

REQUEST FOR PROPOSAL:

Sounding Rocket Mission to Complement Radiation Belt Storm Probes (RBSP) Mission

I. OPPORTUNITY DESCRIPTION

Virginia Tech was fortunate to participate in a NASA Wallops Island Sounding Rocket Outreach Student Launch Program. The program involved the design, manufacture, test, integration, and launch of a sounding rocket payload on an Improved Orion sounding rocket from the Wallops Island Flight Facility (WFF). Students were involved in every aspect of the mission from start to finish.

A follow-on mission should build on the experience of the students who were involved in the previous mission. A major distinction between the previous mission and the proposed mission is that the sounding rocket motor was prescribed in the previous mission, and was provided at no cost to Virginia Tech. In this mission, the students need to consider other sounding rocket alternatives as they develop the payload and mission.

The initial concept is to propose a sounding rocket in response to the Radiation Belt Storm Probes Mission Announcement of Opportunity¹. However, it is possible that other opportunities will arise in the early part of the mission design process. The team should be flexible to responding to these other opportunities.

¹ <http://tinyurl.com/aye8x>

II. PROJECT OBJECTIVE

The objective of the project for the 2005-2006 senior design team is to produce a complete system design and prototype model of the payload. The initial team of AE students should recruit sophomores, juniors, and seniors from AE and other curricula to supplement the team in Spring semester and hence provide continuity in subsequent years of the project.

III. DATA REQUIREMENTS

The final proposal shall include the following:

- a) Identification of the major features of all elements of the payload
- b) Mission planning and trajectory analysis
- c) Structural analysis and design, including mass properties, stress analysis, vehicle interface, deployment mechanisms
- d) Power system requirements and design, including load, batteries, voltage converters, and any other required power equipment
- e) Heat flow analysis and thermal management system design
- f) Communications link requirements, frequencies, antennas, receivers, transmitters
- g) Command and data handling system, including processor selection, command and telemetry requirements, data storage
- h) All interfaces to the sounding rocket and associated subsystems

- i) Cost estimate of production, deployment, and operations
- j) A detailed schedule of activities for development and deployment of the system
- k) A plan for analysis of the science data
- l) End-of-life disposal procedures