



Instrument Systems

collecting data, delivering solutions

Air quality as you move: a New Zealand first

NIWA has designed a mobile air quality monitoring system. This is the first system of its kind in New Zealand.

Why do this? For a cost-effective, city-wide picture

Fixed-location air quality monitoring is comparatively expensive. Many smaller cities can't afford it, and even the bigger ones can only afford to operate a few stations. So the question arises as to how representative these measurements are of the air quality city-wide.

What's involved? Smart thinking

The NIWA system samples air through an intake mounted on the roof of the vehicle. The air passes through two instruments that are robust and capable of taking rapid measurements:

- a German GRIMM instrument measures the particulates. The concentrations of PM₁₀ (which are 10 micrometres or smaller) are required for verifying compliance with air quality standards, but the GRIMM also measures the smaller PM_{2.5} and PM₁ which are more likely to lodge in the lungs or even pass through into the blood stream.
- a US aethalometer for measuring black carbon. Black carbon may be a component of particulates and is a useful indicator of the source of pollution. This instrument measures two 'kinds' of black carbon giving information about the volatile fraction of the aerosols.

A video camera records passing traffic so scientists can interpret the results, identifying how much pollution comes from different sources.

The system includes a Global Positioning System (GPS) to simultaneously record the exact location of the measurements. "We'll be able to generate maps showing the pollution contours of a city," says NIWA air quality scientist Jeff Bluett.

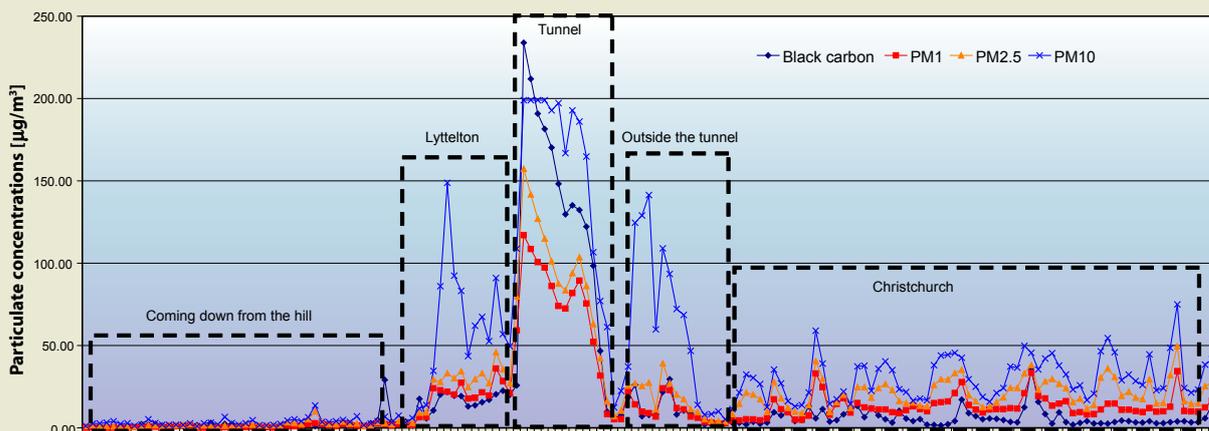
Next test: Central Otago smog

NIWA is conducting winter trials in Alexandra. This includes parking the mobile system next to the town's fixed-location air quality station to compare the results and calibrate the mobile system.



[Photos: Dave Gibb, NIWA]

Test drive results: Christchurch



This graph shows the results of a trial drive through Christchurch on 9 May 2007. Notice how the level of PM₁₀ goes up markedly as we come down the Port Hills to Lyttelton. This profile may reflect relatively 'large' particles like sea salt and dust. The car then drives through the Lyttelton tunnel and records extremely high particulate levels; PM₁₀ went over the instrument limit of 200 $\mu\text{g}/\text{m}^3$. The profile in Christchurch shows a more even spread of particulate sizes typical of urban situations where cars are the dominant source of pollution.

Flow station 3 : Lahar 0

NIWA's flow station on the Whangaehu River at Kariori has survived three lahar events and measured the peak flow each time.

On Sunday 18 March, the long-awaited lahar burst from Mt Ruapehu Crater Lake. We held little hope for our downstream Kariori flow-station; particularly as communications were lost with the site about the time of the lahar. Yet the next day we found the water-level recorder, a Hydrologger, covered in silt but still faithfully recording the water level. The only damage was a severed communications cable.

The estimated peak flow at Kariori was 500 cubic metres a second. This is the third lahar to have passed the site since the flow station was installed; the others were in 1975 and 1995.



Muddy but not beaten. NIWA's flow station at Kariori on the Whangaehu River has now survived three lahars. [Photo: Barry Waugh, NIWA]

Txt ur stns

The latest updates to Starlog Version 4 enable users to operate flow monitoring stations by text message.

In the past two years, Windows-based Starlog Version 4 has revolutionised the way Unidata dataloggers are programmed. Starlog V4 is feature-rich and includes a powerful scheme-creation wizard, a scheme editor with multi-buffer support, and a comprehensive instrument library for the easy inclusion of a wide range of common devices into the logger programme.

New features are continually being added. Now, text message alarms can be sent to nominated mobile phones if data move outside a programmed 'normal' range. The alarm thresholds, reset points, and messages can be easily configured by the user. To complement this, users can also configure an SMS server, on a base PC, so they can, for example, use text messaging to monitor and change flow targets at an irrigation flow control station.

This text alert relates to a remote irrigation control station. The target flow has been set to 235 litres per second and is currently 238 litres per second. It is within the allowable settable tolerance of 10 litres per second so no alarm has been generated. [Photo: Dave Gibb, NIWA]



NIWA in the field

Water management is a hot topic in agriculture, so it was all hands on deck for the NIWA display at the South Island Agricultural Field Days in March. The event at Lincoln University Farm attracted about 20 000 visitors. NIWA presented environmental monitoring solutions aimed at better water management, including our 'Tier2' climate stations (pictured right) for cost-effective on-farm climate monitoring.



[Photos: Eivind Pettersen, NIWA]



Pitching in at the NIWA stand.

Introducing ... Keith Taylor

Keith joined Instrument Systems as our sales and servicing team leader earlier this year. He is the primary contact for all enquiries about our services and products.

Keith says he gets a lot of questions about system issues: "Clients often want to know 'can I use this with that?', or 'how can I make this talk to that?'. That's one of our strengths. We can design complete systems, as well as advising on the best individual instruments for the job. It's about cost-effective solutions; getting the data you need when and where you need it." In addition, the servicing team provides calibration and repair for a wide range of environmental monitoring instruments.

Keith is a fully qualified electrical engineer and was previously a design engineer at Tait Electronics.



[Photo: Nelson Boustead, NIWA]

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