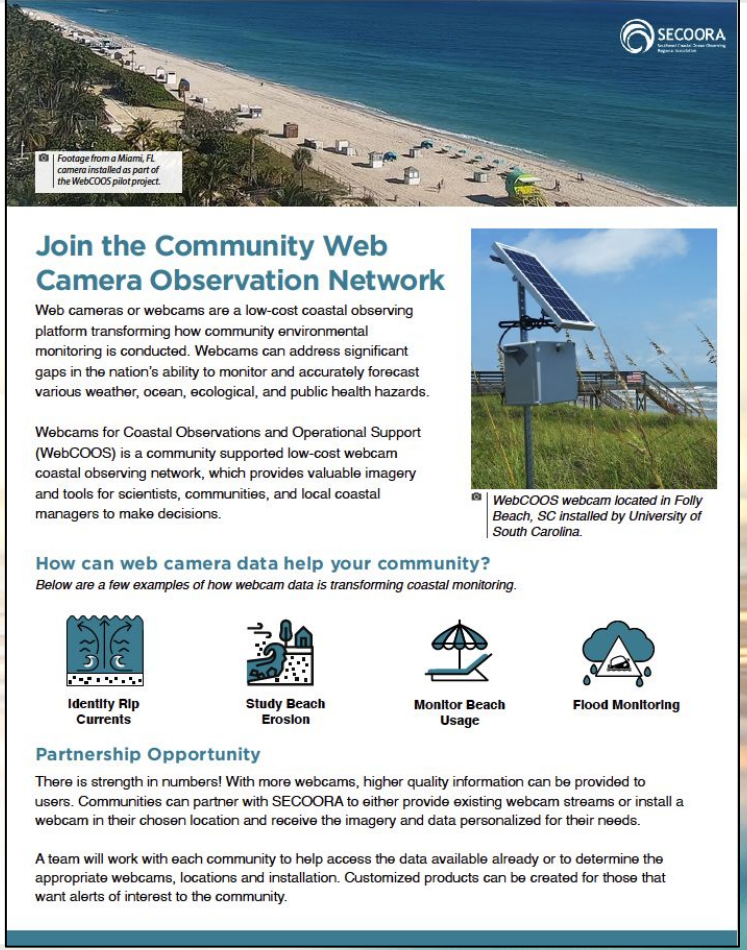
Overview & Introduction

Thursday, October 10, 9:15 - 9:45 AM

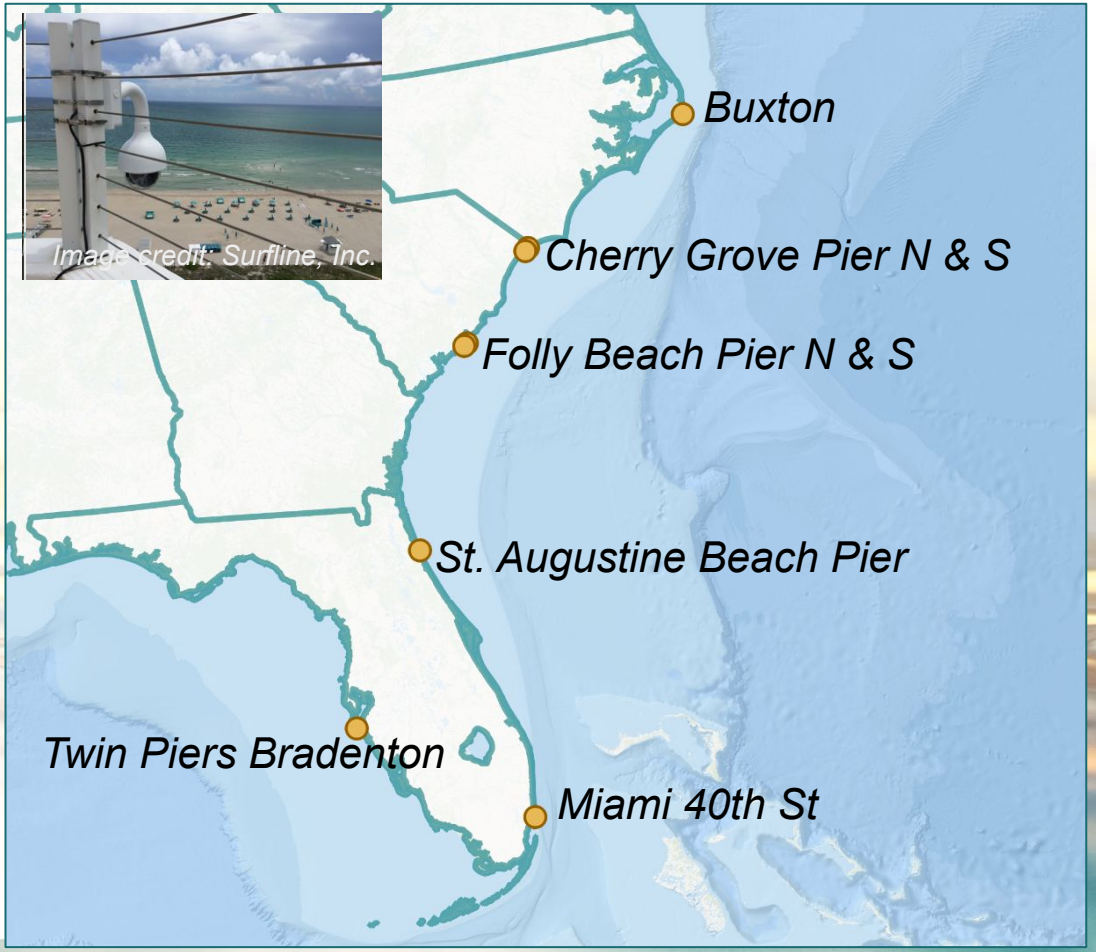
WebCOOS Overview

- **Web**cam **Co**astal **O**bservation **S**ystem
- Goals:
  - Engage webcam operators & end users
  - Automate processing of info from webcam imagery
  - Develop situational monitoring & reporting tool for info on beach activities & hazards
  - Operationalize national webcam data management network



