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REVIEW ARTICLE

Once again about "global warming" and "greenhouse gases"

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ABSTRACT

An analysis was carried out of documents adopted at international conferences from 1992 to 2022 that reflected the current state of the planet's climate, characterized by an increase in the average global temperature. The validity and effectiveness of the measures that were taken to reduce the rate of increase in the indicated temperature were also analyzed. The analysis took into account data characterizing the state of the climate on the planet over the past 66 million years. An analysis of documents relating to the problem of "global warming" shows that too much responsibility is placed on human activity and too little attention is paid to natural factors. At the same time, as evidence, they operate with data of several decades, in the best case, two or three centuries. But this is too small a time scale, and in this case, we can only talk about local climate change in different regions and not about global change on the entire planet. Analysis of data on a scale of hundreds of thousands and millions of years shows that periods of both cooling (ice ages) and warming occurred on our planet long before the appearance of humans. At the same time, the Little Ice Age ended only in the middle of the 19th century, and it is quite natural that a warming process is now underway. The main responsibility for global warming lies with anthropogenic influence due to the development of industry, agriculture, and deforestation. Such human activity has led to an increase in the release of so-called greenhouse gases into the atmosphere, which ensures an increase in the greenhouse effect—the secondary heating of the atmosphere by long-wave (infrared) radiation from the surface of the planet absorbed by these gases. The main gas responsible for the greenhouse effect is carbon dioxide (CO_2). However, it was not taken into account that water vapor has three times the ability to absorb infrared radiation. Also, scientific data obtained from the analysis of core samples recovered from deep wells in Antarctica and Greenland were not taken into account. An analysis of the composition of the air contained in the core showed that the amount of carbon dioxide does not precede warming but comes after warming since 90% of carbon dioxide is dissolved in the World Ocean. When it is heated, a huge amount of carbon dioxide is released into the atmosphere, and when it gets colder, the oceans easily absorb carbon dioxide. Currently, climate policy is based on inadequate models that have many shortcomings, and giving too much of a role to humans in influencing the climate will not have the expected effect.

Keywords: *Mangifera indica*; blossom blight; anthracnose; dieback; disease severity; incidence; fungal attack

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1. Introduction

In 1992, the world community was informed that our planet was at risk of "global warming" and that anthropogenic factors (emissions from industrial and agricultural enterprises, vehicles, households, etc.) were responsible for this, causing an increase in the concentration of "greenhouse gases" in the atmosphere. Namely, in 1992 in Rio de Janeiro (Brazil), at a meeting of the UN International Committee on the Environment, the text of the Framework Convention on Climate Change (UNFCCC)[1] was adopted, in which, in particular, it was noted that:

- the Earth's climate is changing, with a trend towards an increase in the average global temperature;
- the consequences of climate warming are increased drought in the southern regions, increased precipitation in mid-latitudes, a decrease in the area occupied by snow cover and glaciers, an increase in the level of the seas and oceans, and an increase in natural disasters caused by strong winds (storms, tsunamis, hurricanes, and floods);
- global climate warming is caused by an increase in the greenhouse effect—the secondary heating of the atmosphere by long-wave (infrared) radiation from the surface of the planet, absorbed by some gases in the atmosphere. These gases include carbon dioxide CO_2, methane CH_4, nitrous oxide N_2O, hydrofluorocarbons HFC, perfluorocarbons PFC, and sulfur hexafluoride SF_6 (the last three substances are usually combined into one group—fluorine-containing). The greenhouse effect is determined by the difference between the average surface temperature of the planet (about +15 °C) and its radiation temperature in space (about –18 °C). Accordingly, the greenhouse effect is 32 °C–33 °C.

The listed six gases are called "greenhouse gases" (GHGs), the source of which is both natural processes (volcanoes, fires, decay) and anthropogenic activities (**Table 1**).

