Smart Sea Level Sensors in Chatham County


Source: goldenisles.com

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Photo: Sean Compton, FOX5 Atlanta

Sunny Day Flooding

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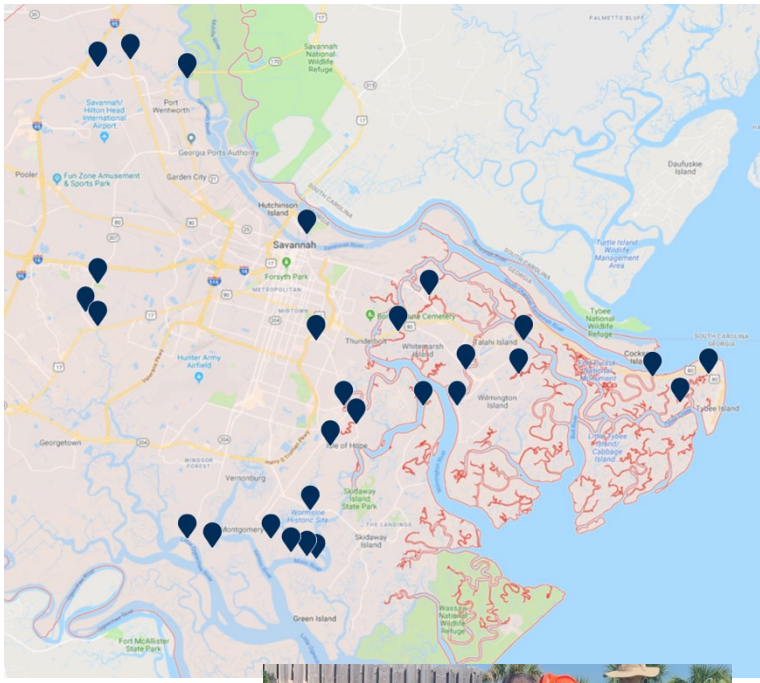
Saturday Morning

Sunday Morning

Project Overview

A high-density deployment of smart sea level sensors to provide hyper-local, real-time water level data across the community.



Goals:

- ***emergency planning & response***
  real-time data portal & toolkits
- ***short- and long-term risk assessment and resilience planning***
- ***develop & test educational resources***
  middle & high school curricula
- ***communication and awareness***
  public events, installations, website

See more details at http://sealevelsensors.org


Skidaway Institute of Oceanography
UNIVERSITY OF GEORGIA
GEORGIA CLIMATE PROJECT
NATIONAL WEATHER SERVICE
TYBEE ISLAND MARINE SCIENCE CENTER
SAVANNAH COLLEGE OF ART AND DESIGN
EMERGENCY MANAGEMENT CHATHAM COUNTY
SAVANNAH
savannahga.gov
Sea Grant Georgia
Georgia Tech
HARAMBEE HOUSE
Citizens for Environmental Justice
UNIVERSITY of HAWAI'I MĀNOA
SAGIS
Savannah Area Geographic Information System
100 MILES
OCS
OGLETHORPE CHARTER SCHOOL
1999
cmcc
SCHOOL OF ENGINEERING
HERSCHEL V. JENKINS
ALMA MATER STUDIORUM
A.D. 1088
the creative coast
Communities of Coastal Georgia Foundation
WOODVILLE TOMPKINS
SAVANNAH STATE UNIVERSITY
GEORGIA SMART COMMUNITIES CHALLENGE
Georgia Tech
NSF
SECOORA
Southeast Coastal Ocean Observing Regional Association
GEORGIA
DEPARTMENT OF NATURAL RESOURCES
COASTAL RESOURCES DIVISION

ultrasonic sensor:

- $300 in parts
- powered by D-cell batteries or small solar cell
- LoRaWAN communications
- installed on bridges, docks
- low installation and maintenance costs

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SCHOOL OF ENGINEERING
HERSCHEL V. JENKINS

LoRa Alliance™
Wide Area Networks for IoT

THE THINGS NETWORK

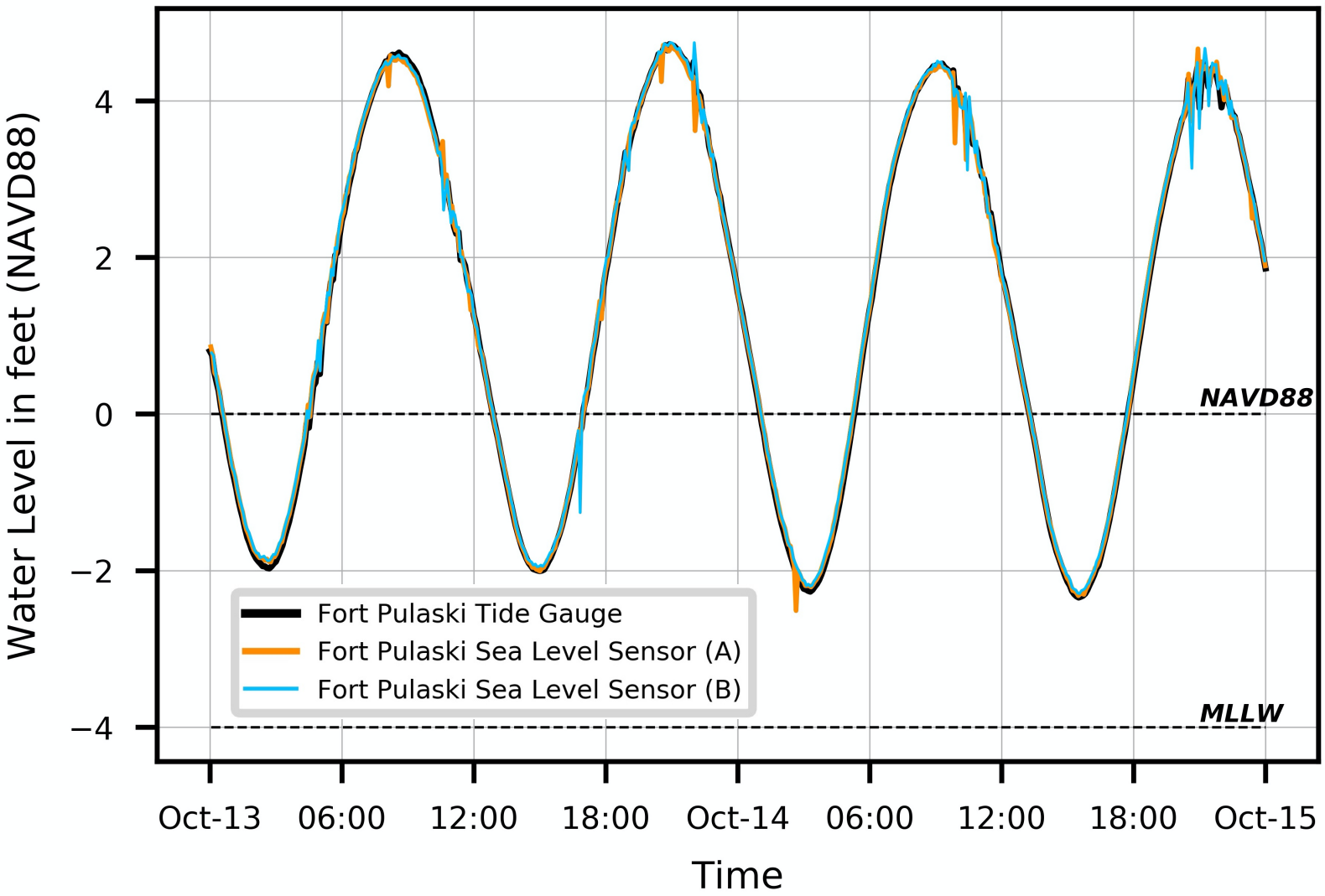
gateway device:
- roughly $1,500
- 1 to 4 mile range
- can serve hundreds of sensors
- needs internet, power

