

Responses to Climate Change and Sea Level Rise

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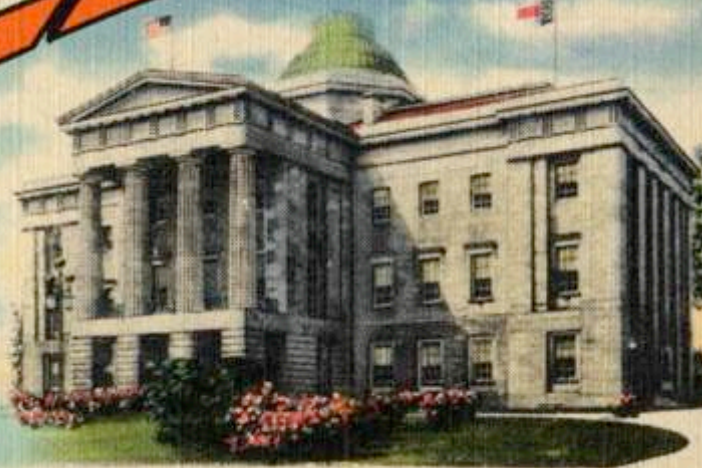


Greetings
from

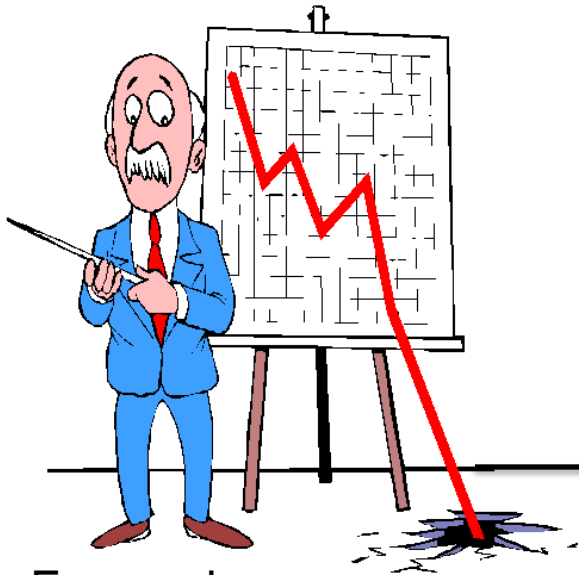
NORTH CAROLINA

State Capital in Raleigh

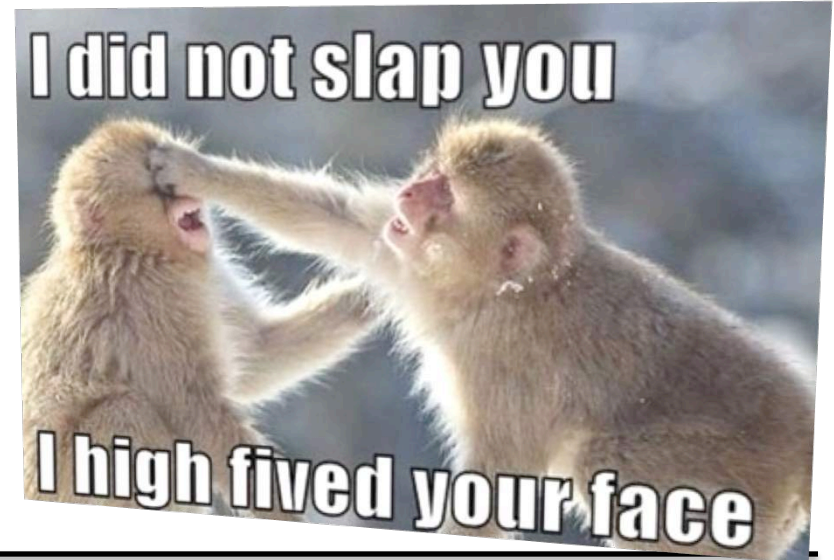
State Flower
the Goldenrod



Why the Controversy?



