350 SCIENCE

THE BASICS OF CLIMATE CHANGE SCIENCE

There are three numbers you need to really understand global warming, 275, 389, and 350.

For all of human history until about 300 years ago, our atmosphere contained 275 parts per million (ppm) of carbon dioxide. That's a useful amount—without some CO_2 and other greenhouse gases that trap heat in our atmosphere, our planet would be too cold for life on Earth.

About 300 years ago, humans began to burn coal and oil to produce energy and goods. The amount of carbon in the atmosphere began to rise. By doing everyday activities like cooking, or turning on the lights, we're taking millions of years worth of carbon, stored beneath the earth as fossil fuels, and releasing it into the air. At the same time, we're changing the way we use our land, cutting down trees and tilling our farmland, which also adds CO_2 to our atmosphere.

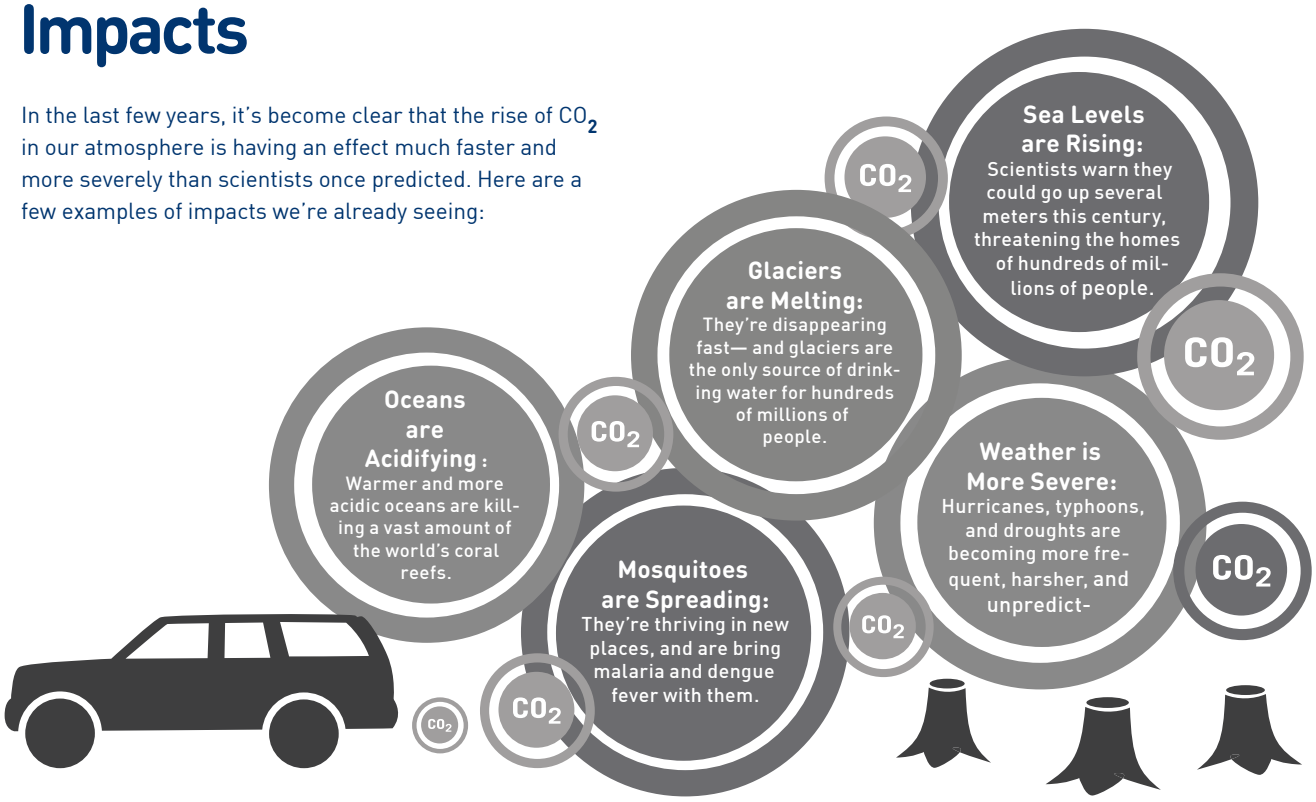
By now—and this is the second number—the planet has 389 parts per million CO_2 – and this number is rising by about 2 ppm every year.

