's own meteorologist Troy Kimmel to design a realistic experience based on actual data and future projections of storm intensity. Participants come away understanding the devastating effects these weather events have on our lives. **Read more.**

"Climate change is a serious challenge that requires serious ideas to drive big societal changes. The size and magnitude of the challenge often makes individuals feel small, even hopeless. Likewise, it is easy to feel small at a large university — especially if you are an undergraduate. The status and support of Planet Texas 2050 gave our students an opportunity to imagine a future climate change disaster and convey it in an accessible and interactive way.
The project unleashed them to make something big with the full measure of their creativity. Students appreciated that they had been invited to participate in a world supported and valued by multiple disciplines and the university at large."

— J. E. Johnson
Scenic Studio Supervisor, Texas Performing Arts
Lecturer, Department of Theatre and Dance

Greeting Each Other During a Crisis

Craig Campbell, an associate professor in the Department of Anthropology, has been working to understand how individuals address one another in times of crisis. His project "Greeting Cards for the Anthropocene" encourages people to design greeting cards that address climate change. It's a way to help people speak more candidly about these topics so we reach one another in ways traditional media often fail to do. In the fall of 2019, researchers held numerous workshops and events to develop and print a set of greeting cards that responded to the challenges of global warming. They brought together dozens of people in the fields of design, rhetoric, and anthropology. The team hosted letter-writing parties where people gathered in a convivial environment, including at an art exhibition titled "At the Terminus" in Vancouver, British Columbia. Some people used prompts. Others created their own cards. Over the course of three nights, more than a hundred cards were slipped into the postal stream, each one tracing its way across the world. They contain the weight of personal testimony and foster a shared understanding and appreciation of what is at stake. **Read more.**

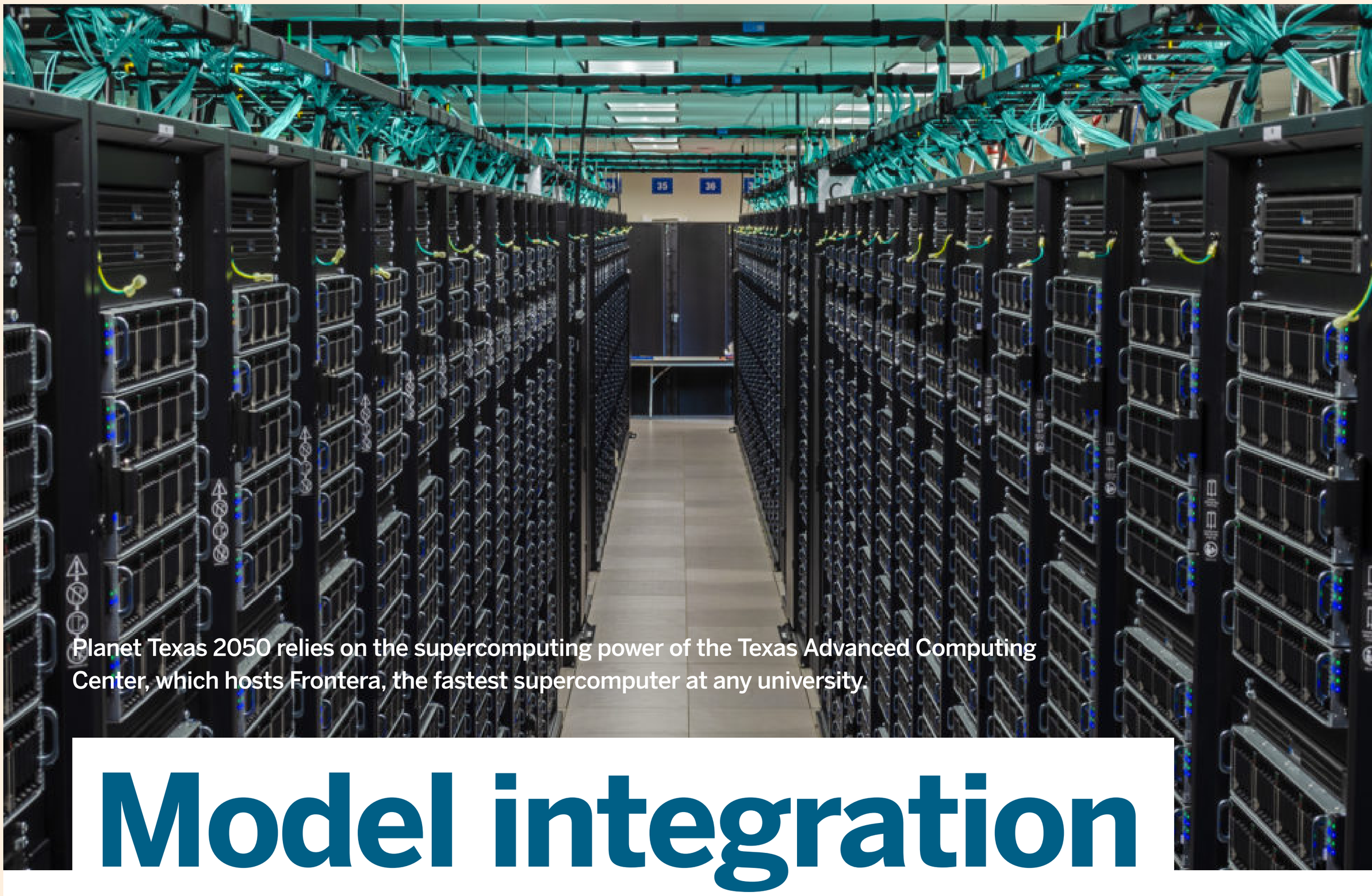
From Future to Reality

Fernanda Leite, associate professor in the Department of Civil, Architectural, and Environmental Engineering, led a VR-based project that included the work of engineers, gaming experts, computer scientists, and artists. Called the Texas Futures Virtual Reality Experience, it allowed users to see, in 3D, what an urban environment in Texas might look like in 30 years. The simulation, which provided an immersive virtual reality experience delivered through a head-mounted display, made users feel as though they had been transported into a future world. Once in the VR world, users went through a series of interactive games that illustrated the effects of population grown in our cities, such as access to water. The team used actual scientific data, including climate projections, flood modeling, and population predictions to create the experience. The interface gave researchers a chance to learn more about how humans process, interact with, and respond to information in the virtual environment. **Read more.**

Resilience Roundtables

Starting in the Fall of 2019, our team instituted monthly ‘Resilience Roundtable’ events to encourage and catalyze interdisciplinary interaction. Among our goals was to help foster connections that would result in future Planet Texas 2050 collaborations and provide guidance to researchers about how to make use of our data and analytics resources. A number of researchers from our various projects led discussions on relevant topics, such as how we define equity, how we consider resilience in our work, and how we interact with communities. We also designed activities so that project leads could identify connections with other projects.

Lori Vanhoose, undergraduate student in arts and entertainment technologies, views a simulation of the Planet Texas 2050 VR game. Photo credit: Amy Best



Planet Texas 2050 relies on the supercomputing power of the Texas Advanced Computing Center, which hosts Frontera, the fastest supercomputer at any university.

Model integration for decision support

Leveraging the supercomputing power of the Texas Advanced Computing Center, Planet Texas 2050 researchers analyze data and integrate complex models that will help state and local agencies and communities make wiser decisions ahead of future climate disasters.

When we launched Planet Texas 2050 in 2018, we decided that if we had better ways to collect, parse, analyze, and deploy data, we could make better decisions. Communities across the state are confronting events like floods that require rapid responses while also experiencing long-term shifts in climate and urban development that demand better preparation and planning. We have lots of data about past events, and we are improving our data collection during each new incident we experience, but researchers still lack ways to identify the right data at the right time so they can be combined into models that more precisely forecast the complex, often cascading hazards that are coming our way — such as a state-wide prolonged freeze on top of a global pandemic.

Our solution is an unrivaled cyber ecosystem. It is a mainframe for powering our big data crunching and analysis needs, but it is also the critical team of facilitators — research scientists, and data visualization and computing experts — who help us use these tools to layer real-time information in complex ways. And quite simply, it's a gamechanger. Many research models are so complex that very few outside academia would understand or be able to use them, if they had access to them at all. Conversely, the models we create are intended for non-scientific stakeholders, like state and local agencies and city planners, to make critical and informed decisions.

Three innovative features of the Planet Texas 2050 cyber-ecosystem are:

- a novel sensor service that measures environmental conditions and sends the data in near-real time to the computational resources at UT's Texas Advanced Computing Center (TACC)
- a tool for sharing of data objects directly from our portal for easy inclusion in integrated models
- a mechanism for facilitating the publication and preservation of enormous data sets — which has not been possible before — in appropriate library collections or for stewardship via external partners

As a use case example, Planet Texas 2050 researchers have begun integrating water availability data throughout the state. We have come up with new methods of combining models of groundwater, surface water, soil water, and atmospheric conditions to assess and forecast events like flooding and drought. In the future, we'll also be using this portal—known as DataX—to model the safest way to evacuate people in storms, which has become increasingly difficult and fraught as they grow in strength and frequency while urban centers grow in population.

