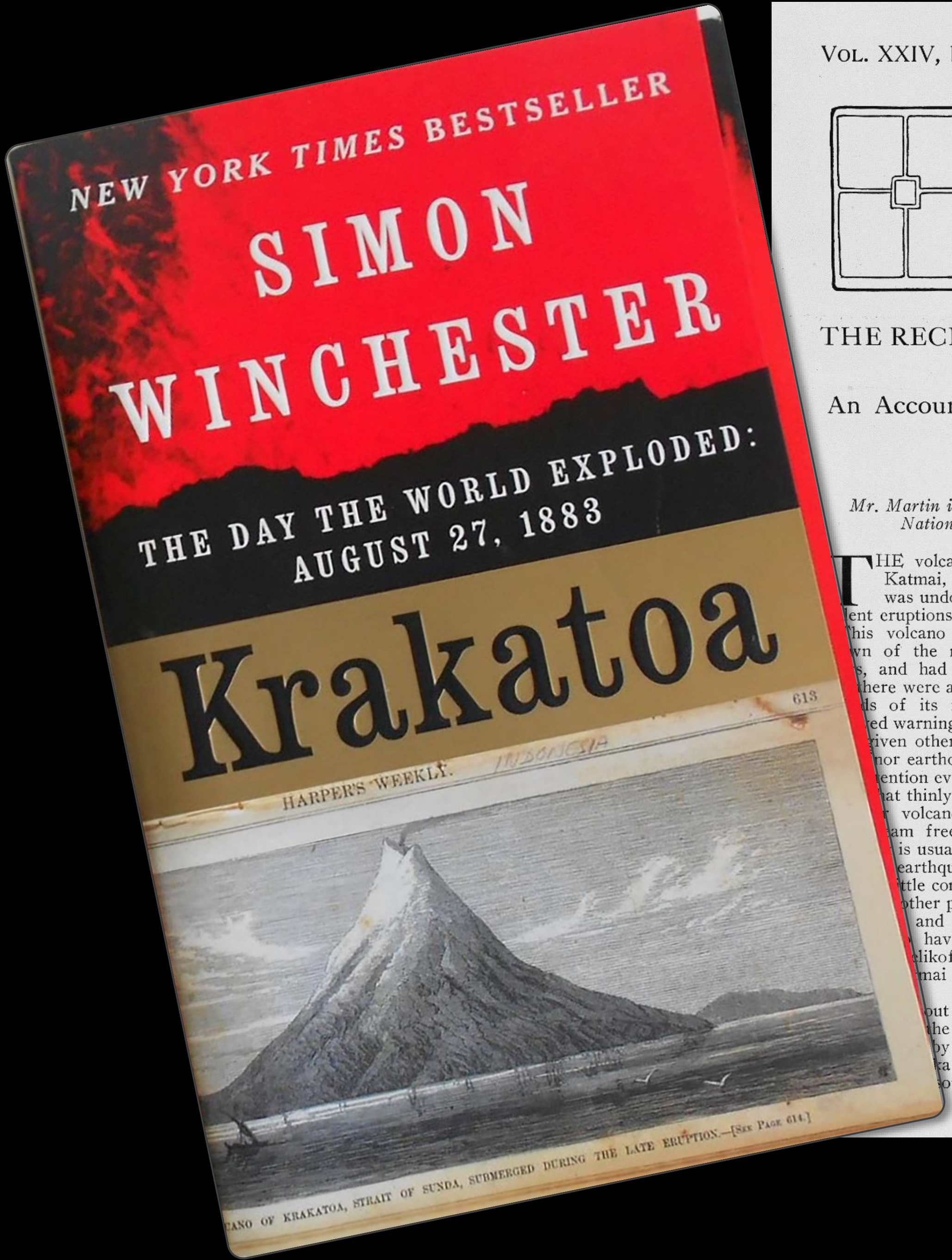
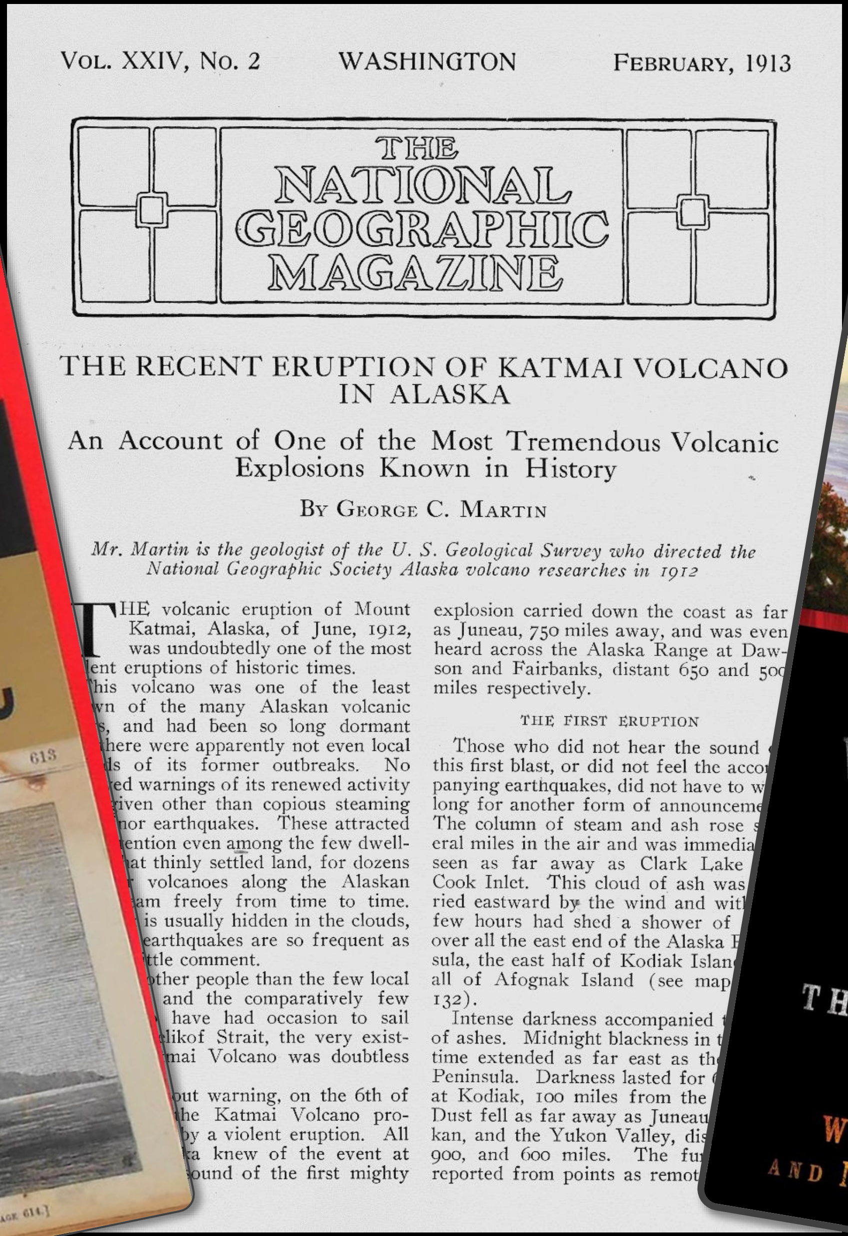
Climate throughout geologic time has been controlled primarily by the balance between abrupt warming caused by voluminous effusive eruptions of basaltic magma over months to hundreds of thousands of years and abrupt cooling caused by major explosive eruptions of evolved magmas over hours to days

Peter L. Ward, US Geological Survey, retired
peward@wyoming.com





VOL. XXIV, No. 2 WASHINGTON FEBRUARY, 1913

THE NATIONAL GEOGRAPHIC MAGAZINE

THE RECENT ERUPTION OF KATMAI VOLCANO IN ALASKA

An Account of One of the Most Tremendous Volcanic Explosions Known in History

BY GEORGE C. MARTIN

Mr. Martin is the geologist of the U. S. Geological Survey who directed the National Geographic Society Alaska volcano researches in 1912

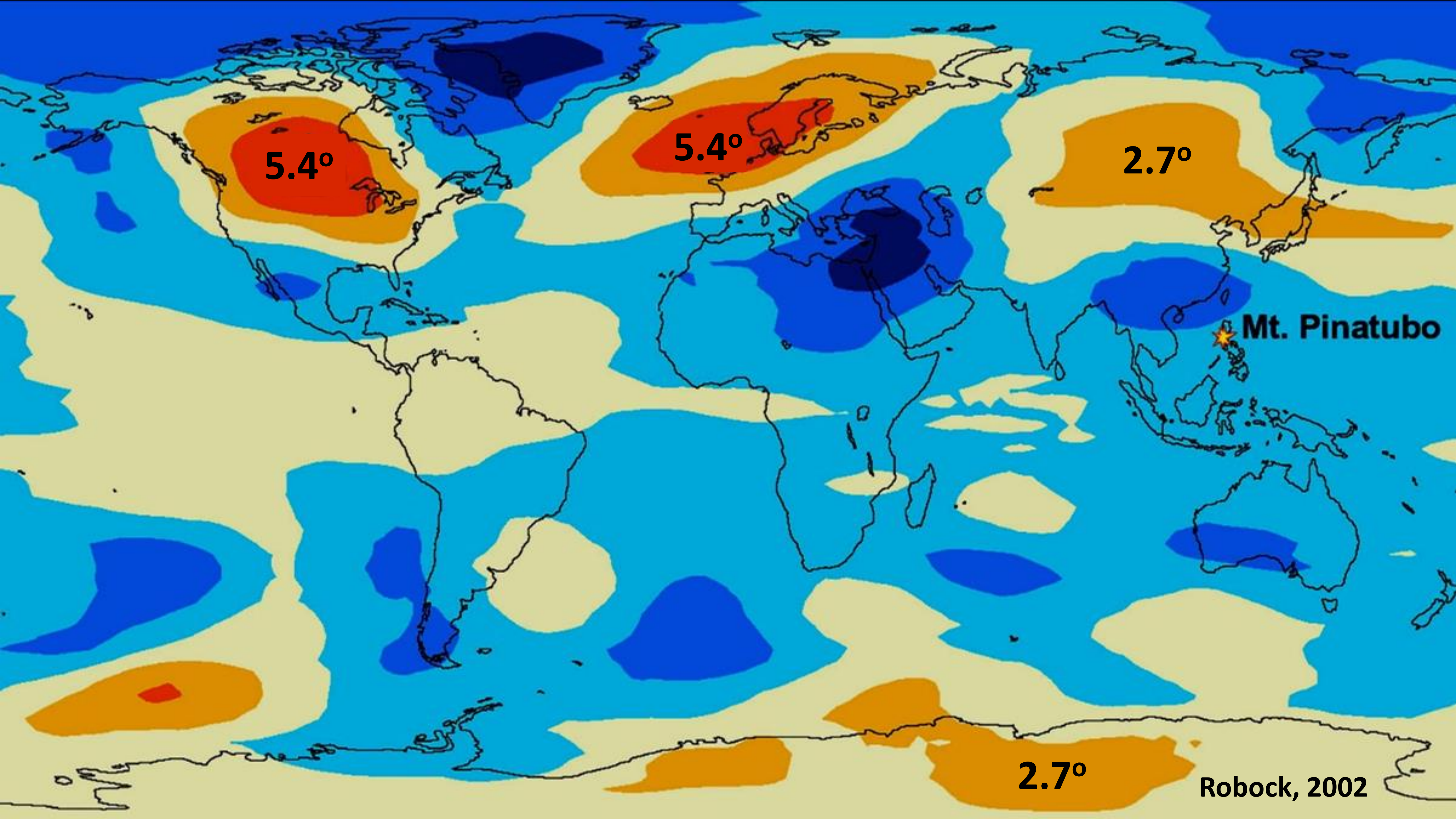
THE volcanic eruption of Mount Katmai, Alaska, of June, 1912, was undoubtedly one of the most ...lent eruptions of historic times. ...his volcano was one of the least ...wn of the many Alaskan volcanic ...s, and had been so long dormant ...here were apparently not even local ...ds of its former outbreaks. No ...ed warnings of its renewed activity ...given other than copious steaming ...nor earthquakes. These attracted ...ention even among the few dwell... ...at thinly settled land, for dozens ...r volcanoes along the Alaskan ...am freely from time to time. ... is usually hidden in the clouds, ... earthquakes are so frequent as ...ttle comment. ...other people than the few local ... and the comparatively few ... have had occasion to sail ...likof Strait, the very exist... ...mai Volcano was doubtless ...

...out warning, on the 6th of ...he Katmai Volcano pro... ...by a violent eruption. All ...ka knew of the event at ...ound of the first mighty explosion carried down the coast as far as Juneau, 750 miles away, and was even heard across the Alaska Range at Dawson and Fairbanks, distant 650 and 500 miles respectively.

THE FIRST ERUPTION

Those who did not hear the sound ... this first blast, or did not feel the accom... panying earthquakes, did not have to w... long for another form of announceme... The column of steam and ash rose s... eral miles in the air and was immedia... seen as far away as Clark Lake ... Cook Inlet. This cloud of ash was ... ried eastward by the wind and with... few hours had shed a shower of ... over all the east end of the Alaska P... sula, the east half of Kodiak Islan... all of Afognak Island (see map ... 132).

