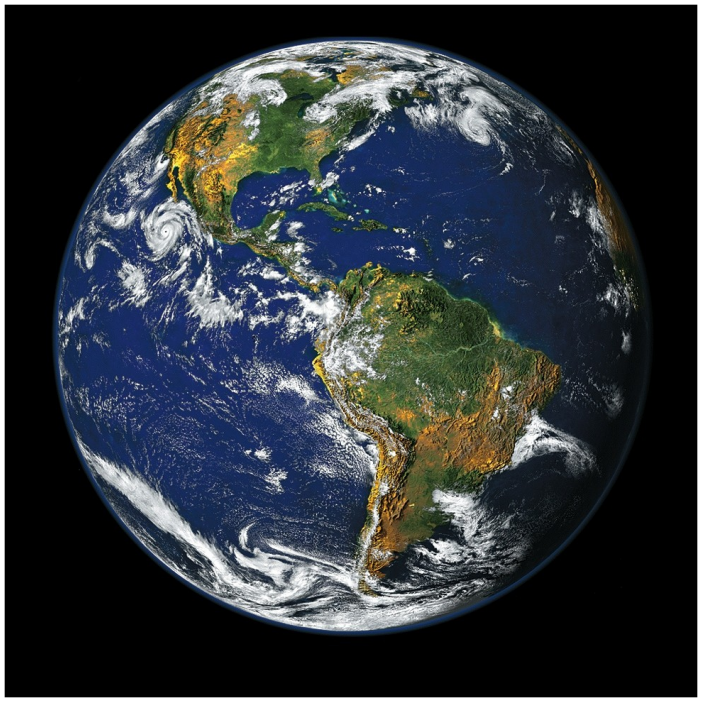

Climate Change in A Nutshell

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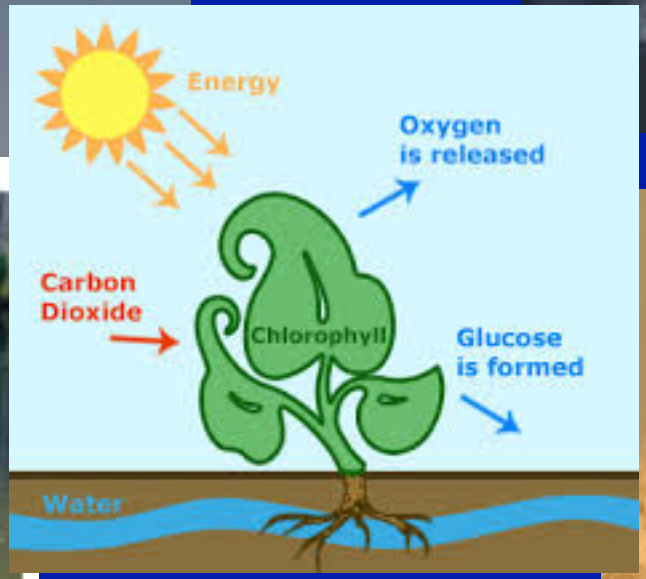
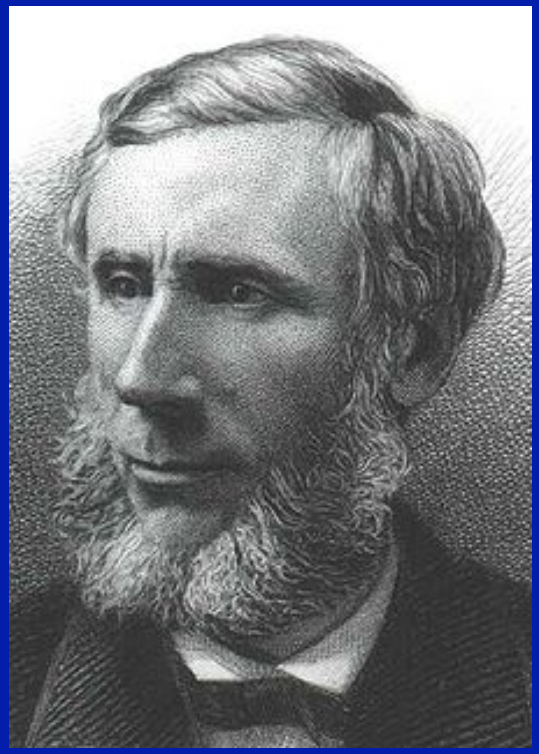
CO_2 is a natural gas.
It is released by breathing fauna and taken up by plants during photosynthesis.
All life depends on it.



