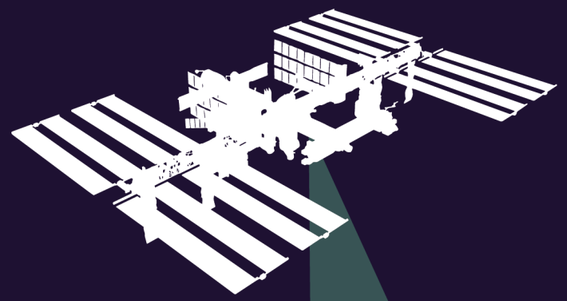
National Aeronautics and Space Administration



OCO-2 and OCO-3:

Watching the Earth Breathe.

Earth's climate is changing.
Carbon dioxide is driving it.
The Orbiting Carbon Observatories are measuring it.
From space.

National Aeronautics and Space Administration

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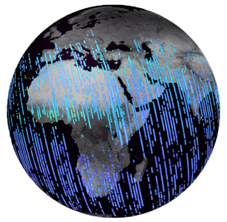
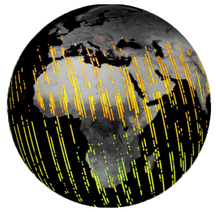


JANUARY 2015



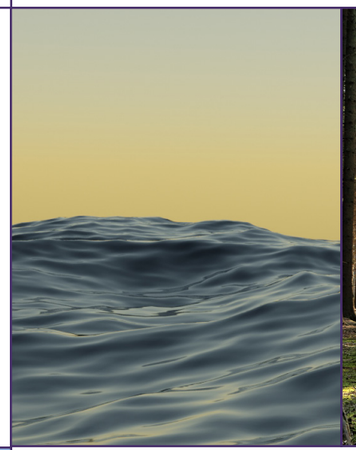
JANUARY 2022

Relentless Rise of CO_2

The Orbiting Carbon Observatory missions are measuring the rise in atmospheric CO_2 to better understand where it is released into the atmosphere, and where it is removed.

Nature's Offset

The OCO missions have quantified how CO_2 emissions are offset by natural carbon sinks like forests and oceans.



Changes Over Time

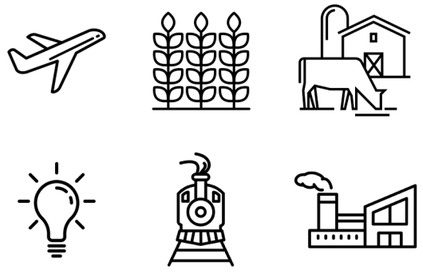
Long-term, global measurements from the OCO missions show two-way interactions between CO_2 and climate.

Local Sources of CO_2

The OCO missions have shown how space-borne measurements can accurately quantify CO_2 emissions from power plants and cities.

CO_2 & Climate Change

Human activities, including burning of fossil fuels, have introduced additional CO_2 into our atmosphere. This has increased Earth's mean temperature, a pattern that will continue over the coming years.



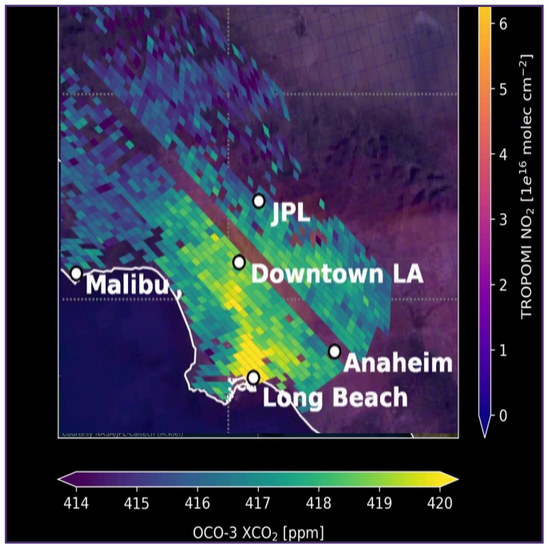
Only about half of the total CO_2 emitted stays in the atmosphere.

Los Angeles Traffic, 2010

CO_2 Hotspots

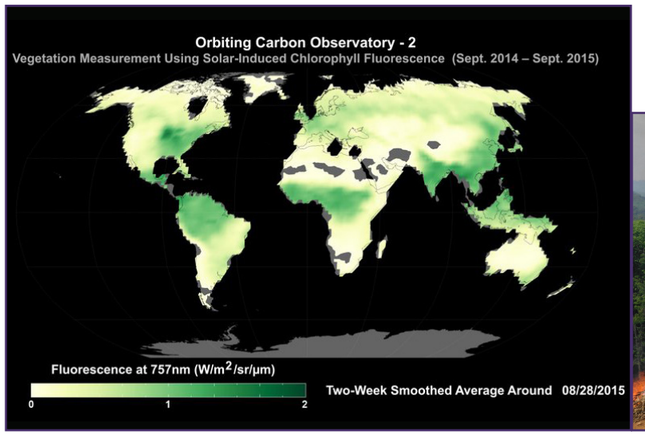
The OCO missions provide observations of CO_2 over large, localized CO_2 sources such as urban areas and power plants.

These data have quantified emissions from dozens of cities and power plants worldwide. They demonstrate a spaceborne capability for tracking power plant emissions in close to real time.



CO_2 concentrations over Los Angeles, captured on Feb 19, 2021

So where does the other half of the CO_2 go?



The OCO record shows how natural sinks vary in space and time around the globe.

Some of it is absorbed by natural carbon sinks, like forests and oceans. The OCO missions keep track of this in two ways: a) through measurements of CO_2 and b) through plant fluorescence. Fluorescence is the glow plants emit when they photosynthesize; it indicates they are taking up CO_2.

Rainforest Deforestation

OCO Record Captures Climate and Extreme Events

Kangaroos and other animals flee a bushfire in Australia

OCO measurements during the 2015/2016 El Nino event quantified impacts on uptake and release of CO_2 by the oceans and biosphere.

OCO measurements show that the Amazon basin, often thought of as the "lungs of the planet", has been a net CO_2 source in the dry/fire season in recent years.

OCO observations during the 2019-2020 Australian drought and wildfires found the resulting reduction in CO_2 uptake exceeded Australia's annual fossil fuel emissions.

OCO data showed that extreme floods in the US Midwest in 2019 both delayed and reduced the carbon uptake from those croplands relative to 2018.