



SCCF

connecting you to nature

Physical Conditions During Hurricane Ian

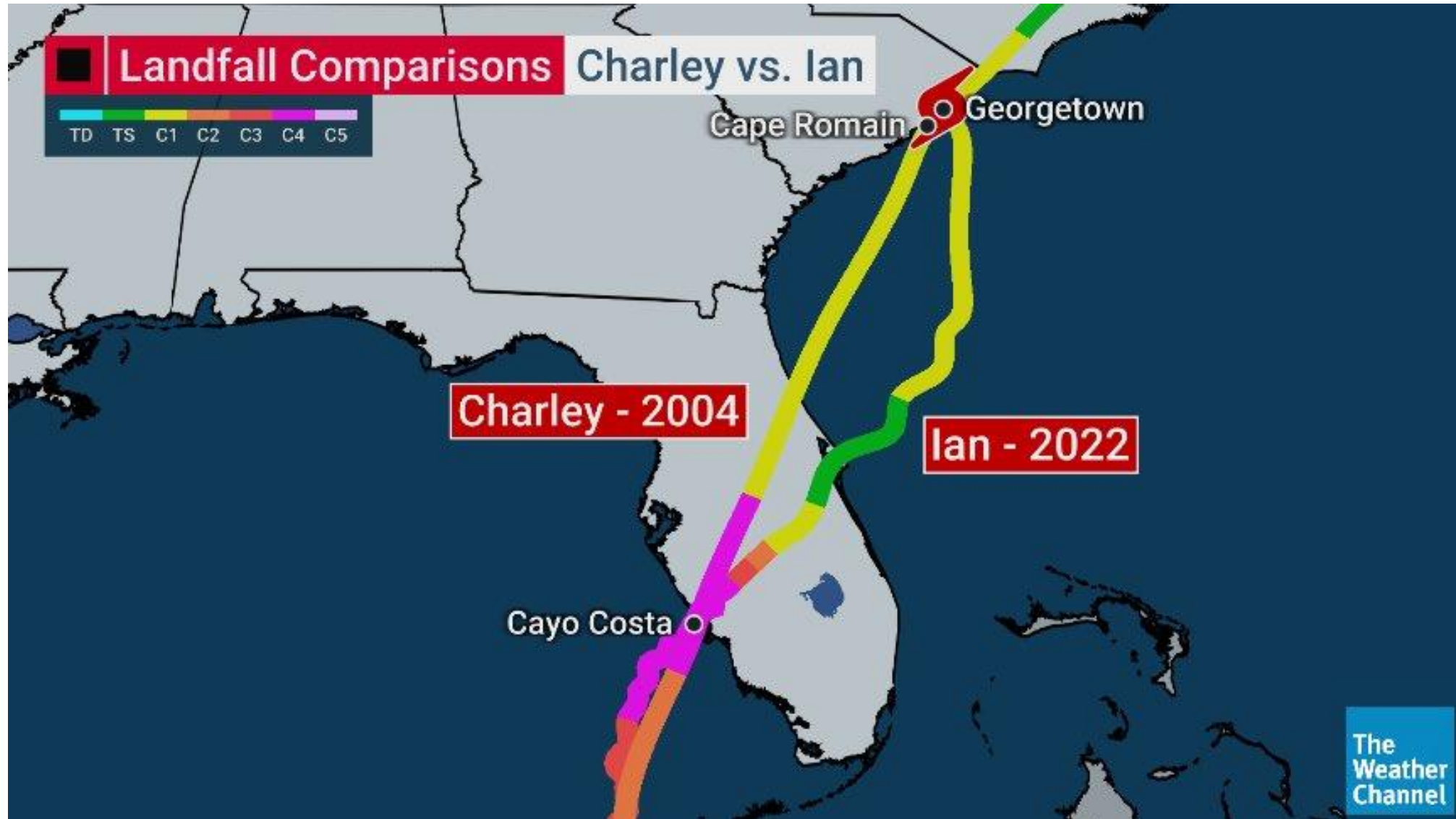
Dr. Carrie Schuman

April 21, 2023



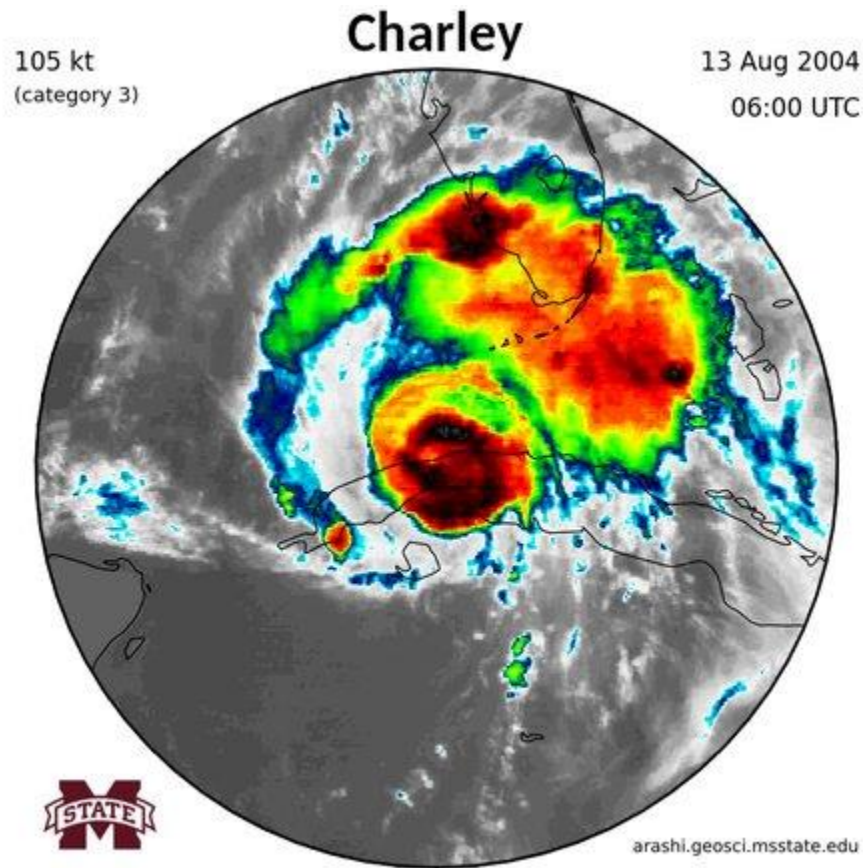


Hurricane Ian – What Did We Experience?





Hurricane Ian – What Did We Experience?

