FloodNet

Hyperlocal, Street-level Flood Monitoring in New York City

CKE Flooding Working Group Meeting, *11/6/2023*

NYU

SCIENCE+ RESILIENCE INSTITUTE JAMAICA BAY · NYC

ADVANCED SCIENCE RESEARCH CENTER
THE GRADUATE CENTER
CITY UNIVERSITY OF NEW YORK

NYC Mayor's Office of Climate & Environmental Justice

NYC OTI Office of Technology & Innovation

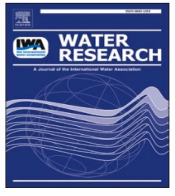
NYC Environmental Protection

NEW YORK CITY DOT

Overview of the FloodNet Project

Project Motivation:
The Need for Real-time, Quantitative Urban Flood Data

01	**Researchers**	Validating flood predictions Monitoring changes to flooding over time Water sampling projects
02	**Community Residents**	Advocacy Day-to-day decision making Flood report validation
03	**Government Agencies**	Infrastructure planning & monitoring Emergency response Post-flood assistance and impact cataloging



Making waves: Uses of real-time, hyperlocal flood sensor data for emergency management, resiliency planning, and flood impact mitigation

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FLOODNET·NYC
NYC.GOV + NYU.EDU + CUNY.EDU

FloodNet NYC: Our Mission

- Develop tools for real-time urban flood monitoring
- Implement these tools to measure flooding in New York City
- Make flood data and monitoring tools **accessible and useful** to stakeholders including residents, community-based organizations, government agencies, and researchers

FloodNet NYC: Our Guiding Principles

Equity + Accountability

- *We work with attention to histories of inequality and environmental injustice.*

Openness + Transparency

- *Openly share principles, practices, and decision-making processes as well as sensor architecture, data, and data processing tools.*

Accessibility + Usefulness

- *Our process and outputs are open access for meaningful use by partners and the public.*

Collaboration + Community

- *Collaborate with multiple stakeholders, with a focus on community in high-impact flood locations.*

Relevance + Credibility

- *Address real-world problems and contribute to contemporary research.*

Sustainability + Integrity

- *Aim to build a flood monitoring network that is relevant now and into the future for NYC communities, researchers, and agencies.*

Our Tools: The FloodNet Sensor

- Sense water depth with accuracy of ±5 mm
- Collect and transmit measurements every 1 min
- Operate independent of existing power and networking infrastructure
- Comprise low-cost components for sensor network scalability

