

New Zealand – Lauder Site Report

Fourth GRUAN Implementation and Coordination Meeting

Paul Johnston & Karin Kreher



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Goal: To align relevant Lauder activities with GRUAN requirements to maximise Lauder's contribution to GRUAN's goals.

Funding: Lauder is currently not explicitly funded for GRUAN operations.

But Lauder receives support from NOAA to make frost point hygrometer (FPH) flights (sondes supplied by NOAA, staff time by NIWA), frequency: 1/month.

and supported towards aligning relevant NDACC measurements to meet GRUAN specifications.

GCOS-121 Radiosonde Site Requirements:

1 x weekly production radiosonde with the best technology currently available at the site.

1 x monthly radiosonde capable of capturing moisture signal in the UT/LS and all other priority 1 variables to the best level possible with current technology, launched together with weekly radiosonde.

Aim: To fly a radiosonde together with other sensors, surface to ~ 30 km weekly (52 per year incl. 12 FPH flights).

Total for 2011: 49 radiosonde flights, including 10 FPH flights. 2 of the FPH ceased early due to leaky valves on the balloons.

Additionally: 4 RS92-only flights were undertaken to support Hippo aircraft overpasses (26/6/2011, 29/6/2011, 28/8/2011, 30/8/2011)

Problem: We are still struggling with a very tight funding situation and resulting staff overload.

Radiosonde Calibrations and Processing

- RS92-SGPW sondes are pressure tested in a vacuum chamber pre-flight at 10 hPa and combined with ground pressure measurements to correct pressure sensor offset and slope.
- Vaisala Marwin ground station (MW12) processing is available, but not used for ozone profiles. These are processed using modified Vaisala ground checks – multiple temp, press, and humidity tests are averaged and applied to the data after the flight. The flight data are processed using an in-house computer program for higher temporal resolution (1 sec).
- Ozone EEC: WMO standard operating procedure, with 0.5% buffer solution, 3 ml of cathode solution.
- A new Vaisala Digicora 3 is expected to be purchased by NIWA later this calendar year (application for Strategic Capex, Paul to discuss with NIWA management tomorrow).

Data availability

These data are generally available through the NDACC and WOUDC archives but not yet for 2011 (issues with file formatting, this is currently being worked on).

Guidelines used

NDACC and WMO guidelines are used for radiosonde and ozone measurements.

Data dissemination practice

Currently NDACC, but alternative quicker release of data will be possible.

Ground-Based Instrumentation and Observing Practices

The minimum set of ground-based instrumentation is to have a ground-based GPS receiver to measure total column water vapour (GPS PW) at each GRUAN site:

GNSS-PW measurements:

- A Trimble NetR9 receiver unit and Zephyr Geodetic 2 antenna was obtained by NIWA in late January 2012.
- Suitable location has been identified & construction of mount completed by mid-March 2012 (Dan Smale).
- Currently we are still in the installation & testing phase; plan to have the system operating by June 2012.
- Received considerable support from - the GRUAN GPS-PW TT community (Kalev Rannat and June Wang), John Braun (UCAR) and John Bevan (NZ GEOnet project).
- Once the hardware is installed it will be configured and incorporated into the New Zealand GEOnet network (<http://www.geonet.org.nz/>). This network is compliant with GRUAN GNSS-PS requirements.

The list for additional ground-based instruments (GCOS-112, priority 2) encompasses six instruments:

1. Surface radiation instruments

Lauder BSRN (Baseline Surface Radiation Network) station measurements are:

- Incoming Longwave Radiation – Pyrgeometer
- Incoming Shortwave Radiation – Pyranometer (global, diffuse and direct)
- Aerosol Optical Depth – 4 wavelengths (412, 500, 610, 778 nm) (BSRN)

The Lauder BSRN station is calibrated by the Bureau of Meteorology, Melbourne

- Skyradiometer: Aerosol optical depth – 11 wavelength from UVA to NIR

2. Microwave radiometer: None (other than stratospheric O₃ & H₂O)

3. Multichannel infrared radiometer (e.g., FTIR): Bruker high res FTIR used for composition measurements (column & some profile info.)

4. Lidar (e.g., Raman Lidar): Aerosol Lidar making NDACC measurements approx. 4 x per months at night

5. Integrated trace gas measurements and sun photometer: suite of composition measurements, NDACC trace plus greenhouse gases (CO₂, CO, CH₄, N₂O) as part of TCCON

6. Cloud radar: None at Lauder

Lauder Resource Status:

A fully compliant GRUAN station, at an estimated > NZ\$1 million/year for 4 radiosonde flights a day operation together with the other priority 1 & 2 measurements, is beyond our current resources at Lauder.

We very strongly embrace the vision and goals of GRUAN, and recognise the urgency of better balancing the hemispheric coverage, but unfortunately the current funding situation in New Zealand makes increased resource support unlikely for now; we are not in a position to make any long-term financial commitments on behalf of NIWA or NZ. However, together with the NZ Permanent Representative to WMO, we will continue to explore every opportunity.

Options that are currently discussed: To work with the NZ Meteorological Service's GUAN Station in Invercargill, 180 km away, to provide an adequate twice daily radiosonde protocol.

With continuing support from NOAA we expect to maintain our weekly best-available radiosonde programme, and monthly water vapour measurements.

The existing levels of NDACC trace species, column and in-situ carbon, and radiation measurements are expected to be reviewed and some may be reduced due to the current economic situation.

Possible Future Developments:

If researchers from other countries wanted to use the Lauder site for their GRUAN experiments we would endeavour to host them (this may need to be cost neutral to us).

Externally funded postdoc to work with us on GRUAN related research





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