And, in the same spirit as our community-engaged research, Planet Texas 2050's champion computing powers are only as good as they are useful to the stakeholders who need them to make important planning decisions. Because of this, we invest heavily in making user-friendly dashboards and accessible training materials and workshops so that our cyber ecosystem actually works for those who need it.

UT Collaborates with Texas A&M on Disaster Resilience

In August 2020 The University of Texas began working with Texas A&M University in a first-of-its-kind collaboration to build a user-friendly web-based portal that will allow state agencies, local governments, and communities to make on-the-ground decisions when faced with disasters like flooding. Called the Texas Disaster Information System (TDIS), it will leverage TACC's supercomputing power for advanced modeling and data analytics to narrow the gap between knowledge and action. The project received $10 million in funding from the Texas General Land Office, which was looking to top research universities to help prevent future disasters like Hurricane Harvey. Currently in its planning phase, the portal has four goals:

- consolidate data and information spread across a wide array of agencies and systems into one single disaster preparedness resource;
- collect, process, and analyze data through tools that support disaster resilience efforts for the state of Texas;
- use and transform data to better prepare Texans for and mitigate against disasters across the state; and
- provide reliable and timely insights for a diverse group of stakeholders to make decisions during different stages of disasters.

Houston after Hurricane Harvey in 2017.

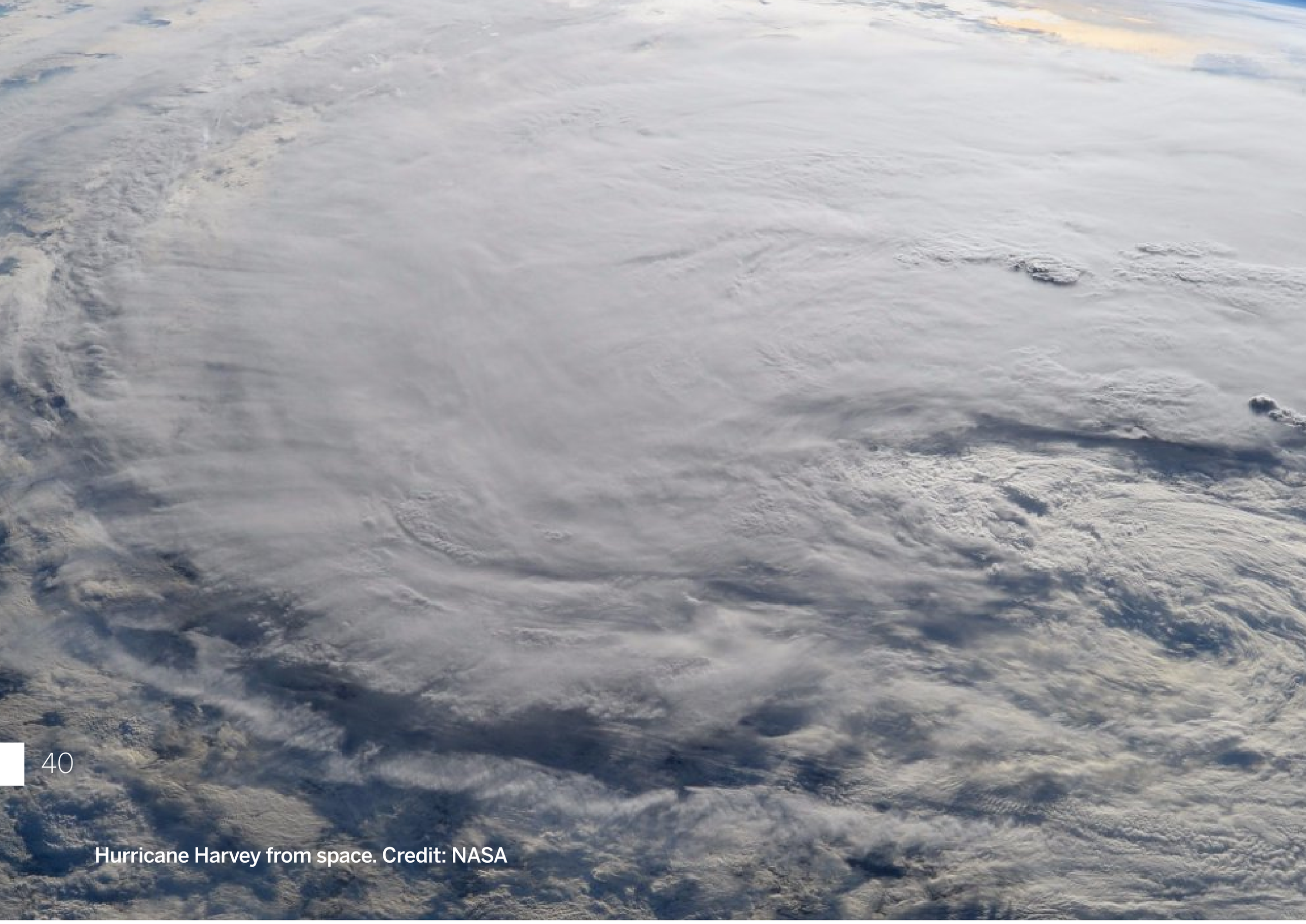
It will be designed with input from key agencies like the Texas Water Development Board, the Federal Emergency Management Agency (FEMA), and the Texas Division of Emergency Management and will build upon the existing data infrastructure already designed as part of Planet Texas 2050.

In the future, TDIS could help emergency response teams plan better evacuation routes during hurricanes and assist community planning agencies better manage fire risks. The first TDIS product will be a statewide hazard map that relies on machine learning and 42 years of municipal, county, and state data to show fire, flood, lightning, hail, drought, and extreme cold and heat risk down to the house-level. Microsoft awarded Planet Texas 2050 $150,000 in Azure cloud credits for the venture, allowing it to store private data on the commercial cloud.

"Planet Texas 2050 has been instrumental helping us in the planning phase of the Texas Disaster Information System. Improving hazard response in Texas is a huge undertaking. Thankfully, we are not starting from ground zero. The cyber ecosystem that Planet Texas 2050 researchers have built is giving us a leg up in creating a state-of-the-art system that will give state and federal agencies better information to make decisions before, during, and after extreme events."

— Sam Brody

Professor, Marine and Coastal Environmental Science
Director, Center for Texas Beaches and Shores
Director, Institute for a Disaster Resilient Texas (IDRT)
Texas A&M University



Hurricane Harvey from space. Credit: NASA

Improving Patient Evacuation During Hurricanes

In August 2017, Hurricane Harvey dumped as much as 50 inches of rain on the eastern half of the state. Whole cities were deluged, and many were without power and running water for days or weeks. After the storm, Operations Research and Industrial Engineering Associate Professor Erhan Kutanoglu and his graduate research student Kyoung Kim decided it would be a novel idea to use logistics and advanced modeling to improve the way hospitals evacuate patients during storms. Hydrologists, using state-of-the-art flood modeling, have been able to determine where and how much rain will fall in a given area in order to create a map of hotspots in Texas most at risk of flooding. Engineers have then used something called stochastic optimization modeling, which incorporates randomness to factor in the storm's uncertainty and predict how danger zones could vary based on

> “Sometimes models aren’t realistic, and they don’t take into account what real life is like. But these guys have listened, and they have taken information that we have given them from previous experiences and adapted their model. We are very excited. When you’re looking at 72 to 96 hours before a storm hits, that’s only two to three days to move millions of people. Your time is very critical. Anything that would make that faster and more precise would be beneficial.”
>
> **— Lori Upton**
> Vice President of Disaster Preparedness and Response Southeast Texas Regional Advisory Council (SETRAC)

changes in the hurricane as it moves closer to land. Finally, logistics experts have figured out how to deploy ambulances and medical personnel and to evacuate patients in the most efficient way, taking into account all variables.

