1. Abstract

The goal of this internship was to develop a proposal for the VISIONS-3 sounding rocket mission, and to understand the mission proposal process. The results of this project are a trajectory and launch vehicle selection, defined mass and monetary budgets, mechanical sizing of the payload, data simulation, and a science traceability matrix.

2. VISIONS and VISIONS-2 Mission Objective

The primary mission of the VISIONS and VISIONS-2 rockets are to determine how, when, and where ions are accelerated to escape velocities in the auroral zone and cusp below 1000km [1]. VISIONS-1 used one sounding rocket, and VISIONS-2 used two launched along the same trajectory. VISIONS-3 will use two sounding rockets launched on different trajectories to use topographical reconstruction, graphically displayed in figure 2.

3. Why Sounding Rockets?

1. Much less expensive than larger launch vehicles; can be launched more often.
2. Allows testing of components in zero-gravity; can be launched from fixed location.
3. Why Sounding Rockets?

4. Tasks Completed

Completing the tasks listed below is a circular process, since each aspect is dependent on the rest. The flow chart displays the chronological order which tasks were completed for this internship.

5. Conclusions

Most communications and scientific satellites in orbit around Earth are in the region that radiation from space weather can damage their electronics – improved shielding can result from better understanding space weather. Insight into our ionosphere, magnetosphere, ion outflow, and the “boiling off” phenomenon of our atmosphere may provide understanding of how the atmosphere of other planets (e.g. Mars) disappeared. This would provide further insight into the life cycle of planets and atmospheres. Additionally, a heightened understanding of space physics could lead to the ability to predict which exoplanets may have an atmosphere and magnetic field like Earth using deep space telescopes.

6. Why is this important?

To accomplish and what scientific answers are sought.

7. Future Work

1. Data Simulation: to be created in either MATLAB or similar software; create 3D model to display results similar to those created in 2D in Figure 3.
2. Complete Science Question and Instrument Accommodation Requirements.
3. Write proposal to submit to NASA.

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References