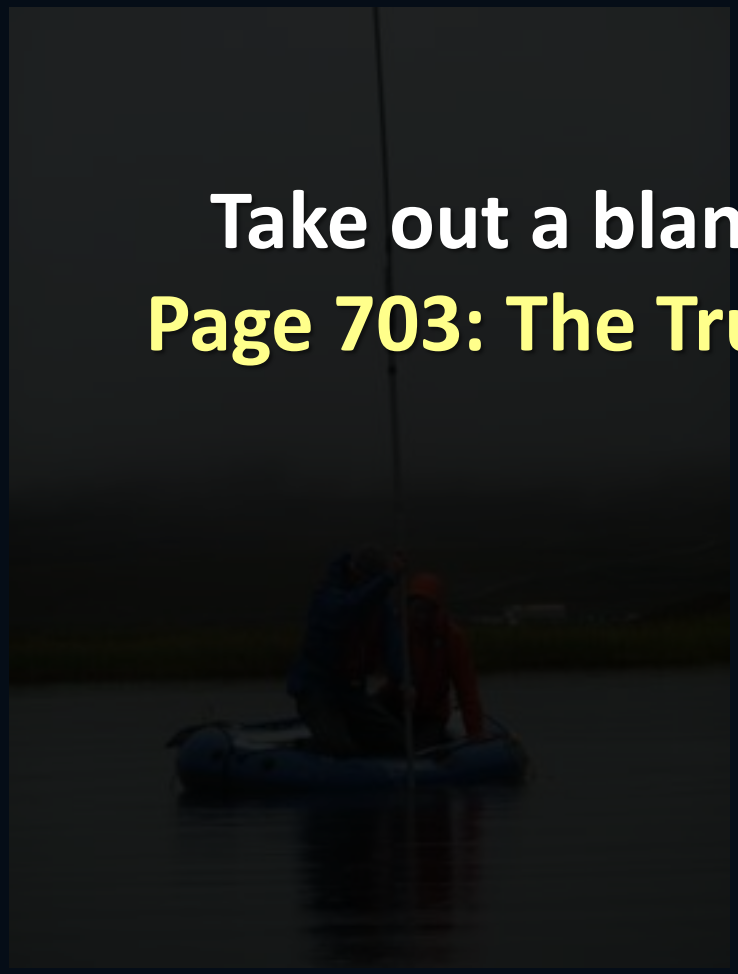
THE TRUTH ABOUT GLOBAL CLIMATE CHANGE

WILL DANIELS
BROWN UNIVERSITY GRAD STUDENT



Take out a blank sheet of paper. Label it

Page 703: The Truth About Global Warming

THE TRUTH ABOUT GLOBAL CLIMATE CHANGE

WILL DANIELS
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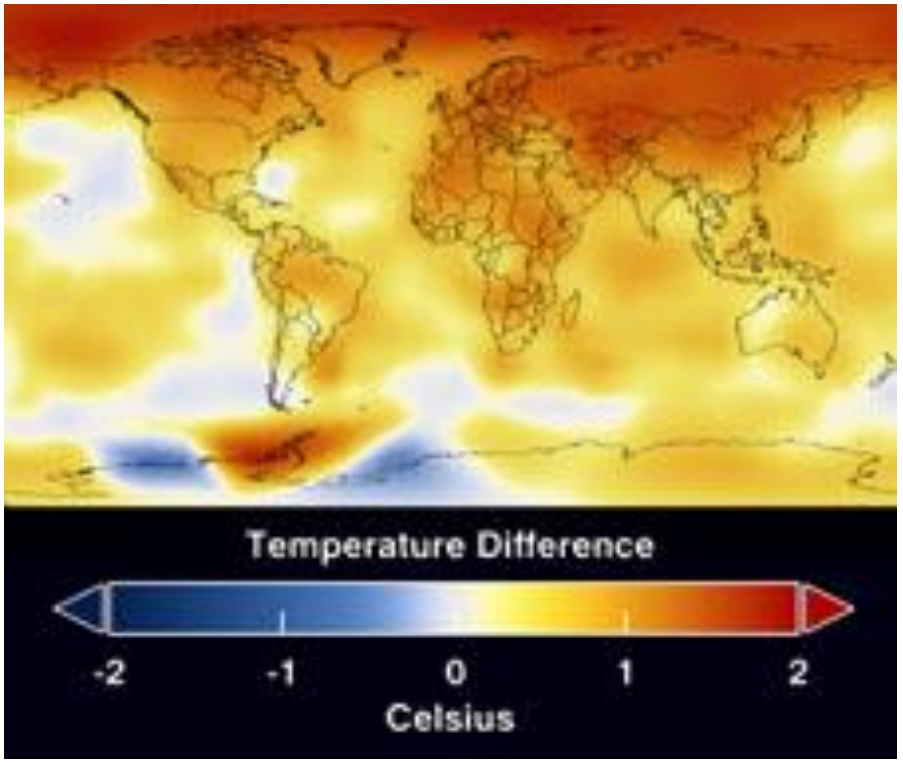
THE CASE FOR CLIMATE CHANGE

1) The climate is changing quickly.

2) Increased greenhouse gasses are the cause.