History: WebCAT

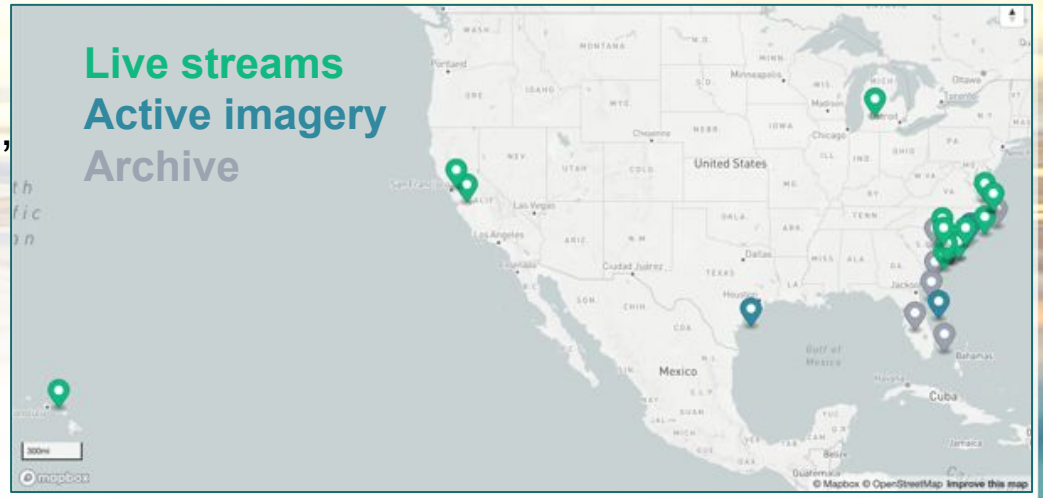
- Started in 2017, cameras operational until January 2021
- 8 cameras at 6 sites in southeast
- Publication: Dusek et al. 2019*



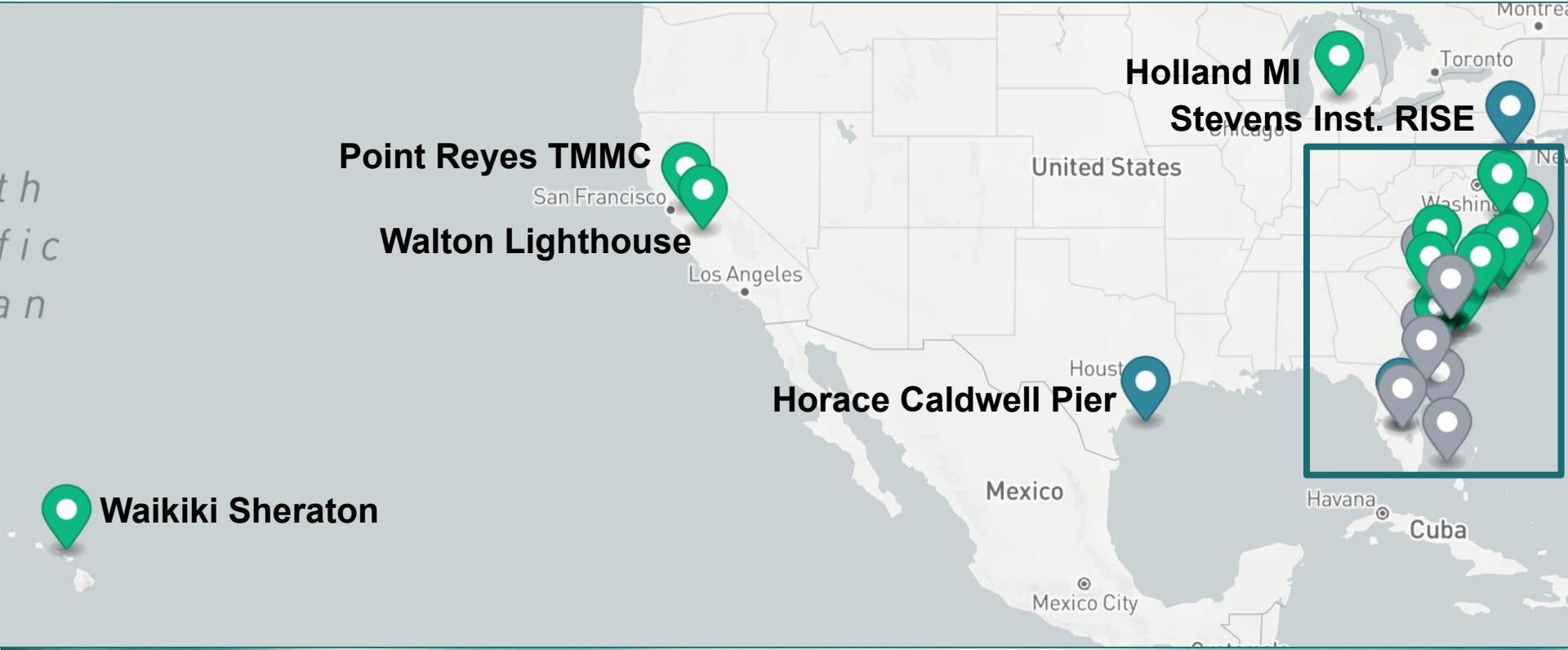
*Dusek G, Hernandez D, Willis M, Brown JA, Long JW, Porter DE and Vance TC (2019) WebCAT: Piloting the Development of a Web Camera Coastal Observing Network for Diverse Applications. *Front. Mar. Sci.* 6:353. doi: 10.3389/fmars.2019.00353

