

Key concepts from posters presented at AGU, December 2017 and AMS, January 2018

Humans caused global warming from 1970 to 1998

Nature caused the very rapid global warming since 2014

Why greenhouse-warming theory is a mistake

Heat is a broad **continuum** of frequencies and amplitudes of oscillation of all the bonds holding matter together

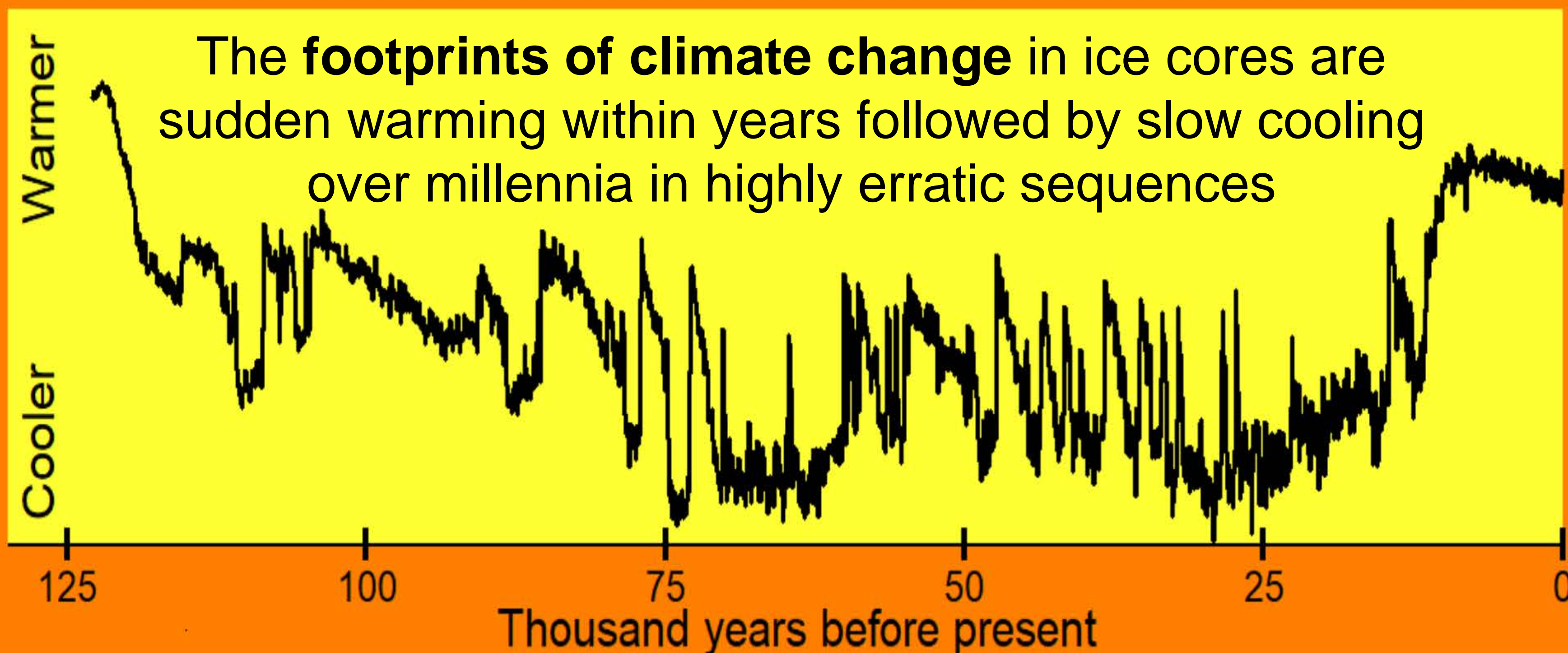
Heat propagates through matter and space via **resonance**

Climate sensitivity has never been measured directly

Increasing concentrations of greenhouse gases have never been shown experimentally to cause air to warm

5 ways that greenhouse-gases are thought to heat Earth

Warming of Earth is explained clearly by ozone depletion



A23E-2408: A depleted ozone layer absorbs less UV-B, cooling the ozone layer, increasing the amount of UV-B observed to reach Earth, heating air by dissociating tropospheric and ground-level ozone, and heating oceans very efficiently by penetrating tens of meters into the mixed layer. UV-B is 48 times more energetic (“hotter”) than IR absorbed by greenhouse gases

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Tuesday December 12, 2017, 13:40 – 18:00 Poster Hall D-F

Abstract: This new insight into the physics of radiation shows why changes in stratospheric ozone are observed to cause changes in global temperature. By 1970, manufactured CFC gases and ozone depletion began increasing. By 1993, increases in CFCs stopped as mandated by the Montreal Protocol. By 1995, increases in ozone depletion stopped. By 1998, increases in temperature stopped until 2014. Ozone is also depleted by halogen gases emitted from major basaltic lava flows, the largest of which, since 1783, occurred at Bardarbunga in Iceland in 2014, causing 2015 and 2016 to be the hottest years on record. Throughout Earth history, the largest basaltic lava flows were contemporaneous with periods of greatest warming and greatest levels of mass extinctions.

Planck’s empirical law shows that temperature of matter results from oscillation of all the bonds holding matter together. The higher the temperature, the higher the frequencies and amplitudes of oscillation. Thus, radiation from a nearby hotter body will make the absorbing body hotter than radiation from a cooler body. According to the Planck-Einstein relation, thermal energy (E) in matter and in radiation equals frequency of oscillation (ν) times the Planck constant (h), $E=h\nu$ —the energy of a frictionless atomic oscillator. Since frequency is observed to be a very broad continuum extending from radio signals through visible light to gamma rays, thermal energy ($E=h\nu$) must also be a very broad continuum. Thermal flux cannot be represented properly by a single number of watts per square meter, as commonly assumed throughout the physical sciences, because all frequencies coexist and the number of watts increases with frequency. Thus, UV-B solar radiation is 48 times more energetic than IR terrestrial radiation absorbed by greenhouse gases and can make the absorbing body 48 times hotter. UV-B causes sunburn; no amount of IR can cause sunburn. Furthermore, in a basic experiment, I show that air containing more than 23 times normal concentrations of CO_2 , shows minimal warming compared to normal air when exposed to the same IR radiation.