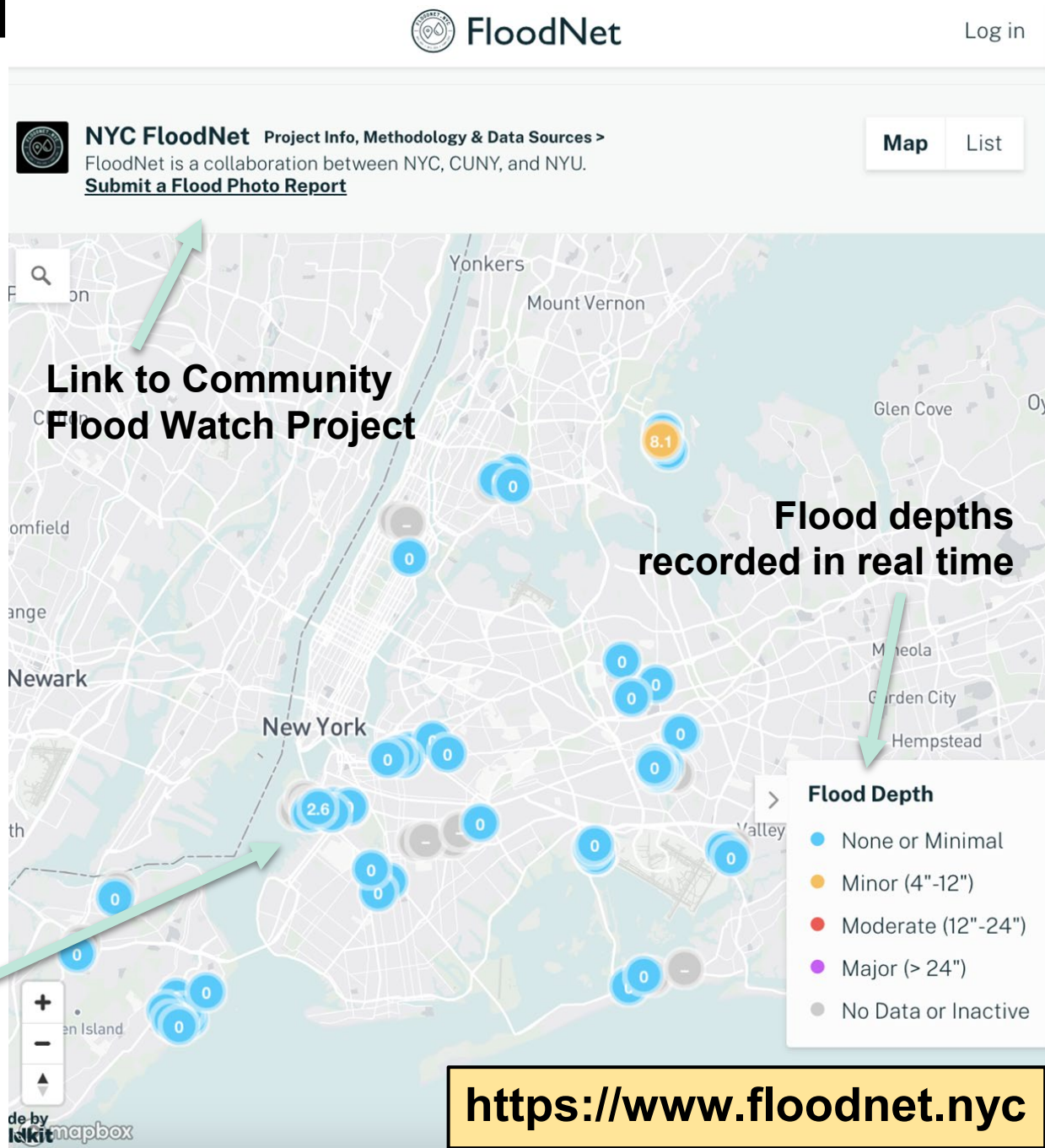
All design files open-source on github

Friday
11:30am - 1pm


FLOODNET.NYC
Local Flood Sensor
Sensor de Inundación de Barrio
This sensor monitors flooding at this location. The information is used to better understand the problem and identify potential solutions.
No identifying information is being collected.
Two city agencies and two academic institutions are responsible for this device, and the data it collects.
NYC
NYC CTO
NYU
To learn more, visit floodnet.nyc or email info@floodnet.nyc

Our Tools: The Data Dashboard

- Public facing tool for data dissemination and outreach
- Shaped by ongoing feedback from community partners and other key stakeholders



Community Engagement (CE)

CE increases our project's ability to foster sustainable impact within communities most at risk.
The core of this lies in the spaces of community outreach, community education, and community action.

Community Outreach

- Raise awareness of project goals and current initiatives
- Facilitate direct information sharing of real-time data with key community stakeholders

Community Education

- Develop internal team knowledge about flood-prone neighborhoods and potential uses for FloodNet data.
- Cultivate and sustain collaborative practices of information sharing and action