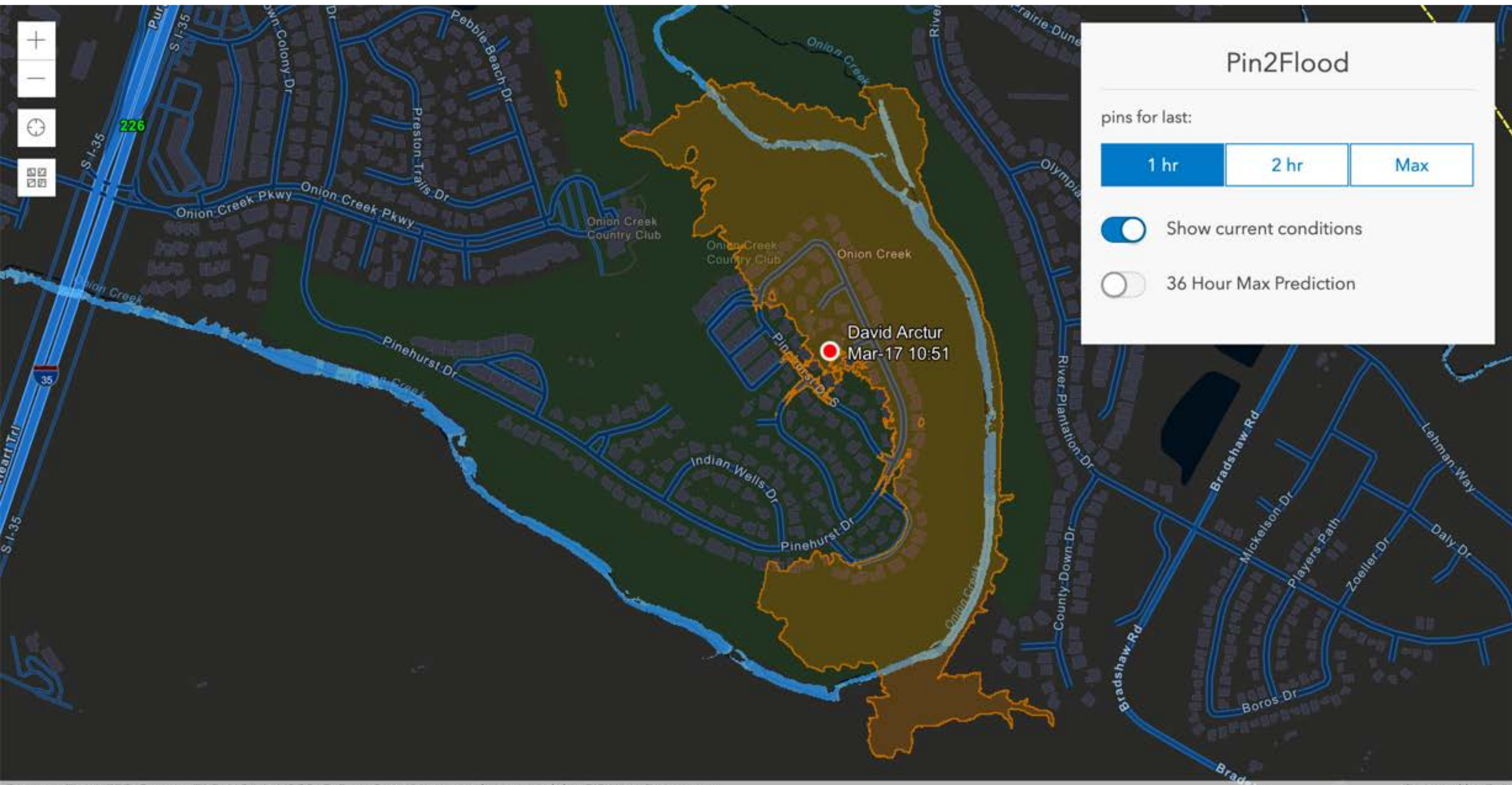
The entire process — from flood modeling, to factoring in randomness, to plotting an efficient evacuation — occurs seamlessly and quickly (as fast as 15 minutes) as part of one integrated model. The final output shows the best evacuation routes to avoid flooding, which will assist state agencies, hospitals, and healthcare facilities in making informed decisions about where to stage ambulances before hurricanes, as well as what hospitals should evacuate patients first, how many, and where they should be taken based on facility capacity and capabilities. The nonprofit Southeast Texas Regional Advisory Council (SETRAC), which assists healthcare facilities in disaster response, has been helping fine-tune the team’s model.

Read more.

On-the-Ground Flood Mapping and Response

Researchers from the Cockrell School of Engineering, UT's Center for Water and the Environment, and the Texas Advanced Computing Center have teamed up to create a mobile application called "Pin2Flood," which will help police, fire, and EMS better respond to flooding disasters on the scene. During a major flooding event, firefighters and police officers on the ground will be able use a smartphone or device to place a digital "pin" on a map to mark the boundary of the water's edge. The app pulls up a map of the floodplain in real time and indicates how many buildings or residences could be in immediate danger — something they aren't able to do today. That information will be fed directly to emergency operations centers so that officials can quickly decide which roads to close, which areas to evacuate, or where to send emergency rescue equipment. The team, led by Paola Passalacqua, a Civil, Architectural and Environmental Engineering associate professor, has been working directly with Texas Department of Transportation, the Texas Division of Emergency Management, the Federal Emergency Management Agency (FEMA), and the

With the Pin2Flood app (shown here), first responders will be able to place a digital "pin" in a certain location where it's flooding to see all other areas at flood risk.



National Weather Service. The app is still in its testing phase, but it's based on intricate, statewide floodplain maps developed using high-resolution elevation data obtained from LiDAR. Other local, state, and federal agencies are interested in adapting these maps for their own use as well. Moreover, the team has partnered with the Austin Fire Department, which has begun leading app outreach and training and has been integral in ensuring that the emergency management community has been involved in the design process from day one.

"Pin2Flood provides first responders with something we never have had before: the ability to map flood inundation real time, before and during an emergency, and in ways we not only understand, but have continued to develop. It is the result of a labor-intensive endeavor spanning 40+ agencies and universities and five years which Planet Texas 2050 helped to facilitate and support."

— Harry Evans
Former Chief of Staff,
Austin Fire Department

TACC Institute

In August 2020, we teamed up with the Texas Advanced Computing Center to host a week-long virtual event that introduced researchers across campus and our research partners to our cyber ecosystem. We taught registered participants ways to take advantage of our tools and services, particularly the central processor we use to help crunch and analyze large datasets. Participants included researchers from Texas A&M University and the Institute for a Disaster Resilient Texas (IDRT).

We highlighted ways we have been able to use the infrastructure, such as tracking the spread of tropical diseases to and within Texas. We also provided hands-on training and demonstrations so that others could learn to use the ecosystem and our open-source tools for things like visualizations and statistical modeling for their own projects.

Two ranchers walk across parched land in Culberson County, Texas, in 2011.
Photo credit: U.S. Department of Agriculture

Looking ahead

Planet Texas 2050 researchers have embarked on 25 individual research projects over the past three years to address some of the biggest problems in the state related to urbanization and climate change. As we enter our fourth year, we have decided to consider our work within the scope of six interrelated "flagships," which will build on the work of our first years while pushing our team into new territory—diving into critical research areas such as biodiversity, landscape change, and environmental justice. Here is an overview of our flagship projects and how they will make Texas more resilient:

Biodiversity and Changing Landscapes

Texas' landscapes and ecosystems are changing fast, losing tree cover and topsoil, making it more difficult for wildlife and people to thrive without the protections and benefits nature provides. A remote network of visual and acoustic sensors placed across the state will act as eyes and ears, detecting environmental and biodiversity-related information like weather, water flows, and animal noises. By listening to birds and other wildlife around the clock, sound data can be used as a general probe of environmental conditions, helping us better understand the speed and degree of change in places undergoing rapid habitat transformation across Texas. We will also look at new species of disease-carrying organisms such as mosquitoes that are migrating northward.

Integrated Models for Complex Decision Making

Scientists are frequently asked to provide models and simulations about complex systems — from weather and climate to disease transmission — but those models may not accurately reflect on-the-ground circumstances. Research scientists at UT's Texas Advanced Computing Center are developing new technologies that allow us to combine and analyze data in new ways and make more accurate predictions. The project will include a first-of-its-kind model that interlaces hurricane projections with storm surge and flooding models in a dynamic, interactive way. This model can be applied on a large, region-wide scale, allowing faster, better-informed decisions for people to deal with both sudden disasters like flash floods and storms as well as more gradual change such as drought conditions and increasing temperatures.

Networks for Hazard Preparedness and Response

In Texas, the most deadly and costly natural disaster is flooding. Preparation and response are limited because existing flood and risk maps don't account for the ways that river flooding, surface flooding, storm surges, and terrain interact. By overlaying new, finely tuned flood maps over specially designed street maps that indicate all known structures, residences, and even which communities are most vulnerable, state agencies and local governments can respond to disasters faster and allocate resources better. This project will focus specifically on communities in southeast Austin and southeast Texas that have seen significant flooding events.

Equitable and Regenerative Cities in a Post-Carbon Future

Migration to urban centers across Texas continues at a breakneck pace, placing immense stress on resources such as water, housing, transportation, and energy while increasing inequality. We need to understand the systems, shocks, and stressors affecting the state's diverse metropolitan areas. Researchers and community stakeholders are analyzing and reimagining ways to plan for housing, infrastructure, solar energy, water and transit. The aim is to give local and state officials data-driven tools and frameworks that will help them to make policy decisions that address climate challenges in a more equitable manner, such as through codes, regulations, and incentives.

Sustainable Texas Communities

Climate change and pollution affect some populations more severely than others, and the disparities are often stark. Our urban planning and public health researchers are collaborating with community partners among these populations to devise new approaches to environmental education that focus on green jobs and economic opportunities tied to climate solutions. The project team will collaborate with environmental education nonprofits to create K-12 curriculum and teacher trainings that foster interest and skills in a variety of green careers, including jobs related to designing, planning, or building infrastructure such as solar arrays and windmill farms; community organizing; and legal roles related to advocating for better air and water quality.

