

INVITED PRESENTATION AT THE DELTA KAPPA GAMMA SOCIETY XI CHAPTER MEETING, CHAMPAIGN, ILLINOIS, MAY 14, 2022

# CLIMATIC CHANGE, A HISTORICAL PERSPECTIVE

Dr. Magdi Ragheb

University of Illinois at Urbana-Champaign  
Dept. of Nuclear, Plasma and Radiological Engineering  
111F Talbot Laboratory  
Urbana, Illinois, 61801, USA  
<http://www.mragheb.com>  
[mragheb@illinois.edu](mailto:mragheb@illinois.edu)



## “BLUE PEARL” EARTH

ON AUG. 23, 1966, THE WORLD RECEIVED ITS FIRST VIEW OF EARTH TAKEN BY A SPACECRAFT FROM THE VICINITY OF THE MOON. THE PHOTO WAS TRANSMITTED TO EARTH BY THE LUNAR ORBITER I AND RECEIVED AT THE NASA TRACKING STATION AT ROBLEDO DE CHAVELA NEAR MADRID, SPAIN. THE IMAGE WAS TAKEN DURING THE SPACECRAFT'S 16TH ORBIT.



## BLUE MARBLED EARTH'S ATMOSPHERE FROM SPACE

VIEW OF THE EARTH AS SEEN BY THE APOLLO 17 CREW -- ASTRONAUT EUGENE A. CERNAN, COMMANDER; ASTRONAUT RONALD E. EVANS, COMMAND MODULE PILOT; AND SCIENTIST-ASTRONAUT HARRISON H. SCHMITT, LUNAR MODULE PILOT -- TRAVELING TOWARD THE MOON.

The troposphere, where the weather phenomena are made, is just 11 km or 36,000 ft in altitude. The globe diameter is 12,000 km and its radius is 6,000 km, which makes the thickness of the troposphere a small fraction of:

$$\delta_{\text{atmosphere}} = \frac{11}{6,000} = \frac{1}{545.45} = 1.83 \times 10^{-3}$$

or no more than 1/545 of the globe's radius.

To create an analogy, the atmosphere would be a thin 1 mm thick layer surrounding a ball of:

$$2 \times 545.45 = 1,090.9 \text{ mm} = 1.09 \text{ m,}$$

or about 1 meter in diameter.

Troposphere is 1 millimeter crust on a 1-meter Sphere

# FERMI PARADOX

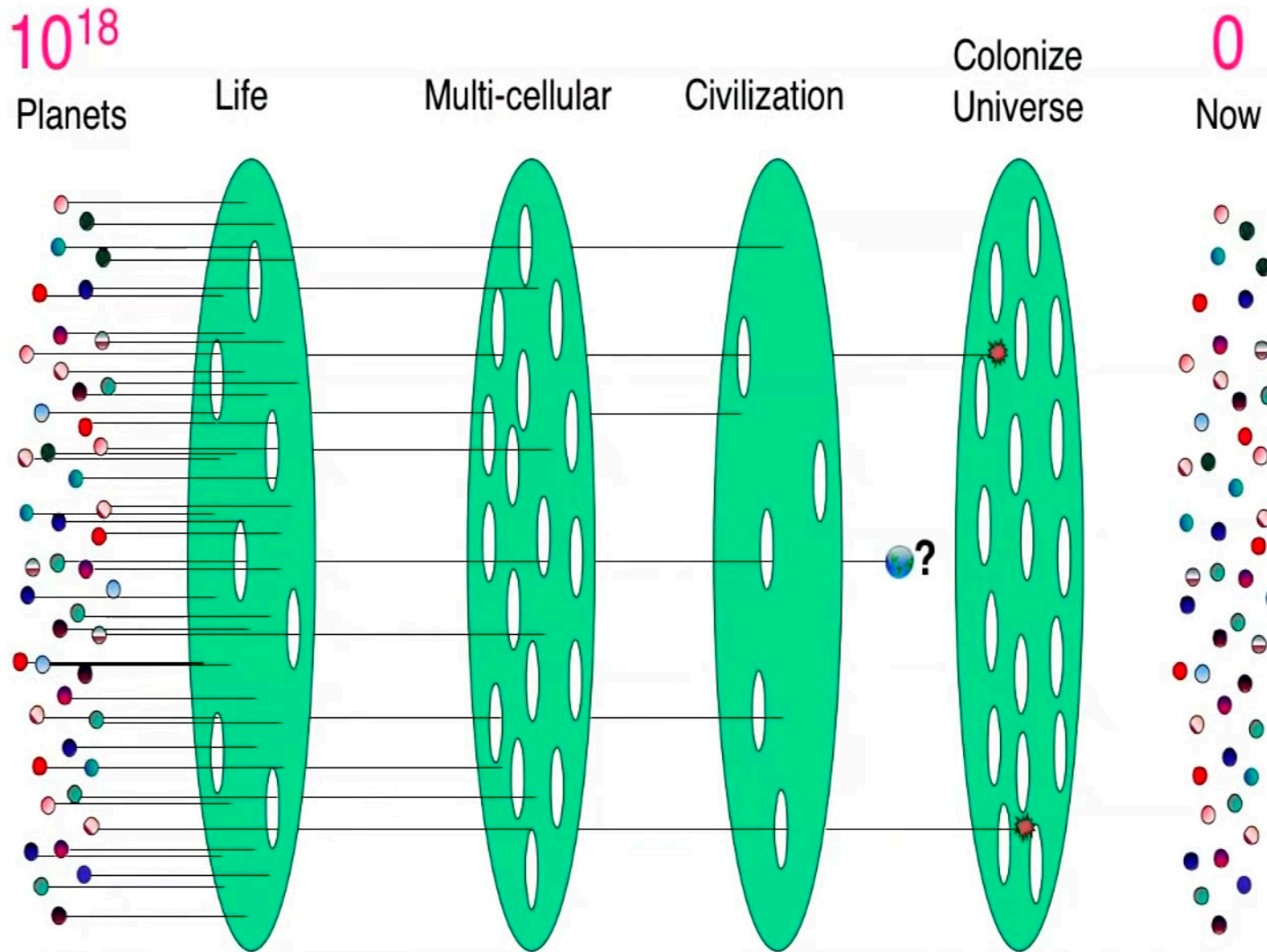
In the summer of 1950, over lunch, American physicist Enrico Fermi, in reference to other technological civilizations' existence, addressed his colleagues:

“Don't you ever wonder where everybody is?”

▶ “If the Universe is so big, where are all the aliens?”



# The Great Filter



## PAST SURVIVED FILTERS

1. Peaceful galaxy
2. Peaceful planet
3. RNA reproduction
4. Cells reproduction
5. Eukaryotes or complex cells survival
6. Sexual reproduction
7. Large brains
8. Civilization birth

## POSSIBLE FUTURE FILTERS

1. Climate Change
2. Asteroid or comet astral impact
3. Global pandemic
4. Nuclear war
5. Earthquake swarms
6. Super-volcanic eruptions
7. Close supernova
8. Solar mass ejection
9. Robot rebellion
10. No starships
11. Loss of survival desire

# THE GREAT FILTER

“Is there a “Great Filter” that limits the continuous existence of other forms of technological civilizations?”

The pessimistic answer to the Fermi Paradox is:

“”Some steps and hurdles to technological civilizations are so improbable to pass that virtually no one does.”

Hurdles could be:

**Avoidable Self-Inflicted :**

**Anthropogenic Climatic Change,**  
Gain of Function (GOF) Research bacterial and Viral Pandemics,  
Nuclear War,  
Artificial Intelligence and Robotics.

**Adaptation, defense, evolution:**

Sun/Planetary interactions,  
Astral Asteroid/Comet impacts,  
Gamma Ray's bursts,  
Supernovae,  
Earthquake and volcanism events.

A plausible optimistic answer is:

“We are here! We are just too early!”

<https://www.youtube.com/watch?v=OnW8UK5d2CA>

Global mass extinctions have occurred five times since the end of the Cambrian time period 500 million years ago, giving an average periodicity of 100 million years. There have also been many smaller extinction events in the geological record since the end of Precambrian time.

Mass extinctions with the percentage of all species that disappeared include:

the Ordovician-Silurian: 85 percent;

the late Devonian: 75 percent;

the Permian-Triassic: 96 percent;

the Triassic-Jurassic: 50 percent; and

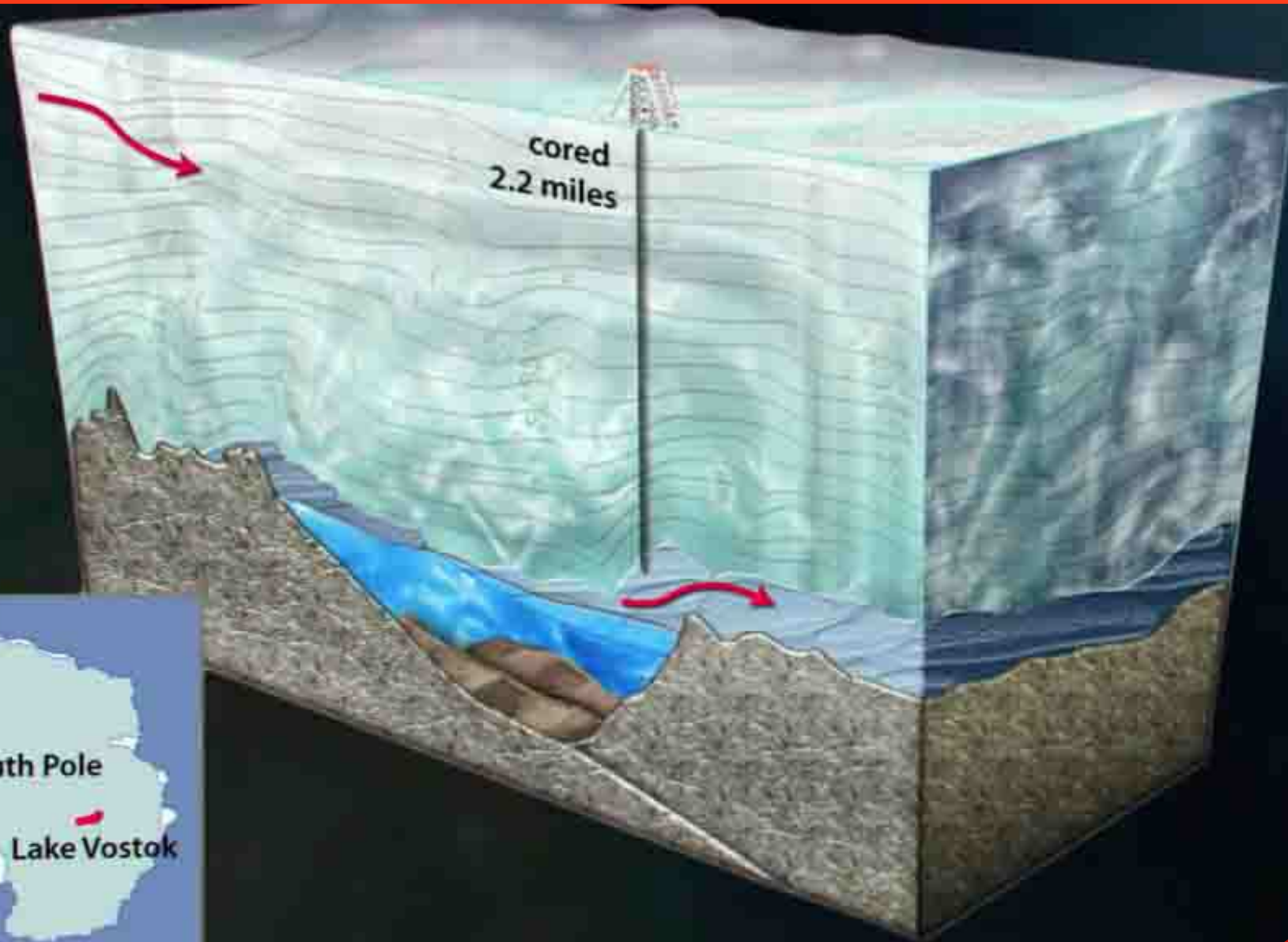
the Cretaceous-Tertiary: 65 percent.

Extinctions have been correlated with astral impact events, flood basalt eruptions, and **abrupt climate changes**.

**Catastrophic methane release from the oceans** is proposed as a mechanism for past and future mass extinctions.

## MASS EXTINCTIONS

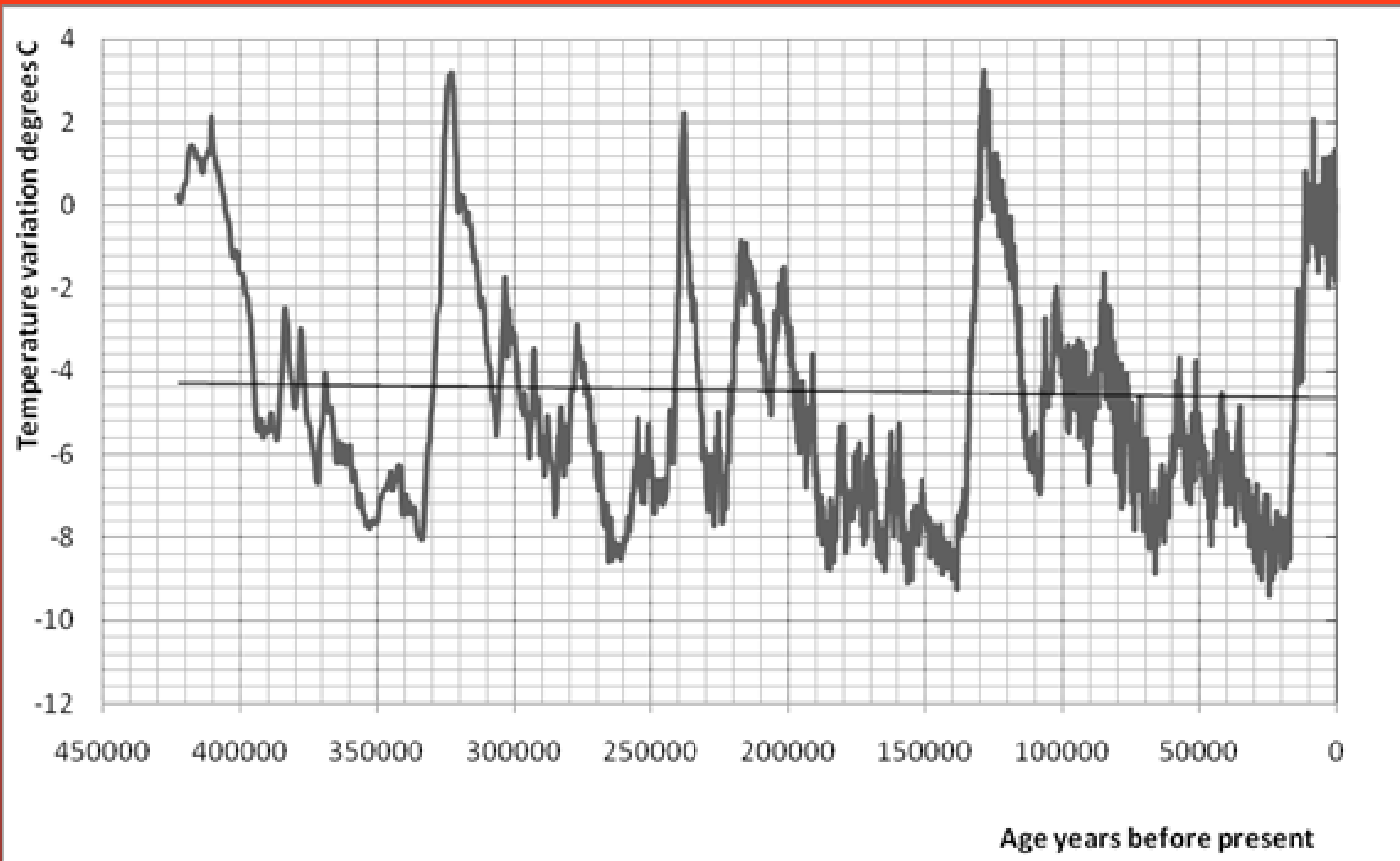




ICE CORES, LAKE VOSTOK, ANTARTICA

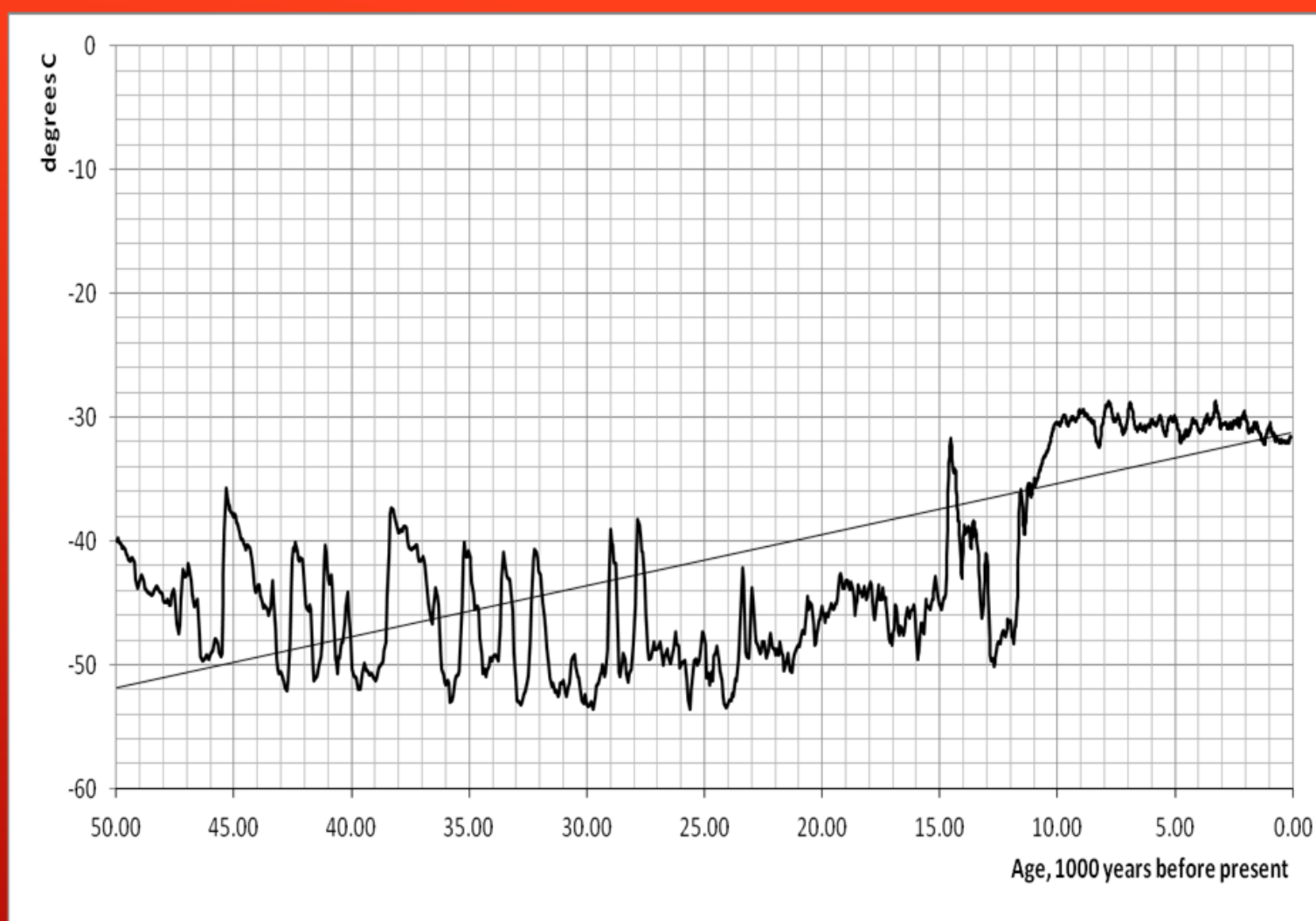


ICE CORES

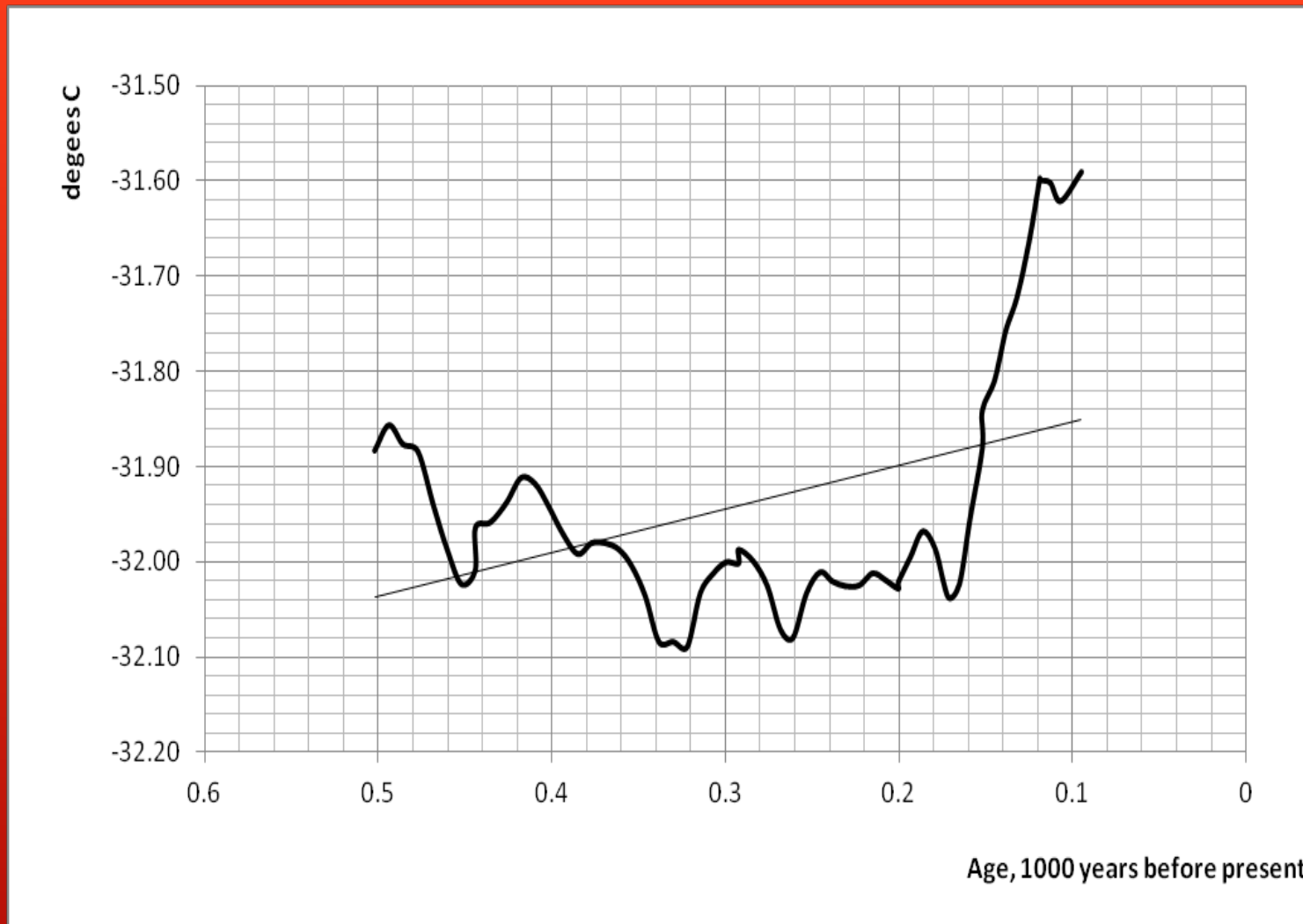


## CYCLIC CLIMATE WITH 100,000 YEARS CYCLE

TEMPERATURE DIFFERENCE IN DEGREES CELSIOUS WITH RESPECT TO MEAN OF RECENT TIME VALUE, FROM DEUTERIUM DATA OVER A 420,000-YEAR PERIOD FROM ICE CORE DATA AT VOSTOK, ANTARTICA. STEEP SUDDEN INCREASES BY ABOUT 10 DEGREES ARE FOLLOWED BY GRADUAL DECREASES TO ABOUT 8 DEGREES BELOW THE RECENT TIME MEAN.