Despite the lowest (of the listed gases) CO_2 greenhouse activity (the value of which is conditionally taken as 1), it is CO_2 that has the greatest influence on the greenhouse effect, since its mass emission to the atmosphere reached 68% of the total of these six gases; CH_4 accounted for about 21%, N_2O—10%, and the rest—1%. At the same time, it was noted in the text of the UNFCCC that if in the middle of the 19th century the concentration of CO_2 in the atmosphere was 280 ppmv (or 0.028% by volume), then at the time of the adoption of the Protocol it was 370 ppmv, and by the end of the 21st century it is expected to increase to 490–1260 ppmv (depending on the scenario).

Table 1. Brief description of anthropogenic greenhouse gases.

Name	Designation	Greenhouse activity	Source of origin
Dioxide carbon	CO_2	1	Combustion of solid, liquid, and gaseous substances containing carbon.
Methane	CH_4	21	Gas production, leakage through seals in main pipelines and gas-cylinder installations of vehicles, enteric fermentation and manure disposal.
Nitrous oxide	N_2O	310	Production of nitrogen fertilizers and nitric acid and exhaust gases from internal combustion engines (especially in the presence of neutralizers).
Hydrofluorocarbons	CxHyFz (HFC)	140–11,700	CFC replacement: packaging, refrigeration, fire extinguishers, cleaning agents, aerosols.
Perfluorocarbons	CF_4, C_2F_6 (PFC)	6500–9200	Used in aluminum casting as a substitute for chlorine-containing substances.
Sulfur hexafluoride	SF_6	23,900	Used in the manufacture of high-voltage switches and magnesium castings.

In 1997, in Kyoto (Japan), at the third conference of the countries participating in the UNFCCC, a differentiated decision was agreed, reflected in the so-called "Kyoto Protocol", according to the allowable level of CO_2 emissions by each country, i.e., emission standards (quotas) were adopted[2]. According to this decision, countries in the period from 2008 to 2012 had to reduce their emissions by 6% on average compared to the 1990 level, which could reach 20%–25% for a number of countries. At the same time, the contribution of individual regions of the world in terms of GHG emissions in 1990 was (and was expected in 2010) as follows:

- USA + Canada + Western European countries—40% (38%);

- Asian countries—24% (27%);
- countries of Eastern Europe and the former USSR—16% (13%);
- Latin American countries—7% (7%); African countries—5% (7%); other countries—8% (8%).

To prevent "global warming" in the Kyoto Protocol, mechanisms were proposed to achieve the goal:

- the mechanism of "clean development". In this case, countries take measures to reduce GHG emissions by modernizing their enterprises and increasing the areas of natural GHG sinks on their territory (for example, forest plantations, 1 hectare of which provides up to 10 tons of CO_2 absorption per year);
- the mechanism of "joint cooperation". In this case, highly developed countries help developing countries introduce into production modern technical solutions that reduce GHG emissions. At the same time, the magnitude of the reduction in GHG emissions is credited to the developed countries, which, thanks to this, can solve the problems of meeting their quotas;
- the mechanism of "quota trading" for GHG. In the event that any country has a positive balance of GHG emissions (i.e., the actual level of emissions, taking into account natural absorption, is less than the quota), then this country can sell to any other state the right to additional GHG emissions in the same volume.

In order to combat climate change and its negative consequences, the next conference in Paris on 12 December 2015, adopted the Paris Agreement. This agreement aims to significantly reduce global greenhouse gas emissions and limit the 21st century global temperature increase to 2 °C while finding means to further limit this increase to 1.5 °C. The agreement provided for the countries to assume obligations to reduce their emissions and to work together to adapt to the consequences of climate change. The agreement provided a framework for transparent monitoring and reporting on the achievement of countries' climate goals. In 2018, the delegates of the next conference, which was held in Poland, adopted a set of rules specifying the procedure for implementing the Paris Agreement. And in 2023, during the first round of "global stocktaking", progress in achieving the goals of the Paris Agreement should be assessed[3].

2. Method and purpose of the study

The research method is analytical. An analysis was carried out of documents adopted at international conferences from 1992 to 2022 that reflected the current state of the planet's climate, characterized by an increase in average global temperature. The validity and effectiveness of the measures that were taken to reduce the rate of increase in the indicated temperature were also analyzed. The analysis took into account data characterizing the state of the climate on the planet over the past 66 million years.

