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Quantification of Horizontal Ozone in the Boundary Layer

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RCEU 2022 Project Proposal

Project Title

Quantification of Horizontal Ozone in the Boundary Layer

Faculty Information

Name: Dr. Michael Newchurch

Status: _____

Department/Program: Earth System Science Department

College: College of Science

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Proposal ID **RCEU22-ESS-MJN-01**

I. Project Description

The Tropospheric Emissions: Monitoring Pollution(TEMPO) satellite will be launched in 2022. TEMPO will be attached to the Earth-facing side of a commercial telecommunications satellite which is in orbit. This will allow TEMPO's ultraviolet and visible light sensors to provide us with a spectra of pollutants in the atmospheric cycles everyday. This project's objective is to validate TEMPO's data with current instrumentation that UAH currently uses to see a spectrum of pollutants in our area. This includes the use of the Rocket City Ozone Quality Evaluation in the Troposphere (RO₃QET) LiDAR, Electrochemical Concentration Cell (ECC) Ozonesondes, Searey aircraft, the National Aeronautical Space Administration (NASA) PANDORA instrument, and NOAA Wind Profiler in Courtland, AL.

II. Student Duties, Contributions, and Outcomes

a. *Specific Student Duties*

Students will use the following instruments above to process the collected ozone data and program displayed ozone concentrations into one image. They will be responsible for going out on these duties using RO₃QET to find these measurements to validate the TEMPO satellite for our area.

RCEU 2022 Project Proposal

b. Tangible Contributions by the Student to the Project (10% of Review)

With the use of RCEU Students, we will be able to validate if TEMPO will be a great resource for scientists to research the effects of tropospheric ozone on nature and the human body.

c. Specific Outcomes Provided by the Project to the Student (30% of Review)

Being a part of this project will open your understanding of tropospheric ozone sources in our area, the use of many instruments that are used to accomplish this goal, programming skills to process real life data, and strengthen your meteorological area of atmospheric chemistry.

III. Student Selection Criteria

Student Qualifications:

1. Understanding of how tropospheric ozone is created and spread throughout the atmosphere.
2. Knowing how LiDAR works and how it is used by the team
3. Knowing how to launch Electrochemical concentration cell (ECC) ozonesondes
4. How to use HYSPLIT
5. Process collected data into images via Python
6. Basic understanding of meteorological processes (i.e. wind processes, low pressure systems, etc)

IV. Project Mentorship

 (30% of Review)

Students will be working with a team to assure they can succeed helping the team reach their goals. Students will be guided along the way to learn how to use instruments and process the data to meet standards. We will hold meetings to review how we will go about reaching our goals, along with other students who are versed in this area who work under Dr. Newchurch.