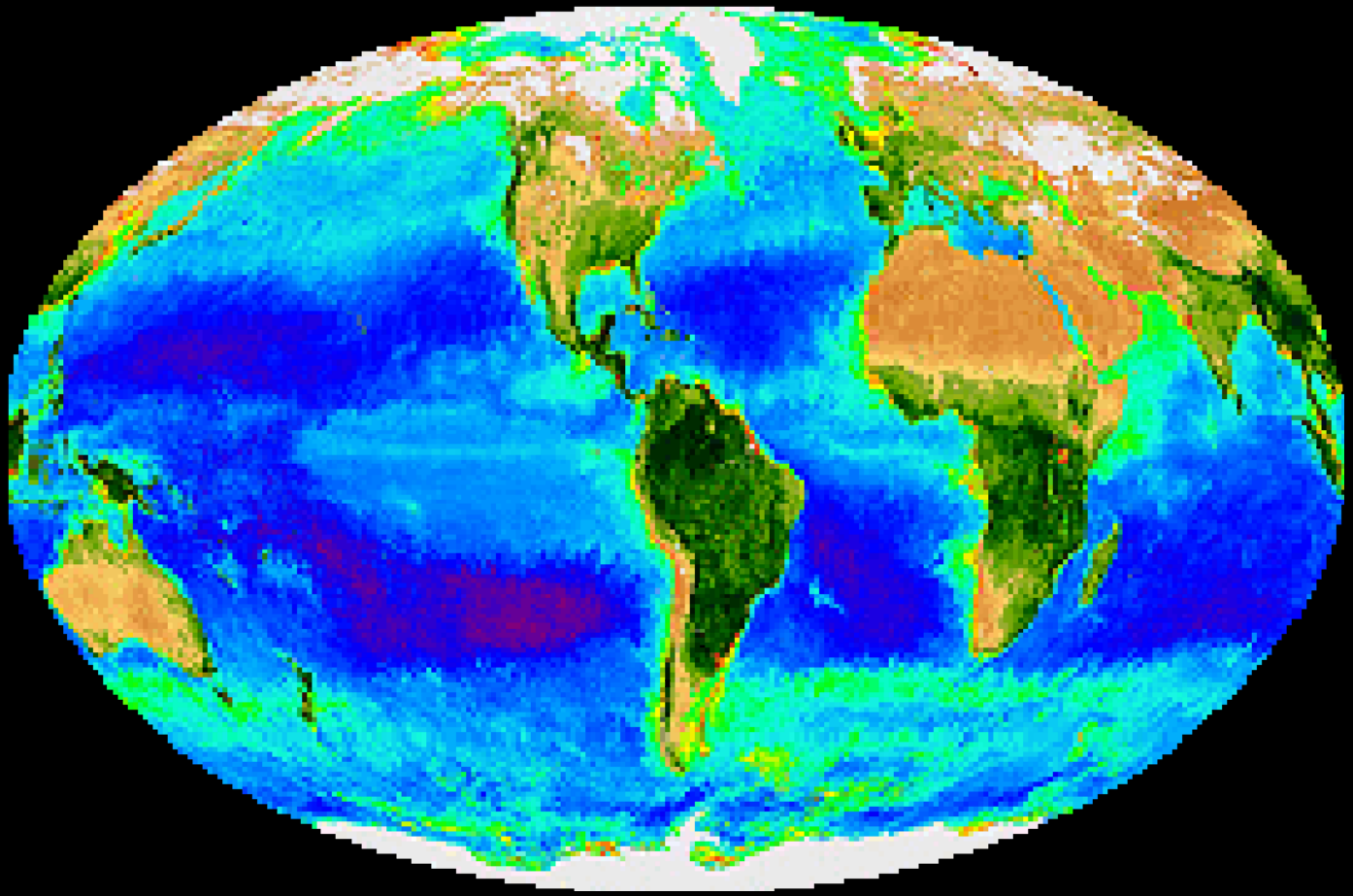
Global Warming – The Changing Oceans

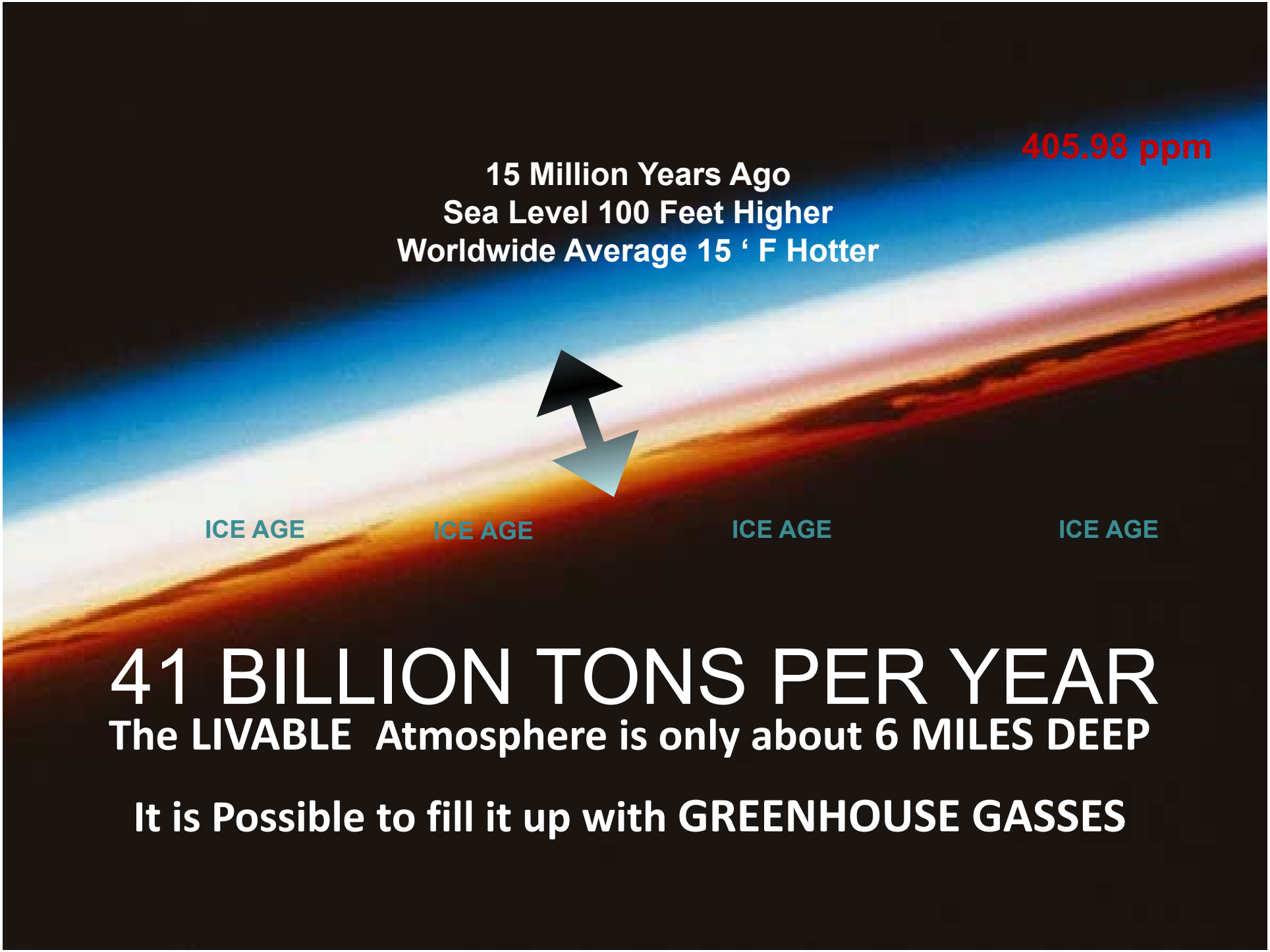
BBRRCT
January 18, 2017

Presented by

Captain Dan Kipnis



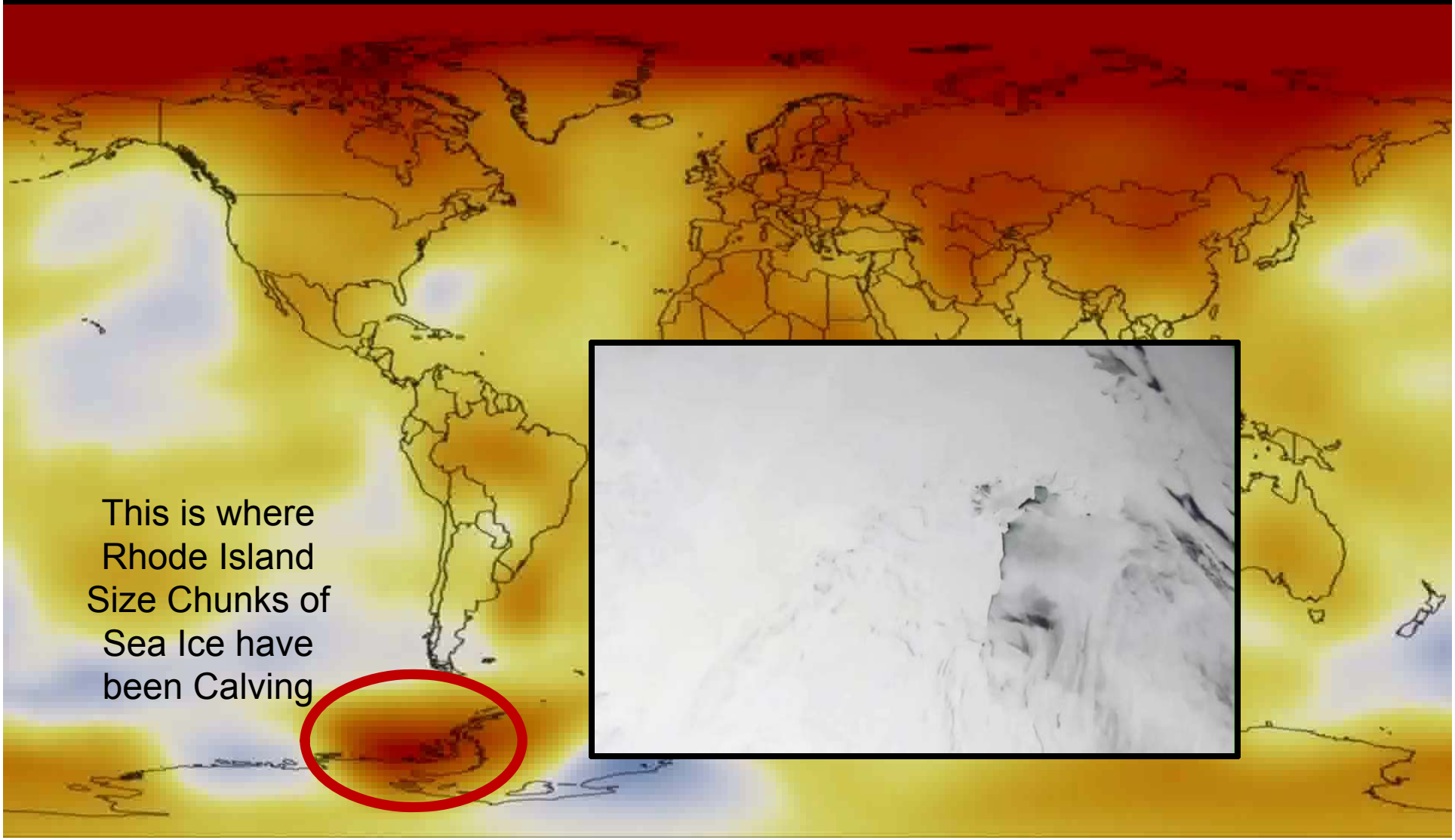
Geoeye / SeaWiFS NOAA


405.98 ppm
15 Million Years Ago
Sea Level 100 Feet Higher
Worldwide Average 15 ‘ F Hotter
ICE AGE
ICE AGE
ICE AGE
ICE AGE
41 BILLION TONS PER YEAR
The LIVABLE Atmosphere is only about 6 MILES DEEP
It is Possible to fill it up with GREENHOUSE GASSES

