

CLIMATE CHANGE FROM PREHISTORIC TIME TO THE PRESENT

MUDANÇAS CLIMÁTICAS DESDE A PRÉ-HISTÓRIA ATÉ O PRESENTE

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Abstract

Basic aim is to draw attention to most of the known influences that have as effect global warming. Why? The physical phenomenon called global warming has become a political issue that uses or rather abuses for example, the issue of increased production of carbon dioxide and greenhouse gases for economic pressures. For each of the thematic areas described further in the text, there are many publications printed and placed on www sites. To tell the truth each part would require the co-authorship of an expert, a narrow specialist, and a more intensive analysis. Given the number of influences, this is not practically possible, and only basic key quotes are given. However, author hopes that the basic main an ONE goal stated here – i.e. to show the quantity of influences and parallel influence of this factors on global warming – will be fulfilled. The large number of effects that have a real or probable significant influence on global warming and vice versa the fact, how few of these effects are actually evaluated in scientific texts is surprising. It seems also, that in case of climate change, cause and effect are often confused by authors. Quote: Greenhouse warming theory is probably rapidly becoming the most expensive mistake ever made in the history of science, economically, politically, and environmentally.

Keywords: Global Warming. Climate Change. Causes. Historical Review.

Resumo

O objetivo básico é chamar a atenção para a maioria das influências conhecidas que têm como efeito o aquecimento global. Por quê? O fenômeno físico chamado aquecimento global tornou-se uma questão política que usa, ou melhor, abusa, por exemplo, da questão do aumento da produção de dióxido de carbono e gases de efeito estufa para pressões econômicas. Para cada uma das áreas temáticas descritas mais adiante no texto, há muitas publicações impressas e disponibilizadas em sites da internet. Para dizer a verdade, cada parte exigiria a coautoria de um especialista, um especialista restrito e uma análise mais intensiva. Dado o número de influências, isso não é praticamente possível, e apenas citações-chave básicas são fornecidas. No entanto, o autor espera que o objetivo principal básico e ÚNICO aqui declarado — ou seja, mostrar a quantidade de influências e a influência paralela desses fatores no aquecimento global — seja cumprido. É surpreendente o grande número de efeitos que têm uma influência real ou provavelmente significativa no aquecimento global e, vice-versa, o fato de que poucos desses efeitos são realmente avaliados em textos científicos. Parece também que, no caso das mudanças climáticas, causa e efeito são frequentemente confundidos pelos autores. Citação: A teoria do aquecimento do efeito estufa está provavelmente se tornando rapidamente o erro mais caro já cometido na história da ciência, economicamente, politicamente e ambientalmente.

Palavras-chave: Aquecimento Global. Mudanças Climáticas. Causas. Revisão Histórica.



1 INTRODUCTION

The Earth's climate system receives most of its energy from the Sun and also radiates energy into space. The balance of these two energy flows determines the energy state of the Earth's environment in which we live. If the incoming energy is higher than the outgoing energy, the climate system warms. If more energy leaves, the Earth cools. The Earth is currently in a so-called "positive energy imbalance", i.e. it receives more energy from space than it radiates back. An example of this changes in incoming and leaving energy is the Pleistocene, when geochemical, geological, paleoecological and prehistoric data reveal the alternation of ice ages and interglacials. These data coincide with periodic variations in the Earth's complex of orbital parameters, which change the solar energy received by the Earth.

The current, *probably ongoing climate change* is also called as a global warming in the literature, because the average temperature on the Earth's surface is increasing. The interpretation of a certain phenomenon was, is and will always be given by the current state of knowledge regarding the analyzed problem .

When classifying climate, it is a period from one decade to hundreds of thousands or more years in a certain region, or on the Earth as a whole. Long-term average data and their variability in a certain area form its climate. These changes can be the result of internal variability, when natural processes change the distribution of energy. An example can also be a multi-decadal oscillation. Climate variability is also the result of influences, such as changes in solar radiation and volcanism. Climate change has consequences for sea level changes and life on Earth. We are not faced with something completely new, but something that has already been here in a different form in the past. And many times!

Some authors wrote , that "today" no one doubts that that we are to blame for climate change.

1/Where do the authors get evidence for this, that we are to blame for it??
2/Demagogic behavior is also information ,that no one doubts it that no one doubts that....,

In the Quaternary, the alternation of glacial and interglacial periods of hundreds or tens of thousands of years became stable. The current era in which we live – the Holocene – is the last interglacial period. It has lasted for 10,300 years (9,700 is also

reported). During this time period, so-called climatic oscillations occur – lasting several years to decades.

The main changes contributing to this phenomenon are according to current ideas given by the following data: The burning of coal, oil and natural gas and some other activities that change the composition of the atmosphere and add greenhouse gases to it. Nitrogen-containing fertilizers produce nitrous oxide emissions. Fluorinated gases are emitted from equipment and products that use these gases. These gases have a very strong warming effect, up to 23,000 times greater than CO₂.

Climate variability can also occur as a result of internal processes not forced from the outside, e.g. in ocean currents, for example in thermohaline circulation, etc. The ocean and atmosphere can interact together, thus creating overall climate change. An example can also be the multidecadal oscillation (from the equator to the 70th parallel).

Processes in the Earth's interior can therefore also contribute to climate variability.

The main *driving force* of climate change is, according to the prevailing opinion, not "direct evidence", the greenhouse effect. On the contrary, during the Ice Age, when there was a high degree of glaciation, the opposite phenomenon was true: the high reflectivity of incident radiation back into space and cooling (albedo value). Many greenhouse gases occur naturally, but human activity unfortunately increases the concentration of some of them, especially carbon dioxide (CO₂), methane (CH₄), nitrogen dioxide (NO₂), and fluorinated gases (a total of 11 substances). According to climatologists, fluorinated gases have a very strong warming effect, up to 23,000 times greater than CO₂. Fortunately, there is no danger of their high concentration.

Is-it possible future impact of warming on food production? *Is-it possible future impact of warming on food production. The main factors for human survival are: energy sources and food production . Regional food production is most affected especially by extreme droughts. There are about 300,000 species of higher plants growing all over the world. Of these, only about 30,000 are used at least occasionally by humans. About 12,000 species are used more intensively. However, only 250 species are commonly used for the production of basic food and plant raw materials. The main crops include: Rice, soybeans, wheat, potatoes, corn, tea, bananas, grapes, poppy seeds, etc. Since weather fluctuations affect important agriculture areas where these crops are grown, which are often on enormously large areas, a loss of production of one of them due to environmental changes - even unexpected ones - can affect - large parts of the*

human population. A larger number of crops on smaller areas would be more advantageous from a food future perspective (mosaic arrangement).

2 MAIN KNOWN CHANGES IN CURRENT WARMING

420 ppm was the CO₂ concentration in the atmosphere in 2022 (from the original 280 ppm). This is an increase of about 48%, in the past the level was higher several times starting from the Cambrian, where it was over 4 thousand ppm - author's note.

+ 1.2 °C global warming since the second half of the 19th century.

+ 2.1 °C is the warming in central Europe since 1960.

Decline in Arctic Ocean glaciation: (7.5 million km² in September 1980, 4.7 million km² in September 2021). Rise in ocean levels since 1900 (20 cm by 2018, 80–150 cm, expected by 2150).

As already mentioned, a shift in temperature zones is occurring, especially in the northern hemisphere, where it has so far been at a speed of 40 kilometers/10 years towards the north.

