

JULY 2021

Climate Change Series: What is Climate Change?

**This is the first article in a series about climate change. The remainder of the articles will be published throughout 2021. Please continue to read each monthly issue for the conclusion of the series.*

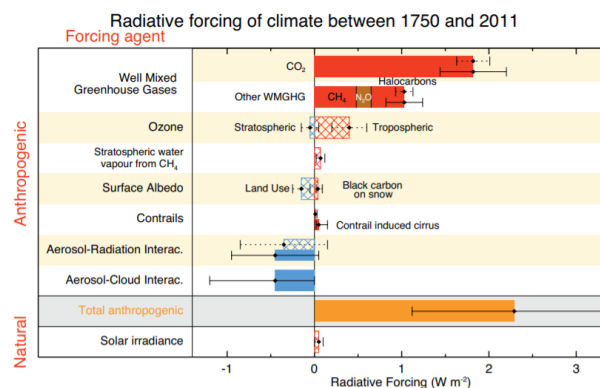
The climate crisis is one of the greatest current and future threats to humanity, even amid the COVID-19 pandemic. Climate change is a phrase familiar to most people, yet it is important to define exactly what is meant by this term. Climate is defined as “the average course or condition of the weather at a place, usually over a period of years.”¹ Contrasted with the weather, which refers to short-term atmospheric conditions, climate refers to long-term trends over the span of a few decades. Thus, climate change refers to the change in long-term atmospheric conditions at a specific place. It is important to remember that the long-term nature of climate has an averaging effect on conditions like temperature, rainfall, etc. For this reason, changes in climate tend to appear relatively small compared to the short-term changes in the weather. As an example, it is not uncommon for the daily high temperature to shift 10°F from one day to the next, whereas a 1°F shift in average high temperature over the course of a decade is a significant change in climate.

Radiation from the sun interacts with the Earth’s surface and atmosphere, playing a large role in determining climate, especially temperature. Areas that experience more direct sunlight from the sun are often warmer than those that receive less radiation. This is why areas near the Earth’s equator are warm year-round, while areas at higher latitudes generally experience seasons of cool weather.

However, the ways radiation interacts with the Earth and its atmosphere are very complex. To the right is a [chart created by the Intergovernmental Panel on Climate Change \(IPCC\)](#) that describes the effect various forcing agents have on warming or cooling the Earth.² A few of them, like aerosol particles and clouds formed by aerosol particles, have a cooling effect. The vast majority of forcing agents have a warming effect, especially greenhouse gases like carbon dioxide. Greenhouse gases in the atmosphere trap radiation that would otherwise be reflected by the Earth’s surface back into space. Taking all of the warming and cooling effects into account produces a significant net warming effect. This net warming is one of the primary contributors to climate change.

The effects of climate change can already be measured and felt around the globe. The global temperature has been rising significantly since the mid-1900s, with 19 of the warmest years on record occurring since 2000.³ The year 2020 tied 2016 for the warmest year on record.³ However, the effects of climate change will extend far beyond warmer temperatures. The temperature of the ocean is rising as well, with the top 100 meters rising 0.6°F since 1969.⁴ The ocean also absorbs the extra carbon dioxide from the atmosphere, resulting in a 30% increase in acidity over the last 200 years that is threatening the survival of coral reefs, crustaceans and the entire oceanic food chain.⁵ Warmer ocean and air temperatures have resulted in a melting of the polar ice caps, with Antarctica losing 148 billion tons of ice per year from 1993 to 2019.⁴ The melting ice caps have corresponded to a rise in the sea level, with current measurements indicating a 3.3mm rise per year and increasing.⁶ Lastly, warmer air holds more moisture than cooler air, which means more moisture must accumulate in the air before it can precipitate to cause rainfall. This is theorized to create longer periods of drought between very intense storms.

Nine of the top 10 years for extreme one-day precipitation events have occurred since 1996.⁷ Please join us for the continuation of this series in the future as we dig deeper into the causes of climate change.



STAFF SPOTLIGHT



2021 NIH Freezer Challenge Results

The 2021 NIH Freezer Challenge concluded on May 1 with promising results when compared to Challenges from previous years. Read the full article to learn about the efforts of NIH labs to improve their freezer management.

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Cold Storage Management Strategies

There are many ways for NIH labs to increase the efficiency of their refrigerator and freezer use. In this article, we will discuss ways to maintain or increase cold storage availability while maintaining or decreasing the number of units.

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NEMS TRAINING

Did you know? Nineteen of the warmest years on record have occurred in the last 21 years, which is a strong sign of global warming and climate change. To learn more about climate change and the NIH, please visit the [NEMS Training webpage](#) to view a short (20 minute) NIH environmental awareness training video.