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# CLIMATE CHANGES OF THE LAST TEN YEARS

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## ABSTRACT

According to the last report of the World Meteorological Organization (WMO), it was stated that the period between 2011 and 2020 was marked by the increase in record-breaking land and ocean temperatures, more than expected loss of melting of glaciers and the rise in sea level, resulting in increased greenhouse consumption. Unexpected natural events occur in many parts of the world. Most of these events were unchanging events that occurred every 100 years. More countries reported record high temperatures between 2010 and 2020 than in previous years, WMO's Annual State of the Climate report said. The emergence of reducing greenhouse gas emissions for the control of climate change has emerged as the most important and luminous brightness for the planet. While carbohydrates in the atmosphere remained almost constant for about 10,000 years before the beginning of the industrial age, CO2 levels have changed by almost 50% since the end of the industrial revolution in the 19th century. The main reasons for this are the increase in the use of fossil fuels, the decrease in forest areas and negative changes in land use. There are opportunities both in terms of type and divisions among natural disasters that cause many losses in resilience around the world and cause large economic losses. According to the WMO, of the 13 disasters with more than 1,000 known deaths during this period, six were heatwaves, four were monsoonal floods or landslides entrenched by such vendors, and three were tropical cyclones. In 2022, economic losses exceeded $10 billion, 16 of which occurred in the United States and eight in East Asia. Of these 27 events, 13 are tropical cyclones, eight are floods, and three are wildfire events. While there have been significant decreases in the amount of precipitation in Turkey, especially in the last three years, there has been a transition from winter months to temperatures like spring months.

**Key words:** Climate change, world temperature increase, carbon emissions, fossil fuels.

## INTRODUCTION

Climate change is a process that manifests itself naturally throughout the history of the earth. The accumulation of greenhouse gases in the atmosphere due to industrialization and development, increased use of fossil fuels, incorrect agricultural practices, and decrease in forest areas for various reasons, strengthens the natural greenhouse effect and causes the world to warm up more than normal. Intergovernmental Panel on Climate Change reports reveal that if greenhouse gas emissions continue to increase at the current rate, global warming will exceed the 1.5ºC limit between 2030 and 2050 (URL-1). Global warming brings changes such as melting glaciers, rising sea levels, and shifting climate zones. In addition, it is possible that there will be significant increases in the severity, frequency and

effectiveness of natural disasters such as extreme weather events such as severe storms, heavy rains and related floods, long-term drought events and desertification processes. This situation seriously threatens the sustainability of life. Therefore, it is imperative worldwide to combat climate change, which is a global problem.
Education is inevitable for the work to be carried out to reach large masses and raise awareness and awareness within the scope of combating climate change. In this regard, large-scale educational studies are carried out all over the world. For this reason, we have to prepare for the fight against the climate crisis, which is one of the leading uncertainties and threats brought by the 21st century in all societies. It requires an approach and creative solutions that embrace uncertainty, contradictions and differences (FAO, 2021.).

## RESULTS

Especially after the industrial revolution, especially since the 1750s, the composition of the atmosphere is changing and greenhouse gas emissions are increasing due to the accelerating human activities. The accumulation of $CO_2$, the most important greenhouse gas, in the atmosphere increased from approximately 280 ppm in the pre-industrial period to over 400 ppm in March 2018. $CH_4$ accumulation, which was approximately 715 ppb in the pre-industrial period, increased to 1859 ppb at the end of 2017. Global atmospheric N2O accumulation increased from approximately 270 ppb in the pre-industrial period to 330 ppb in 2017 (URL-2).
Approximately Equivalent $CO_2$ Concentrations (ppm) in Year. Equivalent Carbon Dioxide Concentrations Include Other Greenhouse Gases and Aerosols (Moss et al, IPCC, 2007-). In order to understand climate change in a longer period, RCP scenarios have been extended until the end of 2300, simply and without adhering to mandatory criteria in terms of emission and concentration levels. CO2 (ppm) Castrations of SRES and RCPs for the next period are shown in figure 1 (URL-3; Ekwurzel et al., 2017).

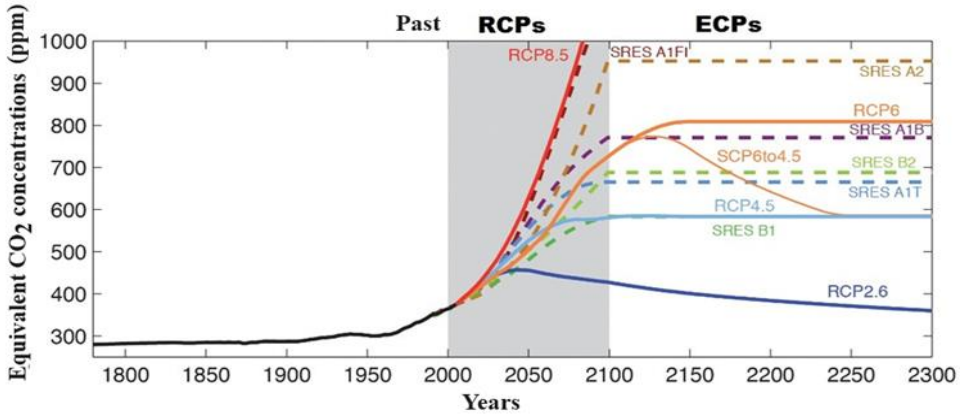


Figure 1. Conjugate $CO_2$ (ppm) Concentrations Model of RCPs for the Future Period.