Global Temperatures

The last 10 years have been the hottest since record keeping began in 1885

Last year was the hottest ever and this July was the hottest month ever recorded



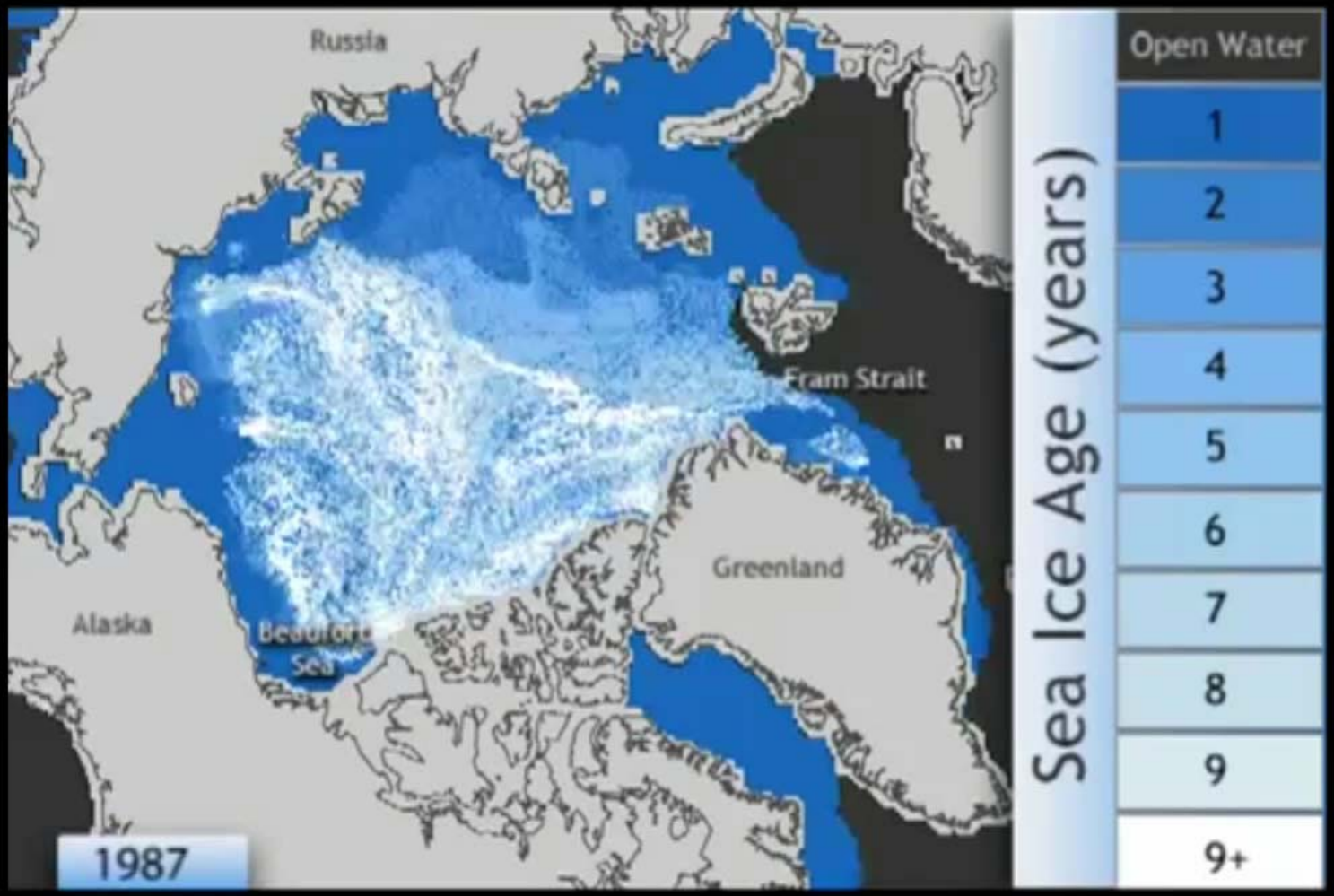
Cold Air is Denser

Hot Air is Thicker

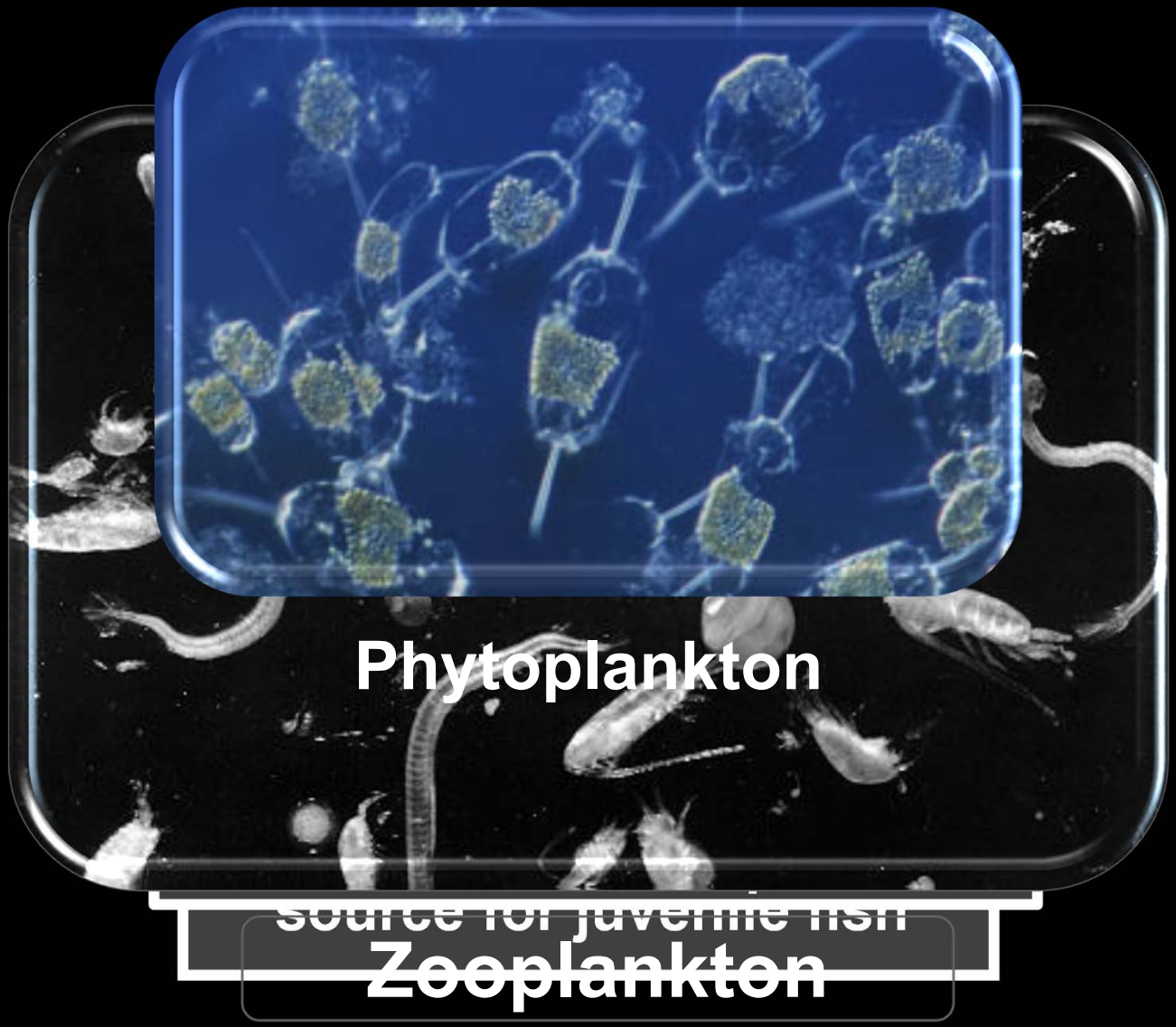
SLOWING OF THE JET STREAM DUE TO WARMER ARTIC AIR AND SEA ICE LOSS

NASA

LOSS OF OLD ARTIC SEA ICE



Marine Microorganisms



WARM WATER

COLD DEEP WATER

CURRENTS RETURN COOL NUTRIENT

Currents are driven by wind and the earth's rotation and be
All currents around the world are connected and move as one
fresh water from the Mid-Fresh water – the
SLOWER the saltwater sinks SLOWING the Ocean's conveyer

With much Hotter Oceans & All the Fresh Water –
The Gulfstream has Slowed Down 10-15%

