

A CARBON OBSERVATORY

NASA is about to launch a spacecraft to keep track of greenhouse gases. **The Orbiting Carbon Observatory-2 is in final preparations for a July 1st launch** from Vandenberg Air Force Base in California.

In the lexicon of climate change, one word appears more often than any other: "carbon." Carbon credits, carbon emissions, carbon sequestration.... These terms are on everyone's lips. The reason is carbon dioxide (CO₂).

According to the Intergovernmental Panel on Climate Change, CO₂ is the most important driver of global warming. **At approximately 400 parts per million, atmospheric carbon dioxide is now at its highest level in at least the past 800,000 years.** The burning of fossil fuels and other human activities are currently adding nearly 40 billion tons of carbon dioxide to the atmosphere each year, producing an unprecedented buildup.

Also known as "OCO-2", the polar orbiting satellite will provide a global picture of human and natural sources of carbon dioxide. **Data from OCO-2 will also be used to quantify carbon dioxide "sinks"—that is, places in the ocean and land which naturally pull carbon dioxide out of Earth's atmosphere for storage.** Knowing what parts of Earth are helping remove carbon from our atmosphere will help us understand whether we can keep them doing so in the future. Greenhouse gases like CO₂ trap the sun's heat within Earth's atmosphere. Some of the extra CO₂ is absorbed by Earth's oceans. Natural land sinks take up the rest, but the amounts of CO₂ taken up at various locations on the Earth's surface are not well understood. OCO-2 scientists hope to coax these sinks out of hiding., **The greenhouse effect is essential to life on Earth** by stabilising habitable temperatures. It acts as a blanket around the Earth, However, increasing CO₂ levels may have given our planet too much of a good thing. By quantifying the natural sources and sinks on Earth now we can better assess how fast CO₂ will build up in the future, Data from this mission will improve the accuracy of global climate change predictions Most scientists agree that increased carbon dioxide from human activities, particularly fossil fuel burning and deforestation, has thrown Earth's natural carbon cycle off balance. Global surface temperatures are increasing and are changing our planet's climate.

Although the mission is named OCO two, it is actually NASA's first spacecraft dedicated to measuring atmospheric carbon dioxide levels. **The original OCO spacecraft, launched from Vandenberg more than five years ago, never reached orbit** because of a separation anomaly in the launch vehicle. So, OCO-2 is NASA's second attempt. And it is coming just in time.

The OCO-2 detects carbon dioxide using three onboard spectrometers. They work by spreading sunlight into its constituent colours. CO₂ reveals itself by absorbing certain colours as sunlight crosses through the atmosphere. By collecting hundreds of thousands of measurements each day as the satellite flies over Earth's sunlit hemisphere the spacecraft will dramatically increase the number of observations of carbon dioxide. The OCO-2 measurements will be combined with data from ground stations, aircraft and other satellites to help answer key questions about carbon dioxide to better understand global warming.

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