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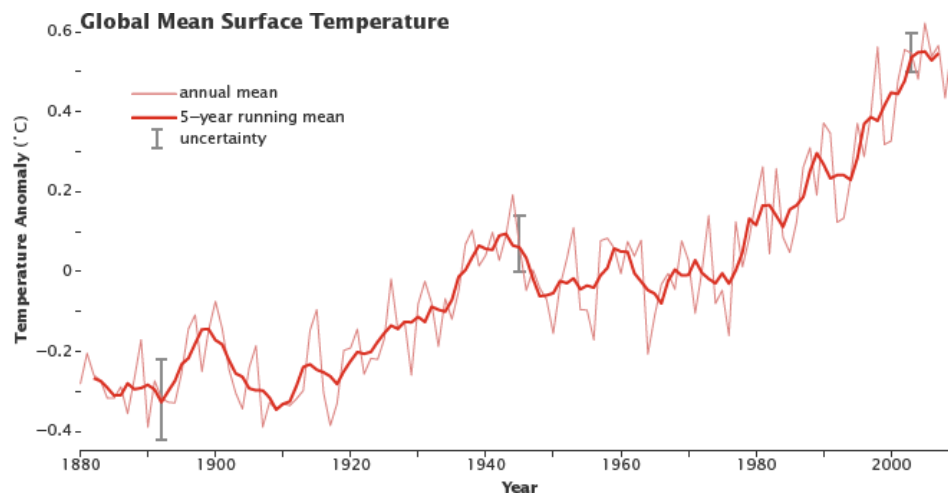
ECO-JOURNAL

August 2022

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Staying Ahead of the Summer Heat Waves

Global temperatures have been on the rise since 1880, and to this day, they continue to climb as the amount of greenhouse gases released into the atmosphere increases (*Global Warming*, 2010). Greenhouse gases (GHG) include carbon dioxide (CO₂), and presently, the major culprit is fossil fuel combustion although other massive contributors also exist. Carbon dioxide is a natural product of many reactions on the planet; however, in large quantities, it can cause serious damage to the stability of multiple ecosystems.



Elevated Levels of Carbon Dioxide

In the atmosphere, elevated concentrations of carbon dioxide absorb massive quantities of heat (Fecht, 2021). Simply put, heat energy comes from the sun, and it is mainly composed of infrared light. When carbon dioxide molecules encounter infrared light, they vibrate and reflect it in all directions. Some of this light/heat is sent back into space whereas most of it is directed towards the surface of the planet. This is what scientists called a “greenhouse effect”.



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In oceans, carbon dioxide dissolves into the water, and through a swift chemical reaction, this forms carbonic acid, which can then produce two types of ions: carbonate and bicarbonate

(Heuer & Grosell, 2014). Carbonic acid raises the acidity of ocean water and causes harm to many marine species and their ecosystems.

Heatwaves, Heat Stress, and Heat-Related Mortality

If you live in North America, chances are that you are fortunate enough to not have the opportunity to witness the negative effects of human activities on the planet. You likely do not experience or see how deforestation increases global temperatures and displaces animals from their natural habitats. You likely do not witness how aquatic life is rapidly changing, disappearing, and dying. You also likely do not experience the worst of summer heat waves as you are probably located away from the equator where temperatures are lower. Additionally, for those of us who have access to air conditioning and other such facilities, it is even harder to notice what is going on in many places in the world.

Heat-Related Mortality. A study conducted by Vicedo-Cabrera and colleagues (2021) looked at the heat-related mortality rate across 43 countries between 1991 and 2018. Their results essentially confirmed what scientists had been predicting for a few years: heat-related mortality is growing globally and on every continent. Another study found that between 1998 and 2017, more than 166,000 people died due to heatwaves (*Heatwaves*, n.d.). Today, scientists estimate that this number will rise as heatwaves are now increasing in occurrence, length, and magnitude.

The Human Body Versus Extreme Heat

Similar to most animals on the planet, the human body was designed by evolution to adapt to varying climates. This is how humans can live in drastically different environments from the cold winters of Siberia to the warmer and more humid climate of Florida.

Adapting to Heat. Humans have the ability to adapt to fluctuating temperatures through various means. One primary method involves cultural technologies or strategies such as shelters and clothing (Daanen & Van Marken Lichtenbelt, 2016). Although effective, these methods have limitations and in extreme weather conditions, they may prove insufficient.



Another way the human body can adjust to changing temperatures is through physiological mechanisms such as perspiration, but the effectiveness of these varies based on factors like genetics, metabolism, and more (Frisancho, 1993). One study found that humans have adapted to rising temperatures over the past few decades; however, at the current global warming rate, our biological mechanisms will not be able to withstand high heat and humidity quickly enough (Hondula et al., 2015).

What does heat do to the human body?

Multiple public health studies have found that high temperatures can cause dizziness, headaches, muscle weakness and/or cramps, nausea, and fatigue (Becker and Stewart, 2011). More severe outcomes also include blood clots, strokes, heart irregularities, and organ failure as elevated body temperatures cause our cells to go haywire.

Tips to Fight the Heat

One of the best ways to escape the negative effects of heat is by hanging around in a cool and properly ventilated space. An air conditioner, a fan, or a shady spot can all help. However, if these options are unavailable, limit your movements to avoid increasing your body temperature through physical motion. Wearing loose clothing that does not cling to the body is also recommended.

Another effective set of solutions involve water. The most important advice is to consume enough water. It should be noted that alcoholic beverages should be avoided as these often contribute to dehydration. Other than consuming water, using it to splash yourself or soak your clothing can also help you cool down.

Below are some additional tips to prevent heat exhaustion and heat stress:

- Avoid crowded and poorly-ventilated closed spaces.
- Avoid outdoor activities on extremely hot and humid days.
- Close the blinds or curtains to keep the indoor environment cool.
- When the outdoor air is warmer than the inside air, close the windows.
- Eat lots of fruits and vegetables and avoid overly sweet and salty foods.
- Avoid strenuous exercise.

Important: In the event of an extreme heatwave, if at any point, you feel like these measures are not helping you feel better, seek medical attention.



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