Economics

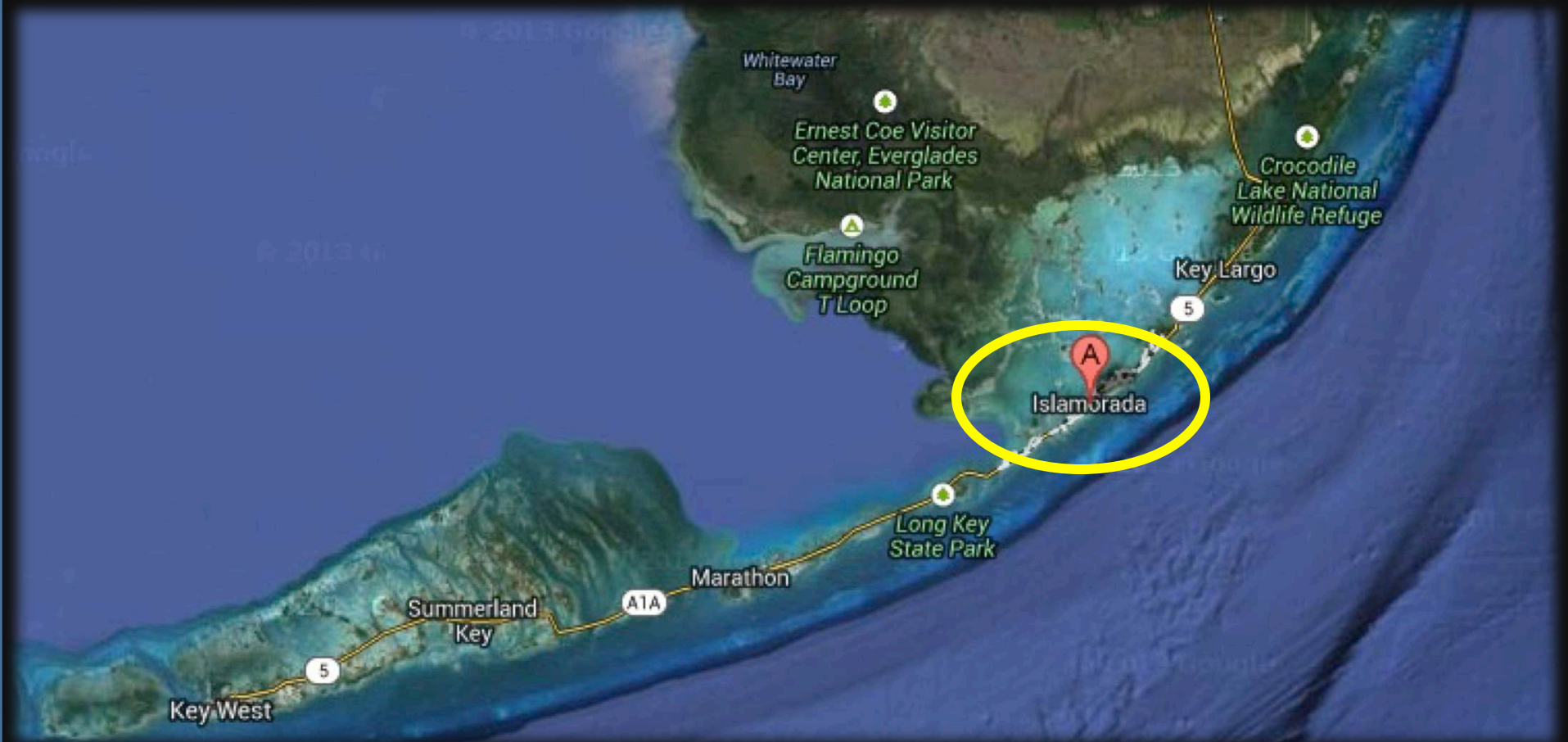


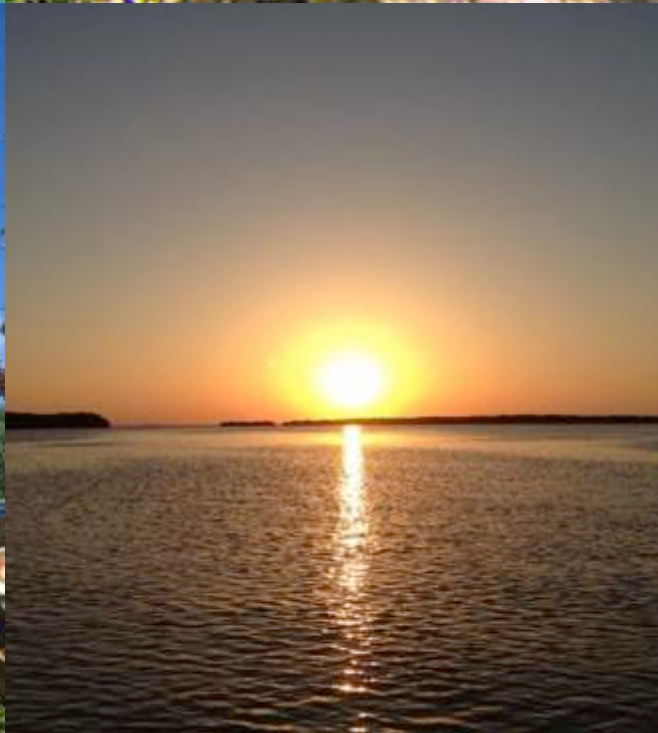
Perception



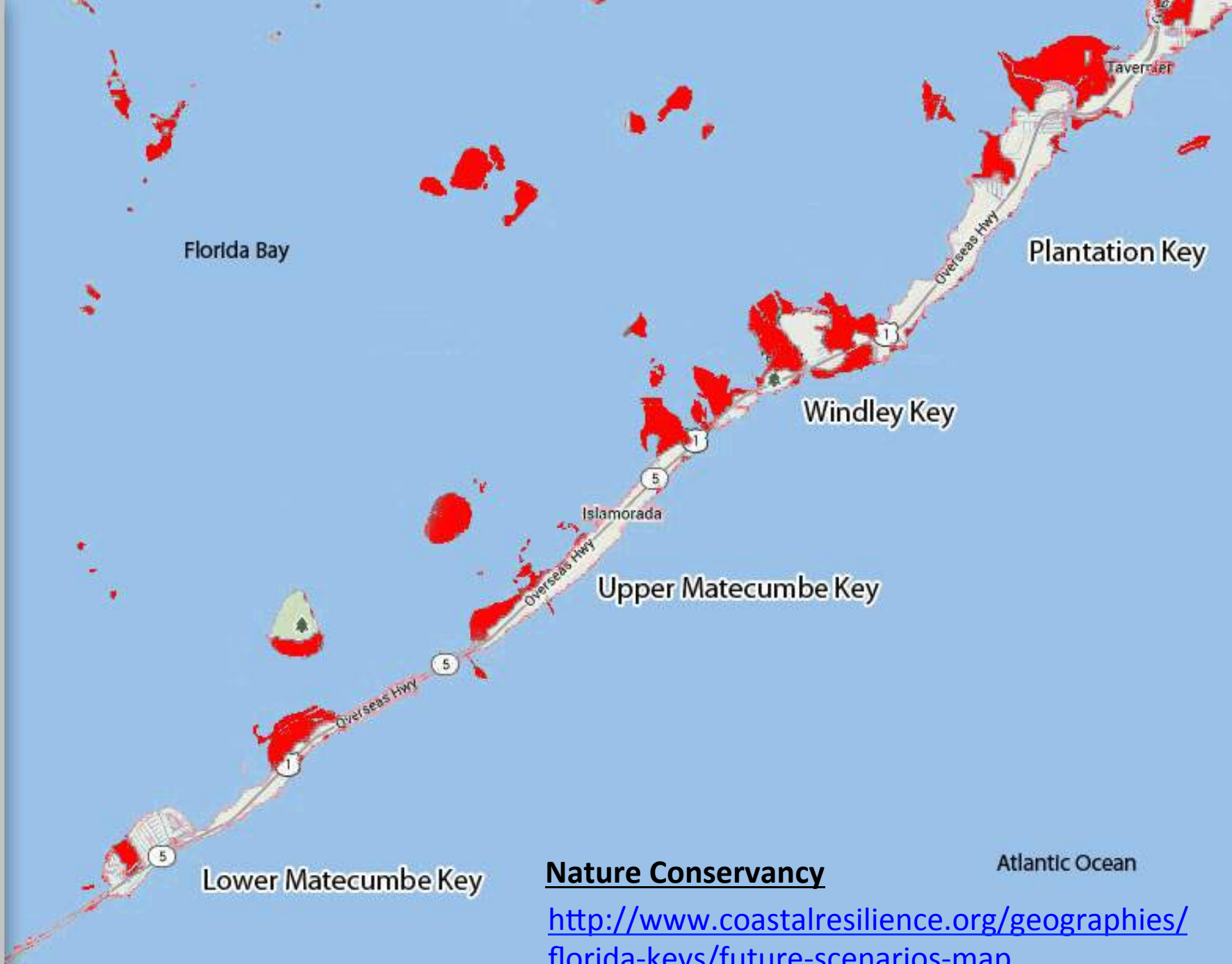
Scientific Confusion?

Islamorada, Village of Islands





1 Foot Sea Level Rise



Nature Conservancy

<http://www.coastalresilience.org/geographies/florida-keys/future-scenarios-map>

Recorded Rise

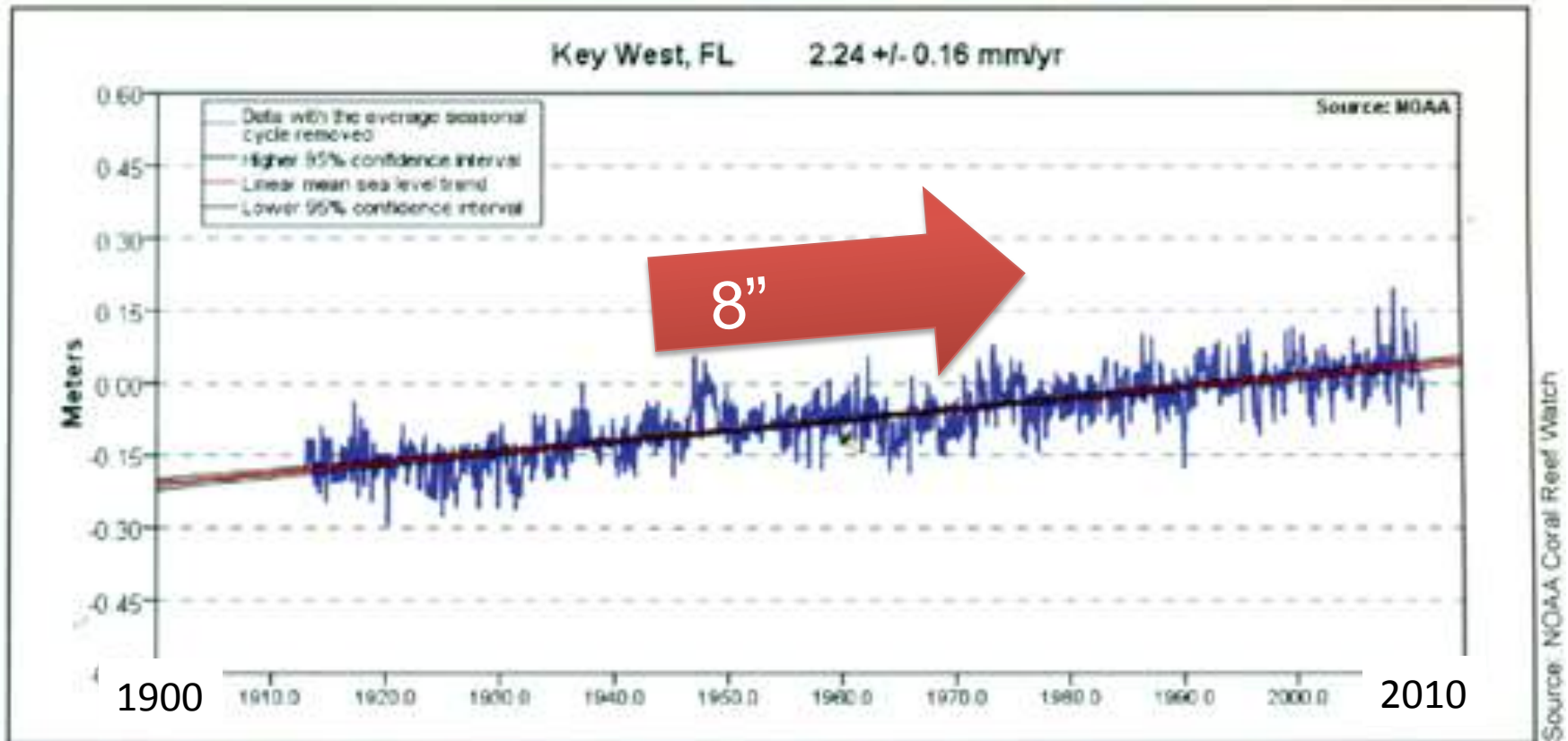
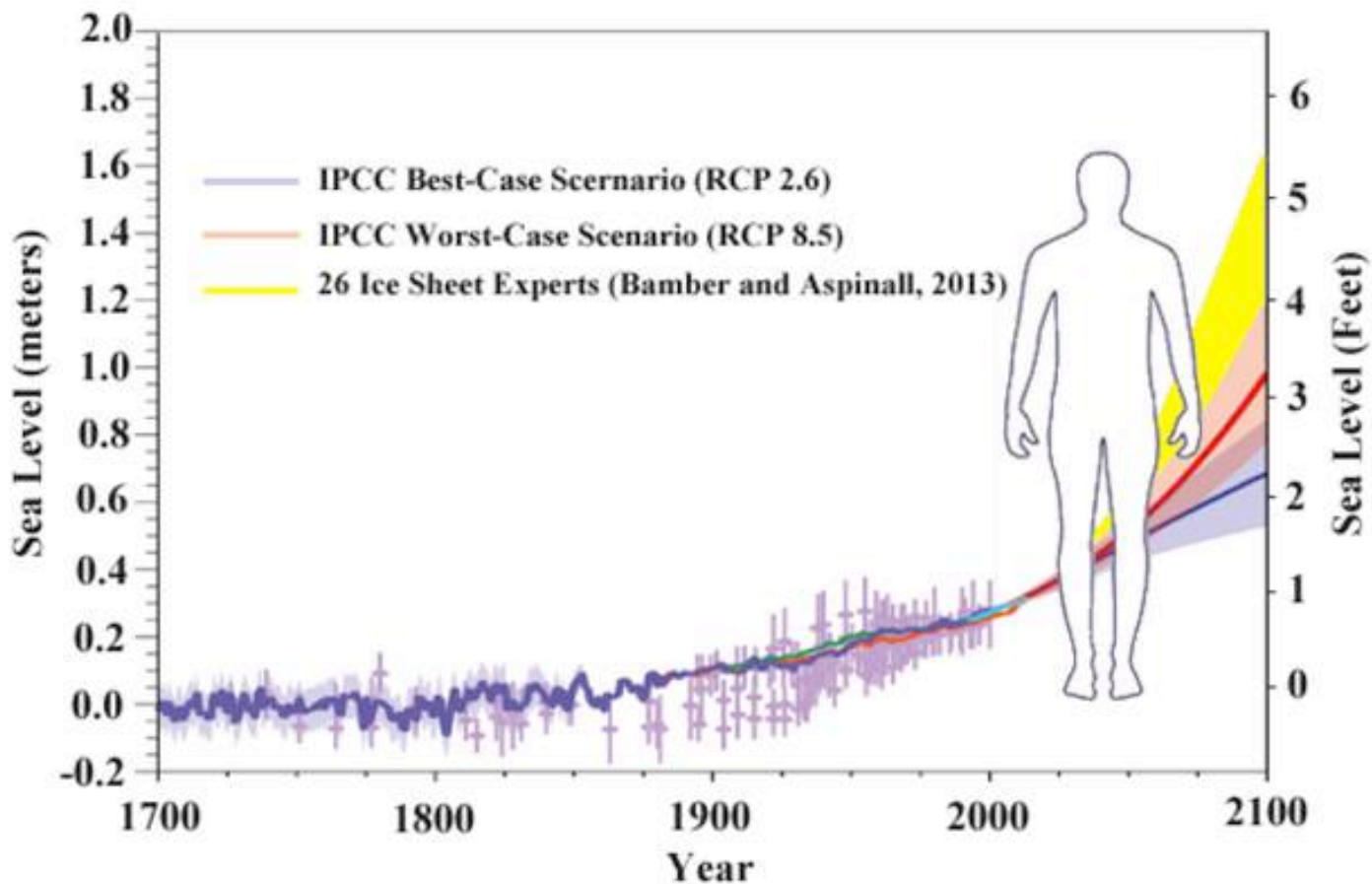