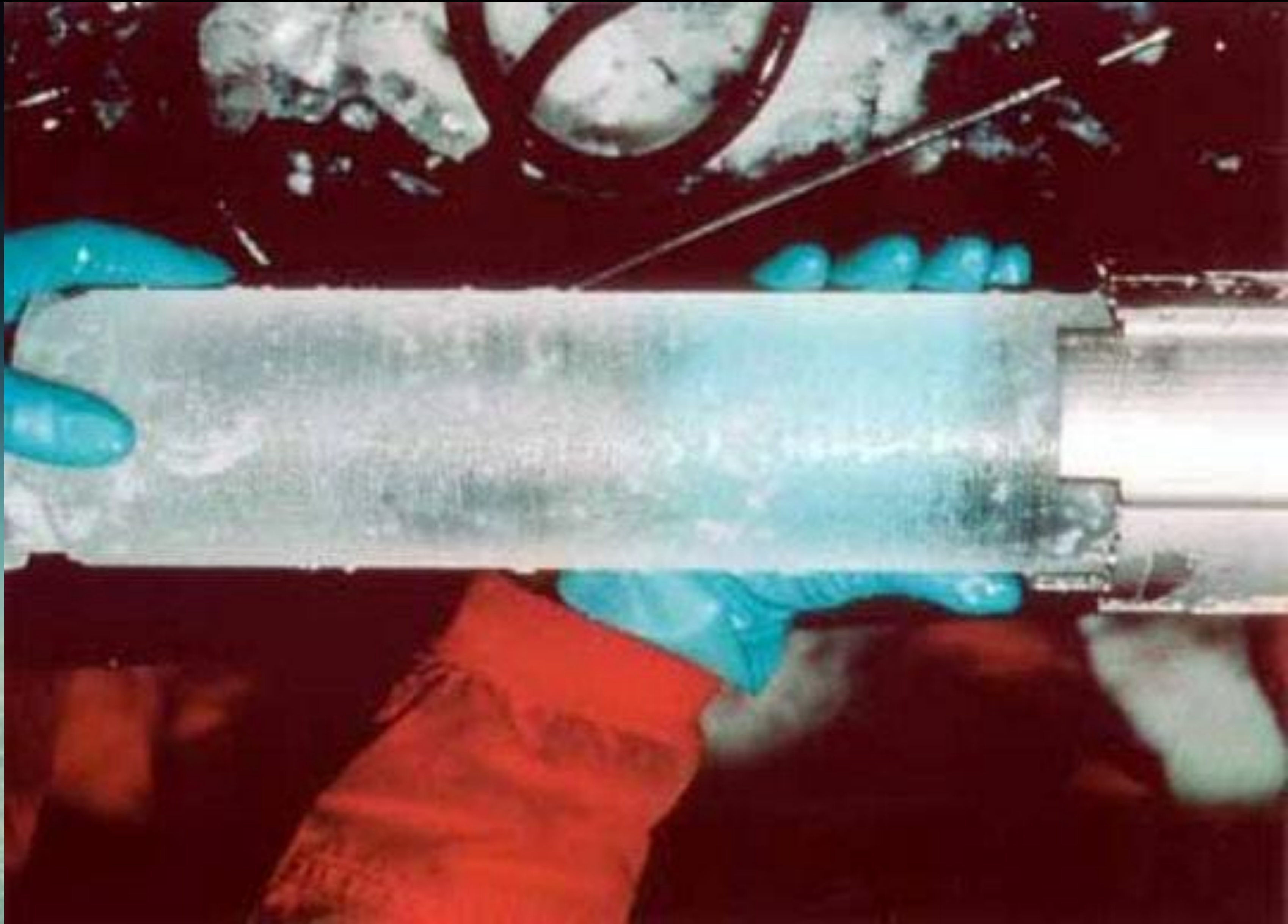
Intense darkness accompanied t... of ashes. Midnight blackness in t... time extended as far east as the ... Peninsula. Darkness lasted for ... at Kodiak, 100 miles from the ... Dust fell as far away as Juneau ... kan, and the Yukon Valley, dis... 900, and 600 miles. The fu... reported from points as remot...

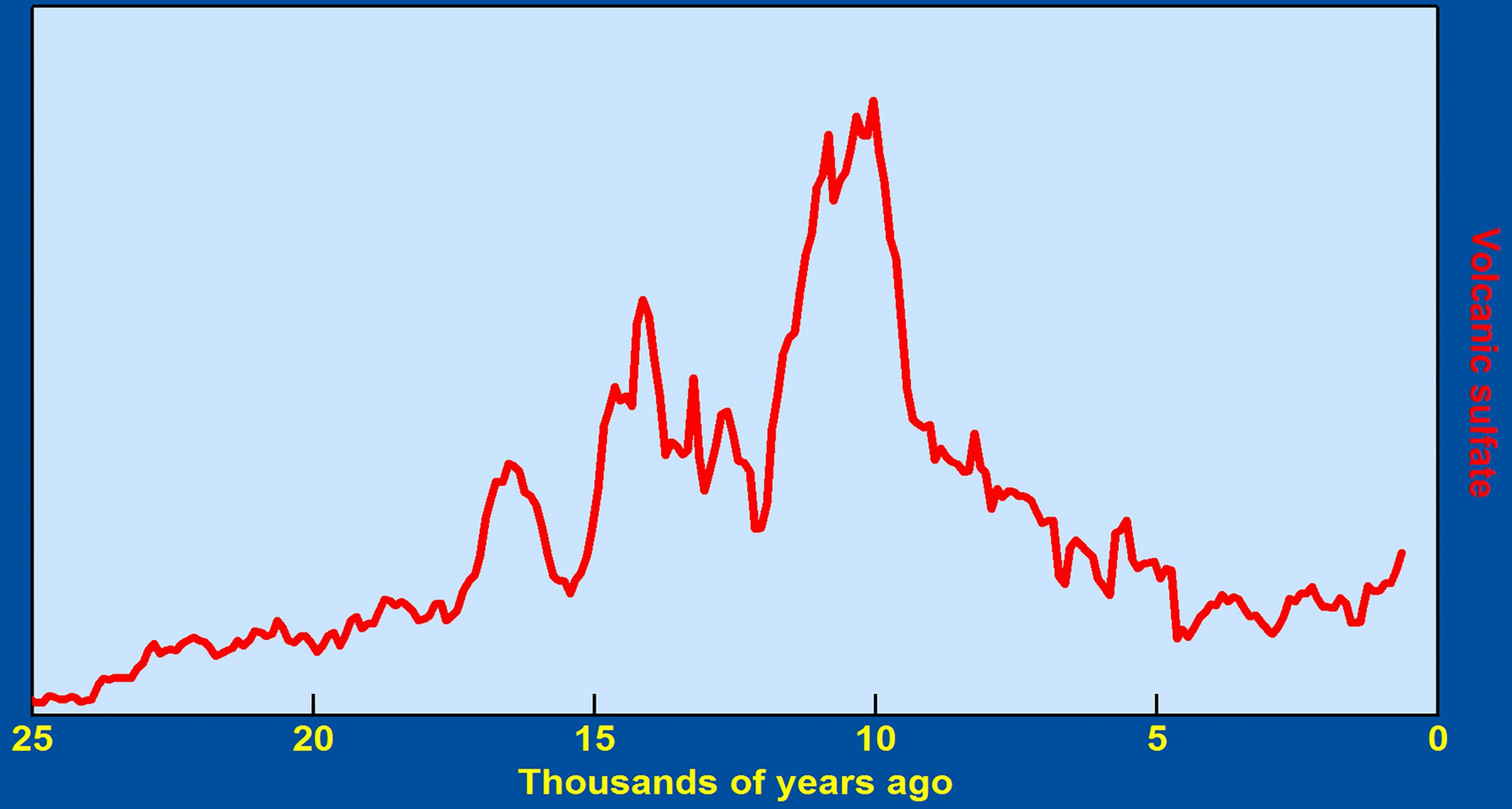

5.4º
5.4º
2.7º
Mt. Pinatubo
2.7º
Robock, 2002


Pinatubo, 1991
Lasting hours
Explosive → Cooling

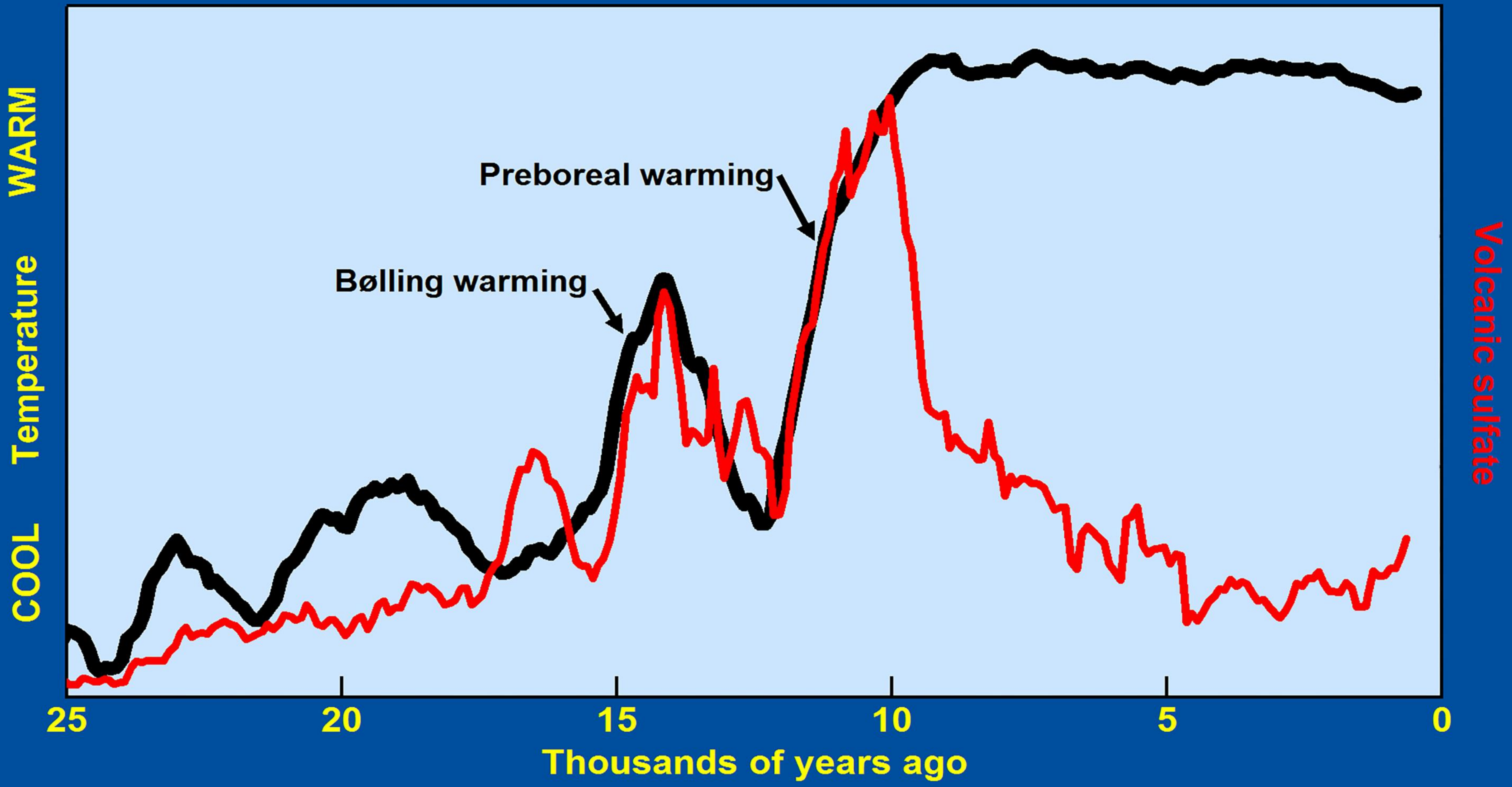

Bárðarbunga, 2014-2015
Lasting > months
Effusive → Warming

Greenland Ice Sheet Program Drill Hole 2 (GISP2)