Stories of Ancient Resilience

Human responses to climate stress and catastrophic events like hurricanes, drought, and resource conflict have been oversimplified for years — portrayed as either miraculous tales of survival or total collapse. We abandon that outdated mentality and look to ancient civilizations, and even the not-so-distant past, to understand how resilience, in many forms, has influenced human choices, movement, and development.

We integrate quantitative information, such as DNA analysis, stable isotope analysis, and LiDAR with the qualitative results of archaeological excavations, historical investigation, and storytelling to explore past mobility and resource management in times of stress. These discoveries will help Texans and our global community better understand the relationships among climate, migration, health, equity, and human and environmental wellbeing.

Specialists in Mesoamerican archaeology lead a LiDAR imagery workshop at the TACC VisLab in February 2020. Photo credit: Adam Rabinowitz

Research and scholarly output

In the grand challenge's first two years, Planet Texas 2050 researchers produced more than a dozen scholarly works, including peer-reviewed articles, preprints, conference proceedings, and presentations. Those that formally acknowledge financial support from Planet Texas 2050 are marked with an asterisk. All academic contributions are archived on Texas ScholarWorks.

An Intelligent Interface for Integrating Climate, Hydrology, Agriculture, and Socioeconomic Models

Association for Computing Machinery

Daniel Garijo, Deborah Khider, Suzanne A. Pierce, Daniel Hardesty-Lewis, Anna Dabrowski, Maria Stoica, Scott Peckham, Kshitij Tayal, Ankush Khandelwal, Vipin Kumar, Lele Shu, Armen R. Kemanian, Christopher J. Duffy, Kelly Cobourn, Rajiv Mayani, Dan Feldman, Binh Vu, Jay Pujara, Minh Pham, Yao-Yi Chiang, Craig A. Knoblock, Rafael Ferreira da Silva, Ewa Deelman, Yolanda Gil, Varun Ratnaker

view

An Observatory Framework for Metropolitan Change: Understanding urban social–ecological–technical systems in Texas and beyond*

Sustainability

R. Patrick Bixler, Katherine Lieberknecht, Fernanda Leite, Juliana Felkner, Michael Oden, Steven Richter, Samer Atshan, Alvaro Zilveti, Rachel Thomas

view

Ancient Maya Wetland Fields Revealed Under Tropical Forest Canopy from Laser Scanning and Multiproxy Evidence

Proceedings of the National Academy of Sciences

Timothy Beach, Sheryl Luzzadder-Beach, Samantha Krause, Tom Guderjan, Fred Valdez Jr., Juan Carlos Fernandez-Diaz, Sara Eshleman, Colin Doyle

view

Assessing the Potential for Greater Solar Development in West Texas USA

Energy Strategy Reviews

D.A. Devitt, M.H. Young, J.P. Pierre

view

Climate Vulnerability in Austin: A multi-risk assessment*

Austin Area Sustainability Indicators

Patrick Bixler, Euijin Yang

view

Decolonial Water Stories: Affective Pedagogies with Young Children

The International Journal of Early Childhood Environmental Education

Fikile Nxumalo, Marleen Villanueva

view

Geospatial Analysis of Environmental Suitability for *Burkholderia* species Using Data Analytics

Katherine A. Brown, Michael G. Shensky, Stan J. Roux, E. Acquaye-Seedah, Jessica Trelogan

view

Communicating in Three Dimensions: Questions of audience and reuse in 3D excavation documentation practice

Studies in Digital Heritage

Adam Rabinowitz

view

Exploring Groundwater Recoverability in Texas: Maximum Economically Recoverable Storage*

Texas Water Journal

Michael H. Young, Charles W. Kreitler, Justin C. Thompson

view

LEAF: Logger for ecological and atmospheric factors*

HardwareX

Ashley M. Matheny, Peter Marchetto, Je'aime Powell, Austin Rechner, Joon-yee Chuah, Erica McCormick, Suzanne A. Pierce

view

People, Land, & Water: Stories of metropolitan growth*

City Forum

Katherine Lieberknecht, Michael Oden, Fernanda Leite, Patrick Bixler, Juliana Felkner, Stephen Richter, Sarah Wu

view

Stream and Spring Water Evolution in a Rapidly Urbanizing Watershed, Austin, TX*

Water Resources Research

Lakin Beal, Jay Banner, Jeffrey Senison, MaryLynn Musgrove, Lindsey Yasbek, Nathan Bendick, Christopher Herrington, Daniel Reyes

view

The DOLCe Initiative: Connecting libraries and advanced computing*

Anna Dabrowski, Jessica Trelogan

view

Revisiting Urban Expansion in the Continental United States*

Landscape and Urban Planning

Steven Richter

view

Tapis-CHORDS Integration: Time-series data support in science gateway infrastructure*

Sean B. Cleveland, Anagha Jamthe, Smruti Padhy, Je'aime Powell, Joe Stubbs, Michael D. Daniels, Suzanne A. Pierce, Gwen A. Jacobs

view

Unprecedented Drought Challenges for Texas Water Resources in a Changing Climate: What do researchers and stakeholders need to know?*

Earth's Future

Jay Banner, John W. Nielsen-Gammon, Benjamin I. Cook, Darrel M. Tremaine, Corinne I. Wong, Robert E. Mace, Huilin Gao, Zong-Liang Yang, Marisa Flores Gonzalez, Richard Hoffpauir, Tom Gooch, Kevin Kloesel

view

From FY19 to FY20, Planet Texas 2050 researchers received $2.4 million in external grants, gifts, and awards, including one to address climate stressors, like the flooding shown here that occurred in southeast Austin after a Halloween 2015 storm. Photo credit: City of Austin

Awards & grants

From FY19 through FY20, Planet Texas 2050 researchers received $2.4M in external grants, gifts, and awards for Planet Texas 2050-related research. These awards are listed below. In addition, Planet Texas 2050 has also contributed its expertise to more than $10M in other externally funded research projects and centers at The University of Texas at Austin to date.

Consortium of Humanities Centers and Institutes (CHCI)

CHCI-Mellon Global Humanities Institutes 2021

Climate Justice and Problems of Scale

$180,000

Cynthia and George Mitchell Foundation

"Internet of Water (IoW): Water for Boerne, TX"

$75,000

U.S. Defense Advanced Research Projects Agency (DARPA)

MINT: Model INTegration through Knowledge-Rich Data and Process Composition

$163,585

Construction Industry Institute

Technology Path to the Future: Reimagining Capital Project Delivery

$137,522

Cynthia and George Mitchell Foundation

Respect Big Bend Coalition Funding

Projecting Impacts to Landscapes and Ecosystem Services from Energy Development in the Big Bend Region, Texas

$150,000

Dow Chemical Company Global Citizenship Partnerships

Corporate gift to Planet Texas 2050

$100,000

National Science Foundation

Coastlines and People (CoPe)

EAGER: Addressing Human-Centric Decision-Making Challenges from Coastal Hazards via Integrated Geosciences Modeling and Stochastic Optimization

$299,932

National Science Foundation

Smart & Connected Communities

Integrating Information Flows and Supporting Communities as Decision-Makers in Response to Acute and Chronic Stressors

$1,216,000

Bill and Shawn Jackson

UT Austin School of Architecture's Social and Ecological Infrastructure Practicum

$10,000

National Science Foundation

Concepts for Advancing Sustainable Urban Systems (SUS) Research Networks: Conference Proposals

Challenges to and Opportunities for Resilience in Rapidly Developing Urban Corridors

$49,925

St. David's Foundation

2020 Austin Area Sustainability Indicators

$25,000

Texas Appleseed (nonprofit)

Equity Analysis of Texas Gulf Coast Disaster Recovery Infrastructure Expenditures

$15,000

From FY19 to FY20, Planet Texas 2050 researchers received $2.4 million in external grants, gifts, and awards, including one to create advanced models that will help decision-makers respond to coastal hazards.

College of Fine Arts graduate student Michael Bruner operates the computers that run the escape room experience.
Photo credit: L. Smith

FY20 projects

Climate Change Adaptation Through Dramaturgy

Team: Khristián Méndez Aguirre (Theater and Dance), Nichole Lynn Bennett (Advertising and Public Relations), Jen Moon (Molecular Biosciences), Anthony Dudo (Advertising and Public Relations), and Katie Dawson (Theater and Dance)

We are interested in how theater and community engagement can help develop a context-specific understanding of climate change to empower Texan communities and individuals to become resilient and adapt to a changing climate. Over-emphasis on educating the public comes at the expense of more effective communication objectives, like framing, building trust, or fostering dialogue. The tradition of plays about science in the 20th century often focused on the ethics behind scientific innovation and discovery. The advent of climate science presents an opportunity for theater to enact the interaction of climate models with history and individual narratives, as a way to address gaps in existing science communication.