Community Action

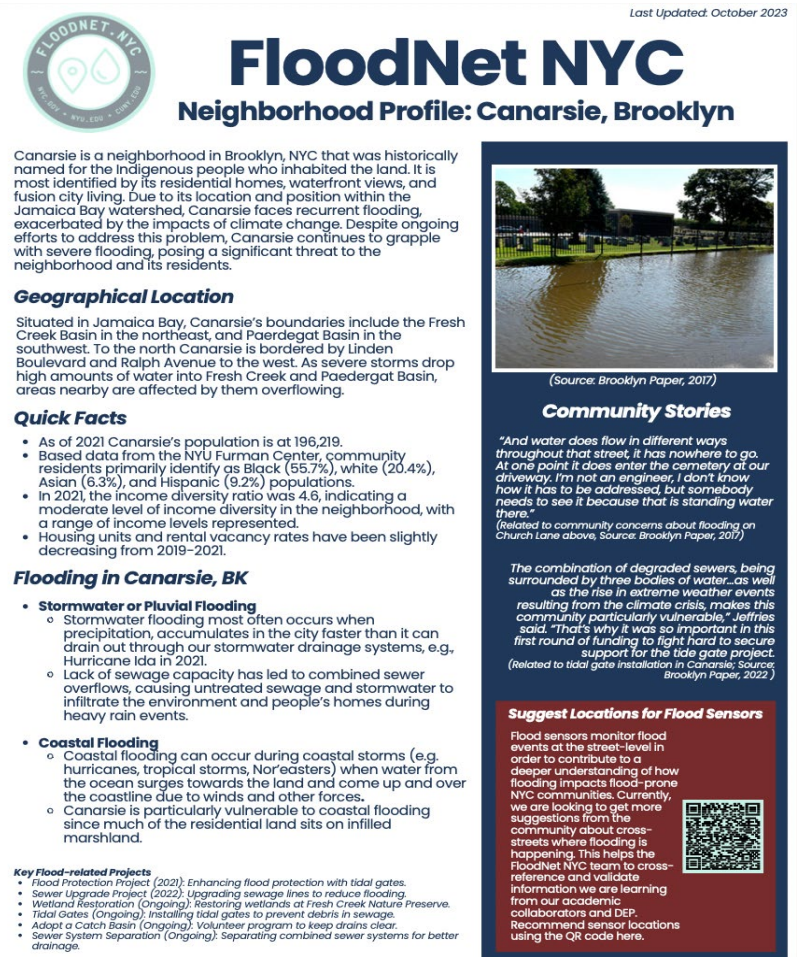
- Contribute our data, learnings, and evidence-based practices to various flood-related efforts and climate justice initiatives around the City

including through collaboration with partners like the Community Flood Watch project.

FloodNet Community Engagement In Practice

Educational materials offer residents accessible and relevant information to keep them informed about FloodNet.

Community outreach events foster direct interactions, build relationships, and address local concerns and needs.