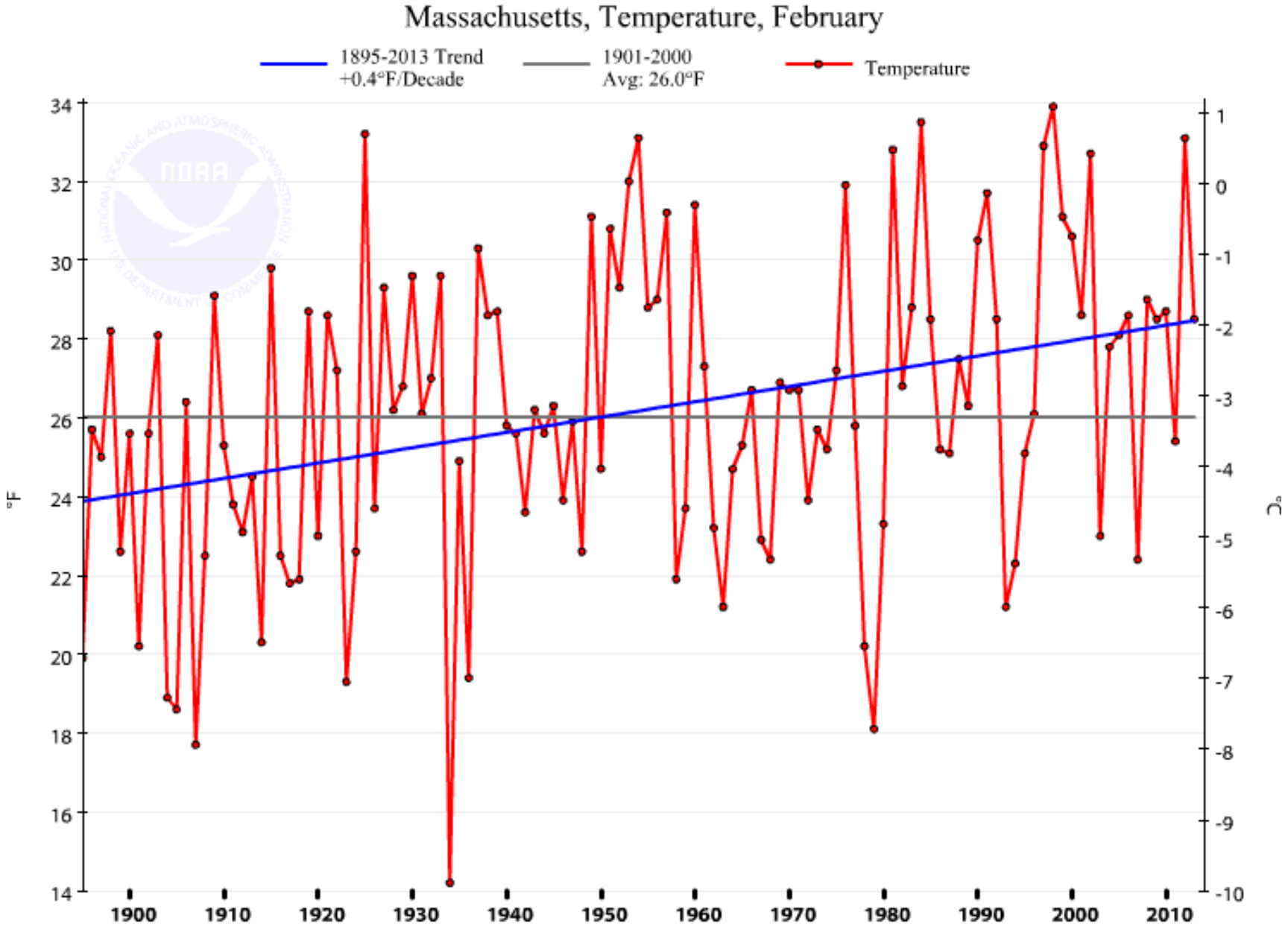
3) The burning of coal and oil by humans is the source of the extra greenhouse gasses.

4) The change will be bad for humans.



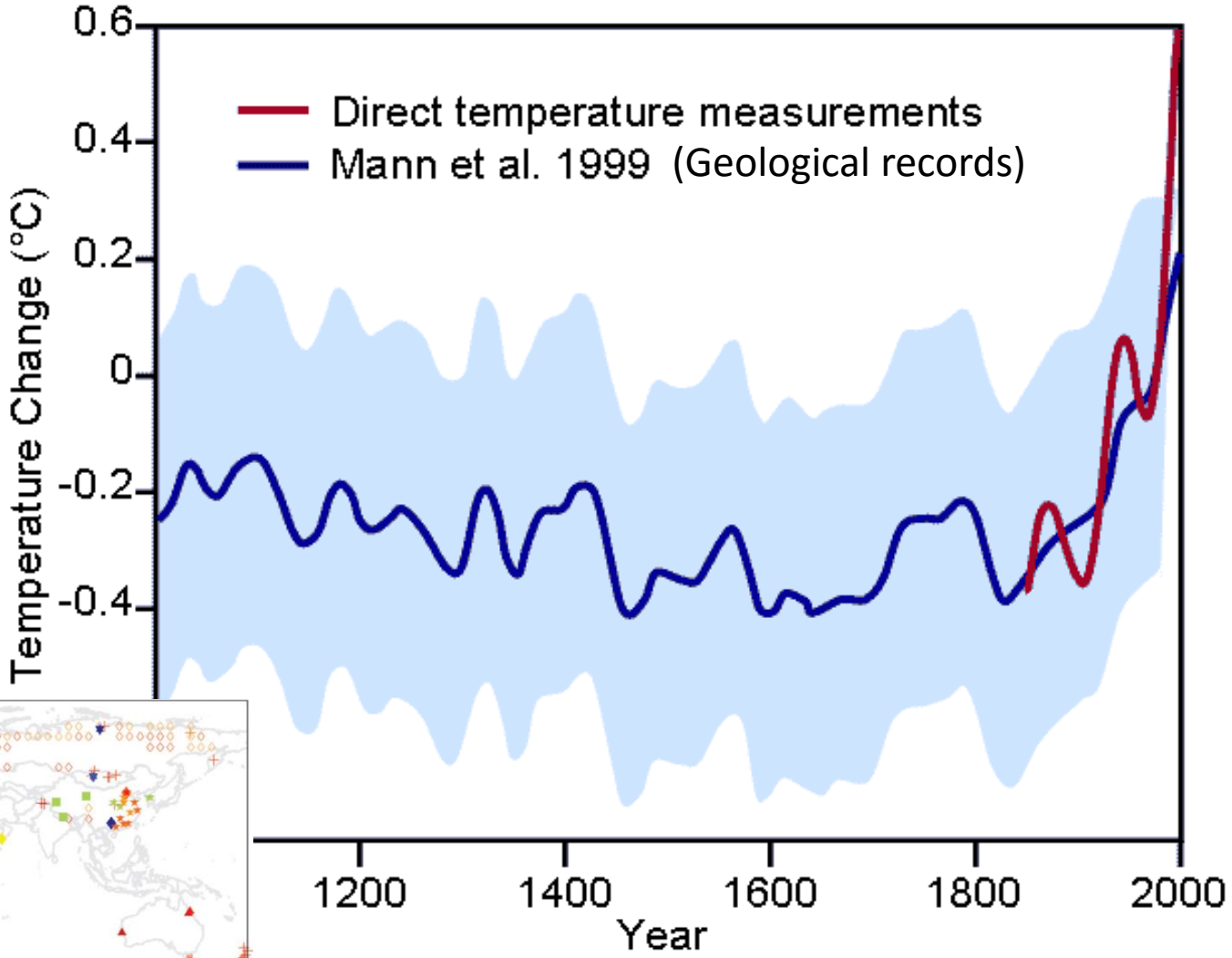
Temperature change from from 1950's to 2000's