Based on a study of almost two thousand plant species at the end of the 20th century, their progress towards the poles was found to be on average 6.5 kilometers/10 years. However, the progress of climate zones is faster. The data given does not apply to all plant species. For woody plants - especially trees - such a rapid natural shift is impossible, unless it is an artificial planting, but some of them are exceptions, for example the European beech (*Fagus sylvatica*), which has a wide climatic amplitude and occurs from the Mediterranean region (Sicily) to southern Sweden, similarly the silver birch (*Betula pendula*) can be found from Spain to Lapland and the shift of the climate zone did not affect it. *Ecological studies show quite clearly that the speed of temperature change is more harmful than higher (not extreme) temporarily prevailing temperatures*

3 OTHER SIGNIFICANT INFLUENCES ON THE COURSE CONTEMPORARY WARMING

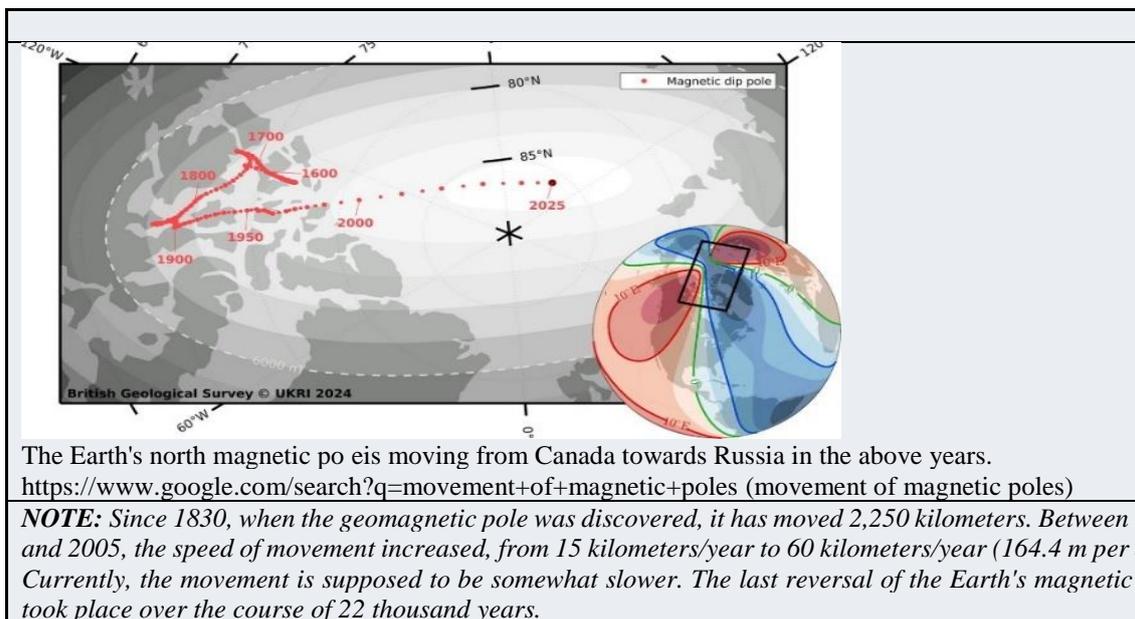
In general, however, it is probably true that climate change is also occurring for other possible reasons:

3.1 The shift of the Earth's magnetic poles (Fig. 1) Probable effects (Ella Jeffries 2025)

on climate change are considered ,not yet statistically and professionally proven. But apparently a very big problem could arise for a large part of current electronic systems and Technologies

Figure 1

Movement of the Earth's magnetic poles



Solar activity has an effect on the Earth's magnetic field, with consequences for weather.

The effect of cosmic warming on Earth's cloud cover. Danish physicist Henrik Svensmark attributes global warming to the effect of cosmic radiation on cloud formation. However, opinions on this theory differ.

Freons are responsible for global warming(?). However, opinions here also differ.

The cause of the phenomenon may be the **mutual position of the planets** of the solar system, the influence of gravitational planet forces, etc. (climate changes also exist on the planets of our solar system).

The movement of the Solar System relative to the Galaxy, i.e. its position, is responsible for global warming.

Eleven-year solar cycles affect fluctuations in climatic phenomena in some areas of the Earth.

Paleoclimatological data for the last 500 million years show that long-term temperature changes are only weakly related to changes in carbon dioxide content.

Dansgaard Oeschger oscillations or D.O event. Dansgaard–Oeschger event is a rapid climate fluctuation; such events occurred 25 times during the last glacial period. Some scientists say that being a multiple of 1,470 years,. The comparable climate cyclicity during the Holocene is referred to as Bond events (see below). Evidence of these oscillations is also found in the Mediterranean Sea. There were a total of 23 or 25) of these abrupt climate swing. During these oscillations, temperatures in Greenland rose by about 5°C over a few decades. Geologists know that the pace of current climate change is negligible. For example, the last interglacial period was a few degrees Celsius warmer. (https://en.wikipedia.org/wiki/Dansgaard%E2%80%93Oeschger_event Wikipedia)

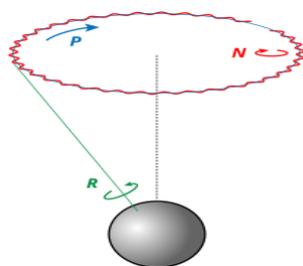
Dansgaard-Oeschger (D-O) oscillation phenomenon was first discovered 30 years ago [*Dansgaard et al., 1984, 1993*].

Another explanation is provided by Milankovitch cycles (Fig. 2, 3), which are quasi-periodically recurring systematic changes in the solar radiation received, caused by fluctuations in the Earth's orbit around the Sun. These changes can affect a number of ecological parameters on Earth, such as climate changes (glaciation, global warming). Milankovitch cycles describe the collective effects of changes in the Earth's movements on its climate over thousands of years.

Milankovitch cycles cause variations of up to 25 percent in the amount of incident solar radiation in the Earth's mid-latitudes, in the region of our planet lying between about 30 and 60 degrees north and south of the equator. (*Milutin Milanković (*28. 5 1879, Dalj, + 12.12 1958, Belgrade, Yugoslavia [now in Serbia] was a mathematician and geophysicist).*)

Figure 2

Basic Earth movements



Milankovitch cycles - Wikipedia, https://en.wikipedia.org/wiki/Milankovitch_cycles

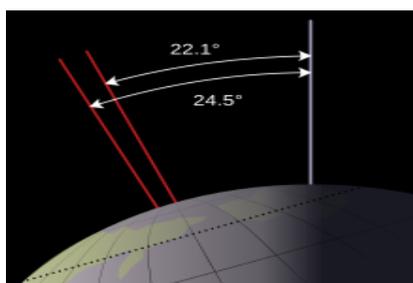
rotation (R, green), precession (P, blue), nutation (N, red).

Changing the axis inclination. 22.1–24.5° range of Earth's obliquity.

The angle of the Earth's axial tilt with respect to the orbital plane (the obliquity of the ecliptic) varies between 22.1° and 24.5°, over a cycle of about 41,000 years. The current tilt is 23.446°, roughly halfway between its extreme values.

Figure 3

Changing the axis inclination



Milankovitch cycles - Wikipedia, https://en.wikipedia.org/wiki/Milankovitch_cycles

rotation (R, green), precession (P, blue), nutation (N, red).

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Explanatory notes-Milankovitch cycles: *Description of the Earth's movements according to Milankovitch cycles see Fig. 2, 3.*

On Earth, cycles manifest themselves as long-term changes in the solar constant and seasonal characteristics at higher latitudes in the Northern and Southern Hemispheres. Three overlapping secular changes in the parameters of the Earth's orbit and axis are distinguished as the celestial-mechanical cause of these fluctuations.

Precession, whose periodicity varies between approximately 19,000 and 24,000 years and in which two different cycles overlap.

Precession of the Earth's axis ("whirlwind peak") with cycles of 25,700 to 25,800 years.

Precession of apsides (perihelia) with cycles of 112,000 years.

Variations in the inclination of the ecliptic (the angle of inclination of the Earth's axis) with a cycle of 41,000 years.

Eccentricity (change in the length of the Earth's semi-axis) changes with a simple cycle of approximately 100,000 years, with a maximum eccentricity every 405,000 years. Changes in eccentricity result in small changes in the amount of energy the entire Earth receives from the Sun each year (a change of about 0.2%).