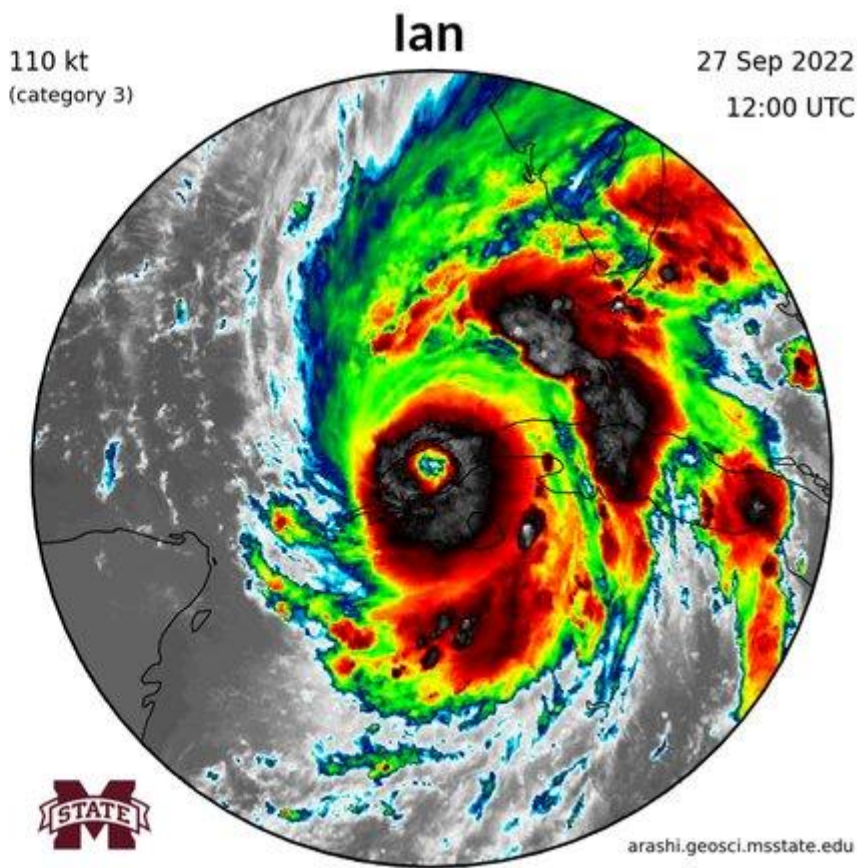
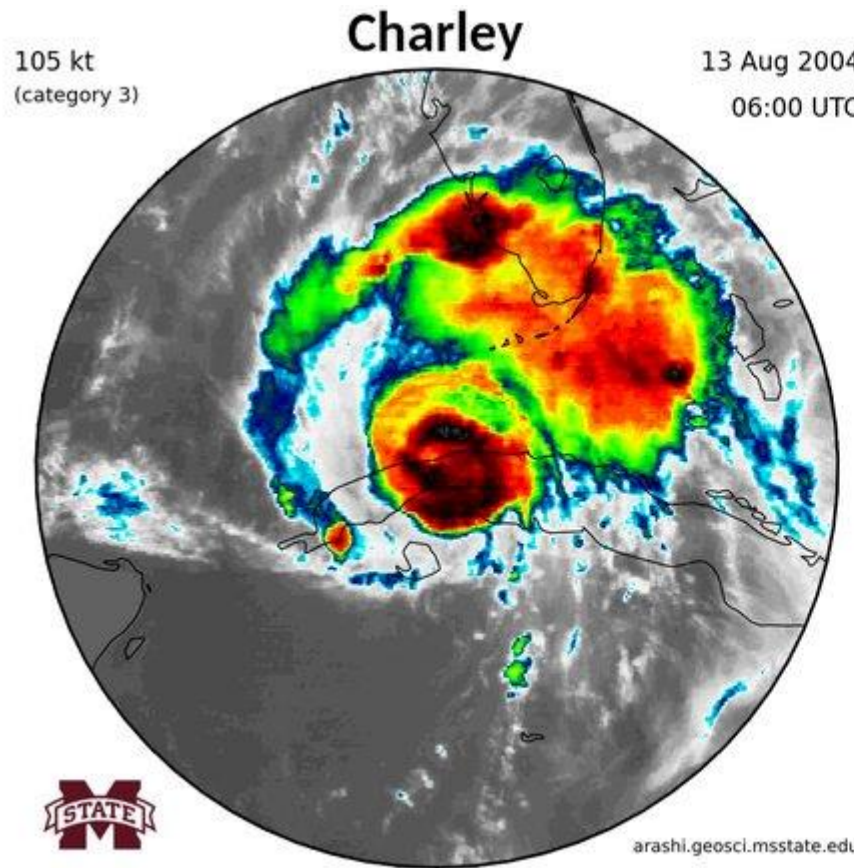


Charley:

- Wind field diameter (miles):
 - Hurricane-force: 50
 - Tropical storm: 170
- Eye width (miles): 5
- Speed (mph): 15-25, crossed state in 7-8 hours



Hurricane Ian – What Did We Experience?



Charley:

- Wind field diameter (miles):
 - Hurricane-force: 50
 - Tropical storm: 170
- Eye width (miles): 5
- Speed (mph): 15-25, crossed state in 7-8 hours

Ian:

- Wind field diameter (miles):
 - Hurricane-force: 90
 - Tropical storm: 350
- Eye width (miles): 40
- Speed (mph): 8-9, crossed state in ~24 hours



