

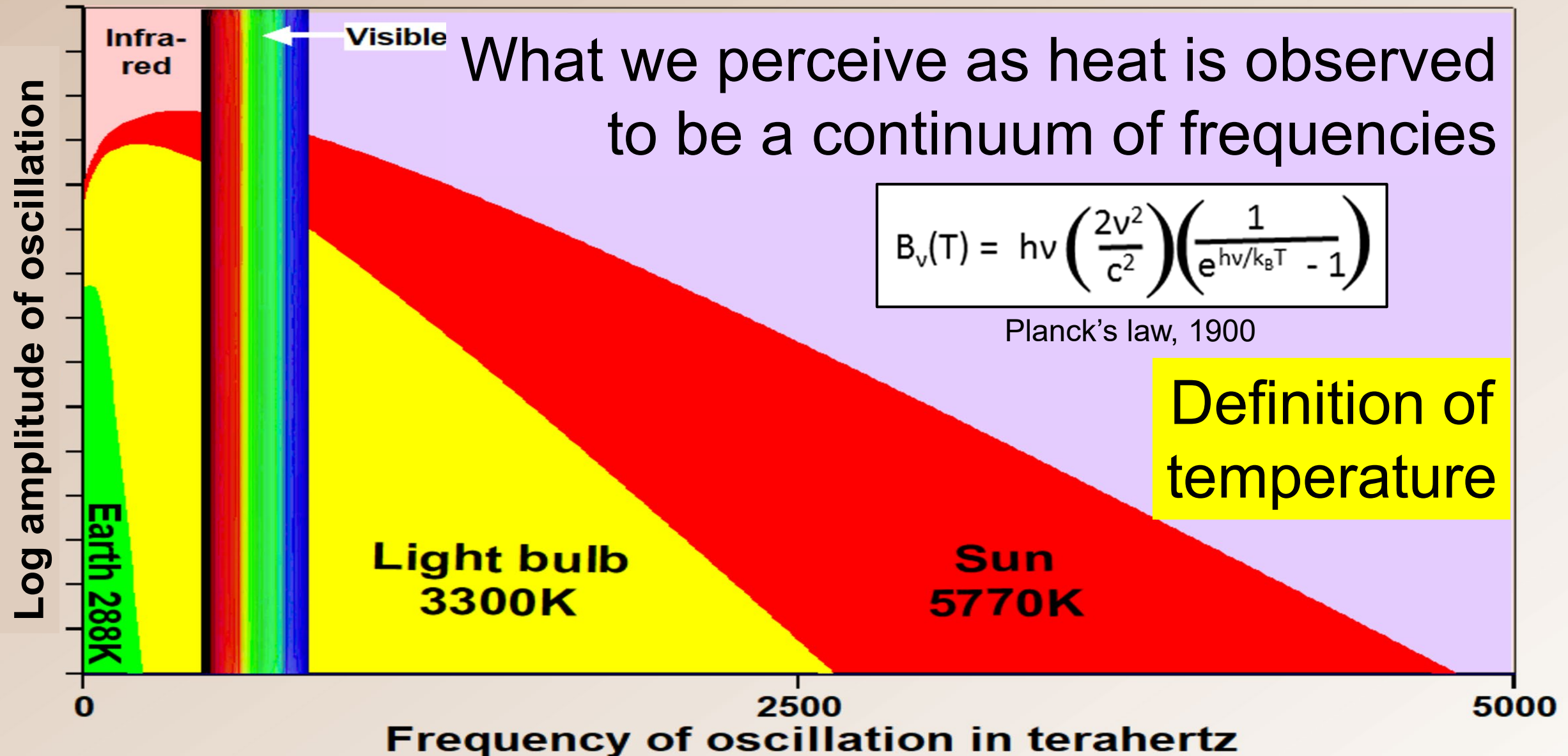
Greenhouse Gases Do Not Absorb Enough **Heat** To Cause Observed Warming

Heat is what a body of matter must absorb to get warmer and emit to get cooler.

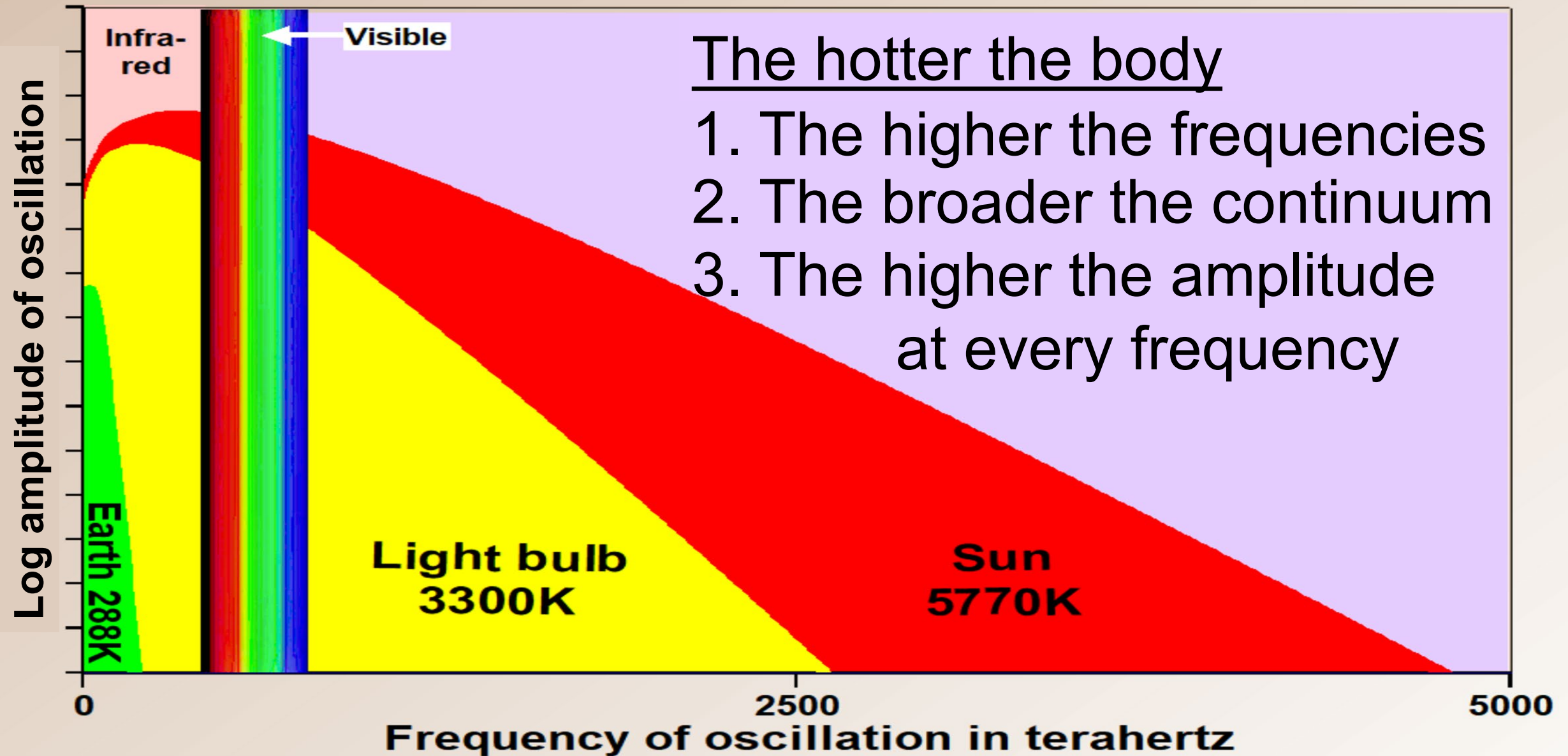
Peter L. Ward

U.S. Geological Survey retired
Science Is Never Settled
Jackson, Wyoming
peward@Wyoming.com

Heat, Radiation, has two physical properties



Radiation from a Black Body



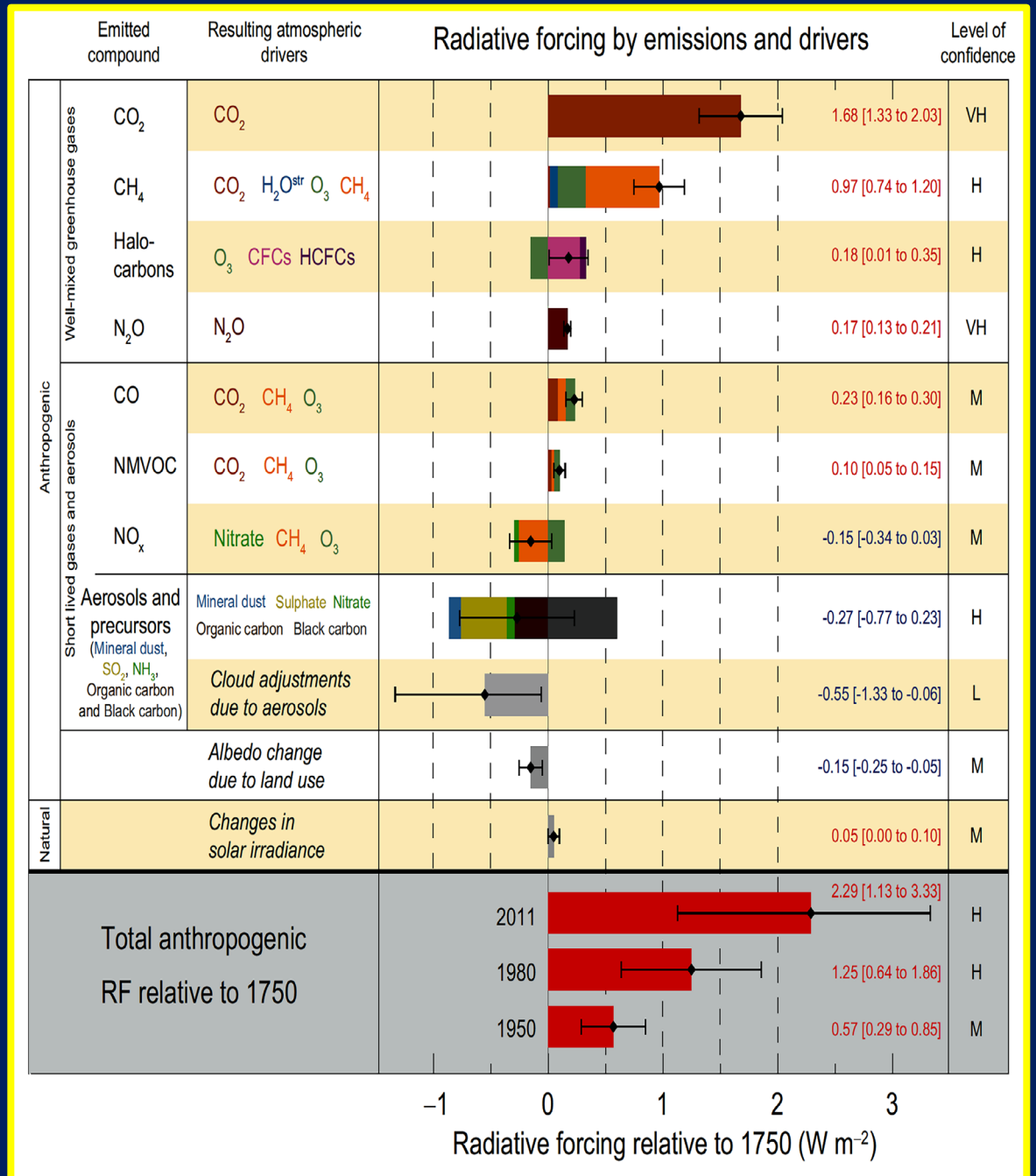
The hotter the body

1. The higher the frequencies
2. The broader the continuum
3. The higher the amplitude at every frequency

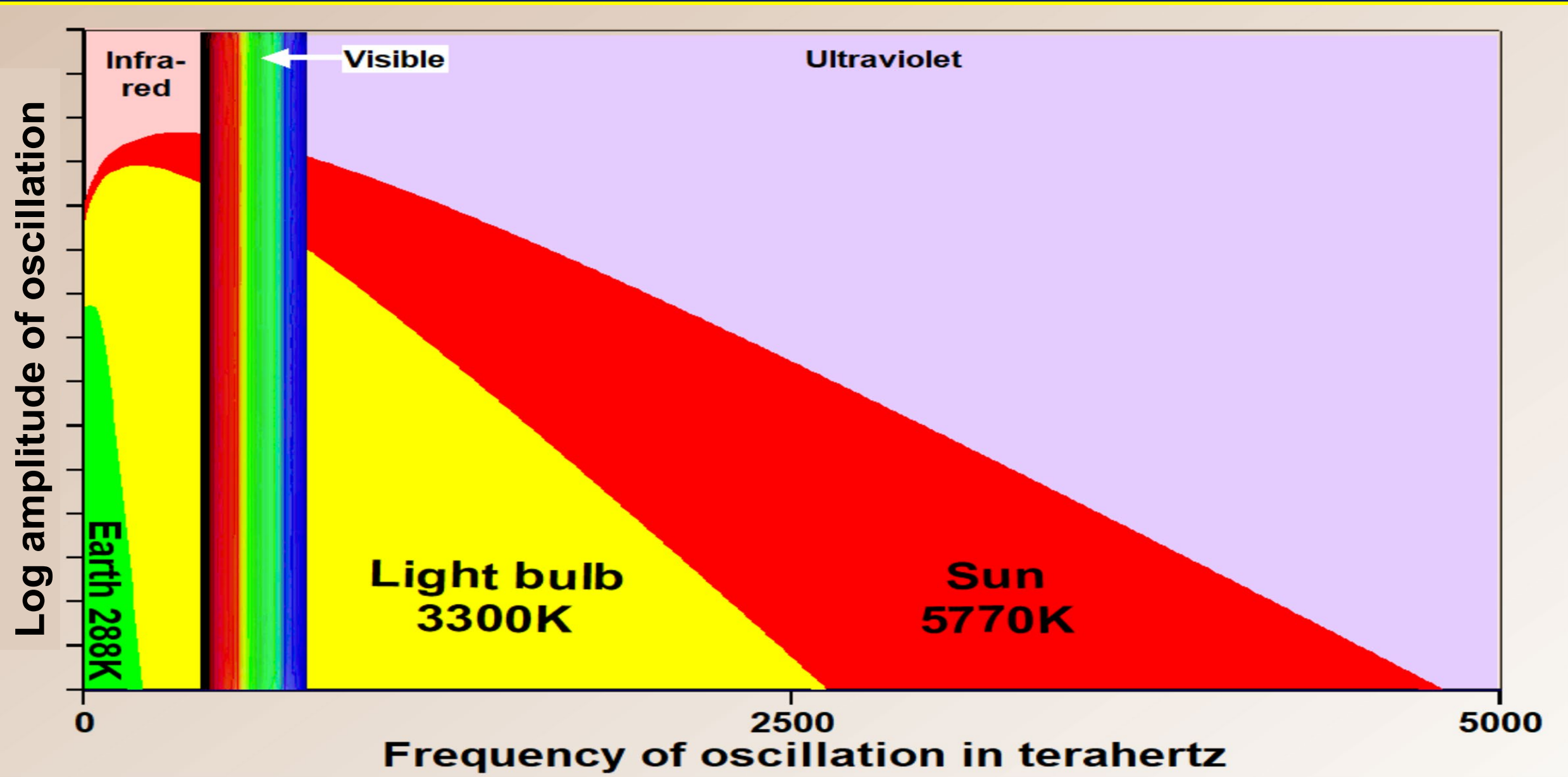
Greenhouse-warming theory is based on radiative forcing in Watts per square meter

Greenhouse-warming theory thinks of heat as an amount of some generic thing

That radiation from Sun is exactly the same as radiation from Earth except there is a lot more of it