Nutation is the rocking or oscillating motion of the axis of rotation of an imperfectly symmetrical rotating body, such as a flywheel. Nutation can be longitudinal, if it involves a variation in the speed of precession, or transverse, if it occurs perpendicular to the precession motion.

Cycles include The shape of Earth's orbit, known as eccentricity, The angle Earth's axis is tilted with respect to Earth's orbital plane, known as obliquity; and the direction Earth's axis of rotation is pointed, known as precession. I.e Milankovitch cycles generally describe the collective effects of changes in the Earth's movements on its climate over thousands of years. (*Milankovitch Orbital Cycles, 2020, Buis, Alan 2024, Milankovitch cycles – Wikipedia*).

Earth's axis approximately along the shell of a double cone. In short, the Earth's orbit around the Sun, the precession of the Earth's axis, the rotation and inclination of the Earth's axis, nutation, the change in eccentricity (=change in the length of the semi-axes of the Earth's orbit) and thus the changing angles of incidence of solar radiation on the northern and southern hemispheres are subject to different orbital time scales with durations from 25,800 to approximately 100,000 and 405,000 years. They partly explain natural climate changes - especially their temporal distribution in the Quaternary period, and are therefore of great importance for climatology and paleoklimatology Northern Hemisphere for cyclical climate change. Continuing research into ice cores in Greenland and Antarctica, scientists concluded that there have been 20 cycles of ice sheet expansion and contraction in both the Northern and Southern Hemispheres over the past 2 million years.

Over the last 800,000 years, there have been twenty wet periods when the Sahara turned green, followed by dry periods. The cycles are therefore determined - very briefly - by the movement of the Earth's axis, and the situation when a wet period occurred is

determined by the ellipticity of the Earth's orbit (a wet period occurs when the orbit is highly elliptic, which has its own regular cycles of change).

The Milankovitch theory has a significant place in geology, with a standard time scale of the last 650,000 years. Milankovitch's theory was thus the first acceptable explanation for the existence of cold age cycles and clearly emphasized the central importance of the (sub)polar regions of the Earth.

Another important and interesting piece of information concerns the inclination of the Earth's orbital plane. The inclination of the Earth's orbital plane relative to the Sun-Jupiter plane coincides well with the periodicity of cold ages during the last 700,000 years of the Pleistocene (=earlier Quaternary period). This is a cycle lasting approximately 100,000 years. The 40,000-year period can also influence the monsoons, and thus the periodic formation of deserts.

As can be seen from the information provided so far regarding the mentioned physical phenomena, this is an understandable but very complex system composed of partial functions, *but the truth is that the Milankovitch cycles alone cannot fully explain the current warming of the Earth. - only partially.*

Bond cycles (2001,2008). (Fig. 4). The rhythm of climatic fluctuations in the Holocene and in the last glacial is statistically the same, it is a quasi-periodic cycle lasting approximately **1470 ±500 years**. These cycles have been shown to have an influence on climate fluctuations in the last ten and a half thousand years (Holocene). The discoverer of these cycles was **Gerard Clark Bond**, an American geologist (*20.5, 1940, +29.6 2005) (*more details: https://en.wikipedia.org/wiki/Bond_event*).

Bond cycles are associated with climate fluctuations in the Holocene. The Holocene (=“Anthropocene”) is the period from the last ice age, from about 9700 BC (or 10,400 years ago) to the present. A total of eight (probably up nine) Bond cycles have been identified that have occurred in the past.

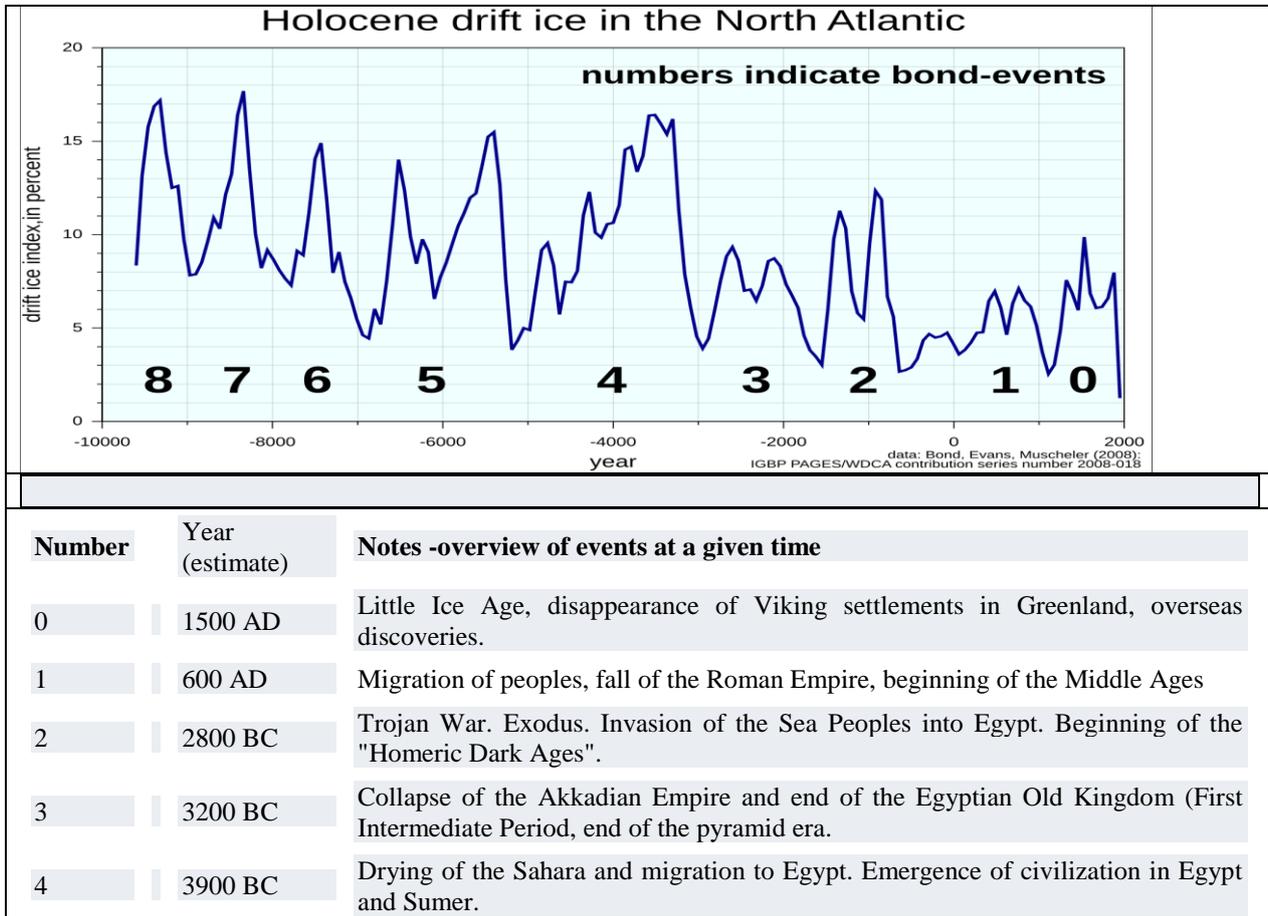
Most of these events do not have a clear climatic signal; some correspond to periods of cooling, but others coincide with aridification in some areas. The gap between events has been estimated at 1,000–1,500 years.

For a better idea, here is a graph from the internet and a table to clarify these cycles:

(https://en.wikipedia.org/wiki/Bond_event#/media/File:BondEvents-stacked-bond2001-labeled-en.svg)

Figure 4

Gerard C. Bond of the Lamont-Doherty Earth Observatory at Columbia University was the lead author of a 1997 paper that postulated a theory of 1,470-year climate cycles in the late Pleistocene and Holocene, based primarily on petrological traces of drift ice in the north.