goal:
provide backbone for diverse IoT applications (temp, humidity, air quality)

LoRa Alliance™
Wide Area Networks for IoT

THE THINGS NETWORK

Comparing two GT sensors with Ft. Pulaski NOAA gauge



average residuals between GT sensors and Ft. Pulaksi = less than 1”, maximum 6”

Decision Support Tools

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public data portal (dashboard.sealevelsensors.org)
-browse sensor data past and present
-slider for visualizing flooding from past flood events, future flood events

emergency planning portal
-access real-time water level data, flag bridges, critical infrastructure for flood risk

3-day flood forecasts (in development)
-validation with sensor data streams underway

Dashboard

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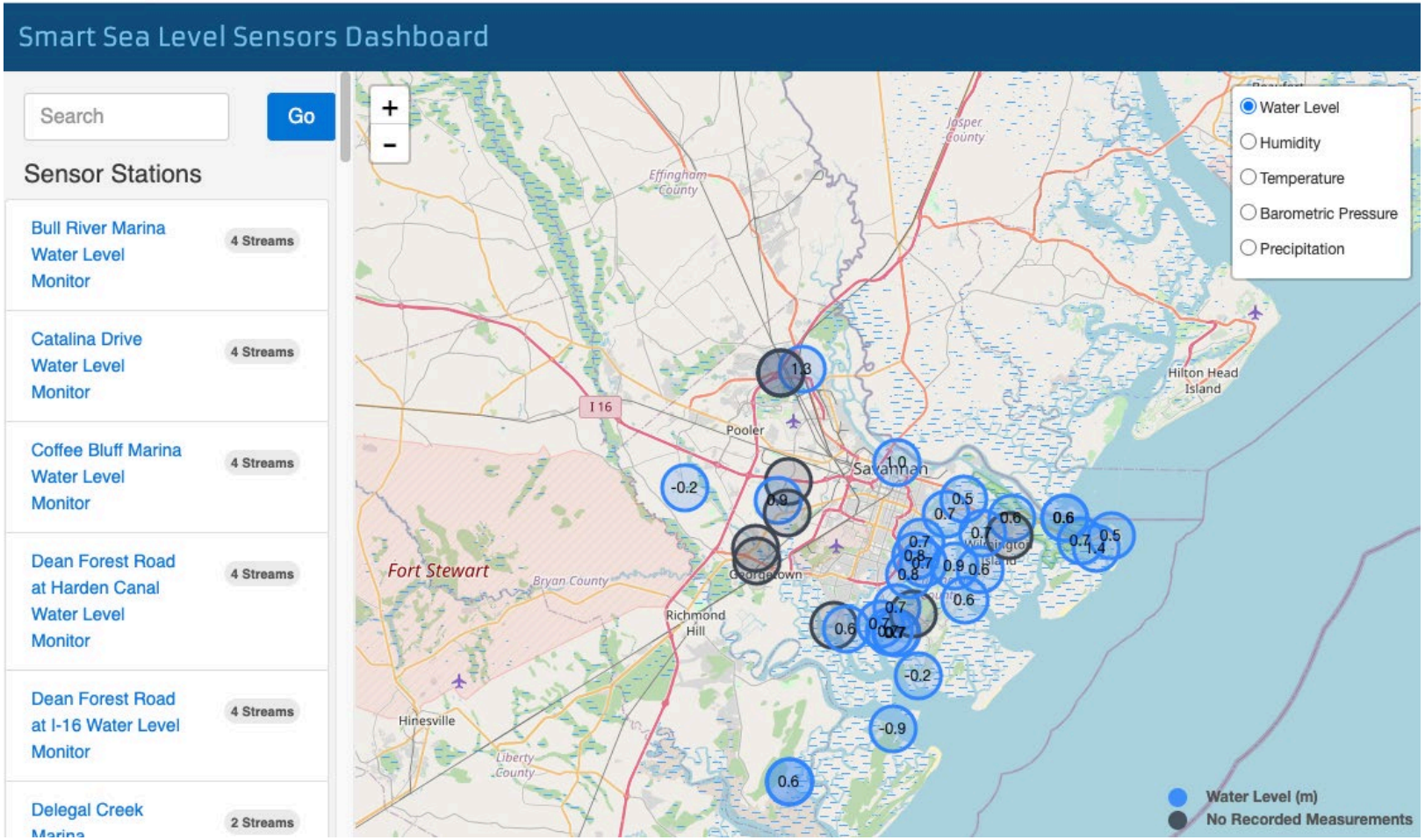

https://dashboard.sealevelsensors.org

Dashboard

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Turner Creek Boat Ramp Water Level Monitor

API Link

SensorThings ID: 55

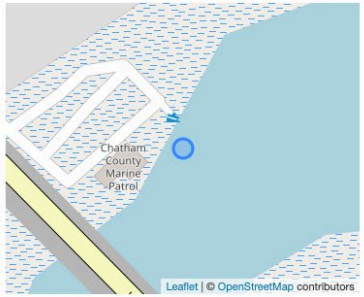
Device ID:

Location Description: Boat ramp near Johnny Mercer Blvd overpass

Sensor NAVD 88 Elevation: 2.492

Sensor Coordinates: (-80.991889, 32.020471)

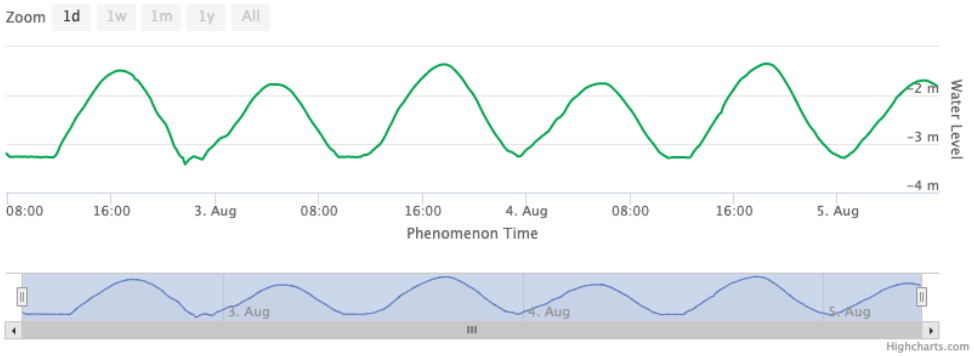
Sensor Notes: Installed 5/6/19 on South side of pedestrian dock next to boat ramp. Initially had issues with interference from the dock. 7/8/19: firmware 1.4, adjust mounting to remove obstructions, alkaline batteries 7/25/20: firmware 1.5, pressure vent, alkaline batteries.