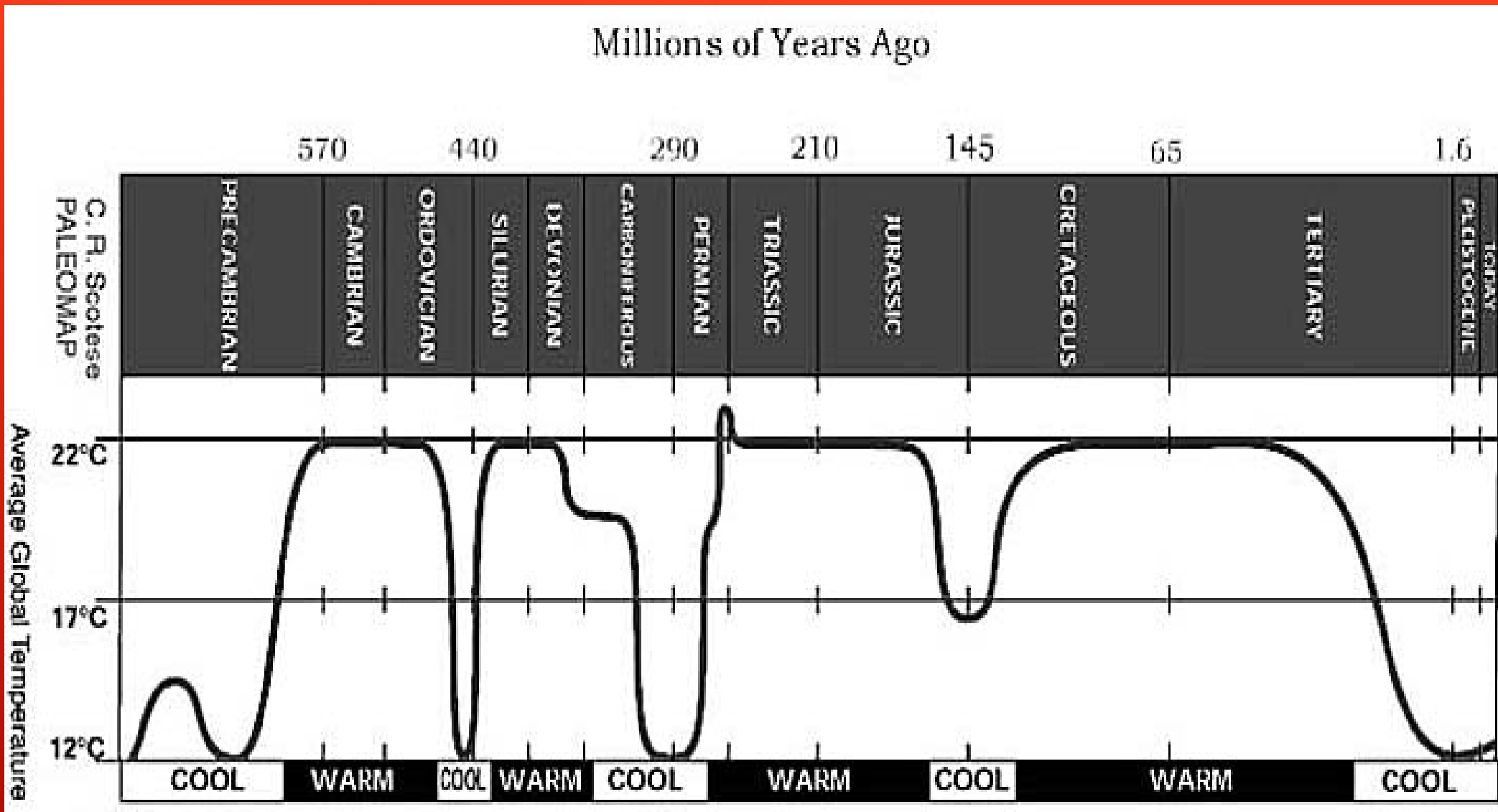


TEMPERATURE VARIATION IN CENTRAL GREENLAND IN THE LAST 50,000 YEARS UP TO THE YEAR 2000. LINEAR LEAST SQUARES INTERPOLATION SHOWS A RANGE OF INCREASE OF ABOUT 22 DEGREES CELSIUS TO THE CURRENT WARM PERIOD THAT SEEMS TO BE ASSOCIATED WITH COOLING DOWN OVER THE LAST 10,000 YEARS



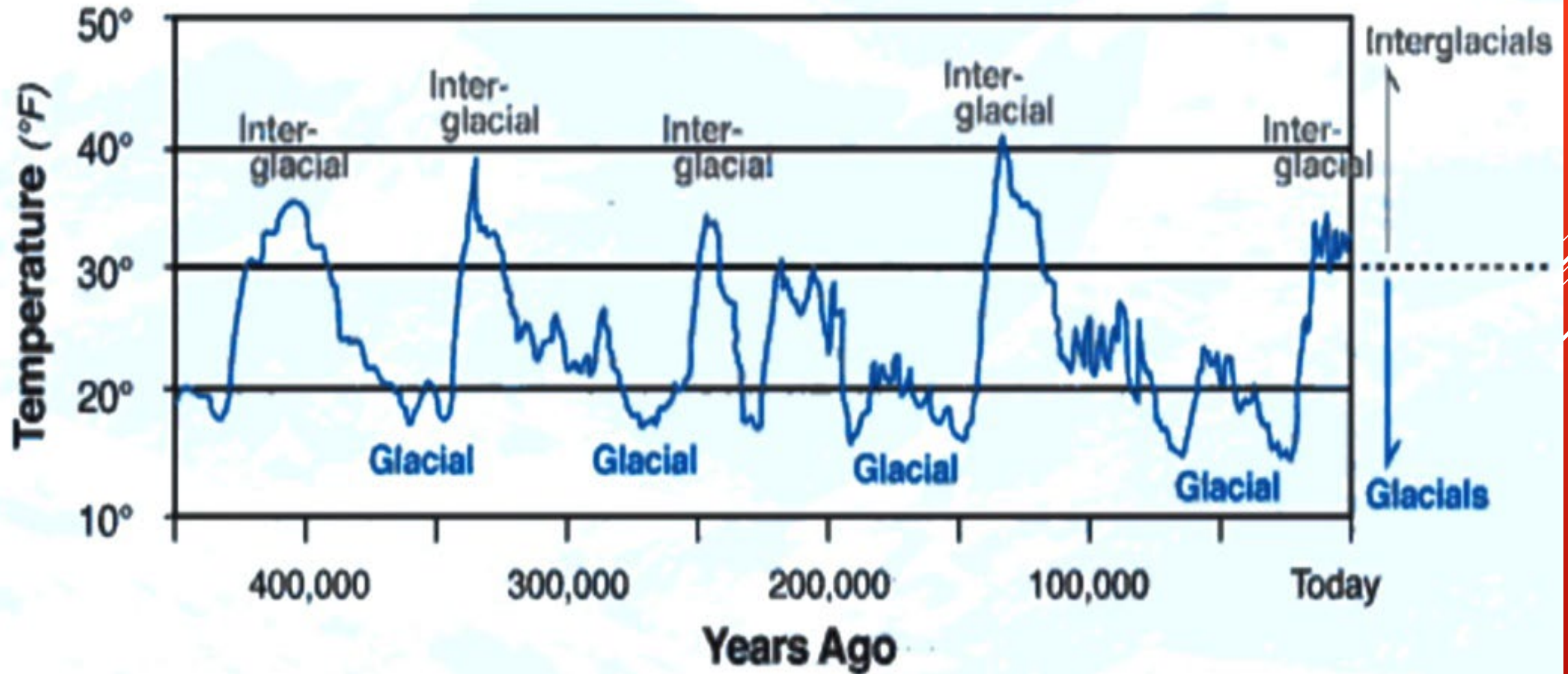
## HOCKEY STICK CURVE

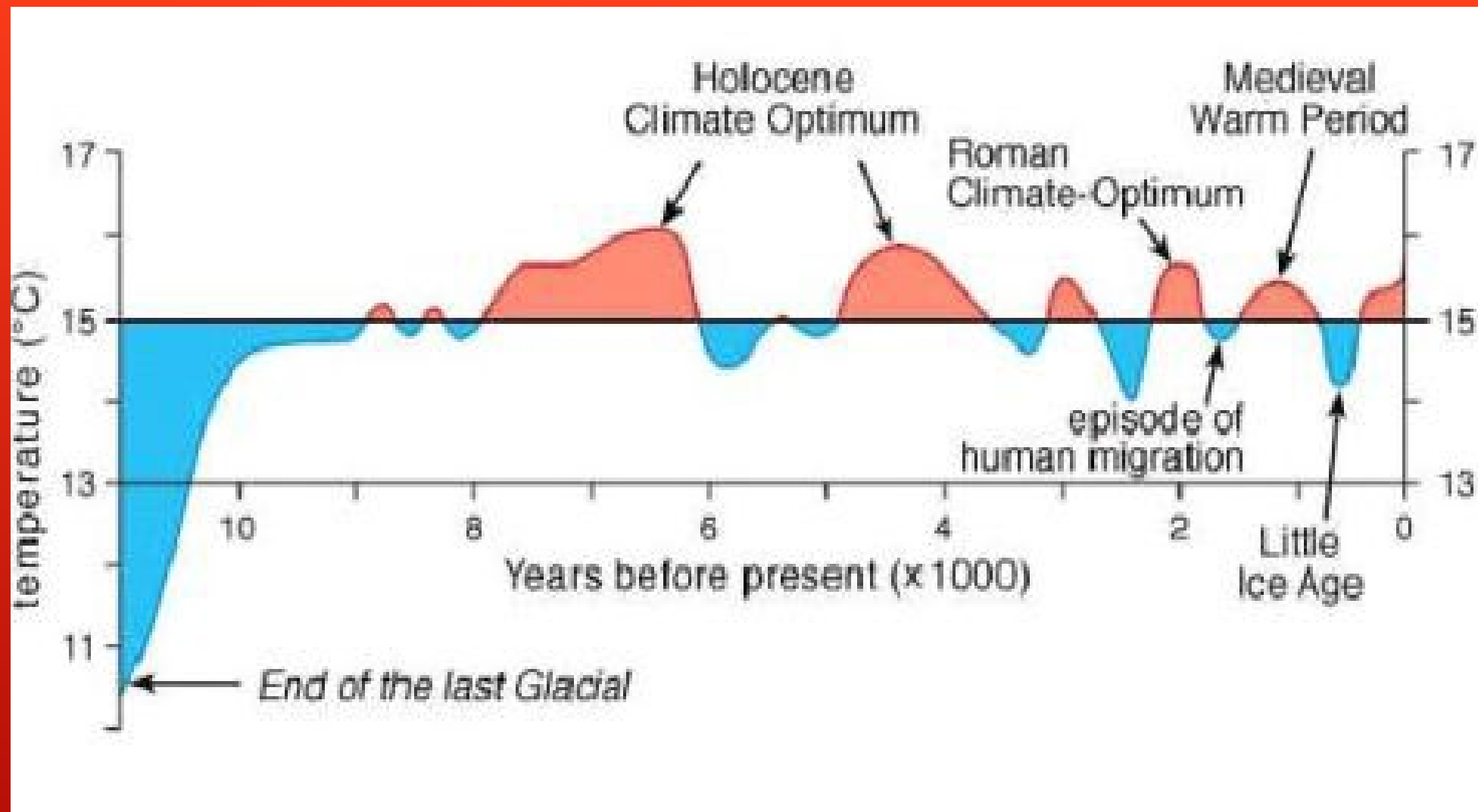
TEMPERATURE IN CENTRAL GREENLAND FROM ISOTOPIC DEUTERIUM CONTENT. A COOLING TREND OVER A 3,000 YEARS PERIOD HAS BEEN INTERRUPTED BY A WARMING TREND STARTING 165 YEARS AGO. LEAST SQUARES LINEAR CURVE FITTING SHOWS ABOUT 0.4 DEGREES CELSIUS INCREASE. THE GENERATED GRAPH DISPLAYS WHAT IS REFERRED TO AS THE MANN'S "HOCKEY STICK CURVE."



CYCLIC TEMPERATURE VARIATION OVER THE GLACIAL-INTERGLACIAL GEOLOGICAL AGES WITH A PERIOD OF 100,000 YEARS. THE EARTH EMERGED FROM THE MOST RECENT GLACIATION PERIOD 18,000 YEARS BEFORE PRESENT.

# Glacial-interglacial cycles over the past 450,000 years





## EXIT FROM THE LAST GLACIATION PERIOD

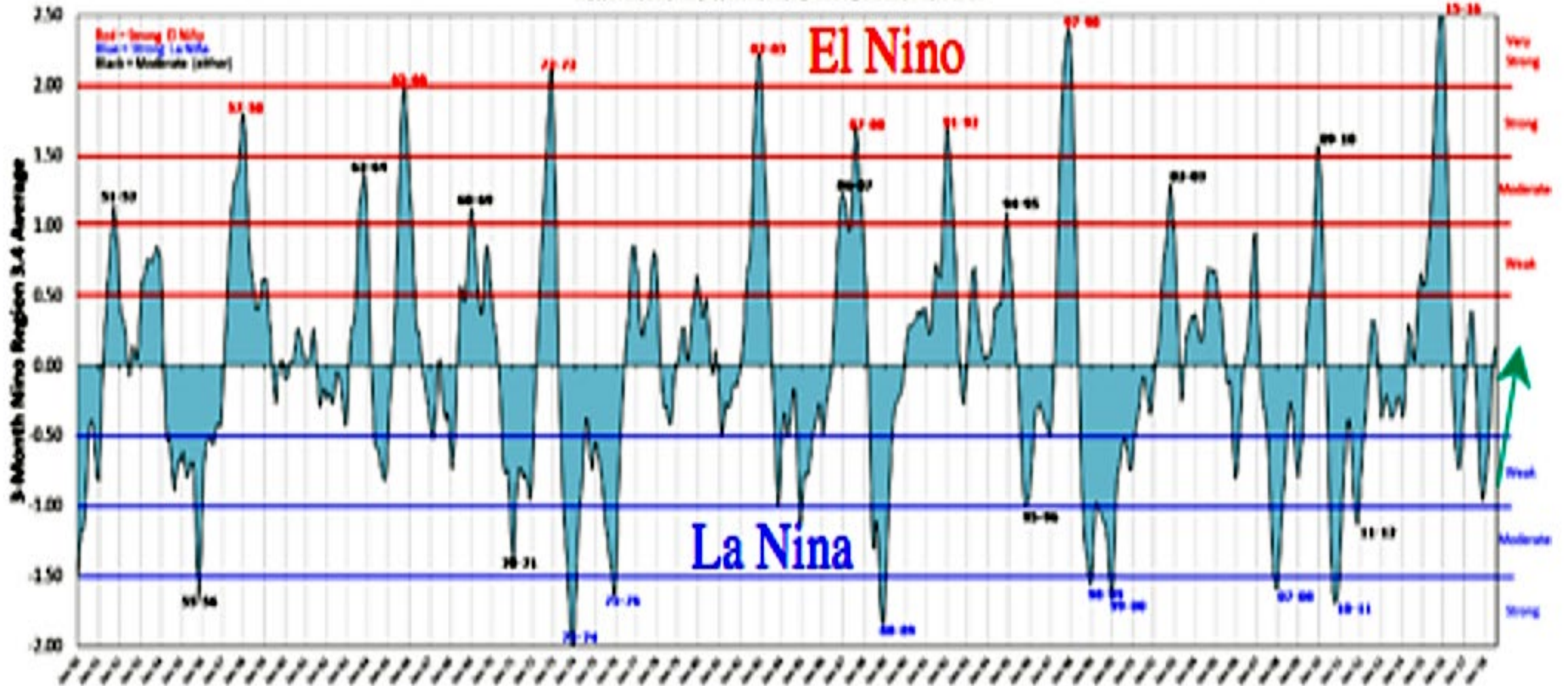


1. A change in the incoming solar radiation through changes in the Earth's orbit or in the sun itself undergoing its own cycles.
2. A change in the fraction of solar radiation that is reflected or albedo; affected by the cloud cover, small particles or aerosols resulting from pollution or volcanic eruptions or land cover.
3. An alteration of the long wave energy radiated back to space by changes in the greenhouse gas concentrations such as CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>2</sub>.
4. Local climate also depends on how heat is distributed by winds on the land masses and ocean currents.

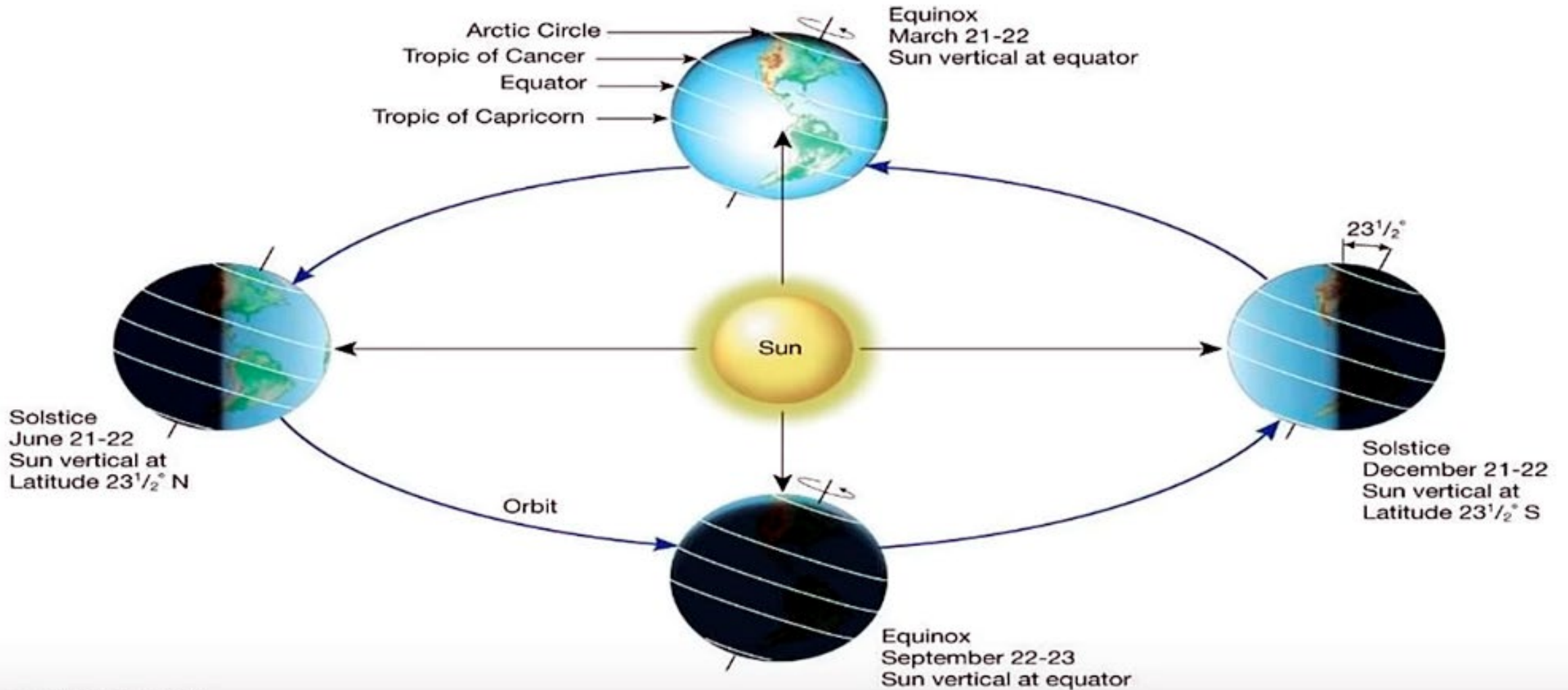
**EARTH'S RADIATION ENERGY BALANCE CAN CHANGE, THUS CAUSING A CLIMATE VARIATION**

# Oceanic Niño Index (ONI)

[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/ensofull/ensofull.shtml](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensofull/ensofull.shtml)

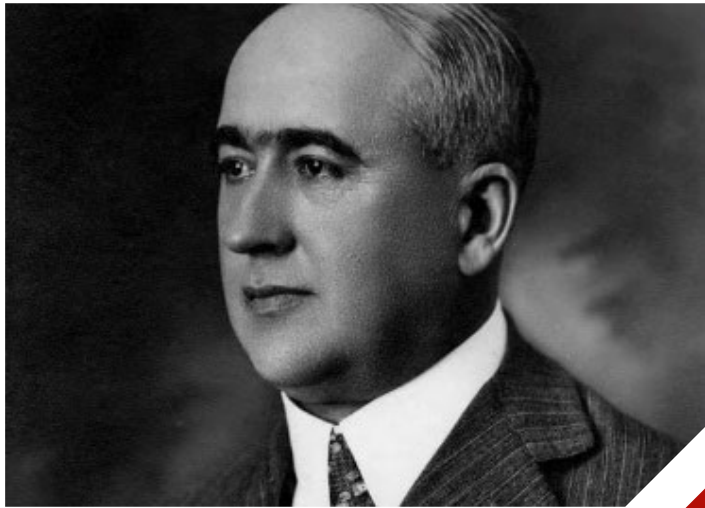


EL NINO/ LA NINA CLIMATIC CYCLE



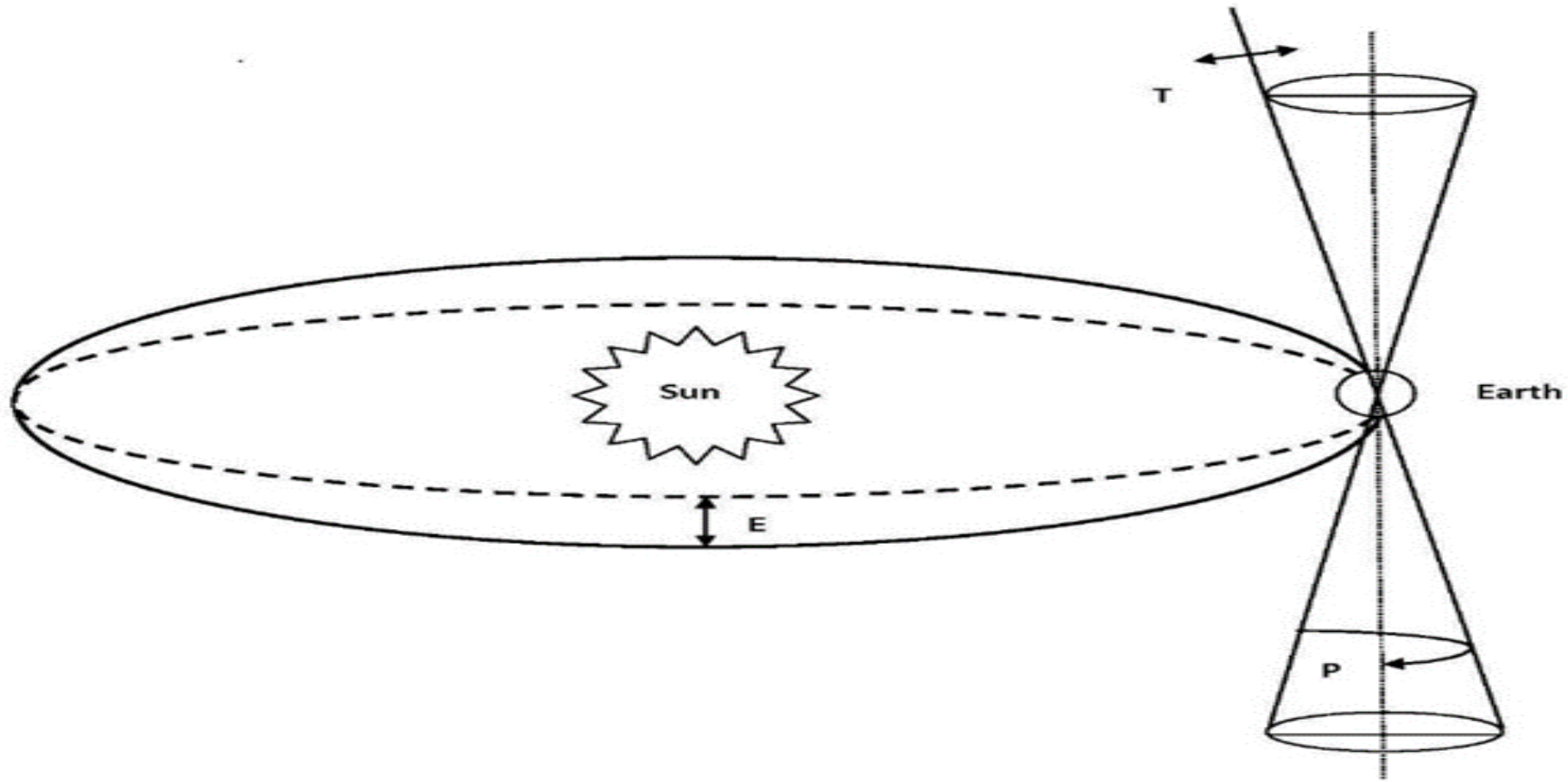
© 2013 Pearson Education, Inc.

