



**Workshop on Climate change in
Mediterranean and Caribbean Seas:
Research experiences and new scientific
challenges. Guayaquil May 8th – 11th 2012**

Coral Reefs and Climate Change: Implications for Caribbean Islands

Rubén Torres
Reef Check
Dominican
Republic



CORAL REEFS





HOME FOR MANY OTHERS





**PROTECT
THE
SHORELINE**

**AGAINST
WAVES AND
CURRENTS**



LARGEST SOURCE OF WHITE BEACH SAND

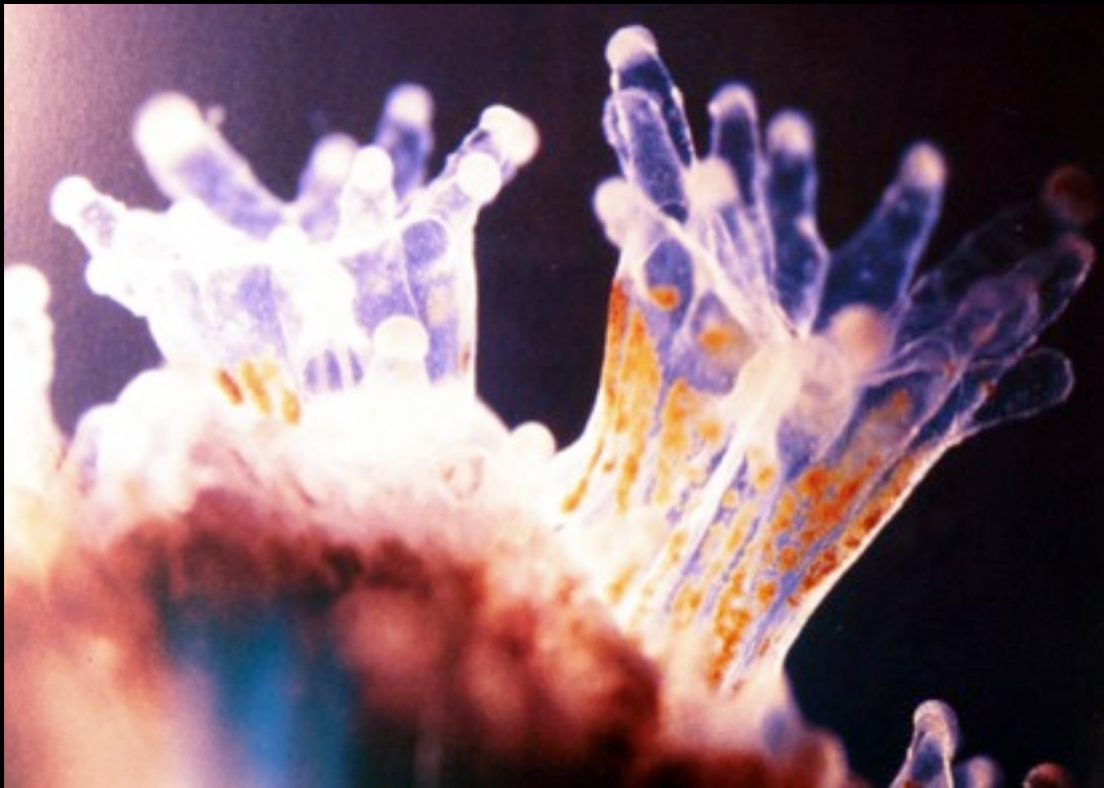


BUILT BY COLONIAL ANIMALS...

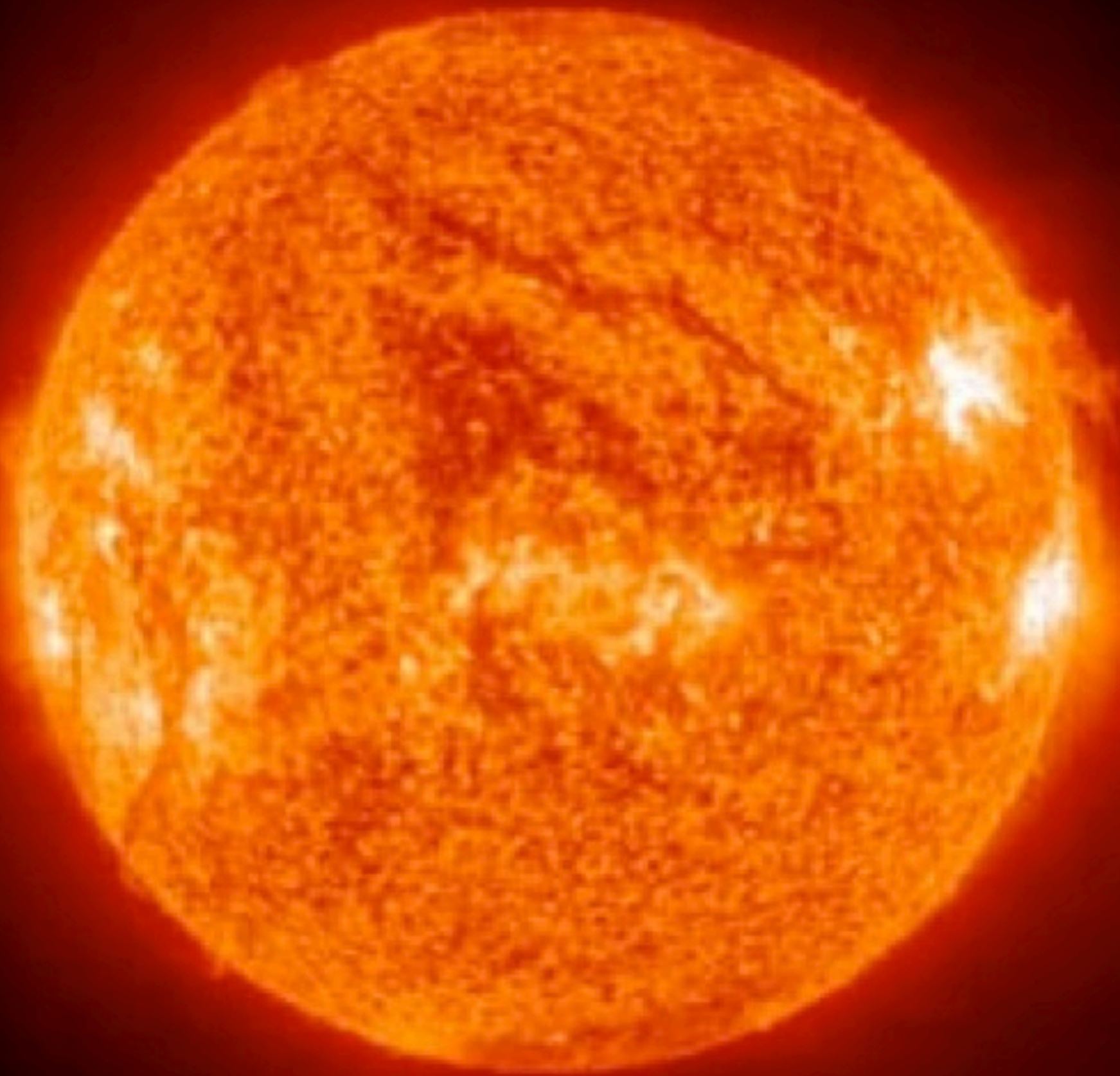


CORALS

SOLAR POWER ANIMALS









FOR THE OCEAN (and Corals), THIS RESULTS IN..

