Introduction to the Biosphere-Atmosphere system

Lecture Autumn 2024

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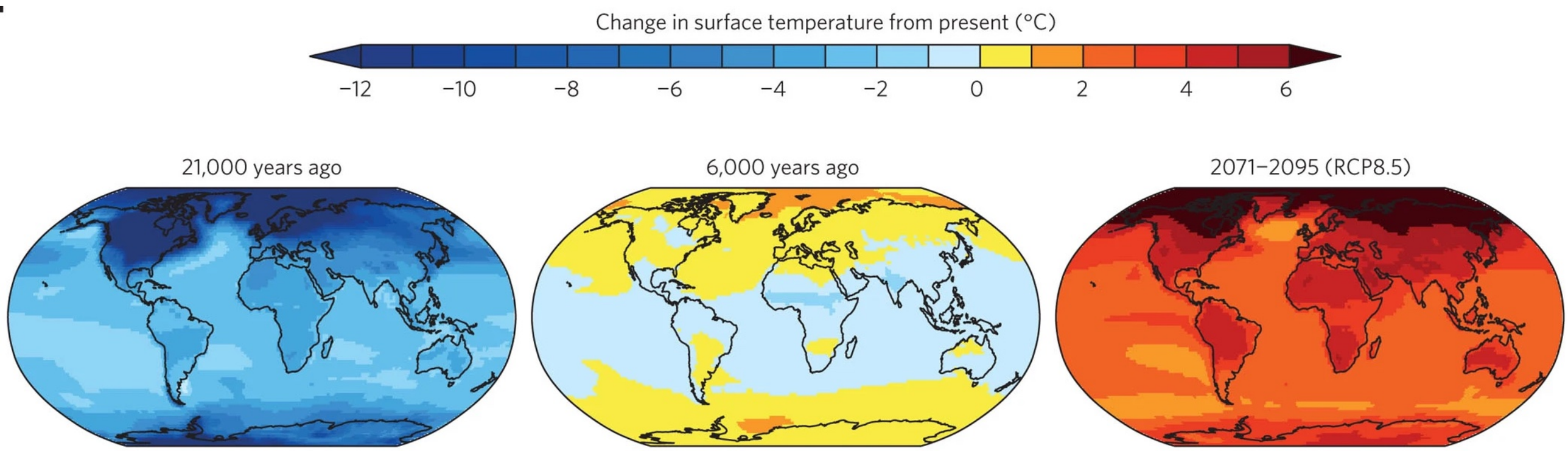
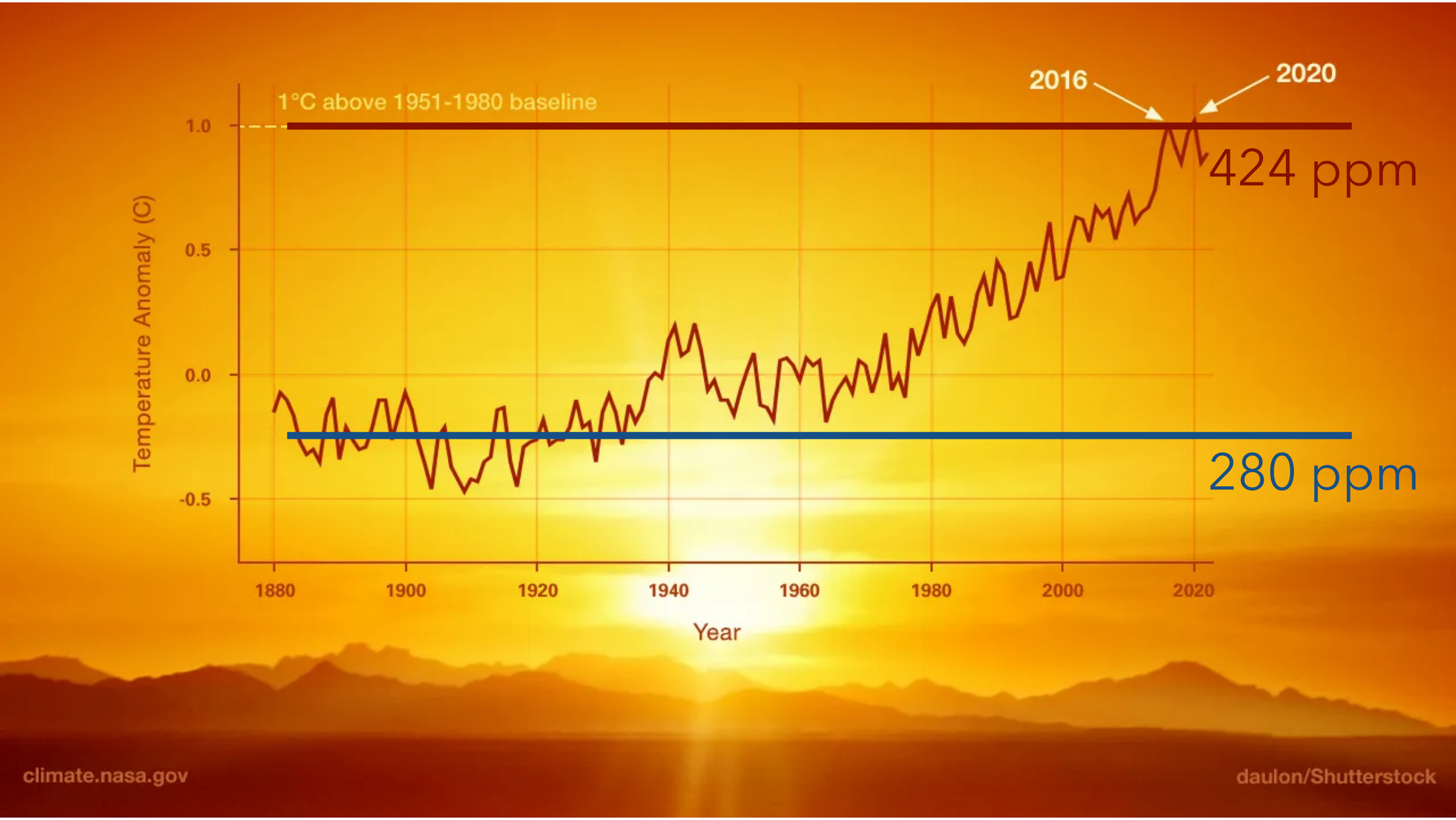
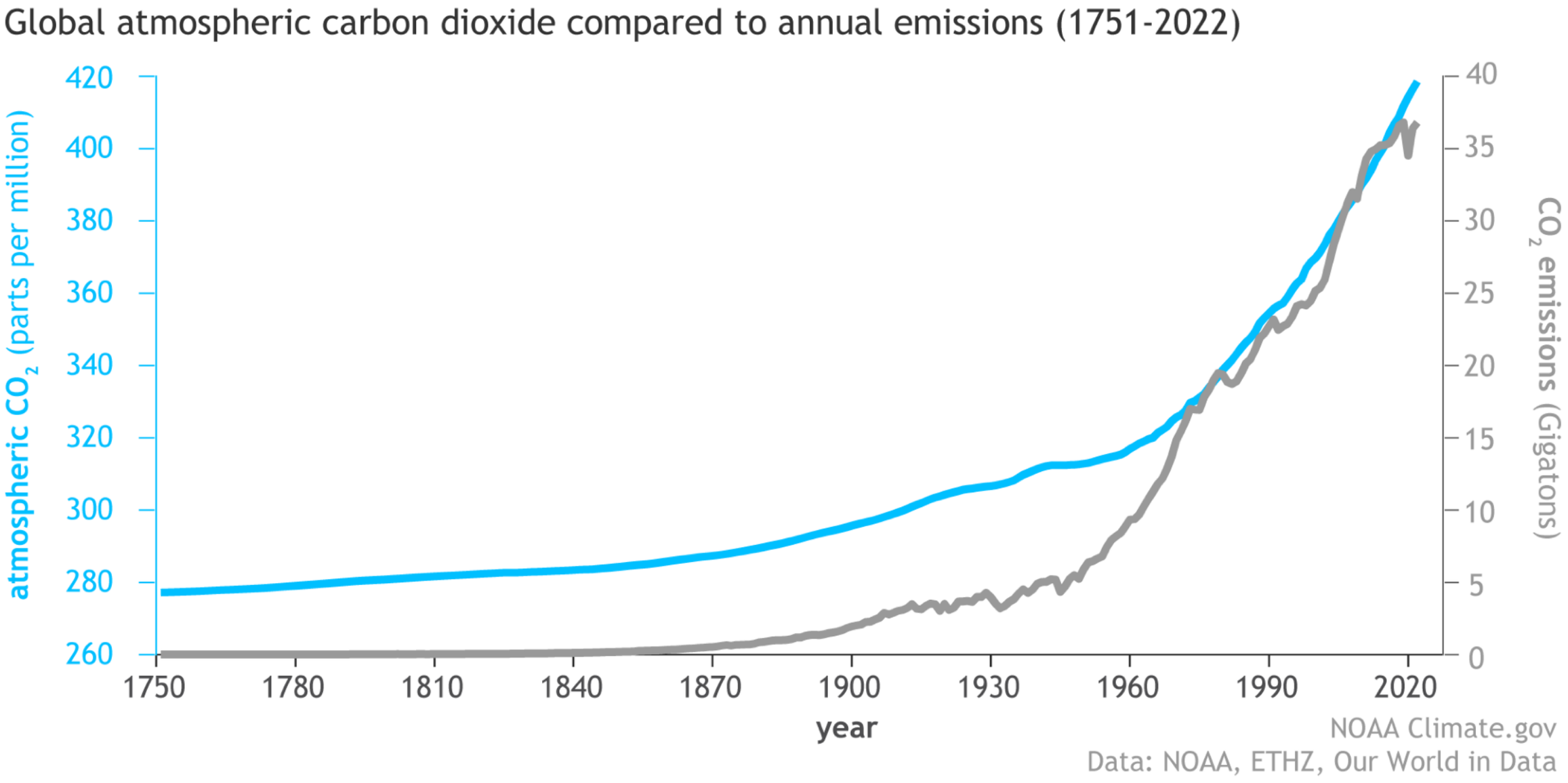
How can such a small amount of carbon dioxide in the atmosphere –only around 420 parts per million– cause so much warming?



Temperature anomaly by NASA data



Pre-industrial to today



The scale of the problem

pre-industrial (up to 1750 since the last ice age 10 000 years ago!) - **280 ppm**

today (2023) - **424 ppm**

This means that of every one million molecules in the atmosphere, 424 are CO2. It can be hard to imagine how a chemical compound that makes up such a small fraction of the atmosphere—less than 0.05%—can be responsible for so much global warming. Yet focusing on the fraction of CO2 in the atmosphere can blind us to just how big a change this represents.

Small amounts of powerful substances have big effects.

First, we are more perceptive to the effects of small fractions than you might think.

Consider your daily cup of coffee. Its power to raise your alertness, energy and heart rate comes from caffeine, which, by coincidence, is present at around 400 ppm.

Let’s check out what’s the energy in a bread. It’s carbohydrate, so carbon and water.

Link to the video: https://www.dailymotion.com/video/x7uuskl