

University of Colorado at Boulder HELIOS V Team September Status Report

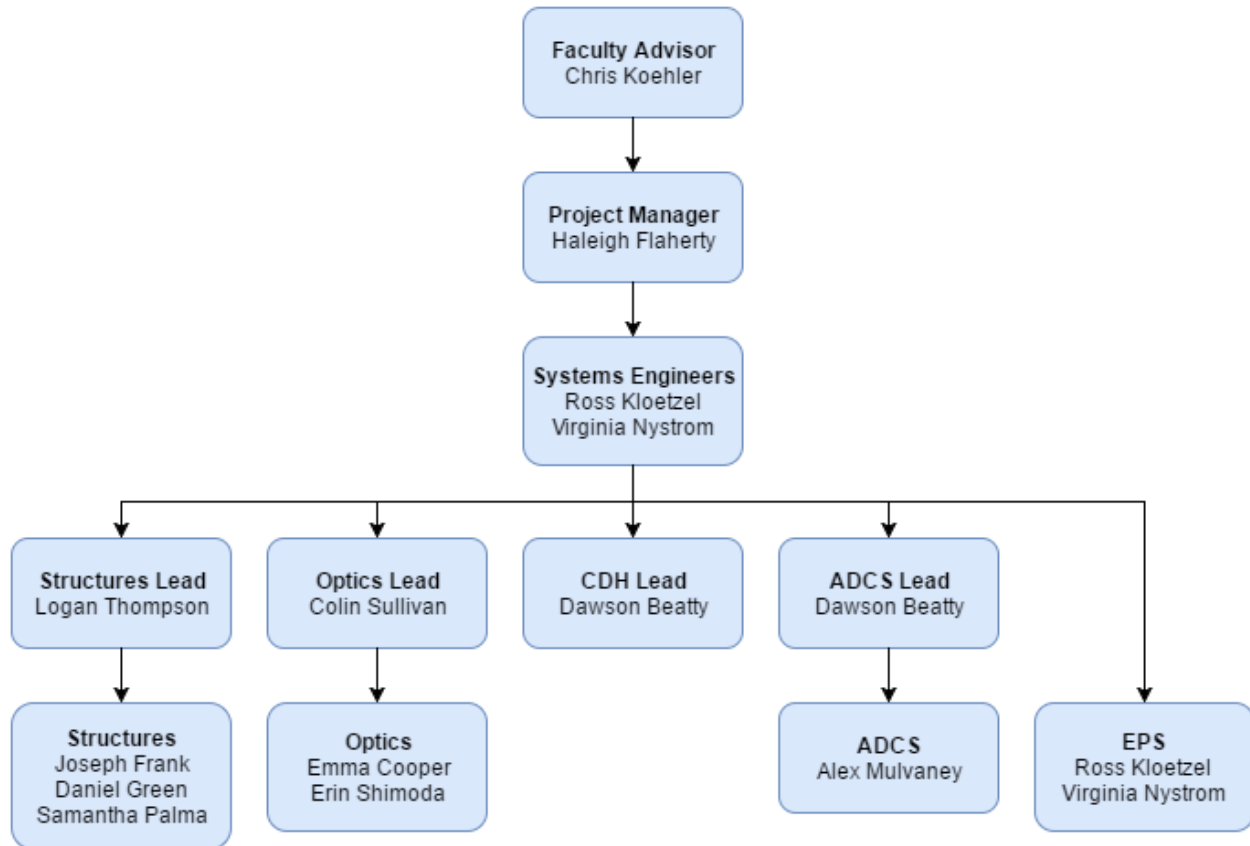
This month was the launch of the HASP platform. During flight, HELIOS performed just as planned. It sent constant data and required commands to be sent only to put it into safe mode for a while when the Sun was out of the payload's view to save data space. Once the HELIOS payload returned to Boulder, the team got working on analyzing the data. Last week they presented their initial findings to other members at Space Grant to get more feedback on what they could learn from the collected data.