1. Increase Sea Surface Temperature

A. More, and Stronger Storms

B. Increase in Frequency and Intensity of Coral Bleaching

C. Sea Level Rise

2. Ocean Acidification

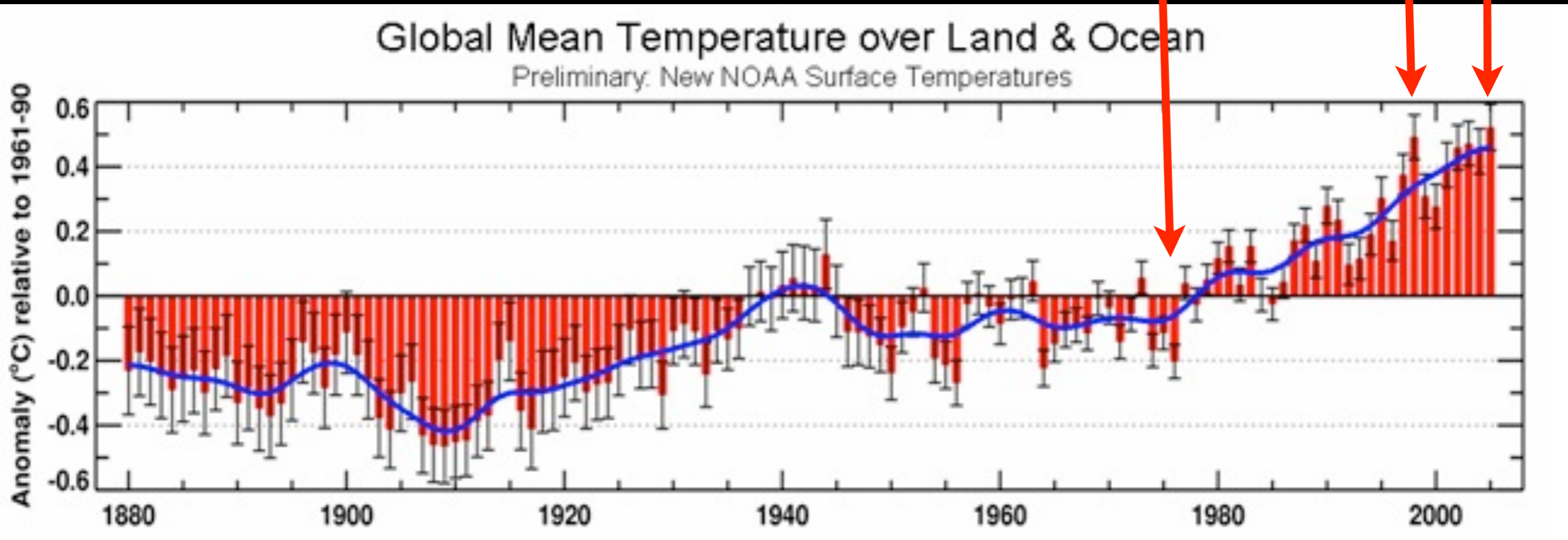
A. Reduction in Calcification Rates

MORE AND STRONGER STORMS

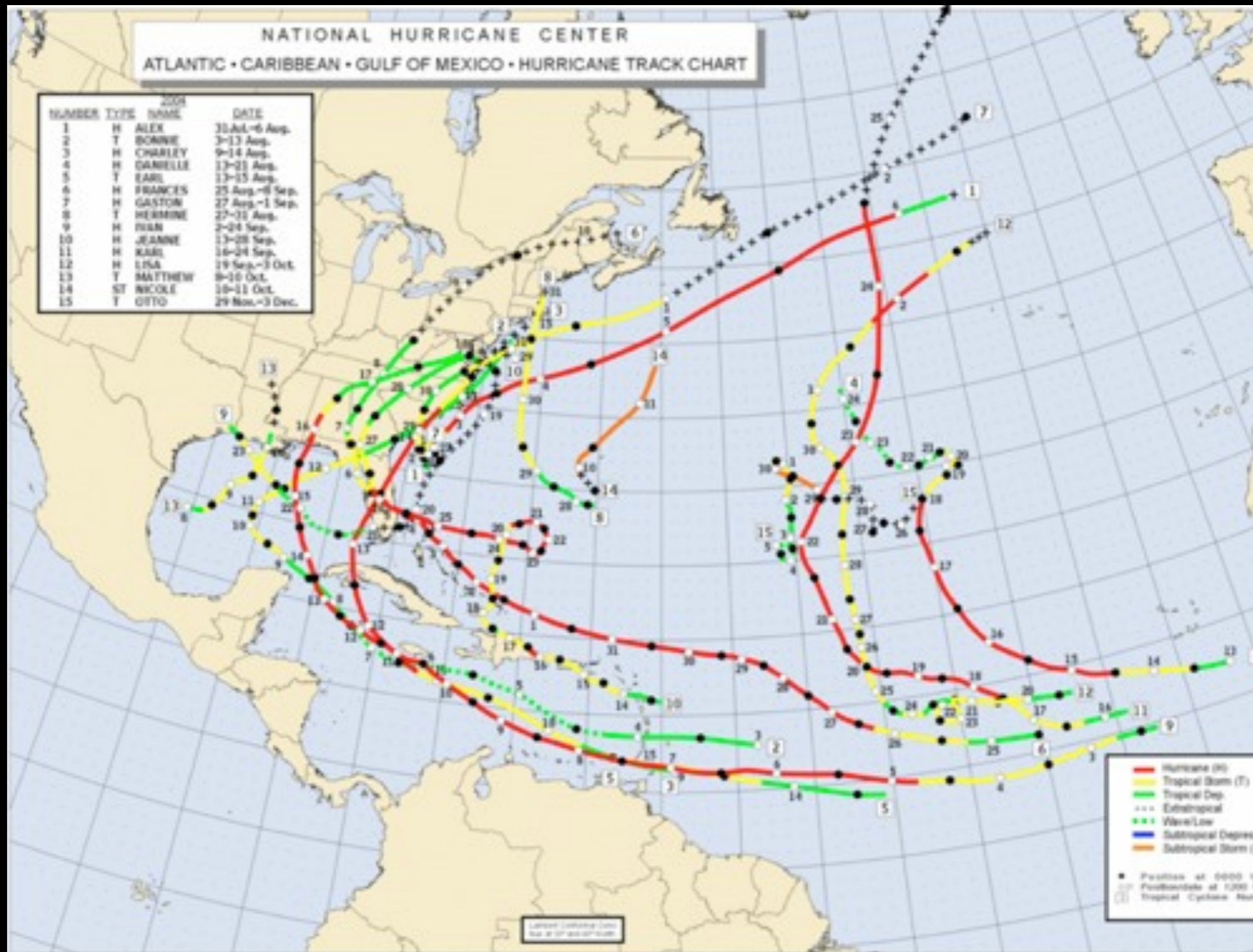
2005

1971

1998

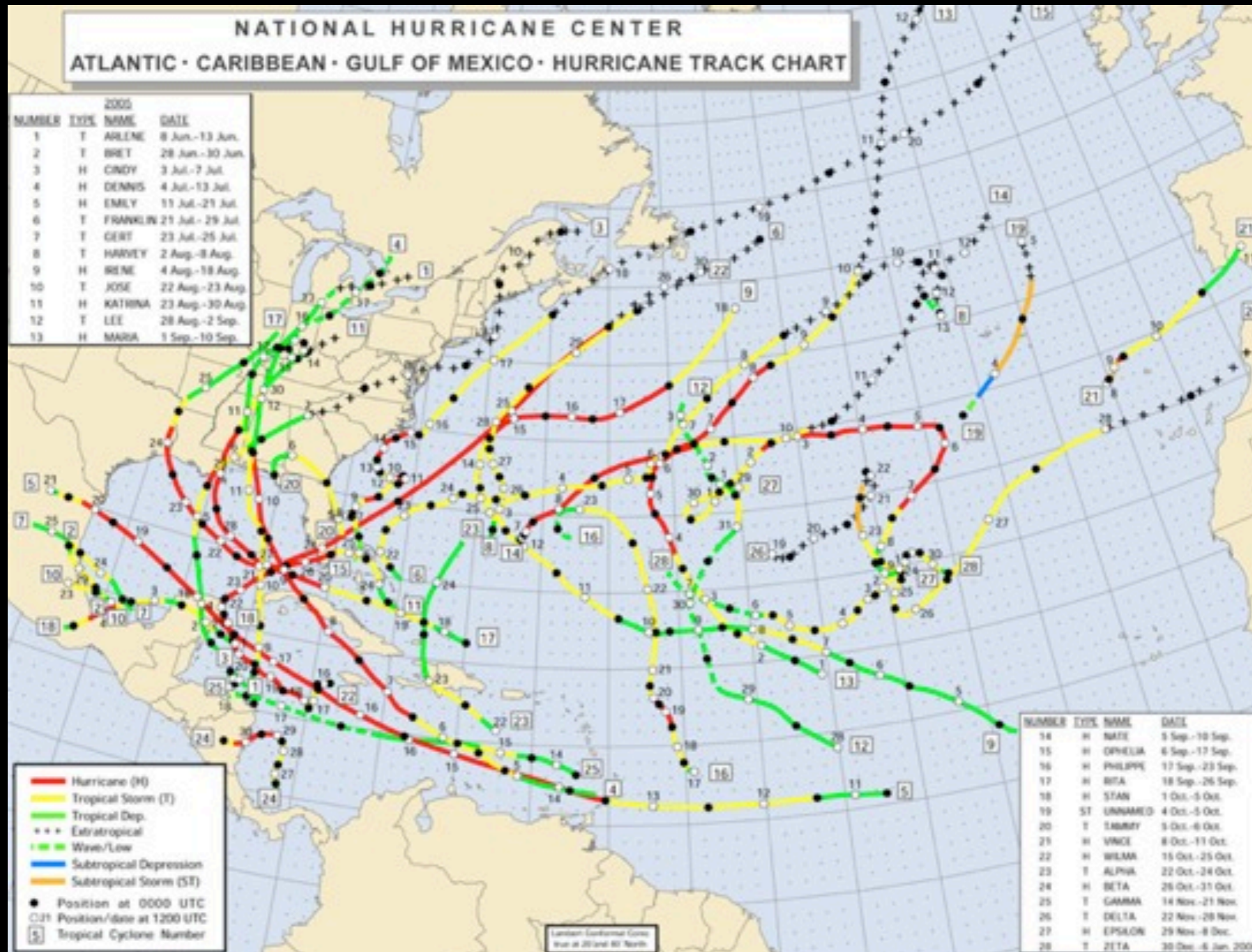


MORE AND STRONGER STORMS



2004

MORE AND STRONGER STORMS



2005

CONSEQUENCES



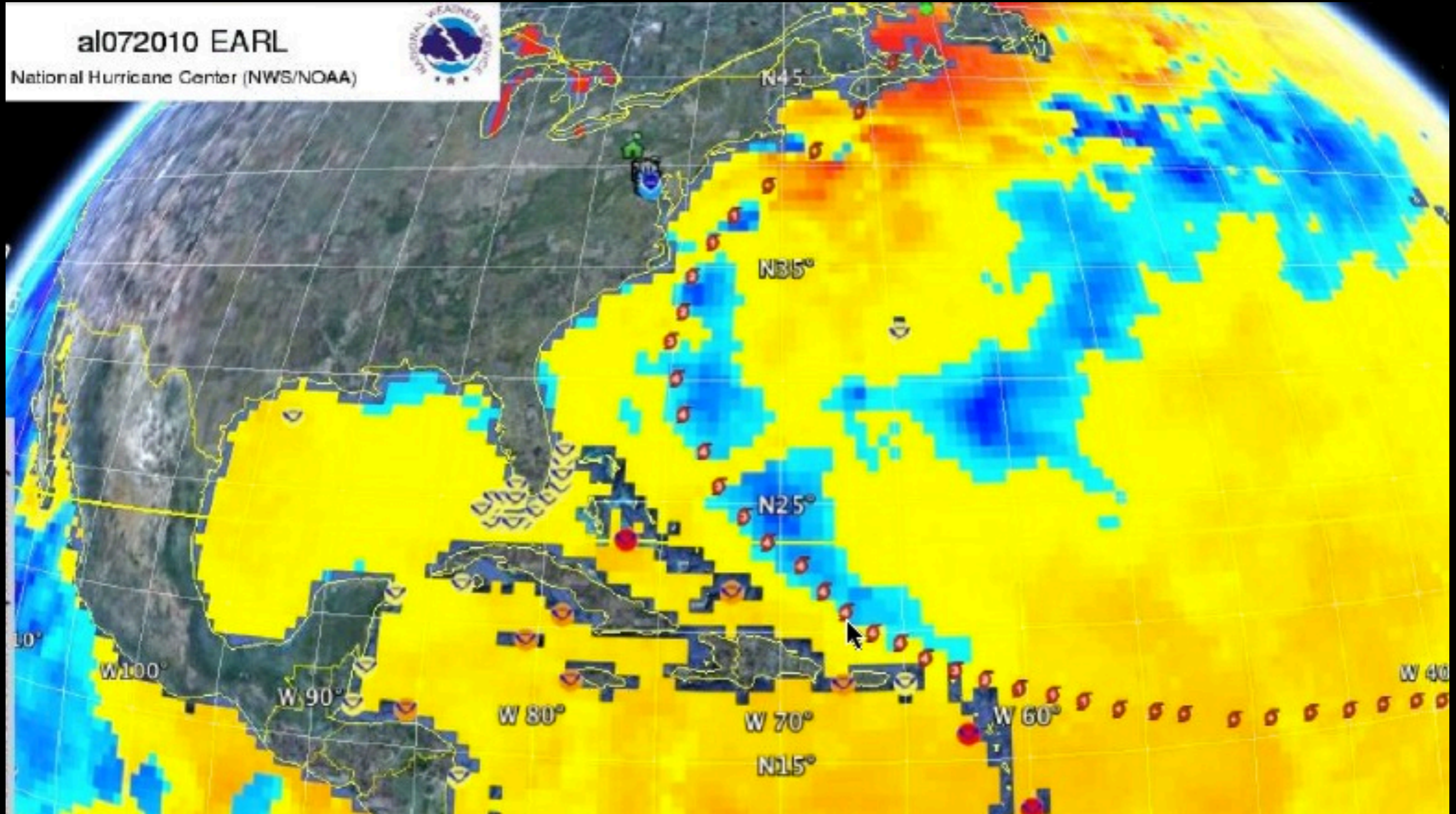
SHORELINE EROSION

**LOSS OF LIVES AND
INFRASTRUCTURES**

**REDUCTION
IN TOURISM**



HURRICANE SEA SURFACE COOLING EFFECTS



HURRICANE CORAL PROPAGATION EFFECTS



CORAL BLEACHING



