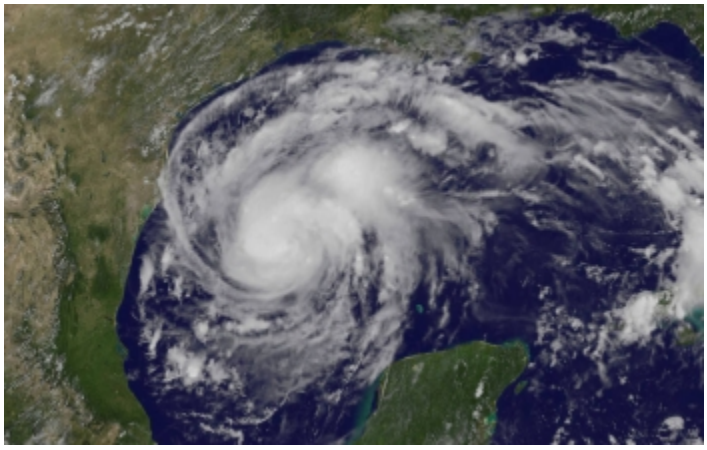
National Science Foundation
WHERE DISCOVERIES BEGIN

News Release 17-098

NSF awards $5.3 million in 59 grants to study effects of recent hurricanes

Funding will help our understanding of how storms form and intensify, and their aftereffects



In the wake of Harvey, NSF has awarded more than 50 grants to study hurricane effects.

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October 10, 2017

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It was August 25, and Hurricane Harvey's intensifying winds were moving onshore in South Texas, bringing torrential rains. No one yet knew that Harvey would eventually swamp Houston in flood waters. Nor that a short time later, powerful Hurricane Irma would do the same in many parts of Florida. Nor that little more than a week after Irma, Hurricane Maria would devastate Puerto Rico.

To help scientists understand how such disasters happen and how we can best respond, the National Science Foundation (NSF) has awarded 59 new grants totaling $5.3 million. These awards are largely related to hurricanes Harvey and Irma; NSF also expects to support studies related to Hurricane Maria.

"NSF-funded scientists have a long history of advancing our understanding of large-scale disasters and their aftermath," says NSF Director France Córdova. "These researchers have increased our ability to predict the paths of tropical cyclones, found ways of improving flood water decontamination, and enhanced our understanding of the mechanisms that may cause levee failures. NSF's new awards will result in similar advances critically needed in the face of such disasters."

NSF funding has also led to the deployment of underwater rescue robots to safeguard emergency workers; the use of real-time models of flood potential; development of effectiveness assessments of oil plume dispersants; and design of hazard-resistant buildings. In addition, researchers supported by NSF have made important discoveries regarding the long-term psychological and emotional effects of disasters.

As part of the new hurricane-related grants, NSF awardee Karen Kosiba of the Center for Severe Weather Research in Boulder, Colorado, is studying how hurricane eyewall vortices behave and how they fuel the most intense winds, using the NSF Doppler-on-Wheels. The results will help future predictions of hurricane damage.

Hurricane Harvey dropped more than 50 inches of rain on parts of Texas. The result will cause tremendous changes in environments along the Texas coast, scientists believe. Whether aquatic animals and plants will die as estuaries become freshwater lakes, and how long the recovery of these waterbodies will take, are questions grantee Paul Montagna of Texas A&M University-Corpus Christi is working to answer.

Ecosystems such as streams provide buffers to lessen storm impacts and speed up the recovery of natural processes that benefit humans. Awardee Christopher Patrick of Texas A&M University-Corpus Christi is conducting research on how streams along the Texas Gulf Coast are responding to the effects of Hurricane Harvey.

Scientist Kevin Fitzpatrick of the University of Arkansas is investigating the role of social ties and resources in helping citizens recover from Hurricane Harvey. Neighborhoods, places of employment and other organizations are important for helping individuals and families navigate their daily lives, researchers have found. Fitzpatrick is studying how people affected by Harvey use social resources and how they can create new resources to assist in recovering from the disaster.

Lauren Stadler of Houston's William Marsh Rice University is studying the short- and long-term effects of Hurricane Harvey's extreme flooding in the Houston region. Stadler is conducting research on the mobilization of chemical and microbial contaminants and the length of time they persist in affected areas. The findings will be compared to previous flood study results to understand post-flood disease spread and changes to microbial communities after extreme flooding. The results will improve how scientists evaluate the human health impacts of contaminants mobilized and deposited by floodwaters.