Hurricanes

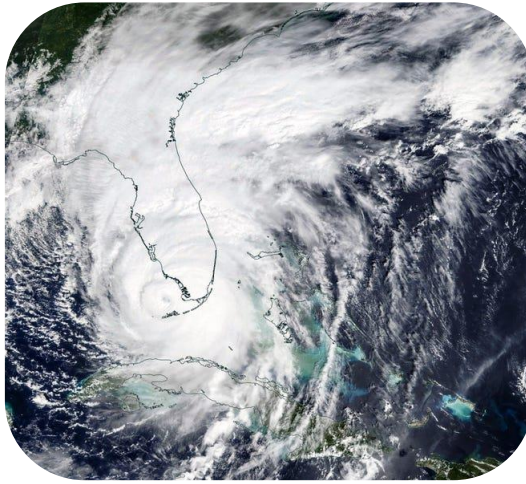


Image Credit: NASA Worldview

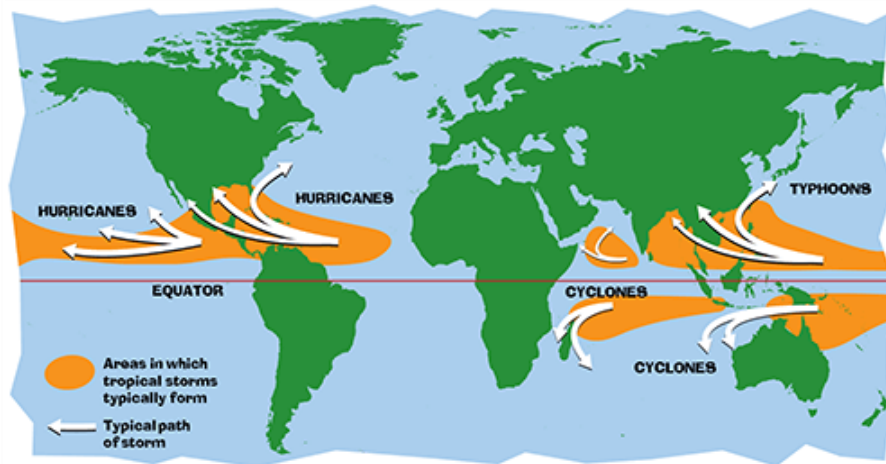
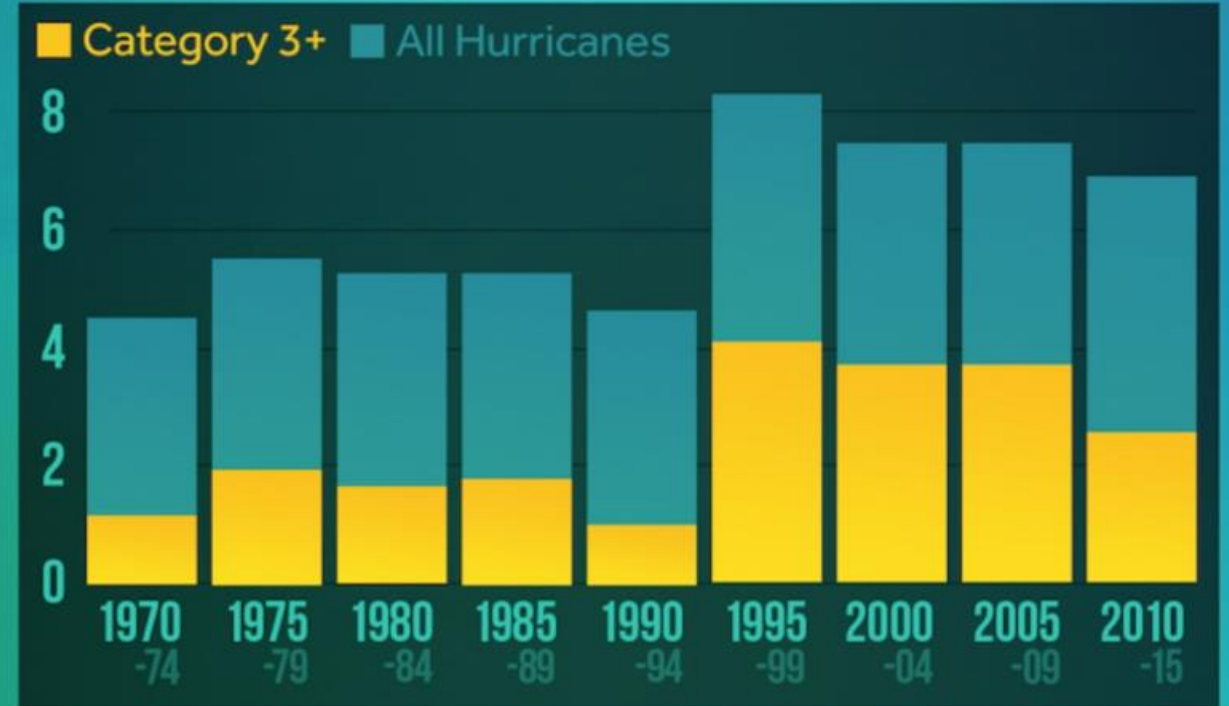


Image Credit: NOAA Scijinks

More Strong Atlantic Hurricanes



5-year average Atlantic basin hurricane count since 1970
Source: NOAA's NHC HURDAT2

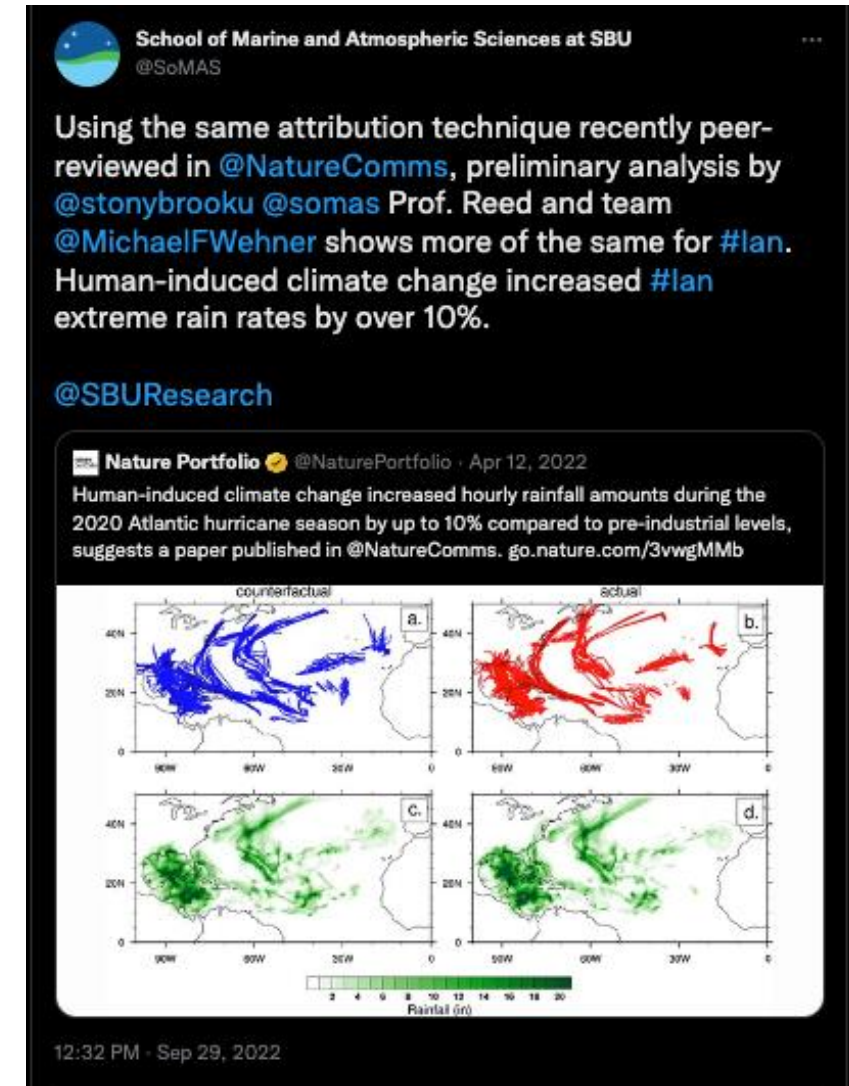
STATES AT RISK
CLIMATE CO
CENTRAL

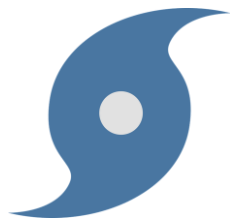




Hurricane Ian – How Does This Fit In?

- Single events $\neq$ climate change, instead look at trends
- Ian appears to be representative of trends
- Can contribute a percentage of the storm to climate change:
 - 10% more rain than would be expected based on pre-industrial revolution trends





Hurricane Ian – What Did We Experience?