Sensor Images:

Datastream of water level measurements relative to fixed position of the sensor

840 Observations



Details Download CSV

https://dashboard.sealevelsensors.org

Chatham Emergency Management Agency (CEMA) Portal

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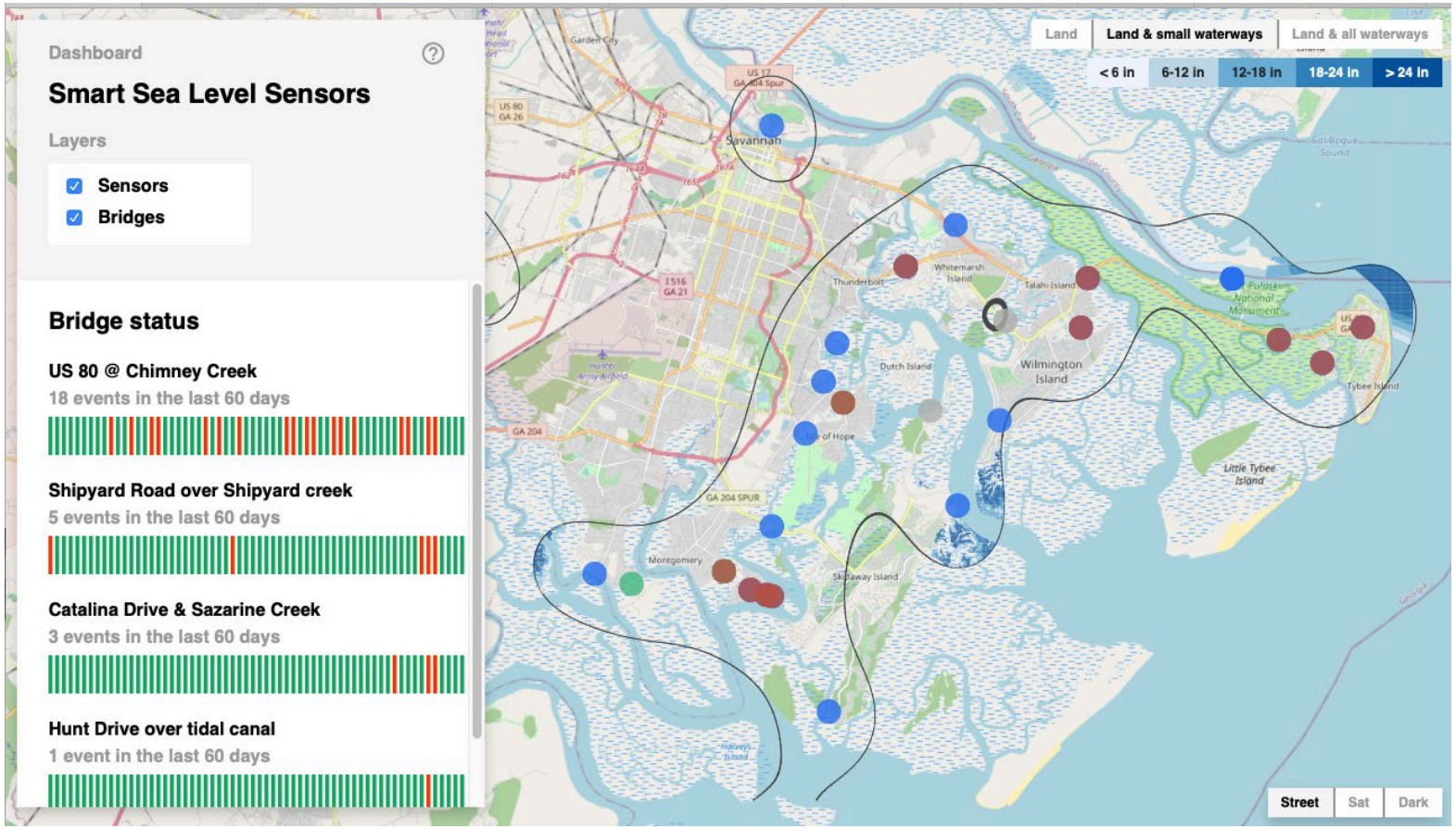
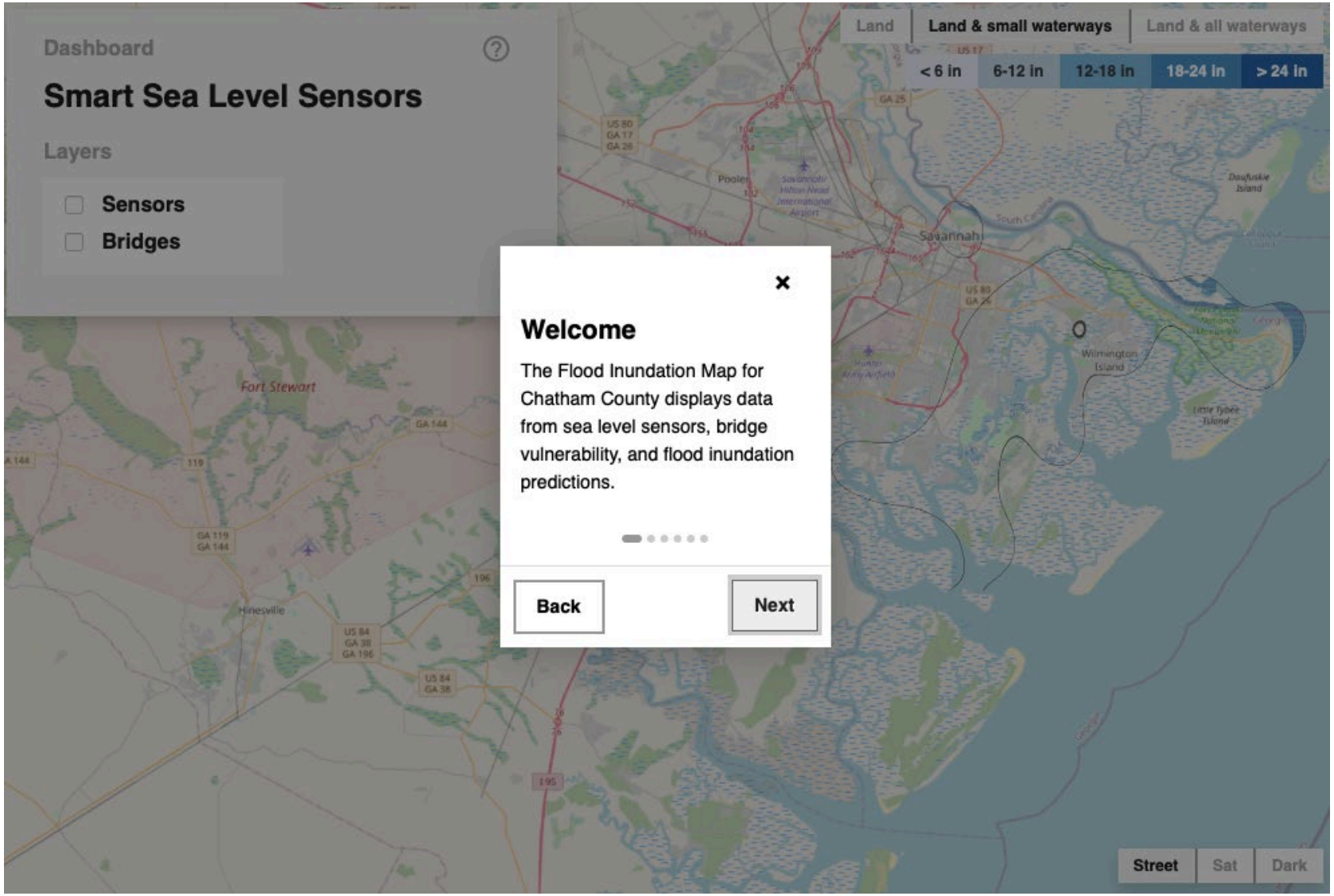
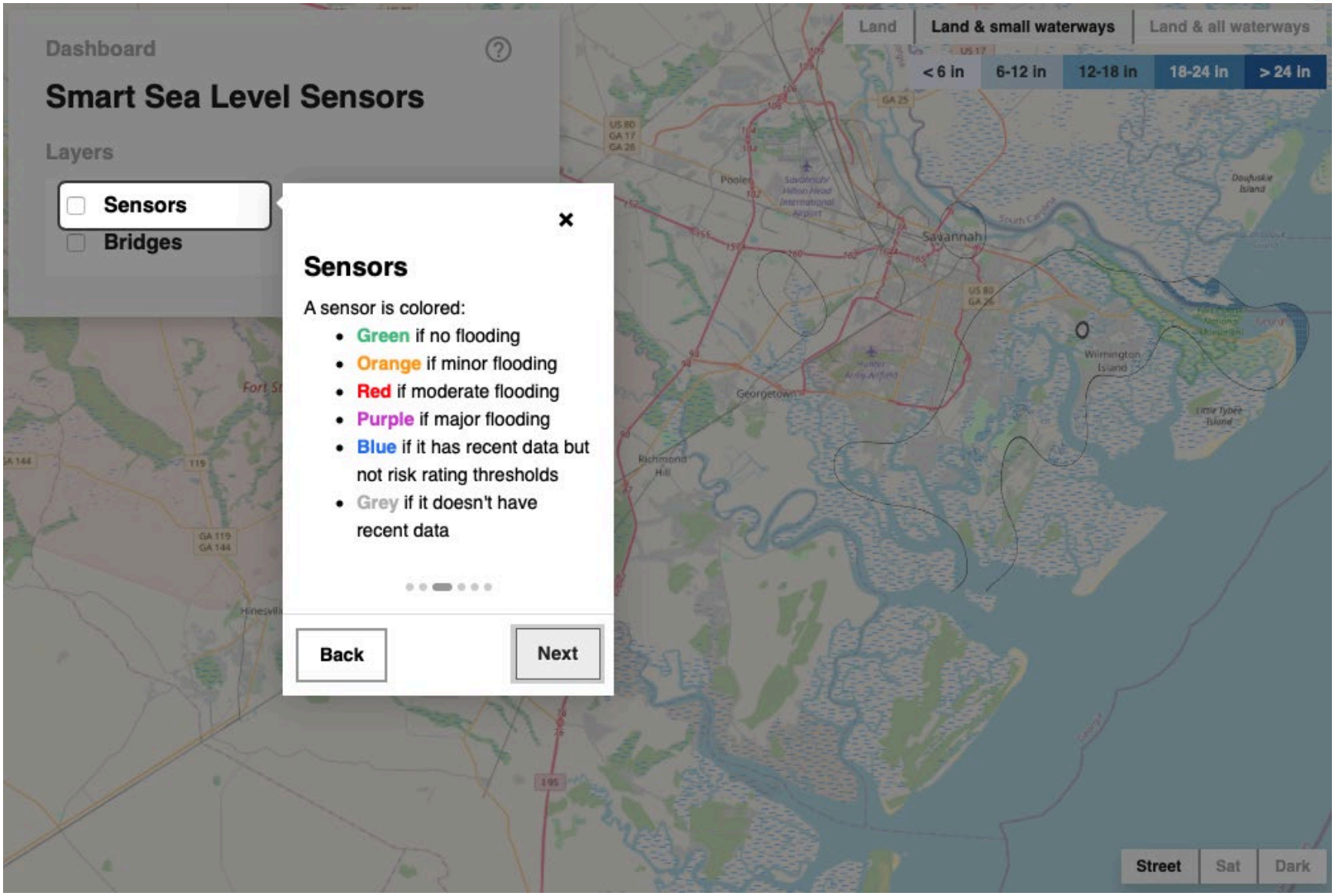
Developing tools for emergency management users