**Symbiotic
Algae**

CORAL BLEACHING

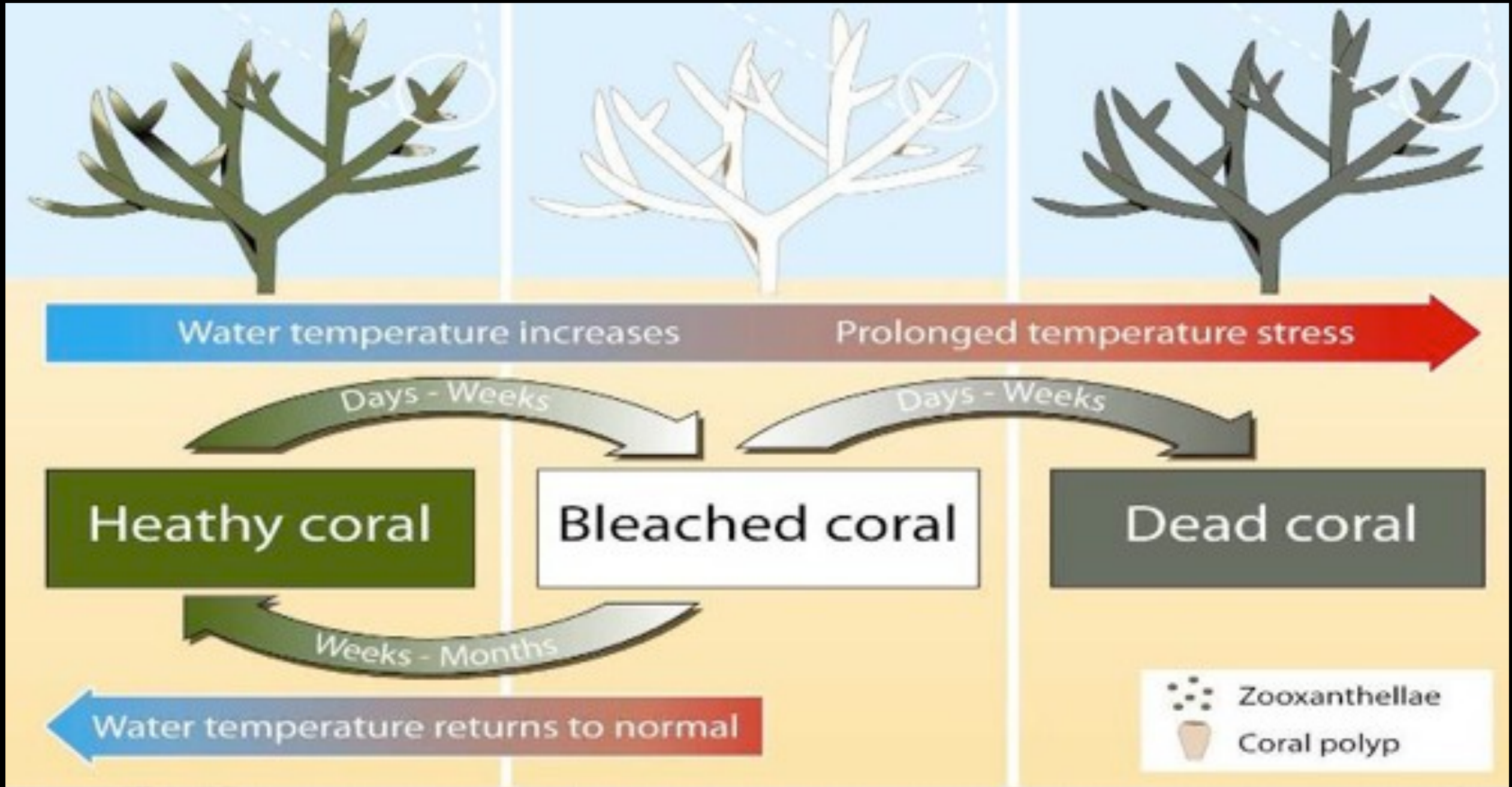
Before

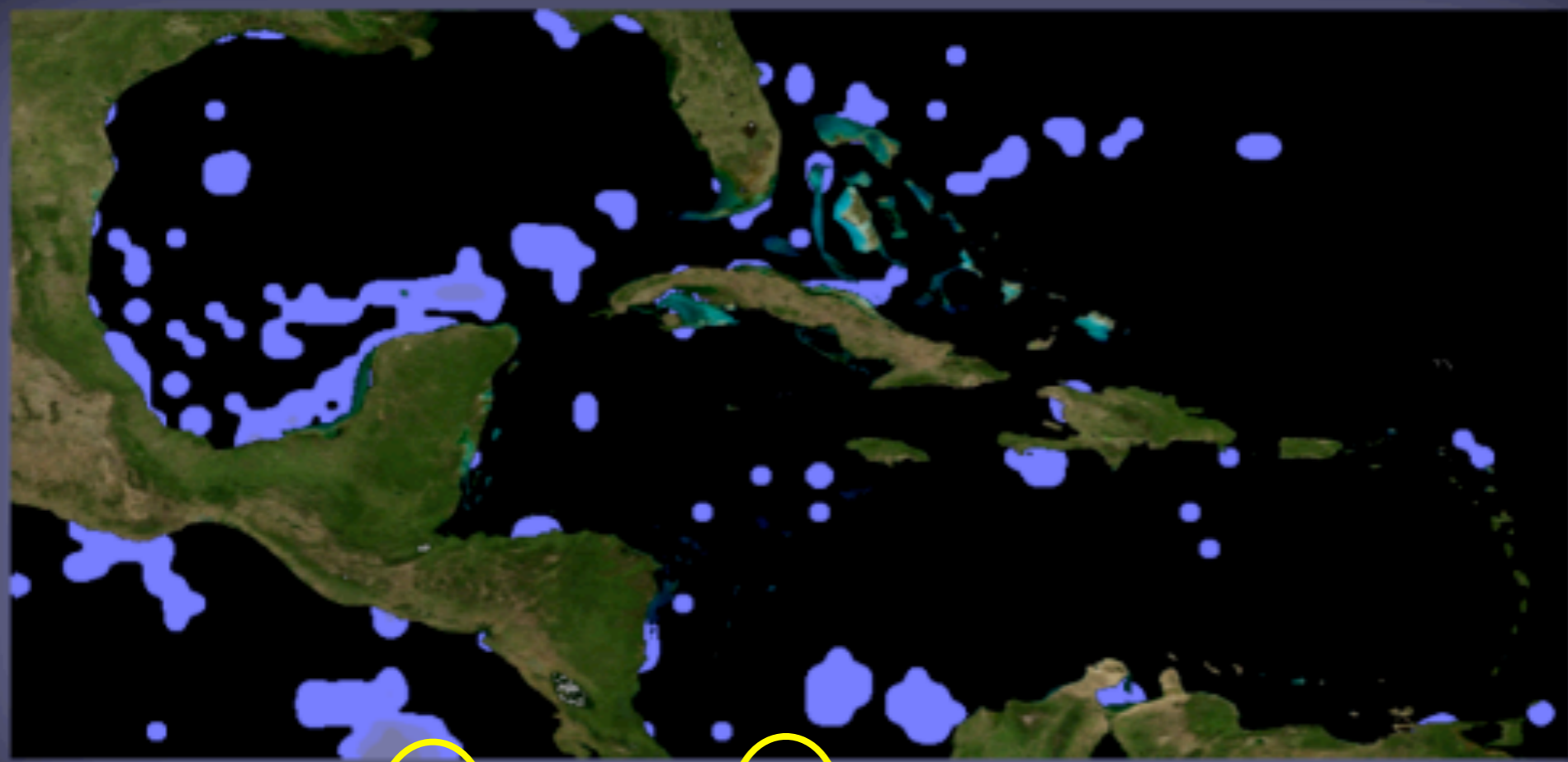


After



CORAL BLEACHING

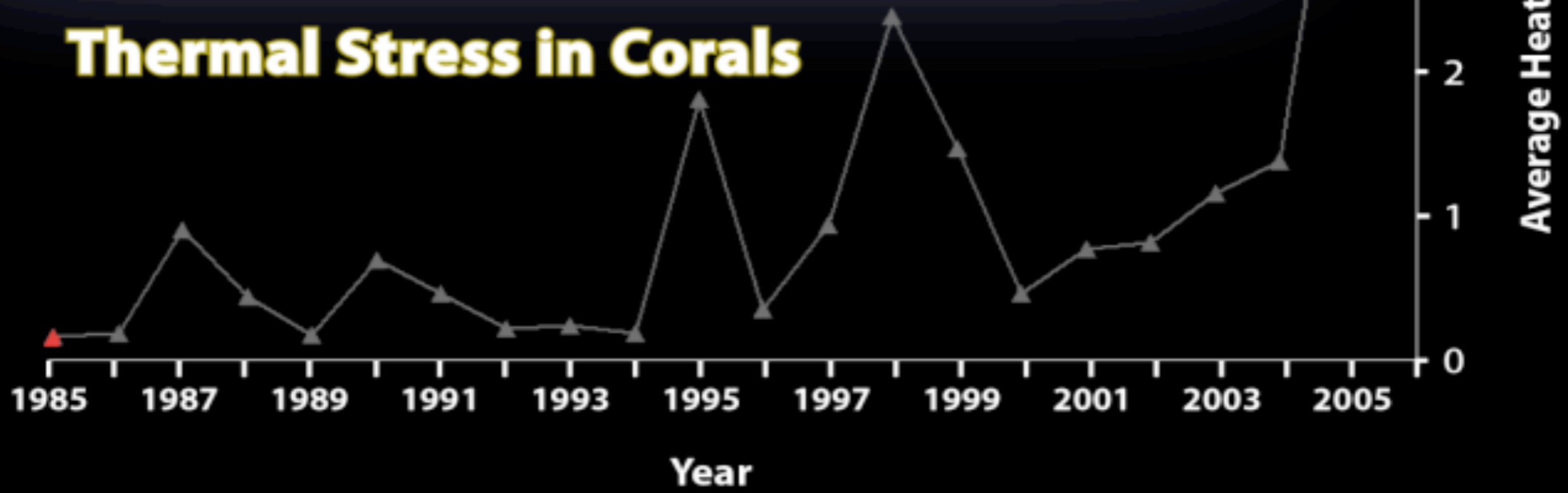


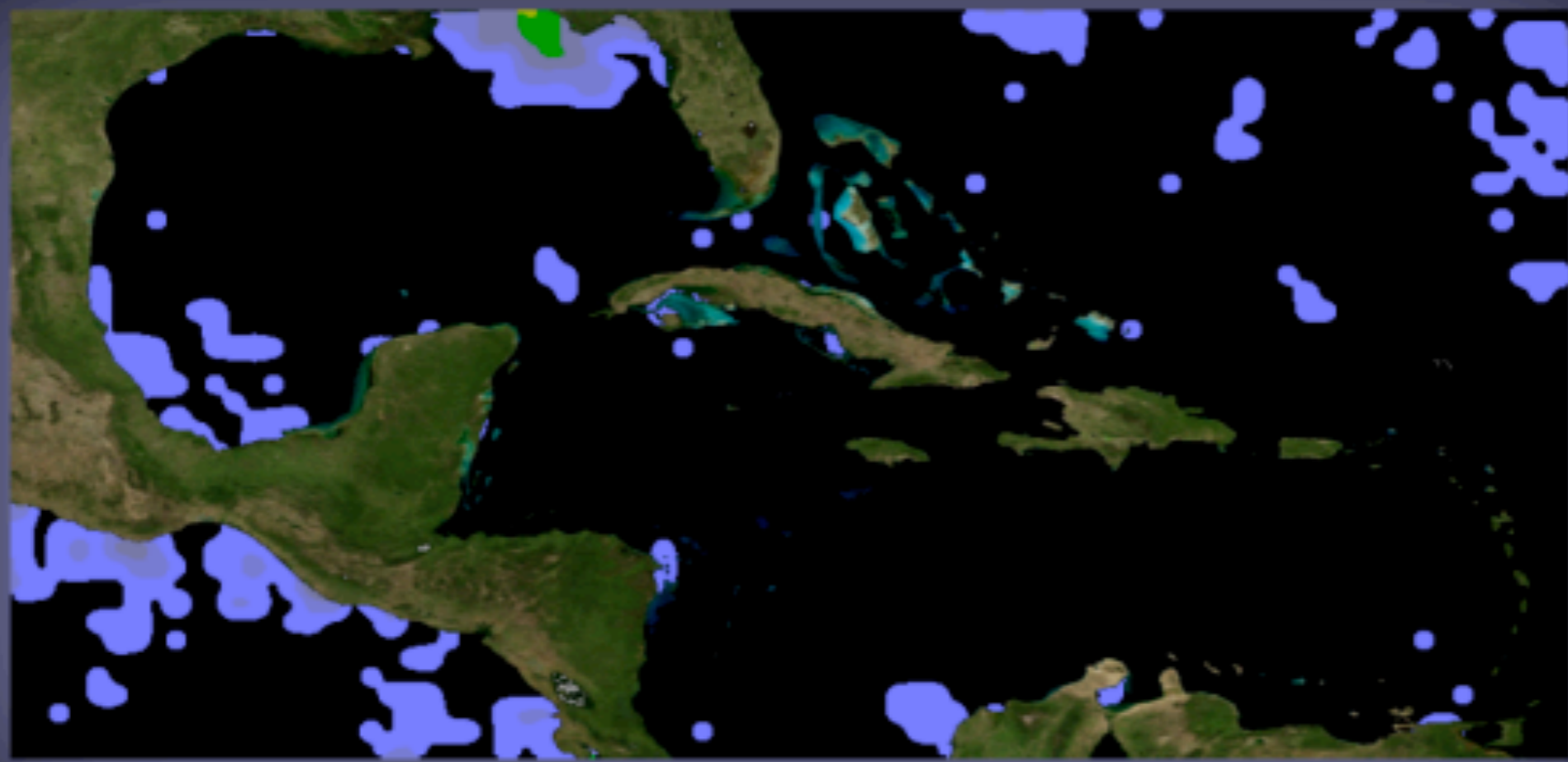


- Bleaching Expected
- Mass Bleaching and Mortality



Thermal Stress in Corals

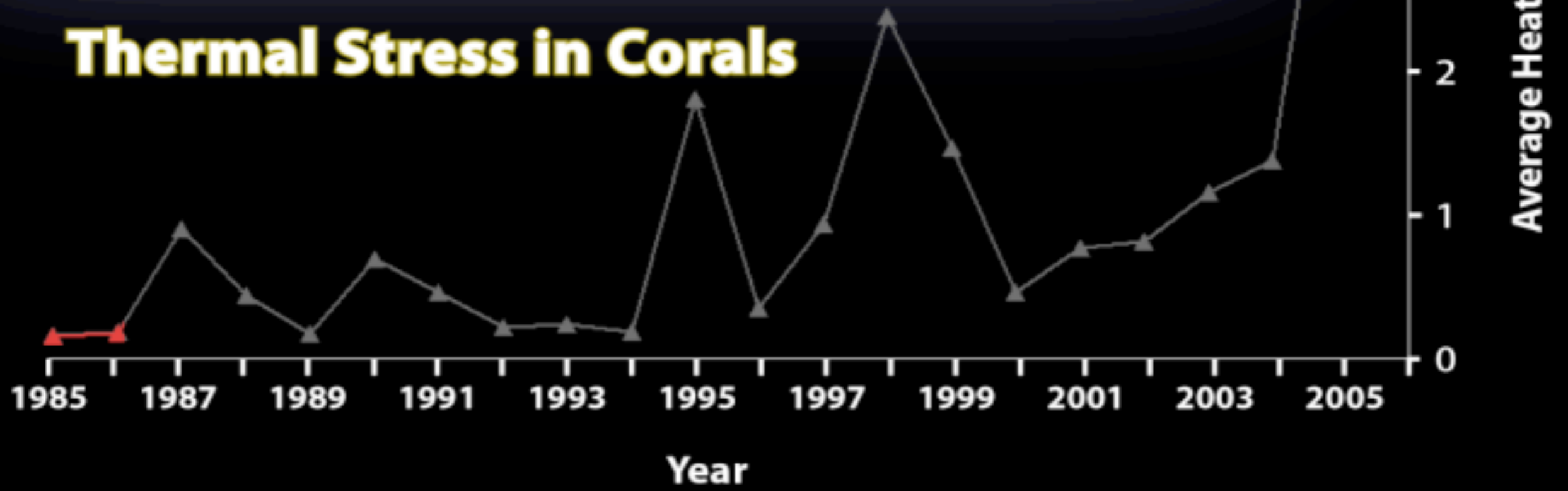


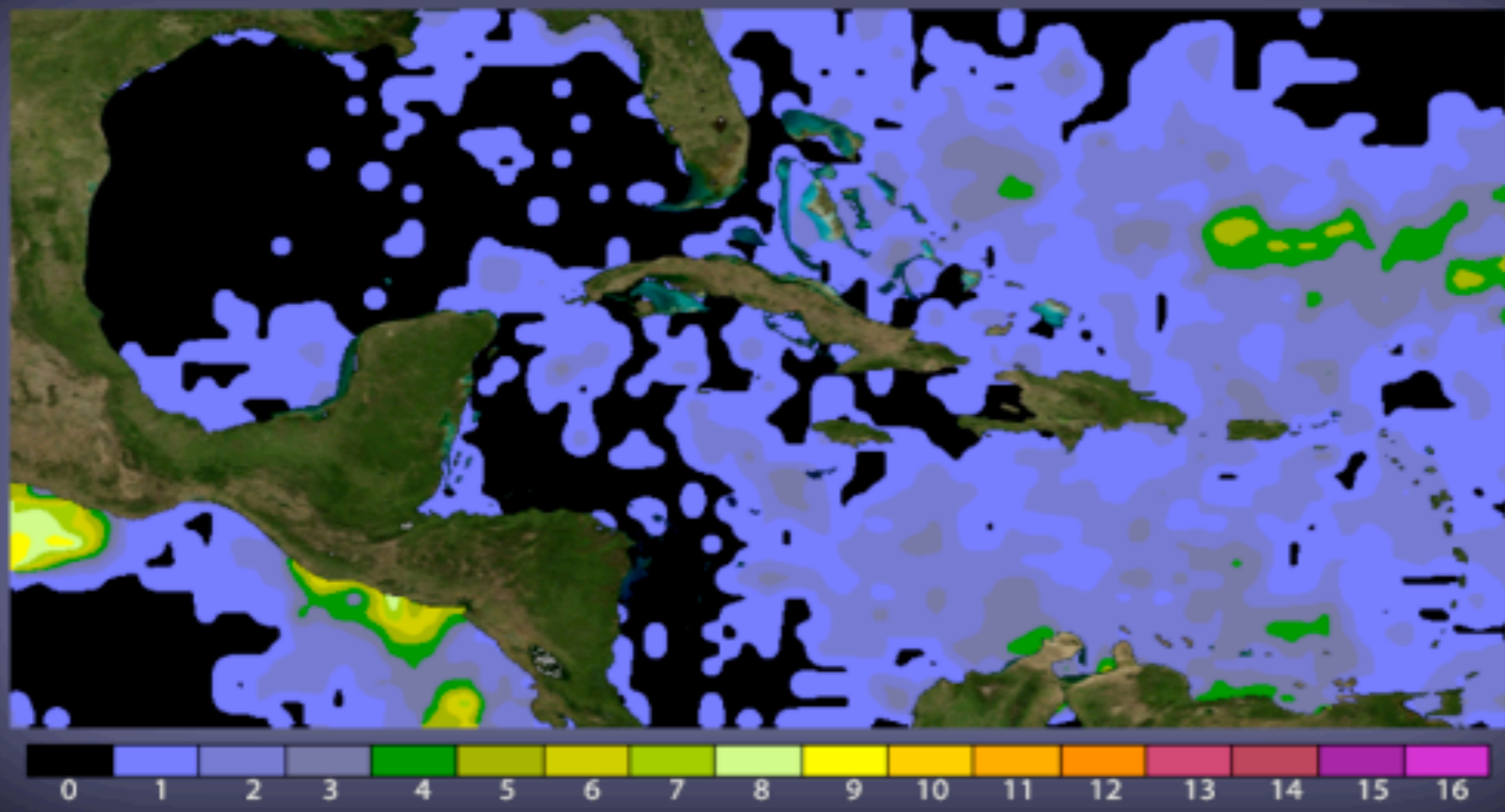




- Bleaching Expected
- Mass Bleaching and Mortality



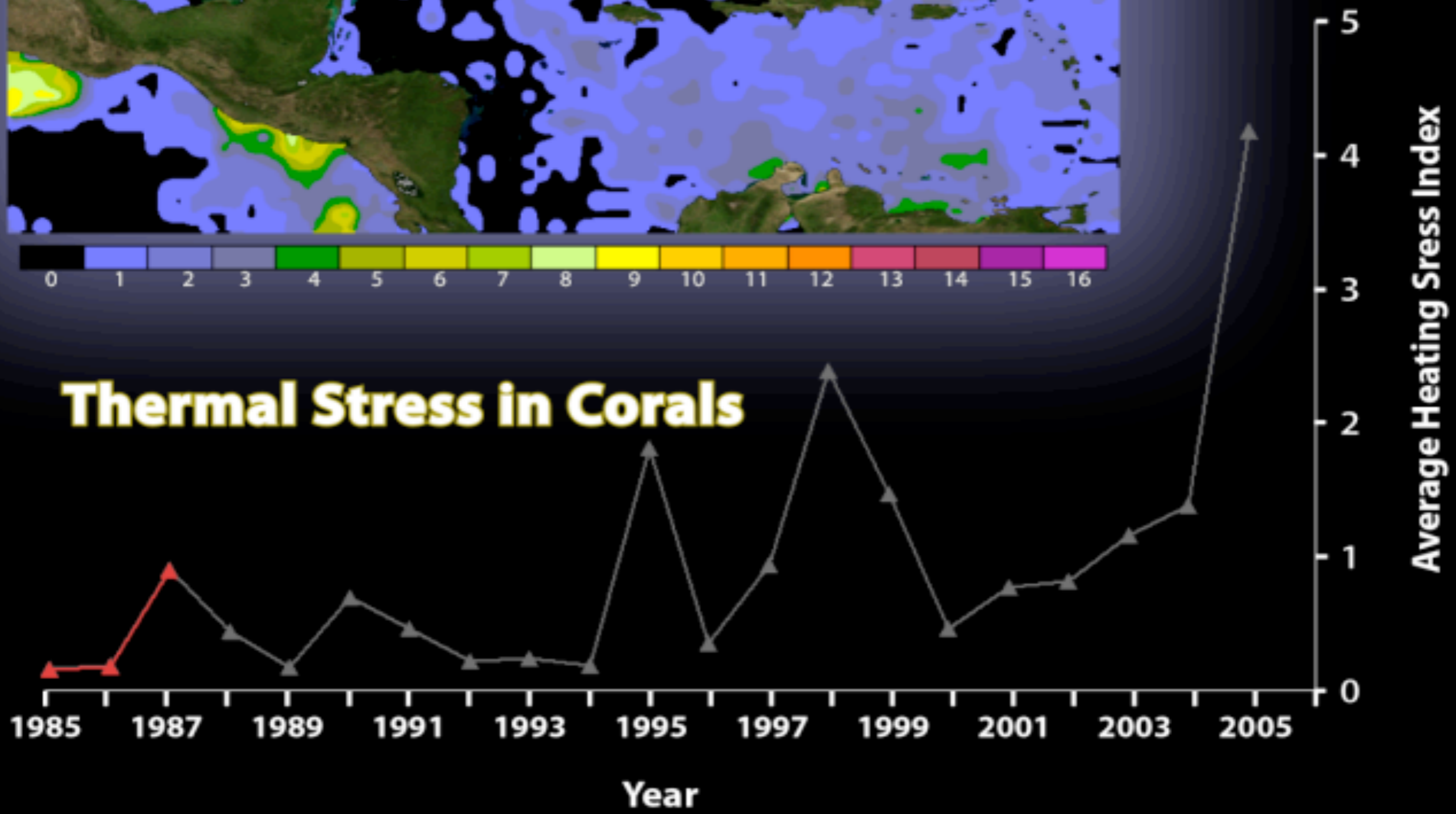
Thermal Stress in Corals

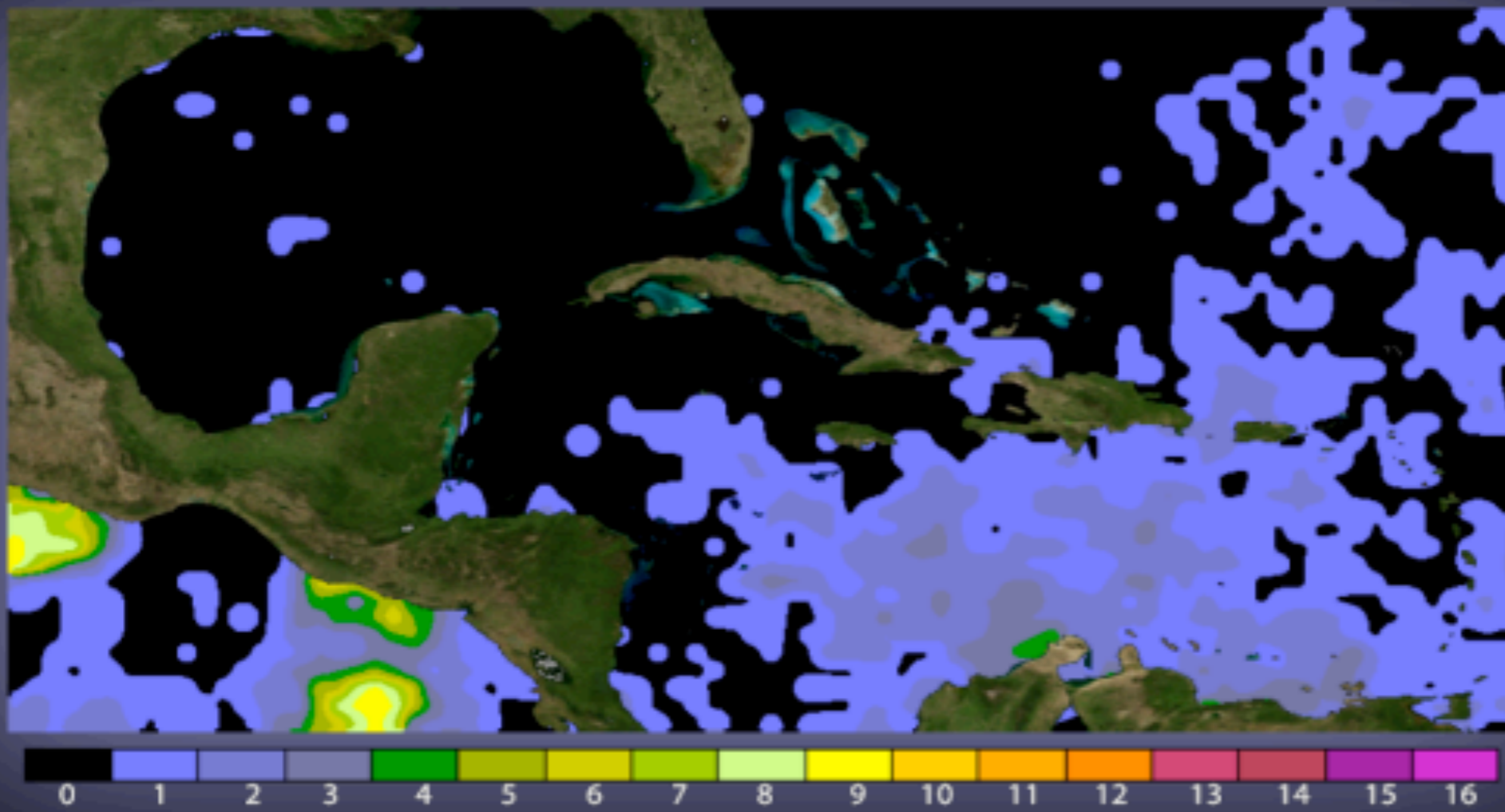






-  Bleaching Expected
-  Mass Bleaching and Mortality

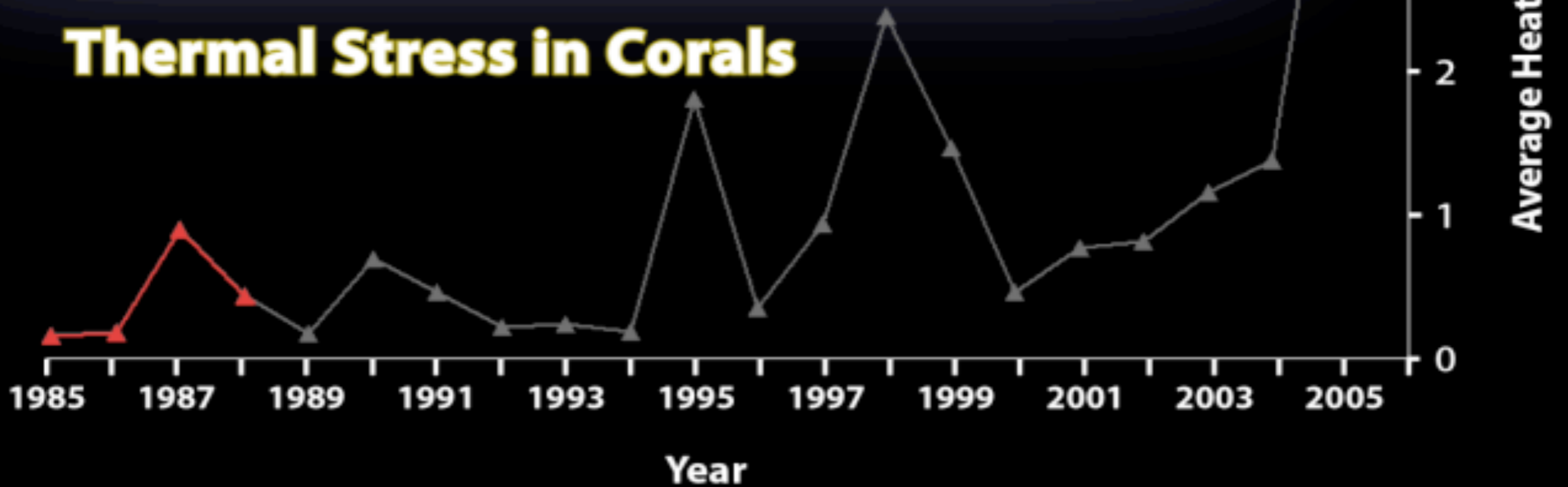
