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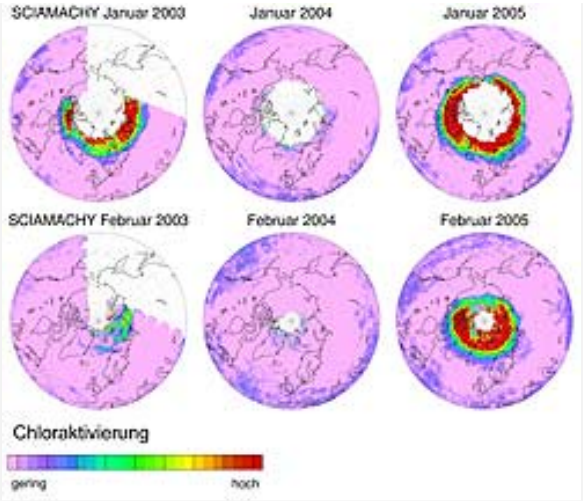
Arctic ozone hole is bigger than ever before

15 March 2005



Distribution of chemically-active chlorine in the stratosphere

As the cold winter weather continues, scientists are measuring the greatest level of decomposition of the ozone layer ever recorded over the North Pole. The conclusion was reached by scientists from the University of Bremen using data from the atmospheric sensor SCIAMACHY. From its position in space, the sensor is currently detecting unusually high concentrations of chlorine dioxides. This means that extremely large quantities of ozone-destroying chlorine are being emitted. Some areas over the North Atlantic are already showing reduced ozone densities of just 30% to 50% of the normal level. The SCIAMACHY (Scanning Imaging Absorption Spectrometer for Atmospheric Chartography) atmospheric sensor is one of ten scientific instruments on board the Earth observation satellite ENVISAT, built by the European Space Agency (ESA) and operated by the German Aerospace Center (DLR).

The presence of chlorine compounds in the stratosphere is usually due to the use of CFCs (chlorofluorocarbons), which are emitted by spray cans and old fridges, for example. Harmless on the Earth's surface, these substances have a very long lifespan and can reach as far as the upper atmosphere. Here, the sunlight causes them to chemically decompose and release chlorine compounds that destroy the ozone.

Chemically active chlorine forms polar stratospheric clouds of ice crystals. The polar vortex that occurs every winter, a low-pressure zone 20km up from the Earth's surface, distributes the chlorine as far south as Europe. SCIAMACHY has measured this occurrence several times in recent years. Scientists from the University of Bremen have now been able to compare the distribution of active chlorine for the years 2003 to 2005. In 2003, active chlorine was only observed in the month of January. The winter of 2004 was relatively warm, so no noticeable level of chlorine activation was recorded. In the long, cold winter of 2005, on the other hand, large areas of high chlorine activation began to form in the stratosphere, resulting in marked decomposition of the ozone layer. Unlike the ozone hole that forms every year over the South Pole, ozone destruction of this magnitude is only seen over the North Pole during cold winters.

Polar stratospheric ice clouds

The ozone layer is vitally important to all life on Earth. It blocks the harmful ultraviolet rays from the Sun which cause skin cancer, providing the Earth with natural UV protection. Because of the shrinking of the ozone layer, it’s particularly important when in the mountains to wear sunglasses and use sunscreen lotion with a high SPF to protect yourself from sunburn. DLR offers a free UV check service that provides information about appropriate suncare for different skin types.

Given the weather forecasts for the North Pole at a height of 20km, over the next few weeks the ozone layer in the far north will probably become thinner than ever before. SCIAMACHY is observing the situation day by day and will be providing us with information about how the ozone layer is developing.

In addition to data from space, DLR is analysing the processes inside the polar vortex in situ in collaboration with ESA, using the altitude research aircraft Geophysica.

The SCIAMACHY atmospheric sensor measures the concentrations of trace gases that are relevant to air quality, the greenhouse effect and ozone chemistry. The project is being managed by the DLR and the Netherlands Agency for Aerospace Programmes (NIVR). Scientific management of the project is the responsibility of the Institute for Remote Sensing and Environmental Physics (IFE/IUP) at the University of Bremen.

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