Challenges around storm data:

- Data for Captiva and Sanibel more limited
- Scientific instrumentation was affected by the storm



HURRICANE IAN

(AL092022)

23–30 September 2022

Lisa Bucci, Laura Alaka,
Andrew Hagen, Sandy Delgado, and Jack Beven
National Hurricane Center
3 April 2023



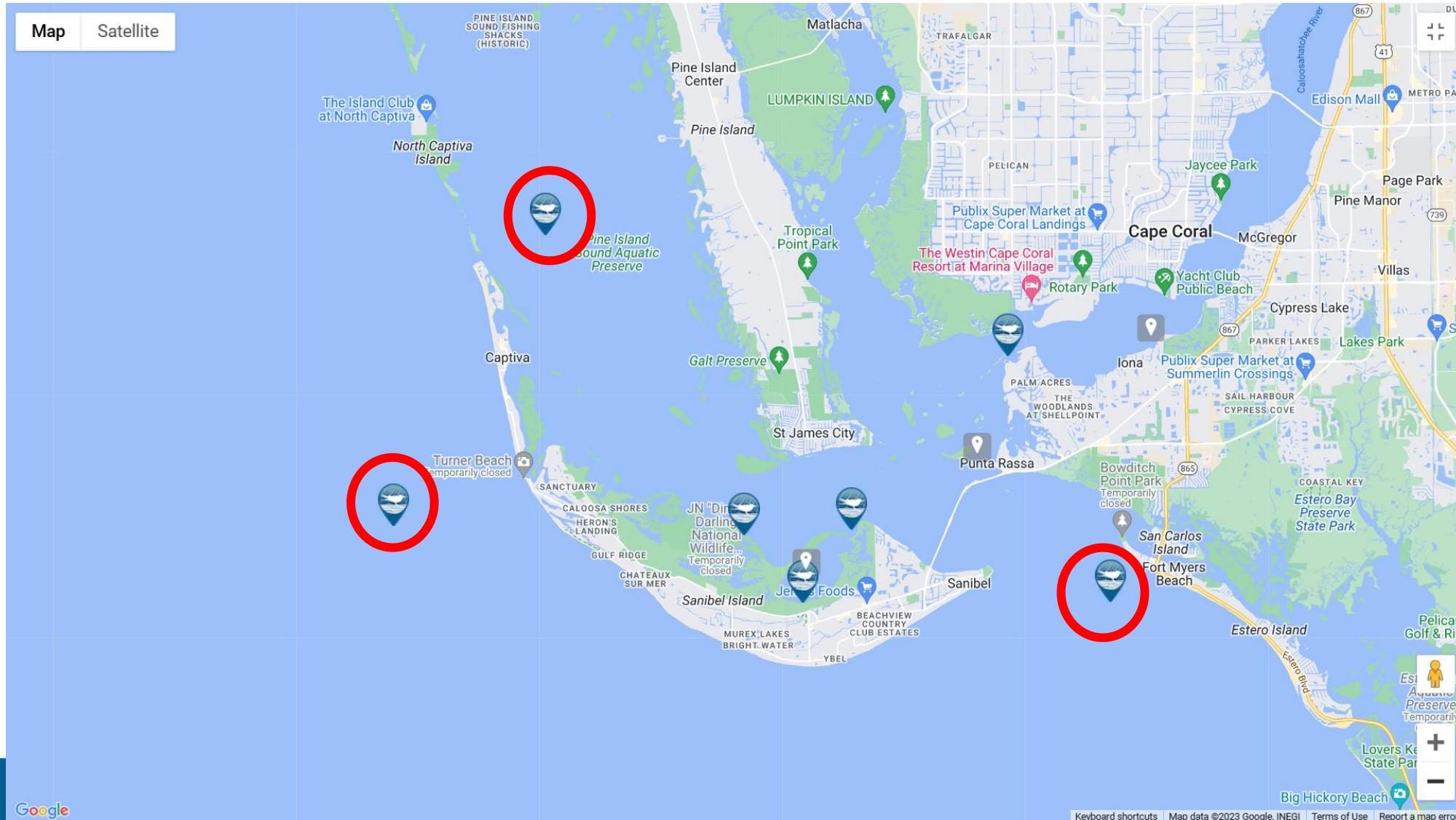
GOES-16 GEOCOLOR IMAGE FROM 28 SEPTEMBER 2022 AT 1210 UTC NEAR THE TIME OF IAN'S LANDFALL IN SOUTHWESTERN FLORIDA. CREDIT: NOAA/NESDIS/STAR

Ian made landfall in southwestern Florida at category 4 intensity (on the Saffir-Simpson Hurricane Wind Scale), producing catastrophic storm surge, damaging winds, and historic freshwater flooding across much of central and northern Florida. Ian was responsible for over 150 direct and indirect deaths and over \$112 billion in damage, making it the costliest hurricane in Florida's history and the third-costliest in United States history. Ian also made landfall as a category 3 hurricane in western Cuba bringing widespread damage and loss of power to the entire island. Ian made its final landfall as a category 1 hurricane in South Carolina.



Hurricane Ian – What Did We Experience?

SCCF River, Estuary and Coastal Observing Network (RECON)

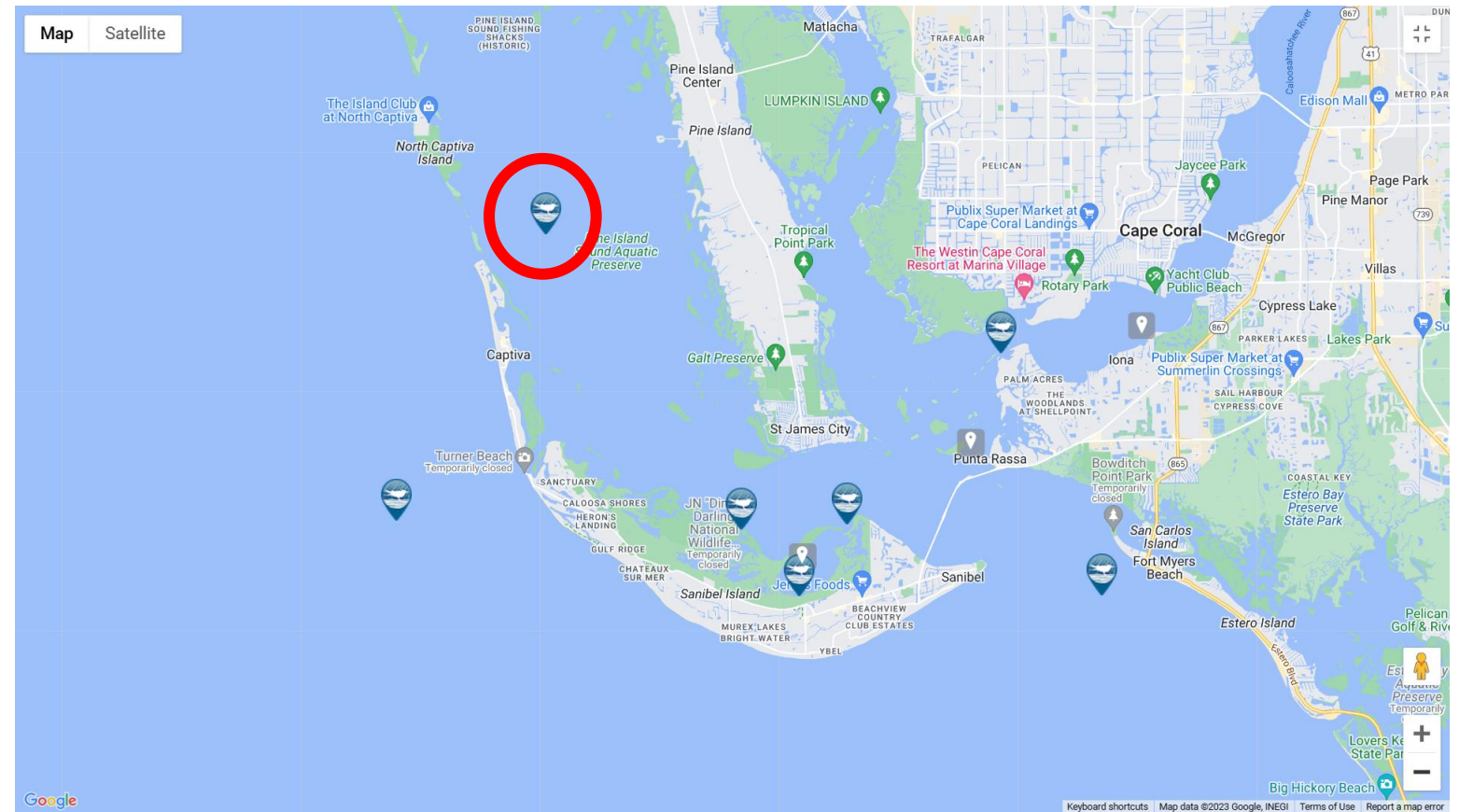




Hurricane Ian – What Did We Experience?

