Abstract

The University of Maine High Altitude Ballooning (UMHAB) team launched two balloons during the August 21, 2017 total solar eclipse, producing a consistent online video stream of the eclipse to an altitude of 110,000 feet. This poster discusses the key factors that lead to a successful launch and recovery, such as thorough testing procedures, redesign of components, choice of launch site, and sometimes luck. In preparation for the event, the team tested the equipment and code over eleven balloon launches. Airplane based testing and tracking were also conducted for the tracking and video stream components. The payloads and nozzle were redesigned to improve efficiency and ease of use. Moreover, the launch site was scouted ahead of time, establishing a good relationship with the host and garnering excellent support for the event. Along with the successful video stream, the team conducted eleven practice and testing in the days before the launch day, ensuring that the launch was a success. They also assisted in setting up our gas delivery and setup and testing in the days before the launch.

Practice and Testing

Beginning the previous year and throughout the spring and summer, the team conducted eleven practice launches. One practice involved two balloons to mimic eclipse day conditions. Various components of the system were tested to confirm functionality under normal operating conditions. One of the more significant components is the video stream payload, which would provide a live stream of the eclipse from the balloon. For a consistent and high quality stream, the ground station must accurately track the payload and establish a solid connection. The team conducted a test in which they flew the payload in an airplane and monitored the tracking system on the ground station, thus identifying some tracking improvements.

Launch Site Preparations

Ahead of time a planning trip was done to scout out the launch location. Possible launch sites were established and connections were also made with our host, Clemson University. They provided us with plenty of support from landlines to our ground stations, to food on the launch day, ensuring that the launch was a success. They also assisted in setting up our gas delivery and setup and testing in the days before the launch.

Lessons learned

Despite our preparations, several failures occurred during the launch. The 360 degree camera was turned on but somehow was not set to record before flight. During the launch the IR camera shut down so it recorded no video, likely due to the extreme heat at the launch site. One of the GoPros recording during the launch shut down mid-accent due to a battery malfunction and did not record footage of the eclipse. One ground station failed due to a servo motor breaking while tracking the balloon. This caused only one successful stream to be produced form our launch.

Conclusion

Overall, the UMHAB team experience during the Aug. 21, 2017 Eclipse was a positive one. Many students were able to help with the project that had been going on since 2015 and were finally able to achieve the goal of a successful live stream of the total solar eclipse. 20 students were able to make the trek from Maine to Clemson to help ensure that UMHAB launches 76 and 77 were a success.