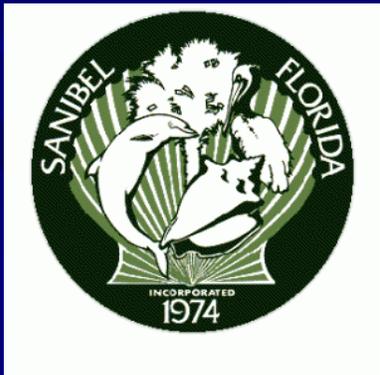


An Assessment of Sanibel's Coastal Vulnerability to Sea-level Rise and Increased Storminess

Public Forum
February 22, 2019

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Assisted by: Katherine Arnett & Andrew Gross



Introductions . . .

Who we are.

Climate–Change Preparedness: For What

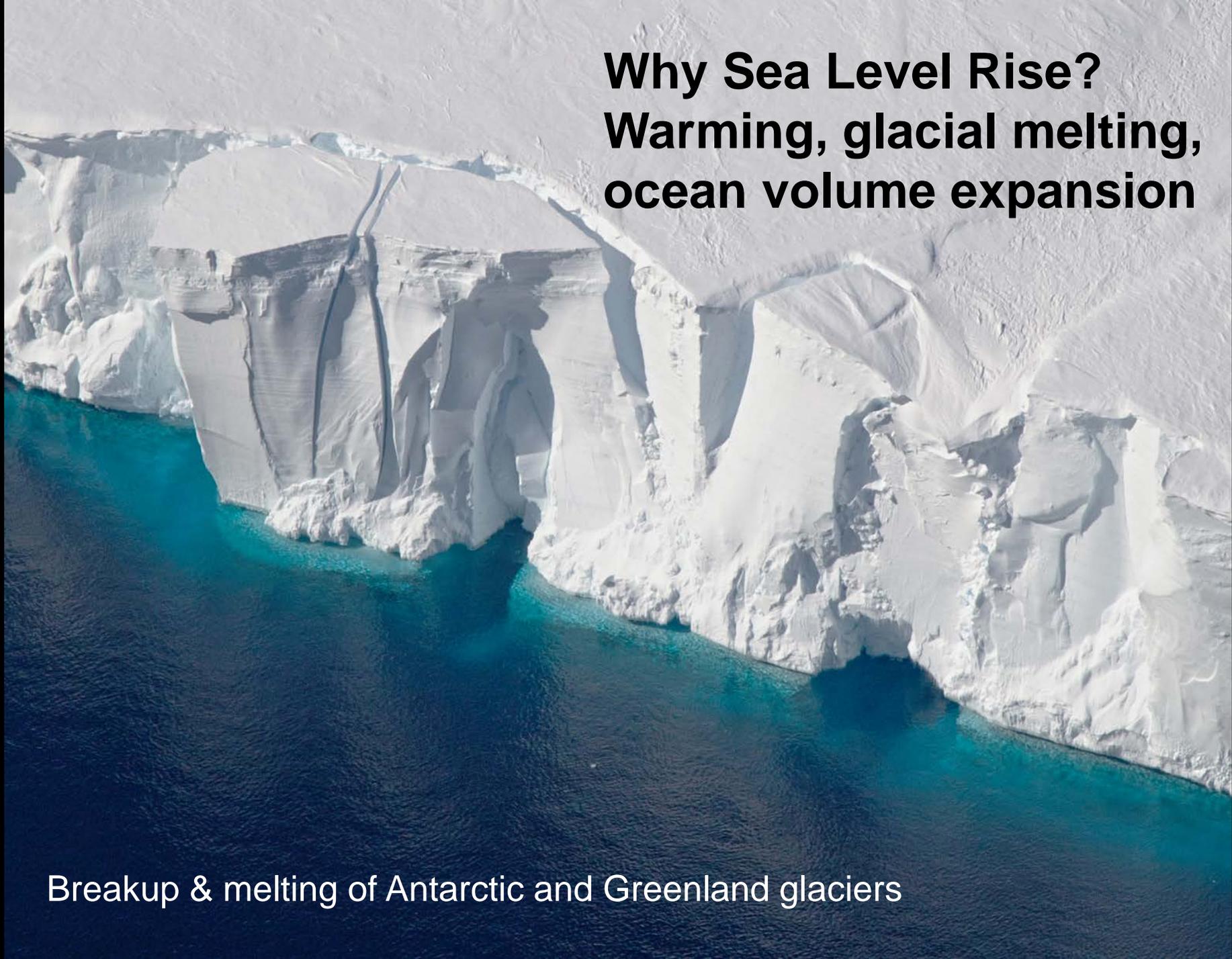
Coastal Southwest Florida concerned mostly with:

- Sea-level rise (SLR), rate and magnitude
- Storminess (when combined with SLR)
- Excesses in precipitation

The effects:

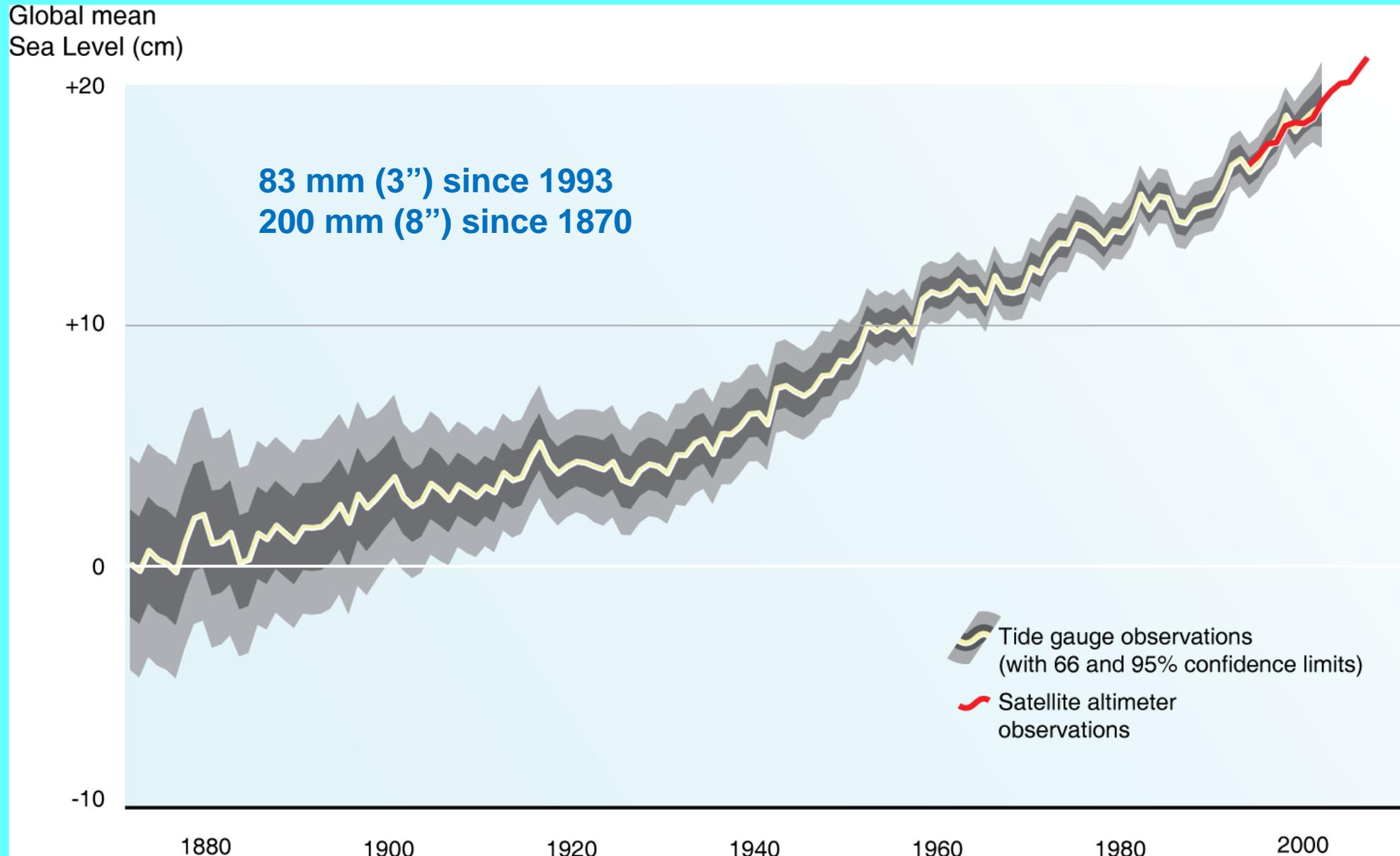
- Inundation from sea water / fresh water
- Coastal erosion and deposition
- Nuisance flooding

Why Sea Level Rise? Warming, glacial melting, ocean volume expansion



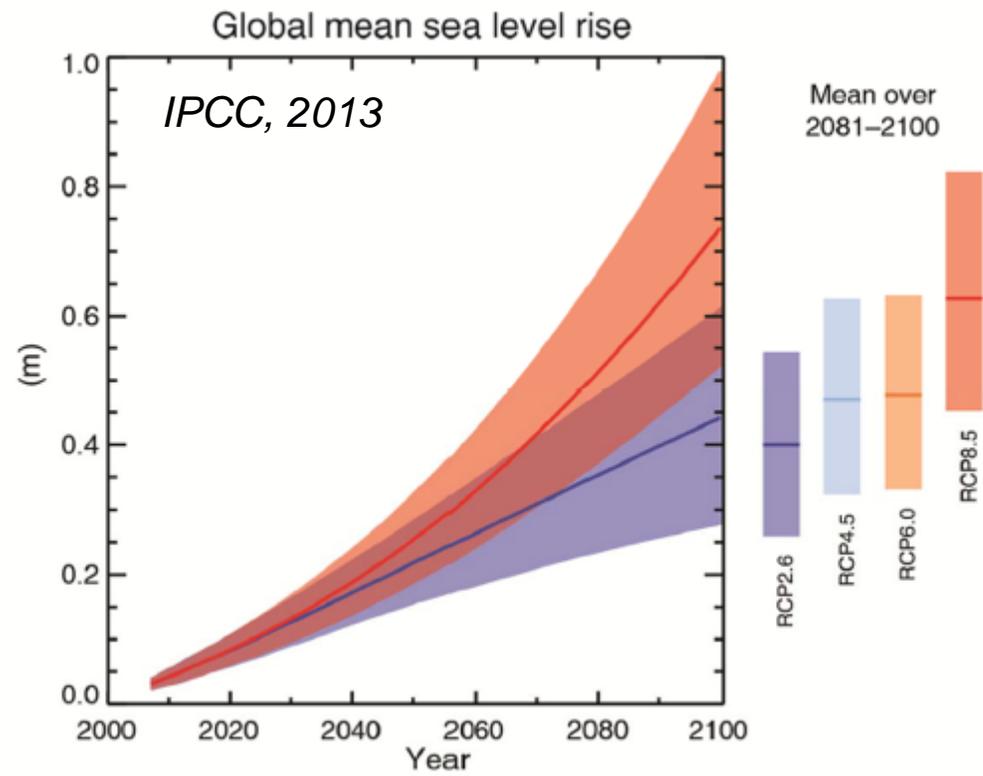
Breakup & melting of Antarctic and Greenland glaciers