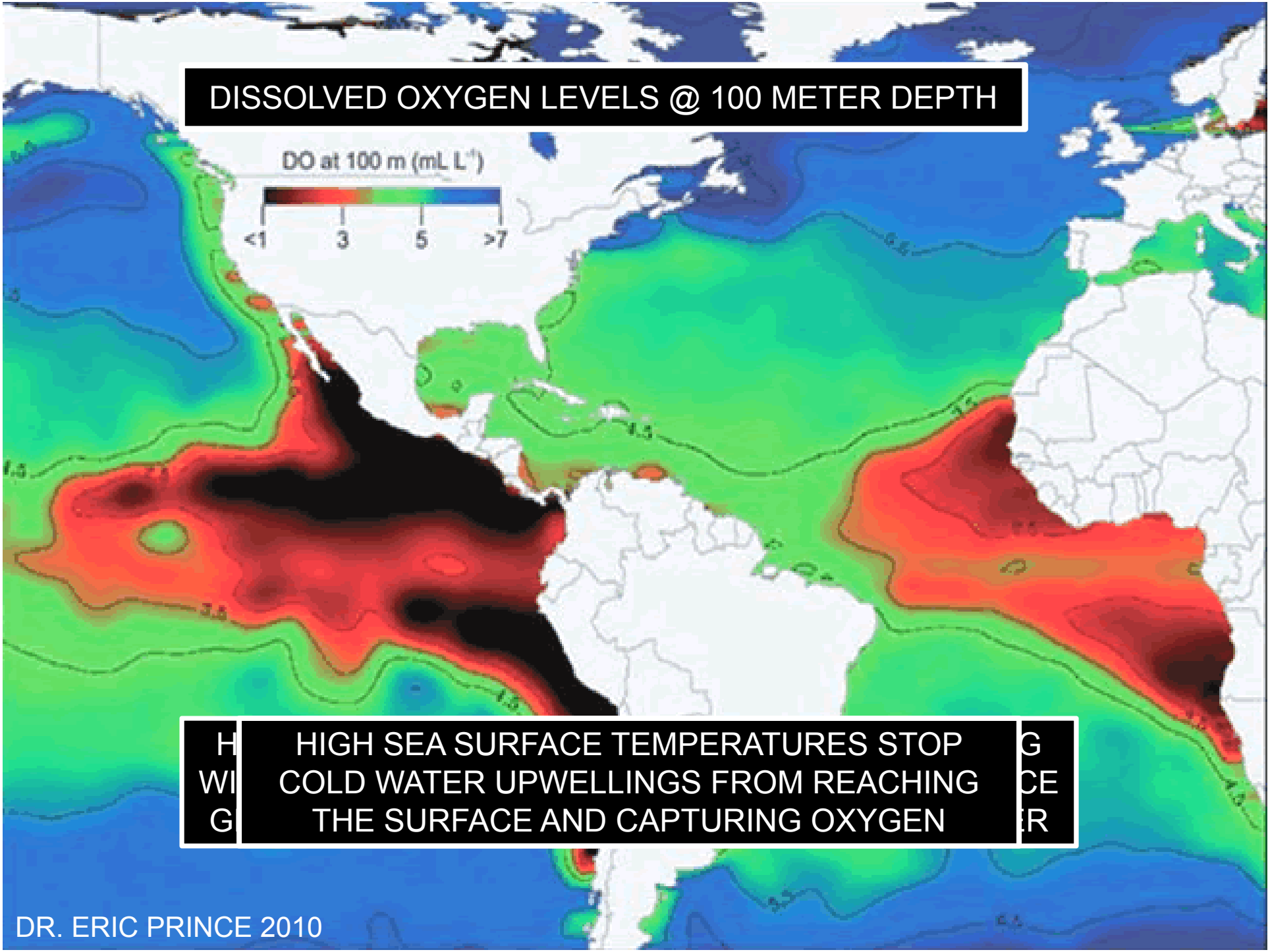
NASA

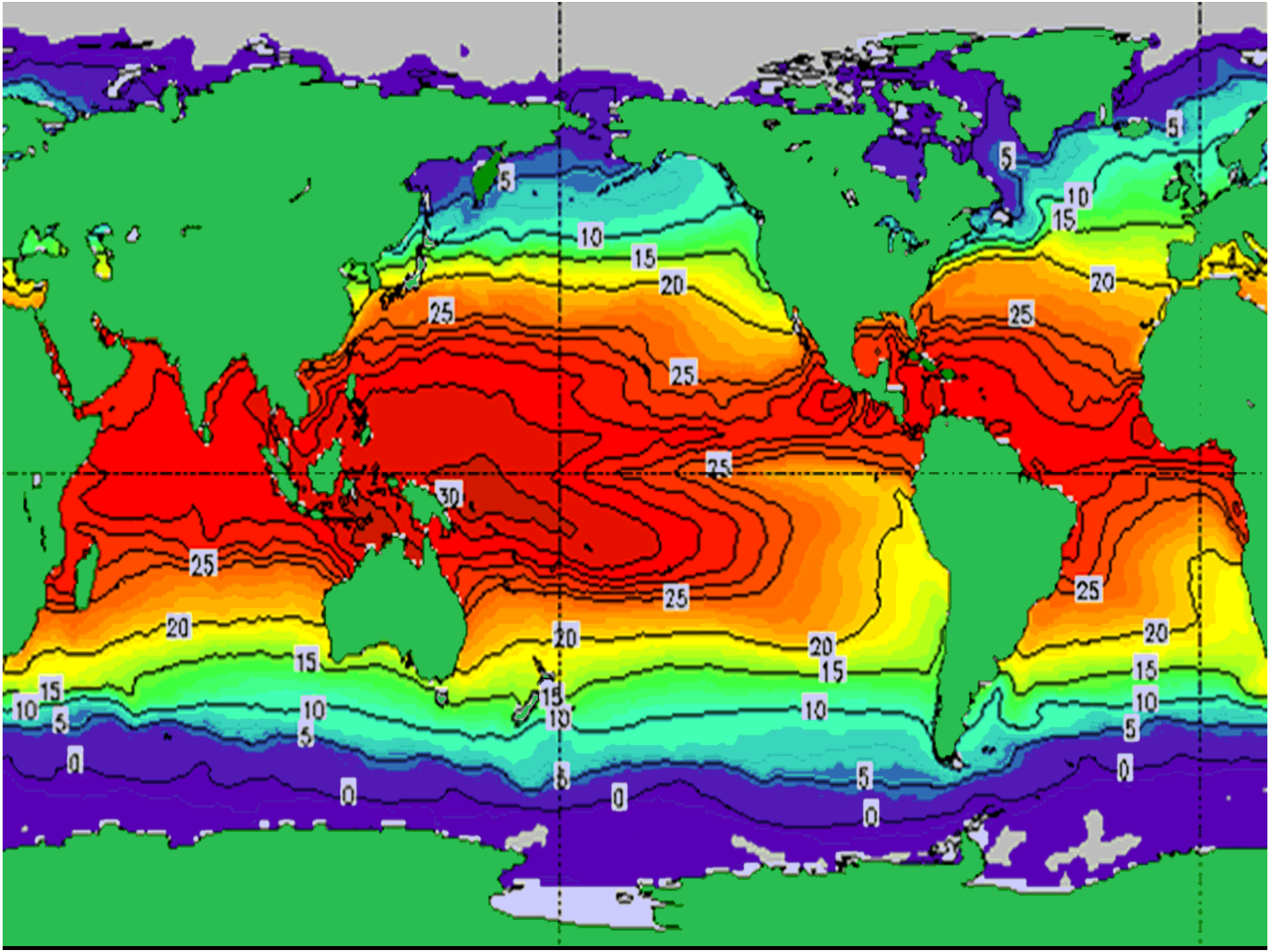
"Microscopic life crucial to the marine food chain is dying out. The consequences could be catastrophic."

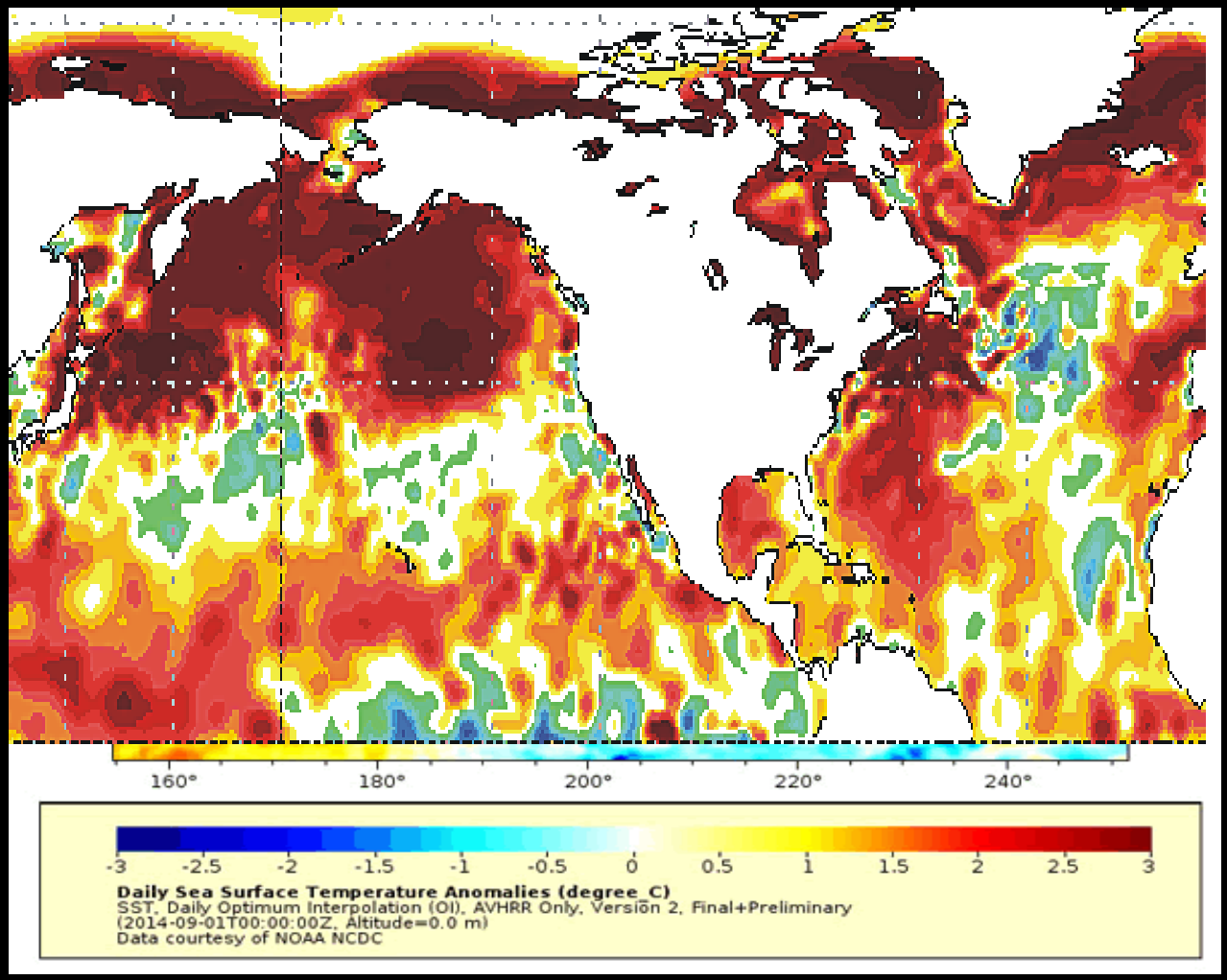
The Independent, July 29, 2010

"Scientists may have found the most devastating impact yet of human-caused global warming — a **40% decline** in phytoplankton since 1950 linked to the rise in ocean sea surface temperatures."