# EFFECT OF EARTH'S 23.5 DEGREES TILT ON THE SEASONS CLIMATIC CYCLE



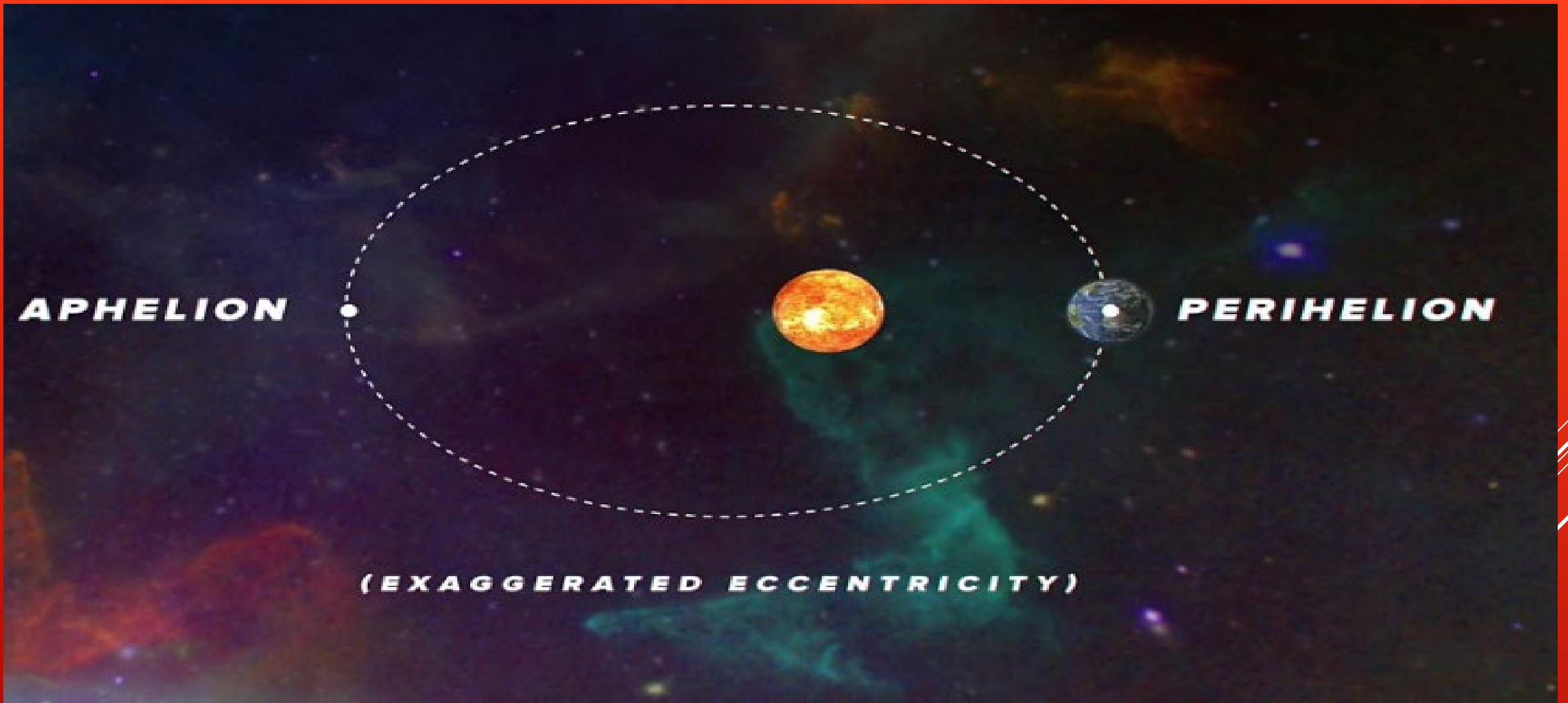
Milutin Milankovitch's theory states that as the Earth travels through space around the sun, cyclical variations in three elements of the Earth and sun geometry combine to produce variations in the amount of solar energy that reaches the Earth.

## MILANKOVITCH EARTH'S ORBITAL CLIMATIC CYCLES

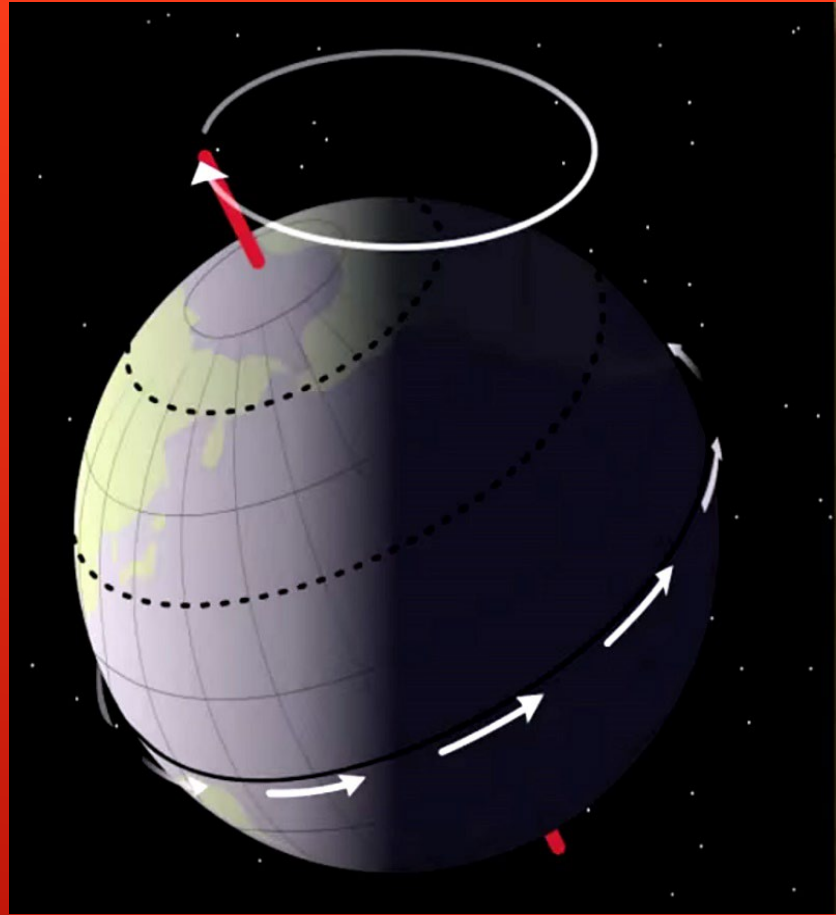


SUN GEOMETRY COMBINE TO PRODUCE VARIATIONS IN THE AMOUNT OF SOLAR ENERGY THAT REACHES THE EARTH. THE THREE COMPONENTS ARE:

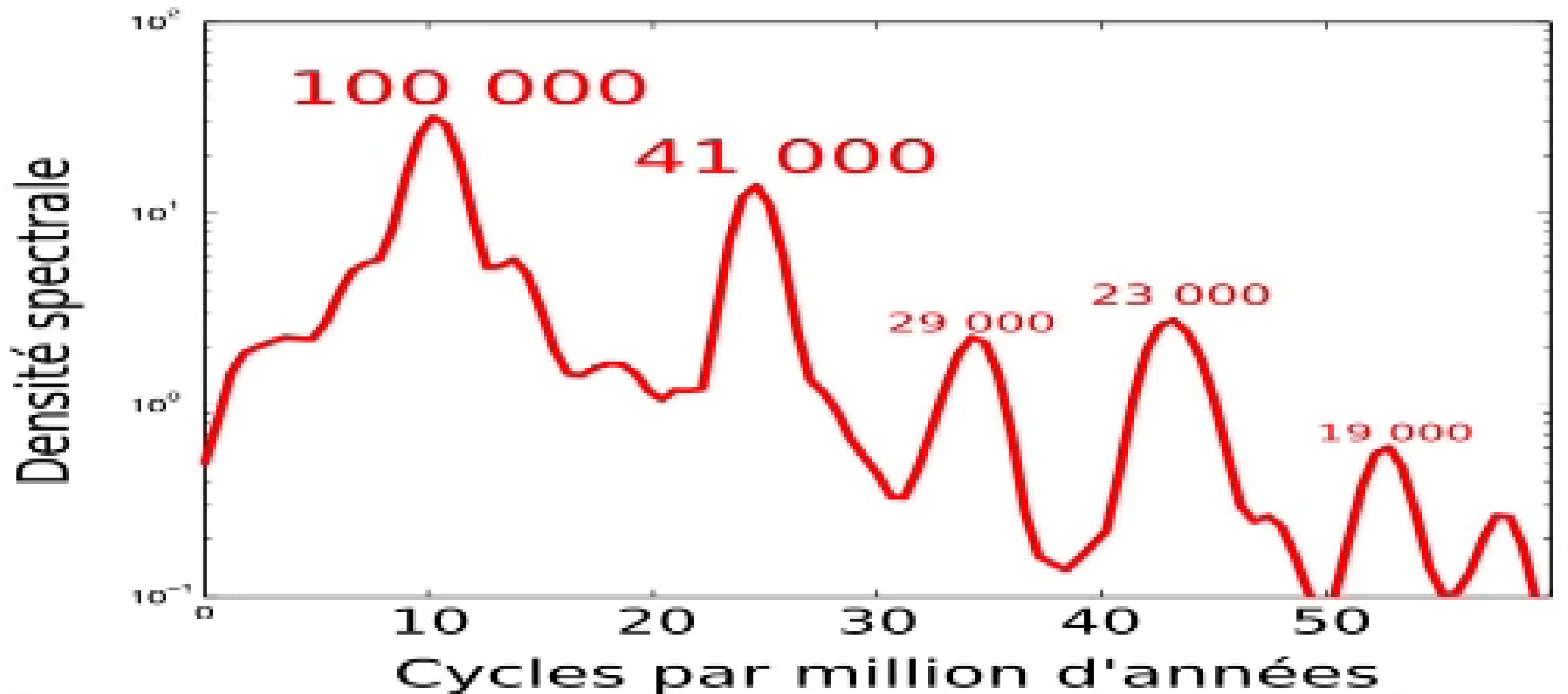
1. **ECCENTRICITY CYCLE:** VARIATIONS IN THE EARTH'S ORBITAL ECCENTRICITY OR THE SHAPE OF THE ORBIT AROUND THE SUN, LEADING TO A **100,000 YEAR PERIOD**.
2. **OBLIQUITY CYCLE:** CHANGES IN OBLIQUITY OR TILT OF THE EARTH'S AXIS OR CHANGES IN THE ANGLE THAT EARTH'S AXIS MAKES WITH THE PLANE OF EARTH'S ORBIT, LEADING TO A **41,000 YEAR PERIOD**.
3. **PRECESSION OF THE EQUINOXES CYCLE:** OR THE CHANGE IN THE DIRECTION OF THE EARTH'S AXIS OF ROTATION, LEADING TO A **19,000 TO 23,000 YEAR PERIOD**.



ECCENTRICITY OF EARTH ORBIT FROM A CIRCLE TO AN ELLIPSE HAS A 100,000 YEARS CYCLE.

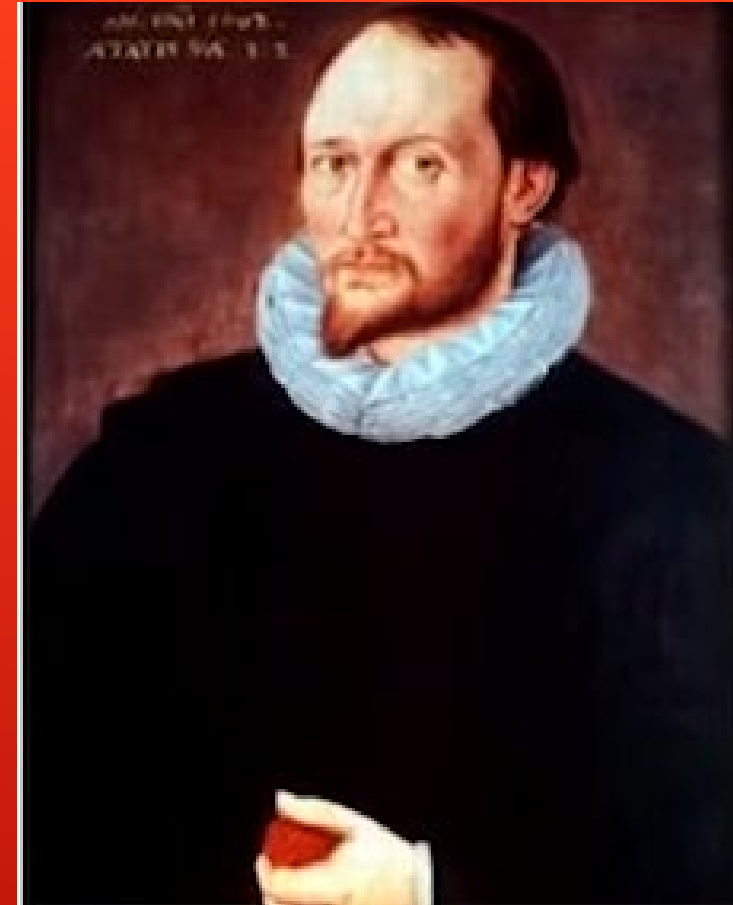
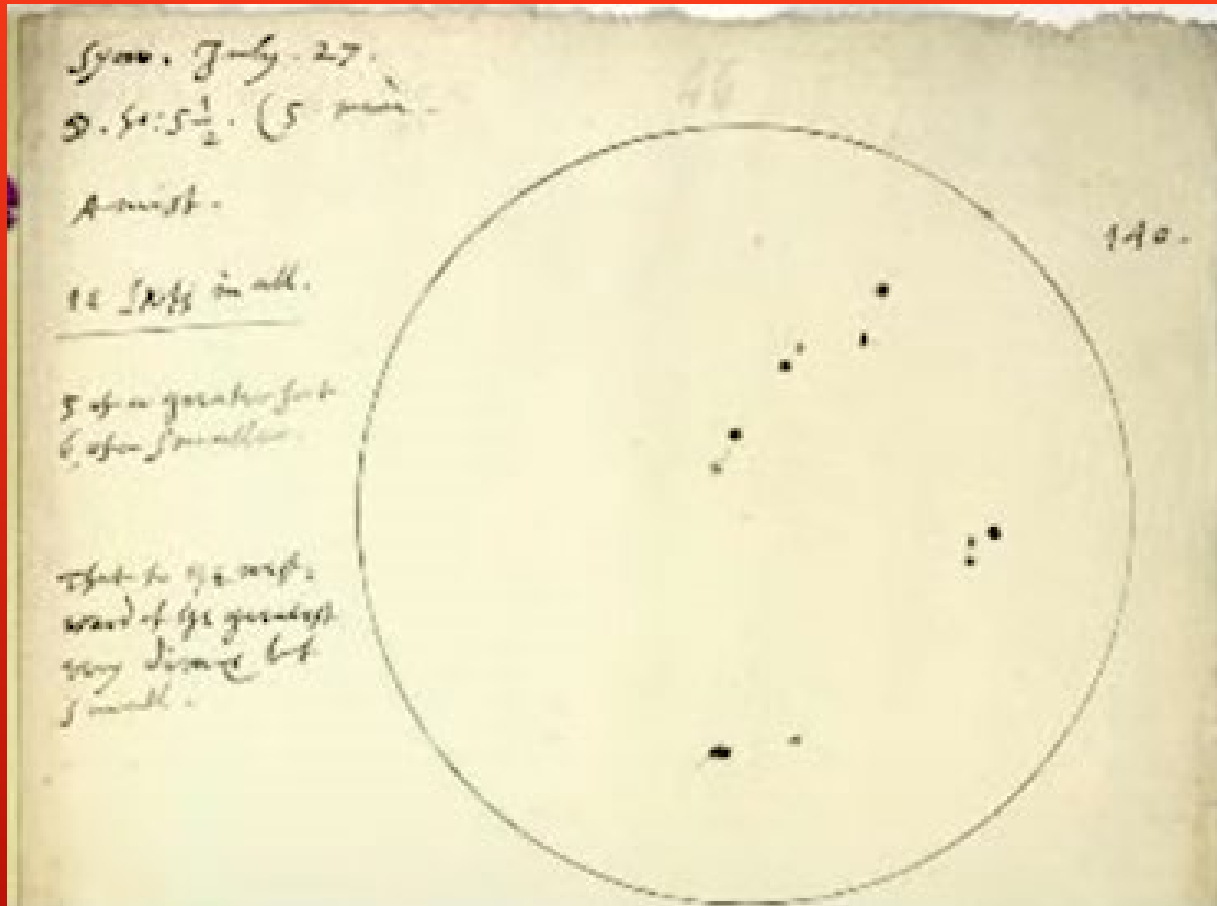


EARTH INCLINATION WITH AN ANGLE OF 23.5 DEGREES (WITH A CYCLE OF 41,000 YEARS BETWEEN 22.5-24 DEGREES) DETERMINES THE SEASONS AND PRECESSION CYCLE (20,000-40,000 YEARS).

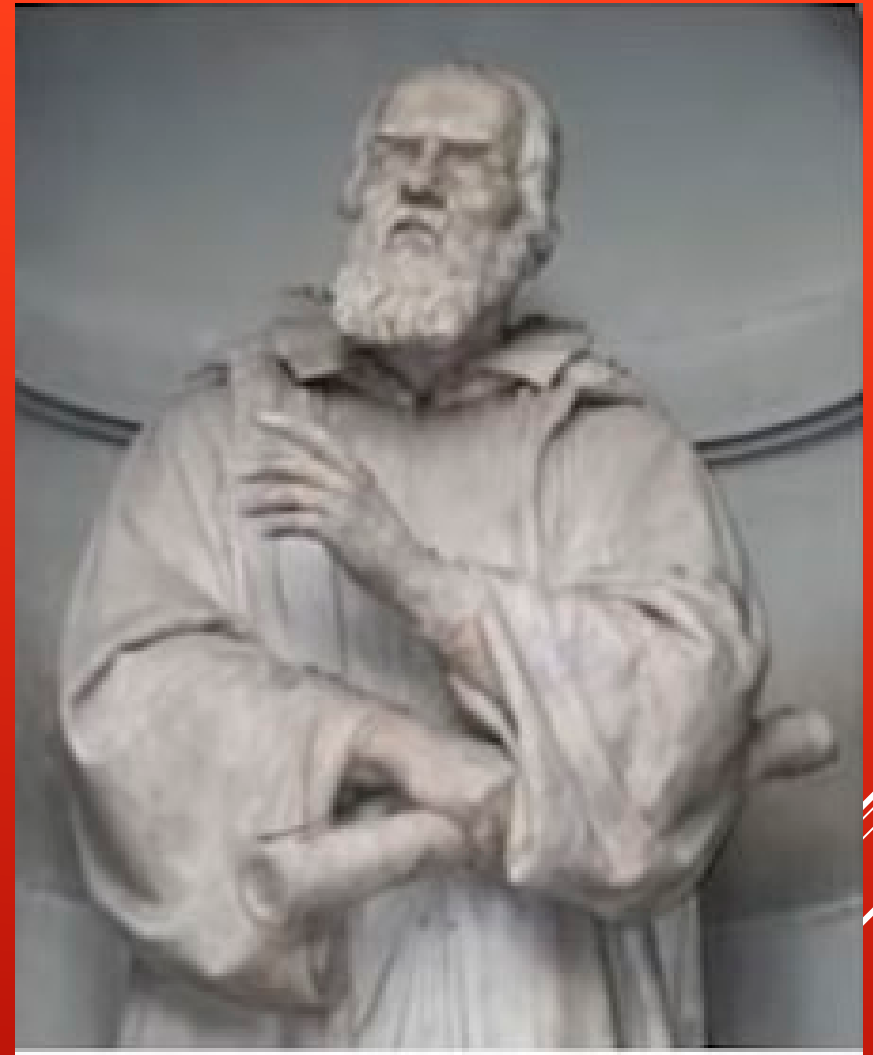
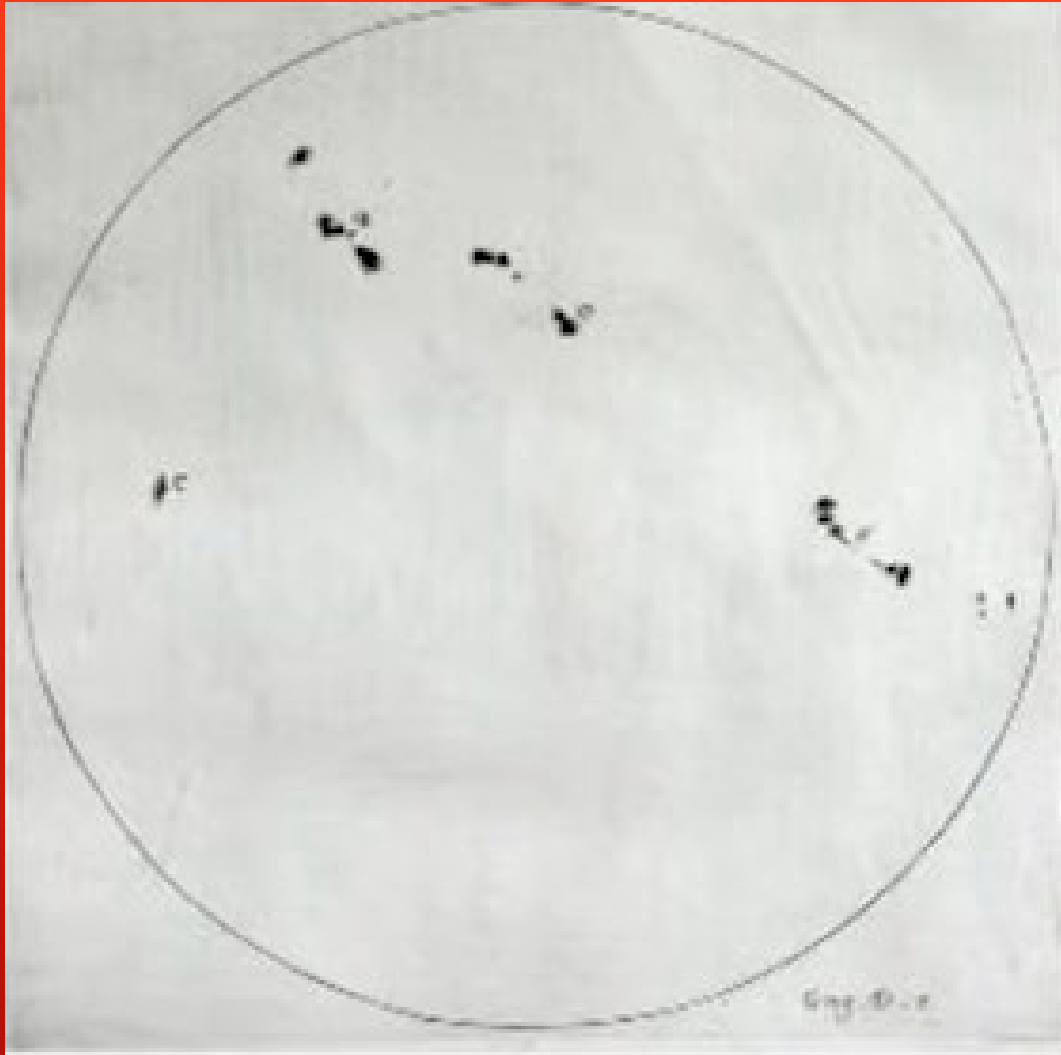