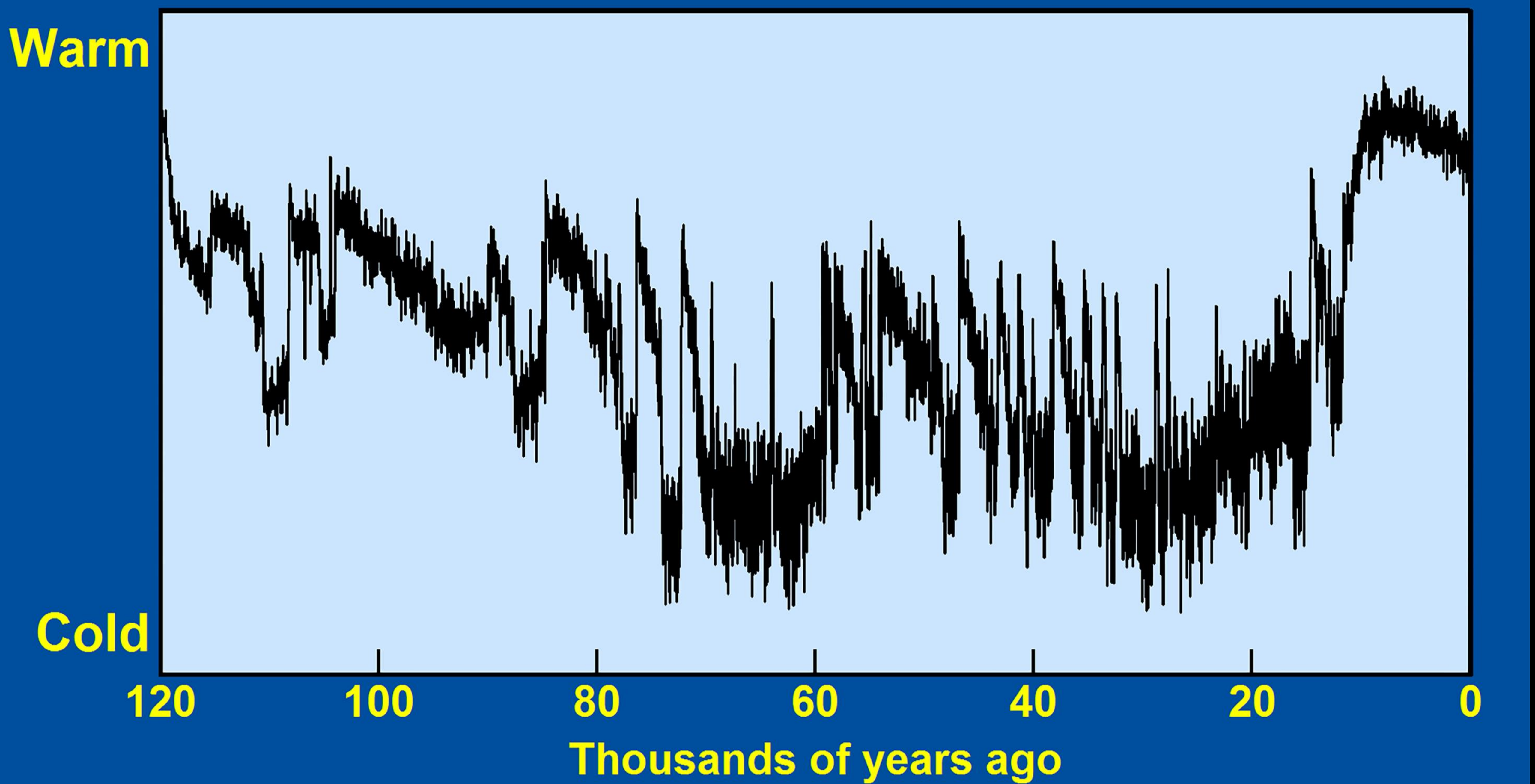


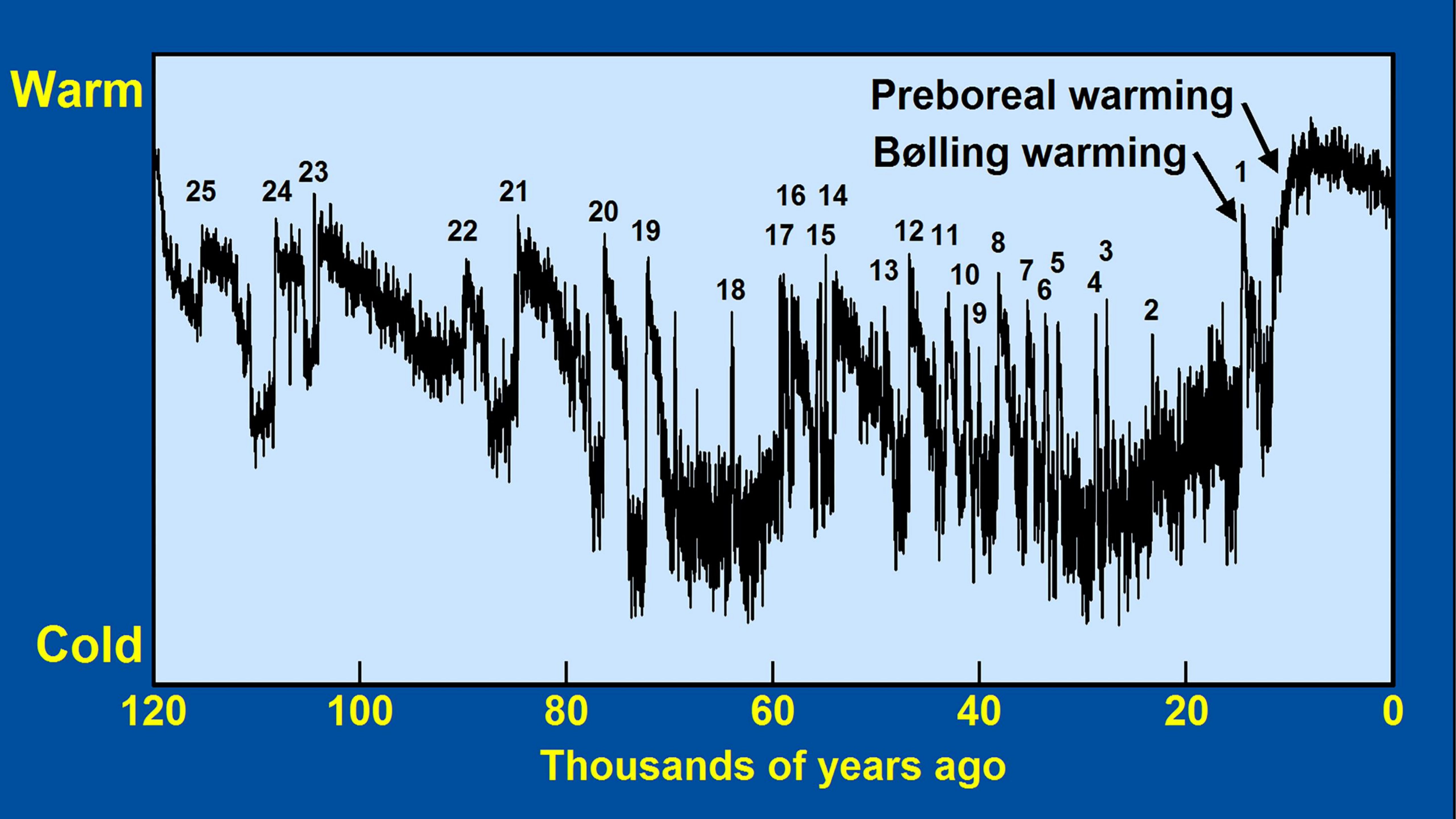


Volcanic sulfate
25
20
15
10
5
0
Thousands of years ago

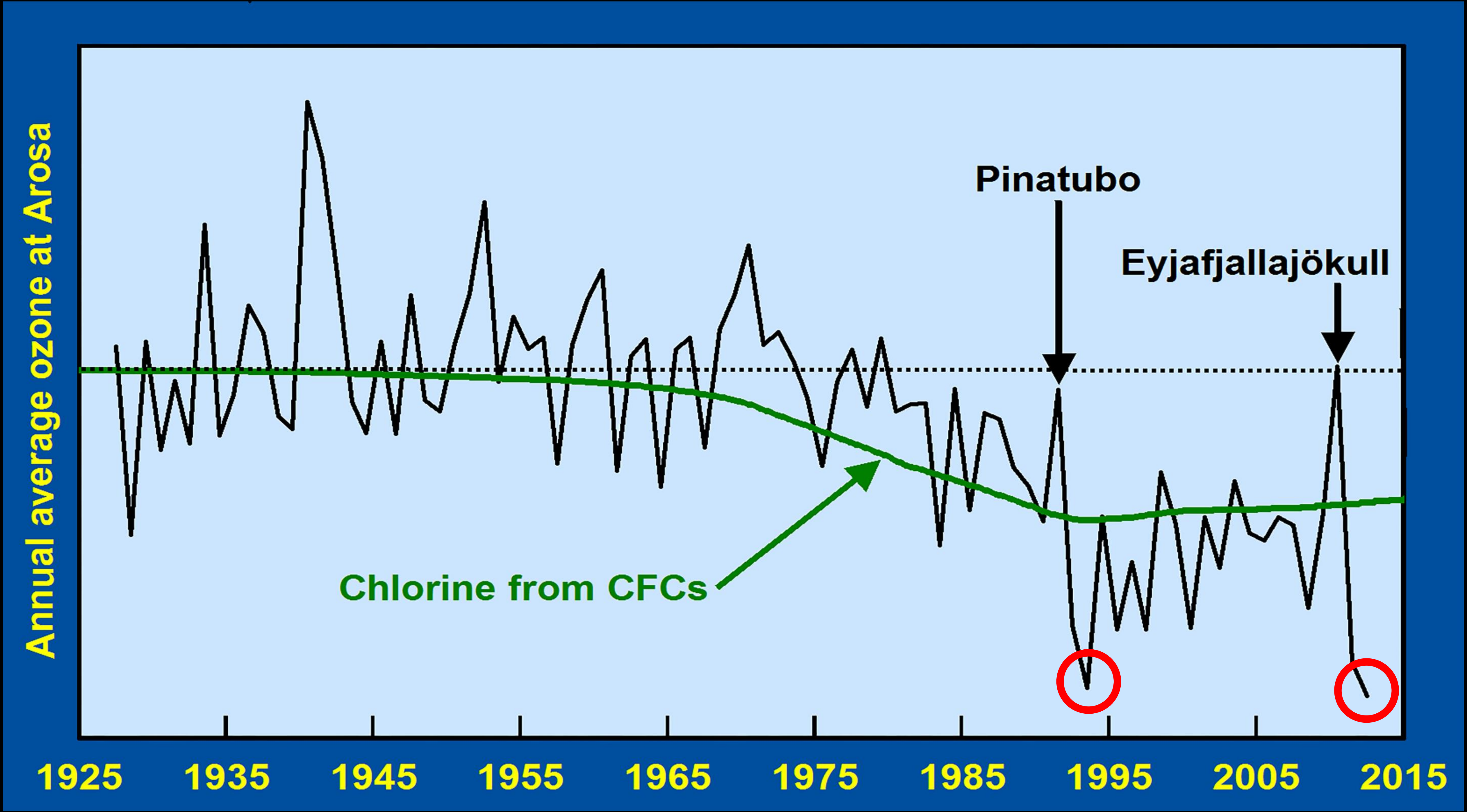


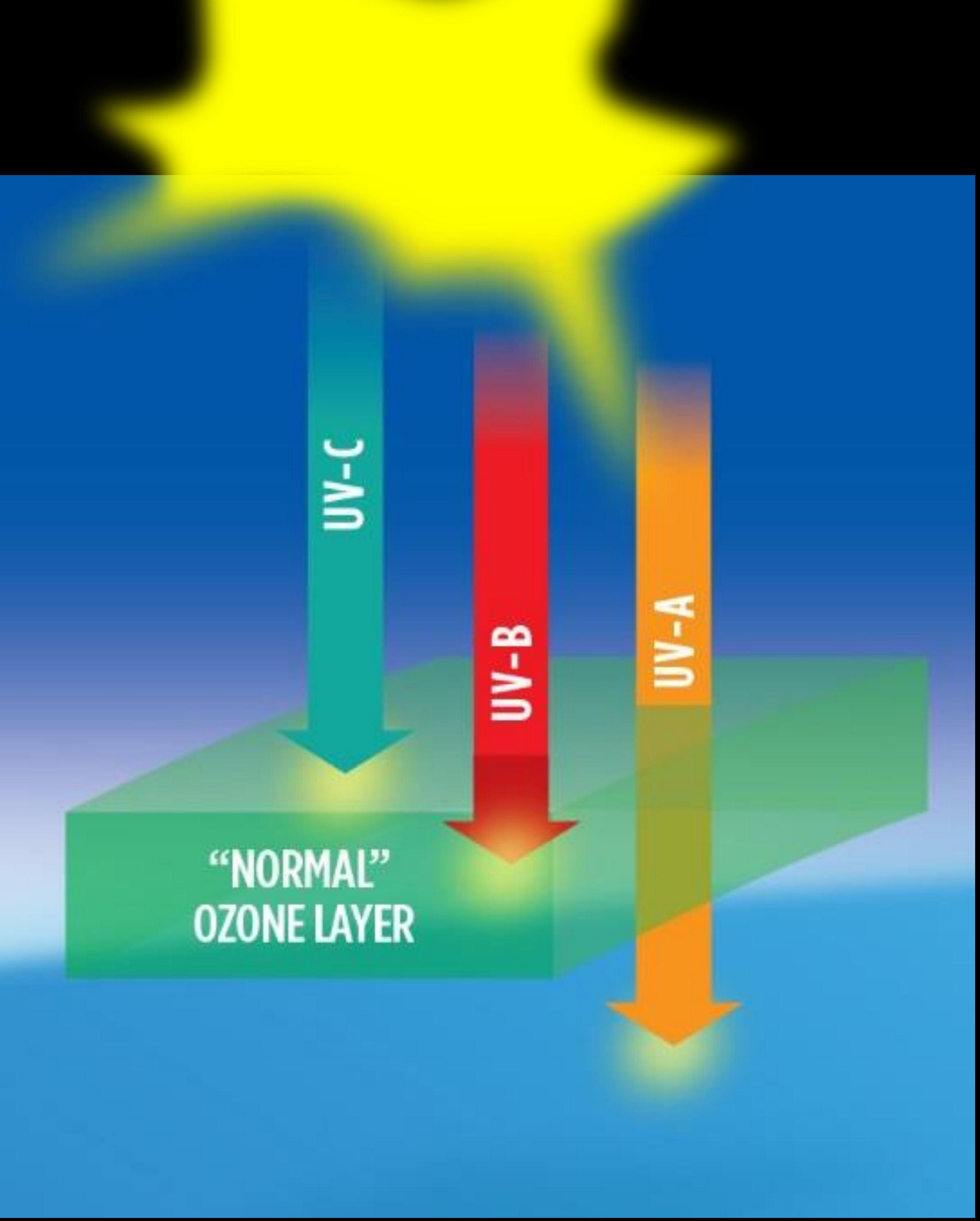
WARM
COOL
Temperature
Volcanic sulfate
Preboreal warming
Bølling warming
25
20
15
10
5
0
Thousands of years ago