Robin Murphy of Texas A&M University and David Merrick of Florida State University are leading a hurricane response project that uses an unmanned aerial system (UAS). The scientists are collecting data from unmanned aerial vehicle (UAV) flights over hurricane-affected locations -- 119 flights at Hurricane Harvey sites and 247 flights at Hurricane Irma sites. The UAVs are deployed in Fort Bend County, Texas, and Putnam and Collier Counties, Florida, to support disaster response efforts. The project involves a range of UAS platforms flying at various altitudes and for different missions. Video, still imagery and photogrammetry (the use of photography in surveying and mapping to measure distances between objects) are part of the project, which involves flights before the hurricanes, during response phases and through restoration phases.

Other subjects NSF grantees are focusing on include: whether mangroves provide better coastal protection than salt marshes; how Texas barrier islands responded to and will recover from Harvey; and whether liquid mercury released into the floodplain sediments of the San Jacinto River in Texas poses a threat to public health.

For more information on NSF's response to the recent hurricanes, please see: NSF Response to Natural Disasters <https://www.nsf.gov/naturaldisasters/> .

NSF Hurricane Harvey/Irma Awards

Anna Armitage, Texas A&M University: RAPID Collaborative Research: Do mangroves provide better coastal protection than salt marshes? A Hurricane Harvey case study from Port Aransas, Texas, USA <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761414>

Roberto Barrios, Southern Illinois University at Carbondale: RAPID: Changing perceptions of causes and consequences in the immediate aftermath of a disaster <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760598&HistoricalAwards=false>

Michael Biggerstaff, University of Oklahoma, Norman: RAPID: Study of Landfalling Tropical Cyclones <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759479&HistoricalAwards=false>

Jonathan Bray, University of California-Berkeley: Geotechnical Extreme Events Reconnaissance (GEER) Association: Turning Disaster Into Knowledge <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1266418&HistoricalAwards=false>

Katherine Browne, Colorado State University: COLLABORATIVE RESEARCH: RAPID: How decision-making about risk and interdependencies impact well-being: A baseline study of communities affected by Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760375&HistoricalAwards=false>

Shankar Chellam, Texas A&M Engineering Experiment Station: RAPID: Water quality impacts of hurricane Harvey: Distribution of metals and diversity of microbial communities in greater Houston <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759709&HistoricalAwards=false>

Timothy Collins, University of Texas at El Paso: RAPID: Trajectories of Social Vulnerability among Houston Area Households: A Pre- and Post-event Study of Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760655&HistoricalAwards=false>

Prashant Doshi, University of Georgia Research Foundation Inc.: RAPID: Evacuate or Not? Modeling the Decision Making of Individuals in Impending Disaster Areas <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761549&HistoricalAwards=false>

Yury Dvorkin, New York University: RAPID: Transportable Energy Storage for Enhancing Power Grid Resiliency to Natural Disasters <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760540&HistoricalAwards=false>

Marc Edwards, Virginia Polytechnic Institute and State University: RAPID: Potable water hazards and resource needs in private well communities impacted by extreme flooding events <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760296&HistoricalAwards=false>

Jens Figlus, Texas A&M University: RAPID: Hurricane Harvey Rapid Response: In-Situ Barrier Island Storm Impact and Recovery Measurements of Hydrodynamics, Morphodynamics, and Sedimentation Acr. Hog and F. Island TX <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760713&HistoricalAwards=false>

Kevin Fitzpatrick, University of Arkansas: RAPID: Capital, Coping, and the Displaced: Health, Well-Being, and Resiliency Among Hurricane Harvey Evacuees <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760185&HistoricalAwards=false>

Navid Jafari, Louisiana State University & Agricultural and Mechanical College: RAPID: Collaborative: Data Driven Post-Disaster Waste and Debris Volume Predictions using Smartphone Photogrammetry App and Unmanned Aerial Vehicles <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760718&HistoricalAwards=false>

Navid Jafari, Louisiana State University & Agricultural and Mechanical College: Fast Reconstruction of Flood Hydrographs in the Houston Metropolitan Area during Hurricane Harvey Based on Image Processing and In-situ Measurements <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760582&HistoricalAwards=false>

Vikram Kapoor, University of Texas at San Antonio: RAPID: Mobilization and transport of microbial contaminants along Texas waterways following Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759963&HistoricalAwards=false>

Tracy Kijewski-Correa, University of Notre Dame: RAPID: Coordinated Structural Engineering Reconnaissance for 2017 Hurricane Irma <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761461&HistoricalAwards=false>

John Kominoski, Florida International University: Collaborative Research: Do mangroves provide better coastal protection than salt marshes? A Hurricane Harvey case study from Port Aransas, Texas, USA <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761444&HistoricalAwards=false>