Collaborative Escape Room Project

Team: Sven Ortel (Theatre and Dance), Michael Baker (School of Design and Creative Technologies), David Cohen (School of Design and Creative Technologies), and J.E. Johnson (Texas Performing Arts)

This immersive escape room experience inspired by the Planet Texas 2050 initiative will be produced by the University of Texas at Austin, College of Fine Arts students and faculty in collaboration with multiple UT colleges, schools, and units. Featuring physical and digital puzzles, immersive media, and mixed reality technology, this experience will transport players into a world where extreme weather and population growth put Texans' resilience to the test.

DataX and Model Integration

Team: Suzanne Pierce (TACC), Je'aime Powell (TACC) and Anna Dabrowski (TACC), and the following TACC Functional Departments: Ops & System Administration, High Performance Computing, Data & Statistics, Visualization, and Advanced Computational Interfaces

The vast and complex challenges facing society today exceed our ability to reason about them without the aid of computational support. Our most challenging resiliency problems require an intersection and integration across knowledge domains. The DataX and Model Integration program aims to design and build data systems and integrated modeling capabilities that are reusable, scalable, and understandable by non-traditional advanced computing user groups.

Digital Object Life Cycle (DOLCe)

Team: Anna Dabrowski (TACC) and Jessica Trelogan (Libraries)

Planet Texas 2050 will produce invaluable—and in some cases irreplicable—data products with potential to enable future research for generations. The Digital Object Life Cycle (DOLCe) initiative seeks to develop the necessary infrastructure, mechanisms, and policies at TACC to ensure that those data are safeguarded throughout the research life cycle. This proposal specifically addresses the end of the life cycle by enabling best practice in the publication and preservation of data for future reuse.

Development of a Framework of Data Interpolation, Scaling, and Homogenization (DISH) for Mapping Natural Resources in Texas

Team: Alex Sun (Bureau of Economic Geology), Michael Young (Bureau of Economic Geology), Suzanne Pierce (TACC), Justin Thompson (Bureau of Economic Geology), Bridget Scanlon (Bureau of Economic Geology), and Daniel Hardesty-Lewis (TACC)

Climate change and population growth are adding unprecedented stress on Texas waters and other natural resources. Quantifying the nexus between natural resources, energy generation, and food production is critically important for sustainable regional planning. Understanding the spatiotemporal dynamics of water availability and other natural resources, in relation to energy production and urban demands are primary pillars of Planet Texas 2050. Currently, natural resources information for Texas is scattered across disparate data sources and in heterogeneous resolution and formats. This project extends and expands toolsets that were started under the Water Averaging project for data imputation, scaling, and homogenization (DISH) for Texas natural resources and to support integrated cross - sector modeling.

Facilitating Timely & Efficient Evacuation of Texas Cities Using Shared and Autonomous Vehicle Fleets

Team: Kara Kockelman (Civil, Architectural, and Environmental Engineering), Krishna Kumar (Civil, Architectural, and Environmental Engineering), and Mechele Dickerson (Law)

We need more strategies for protection of life and property, including expert evacuations during flooding. This project will assess the cost and effectiveness of various existing strategies, including near-term use of manned fleets like buses and vans, as well as shared autonomous vehicles. These longer-term solutions will protect human drivers while maximizing fleet diffusion through vulnerable neighborhoods, thanks to use of more, smaller vehicles.

Geospatial Analysis of Environmental Suitability for Establishing *Burkholderia* Species in Texas

Team: Stan Roux (Molecular Biosciences), Katherine Brown (Molecular Biosciences), Jessica Trelogan (Libraries), Michael Shensky (Libraries), and a to be determined TACC collaborator

Key aims of this project are to use existing data about soil, water, weather, land use, and melioidosis risk factors to generate geospatial data and maps that can identify ecological niches in Texas for *B. pseudomallei* and related soil organisms. A 2016 study identified parts of Texas and Florida as vulnerable for establishment of Burkholderia pseudomallei, the causative agent of melioidosis, which has high rates of fatality (54% compared to 15% for malaria) and is estimated to kill more people each year than more well-known diseases such as leptospirosis and dengue.

Graybelt (Artist-in-Residence)

Marie Lorenz

Sculptor and performance artist Marie Lorenz will design a video map of the water that flows down Texas' Colorado River — one of the state's primary water sources — into the Gulf of Mexico. During its 862-mile journey from Lubbock to Matagorda Bay, the river's waters change from rugged and rural to urban and unidentifiable. Lorenz will invite local participants to join her on this Colorado River trek in a handmade boat while she explores its path and records interviews with those she meets along the way who have connections to the land and the river. "Graybelt" will help researchers understand how personal experience with our environment affects our perceptions, behaviors, and awareness of critical resources.

Greeting Cards from the Anthropocene

Team: Craig Campbell (Anthropology), Casey Boyle (Rhetoric & Writing), and Kate Canales (School of Design and Creative Technologies)

This team seeks to develop tools to put in the hands of everyday people to better cultivate the communication of climate change, including those who are just coming on board to recognizing the urgency of our predicament. To accomplish this grand task, we propose a series of critical and creative workshops that adopt mundane greetings genres like greeting cards, postcards and calling cards and adapt those forms to political intervention.

Gallery visitors pull writing prompts and compose messages on "Hey, Honey Bee!" greeting cards in Vancouver, BC, as part of Planet Texas 2050's Greeting Cards for the Anthropocene project.

Hurricane-Resilient Healthcare Infrastructure Modeling with Integrated Flood Prediction and Stochastic Logistics Optimization

Team: Erhan Kutanoglu (Mechanical Engineering), Zong-Liang Yang (Geosciences), and John Hasenbein (Mechanical Engineering)

Prediction and logistics models have yet to be integrated for hurricane preparedness and response. For patient evacuation, this means allocation and routing recommendations for each hospital, ambulance and patient are made independently. This team plans to generate various flood scenarios using the state-of-the-art predictive earth, water and atmosphere modeling by taking advantage of high-performance computing and probabilistic nature of hurricane forecasts, including path, wind speed, size and precipitation amounts. The team will then propose a scenario-based stochastic model that optimizes all evacuation decisions simultaneously, avoiding the drawbacks of sequential, suboptimal decisions.

Improving the Estimation of Inundation Extent and Depth with High Resolution Terrain Data Over the State of Texas

Team: Paola Passalacqua (Civil, Architectural, and Environmental Engineering), David Arctur (Center for Water and the Environment), Harry Evans (Center for Water and the Environment), Xing Zheng (Center for Water and the Environment), Suzanne Pierce (TACC), Daniel Hardesty-Lewis (TACC), and Michael Young (Bureau of Economic Geology)

Flood disasters resulting from recent events in Texas have emphasized the need for rapid estimation of flood inundation. With the availability of high-resolution terrain (HRT) data over most of Texas, we have the opportunity to obtain high accuracy inundation mapping. This team developed a workflow called GeoFlood that estimates flood inundation extent and depth from HRT data and discharge forecasts by using geodesic minimization principles and topographic attributes. The tools require further analysis and development to be scaled up for applicability over the whole state, which is what this project aims to do.

PaleoTexas

Team: Daniel Breecker (Geosciences), Jay Banner (Geosciences), Christopher Bell (Geosciences), Jonathan Jarvis (Texas Archaeological Research Laboratory), LeeAnn Kahlor (Advertising and Public Relations), Melissa Kemp (Integrative Biology), Adam Rabinowitz (Classics), Timothy Shanahan (Geosciences), Stacie Skwarcan (Geosciences), and Darrel Tremaine (Environmental Science Institute)

Challenges facing 21st-century Texas involve complex interactions between climate, ecosystems, and humans. Understanding past interactions may help prepare us for the future. Yet, despite a growing body of data for these systems in Texas produced by various disciplines, we lack an understanding of their interconnections. Our research questions center on the period of significant global changes during the past 20,000 years in Central Texas, including how climate change influence biodiversity, human settlement and areas affected by drought.

Abandoned grain elevator in the ghost town of Wastella, Texas. Photo credit: U.S. Department of Agriculture

Resources, Stress, and Population Dynamics in Premodern Urban Societies

Team: Adam Rabinowitz (Classics), Jay Banner (Geosciences), Tim Beach (Geography), Deborah Bolnick (UConn), Michael Holleran (Architecture), Jonathan Jarvis (Texas Archaeological Research Laboratory), Melissa Kemp (Integrative Biology), Sheryl Luzzadder-Beach (Geography), Lourdes Rodríguez (St. David's Foundation), Astrid Runggaldier (Art & Art History Mesoamerica Center), Rick Smith (Dartmouth), David Stuart (Art & Art History, Mesoamerica Center), Rabun Taylor (Classics), Fred Valdez (Anthropology), and Dennis Wylie (Center for Biomedical Research Support)

This research project focuses on the range of human strategies in pre-modern urban environments for providing basic water resources; on evidence for stresses on individual urban residents as indicated by skeletal remains, with a particular focus on differences in diet and health; and on the role of migration and population mobility in the demographic makeup of a sample set of ancient cities.