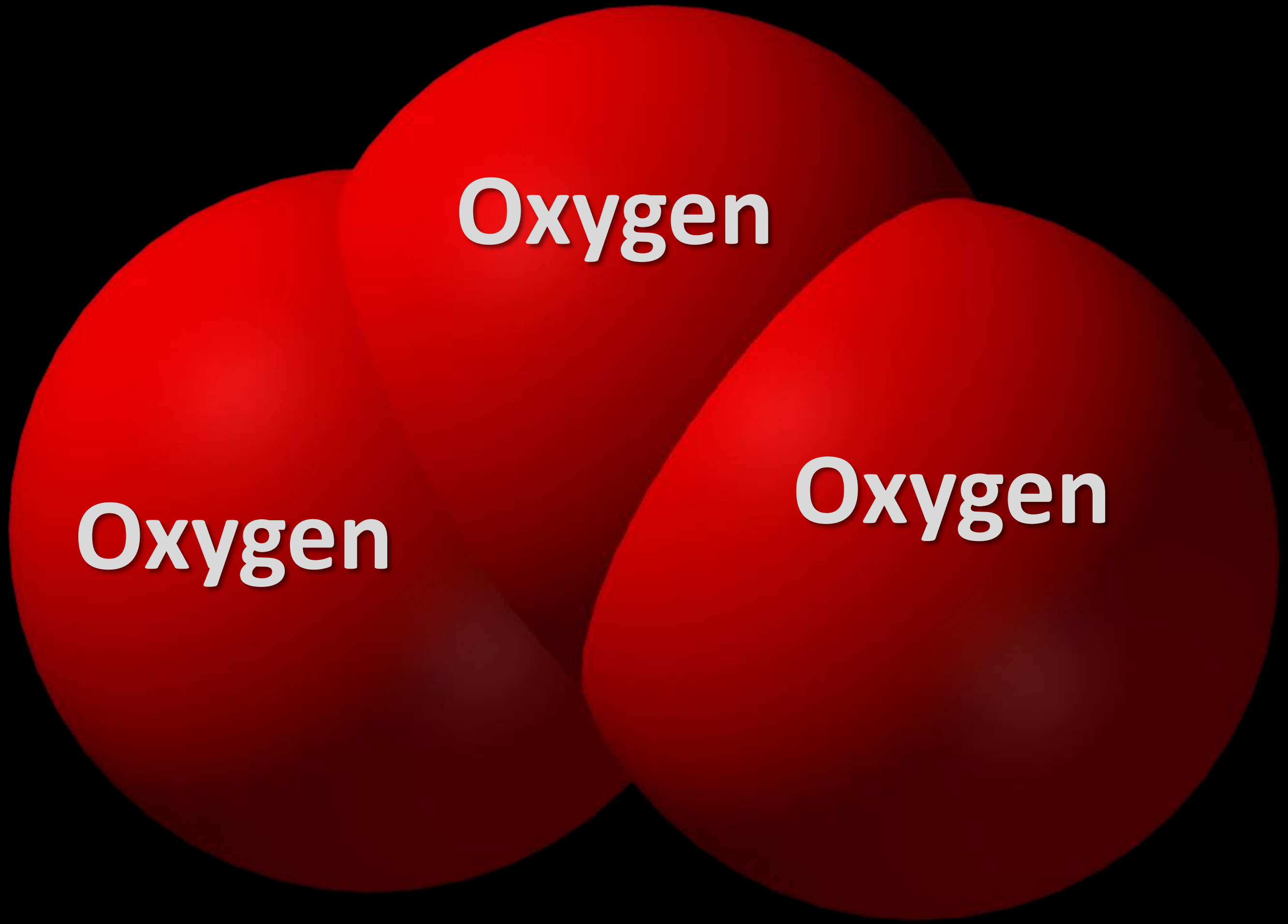

Warm
Cold
120
100
80
60
40
20
0
Thousands of years ago

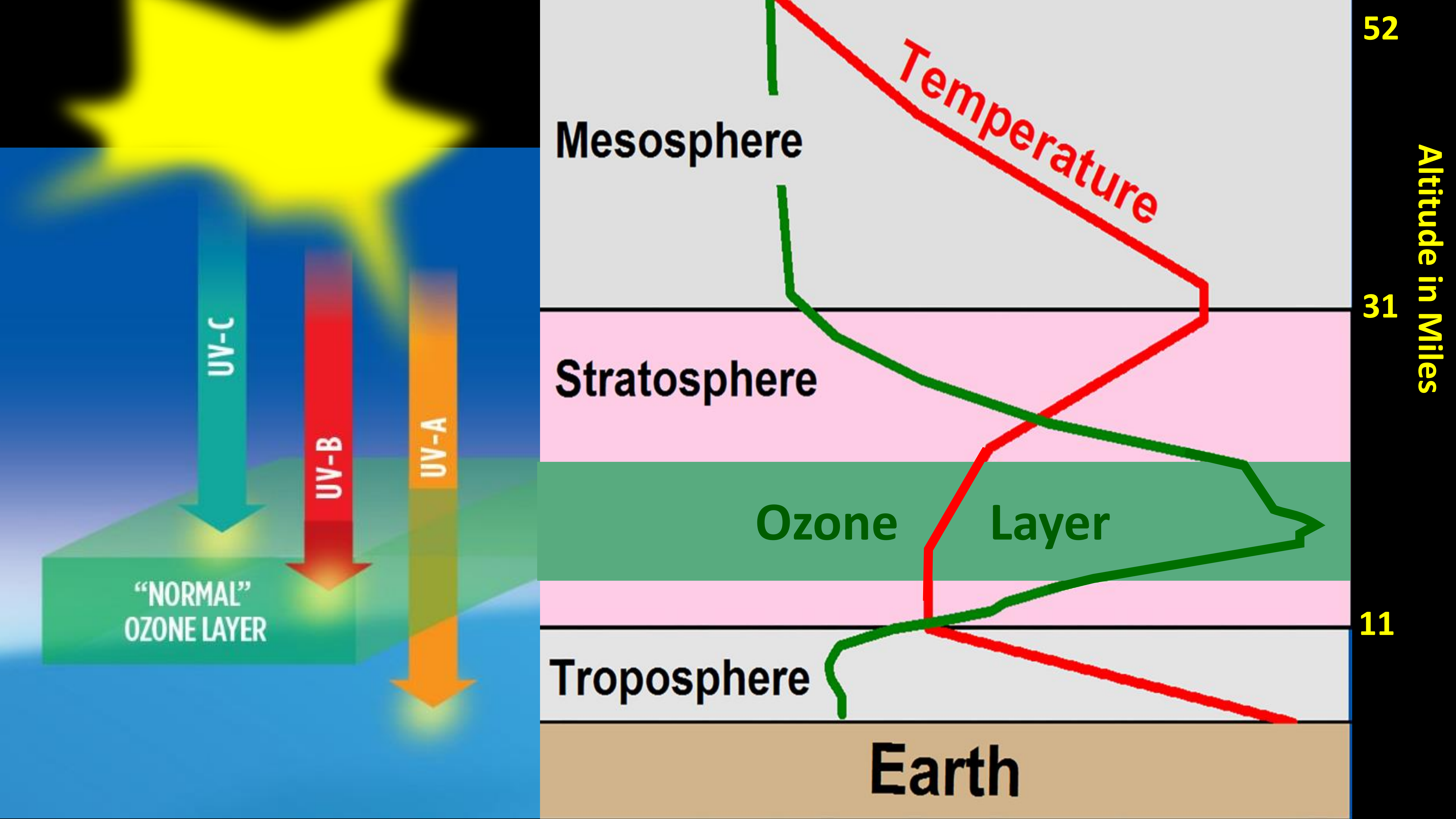


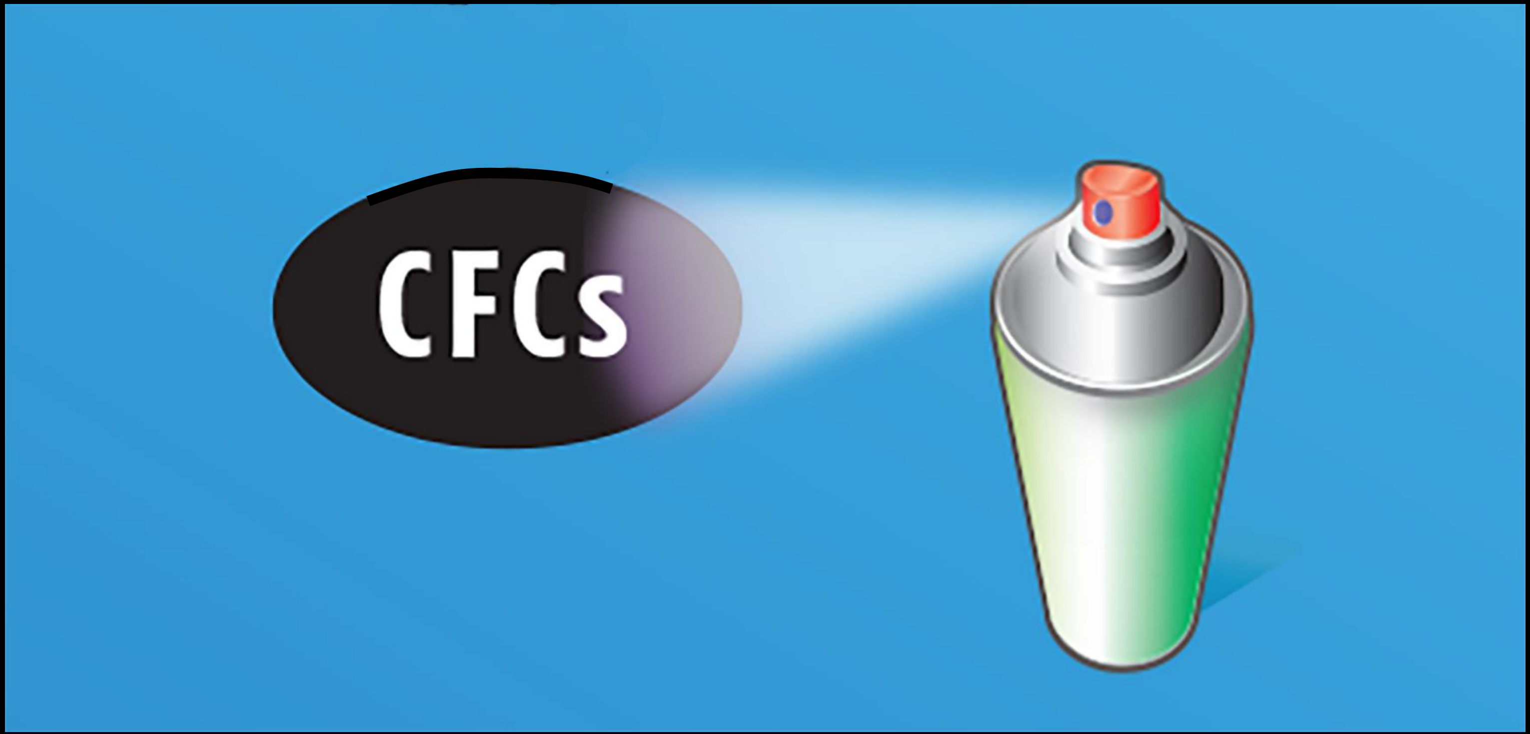
Warm
Cold
Preboreal warming
Bølling warming
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
120
100
80
60
40
20
0
Thousands of years ago

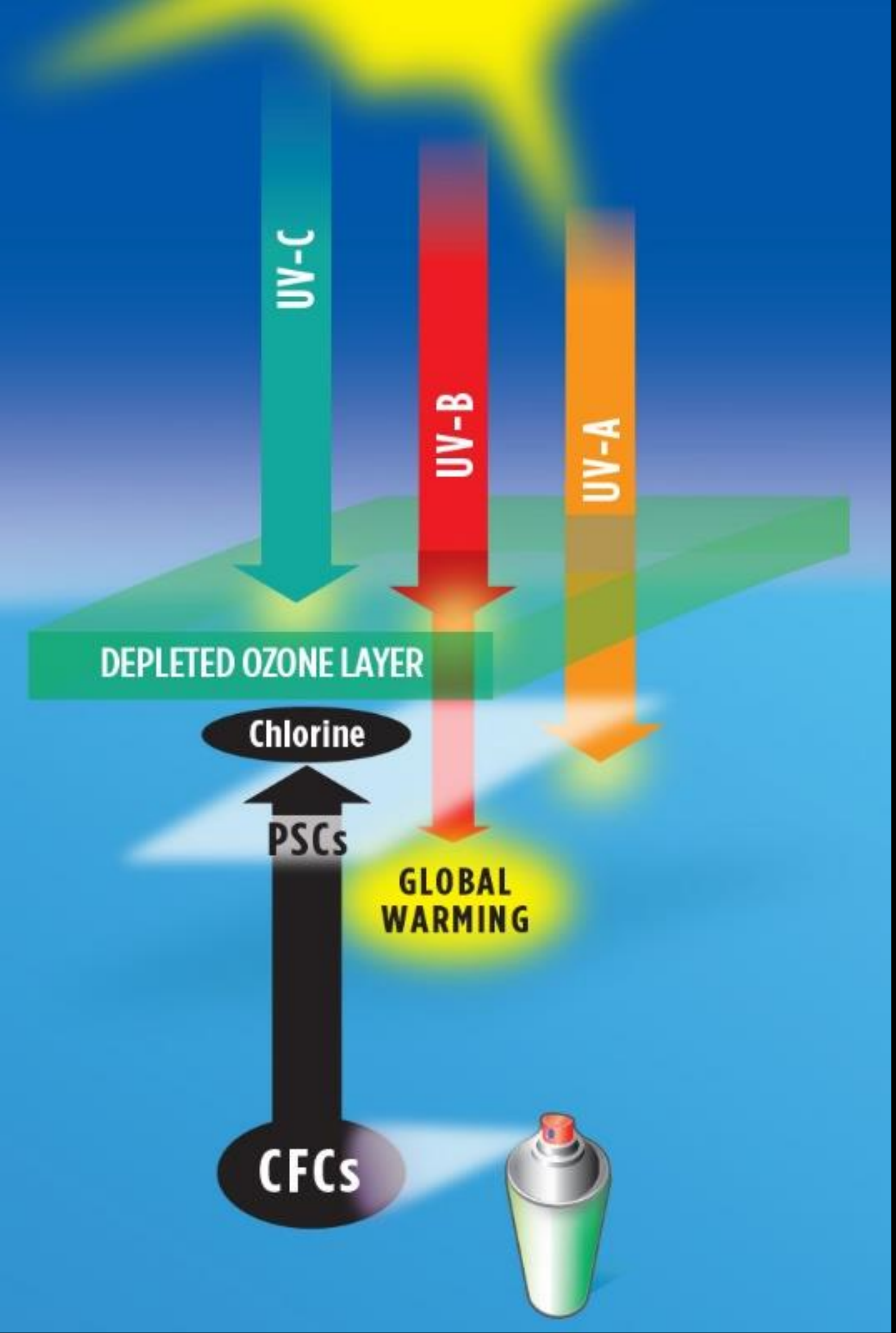

Annual average ozone at Arosa
Pinatubo
Eyjafjallajökull
Chlorine from CFCs
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015