SPECTRAL DENSITY OF SOLAR CYCLES

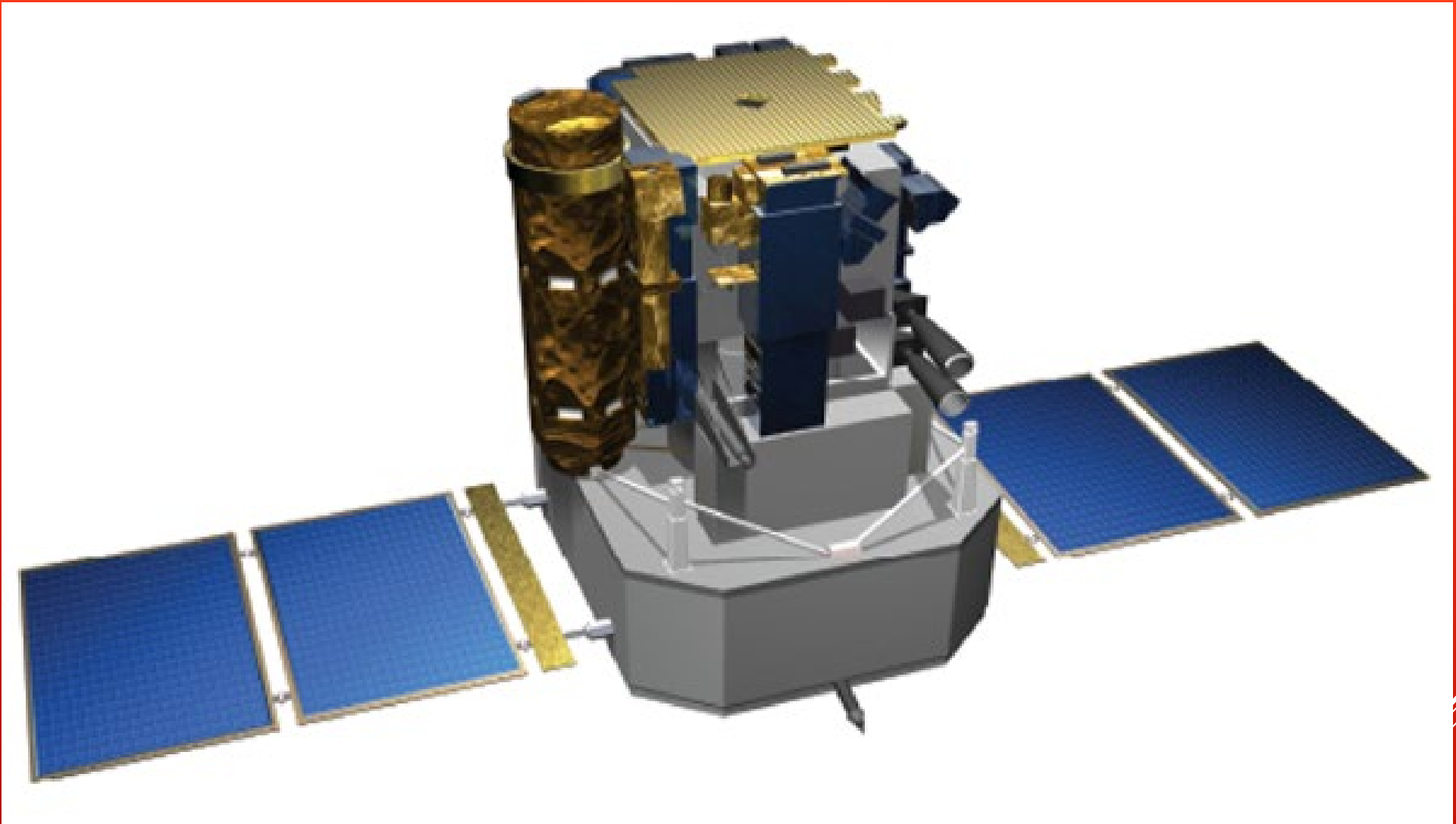




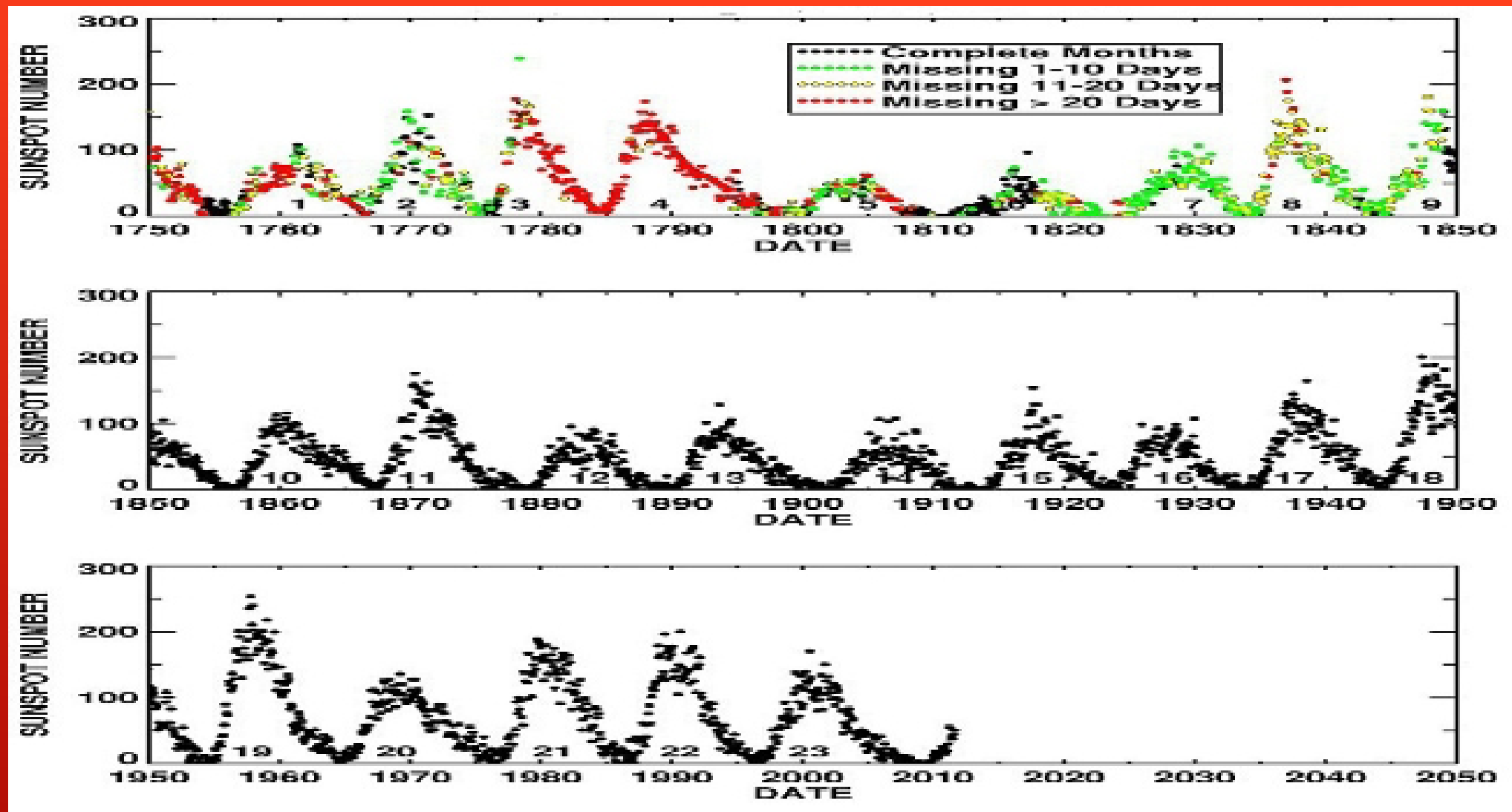
SUNSPOTS WERE OBSERVED BY CHINESE ASTRONOMERS IN 28 BC AND REPORTED BY THOMAS HERRIOT. SUNSPOTS ARE AREAS OF INTENSE MAGNETIC ACTIVITY ON THE SURFACE OF THE SUN. THEY LOOK LIKE A PAIR OF DARK SPOTS BECAUSE THEY ARE AROUND A THOUSAND DEGREES COOLER THAN THE AREA AROUND THEM. AT 4,000 TO 4,500 KELVIN OR ABOUT 7,000 DEGREES FAHRENHEIT, THEY ARE STILL VERY HOT. SUNSPOT ACTIVITY CYCLES ABOUT EVERY 11 YEARS.



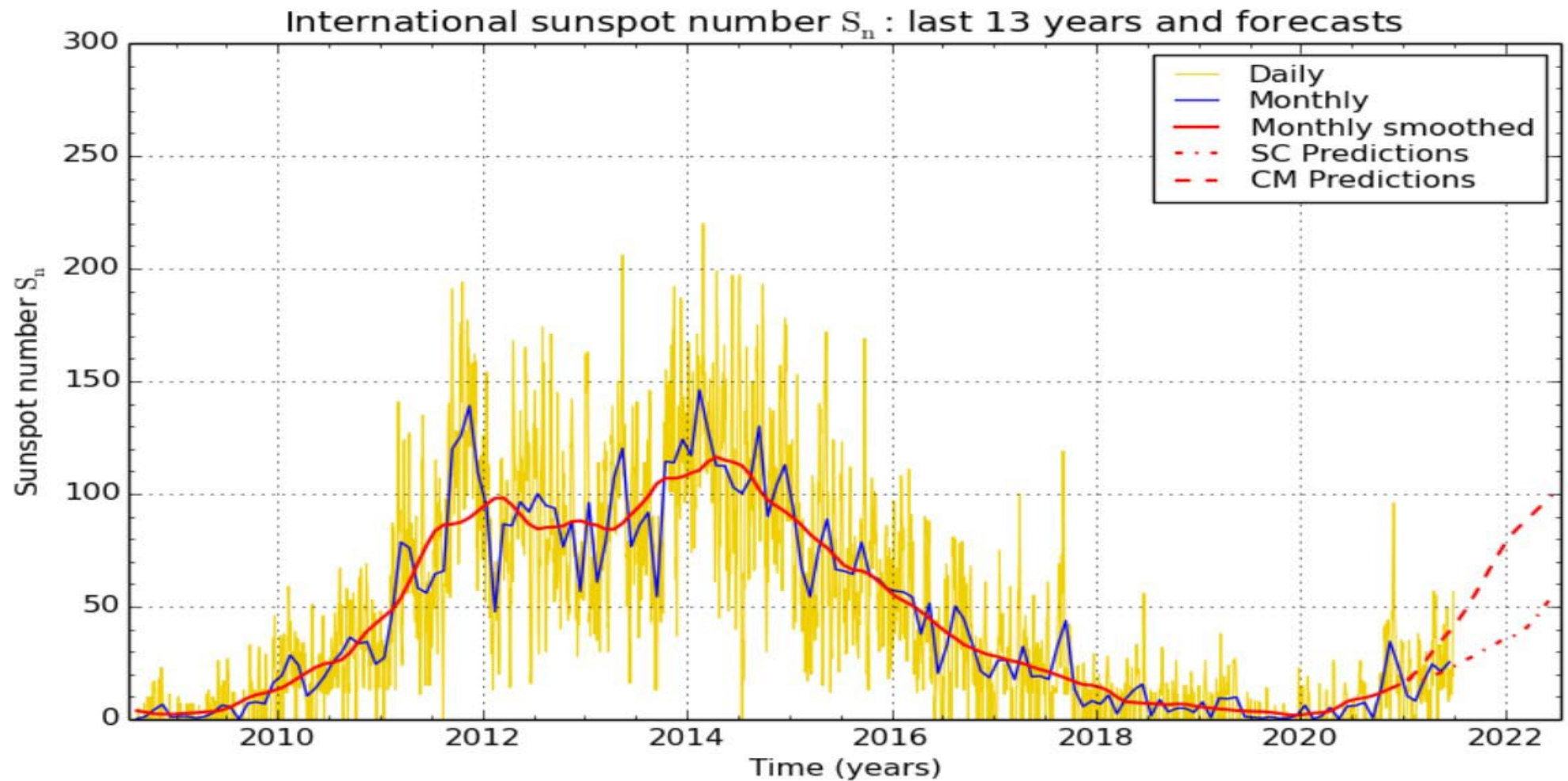
SUNSPOTS WERE OBSERVED BY GALILEO GALILEI  
AFTER THE INVENTION OF THE TELESCOPE, 1609.



THE SOHO SATELLITE STUDIES THE SUN FROM ITS DEEP CORE TO THE OUTER CORONA AND THE SOLAR WIND. IT IS 25 FEET IN WIDTH, WEIGHS 2 TONS AND WAS LAUNCHED IN 1995. SOURCE: NASA.



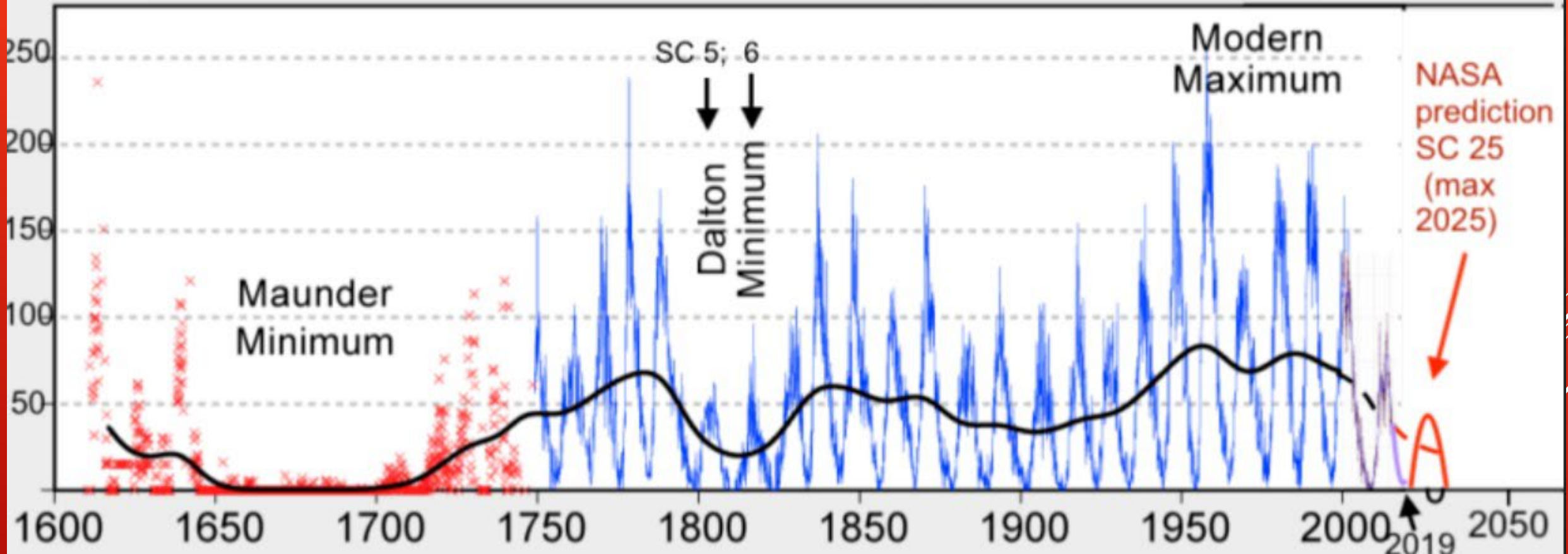
MONTHLY AVERAGED SUNSPOT NUMBER OF 11-YEAR  
SUNSPOT CYCLES SINCE THE USE OF TELESCOPES.



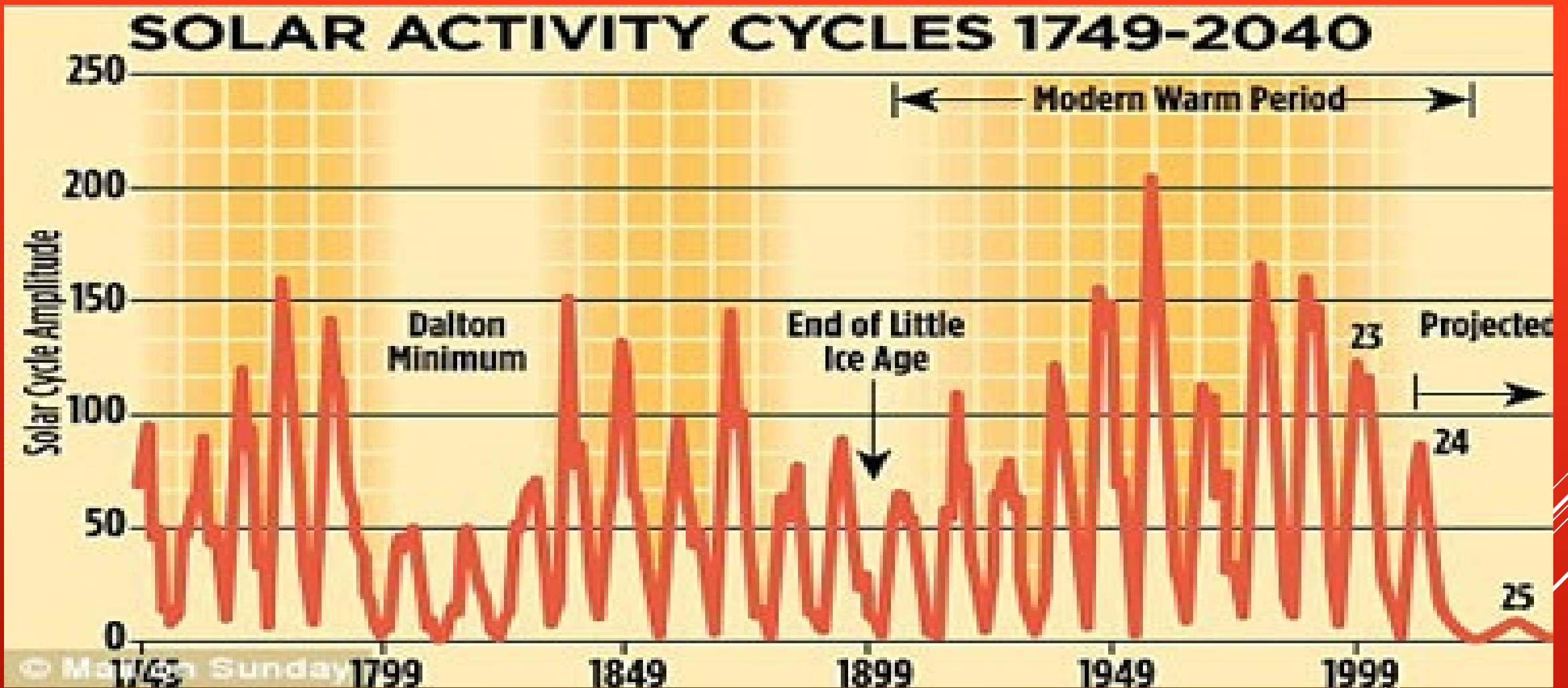
SILSO graphics (<http://sidc.be/silso>) Royal Observatory of Belgium 2021 July 2

INTERNATIONAL SUNSPOT NUMBER JULY 2ND, 2021. NEW SOLAR CYCLE 25 EMERGING. SOURCE: BILL LIVINGSTON AND MATT PENN, NATIONAL SOLAR OBSERVATORY, NSO.

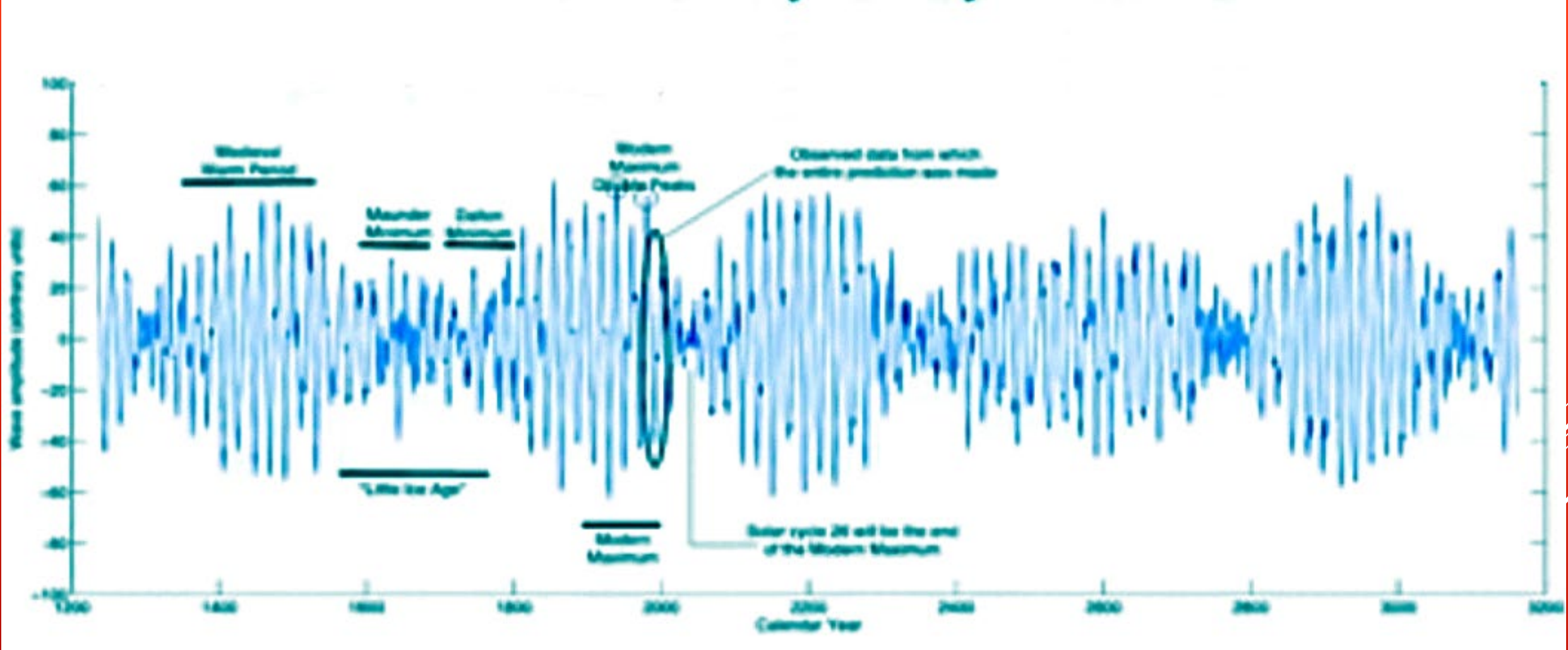
# NASA prediction Solar Cycle 25



THE LITTLE ICE AGE OCCURRED DURING A PERIOD OF LOW SUNSPOTS ACTIVITY MAUNDER MINIMUM FROM 1640 TO 1700. SOURCE: NOAA, NASA.



PROJECTED COOLING IN THE 25TH SOLAR CYCLE, POSSIBLY A DALTON RATHER THAN A MAUNDER MINIMUM (LITTLE ICE AGE).



LONG TERM COOLING AND HEATING CYCLES COMBINATION. VALENTINA ZHARKOVA IS PREDICTING A COOLING EFFECT THAT IS 2.5 TO 4 TIMES LARGER THAN THE MAUNDER MINIMUM. ZHARKOVA'S ANALYSIS SHOWS AN 8 WATTS PER SQUARE METER DECREASE IN THE TSI (TOTAL SOLAR IRRADIANCE). A 2015 NATURE STUDY LOOKED AT 2 WATTS PER SQUARE METER DECREASE CAUSING A 0.13 -DEGREE CELSIUS EFFECT. A FOUR TIMES LARGER EFFECT WOULD CAUSE A 0.5 -DEGREE CELSIUS DECLINE.





Little Ice  
Age in  
Europe saw  
the River  
Thames in  
England  
freeze over.



Little Ice Age in Europe saw the River Thames in England freeze over.



