# Video: Counting carbon

July 26 2021

Credit: Unsplash/CC0 Public Domain

The Paris Agreement adopted a target for global warming not to exceed 1.5°C. This sets a limit on the additional carbon we can add to the atmosphere—the carbon budget. Only around 17% of the carbon budget is now left. That is about 10 years at current emission rates.

Each country reports its annual greenhouse gas emissions to the United Nations. Scientists then set these emissions against estimates of the carbon absorbed by Earth's natural carbon sinks. This is known as the bottom-up approach to calculating the carbon budget.

Another way to track carbon sources and sinks is to measure the amounts of greenhouse gases in the atmosphere from space—the top-down approach. As well as tracking atmospheric carbon, ESA's Climate Change Initiative is using satellite observations to track other carbon stocks on land and sea.

How we use the land accounts for about a quarter of our greenhouse gas emissions. Forests are the largest store of carbon on the land. Fire acts as a conduit for carbon to pass from the land to the atmosphere. And phytoplankton in the ocean are an important carbon sink.

ESA's Regional Carbon Cycle Analysis and Processes project is using this information to reconcile the differences between the bottom-up and top-down approaches. Observations are combined with atmospheric and biophysical computer models to deduce carbon fluxes at the surface. This will improve the precision of each greenhouse gas budget and help separate natural fluxes from agricultural and fossil fuel emissions. This work will help us gauge whether we can stay within the 1.5°C carbon budget, or if more warming is in store.

Provided by European Space Agency