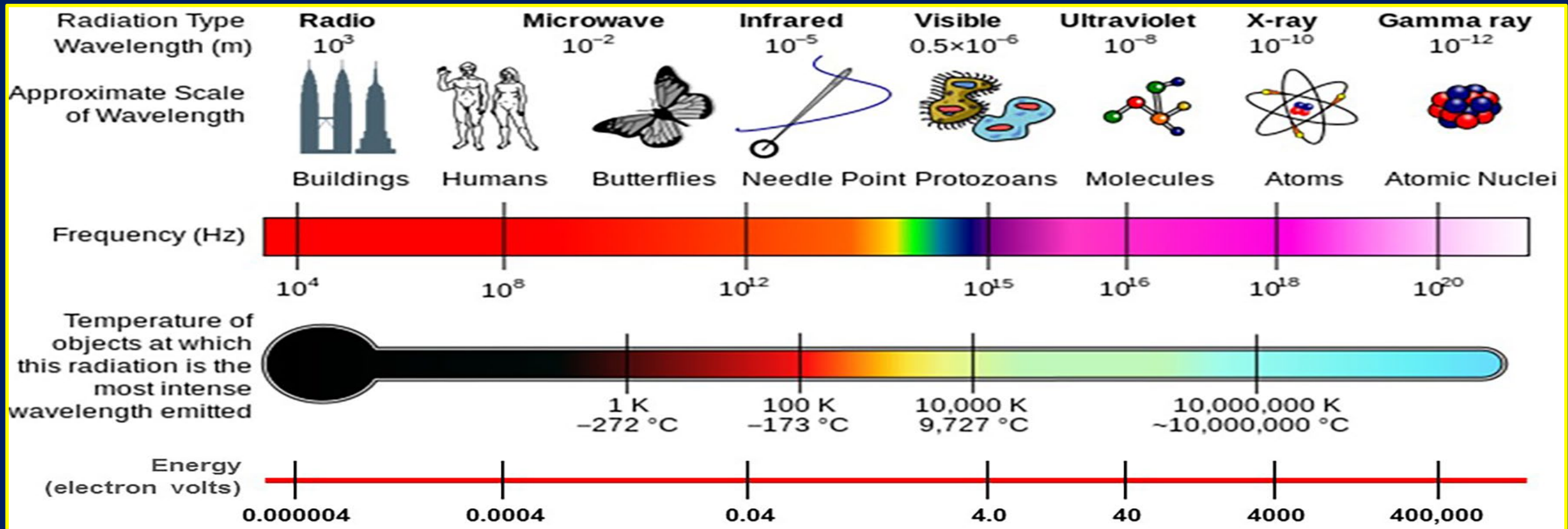


The Physical Properties of Heat are a Function of Temperature

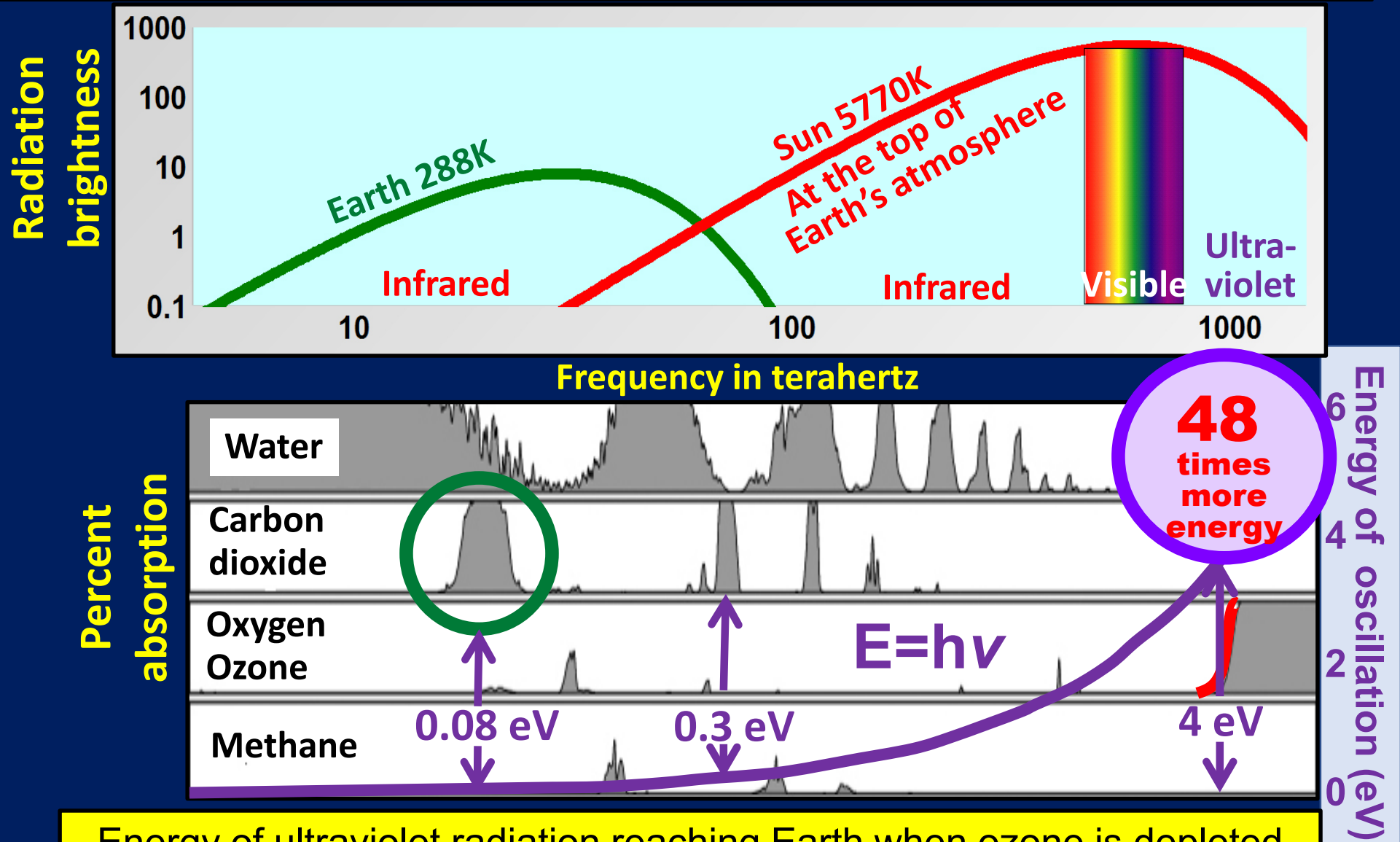


The Planck-Einstein Relation

$$E = h \nu$$

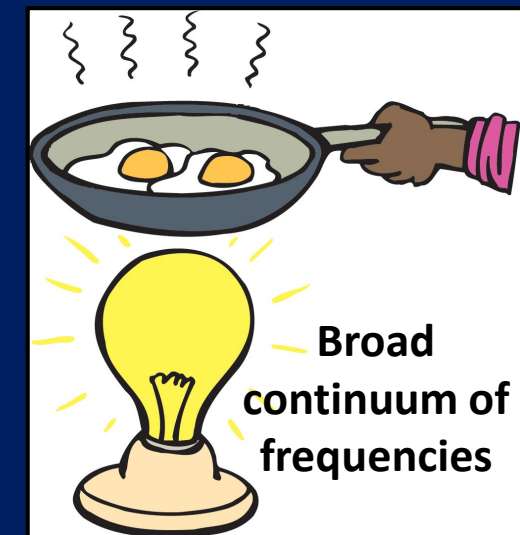
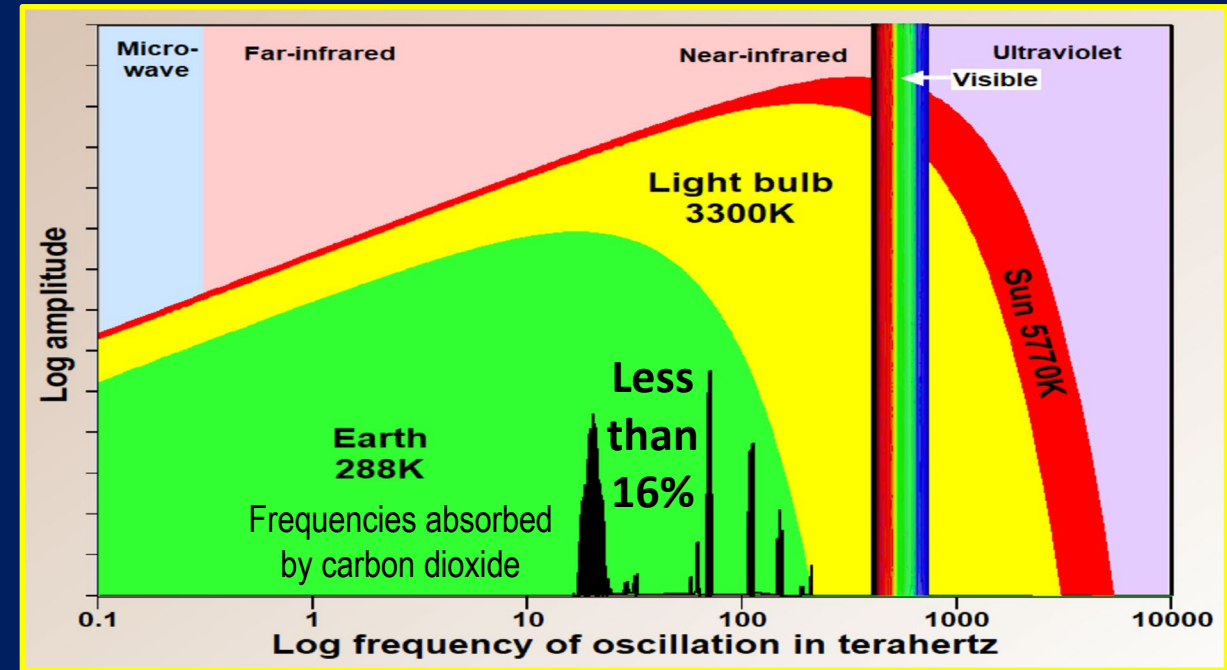
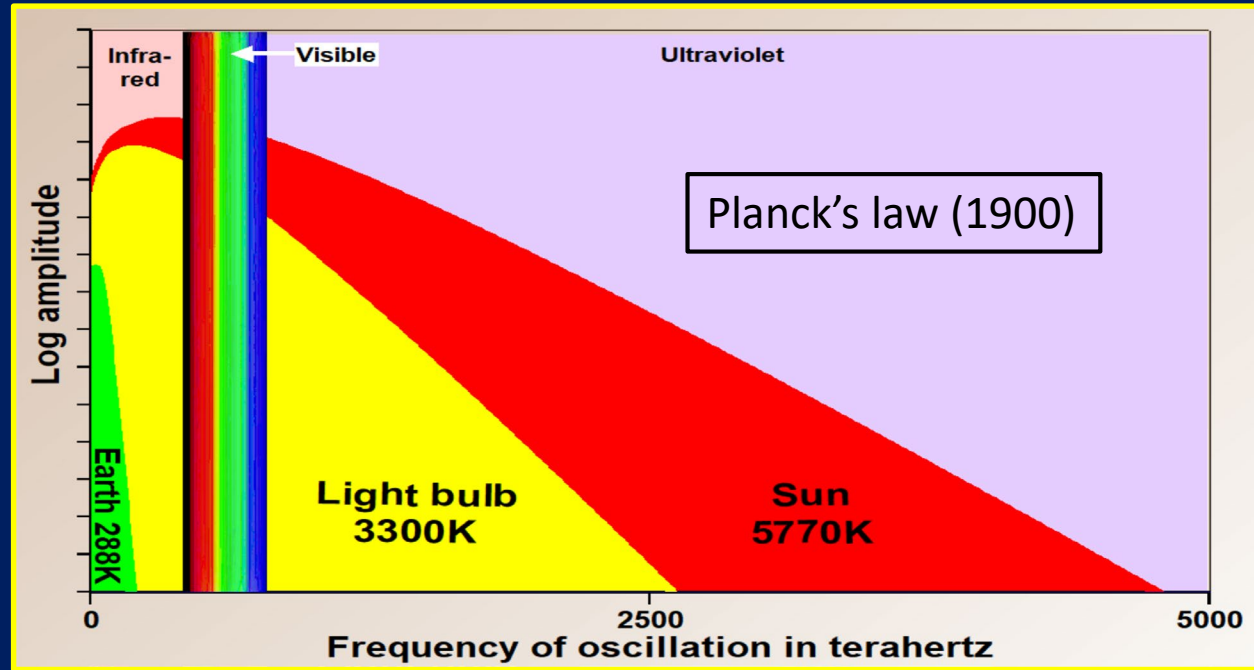


Energy absorbed by greenhouse gases



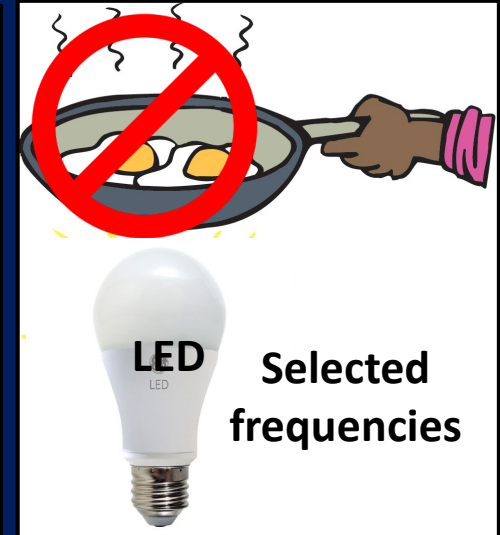
Energy of ultraviolet radiation reaching Earth when ozone is depleted is at least 48 times "hotter" than energy absorbed by greenhouse gases