Texas Futures Virtual Reality Experience

Team: Fernanda Leite (Civil, Architectural, and Environmental Engineering), MJ Johns (School of Design and Creative Technologies), and Andrew Solis (TACC)

This team will create a user - centered virtual experience of what an urban environment of a select city in Texas would look like in 2050 given a do - nothing scenario, with regards to expected climate change and population growth in the State of Texas. A portion of a selected city like Austin will be modeled with added digital assets from existing research.

This simulation will provide an immersive individual virtual reality experience, delivered through a head-mounted display. The simulation will provide users a sense of presence, as if they were tele - transported via a time machine into a future world, where they would be able to interact with digital asset and visualize data in 3D space.

Texas Metro Observatory

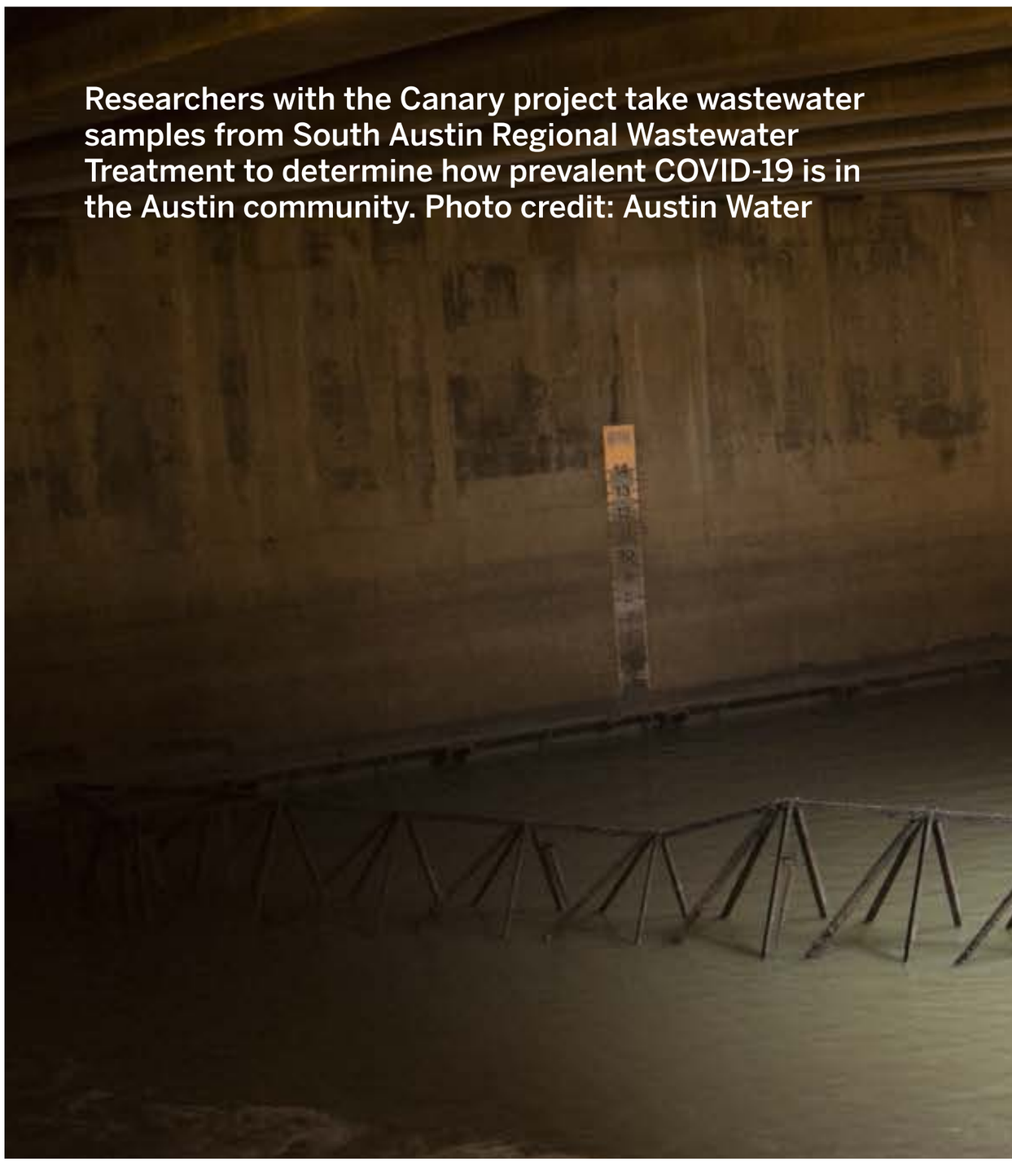
Team: Katherine Lieberknecht (Architecture), Patrick Bixler (LBJ School of Public Affairs), Juliana Felkner (Architecture), Fernanda Leite (Civil, Architectural, and Environmental Engineering), Michael Oden (Architecture); and Nicole Joslin (Austin Community Design and Development Center) and Marla Torrado (Austin Community Design and Development Center)

The Texas Metro Observatory (TMO) is a communication and data platform dedicated to sharing information and ideas about Texas' communities, understanding common problems related to urbanization processes in these communities, and developing solutions across the state's metropolitan areas. The TMO will allow researchers, community members, nonprofit organizations, public sector agencies, policy makers, and the business community to access metropolitan-scaled economic, environmental, health, demographic and governmental data for the state. It also will include useful data interpretation and analysis such as data visualizations, infographics, and tools that will help tell the story of the places where Texans live.

Texas Water Stories

Team: Heather Houser (English), Paul Adams (Geography), C.J. Alvarez (Mexican American & Latina/o Studies), Tia Madkins (Education), and Fikile Nxumalo (University of Toronto)

This project aims to understand how Texas water has been shaped by interactions among geological and climatic forces, policy and engineering decisions, and spiritual, cultural, and industrial relations, and to understand how the beliefs and values different communities attach to water affect water use and stances toward future policies for climate resilience.



Researchers with the Canary project take wastewater samples from South Austin Regional Wastewater Treatment to determine how prevalent COVID-19 is in the Austin community. Photo credit: Austin Water

Towards an Equitable Knowledge-Action Network: A Comprehensive Assessment of Environmental NGOs

Team: Jayme Walenta (Geography), Patrick Bixler (LBJ School of Public Affairs), Caroline Faria (Geography), Ji Ma (LBJ School of Public Affairs), Jonathan Lowell (Planet Texas 2050), and Michael Shensky (Libraries)

This team developed an inventory of environmental nongovernmental organizations (E-NGOs) in the State of Texas, documenting their existing networks, policy agendas, and areas of focus. The inventory was converted into a digital map to promote cross-organizational collaborations.

Through interviews, the team determined the most viable opportunities for cross-organizational collaborations. The collaborations will shape Planet Texas 2050 modeling efforts while also directing programmatic strategies of a network of E-NGOs throughout the state.

Transportation-Related Air Pollution (TRAP)

Team: Natalia Ruiz Juri (Center for Transportation Research), Josh Apte (Civil, Architectural, and Environmental Engineering), Alex Karner (Architecture), Elizabeth Matsui (Dell Medical School), Lourdes Rodríguez (St. David's Foundation), and Corwin Zigler (Statistics and Data Science)

This project aims to quantify current transportation-related air pollution exposure and its effects on health. Researchers at the Center for Transportation Research (CTR) will collaborate with faculty and students working in community and regional planning, health, and air measurement, among others, to develop a list of datasets and corresponding processing and visualization needs. In collaboration with the Texas Advanced Computing Center (TACC), the datasets will be processed to facilitate their efficient use, analysis and visualization. Models may be used to comprehensively evaluate policy, transportation, and urbanization decisions.

Urban Planning for an Uncertain Future

Team: Robert Paterson (Architecture), Miriam Solis (Architecture), Pavithra Vasudevan (Women's & Gender Studies and Africa & African Diaspora Studies), and Deidre Zoll (Architecture)

There is limited empirical evidence evaluating whether climate adaptation practices are creating or recreating environmental inequalities. This question is especially important in Texas given the lack of large-scale urban adaptation planning. This team asks how Texas cities are planning for climate change by exploring climate-related heat and flood risks with regard to spatial patterns of social inequality, infrastructure vulnerability, and public health concerns, as well as to what extent community groups are engaged in adaptation decisions.

Suzanne Pierce, TACC research scientist and Planet Texas 2050 founding member, helped high school students learn about environmental sensors and citizen science during a Code@TACC

µP-STREAM: Micro-controller Platform Sending Telemetry Real-time for Earth's Adaptive Models

Team: Je'aime Powell (TACC), Kelly Pierce (TACC), and Tim Keitt (Integrative Biology)

A key component when designing resilient systems is monitoring complex changes in the environment in near-real-time so that infrastructure and interventions are adaptive. This project will deploy a sensor network that will adaptively measure environmental conditions and stream data in near-real time using the computational resources at UT's Texas Advanced Computing Center (TACC). This acoustic monitoring technology will detect environmental changes in Texas's Lost Pines ecoregion, a site for long-term biodiversity research. We will new systems informed by power requirements, sampling density in time and space, and reliable data streaming cyberinfrastructure. This knowledge will allow future design of sensing systems capable of informing models and policy in this dynamically changing region.