Known phenomena (short-term fluctuations in weather). **El Niño** warming of the ocean surface, i.e. the appearance of above-average sea surface temperatures in the central and eastern tropical Pacific Ocean, and the **La Niña** phenomenon is the colder counterpart of the El Niño phenomenon. The warming caused by the El Niño phenomenon causes a change in atmospheric circulation over Indonesia, India and Australia, precipitation decreases, but precipitation increases over the central and eastern tropical Pacific Ocean. The influence is also felt in Europe. There is a connection between El Niño - or ENSO - (El Niño, Southern, Oscillation) and the lunar tidal cycle of the Moon with a period of 18.6 years. This period is then reflected in the state of mangroves (sea level) in the given stands.

Climate change in the southern hemisphere in comparison with northern hemisphere of the Earth. Climate change in the Southern Hemisphere is characterized by warming temperatures, increased drought risk in some areas, and a trend toward more extreme rainfall in others, with significant effects on ocean circulation and storms. These changes include more intense westerly winds, leading to potential ocean heat transport changes and faster sea ice melt, alongside regional impacts like extreme heatwaves in South America and Australia and drought in southern Australia.

There is special problem of global warming .

Why the southern hemisphere is stormier than the northern hemisphere

For a long time, most weather observations on Earth were taken on land. This gave scientists a clear picture of storms in the northern hemisphere. However, for the southern hemisphere, which is only around 20% land, it was not until the advent of satellite-based observations in the late 1970s that we obtained a clear picture of situation there:

The southern hemisphere is about 24% stormier than the northern hemisphere.

Despite a number of different theories, no one had provided a clear explanation for this difference in storminess between the two Earth hemispheres.

Three times faster than the rest of the planet – that’s how the South Pole has been warming over the past three decades. This is according to an international team of climate scientists who analyzed data from weather stations spread across Antarctica over the past 60 years.

The South Pole is warming at a rate of around 0.6 degrees Celsius per decade, while the rest of the Earth is warming by an average of just 0.2 degrees per decade.....

4 INTERNAL CAUSE OF VARIABILITY ON EARTH

Oceans and glaciers respond to climate changes more slowly, while the Earth's surface and atmosphere respond to temperature changes in their surroundings more quickly. Climate variability can also occur as a result of internal processes not forced from the outside, e.g. in ocean currents, for example in the thermohaline circulation, etc. The ocean and atmosphere can interact together

5 SOURCES OF BASIC INFORMATION BEFORE THE INDUSTRIAL REVOLUTION (1850) PROXY DATA AND BASIC IMPORTANT EPOCHS OF EARTH'S DEVELOPMENT

There is already a minimum of meteorological data in these ancient periods. This mainly concerns the use of *proxy data*. Proxy data are indirect data, that we use to reconstruct significant historical and natural phenomena for which we do not have direct data. Otherwise, for example, we would not know anything about life in the Jurassic, etc. Proxy data are divided into: natural sources and human sources. Natural sources are, for example: analysis of glaciers and marine sediments, geological analysis, paleontological analysis, biological analysis, etc. Human sources can be: archaeological sources, documentary sources, the first measurements recorded by man

Table 1

Geological periods

Pre-geological period 4000-6000 million years ago.
Prehistoric mountains 1900-4000 million years ago.
Old mountains 600-1900 million years ago.
Primordial mountains (Cambrian, Ordovician, Silurian, Devonian, Carboniferous and Permian), 225-600 million years ago.
Mesozoic-Mesozoic (Triassic, Jurassic and Cretaceous), 65-225 million years ago.
Tertiary mountains (Paleogene, Neogene development of gymnosperms and angiosperms, era of mammals), 2.59-65 million years ago.
Quaternary mountains (Pleistocene, Holocene development of modern plants and humans) 0-2.59 million years ago.

Prehistoric time is only briefly outlined, it is an epoch of Earth's development very distant from the present. Overall, the Quaternary (2.588 million years) looks like “one big ice age” compared to the previous warm periods. Their first part, the **Pleistocene**, represents a cold period, it is the Ice Age (for humans it is the Stone Age epoch).

The Holocene, the last period we are living in, lasts about 11,000 years. In the Holocene, warmer periods alternate with colder periods. On the basis of geological point of view, in the ancient past, ice ages also began when continents were in positions that reduced the flow of warm water from the equator to the poles, thus allowing the formation of ice sheets. Ice sheets increase the reflectivity of the Earth, thereby reducing the absorption of solar radiation. The result? Cooling.

Significant important time period when life almost disappeared/additional information/. 252 million years ago (the end of the Paleozoic Era), most life on Earth

became extinct. Paleontologists have described the presumed cause, stating that strong emissions of carbon dioxide were to blame. Scientists measured different boron isotopes in fossils and monitored the development of pH, i.e. how the acidity of the oceans changed. According to it, it is possible to measure how the concentration of carbon dioxide in the atmosphere developed. A new study has confirmed that carbon dioxide was probably the cause of the dramatic changes, and has refuted the original hypothesis about the influence of methane. However, there are also opposing hypotheses refuting this claim, believing that the causes were different.

Human ancestors in Africa nearly went extinct about 900,000 years ago. According to a new study by Chinese scientists, there were only about 1,280 individuals on the planet at that time, and about the same number of them lived for about another 117,000 years. Only then did the ancestors of today's people start to do a little better. So, 900,000 years ago, humans were so close to extinction that at one point there were only 1,300 of them. The likely cause was a complex climate crisis caused by many factors. Around 813,000 years ago, the population of prehistoric humans began to increase again. How the ancestors survived and what enabled them to prosper again is unclear.

During the last 800,000 years, there has been a regular alternation of glacial and interglacial periods (given by periodic variations in the Earth's orbital parameters, which have an effect on the solar energy received by the Earth.

In contrast to this information, it should be noted that in the Cambrian, 500 million years ago, the concentration of the gas in question reached an incredible value for us - 4000ppm (**four thousand!!**). At that time, our ancestors - vertebrates of that time - already lived and survived, i.e. they did not "cook" themselves due to the warming caused by the concentration of carbon dioxide, as would follow from current ideas...

6 IMPORTANT CLIMATE CHANGE EVENTS IN THE LAST 2000 YEARS.

6.1 Late antique "Little Ice Age" 536 AD

The worst year in human history was probably the year 536 AD. It tormented humanity with cold, hunger, instability, almost darkness, "the sky denied the people the shining sun". It was the worst year in history, say many historians. The cause was a huge volcanic eruption in Iceland, which occurred suddenly and created a veil of dust over a

huge part of the northern hemisphere. And more, it was followed by two more dramatic volcanic eruptions, in 540 and 547.

Summer temperatures dropped by 1.5 to 2.5°C, and humanity entered its coldest decade in 2,300 years. It snowed in warm parts of China, and wheat failed to grow in Ireland for three consecutive years. In the weakened human population, the bubonic plague struck moreover the Roman port city of Pelusium in Egypt in 541.

The lingering impact of the volcanic winter of 536 was further exacerbated in 539–540, when a second volcanic eruption caused summer temperatures in Europe to drop by up to 2.7 °C below normal. It also resulted in a deterioration in international relations. The Levant, Egypt and Persia were conquered. There was a population decline in the Negev Desert and a host of other events, facilitated by the somewhat improved or worsened weather (in the hot deserts).

6.2 Period 875-1194 (also given as the period 950 to 1250) - Climatic optimum

Names such as the Medieval Climatic Optimum ("maximum"), the Medieval Warm Period, or the Medieval Climatic Anomaly are used. This period also includes the so-called Oort Minimum with minimal solar activity (1010-1050) over time.

This is a period that was characterized by significant warming of the climate, especially in the North Sea region, but it was also related to other climate changes of the time in other countries. Significant changes took place in parallel in China. However, it was probably not a global phenomenon. The levels of the world's oceans were about 20 cm higher around 1200 AD than they are today! This period was followed by the so-called Little Ice Age. Some sources use the term *Medieval Climate Anomaly* for this period with regard to other important phenomena that took place during this period.