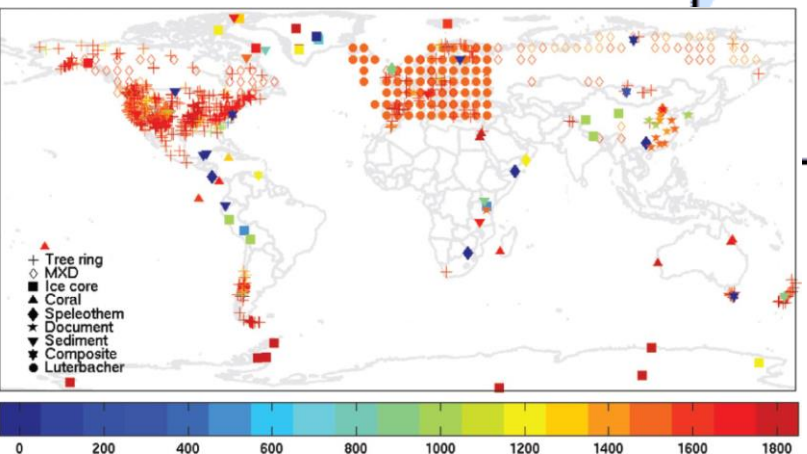
IS CLIMATE CHANGING?



IS CLIMATE CHANGING?
GLOBAL TEMPERATURE ✓

Temperature has increased ~0.75-1.5 C over the past 150 years





THE CASE FOR CLIMATE CHANGE

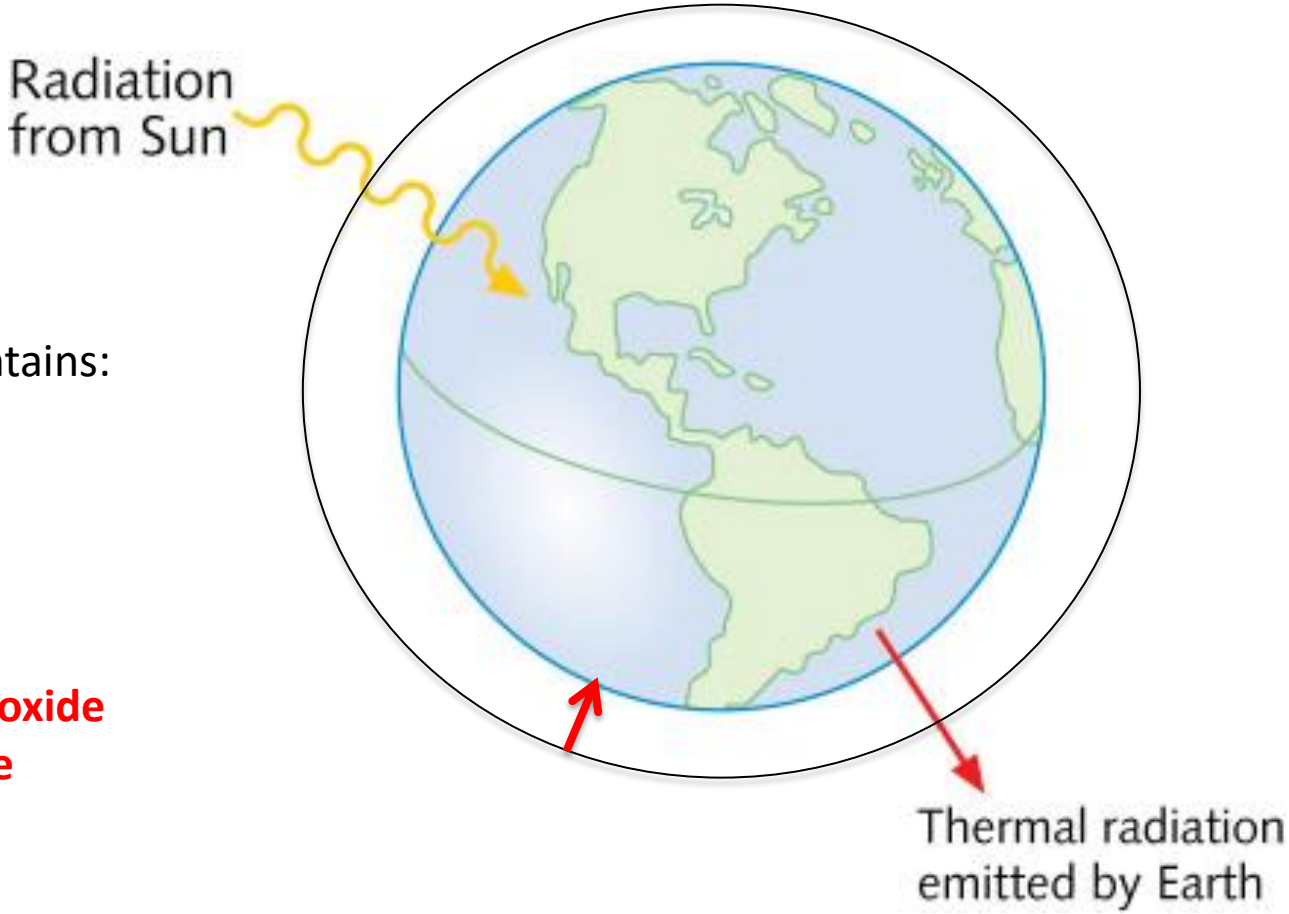
1) The climate is changing quickly. ✓

ARE GREENHOUSE GASSES RESPONSIBLE FOR THE CLIMATE WARMING?