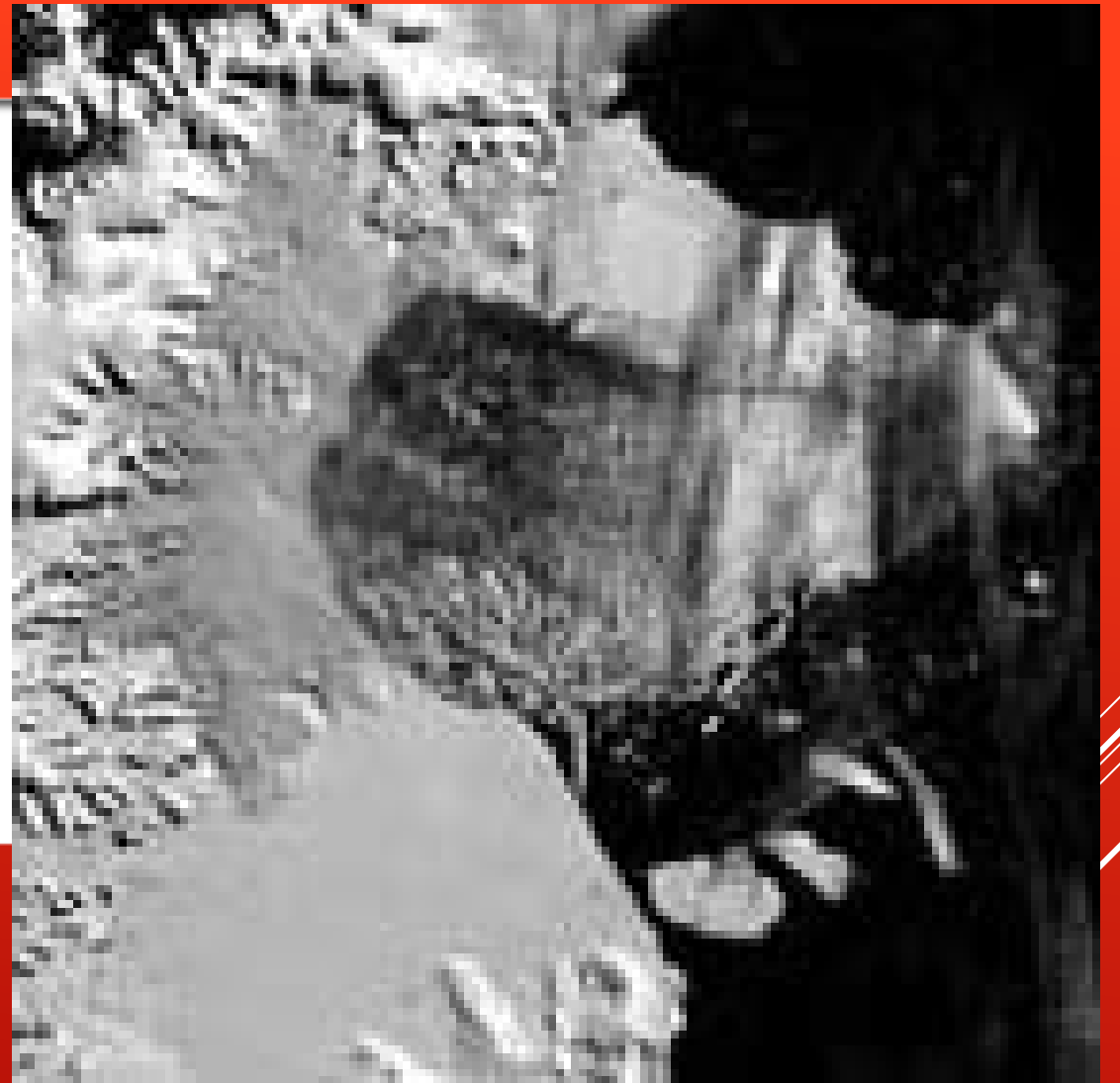
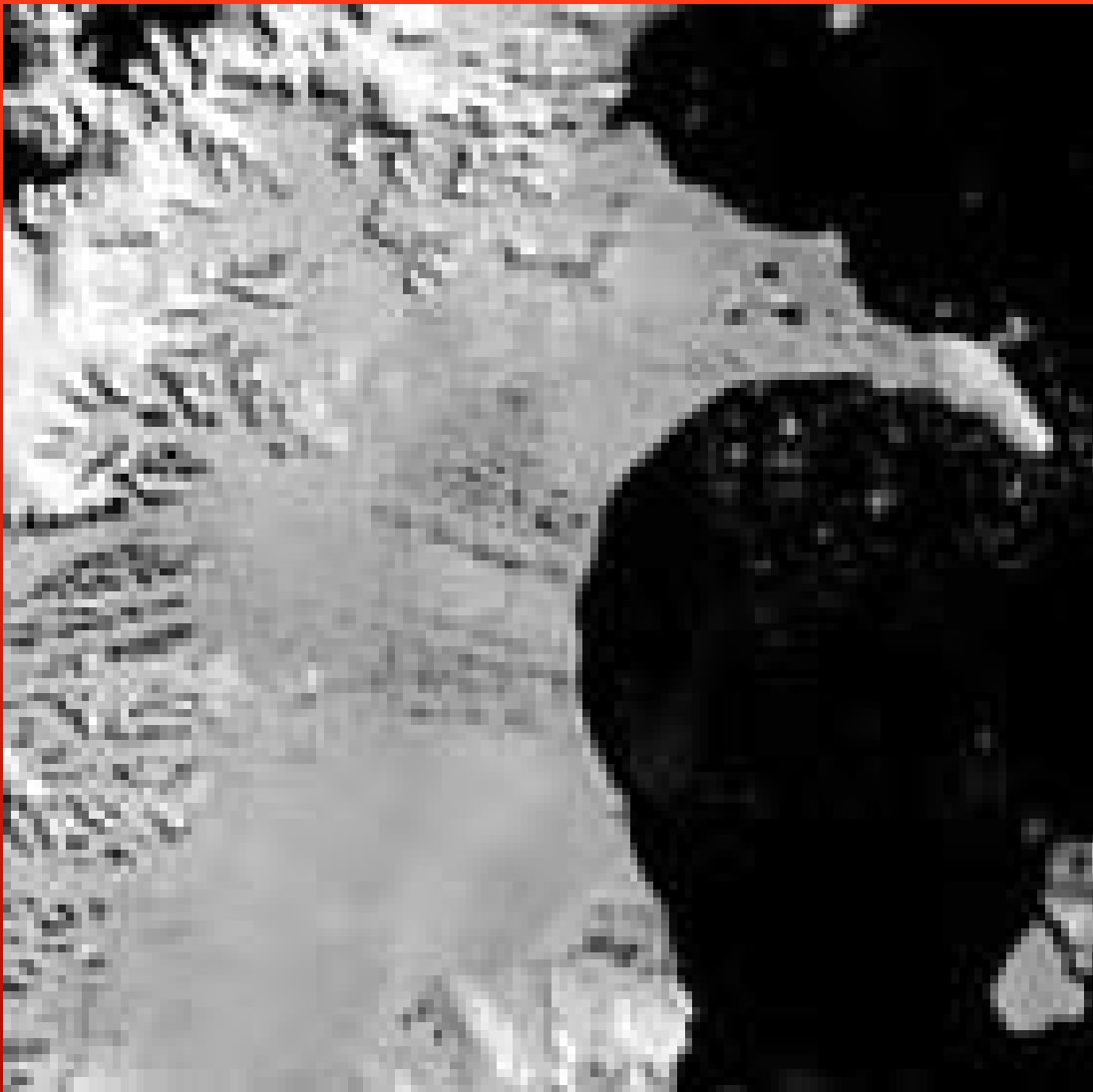
Little Ice Age in Europe saw the River Thames in England freeze over.



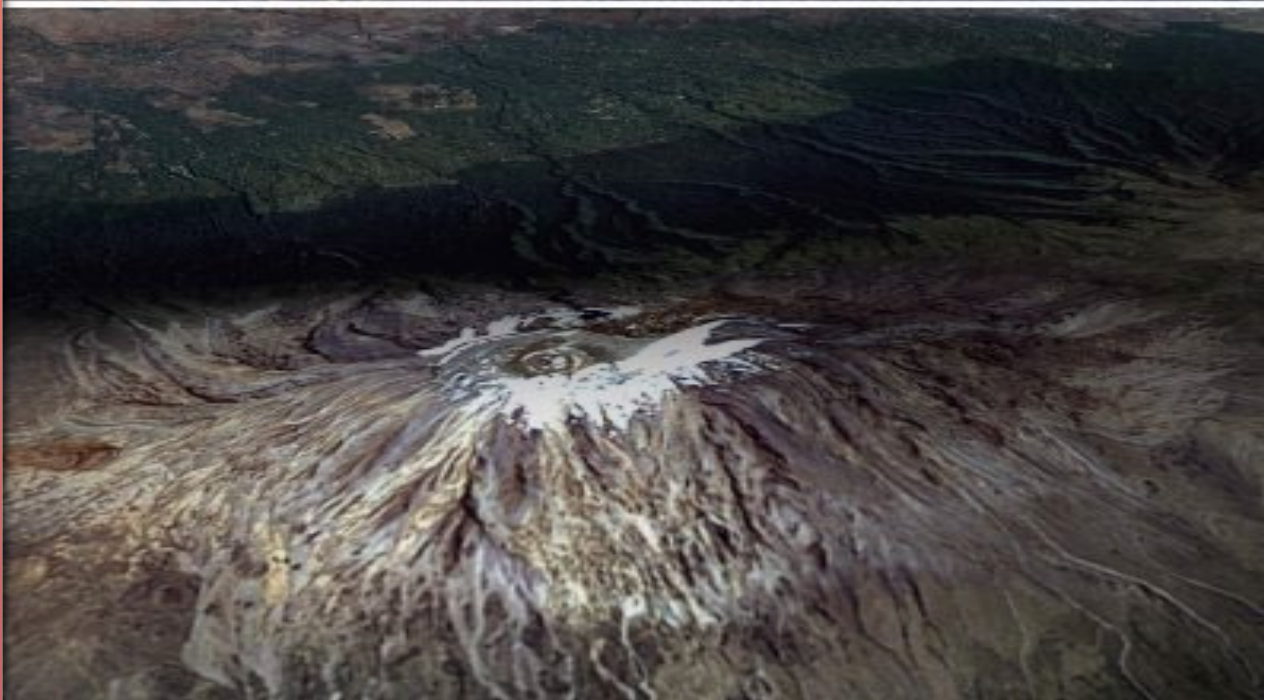
From 1932 to 1988 an ice cave vanished completely within 56 years in the USA's Glacier National Park, Montana.



GLACIER RETREAT IN SWITZERLAND, TRIENT 1891, 2019



SHATTERING OF 1,300 SQUARE MILES OF ANTARTICA'S ICE SHELF WITHIN 30 DAYS IN 2000. SOURCE: NASA.

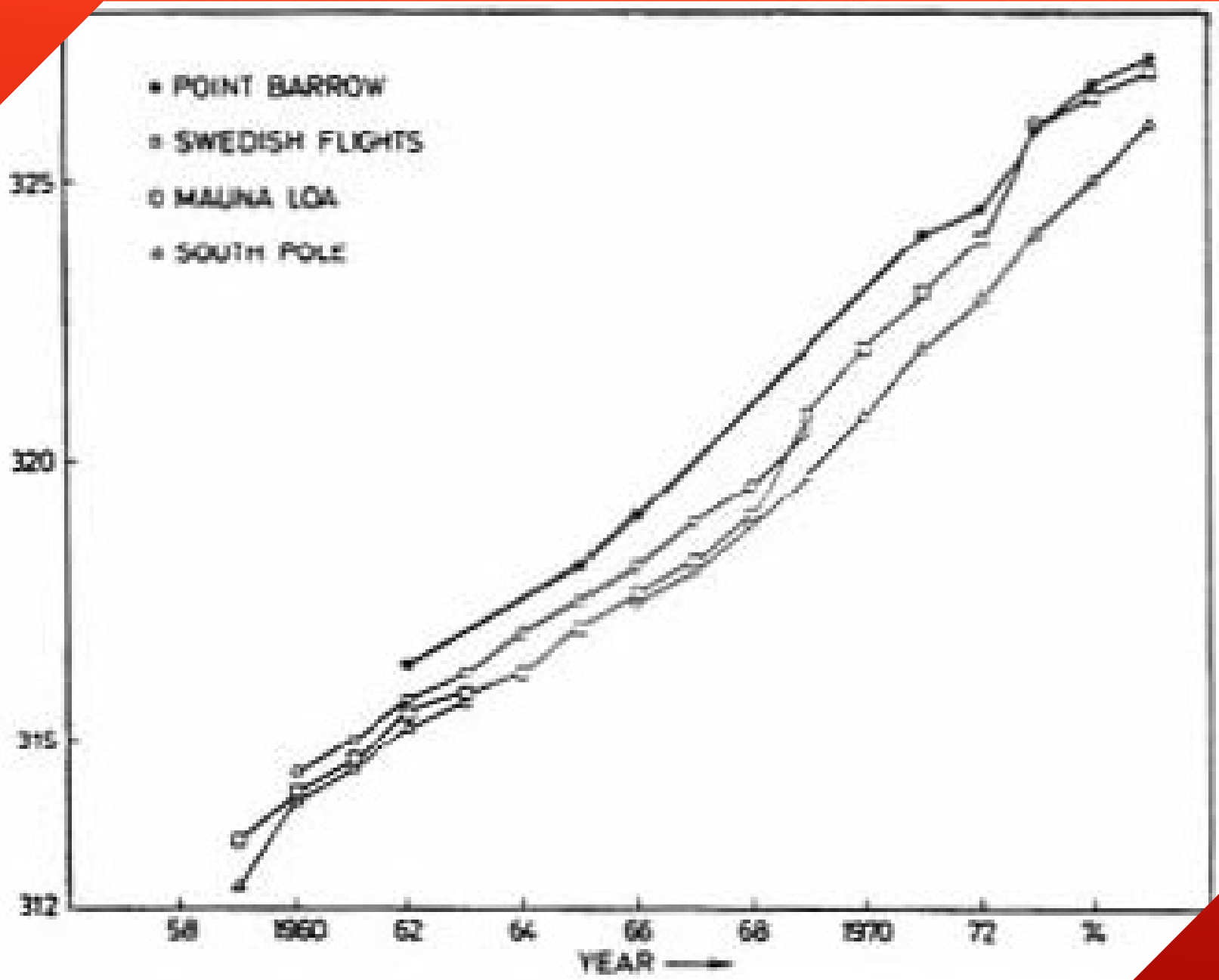


MOUNT  
KILIMANJARO,  
TANZANIA.  
AFRICA.  
FEBRUARY 1993  
AND FEBRUARY  
2000.

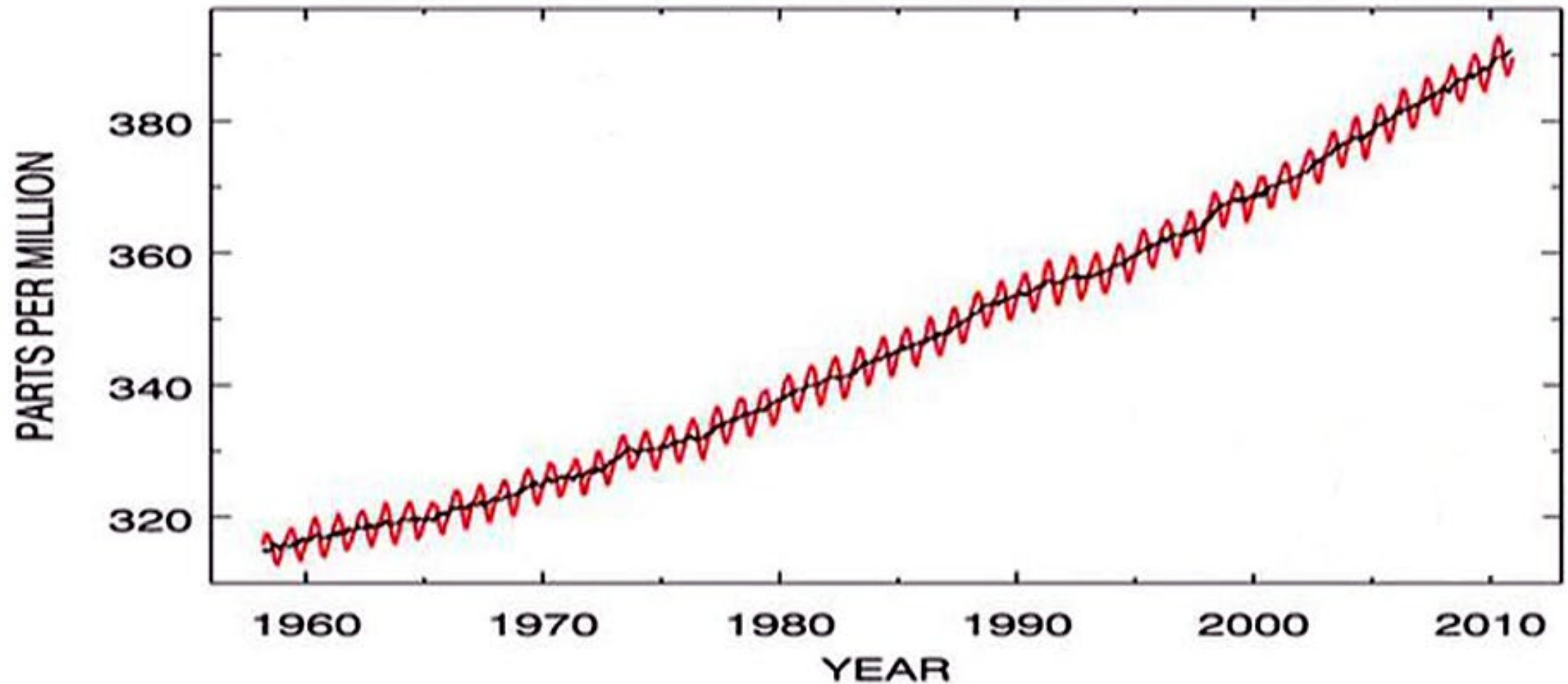


THE RETREAT OF  
THE ICE IN THE  
ARCTIC OCEAN  
FROM SEPTEMBER  
1979 TO SEPTEMBER  
2005

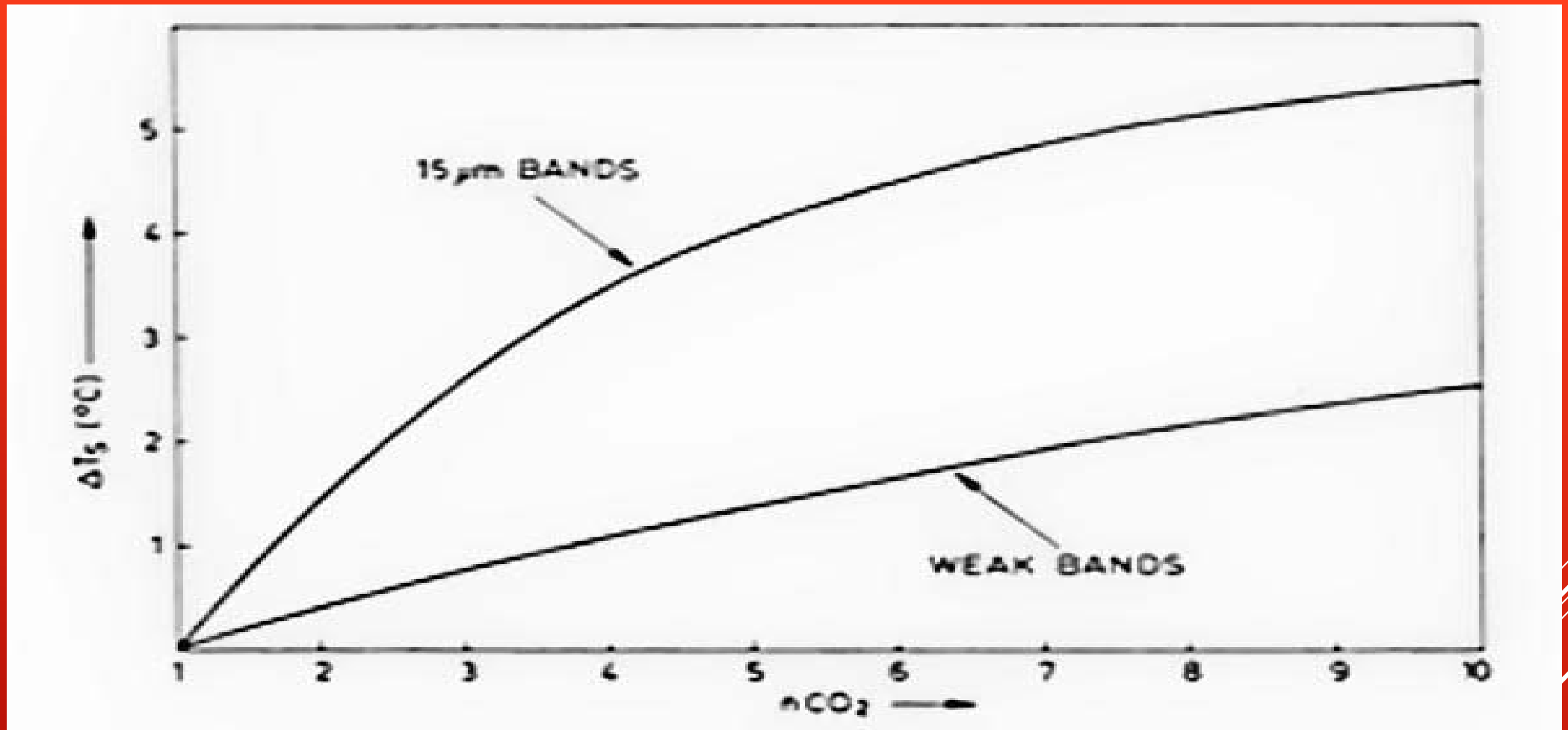




THE STEADY INCREASE IN PARTS PER MILLION IN VOLUME FROM DIFFERENT ATMOSPHERIC CO<sub>2</sub> MEASUREMENTS

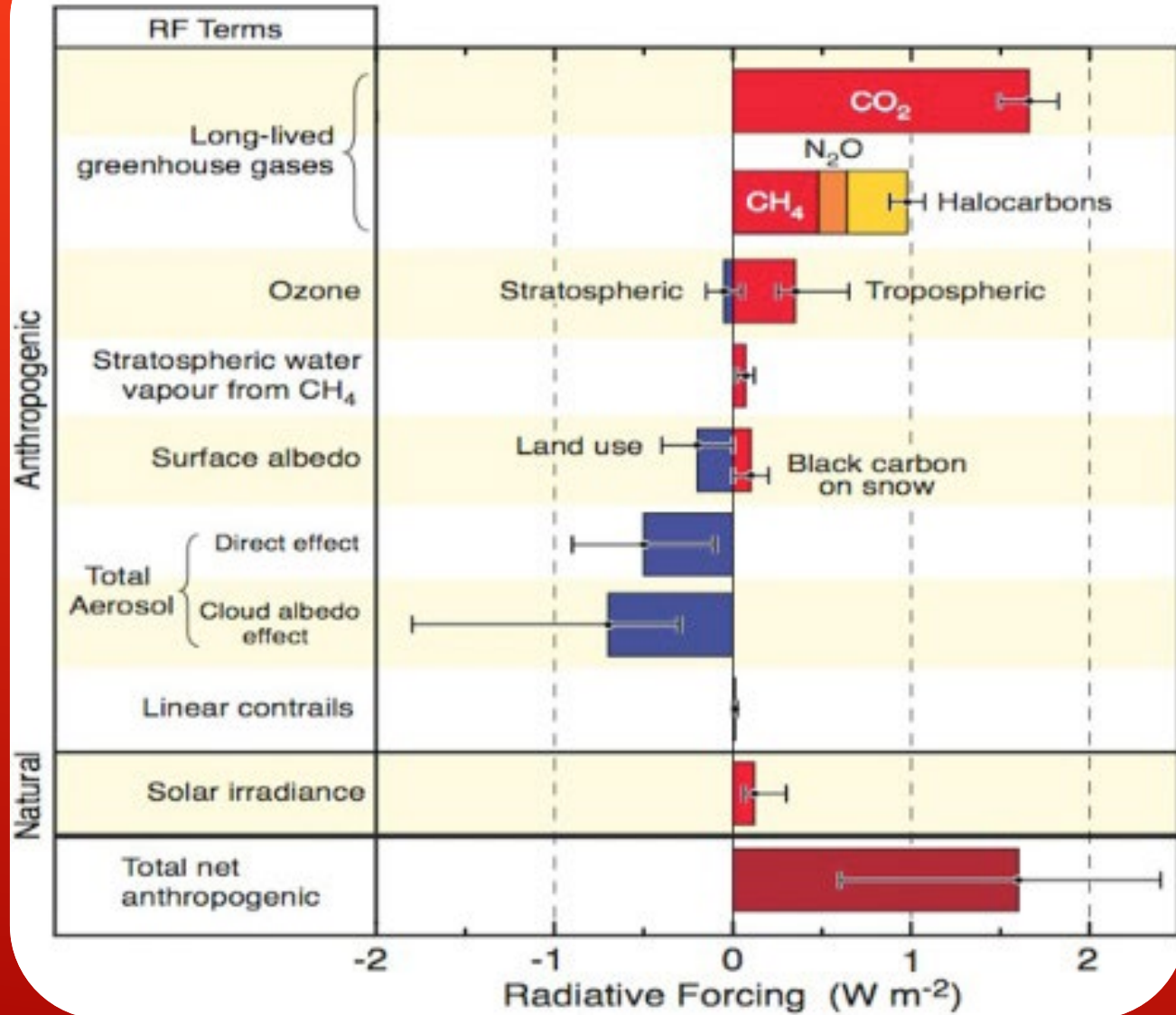


KEELING CURVE FOR THE SEASONAL MONTHLY AVERAGE CO<sub>2</sub> CONCENTRATION TAKEN AT THE MAUNA LOA OBSERVATORY, HAWAII, AS OF JANUARY 2011.