Physical Conditions:

- Sustained wind speed, gust speeds recorded by some SCCF recon sites for part of the storm
- Redfish Pass, sustained speed peaked at 94 mph, peak gust of 126 mph

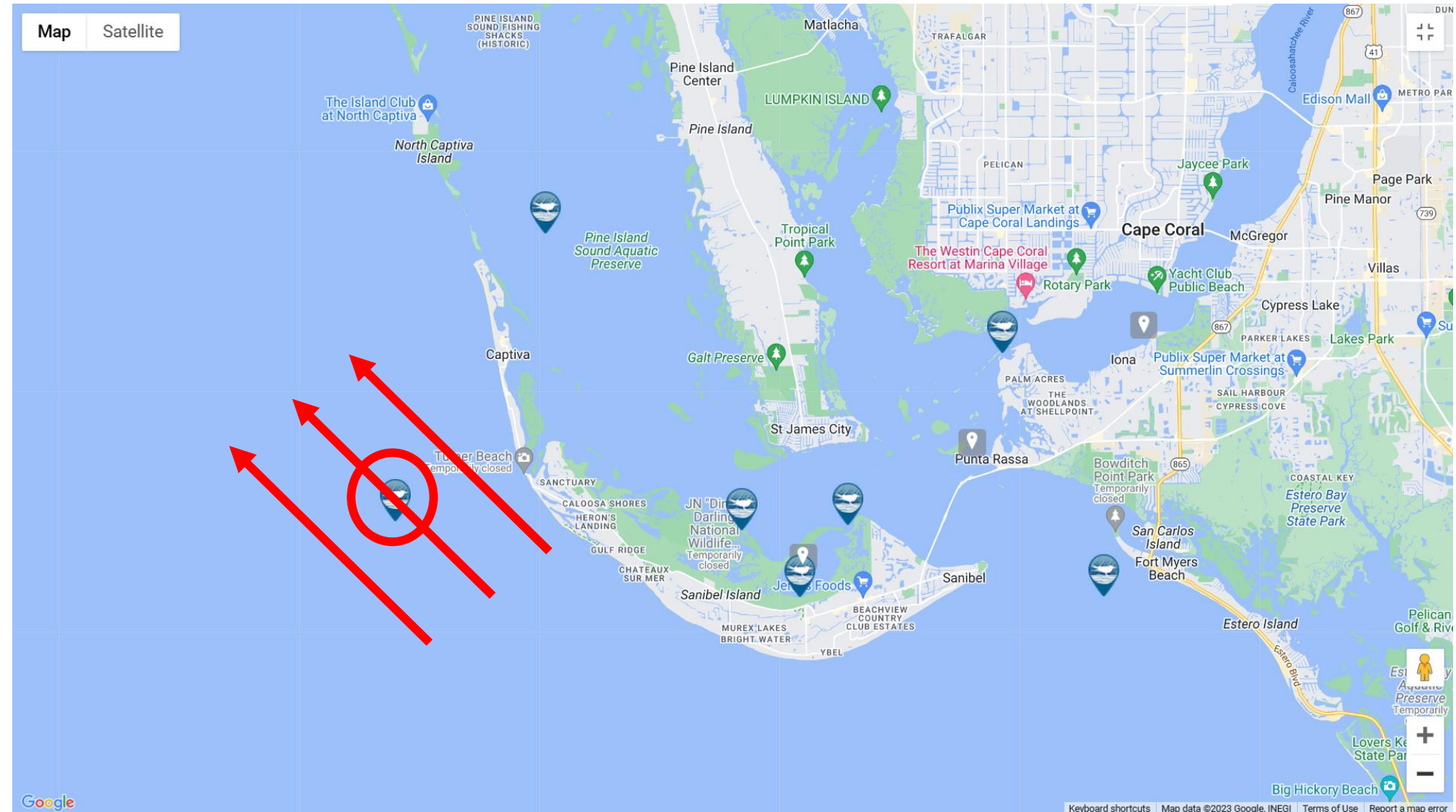




Hurricane Ian – What Did We Experience?

Physical Conditions:

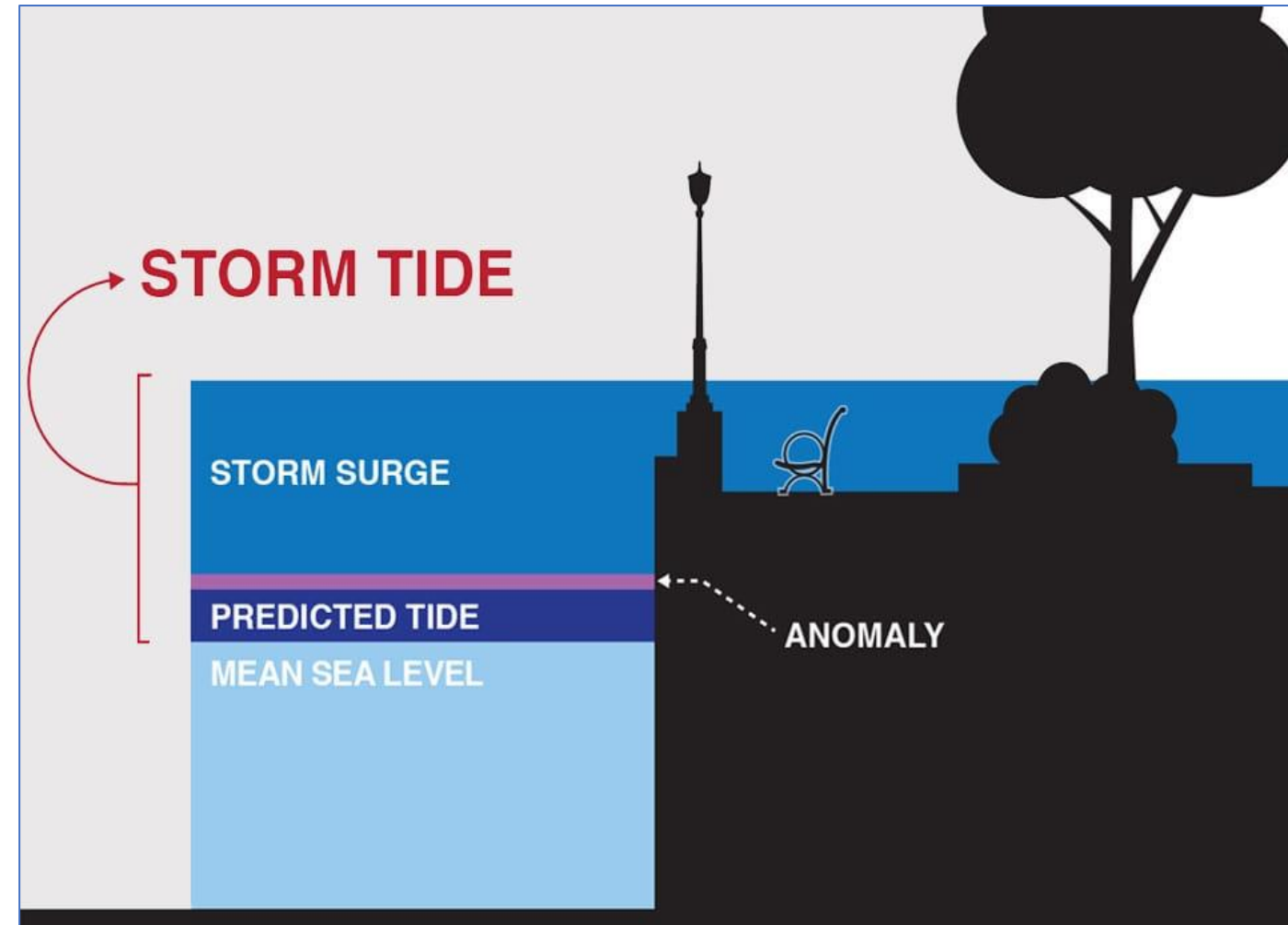
- Wave direction (SCCF wave buoy)
- Originated from Southeast, traveled towards Northwest