Electromagnetic radiation is a broad continuum of frequencies



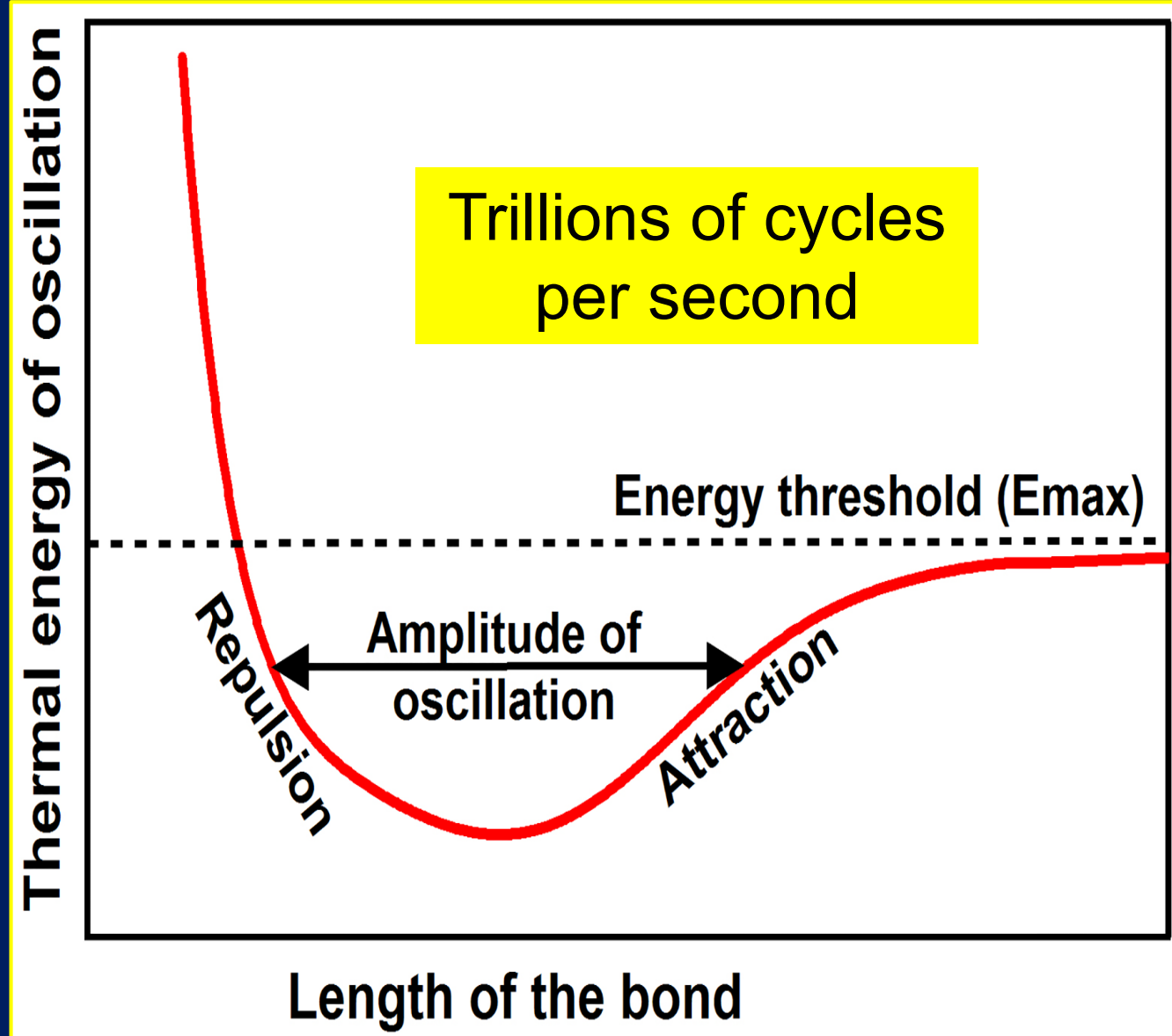
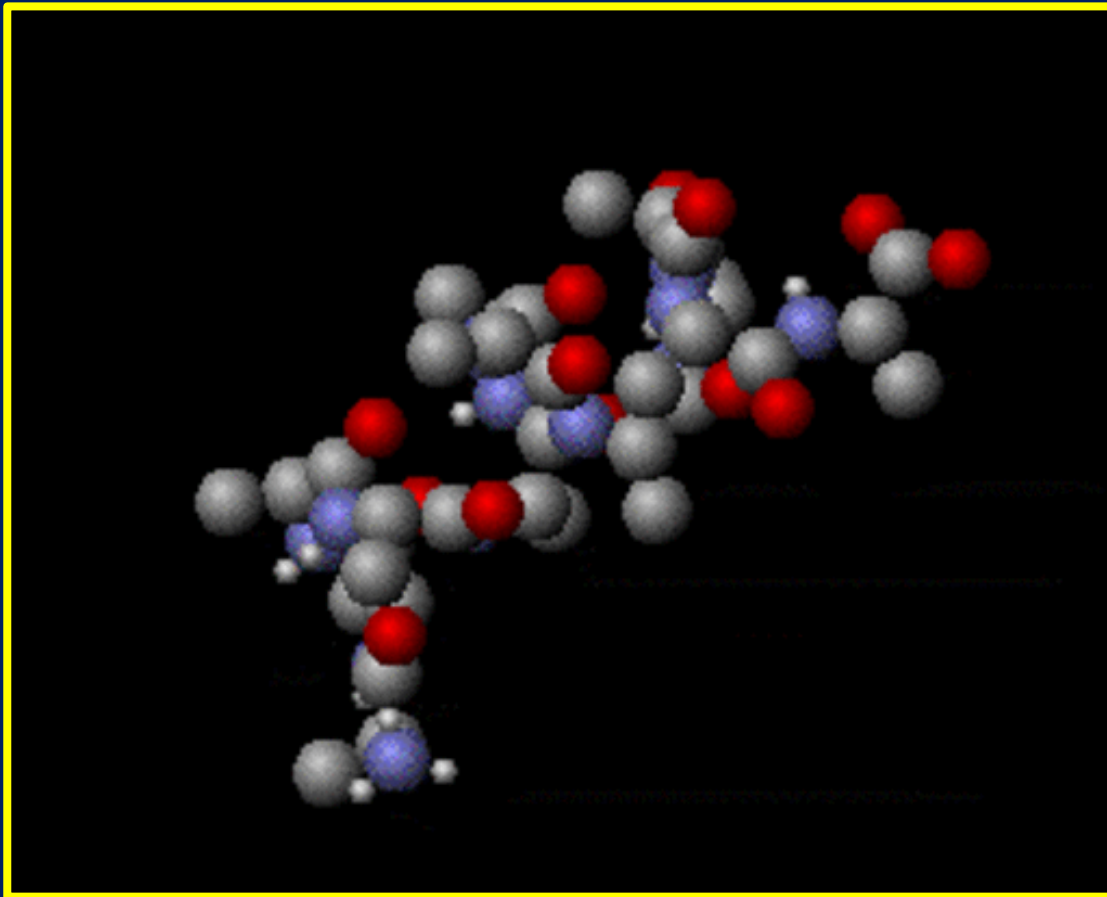
Greenhouse gases simply do not absorb a broad enough range of frequencies, that we perceive as heat, to be a significant cause of global warming.

Greenhouse-warming theory appears to be mistaken.



Frequency of oscillation of what?

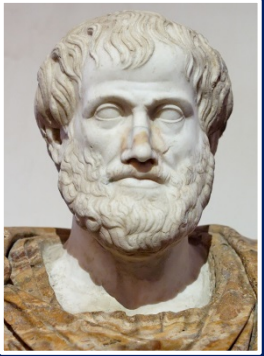
Frequency of oscillation
of all the bonds holding
matter together