Temperature depends on…

1. How much energy from the sun hits earth.

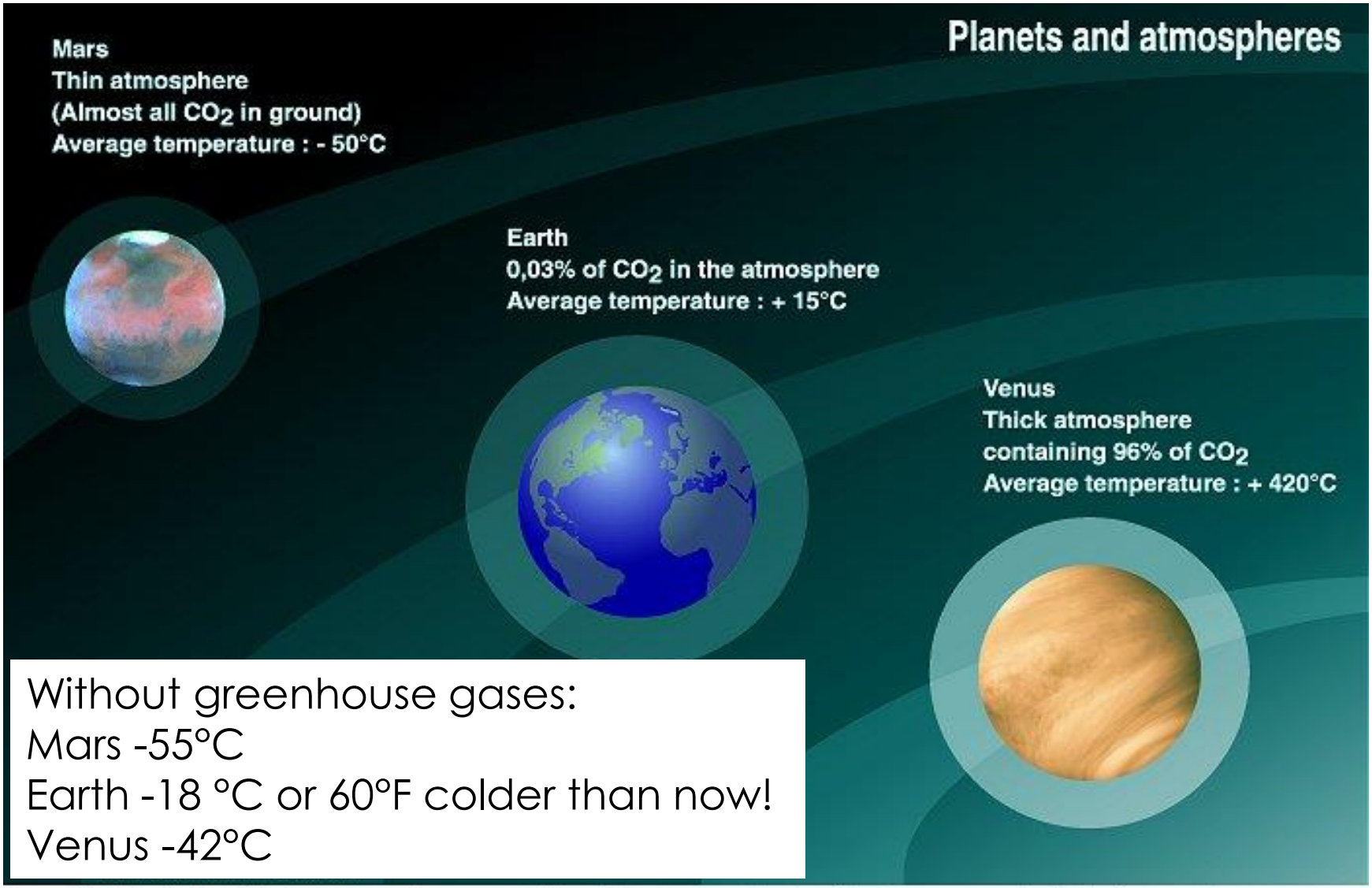
2. GREENHOUSE EFFECT: How much energy from the sun the earth keeps, which depends on the thickness of our blanket of greenhouse gasses.



Our Atmosphere contains:

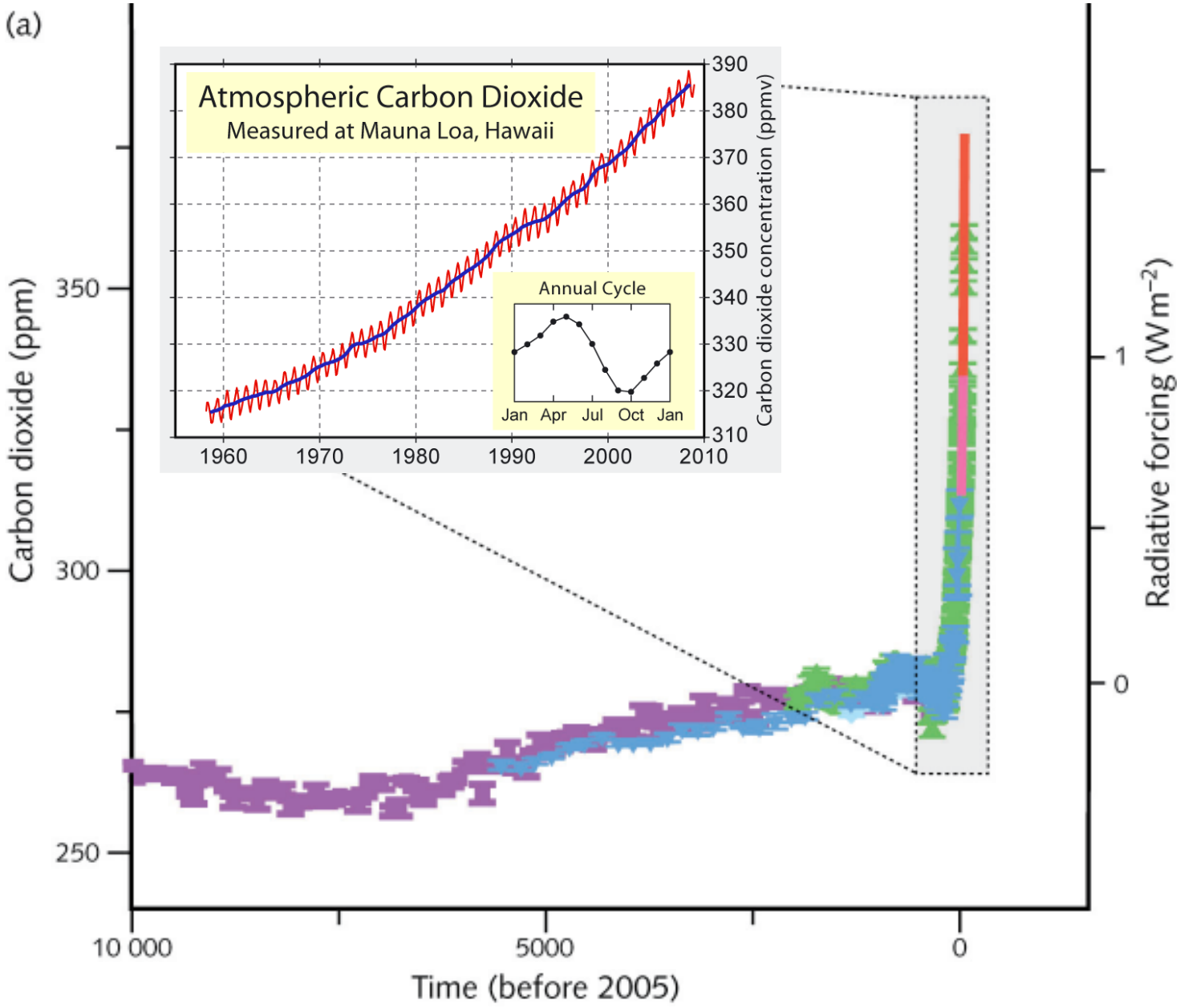
78% --- nitrogen
20% --- oxygen
1% --- water vapor
0.9% --- argon
0.039% --- carbon dioxide
0.0002% --- methane

