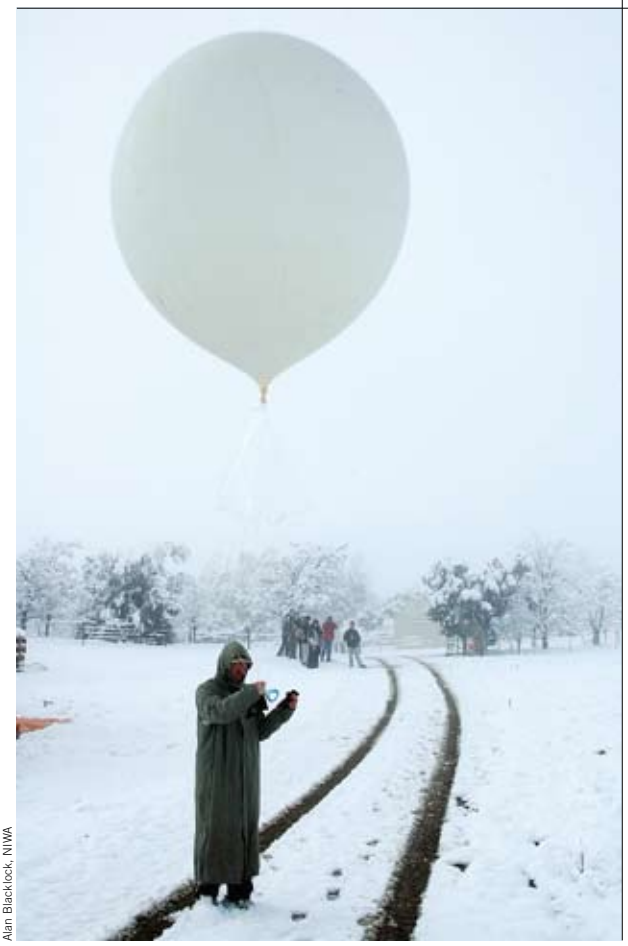
Atmosphere



Alan Blacklock, NIWA

Signs of ozone recovery: what about UV?

NIWA scientists were extensively involved in international assessments published this year under the Montreal Protocol for the protection of the ozone layer.

Measurements made at Lauder, Central Otago, and reported in the ozone assessment, provided the first evidence of a recovery in southern mid-latitude ozone.

NIWA was also one of 13 groups worldwide to contribute chemistry-climate model simulations to the assessment. This work is fundamental to advancing scientific understanding of the interactions between ozone depletion and climate change. Ozone over southern mid latitudes is now expected to return to 1980 values around 2040, with Antarctica following between 2060 and 2075. After 2050, interactions with climate change may produce a 'super-recovery' in ozone outside polar regions.

So what does this mean for New Zealand? Even if UV reverts to its pre-ozone hole levels, New Zealand will still get much more UV in the summer than corresponding latitudes in the northern hemisphere. Conversely, the country has low winter UV levels, and we have stepped up research into the implications for vitamin D deficiency.

This research is funded by the Foundation for Research, Science & Technology.

Alan Thomas at NIWA's Lauder site launching one of the balloons that carry ozone sondes to altitudes of 30 km.

New atmospheric science laboratory in Antarctica

The Prime Minister Helen Clark formally opened the new atmospheric science laboratory at Arrival Heights on 20 January 2007, as part of the celebrations of the 50th anniversary of Scott Base.

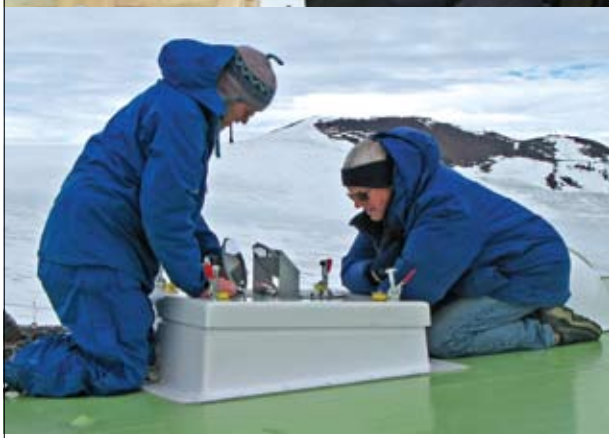
The lab is owned by Antarctica New Zealand and NIWA is the major tenant. We use it as a base for remote sensing and taking air samples to monitor and understand changing atmospheric composition, including greenhouse gases, the annual ozone hole, and associated stratospheric chemistry. So it was a busy summer season at Arrival Heights, moving sensitive instruments, installing new equipment, while continuing existing research. In addition, NIWA and Antarctica New Zealand operated a high-precision UV spectro-radiometer for two months to validate UV measurements made by US scientists.

