

# CGUHS Near Space Research Team



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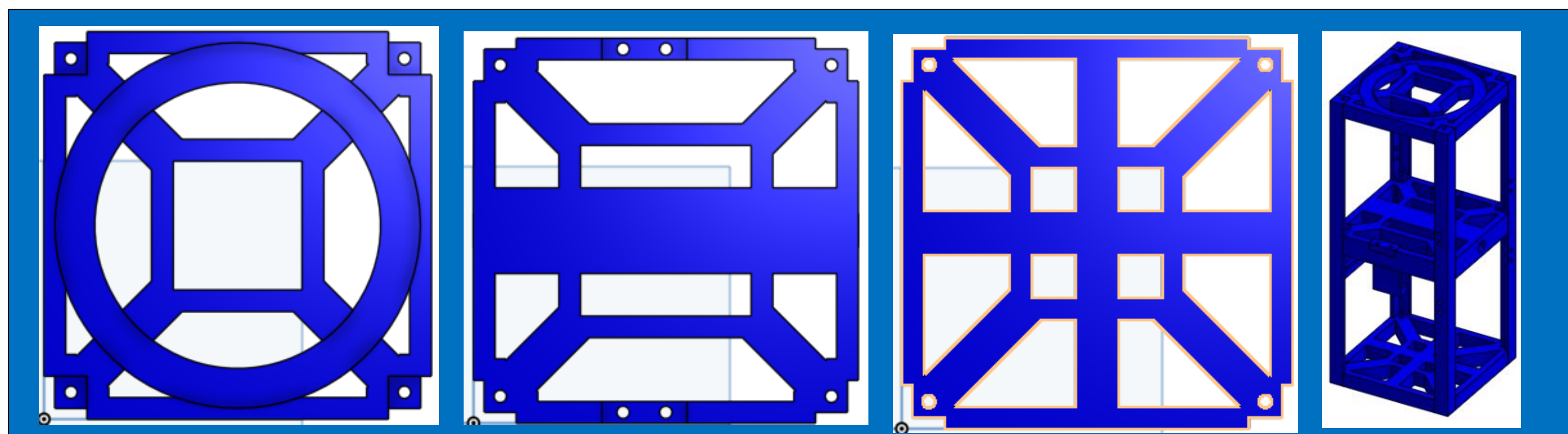
Mentor: John Morris

Casa Grande Union High School ASCEND! Team

## Introduction & Project Description:

This study details the design, construction, and deployment of high-altitude balloon payloads for atmospheric characterization and technological development. Building our system around the Arduino Mega, and later slaving on an Uno, our payload was built to collect temperature, pressure, humidity, and UV-C data up to 100,000 feet, complemented by 4K video of the flight. Initial missions focused on stratospheric and ozone layer traversal, demonstrating data logging to microSD cards. This year, we began to work with MATLAB and Onshape CAD software to start elevating our payloads and studies during each flight.