The purpose of this study is to show the unreasonably excessive responsibility of anthropogenic factors leading to an increase in the average temperature on the planet, compared to natural factors, which causes the ineffectiveness of the proposed measures to reduce the intensity of the increase in this temperature.

3. Results and discussion

3.1. Greenhouse gases and water vapor

An analysis of documents from 1992, 1997, and subsequent years shows that they do not reflect the accepted data that these six gases cause the intensification of the greenhouse effect and, thus, climate warming.

Air is a mechanical mixture of gases that form the gaseous shell of the earth. The natural composition of the atmosphere is determined, first of all, by the presence of oxygen (21% by volume) and nitrogen (78% by volume); the remaining gases account for about 1% in total. The presence of other substances in the atmosphere is due to both natural phenomena (lightning strikes, fires, dust storms, volcanic eruptions, etc.) and the anthropogenic factor (i.e., human activity in various fields). When solving this problem, it is necessary to take

into account not only the trivial characteristics of the gases that make up the atmosphere: density, heat capacity, thermal conductivity, pressure, and temperature. The calculation should also take into account such characteristics as the geographical location of the region (in relation to which the calculations are made), the intensity of radiation from the Sun (primary) and the Earth (secondary) in the entire spectrum of radiation, as well as the spectral characteristics of the atmosphere: absorption, transmission, and reflection of long-wave radiation. radiation, the state of the atmosphere (presence of aerosols, smoke, and dust), and a number of others. For example, absorption of infrared radiation by CO_2 is observed in the wavelength ranges 1.35–1.58, 1.8–2.05, 2.4–3.4, 8.5–13.0 microns, etc.; in other ranges, the transmission efficiency exceeds 80% of all radiation[4]. This fact indicates that not all long-wave radiation is absorbed by carbon dioxide.

The spectral characteristics of the atmosphere are significantly influenced by the presence of water vapor, the transmission and absorption spectra of which are similar to the spectra of CO_2. Water vapor is the most active greenhouse gas: its contribution to the total greenhouse effect (reaching 32 °C–33 °C) is 20.2 °C, against the contribution of CO_2 at 7.2 °C. Nowadays, the greenhouse effect is up to 78% (on average) due to water vapor and only 22% due to carbon dioxide. But water vapor was not included in the list of GHGs. At the same time, anthropogenic CO_2 (taking into account the natural factor) makes up about 10% of its total amount; that is, the share of anthropogenic CO_2 in the total greenhouse effect accounted for only 2%, and a decrease in its role within the framework of the Kyoto Protocol by 5% would mean a decrease in the total greenhouse effect by 0.1%[5]. Thus, the development of measures to reduce CO_2 emissions into the atmosphere without taking into account the influence of water vapor on the degree of heating of the atmosphere is unproductive.

In addition, we must take into account that about 90% of carbon dioxide is dissolved in the world's oceans. And it is the ocean temperature that has the main influence on the concentration of CO_2 in the atmosphere: when water is heated, the solubility of gases decreases and gases are released into the air. When cooling water, on the contrary, CO_2 is absorbed by water. Accordingly, this process has nothing to do with anthropogenic activities (development of industry, agriculture, transport, etc.).

The change in the concentration of carbon dioxide in the atmosphere is, first of all, seasonal in nature, i.e., temperature fluctuations during the "winter-summer" period have no connection with human activity but depend on cosmic processes: the movement of the Earth in its orbit around the Sun, the nature of the Earth's rotation around its axis (taking into account precession), the tilt of the Earth's axis, the movement of the entire solar system in space, solar activity, cosmic dust clouds, etc. Also, planetary phenomena such as forest fires and especially volcanic eruptions have a great influence, which was not taken into account when assigning quotas.

In addition, the very concept of "greenhouse effect" in relation to the lower layer of the atmosphere—the troposphere (up to 12 km altitude)—is of little use since it implies heating of the air due to radiation. However, for pressure conditions above 0.02 MPa (i.e., 0.2 atmospheric pressure at ocean level), heat exchange is carried out mainly due to convective heat transfer by air currents. Radiative heating is characteristic of rarefied layers of the atmosphere—the stratosphere, mesosphere, etc.