Accelerating SLR Rates

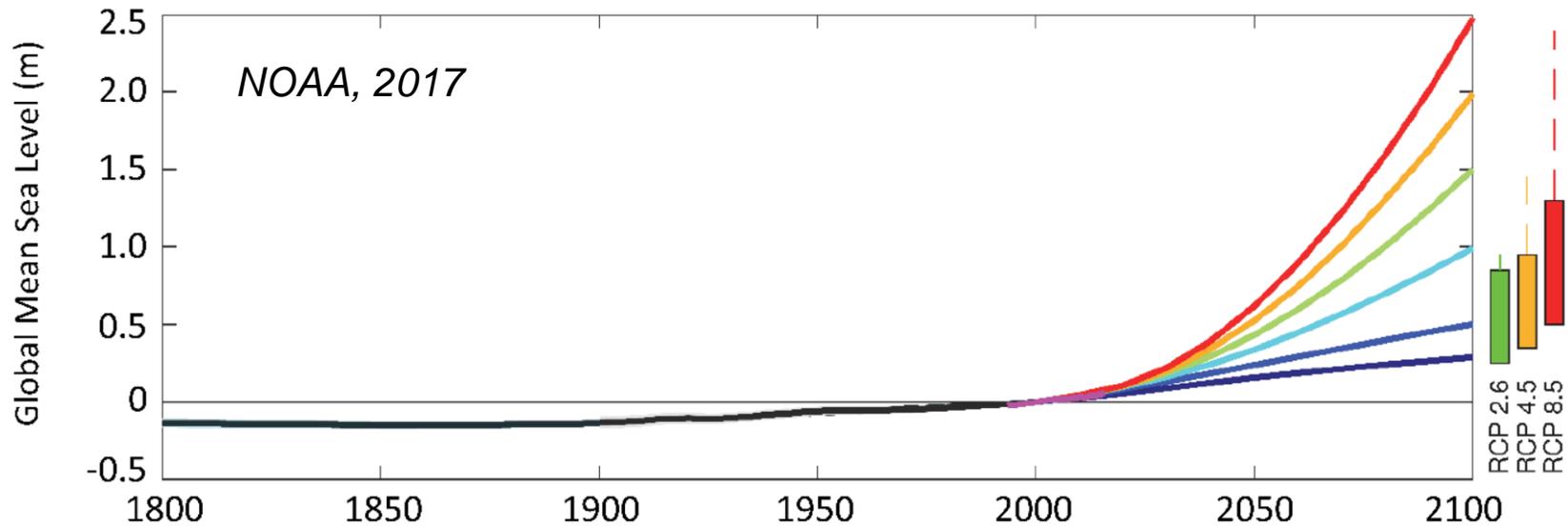


SLR Projections for 21st Century

RCP 4.5 Paris Accord
RCP 8.5 Business as Usual

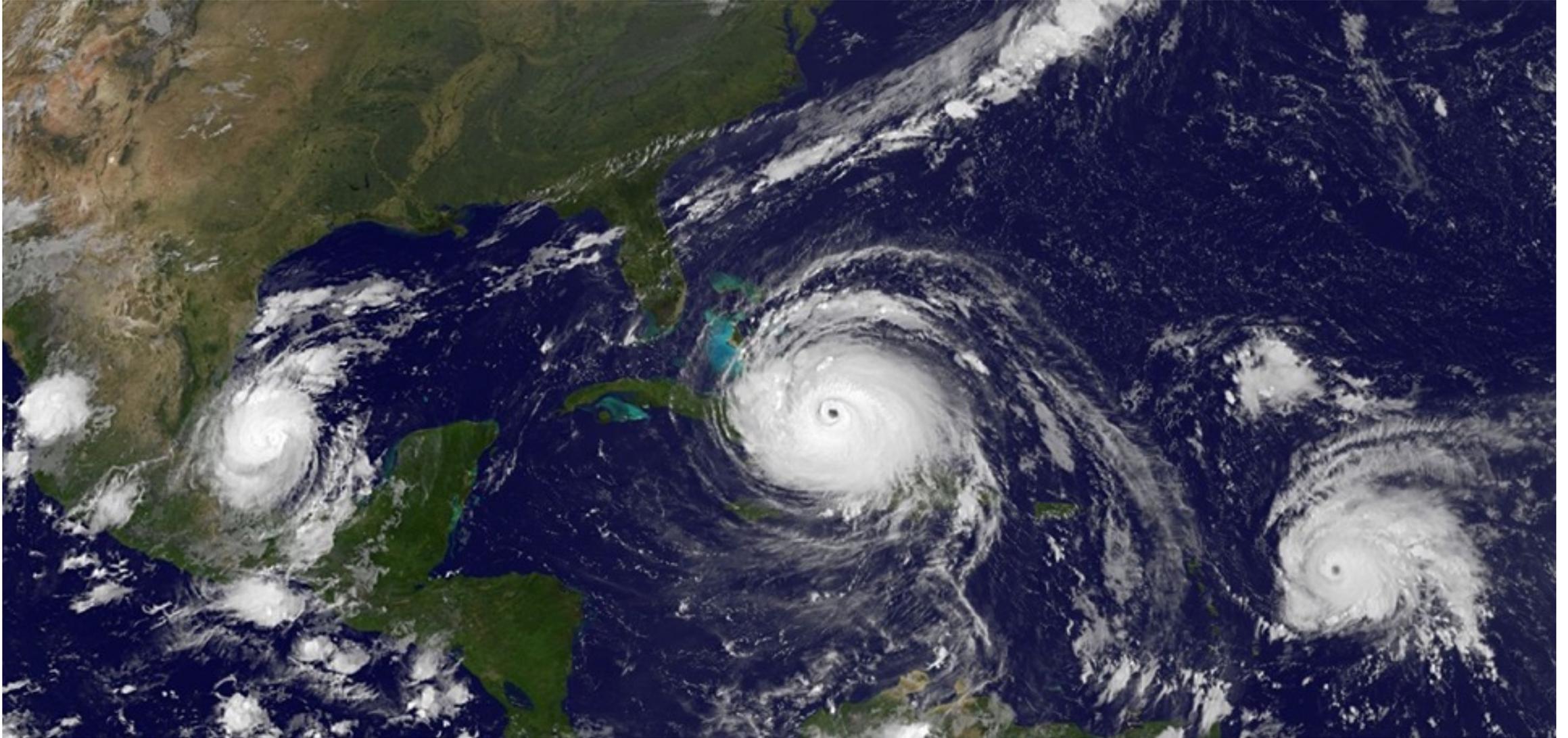


NOAA Global Mean Sea Level (GMSL) Scenarios for 2100



Why Storminess?

