Asgardia-1 Satellite Technical Description

The overall goal of the Asgardia-1 mission, is to demonstrate long term storage of data in LEO. The spacecraft will carry a 512GB MicroSD XC model solid state disk drive, which is periodically checked for data integrity and function.

The satellite will be launched as a payload aboard a NASA CRS (Commercial Resupply Mission) inside a NanoRacks CubeSat Deployer (NRCSD). Current launch vehicle is the Orbital-ATK OA-8 rocket, scheduled to launch from Wallops Island, VA on September 12, 2017. About 90 days after this launch, the OA-8 will un berth from the ISS, boost to a higher orbit, and deploy the satellite. The satellite will be inserted into a near-circular orbit at 500 km at an inclination of 51.6 degrees from the equator. Transmission will begin 30 minutes after deployment and will remain active through the life of the satellite. Atmospheric friction will slow the satellite and reduce the altitude of the orbit until de-orbiting occurs, approximately 5 years after launch. See the Orbital Debris Assessment Report for details.

The spacecraft is a single unit with the dimensions of an equivalent of 2 stacked 10 cm X 10 cm X 10 cm CubeSat modules (giving an overall dimension of 10 cm X 10 cm X 20 cm.) The total mass is about 2.2 Kg.

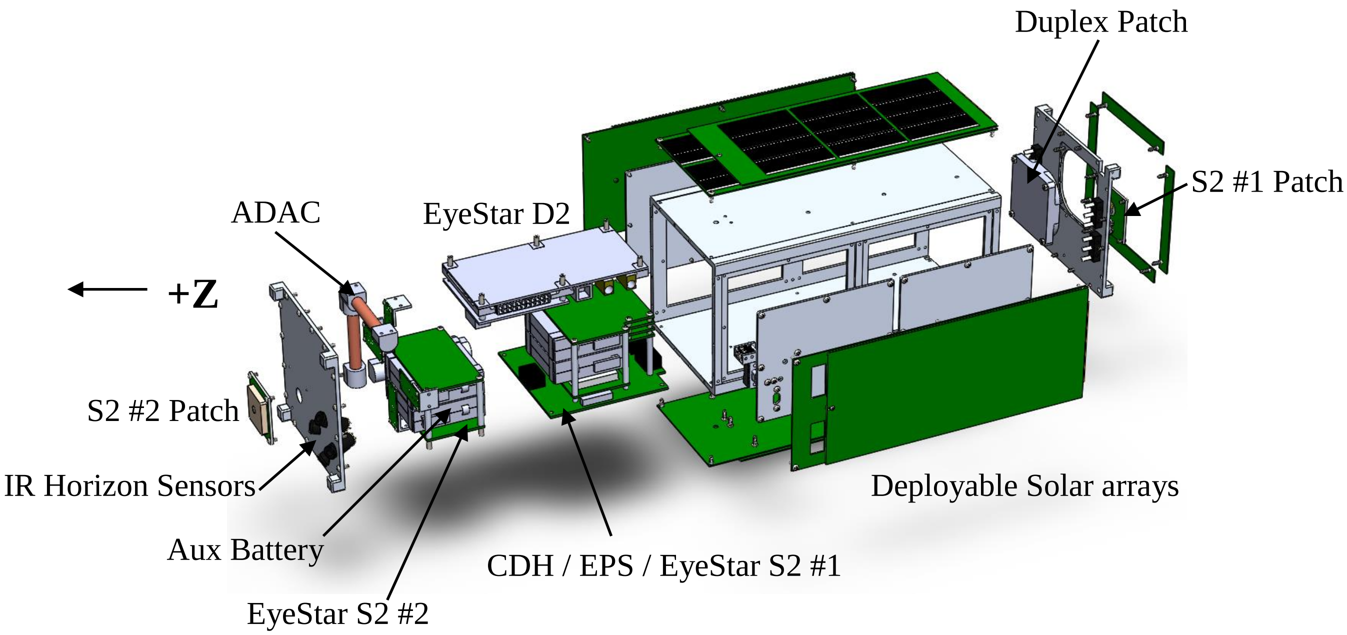

Figure 1 Asgardia-1 Overview

Asgardia-1 Satellite Technical Description

The satellite contains the following systems:

Guidance, Navigation and Control (GNC) Subsystem: Attitude determination is performed by a number of systems. A passive neodymium permanent magnet is located at the CG of the spacecraft, which provides general orientation throughout the orbit. This is the only critical component of the GNC subsystem. A secondary system consists of (3) torque coils oriented along the three axes of the spacecraft located at the +Z end. Four (4) horizon sensors on the +Z axis provide supplemental orientation feedback to the system, allowing for command and control of the torque coils. Additionally, the GlobalStar radio receives GPS data, which is not required for flight control.

Command and Data Handling (CDH) Subsystem: The CDH function shares hardware with the EPS function. The hardware includes dual processors with onboard diagnostics supporting both the EPS and CDH functions. Ground commands are received through the EyeStar D2 Duplex Module.

Communications System: The primary communication system consists of a Near Space launch EyeStar D2 Duplex Module for two way communications to ground operations, via the Global Star Constellation. A patch antenna is used. In addition, two transmit only radios are included. These are EyeStar S2 Simplex Modules manufactured by Near Space Launch; each uses a separate patch antenna. All transmission can be terminated on command. Also, if communication with the Globalstar constellation is lost, transmission will be terminated until communication is regained.

Electrical Power Subsystem (EPS): The EPS is a direct energy transfer system using a solar array producing approximately 3.47W of orbit average power to charge the 8.8 A-hr battery system (total system is 65.12W-hrs). The solar arrays utilize standard Alta Devices flexible photovoltaic cells; the batteries are COTS Tenergy 925050 Li-Polymer cells. The Advanced EPS board controls the charging through four MPPT modules and load switching of the system.

Thermal Monitoring Subsystem (TMS): The TMS consists of (12) thermocouples located throughout the electronics boards and on each solar array. There are no active heating mechanisms. The thermocouples are wired to the Advanced EPS board, which hosts algorithms to monitor and record the temperatures, and the EPS can shut down modules based on temperature.

Structure Subsystem: The structure is fabricated of 6061 Aluminum alloy.

Propulsion Subsystem: No propulsion subsystem is included.

Payload Subsystem: The primary payload is a solid state device hard drive. The drive is loaded on the ground with data, and the data is updated once on orbit. A file is returned that verifies successful data transmission. The secondary payload consists of two Energetic Particle Detectors, one external and one internal. From this data we can map the solar flux, and determine the radiation dosing that the internal electronics are receiving.