Of interest are the data for 1928, according to which the CO_2 content in the atmosphere ranges from 250 to 350 ppmv. At the same time, over land at night, the concentration of carbon dioxide is 20–30 ppmv higher than during the day (over the sea, such a difference is not observed), and in the air of populated areas compared to uninhabited areas, the concentration of CO_2 is higher but also no higher than by 20–30 ppmv. The influence of combustion and decay processes increases the concentration of CO_2 only in the immediate vicinity of these places; only volcanic activity affects long distances. Rain does not change the CO_2 content in the air, but fog and frost, as well as frost (up to minus 10 °C), lead to an increase in its concentration due to the slowdown in mixing the lower layers with the upper ones[6]. These data were presented long before the concept of "global warming" arose and at a time when there were much fewer cars and industry was much less developed. But

the figures given more than 50 years later in the Kyoto Protocol, which should characterize the negative consequences of industrial development, strangely completely coincide with the values given in 1928.

3.2. Natural anomalies

It is also worth paying attention to the fact that in recent years, periods of anomalous (for these regions) cooling have been observed in a number of regions of the world (**Table 2**). The geological archive shows that the Earth's climate has varied since the planet existed, with natural cold and warm phases. The Little Ice Age ended as recently as 1850. It is therefore not surprising that we are now experiencing a period of warming[7]. But there is no reason to talk about human influence on the climate in those years.

Table 2. Anomalous natural phenomena.

Year	Country	Description of anomaly
2012, February	Italy	In Europe, there are severe frosts. In Venice, Italy, the canals froze for the first time in 80 years; in Rome, the Colosseum was covered with snow[8].
2014, January	USA	Unusually cold weather persists across much of the US, with Chicago on the night of January 9th dropping to –20 °C. Severe frosts led to the almost complete freezing of one of the largest waterfalls in the world—Niagara. Residents of the United States have experienced the most severe frosts in the last 20 years in recent days. Due to the "ice funnel" that brought air masses from the North Pole to the USA, temperatures below freezing were recorded in 48 of the 50 US states (with the exception of Alaska and Hawaii). In Los Angeles, temperatures on the east coast of the country and in the south dropped to minus 40 °C in some places. The record was set in Chicago, Illinois, where thermometers showed 27 °C below zero. "Frosty achievements" are also noted in South Carolina, Florida, Georgia, Texas, Missouri, and New York[9].
1979, 2005, 2012, 2016, 2018	Africa (Sahara desert)	Snow fell in the Sahara for the fifth time in almost 40 years. An unusual phenomenon for the region was recorded in 2005 and 2012. And before that, it was snowing in the Sahara back in 1979 in the city of Ain Sefra[10].
2018, January	USA	Severe frosts in the northeastern United States led to the partial freezing of the most powerful Niagara Falls in North America[11].
2020, January	India, Pakistan, UAE, Afghanistan	Residents faced severe snowfalls and devastating floods[12].
2021, February	Netherlands	Due to the established frosts in the Netherlands, canals and rivers froze[13].
2021, January	Spain	Abnormal blizzards in the region are the result of the Filomena storm, which promises to be the strongest in Spain in decades. Such a snowfall has not been seen here for about 50 years. Heavy rainfall will be replaced by frosts—at night, the temperature will drop to minus 7 °C–12 °C[14].
2021, January	Morocco	Since Saturday, heavy snowfalls have continued in Morocco. According to the local meteorological bureau, over the past 24 h, up to 30 cm of snow fell in 10 provinces of the country, reports MWN[15].
2021, January	China	The temperature in the Chinese capital, Beijing, on 7 January dropped to a 50-year low. In the morning, minus 19.6 °C was recorded in the city—this figure broke the previous local record for cold weather in 1969. The temperature dropped below this mark only in 1966, reaching minus 27.4 °C. Beijing is not accustomed to such cold weather. The average temperature in January here is minus 3.4 °C. Cold, dry winters in Beijing have become more frequent in recent years. They are associated with cold air currents from the northwest[16].