Dobson (1929) reported the close correlation between regions of high and low ozone concentrations and weather. Variation in ozone levels are closely associated with changes in the Multivariate ENSO Index and other atmospheric and oceanic oscillations.

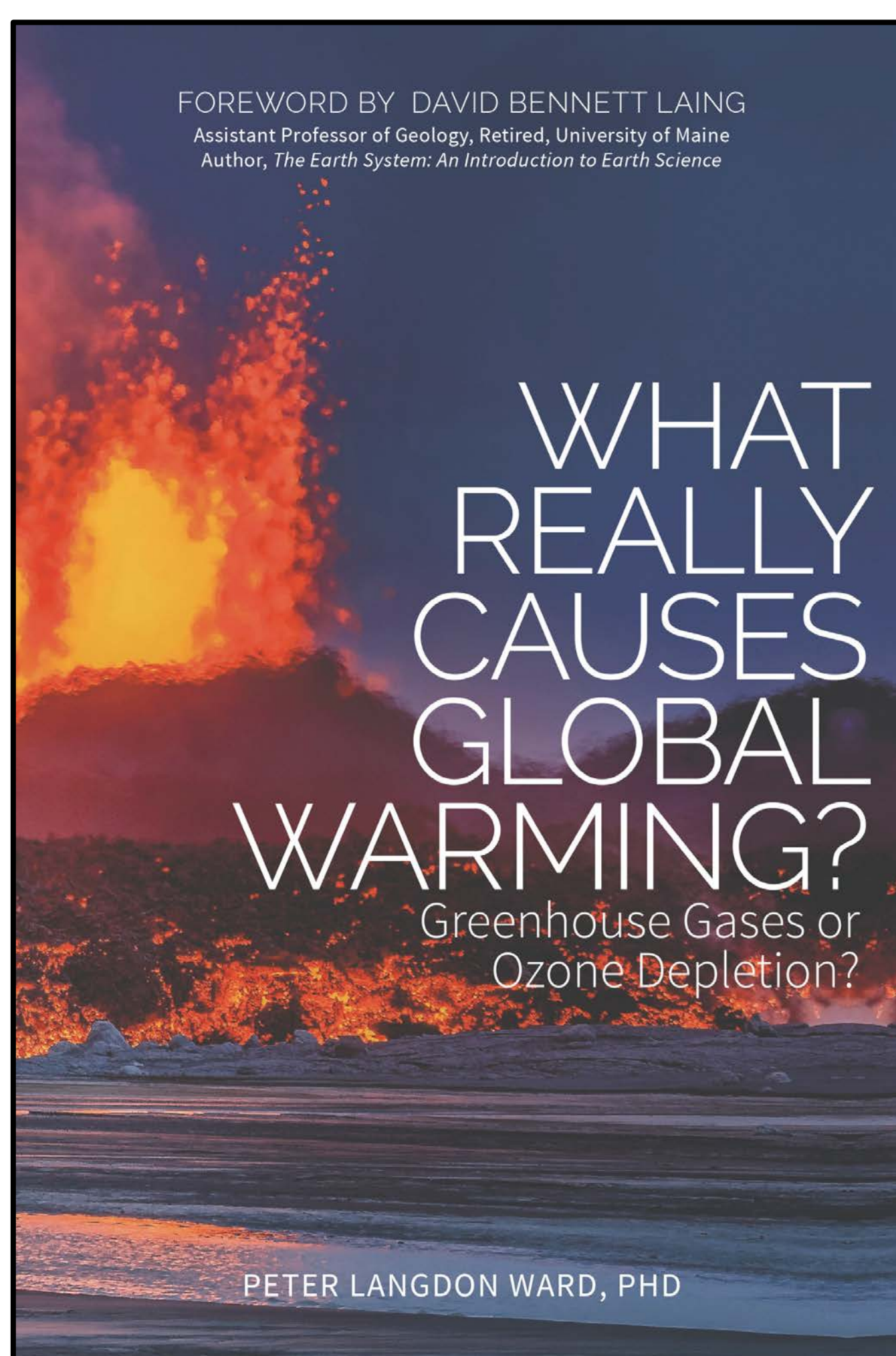
Plain Language Summary: Depletion of the stratospheric ozone layer is the primary cause of global warming observed recently and throughout Earth history. When ozone is depleted, more ultraviolet-B radiation than normal is observed reaching Earth, warming air in the lower atmosphere by splitting ozone pollution apart and warming oceans efficiently by penetrating tens of meters below the surface. Climate scientists currently dismiss ozone depletion as unimportant because they think there exists a greater amount of infrared energy absorbed by greenhouse gases than ultraviolet-B energy reaching Earth when ozone is depleted. Radiant energy, however, is not a function of amount; it is a function of frequency. Ultraviolet-B radiation possesses 48 times higher frequency than infrared radiation. Thus, ultraviolet-B radiation is 48 times more energetic, 48 times “hotter,” able to warm the absorbing body to higher temperatures. Ultraviolet-B causes sunburn and skin cancer, while no amount of infrared radiation can do the same.

Ozone is depleted by manufactured chlorofluorocarbon gases (from 1970 to 1998) and by chlorine and bromine gases emitted from large basaltic lava flows. The largest basaltic flow since 1783 was erupted from Bárðarbunga in Iceland in 2014-2015, making 2015-2016 the hottest years on record. Earth continues to warm because ozone remains depleted.

