

## Unnatural, Excessive & Toxic

### *Will Carbon be the beginning and end of humans?*

By Merlin Francis

*In the [last article](#) on [Climate On Our Minds](#), we spoke about the Keeling Curve and the grim reminder that human activities were increasing CO2 levels in the atmosphere causing the planet to heat up. Bending the curve (and coping with the increase that has happened so far) requires mitigation, adaptation, and resilience.*

*But what exactly is Climate Change? And why should we worry when the climate is, anyway, always changing? Read on.*

Carbon dioxide is often made out to be the villain in the climate change story. But without carbon dioxide, would life even exist?

### **Flashback: How carbon dioxide helped begin life on Earth**

Approximately [4.6 billion years ago](#) 'Earth' was simply a mixture of dust and gas swirling around the sun. The sun itself was just forming, gravity bringing together clouds of dust and gas (called solar nebula). Gas, dust and materials began coming together, slowly growing into larger particles. The solar wind blowing from the sun literally blew away lighter gases like hydrogen and helium. But heavier, rocky material came together and formed planets such as the Earth. At this time, Earth was simply the third rock from the sun. Some of the rocks that formed early Earth spread for miles, but Earth's current [size is believed to have come](#) about following a collision with an object the size of Mars, probably one that existed within our solar system. The energy from the collision not only sent debris from the Earth flying into space to make the moon, but was so hot that [early Earth](#) was simply molten lava and no atmosphere.

Eventually, because the sun was much colder than it is today, the upper layer of the Earth cooled to form crusts that hold large, irregular masses of solid rock on which our continents, countries, and oceans exist — the tectonic plates. While the crust cooled, the deeper layers of the Earth had high pressure and were extremely hot. A constant exchange of heat between these layers causing a current that can move continents (literally). Convection currents in the mantle of the Earth — the semi-solid, viscous layer just below the crust — causes the tectonic plates to glide ever so slowly and sometimes crash at the boundaries, leading to the formation of mountains, oceans, or volcanoes. They may move apart, separating continents.

But there's more. [Crashing tectonic plates helped set the stage for the evolution of life](#). It released large amounts of carbon dioxide from Earth's mantle into the atmosphere. [Carbon dioxide](#), a greenhouse gas, warmed the Earth. It prevented infrared radiation from the sun from entering the atmosphere. It formed a thick blanket around the Earth and along with Earth's gravity, ensured that gases from the Earth didn't simply float away into the immense universe, but were available as resources to be used for beginning and ensuring the continuity of life.

### **Natural and not so natural**

Over many years of evolution, Earth went through various [climate cycles](#) resulting in both long and short periods of cooling and warming. These cycles are usually triggered by changes in the Earth's orbit and tilt in relation to the sun and occur periodically but are influenced by other factors (such as the amount of carbon dioxide in the atmosphere, the direction of the wind, changes in ocean currents, etc.). The [last ice age](#) ended only about 20,000 years ago and scientists are discovering that

changes to Earth's orbit, along with increased carbon dioxide levels (among other reasons), caused the ice age to end (we are currently in an inter-glacial period).

***Could it be possible that the current rise in temperature is simply a naturally occurring change?***

Reading the signs left behind in tree rings, bubbles trapped in old Arctic ice, and observations of the sun, Earth's orbit, and the moon, scientists are sure this time it is different.

What is primarily unnatural about what we are seeing today is the scale and speed of the changes — and they all go back to the industrial revolution.

Natural climate cycles occur over large periods of time (hundred thousands of years), unlike the current changes we are witnessing. For instance, as the last ice age ended, the global average temperature on the Earth rose by 5–7 degree Celsius — but over a period of at least 7000 years.

***What is un-natural in today's context is that in just 200 years, there's been a 40% increase in carbon dioxide which has already caused warming of 1 degree. Not only is the amount of atmospheric carbon dioxide higher than what scientists have observed in [800,000 years](#), but current warming on Earth is occurring ten times faster than normally seen during an inter-glacial period.***

On the one hand, Earth is the warmest it has ever been in at least 1500 years, if not more. On the other hand, carbon dioxide emissions have risen significantly — from `200 ppm to over 421 ppm in 2022. In fact, human activities result in more carbon dioxide emissions than even volcanoes and researchers from [Deep Carbon Observatory](#) estimate that these emissions are higher than what was probably seen on Earth soon after the asteroid event that destroyed the dinosaurs (about 66 million years ago).

A basic understanding of the physical science of greenhouse gases will tell you that climate change is simply Earth's attempt to cope with the dramatic increase in carbon dioxide and other greenhouse gases. And it goes without saying that even *Amruth* turns poisonous when taken in excess.

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