Figure 23. Mean tide measurements from tide station KYWF1 - 8724580 at Key West harbor. The mean sea level trend is +2.24 millimeters/year with a 95% confidence interval of +/- 0.16 mm/yr based on monthly mean sea level data from 1913 to 2006 which is equivalent to a change of 0.73 feet in 100 years.

Predicted Rise: IPCC

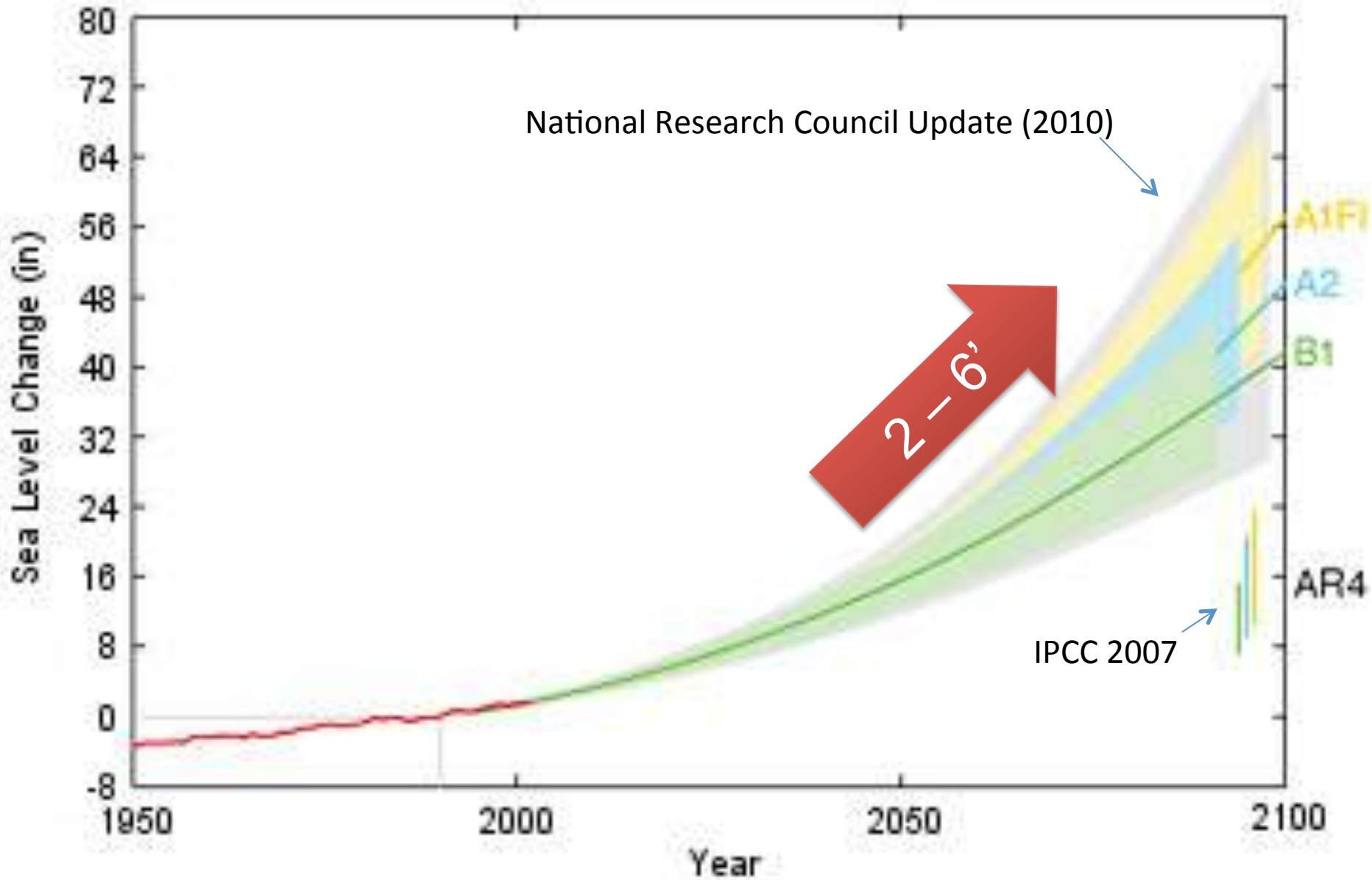
Sea Level Rise: Observed and Predicted as of 2013



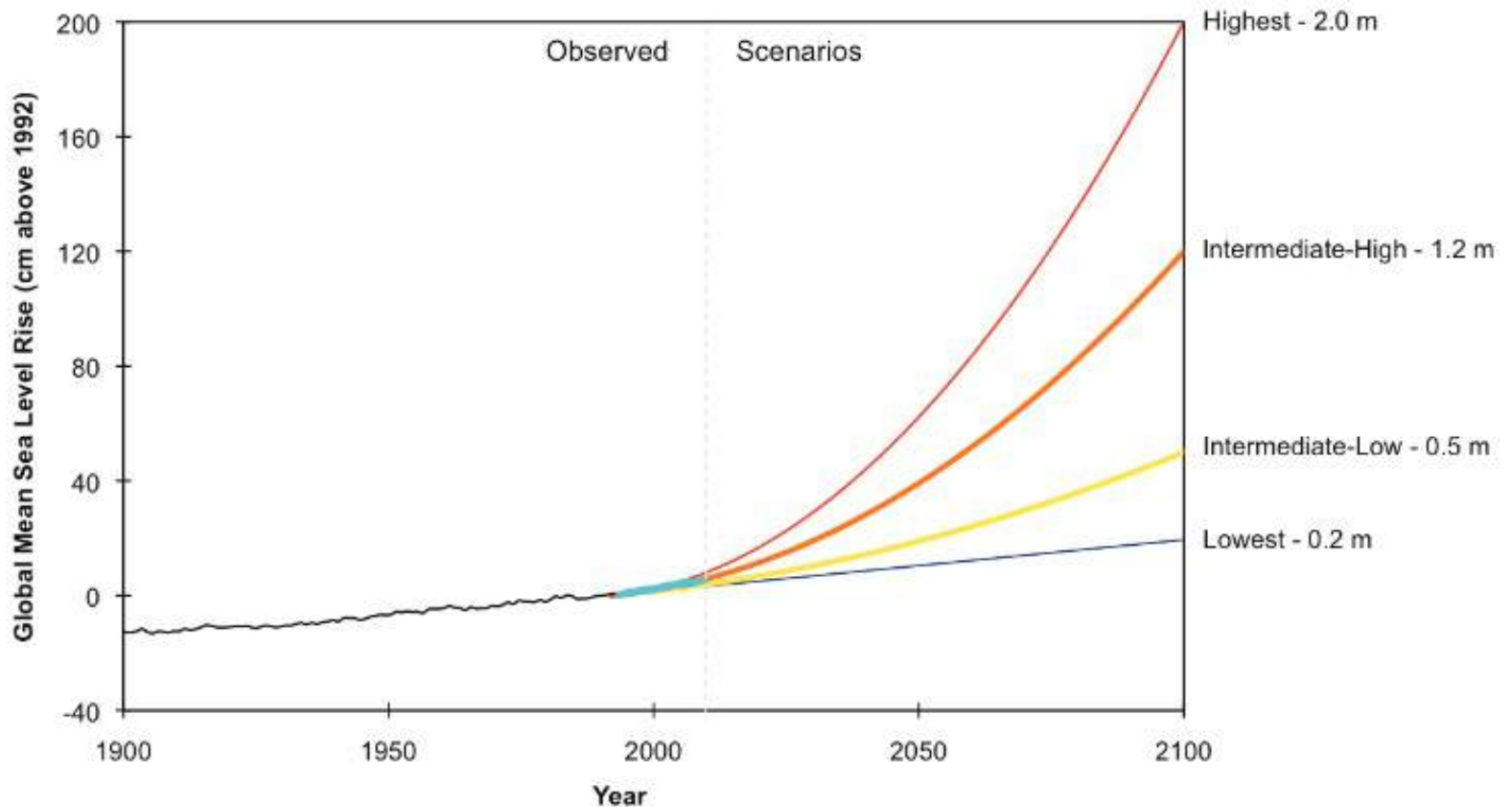
- IPCC (2007)
- Projected by 2100
7 - 23"

- IPCC (2013-2014)
- Projected by 2100
10.8 - 38.4" (3.2')
- Does not account for
Antarctic ice sheets
- Low estimate?