Ward, P. L., 2017, **Ozone depletion explains global warming**: Current Physical Chemistry, v. 6, no. 4, p. 275-296, doi: [10.2174/1877946806999160629080145](https://doi.org/10.2174/1877946806999160629080145)

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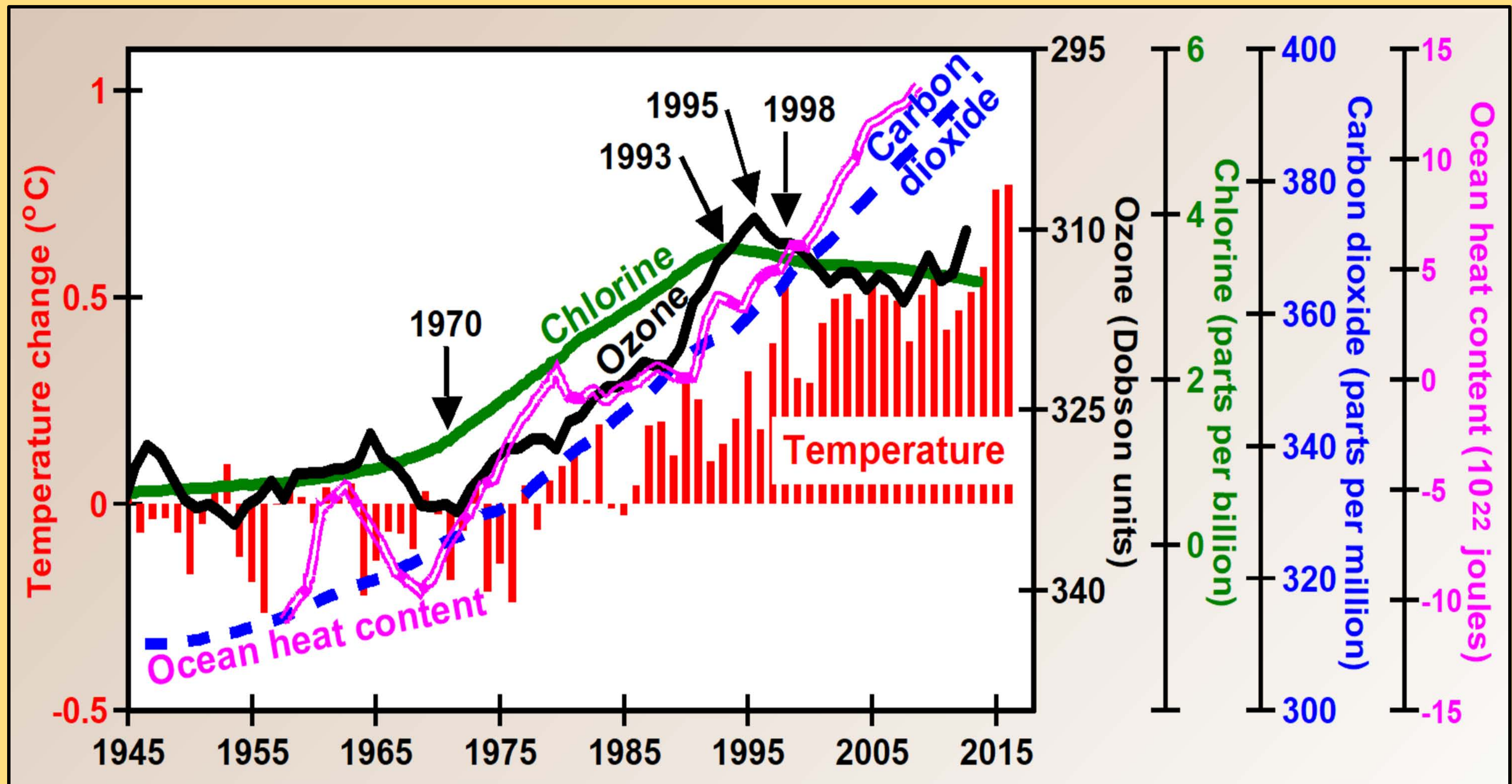
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Humans caused global warming from 1970 to 1998

Average annual global temperatures began increasing around 1970 when ozone depletion, caused by widespread use of manufactured CFC gases as refrigerants, spray-can propellants, solvents, and foam-blowing agents, began forming the Antarctic Ozone Hole.

Ozone depletion stopped increasing in 1995 and temperatures stopped increasing in 1998 because the Montreal Protocol on Substances that Deplete the Ozone Layer limited production of CFCs and led to nearly constant ozone depletion and temperatures from 1998 through 2013, known as the Global Warming Hiatus.



- 1970 Increased manufacturing of CFCs depleted the ozone layer causing global warming
- 1974 Molina and Rowland discovered the mechanism
- 1985 Farman, Gardiner and Shanklin discovered the Antarctic Ozone Hole
- 1987 The Montreal Protocol was negotiated, reducing manufacturing of CFCs
- 1989 The Montreal Protocol took effect
- 1993 Increases in CFC emissions stopped
- 1995 Increases in ozone depletion stopped
- 1998 Increases in average annual global mean temperatures stopped

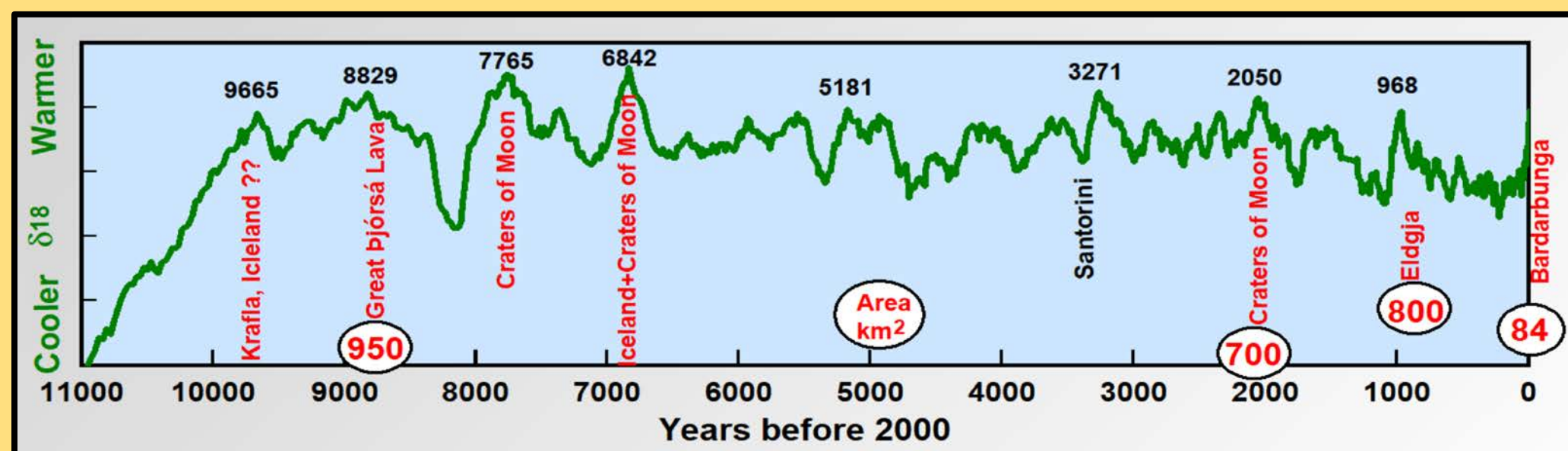
During the Global Warming Hiatus, from 1998 through 2013, temperatures remained nearly constant while ozone remained depleted, ocean heat content continued to increase, glaciers continued to melt, and sea level continued to rise.