Nature Geoscience, 2010


DISSOLVED OXYGEN LEVELS @ 100 METER DEPTH
DO at 100 m (mL L⁻¹)
<1
3
5
>7
HIGH SEA SURFACE TEMPERATURES STOP
COLD WATER UPWELLINGS FROM REACHING
THE SURFACE AND CAPTURING OXYGEN
DR. ERIC PRINCE 2010


5
10
15
20
25
30
0



A low-pressure trough between California and Hawaii weakened the winds that typically drive upwelling of deep, cold water along the California Coast.

Surface Temperatures up to 6' F above normal

Sea Temperature Anomalies September 2016

NOAA

OCEAN ACIDIFICATION

C s

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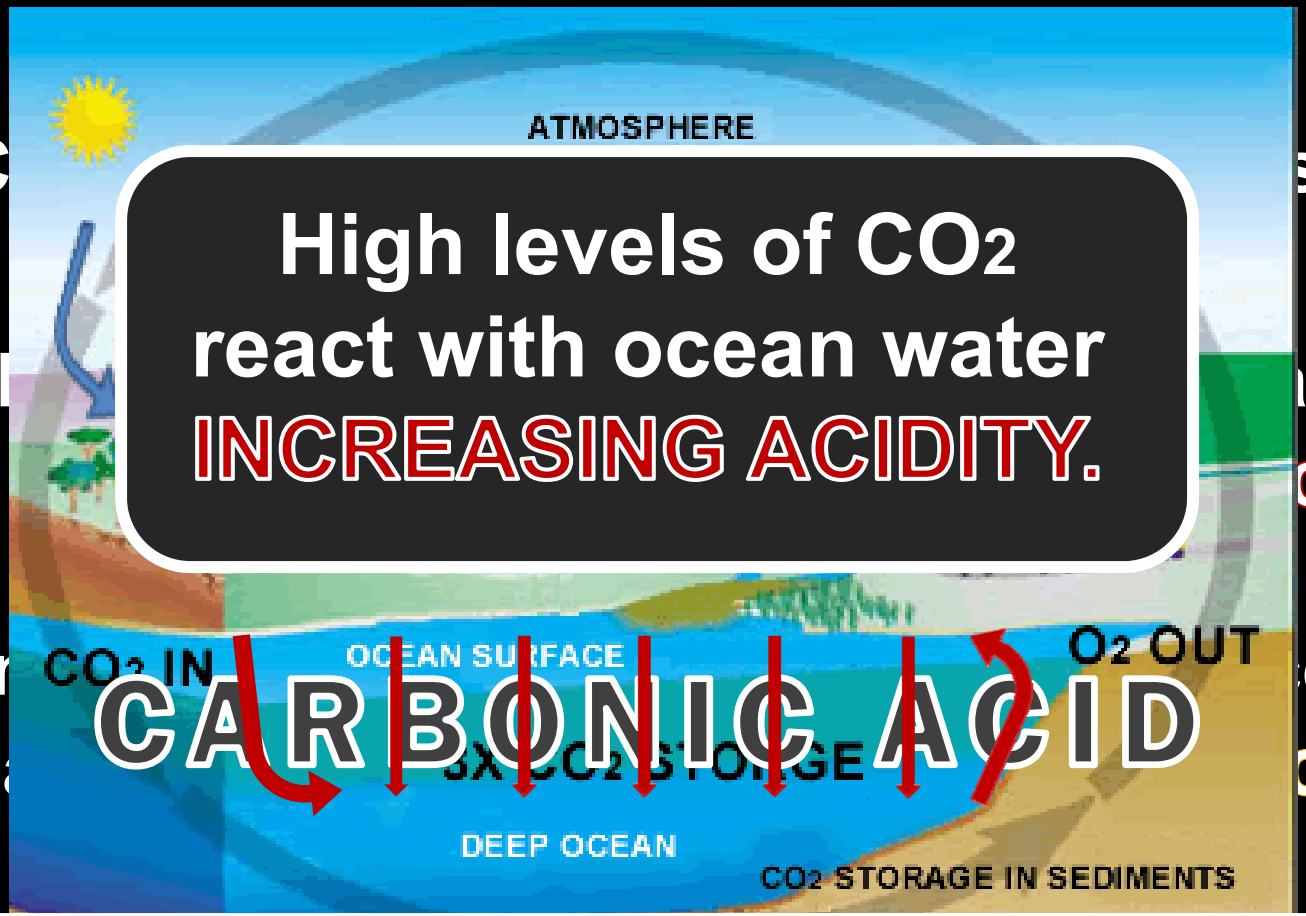


