

# CARBON CYCLE



## *Atmosphere*

What am I?

I am all the carbon floating around in the atmosphere.

In what form do I hold carbon?

Carbon is part of the atmospheric gases: carbon dioxide ( $\text{CO}_2$ ), methane ( $\text{CH}_4$ ) and man-made chlorofluorocarbons (CFCs).

How long does carbon stick around?

Carbon dioxide stays in the atmosphere for 10s to 1000s of years. Methane stays for about 12 years. CFCs stay for 100s of years, but are no longer widely used.

How does carbon get in and out of me?

Plant photosynthesis, respiration, and decomposition move  $\text{CO}_2$  in and out of the atmosphere. Volcanic eruptions, diffusion from oceans, soil decomposition, burning fossil fuels and making cement also add  $\text{CO}_2$ . Methane enters from bacterial fermentation in rice paddies and cow intestines, and thawing of frozen clathrates in tundras and ocean sediments. CFCs are added by people.

How much carbon do I store?

775 Gigatons of carbon (GtC) are held in the atmosphere. This is the same as 370 part per million (ppm) of  $\text{CO}_2$ .

How much carbon moves in or out of me (flux)?

The carbon dioxide moving from the atmosphere to and from the biosphere and the surface ocean has been more or less balanced. Today, however, people are upsetting the CO<sub>2</sub> balance. The table below shows some of the perturbations.

| <b>Human Perturbations to the Global Carbon Budget</b>  |                      |
|---|----------------------|
| <b>CO<sub>2</sub> sources</b>   | <b>Flux (GtC/yr)</b> |
| Fossil fuel combustion and cement production  | 5.5 ± 0.5            |
| Tropical deforestation  | 1.6 ± 1.0            |
| <i>Total anthropogenic emissions</i>  | <i>7.1 ± 1.1</i>     |
| <b>CO<sub>2</sub> sinks</b>   |                      |
| Storage in the atmosphere   | 3.3 ± 0.2            |
| Uptake by the ocean   | 2.0 ± 0.8            |
| Northern hemisphere forest re-growth  | 0.5 ± 0.5            |
| Other terrestrial sinks (CO <sub>2</sub> fertilization, nitrogen fertilization, climatic effects) | 1.3 ± 1.5            |
| Source: Climate Change 1995, published by the IPCC  |                      |