Hurricane Ian – What Did We Experience?

Storm surge: Additional height of water a storm introduces above what is “typical”

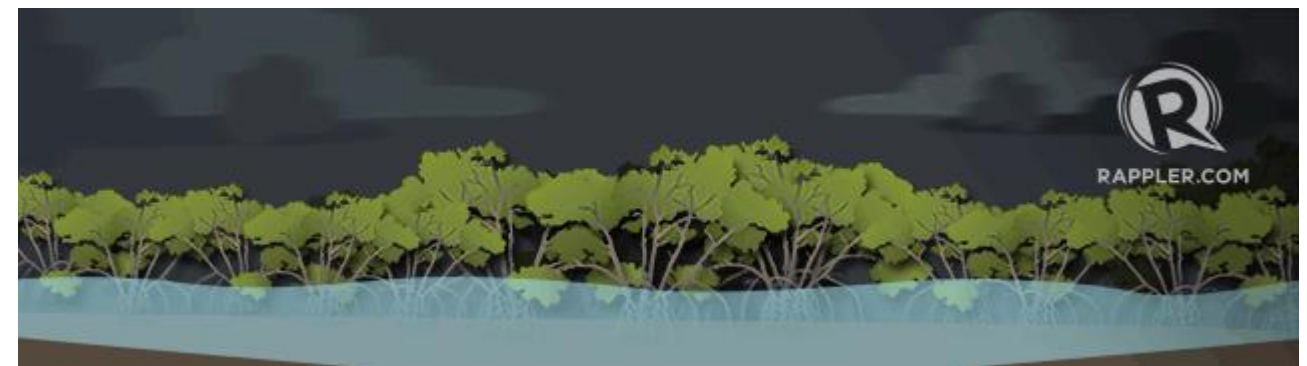
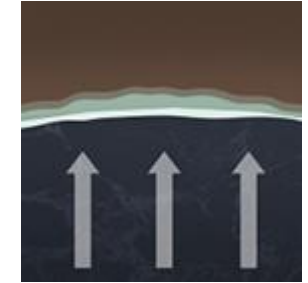
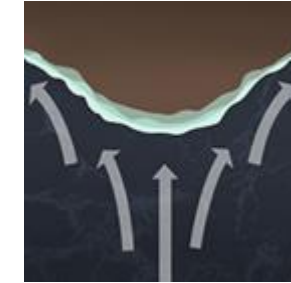
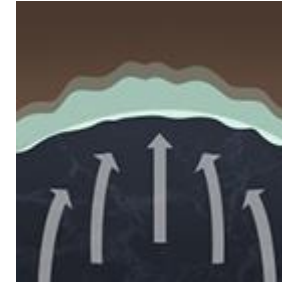




Hurricane Ian – What Did We Experience?

Storm surge impact on a given area can be influenced by:

- Size, intensity, forward speed, approach angle of a storm
- Shape of the coastline
- Slope and width of ocean floor
- Local features/barriers



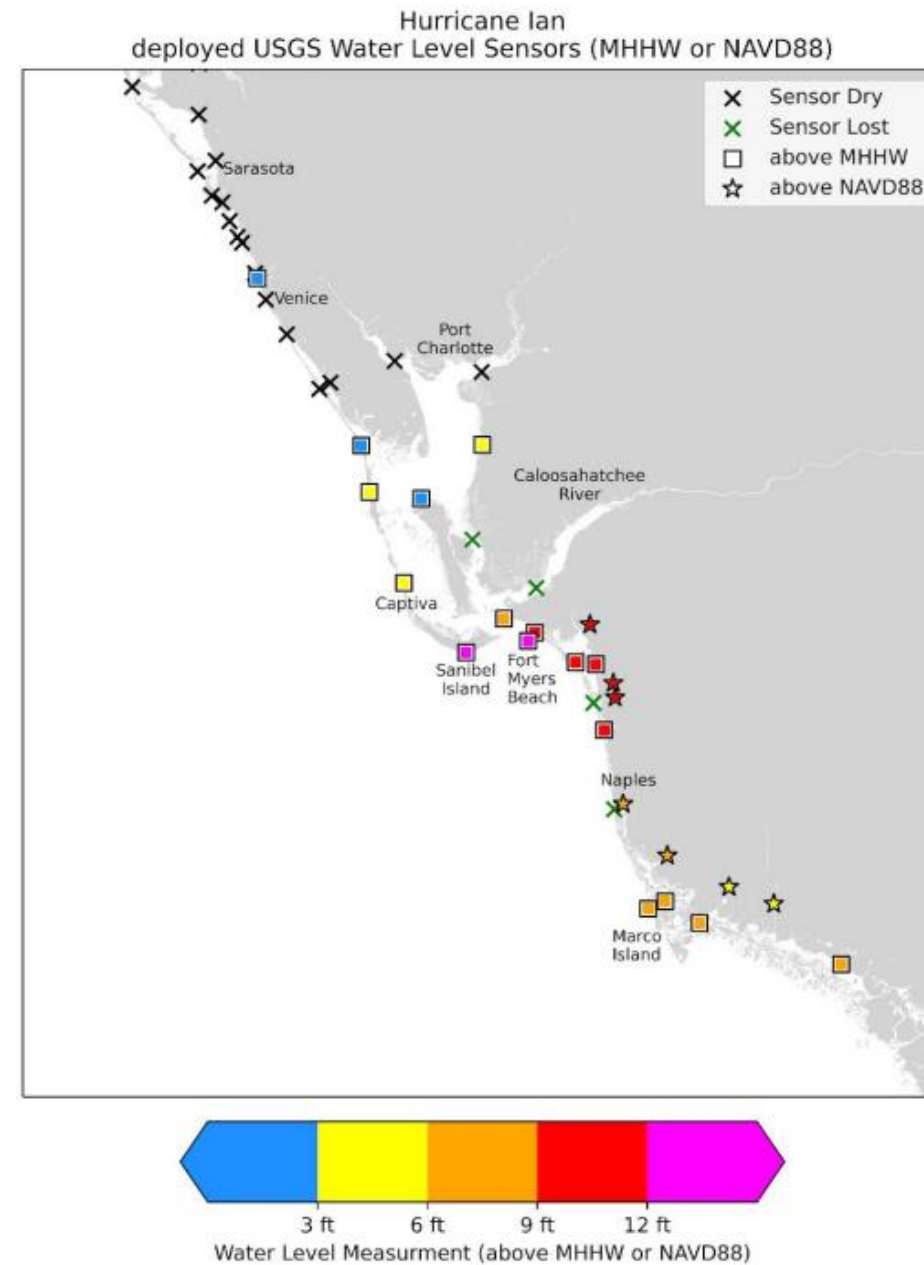
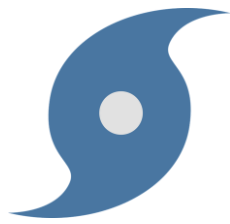