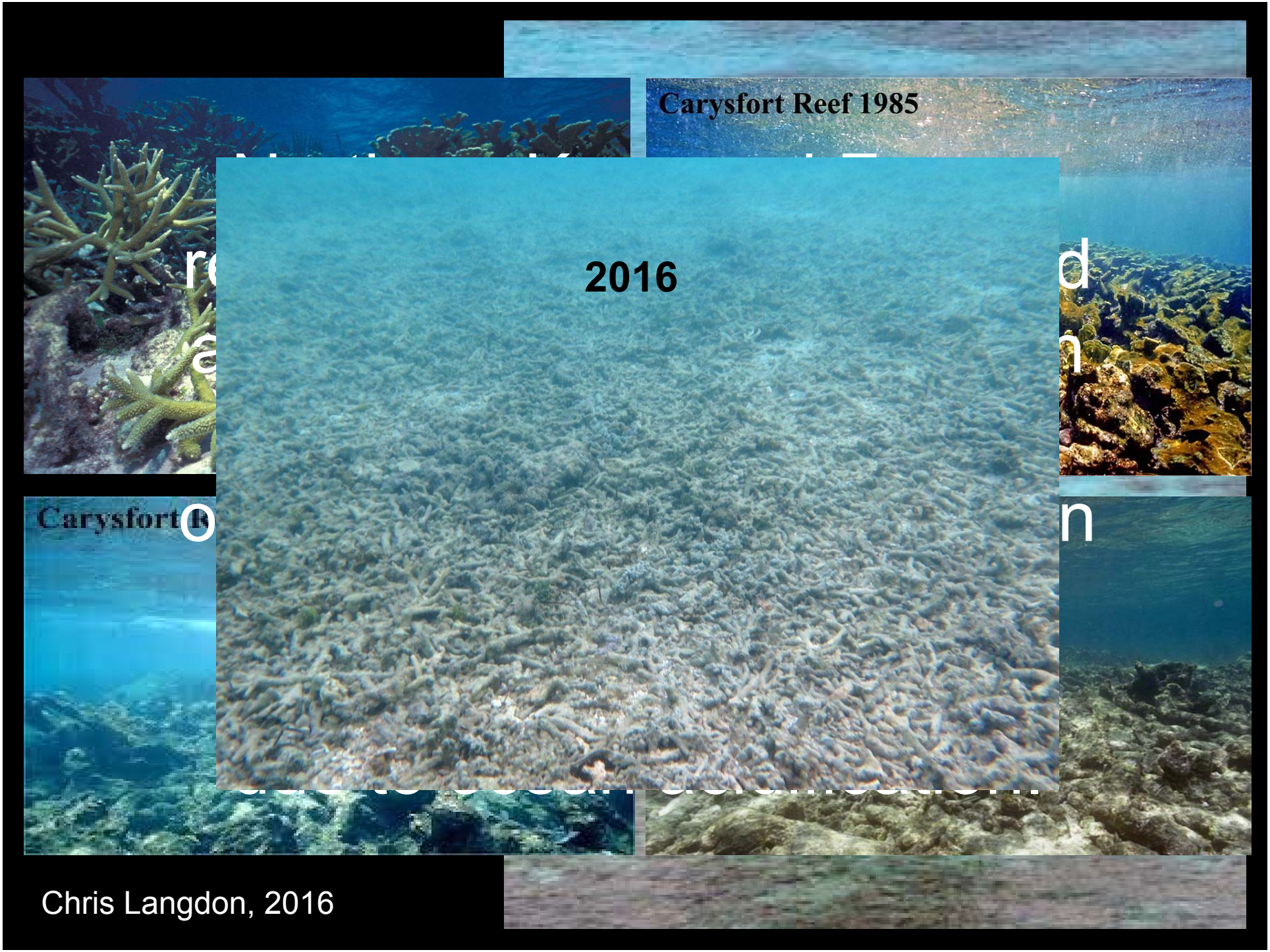
High levels of CO_2 react with ocean water INCREASING ACIDITY.