3.3. Factors influencing CO_2 emissions and absorption

CO_2 present in the atmosphere is absorbed by vegetation and microorganisms during the reaction of photosynthesis—the conversion of the radiant energy of the sun by green plants and photosynthetic microorganisms into the energy of chemical bonds in organic substances. During the process of photosynthesis, which occurs with the participation of light-absorbing pigments (chlorophyll and others), plants synthesize carbohydrates ($C_n(H_2O)_m$) from inorganic compounds—carbon dioxide CO_2 and water H_2O.

$$6CO_2 + 6H_2O + light = C_6H_{12}O_6 + 6O_2.$$

Thanks to the photosynthetic activity of green organisms, oxygen appeared in the primary atmosphere of the Earth, an ozone screen of the atmosphere arose, and conditions were created for biological evolution. Every year, as a result of photosynthesis on Earth, due to the absorption of about 300 billion tons of CO_2, about 150 billion tons of organic matter are formed and almost 200 billion tons of free oxygen O_2 are released. At the same time, humanity's contribution to the formation of CO_2 is no more than 10 billion tons annually. All this contributes to the effective restoration of vegetation, especially in areas where massive deforestation is taking place. But these facts were not reflected in the documents of the 1992 and 1997 conferences (as well as in subsequent years). It was also not reflected that it is the reaction involving CO_2 that gives the planet a vital gas—oxygen.

The documents concerning the mechanisms for implementing the UNFCCC provided data on the specific value of quotas for carbon dioxide emissions per 1 resident of the country or per $1 of gross domestic product (GDP); in this case, the winners were countries with either a large population or high GDP[17].

But such an approach cannot be objective, since the impact of any chemical substance on flora and fauna (including humans) depends on the concentration of this substance, which, in turn, depends on the supply of the substance into the atmosphere and absorption from the atmosphere. And in order to implement the "clean development" mechanism, the UNFCCC documents recommended increasing the areas of natural GHG sinks on its territory. The efficiency of CO_2 absorption by the forests of countries is proportional to the forest area in these countries. And in this case, the balance between arbitrarily assigned quotas and CO_2 absorption (taken the same for all countries in the amount of 10 tons of CO_2 per 1 hectare of forest during the year) turns out to be positive (i.e., absorption exceeds established quotas) only in a few countries: Russia, Canada, Australia, Sweden, and Finland (**Table 3**).

Table 3. Emission and absorption of CO_2 by countries participating in the UNFCCC (1997).

Country*	Emission		Country area, sq. km (thousand)	Forest area, %	Absorption forests, thousand tons	Balance,** thousand tons
	Quota, thousand tons	Share of the total, %				
Total release	13,728	100*	-		-	-
USA	4956	36,1	9363	30	2808	−2147
Russia	2389	17,4	17,075	46	7854	5466
Japan	1167	8,5	370	67	248	−919
Germany	1016	7,4	356	31	110	−906
Britannia	590	4,3	244	10	24	−566
Canada	453	3,3	9976	54	5387	4934
Italy	426	3,1	301	23	69	−356
Poland	412	3,0	312	28	88	−324
France	371	2,7	551	27	149	−222
Australia	288	2,1	7687	19	1461	1172
Netherlands	165	1,2	41	8	3	−161
Belgium	110	0,8	30,5	21	6	−103
Austria	55	0,4	84	32	26	−28
Sweden	55	0,4	450	68	305	250
Finland	55	0,4	338	76	257	202

Notation: *—information is provided for 15 of the 34 countries participating in the meeting in Kyoto in 1997, which account for more than 90% of quotas for greenhouse gas emissions in terms of CO_2[1,2]; **—positive balance if GHG absorption exceeds the quota.

According to data for 2019–2020, increased GHG emissions (in terms of CO_2 emissions) were noted in a number of the countries listed below (**Table 4**)[17].

Table 4. Countries with the highest CO_2 emissions (2019/2020).