Despite considerable uncertainty, the period between 950 and 1100 was very likely the warmest period of the last 2000 years before the start of the 20th century. However, temperatures were about 0.1 °C and 0.2 °C below the 1961–1990 average and well below period the post-1980 average. Proxy data records from different regions show that the warmest periods in different regions occurred in different years. These regional warm periods did not occur as consistently across all regions as the warming of the late 20th century. This period was characterized in some parts of the world by, for example,

population explosions and the expansion of populations into areas that were previously uninhabitable. Temperatures for this period have been determined from proxy data from ice cores, tree rings and lake sediments. The descriptions also provide historical chronicle records. *These periods are often documented in the literature as "dry periods" and "rainy periods". The period of climatic optimum ended with the so-called Little Ice Age at the beginning of the 14th century*, when there was a gradual but significant decrease in temperatures and population decline.

It is likely that in some areas temperatures reached or exceeded present temperatures, but globally they did not reach present values. The highest temperature maxima were in the North Atlantic, South Greenland, the Eurasian Arctic and parts of North America, and these maxima were significantly higher than the average temperatures in these areas at the end of the 20th century (for the period 1961–1990) and in some areas were even more warmer than they were between 1990 and 2010! In some areas, such as central Eurasia, northwestern North America and probably also in the South Atlantic, anomalous cooling occurred, Greenland in the this period „allowed“ the Vikings to colonize America.

During the Medieval Warm Period, Europe experienced a population explosion, which was undoubtedly helped by a favorable climate. Grain was also grown in more northern areas, in Norway and in the mountains of Scotland. It is believed that the population of Europe almost tripled between 1100 and 1400. Increased agricultural production also supported the emergence and expansion of cities, where trade in crops took place. The climate in eastern equatorial Africa during this period oscillated between drier periods and relatively humid periods.

6.3 Period 1195 (1250) -1850 Little Ice Age

Although most of the Northern Hemisphere was colder on average in the years 1400–1700, Labrador and isolated areas of the USA were about as warm during the Little Ice Age as they were in the period 1961–1990. It should also be noted that although this period was cold on average, it was not constant and there were also warm periods – the variability of the weather was considerable

The Little Ice Age was one of the coldest periods in the last 10,000 years, at least in Europe and the surrounding areas. See, for example, the disappearance of the Viking

settlement in Greenland during this period. A study by the University of Massachusetts Amherst concludes that there was a significant temporary warming before the cooling around 1400. Any of several further dates taken from the literature over a period of more than 400 years could mark the beginning of the Little Ice Age.

Around 1250: The Atlantic ice began to grow, a cold period that was probably greatly intensified by the massive eruption of the Samalas volcano (Lombok Island, Indonesia) in 1257 and the associated volcanic winter. The finest particles could have risen to heights of 40 kilometers or more. Otherwise, they say, this volcanic material could not have reached places all over the globe, including the ice sheets of Greenland and Antarctica. The impact on the climate was significant. Radiocarbon dating of plants shows that they were killed by glaciation.

The Wolf's Minimum period took place approximately in the years 1280 (1300?) - 1340, then in the following years, due to the worsening conditions, a plague epidemic occurred, when approximately 50% of Europeans lost their lives.

Around 1300: The time when warm summers in northern Europe ceased to be reliable.

Around 1315: There were rains and a great famine in 1315–1317, floods, crop failures, cannibalism, eating of newborns, lack of fodder for livestock.

Period 1310 -1330: At this time, northern Europe experienced the worst and most sustained period of adverse weather in the entire Middle Ages, with harsh winters, rainy summers, and grain failure.

Around 1347: 200 million dead, a major population decline, by 1350 it had affected parts of Africa, India, the Arab countries and China (25 million people). In addition, in the years 1348-52 the "Black Death" devastated half of Europe

Period 1466-1618: The influence of minimum solar activity. *The Spörer minimum* of solar activity (1450-1550) refers to this historical period (see also the following text).

Period 1560 až 1630: The global expansion of glaciers, the so-called *Grindelwald fluctuation*, has begun.

Around 1650: The beginning of the coldest years in the middle of this period (1195 -1850), i.e. the first climatic minimum. Experts cannot explain this climate anomaly precisely, however, several causes have been proposed: orbital cycles, reduced solar activity, increased volcanic activity (volcanic winter), changes in ocean currents,

fluctuations in human population in different parts of the world causing afforestation or deforestation, and natural variability in global climate, cyclical decrease in solar radiation, changes in ocean circulation, changes in Earth's orbit and axial tilt (orbital forcing), natural variability in global climate.....

Period 1638–1715: Overall, the coldest period of the Little Ice Age was the 17th century. At that time, the Sun was in the *Maunder Minimum* (1638–1715). This resulted in extreme winters in Europe. Other cold periods occurred in the previous period, at the aforementioned *Spörer Minimum* (1400–1510) and in the later period at the *Dalton Minimum* (1790–1830). These are three periods of solar activity when almost no sunspots appeared.

Explanatory notes

Sörer Minimum (1450-1550) The period of low solar activity that lasted from 1420 to 1570 (1450 to 1550) is known as the Spörer Minimum. It is named after the German astronomer Gustav Spörer.

Maunder Minimum (1645–1715). The Sun probably grew larger and its rotation slowed down at that time.

Named after the English astronomer E. W. Maunder. Maudr relied on observations by astronomers such as Galileo Galilei, Thomas Hariot, David and Johan Fabrigius, Christopher Scheiner and others. At that time, only about 50 sunspots were counted. During normal cycles, the Sun should have between 40 and 50,000 spots.

Dalton Minimum 1790-1830 (John Dalton * 6. 9.1766– +27.71844) British naturalist, chemist, mathematician and meteorologist. Like the Maunder Minimum and the Spörer Minimum, the Dalton Minimum coincided with a period of below-average global temperature. During these periods of solar minimum, sunspots on the Sun's surface almost completely disappeared.

There are believed to be following solar minima, starting with the Egyptian minimum in 1300 (1400) BC, up to the most recent minimum. **(Fig. 5)** The solar minimum in the solar cycle is a period when there is little or no solar activity on the Sun. It is evaluated based on the relative number of sunspots in 11 years. From the Roman maximum to the Dalton minimum, *there is a relatively significant agreement between solar cycles and terrestrial events*, even though other factors (volcanoes, etc.) intervened in the events and interactions of the aforementioned influences occurred. *The time*

periods given by different authors - the dates - partially differ, but these are only relatively minor deviations, including the names of the phenomena.

Figure 5

Significant minima and maxima of solar activity

Sumerian maximum	around 2700 B.C.
Greek maximum	around 2500 B.C.
Stonehenge maximum	around 1800 B.C.
Egyptian minimum	around 1400 B.C.
Homeric minimum	around 750 B.C.
Greek minimum	around 400 B.C.
Roman maximum	around 0
Oort minimum	period1010-1050
Medieval maximum	around 1200
Wolf minimum	period1280-1340
Spörer minimum	period1450-1550
Maunder minimum	period1645-1715
Dalton minimum	period1790-1830

Year 1815: The Tambora volcano became famous for a series of eruptions that began on April 5, 1815, and culminated on April 10, 1815. The Tambora eruption of 1815 can be clearly ranked among the largest ecological disasters that humanity has ever encountered. In 1815, 100,000 people died. It began when a cloud of sulfur compounds released by Tambora delayed the arrival of the Indian monsoon rains for the following two years. This caused drought and crop failure on the Indian subcontinent, but worse was the parallel emergence of a new and deadly strain of cholera. The following year, 1816, was known in Europe and North America as the year without a summer due to the large amount of volcanic ash in the atmosphere. That year, the temperature in the Northern Hemisphere dropped by 0.5 °C. A small contemporary example for eyewitnesses can be The eruption of Mount St. Helens (Fig. 3) in the United States on May 18, 1980. The result of the eruption was a cool summer and very late ripening of crops. The question is what humanity would do in the event of an unexpected, more powerful eruption today.