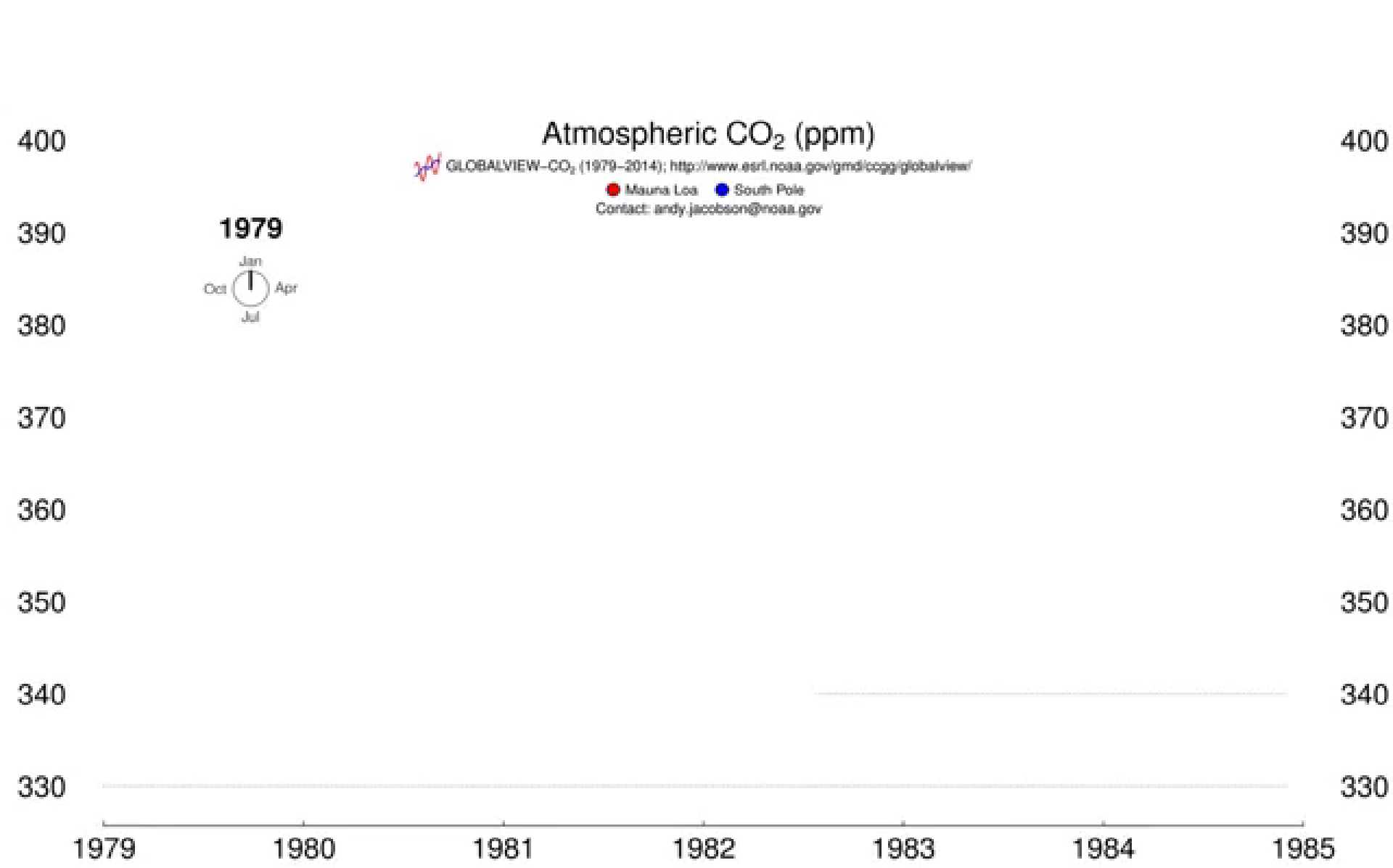
ARE GREENHOUSE GASSES RESPONSIBLE FOR THE CLIMATE WARMING?



GREENHOUSE EFFECT: How much energy from the sun the earth keeps.

ARE GREENHOUSE GASSES RESPONSIBLE FOR THE CLIMATE WARMING?