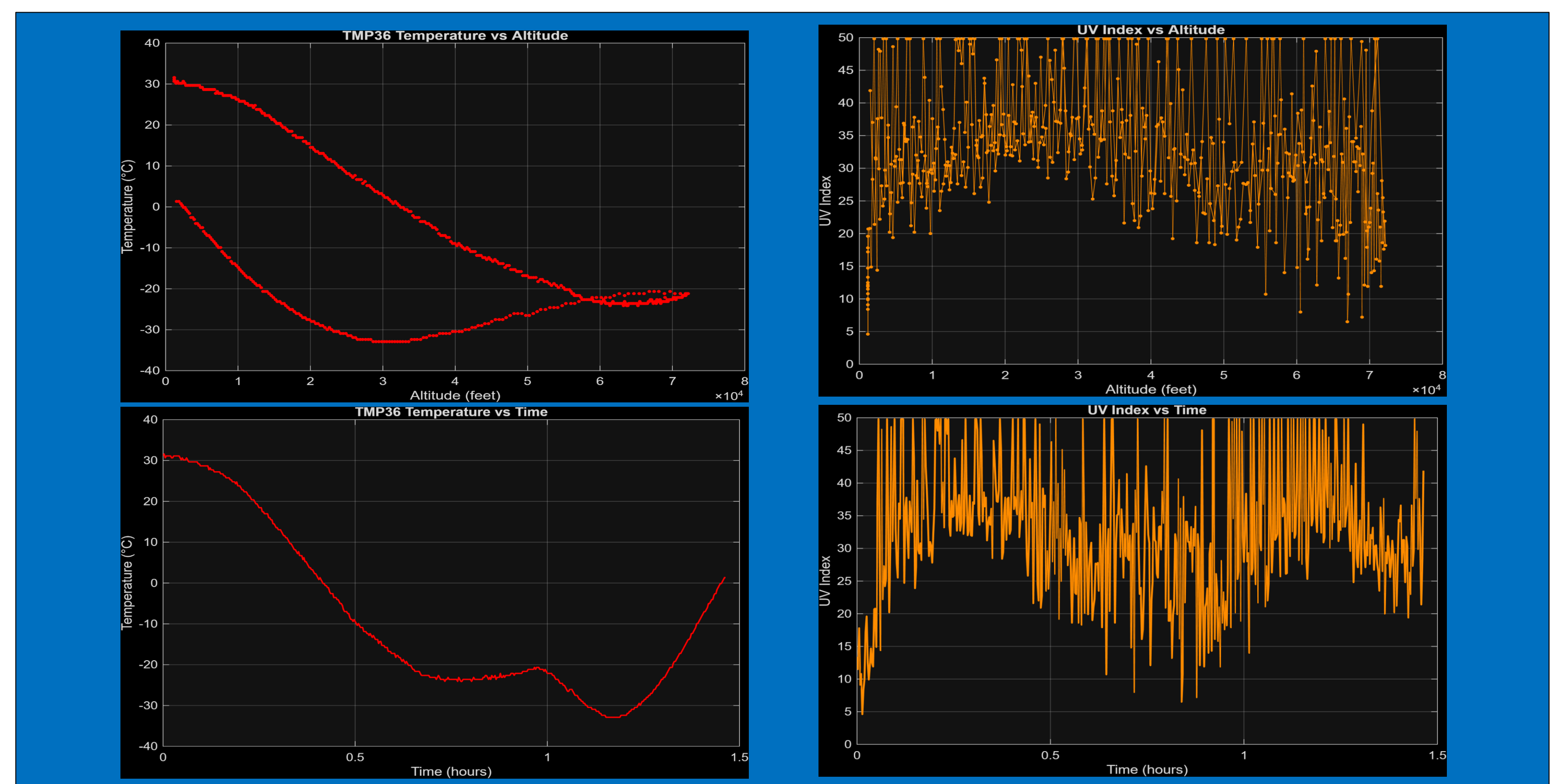
Our four primary science objectives are to measure the full atmospheric temperature, pressure, and humidity profile from ground to 100,000 ft, characterize UV radiation increase through the ozone layer during ascent, document particulate matter concentration across atmospheric boundary layer and free troposphere, capture geotagged time-lapse images showing Earth's curvature, cloud structure, and surface features



## Results:

Fall 2025: Single Payload Atmospheric Data Collection, we spent our time building and testing our electrical system, however, did fail to collect data due to wiring issues with the SD card and Flash memory. During this flight, we did obtain approximately 60 minutes of 4K video depicting the balloon ascent and the curvature of the Earth.

Spring 2026: Single Payload system, however, incredibly simplified flying only the BME280, TMP36, and UV sensors. There was a large focus on testing as we go to ensure everything functions throughout the process. We collected 24 hours of data from this flight.