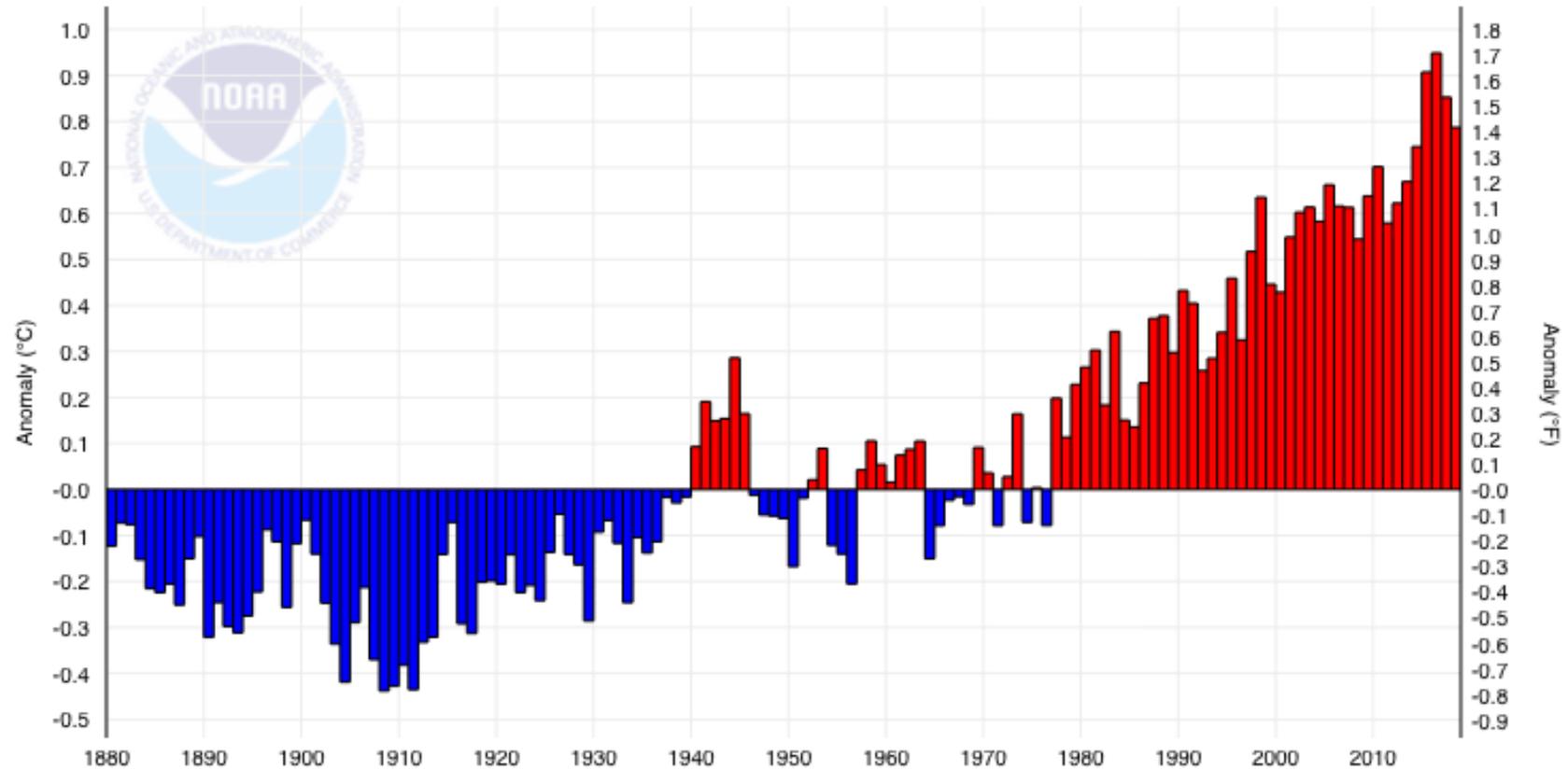
Warmer oceans; more intense, wetter, larger, & quick to fuel storms



Katia, Irma, and Jose, Sept 8, 2017

Driven by Global Warming . . .