Meanwhile, atmospheric concentrations of CO₂ have been increasing at ever-increasing rates showing no relationship to observed changes in rates of warming.

Nature caused the very rapid global warming since 2014

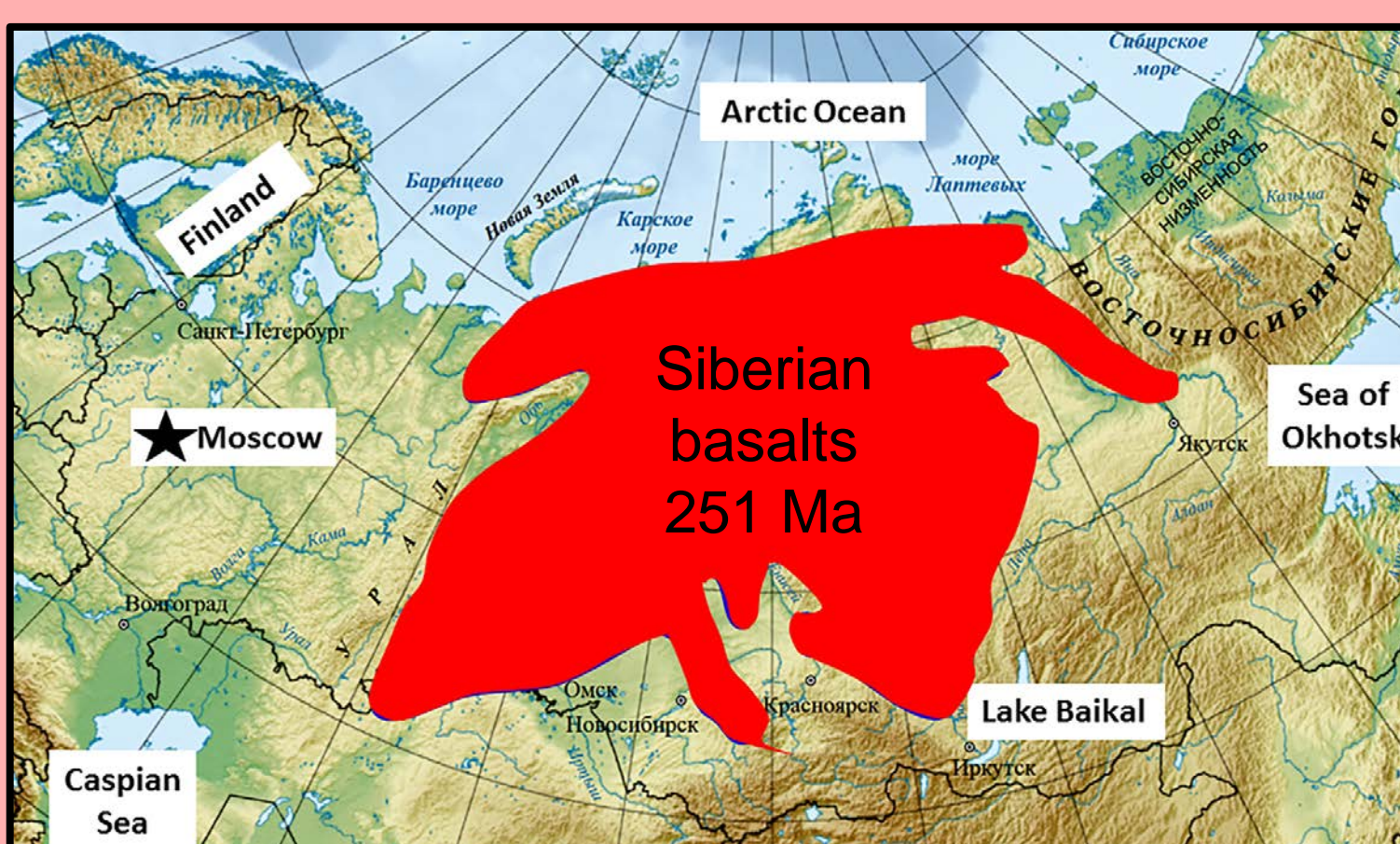
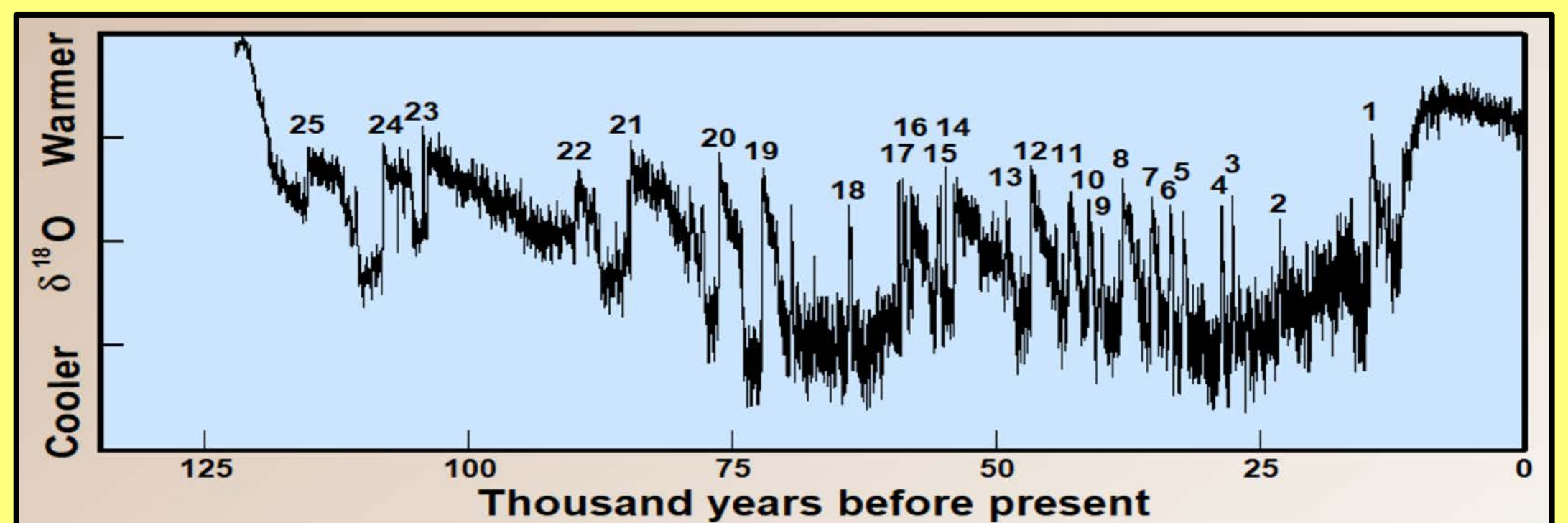
Global warming began increasing suddenly in 2014, at nearly 5 times the rate from 1970 to 1998, making 2016 the hottest year on record.