PARTS PER MILLION (PPM)

The concentration of CO_2 in our atmosphere is measured in "parts per million", which simply means a ratio of CO_2 molecules per million molecules in our atmosphere. There's currently 389 parts per million (ppm) in the atmosphere. 389ppm may sound like a small amount, but our atmosphere is so finely tuned that changing this concentration just a little bit can disrupt our entire planet.

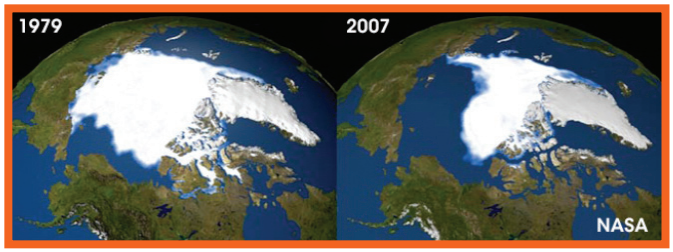
Climate Change Impacts

In the last few years, it's become clear that the rise of CO_2 in our atmosphere is having an effect much faster and more severely than scientists once predicted. Here are a few examples of impacts we're already seeing:



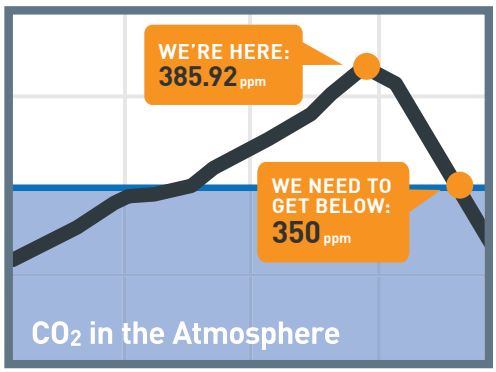
Impacts are speeding up

The Arctic is sending us the clearest message that climate change is happening now, and much faster than scientists once thought. In the summer of 2007, the extent of Arctic sea ice decreased by nearly 40%. It is melting so fast that scientists now believe the Arctic could have no ice in the summertime as early as 2013, which is 80 years ahead of what had been predicted just a few years ago.



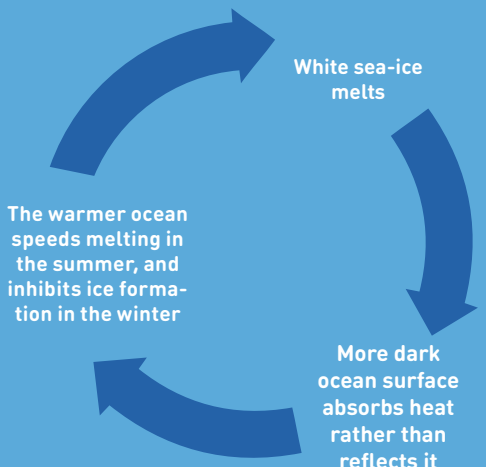
350ppm: The safe level of CO_2 for our atmosphere

350 parts per million is the third and final number to remember, and it represents the safety zone for planet Earth. Above 350ppm we risk reaching dangerous 'tipping points' (see right). We don't know how long we can stay above 350ppm—this number is far outside the range we've seen in our recorded history—but we do know that the smart thing would be get back to the safety zone as soon as possible.



What's a "Climate Tipping Point"?

This means a point in time when the earth's climate begins to change in ways we can't undo in our lifetimes - or possibly for many, many generations. Tipping points are fed by impacts that reinforce each other, called 'feedback loops'. For example, as Arctic sea ice melts, the darker ocean absorbs more sunlight, becomes warmer, and speeds melting. An example of a tipping point, is the potential melting of the Greenland or Antarctic ice sheet. These are dangerous events that we must avoid by getting below 350ppm as soon as possible.



Feedback loop example: the Albedo effect in the Arctic

"If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, paleoclimate evidence and ongoing climate change suggest that CO_2 will need to be reduced from its current 389 ppm to at most 350 ppm."

—Dr. James Hansen, NASA