Thermal Stress in Corals

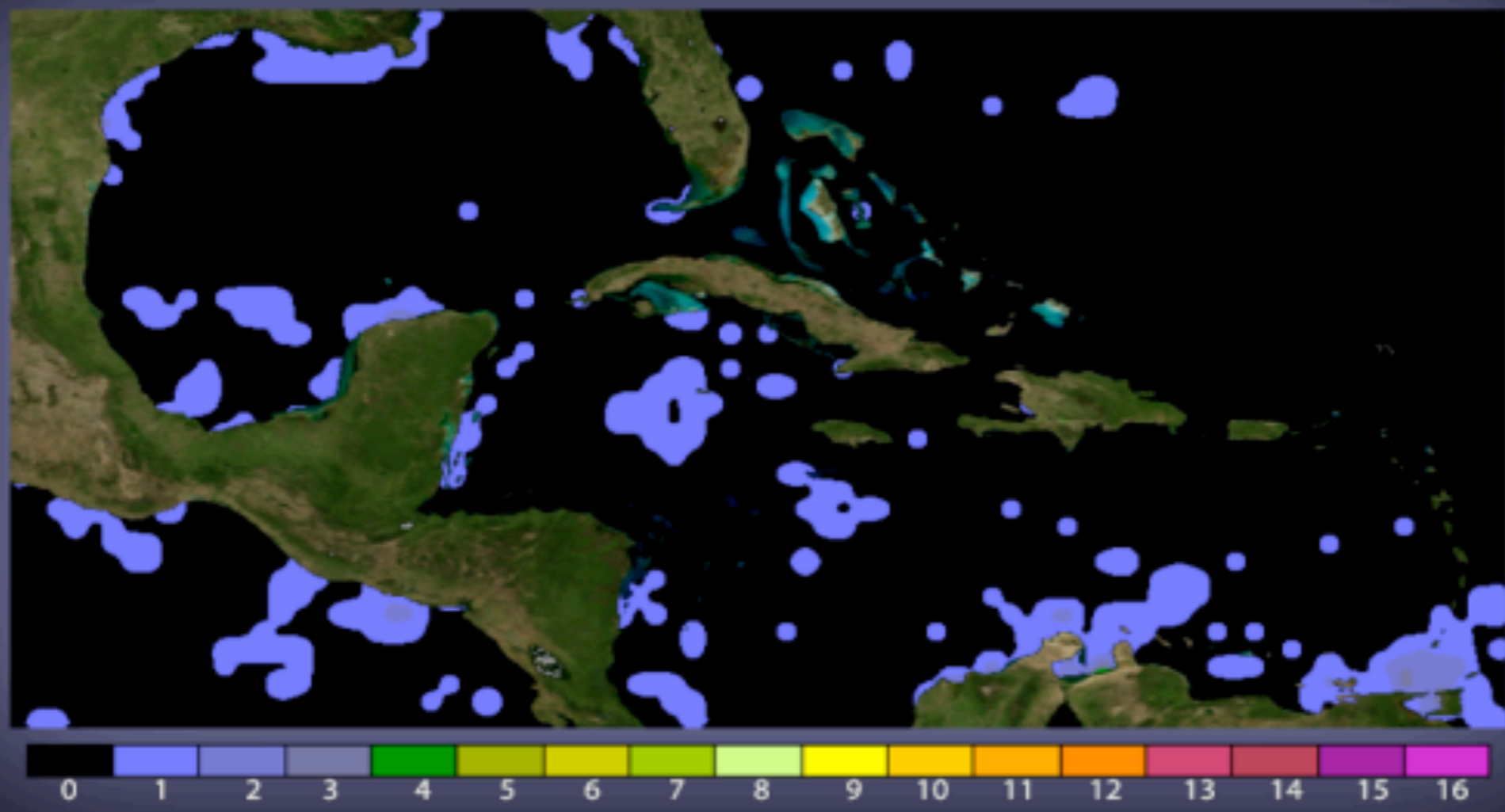




-  Bleaching Expected
-  Mass Bleaching and Mortality

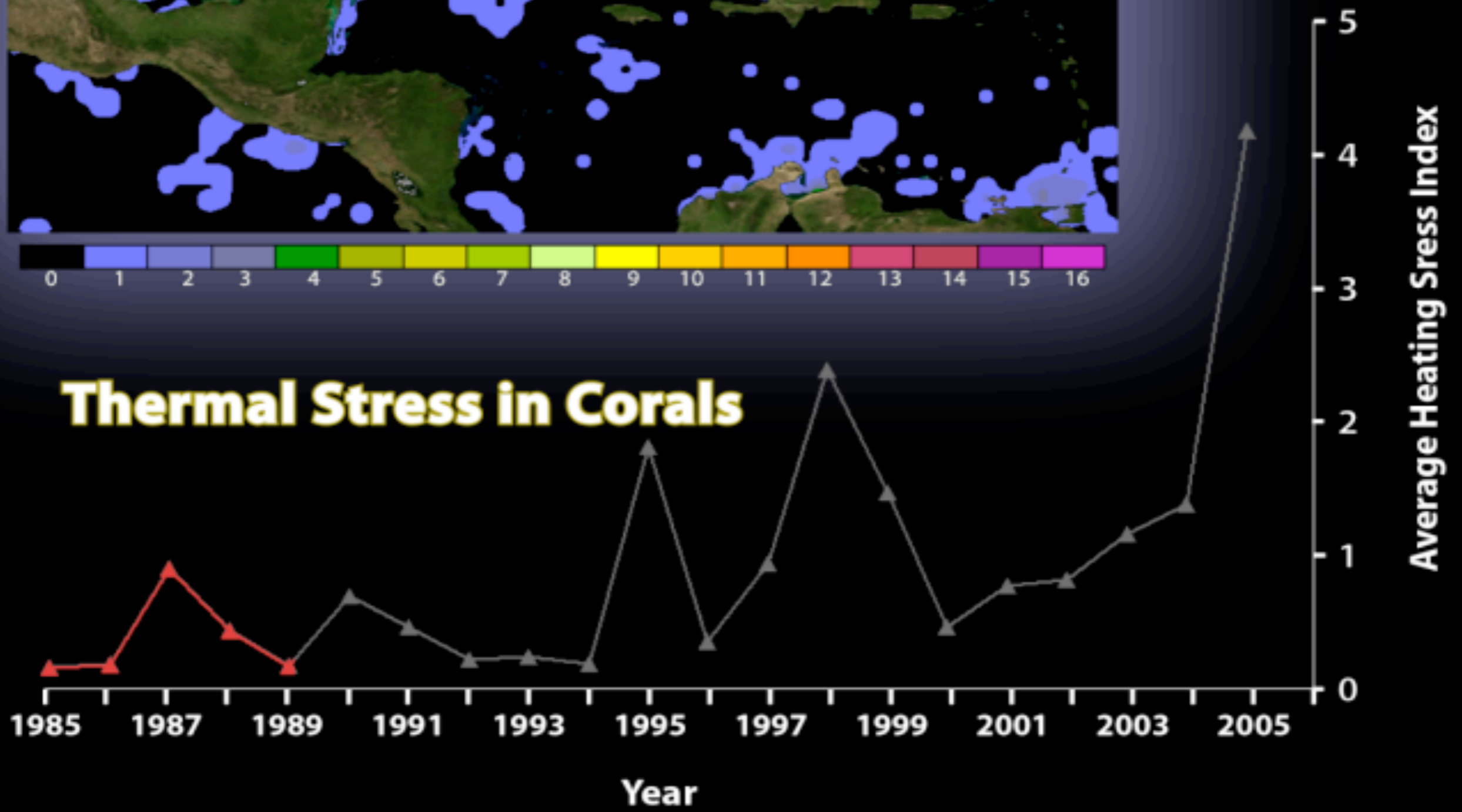
Thermal Stress in Corals

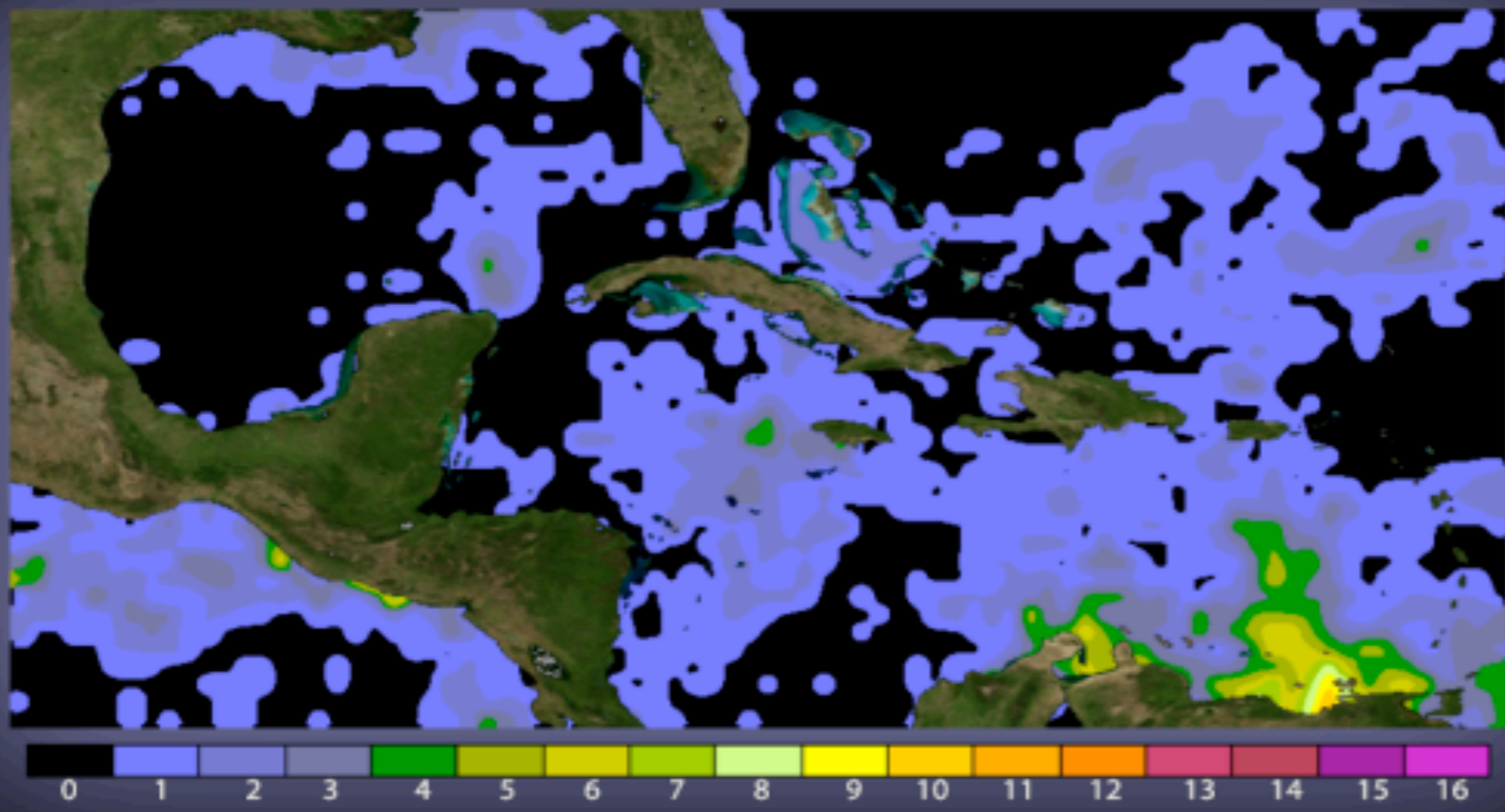




- Bleaching Expected
- Mass Bleaching and Mortality

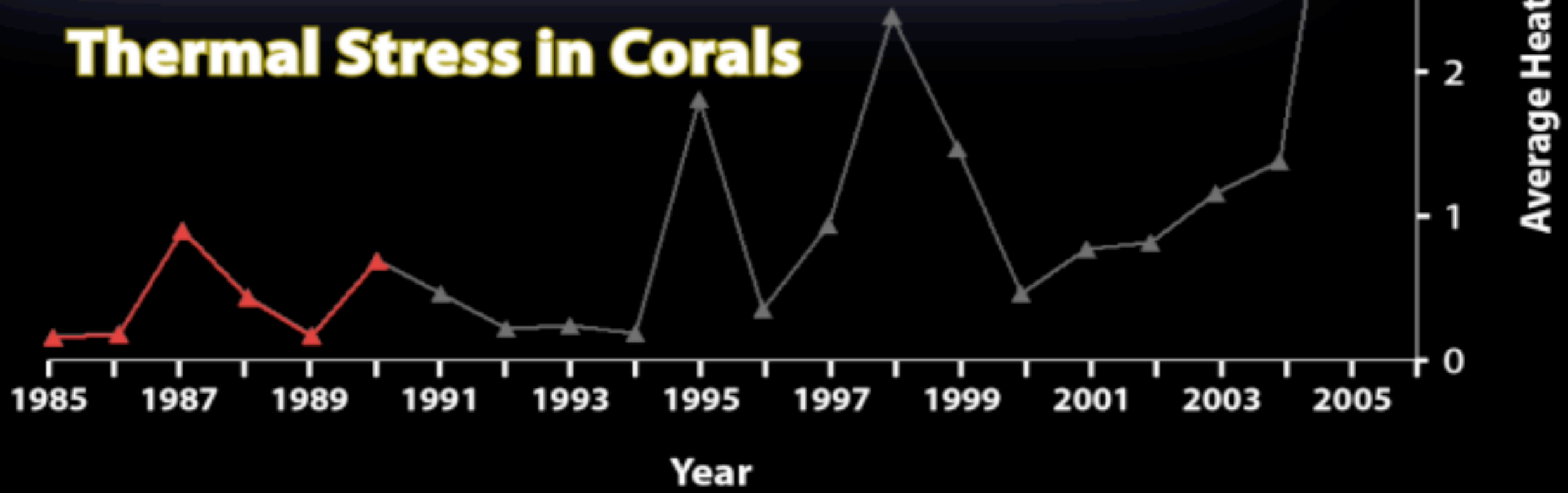
Thermal Stress in Corals

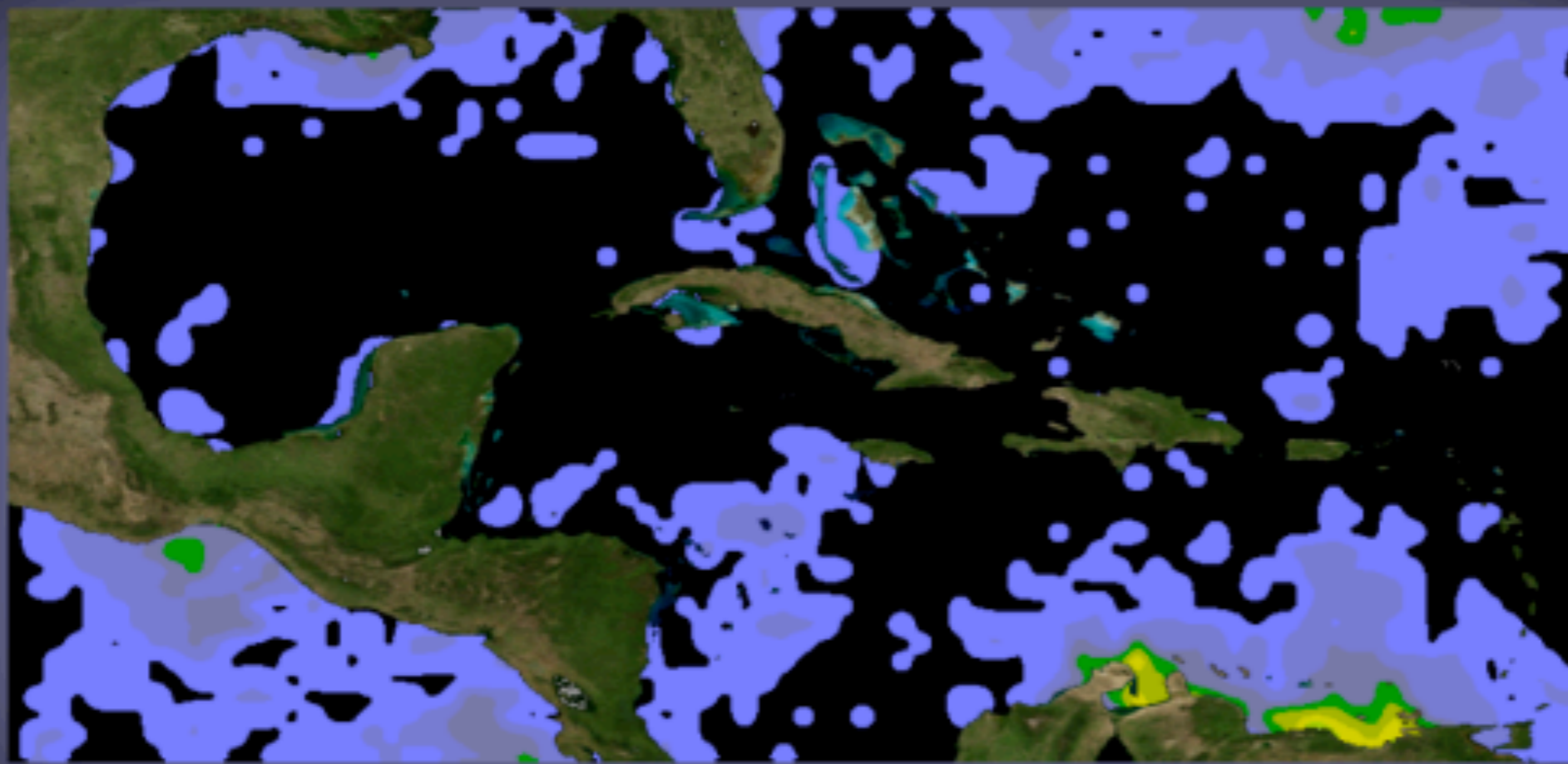






- Bleaching Expected
- Mass Bleaching and Mortality

Thermal Stress in Corals

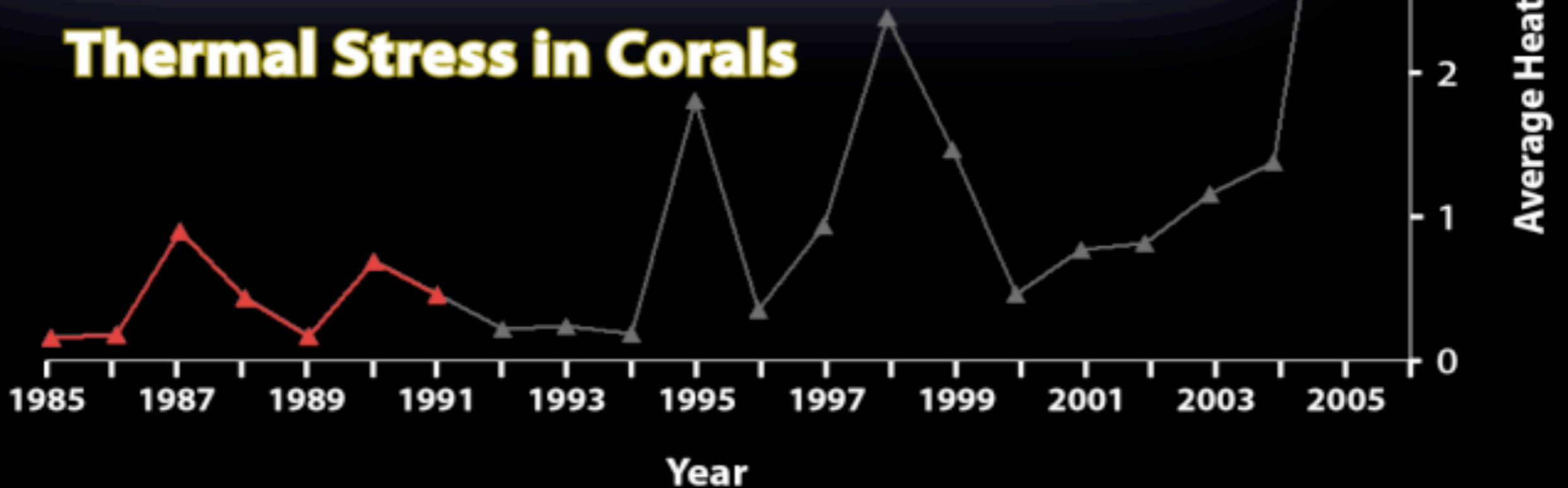


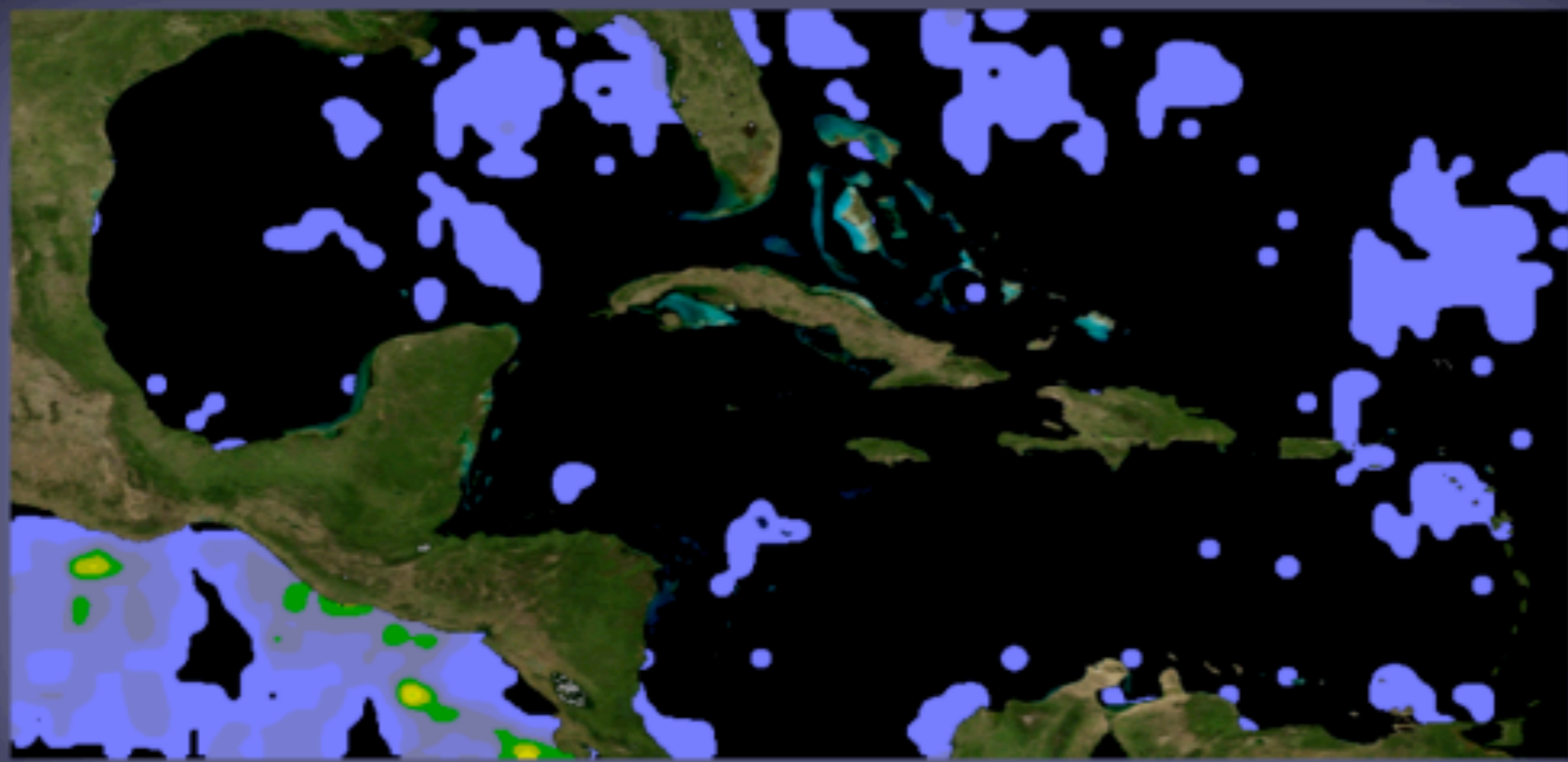




-  Bleaching Expected
-  Mass Bleaching and Mortality



Thermal Stress in Corals

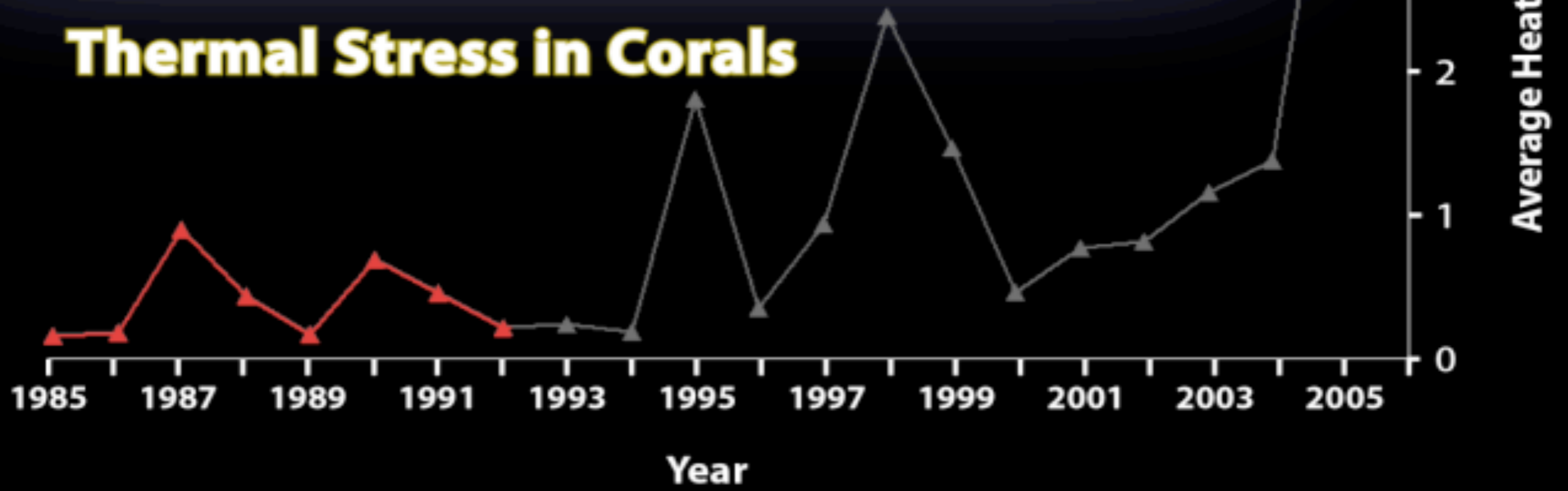