Atmospheric CO_2 (ppm)
GLOBALVIEW–CO_2 (1979–2014); http://www.esrl.noaa.gov/gmd/ccgg/globalview/
Mauna Loa
South Pole
Contact: andy.jacobson@noaa.gov
1979
Jan
Apr
Jul
Oct
400
390
380
370
360
350
340
330
1979
1980
1981
1982
1983
1984
1985

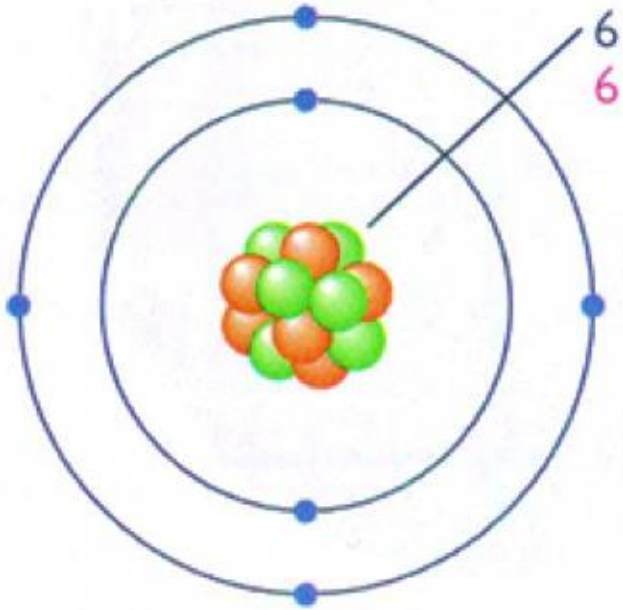
THE CASE FOR CLIMATE CHANGE

1) The climate is changing quickly. ✓

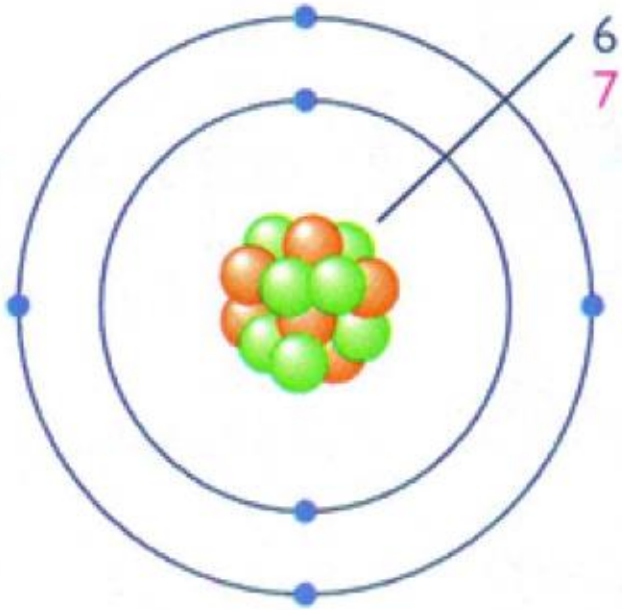
2) Increased greenhouse gasses are the cause. ✓

HUMANS BURN A LOT OF FUEL FOR ENERGY IN OUR DAILY LIVES

Carbon-emitting fuels



Carbon-12
(6P + 6N)
Atomic weight = 12



Carbon-13
(6P + 7N)
Atomic weight = 13

\+ Proton (atomic mass =1)

Neutron (atomic mass = 1)

\− Electron (atomic mass = 0)