History: Launching WebCOOS

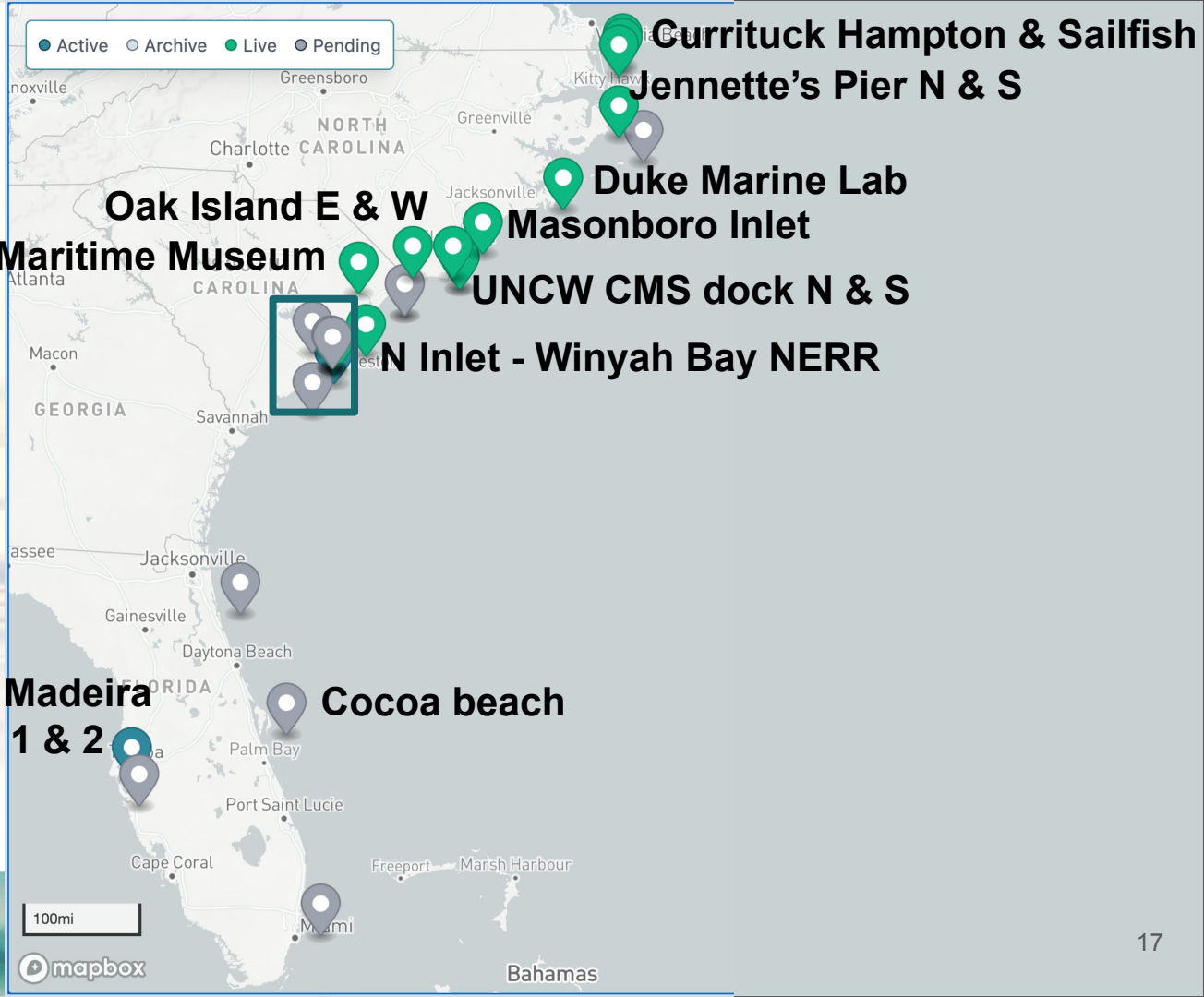
- Started in 2020, 19 active cameras
- Mainly in southeast, some in CA, HI, MI, TX
- Develop operational webcam coastal observing network
- Applications: AI/ML,shoreline change, flooding, beach usage, rip currents
- 12.4M objects = >138 TB total



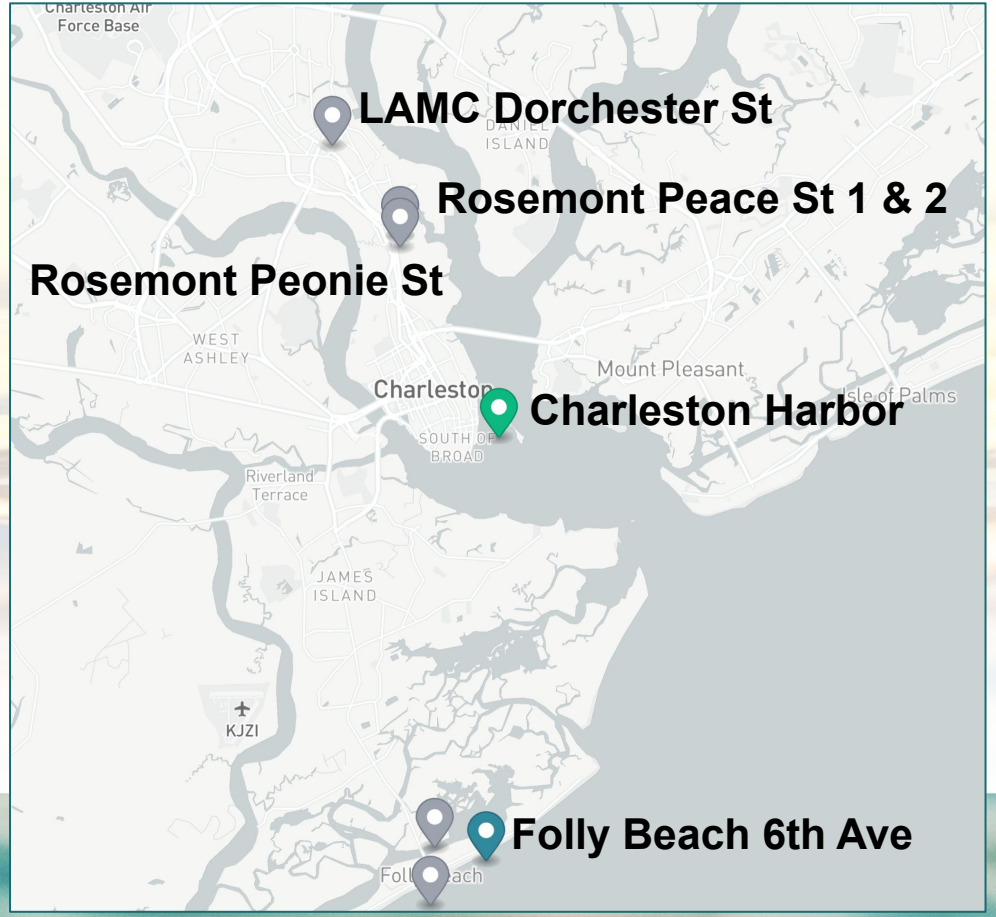
Map of WebCOOS locations (nationwide)