Urban Watershed Evolution

Team: Jay Banner (Geosciences), Ashley Matheny (Geosciences), Mary Jo Kirisits (Civil, Architectural, and Environmental Engineering), Kasey Faust (Civil, Architectural, and Environmental Engineering), Lynn Katz (Civil, Architectural, and Environmental Engineering), Ngoc Tran (Math), Shalene Jha (Integrative Biology), Bryan Black (University of Arizona), Christopher Herrington (City of Austin), Amy Belaire (The Nature Conservancy), Kate Catterall (Design and Creative Technologies), Alyson Beaton (Design and Creative Technologies), Darrel Tremaine (Environmental Science Institute), and Lakin Beal (Geosciences)

The overarching goal is to map, quantify, and understand the interconnections and interdependencies of urban growth, human well-being, and hydrologic and ecological function. This project looked specifically at the effect of urbanization on Austin's watersheds. It found that municipal water made up the bulk of Bull Creek's watershed.

A year in stories

Last year, Planet Texas 2050 researchers and their work were featured in more than 30 blog posts, news stories and podcasts. We are excited to have our achievements and expertise recognized by these important outlets. Read more about how our work is helping to make Texas more resilient.

Texas Students Join Global Climate Strike, KXAN (Sept. 20, 2019)

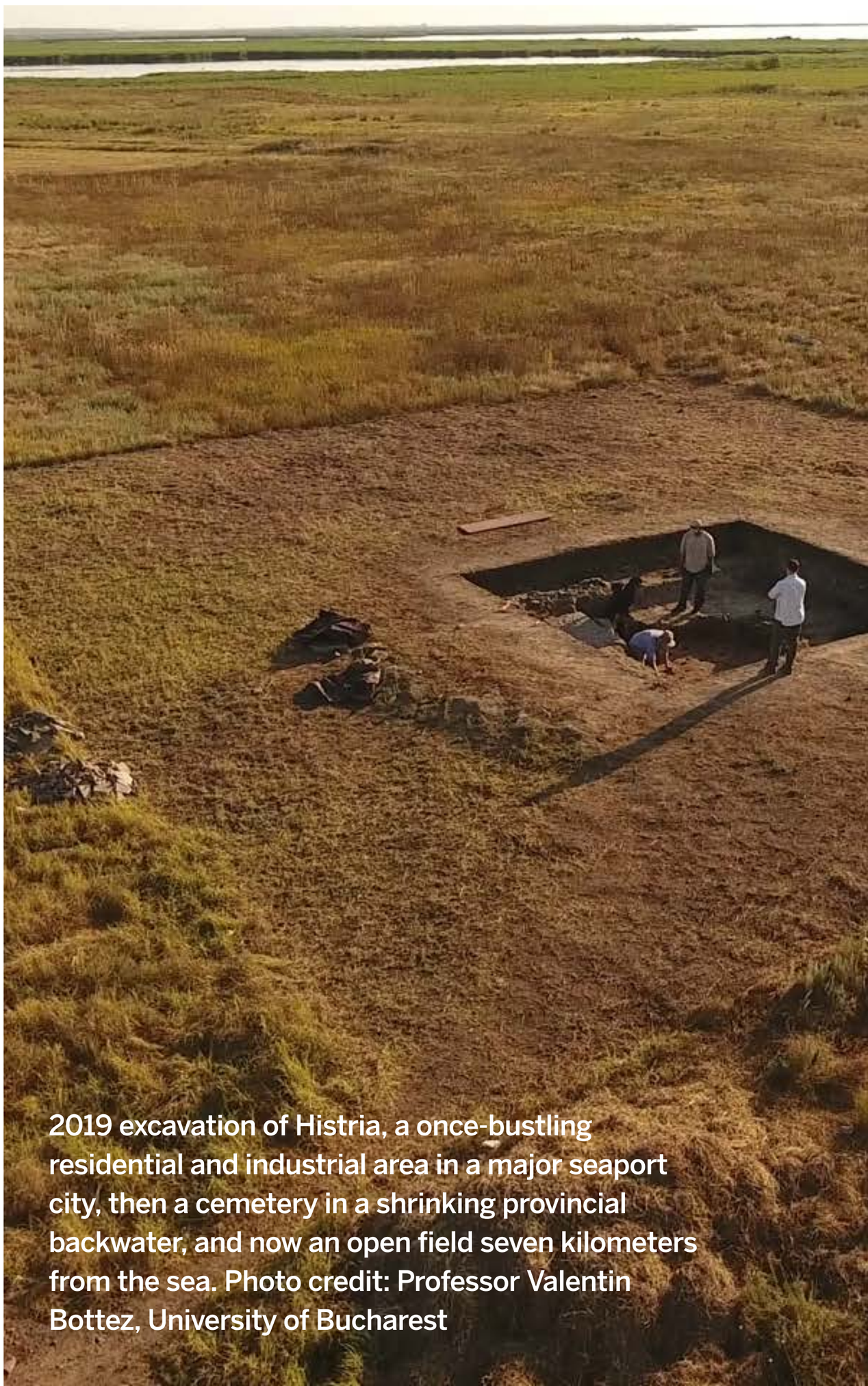
With Texas's population expected to nearly double by 2050 and the effects of climate change worsening, Austin-area students participate in global climate strike.

Read more.

The Reinvention of Casa Herrera, College of Fine Arts News (Oct. 23, 2019)

UT's Mesoamerican Center transforms beautiful colonial residence in Antigua, Guatemala into a teaching and research center, serving as a critical base for UT and Planet Texas 2050.

Read more.



2019 excavation of Histria, a once-bustling residential and industrial area in a major seaport city, then a cemetery in a shrinking provincial backwater, and now an open field seven kilometers from the sea. Photo credit: Professor Valentin Bottez, University of Bucharest

Planet Texas 2050 Uses Ancient Civilizations to Prepare Texas For the Future, Alcalde (Nov. 1, 2019)

Planet Texas 2050 researchers look to the once-thriving colony of Histria in Romania to teach them about today's world—and specifically about Texas.

Read more.

Podcast: "Border Land, Border Water: A History of Construction on the US-Mexico Divide," featuring C.J. Alvarez, New Books Network (Jan. 3, 2020)

Recent debates over the building of a border wall on the U.S.-Mexico divide have raised logistical and ethical issues, leaving the historical record of border building uninvoked. A recent book, written by Mexican American and Latina/o Studies assistant professor and Planet Texas 2050 researcher C.J. Alvarez, offers an over one-hundred-year history that extends to before the building of a border wall in 1990.

Listen.

Fast Forward: Austin Metro Area Sees Two Decades of Explosive Growth, Austin American-Statesman (Jan. 10, 2020)

In the next 20 years, the Austin metro area's population is expected to nearly double to 3.6 million, making it critical for urban planners to find ways to support the region's increasingly more suburban communities with the transportation infrastructure, health care facilities and social services more common in big cities.

Read more.

‘Border Land, Border Water’ Is A 150-Year History of Construction on the US-Mexico Border, featuring C.J. Alvarez, Texas Standard (Jan. 23, 2020)

Mexican American and Latino/a Assistant Professor C.J. Alvarez’s new book looks at the history of the U.S.-Mexico border through the development of ports of entry, boundary markers, transportation networks, fences, barriers, surveillance infrastructure, dams and other river engineering projects.

Read more.

What Starts Here Can Save the Arctic, Medium (Jan. 29, 2020)

Planet Texas 2050 sponsors UT studio art major to join a 12-day expedition in the Arctic as part of the ClimateForce team, which is dedicated to significantly reducing carbon emissions in the next five years.

Read more.

Masri Endowment to Support Graduate Education at the UT Jackson School of Geosciences, UT News (Jan. 29, 2020)

The Munib and Angela Masri Foundation pledges $10.5 million to create an endowment for graduate education at The University of Texas at Austin Jackson School of Geosciences, complementing the Planet Texas 2050 initiative.

Read more.

UT Professor Maps Climate Vulnerability in Austin, featuring Patrick Bixler, Austin Monitor (Feb. 12, 2020)

Communities within Austin are disproportionately affected by climate change based on their social vulnerability. LBJ School of Public Affairs Assistant Professor and Planet Texas 2050 researcher maps the areas at highest risk of experiencing the hazards associated with climate change.

Read more.

Podcast: Timeless Secrets of Ancient Romania, featuring Adam Rabinowitz, The Slavic Connexion (Feb. 19, 2020)

Modern-day archaeologist and Planet Texas researcher Adam Rabinowitz and archaeology graduate student Susan Crane take a deep dive into the ancient world of Romania through their exciting archaeological expeditions and unbelievable discoveries.

Listen.