CARBONIC ACID

SHRIMP CRABS KRILL OYSTERS CLAMS CORALS ZOOPLANKTON

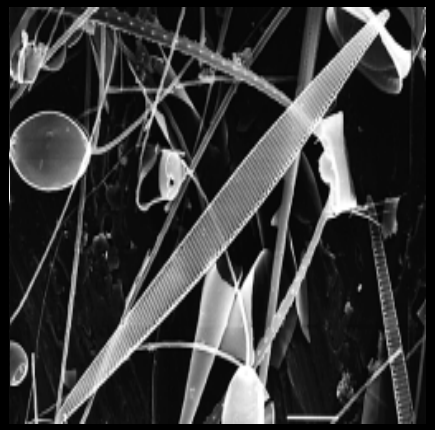
© NASA Earth Observatory

CORAL BLEACHING



Chris Langdon, 2016

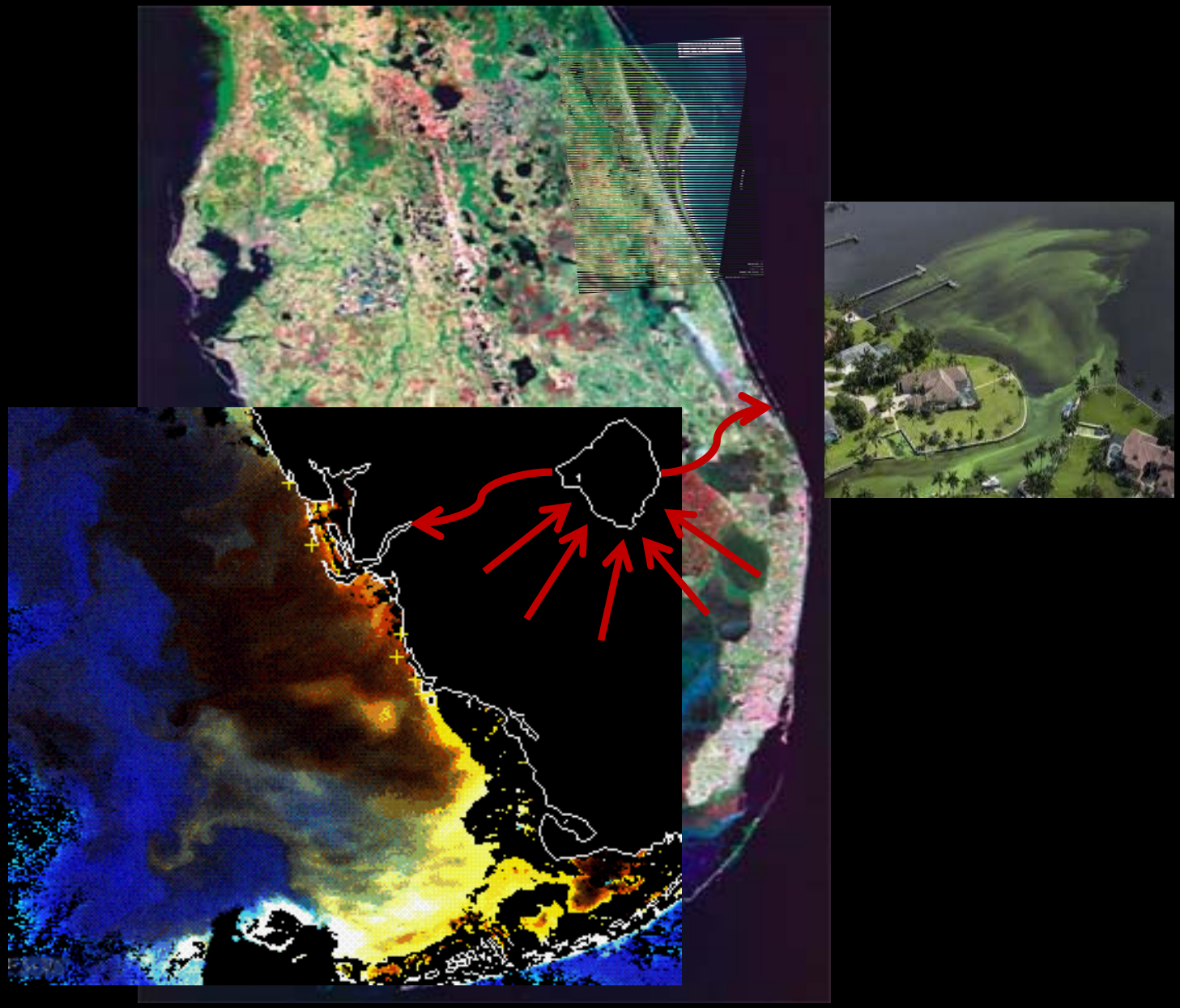
RED TIDE



Orr et al., 2005

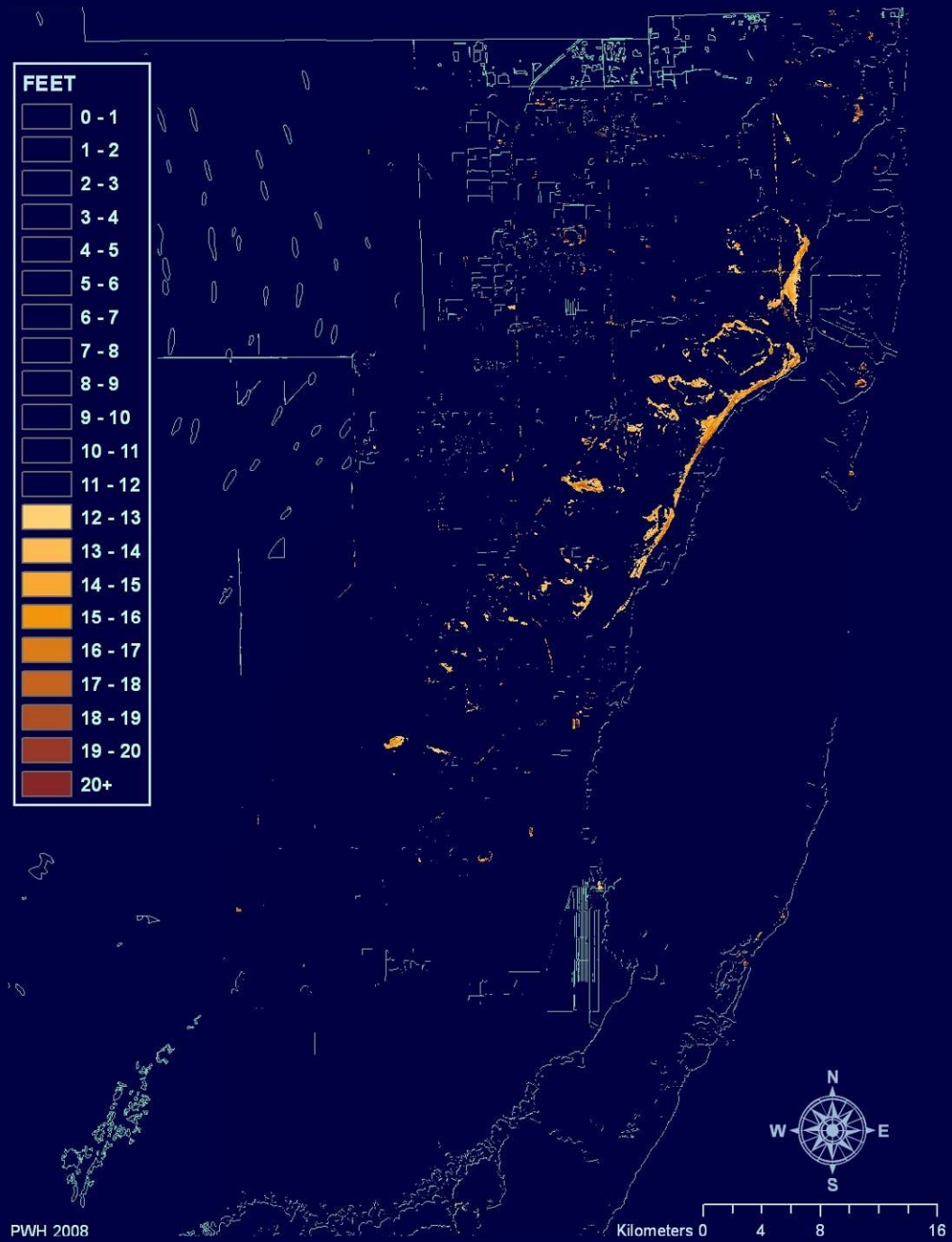
Dinoflagellates are the predominant red tide organism in the Gulf of Mexico and can kill fish in vast numbers

Red Tide robs water of oxygen and acts as a toxin on marine life



LOWES

We are [illegible] by 2100



SLR = 0 Ft.

+ 10 Ft.

Current 3% Upland surface remaining

above mean high tide.

Massive mainstream and

tidal channels and a series of

coastal vegetation migrates

independent islands

Miami-Dade County Groundwater

(transverse glades) — threat to major

works becomes difficult — Turkey

Point, South Dade landfill

Rainfall greatly reduced.

Much of remaining low upland in west Miami-Dade County becoming

Causeways inundated.

Prepared by:
Peter Harlem, 2008

+ 3 meters

Weiss and Overpack Univ. of Arizona

What Can YOU Do?

What Can YOU Do?

Don’t Give Up

Changing laws is even **more important** than changing light bulbs

Tell your leaders this matters to you!

Let them know you will **support or strongly oppose** them based on **what they say and DO** about solving the

The Time for Action Is...

NOW

Join the movement

350.org

Fall back to **NO MORE THAN** 350
Parts per Million Atmospheric CO_2

Terry Gibson

This production is dedicated to all young people around the world. May we have the foresight, determination and commitment to present them with healthy and productive aquatic ecosystems. If we protect our waters we protect our Earth.

Produced and Created by:

Captain Dan Kupnis

National Wildlife Federation

Florida Wildlife Federation

The Climate Reality Project

NASA Goddard Space Weather

Source: NASA