UV-C
UV-B
UV-A
"NORMAL"
OZONE LAYER


Oxygen
Oxygen
Oxygen

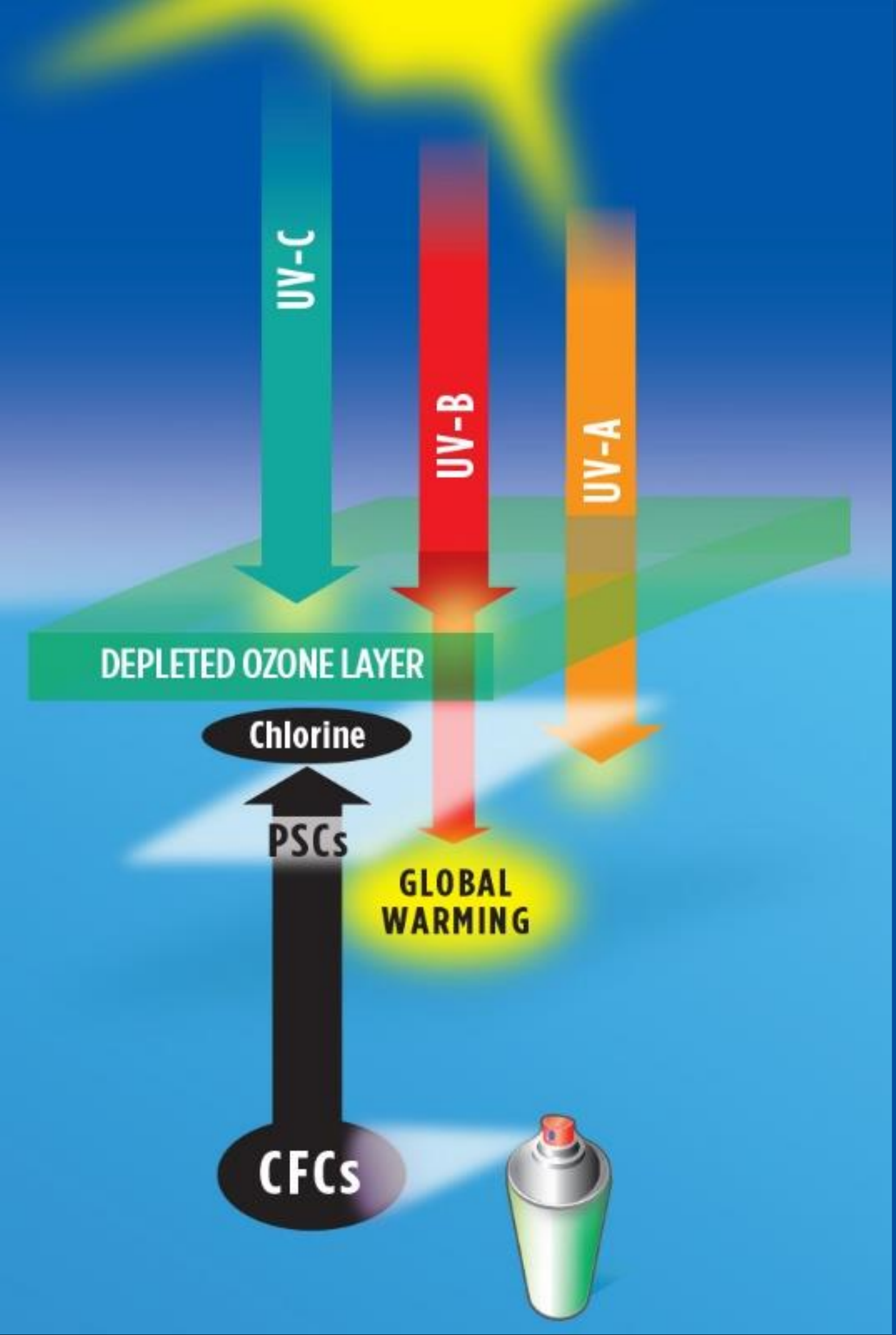

UV-C
UV-B
UV-A
"NORMAL" OZONE LAYER
Mesosphere
Temperature
Stratosphere
Ozone
Layer
Troposphere
Earth
52
31
11
Altitude in Miles