**So how does heat travel
through matter and
through air and space?**

Waves



Aristotle 340 BC



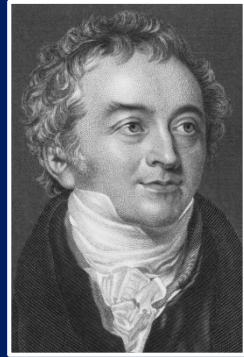
Descartes 1630



Huygens 1678



Hooke 1680



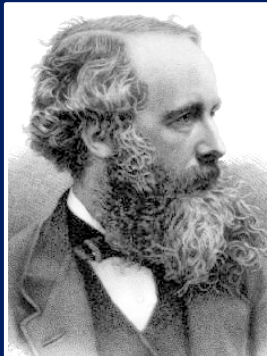
Young 1802



Fresnel 1814

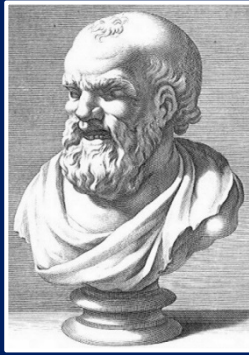


Faraday 1830

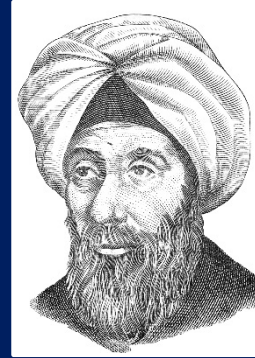


Maxwell 1865

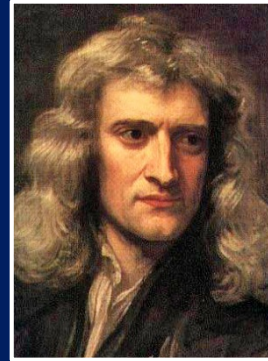
Particles



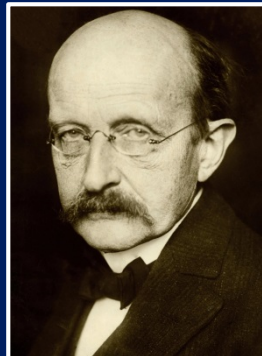
Democritus 410 BC



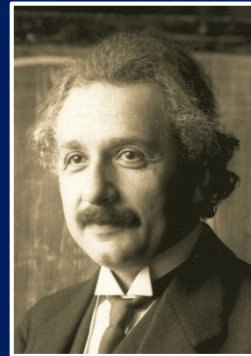
Alhazen 1000



Newton 1702

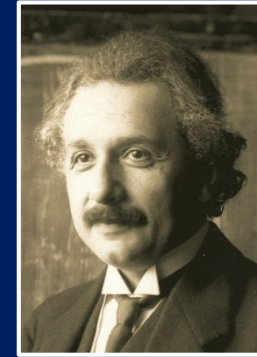


Planck 1900

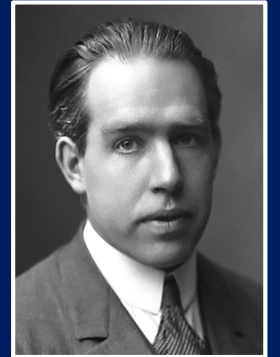


Einstein 1905

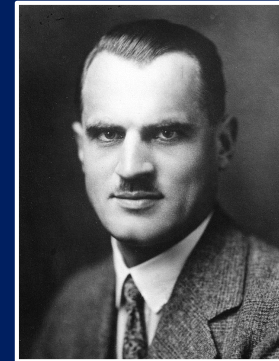
Wave particle duality



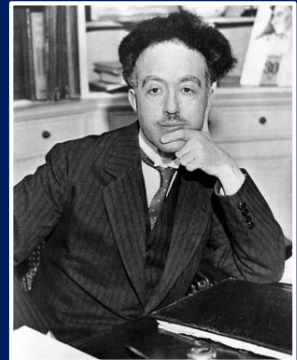
Einstein 1905



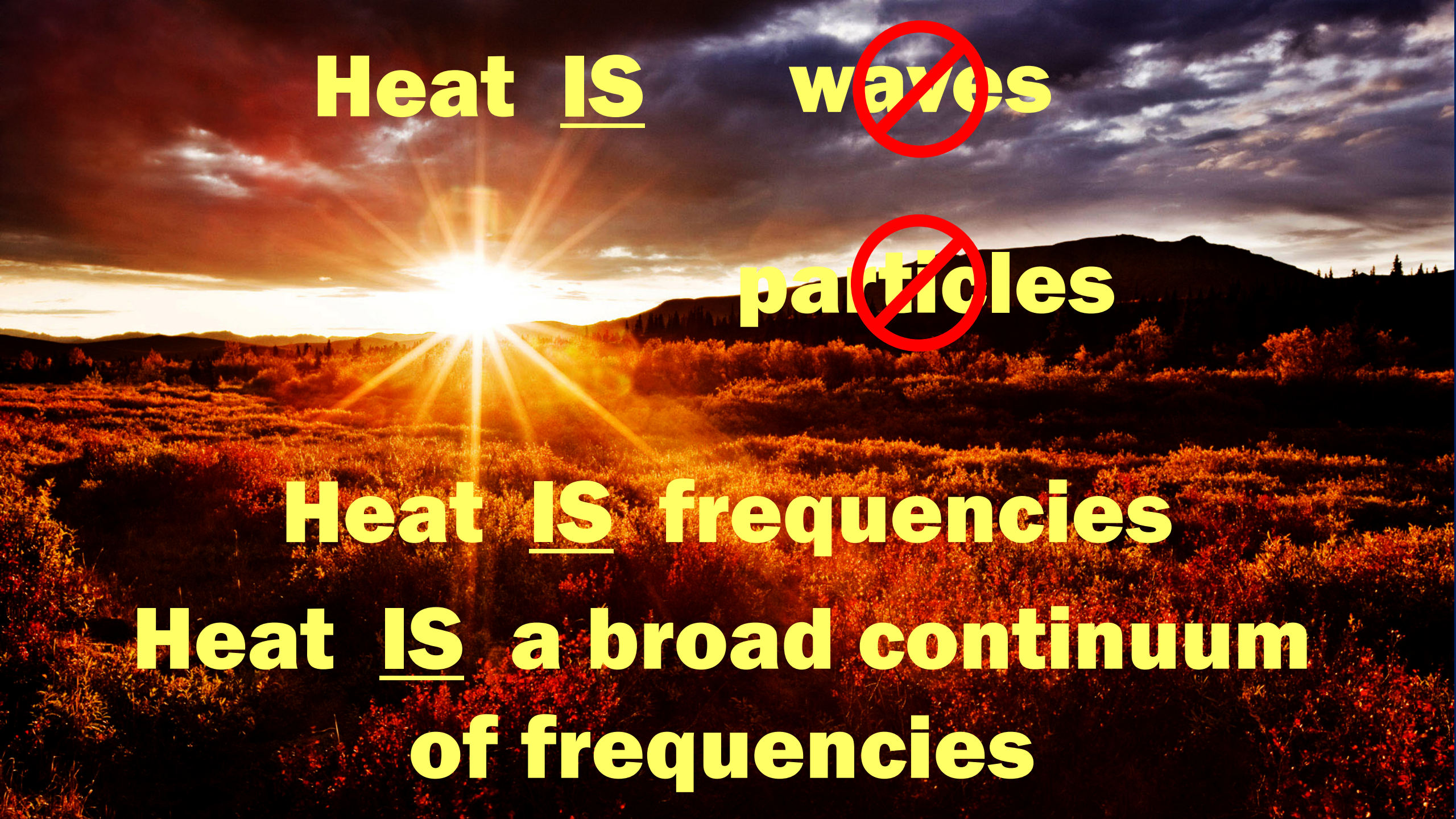
Bohr 1912



Compton 1922



de Broglie 1924



Heat IS waves

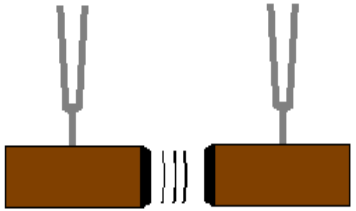
particles

Heat IS frequencies

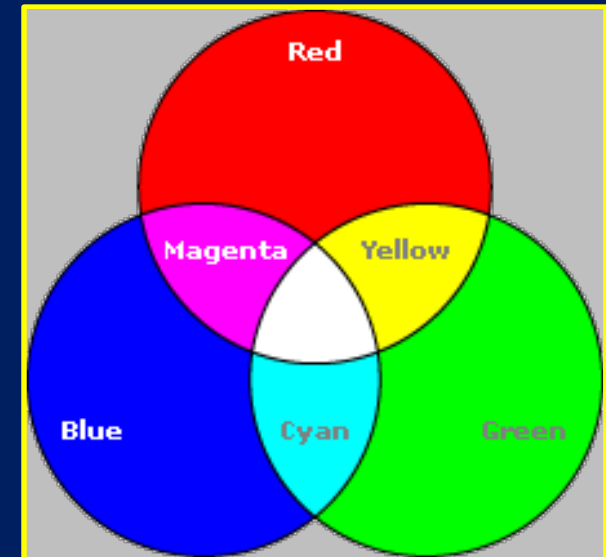
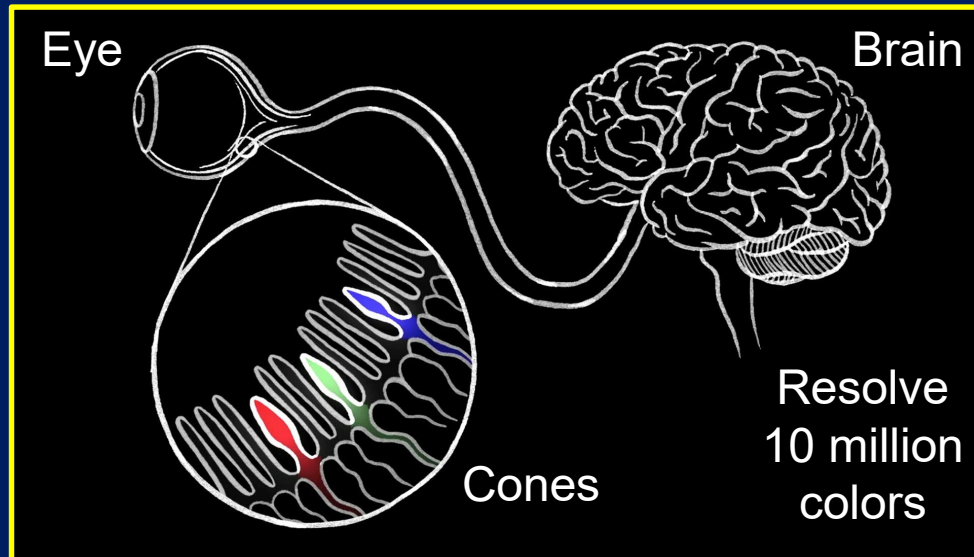
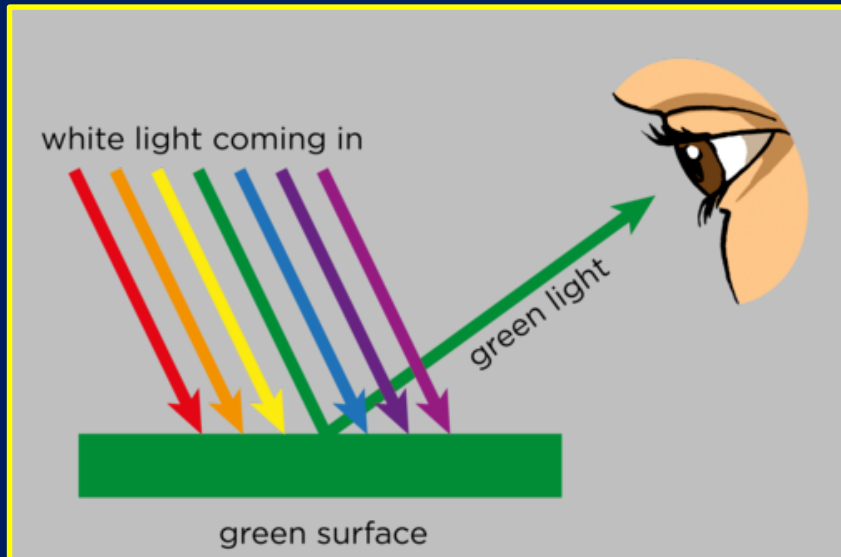
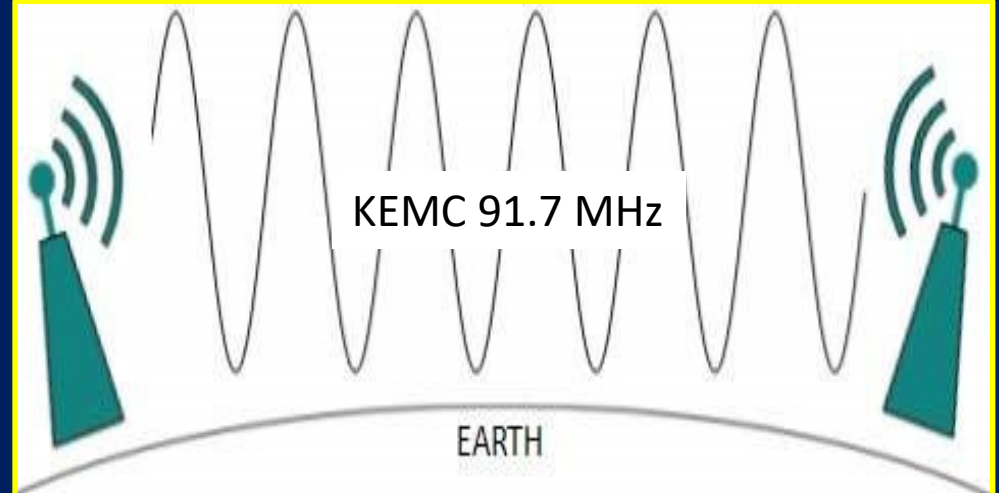
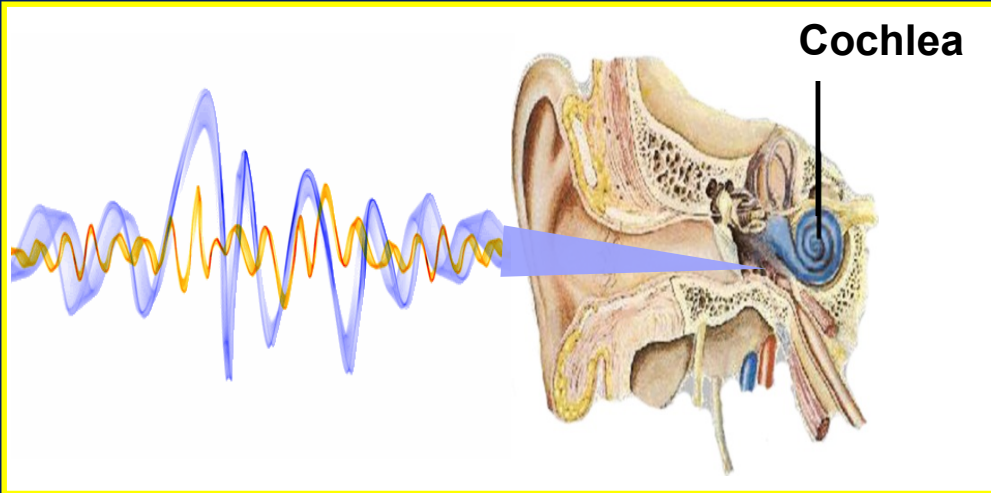
**Heat IS a broad continuum
of frequencies**

The amplitude of oscillation at each frequency of oscillation travels by resonance

Sympathetic oscillations

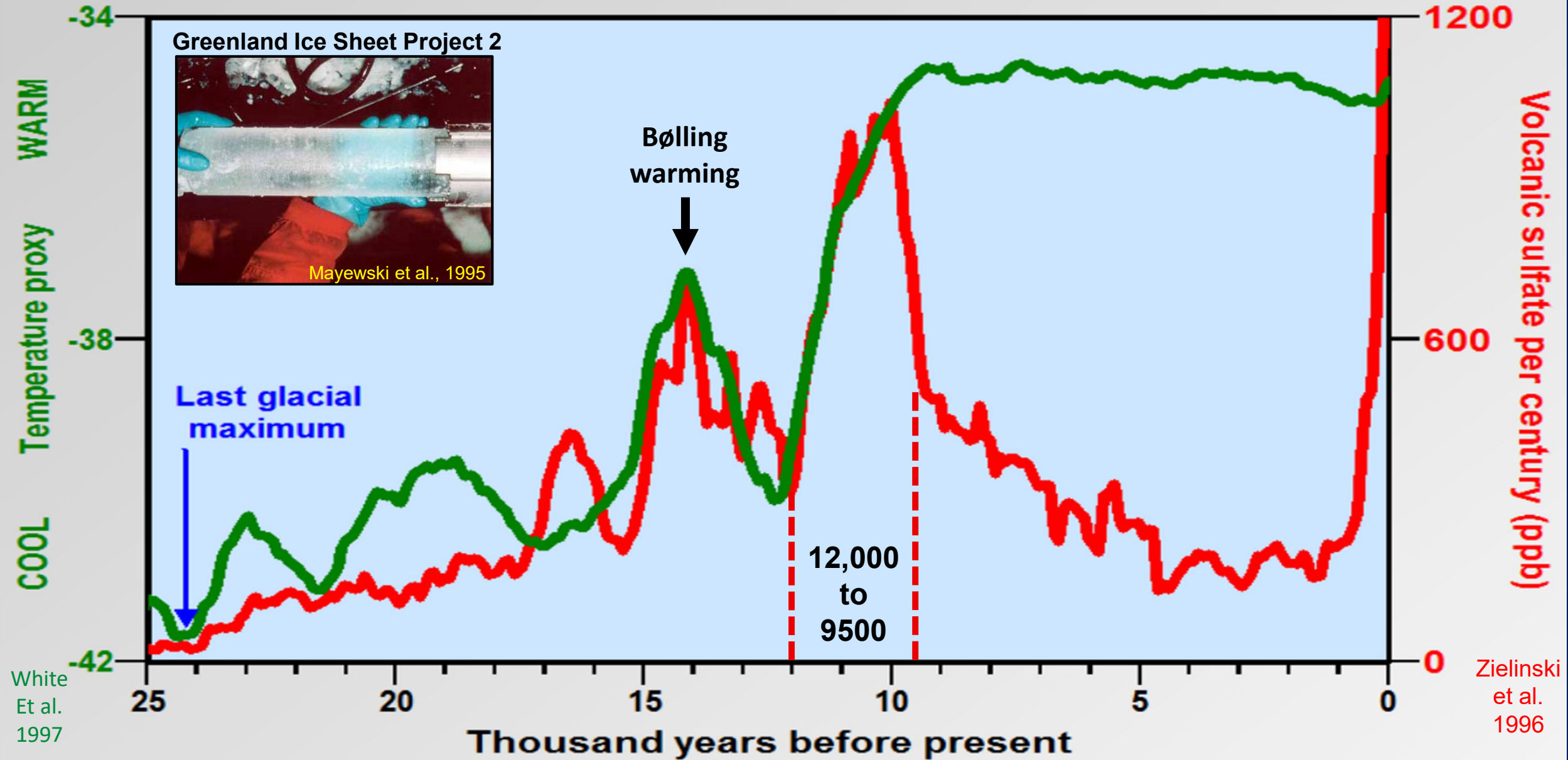


Tuning forks

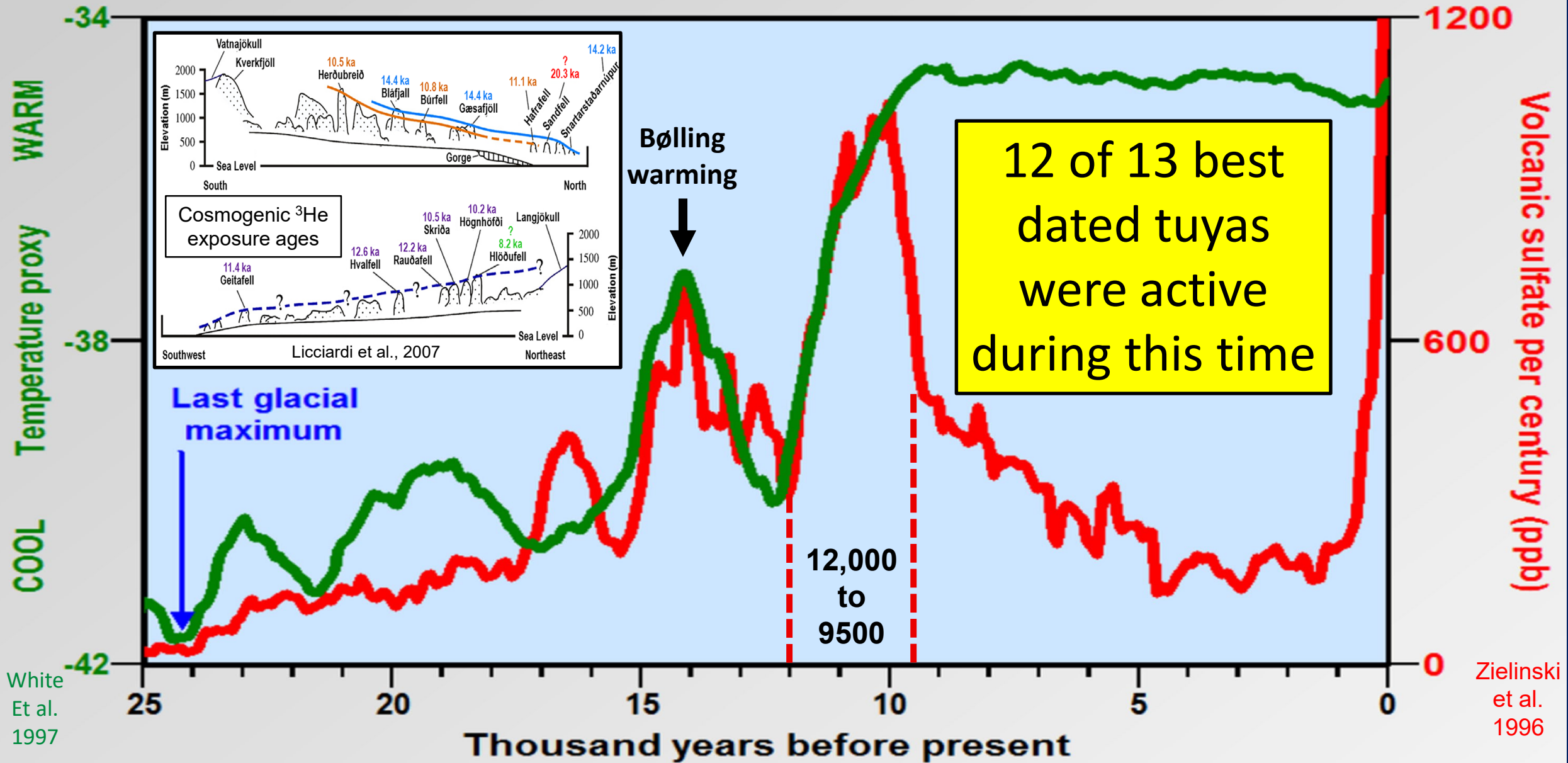


So what causes global warming
and
what causes global cooling?

The enigma: Volcanism ended the last ice age



Basaltic volcanism ended the last ice age





Bárðarbunga 2014

Aerially
extensive
flood-basaltic
eruptions

versus

Aerosol
forming
explosive
eruptions



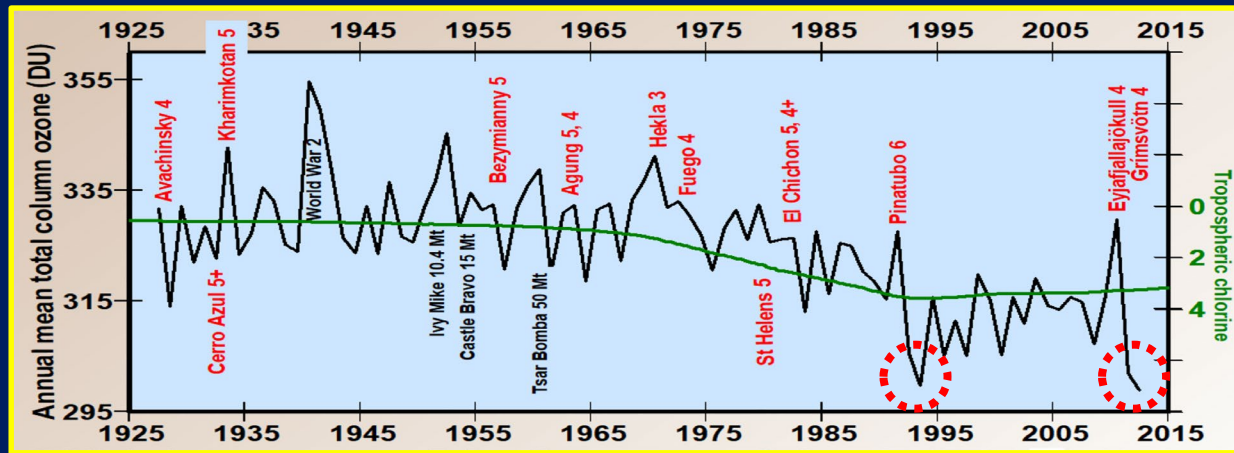
Pinatubo 1991

Occur in rift zones

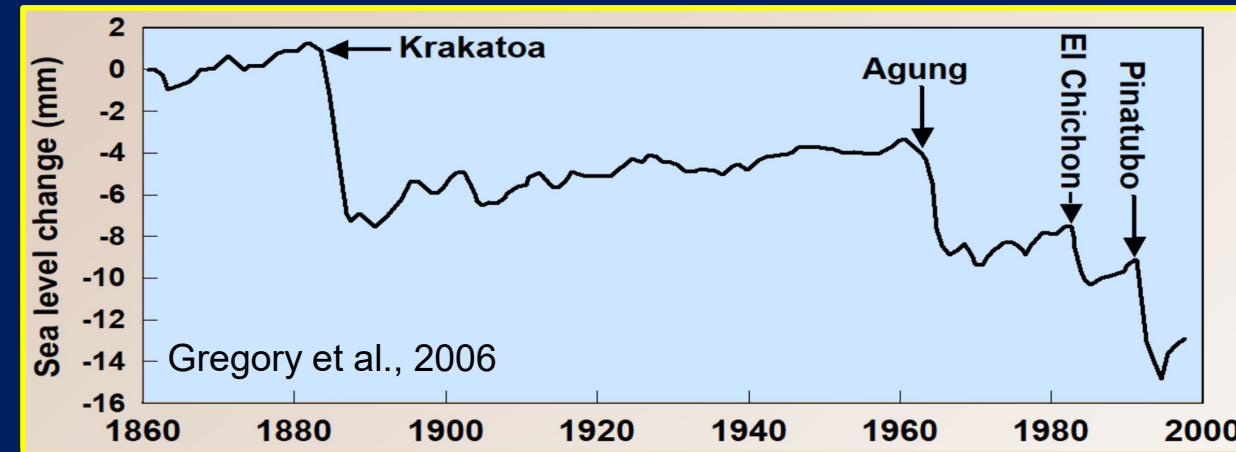
Occur above subduction zones

Chlorine and bromine deplete ozone, warming
Earth **GLOBALLY** many degrees within years

