University of Lethbridge News Release

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U of L alum heads up ozone measurement program in New Zealand

Dr. Richard Querel (MSc ’08, PhD ’10) has his eyes on the skies, but these are not ordinary skies. To get the best atmospheric measurements, the skies need to be unpolluted and that’s why he lives and works in one of the most remote locations on the planet.

Querel, who studied under Dr. David Naylor, leads the ozone measurement program at the Lauder Atmospheric Research Station, which is part of New Zealand’s National Institute of Water and Atmospheric Research (NIWA). The site recently received Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN) certification from the World Meteorological Organization. Lauder is the only site to receive the certification in the Southern Hemisphere and it joins other locations like Lindenberg, Germany, Ny-Ålesund, Norway, and Boulder, Colorado.

“The site is unique in the world and has been operating since 1961, first for auroral and radar research, and later as a climate monitoring station. The site is part of several international networks in addition to GRUAN,” says Querel.

Located in the Otago region about 25 minutes away from Alexandra, a town of about 5,000, the research station has a dozen scientists and technicians working there.

“We’re one of three sites in the world that measures ozone profiles using all five standard techniques,” he says. “As part of the ozone project, we launch weekly ozonesondes (balloon-borne instruments) that can go as high as 36 kilometres and measure temperature, humidity, pressure and ozone.”

These ongoing measurements show the ozone layer is recovering thanks to the Montreal Protocol banning the use of chlorofluorocarbons (CFCs) in 1987. Querel says the Earth’s ozone layer should return to pre-ozone-hole conditions during this century. The ozone layer shields the planet from much of the sun’s harmful ultraviolet radiation.

Querel also leads a task that measures stratospheric trace gases, specifically nitrogen dioxide (NO_2), an ozone precursor. Lauder has measured NO_2 since 1980 and that means technicians must maintain the instrument systems that were built before the personal computer age. Some of the systems were hand-built, continue to run on DOS and require floppy disks to move data around.

“They’re still producing world-class measurements and are a testament to the Kiwi scientists and technicians who designed and built them and have kept them running,” he says.

Lauder also has many cutting-edge hardware installations and serves as an important calibration and validation site for space-based instruments. Satellites can have relatively short lifespans so aligning their measurements to ground-based reference measurements like those made at Lauder helps ensure there are no gaps in satellite data sets.

Querel, who grew up in a small town in Ontario, studied under Naylor beginning in 2005. His research work centred on atmospheric measurements, specifically water vapour. After leaving the U of L, Querel did a postdoctoral fellowship at the Universidad de Chile in Santiago where he was involved in the commissioning of a microwave radiometer installed at the European Southern Observatory’s Paranal site in the Atacama Desert.

He joined the staff at Lauder in 2013 and found himself living once again in a semi-arid climate with a mix of foothills and prairie landscapes. Even though he lives in the most inland part of New Zealand, he doesn’t have to travel far for a change of scenery.

“What might take 1,000 kilometres in Canada, to go from ocean to mountains to forests to foothills to prairies, you can see all within a one-hour drive in New Zealand,” says Querel.

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