

→ EVOLUTION OF THE ATMOSPHERE

Atmospheric processes are central to our climate as they regulate how much energy we receive from the sun, and crucially, how much is emitted back into space – this is the ‘radiation budget’.

The ESA Climate Change Initiative (CCI) is combining satellite data from different missions to monitor, and detect signs of change, in these atmospheric processes.

By mapping the global variation of carbon dioxide (CO_2) and methane (CH_4) it possible to identify the location and the extent of the release and take up of these key greenhouse gases; to validate our knowledge of surface fluxes; and to improve our understanding of Earth’s carbon cycle.

Similarly, global maps of water vapour are being enhanced by the CCI to study the long-term variation of what is the most abundant, naturally occurring greenhouse gas in Earth's atmosphere.

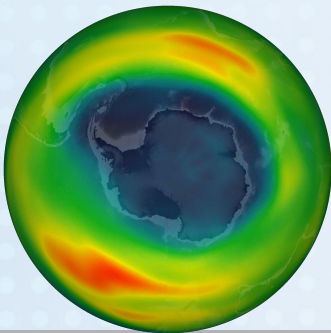
Cloud and aerosols influence the climate system and are measurable from space. Both increase and decrease the amount of energy the Earth receives, with clouds for example, reflecting sunlight (cooling) while also limiting the loss of energy released from the planet's surface in to space (warming).

Data from historic and current satellite missions is used by the CCI to develop global climate data records, for cloud and aerosol, stretching back to the late 1970s.

These long time series provide insights in to the water cycle and the energy budget of the Earth, with clouds linked with precipitation patterns and water transport while extending our knowledge of the types, amounts and interactions of different aerosols in the past and present atmosphere can to better predict better their effects on a future climate.

Satellites also measure the amount of ozone in our atmosphere. The CCI provides the most complete and consistent European measurements to date of the global distribution of ozone. This helps to track the state of the ozone hole over Antarctica and how the chemistry of our atmosphere is changing over time.

The recent launch of the Copernicus Sentinel-5P satellite is set to dramatical improve the accuracy of the ozone data record in to the future.



Satellite observations help to understand atmospheric processes, such as ozone-climate connections.