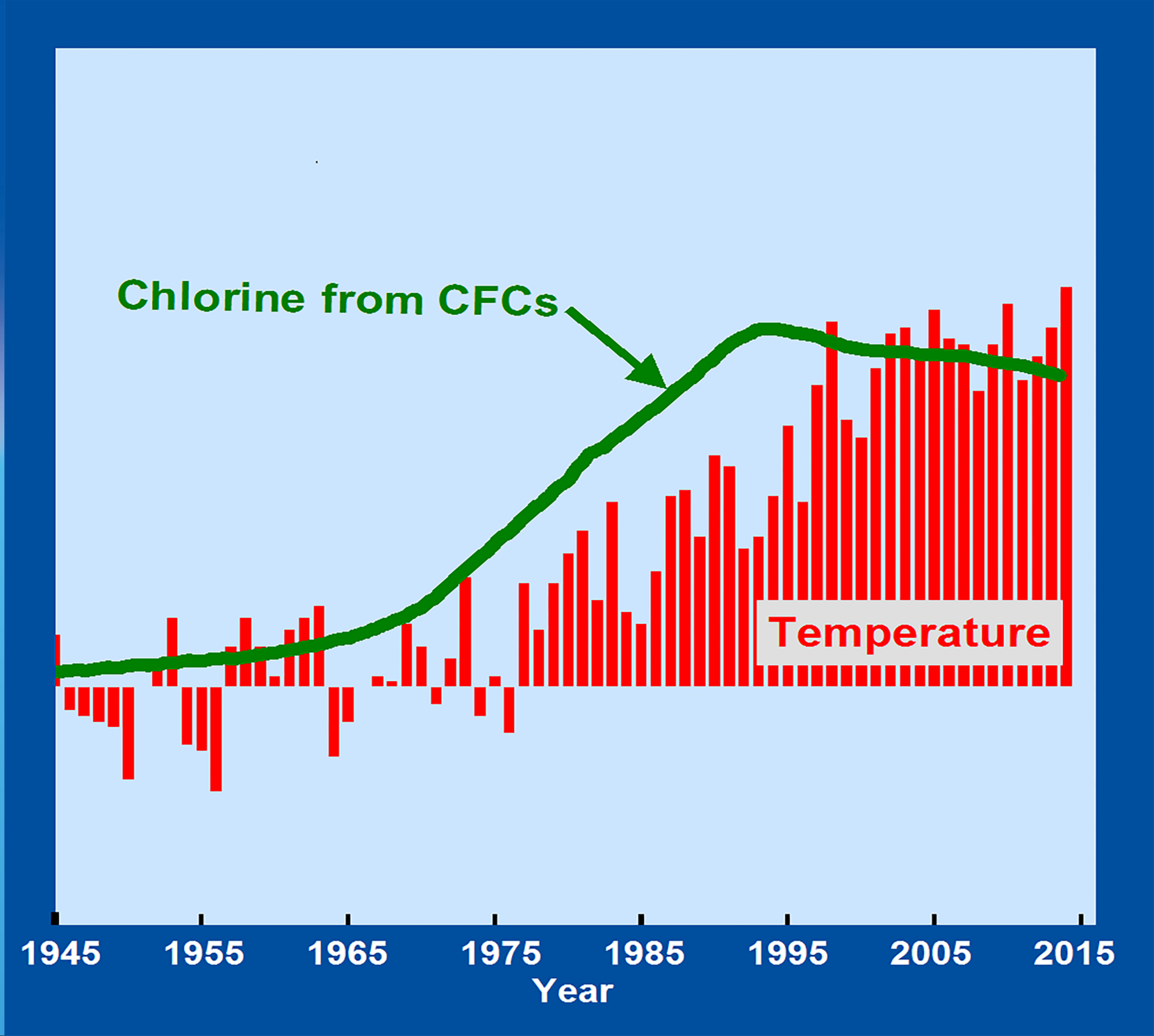

CFCs

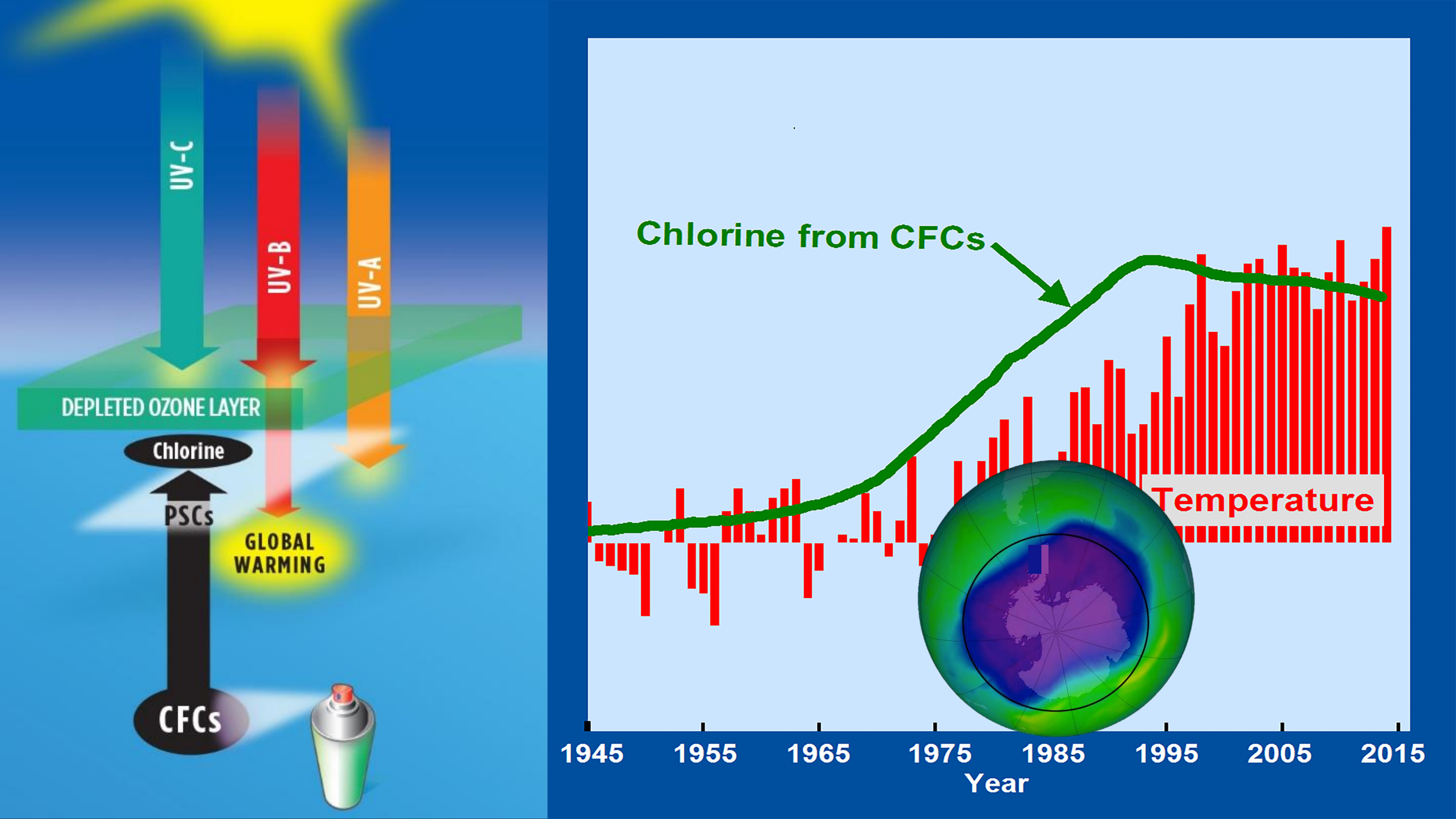


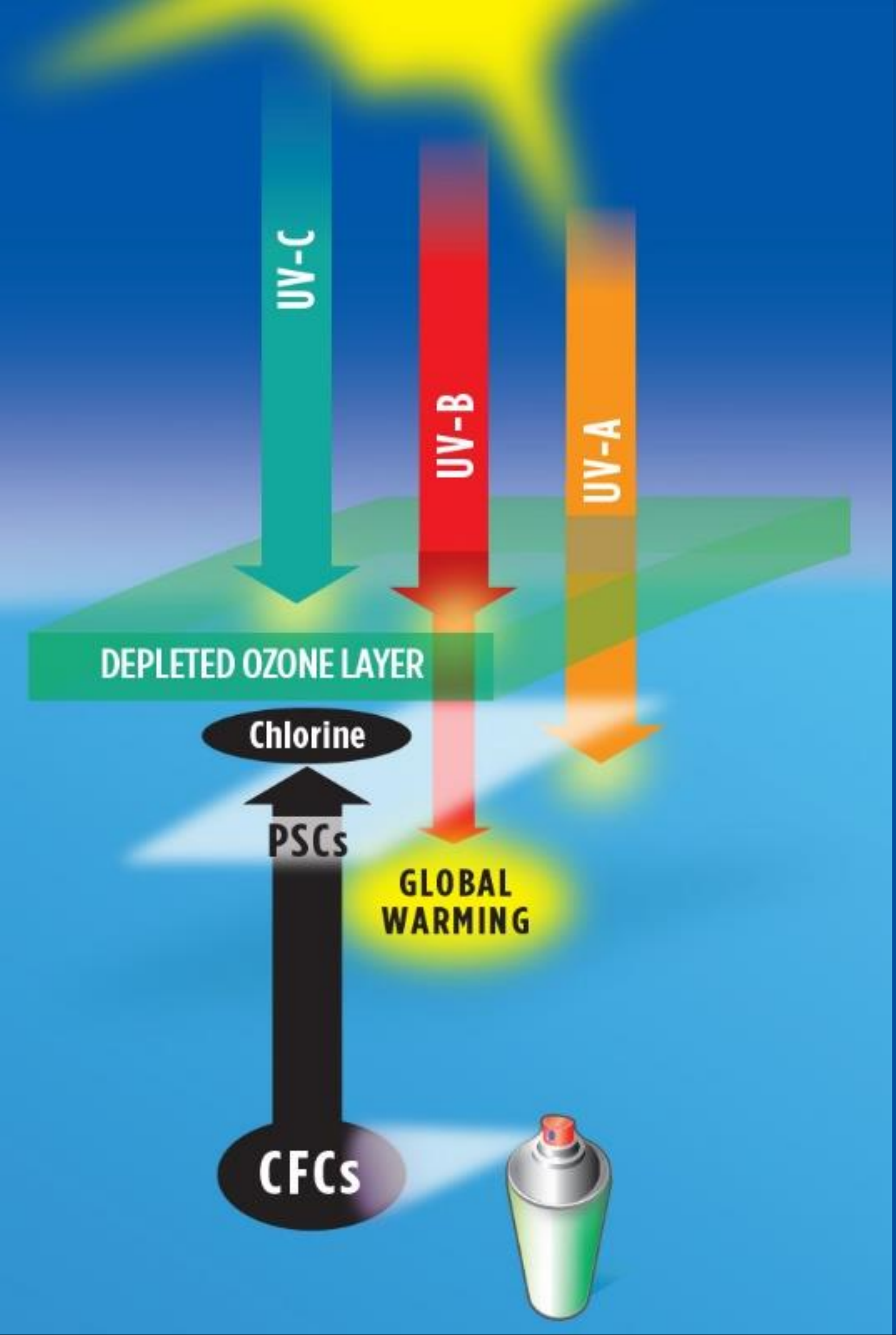
Polar Stratospheric Clouds

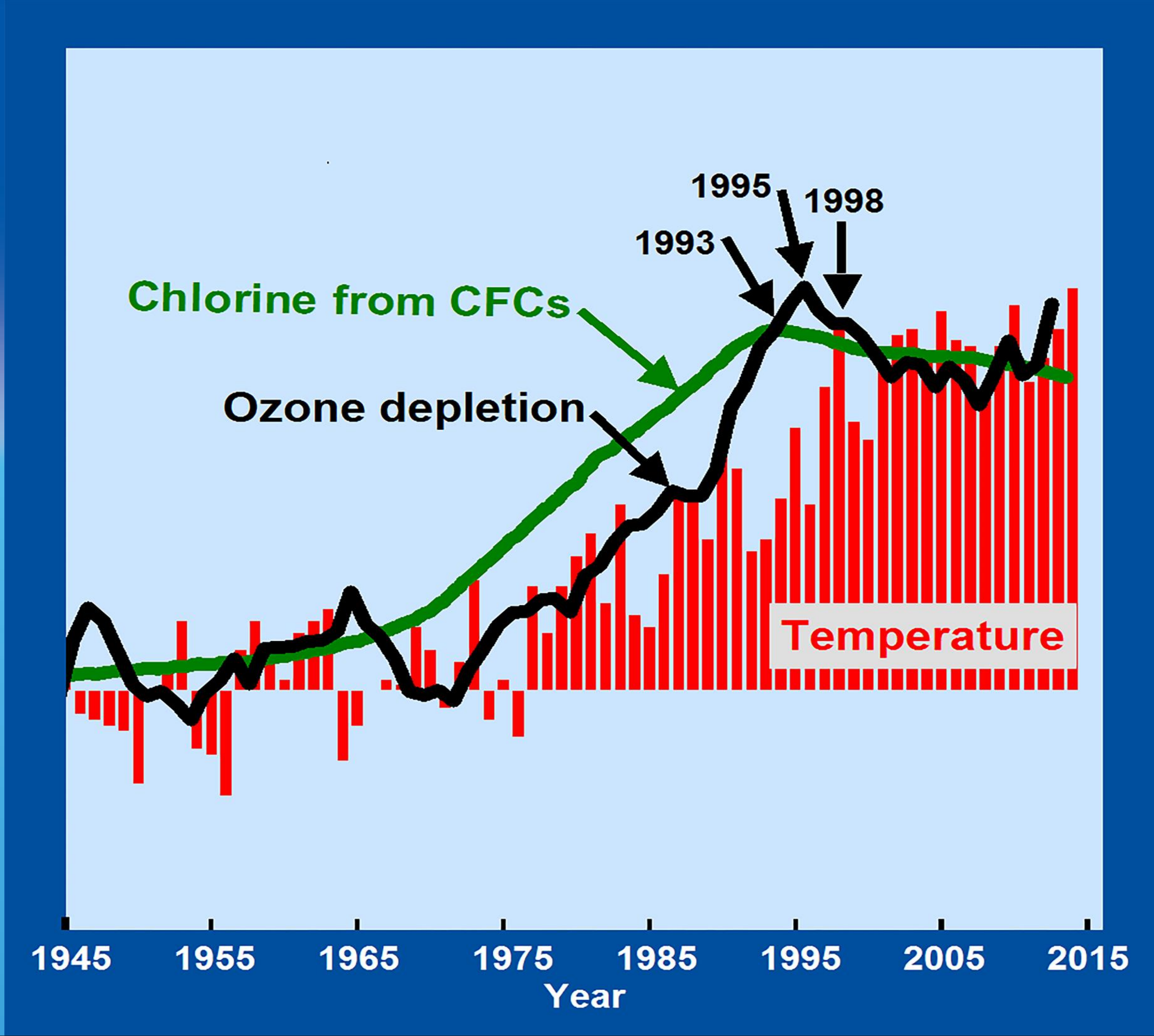
Chlorofluorocarbon gases

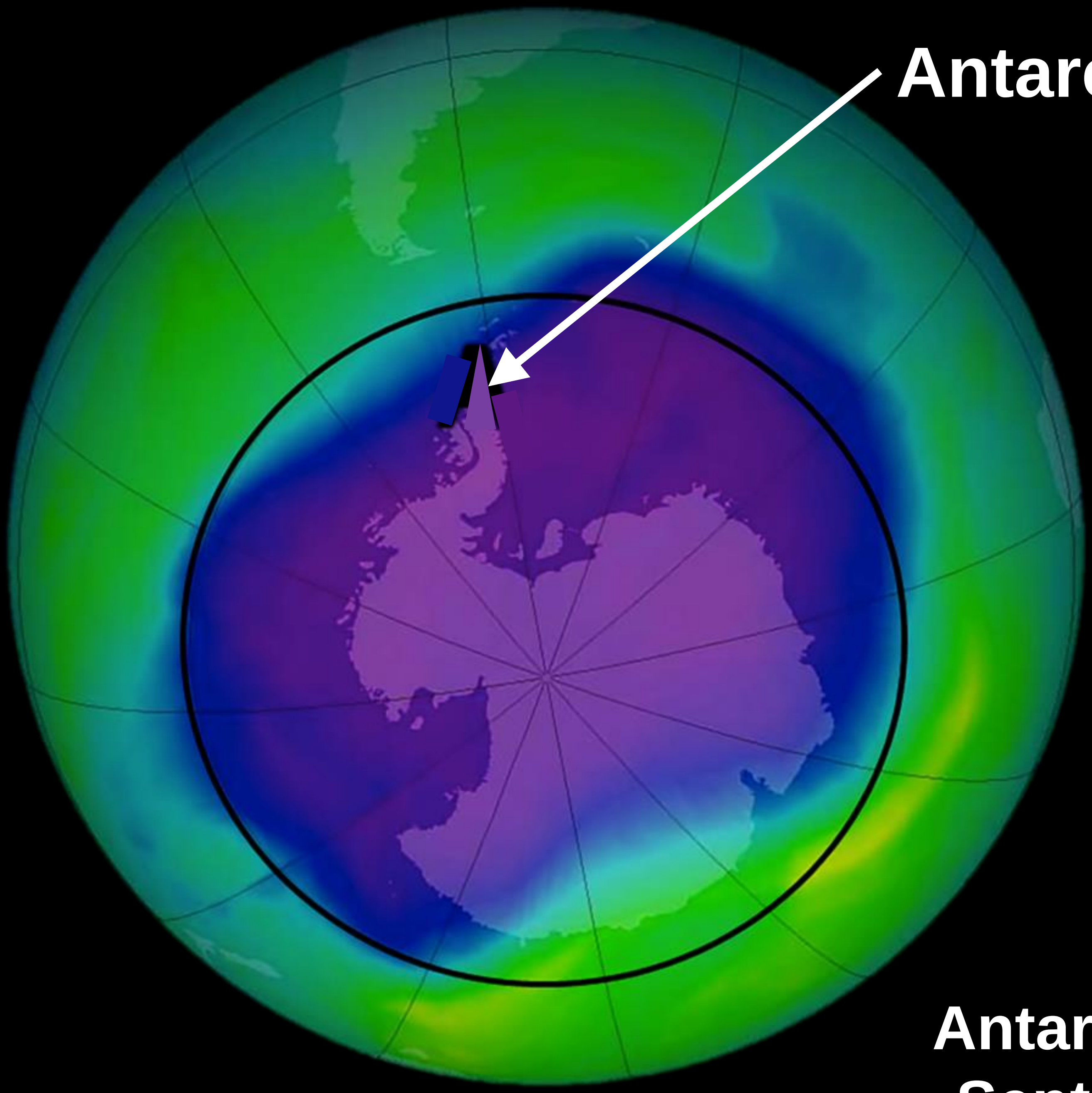

UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
Chlorine
PSCs
GLOBAL WARMING
CFCs


Chlorine from CFCs
Temperature
1945
1955
1965
1975
1985
1995
2005
2015
Year


UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
Chlorine
PSCs
GLOBAL
WARMING
CFCs
Chlorine from CFCs
Temperature
1945
1955
1965
1975
1985
1995
2005
2015
Year

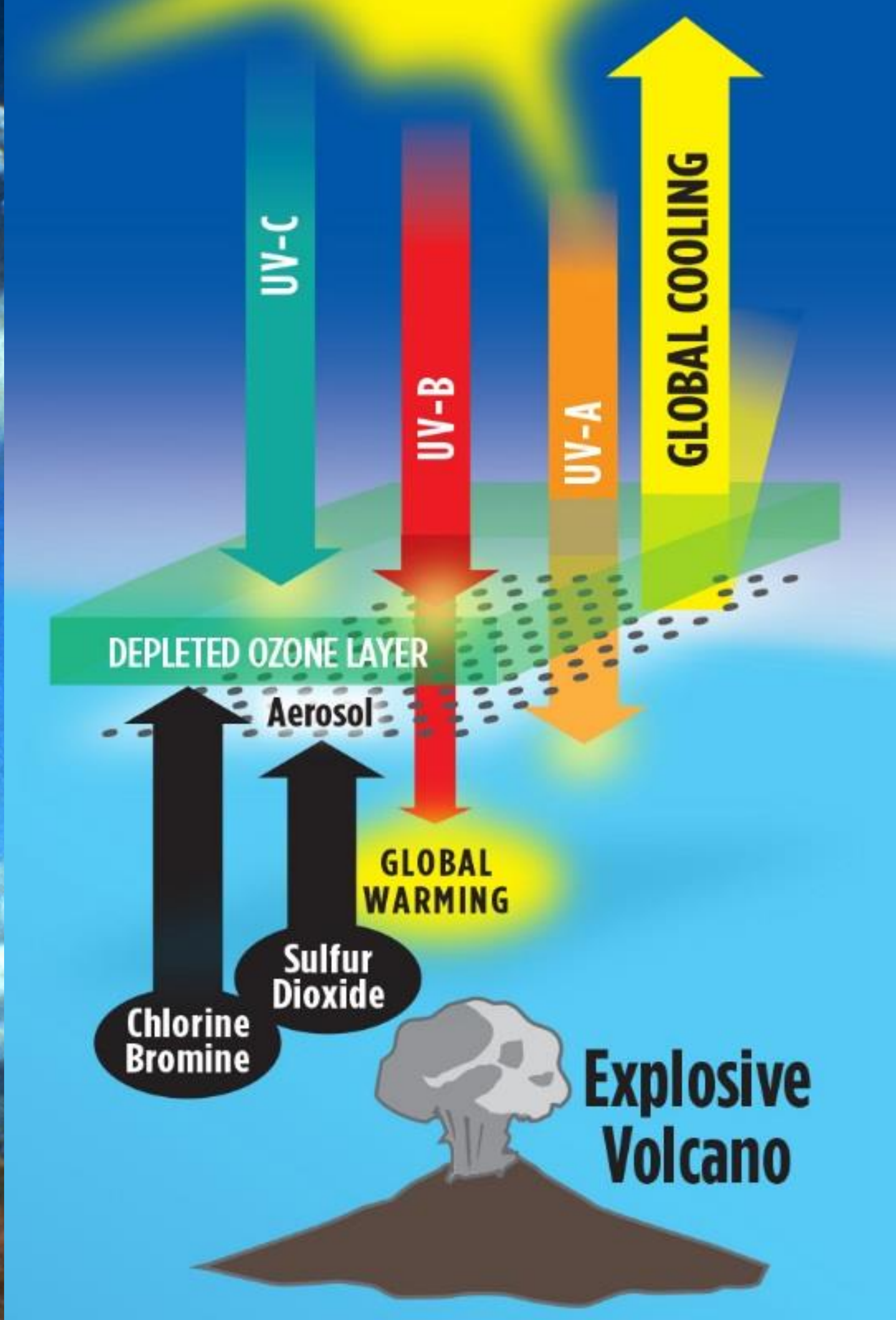

UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
Chlorine
PSCs
GLOBAL WARMING
CFCs

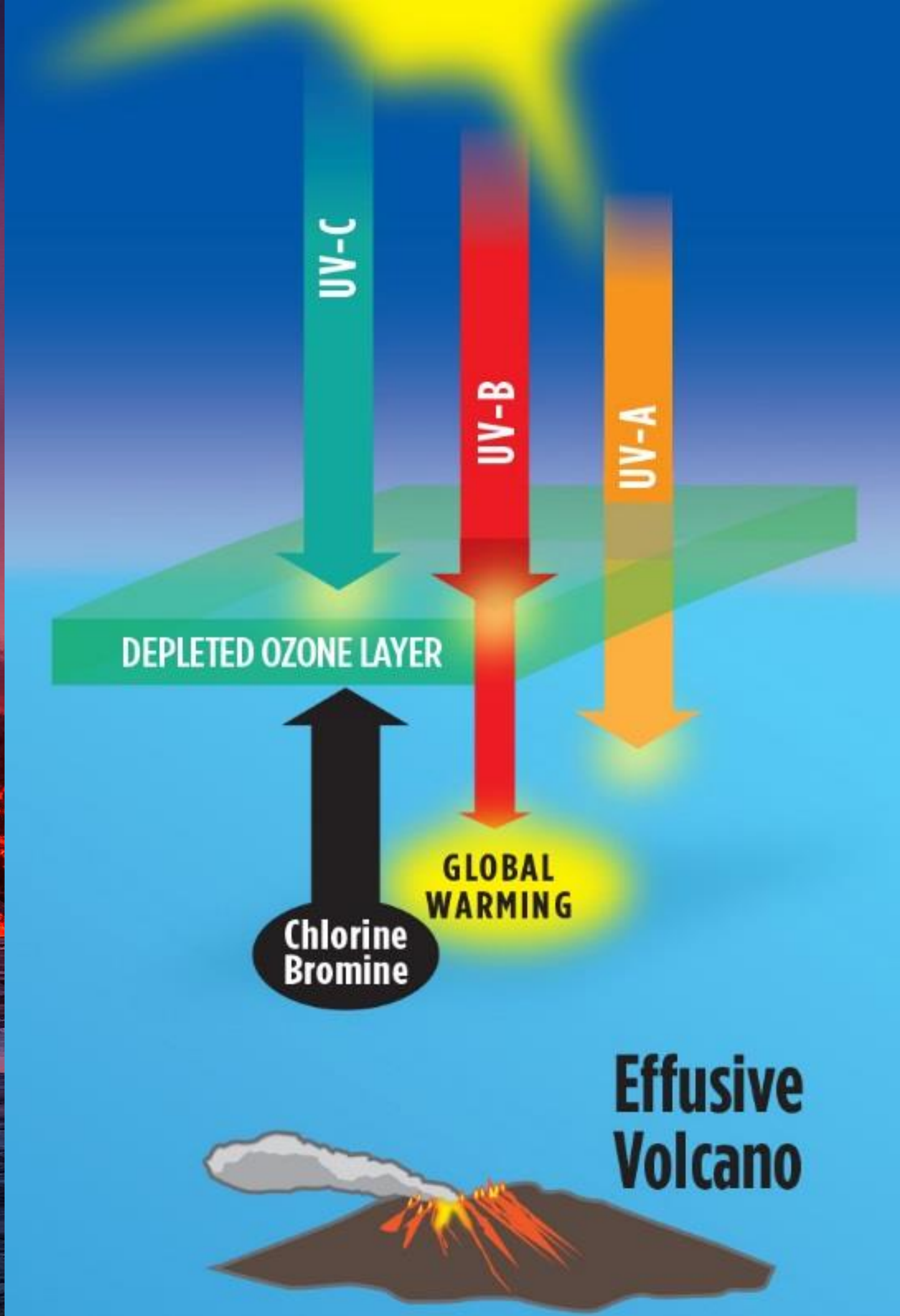

1995
1998
1993
Chlorine from CFCs
Ozone depletion
Temperature
1945
1955
1965
1975
1985
1995
2005
2015
Year