Data Show a Warming Climate in Central Texas. Why Rising Temperatures Are Cause for Alarm, featuring Jay Banner, Austin American-Statesman (Feb. 21, 2020)

Climate scientists agree: Austin is getting hotter — and will continue to do so in coming decades. Experts warn that a warmer Texas likely will to lead to declines in dairy production, steeper competition for water and spikes in disease.

Read more.

Jackson School of Geosciences Professor Jay Banner leads a thought exercise during his class covering climate change. Photo credit: Dave Creaney for the Austin American-Statesman

From Virtual to Reality: Take a Walk Around Austin in 2050, Medium (Feb. 27, 2020)

Planet Texas 2050 researchers and UT students create an immersive virtual reality experience to teach about the dangers of climate change.

Read more.

Prioritizing Community Engagement and Equity in Climate Resilience Planning, Medium (March 6, 2020)

Community engagement and relationship-building is integral for any city or institution planning for climate resilience and its key to the work of Planet Texas 2050.

Read more.

Earth Day at 50: Still Seizing the Moment, Medium (April 20, 2020)

Planet Texas 2050 researchers from more than a dozen disciplines are working on many of the same topics that concerned activists on the very first Earth Day, like access to clean air and water, mitigating climate change and ensuring environmental justice.

Read more.

Escaping a Climate Crisis, Medium (March 3, 2020)

UT students construct a fully operational escape room prototype that places participants in the shoes of scientists on an observational platform in the middle of the Gulf of Mexico during a devastatingly powerful hurricane.

Read more.

Texas in 2050, By; Faith Singer-Villalobos, TEXASCALE (April 13, 2020)

Get a look into DataX, the technology platform that supports all of the data, integration, projects, applications, and actions that enable the research for Planet Texas 2050.

Read more.

On Earth Day, UT Austin is Ranked Among Top Universities Committed to Sustainability, UT News (April 22, 2020)

Integrating sustainability throughout the educational and operational activities at UT has been a focus for years. Now, the Sustainability Tracking Assessment & Rating System (STARS) has given the university its first-ever achievement of a Gold rating.

Read more.

Together: Human Health and Our Environment Are Inextricably Linked, Medium (April 21, 2020)

The bacterium *Burkholderia pseudomallei* which causes the serious disease melioidosis, is normally found in tropical and subtropical environments like Thailand and Northern Australia but is now present in parts of Central America, Mexico, Puerto Rico — and even Texas. Planet Texas 2050 researchers are examining regional soil, water, weather, and land use data to develop maps that can identify potential ecological niches where *Burkholderia* might thrive.

Read more.

Call for Transparency of COVID-19 Models, Science (May 1, 2020)

Scientific models are critical tools for anticipating, predicting, and responding to complex biological, social, and environmental crises, including pandemics. In this article, signed by Planet Texas 2050 researchers Heather Houser and Suzanne Pierce, researchers from across institutions call for scientists around the world to openly share their knowledge, expertise, tools, and technology.

Read more.

The Covid-19 'Infowhelm,' featuring Heather Houser, The New York Review (May 6, 2020)

English Associate Professor and Planet Texas 2050 researcher Heather Houser's new book sheds light on how the COVID-19 pandemic is testing our ability to process frightening and imminently consequential data.

Read more.

Podcast: Border Land, Border Water, featuring C.J. Alvarez, THINKBELT (May 9, 2020)

The landscape along the US-Mexico border has been manipulated and altered over the past 150 years in an effort to control not only people but also animals, goods, and water. Planet Texas 2050 researcher C.J. Alvarez details the history of construction along the international divide.

Listen.

Tracing Water, Medium (May 28, 2020)

Research shows that municipal water, including wastewater, is leaking into Austin's rain-fed springs and streams. In fact, in some places, municipal water makes up the majority of water flowing in these locations.

Read more.

UT Study Shows Austin-area Water and Wastewater Pipes Feeding into Bull Creek, KXAN (May 30, 2020)

A new UT study discovered that the water that flows through Bull Creek and other urbanized areas can be traced back to municipal sources such as wastewater pipes.

Read more.

Texas Needs to Prepare for Possibility of Extreme Droughts, UT Professor Says in Recent Study, NBC DFW (July 8, 2020)

Texas needs to start making plans for a future that could include unprecedented drought challenges, a study led by a research grounp at UT finds.

Read more.

Bull Creek Fed in Part by Austin-area Wastewater Pipes, UT Report Finds, CBS Austin (May 29, 2020)

A new UT study finds that in urbanized areas, much of the water that flows through Bull Creek can be traced back to municipal sources such as sprinkler runoff and leakage from municipal water and wastewater pipes.

Read more.

Artists Explore New Ways of Knowing in a Time of Information Overload, featuring Heather Houser, Nature (June 1, 2020)

English Associate Professor and Planet Texas 2050 researcher Heather Houser's new book explores the intersection of art and data visualization.

Read more.

Escaping Disaster, Medium (June 9, 2020)

Predictive models that hospitals and other agencies rely on during hurricanes don't take into account all potential storm scenarios, and they don't include a final output that recommends logistics decisions about evacuating their patients. Planet Texas 2050 researchers are working to improve that.

Read more.

Texas A&M Study: Texas Will Face Driest Conditions of the Last 1,000 Years, Texas A&M Today (July 8, 2020)

Texas' future climate will feature drier summers and decreasing water supplies for much of the state for the remainder of the 21st century — likely resulting in the driest conditions the state has endured in the last 1,000 years.

Read more.

Texas Needs to Prepare for a 'Megadrought,' State Climatologist Warns, KUT (July 10, 2020)

Because of climate change, an increasing aridness will grip Texas causing the soil to dry up and be unable to support the same amount of agriculture and plant and animal life. UT and Texas A&M researchers find it will make the climate of East Texas more like that of West Texas, and the climate of West Texas more like that of New Mexico.

Read more.

Texas Needs to Start Preparing for Possibility of 10-Year Megadroughts, UT News (July 8, 2020)

Texans need to prepare for a near future that is hotter, drier and fraught with more water extremes. But preparation isn't a one-size-fits-all solution, especially in the face of megadroughts that could be unlike anything the state has seen in the past thousand years.

Read more.

21st Century Texas Climate will Rival 'Megadroughts.' Futurity (July 9, 2020)

The future climate of Texas will feature drier summers and decreasing water supplies for much of the state for the remainder of the 21st century. UT researchers urge it's time to take action now.

Read more.

Texas Ranchers, Activists and Local Officials Are Bracing for Megadroughts Brought by Climate Change, The Texas Tribune (July 27, 2020)

A new study from UT and Texas A&M University warns that droughts in the latter part of this century could be the worst on record.

Read more.

Texas to have Drier Summers for Rest of 21st Century, AZoCleantech (July 9, 2020)

Climate in Texas will feature drier summers and reduced water supplies for most parts of the state for the rest of the 21st century—probably leading to the driest conditions the state has encountered in the last 1,000 years.

Read more.

Buildings as Living Things: 6 Questions with Fernanda Leite, Cockrell School of Engineering News (Aug. 19, 2020)

Buildings represent the backbone of the world's cities. However, they are far from static — changing and evolving over time the same way cities do. The evolution of buildings is an important aspect of building information modeling, a trend in architecture and construction of creating and maintaining 3D digital representations of structures. Fernanda Leite, an associate professor in the Department of Civil, Architectural and Environmental Engineering and Planet Texas 2050 chair, has made this concept a centerpiece of her research.

Read more.

Hey Honey Bee! Extinction Stings, Medium (Aug. 5, 2020)

Planet Texas 2050 project "Greeting Cards from the Anthropocene" encourages people to design greeting cards that address the climate crisis. It's a way to help people speak more candidly about these topics so we reach one another in ways traditional media often fail to do.

Read more.

Planet Texas 2050 Leadership

Jay Banner
Geological Sciences
Founding Member

Richard Corsi (2018-2019)
Dean, Maseeh College of
Engineering & Computer Science
Portland State University
Founding Member

David Kramer
Office of the Vice President
for Research
Program Director

Heather Houser (2018-2020)
English
Past Chair, Founding Member

Tim Keitt
Integrative Biology

Fernanda Leite
Civil, Architectural, and
Environmental Engineering
Chair

Katherine Lieberknecht
Architecture
Past Chair, Founding Member

Jonathan Lowell
Architecture
Community Liaison

Dev Niyogi
Geological Sciences
Civil, Architectural, and
Environmental Engineering

Suzanne Pierce
Texas Advanced Computing Center
Founding Member

Adam Rabinowitz
Classics
Founding Member

Lourdes Rodríguez (2018-2020)
St. David's Foundation
Founding Member

Miriam Solis
Architecture

Michael Young (2018-2020)
Bureau of Economic Geology
Founding Member

UT Austin studio art major Seyi Odufuye with adventurer Robert Swan, the first person to walk to both the north and south poles. Planet Texas 2050 sponsored Odufuye on a 12-day Arctic expedition.

TEXAS
The University of Texas at Austin