Form aerosols cooling Earth
GLOBALLY $\sim 0.5^{\circ}\text{C}$ for ~ 3 years

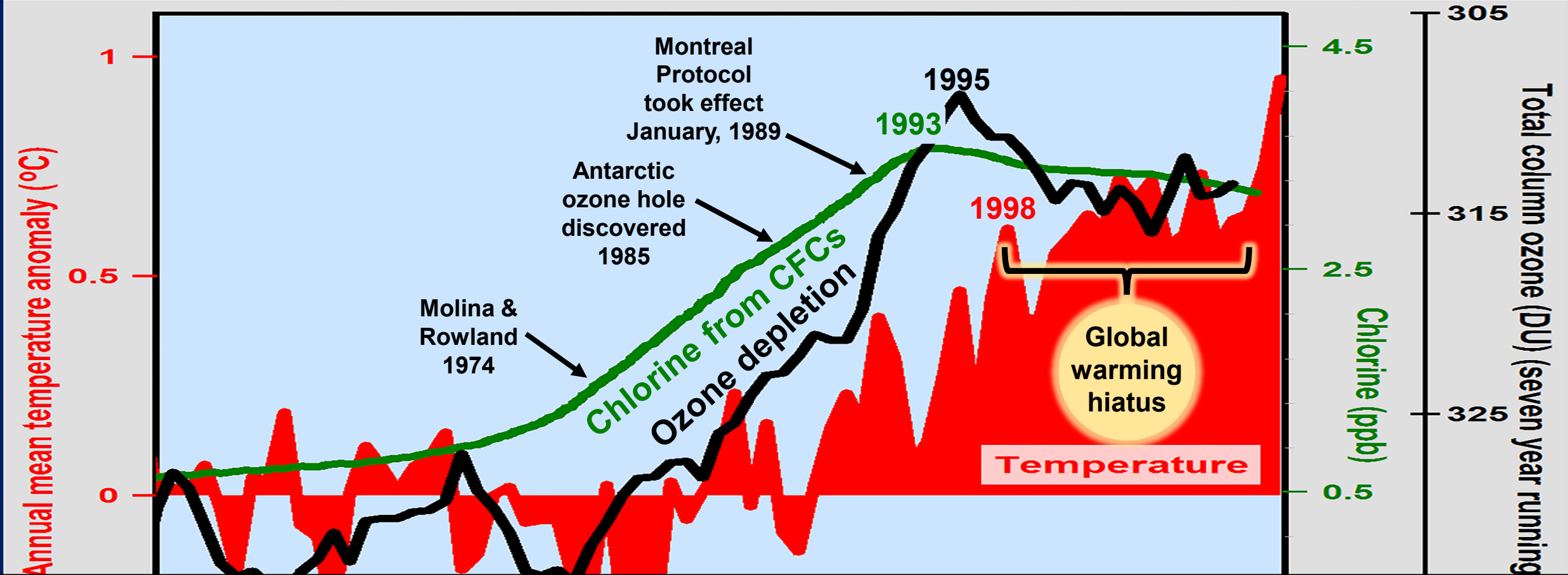


Amount of global warming is determined
by the duration and aerial extent



Amount of global cooling is determined
by the number of eruptions per century

Human-caused global warming



Increasing CFCs caused increasing warming from 1970 to 1998
The Montreal protocol stopped the increases
BUT ozone remained depleted

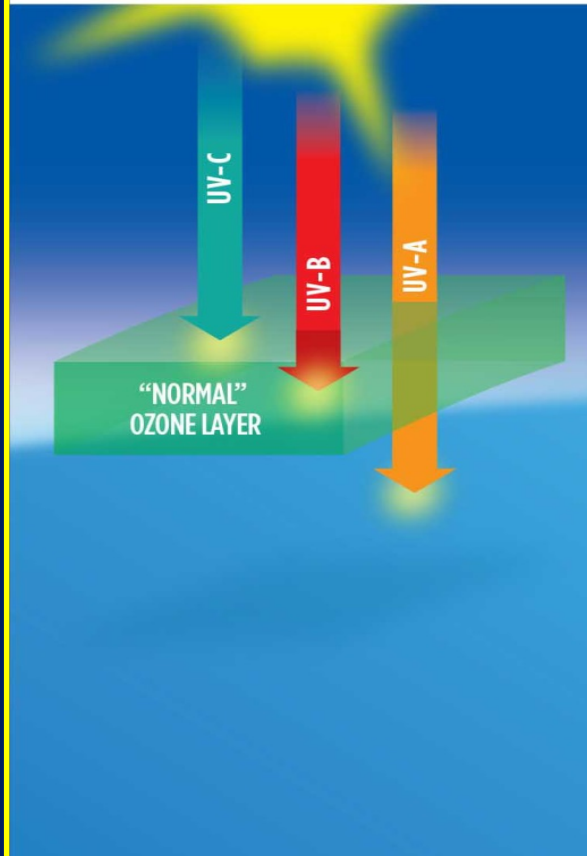
The effects of ozone depletion and of aerosols

NORMAL CONDITIONS

UV-C keeps atmosphere warm

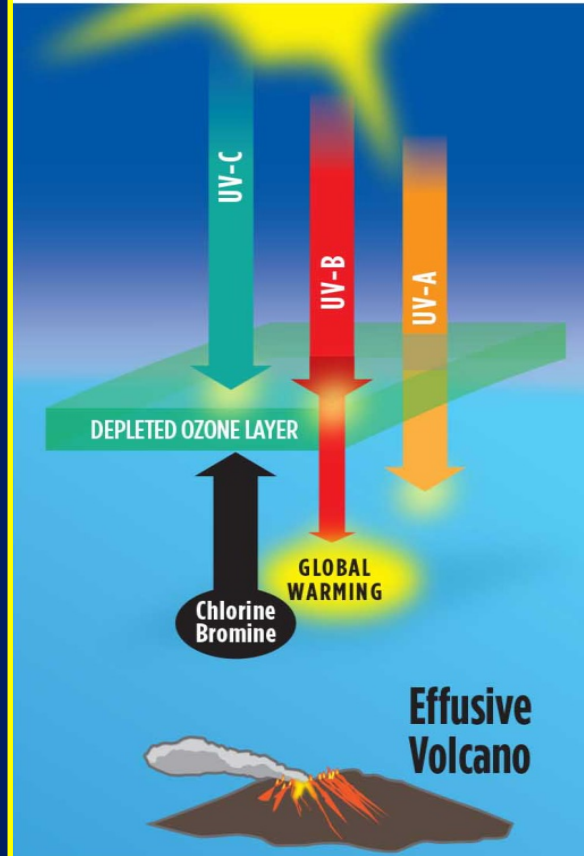
UV-B keeps ozone layer warm

UV-A & sunlight keeps Earth warm



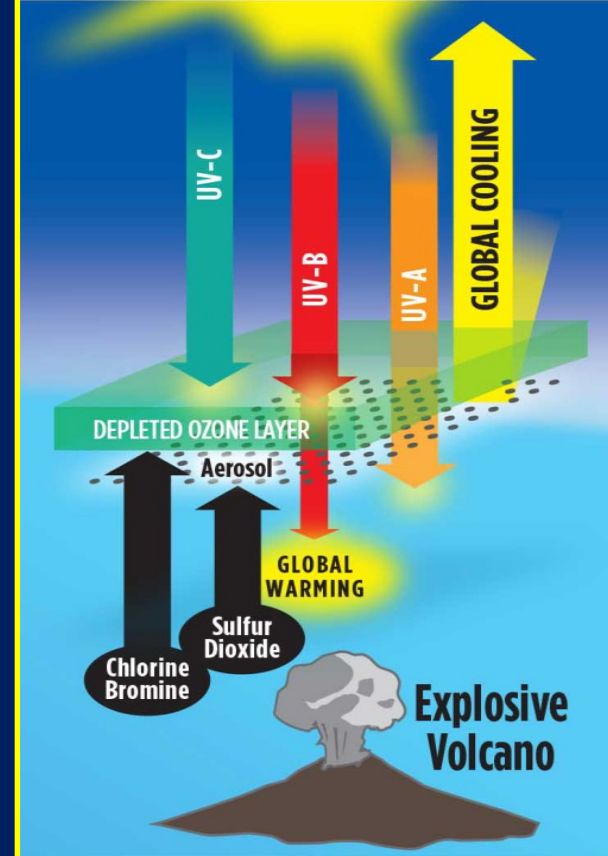
GLOBAL WARMING

Volcanoes release **Chlorine & Bromine**
depleting ozone
cooling ozone layer & warming Earth



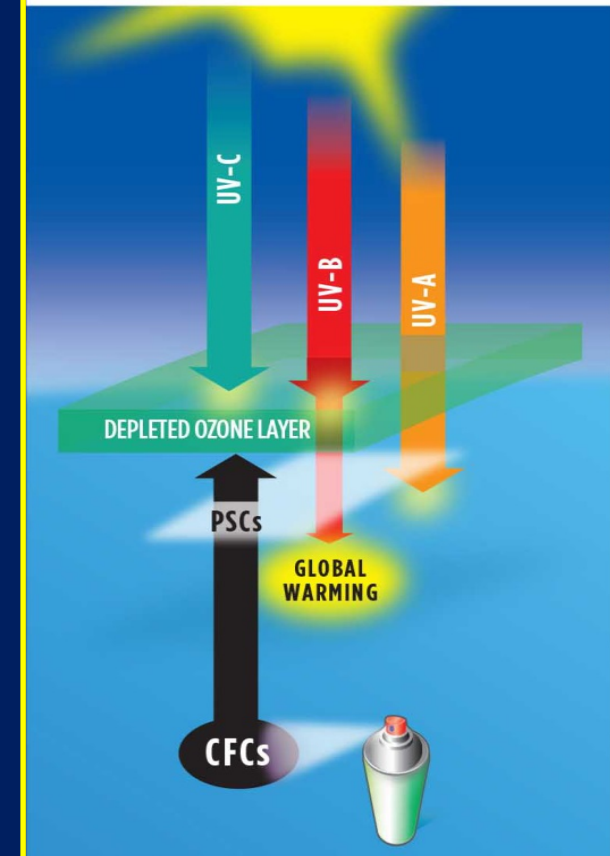
GLOBAL COOLING

Explosive volcanoes also eject
Sulfur Dioxide into stratosphere
forming aerosols that reflect & disperse
sunlight causing net cooling of Earth

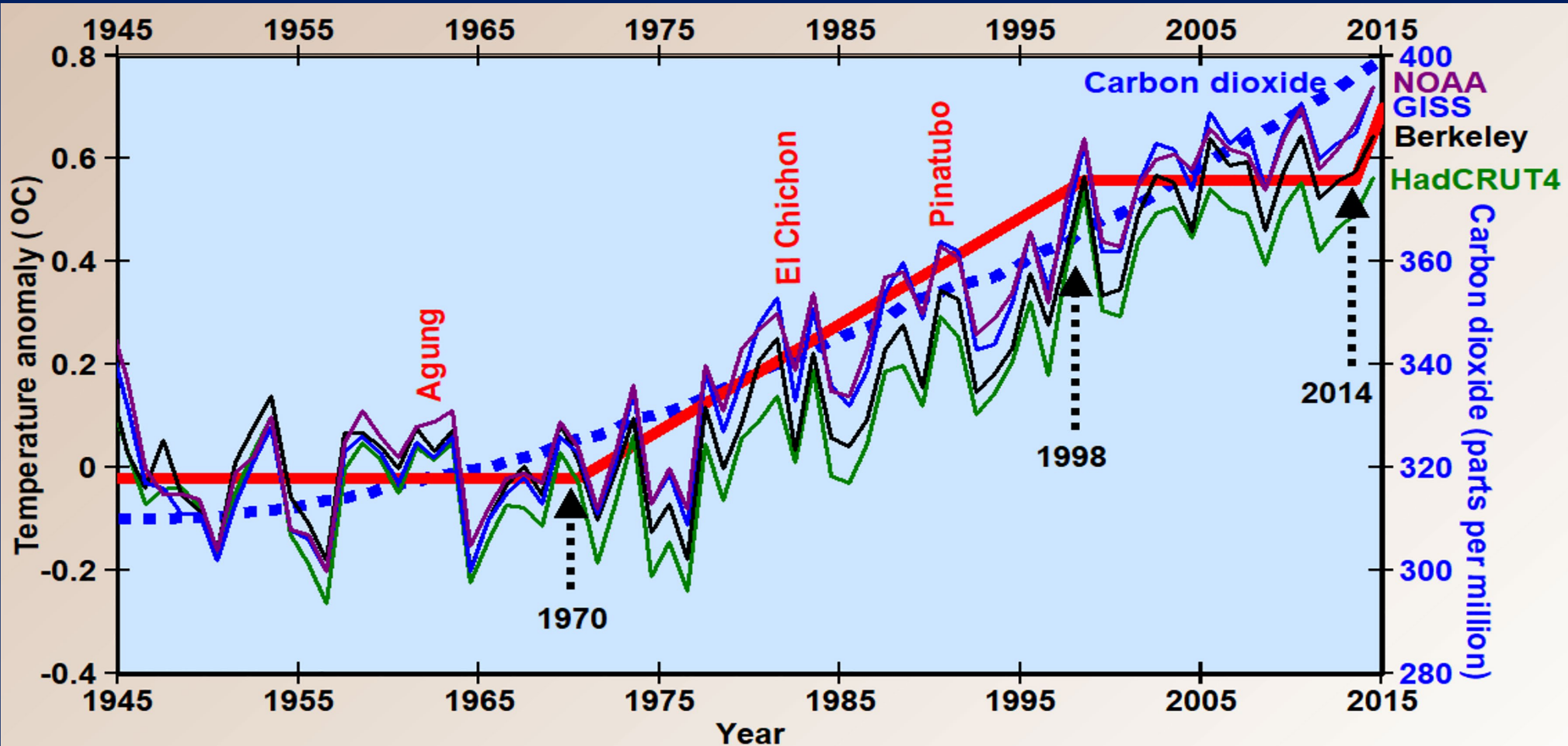


GLOBAL WARMING

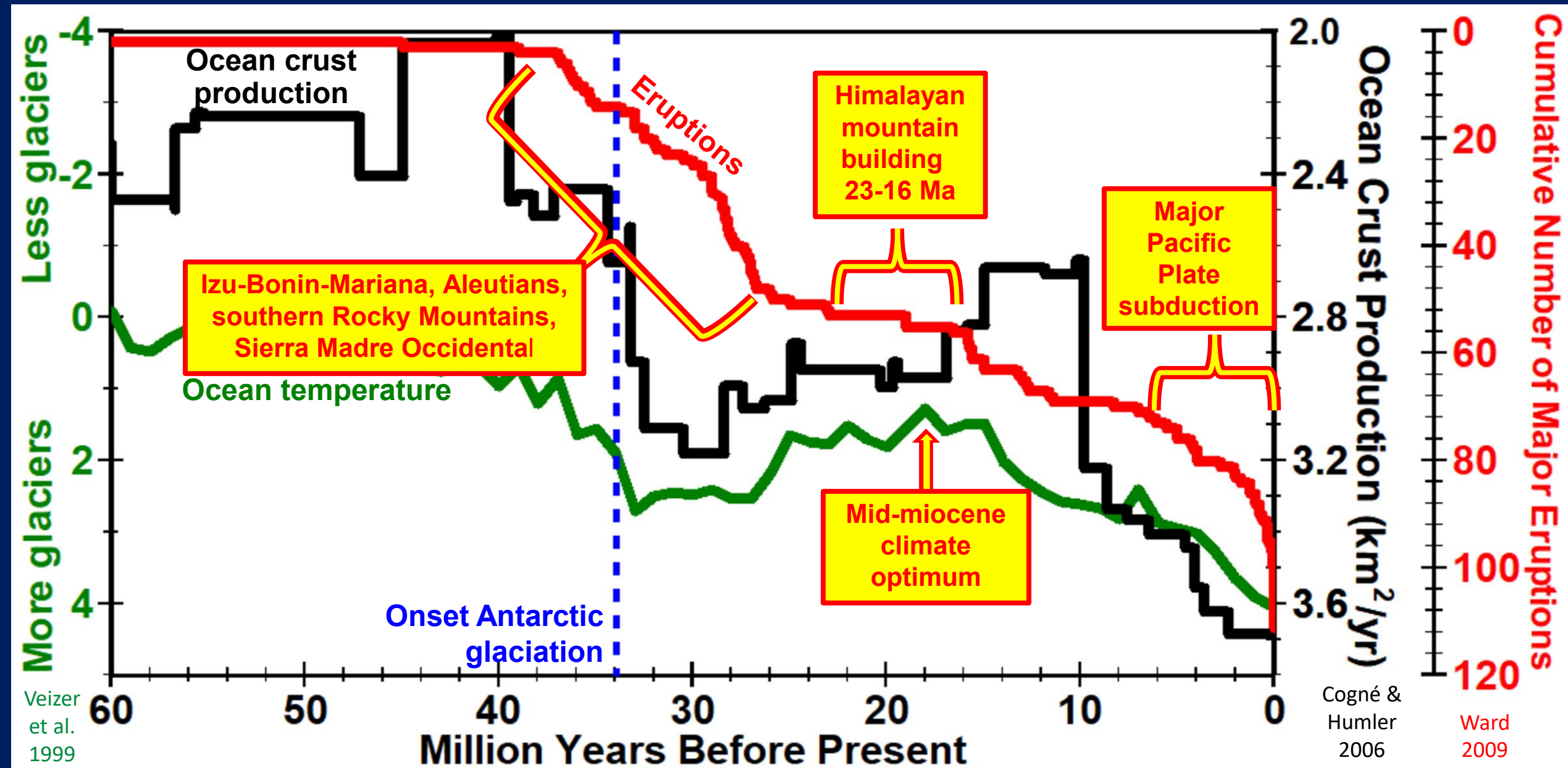
CFCs in polar stratospheric
clouds (PSCs) release chlorine
depleting ozone
cooling ozone layer & warming Earth