Map of WebCOOS locations (regional)



Map of WebCOOS locations (local)



Now: National WebCOOS

- Adding 6 cameras per IOOS RA over 3 years
- Installing webcams, and/or integrating Cameras Of Opportunity
- Applying relevant AI/ML algorithms to new webcams
- 2 planned workshops: **technical** & applications
- Refine install & operation procedures, data management SOPs, develop training materials


Future National WebCOOS sites?
Canada
United States
Mexico
Gulf of Mexico
Cuba
Puerto Rico
Guatemala
Nicaragua
Caribbean Sea
Colombia
Ecuador
Peru
Brazil
Bolivia
Guyana
Suriname
Hudson Bay
Northwestern Passages
Sea of Japan
Japan
North Pacific Ocean
Philippine Sea
Papua New Guinea
Arafura Sea

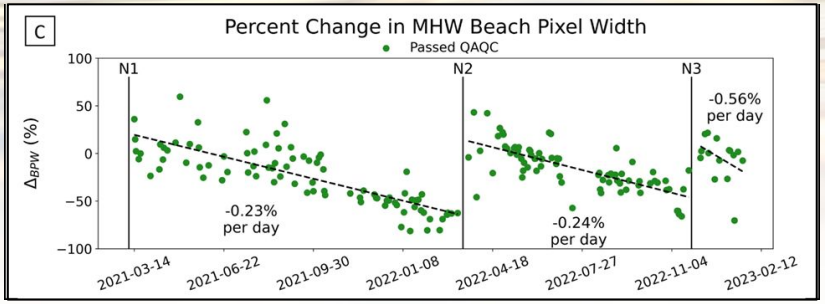
Planned workshops

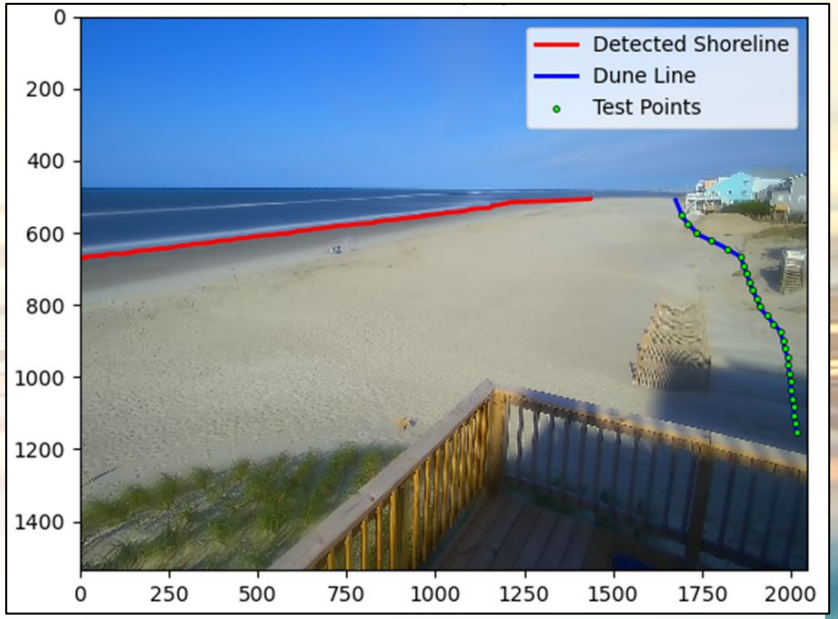
Year 1 (2024): technical workshop

- Focus on webcam installs, products, standards
- Build expertise in regions to support future installs & streamline data ingestion

Shoreline & coastal change

- Inter- and intra-annual trends in shoreline change.