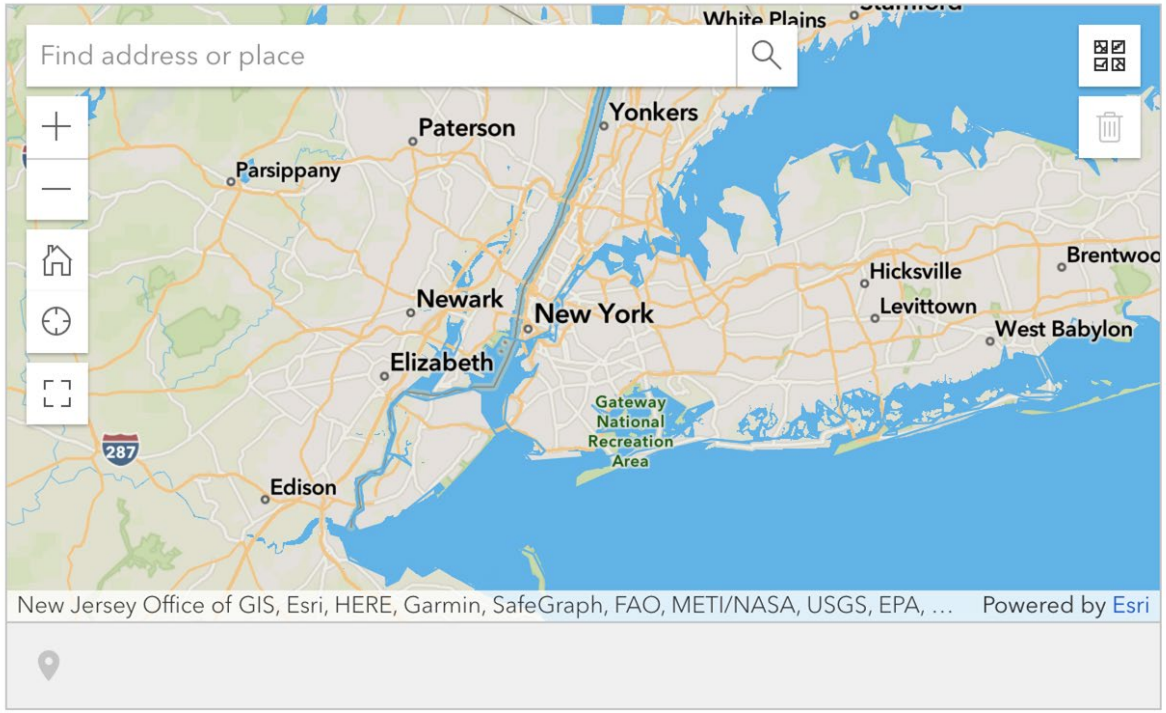


Community profiles provide a concise and accessible resource for information sharing and collaboration.

FloodNet Community Sensor Suggestion

Please select your suggested sensor location on the map below:

You can select a location by zooming in and dropping a pin or by searching for an address via the search bar.



QR code to suggest sensors

FloodNet has a mandate from NYC DEP to install 500 sensors over the next four years.

Sensor placement is informed by requests we collect from NYC residents, city government, and researchers. We analyze these requests alongside predicted flood maps and other indicators of flood risk and vulnerability.

Partner Highlight:
Community Action in Jamaica Bay & the Community Flood Watch Project

Documenting local flooding since 2018:

Community Flood Watch Project

Beach 78th St, Oct 27, 2018


Beach 84th St, Sep 29, 2019


Davenport Court, Sept 10th, 2018


Neptune Ave, Sept 2, 2019

Government

COMMUNITY FLOOD WATCH PROJECT

Residents

Scientists

NYCEM - Notify NYC @NotifyNYC · Sep 28, 2019

.@NWSNewYorkNY Coastal Flood Statement issued for Queens South, this evening and again Sunday morning on 9/29 until 11AM. Tides above normal possible. weather.gov/okx. Multilingual & ASL link: on.nyc.gov/2hoK0lj.

9 6

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Coastal Hazard Message
National Weather Service New York NY
1012 PM EDT Sat Sep 28 2019

...LOCALIZED MINOR COASTAL FLOODING SUNDAY MORNING...

Southern Queens-Southern Nassau-
1012 PM EDT Sat Sep 28 2019

...Brief minor flooding of the most vulnerable locations near the
waterfront and shoreline...

* LOCATIONS...Southern Nassau and Southern Queens.

* TIMING...From 7 AM EDT Sunday through Sunday morning.