Valencia Koomson, Tufts University: Collaborative Research: Ultrasensitive frequency domain spectrometer for high throughput bacteria detection in floodwater <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760500&HistoricalAwards=false>

Karen Kosiba, Center for Severe Weather Research: RAPID: Collection and Analysis of Data in Major Landfalling Hurricanes (2017) <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759461&HistoricalAwards=false>

Changzhi Li, Texas Tech University: RAPID: Low-cost Smart RF Sensor for Autonomous Floodwater Level Monitoring <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760497&HistoricalAwards=false>

Michael Lindell, University of Washington: RAPID: Risk Area Residents' Response to Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760766&HistoricalAwards=false>

Emmett Lodree, University of Alabama Tuscaloosa: RAPID/Collaborative Research: Field Study of Volunteer Convergence in Post-Disaster Relief <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760221&HistoricalAwards=false>

Hui Liu, Texas A&M University: RAPID: Urgent sampling zooplankton for assessing ecosystem restoration of Galveston Bay after catastrophic impacts of Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760463&HistoricalAwards=false>

Maria Mayorga, North Carolina State University: RAPID/Collaborative Research: Field Study of Volunteer Convergence in Post-Disaster Relief <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760193&HistoricalAwards=false>

Sheryl McCurdy, University of Texas Health Science Center Houston: RAPID: Differentiated Household Recovery Post-Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760699&HistoricalAwards=false>

Ranjana Mehta, Texas A&M University Main Campus: RAPID: Human-Robotic Interactions During Harvey Recovery Operations <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760479&HistoricalAwards=false>

David Merrick, Florida State University: RAPID: Collaborative Research: Unmanned Aerial System Datasets from Hurricanes Harvey and Irma <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1762139&HistoricalAwards=false>

Michelle Meyer, Louisiana State University & Agricultural and Mechanical College: Structures of Long-Term Disaster Recovery: Organizational Roles and Collaboration in Six Cities <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1463847&HistoricalAwards=false>

Michelle Meyer, Louisiana State University & Agricultural and Mechanical College: RAPID: Organizational Development in Response to Crisis <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760344&HistoricalAwards=false>

Paul Montagna, Texas A&M University: RAPID: Capturing the Signature of Hurricane Harvey on Texas Coastal Lagoons <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760006&HistoricalAwards=false>

Rebecca Morss, University Corporation for Atmospheric Research: Hazard Prediction and Communication Dynamics in the Modern Information Environment <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1331490&HistoricalAwards=false>

Ali Mostafavi, Texas A&M Engineering Experiment Station: RAPID: Houston in Hurricane Harvey (H3): Establishing Disaster System-of-Systems Requirements for Network-Centric and Data-Enriched Preparedness and Response <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759537&HistoricalAwards=false>

Ali Mostafavi, Texas A&M Engineering Experiment Station: RAPID: Assessment of Risks and Vulnerability in Coupled Human-Physical Networks of Houston's Flood Protection, Emergency Response, and Transportation Infrastructure in Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760258&HistoricalAwards=false>

Robin Murphy, Texas A&M Engineering Experiment Station: RAPID: Collaborative Research: Unmanned Aerial System Datasets from Hurricanes Harvey and Irma <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1762137&HistoricalAwards=false>

Caela O'Connell, University of Tennessee Knoxville: COLLABORATIVE RESEARCH: RAPID: How decision-making about risk and interdependencies impact well-being: A baseline study of communities affected by Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760662&HistoricalAwards=false>

Jamie Padgett, William Marsh Rice University: Numerical and Probabilistic Modeling of Aboveground Storage Tanks Subjected to Multi-Hazard Storm Events <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1635784&HistoricalAwards=false>

Christopher Patrick, Texas A&M University: RAPID: Measuring the response of stream communities to Hurricane Harvey across a semi-arid to sub-humid gradient <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761677>

Steven Pennings, University of Houston: Collaborative Research: Do mangroves provide better coastal protection than salt marshes? A Hurricane Harvey case study from Port Aransas, Texas, USA <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761428&HistoricalAwards=false>

Anand Puppala, University of Texas at Arlington: RAPID: Collaborative: Data Driven Post-Disaster Waste and Debris Volume Predictions using Smartphone Photogrammetry App and Unmanned Aerial Vehicles <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760715&HistoricalAwards=false>

Rajeev Ramchand, Rand Corporation: RAPID: A Longitudinal Assessment of Risk and Resilience in the Gulf of Mexico Following Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760484&HistoricalAwards=false>