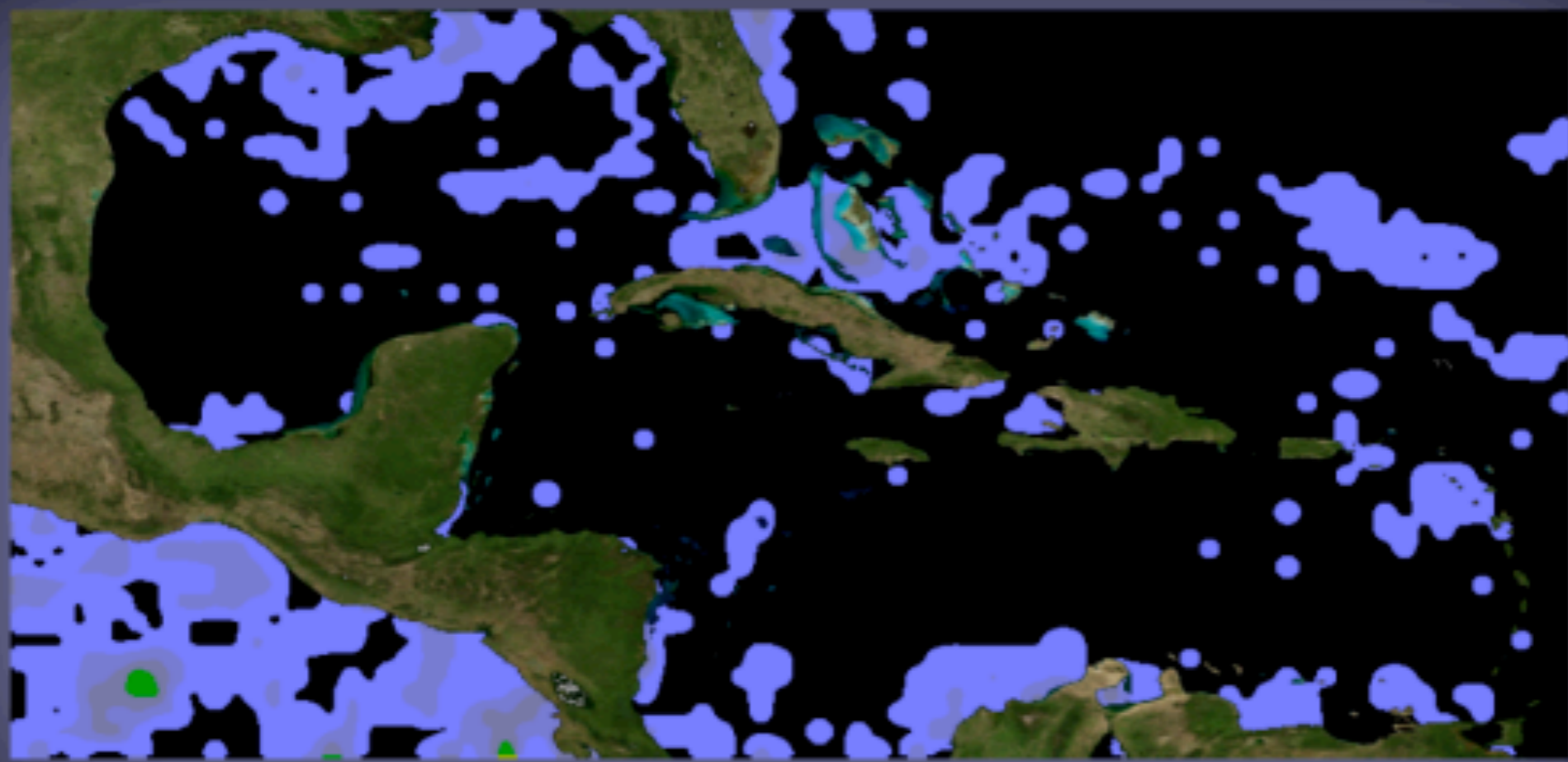




-  Bleaching Expected
-  Mass Bleaching and Mortality

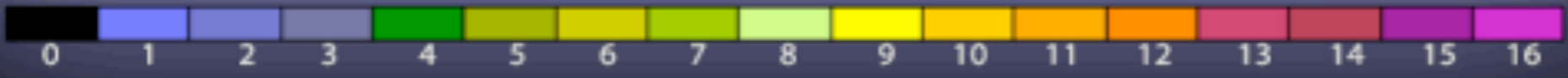


Thermal Stress in Corals

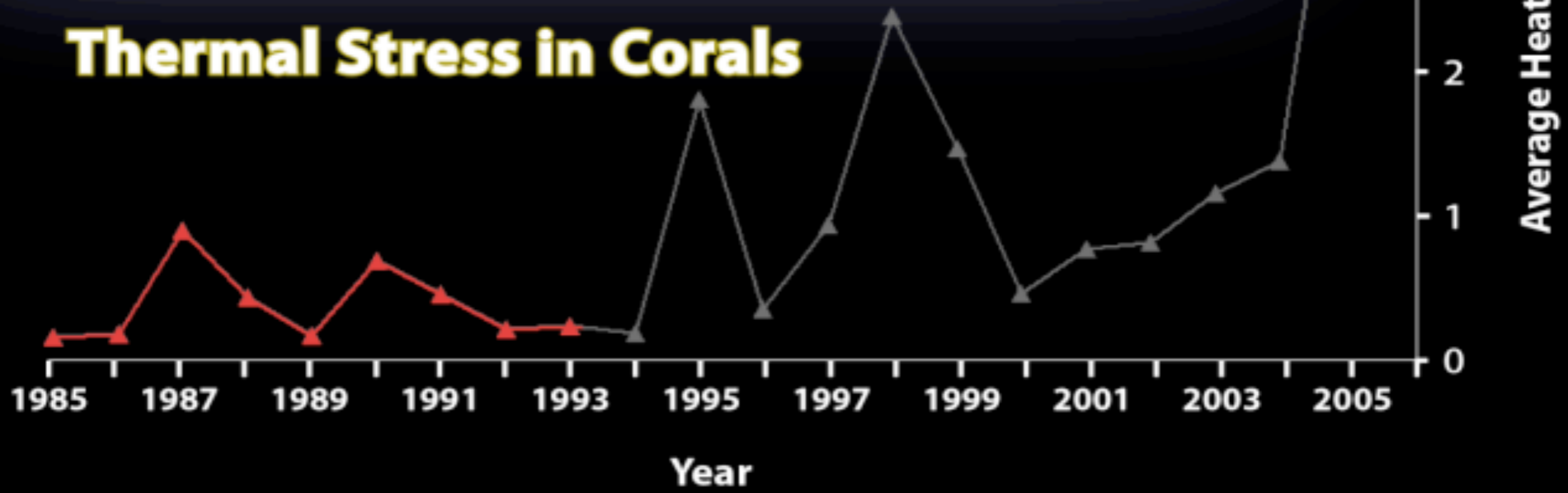


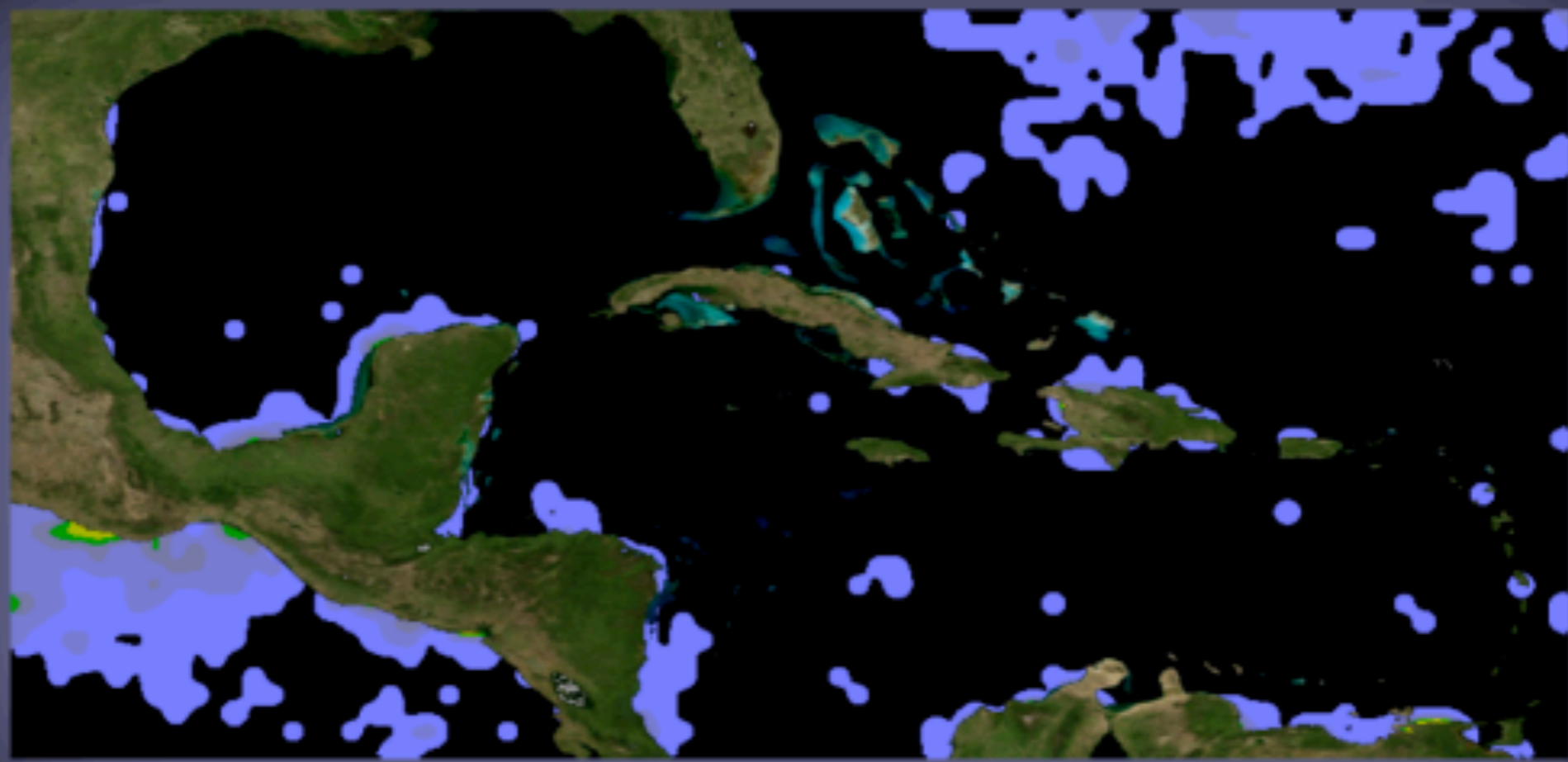




-  Bleaching Expected
-  Mass Bleaching and Mortality



Thermal Stress in Corals

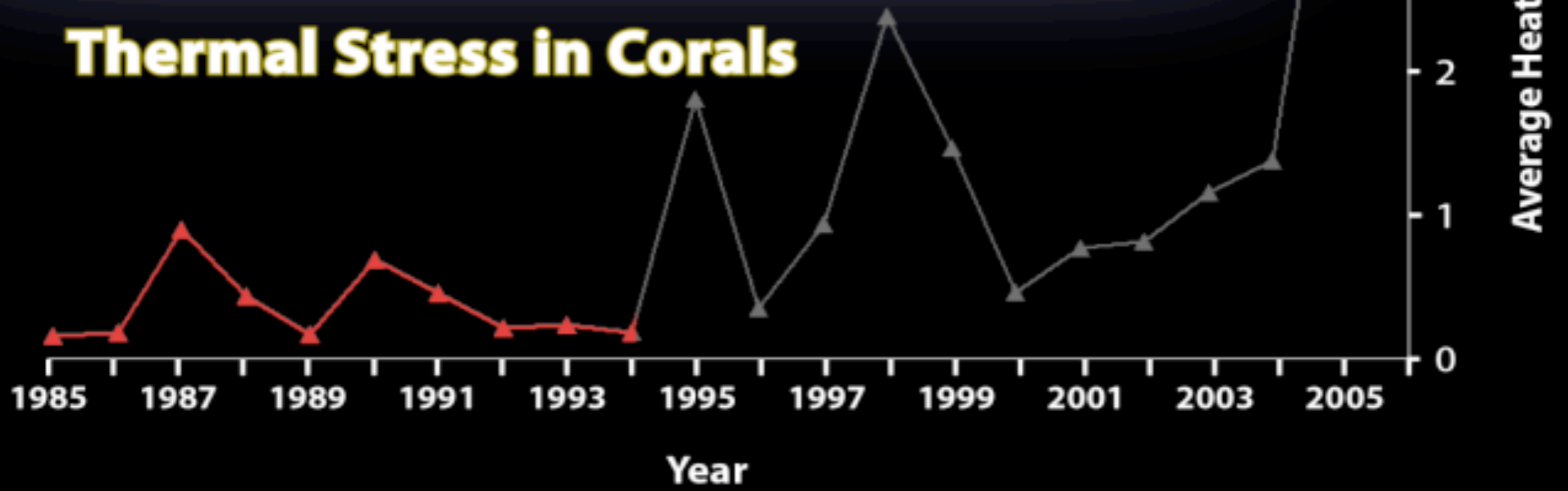


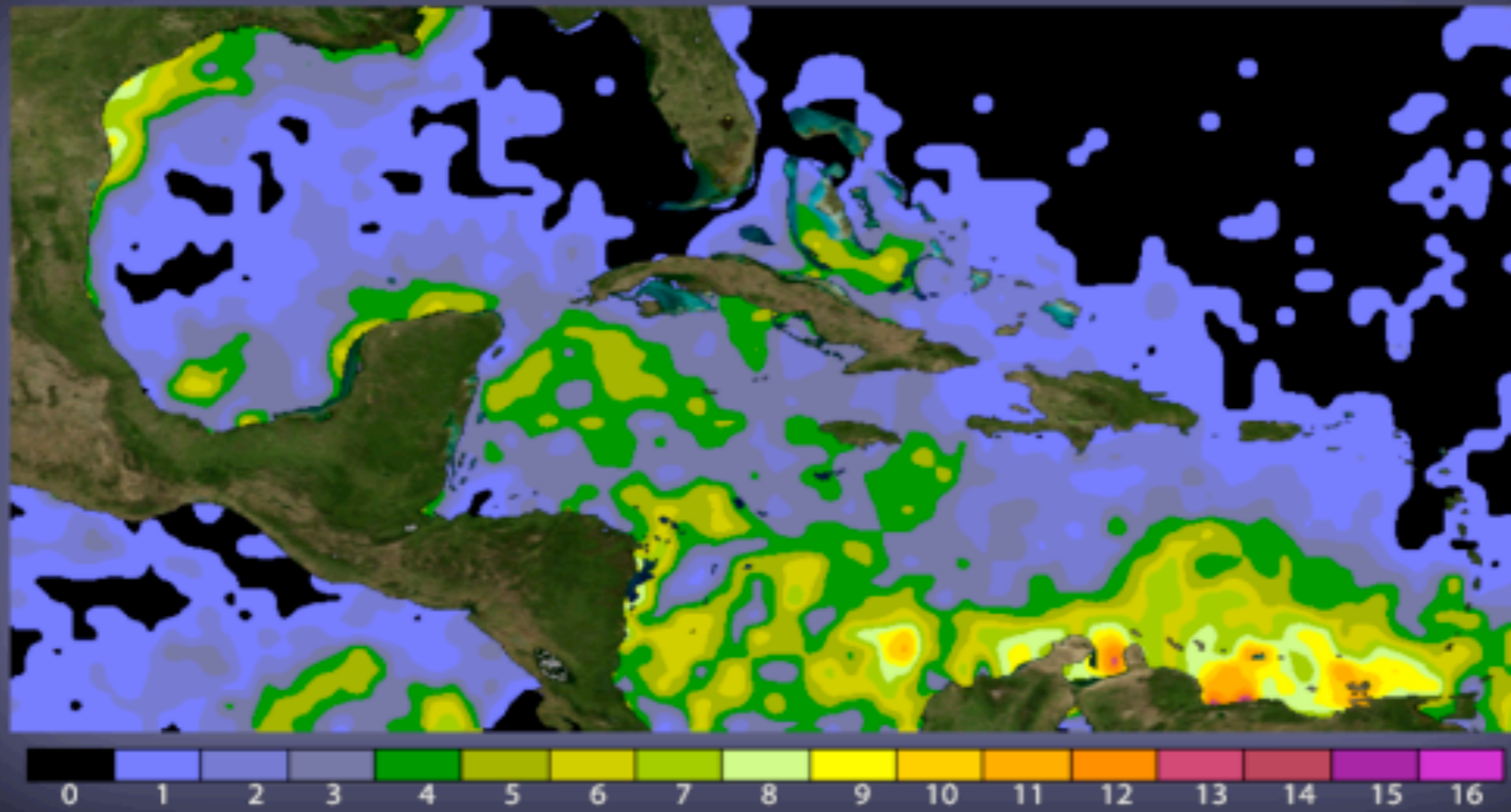


-  Bleaching Expected
-  Mass Bleaching and Mortality



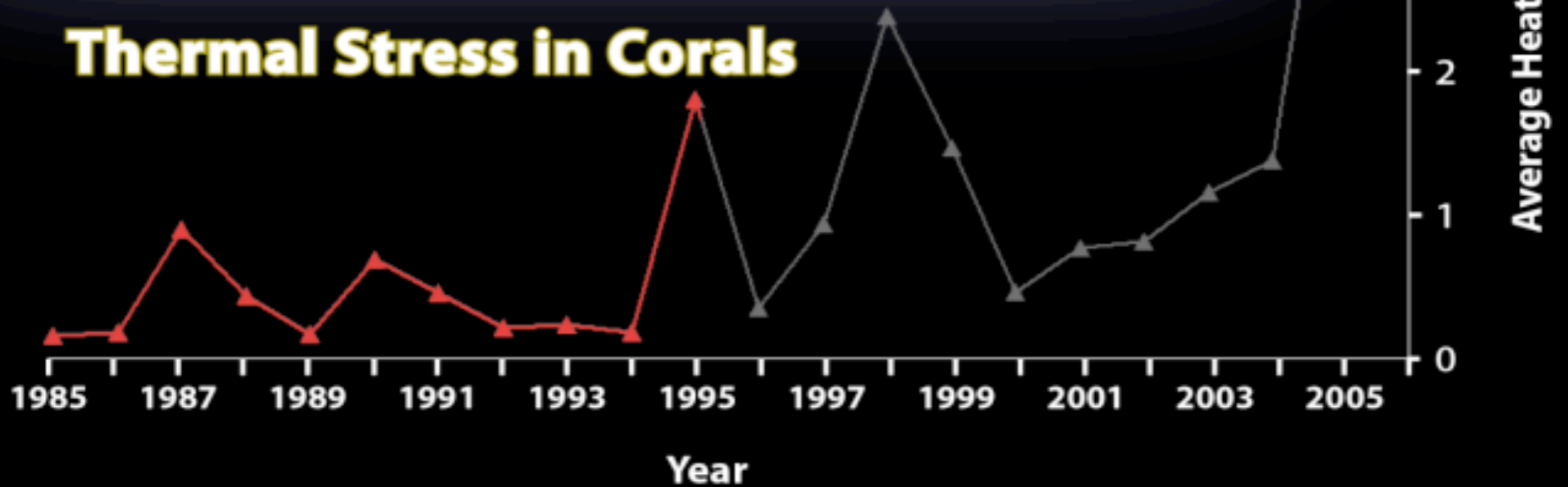
Thermal Stress in Corals

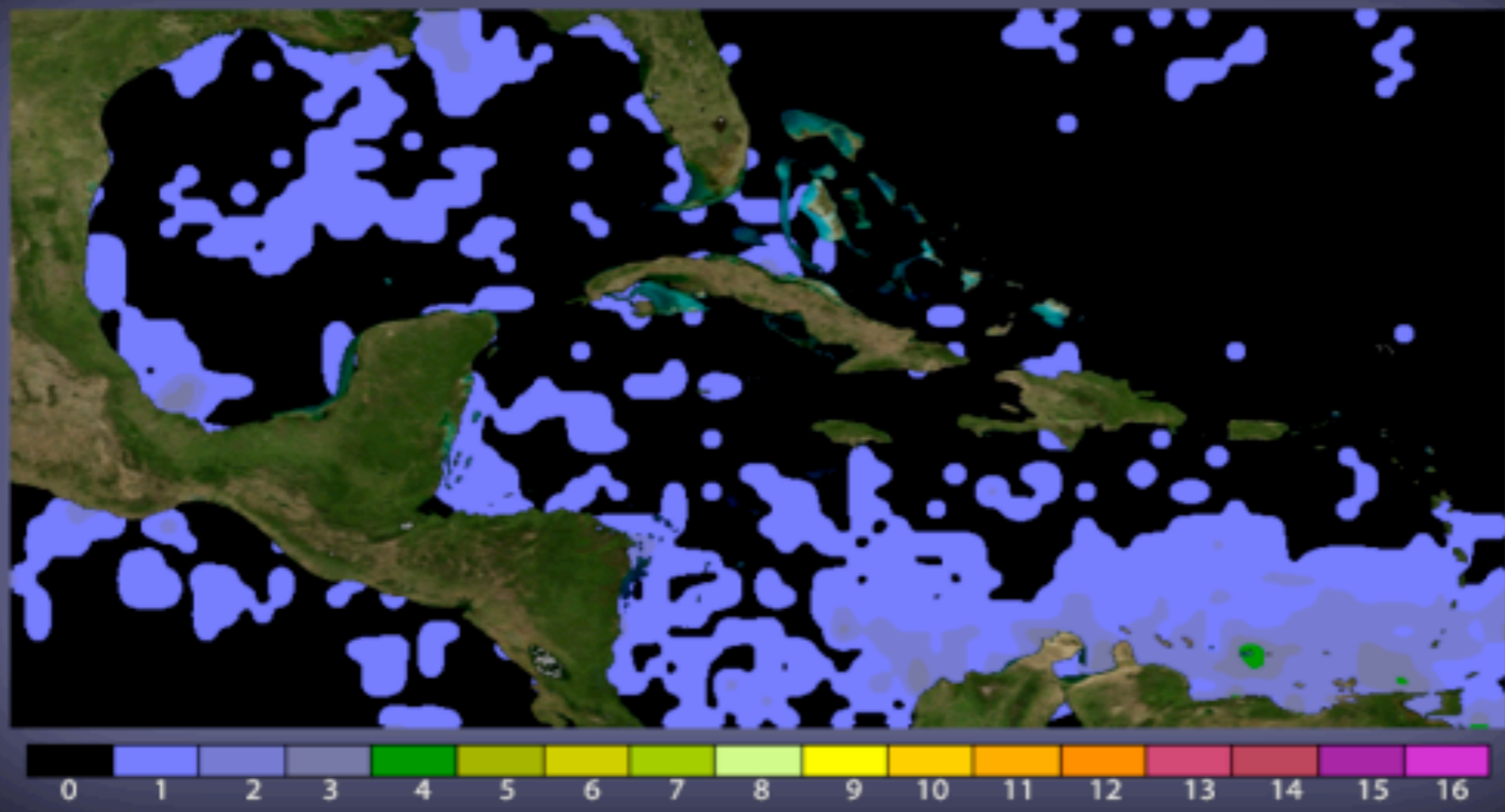




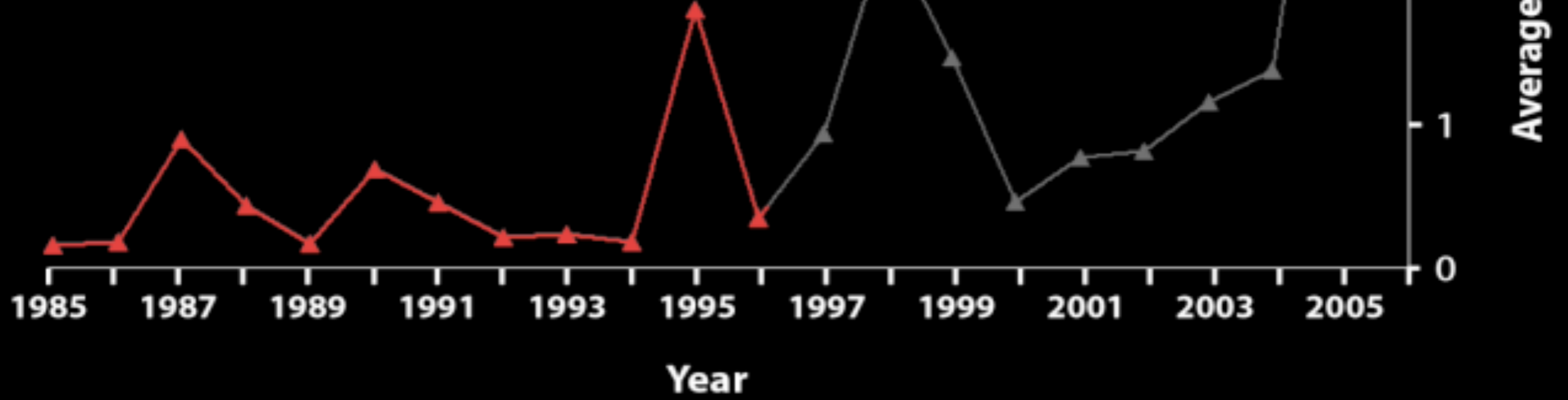
- Bleaching Expected
- Mass Bleaching and Mortality