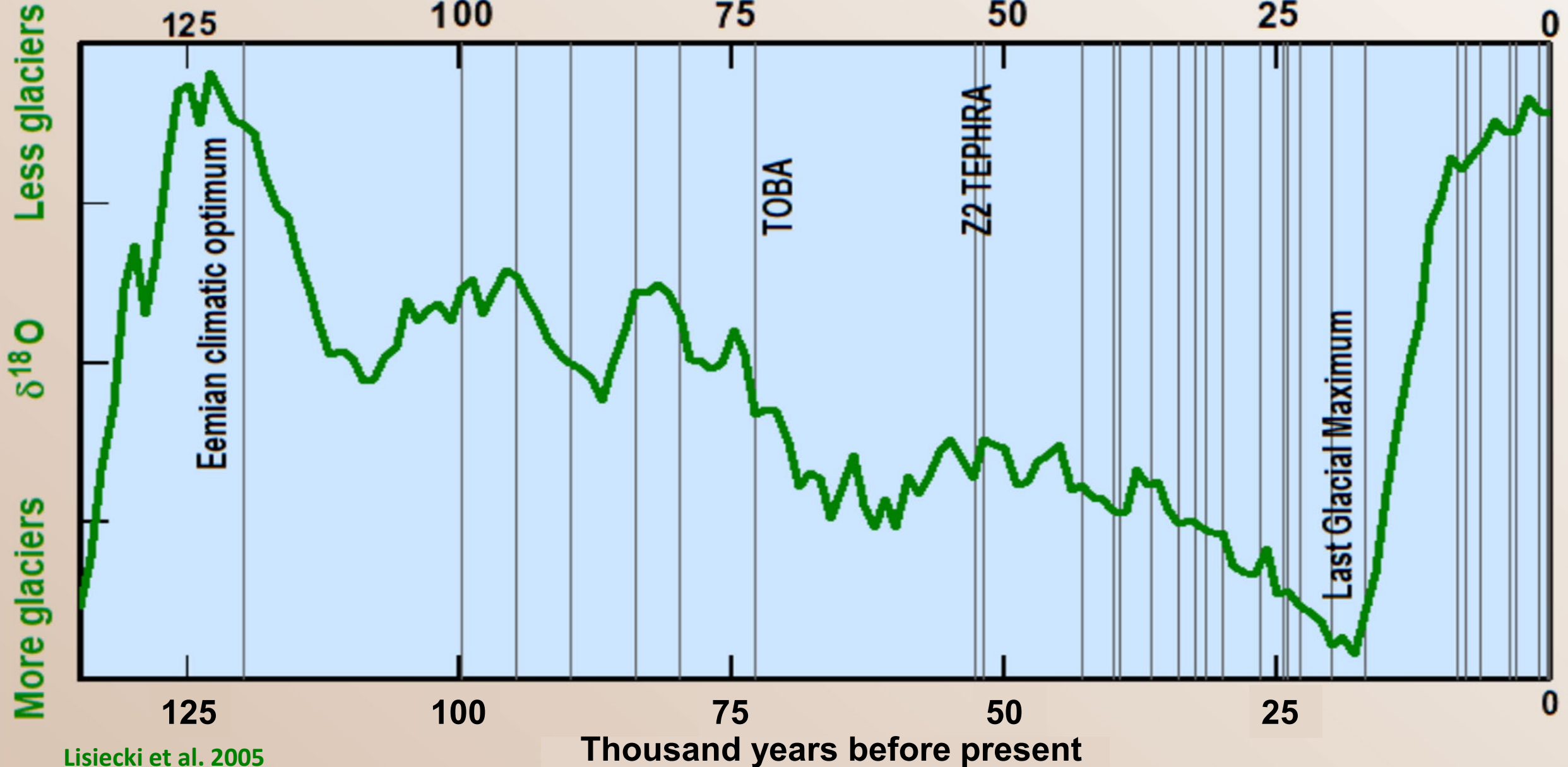
Changes in temperature trends



Major cooling when there is major subduction

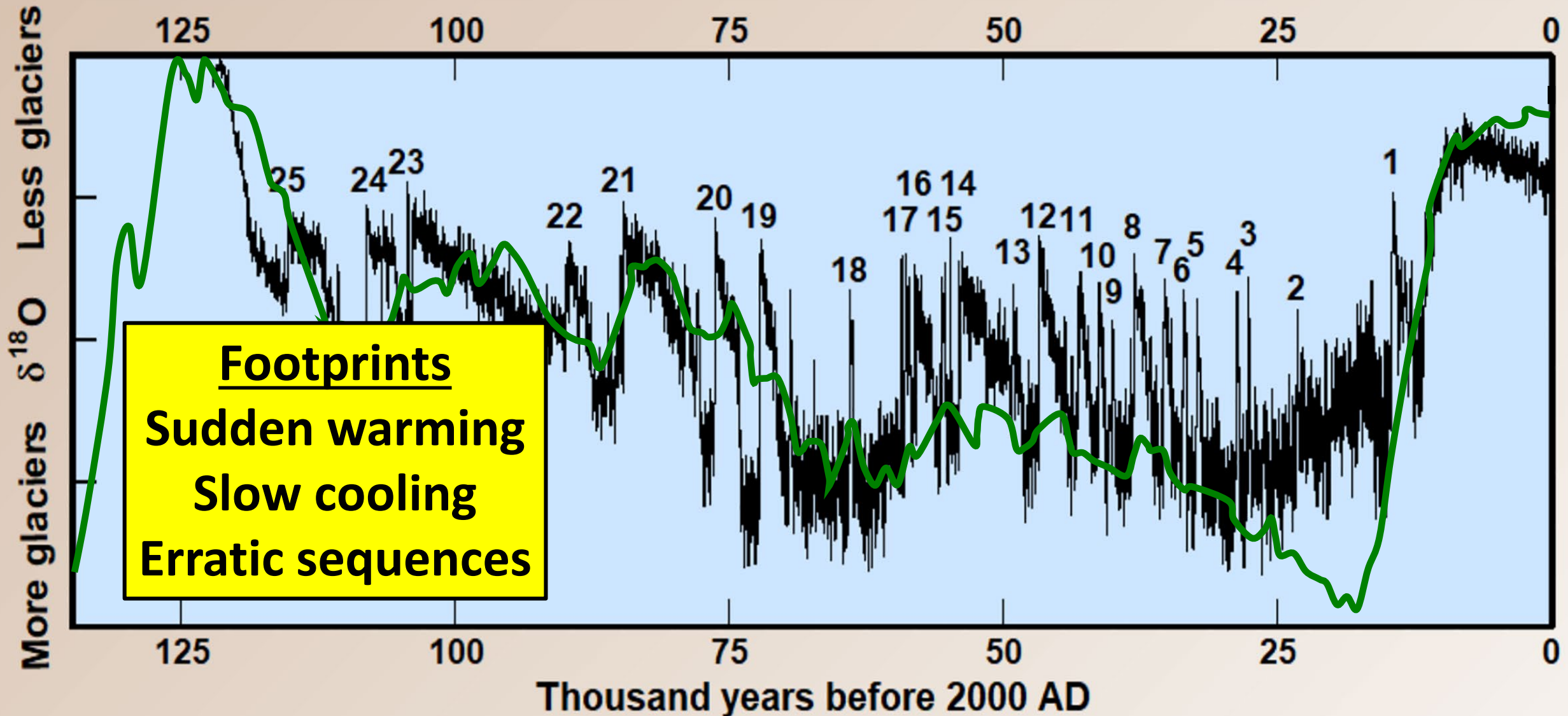


Stack of 57 globally distributed deep sea $\delta^{18}\text{O}$ records

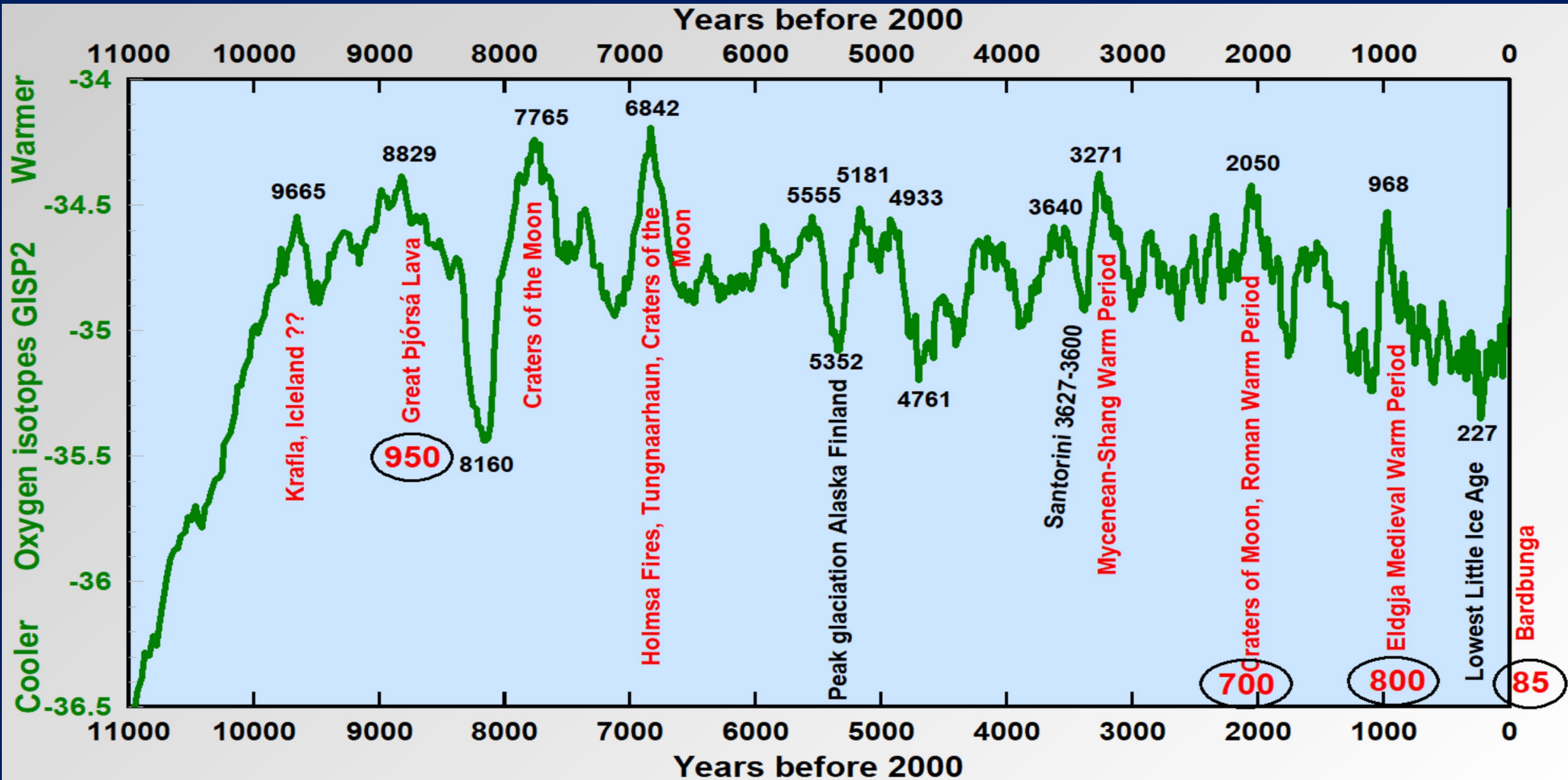


Erratic sequences of rapid warming followed by slower cooling

Dansgaard-Oeschger events observed in Greenland ice

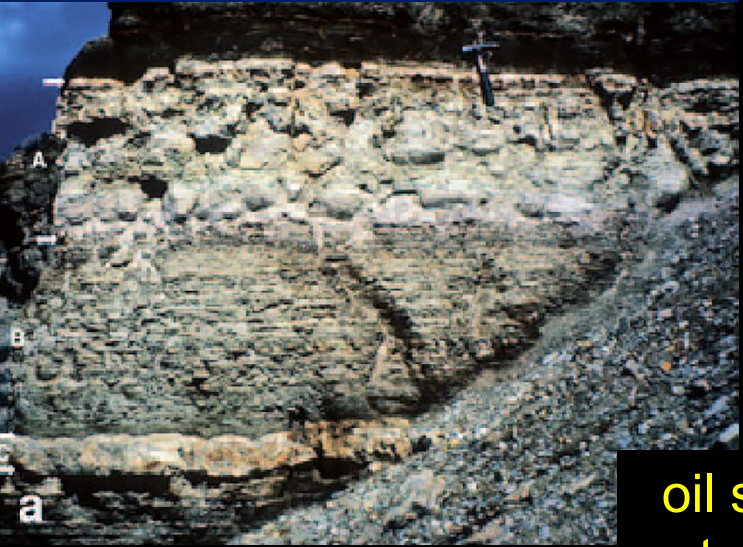


Holocene temperatures and volcanism

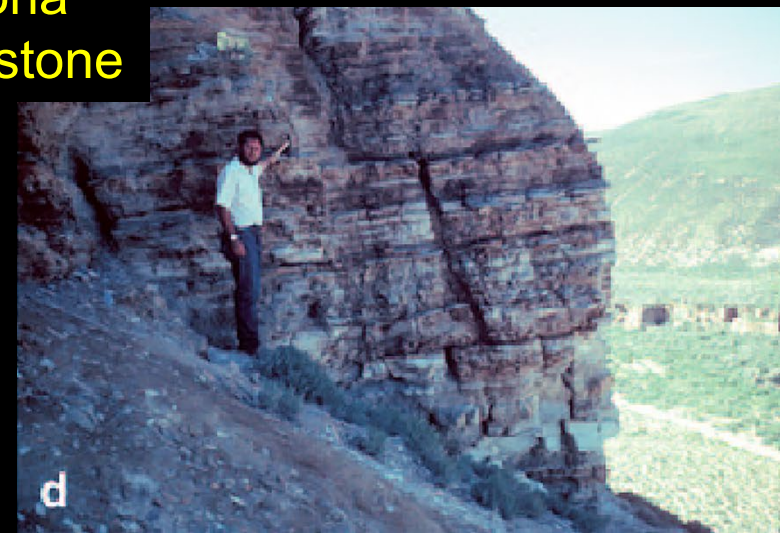
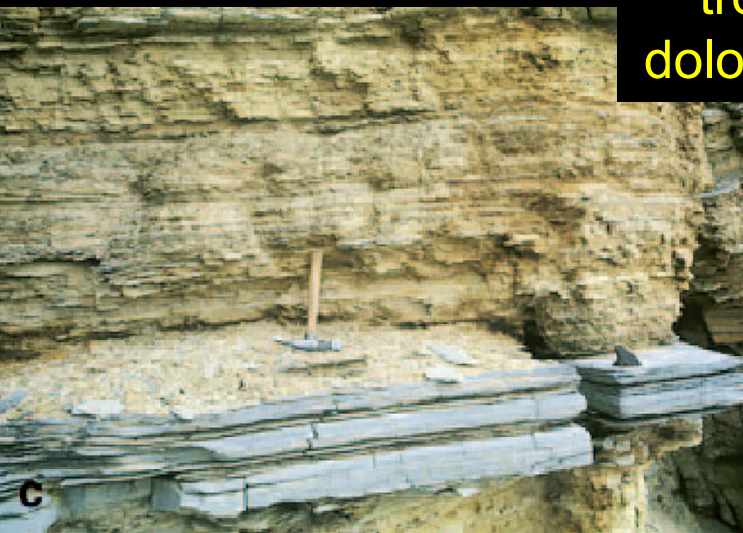