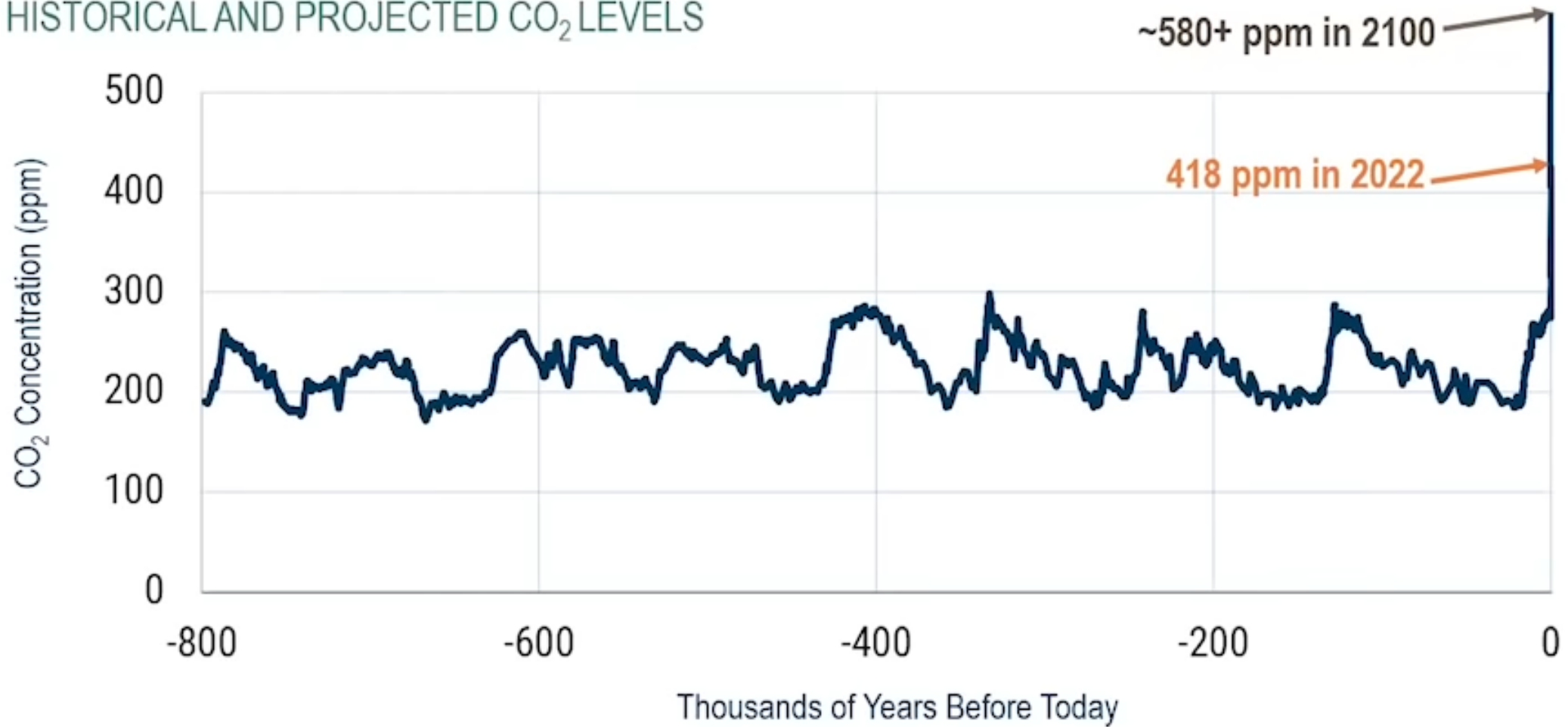
THE 15  $\mu\text{m}$  AND THE WEAK ABSORPTION BANDS FOR  $\text{CO}_2$ , A DOUBLING OF THE  $\text{CO}_2$  CONCENTRATION FROM 320 PPM TO 640 PPM, LEADS TO A TEMPERATURE INCREASE OF 1.98  $^{\circ}\text{C}$ .

Radiative Forcings, 1750--2006 (IPCC, 2Feb07)

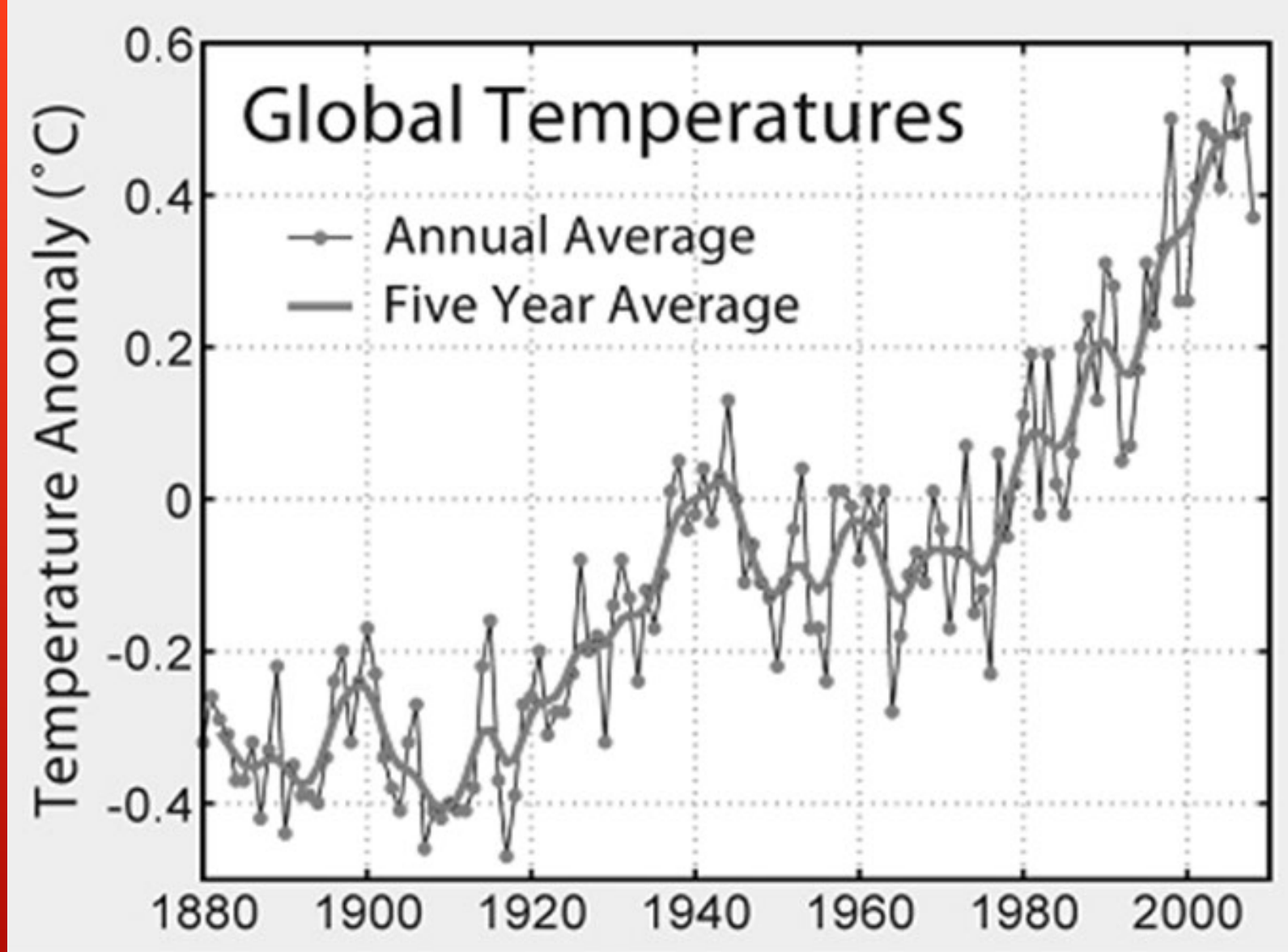


POSITIVE AND NEGATIVE FORCINGS

## HISTORICAL AND PROJECTED CO<sub>2</sub> LEVELS



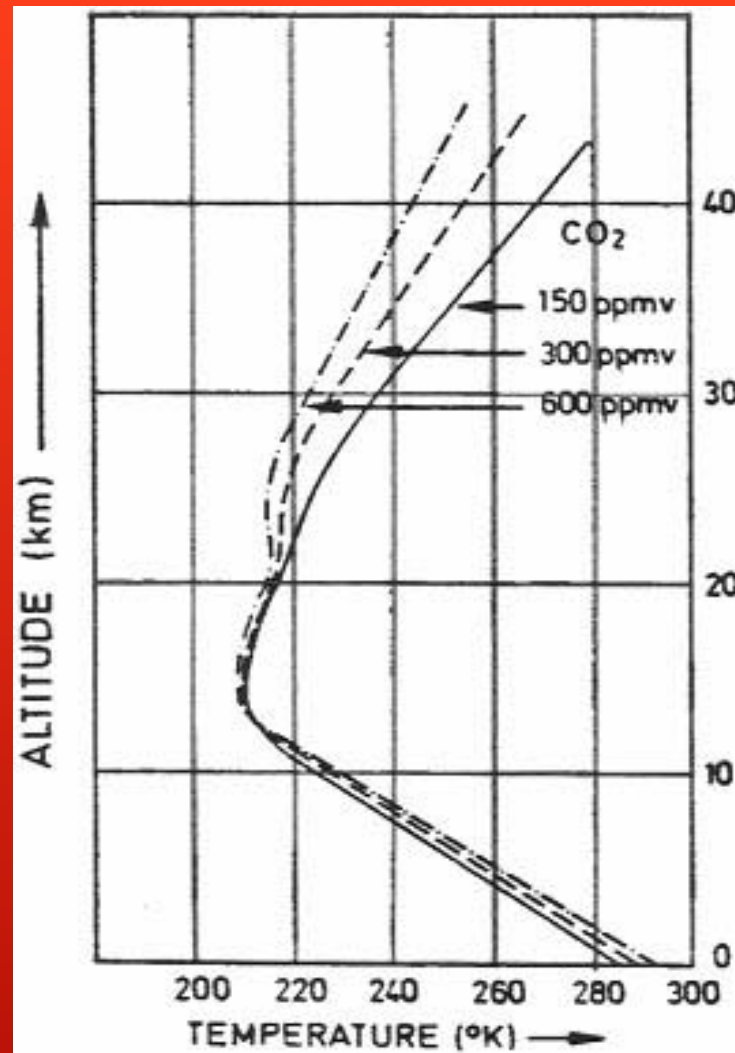
HISTORICAL CO<sub>2</sub> LEVELS



Global temperature trend. Source: Intergovernmental Panel on Climate Change, IPCC.

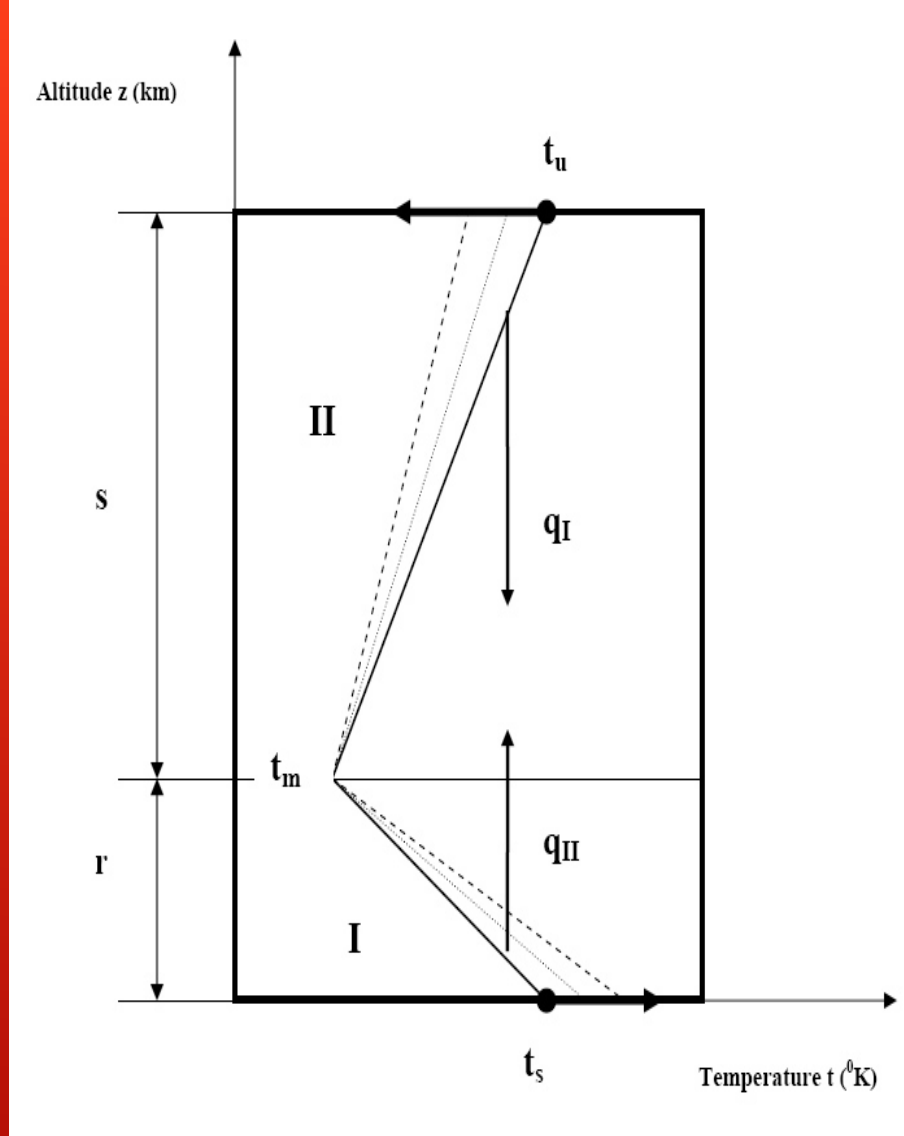
- ▶ 1. Melting of the polar ice caps, ozone depletion, bromide explosions,
- ▶ 2. Disintegration of the West Antarctica ice sheet,
- ▶ 3. Melting of the North Atlantic ice cover,
- ▶ 4. Change in the world food production patterns,
- ▶ 5. Increased biomass,
- ▶ 6. Decreased soil organic matter and fertility,
- ▶ 7. Increased pest and disease pressure,
- ▶ **8. Increased incidence of severe weather events,**
- ▶ 9. Allergies incidence.
- ▶ 10. Habitat alterations.
- ▶ 11. Early arctic bloom,
- ▶ 12. Permafrost melting,
- ▶ 13. Genetic profile changes,
- ▶ 14. Upper atmosphere thinning,
- ▶ 15. Higher mountain chains,
- ▶ 16. Archaeological Effects,
- ▶ 17. Forest fires incidence,
- ▶ 18. Cloud height shrinking,
- ▶ 19. Ocean's acidification, mass extinctions.

EXPECTED CONSEQUENCES



THE VARIATION OF TEMPERATURE AS A FUNCTION OF HEIGHT DEPENDING ON THE CO<sub>2</sub> CONCENTRATION. SOURCE: IAEA BULLETIN.

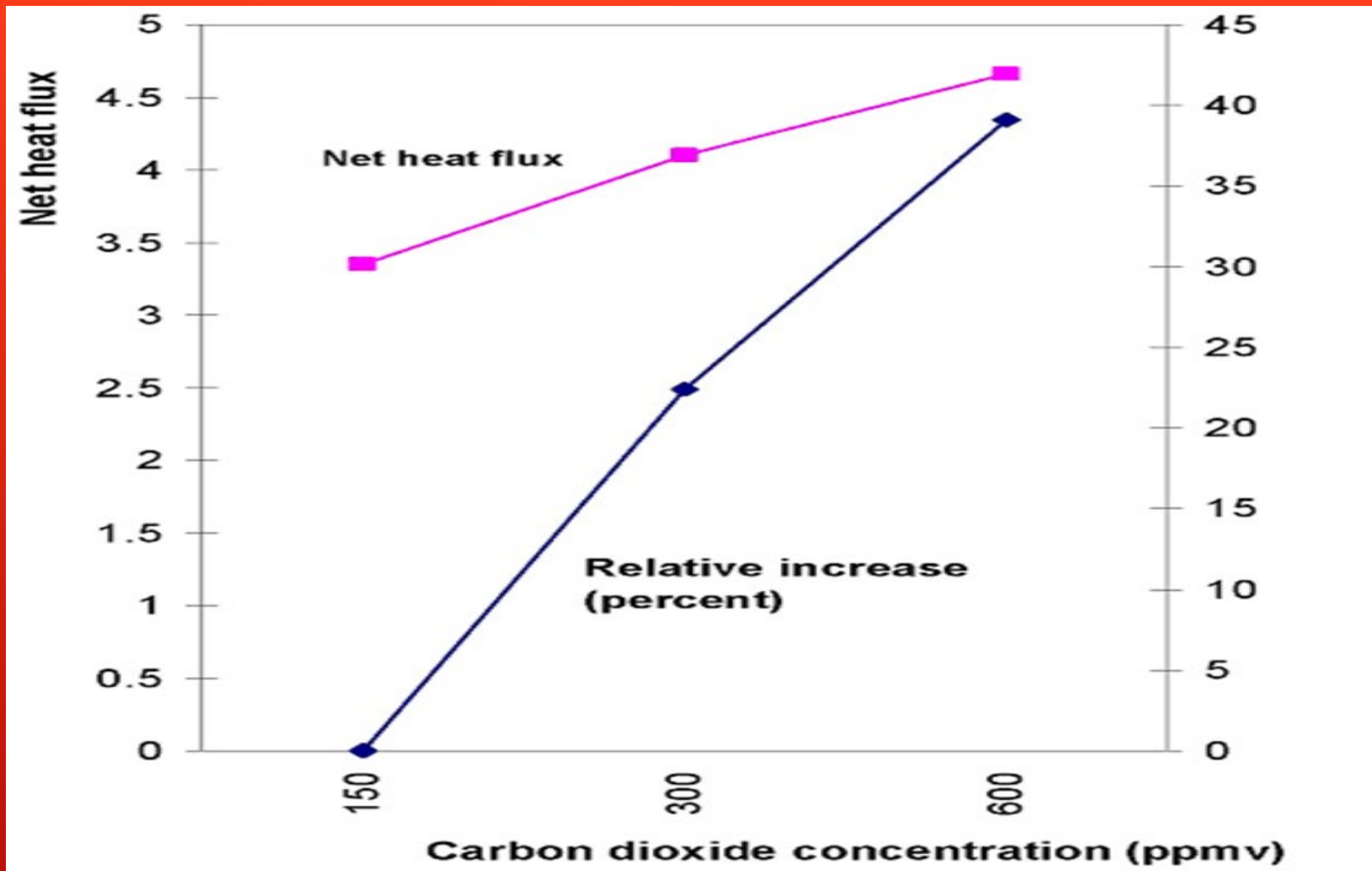




GEOMETRICAL MODEL OF HEAT FLUXES FLOWS INTO THE TROPOSPHERE.

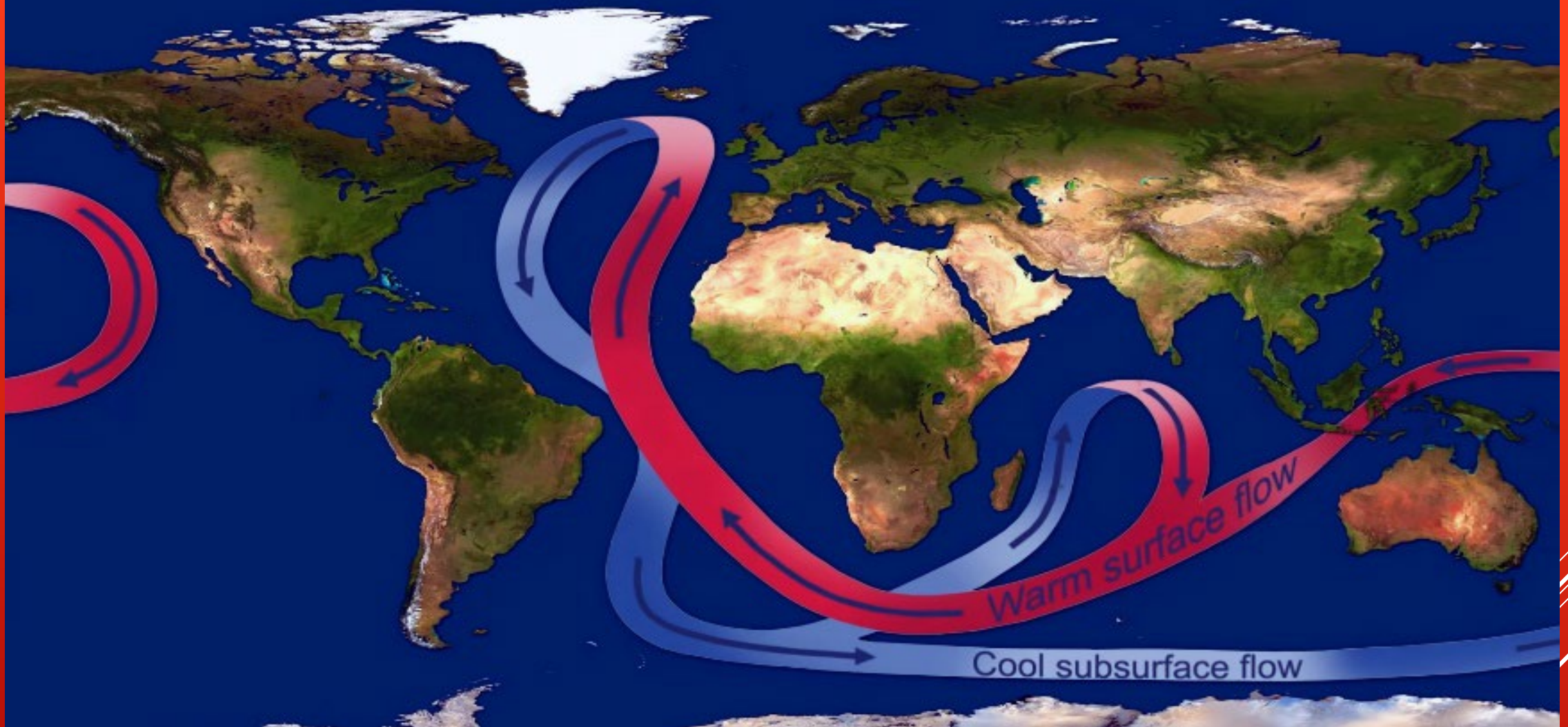
Carbon dioxide concentration (ppmv)	Surface temperature ( $t_s$ )	Upper level temperature ( $t_u$ )	Temperature gradient, lower atmosphere (K/km)	Temperature gradient, upper atmosphere (K/km)	Net heat flux (x kA)	Relative increase (percent)
150	282	269	5.54	2.19	3.35	-
300	284	253	5.69	1.59	4.10	22.4
600	286	242	5.85	1.19	4.66	39.1

EFFECT OF CARBON DIOXIDE CONCENTRATION ON TEMPERATURE GRADIENTS AND ATMOSPHERIC HEAT FLUXES.



NET HEAT FLUX INTO TROPOSPHERE AS A FUNCTION OF CARBON DIOXIDE CONCENTRATION.