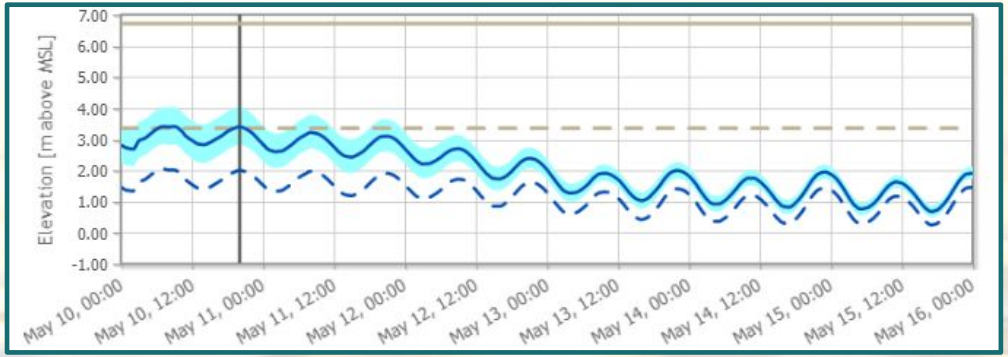




Shoreline & coastal change

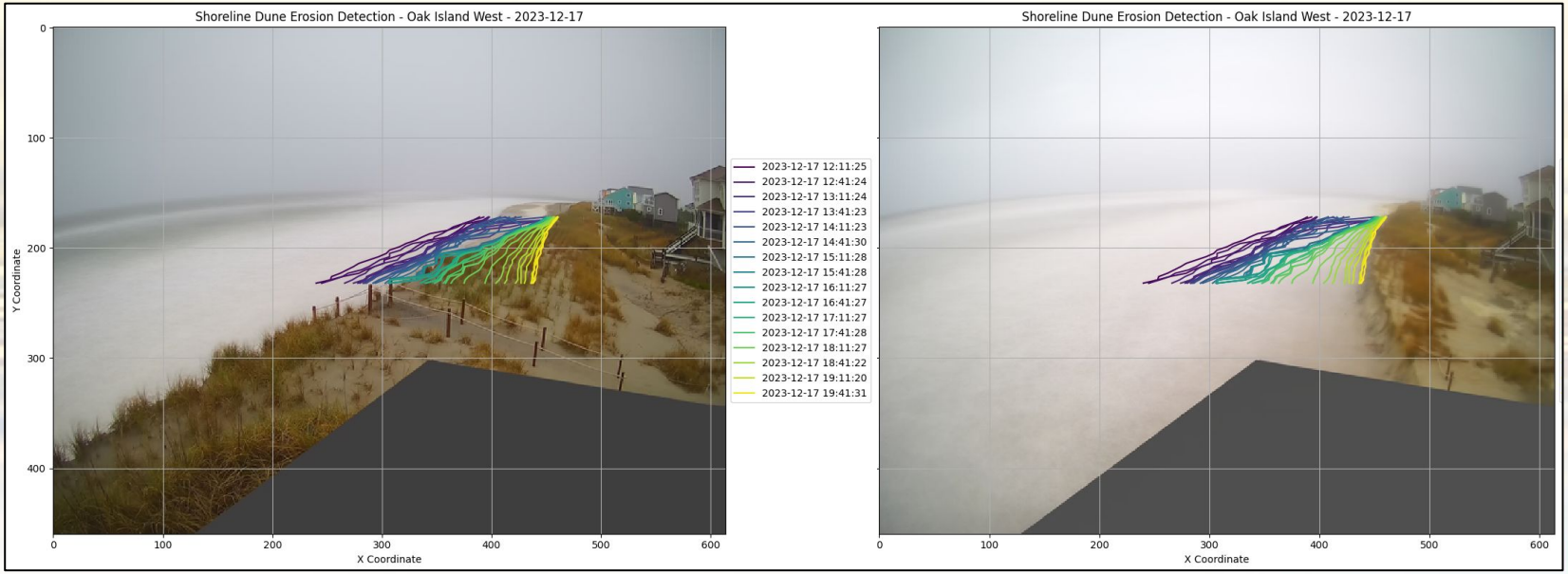
https://coastal.er.usgs.gov/hurricanes/research/twlviewer/

- Identify hourly shorelines to monitor storm impacts to dunes or infrastructure & validate operational national water level models



Partners:

Shoreline & coastal change



Rip current detection methods

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Flow Based Approach


Machine Learning Approach (Appearance)

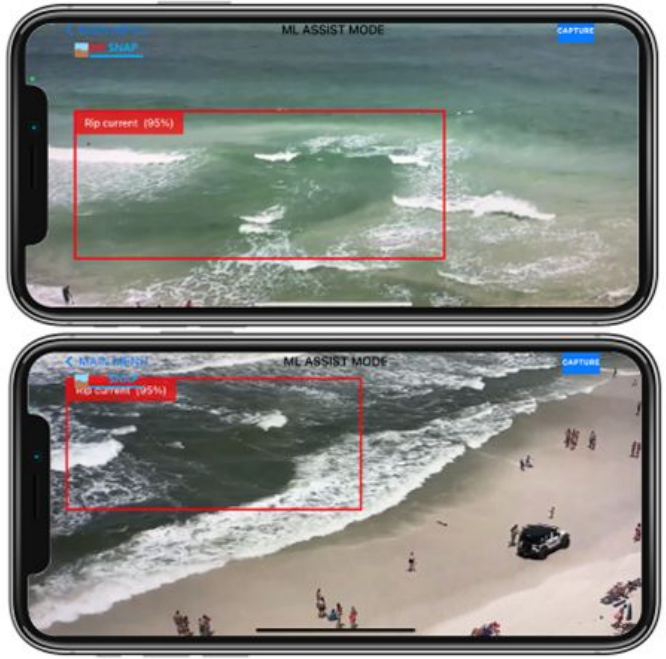


Machine Learning Approach (Behavior)