THE CASE FOR CLIMATE CHANGE

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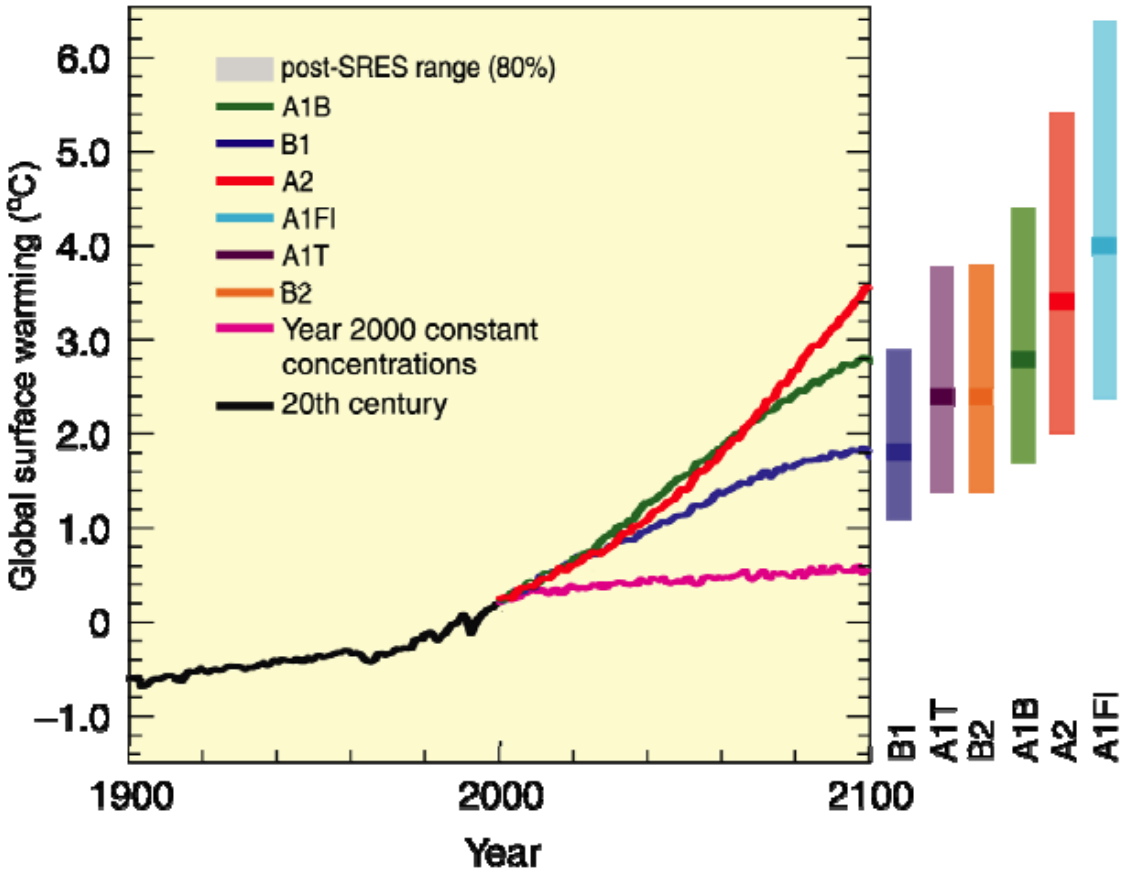
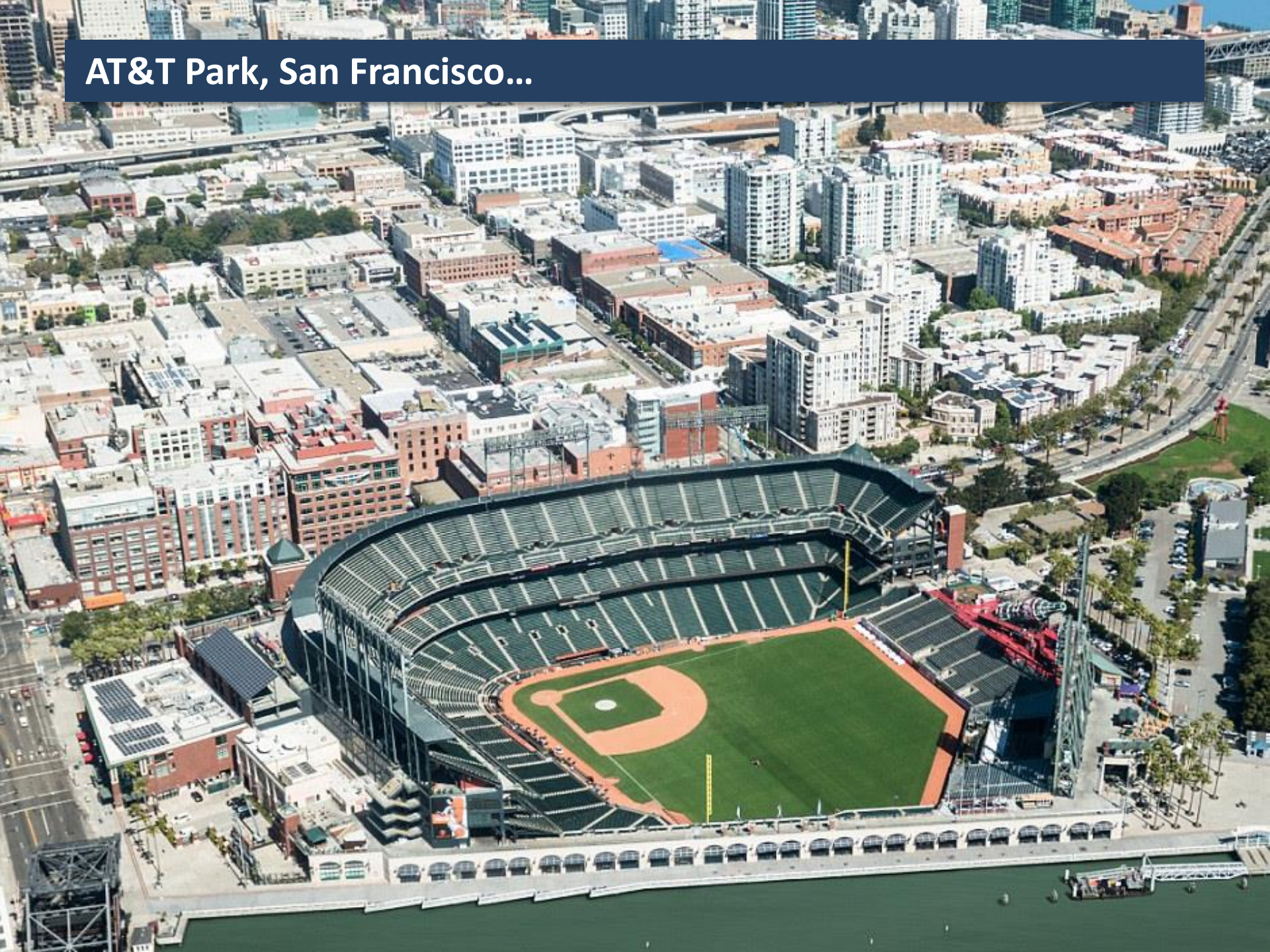
THE FUTURE AND THE EFFECTS FOR HUMANS