* COASTAL FLOOD IMPACTS...There is a low threat of property damage.
Shallow flooding is expected in the most vulnerable locations near
the waterfront and shoreline.
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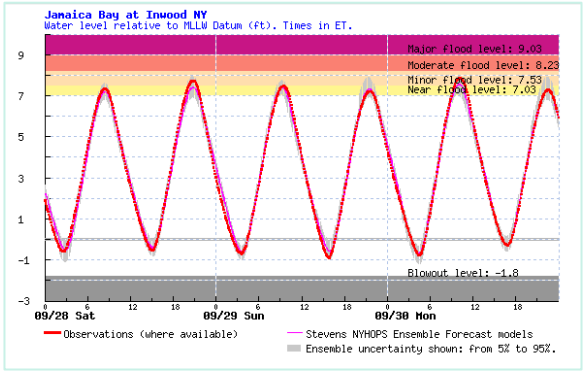
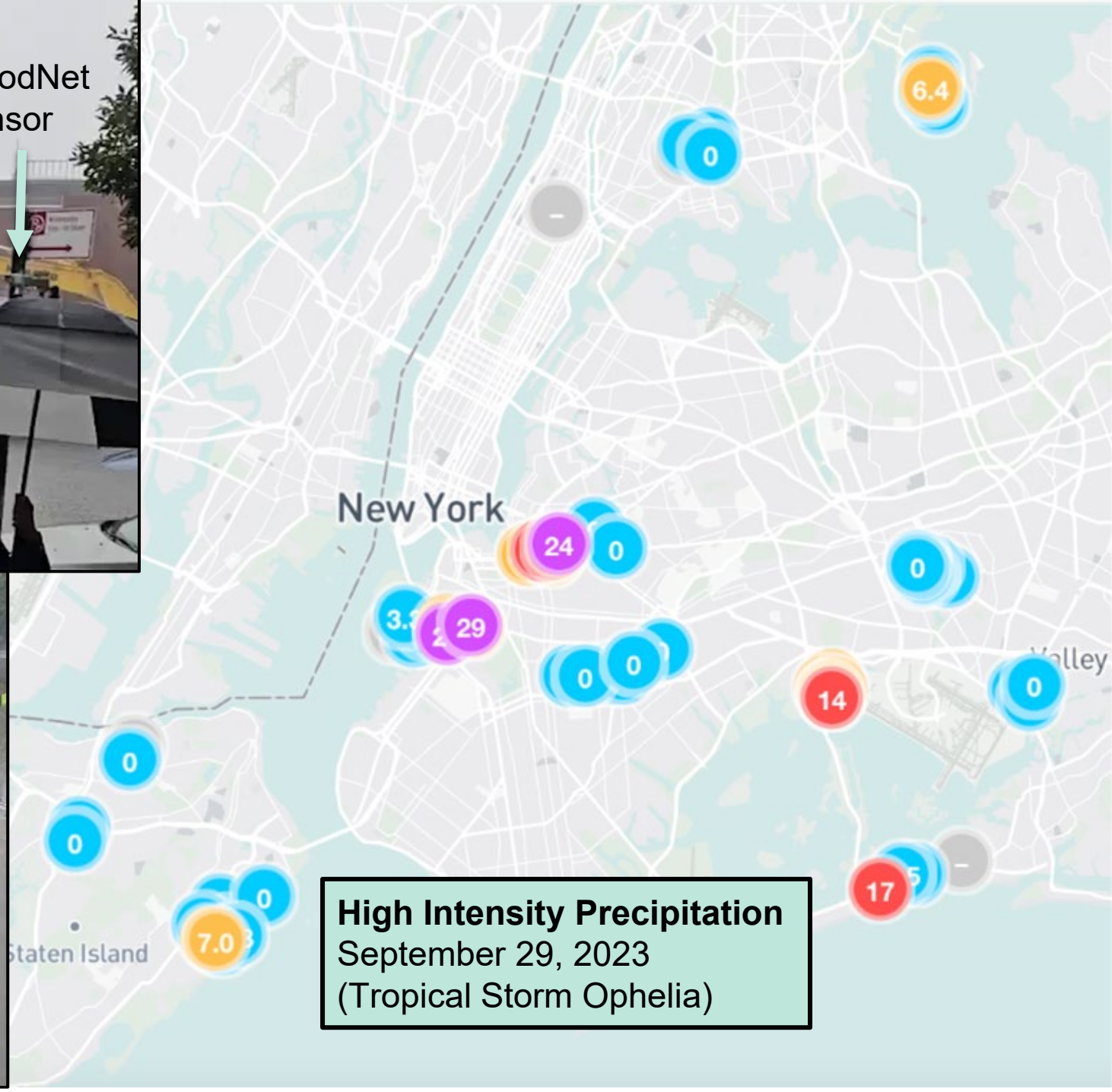