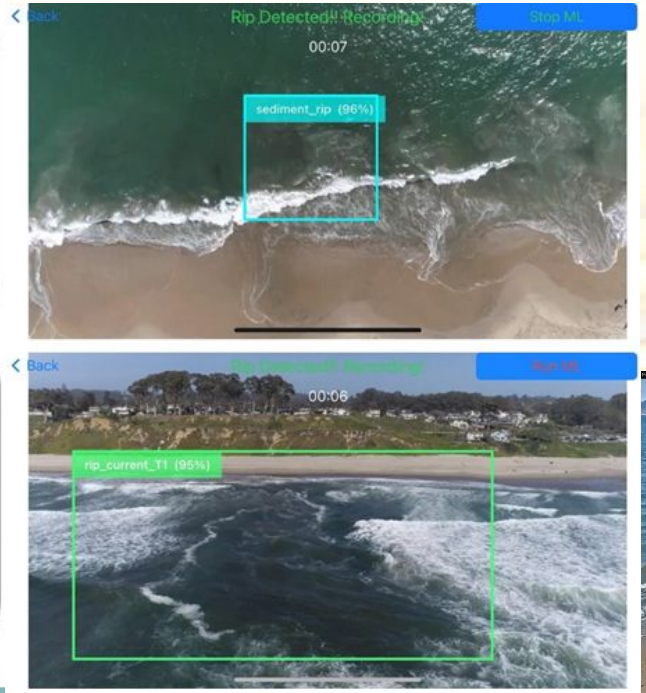


Related works

Rip Finder



Rip Scout



Walton Lighthouse

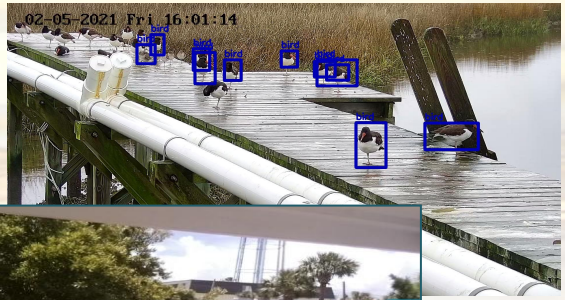
Seal Detection (MMRC)

Coastal flooding & impacts

- Charleston, SC & Beaufort, NC
- Co-located with NOAA NWLON stations

Coastal flooding & impacts

Situational awareness & reporting



Situational awareness & reporting

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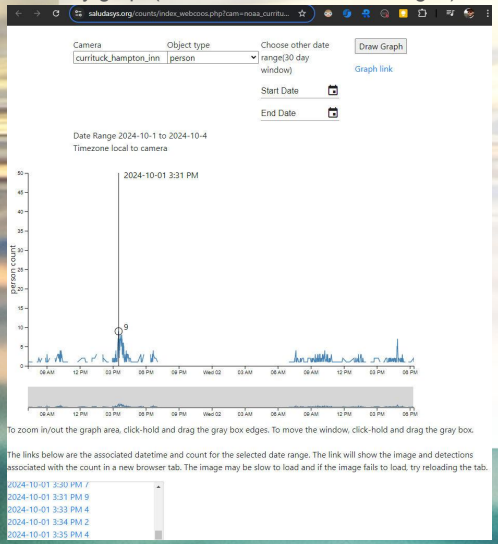
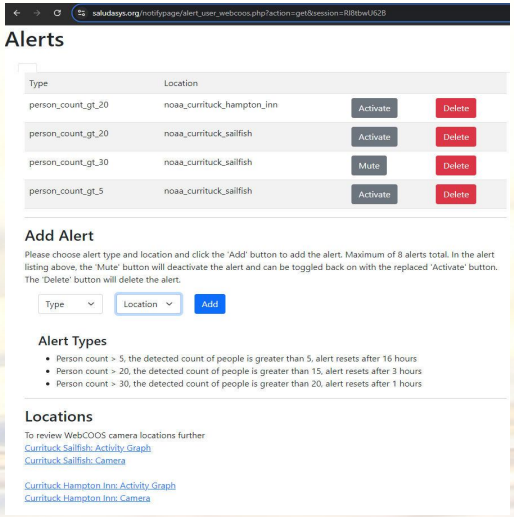
Object Detection(person,...)

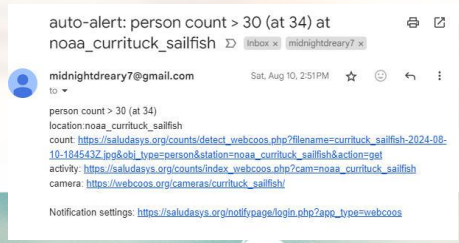
Activity graph(time vs counts, links to images)