Figure 8.

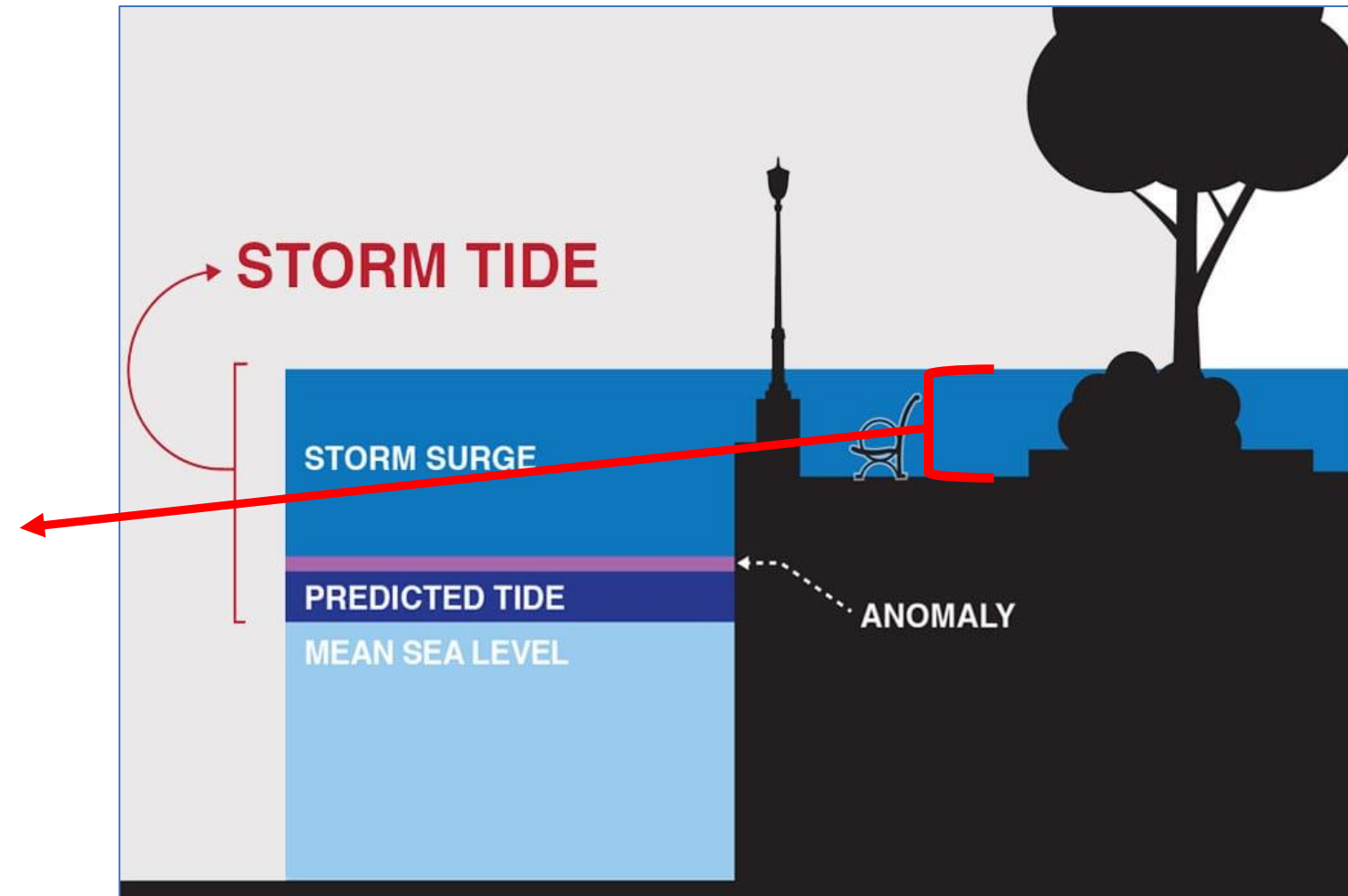
Maximum wave filtered water level measurements (ft above MHHW or NAVD88) from USGS water level sensors deployed along the west coast of Florida. NHC uses MHHW (displayed as squares) as an approximation for inundation at USGS sensors when a valid conversion from NAVD88 can be made using the NOAA VDatum tool. Sensors outside the valid conversion are given in NAVD88 (displayed as stars).



Hurricane Ian – What Did We Experience?

Storm surge: Additional height of water a storm introduces above what is “typical”

Inundation: water level above normally dry ground (storm surge + tides + waves + freshwater input)





Hurricane Ian – How much inundation across the island?

