

Measuring and Quantifying Toronto's Greenhouse Gas Emissions

D. Wunch

Description of Research

The climate change summits in recent years have resulted in an agreement to limit the rise in global temperatures by cutting greenhouse gas emissions. An important aspect of these international agreements is to encourage cities and local communities to cut their emissions. Toronto is part of the C40: a group of cities leading greenhouse gas emissions reduction efforts. My research group focuses on characterizing, monitoring, and quantifying Toronto's urban emissions to verify that the emissions are indeed reducing at the rate necessary to meet these goals. We use a variety of atmospheric measurement techniques, physical models, and data analysis methods, including remote sensing from the ground and from space, local surface concentration collection and analysis, and computational data analysis.

Summer Project Descriptions

Students involved in this project will have the opportunity to participate in many projects:

- Install, test, and calibrate GHG and air quality monitoring instrumentation throughout the Greater Toronto Area (GTA).
- Operate our mobile greenhouse gas observatory and our ground-based remote sensing observatories. The mobile observatory is contained in a bicycle cargo trailer, and our ground-based remote sensing observatories are located throughout the Greater Toronto Area (GTA).
- Participate in the design and implementation of a systematic scheme to measure greenhouse gases in Toronto's atmosphere.
- Quantify emissions from the measurements and help to create a comprehensive map of Toronto's emissions.
- Develop machine learning techniques to analyse and interpret environmental images of vegetation within the city.
- Develop computer coding skills (e.g., time series analysis, machine learning, geostatistical tools and techniques) to analyse and interpret the data from the observatories and satellite measurements over the city.

Applicant Requirements

These projects would be suitable for undergraduates with computing experience and enthusiasm! Familiarity with Python, R, or Matlab is preferred. Frequent travel throughout the GTA by bicycle to measure near potential emission sites could be required. Up to four summer intern positions are available on this project.

Contact Information

For more information, please feel free to contact me by email:
dwunch(at)atmosph.physics.utoronto.ca