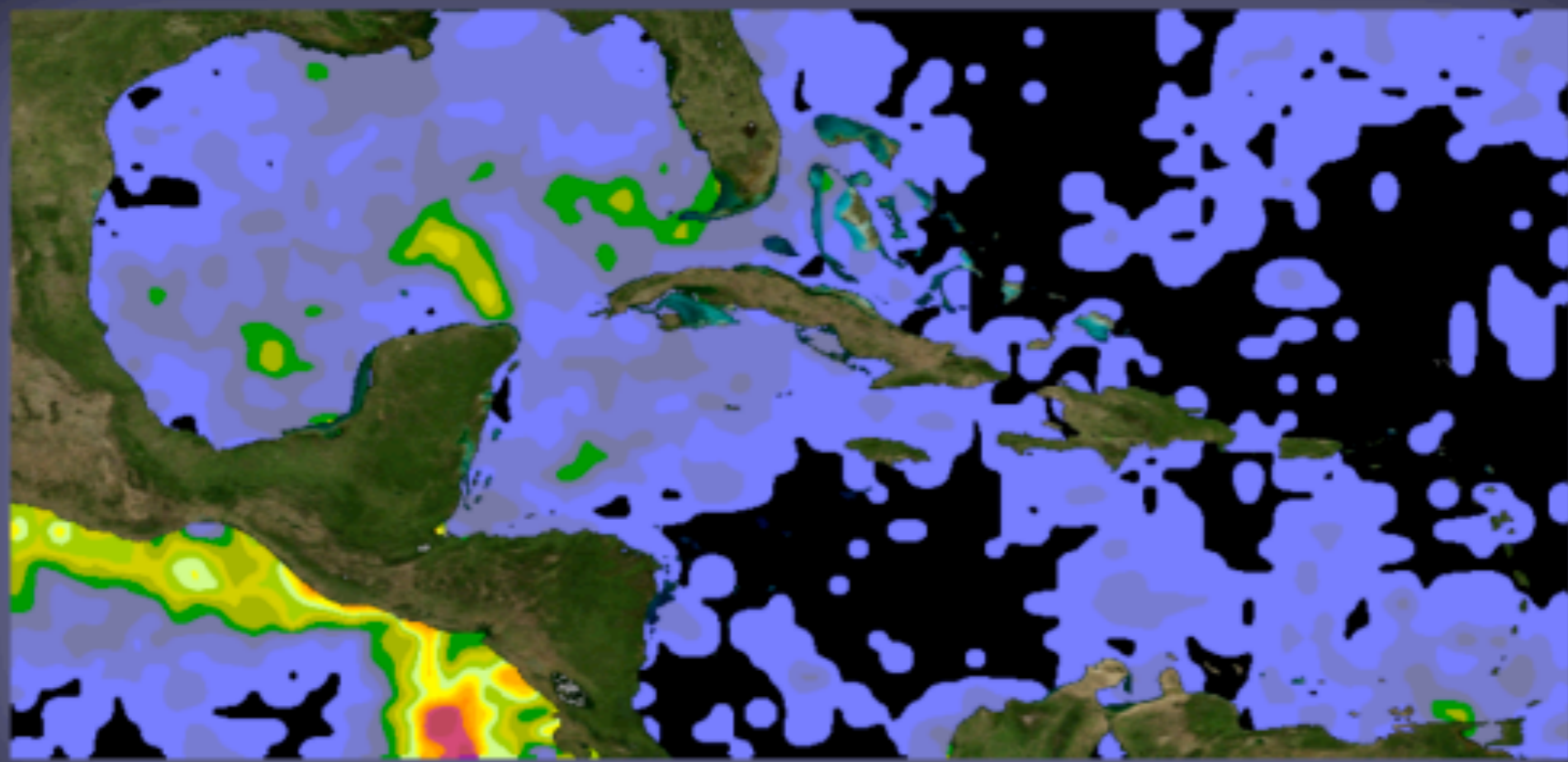
Thermal Stress in Corals







Thermal Stress in Corals

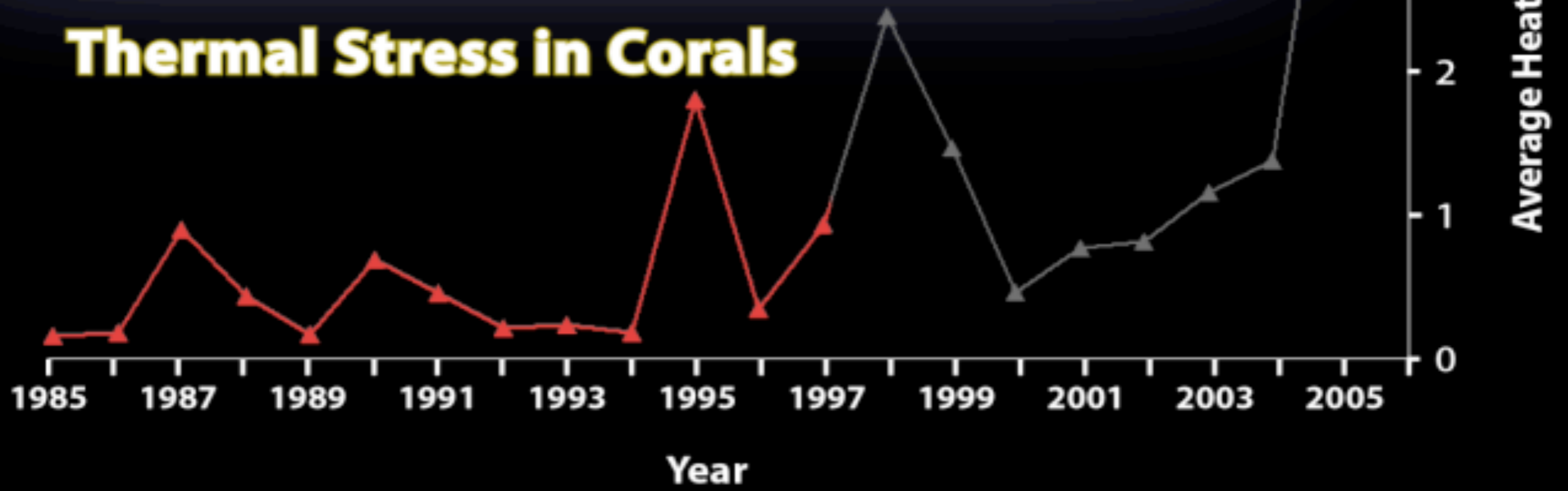


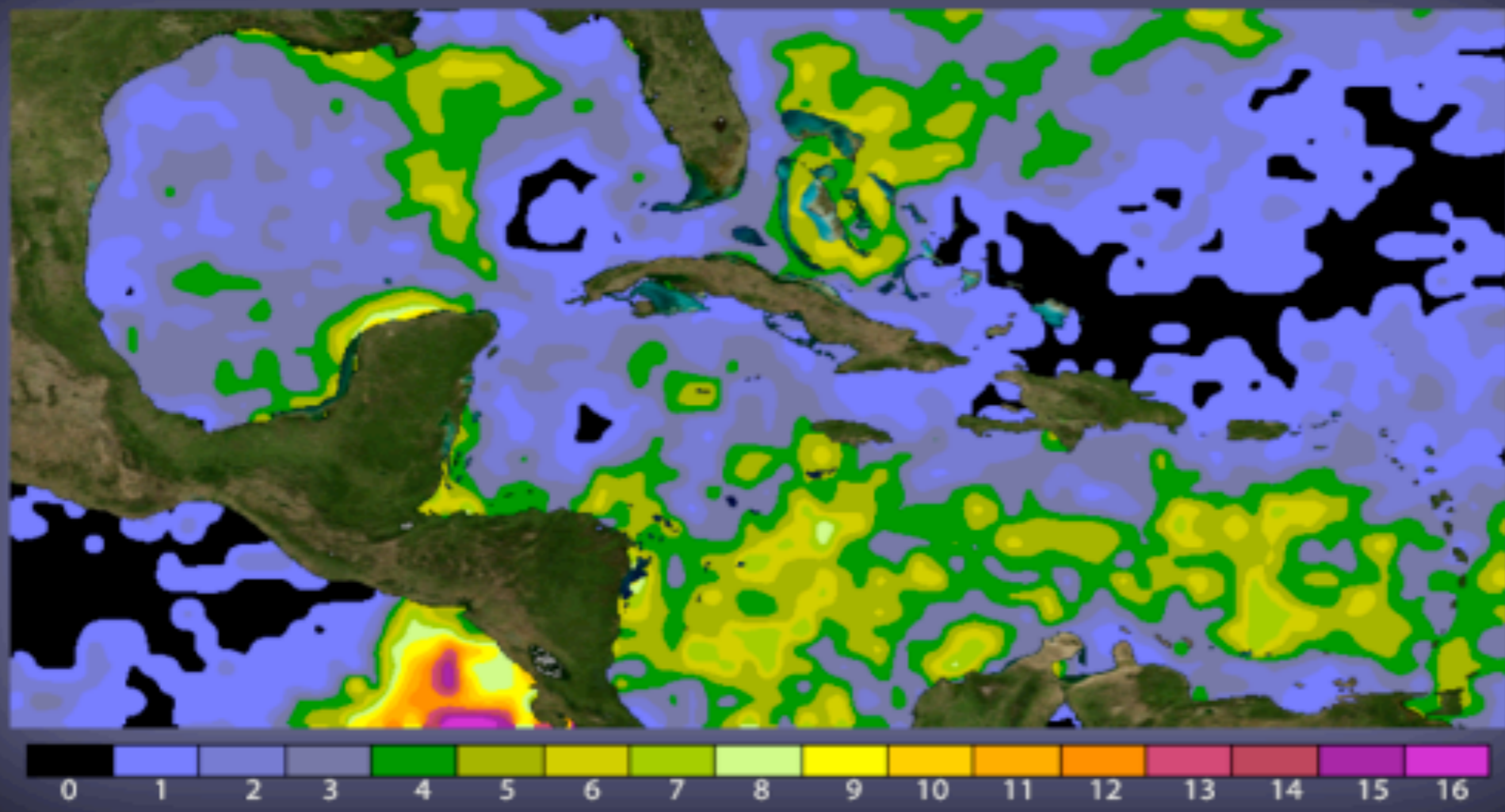




-  Bleaching Expected
-  Mass Bleaching and Mortality



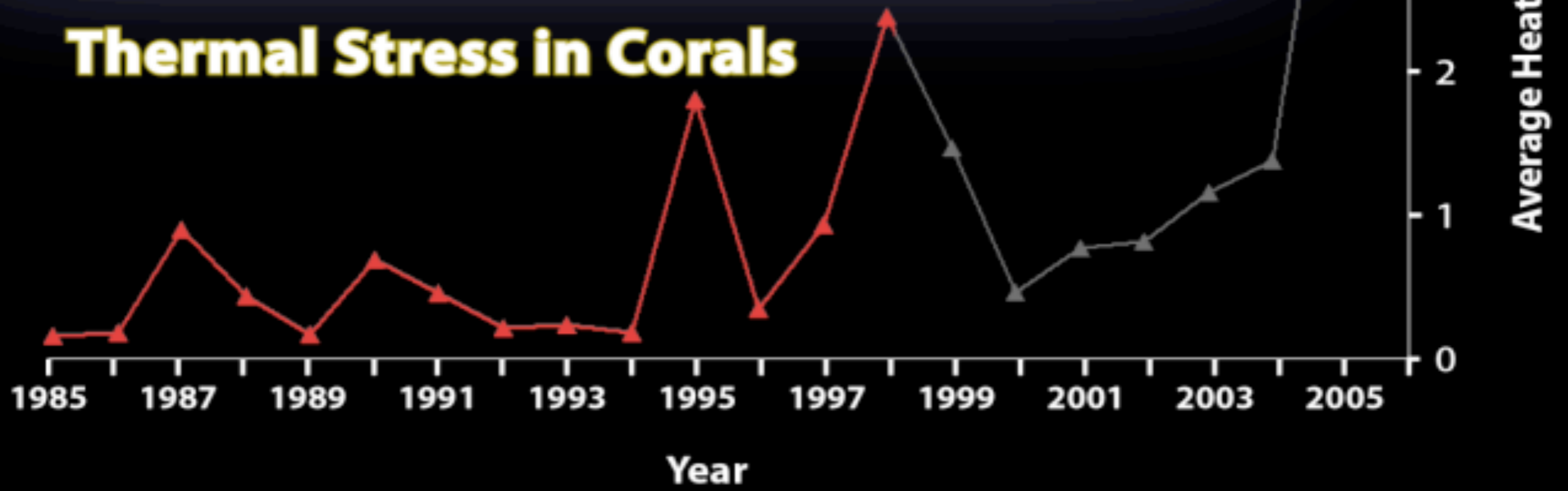
Thermal Stress in Corals

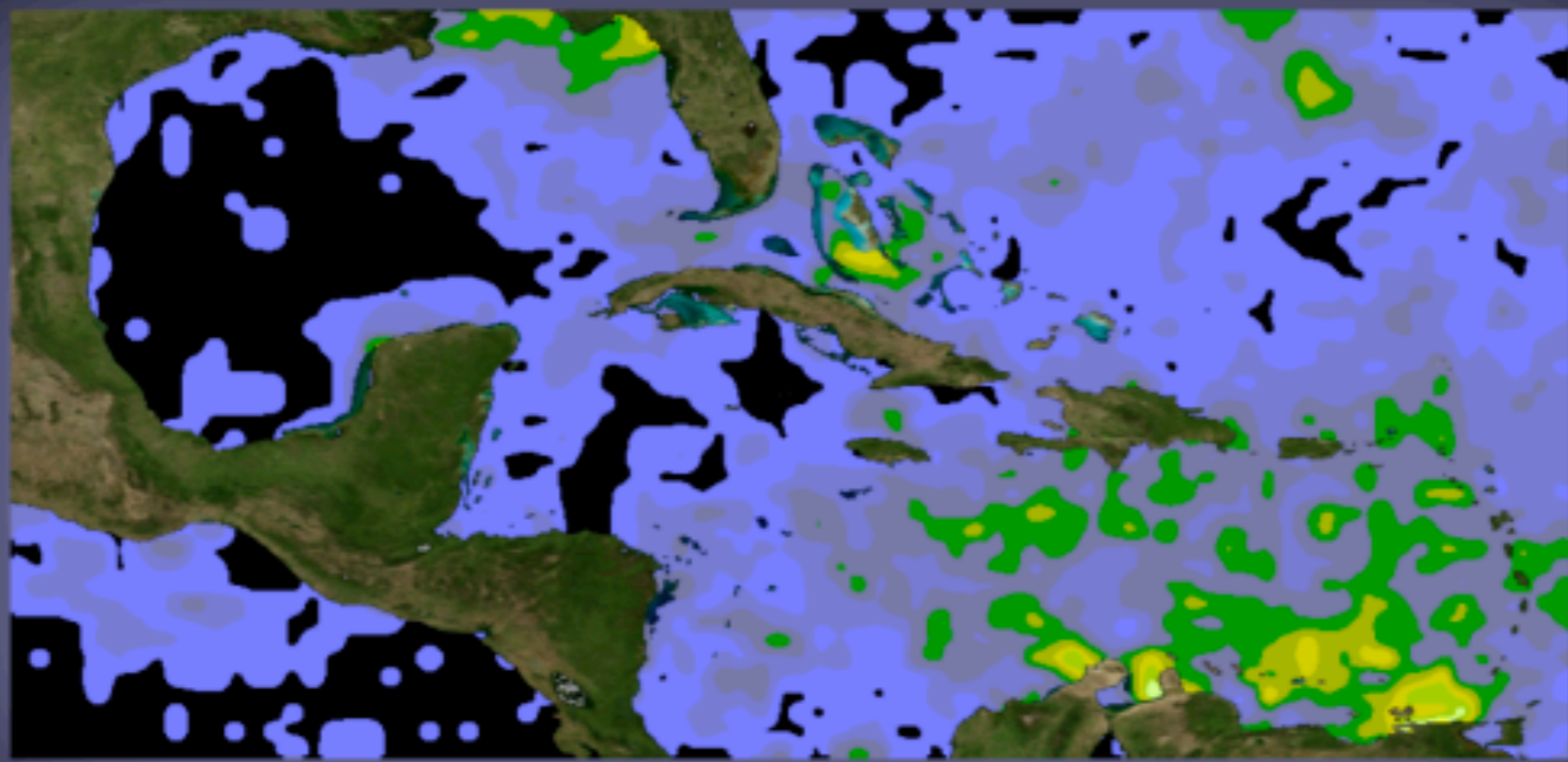






-  Bleaching Expected
-  Mass Bleaching and Mortality

Thermal Stress in Corals

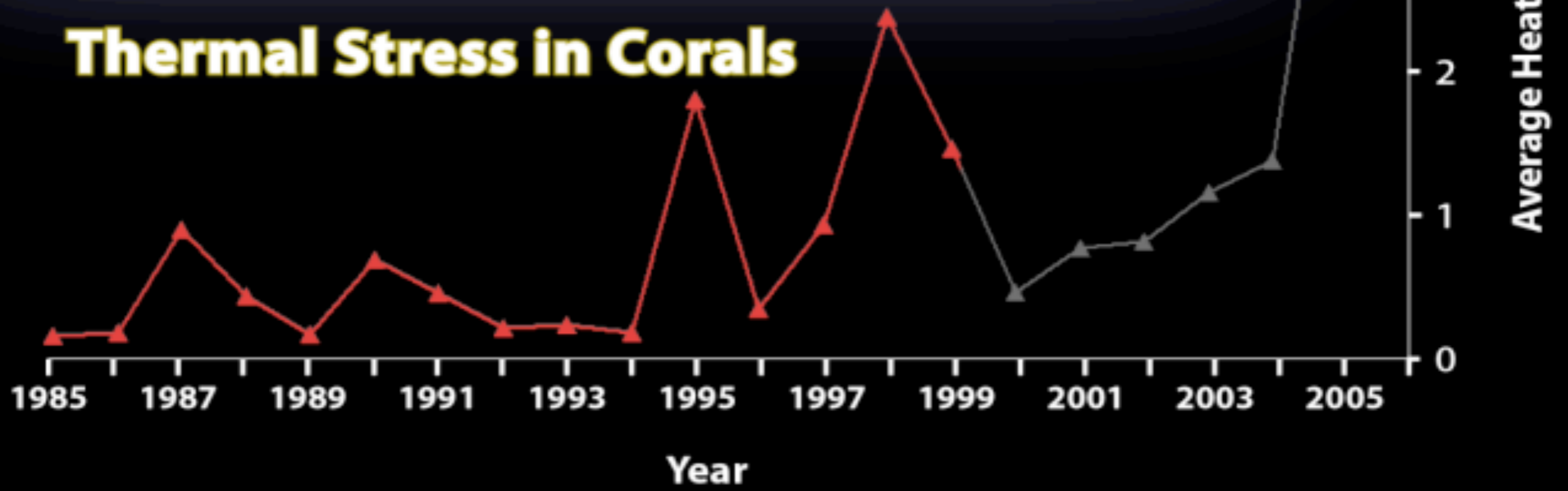


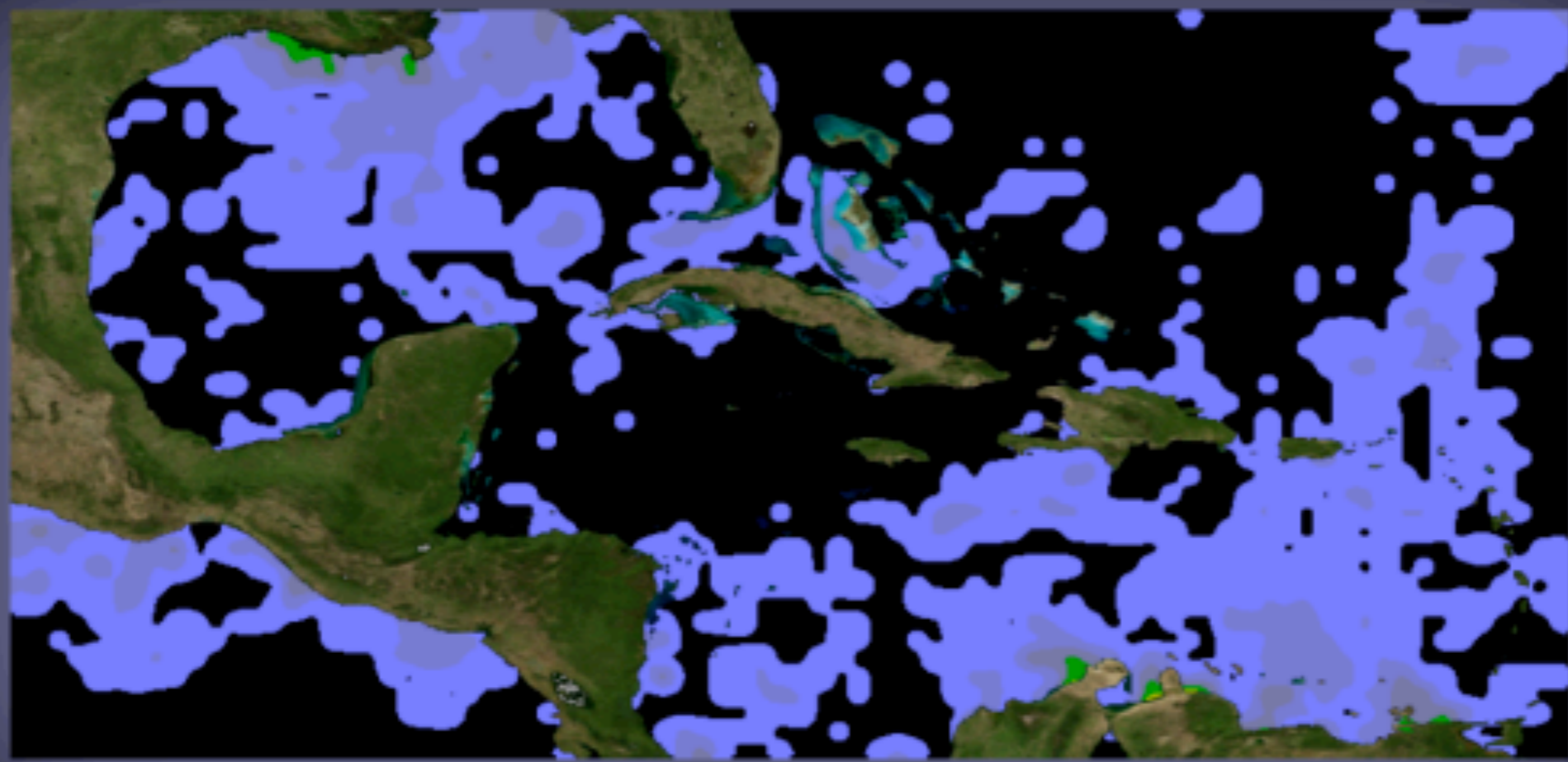


-  Bleaching Expected
-  Mass Bleaching and Mortality



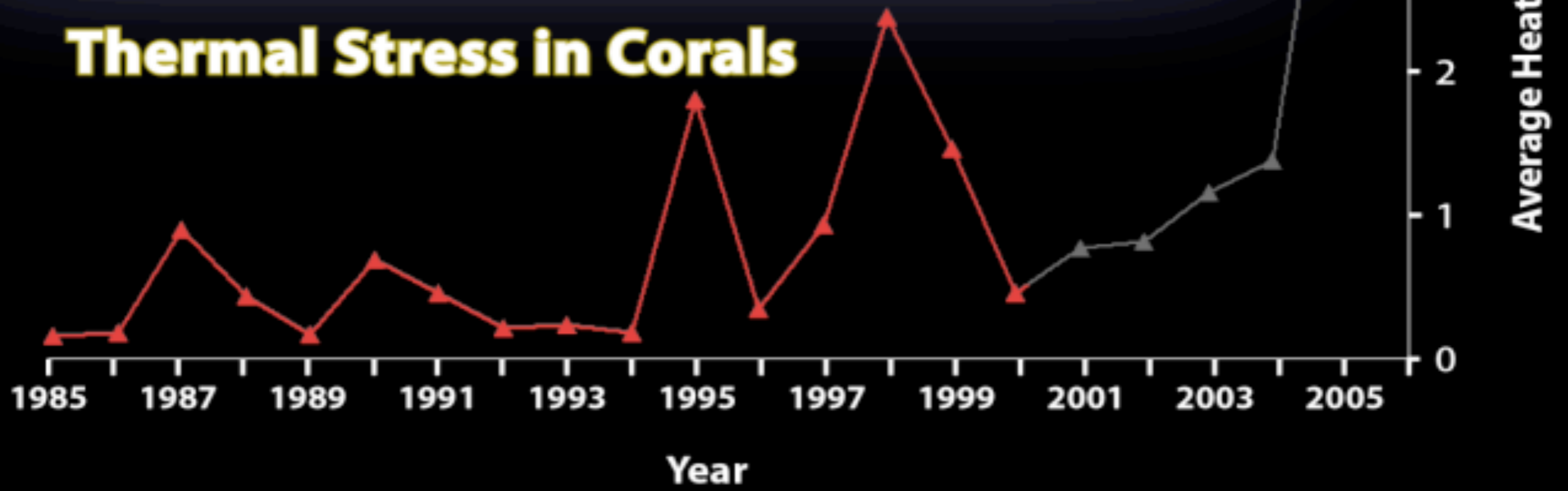
Thermal Stress in Corals

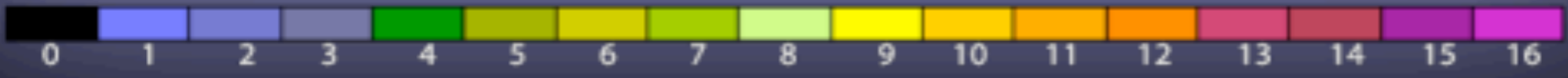
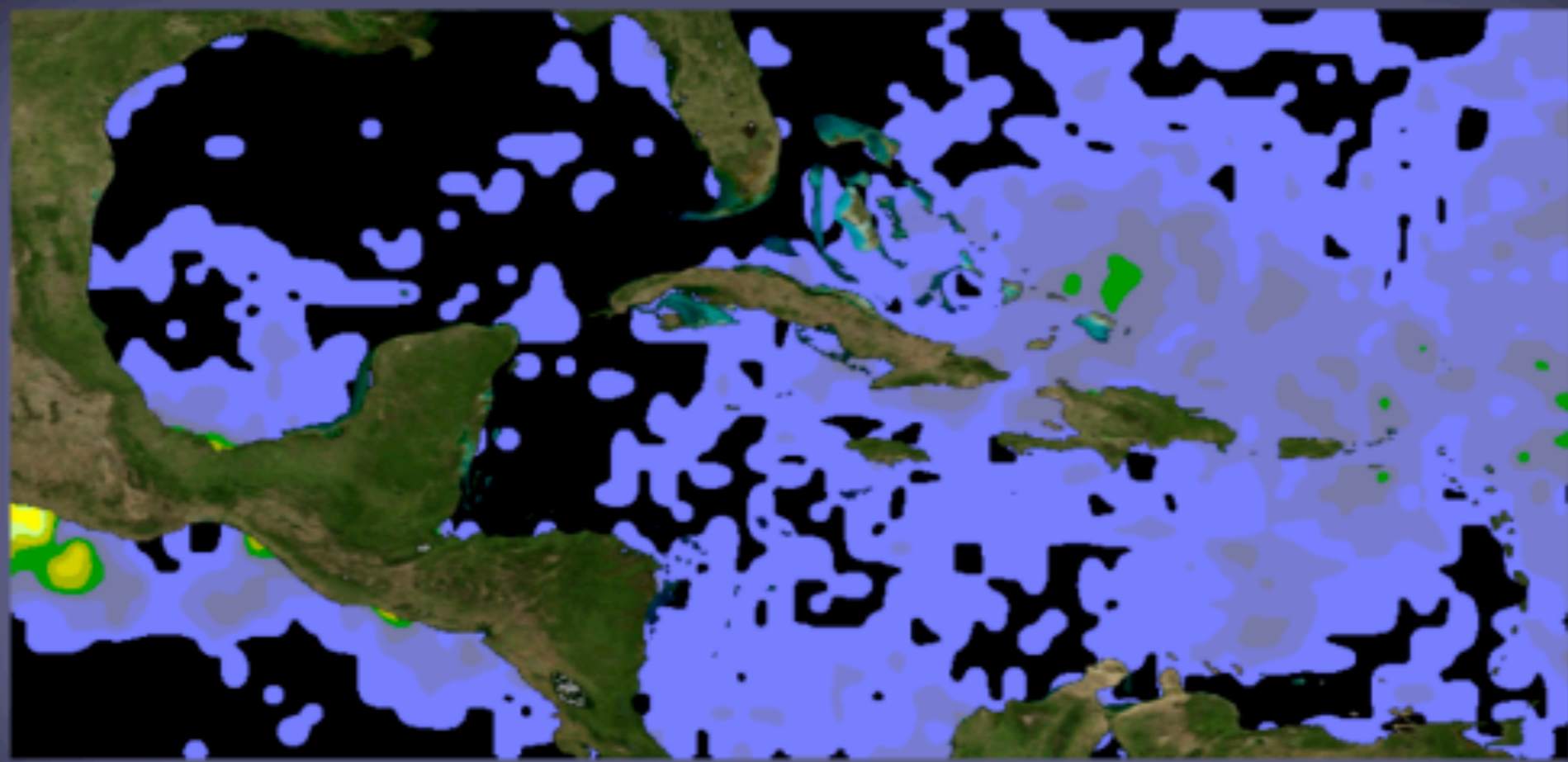