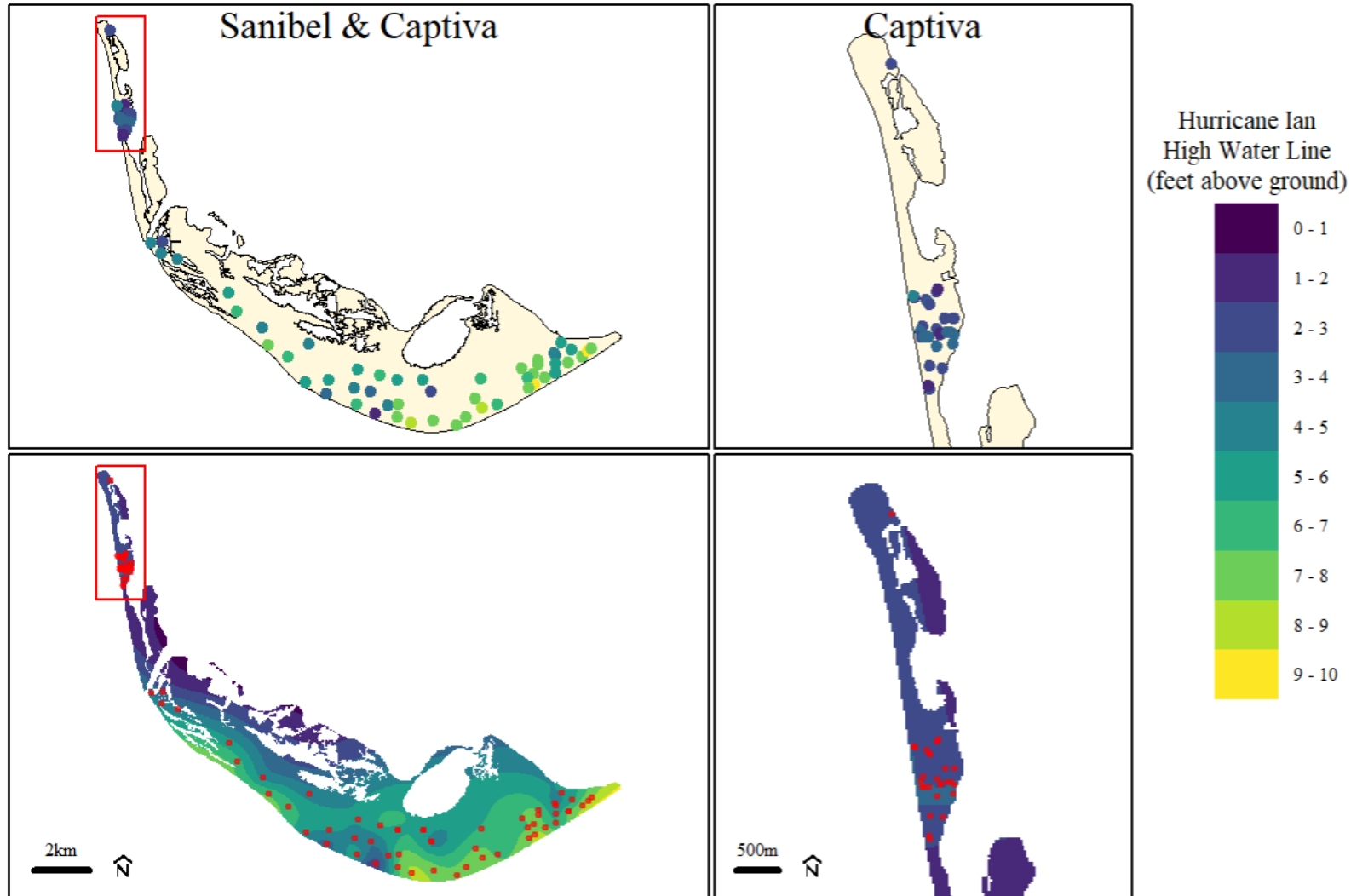


Image Credit: SCCF

- Inundation for Sanibel, Captiva: we can use interpolation of high water mark data



General pattern:

- Sanibel – 0-10 feet
- Captiva – 0-4 feet



Hurricane Ian – Large Scale Impacts

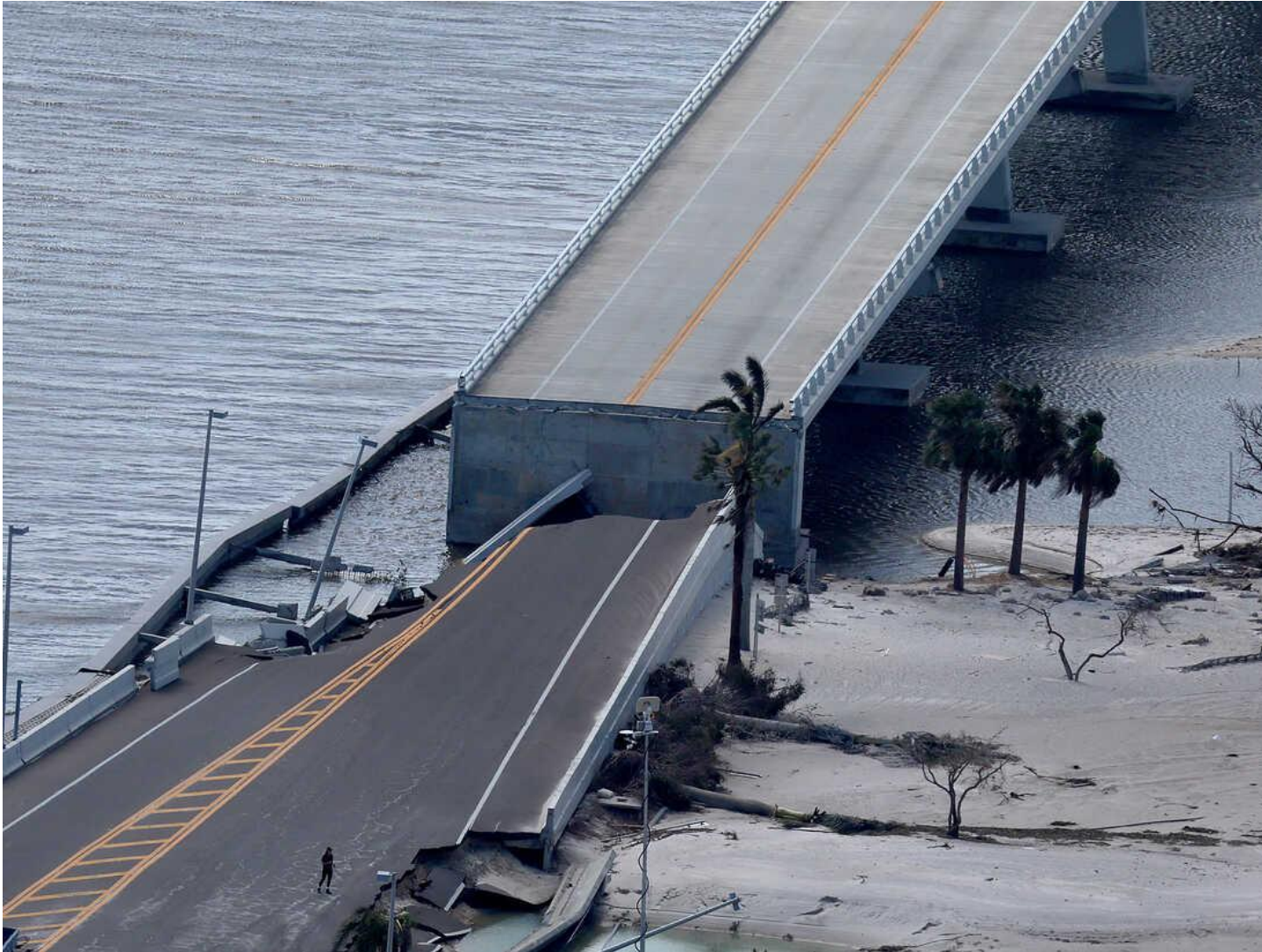


Image Credit: Joe Raedle/Getty Images

- Bridges did okay – approaches to bridges did not
- 5 out of 6 failed – soil washed out between stabilizing walls



Hurricane Ian – Large Scale Impacts



- Significant Ebb Scour Channels on Sanibel Beaches
- Large movement of sand into submerged beach profile of Captiva Beaches

Questions?



NATIONAL HURRICANE CENTER TROPICAL CYCLONE REPORT

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