Currently, a future active super volcano is probably forming, or rather, phenomena are taking place that indicate its future formation about 300 kilometers under the Pacific Ocean, the Mediterranean Sea may also be dangerous for the world as a second case, and Yellowstone Park can be mentioned as a third. Another, i.e. a fourth "monster" is allegedly "sleeping" under Alaska.

6.4 Global warming: from the twentieth to the twenty - First centurie

Objectively speaking, the current warm period actually began at the end of the 19th century. The temperature increase at the end of the 19th century compared to the previous period is lower than at present, but it is an extremely similar phenomenon!

However, the current temperature increase is so rapid that even sudden geophysical events in the history of the Earth do not come close to this rate of increase, as some authors claim. Many others authors disagree with them.

It is reported that 41 to 64% of pre-anthropogenic temperature changes on a 10-year scale were caused by changes in solar radiation and volcanism (the period before 1850 is taken as the approximate beginning of the industrial revolution). The influence of climate change and weather patterns on ecosystems are also significant. Unfortunately, hundreds of plant species disappear on our planet every year. This is evidently also due to human influence. *The question is what to include in the evolution caused by gradual climate change.*

6.5 Present: humanity probably expects „New Little Ice Age“

New “little ice age” will develop will be created on Earth in the years 2030–2040 with a relatively high probability, during this period, solar activity will be probably decrease by up to 60 percent (=the natural regular cycle of the sun). This conclusion was first presented by a team of scientists from **Newcastle (July 9, 2015)**. www.sciencedaily.com/releases/2015/07/150709092955.htm

Further information is provided by Prof. Valentina Zharkova at the National Astronomy Meeting in Llandudno , this information was also reported by the British newspaper Express in 2024. This professor's paper has now been withdrawn due to alleged unreliability..... This is probably a misunderstanding of the statistical description.

The change is supposed to be similar to the periods from 1645 to 1715,, alternating droughts and floods, especially during the Maunder Minimum. In general, it is believed that this will be, according to all indications, a generally weaker manifestation of the aforementioned negative influences.

And at this very moment, a question arises for scientists, politicians and other fields "frightened" by the further development of global warming. They have produced

climate forecasts until the end of the 21st century based on the further course of global warming. However, there is no evidence that these forecasters are wrong. There is no evidence to the contrary - that they are right.

7 DISCUSSION

7.1 Scientific consensus on climate warming

One can be found in prevailing part of literature majority opinion that the Earth has been consistently warming since the start of the Industrial Revolution, that the rate of recent warming is largely unprecedented and warming is mainly the result of a rapid increase especially in atmospheric carbon dioxide (CO₂) and other greenhouse gases caused by human activities.

More information:

see:https://en.wikipedia.org/wiki/Scientific_consensus_on_climate_change

However, this „claim“ can be countered by a number of historical periods in the development of our planet where global warming occurred and was not due to CO₂, and other gases manufactured by human activities.

As we see extreme weather events growing—in number and in intensity—all around us, it is evident that climate change (especially the weather variability) is a crisis that must be tackled and adapted to. But in order to find the solutions, we must know the essence around global warming.

There is a basic question if exist "lies" about global warming. To tell the truth, one and the same phenomenon is often explained in completely opposite ways. Lies—more objectively speaking, adapting the facts to the needs of the authors—appear on both sides of the "scientific barricade" i.e., among supporters and opponents of human guilt for the given phenomenon.

7.2 The reasons given by supporters of opinion of human influences, can be shortly and simply summarised

The main reasons most commonly reported for accepting this idea are:

1. Burning fossil fuels

2. Deforestation
3. Agriculture -The greenhouse gases emitted from agriculture are methane, nitrous oxide and carbon dioxide. Livestock like cattle and sheep produce a large amount of methane – for example making up approximately 10% of Australia’s emissions
4. Transportation
5. Industry manufacturing

It is evident that this is a complex influence of a number of factors on the current state, but in reality, the vast majority of publications only assess the influence of harmful gases emitted by humans.

This is not a comprehensive approach

7.3 The reason given by opponents of opinion of human influences, can be shortly summarised

Opponents of this theory - the theory of global warming man made are representing a numerically smaller part of scientists, however, they have a group of physicists in their ranks. On the other hand there are hundreds (thousands) of papers supporting this idea.

But it seems, that in case of climate change, is by this second groupe of scientist cause and effect often confused (*increasing concentration of CO₂ x temperature growth and absolutely opposite phenomenon- influence of warming on the concentration of CO₂ growth*)

7.4 General comments on global warming

Not a single worker describing this phenomenon provides clear physical evidence of how much soleil energy newly “added” gases into atmosphere of nature by humans are capable of absorbing. They only cite works by authors with the same character of the text. So a kind of chain reaction is created here....A little special.

Very serious remark concerns the fact that warming and cooling have already occurred several times in the history of the Earth, it is periodic, i.e. it is repeated regularly moreover with different concentrations of carbon dioxide, but the authors of articles on global warming practically do not mention it (don't they want?).

Let's ask ourselves a question - isn't this method of contemporary assessing global warming of erroneous thinking that has flooded the world for mainly economical reasons? There have been many similar waves of thought on Earth in various fields of knowledges over the past centuries, the whole "scientific" world always claimed something... and then there was always a sudden turning point. Either the level of knowledge changed the previous claims or new methods of evaluation brought a change in the thinking.

Mere correlations between rising average temperatures and Growing concentrations of greenhouse gases cannot be cited as evidence of the observed phenomenon (knowledge of statistic science!!). So the question is, if only only value of correlation coefficient and regression graphs using relationship between growth of greenhouse gases concentration and average temperature is susceptible confirmation for cause of global warming. It is need to especially to prove how it happens.

Question for discussion : There is basic question if exist scientific "lies" about global warming. To tell the truth, they are not lies but quite different explanation appear on both sides of the "scientific barricade" i.e, among supporters and opponents of human guilt for the given phenomenon. However, no one doubts, that man destroys nature with his activities in any case and in other ways too.

Question for discussion: There are influence of methane cattle production (flatulence) on the global warming? A very strange and very debatable problem is the so-called negative impact of cattle flatulence i.e methane production on climate development. For many reasons, for example, the measure of one European government to limit methane production by cattle due to the assumption (proof?) that cattle pollute the planet, therefore changing the climate, is somewhat strange. It seems probably even nonsensical. Is-it only "science fiction"?

Plimer, Ian (2009) presents problem of the missing science in problem of global warming. Words of the author could be expressed in the words of this author as follows:

Climate, sea level, and ice sheets have always changed, and the changes observed today are less than those of the past. Climate changes are cyclical and are driven by the Earth's position in the galaxy, the sun, wobbles in the Earth's orbit, ocean currents, and plate tectonics

In earlier times, atmospheric carbon dioxide was much higher than it is today, but it did not cause climate change. During times of excessive carbon dioxide concentration, there was no greenhouse effect. During past glaciations, carbon dioxide was more concentrated in the atmosphere than it is today. Is CO₂ causing warming? Confusing cause and effect!! Informed dissent must be respected and ideology that subverts the evidence must be guarded against.

Human emissions of the gas of life have never been shown to be driving global warming. Large parts of other science are ignored.... "I have no opinions, but demonstrable facts," says the author. Professor Plimer describes environmentalism as a "modern religion" because cause and effect are often confused when it comes to climate change.

Very interesting results are presented by **Robert Lea (2024)**.

In an astonishing cosmic cycle that occurs every 2.4 million years, Mars' gravitational pull is shifting Earth's path around the sun, warming its climate and increasing vigorous deep ocean circulation, according to a new study published this week in the journal *Nature Communications*. 15. 3. 2024

Scientists have discovered geological evidence that the gravitational interaction between Mars and Earth drives a 2.4-million-year cycle of deep-sea circulation and global warming.