Portal Overview



Sensor Layer



Sensor Layer

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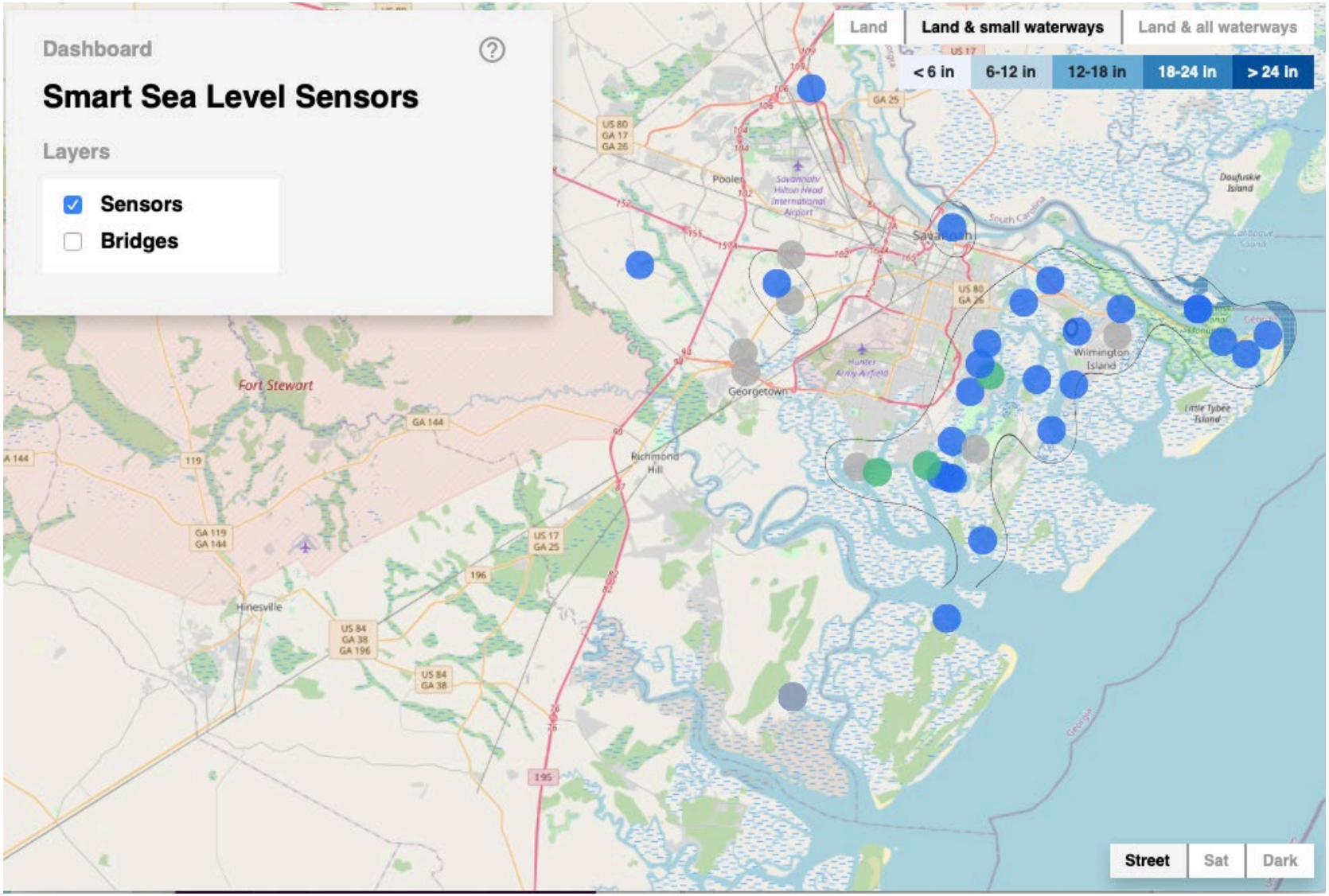
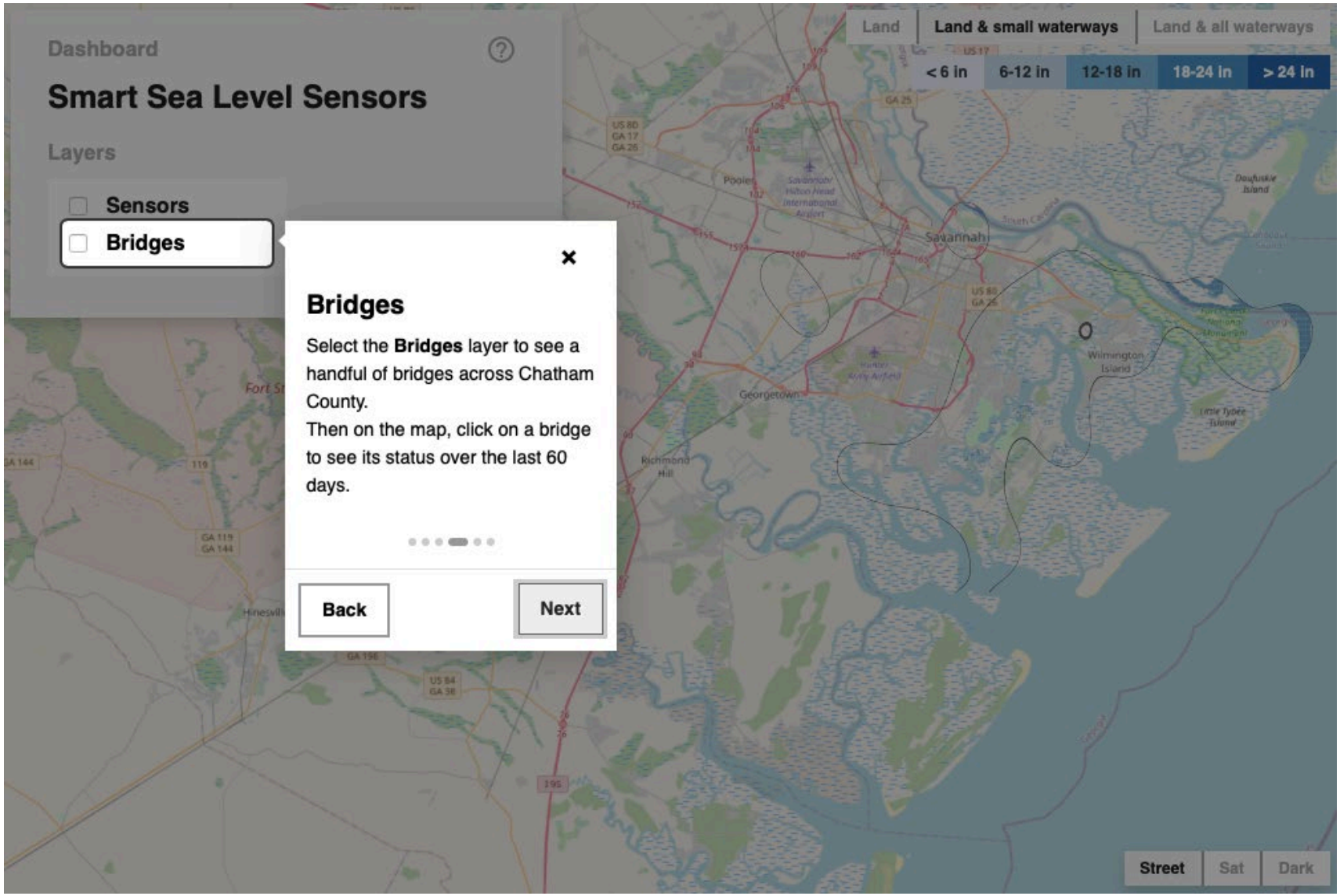
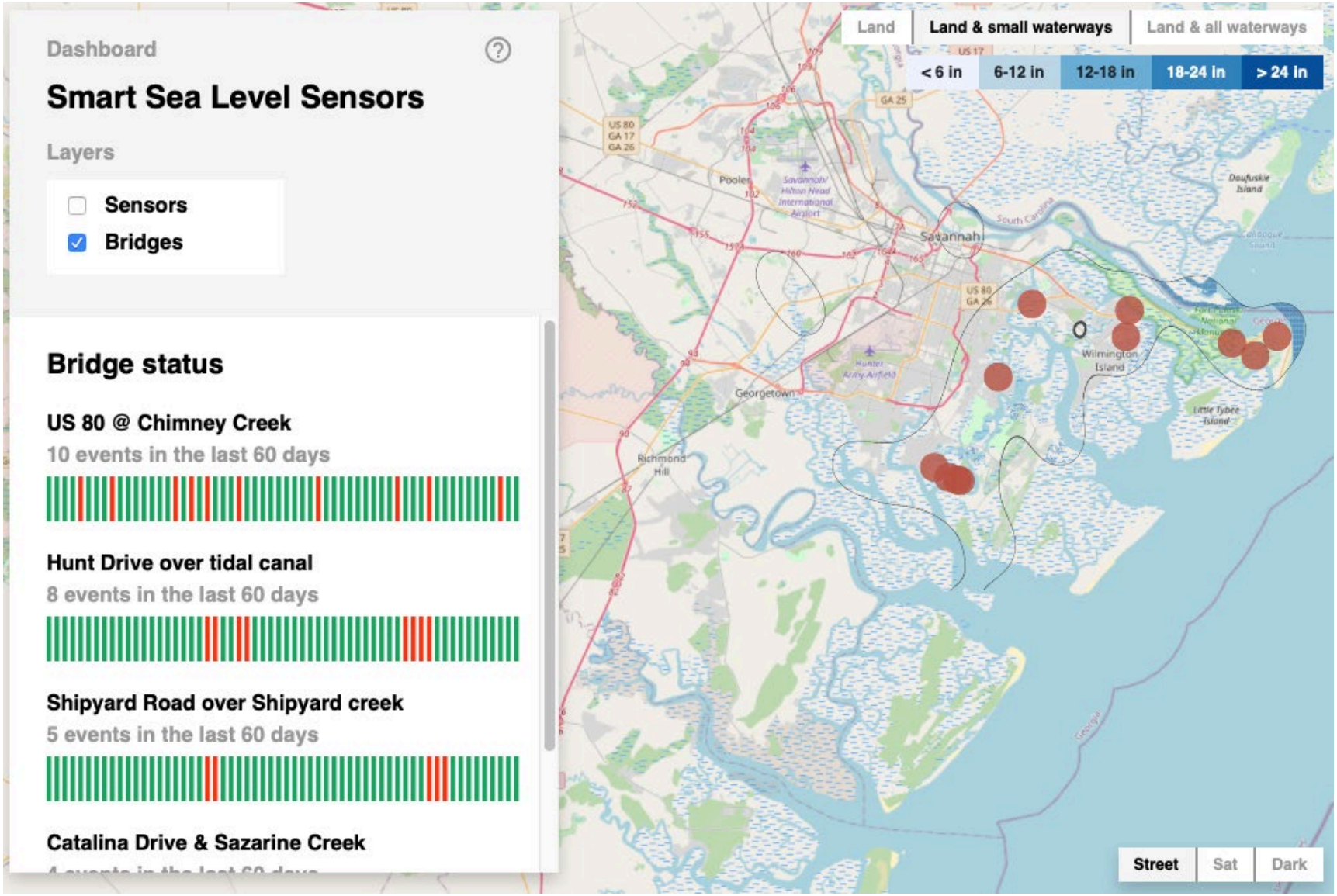