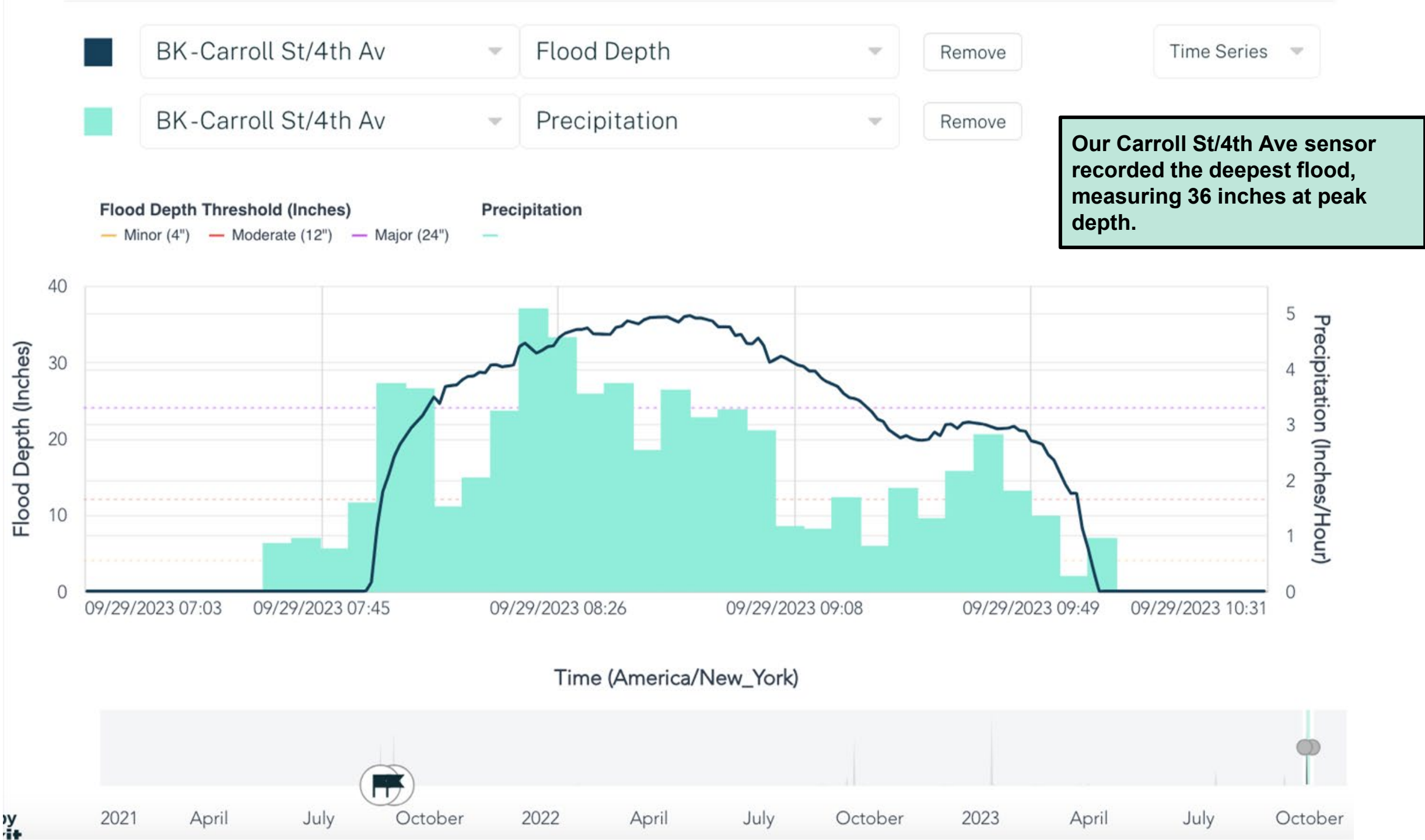
Submit your photos of flooding to build an online resource for your community