The surprising link between Mars and Earth's seas and climate sees deep currents wax and wane, and this connects to periods of increased solar energy and a warmer climate. The research could help reveal how climate change over geological timescales affects the circulation of the oceans.

This knowledge could help researchers create better climate models.

Ian C McClintoc presents proof that CO₂ is not the Cause of the Current Global Warming. Ian McClintock is a farmer from the south-west of NSW who, like most farmers, takes a very keen interest in the weather, in weather predictions, and for over .

Author states that there is a lot of evidence to support the claim that anthropogenic greenhouse gas emissions are not the main drivers of global climate change, however, the data presented in this publication are sufficient to convincingly prove this case. It demonstrates by various methods that the key hypothesis of the IPCC (Intergovernmental Panel on Climate Change) and its supporters fails and that it is not true that human-induced emissions of CO₂ and other greenhouse gases are the cause of the current

warming period. The IPCC theory is said to be supported only by computer models - that is, by the way they are built.

Bad methodology is to key in on one variable, i.e. CO₂ concentration, and not look at other factors that could cause global warming. Other statistical reasons for this claim can be found at work of **J. Van Vliet- Pourquoi l'effet du CO₂ sur le climat est exclu par la physique | Science, climat et énergie 2020**).

Peter Langdon Ward presents considerations and facts (<https://whyclimatechanges.com/impossible/>) that nine Fundamental Mistakes in the problematic of Physics of Heat and in Greenhouse-Warming Theory exists.

In other words, If greenhouse-warming theory is mistaken, i.e. with with large probability, it is necessary to consistently present clear physical evidence. To tell the truth author presents that Earth Cannot Be Warmed by a Blanket of Greenhouse Gases which cannot with very large probability physically cause contemporary observed global warming. Greenhouse warming theory is rapidly becoming the most expensive mistake ever made in the history of science, economically, politically, and environmentally. Carbon dioxide makes up only 0.04% of the atoms and molecules in the air. Any increase in energy resulting from absorption by carbon dioxide must be shared with 2,500 other molecules and atoms.

Nuño Domínguez (2023) presents, that the decrease of the rotation velocity of the planet's inner core has yet imperceptible effects for humans, but it is essential to understand, that yet not.

David R. Henderson (2024) presents statistical reasoning: We can't simply look at the fact that CO₂ increased and then the temperature increased and attribute the whole increase in temperature to the increase in CO₂. It is a very bad methodology to focus on one variable, CO₂ concentration, and not look at other factors that could cause global warming. He considers one factor-dozens of influences to be a bad solution.

It is necessary to draw attention on the extraordinary book (**Bjorn Lomborg, 2020**) of a prominent author that should be read by anyone who is concerned, as an expert or layperson, as propounder or as a opponent with the issue of global warming and its causes. Based on more than 650 citations, the book shows the misconceptions of many climatologists, the unnecessary fear and confusion caused by the authors' predictions based on partial analyses, not a comprehensive analysis of the phenomenon.

7.5 Climate change on planets orbiting the sun

Observations obtained by the Hubble Telescope, the James Webb Telescope, ground-based instruments, and satellites reveal that "climate change" is very likely occurring on the planets of the sun.

It is, somewhat plausible, piece of evidence that CO₂ alone is not the main driver of warming on this planet is the climate change and warming on Mars, Triton (Neptune's moon), Pluto, and Jupiter. All of these bodies exhibit "global warming" or "climatic change." This warming and climate change does not occur on all bodies that are part of the solar system, for example, on Uranus it is cooling. The planets and moons that are said to be warming or changing their "climate" constitute eight bodies in the solar system. However, all of the outer planets have much longer orbital periods than Earth, so any observed "climate change" on them can only be seasonal **Mars**: New data indicate a warmer and wetter climate on Mars in the past. The current atmosphere of Mars is made up of 95% carbon dioxide, and current warming is now expected (lightning has also been recorded here). The course of climatic phenomena in the past was probably like on Earth.

Jupiter (Fig. 6): Jupiter has lost its decoration, the southern equatorial belt. In addition, the giant spot (Red Spot) on Jupiter is shrinking "due to climate change" and other spots, meteorologically classified as cyclones, are probably forming. The temperatures of individual Jupiter belts change over time.

Short explanation: *Jupiter's Great Red Spot is very likely a gigantic storm with a diameter twice that of planet Earth, is shrinking and smaller spots are emerging around it. Discovery of new cyclones likely signifies current climate change. Jupiter has an orbital eccentricity of 0.048, its distance from the Sun between perihelion and aphelion varies by about 75 million km, and the inclination of Jupiter's rotational axis is only 3.13°. Due to, Jupiter does not experience seasonal variations ("seasons") in weather as on Earth or Mars.*

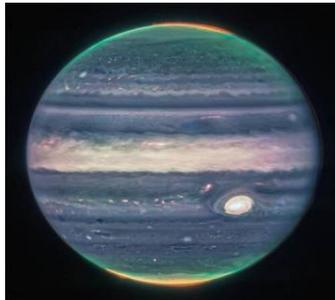
Pluto : "Warming" was measured, but for clarification it should be noted that Pluto's temperature is 43 Kelvin (i.e. -230 °C) and therefore if warming occurs, it means a rise from lower negative temperatures to "higher lower" negative temperatures, but still very low.

Triton (Fig.7) (Moon of Neptun): Triton, which appears to have warmed significantly since the Voyager probe visited it in 1989, is unique among the large moons

of the Solar System in that it moves in a retrograde orbit (that is, it orbits in the opposite direction to the rotation of its planet).

Figure 6

Jupiter



Source: <https://search.seznam.cz/obrazky/>

Figure 7

Moon Triton. Natural satellite of Neptune.



7.6 Two interesting factors likely to influence climate development

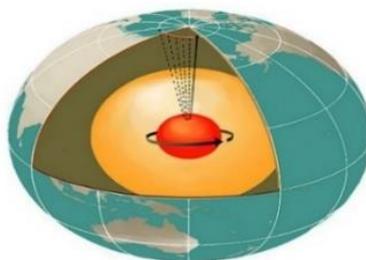
a/Rotation of the earth's inner core (Fig. 8). It was found that the rotation of the inner core not only slowed down, but even reversed its direction, a change that could cause changes in the length of the day by fractions of a second. The behavior of the inner core is closely linked to the Earth's magnetic field. Core is probably hot as the surface of the sun. (Domínguez 2023, Wang, W., Vidale, J.E., Pang, G. et al. 2024).

b/ Ozone hole (Fig. 9). There has been much discussion about this phenomenon. The ozone hole was formed by the decomposition of stratospheric ozone by chlorine compounds (mainly CF₂Cl₂ dichlorodifluoromethane, Freon 12 and CFCl₃-californium chloride) and bromine released by the photochemical decomposition of some anthropogenic products. Ozone layer depletion and global

climate change are indirectly related, because both ozone-depleting substances and their substitutes are “greenhouse gases.” In the Southern Hemisphere and Antarctica (Fig. 12), the ozone hole has contributed by changing the spectrum of light reaching the Earth indirectly to changes in surface climate and atmospheric circulation. Ozone-depleting substances and greenhouse gases change a number of processes. These changes result in warming of the troposphere and cooling of the stratosphere. At the equator, the stratosphere reaches heights of about 17 km, and at the poles, up to 8 km. In the case of the ozone layer, we can mention the international success of two negotiations, when humanity managed to prevent the destruction of the ozone layer (22 March 1985 Vienna Convention, Montreal Protocol 16 September 1987)

Figure 8

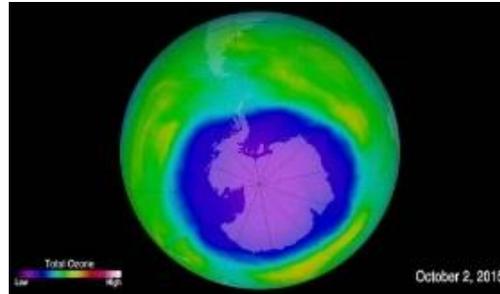
The Earth's core and its rotation, The Earth's core consists of a semi-liquid outer core (outer radius 3,470 km) and a solid inner core (radius approximately 1,220 km). The Earth's core stopped in 2009. And then it started spinning in the opposite direction.