This warming appears to be caused by Bárðarbunga volcano in central Iceland, which extruded 85 square kilometers of basaltic lava in 6 months, the largest lava flow since the eruption of Laki in 1783.

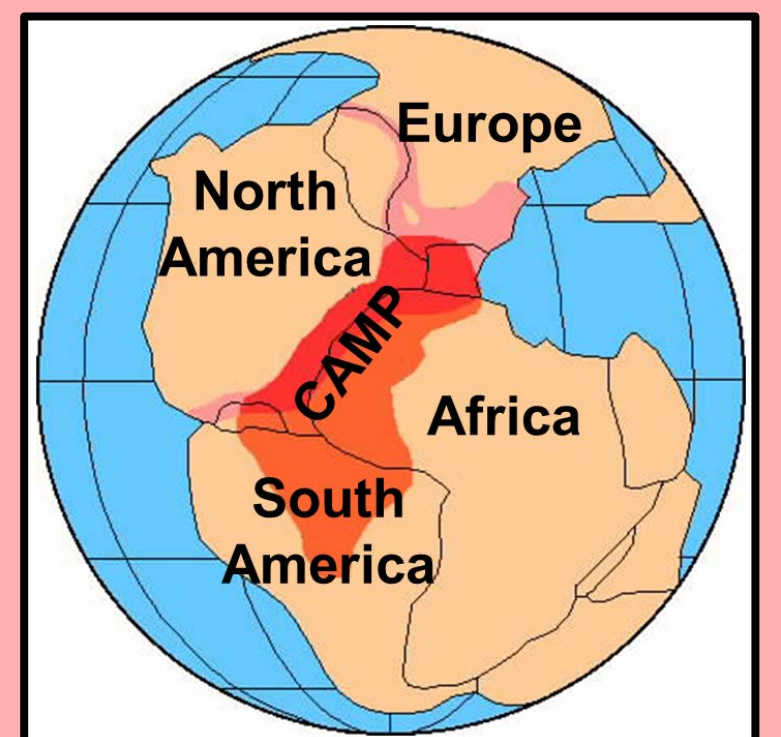


Basaltic lava flows covering areas of hundreds of square kilometers were contemporaneous with all major warming periods throughout written history and throughout the Holocene.

Extensive basaltic lava flows in Iceland were contemporaneous with rapid warming from 12,000 to 9,500 BP heating the oceans out of ice-age conditions and also with the 25 periods of rapid warming in the past 120,000 years.



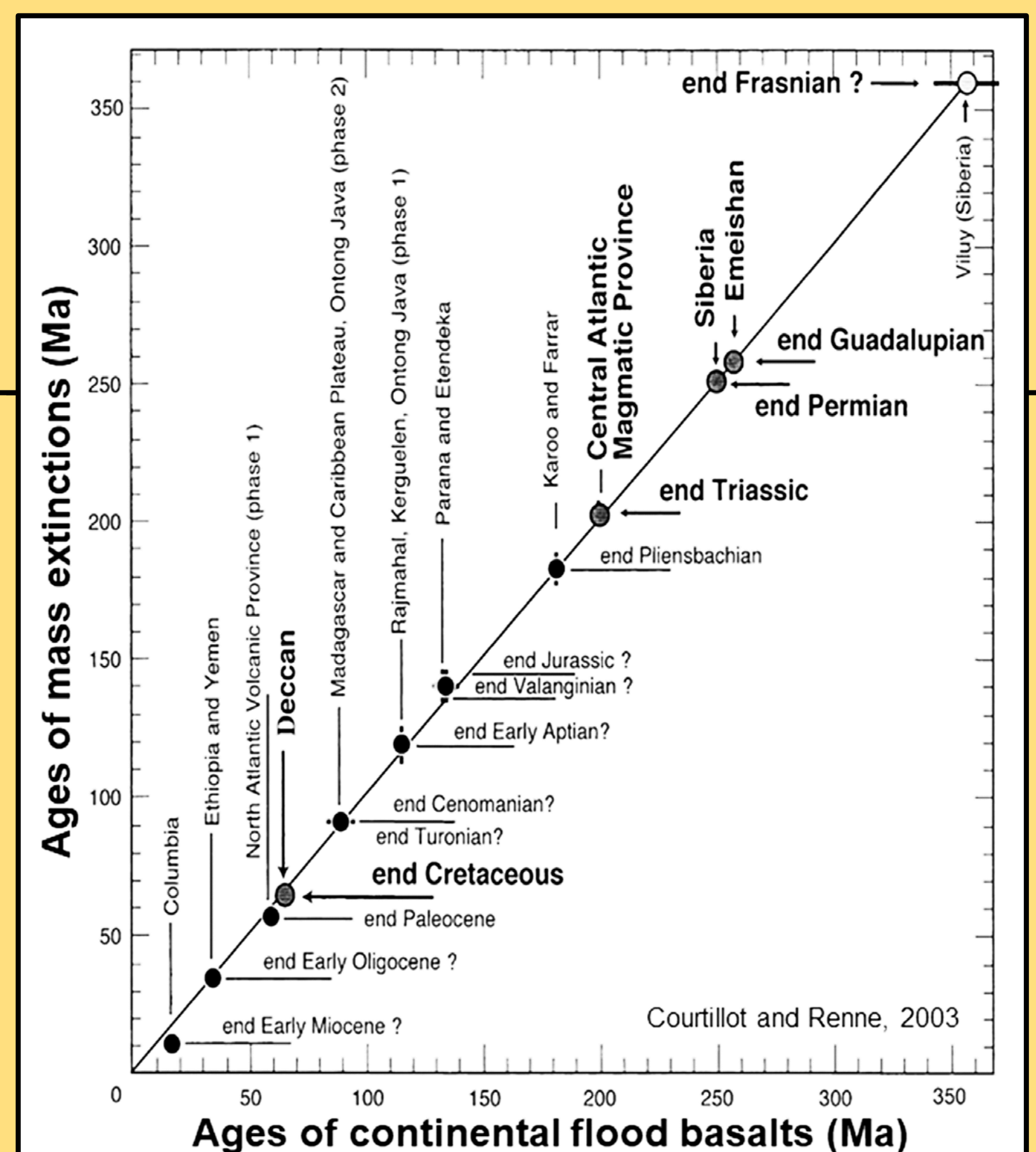
Basaltic lava flows covering areas of millions of square kilometers, known as Large Igneous Provinces (LIPs), were contemporaneous with all periods of major global warming, major ocean acidification, and major mass extinctions.