Representative Concentration Pathways (RCP): It has been determined that the surface temperature of our planet has increased by approximately 1.2°C as a result of the accumulation of carbon dioxide ($CO_2$) and other greenhouse gas emissions in the atmosphere since the industrial revolution. Intergovernmental Panel on Climate Change (IPCC) reports and various studies have scientifically proven that it is acceptable for the surface temperature of our planet to increase by at most 2°C by the end of this century, and if precautions are not taken, the climate order of our planet will change permanently. IPCC's "Climate Change 2021: Physical Science Basis Report" underlines that we are dangerously close to the irreversible threshold point of 1.5°C, which is considered a red alarm in climate change, and that current efforts to prevent warming are insufficient (IPCC, 2021a). In the IPCC "Climate Change 2022: Impacts, Adaptation and Vulnerability Report", the interdependence of climate, biodiversity and people is revealed and it is emphasized that any further delay in global action on climate change will make it impossible to secure a liveable future (IPCC, 2022b). In the IPCC "Climate Change 2022: Climate Change Challenge Report, countries are behind in implementing the policies and actions required to achieve net zero emissions; It is stated that if the current pattern

continues, temperatures may rise up to 3°C, which is an extreme level. To eliminate dependence on fossil fuels, radical changes are needed in all aspects of society and the global economy (IPCC, 2022c).

The year 2022 has been a year in which climate change began to be remembered as a disaster beyond a crisis, with extreme heat waves and droughts occurring around the world. More than 500 children lost their lives in the flood disaster in Pakistan, in which 33 million people were displaced and more than 2000 people lost their lives. The frightening drying of the Yangtze River in China, the third longest river in the world, what is happening in Europe with a heat wave that has not been seen in 500 years, the frequent fires, floods and drought in Turkey are the most important indicators that the climate crisis is not at our doorstep but in our homes. For this reason, education has become the top priority agenda issue not only for educators and government institutions but also for other stakeholders in making the entire society resilient to the negative effects of climate change, starting from early childhood (MGM, 2015).

Global Climate 2011-2020: a decade of acceleration: sounded the alarm about the profound transformation taking place, especially in the Arctic regions and high mountains. Glaciers are thinning by about 1 meter per year; This is an unprecedented loss and creates long-term impacts on the water resources of millions of people. The Antarctic continental ice sheet lost almost 75% more ice between 2011-2020 than in 2001-2010; This is a worrying development for future sea level rise that will jeopardize the viability of low-lying coastal regions and states (URL-4).

In a silver lining, the report said Antarctica's ozone hole was smaller in 2011-2020 than in the previous two decades, thanks to successful and concerted international action to phase out ozone-depleting chemicals; This is an indication of the success of Montreal's Protocol. “Each decade since the 1990s has been warmer than the last, and we see no immediate sign of this trend reversing. More countries reported record high temperatures than in other decades. Our ocean is warming faster and faster, and the rate of sea level rise has nearly doubled in less than a generation. People are losing the race to save our melting glaciers and ice sheets. The WMO states that global warming is clearly caused by greenhouse gas emissions from human activities. To prevent climate change from getting out of control, reducing greenhouse gas emissions must be a top priority for the planet.

Our weather conditions are becoming more extreme and this will have a clear and demonstrable impact on socio-economic development. Droughts, heat waves, floods, tropical cyclones and wildfires damage infrastructure, destroy agricultural crops, limit water resources and cause mass displacement. Numerous studies show that the risk of intense heat in particular has increased significantly over the past decade. The global average temperature for the period 2011-2020 was 1.10 ± 0.12 °C above the 1850-1900 average. This is based on the average of six data sets used by WMO. The six hottest years recorded worldwide occurred between 2015 and 2020 (WHO, 2023.

Every successive decade since the 1990s has been warmer than all previous decades. The hottest years of the decade were 2016 and 2020 due to the strong El Niño event. The largest positive anomalies of the decade were in the Arctic, where temperatures were above 2 °C above the 1981-2010 average. More countries reported record high temperatures than in other decades. For about 10,000 years before the beginning of the industrial age, atmospheric carbon dioxide remained nearly constant at about 280 ppm. Since then, CO2 has increased by nearly 50%, reaching 413.2 ppm in 2020, mainly due to the burning of fossil fuels, deforestation and changes in land use (URL-5.

Approximately 90% of the heat accumulated in the Earth system is stored in the oceans. Ocean warming rates have been increasing particularly strongly over the last two decades. Ocean warming rates above 2000 meters increased from 0.6 ± 0.1 Wm-2 in the entire 1971-2020 period to 1.0 ± 0.1 Wm-2 in the 2006-2020 period. It reached a record high in 2020 and this trend is expected to continue in the future. One consequence of $CO_2$ accumulating in the ocean is its acidification, meaning the ocean pH decreases; This makes it difficult for marine organisms to build and maintain their shells and skeletons (URL-6).

## CONCLUSION

Increasing commitments to address global warming can take many forms, but generally the ways in which countries and economies decarbonise will include disruption, setting targets for net zero carbon and timescales for how to achieve that target; Alternative energy sources need to expand, typically through a rapid ramp-up of energy derived from carbon. Due to the lack of water resources in the world and global warming, there will be periodic and severe drought and desertification in some regions, hurricanes, storms, floods and floods will continue for a long time, and serious problems will soon occur as a result of global warming, industrial pollution and unconscious water use. The biggest problem in countries in the arid and semi-arid climate zone will be drought, in some countries a decrease in

the water levels of lakes has been detected and they have started to dry out, the pollution rate of some lakes has reached very large levels, the ecological balance is disrupted, underground and aboveground Water resources are not sufficiently nourished and insufficient due to drought, people are not conscious about water use and in some places there is a fear of thirst and power outages, municipalities are trying to take some savings measures but the measures taken are insufficient, and in the agricultural sector, a significant decrease in product diversity and production has been detected. For these reasons, it is necessary to determine the effects of global warming and the potential of water resources, to protect the already scarce water resources in the coming period, to use them consciously and to take precautions against possible water scarcity in the future.

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