CO_2 keeps the planet habitable

Joseph Fourier computed that the Earth should be much colder than it is (1824, 1827)



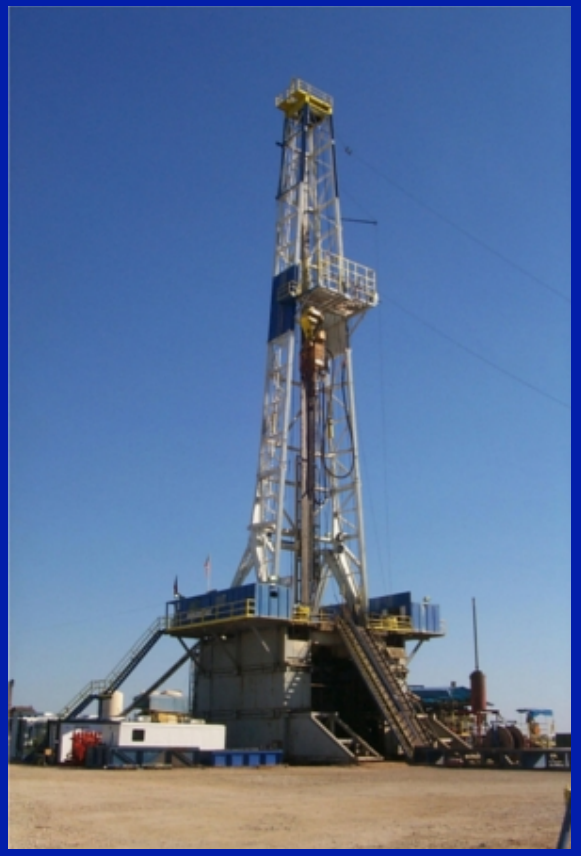
John Tyndall, January 1863

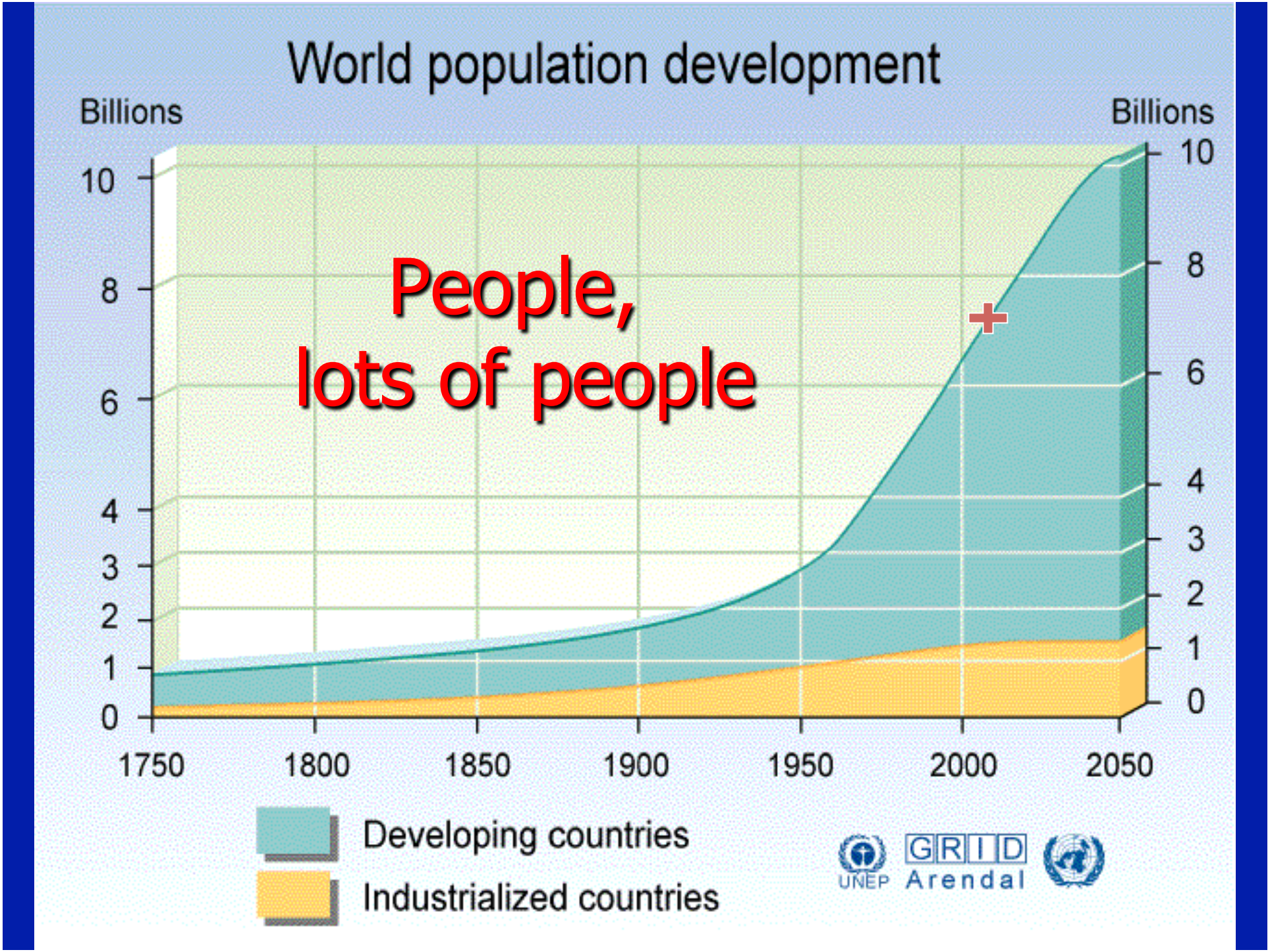
Measured the absorption and emission of radiation by CO_2 in air (made the measurements of the physics.)

Svante Arrhenius, 1896

Calculated in detail effect of CO_2 on Earth's temperature.

CO_2 is a greenhouse gas. It is released by burning fossil fuels.