Central Atlantic Magmatic Province 201 Ma

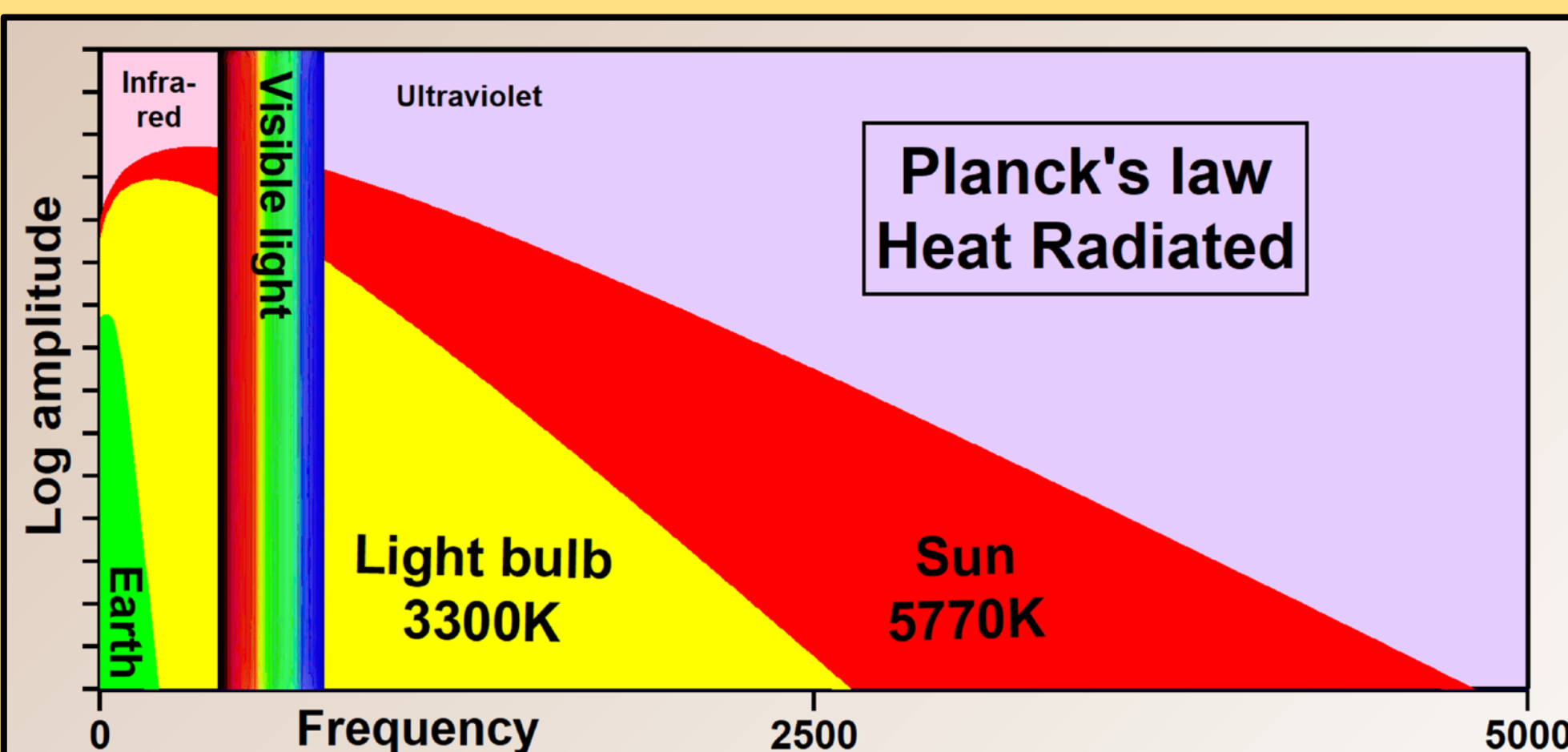
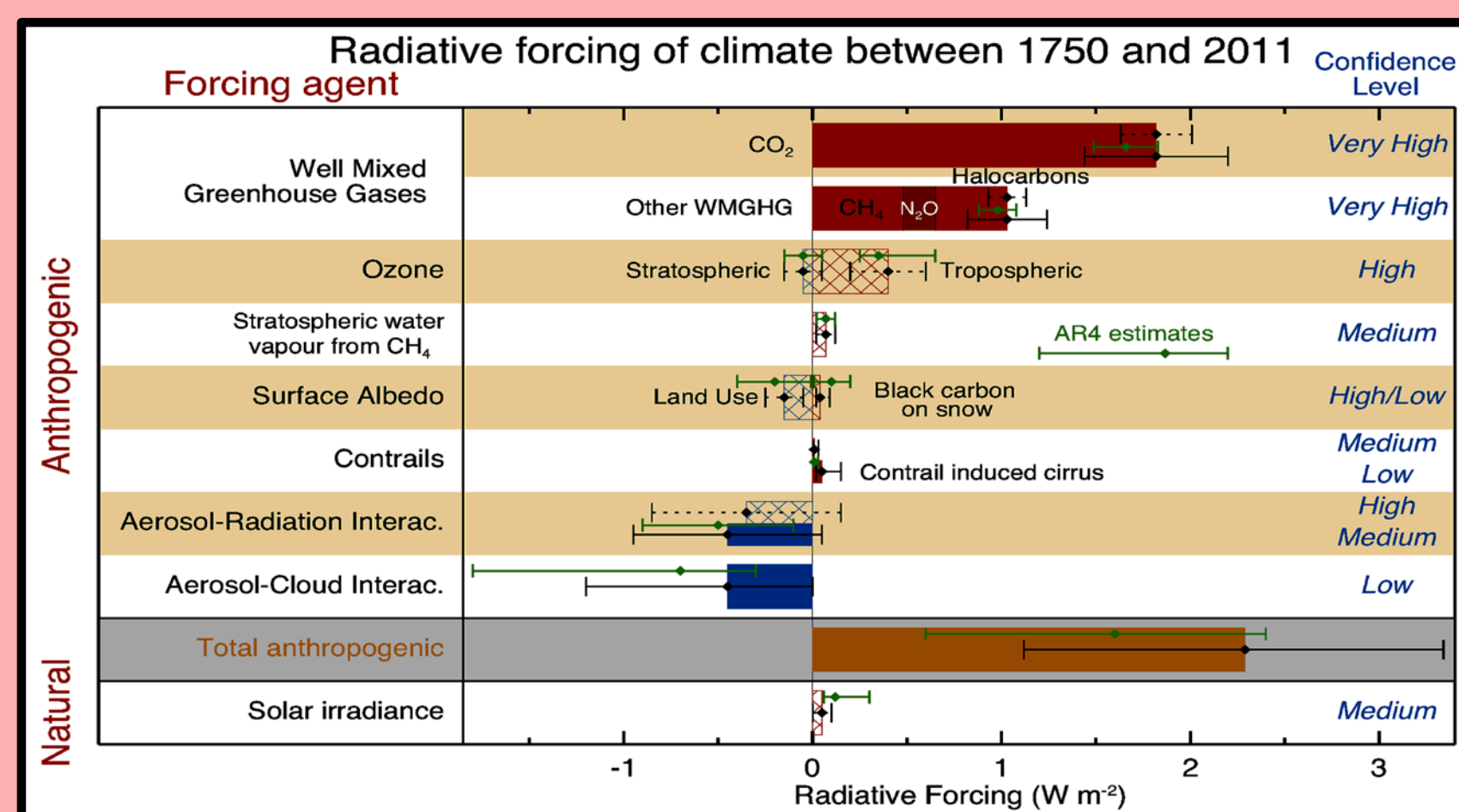
Large Igneous Provinces were typically formed at the end of periods on the geologic time scale suggesting they were primarily responsible for sudden changes in climate and fossils that are mapped world wide.