The new building is designed to withstand winds of 216 km/h (an average 1-in-50 year event) and to maintain an internal temperature of 20 °C (outside temperatures are –5 to –50 °C). The old lab has been removed from Antarctica.

Top: The Prime Minister, Rt Hon Helen Clark, unveils the plaque to officially open the new Arrival Heights Research Laboratory.

Bottom: Installing solar tracker devices on the roof of the new lab at Arrival Heights.

(c) G Powell, Antarctica NZ Pictorial Collection: K250 06/07



Stephen Wood, NIWA

Wayne Webley, Applied Research Services Ltd

Clearing the air: helping councils meet environmental standards

NIWA leads a collaborative research programme aimed at helping regional councils meet the National Environmental Standards for Air Quality by the regulatory deadline of 2013.

This year, at least three regional councils used model-based tools developed by the research team to predict likely future emissions and assess new pollution sources.

After end-user feedback, this year our research included studies of so-called non-tailpipe vehicle emissions, and of real-life domestic solid fuel heater emissions.

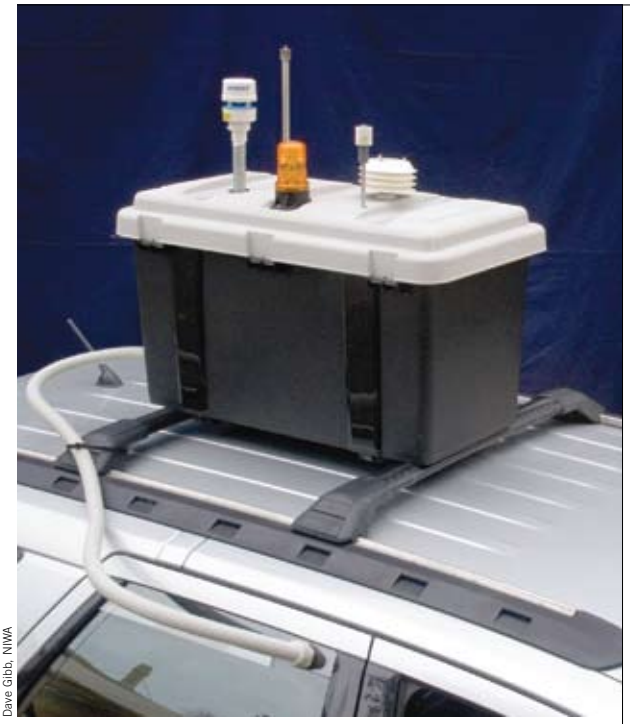
On non-tailpipe emissions, we worked with the Auckland Regional Council, monitoring the effects of road dust and brake and tyre wear on air quality in North Shore City.

NIWA in the living room: real-life measurement of emissions from domestic solid fuel heaters.

The results will enable councils to estimate such emissions with much more certainty.

During the winter we measured the emissions from domestic solid fuel heaters in Nelson, Rotorua, and Taumarunui. One regional council said it will provide vital data to help address this issue, and hence help in compiling accurate emission inventories, guiding policy, and developing new real life test procedures.

The research is funded by the Foundation for Research, Science & Technology. Many end-users also contribute data, time, and funds.



Dave Gibb, NIWA

Air quality as you move: a NZ first

This year, NIWA designed and built a mobile air quality monitoring system – a first for New Zealand.

Fixed-location air quality monitoring is comparatively expensive. Even the bigger cities can only afford to operate a few stations, and the question arises as to how representative are fixed-point measurements of the air quality city-wide.

The NIWA system samples air through an intake mounted on the roof of the vehicle. The air passes through two instruments that provide a good profile of both the amount and source of air pollution. One instrument measures particulates in three sizes: PM10, for verifying compliance with air quality standards, and the smaller PM2.5 and PM1, which are more likely to lodge in the lungs or pass into the blood stream. The other instrument measures two 'kinds' of black carbon, giving information about the source of pollution (vehicles or home heating).

The system includes a Global Positioning System (GPS) which records the exact location of the measurements and will enable scientists to develop maps showing the pollution contours within a city at a specific time.