Bridge Layer



Bridge Layer



Inundation Models

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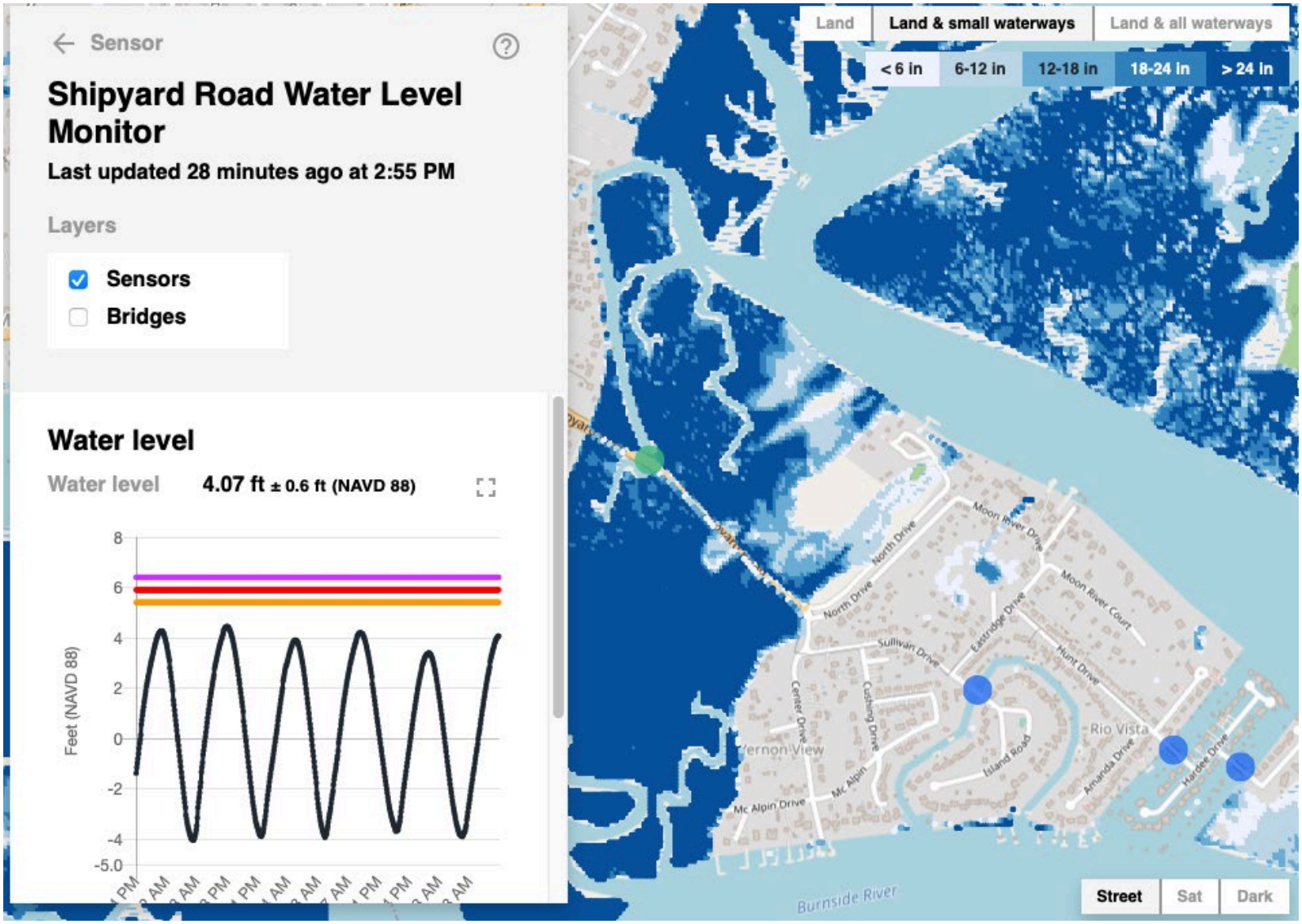