Eocene Green River Formation in Wyoming

53 to 48 million years ago



oil shale
trona
dolostone

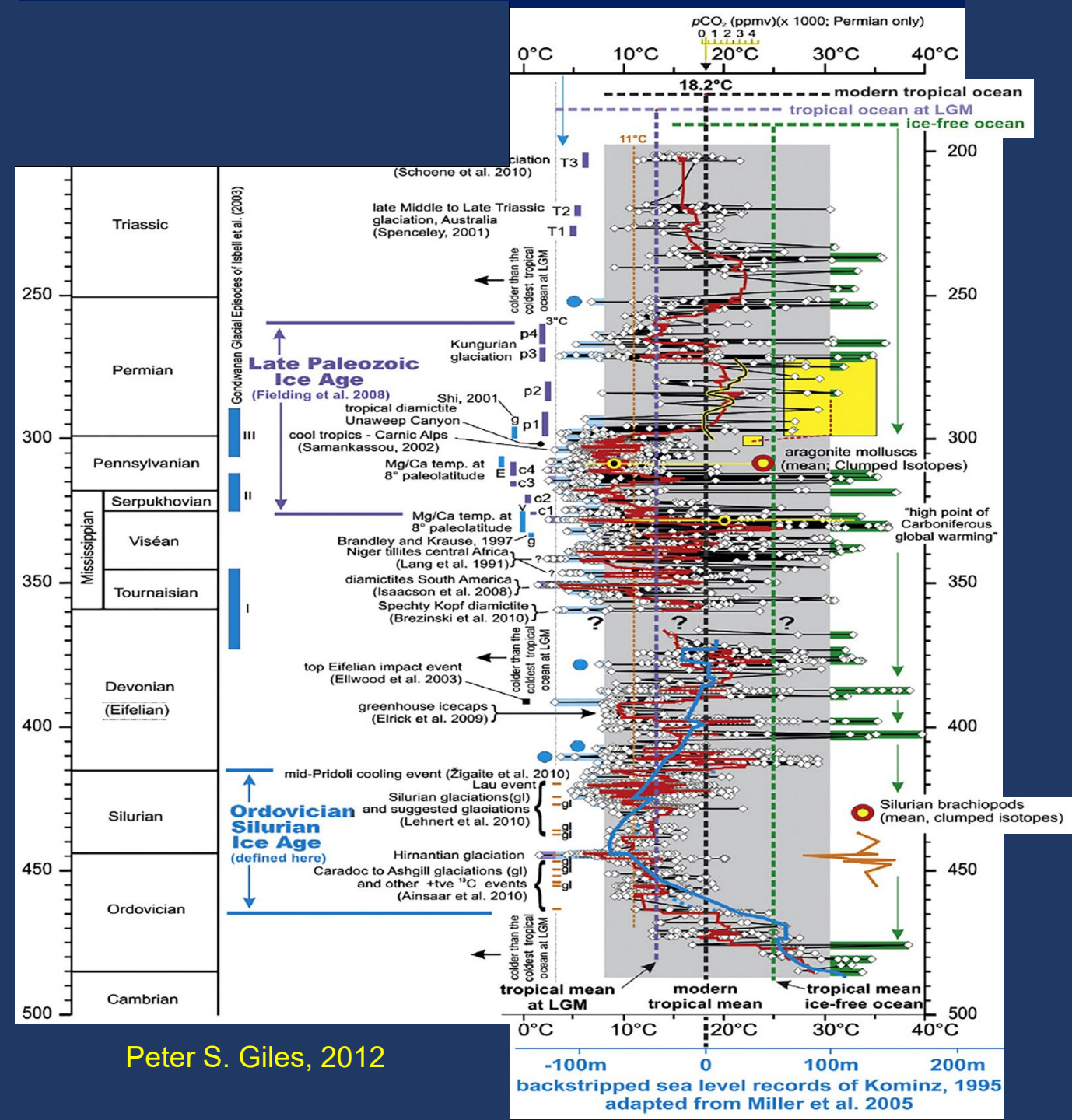


Mud Lake
Florida
Oil shale

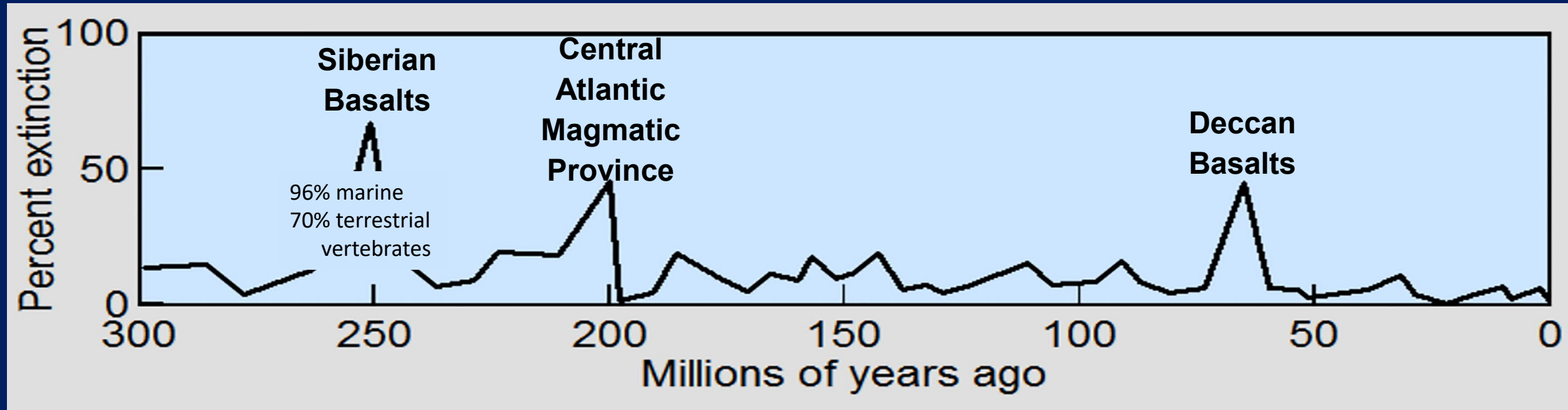
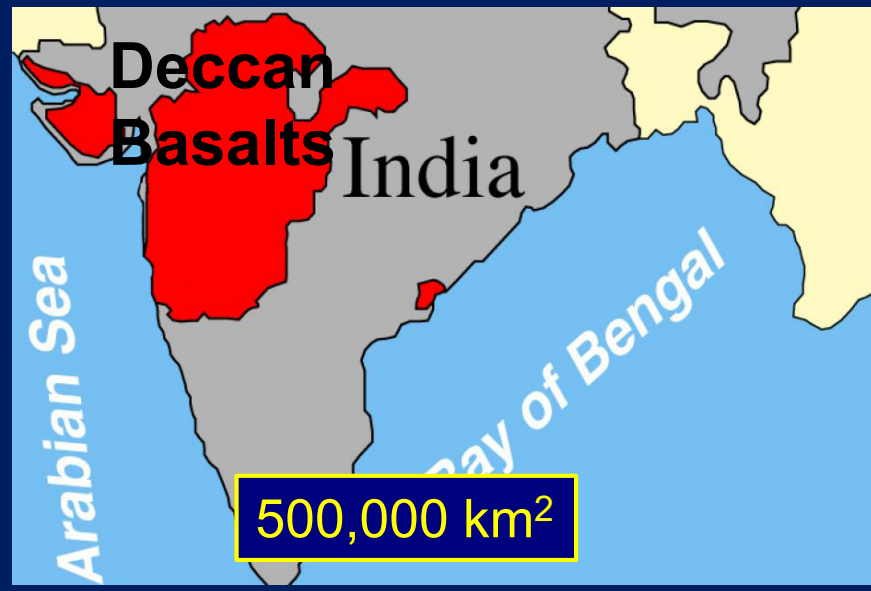
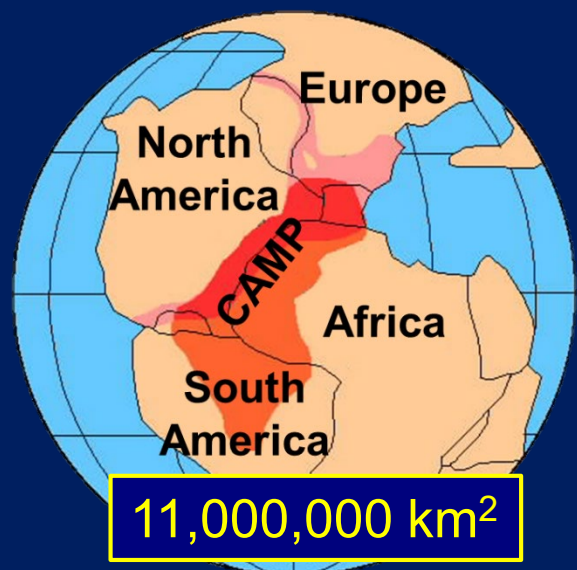


Lake Magadi,
Kenya, Trona

Paleozoic brachiopod habitat temperatures

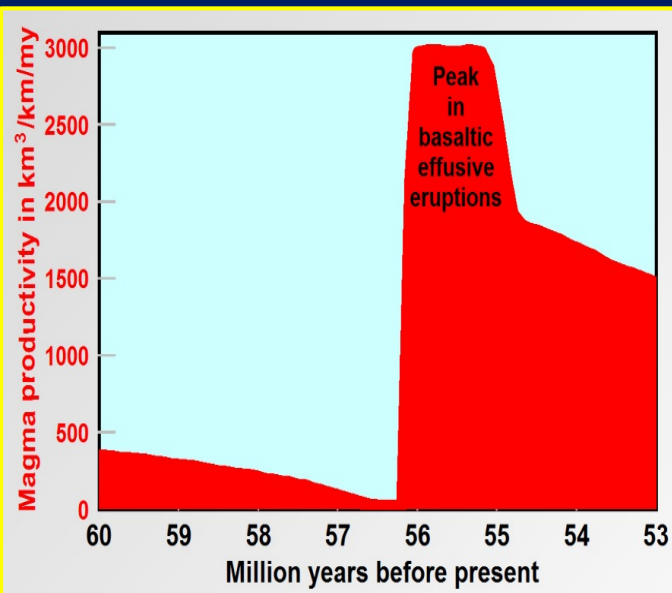


Examples of flood basalts and large igneous provinces

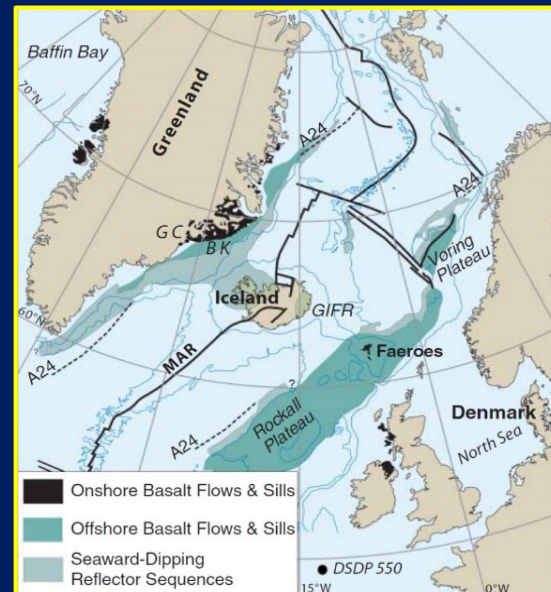


Paleocene-Eocene Thermal Maximum

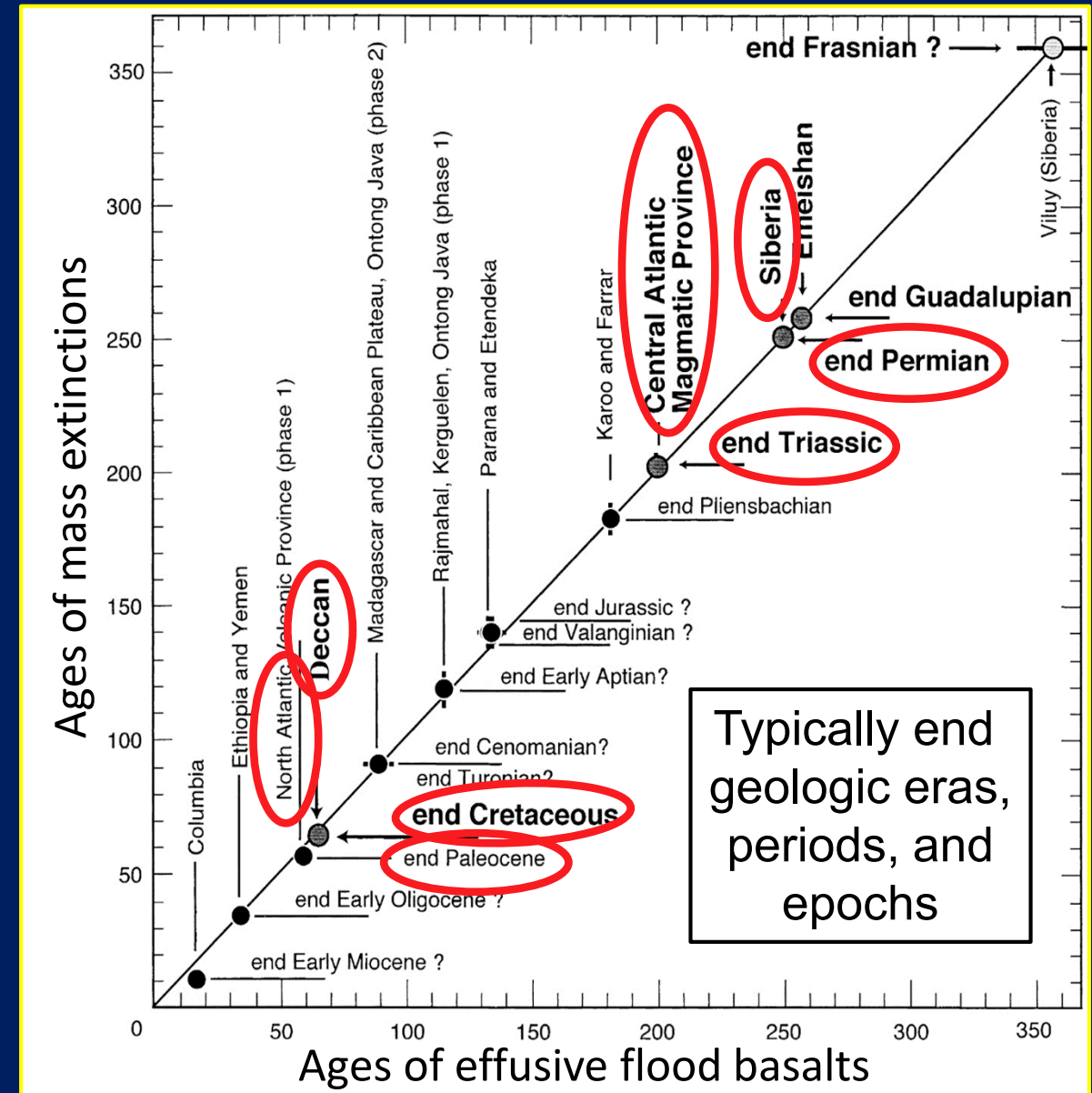
Extrusion of basaltic magma reached a peak 56 million years ago during the rifting of the Greenland-Norwegian Sea