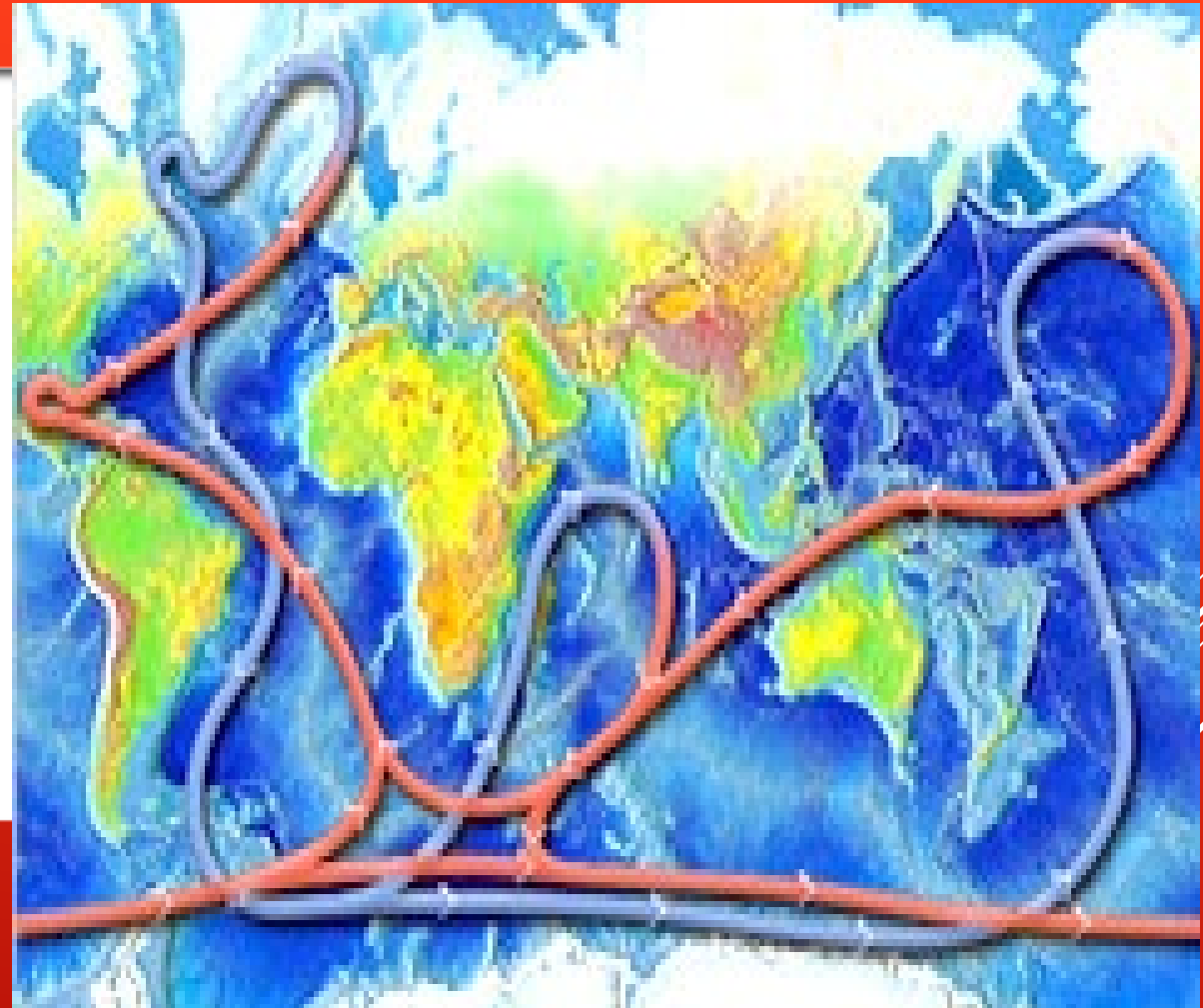
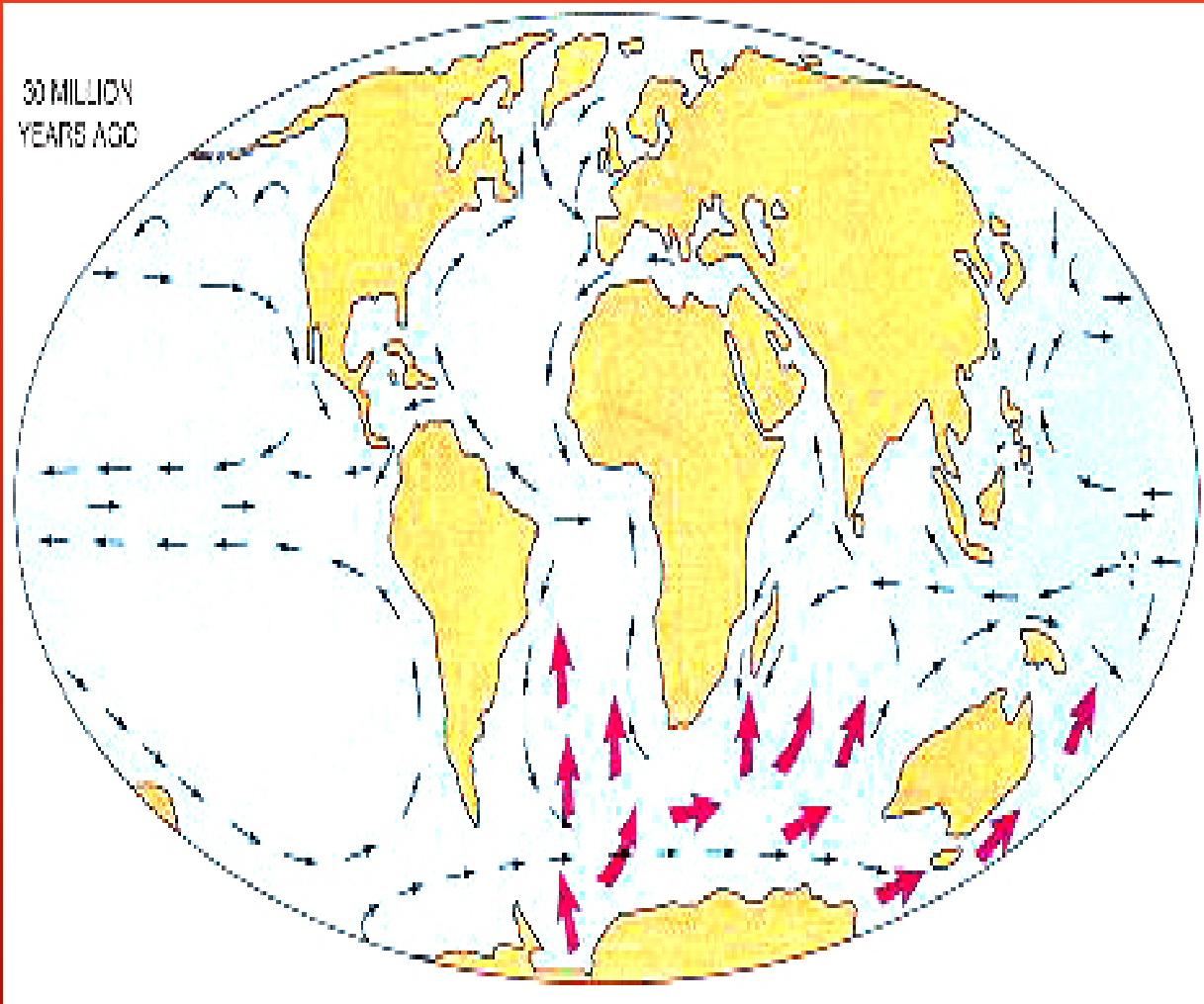
CO2 DOUBLING RESULTS IN 22 PERCENT INCREASE  
CO2 QUADRUPLING RESULTS IN 39 PERCENT INCREASE



**CONTEMPORARY GREAT EARTH OCEAN CONVEYOR BELT.**

**IN THERMO-HALINE CIRCULATION, WARM WATER FLOW IN THE ATLANTIC OCEAN IS DIVERTED BY THE WESTERLIES SURFACE TRADE WINDS TO THE NORTH AT THE JOINING POINT OF NORTH AND SOUTH AMERICA, WARMING EUROPE.**

**AS IT BECOMES SALTY AND MORE DENSE IT SINKS GENERATING A RETURN FLOW.**

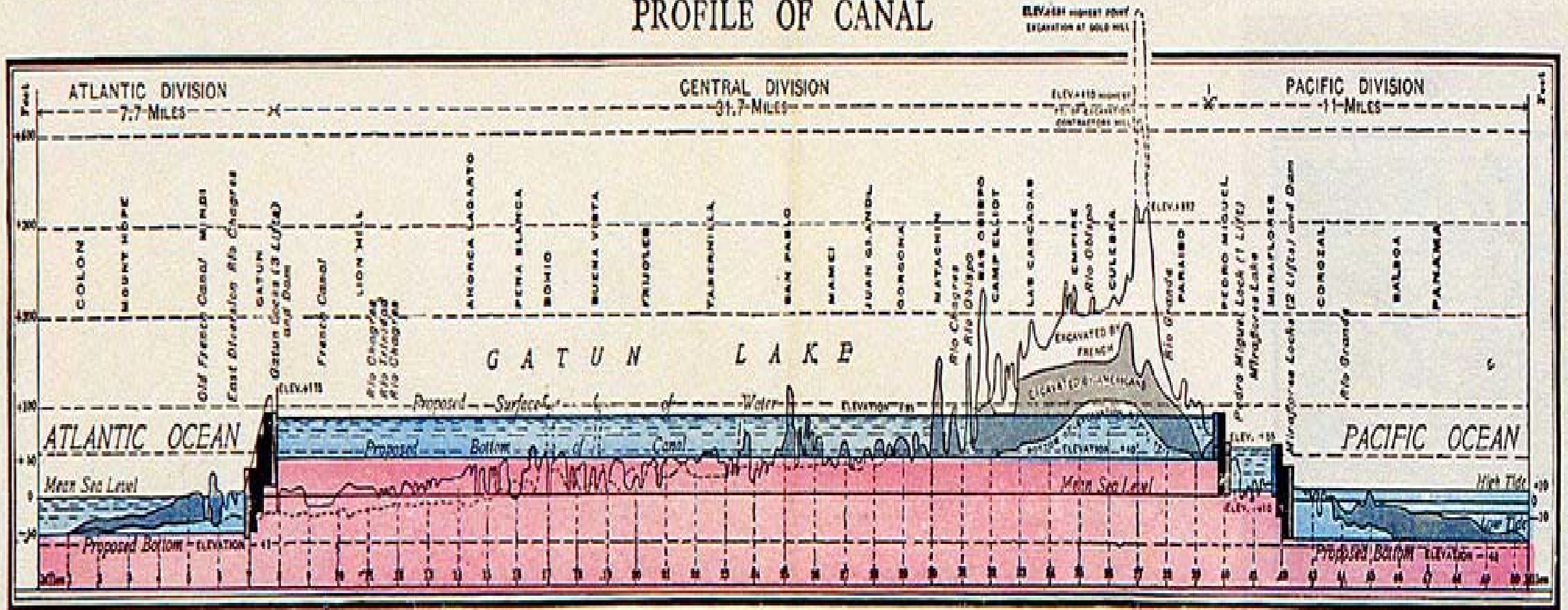


GLOBAL OCEAN CURRENTS 30 MILLION YEARS BEFORE PRESENT. NOTICE THE FLOWS FROM THE ATLANTIC OCEAN TO THE PACIFIC OCEAN, AND FROM THE PACIFIC OCEAN TO THE MEDITERRANEAN SEA THEN TO THE ATLANTIC OCEAN. THE ARCTIC OCEAN HAD THEN OPEN WATERS. ANTARTICA HAD NO ICE COVER. A MILD TEMPERATE EARTH PLANET CLIMATE PREDOMINATED.



PANAMA CANAL LOCKS AND DAMS INTO  
LAKE GATUN

# PROFILE OF CANAL

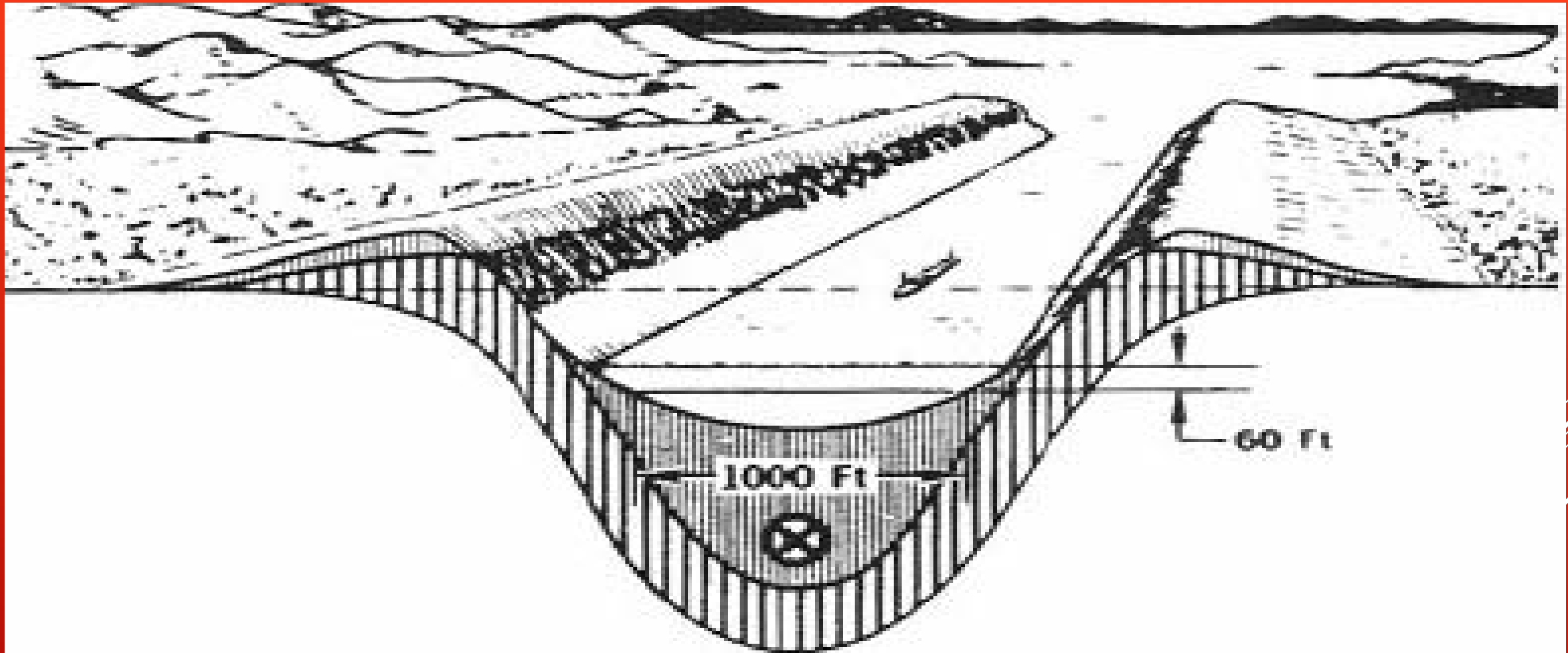


ELEVATION CUT OF THE PANAMA CANAL, SHOWING THE MOUNTAINOUS AREAS EXCAVATED BY THE FRENCH AND THE AMERICANS.

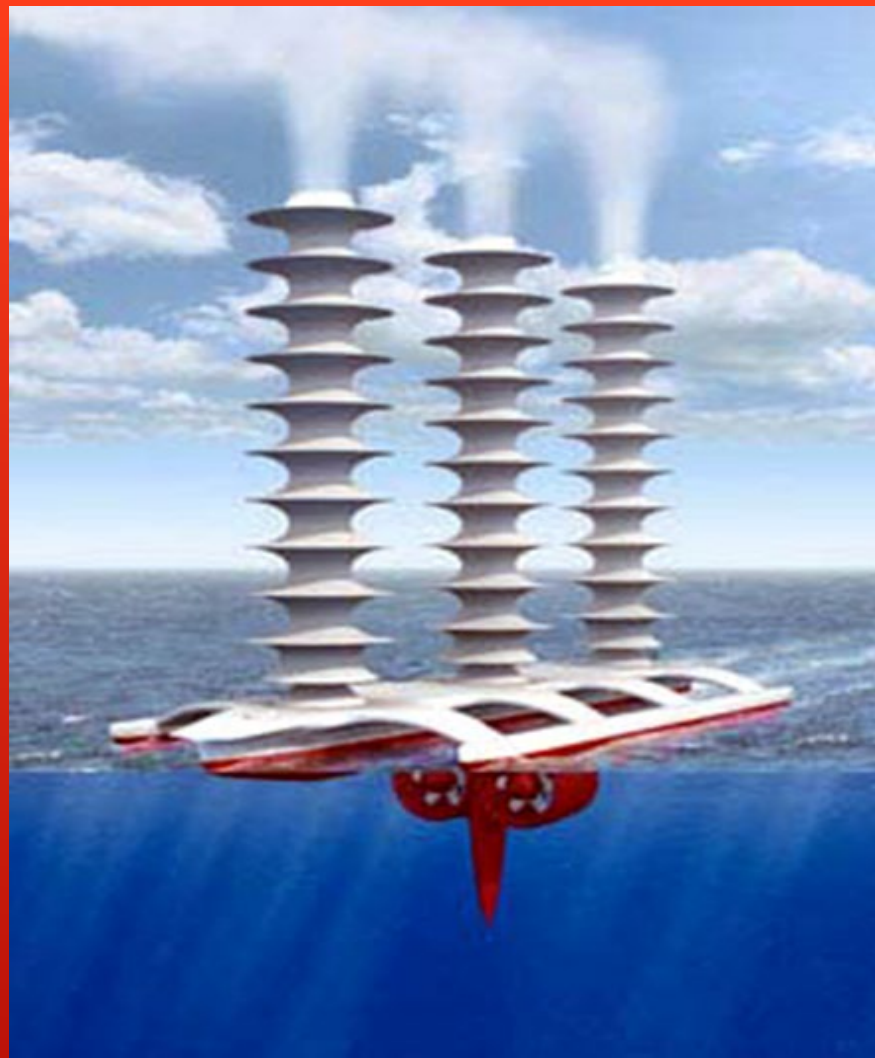


MULTIPLE FIVE-ROW 1.1 KILOTON TNT EXPLOSIVE CHARGES  
BUGGY CHANNEL EXCAVATION EXPERIMENT IN BASALT  
HARD ROCK. SOURCE: LLNL.





IN CASE OF RUNAWAY WARMING, PEACEFUL CLEAN THERMONUCLEAR CRATERING DEVICES RELEASING MEGATONS EQUIVALENT OF TNT EXPLOSIVE CAN EXCAVATE A SEA LEVEL CANAL USING NUCLEAR CIVIL ENGINEERING METHODOLOGIES RECONNECTING THE ATLANTIC TO THE PACIFIC.



CONCEPTUAL DESIGN OF REFLECTING LOW CLOUD COVER SEEDING TOWERS ON OCEAN-ROAMING SHIP USING FLETTNER ROTOR WIND TURBINES TO COOL CLIMATE. THE ROTATING TOWERS USE THE MAGNUS EFFECT TO PROPEL THE SHIP AND PUMP WATER. SOURCE: JOHN MCNEIL.

The Intergovernmental Panel on Climate Change (IPCC), shared the 2007 Nobel Peace Prize with former USA Vice President Al Gore, The Kyoto Protocol expired by 2012.

The Kyoto Global Climate Treaty, was **signed but not ratified** by the USA in December of 1997. If ratified by a USA Senate vote, the USA would be obligated to **cut greenhouse gas emissions by a factor of one third by the years 2008-2012, to below 1990 emission levels.**

The treaty would not impose limits on economically developing countries such as China and India.

The energy related reductions by the USA required by the Kyoto agreement amount to 551 million metric tons of carbon. Electricity's share of the total is 37 percent or 219 million metric tons. This would have required the unrealistic retirement of 150 base load fossil fuel power plants of 1,000 Megawatts Electric (MWe) each, operating at a capacity factor of 80 percent.

GLOBAL CLIMATE KYOTO PROTOCOL, 1997



UNITED NATIONS CLIMATE CHANGE CONFERENCE IN CANCUN, MEXICO, DECEMBER 10, 2009 WAS ATTENDED BY 194 COUNTRIES. GREENPEACE' "SINKING ICONS" DRAMATIZES INCREASED SEA WATER LEVELS. PHOTO: AFP.

The Cancun deal includes a commitment to limit warming to **less than 2 degrees Celsius or 3.6 Fahrenheit above pre-industrial times**; a long-term goal that scientists have insisted is essential to avert the worst effects of climate change. That goal is **not legally binding** because nations only agreed to “take note” of it. The agreement contains no concrete targets for cuts in CO2 emissions by 2050. There are no such goals for individual industrial sectors such as farming, aviation and maritime transport either.

The European Union, EU remained committed to cut its CO2 emissions by 20 percent by 2020.

The countries most affected by global warming are to receive assistance from a “**Green Climate Fund**” agreed by nations in Cancun. Industrialized countries agreed to provide \$30 billion by 2012, rising to \$100 billion by 2020.

The Kyoto document explicitly refers to the calculations of the Intergovernmental Panel on Climate Change (IPCC) that calls on **industrialized nations to reduce their CO2 emissions by 25 to 40 percent**. A decision on Kyoto could only be taken at the next climate conference at the end of 2011 in Durban, South Africa.

UNFCCC CANCUN, MEXICO CLIMATE CONFERENCE, 2010



CLIMATE CONFERENCE, PARIS FRANCE NOVEMBER 4, 2016.

The Paris climate change agreement was drawn up in December 2015, and was formally ratified by enough nation-states in October 2016. By November 4, 2016, it became binding for the countries that decided to sign up, which includes the USA, China, and the members of the European Union (EU). Those countries commit themselves to endeavor to reduce their fossil-fuel use in order to **limit average global temperature rises to less than 2 °C above preindustrial levels.**

A UN report warns that the emissions pledges put forward by the countries to date do not go far enough, suggesting that the emissions targets between now and 2030 will actually put the world on track to warm up by 3.4 °C by 2100. The report says that a **further 25 percent reduction in emissions will be required to keep warming below the 2 °C limit.**

PARIS CLIMATE CHANGE AGREEMENT, 2016

A **USA House of Representatives bill (H.R.2454)**, designated as “**cap-and-trade**,” aims at **reducing USA greenhouse gas emissions by 17 percent from 2005 levels by 2020 and by 83 percent by 2050**. It allows the imposition of tariffs on carbon-intensive goods such as steel, cement, paper, and glass, if they are produced in countries the USA judges to be irresponsible in reducing greenhouse gas emissions.

On April 5, 2007, the **USA Supreme Court** ruled out that the USA Federal Government agencies such as the Environmental protection Agency (**EPA**) **has the pervue to regulate CO2 emissions which the court has officially deemed as a pollutant** as a contributor to global warming. In the USA, by law, CO2 emitting industries will be either forced to reduce their emissions, reducing their production and therefore income or offset them with certified carbon credits. A **carbon credit or offset** is a tradable permit providing a way to reduce greenhouse gas emissions by assigning them a monetary value. **One credit or permit represents 1 ton of CO2** removed from the atmosphere. A corporation purchasing carbon credits from other industries sequestering it on the open market **for about \$20** acquires the right to emit it.

**CURRENT USA LEGAL FRAMEWORK**





RISING SEA LEVELS ASSOCIATED WITH "KING TIDES". FLOODING AT FORT LAUDERDALE FLORIDA STATE ROAD A1A, 2013.



CITY OF VENICE, ITALY SAINT MARK'S SQUARE'S TIDAL FLOODING, NOVEMBER 2019. SCIENTISTS SAY WE ARE GOING TO SEE MORE THAN **ONE METER OF SEA LEVEL RISE WITHIN THE NEXT 80 YEARS**, CAUSING TRADITIONAL COASTAL DEFENSES TO FAIL.



FLOODING IN GERMANY 2021

# MORE U.S. DOWNPOURS

Annual 3" + Rainfall Days Compared to Average



Based on methodology by Brian Brettschneider  
Source: RCC-ACIS.org

CLIMATE  CENTRAL

SEVERE RAIN DOWNPOURS



*Soil levels shown in exhibit for Adair County, Iowa*



LOSS OF TOPSOIL FROM 14 INCHES IN 1850 TO 4.6  
IN 2020 AND EFFECT ON FOOD SUPPLY



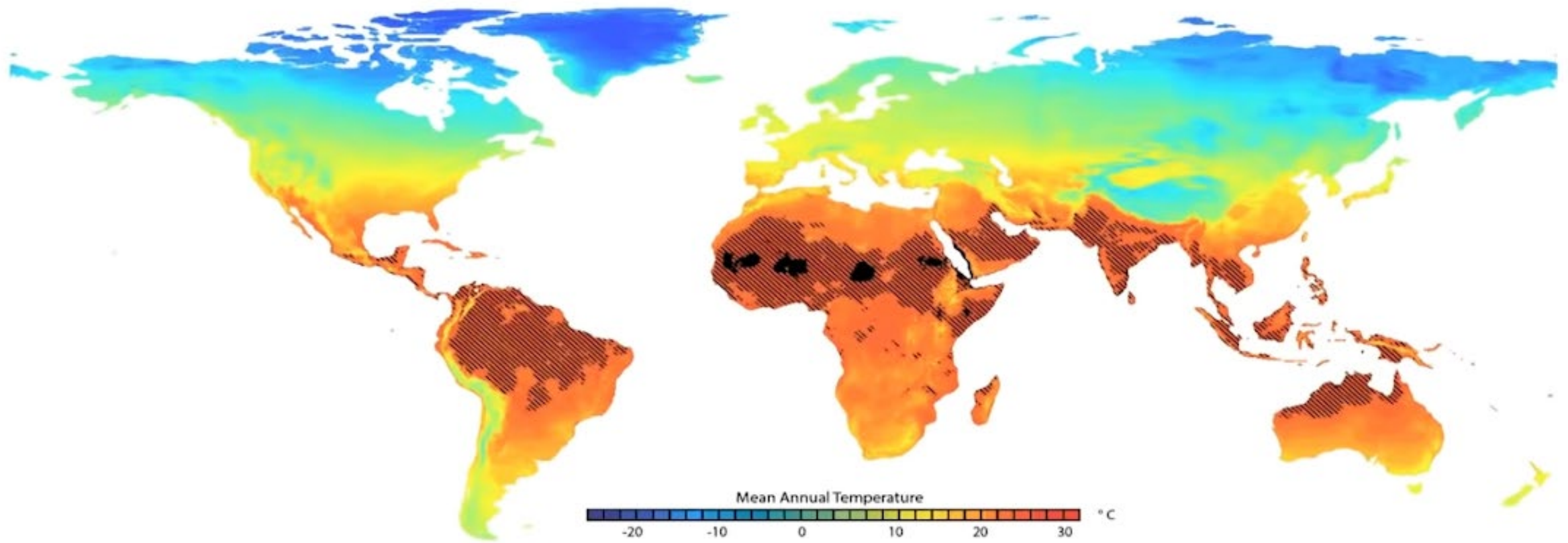
CITY OF PARADISE FIRE, CALIFORNIA, NOVEMBER 8, 2019.