Team Demographics

Student	Ethnicity	Gender	Year	Major	Start Time	End Time	Grad/ Undergrad
Haleigh Flaherty	Caucasian	Female	Junior	Aerospace Engineering	January 2016	Current	Undergrad
Paige Arthur	Caucasian	Female	Senior	Aerospace Engineering	January 2016	May 6 th 2016	Undergrad
Ryan Cutter	Caucasian	Male	Senior	Aerospace Engineering	January 2016	May 6 th 2016	Undergrad
Erin Shimoda	Caucasian/ Asian	Female	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad
Virginia Nystrom	Caucasian	Female	Sophomore	Aerospace/ Applied Math	February 2016	Current	Undergrad
Joseph Frank	Caucasian	Male	Sophomore	Engineering Physics	February 2016	Current	Undergrad
Severyn Polakiewicz	Caucasian	Male	Junior	Aerospace Engineering	February 2016	May 6 th 2016	Undergrad
Rebekah Haysley	Caucasian	Female	Sophomore	Mechanical Engineering	February 2016	June 1st 2016	Undergrad
Colin Sullivan	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad
Samantha Palma	Caucasian/ Asian	Female	Sophomore	Mechanical Engineering	February 2016	Current	Undergrad
Ross Kloetzel	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad

Michael Catchen	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	May 6 th 2016	Undergrad
Alex Mulvaney	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad
Logan Thompson	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad
Dawson Beatty	Caucasian	Male	Sophomore	Aerospace Engineering	February 2016	Current	Undergrad
Gage Froelich	Caucasian	Male	Junior	Mechanical Engineering	February 2016	March 2015	Undergrad
Daniel Green	Caucasian	Male	Junior	Mechanical Engineering	February 2016	Current	Undergrad
Emma Cooper	Caucasian	Female	Sophomore	Aerospace Engineering	March 2016	Current	Undergrad

Team Organization

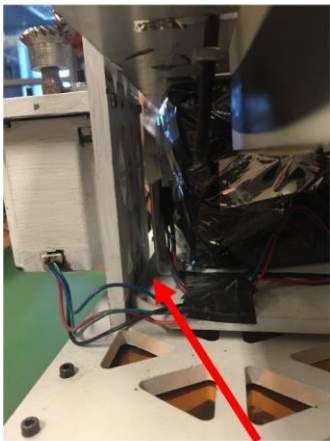


Accomplishments of September

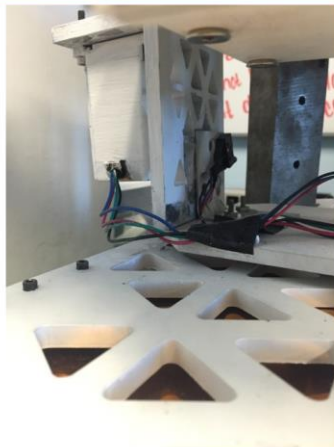
Structures: When the payload returned from flight, the structures team was the one to unbox the payload and look over it for damages. In their investigation, they found many parts of the structure damaged. The most obvious was the damage to the intermediate housing, which holds up the upper housing. The L brackets on it had been bent, and one of the bearings holding the upper housing dislodged. The damages are pictured below and the structures team has determined that they were most likely due to landing.