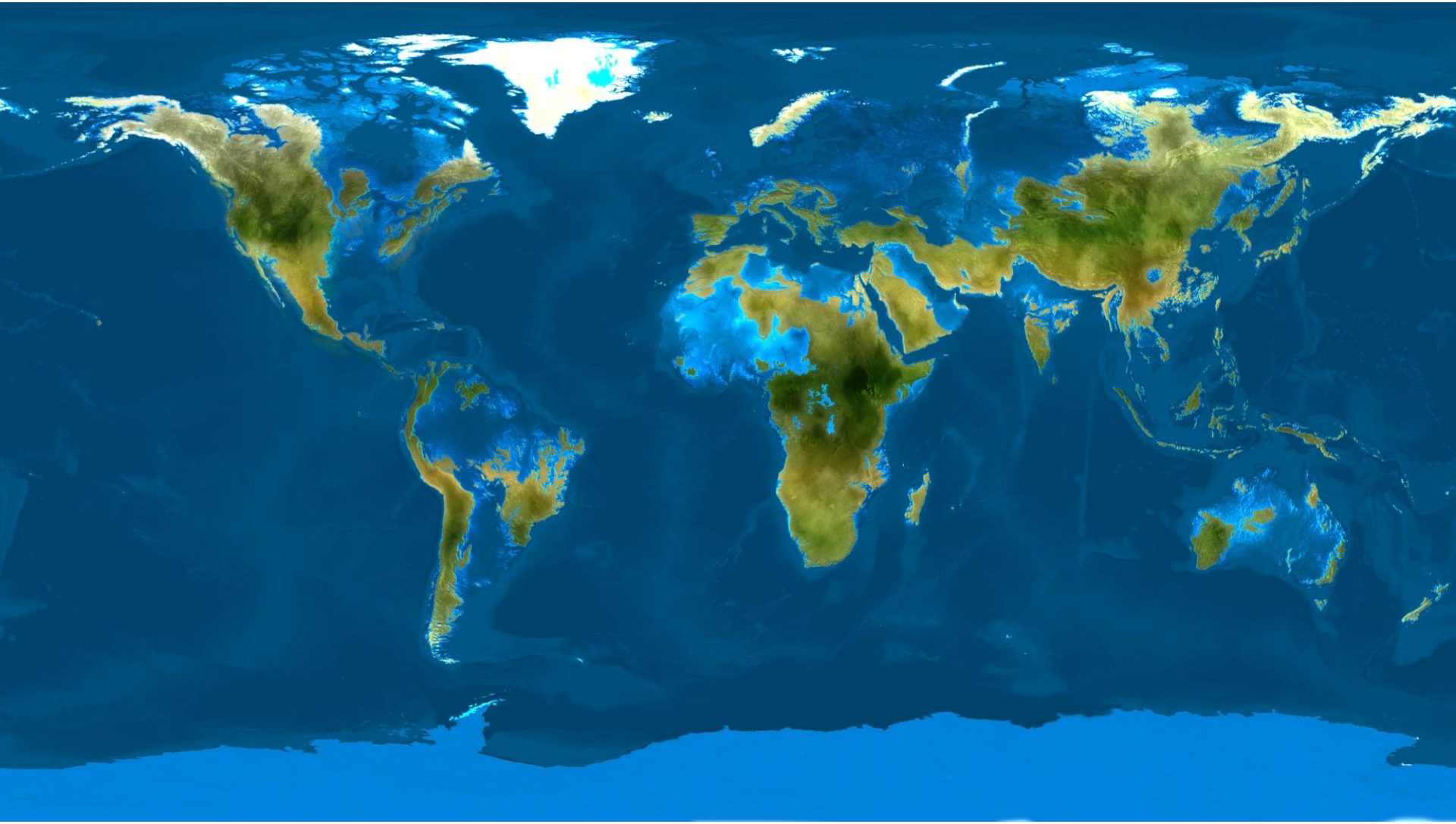
Global temperature has already increased by 0.75-1.5 ^{o}C and is still rising!

AT&T Park, San Francisco…



AT&T Park, San Francisco… if the West Antarctic ice sheet melted.

SEA LEVEL RISE OF 170 METERS



If all the ice on Greenland and Antarctica melted, the world would look like this!

GLOBAL FOOD PRODUCTION *COULD* DECREASE

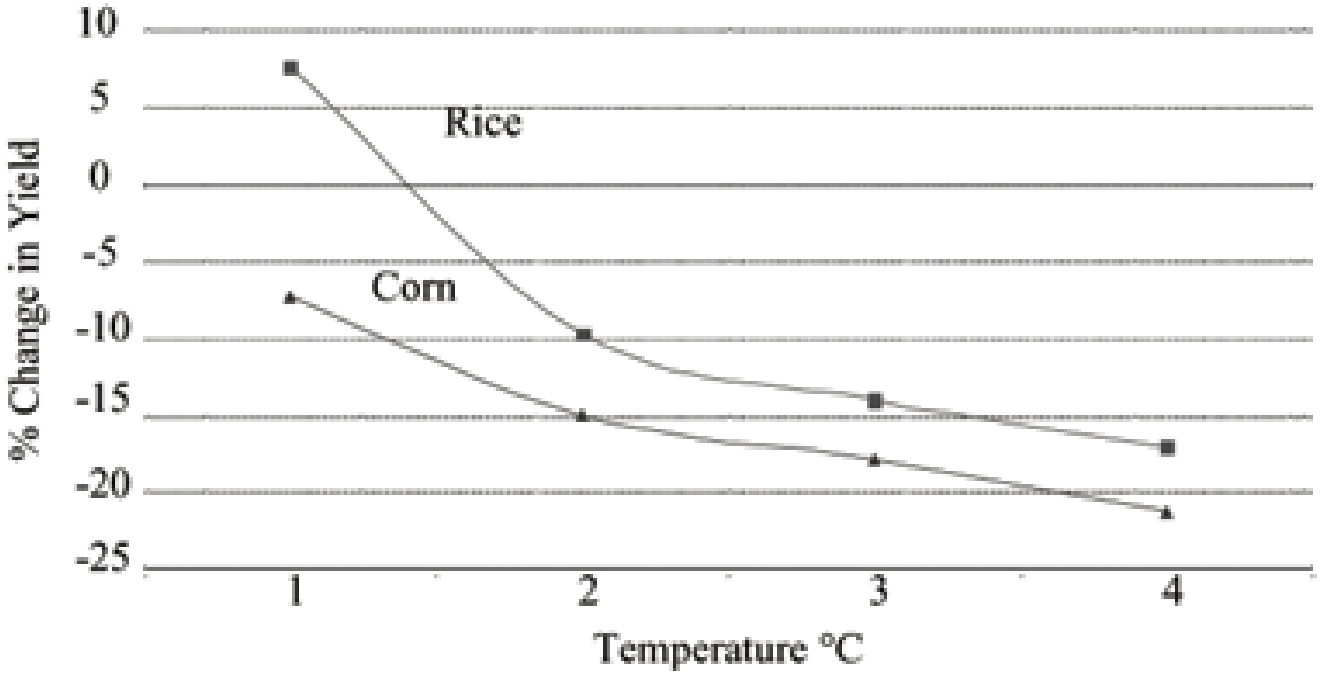


Figure 2 - Corn and rice yields versus temperature increase in the tropics averaged across 13 crop modeling studies. All studies assumed a positive change in precipitation. CO_2 direct effects were included in all studies. Adapted form Easterling & Apps (2005).

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THE SOLUTIONS?

1) REDUCE OUR ENERGY REQUIREMENTS
2) USE ALTERNATIVE, CARBON-FREE FUELS
3) ADAPT TO A WARMER WORLD

CARBON-FREE ENERGY: SOLAR

CARBON-FREE ENERGY: WIND ENERGY

CARBON-FREE ENERGY: HYDRO-ELECTRIC

THE TESLA MODEL-3 – AN ELECTRIC CAR FOR $35,000

So what would it take to get to a world powered by renewables?

1 million tidal power plants
and
5000 geothermal plants
and
4 million wind turbines
and
1.7 billion rooftop photovoltaic systems
and
100,000 solar power plants.

WE CAN DO IT!