THAWING PERMAFROST AT ALASKA'S NOATAK NATIONAL PRESERVE RELEASES METHANE GAS. PHOTO: EDWARD SCHUUR, UNIVERSITY OF FLORIDA.

# INDIA AND SOUTHEAST ASIA WILL BE TOO HOT FOR HUMAN HABITATION IN 2070

---

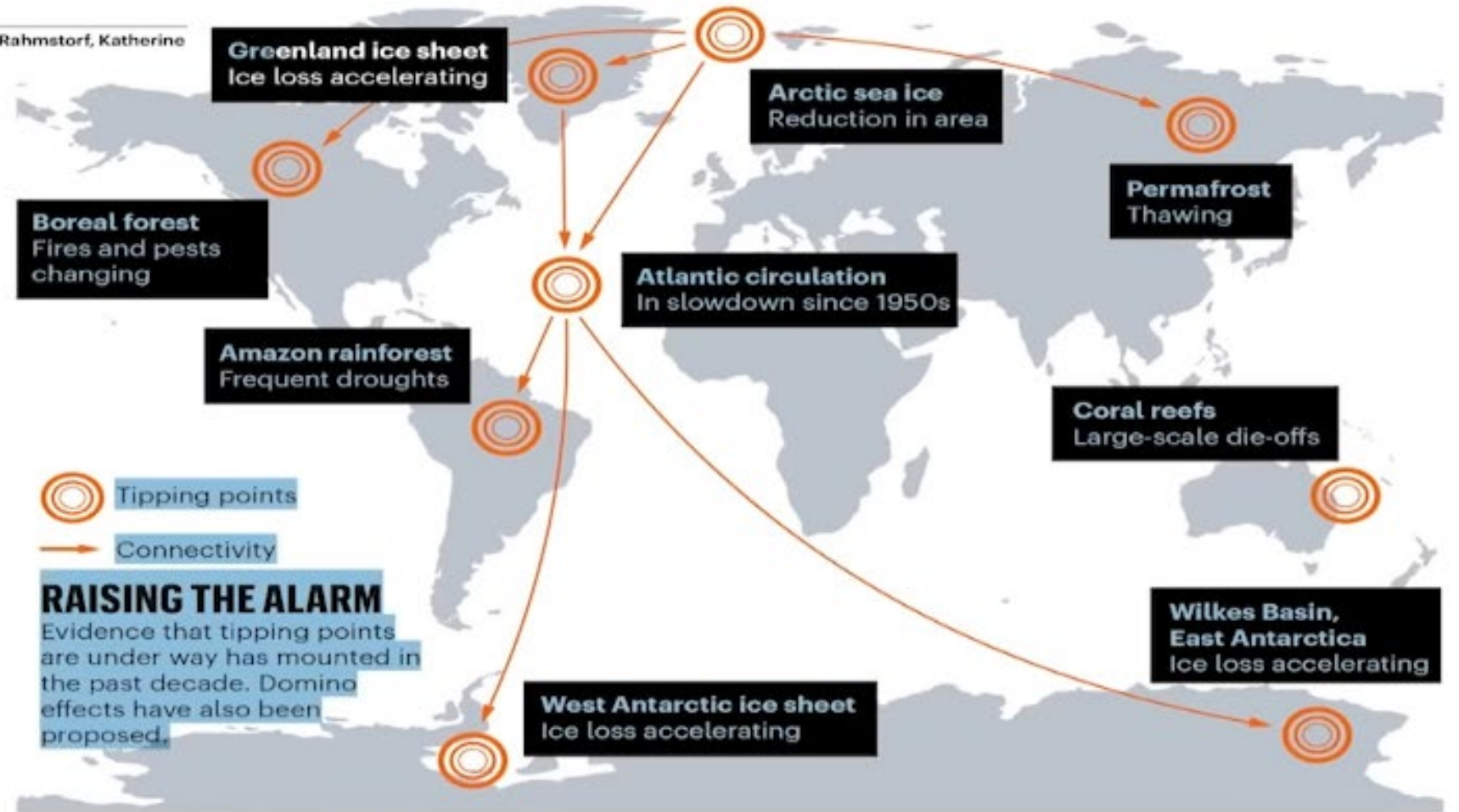


UNLIVEABLE TEMPERATURES BY 2070



# Climate tipping points – too risky to bet against

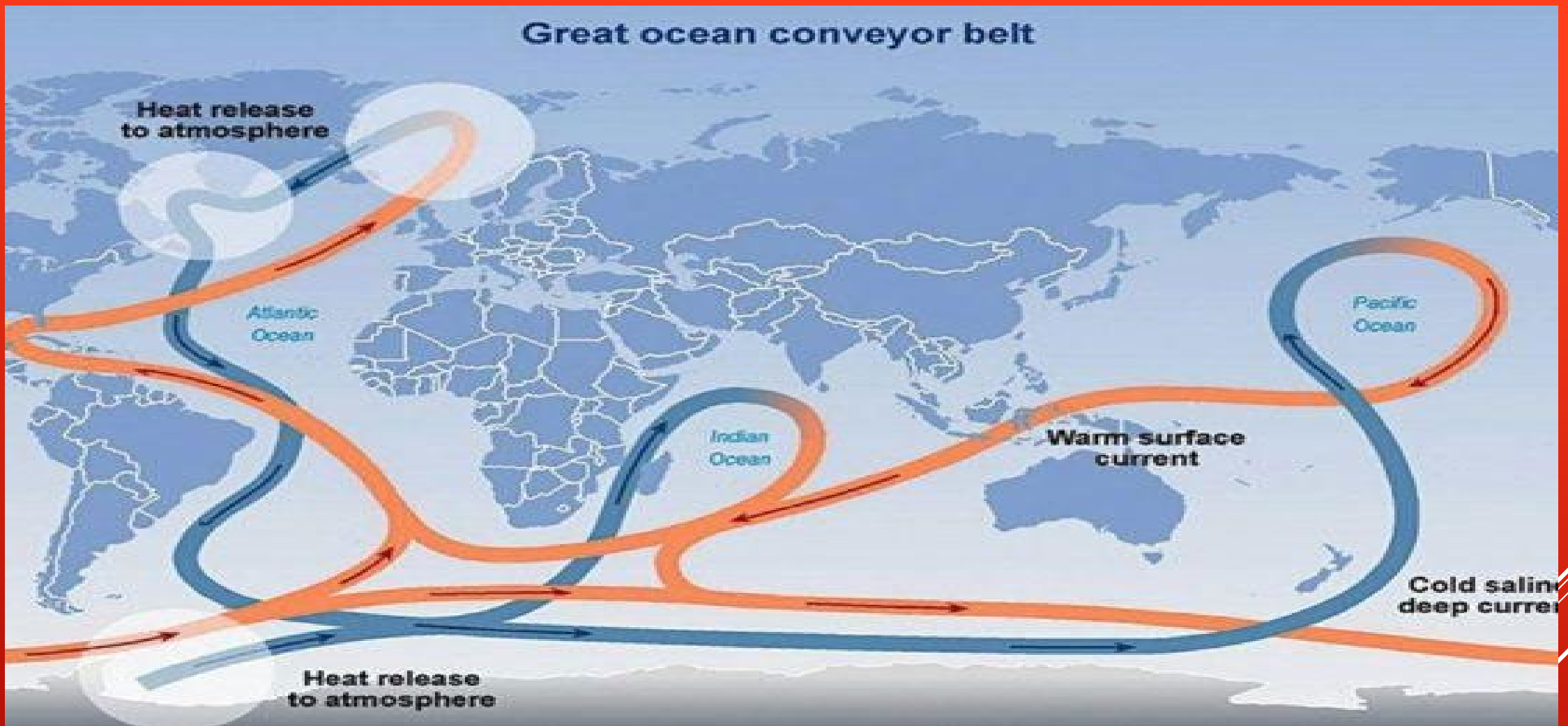
Timothy M. Lenton, Johan Rockström, Owen Gaffney, Stefan Rahmstorf, Katherine Richardson, Will Steffen & Hans Joachim Schellnhuber



SOURCE: T. M. LENTON ET AL.

Source: Johan Rockström

# TIPPING POINTS



**TIPPING POINT: PARADOXICAL ICE AGE IN EUROPE.**

SCIENTISTS REPORTED THAT THE WEAKENING CURRENTS DUE TO SALINITY CHANGES LOOK SIMILAR TO THOSE THAT HAPPENED RIGHT BEFORE THE LITTLE ICE AGE, A COLD SPELL OBSERVED BETWEEN ABOUT 1600 AND 1850 AD FOR A DURATION OF 250 YEARS OR 2 ½ CENTURIES.



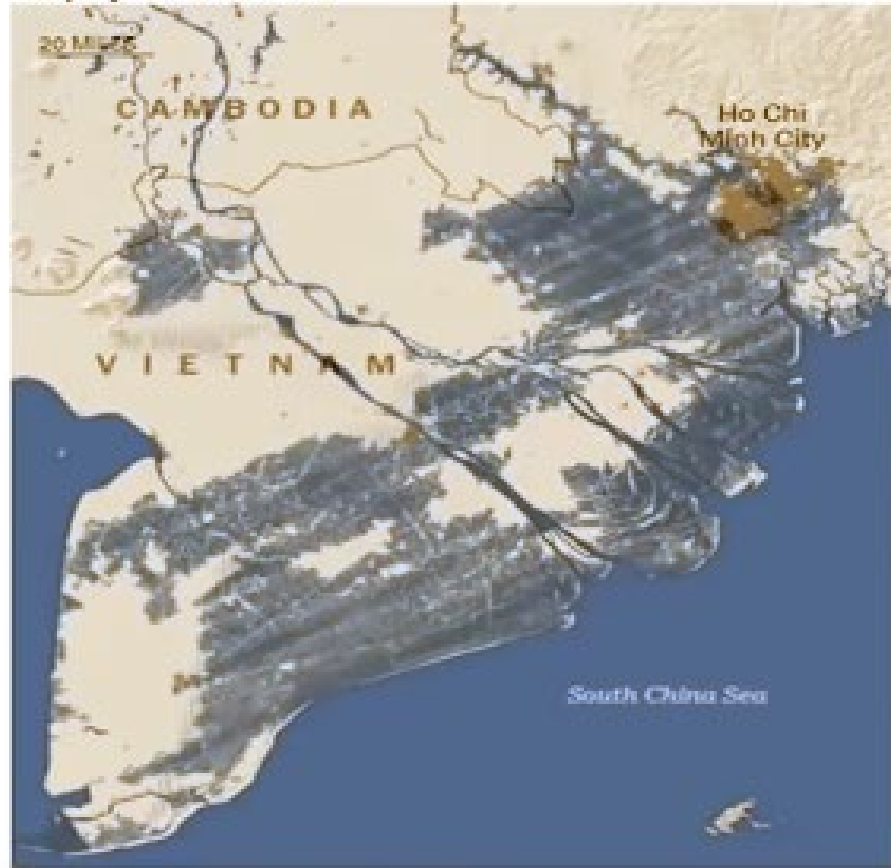
SOCIAL DISLOCATIONS. SOUTH TO NORTH MIGRATION FROM AFRICA TO EUROPE ACROSS MEDITERRANEAN SEA



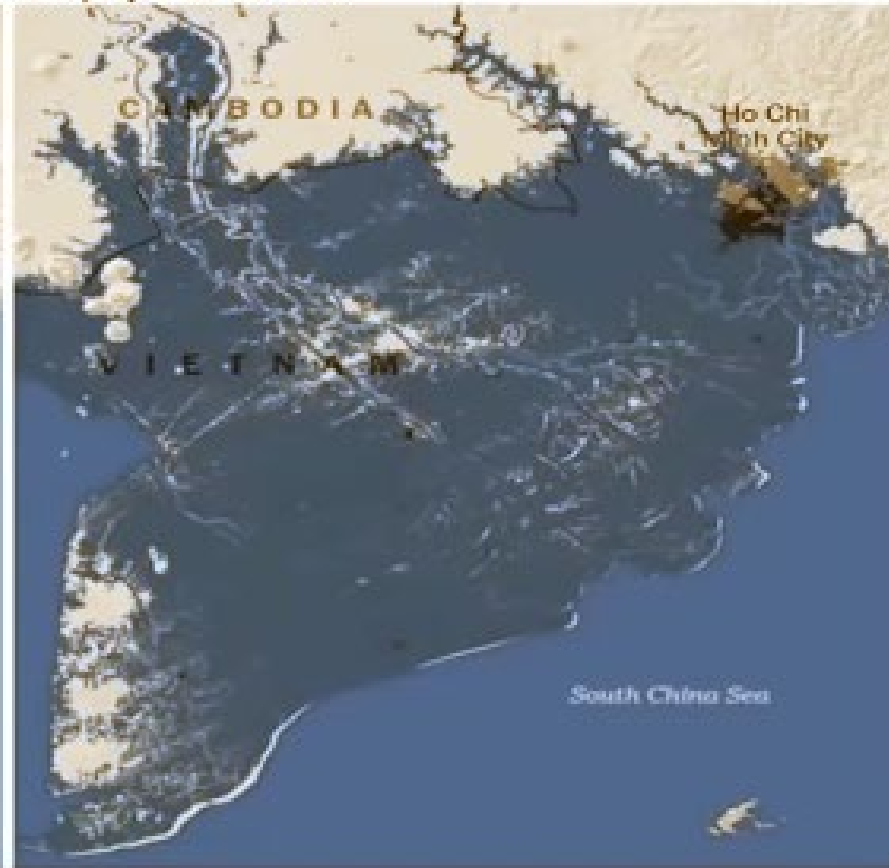
SOUTH TO NORTH MIGRATION. SOUTH AMERICAN MIGRANTS AT USA BORDER WALL WERE REPULSED WITH TEAR GAS AND RUBBER BULLETS, NOVEMBER 2018.

■ Land underwater at high tide ■ Populated area

Old projection for 2050



New projection for 2050



MEKONG DELTA FLOODING, VIETNAM 2050



EXPECTED RISING SEA LEVEL ENCROACHMENT  
AROUND THE GULF OF MEXICO

# THE GREAT FILTER

“Is there a “Great Filter” that limits the continuous existence of other forms of technological civilizations?”

The pessimistic answer to the Fermi Paradox is:

“”Some steps and hurdles to technological civilizations are so improbable to pass that virtually no one does.”

Hurdles could be:

**Avoidable Self-Inflicted :**

**Anthropogenic Climatic Change,**  
Gain of Function (GOF) Research bacterial and Viral Pandemics,  
Nuclear War  
Artificial Intelligence and Robotics

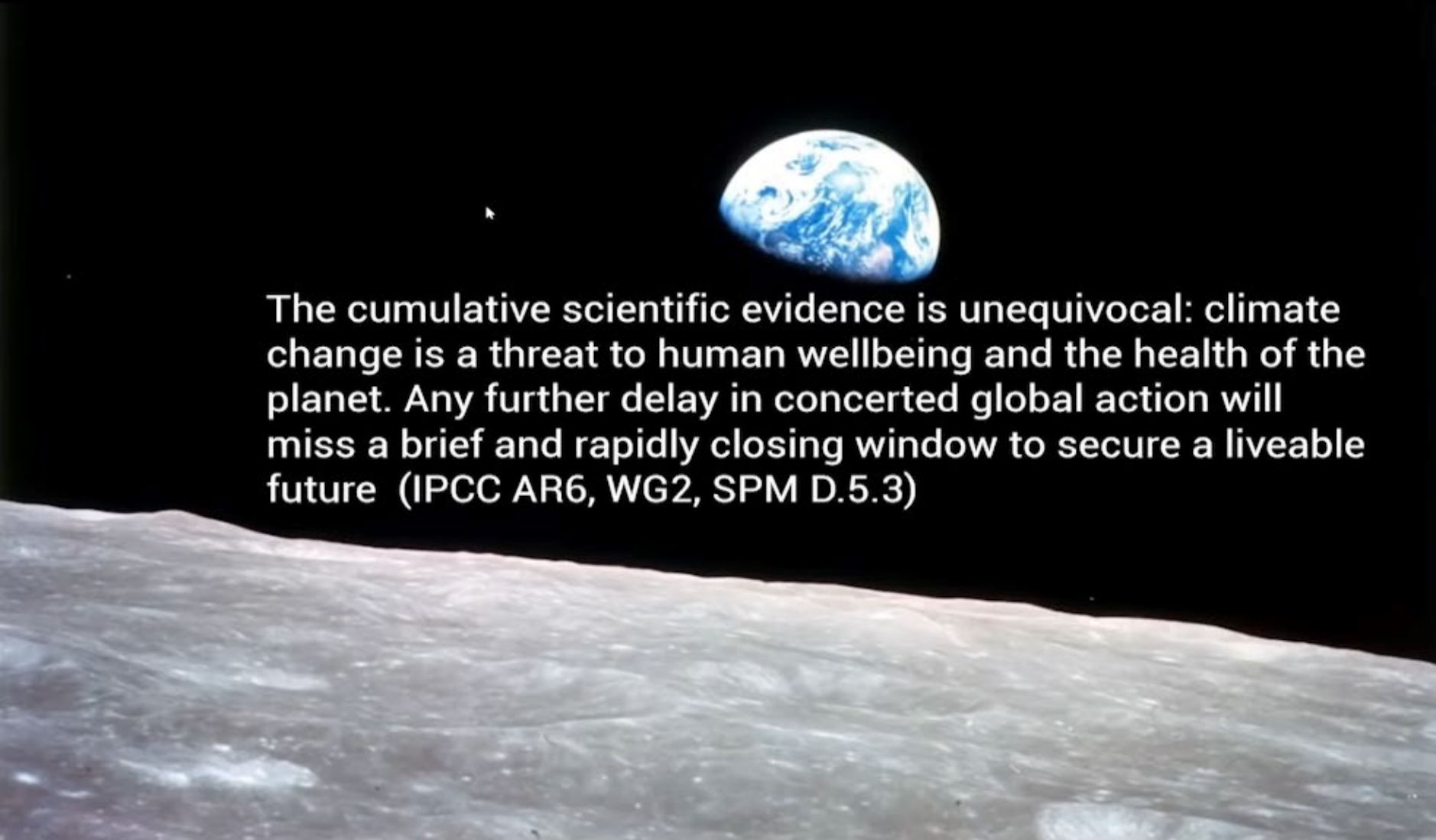
**Adaptation, defense, evolution:**

Sun/Planetary interactions  
Astral Asteroid/Comet impacts,  
Gamma Ray's bursts,  
Supernovae,  
Earthquake and volcanism events.

A plausible optimistic answer is:

“We are here! We are just too early!”

<https://www.youtube.com/watch?v=IF7yy5FcAr8>



The cumulative scientific evidence is unequivocal: climate change is a threat to human wellbeing and the health of the planet. Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future (IPCC AR6, WG2, SPM D.5.3)

A LIVEABLE FUTURE



## REFERENCES

1. J. R. Petit, et al., 2001, "Vostok Ice Core Data for 420,000 Years," IGBP PAGES/World Data Center for Paleoclimatology Data Contribution Series #2001-076, NOAA/NGDC Paleoclimatology Program, Boulder CO, USA, 2001.
2. J. R. Petit, Jouzel J., Raynaud D., Barkov N.I., Barnola J.M., Basile I., Bender M., Chappellaz J., Davis J., Delaygue G., Delmotte M., Kotlyakov V.M., Legrand M., Lipenkov V., Lorius C., Pépin L., Ritz C., Saltzman E., Stievenard M., Climate and Atmospheric History of the Past 420,000 years from the Vostok Ice Core, Antarctica, *Nature*, 399, pp.429-436, 1999.
3. R. B. Alley, "GISP2 Ice Core Temperature and Accumulation Data," IGBP PAGES/World Data Center for Paleoclimatology, Data Contribution Series #2004-013, NOAA/NGDC Paleoclimatology Program, Boulder CO, USA, 2004.
4. R. B. Alley, R.B, "The Younger Dryas cold interval as viewed from Central Greenland," *Quaternary Science Reviews* 19:213-226, 2000.
5. Robert Kunzig, "Shading the Earth" *National Geographic*, Vol. 216, No. 2, pp. 24-27, August 2009.
6. C. Lorius, J. Jouzel and D. Raynaud, "The Ice Core Record: Past Archive of the Climate and Signpost to the Future." In: *Antarctica and Environmental Change*. Oxford Science Publications, pp. 27-34, 1993.
7. D. M. Etheridge, L.P. Steele, R.L. Langenfelds and R.J. Francey, "Natural and anthropogenic changes in atmospheric CO<sub>2</sub> over the last 1000 years from air in Arctic ice and fern," *J. Geophys. Res.*, Vol. 101, pp. 4115-28, 1996.
8. Neil Shea and Mark Thiessen, "Under Fire," *National Geographic*, Vol. 214, No. 1, pp. 116-143, July 2008.
9. Rebecca Morelle, "Rise in Violence 'Linked to Climate Change,'" *BBC World Service*, August 2, 2013.

# REFERENCES (CONT.)

10. S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H.L. Miller (eds.). "Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change," Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, IPCC, 2007.
11. Gerald W. Johnson, "Peaceful Nuclear Explosions," in: Progress in High Temperature Physics and Chemistry, Carl A. Rouse, ed., Vol. 4, Pergamon Press, 1971.
12. W. Livingston and M. Penn, "Are Sunspots Different During This Solar Minimum?" National Solar Observatory, EOS, Transactions American Geophysical Union, Vol. 90, No. 30, pp. 257-264, July 28, 2009.
13. <https://www.mragheb.com/NPRE%20457%20CSE%20462%20Safety%20Analysis%20of%20Nuclear%20Reactor%20Systems/Global%20Climatic%20Variation%20and%20Energy%20Use.pdf>
14. Magdi Ragheb, "Restoring The Global Equatorial Ocean Current Using Nuclear Excavation," i-manager's Journal on Future Engineering & Technology, Vol. 5, No. 1, pp. 74-82, August-October, 2009.
- 15.. Magdi Ragheb, "Tight Natural Gas as a Bridge Fuel Toward Renewables," NBIZ Magazine, pp. 21-29, Winter 2011.
16. Rachel Beck and Magdi Ragheb, "Production of Carbon-Neutral Hydrocarbons From CO<sub>2</sub> and H<sub>2</sub> In Lieu of Carbon Capture and Storage (CCS)," 10th International Conference on "Role of Engineering Towards a Better Environment, RETBE14, Alexandria University, Faculty of Engineering, 15-17 December 2014. Abstract. Power Point Presentation.
16. Blake Stevens and Magdi Ragheb, "Atmospheric Heat Fluxes and Restoration of Circumglobal Current," Proceedings of the 1st International Nuclear and Renewable Energy Conference (INREC10), Amman, Jordan, March 21-24, 2010.

“In a distant village, lived six blind men. One day the villagers announced, “Hey, there is an elephant in the village today.”

They had never seen or felt an elephant before and so decided, “Even though we would not be able to see it, let us go and feel it anyway.” And thus they went down to the village to touch and feel the elephant to learn what animal this was and they described it as follows:

“Hey, the elephant is a pillar,” said the first man who touched his leg.

“Oh, no! it is like a rope,” argued the second after touching the tail.

“Oh, no! it is like a snake,” the third man spouted after touching the trunk.

“It is like a big hand fan” said the fourth man feeling the ear.

“It is like a huge wall,” sounded the fifth man who groped the belly.

“It is like a spear,” Said the sixth man with the tusk in his hand.

They all fell into heated argument as to who was right in describing the big beast, all sticking to their own perception.

## SIX BLIND MEN, AFRICAN TALE.

WITH ALL MODESTY AND HUMILITY.