Assumed Landing Damages



L-Bracket disconnected



Missing L-Bracket screws



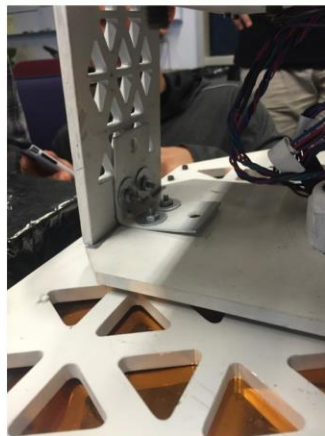
Bearing dislodged



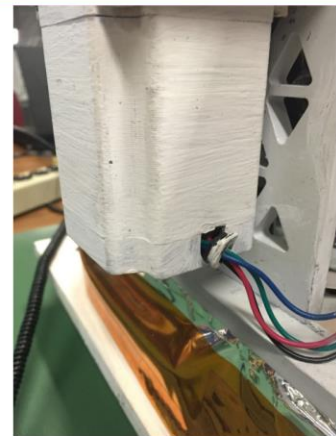
Assumed Landing Damages



Landing Orientation



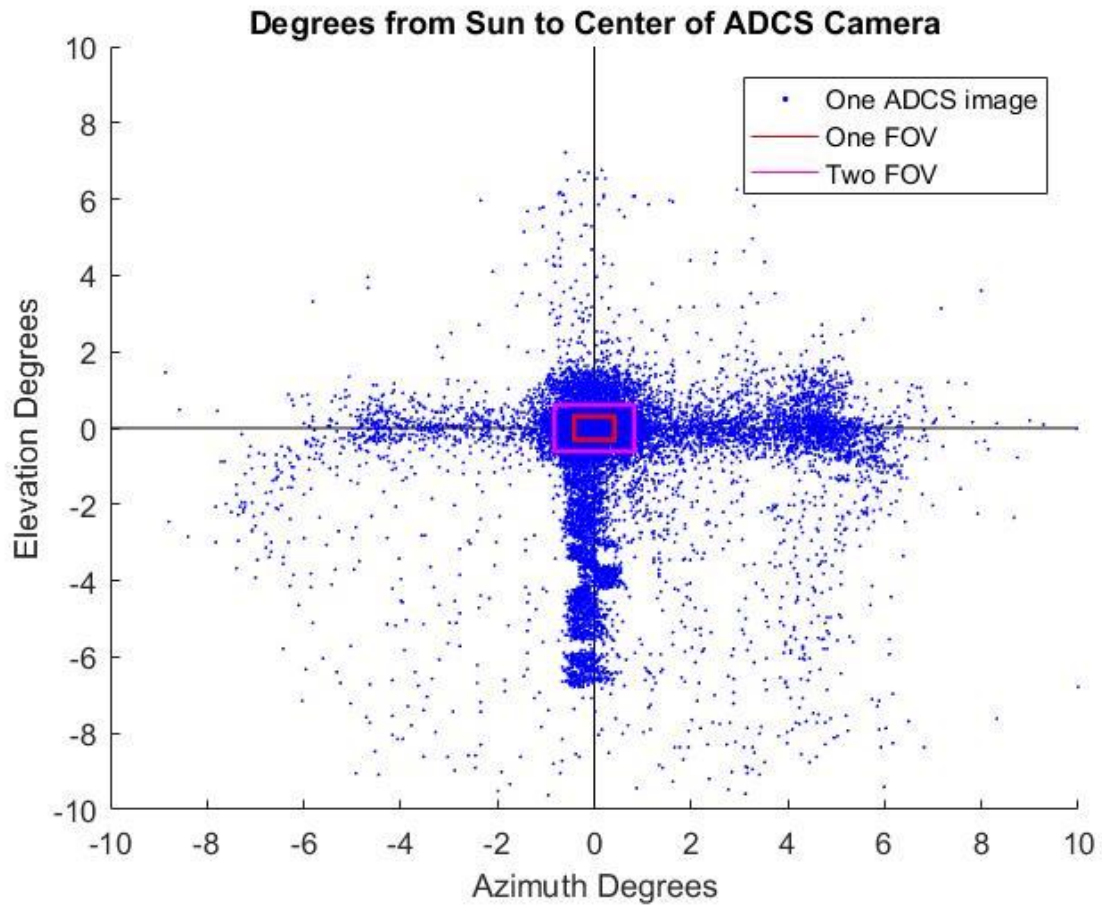
L-Bracket Bent

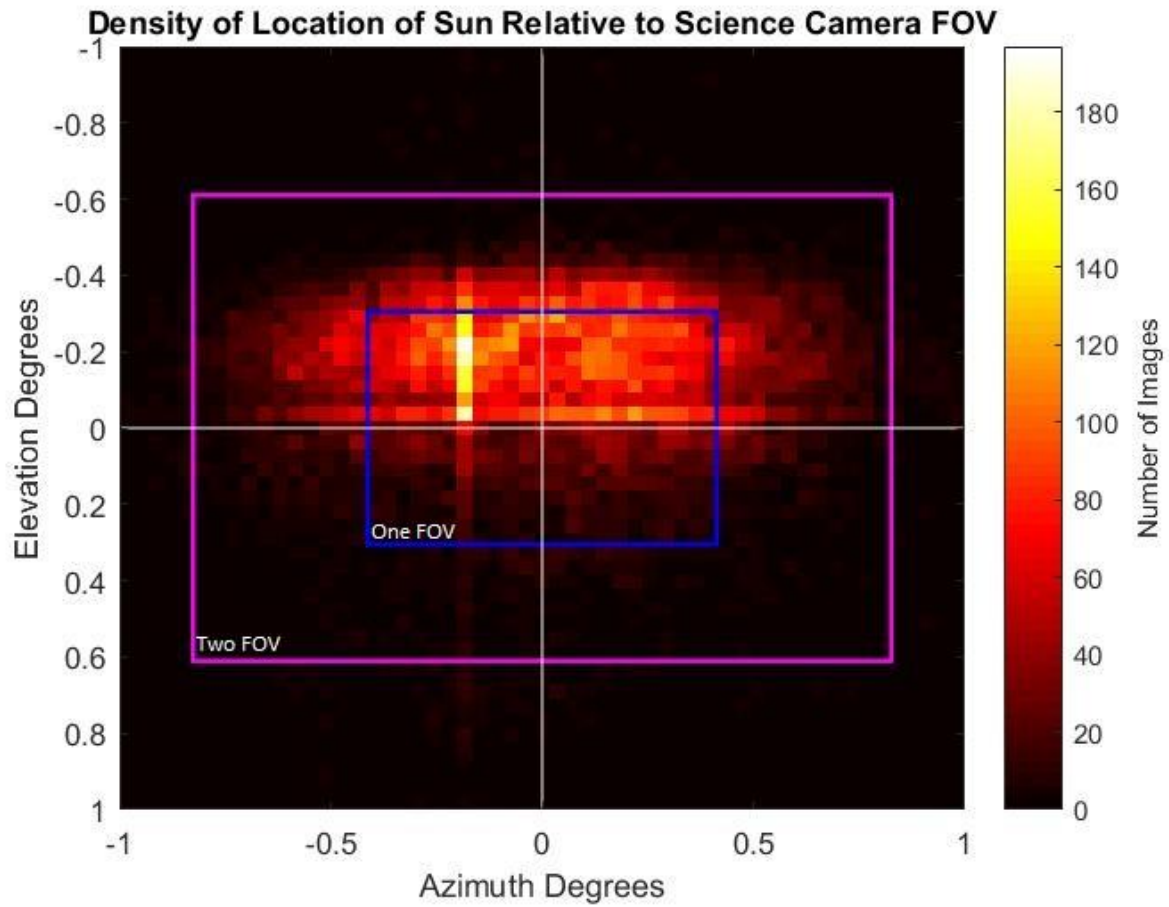


Motor wire cover dislodge

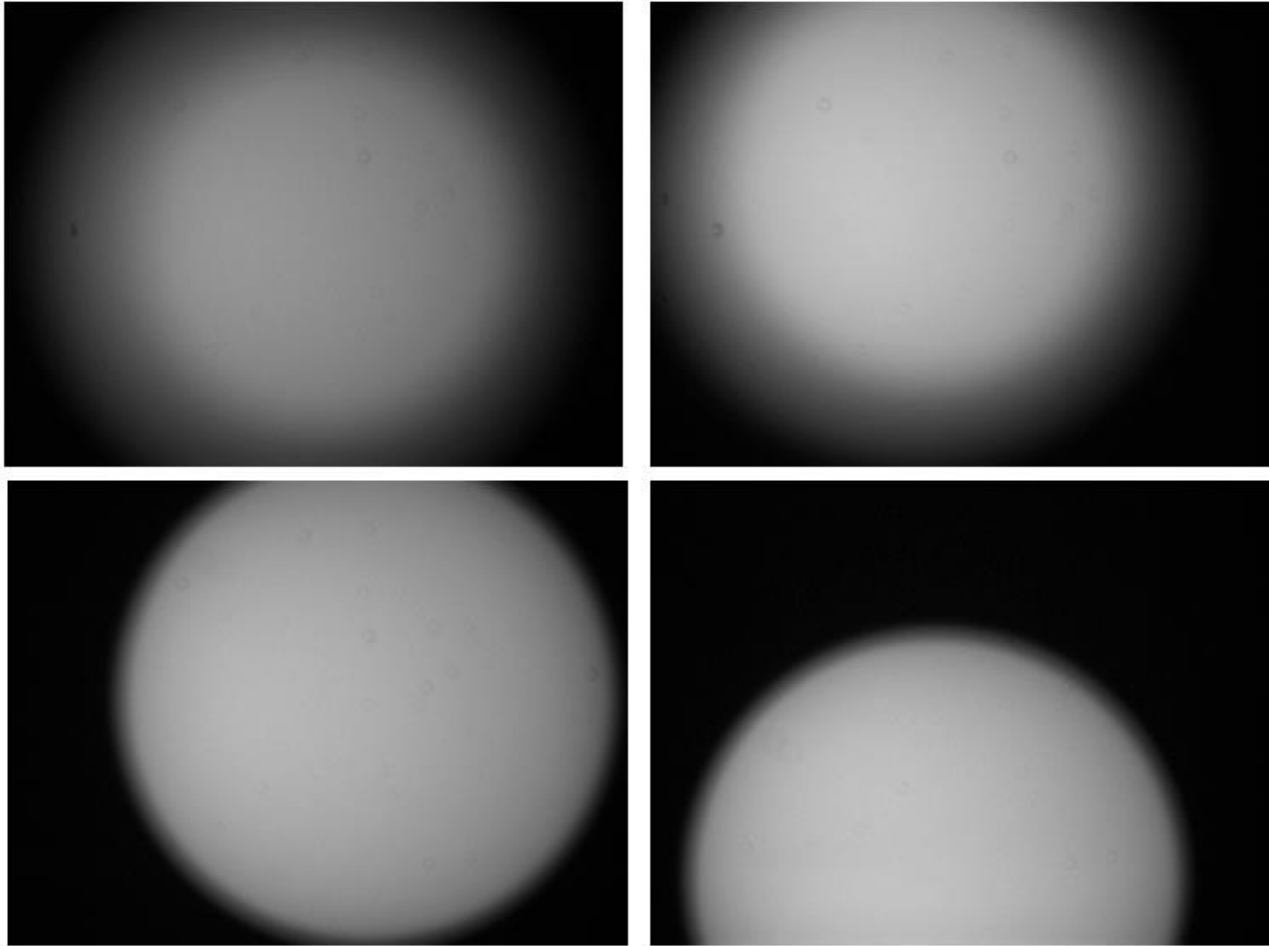
CDH: The CDH part of the payload performed greatly during the flight. After flight, the team extracted the data and has been helping the systems team with analyzing all of the environmental and payload data collected during the flight.

