Conclusion and Update on Hurricane Fiona

NCST Advisory Committee Meeting
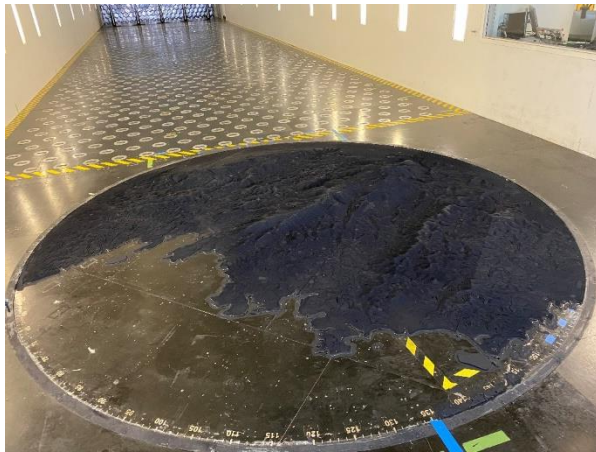
June 14, 2023

Maria Dillard

Associate Team Lead

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
U.S. DEPARTMENT OF COMMERCE

Data Collection Status: NCST Investigation Projects

Subsequent slides present project-by-project status of data collection for NCST Investigation Projects

Hazard Characterization

Performance of Critical Buildings

Public Response to Emergency Communications

Morbidity & Mortality

Hazard Characterization

NIST

Objective: *Document and understand wind environment and other hazards including storm surge, rainfall, flooding, and landslides*

Data Collection Status:

Wind Tunnel Testing of Topographic Models ✓ *University of Florida*	**Meteorological Data for Wind Field Model** ✓ *Applied Research Associates*
Field Measurements of Winds on Cell Towers (2 years) ✓ *University of Florida / WeatherFlow*	**Data on rainfall, storm surge, flooding and landslides** ✓

Performance of Critical Buildings

Objective: *Evaluate how critical buildings performed (hospitals and shelters) – including dependence on electricity, water, and other infrastructure*

Data Collection Status:

Facility Evaluations: 5 hospitals, 5 shelters

Phase 1: Document collection and review ✓

Phase 2: Site visits and interviews

Expected Completion by Fall 2023

Stantec Consulting

Wind Tunnel Testing of Two Hospitals ✓

University of Florida

Public Response to Emergency Communications

Objective: *Document role of emergency communications and public's response – focusing on communications during and immediately after hurricane*

Data Collection Status:

Information Provider Interviews ✔	Household Surveys ✔
Horsley Witten	*Horsley Witten*
Public Messages for Qualitative Content Analysis ✔	Household Interviews ✔
	Horsley Witten

Morbidity and Mortality

Objective: *Better understand how damaged buildings, and failures in supporting infrastructure, played a role in injuries and deaths*

Data Collection Status:

Verbal Autopsy and Social Environmental Survey ✓ *GW-UPR*	Integrated Database of Deaths in Puerto Rico ✓ *GW-UPR*
Medical Records and Hospital Functions Review ✓ *GW-UPR*	Spatial and Temporal Data for Analysis of Deaths ✓ *GW-UPR*

Subsequent slides present project-by-project status of data collection for NWIRP Research Projects

**Impacts to
and Recovery of
Infrastructure Systems**

**Recovery of
Business and
Supply Chains**

**Recovery of
Social Functions**

Impacts to and Recovery of Infrastructure Systems

Objective: *Evaluate dependencies of building function on infrastructure (power, water, and transportation) and causes of the loss of functionality and extended-duration outage of the wireless communication system*

Data Collection Status:

Structured Interviews on Infrastructure Dependencies *Horsley Witten* *Expected Completion by Winter 2023/24*	**Transportation Incident Database** ✔
Satellite Remote-Sensing Data on Tree Canopy Cover ✔	**Aerial Imagery of Cell Towers** ✔

Recovery of Business and Supply Chains

Objective: *Study recovery of small- and medium-sized businesses (in manufacturing, retail, and service sectors) and supply chain disruption*

Data Collection:

Business Disruption and Recovery

Surveys of Small and Medium-Sized Manufacturers ✓

Horsley Witten

Surveys of Small and Medium-Sized Retail and Service Businesses ✓

Horsley Witten

Supply Chains

Interviews of Shipping and Transportation Representatives ✓

Horsley Witten

Recovery of Social Functions

NIST

Objective: *Examine recovery of schools and hospitals, including physical repairs, services, and staffing*

Data Collection Status:

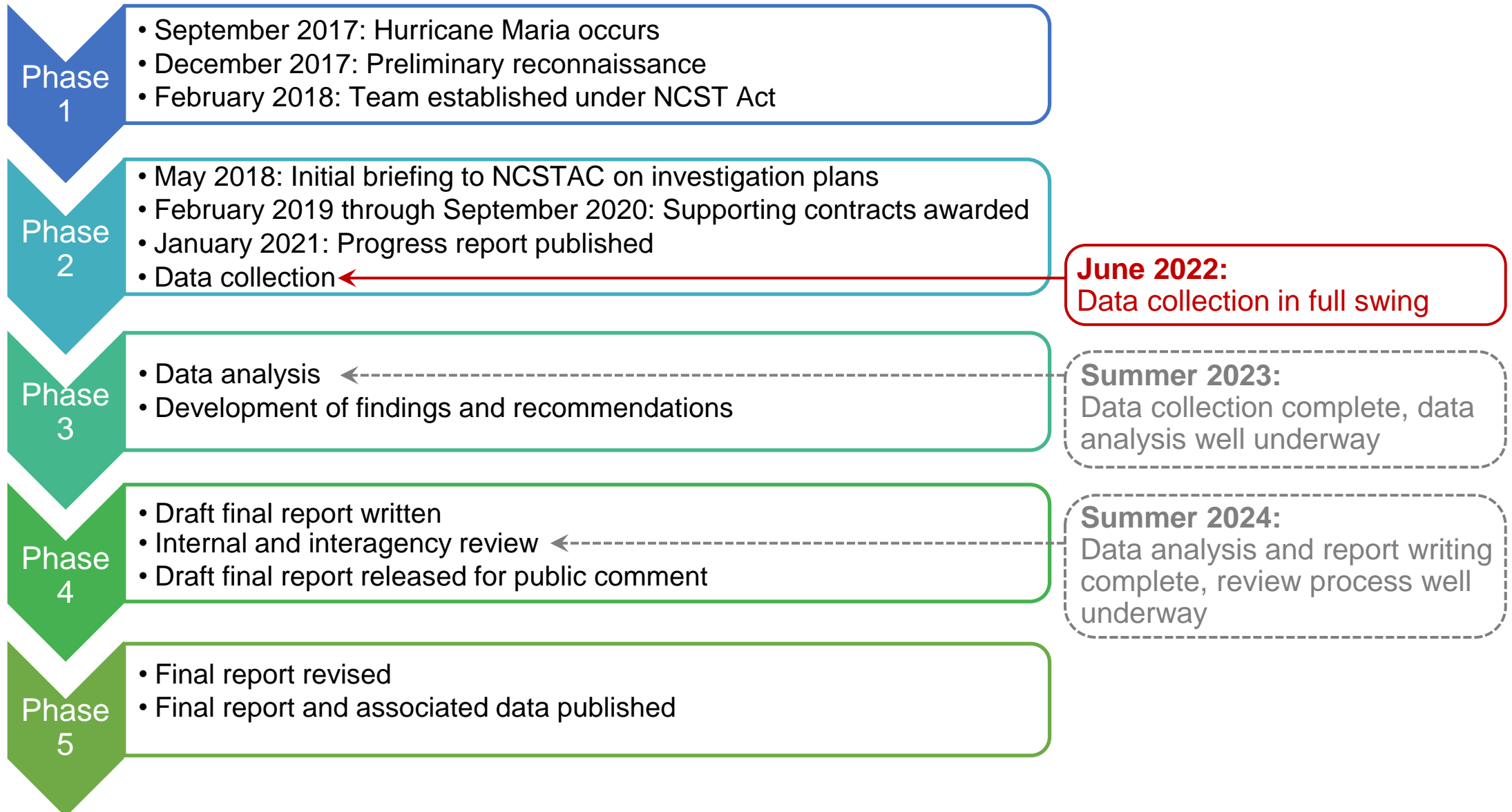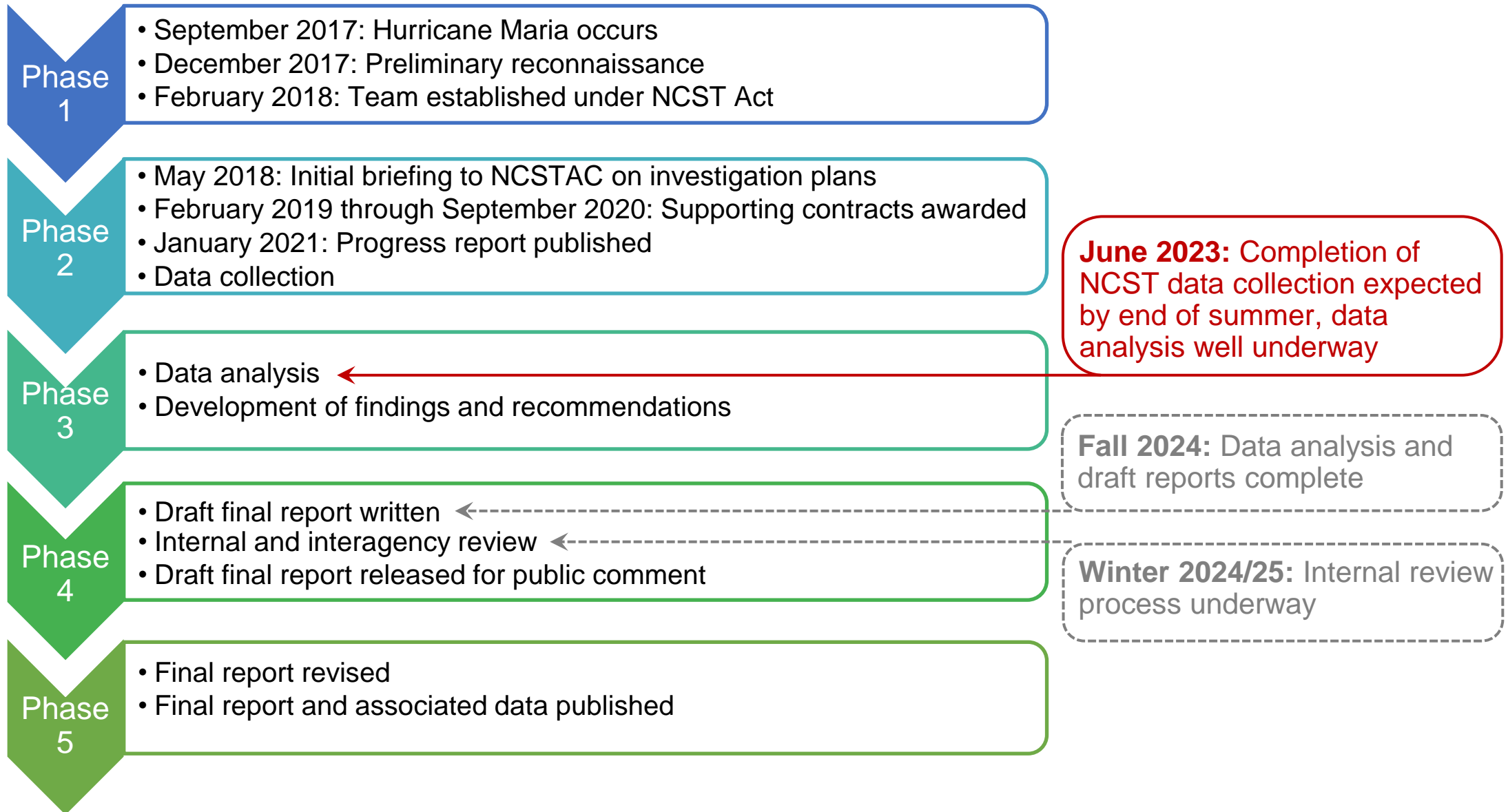|	
Wave 1 School Surveys ✔ *Horsley Witten*	**Wave 1 Hospital Surveys** ✔ *Horsley Witten*
School Interviews *Horsley Witten* *Expected Completion by Fall 2023*	**Hospital Interviews** *Horsley Witten* *Expected Completion by Fall 2023*