Country	Total emission, Mt	Emission, t/human	Emission, t/sq. km	Relative concentration **
China*	9876.51	7.10	1028.9	22.7
USA	4285.90	13.00	435.8	9.6
India*	2310.00	1.70	702.7	15.5
Russia	1555.90	10.80	90.9	**2.0**
Japan	1024.10	8.20	2710.4	59.8
Indonesia	626.60	2.30	329.0	7.3
Germany	585.30	7.00	1635.7	36.1
Iran*	583.51	7.00	354.1	7.8
South Korea	570.70	11.00	5695.0	125.7
Canada	523.20	13.80	52.4	**1.2**
Saudi Arabia*	495.21	14.50	230.4	5.1
South Africa*	433.61	7.40	355.4	7.8
Brazil	385.70	1.80	45.3	**1.0**
Mexico	381.00	3.00	193.2	4.3

Note: *—data for 2019, **—relative concentration is calculated taking into account emission data "tons/sq.km"; for Brazil, it is taken as 1.0, and for other countries, it is relative to Brazil.

However, the comparison of countries by absolute GHG emissions is incorrect. The reason is that (as with the data indicated in **Table 3**), the harm caused by GHGs is proportional to their concentration in the air, i.e., proportional to the area of countries. And the relative harm between countries from GHG emissions can be assessed if the lowest value of GHG concentration in the atmosphere of the listed countries (in this case, Brazil) is taken as one. And this criterion objectively shows the degree of harm from GHGs in each country.

According to the data presented in **Table 4** (right column), the least harm is typical, except for Brazil (coefficient 1.0), Canada (coefficient 1.2), and Russia (coefficient 2.0). Next comes a group of six countries: Mexico (4.3), Saudi Arabia (5.1), Indonesia (7.3), South Africa and Iran (7.8 each), and the USA (9.6). The remaining 5 countries (India, China, Germany, Japan, and South Korea) have significantly higher specific emissions (Japan, with a coefficient of 59.8, and South Korea, with a coefficient of 125.7, are especially different in this regard).

It should be noted that in all countries the practice of deforestation continues (with varying intensity) to ensure the functioning of other industries and agriculture (**Table 5**)[18].

And again, it is incorrect to compare countries, by the area of deforested forests, since the areas occupied by forests in each country are different. Taking into account this factor, the greatest damage to their forest plantations was caused by Paraguay (the share of cut down forests in the total forest area of the country is 3.45%), Malaysia (2.42%), and Indonesia (1.78%) (right column of **Table 5**). In 2022, 4.1 million hectares of primary tropical forests were cut down worldwide. The "record holders" are Brazil, Congo, and Bolivia, and the smallest share of deforested forests in relation to the country's forest area is in China, Congo, and Russia.

A reduction in forest area leads to an increase in the concentration of greenhouse gases in the atmosphere due to the release of CO_2, which is found in forest biomass and is released into the atmosphere when it is burned and rotted (in this case, the photosynthesis process is not possible due to the lack of green spaces). Thus, according to experts, at least 15% of greenhouse gas emissions occur due to deforestation. Tropical forests alone store between 228 and 247 Gt of carbon. Deforestation also leads to a change in soil albedo (the

ability to reflect solar radiation fluxes), which can provoke a disaster. In addition, the reduction in forest area leads[19]:

- to sudden temperature changes;
- local climate change;
- an excess of sunlight, which destroys plants that like to live in the shade;
- creation of a greenhouse effect in the biosphere;
- destruction of ecosystems;
- an increase in the amount of nitrogen in the soil, which prevents the growth of new trees.

Table 5. Deforestation intensity (2010-2020).

Country	Square deforested, ha (thousand)	Forest area, sq. km (thousand)	Share of cut forests, %
Russia	4139	8149.0	0.51
Canada	2450	3470.0	0.71
Brazil	2157	4926.0	0.44
USA	1736	3104.0	0.56
Indonesia	1605	903.0	1.78
Congo	608	1523.0	0.40
China	523	2099.0	0.25
Malaysia	465	192.5	2.42
Argentina	439	289.1	1.52
Paraguay	421	122.0	3.45

3.4. About the mechanisms for achieving the goal of the Kyoto Protocol

As noted in Section 1 of this article, to prevent "global warming", the Kyoto Protocol proposed three mechanisms to achieve the goal: "clean development", "joint cooperation" and "cap-and-trade".