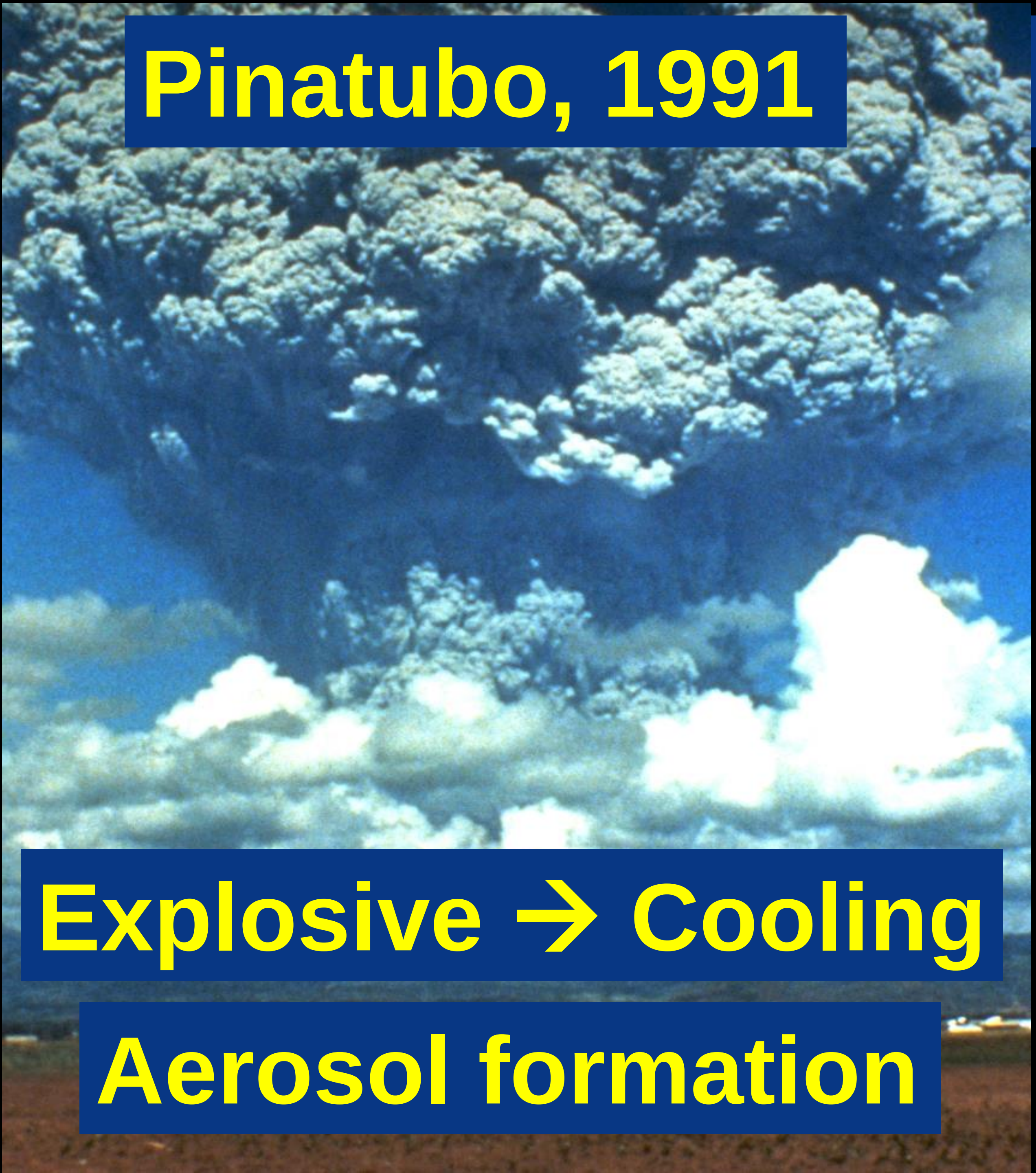


NASA

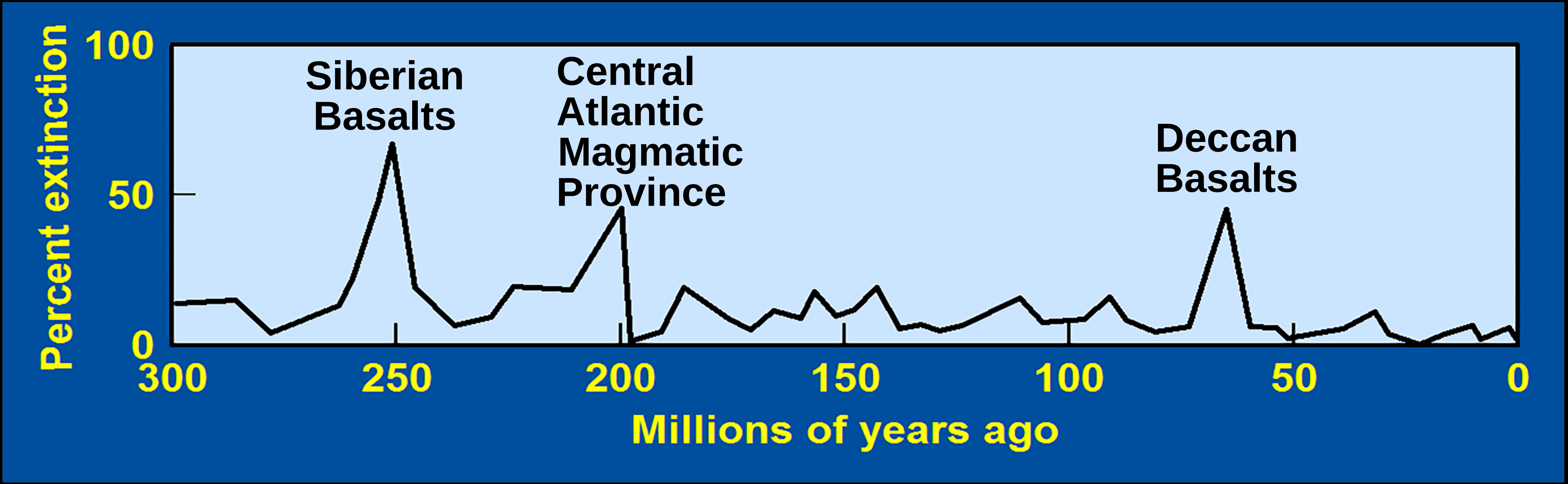
Antarctic Ozone Hole
September 24, 2006


UV-C
UV-B
UV-A
GLOBAL COOLING
DEPLETED OZONE LAYER
Aerosol
GLOBAL WARMING
Sulfur Dioxide
Chlorine Bromine
Explosive Volcano

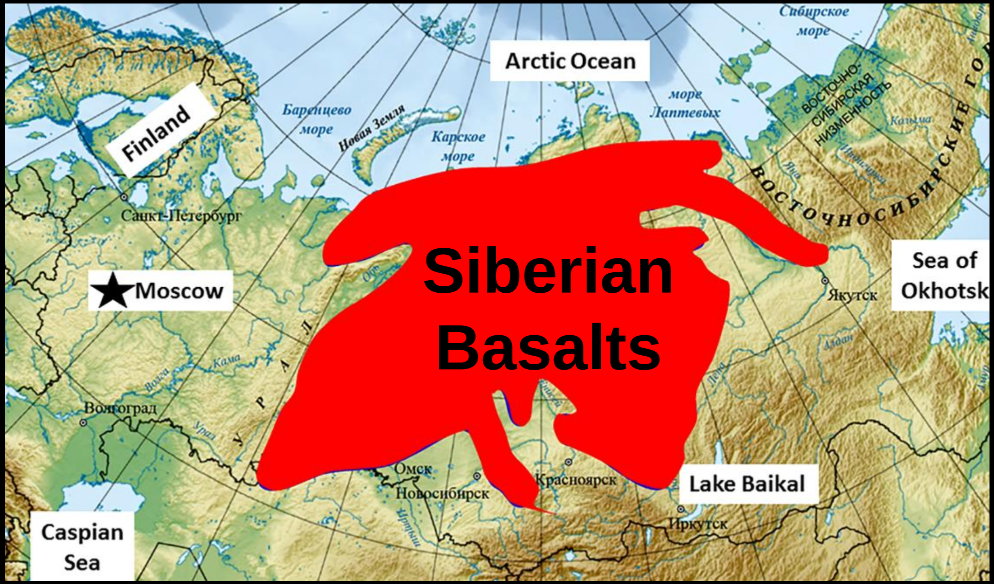

UV-C
UV-B
UV-A
DEPLETED OZONE LAYER
GLOBAL WARMING
Chlorine
Bromine
Effusive
Volcano


Pinatubo, 1991
Explosive → Cooling
Aerosol formation

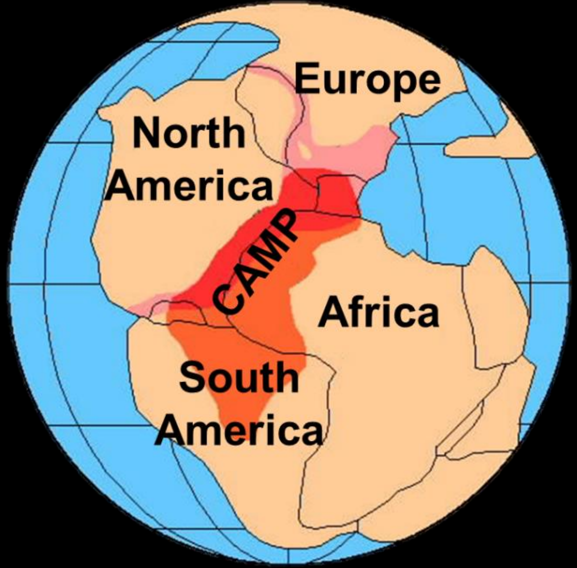

Bárðarbunga, 2014-2015
Effusive → Warming
No aerosol formation
© Arctic-Images/Corbis



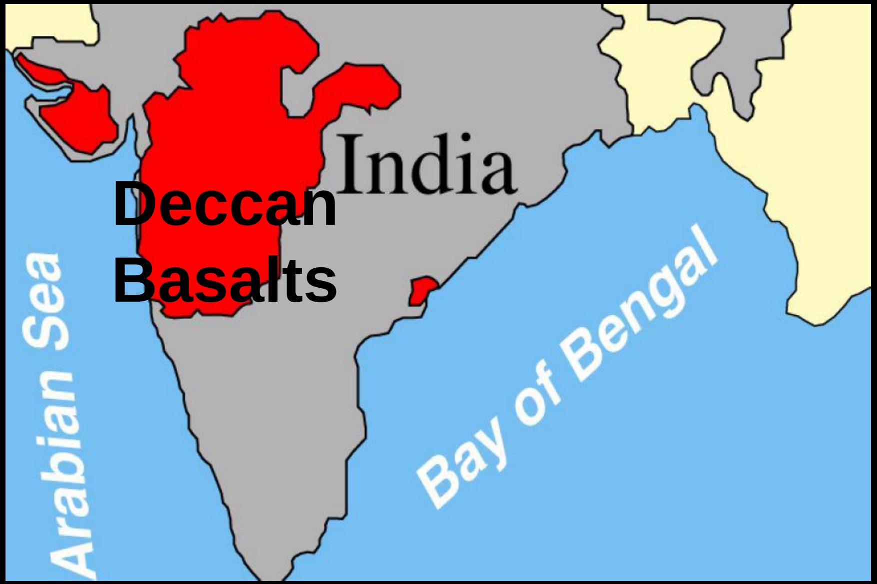
Percent extinction
100
50
0
Siberian Basalts
Central Atlantic Magmatic Province
Deccan Basalts
300
250
200
150
100
50
0
Millions of years ago