This phenomenon can -theoretically, probably - affect the climate, but to tell truth direct evidence of an effect on the climate has not yet been published.

Figure 9

Ozone hole in 2015 (blue color) 128 Ozone Hole Stock Photos, High-Res Pictures, and Images - Getty Images / Antarctic ozone hole, Ozone hole earth



Ozone hole is a seasonal thinning of the ozone layer, particularly over Antarctica in the Southern Hemisphere's spring (Sept-Dec), defined as areas where ozone concentrations drop below 220 Dobson Units (DU) due to human-made chemicals like CFCs releasing chlorine, which destroys ozone, but international efforts like the Montreal Protocol are successfully leading to gradual recovery, with recent years showing smaller holes.

8 EXAMPLES FROM THE HISTORY OF CLIMATE DISASTER FROM 4000 BC TO THE BEGINNING OF OUR ERA

The greatest enemy of early farmers, was disasters related to water - its lack, or rather droughts, as evidenced by historical data. Three fields deal with these problems.

***Historical climatology** is the study of historical climate change, its impact on civilization*

***Paleoclimatology**, which includes climate change throughout Earth's history.*

***Ecological determinism.** In the 18th and 19th centuries, anthropologists argued that the environment shapes character. Modern anthropologists reject such claims.*

8.1 India 4000 BC (Bond Cycle No. 4?)

One of the first disasters occurred approximately four thousand years ago, when the Indian city-states of Harappa and Mohenjo-daro were invaded by invaders from the north. The fall was probably caused by a long-lasting drought and cooling, which weakened these city-states and made them defenseless. This cooling, in turn, created

favorable conditions for the emergence of the first civilizations in Sumer and Egypt, which invented writing. The simultaneous drying of the previously green Sahara led to migrations, for example to the Nile Valley.

8.2 Ancient Egypt. A catastrophic wave of drought and cooling in the years 2150–1990 BC (Bond cycle no. 2)

This history is poorly mapped. The biblical book of Genesis provides a certain idea of the situation at that time: It describes seven years of famine that plagued the countries around Egypt, after which the famine moved to the Nile Delta. The effects of the crisis are described even more eloquently by the so-called Ipuwer papyrus: “The subordinate has become the superior, the land is devastated,...

8.3 The demise of Sumerian cities around 2000 BC

At this time, a number of Sumerian cities disappeared: According to surviving sources, the advanced settlements of the inventors of the first writing fell into the hands of the much more backward Elamites and Amorites. And that the blame for their demise can again be attributed to the vagaries of the weather is also evidenced by the contemporary dirge Lamentation for the Destruction of Ur, which reads, among other things: "They took away the kingdom from Sumer / The Euphrates and Tigris on their devastated banks only bore weeds / The fertile fields only bore thistles / The gardens without grafts perished of their own accord..."

8.4 Indian civilizations around 2000 BC

The probable cause of the rapid decline of advanced Indian civilizations was ultimately explained by a climate change. Around 1900 BC, rivers and fields in their vicinity suddenly dried up. Extreme drought, followed probably by famine, was responsible for the destruction of one of the most advanced cultures of antiquity.

8.5 The Greek Dark Ages

There was a long period of drought between 1200 and 850 BC. It is believed that the Mediterranean Sea was cooling at this time, resulting in less evaporation and a subsequent decrease in rainfall over a vast area. Several other cultures collapsed during the same period, such as the New Kingdom in Egypt.

The Homeric Minimum *was associated with a wave of extreme drought.* Droughts hit Asia and Europe between 843 and 775 BC, and scholars sometimes refer to this period, as noted, as the “Homeric Minimum.” Almost seven decades of lack of rainfall were primarily accompanied by extensive migration in the northern and central parts of the Apennine Peninsula. The “Homeric Minimum” probably also triggered a wave of migration known as the “Greek colonization.” It took place roughly between 750 and 550 BC.

8.6 Drought at the beginning of the 2nd century AD

At the beginning of the 2nd century AD, a long-lasting drought began, and sand from the Sahara swept into the Egyptian fields, which had long been the main granary of Rome. Grain was also not produced in Hispania and Sicily, and the empire had to look elsewhere for fertile land.

8.7 Drought in Europe around 130 AD

This drought lasted almost three centuries, after which it broke out again after a short break in 475 and ended in 618 (approximately). During this period, at the end of the 4th century the Roman Empire broke up into two parts and a little later the Western Empire completely disappeared (after 476). Similar events occurred on the American continent, a number of events took place in parallel with events on the European continent—or or the opposite extreme occurred. This is also known today-globally it is warming, but in the American northwest there are cruel winters.

8.8 Note- interesting fact

Mammoths their small form, resistant to negative conditions, died around 1500 BC and not in the ice age : *The extinction of the mammoths on Wrangel Island around 1500 BC, due to significant weather fluctuations unfavorable for life. Mammoths therefore became extinct only during the time of "ancient Egypt", i.e. at a time when the pyramids were already standing. Dwarf mammoths - resistant to negative conditions, died out on Wrangel Island around 1500 BC, by influence of climate changes while the existence of humans is documented here only five hundred years after this event, which excludes them from contributing to the extinction of mammoths.*

9 CONCLUSION

- 1/If we want to understand “global warming”, it is time to strive for objectivity, for the necessary comprehensive assessment of all influences. Currently, there is a lack of synthetic works evaluating the given phenomenon from the point of view of all available knowledge.
- 2/ Quite often and surprisingly, there are different opinions of climatologists, physicists and geologists on individual phenomena. Given the complexity of the problem and the current level of knowledge, this is understandable.
- 3/In the case of greenhouse gases, especially CO₂, a group of physicists, based on physical laws, indicate that in earlier times the content of atmospheric carbon dioxide was often much higher than at present, and did not cause climate change.
- 4/ The conclusions of individual disciplines are given by the current level of knowledge of the given issue.
- 5/ The dates given for the individual described periods over the last 2000 years (even from earlier eras) are somewhat variable, they differ among authors, however, the main given periods are always defined approximately the same.
- 6/ Bond cycles, Milankovitch cycles, the influence of solar activity cycles, periodic variations of the Earth's orbital parameters, constellations of solar system bodies, etc., and sometimes disturbed by other influences - for example, volcanic eruptions, space events, etc.

- 7/ The Earth will with some probability will be face a new, but very small ice age. Why? According to astronomers' predictions, solar activity will decrease by approximately 60% after 2030 to the level of a new Little Ice Age, but not as strong.
- 8/ The mechanism by which solar activity causes climate change is not yet known, only partial phenomena are clear.
- 9/Paleoclimatological data for the last 500 million years show that long-term temperature changes are only weakly related to changes in the atmospheric carbon dioxide content.
- 10/ During the last 800,000 years, there has been an alternation of ice ages and interglacials. These data coincide with periodic variations in the Earth's orbital parameters.
- 11/The temperature increase at the end of the 19th century compared to the previous period is lower than at present, but it is an extremely similar phenomenon in all paramertes!
- 12/ It seems, that in case of climate change, cause and effect are often confused in large quantity of "scientific" articles. So that is to say there is one more very important question, is it clear role of ocean?(see basic information of Herry law).
- Greenhouse warming theory is probably becoming the most expensive mistake ever made in the history of science, economically, politically, and environmentally.
- 13/ The Earth as a whole experienced warm and cold periods of a longer nature, lasting hundreds of years, but practically at the same time always there are locations on the Earth with contradictory trend within individual periods - so there is great variability between locations.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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