Modeling Research Team

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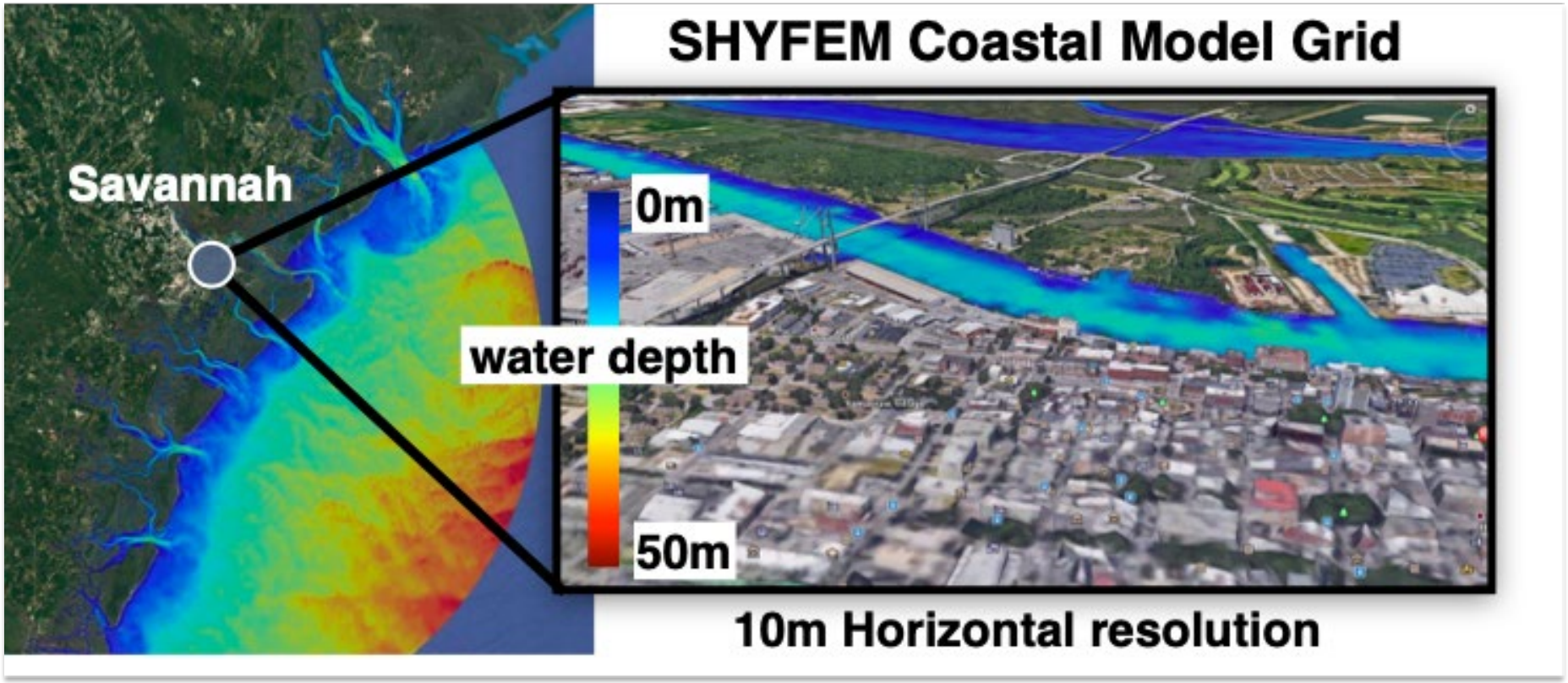
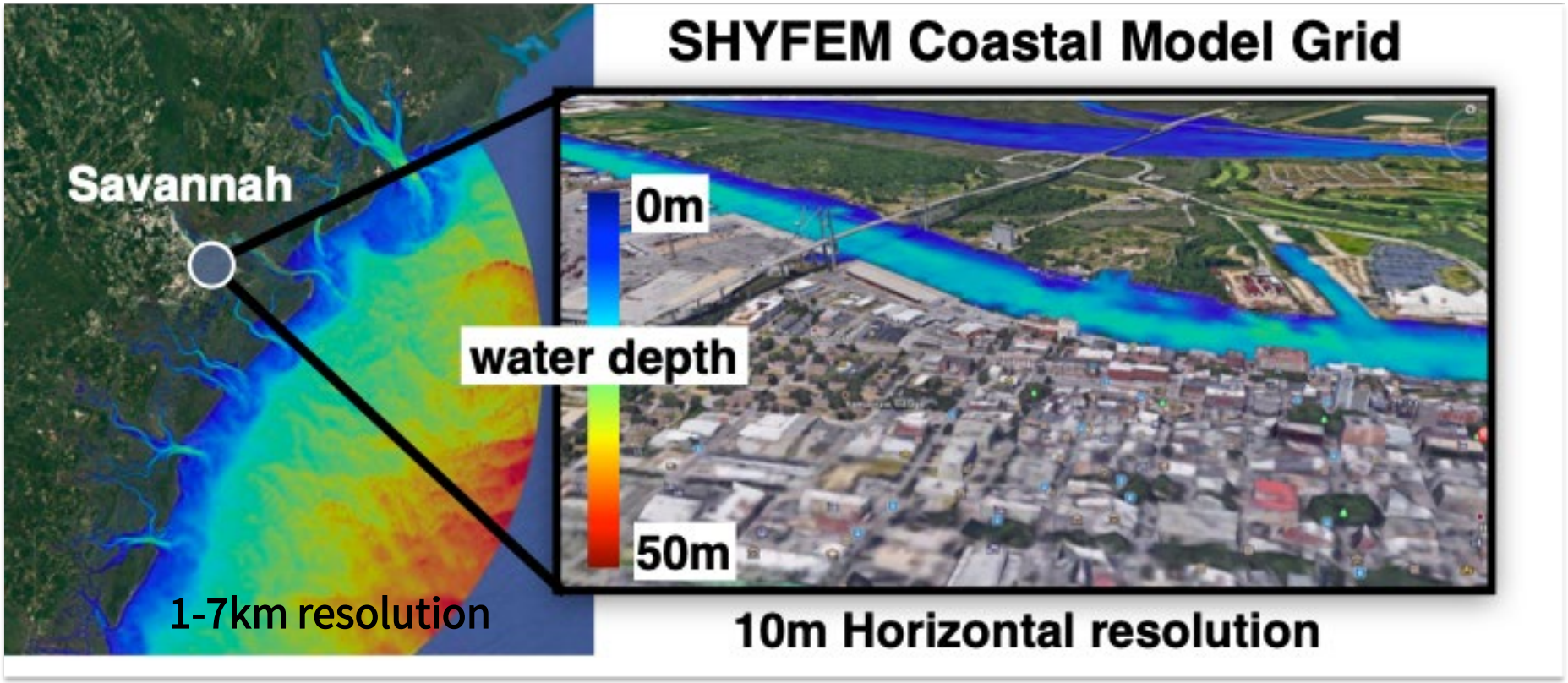
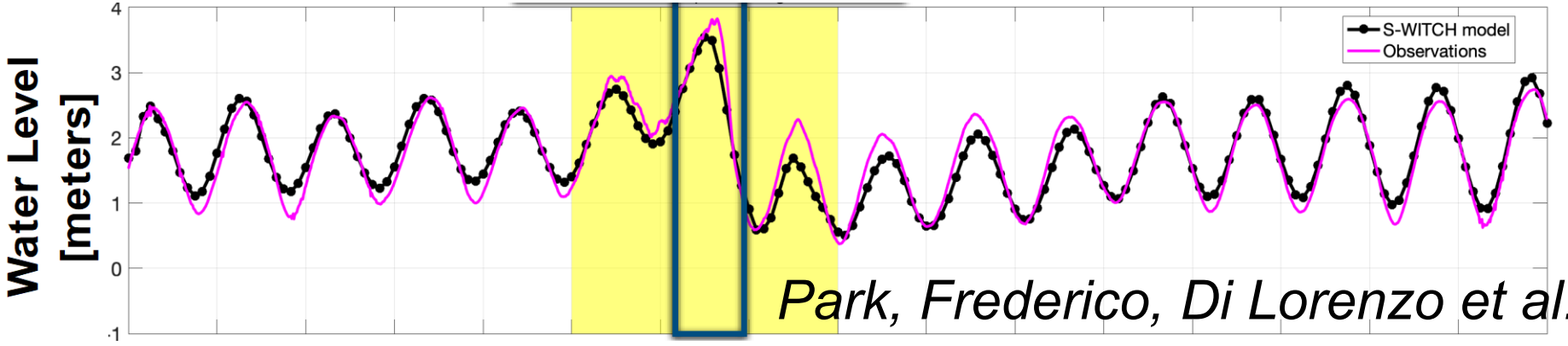
Led by Dr Emanuele Di Lorenzo