Predicted Rise: NRC

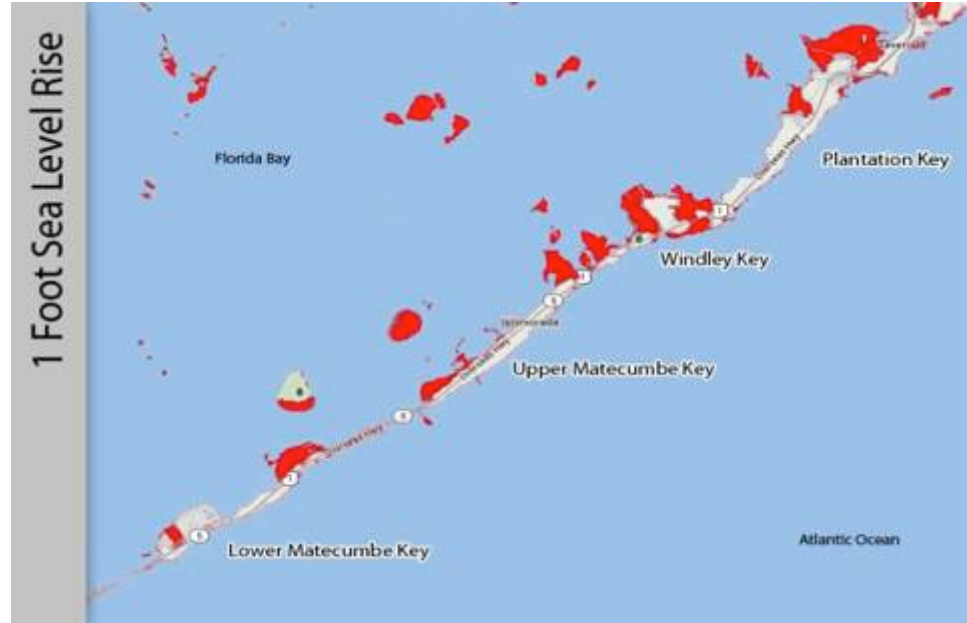
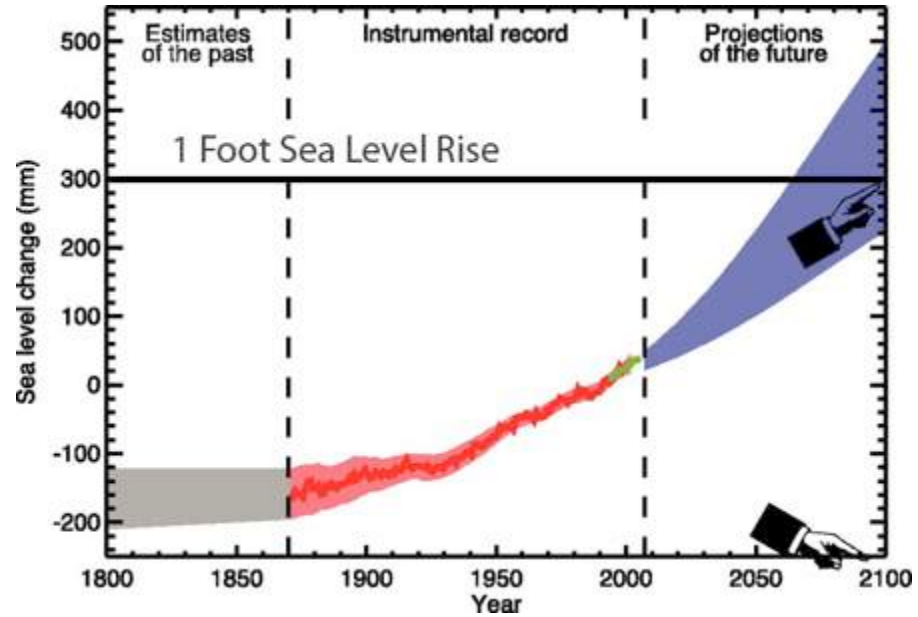


National Climate Assessment

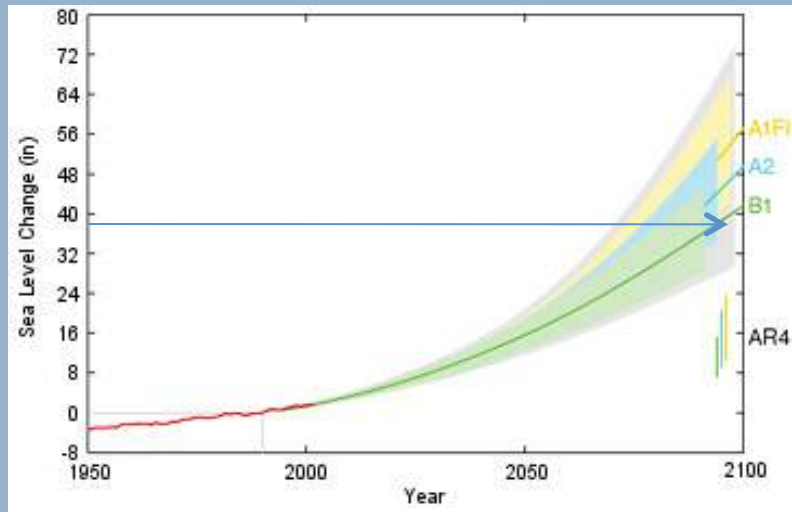
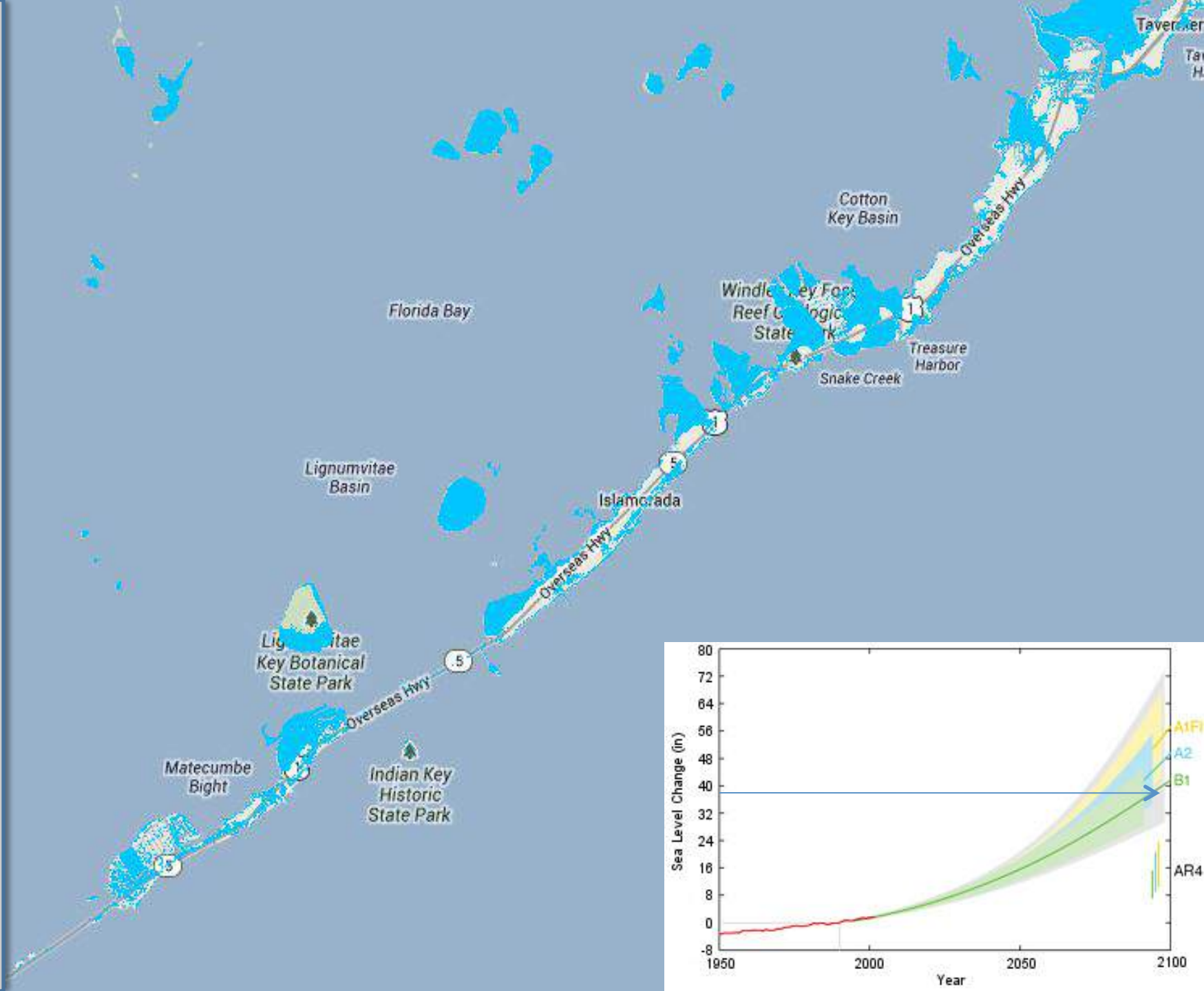


Scenario	SLR by 2100 (m)*	SLR by 2100 (ft)*
Highest	2.0	6.6
Intermediate-High	1.2	3.9
Intermediate-Low	0.5	1.6
Lowest	0.2	0.7