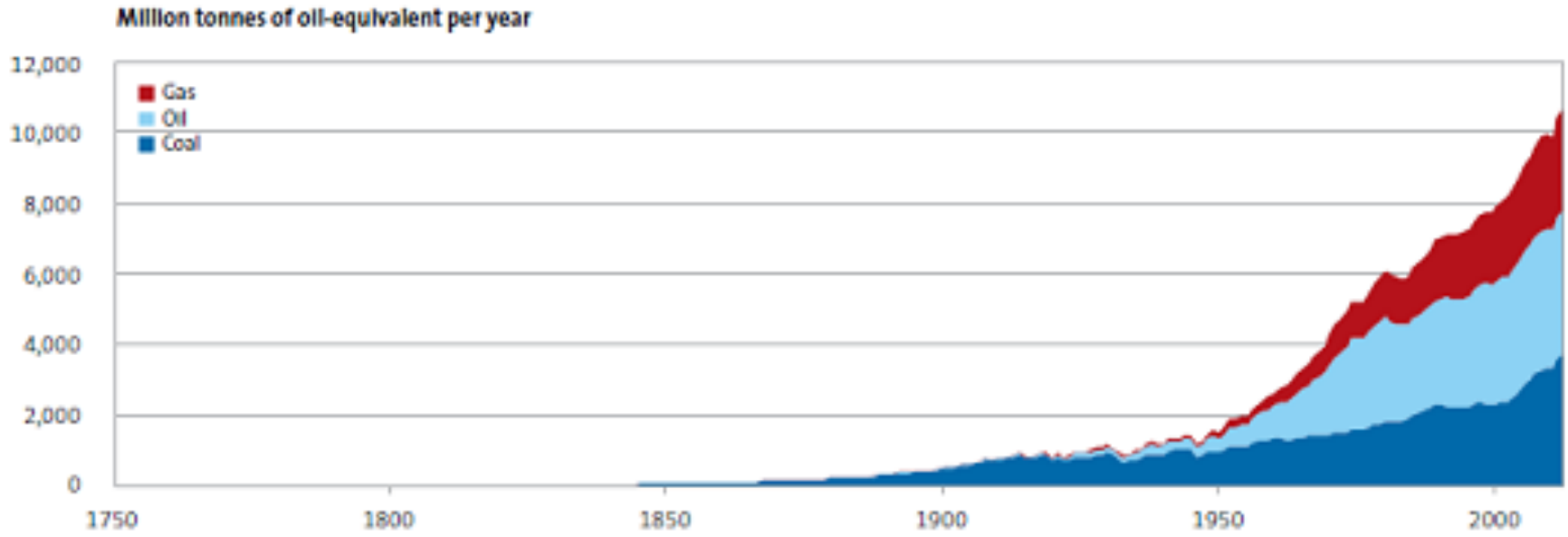



World population development
Billions
Billions
10
8
6
4
3
2
1
0
1750
1800
1850
1900
1950
2000
2050
People,
lots of people
Developing countries
Industrialized countries
UNEP
GRID
Arendal

We are burning fossil fuels.

CO_2 is going into the atmosphere

Fig. 5.1: World fossil fuel consumption since 1750*



* Source: Tullett Prebon calculations and estimates from various sources

When/why did scientists get alarmed?

It makes perfect sense from their point of view.

Raising the alarm on CO_2 began in the late 1950s. The first was Gilbert Plass[1].

First Earth Day 1970.

First IPCC Report commissioned in 1988.

Scientists were morally obligated to sound the alarm, even if they were ill suited to carry a message many people didn't want to hear.

1. Plass, G.N., 1956, Carbon Dioxide and the Climate, American Scientist 44, p. 302-16. Plass, G.N., 1956, Effect of Carbon Dioxide Variations on Climate, American J. Physics 24, p. 376-87. Plass, G.N., 1956, The Carbon Dioxide Theory of Climatic Change, Tellus VIII, 2. (1956), p. 140-154.

Atmospheric CO_2 rates
Cenozoic Average: 0.0001 ppm/yr
Anthropogenic rate: ~2 ppm/yr