With regard to the "clean development" mechanism, the data presented in **Table 3** show that at the time of adoption of quotas, it was not taken into account that for several countries (Russia, Canada, Australia, Sweden, and Finland), the balance between arbitrarily assigned quotas and CO_2 absorption turns out to be positive (i.e., the excess of CO_2 absorption over the established quotas). This means that the listed 5 countries had actually already implemented the "clean development mechanism" at the time of the adoption of these documents. But this fact was not taken into account in the conference documents.

As for the "joint cooperation" mechanism, since the reduction in GHG emissions is credited to developed countries, it is thanks to this that developed countries can formally solve the problem of fulfilling their quotas without reducing greenhouse gas emissions on their territory. For developing countries, due to the low level of industrial development, this cannot have a significant effect.

The same can be said about the mechanism of "trading quotas" for GHGs: a country purchasing a quota from another country will not improve the situation with GHG emissions on its territory. Thus, the last two mechanisms are self-deception, since they cannot influence the situation with local climate change.

3.5. Brief historical excursion

Regarding global climate change, according to data from the last 66 million years, the current global warming is just coming out of the Ice Age, which began approximately 5 million years ago. And during most of the period under study (about 80%), temperatures prevailed much higher than the current ones by 8 °C–15 °C and there were no ice caps at the poles. At the same time, the Little Ice Age ended only in the middle of the 19th century, and it is quite natural that a warming process is now underway. The authors see the reason for

the increase in temperature in the massive emissions of carbon into the atmosphere as a result of active volcanic eruptions in the North Atlantic igneous province. This event coincides with a sharp increase in CO_2 content in the atmosphere—to a record 2000–3000 ppmv, which is 5–8 times more than the current value of 400 ppmv. We are now living in a moderately warm phase of the glacial mega-period[20]. And although the authors of this study note that the content of carbon dioxide in the atmosphere has increased from 280 ppmv in the 1700s to approximately 415 ppmv today due to human activity, their data does not correlate with the above data[6], who noted the presence of CO_2 concentration in the atmosphere in the range of 250–350 ppmv in the first third of the twentieth century.

In 1998, the British Royal Geographical Society hosted a lecture by the famous Russian geographer and corresponding member of the Russian Academy of Sciences, Professor Andrei Petrovich Kapitsa, on the topic "Global environmental problems from Peter the Great to the present day." During the lecture, he drew the audience's attention to two very interesting sources of information about the Earth's past: drilling wells in Antarctica and Greenland. The wells go into the ice to a depth of several thousand meters. Core samples are taken; in this core are air bubbles from those eras when snow was deposited, and in the bubbles is the composition of the atmosphere. Modern methods have been used to determine the amount of carbon dioxide and other gases, as well as the amount of oxygen, the temperature at which snow fell, and a number of other characteristics. All classical ice ages, periods of warming, and the corresponding amount of carbon dioxide in the atmosphere are well traced. And it turned out that the change in carbon dioxide concentration does not precede warming but occurs after warming, which is understandable: 90% of carbon dioxide is dissolved in the World Ocean, and the process of removing carbon dioxide from water is endless. If you heat the ocean even by half a degree, it immediately releases a mass of carbon dioxide into the air, which is recorded in wells. On the contrary, in the case of cooling, the oceans easily absorb carbon dioxide. For example, the ice cap covering the Arctic Ocean is entirely determined by the average temperature in the polar region. The slightest warming leads to a reduction in the cap, increasing the area of open water that releases carbon dioxide into the atmosphere. When it gets colder, the amount of carbon dioxide in the atmosphere drops. However, these processes are weakly related to human activity[21].

Has our planet been experiencing climate change in recent years? The answer is clear—yes, he is worried. But they are expressed not in a unidirectional warming of technogenic nature but in an increased contrast of synoptic processes and weather anomalies in the continental parts of the planet: an abnormally hot month is replaced by an abnormally cold one, an abnormally dry month by an abnormally wet one, and this contrast alternates in time and space.