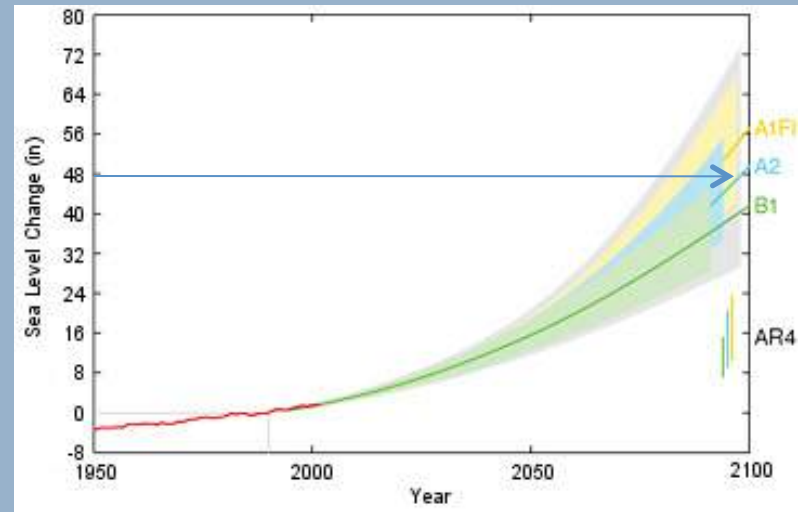
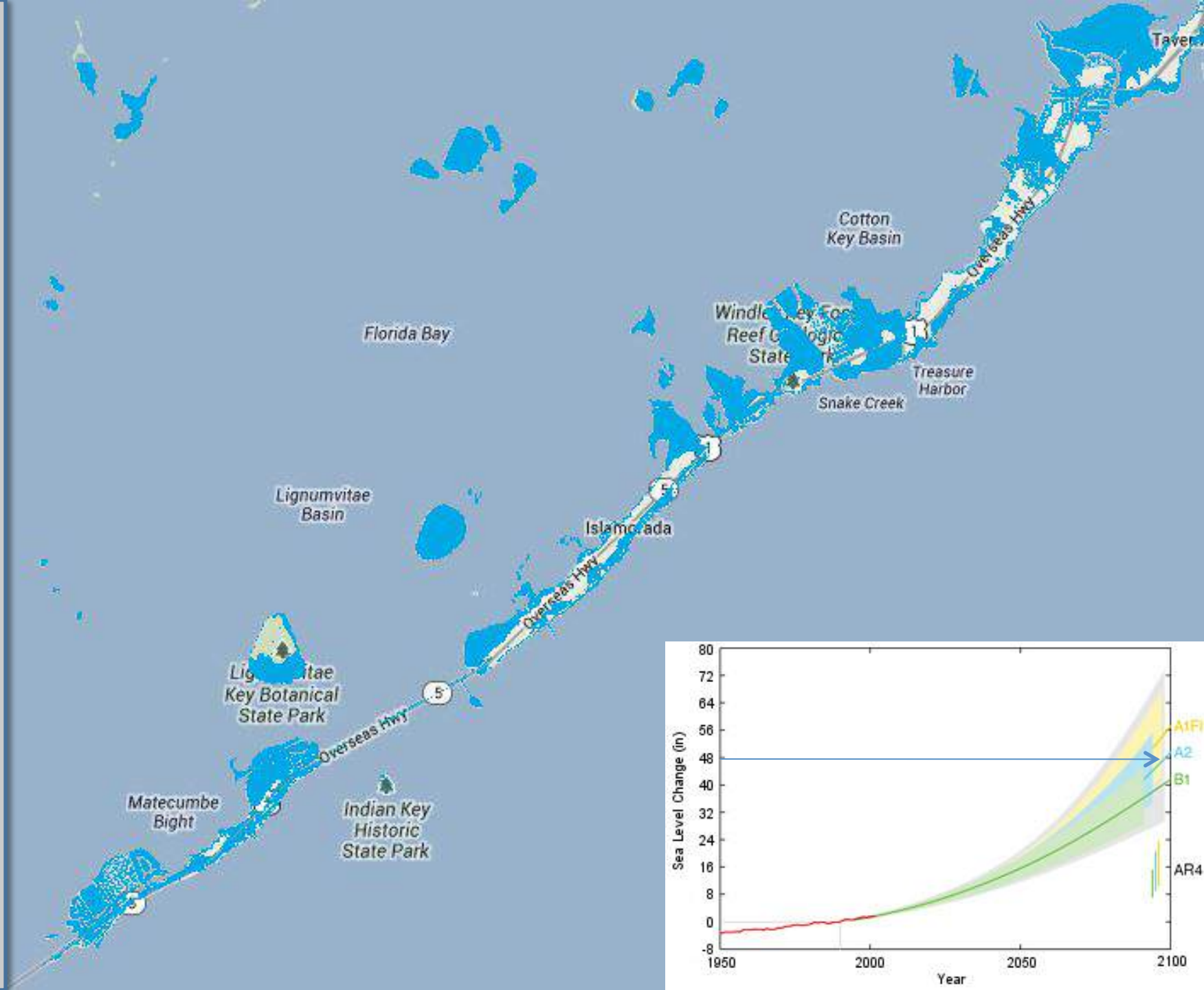
1' is possible



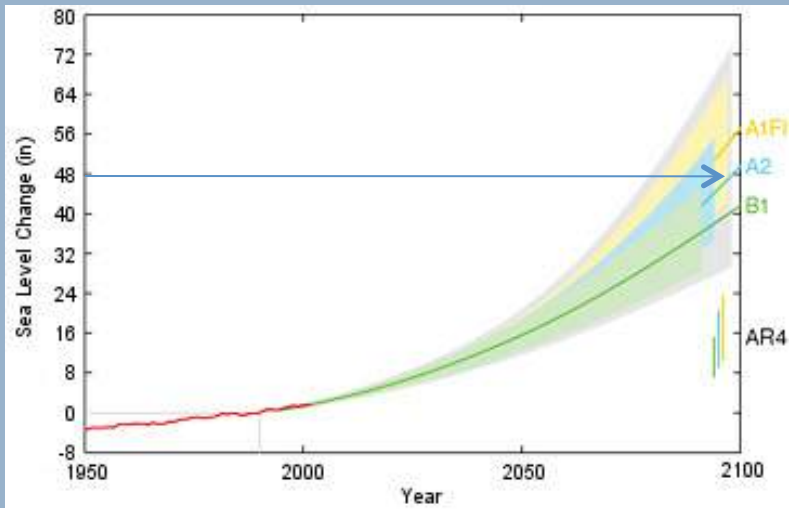
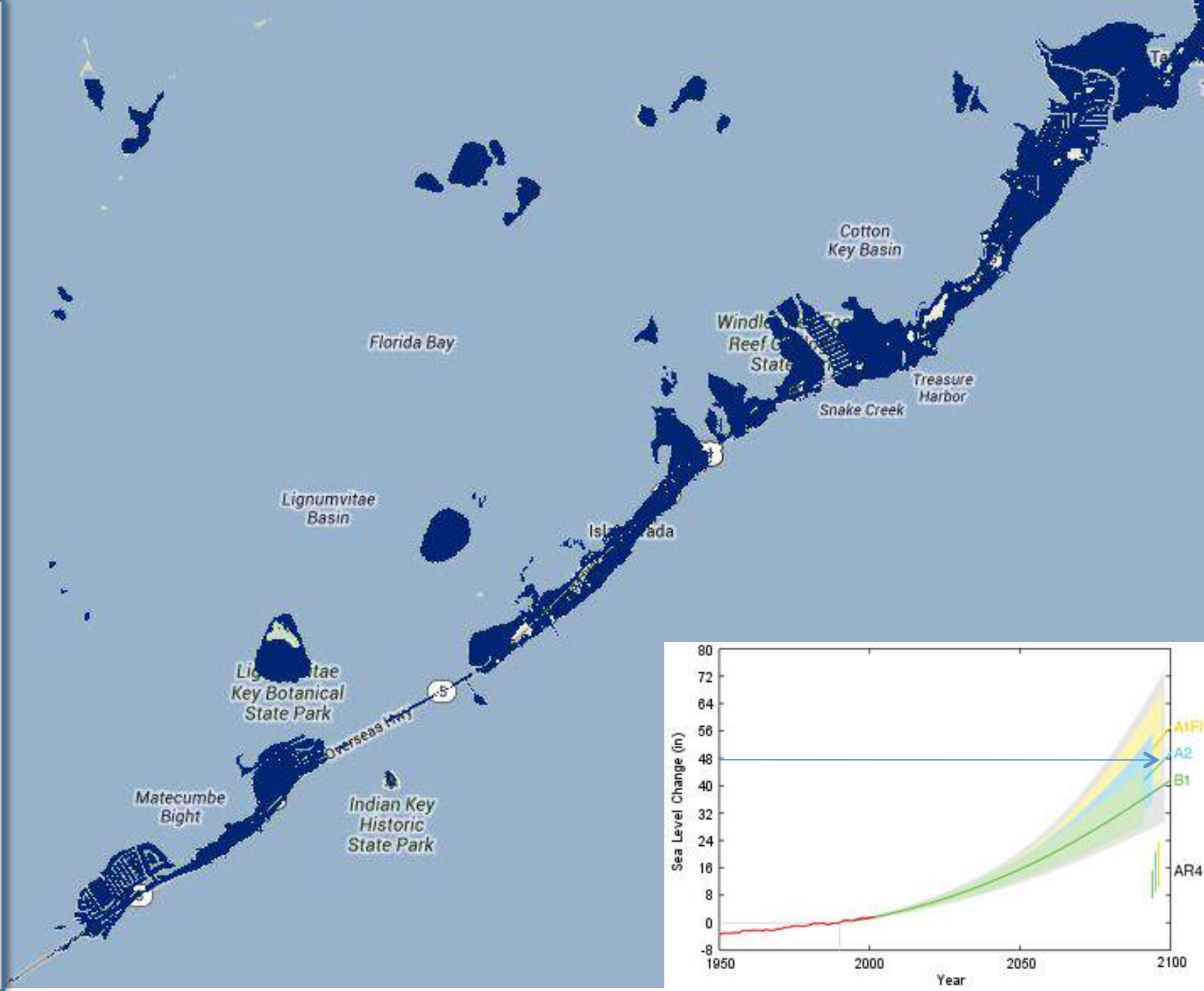
3 Foot Sea Level Rise