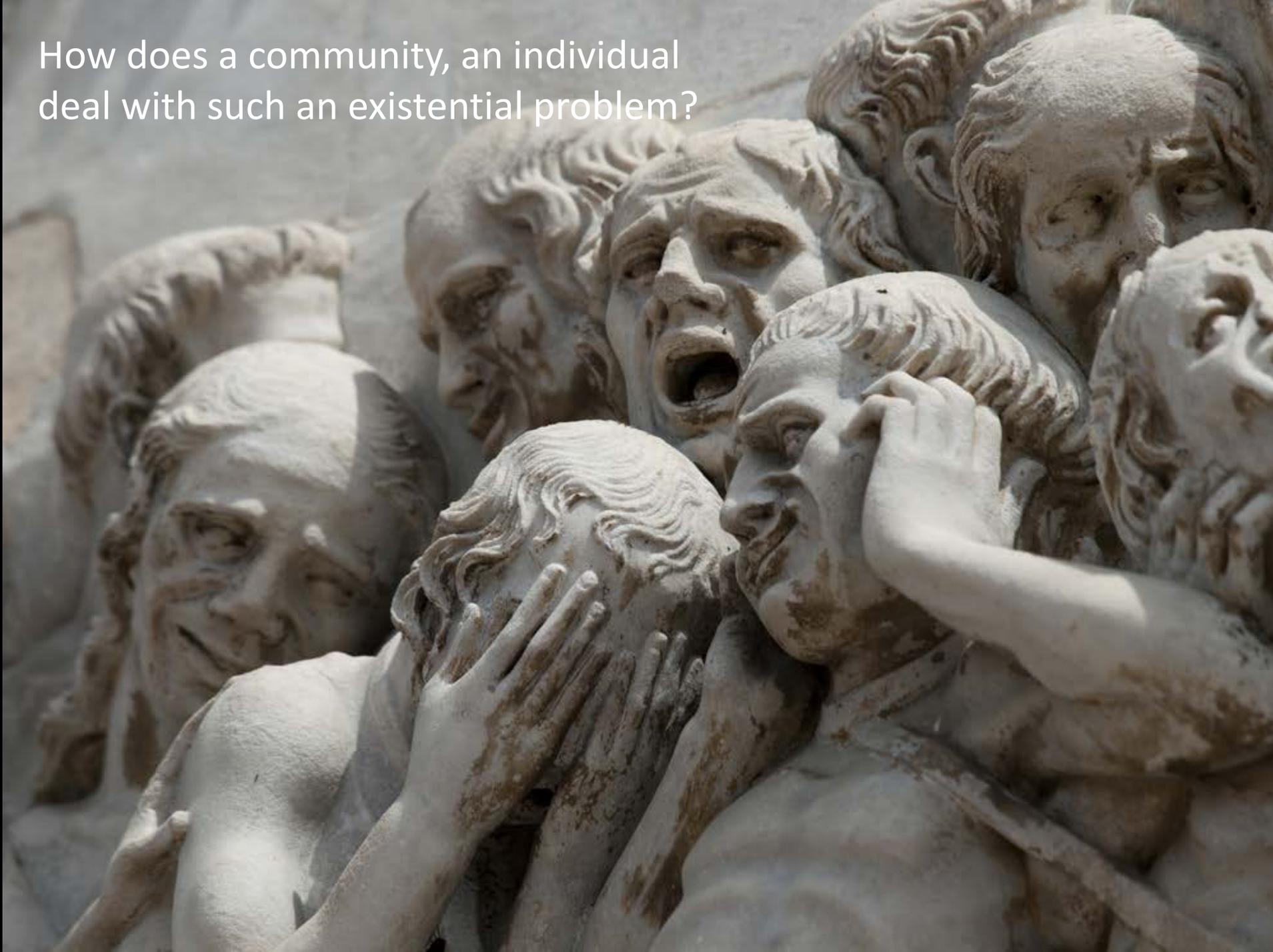
Departure of Global Temperature From Average, 1880 - 2018



Preparedness: The Process

- Understanding vulnerability
- Adaptation planning to improve “resilience”
- Implementation
- Mitigation – changing carbon-use practices to lessen effects
- Other efforts in SWFL:
 - Collier County
 - Development of a regional compact

How does a community, an individual deal with such an existential problem?



Proactively, hopefully, intellectually, responsibly . . .

Maintaining a community's economic and spiritual health through adaptation, while having an aesthetic plan for a different existence in the deeper future (if needed), while working locally, nationally, and internationally to reduce the likelihood of extreme effects.



Project Overview

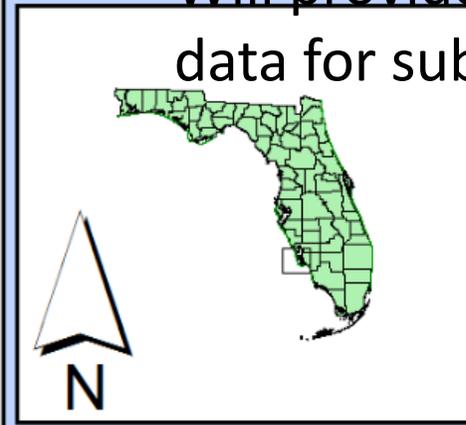
- Persons involved: FGCU & the City.
- 6-month study funded through FL DEP's Coastal Partnership Initiative.
- Through June 30, 2019; \$53,460.
- Purpose: Help Sanibel understand its vulnerabilities to sea-level rise (SLR) and storminess. Most relevant climate-change effects for Sanibel.
- Employ a community engaged, cooperative, proactive, and hopeful, yet cautious approach.
- A first step in a longer process.

Details

- A first step to understanding vulnerability.
- Two aspects:
 - Community engagement. Focus attention of civic leaders and island residents on the problem, address concerns, and identify, map, and prioritize the critical natural, cultural, and urban assets under risk.
 - Document history of coastal habitat change since 1970. Determine impacts in recent past & provide the foundation for computer modeling future behavior.
- Subsequent steps: inundation & coastal geomorphological modeling.

History of Coastal Change

- Current landscape topography: LiDAR data to generate digital elevation model (DEM).
- Generate DEMs from earlier years: 1998, 2004 (post-Charley), 2004 (pre- and post-Ivan), 2006, 2010, 2014, 2015.
- Characterize coastal landscape from 1970-1998 using FL DEP's beach profiles.
- From both, digitally map patterns of coastal erosion & deposition, and develop sediment budgets for the coast.
- Will provide insights into the coastal segments of vulnerability and provide data for subsequent modeling.