ADCS: The ADCS team also performed well during flight, though they have much more data to analyze to fully understand how well their team performed. They have created a heat map and plot, shown below, of where the Sun was located in each of the images they took, but they plan to do more with this data to fully understand how accurately the payload tracked the Sun.





Optics: Unfortunately, the optics portion of the payload did not perform correctly. When payload came back and the images were opened, all of them came out variously blurred. A few samples are shown below.



Images from flight

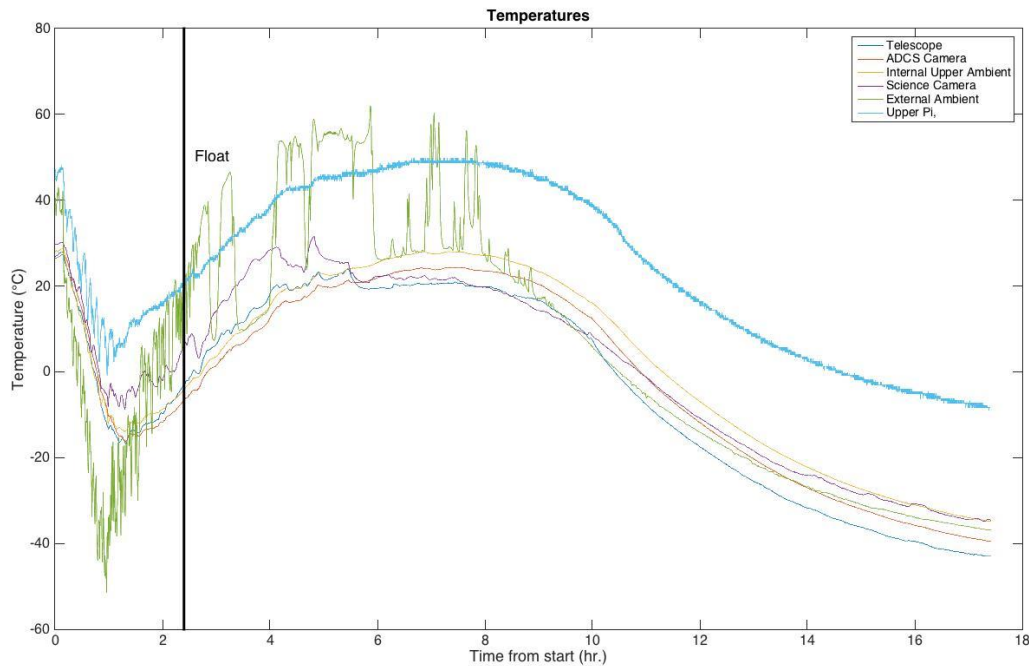
The optics team has already started working on failure analysis. They have developed several theories on what could have gone wrong and have started working through them to narrow down what could or could not have happened. There were slight damages to the telescope when it returned, but nothing major enough to cause concern. The optics team's theories and plans to investigate are as shown in the table.