4 Foot Sea Level Rise



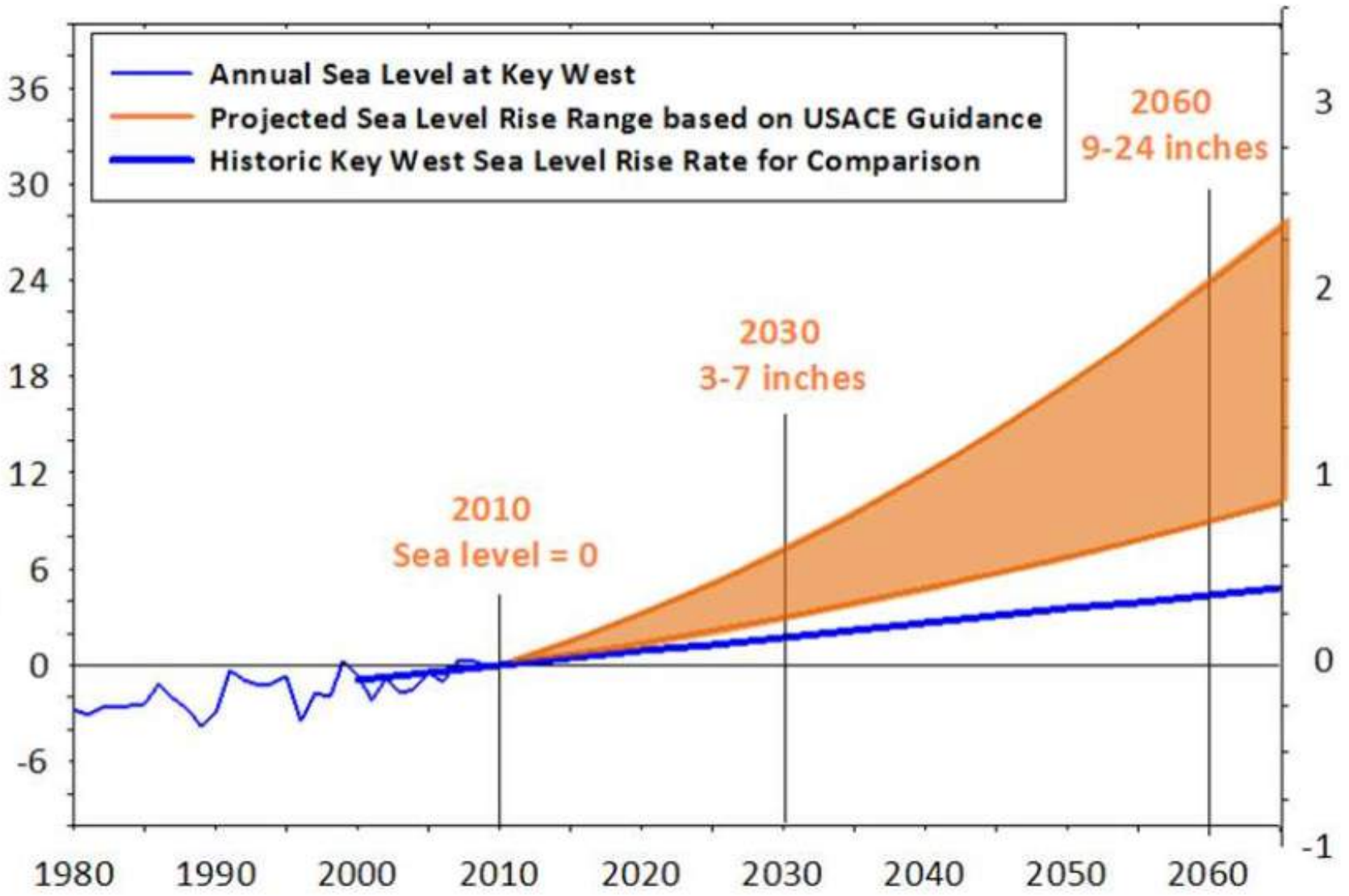
4 Foot Sea Level Rise w storm surge



Sea Level Rise (inches)

Sea Level Rise (feet)

- Annual Sea Level at Key West
- Projected Sea Level Rise Range based on USACE Guidance
- Historic Key West Sea Level Rise Rate for Comparison





Why is the Sea Rising?

Why is the Sea Rising?

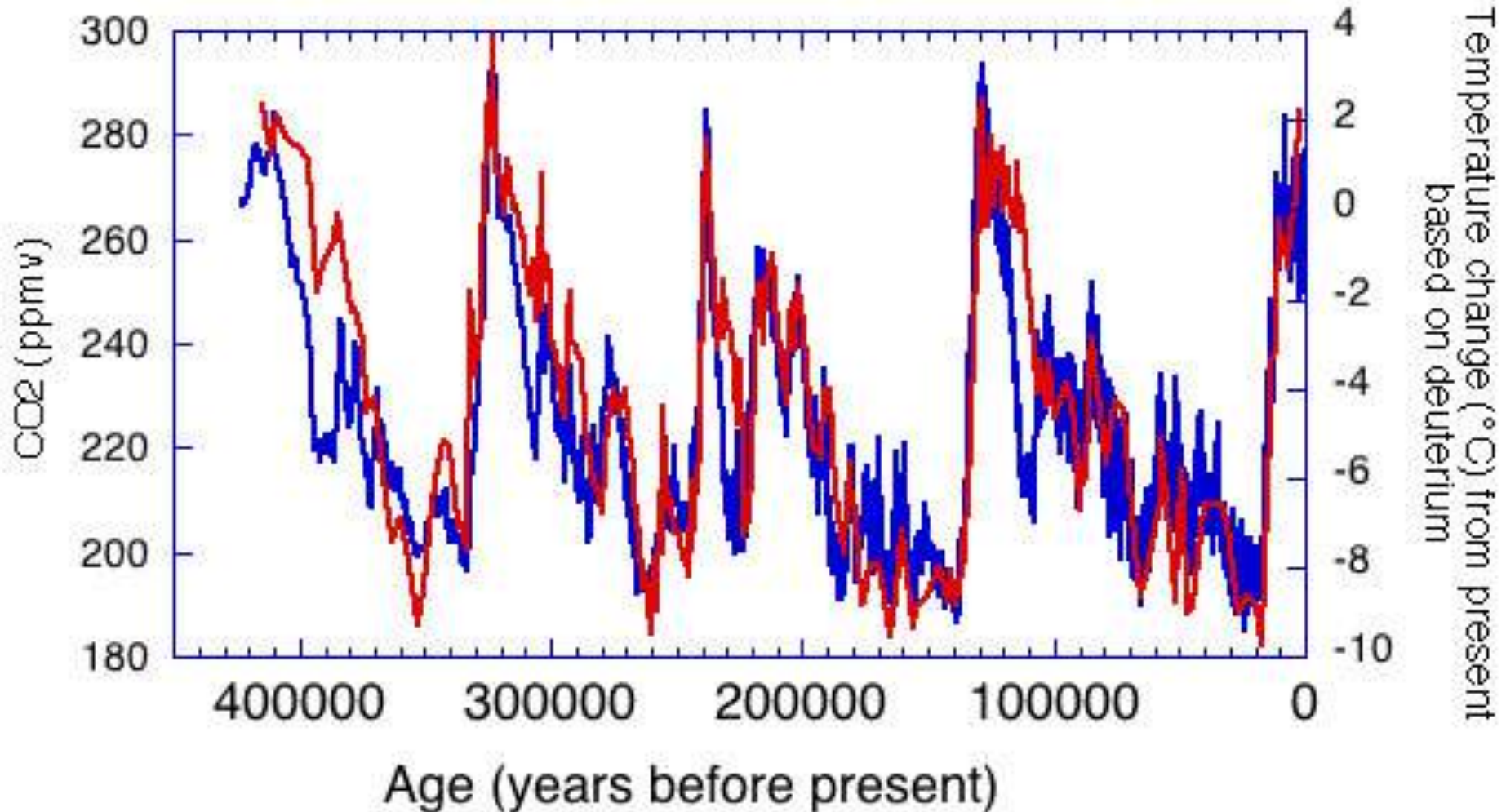
Natural Cycles: Tides

Yellow rectangle marks a storm drain that is not functioning due to extreme high tide – Fort Lauderdale