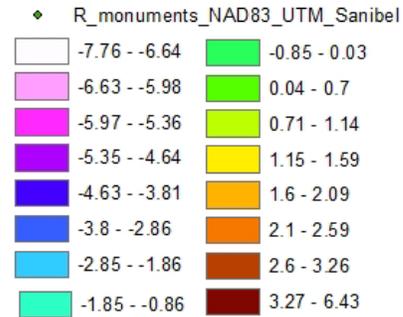
Gulf of Mexico

0 0.5 1 2 3 Miles

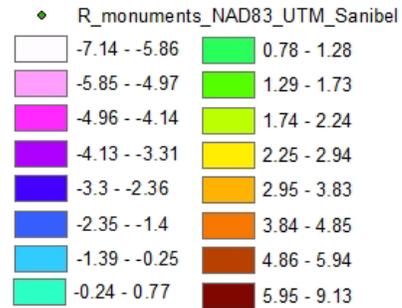


2010 Digital Elevation Model for Sanibel & Captiva

Captiva and Northern Sanibel



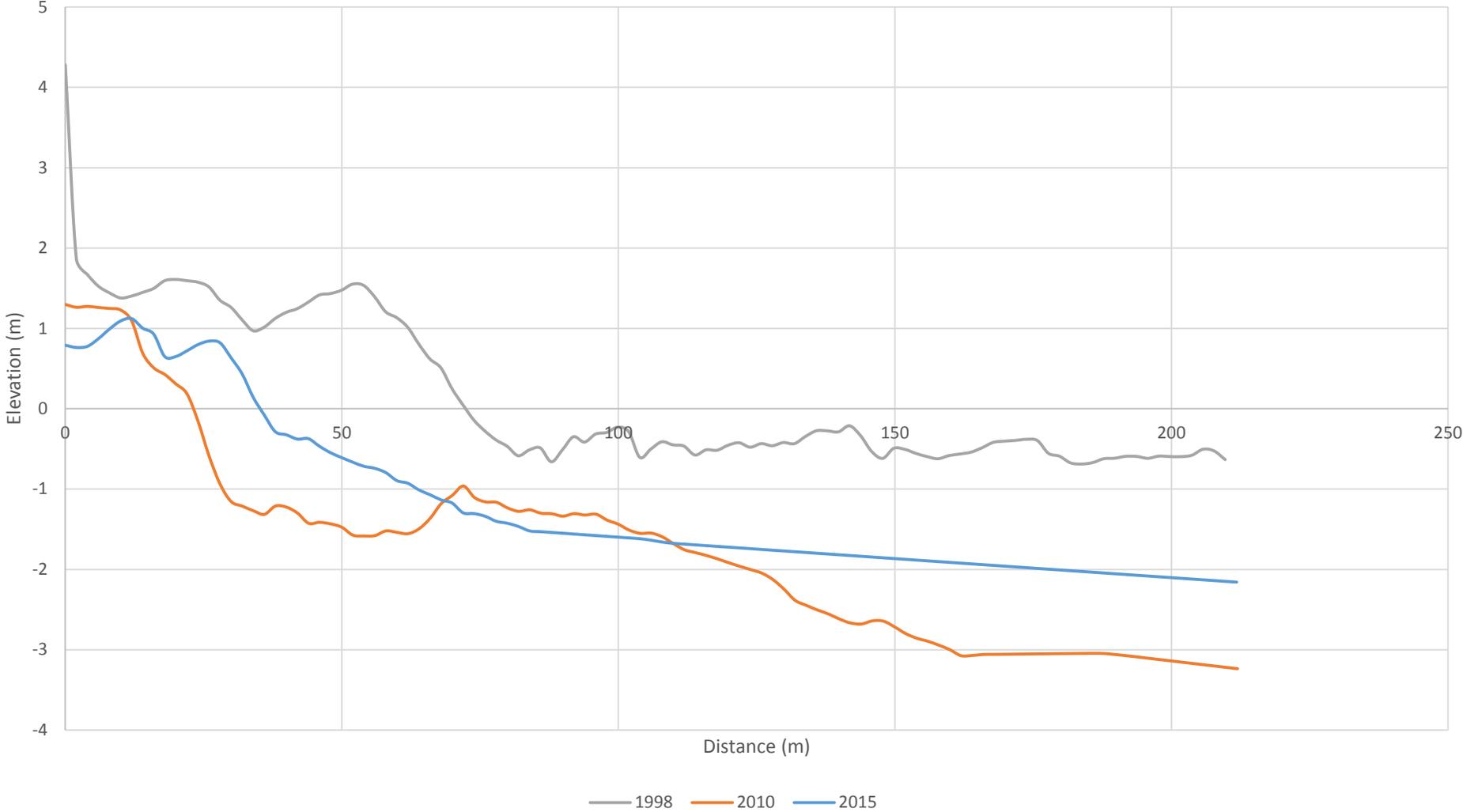
Southern Sanibel



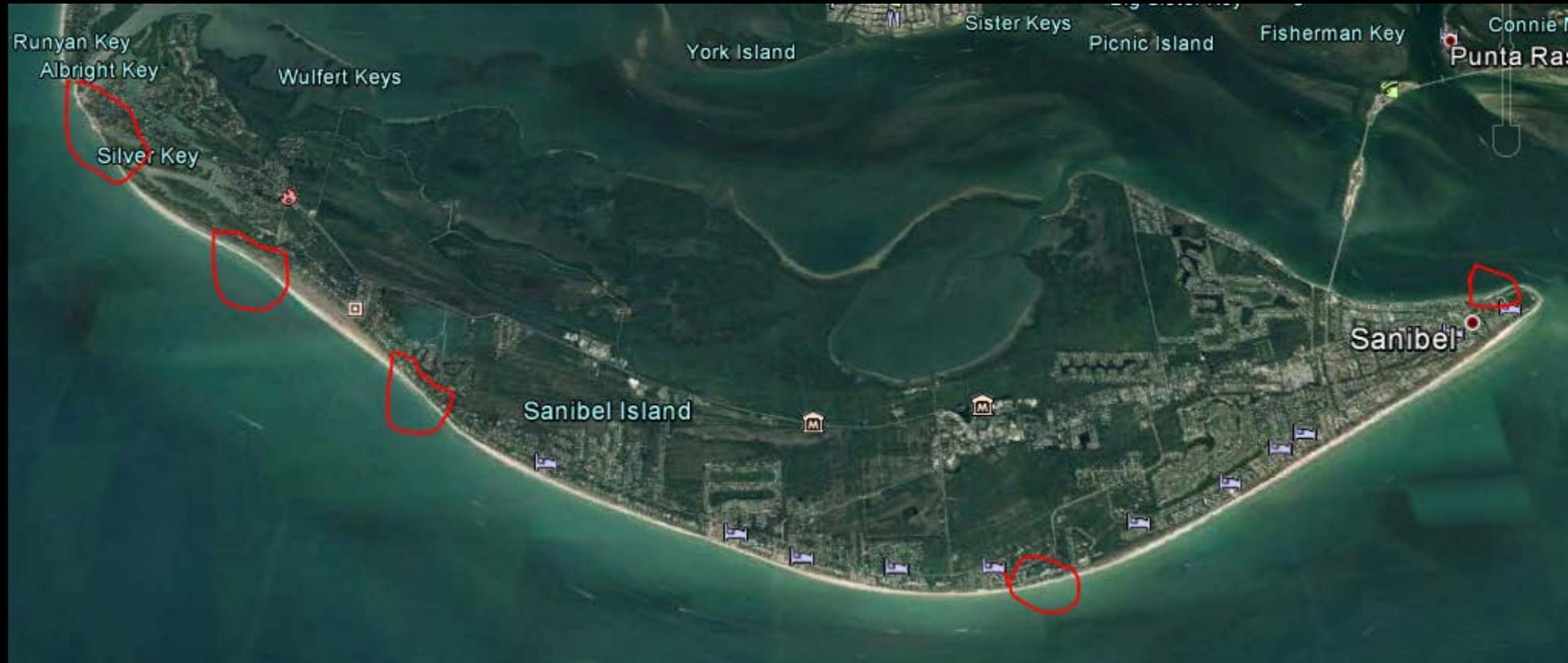
Elevations in meters

Large-scale erosion observed at R118 station

R-118



Potential erosional hot spots addressed in this study:



Community Engagement

- Public presentation: Feb 22, 4 pm, Sanibel Community House.
- 8 Community engagement teams:
 - Community Infrastructure, Business Community, Development Community, School & Education, Social Resources, Natural & Cultural Resources, Captiva Community Panel, Community at Large.
 - Team captains + 6-10 members each.
- Purpose:
 - What target dates and SLR magnitudes are important?
 - SWOT analysis.
 - Identify, map, and prioritize assets.

Teams & Captains

- Community Infrastructure: Oisin Dolley
- Business Community: Evelyn Stuart
- Development Community: Dustyn Corace
- School & Education: Bruce Neil
- Social Resources: Maggi Feiner
- Natural & Cultural Resources: Joel Caouette
- Captiva Community Panel: David Mintz
- Community at Large: Jon Gustafson
- Are we missing other sectors?

