

Graduate Research Assistant position

Starting date

Fall 2023

Duration

3 years

The Atmospheric Waves Experiment (AWE)

The Atmospheric Waves Experiment (AWE) is the first dedicated NASA mission to investigate global gravity waves (GWs) properties in the upper atmosphere and their impacts on the ionosphere-thermosphere-mesosphere (ITM). An Infrared imager (Advanced Mesospheric Temperature Mapper or AMTM) will operate onboard the International Space Station for two years (tentative launching date will be December 2023), measuring the intensity of selected spectral lines of the hydroxyl (OH) emission layer, around 87 km altitude. The raw image data will be processed to derive the mesospheric temperature, and to measure GW parameters with a near-global coverage. The USU Physics department will host the AWE Science Operations Center (SOC).

As part of this project, a graduate candidate will be closely involved with AWE data processing and analysis. Their tasks will include:

- Analysis of AWE image data,
- Implementation of an algorithm to automatically extract the GW parameters,
- Investigation of atmospheric dynamics to answer the AWE science objectives: 1. Quantify the seasonal and regional variabilities and influences of GWs near the mesopause (~87 km altitude), 2. Identify the dominant dynamical processes controlling GWs, 3: Estimate the wider role of GWs in the ITM,
- Publication of results in scientific journals and presentation at national and international conferences.

The candidate will gain valuable experience in working with multiple datasets, including satellite, ground-based, and models. They will closely work with the AWE science team, which comprises highly recognized aeronomy experts.

Qualifications

- Bachelor's degree in physics, atmospheric physics, or related field,
- Good background knowledge in atmospheric physics,
- Basic knowledge in signal/image processing,
- Familiarity with programming (e.g., C++, IDL, Python...),
- High self-organization,
- Good written and spoken English (TOEFL internet-based (iBT) exam score of 79 or paper-based exam score of 550 for international students).

Candidates must be accepted in the USU graduate program.

Application to USU School of Graduate Studies: <https://gradschool.usu.edu/admissions/>

Contact: mike.taylor@usu.edu, dominiquepautet@gmail.com, and yu.cheng@usu.edu

Graduate Research Assistant position (Student collaboration)

Starting date

Fall 2023

Duration

3 years

The Atmospheric Waves Experiment (AWE)

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A student collaboration (SC) program is set up as part of this mission involving Utah State University (USU) and Embry-Riddle Aeronautical University (ERAU, Daytona Beach, Florida). The main scientific goal will be to relate the GWs measured by at 87 km altitude with disturbances at ~250 km altitude. USU students will operate an imaging system at the Bear Lake Observatory (BLO), focusing on the Medium Scale Traveling Ionospheric Disturbances (MSTIDs), measured in the Oxygen emission at ~250 km. Each group will be composed of 1 graduate and 2-3 undergraduate students and will be under the supervision of a senior researcher. They will analyze and interpret the data to understand connections between the mesosphere and the thermosphere/ionosphere. The SC will engage students in compelling science and reinforce primary educational objectives such as understanding atmospheric physics or developing skills to analyze and visualize scientific data, preparing students for careers in STEM.

As part of the AWE student collaboration, the candidate's work will include the following tasks:

- Operating an airglow imager at BLO,
- Analyzing the airglow image data,
- Work closely with the ERAU team to establish relations between neutral atmosphere (imaging) and ionosphere (TEC),
- Managing and mentoring a team with several undergraduate students,
- Publish results in scientific journals and presentations at national and international conferences.

Qualifications

- Good background knowledge in atmospheric physics,
- Basic knowledge in signal/image processing,
- Familiarity with programming (e.g., C++, IDL, Python...),
- Good self-organization and management skills,
- Good written and spoken English (TOEFL internet-based (iBT) exam score of 79 or paper-based exam score of 550 for international students).

Candidates must be accepted in the USU graduate program.

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Graduate Research Assistant position (Computer Science)

Starting date

Fall 2023

Duration

3 years

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The Atmospheric Waves Experiment (AWE) is the first dedicated NASA mission to investigate global gravity waves (GW) properties in the upper atmosphere and their impacts on the ionosphere-thermosphere-mesosphere (ITM). An Infrared imager (Advanced Mesospheric Temperature Mapper or AMTM) will operate onboard the International Space Station during two years, measuring the intensity of selected spectral lines of the hydroxyl emission layer, around 87 km altitude. The raw image data will be processed to derive the mesospheric temperature, and to measure the GW parameters with a near-global coverage. Data storage, processing, and distribution will be performed within the AWE Science Operations Center (SOC) located in the USU Physics department. Information about this mission will be accessible on a website, and the data will be disseminated to the science community through a searchable database.

As part of the AWE mission, the graduate candidate's work will include the following tasks:

- Monitoring data processing and distribution,
- Maintenance and upgrade of the AWE website and database, under the supervision of Logan Software Inc. personnel,
- Maintenance and upgrade of the AWE hardware located inside the USU data center, also under the supervision of Logan Software Inc. personnel,
- Regular transfer of the AWE data to the NASA Space Physics Data Facility (SPDF) for backup.

Qualifications

- Good knowledge and experience in website and database maintenance,
- Basic knowledge in signal/image processing,
- High self-organization,
- Good written and spoken English (TOEFL internet-based (iBT) exam score of 79 or paper-based exam score of 550 for international students).

Candidates must be accepted in the USU graduate program.

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