Hanadi Rifai, University of Houston: RAPID: Chemical and Microbiological Quality of Floodwaters in Houston Following Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759440&HistoricalAwards=false>

Nathanael Rosenheim, Texas A&M University: RAPID: Critical Infrastructure Disruption and the Food Distribution Network: The Implications for Food Security Following a Natural Disaster <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760726&HistoricalAwards=false>

David Roueche, Auburn University: RAPID: Collection of Perishable Data on Wind- and Surge-Induced Residential Building Damage in Texas during 2017 Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759996&HistoricalAwards=false>

Shayla Sawyer, Rensselaer Polytechnic Institute: Collaborative Research: Ultrasensitive frequency domain spectrometer for high throughput bacteria detection in floodwater <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760404&HistoricalAwards=false>

Saundra Schneider, Michigan State University: RAPID: Public Perceptions of Success and Failure in the Governmental Response to Natural Disasters <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760254&HistoricalAwards=false>

Jason Senkbeil, University of Alabama Tuscaloosa: RAPID: Social and Geophysical Influences on Evacuation Decision Making for Hurricane Irma <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760235&HistoricalAwards=false>

Roxane Silver, University of California-Irvine: RAPID: Responding to the Risk of Hurricanes Harvey and Irma: Choices and Adjustment Over Time <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760764&HistoricalAwards=false>

Kimberley Shoaf, University of Utah: Evacuation Decision-making process of Hospital Administrators in Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760653&HistoricalAwards=false>

Lauren Stadler, William Marsh Rice University: RAPID: Assessment and treatment of flood-contaminated water sources and hot-spots of microbial contaminants in post-Harvey Houston <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1759457&HistoricalAwards=false>

Keri Stephens, University of Texas at Austin: RAPID: The Changing Nature of "Calls" for Help with Hurricane Harvey: Comparing 9-1-1 and Social Media <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760453&HistoricalAwards=false>

David Tarboton, Utah State University: RAPID:Archiving and Enabling Community Access to Data from Recent US Hurricanes <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1761673&HistoricalAwards=false>

John Taylor, Georgia Tech Research Corporation: RAPID: Discovering Crises Within Crises - Real-Time Detection, Tracking and Visualization of Emergent Crises in Hurricanes <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760645&HistoricalAwards=false>

Firat Testik, University of Texas, San Antonio: RAPID: Hurricane-Driven Beach Sand Sorting from Dune to Shoreline: The Case of Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760158&HistoricalAwards=false>

Brian Tomaszewski, Rochester Institute of Technology: Geographic Information Systems (GIS) for Disaster Resilience Spatial Thinking <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1659735&HistoricalAwards=false>

Satish Ukkusuri, Purdue University: CRISP Type 2/Collaborative Research: Critical Transitions in the Resilience and Recovery of Interdependent Social and Physical Networks <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1638311&HistoricalAwards=false>

J. Arn Womble, West Texas A&M University: RAPID: Preservation of 3D Damage Data for Reality-Capture-Enhanced Modeling of Engineered Steel Structures on the Texas Coast Subjected to 2017 Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760010&HistoricalAwards=false>

Le Xie, Texas A&M Engineering Experiment Station: RAPID: Powering through the hurricane: self-organizing power electronics intelligence at the network edge <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760554&HistoricalAwards=false>

Nathan Yee, Rutgers University, New Brunswick: RAPID: Transformation of Elemental Mercury Dispersed by Flooding During Hurricane Harvey <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760534&HistoricalAwards=false>

Jun Zhuang, SUNY at Buffalo: RAPID: Identification of Key Dynamics for Rumor Spread and Control during Hurricanes Harvey and Irma <https://www.nsf.gov/awardsearch/showAward?AWD_ID=1760586&HistoricalAwards=false>

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Hurricane Harvey's torrential rains led to tremendous floods in Texas.
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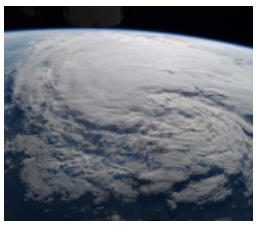

Bearing down on the U.S.: Harvey in the days before it made landfall.
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First responders from across the U.S. came to the rescue during floods from Harvey's rains.
Credit and Larger Version (/news/news_images.jsp?cntn_id=243293&org=NSF)

Shortly after Hurricane Harvey, Hurricane Irma headed for the U.S., here over the Virgin Islands.
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Irma's gales swept across South Florida in this image taken near Naples, Florida.
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Media Contacts
Cheryl Dybas, NSF, (703) 292-7734, cdybas@nsf.gov (mailto:cdybas@nsf.gov)

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