## Conclusion:

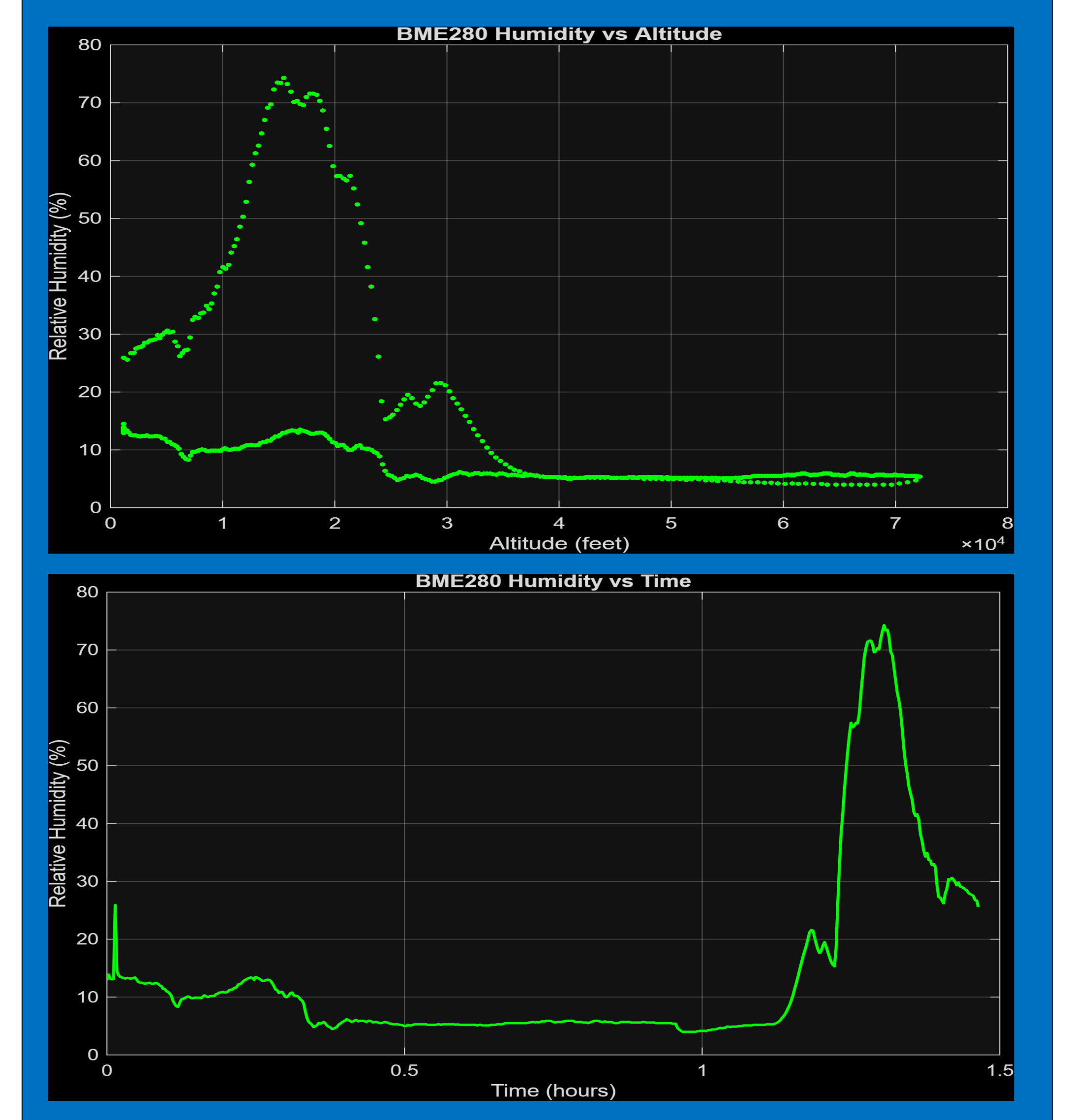
At this point, we are focused on the reliability of our payload systems, ensuring that they run as expected every flight.

### Fall 2025:

- No SD Card; Set on fire
- Poor wire management
- Captured hour long 4k Video

### Spring 2026:

- Failed Camera; No SD Card
- Data Collected
  - UV
  - Internal Temperature
  - Altitude
  - Humidity
  - Pressure



## Future Plans

Due to our successful spring flight, our next goal is to build off that system. With a current plan to continue to alter the current 3D enclosure model to better fit our electrical systems. We have plans to test different science missions in the future with the want to revisit the tomato seed experiment with the goal of seeing the effect the atmosphere has on different plants. The overall goal of this experiment is to see how plants may be affected by the Mars atmosphere.

Future iterations will prioritize reliability over complexity, with strict adherence to weight limits and emphasis on proven components. Integration of data logging and RF communication into a dual-payload system will only occur after achieving stable individual functionalities, with cautious and incremental testing.