SLR Projections Used By SE FL Regional Climate Change Compact

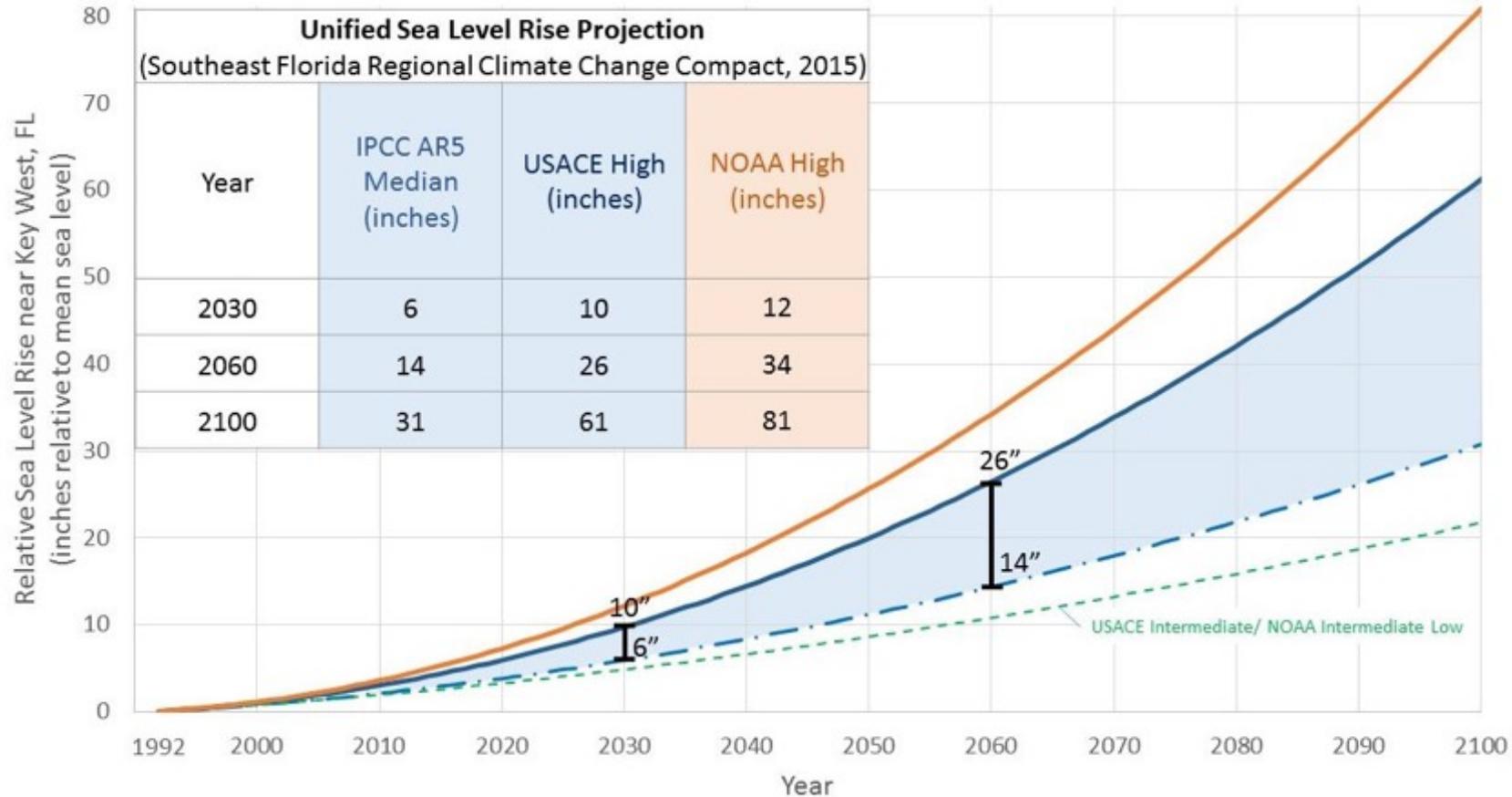


Figure 1: Unified Sea Level Rise Projection. These projections are referenced to mean sea level at the Key West tide gauge. The projection includes three global curves adapted for regional application: the median of the IPCC AR5 RCP8.5 scenario as the lowest boundary (blue dashed curve), the USACE High curve as the upper boundary for the short term for use until 2060 (solid blue line), and the NOAA High curve as the uppermost boundary for medium and long term use (orange solid curve). The incorporated table lists the projection values at years 2030, 2060 and 2100. The USACE Intermediate or NOAA Intermediate Low curve is displayed on the figure for reference (green dashed curve). This