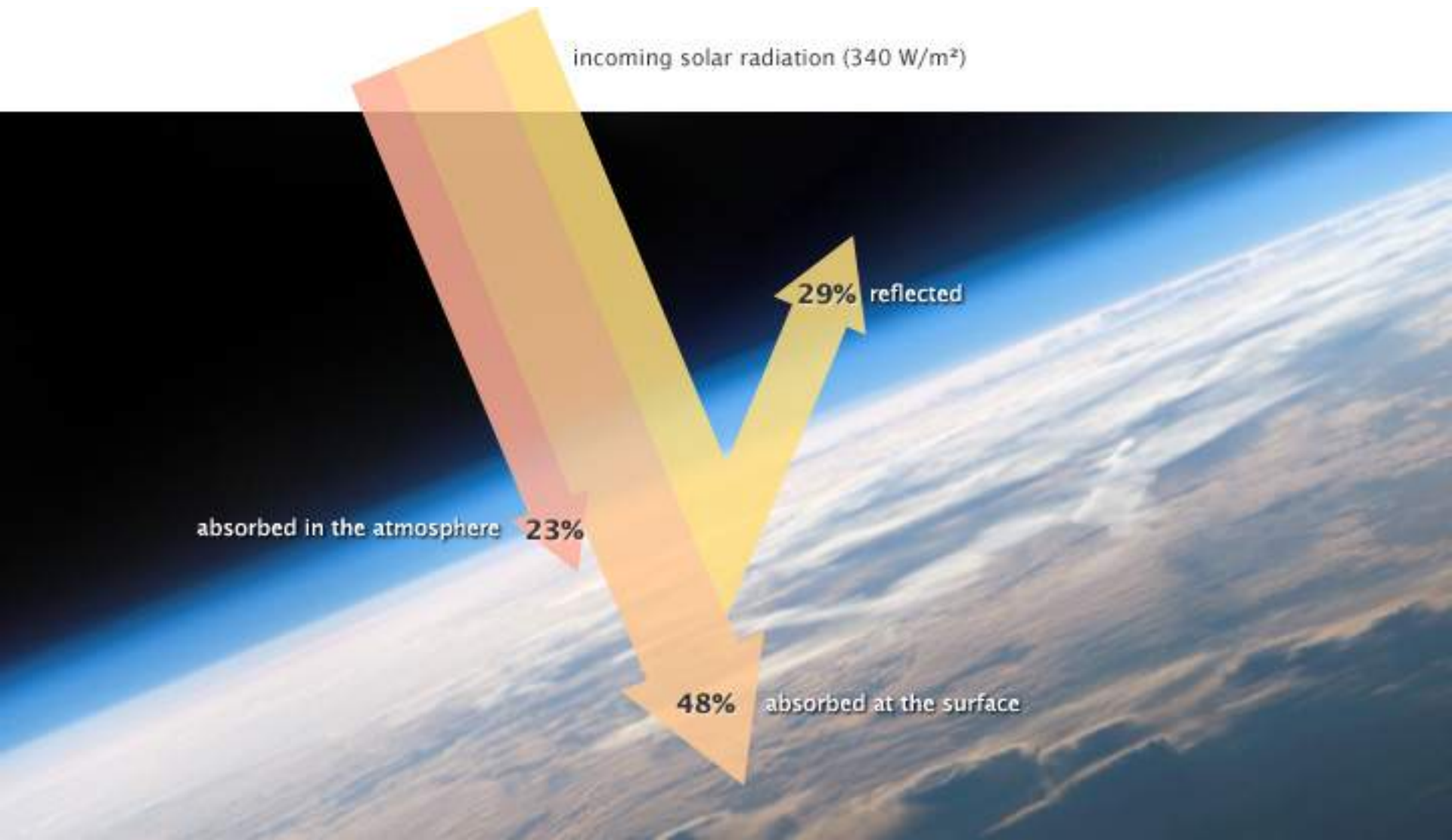


Why is the Sea Rising?

Natural Cycles: Carbon Dioxide

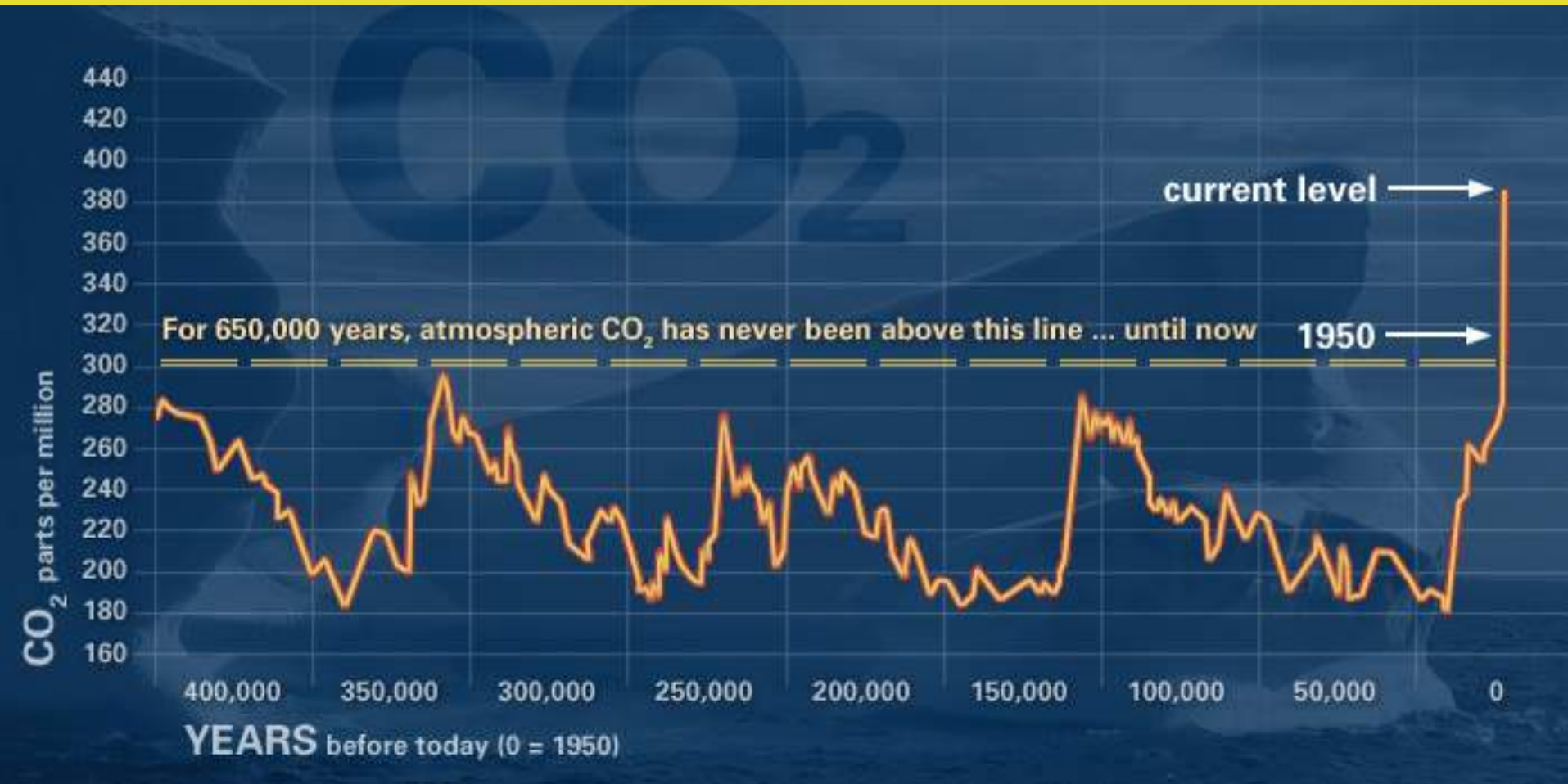


The CO2 Effect & Feedback Loops

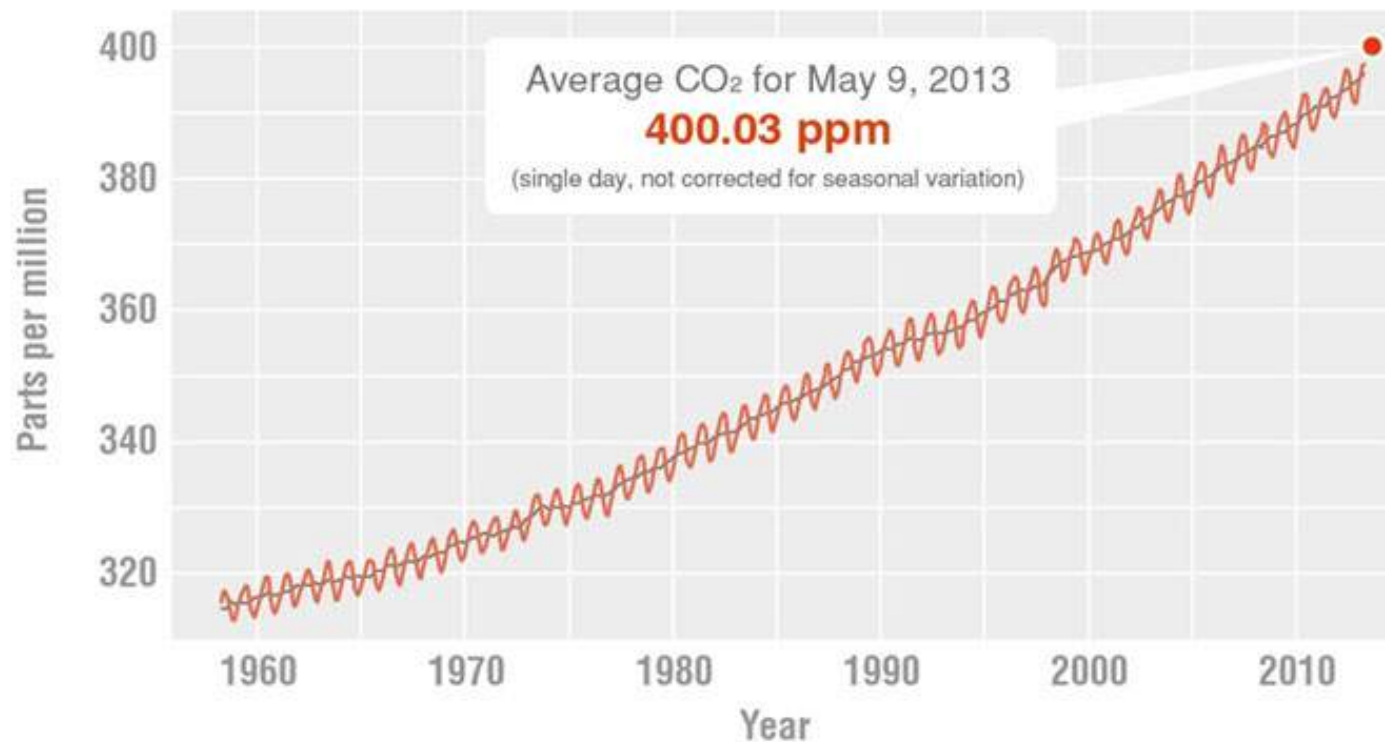


Why is the Sea Rising?