www.mycoast.org/ny/flood-watch

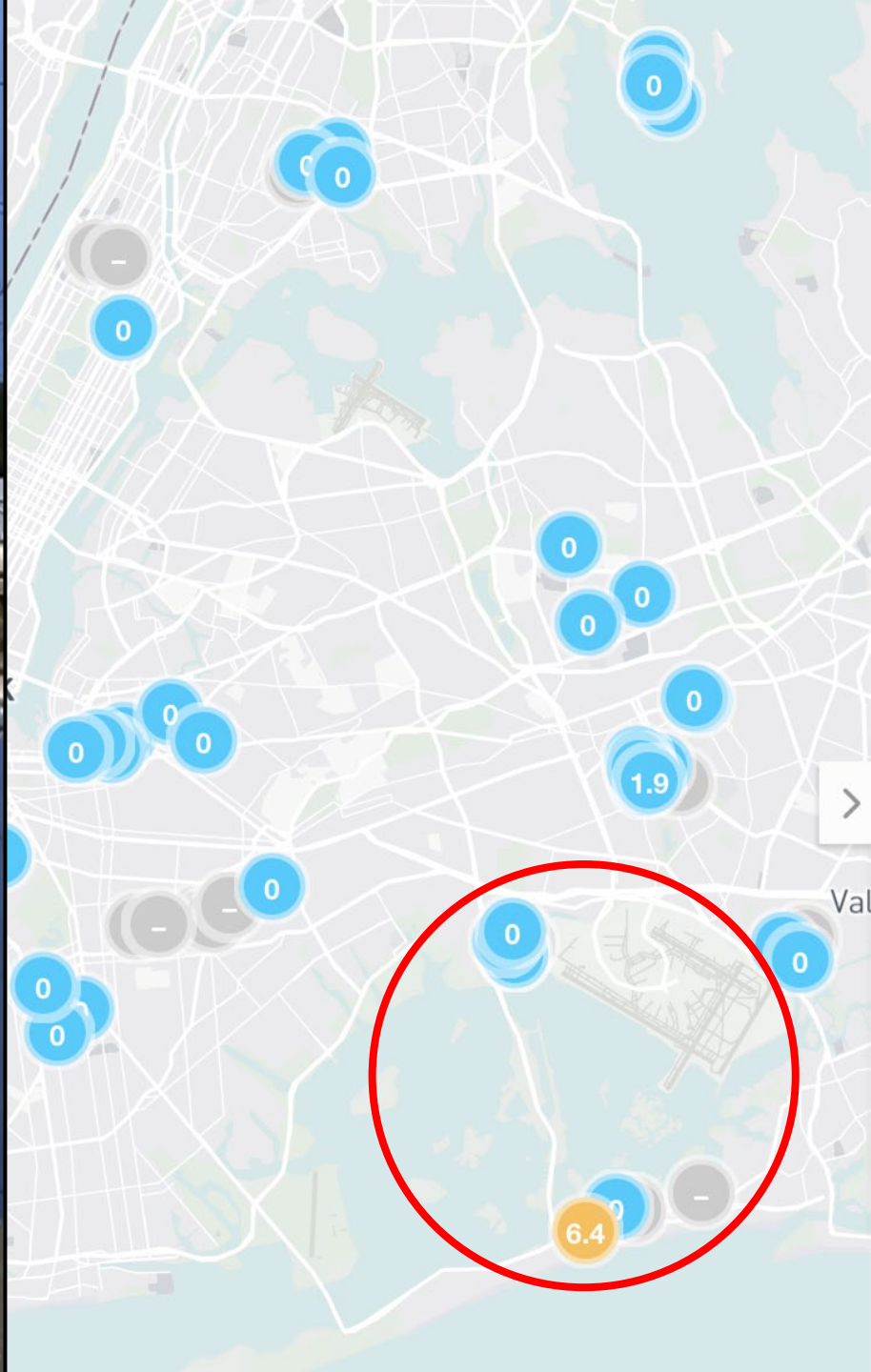
A Deep Dive on Flood Sensor Data



High Intensity Precipitation
September 29, 2023
(Tropical Storm Ophelia)


BK-Carroll St/4th Av
Flood Depth
Remove
Time Series
BK-Carroll St/4th Av
Precipitation
Remove
Our Carroll St/4th Ave sensor recorded the deepest flood, measuring 36 inches at peak depth.
Flood Depth Threshold (Inches)
Minor (4")
Moderate (12")
Major (24")
Precipitation
Flood Depth (Inches)
Precipitation (Inches/Hour)
0
10
20
30
40
0
1
2
3
4
5
09/29/2023 07:03
09/29/2023 07:45
09/29/2023 08:26
09/29/2023 09:08
09/29/2023 09:49
09/29/2023 10:31
Time (America/New_York)
2021
April
July
October
2022
April
July
October
2023
April
July
October


Frequent coastal flooding caused by high tides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1.9
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6.4