Di Lorenzo, Frederico, Pinardi et al.



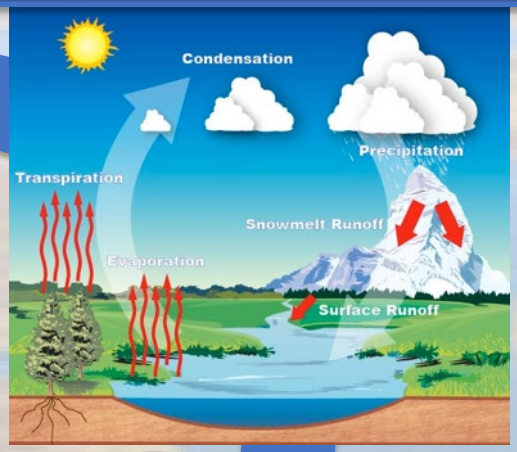
Hurricane Matthew – data/model comparison



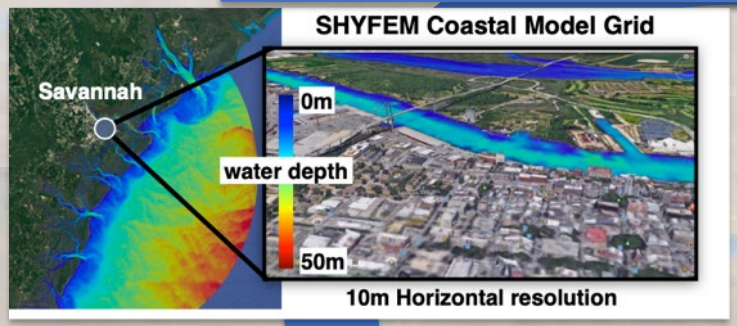
Park, Frederico, Di Lorenzo et al.

Future goals
integrated forecasts of compound risk

Regional Atmosphere & Land Hydrology Model



Coastal Water and Ocean Model



Urban Flooding Models with Infrastructure

Di Lorenzo, Pinardi et al.
Lozano, Tien et al.

Educational Partnerships

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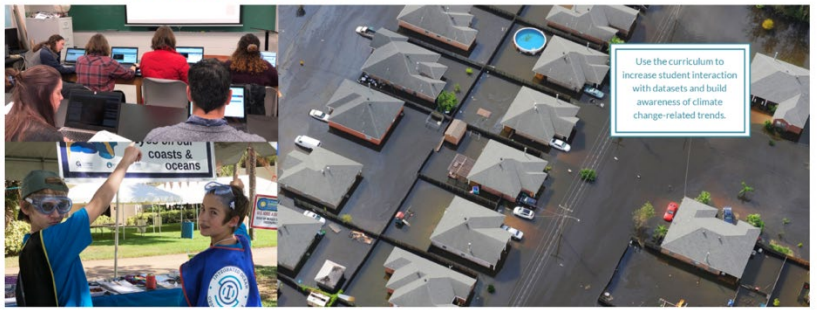
Woodville Tompkins Technical & Career High School

SCHOOL OF ENGINEERING HERSCHEL V. JENKINS

SCCPSS

Sea Level Rise Curriculum



Coastal communities are experiencing an increase in coastal flooding due to storms, king tides, and sea level rise. Educating students on these issues is not only a great science and math exercise, it increases informed-decision making on adapting to climate change-related trends.

- developed by Dr. Alex Robel and Jayma Koval
- webinars for teachers available online at:

https://secoora.org/education-outreach/sea-level-rise-curriculum/

”Map Room”

Dr. Yanni Loukissas
Georgia Tech

Community engagement
& curriculum dev’t

Community Engagement

[SCC CIVIC-FA Track B] Visualizing Resilience: BIPOC Youth Advocacy through Mapmaking

Led by Dr Allen Hyde, School of History and Sociology

- Harambee House: Dr. Mildred McClain, Dawud Shabaka
- City of Savannah Office of Sustainability: Nick Deffley
- Savannah State: Dr Philip Omunga
- GT Team: Yanni Loukissas, Nisha Botchwey, Kim Cobb, Ruth Yow, Meltem Alemdar, Iris Tien, Russ Clark

- Planning grant awarded, new proposal submitted May 5 for $1M
- Deep educational focus for Black, Indigenous, and People of Color youth

Keys to our success

- partnerships with city, county officials from Day 1
- frequent team calls, public workshops
- deep investments by entire research team
- incredible student researchers, interns

Moving forward

- SECOORA project, expand and sustain
- Continued engagement at all levels