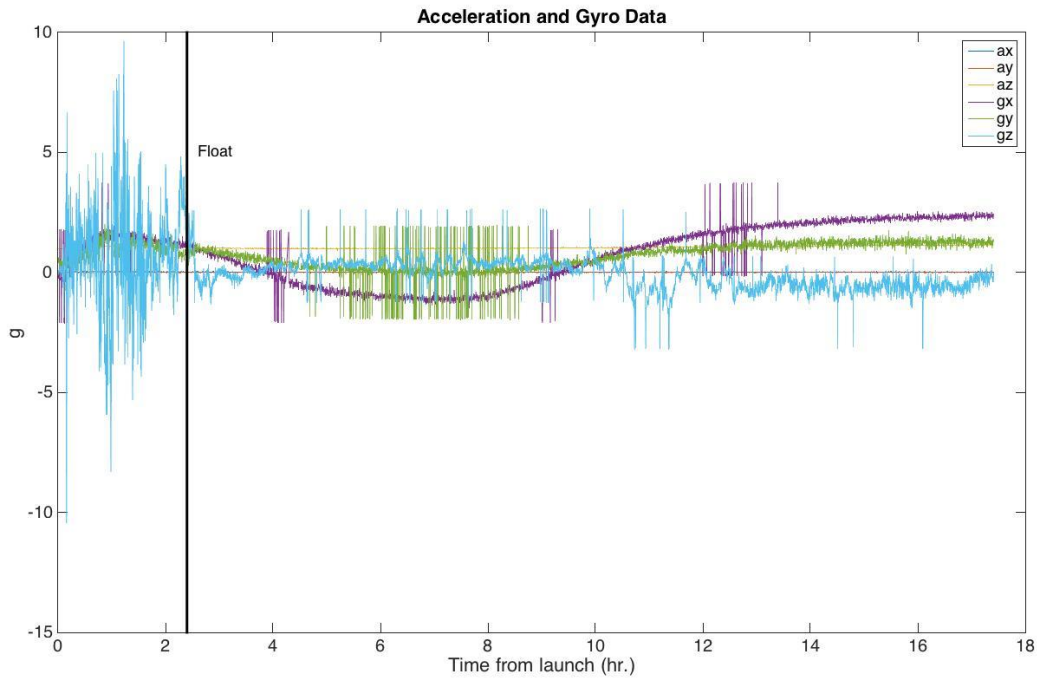


Failure Analysis Plan

Theory	Plan for Testing
Incorrectly focused prior to flight	Capture images of the Sun with the current telescope configuration, which has not been touched since flight
Focus was bumped	Same as above – May be able to distinguish from above depending on how far off the focus is
Back of telescope not in usual orientation	Disassemble the telescope (will only do as the very last test)
Internal problem	Disassemble the telescope (will only do as the very last test)
Condensation	Test the effects of condensation and water droplets on images
Platform Slough/Movement	Move HELIOS around rapidly while taking pictures to see impact on images
Altitude difference	If images appear fine the ground and no other test produces the blurred images, this may be the cause

Systems: The systems team has been working hand in hand with the CDH team to analyze the data collected by the payload. They have already created the initial plots and have now begun layering them to find patterns and correlations in the data. Here are a few of their plots:





Plans for October

The team has laid out a plan for the rest of the semester. This includes a final data review the week before fall break to show their completed data and receive feedback to incorporate in the final paper due to HASP. For this upcoming month, the structures team will repair the payload so that optics can use it for their failure analysis testing. Optics will be working through their failure analysis plans as systems and CDH work more on the data HELIOS collected.