

REBUILDING THE OZONE LAYER

International Ozone Day on 16 September this year marked the 20th anniversary of the Montreal Protocol on Substances that Deplete the Ozone Layer – arguably the world's most successful multilateral environmental agreement.

The Montreal Protocol limits the production and release of certain human-made substances that trigger damage to the protective blanket of ozone in the stratosphere (10-50 km above the Earth's surface).

Over the past 30 years the action of such chemicals and the special meteorological conditions found in the winter polar stratosphere, particularly over Antarctica, have resulted in dramatic episodes of enhanced ozone destruction during spring – and the formation of the 'ozone hole'. The scientific study of this phenomenon in the 1980s provided the basis

for the swift cooperative action that led to the Montreal Protocol.

After 20 years of international action there has been a 95% reduction in global emissions of ozone depleting substances and there are initial indications of ozone recovery in certain parts of the atmosphere. However, the international scientific community is still intensively examining human influences on ozone to ensure that we can accurately assess the state of the atmosphere and the effectiveness of our actions.

During this, the International Polar Year (IPY), the 'ORACLE-03' project (also known as 'Ozone layer and UV radiation in a changing climate evaluated during IPY') will conduct extensive measurement and modelling studies of ozone in the Antarctic and Arctic (*Australian Antarctic Magazine* 12: 12-13). The Antarctic measurements include a network of nine stations that are measuring the vertical distribution of ozone with balloons – with Australia's Davis station contributing ozone and other atmospheric measurements to the project.

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More information Montreal Protocol:

<http://ozone.unep.org/index.shtml>

ORACLE-03 project: www.awi-potsdam.de/

www-pot/atmo/ORACLE-03/

First harbingers of ozone depletion detected

The first Polar Stratospheric Clouds (PSC) for 2007 were detected over Davis, Antarctica, by Australian Antarctic Division lidar scientist, Didier Monselesan, in May. PSCs promote chemical changes in the atmosphere that lead to the depletion of the ozone layer over Antarctica each year. They occur only at high polar latitudes in winter, when temperatures in the stratosphere (8-50 km above ground) fall below about -85°C. Average temperatures in the Antarctic lower stratosphere were below average at the time of the sighting – as they were in 2006 when persistently low winter temperatures led to record levels of ozone destruction.

Although invisible to the eye, the PSCs were detected by the Davis atmospheric lidar. The lidar uses pulsed light from a powerful laser to map clouds and measure atmospheric temperatures. The PSCs first appeared on May 28 as a thin layer at an altitude of 22 km.

In the accompanying lidar image, the sloping wavy features in the cloud layer arise from a rising and falling motion due to atmospheric waves propagating up from the lower atmosphere. Based on the prevailing temperatures and characteristics of the lidar measurements, it is likely that the PSCs consisted of micron-diameter particles comprised of an icy mixture of water with nitric acid and sulphuric acid.

A photograph taken by Didier on the same evening shows the green laser beam of the lidar, the green



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arcs of the aurora australis (right side of image) and a waxing moon. Also visible are a few wispy stratus clouds at an altitude of about one kilometre.

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More information

www.aad.gov.au/default.asp?casid=222