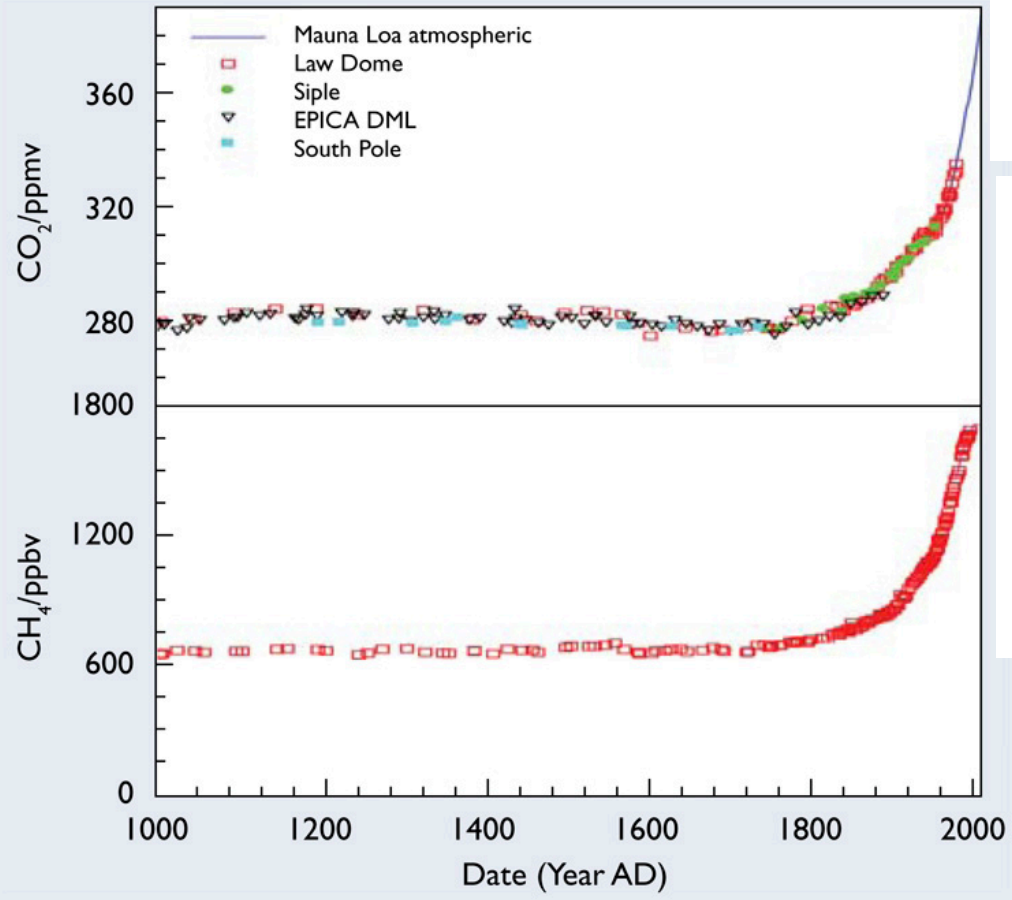
Way too much CO_2!!

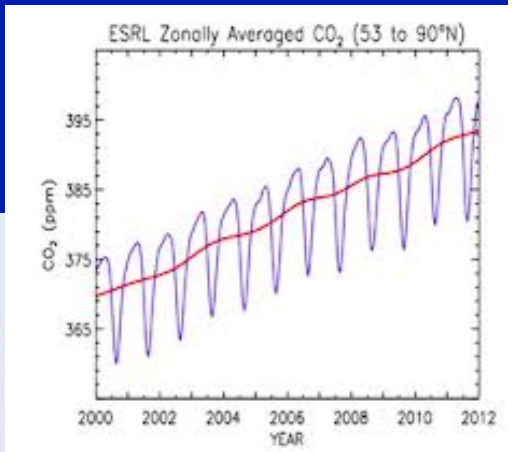
1000 years

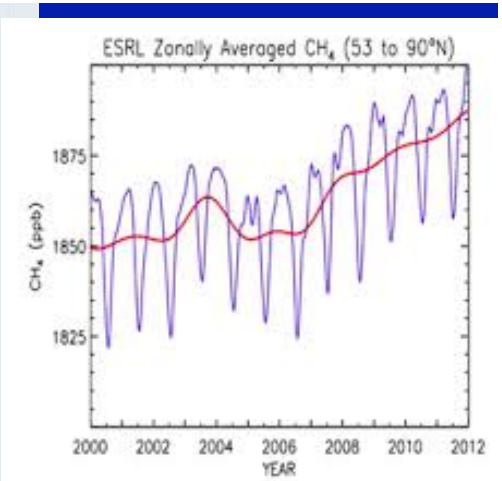
CO_2

CH_4

Fig. 2: *CO_2 and CH_4 over the last 1,000 years*[1-4]