3.6. About modeling natural processes

Unfortunately, the gap between the real world and the simulated world indicates that we are far from understanding climate change; climate policy is based on inadequate models that have many shortcomings.

For example, there is a factor that has a significant impact on heat and mass transfer processes—air pollution with solid and liquid substances. But the presence of these substances in the atmosphere allows solar radiation to be scattered and reflected. Accordingly, measures aimed at reducing such pollution led to an increase in air temperature in local regions. For example, in China, due to the improvement in atmospheric conditions, the average air temperature has increased by 0.7 °C since 2014. Removing this protective shield, which scatters and reflects solar radiation, caused more intense heat waves, as reported in meteorological data. Thus, reductions in air pollution have had a more significant impact on temperature increases in some industrial cities in China over the past decade than warming associated with greenhouse gas emissions[22].

Accordingly, the analysis of climate change-related issues would benefit from a more robust methodology that would allow skeptics and others to conduct comparative analyzes of these issues[23]. This point of view

was expressed by several hundred scientists from dozens of countries: 109 from Australia, 49 from Canada, 79 from France, 160 from Italy, 61 from the Netherlands, 112 from the USA, etc.[7].

4. Conclusions

An analysis was carried out of documents adopted at international conferences from 1992 to 2022 that reflected the current state of the planet's climate, characterized by an increase in the average global temperature. The validity and effectiveness of the measures that were taken to reduce the rate of increase in the indicated temperature were also analyzed. The analysis took into account data characterizing the state of the climate on the planet over the past 66 million years.

The main idea contained in these documents is that the main responsibility for global warming lies with anthropogenic influence due to the development of industry, agriculture, and deforestation. Such human activity has led to an increase in the release of so-called greenhouse gases into the atmosphere, which ensures an increase in the greenhouse effect—the secondary heating of the atmosphere by long-wave (infrared) radiation from the surface of the planet absorbed by these gases. These gases included carbon dioxide CO_2, methane CH4, nitrous oxide N2O, hydrofluorocarbons HFC, perfluorocarbons PFC, and sulfur hexafluoride SF6. Despite the lowest (of the listed gases) greenhouse activity of CO_2 (the value of which is conventionally taken as 1), it is CO_2 that has the greatest influence on the greenhouse effect because its mass release into the atmosphere reached 68% of the total of these six gases. However, it was not taken into account that water vapor has three times the ability to absorb infrared radiation: the greenhouse effect up to 78% (on average) is due to water vapor and only 22% to carbon dioxide. But water vapor was not included in the list of GHGs. Accordingly, the development of measures to reduce the greenhouse effect without taking into account the influence of water vapor on the degree of heating in the atmosphere is unproductive.

When developing the above documents, it was not taken into account that, according to data for the last 66 million years, current global warming is only an exit from the Ice Age, which began approximately 5 million years ago. And it makes no sense to talk about the human impact on the warming processes in those periods. At the same time, the Little Ice Age ended only in the middle of the 19th century, and it is quite natural that a warming process is now underway.

Scientific data obtained in the mid-1990s during drilling in Antarctica and Greenland, which resulted in core samples, were not taken into account. An analysis of the composition of the air contained in this core showed that the amount of carbon dioxide does not precede warming but comes after warming, which is understandable: 90% of carbon dioxide is dissolved in the World Ocean. And if you heat the ocean even by half a degree, it immediately releases a mass of carbon dioxide into the air, which is recorded in wells; conversely, in the cases of cooling, the oceans easily absorb carbon dioxide.

The requirement to develop measures to reduce carbon dioxide emissions into the atmosphere does not take into account the fact that it is thanks to carbon dioxide under the influence of sunlight and when interacting with water vapor (i.e., during the photosynthesis reaction) that both green plant mass and oxygen formation occur.

Unfortunately, current climate policy is based on inadequate models that have many shortcomings, and giving too much of a role to humans in influencing the climate will not have the expected effect. This point of view was expressed by several hundred scientists from dozens of countries: 109 from Australia, 49 from Canada, 79 from France, 160 from Italy, 61 from the Netherlands, 112 from the USA, etc.[7].

Conflict of interest

The author declares no conflict of interest.

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