

Understanding the links between carbon & climate.

In this video, Dr. Ian Matthews introduces and explores some of the key concepts surrounding the carbon cycle and how current climatic change can be understood within those terms. The video introduces and gives examples of **transfers** and **stores** of carbon in the earth system at a **range of geographic and temporal scales**. The methods of measuring the transfer of carbon between the atmosphere, lithosphere and biosphere are discussed alongside the **'fast' and 'slow' components** of the carbon cycle. Next, a longer term perspective of the changing amounts of carbon in the atmosphere is presented using indirect (proxy) measurements from ice core records and chemical measurements. The video finishes with a brief discussion of the way of mitigating the effects of enhanced amounts of carbon in the atmosphere can be achieved using natural carbon stores.

Key points.

1. The global carbon cycle is a closed system with no new inputs or outputs.
2. At regional and local scales there may be enhanced transfer of carbon between stores.
3. The enhanced transfer of carbon between stores leads to them being referred to as sources and sinks.
4. The carbon cycle has 'fast' and 'slow' components. Some transfers occur in hours while others take millennia.
5. One of the most important places to measure carbon transfer is in the atmosphere due to its properties as a greenhouse gas.
6. Atmospheric CO₂ content varies cyclically over single days, seasons, and much longer timescales.
7. A lot of the change in atmospheric CO₂ content relates to plant photosynthesis and respiration which is altered by temperature and length of sunlight during the day.
8. Atmospheric CO₂ has been measured directly at the Scripps Observatory at Moana Loa since 1958.
9. Prior to 1958 we rely on indirect measurements (proxies) from things like gases trapped in column of ice from Greenland and Antarctica.>
10. The long term data shows that human activity has transferred large amounts of carbon from long term stores (fossil fuels) into the atmosphere producing levels of atmospheric CO₂ not seen for at least 5 million years.

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