- Bleaching Expected
- Mass Bleaching and Mortality

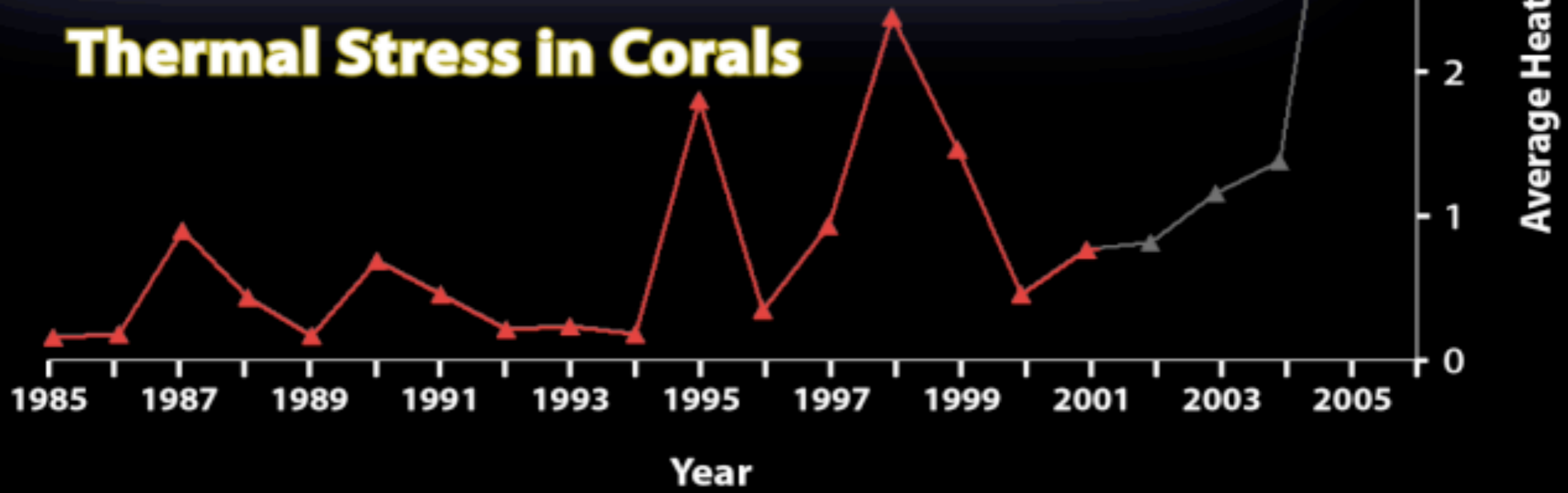
Thermal Stress in Corals

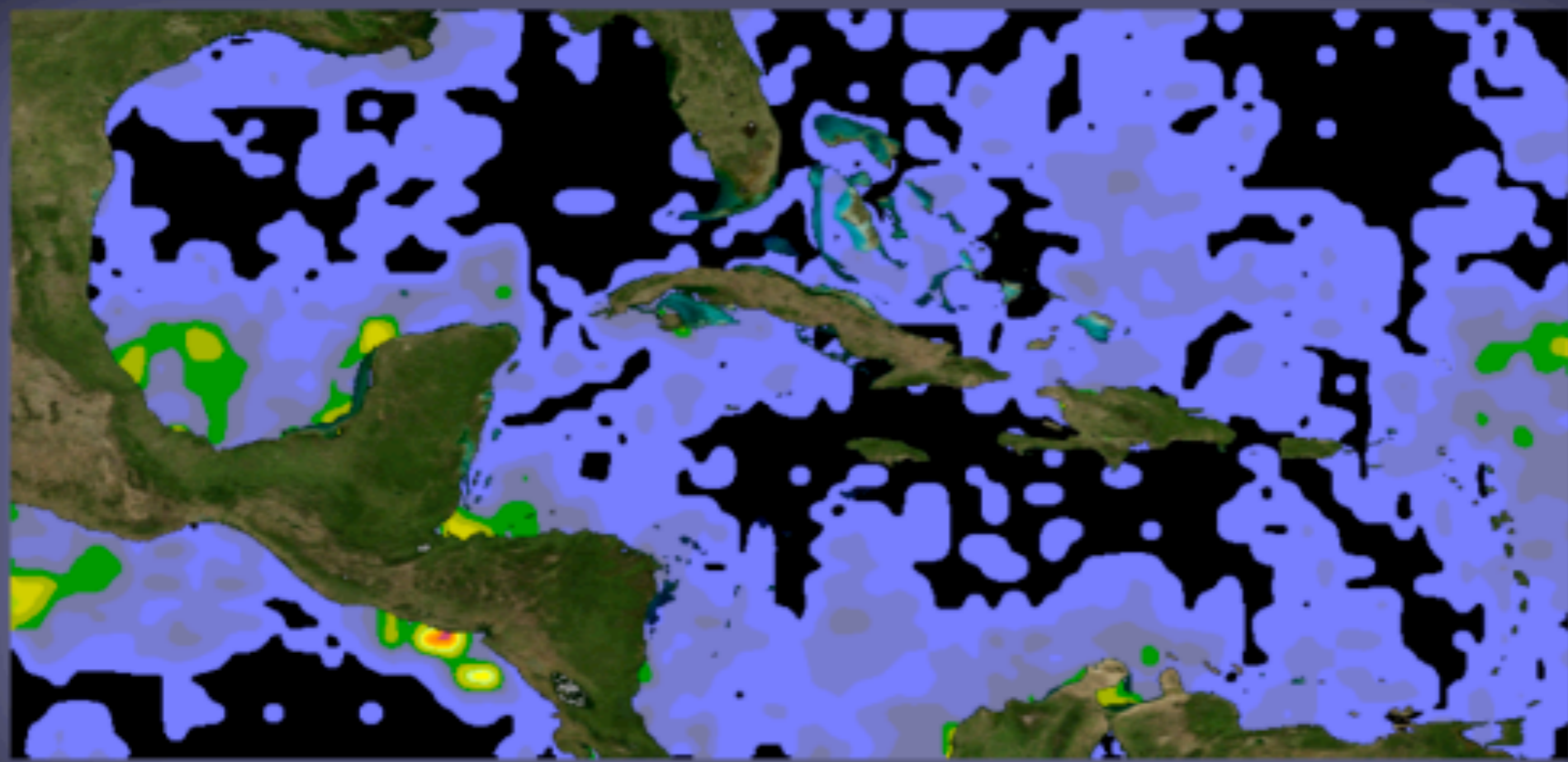






-  Bleaching Expected
-  Mass Bleaching and Mortality

Thermal Stress in Corals

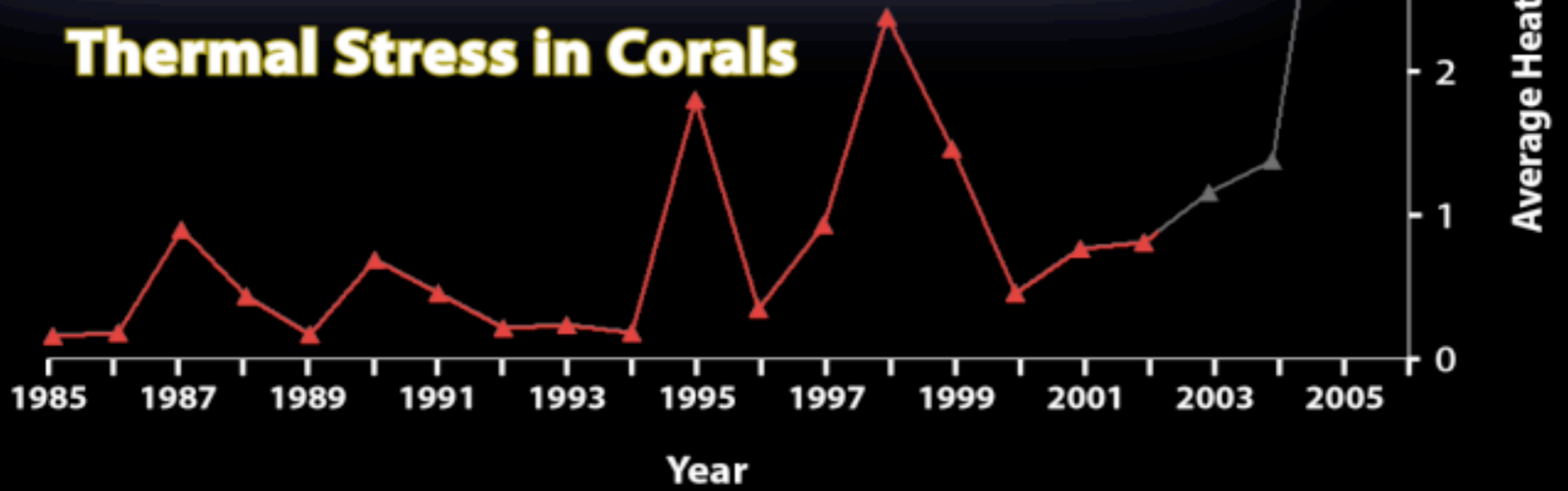


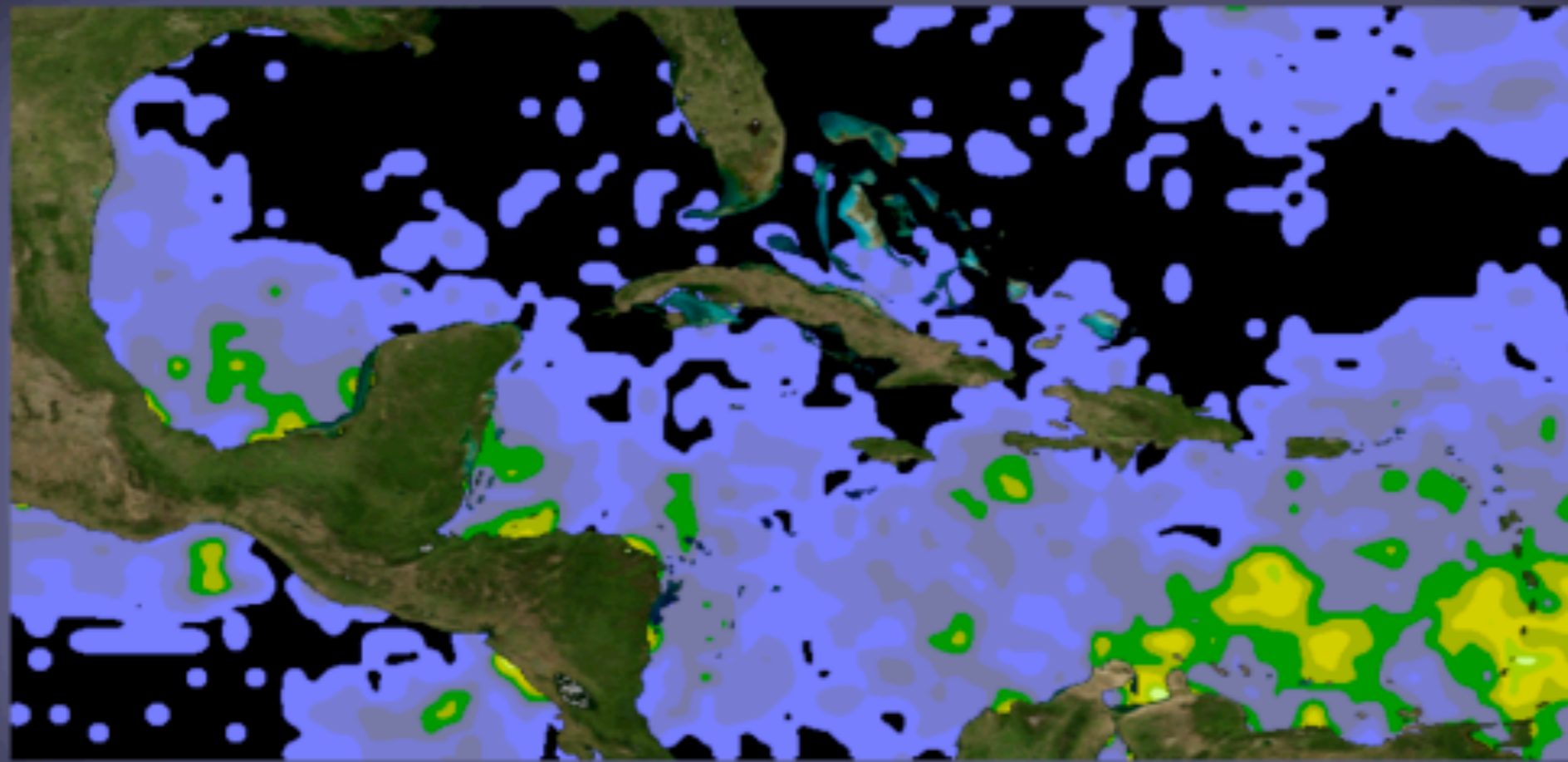




-  Bleaching Expected
-  Mass Bleaching and Mortality



Thermal Stress in Corals

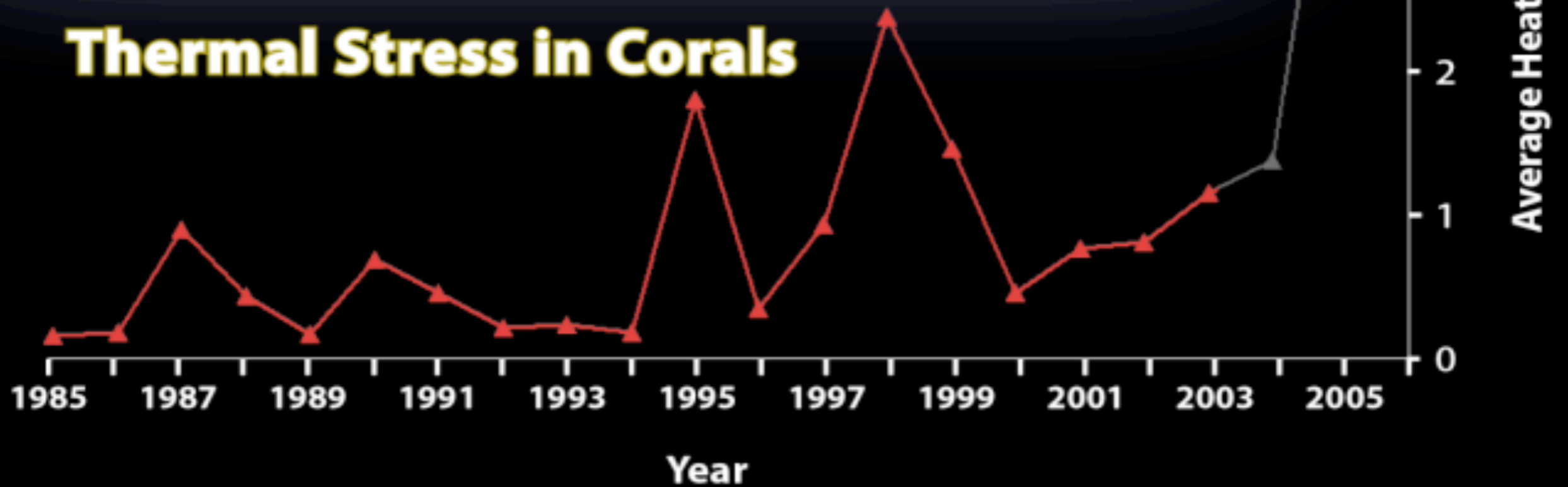


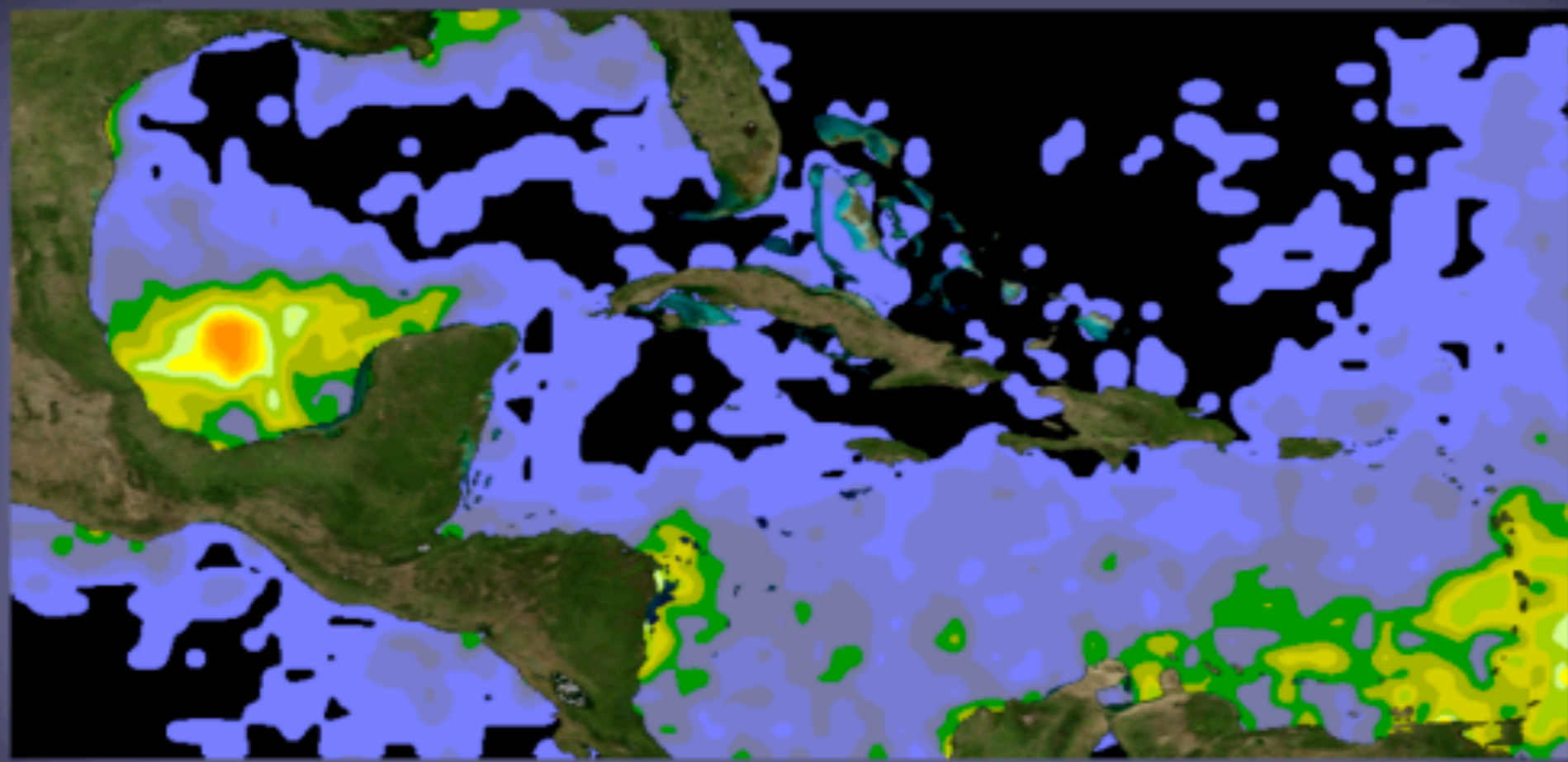


-  Bleaching Expected
-  Mass Bleaching and Mortality



Thermal Stress in Corals

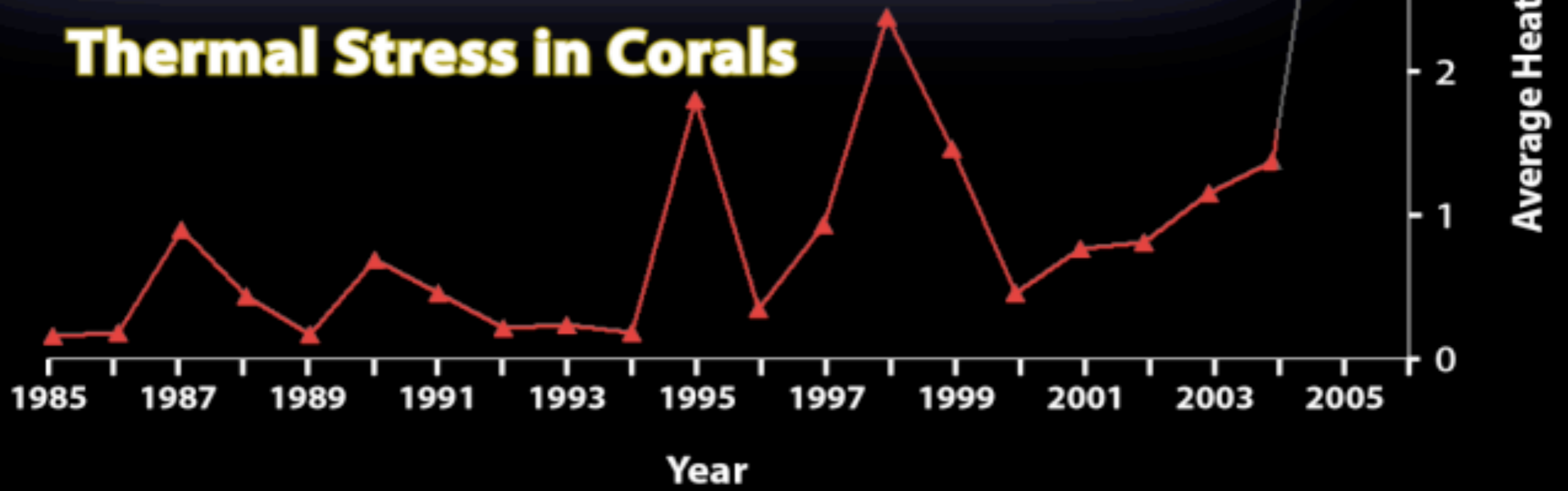


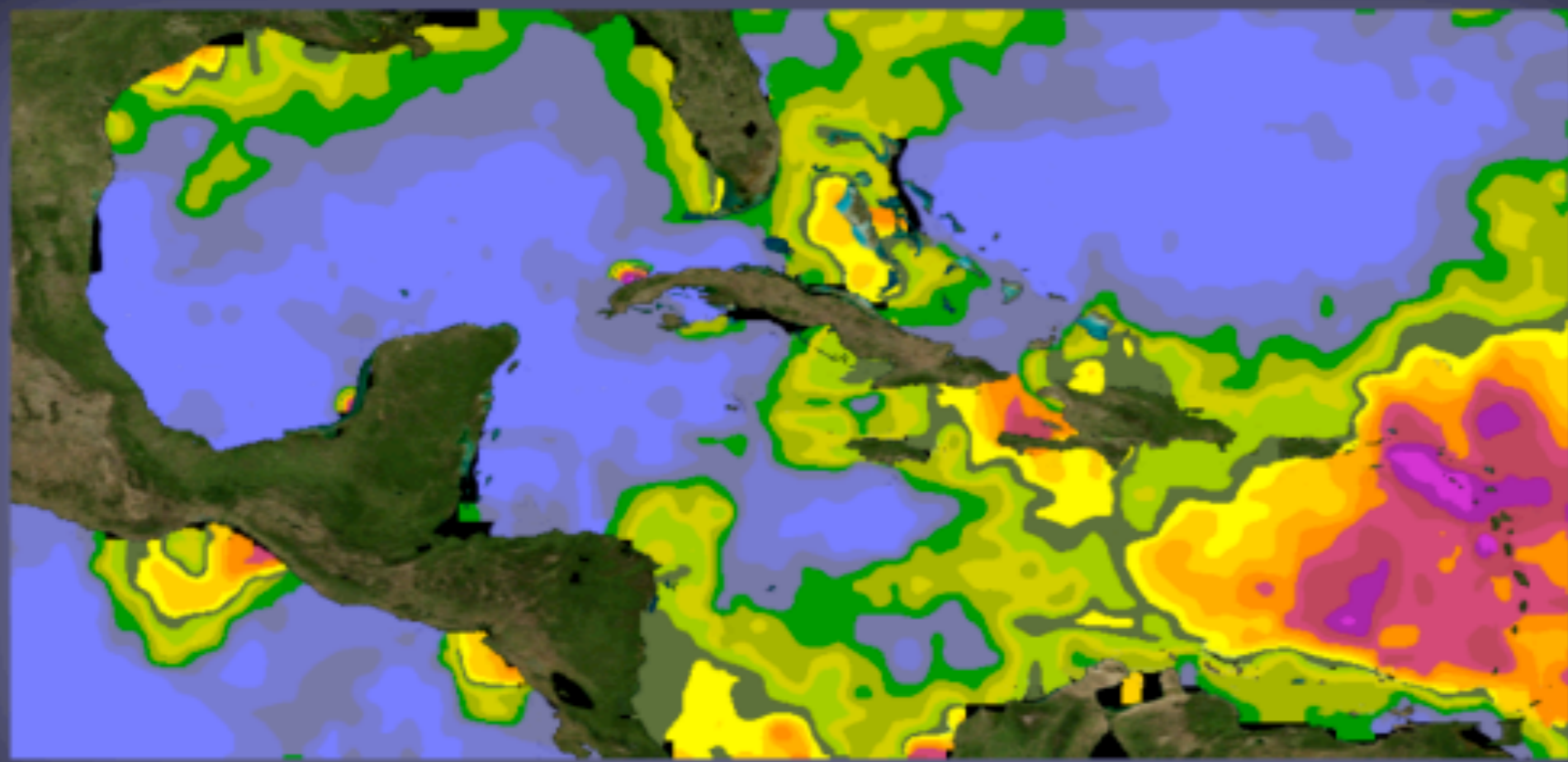




- Bleaching Expected
- Mass Bleaching and Mortality



Thermal Stress in Corals

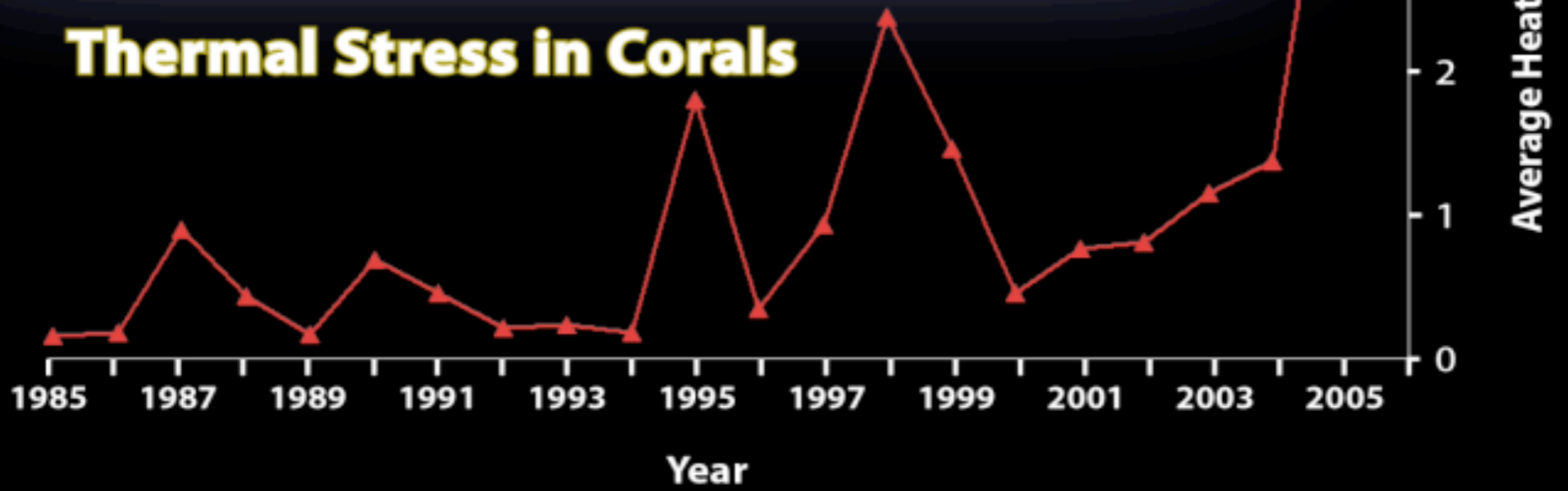




-  Bleaching Expected
-  Mass Bleaching and Mortality



Thermal Stress in Corals



CORAL BLEACHING

1997 – 1998: ~16% of global reefs were killed

**2005: Worst bleaching in Caribbean:
50% mortality in one year**

**2010: Probably worse than 1997-1998:
10-75% mortality**

CONSEQUENCE: Coral Reef Degradation

LOSS OF HABITAT

**LOSS OF COASTAL
PROTECTION**

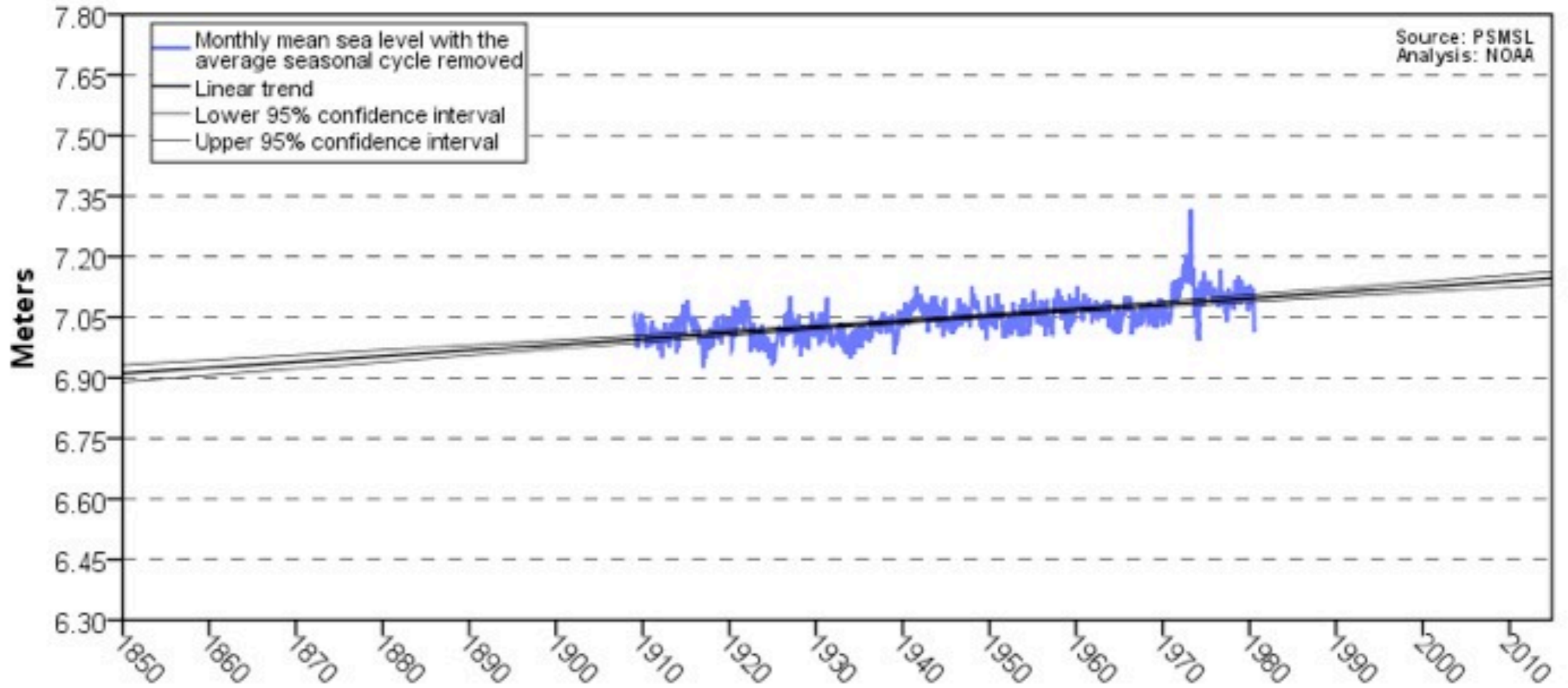
**LOSS OF
RECREATION
POTENTIAL**



SEA LEVEL RISE

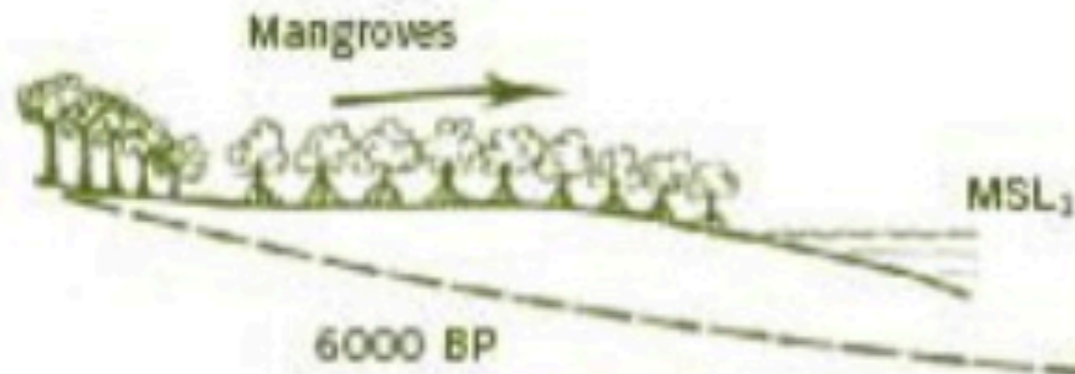
Cristobal, Panama

1.41 +/- 0.22 mm/yr

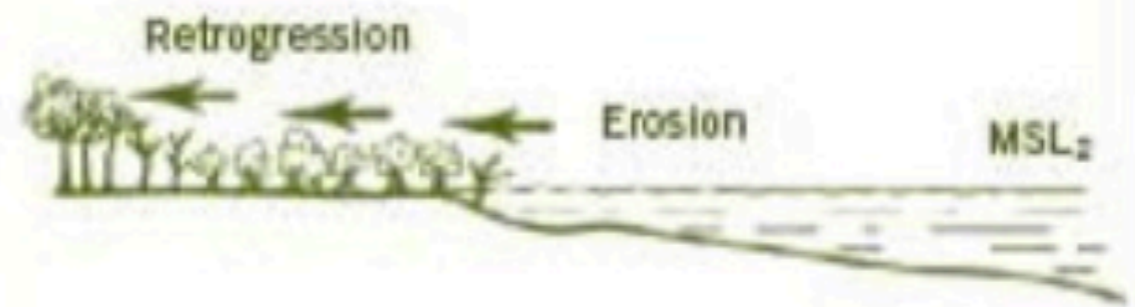


CONSEQUENCE: Shoreline Erosion

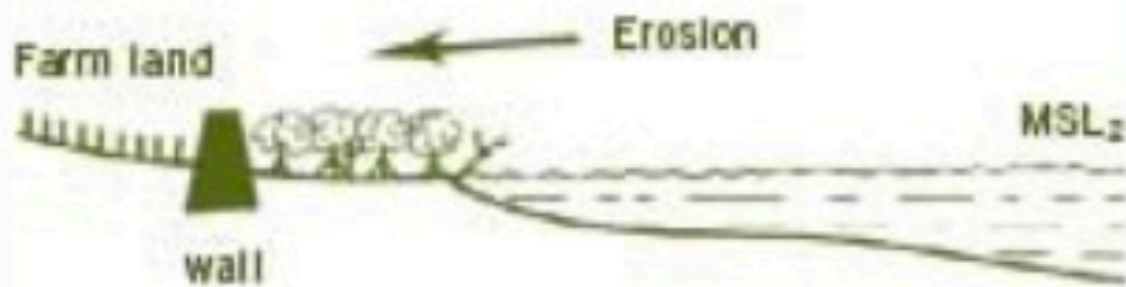
A. Existing Situation



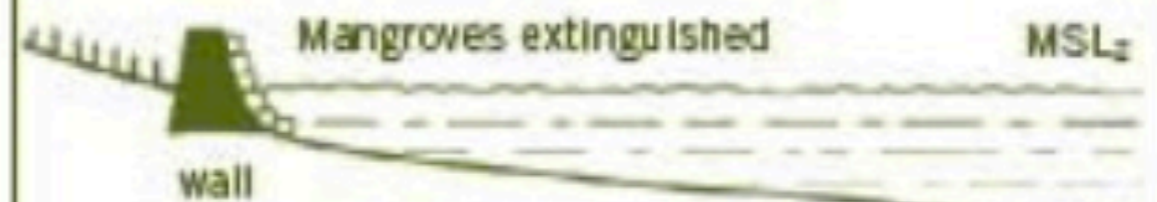
B. Response to Sea Level Rise



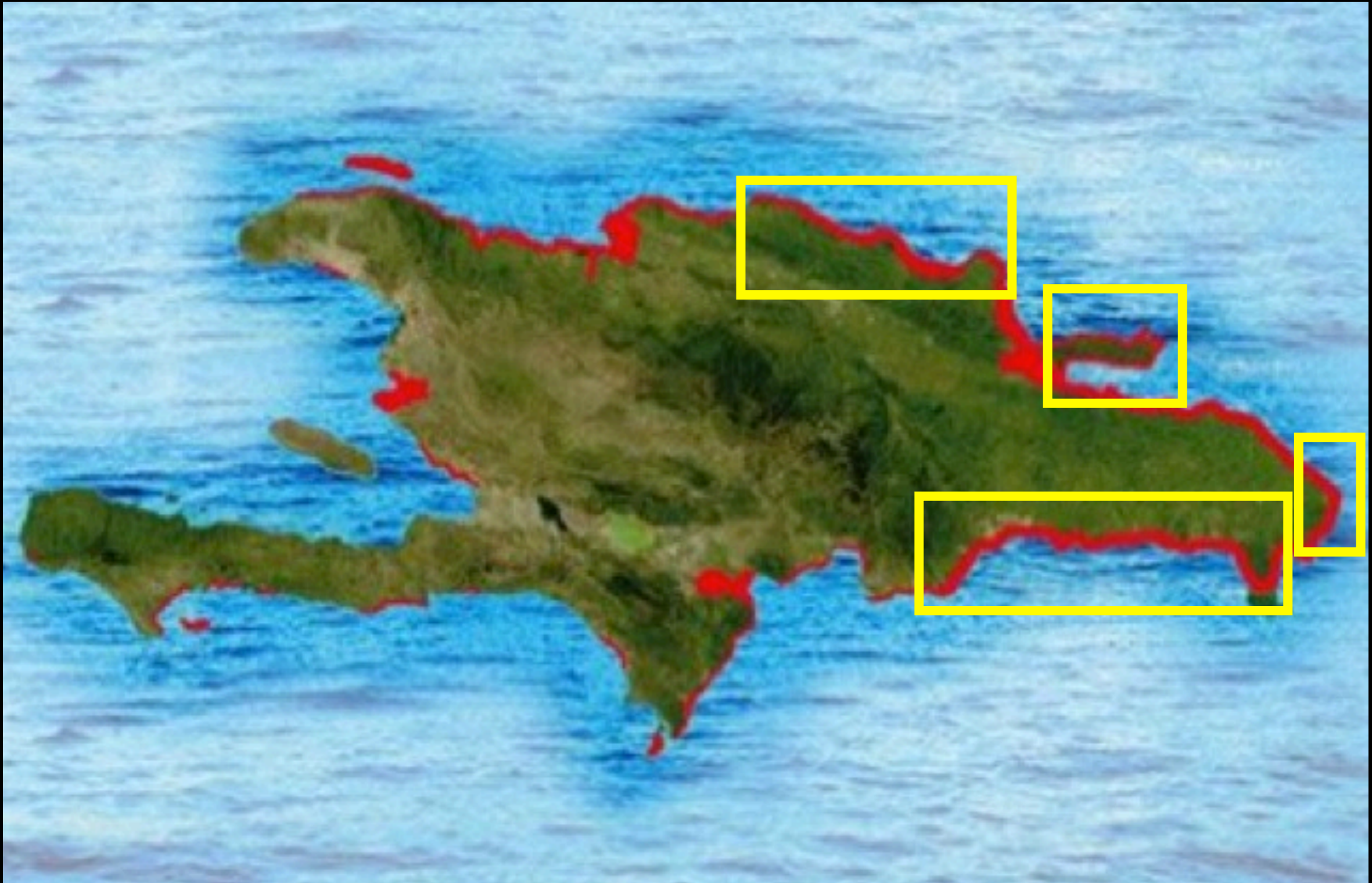