scenario would require significant reductions in greenhouse gas emissions in order to be plausible and does not reflect current emissions trends.

Scenarios for Probabilistic Inundation Risk Mapping

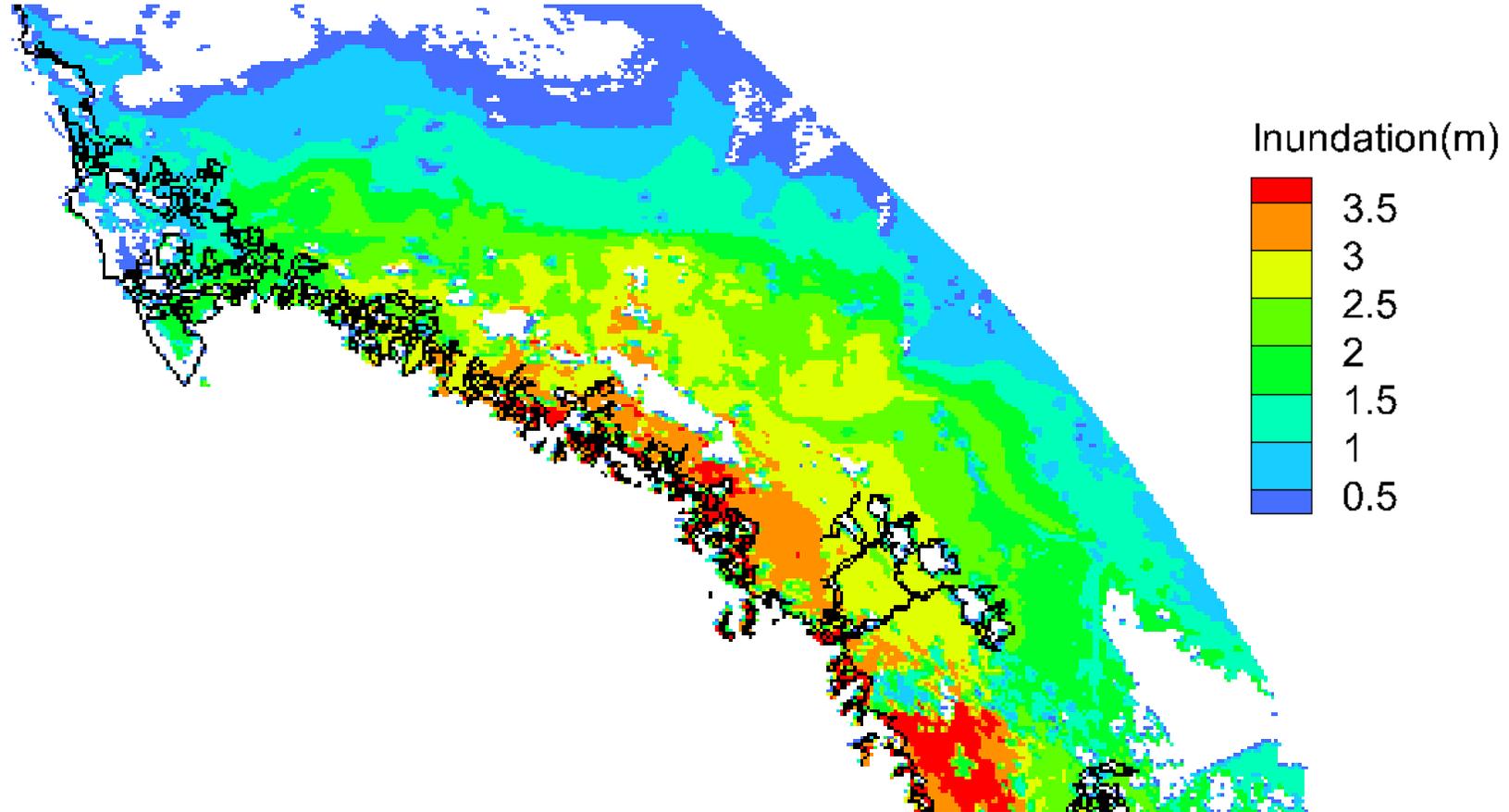
Based on latest SLR science, including NOAA (2012, 2014, 2017)

Period	RCP	SLR (ft)		
		Low	Medium	High
Current	---	---	---	---
2030	4.5	0	0.5	1
2060	4.5	0.5	1.5	2.5
2100	4.5	1	3	6.6

RCP: Representative Concentration Pathway; 4.5: Paris Accord

Inundation Modeling Map for Collier County Showing Storm Surge

- Something similar should be generated for Sanibel.
- Where do assets map on this landscape?



Storm Inundation for Irma Under Current Climate



■ Thank you . . .

- What are your concerns?
- What do you view as the critical “dates in the future”?