Natural Cycles: Carbon Dioxide



Carbon Dioxide Concentration

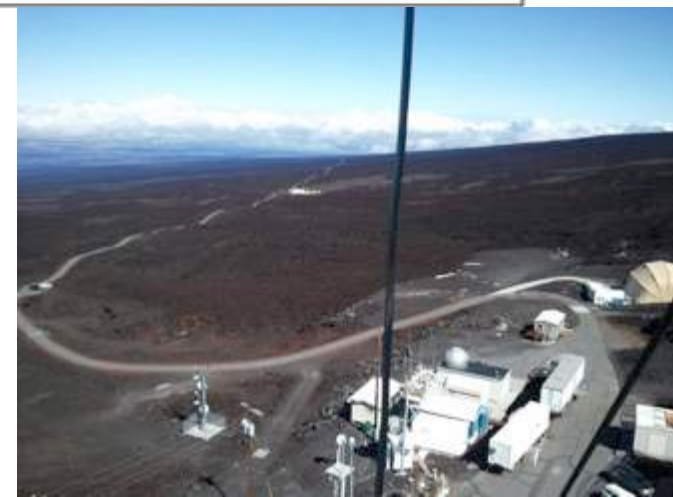


Credit: NOAA/Scripps Institution of Oceanography

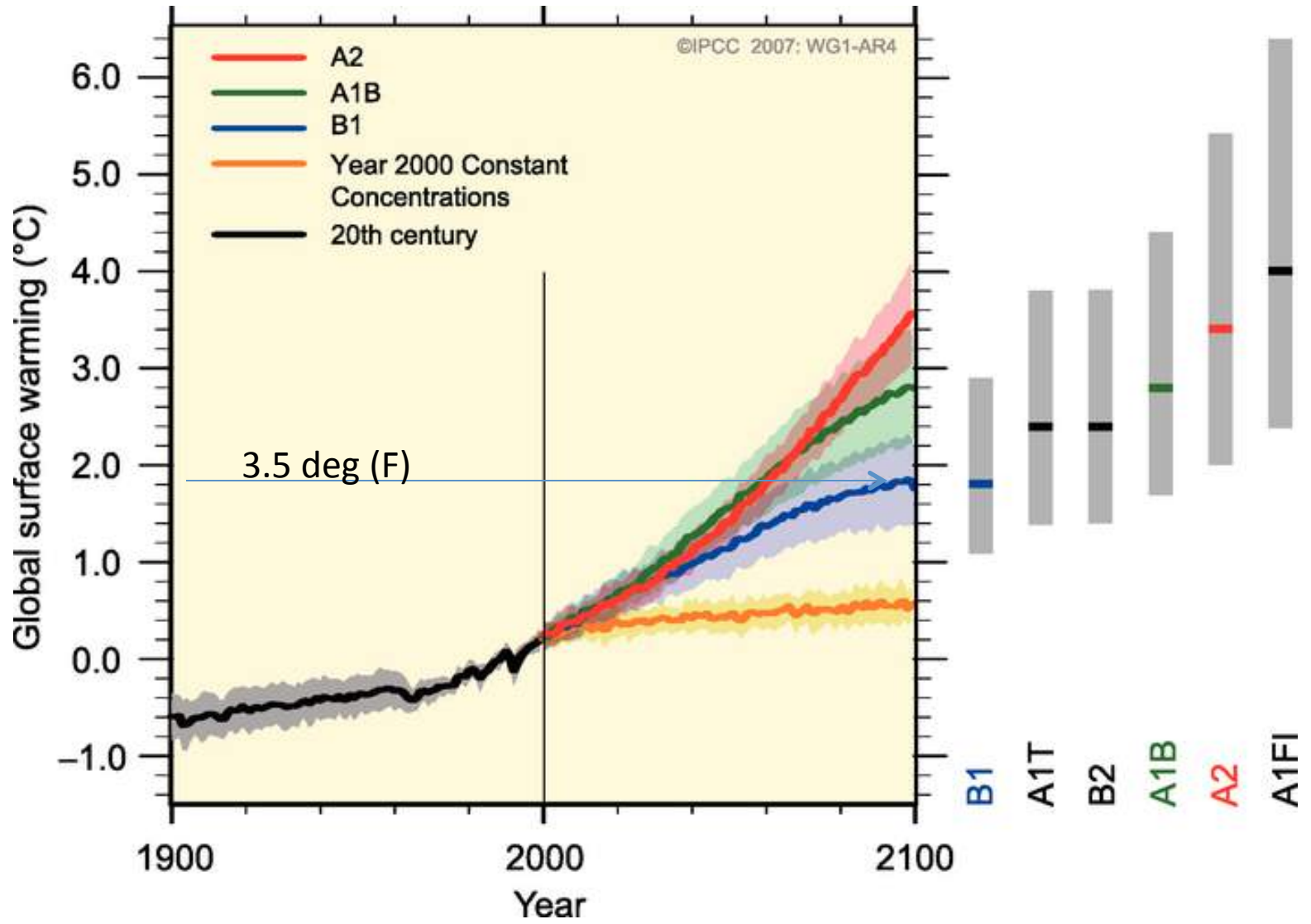
Mauna Loa Observatory

IPCC - April 2014: Greenhouse gas emissions accelerate despite reduction efforts.

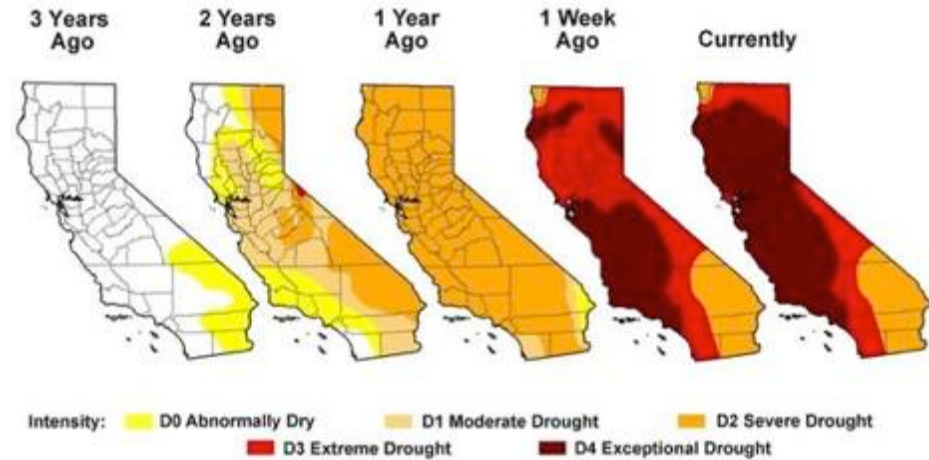
http://ipcc.ch/pdf/ar5/pr_wg3/20140413_pr_pc_wg3_en.pdf



IPCC Temperature Projections



What does this mean for us?



- Sea level rise
- Food Scarcity
- Altered Weather
- Public Health Changes
- Vegetative Changes
- Ocean Acidification
- Reefs and Fisheries



What does this mean for us?

Climate Refugees

2004 GAO Study – 4 Villages Threatened
2009 GAO Study – 31 Villages Threatened




Neutauk, Alaska

What are we doing about it?

- Majuro Declaration signed on September 5, 2013
- 16 Members including Marshall Islands and Australia
- To spark a “new wave of climate leadership” and highlight the impact of climate change in the Pacific Ocean.





Federal Actions

- Vulnerability Assessment Grants
Federal Highway Administration administered for MPOs (5) and State Transportation Agencies (14)
- President Obama \$1,000,000,000 Climate Resilience Fund (2015 Budget)
- 2015 Executive Order – Sea Level Rise must be considered in federally funded projects, including local government grant funds

Responses in Florida



- Florida Post Disaster Redev. Planning Guidelines/Pilot Communities/Guidebook
- Florida Comprehensive Planning Requirements
- Local Government Responses

Islamorada's Sea Level Rise Plan

Economic Effects

- Risk to infrastructure?
- Impacts to tourism?
- Rising insurance costs?



Efforts to Date



- Preparing and Planning
 - Sustainability Plan
 - Moved City Hall to higher ground
 - Local Mitigation Strategy
 - Some stormwater projects

Council Options Presented

1. Take no action.
2. Enter the planning process.
 - a) Direct staff to move through the stages of the planning process.
 - b) Hire additional staff to move through the stages of the planning process.
 - c) Hire an outside consultant to move through the stages of the planning process.
 - d) Explore partnership to move through the stages of the planning process.
 - e) Seek outside funding sources through grants to implement 2-5.
3. Develop adaptation priorities and projects to pursue without the planning process.