C. With Sea Wall



D. Eventual Situation



DOMINICAN REPUBLIC COASTAL AREAS IN DANGER



FOR THE OCEAN, THIS RESULTS IN..(part 2)

1. Increase Sea Surface Temperature

A. More, and Stronger Storms

B. Increase in Frequency and Intensity of Coral Bleaching

C. Sea Level Rise

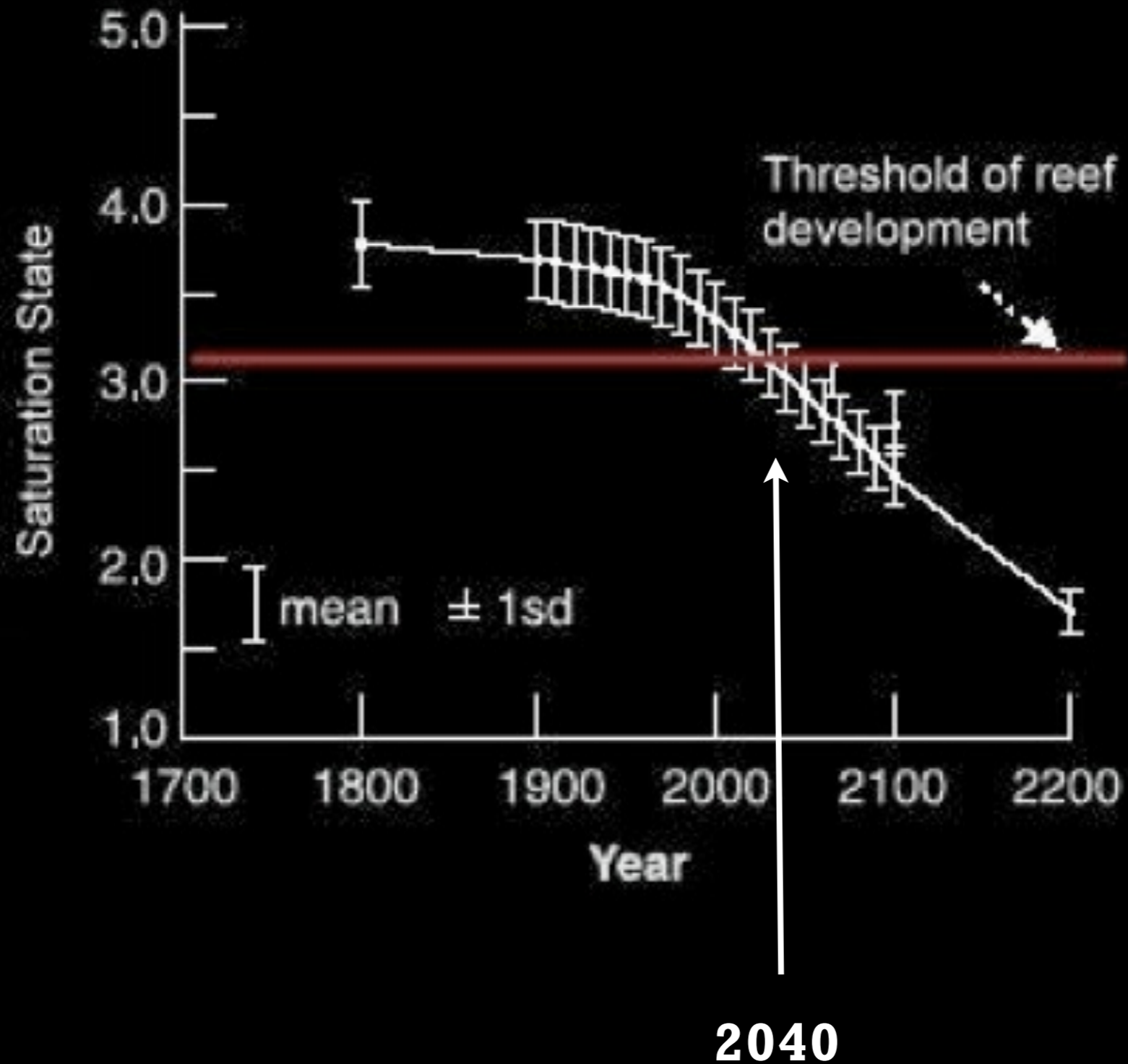
2. Ocean Acidification

A. Reduction in Calcification Rates

REDUCED CALCIFICATION RATES



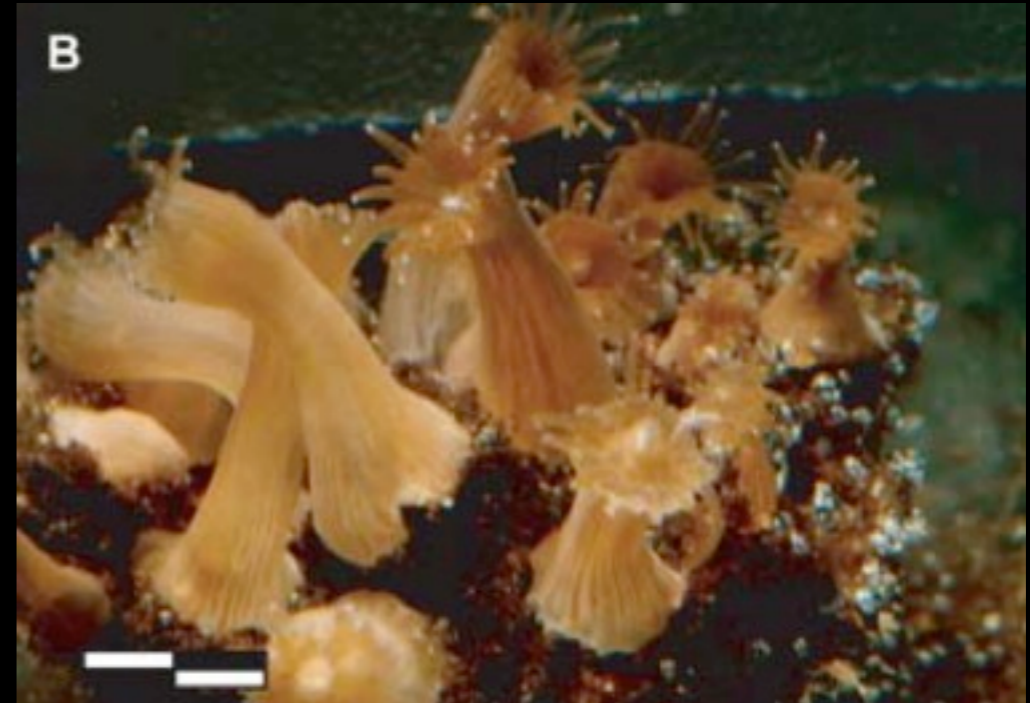
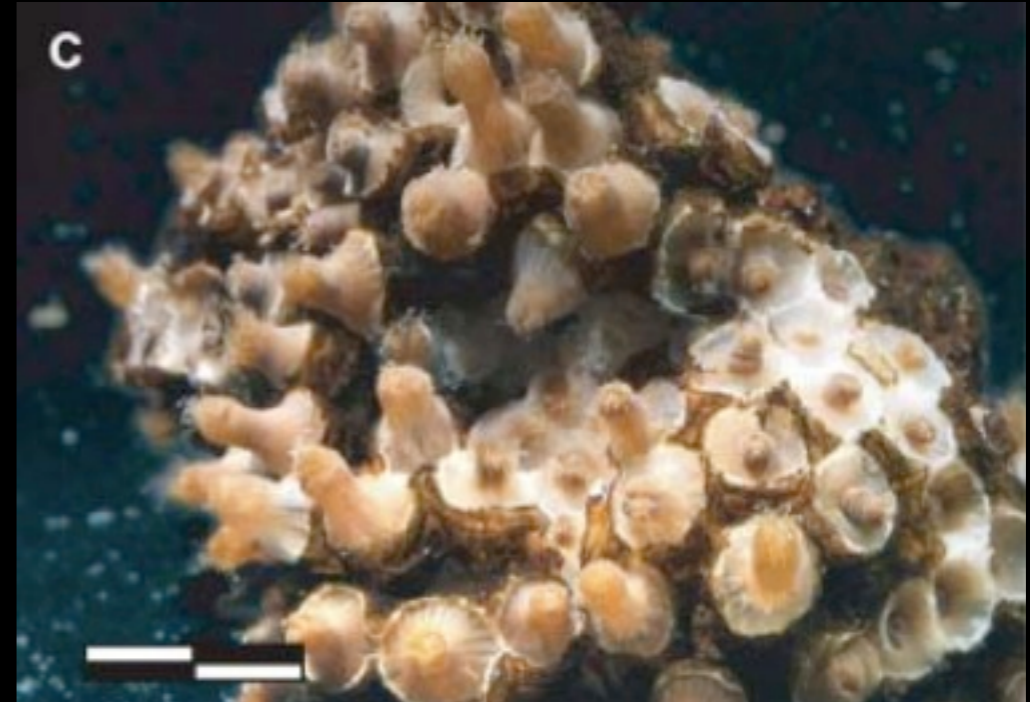
REDUCED CALCIFICATION RATES



REDUCED CALCIFICATION RATES

Today

Future?

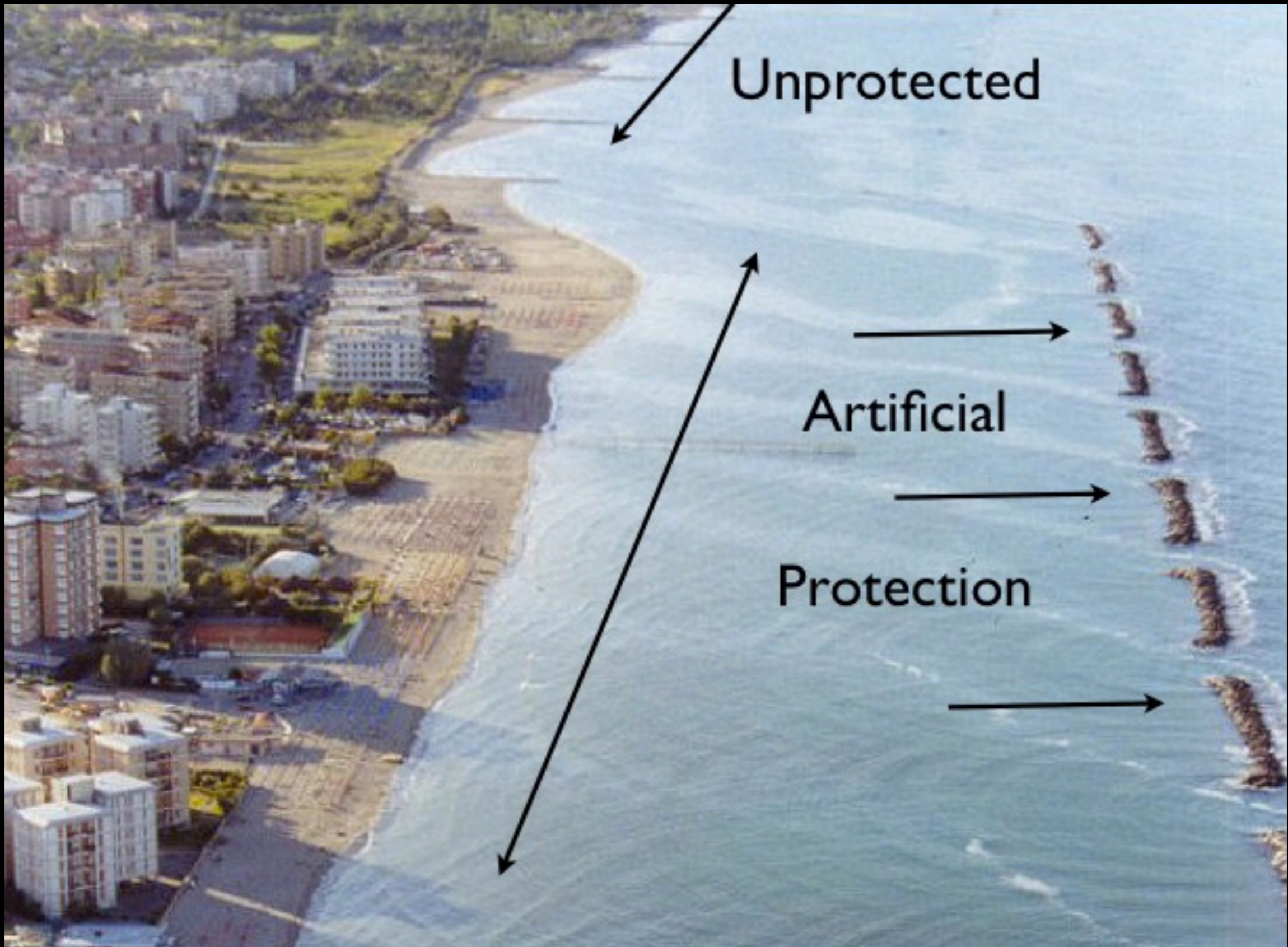




**CONSEQUENCE:
Reduced Coral Growth
and Coastal Protection**



CONSEQUENCE: Shoreline Erosion



LOSS OF HABITAT



ONCE BEAUTIFUL ~~NOW~~ UNDERWATER DESERTS



IMPLICATIONS

Tropical Island

Developing Tourism Industry

Dependent on White Sandy Beaches

Affected by Climate Change

PROPOSED SOLUTIONS

Education and Awareness

CO₂ Emission Reduction

CO₂ Sequestration

Use of Clean Energy

**BUT NOT BEING A MAYOR
WANT TO ABANDON THE...
CAUSE OF THE PROBLEM**

SOLVE LOCAL PROBLEMS

Overfishing

Pollution

Physical Impacts

Habitat Destruction

TAKING ACTION NOW!

Sustainable Fisheries

Adequate Waste Management

**Environmentally Friendly
Development Practices**

**Involving Local Communities
in Conservation**

**Implementing Marine Protected
Area Networks**

See you in the Ocean...



REEF CHECK



REPUBLICA DOMINICANA

More Information:

Rubén Torres, Ph.D.

**Reef Check
Dominican Republic**

809-227-4409

ruben@reefcheck.org

**www.reefcheck.org
www.reefcheckdr.org**