

Remote Sensing of Urban, Rural, and Arctic Atmospheric Composition

Professor Kimberly Strong

2025 Undergraduate Summer Project Description

Research Area

Our research involves the use of UV-visible and Fourier transform infrared (FTIR) spectrometers to measure the concentrations of trace gases in the atmosphere and microphysical properties of clouds. We use atmospheric remote sounding measurements from ground-based and satellite instruments for studies of ozone chemistry, climate, wildfires, and air quality. Understanding of the physical and chemical processes underlying these issues requires accurate and timely observations of atmospheric composition. My research group operates eleven ground-based spectrometers affiliated with three international observing networks and two lab-based spectrometers. The former are located at the University of Toronto Atmospheric Observatory (TAO) in downtown Toronto; the Centre for Atmospheric Research Experiments (CARE) in Egbert, Ontario; the Polar Environment Atmospheric Research Laboratory (PEARL) in Eureka (80N) and the Canadian High Arctic Research Station (CHARS) in Cambridge Bay (69N), both in Nunavut; and St. Mary's University in Halifax, Nova Scotia.

Research Projects

We have several possible summer projects available depending on student interests. These projects involve some combination of experimental work, data acquisition, software development, numerical analysis, use of model data, interpretation in terms of atmospheric processes, and satellite validation. Examples of potential activities include:

- Assisting with daily measurements of infrared solar radiation by the FTIR spectrometer at TAO.
- Automating transfer of FTIR spectral and ancillary data from Egbert to Toronto, automating quality assurance and quality control for Egbert data, improving our QA/QC code, and analyzing these data.
- Analyzing measurements of the concentrations of atmospheric trace gases from TAO, CARE, PEARL, and CHARS.
- Investigating the effect of cloud microphysics on the far-infrared energy budget in the High Arctic.

Requirements

Applicants should have completed second year or higher, have an interest in atmospheric physics, have some experimental/laboratory skills, and have experience with computer programming (including Python) and data analysis.

For More Information

For more information, contact Kimberly Strong (strong@atmosph.physics.utoronto.ca) and visit:

- [Kimberly Strong's Home Page](#)
- [Earth, Atmospheric, and Planetary Physics Group](#)
- [Department of Physics](#)
- [University of Toronto](#)
- [NSERC Undergraduate Student Research Award \(USRA\) Program in Physics at Toronto](#)
- [Centre for Global Change Science Summer Undergraduate Intern Programme at Toronto](#)