< Back to Sensor Map

Data View

Add Chart

Share

Q - Beach 84 St

Far Rockaway , Queens

Deployed on December 10, 2021 by FloodNet

Last Seen 11/3/2022, 20:08

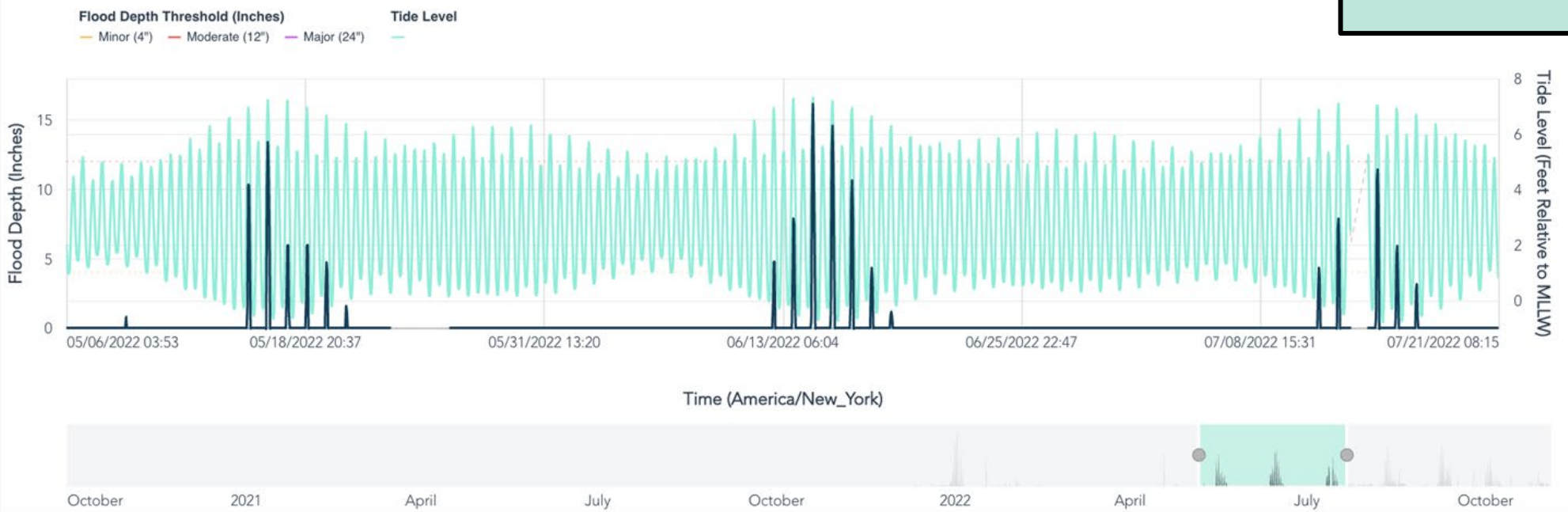
19 of 23

View By: Day Week 2 Week Month Year All 05/06/22 07/21/22

Q - Beach 84 St | Flood Depth | Remove

Q - Beach 84 St | Tide Level | Remove

Tidal flooding on Beach 84th St from May-July 2022



Funding Sources:

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New York State of Opportunity. Empire State Development

CUNY Office of Research

NYU Marron Institute of Urban Management

New York University
Andrea Silverman, Charlie Mydlarz, Elizabeth Henaff, Tega Brain, Amanpreet Kaur, Bea Steers

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Ricardo Toledo-Crow, Praneeth sai venkat Challagonda, Kendra Krueger

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Brett Branco, Véronëque Ignace, Hannah Eisler Burnett, Polly Pierone

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Hayley Elszasz

NYC Office Technology & Innovation
Paul Rothman, Briana Garcia

+ student researchers at NYU and CUNY

Thank you to community group partners, including:

El Puente Bushwick Leadership Center, Sixth Street Community Center, New Hamilton Beach Civic Association, Gowanus Canal Conservancy, Red Hook Initiative, Pioneer Works Community Sensor Lab, Resilient Red Hook, Rockaway Initiative for Sustainability and Equity, Bronx River Alliance, Canarsie Community Development Inc., Edgemere Community Civic Association

FLOODNET.NYC
NYC.GOV + NYU.EDU + CUNY.EDU

https://www.floodnet.nyc/

Q&A

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