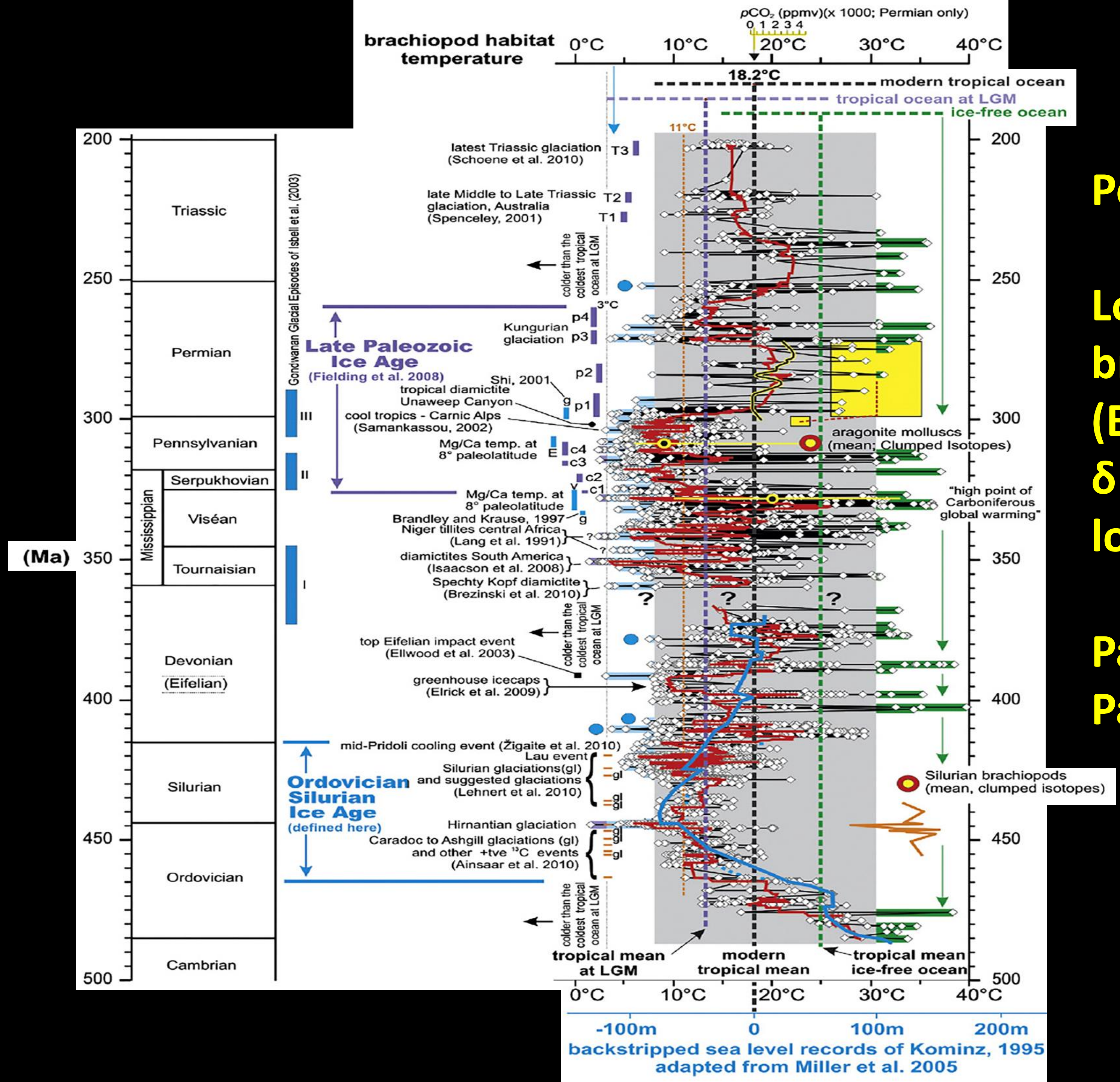
Arctic Ocean
Finland
Moscow
Siberian Basalts
Sea of Okhotsk
Lake Baikal
Caspian Sea



Europe
North America
CAMP
Africa
South America



India
Deccan Basalts
Arabian Sea
Bay of Bengal



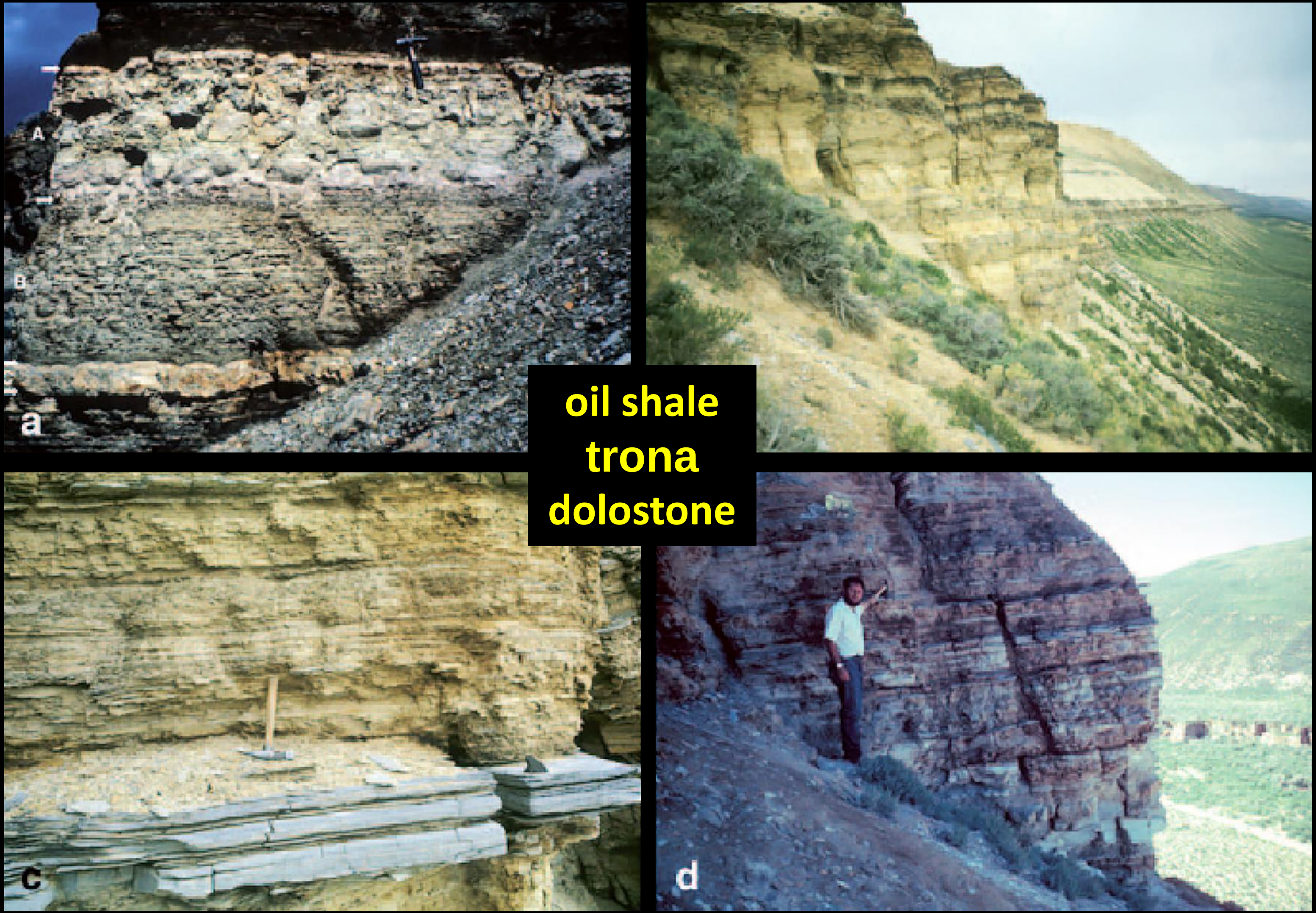
Peter S. Giles, 2012

Low-latitude Ordovician to Triassic brachiopod habitat temperatures (BHTs) determined from δ18O[brachiopod calcite]: A cold hard look at ice-house tropical oceans

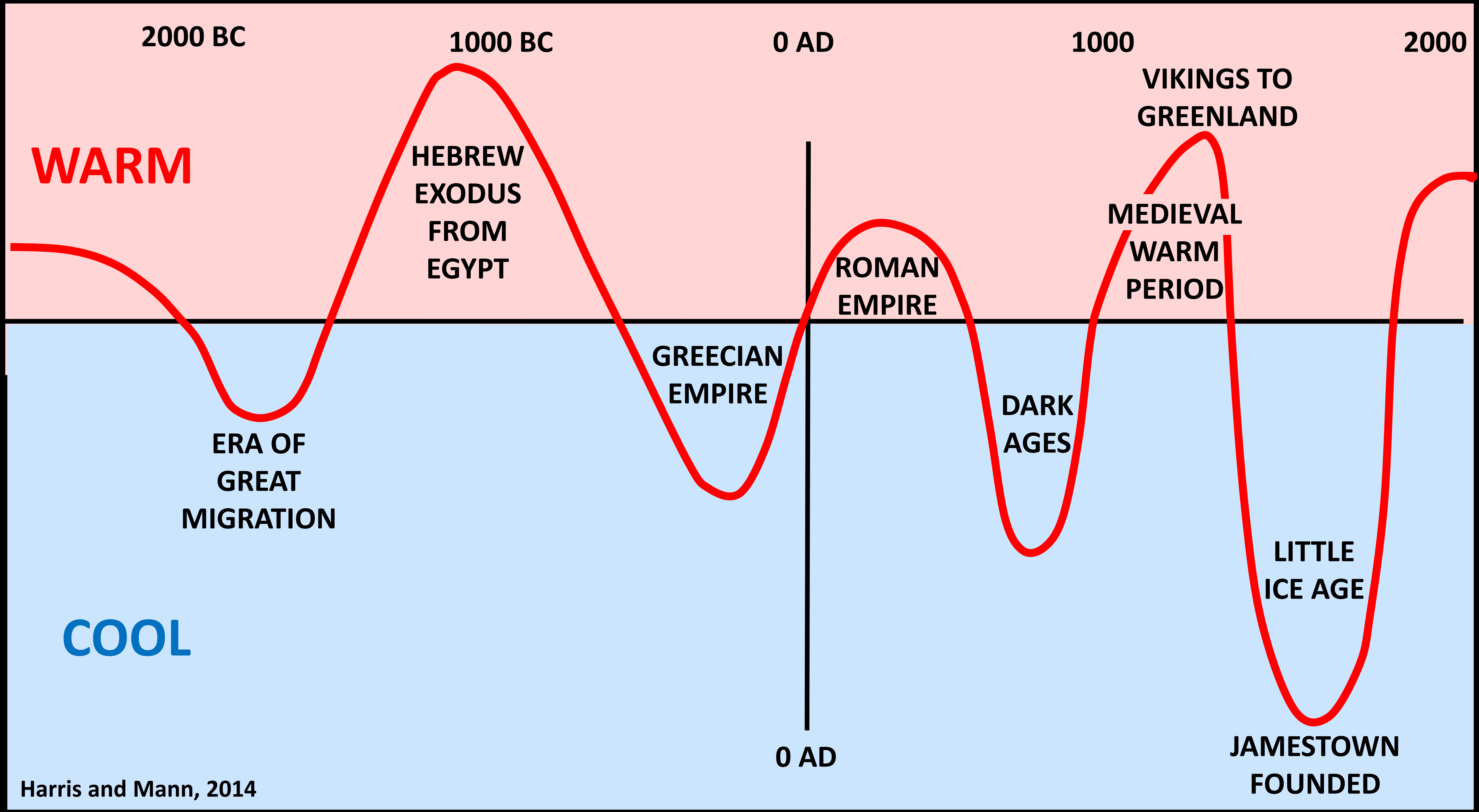
Palaeogeography, Palaeoclimatology, Palaeoecology, v. 317-318, p. 134-152.

Eocene Green River Formation in Wyoming

Ronald C. Surdam, 2013, Geological Observations Supporting Dynamic Climatic Changes, in Geological CO_2 Storage Characterization, Springer.



oil shale
trona
dolostone

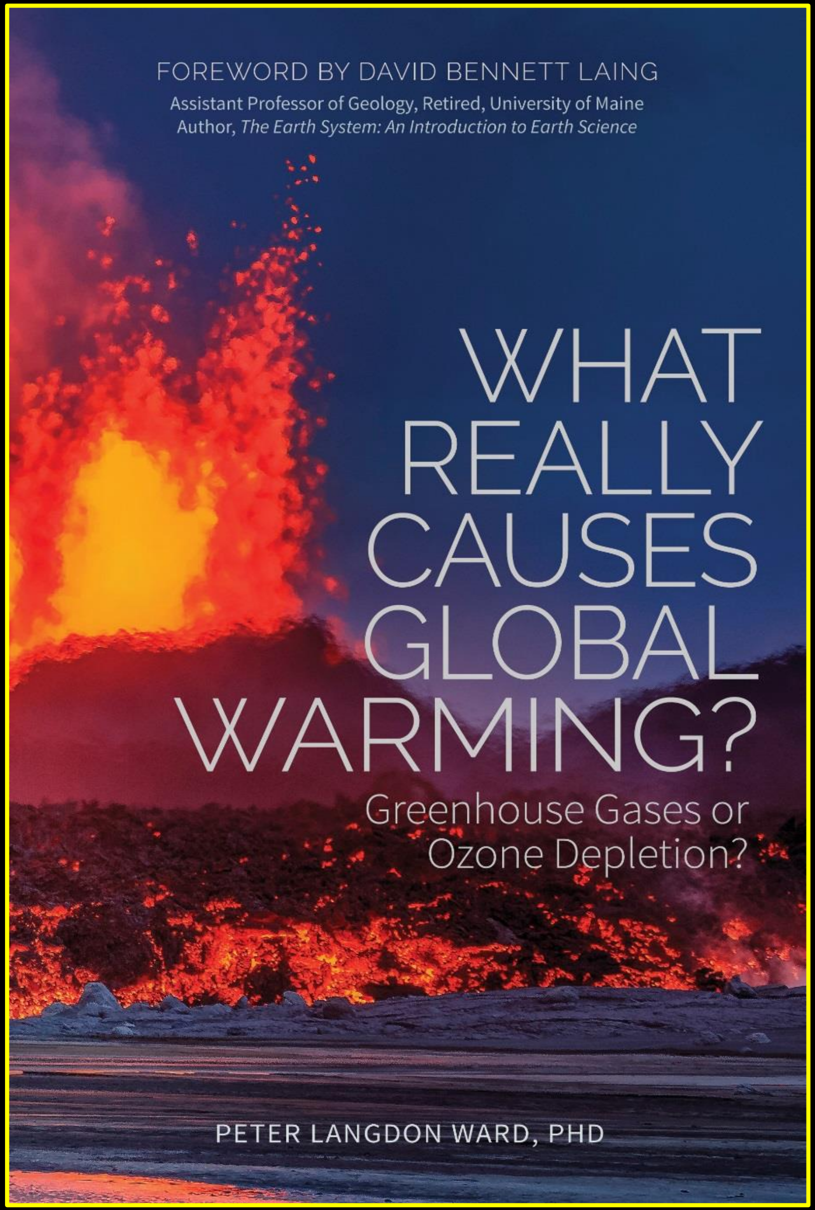


2000 BC
1000 BC
0 AD
1000
2000
WARM
COOL
HEBREW EXODUS FROM EGYPT
ERA OF GREAT MIGRATION
GREECIAN EMPIRE
ROMAN EMPIRE
DARK AGES
VIKINGS TO GREENLAND
MEDIEVAL WARM PERIOD
LITTLE ICE AGE
JAMESTOWN FOUNDED
0 AD
Harris and Mann, 2014

Ozone depletion caused by volcanic eruptions and CFC gases provides a clear and sufficient explanation for warming over the past 100 years and for warming throughout all of geologic time.

What role did greenhouse gases play?

For more information:



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ScienceIsNeverSettled.com

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