Expected Timeline: from June 2022

Phase 1
- September 2017: Hurricane Maria occurs
- December 2017: Preliminary reconnaissance
- February 2018: Team established under NCST Act

Phase 2
- May 2018: Initial briefing to NCSTAC on investigation plans
- February 2019 through September 2020: Supporting contracts awarded
- January 2021: Progress report published
- Data collection

June 2022:
Data collection in full swing

Phase 3
- Data analysis
- Development of findings and recommendations

Summer 2023:
Data collection complete, data analysis well underway

Phase 4
- Draft final report written
- Internal and interagency review
- Draft final report released for public comment

Summer 2024:
Data analysis and report writing complete, review process well underway

Phase 5
- Final report revised
- Final report and associated data published

Expected Timeline: June 2023 Update

Phase 1
- September 2017: Hurricane Maria occurs
- December 2017: Preliminary reconnaissance
- February 2018: Team established under NCST Act

Phase 2
- May 2018: Initial briefing to NCSTAC on investigation plans
- February 2019 through September 2020: Supporting contracts awarded
- January 2021: Progress report published
- Data collection

June 2023: Completion of NCST data collection expected by end of summer, data analysis well underway

Phase 3
- Data analysis
- Development of findings and recommendations

Fall 2024: Data analysis and draft reports complete

Phase 4
- Draft final report written
- Internal and interagency review
- Draft final report released for public comment

Winter 2024/25: Internal review process underway

Phase 5
- Final report revised
- Final report and associated data published
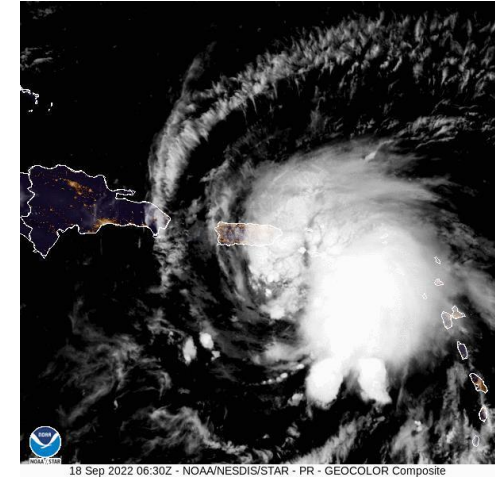
Update on Hurricane Fiona

- NIST's Engineering Laboratory received $40M in additional funding through a disaster supplemental appropriation "…for the development of resilience standards with regard to weather and climate disasters, and for necessary expenses to carry out investigations of building failures pursuant to the National Construction Safety Team Act of 2002".

- These funds will support extension of the HM Program to consider impacts of Hurricane Fiona, including:
  - **Hazard Characterization:** Assessment of the hazard, specifically wind and rainfall
  - **Critical Building Performance:** Evaluation of Hurricane Fiona's impacts on hospitals and shelters selected for evaluation in the Hurricane Maria NCST Investigation
  - **Recovery of Infrastructure:** Assessment of impacts on infrastructure systems and their interdependencies (e.g., power, water, transportation)
  - **Recovery of Social Functions:** Evaluation of physical and non-physical impacts of Hurricane Fiona as well as effects on recovery from Hurricane Maria

- Observations from Hurricane Fiona are expected to provide context to inform recommendations from the Hurricane Maria NCST Investigation

Hurricane Fiona: Progress

The Team has begun the assessment of impacts through:

- Incorporating Hurricane Fiona-related interview questions into ongoing Phase 2 evaluations of selected shelters and hospitals for the *Critical Buildings Project*
  - Data Collection in progress
- Incorporating Hurricane Fiona impact assessment into Wave 2 Survey of Schools and Hospitals for the *Recovery of Social Functions Project,* along with questions about the effect of Hurricane Fiona on recovery from Hurricane Maria
  - IRB and OMB/PRA Approvals obtained March 2023
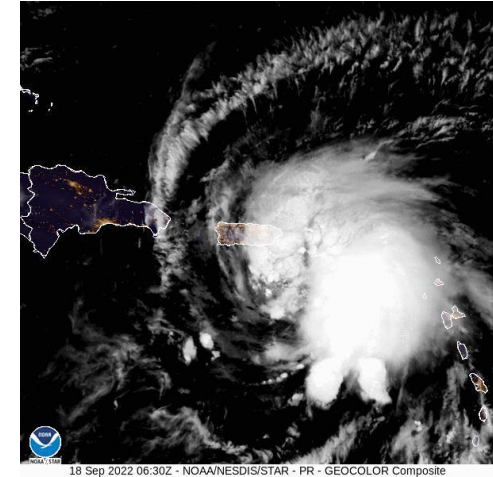 - Data Collection began May 2023

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Hurricane Fiona

Hurricane Fiona: Progress

Since the Disaster Relief Supplemental Appropriation Act passed in December 2022, the Team has allocated funds for:

- Extending staffing via NIST's Professional Research Experience Program (PREP) to support rainfall analysis for Hurricane Fiona and comparisons with Hurricane Maria

- Initiation of a new procurement for a contractor to support the development of a wind-field model for Hurricane Fiona

- Initiation of a new procurement for a contractor to support preparation and delivery of technical reports that provide findings and recommendations regarding the impacts of Hurricane Maria on Puerto Rico, as well as the impacts of Hurricane Fiona on the long-term recovery.

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Hurricane Fiona

Questions?

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www.nist.gov/topics/disaster-failure-studies/hurricane-maria