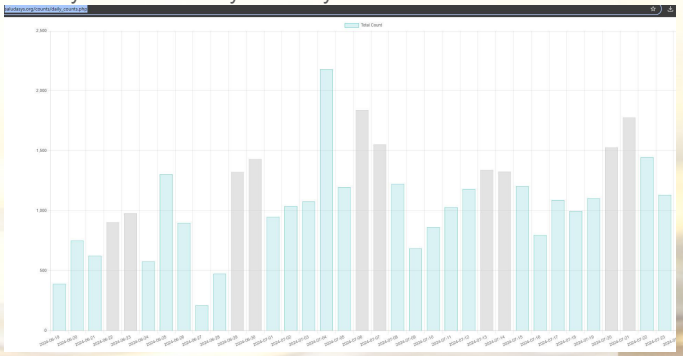
Alert/notification thresholds



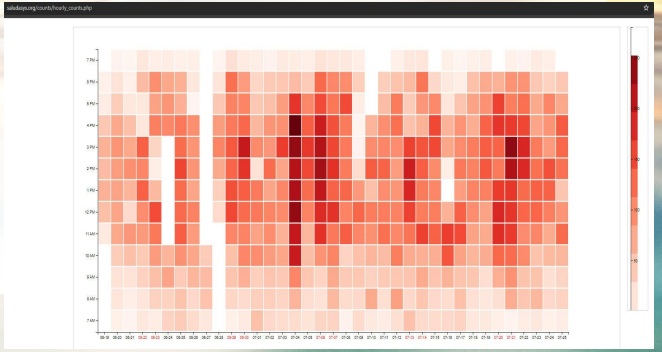
Text/Email notification



Daily status or activity summary



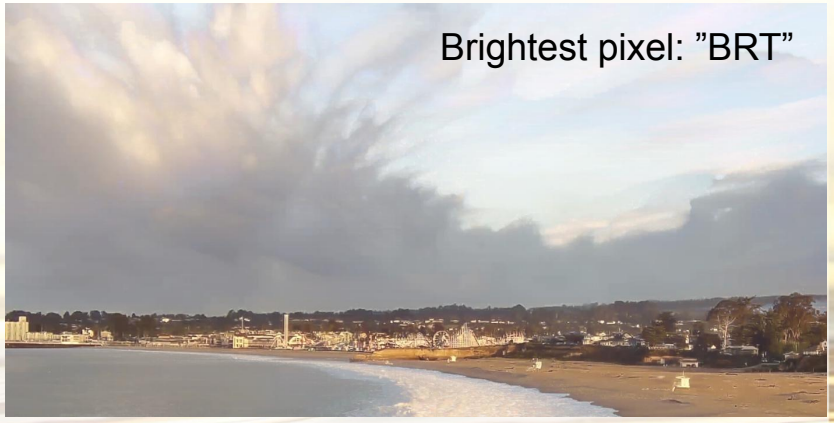
Hourly activity summary

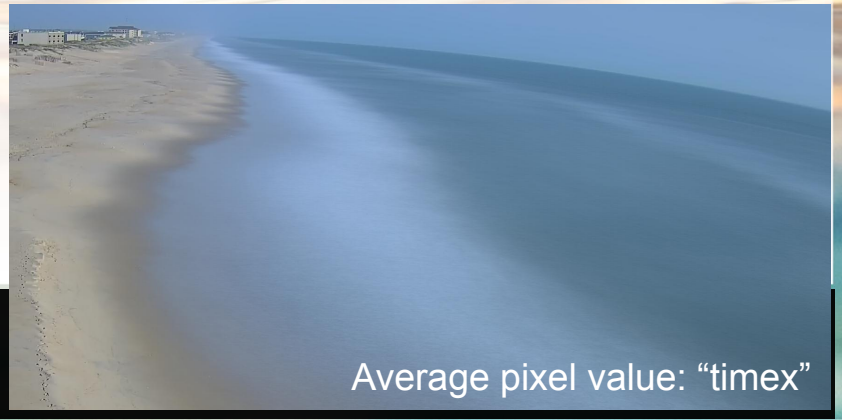


Integrating AI/ML algorithms

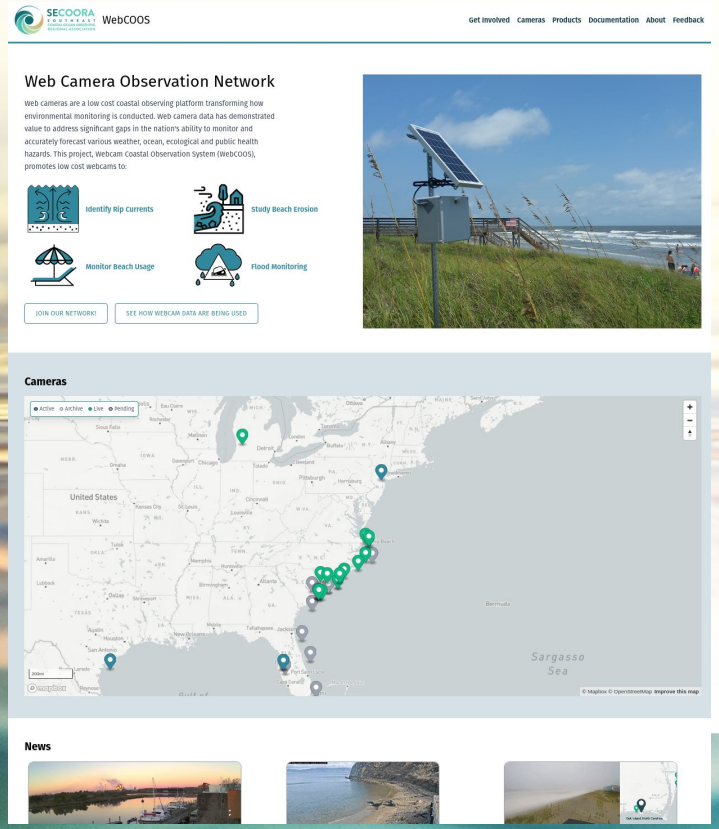
- Scaling to multiple cameras in the cloud in near real time