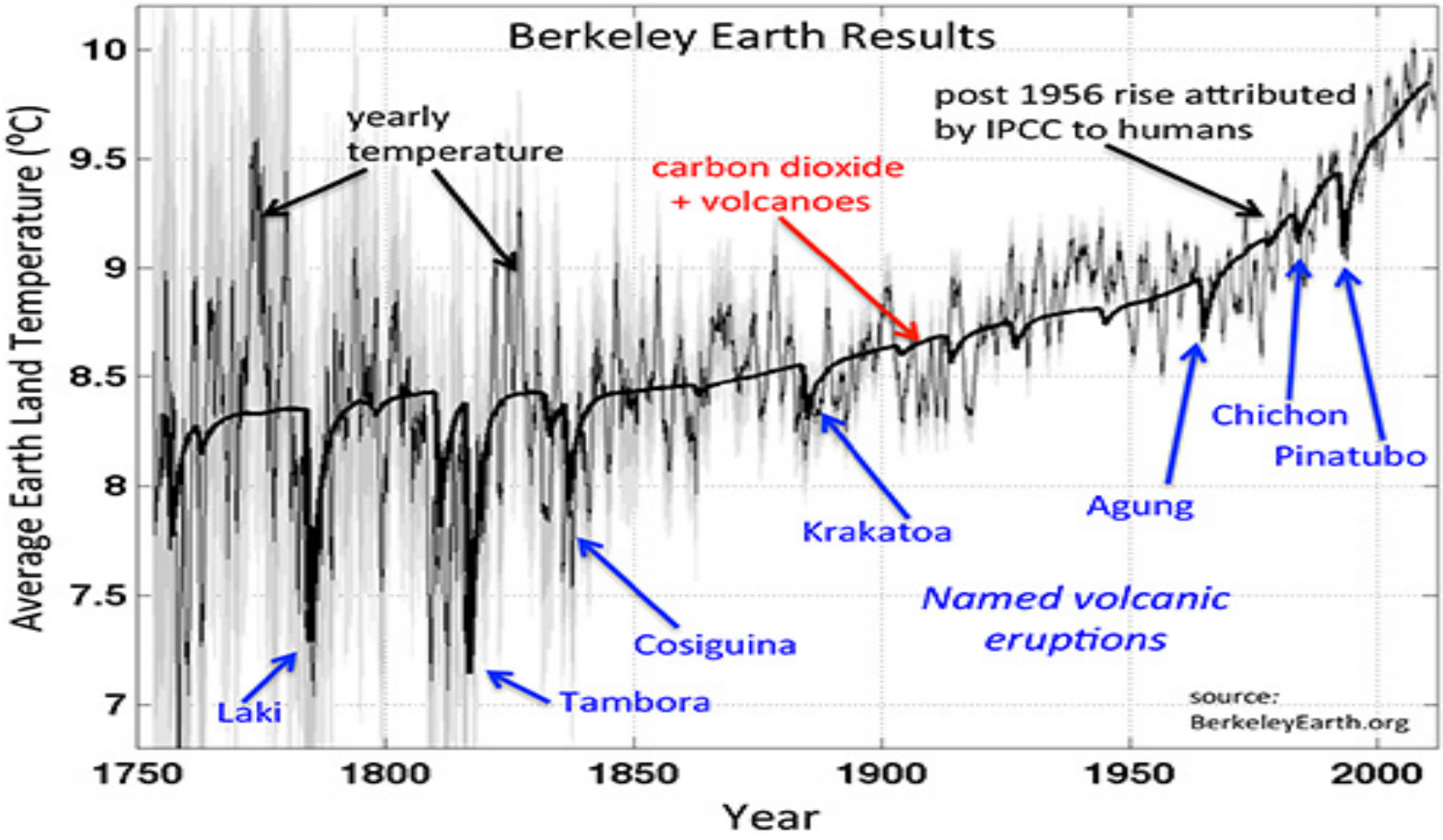






Average Land Temperature

Curve: Temp rising like the log(CO_2 abundance) plus volcanic dips.



Predicted impacts

- Mass extinction
- More extreme weather
  - severe storms, flooding
  - drought -> fires, water shortages
- Rising sea level
- Loss of arable land
- Heat related disease and illness
- Economic impacts