

Atmospheric Remote Sensing and Spectroscopy – K. A. Walker

Description of Research

My research group uses spectroscopy with in situ and remote sounding techniques to study the composition and chemistry of the Earth's atmosphere. We use instruments on the ground as well as those carried by balloons and satellites. These atmospheric composition measurements are the data needed to investigate stratospheric ozone depletion, tropospheric air pollution and climate change.

Detailed Descriptions

Three projects are available for up to three undergraduate summer students to get involved in research:

1) Analyzing data from a high-altitude balloon flight. The Canadian Atmospheric Laser Absorption Spectrometer Test-bed (CALASET) project has developed a balloon payload to study the composition of the Earth's atmosphere. The project has been flown in 2018, 2019, 2022, 2023 and 2024. The student will assist with analysis of data from past flights and modifications of auxiliary systems software for future flights.

2) Studying the global distribution of gases in the Earth's atmosphere. The Atmospheric Chemistry Experiment (ACE) satellite is providing measurements of many atmospheric gases that have not been measured before. The student will assist with the analysis and validation of ACE results for different atmospheric gases. (<http://maestro.physics.utoronto.ca/>).

3) Validating Arctic measurements from the ACE and OSIRIS instruments. Yearly, a team conducts an intensive measurement campaign at the Polar Environment Atmospheric Research Laboratory (PEARL) in Eureka, Nunavut. These results are used to examine the data quality of the satellite measurements. The student will assist with comparing measurements from PEARL with those from the OSIRIS (Optical Spectrograph and InfraRed Imaging System) and ACE satellite instruments. The student will also assist with organizing the dataset from the past 22 years of campaigns. (<https://eureka.physics.utoronto.ca/>)

Requirements

For these projects, I am looking for students with an interest in atmospheric physics and chemistry at any level. Having general computer knowledge and some experience with computer programming is necessary for all these projects. For the balloon project, having general technical/laboratory skills (e.g. assembling hardware and familiarity with optics and components) and experience with python or C would be a definite asset. Students who are enrolled in physics, engineering science, chemical physics or chemistry are strongly encouraged to apply.

For More Information

If you are interested in any of these projects and would like to discuss them further, please contact me by e-mail at kaley.walker@utoronto.ca.