Axiom DATA SCIENCE





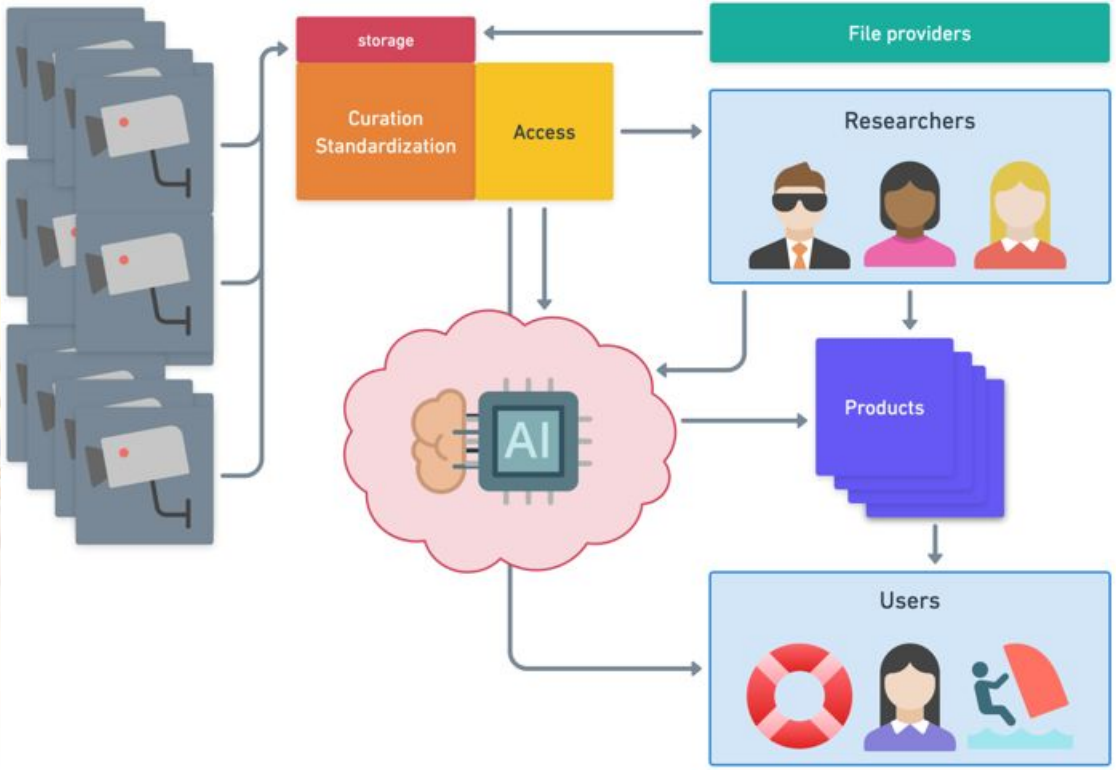
Camera access: WebCOOS.org or API



Axiom DATA SCIENCE

Imagery → WebCOOS

- **Preferred:** Access to live RTSP feed.
- Option 2:
  1. Upload standardized video files regularly through API (S3, etc.).
  2. Access video footage files & download periodically (HTTP, S3, etc.).
  3. Upload files via a website.



Installation contractor: Surfline

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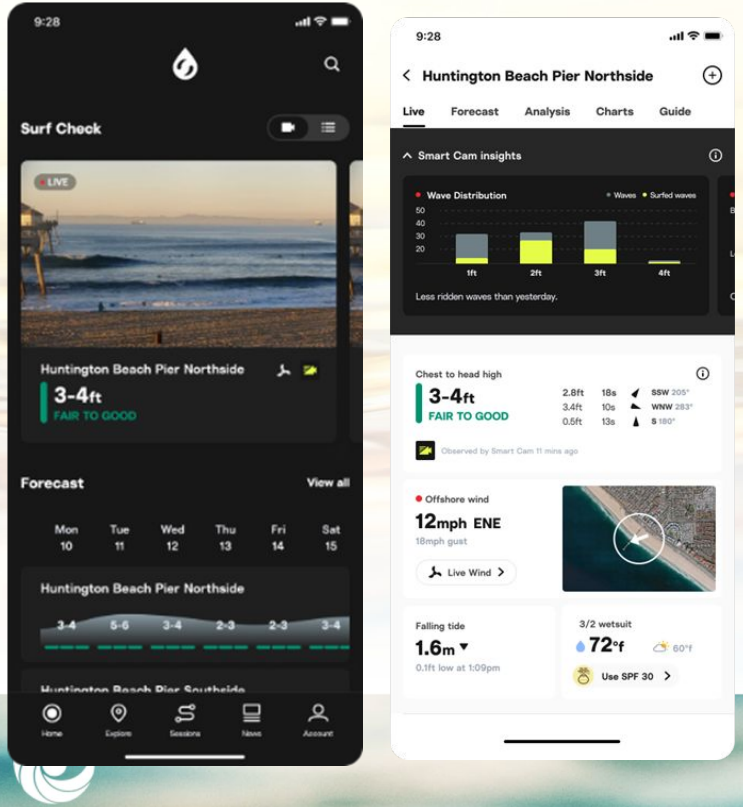
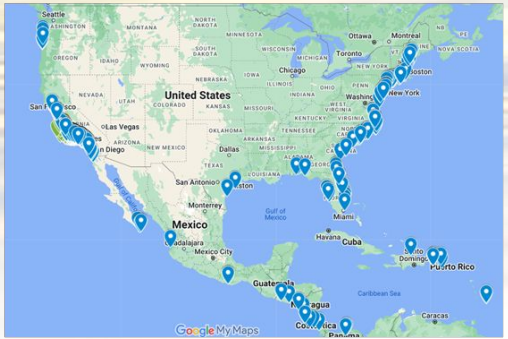
Serving The Surf Community For Over 35 Years

Founded in 1985, Surfline has become the nucleus of global surf culture by helping surfers find the right waves at the right times all around the world

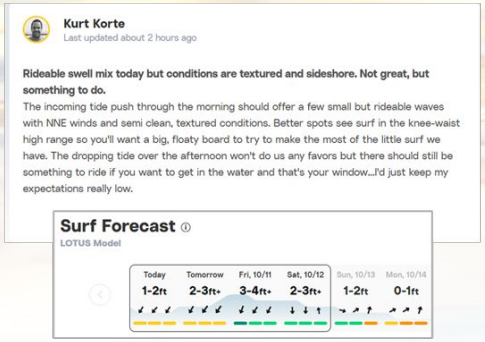


Surfline Technical Overview

Managed Network of >1.2k Cameras Across the Globe



Proprietary Nearshore Wave Models and 30 Years of Observation Data



Extensive AI/ML Capabilities Running Across our Global Network of Cameras

Collaborations & partnerships

- NOAA IOOS & NWS
- USGS CoastCams
- USACE ERDC CorpsCam
- Local lifeguarding, beach safety, public health, community development agencies & organizations
- Cultural resources: The Marine Mammal Center, NPS, SC Maritime Museum
- Camera hosts & operators