Large basaltic lava flows appear to cause sudden global warming as often as every few hundreds to thousands of years. Larger flows cause greater warming, more extinctions, and more ocean acidity, but are less frequent.



Why greenhouse-warming theory is a mistake

Greenhouse-warming theory is based on radiative forcing, which assumes that the physical nature of radiation is the same for all bodies of matter at all temperatures. Currently scientists think what changes is the amount of radiation measured as the radiative forcing in Watts per square meter. The hotter the body, the greater the amount radiated. The greater the amount absorbed, the hotter the body will become.

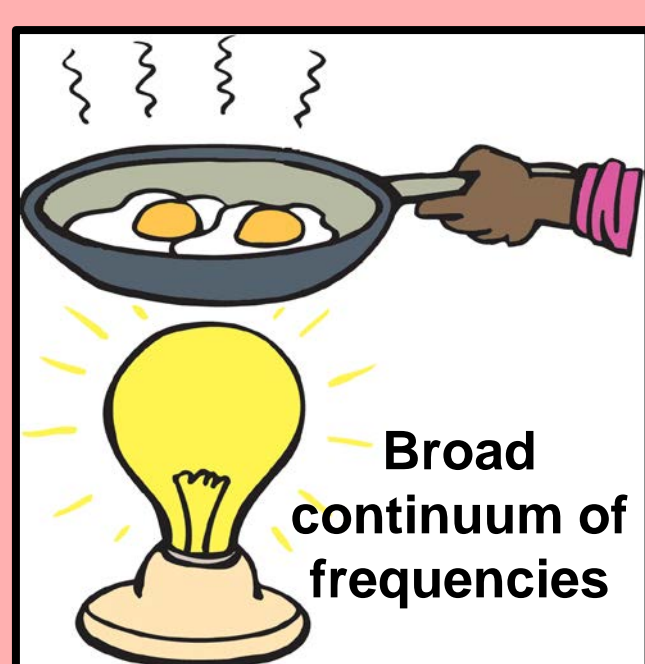
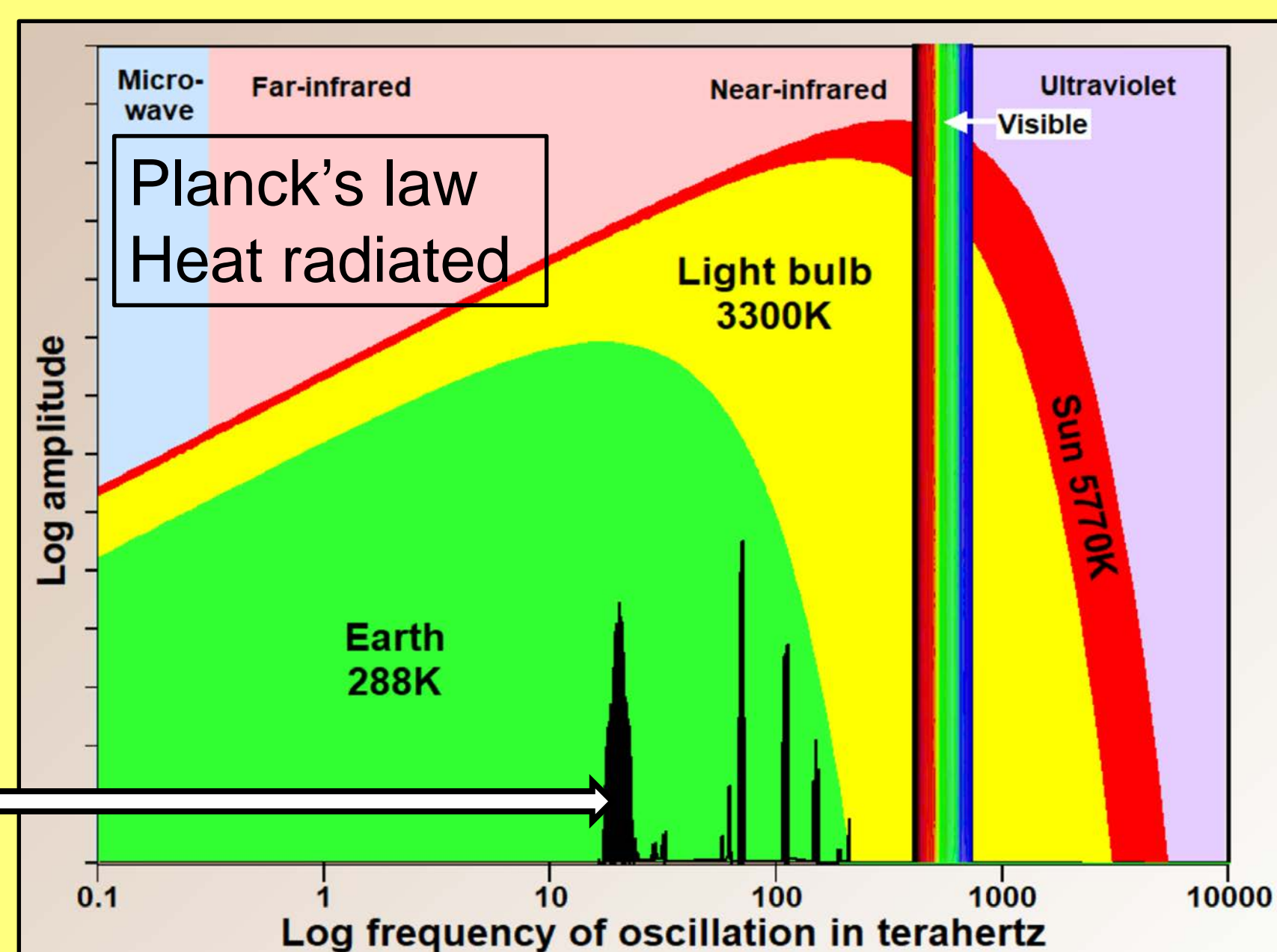


But Planck's empirical law shows that radiation measured from a body of matter is a broad continuum of frequencies of oscillation of the bonds holding the matter together and, most importantly, that the frequencies and amplitudes of oscillation making up radiation increase with increasing temperature of the body of matter.

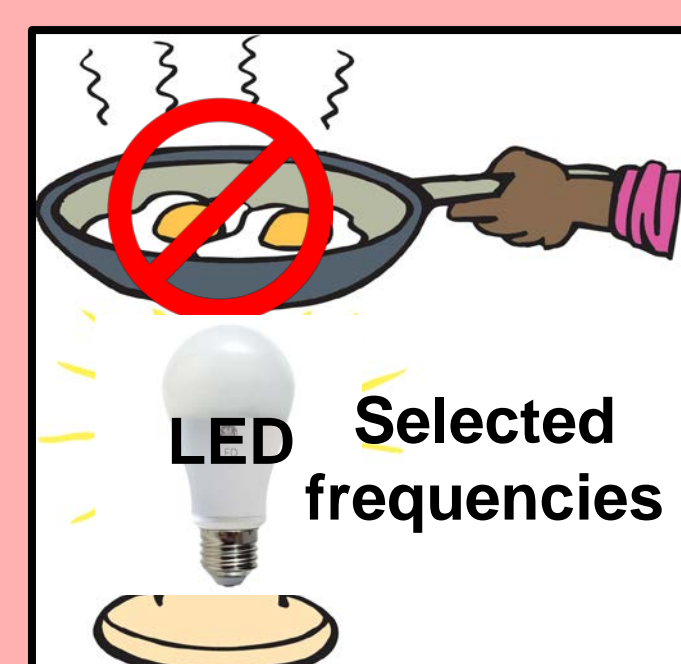
Heat is what a body of matter loses or absorbs by radiation or conduction to change its temperature.

To warm Earth to the temperature of a lightbulb, Earth must absorb the frequencies and amplitudes shown in yellow. These can only come from a body that is as hot or hotter than the filament of a lightbulb.

Carbon dioxide only absorbs less than 16% of the frequencies radiated by Earth as shown by the vertical black lines.



Greenhouse gases do not absorb heat. They can only radiate what they absorb, which is less than 16% of the frequencies radiated by Earth. An incandescent lightbulb produces some visible light and a lot of heat. An LED lightbulb radiates only frequencies of visible light and thus minimal heat. This is why LEDs are so energy efficient.



The Planck-Einstein relation $E=h\nu$ says that the energy (E) of an atomic oscillator is equal to the Planck constant (h) times frequency (ν). Radiation results from a continuum of these oscillations where frequency and therefore energy are continuums.

Heat and radiative forcing are continuums, not discrete amounts as currently assumed.