Storey et al. 2007

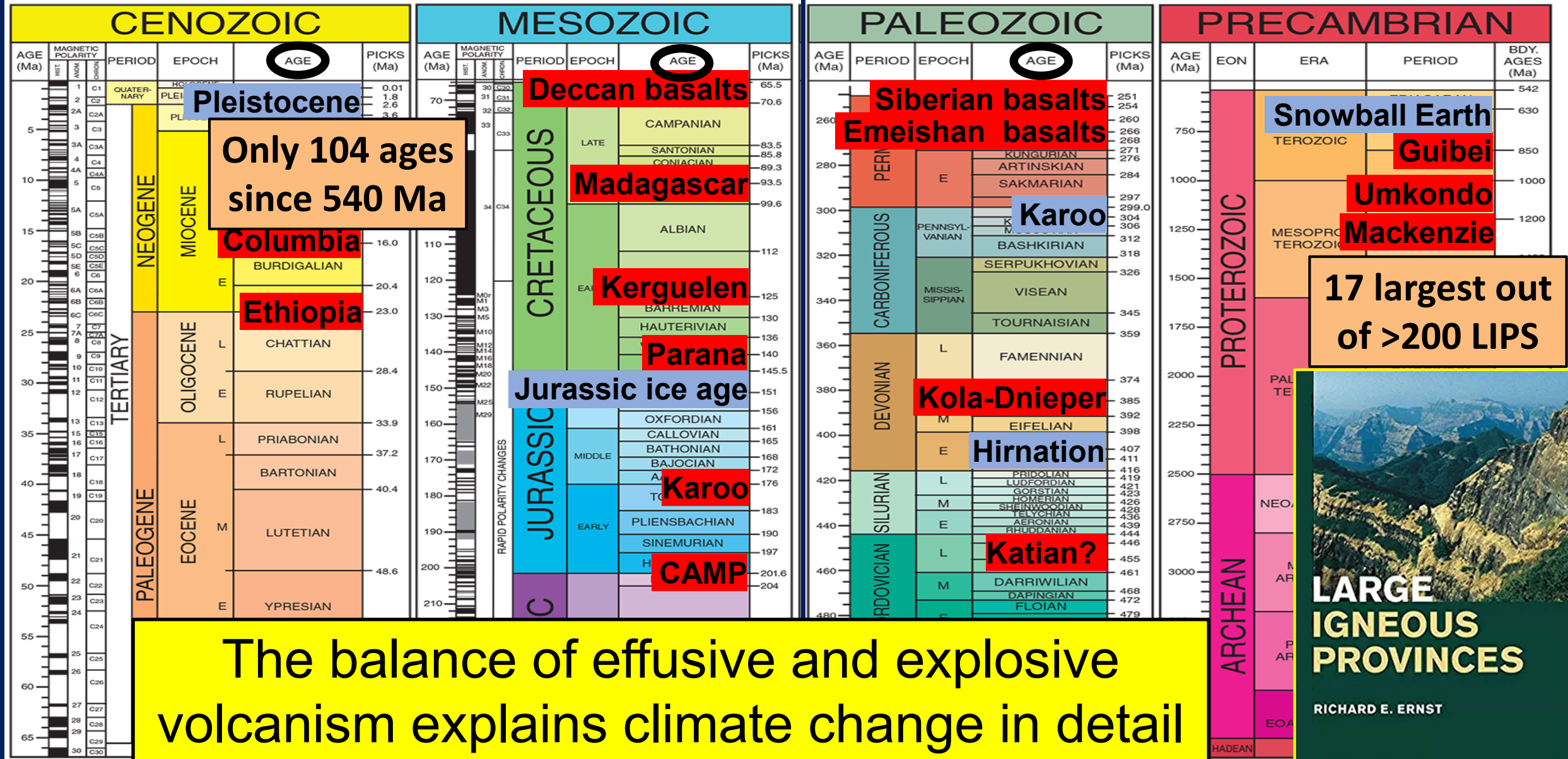


Associated with end of time units



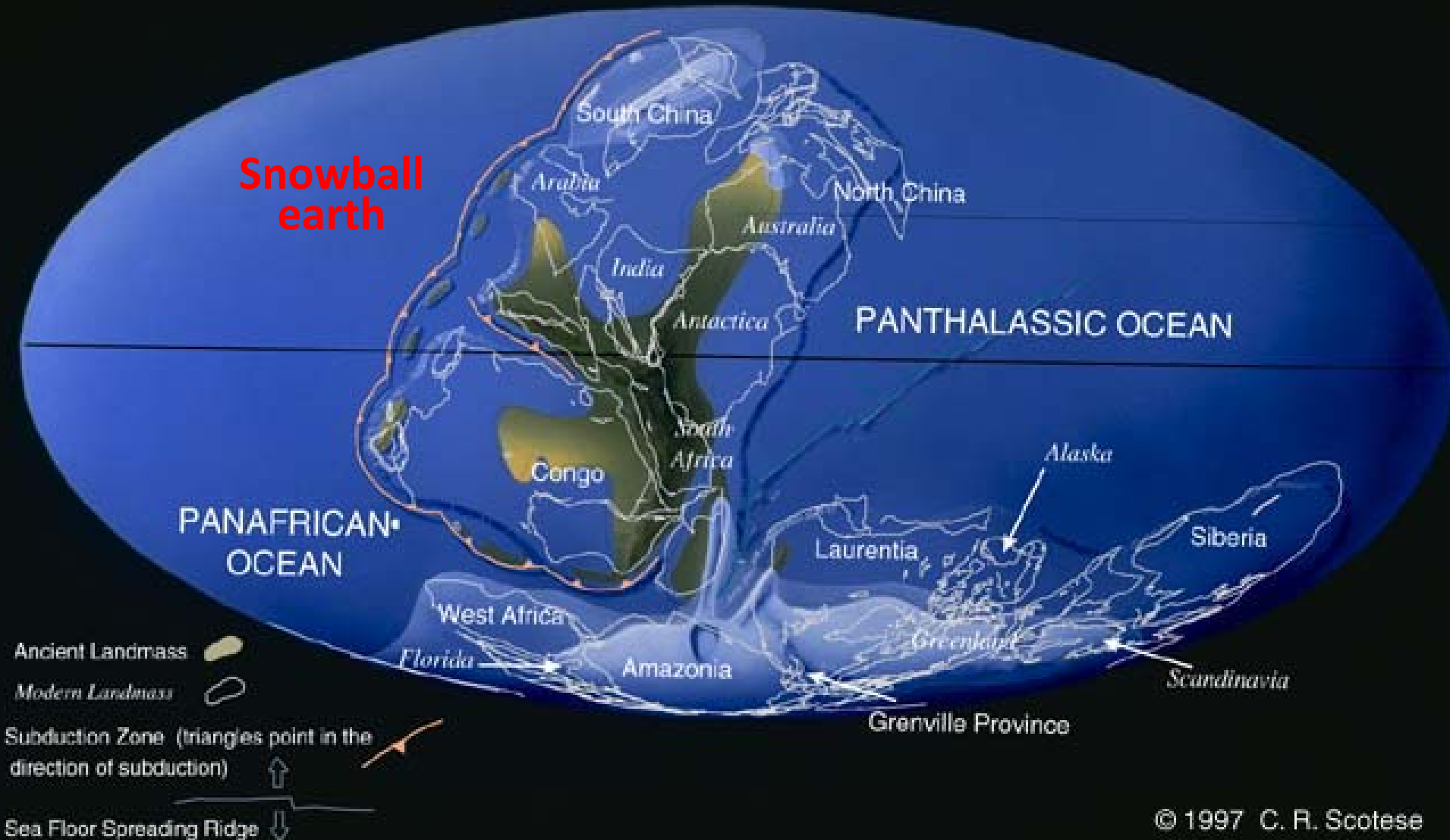
Courtillot and Renne 2003

Large Igneous Provinces punctuate the geologic time scale

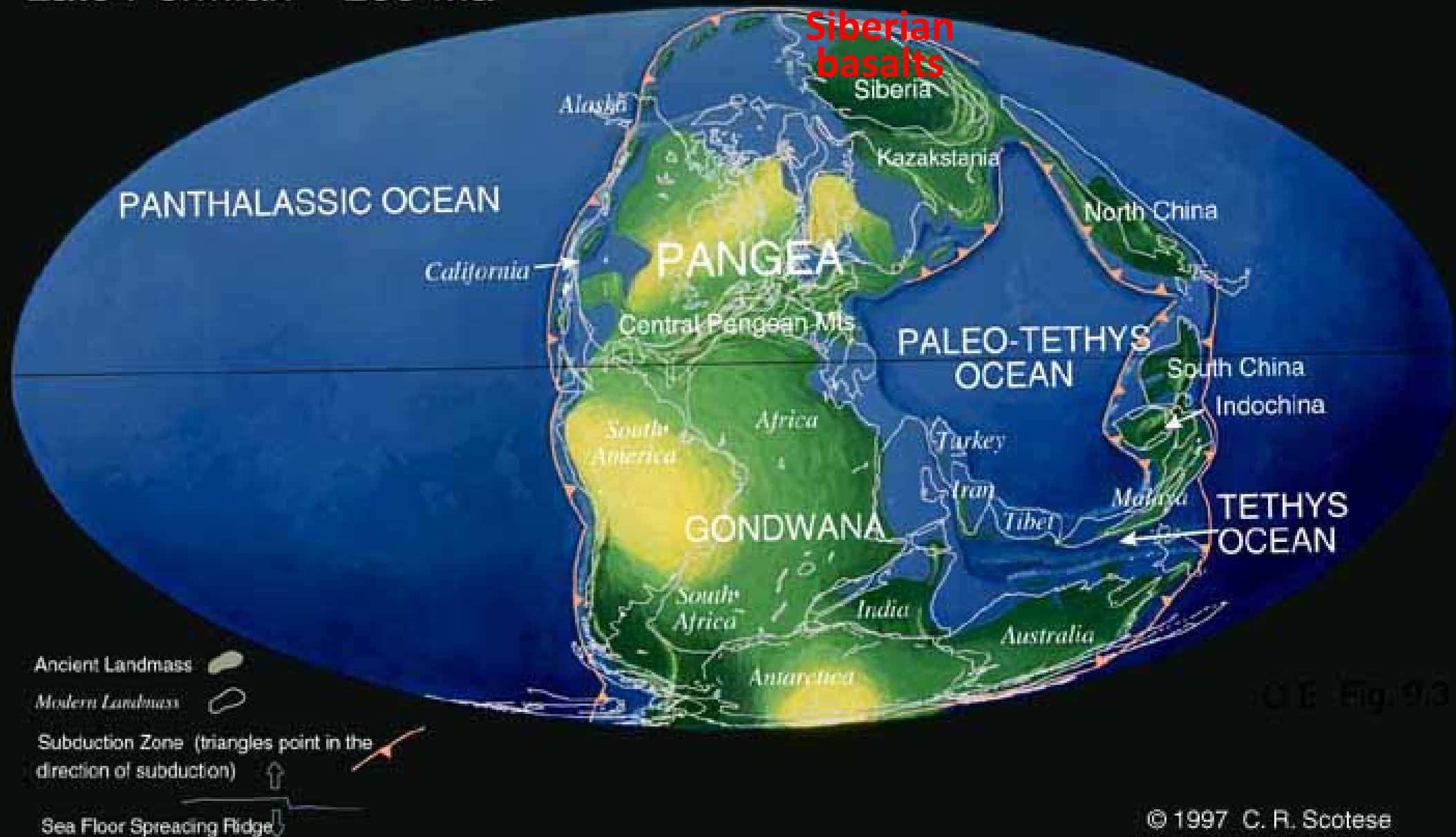


Late Proterozoic 650 Ma

Little sub-aerial rifting

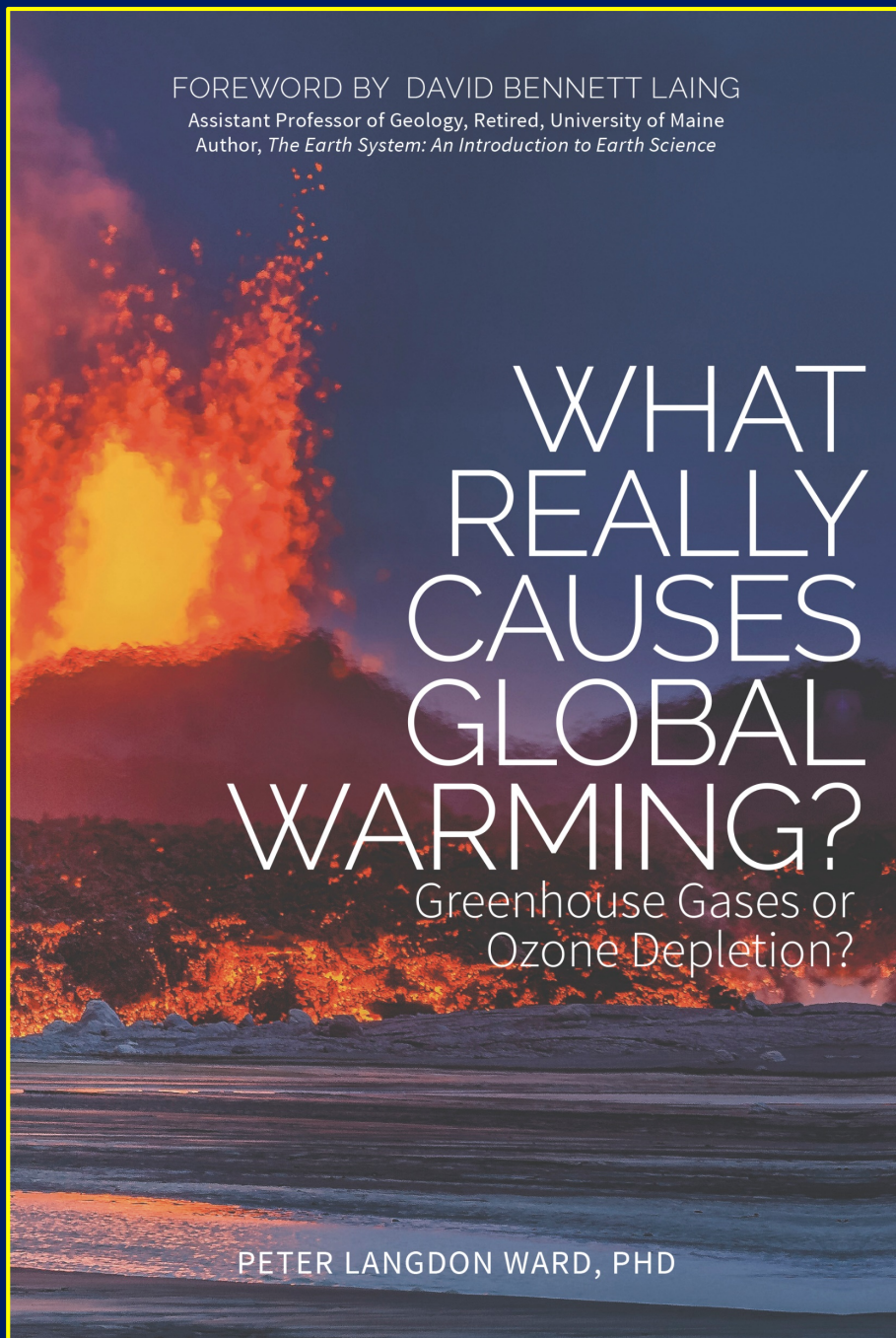


Late Permian 255 Ma



Conclusions

1. Greenhouse gases do not absorb enough heat to cause observed global warming.
2. Heat and temperature result from a broad continuum of frequencies of oscillation.
3. Amplitude of oscillation at each frequency of oscillation travels by resonance.
4. Global cooling is caused primarily by large explosive eruptions forming aerosols in the lower stratosphere, reflecting and scattering sunlight.
5. Global warming is caused primarily by depletion of the ozone layer caused by manufactured CFC gases and by basaltic volcanic eruptions.



Implications

We can burn fossil fuels without overheating Earth

But we must minimize air pollution

We need to help the ozone layer recover

We need to help people understand:

1. That greenhouse-warming theory is a scientific mistake,
2. That science is self-correcting,
3. That science is never settled,
4. That science is still the most logical and valuable way to inform good public policy in our increasingly technological world.

WhyClimateChanges.com

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