NSLSAT-1 Satellite Technical Description

The overall goal of the NSLSAT-1 mission, is to correlate the Solar Activity to the Electron Density in the Near-Earth (LEO) Plasma Field. The spacecraft will carry an Energetic Particle Detector and a Langmuir Probe.

The satellite will be launched as a payload aboard a Virgin Orbit Launcher1 rocket, scheduled to launch from Anderson Air Force Base, Guam, No Earlier Than June 1, 2021. The satellite will be inserted into a circular orbit at 500 km at an inclination of 45 degrees from the equator. Transmission will begin 30 minutes after deployment and will remain active for 2 years. Atmospheric friction will slow the satellite and reduce the altitude of the orbit until de-orbiting occurs, approximately 6 years after launch. See the Orbital Debris Assessment Report for details.

The spacecraft is a single unit with the dimensions of an equivalent of 3 stacked 10 cm X 10 cm X 10 cm CubeSat modules (giving an overall dimension of 10 cm X 10 cm X 30 cm.) The total mass is about 3.0 Kg.

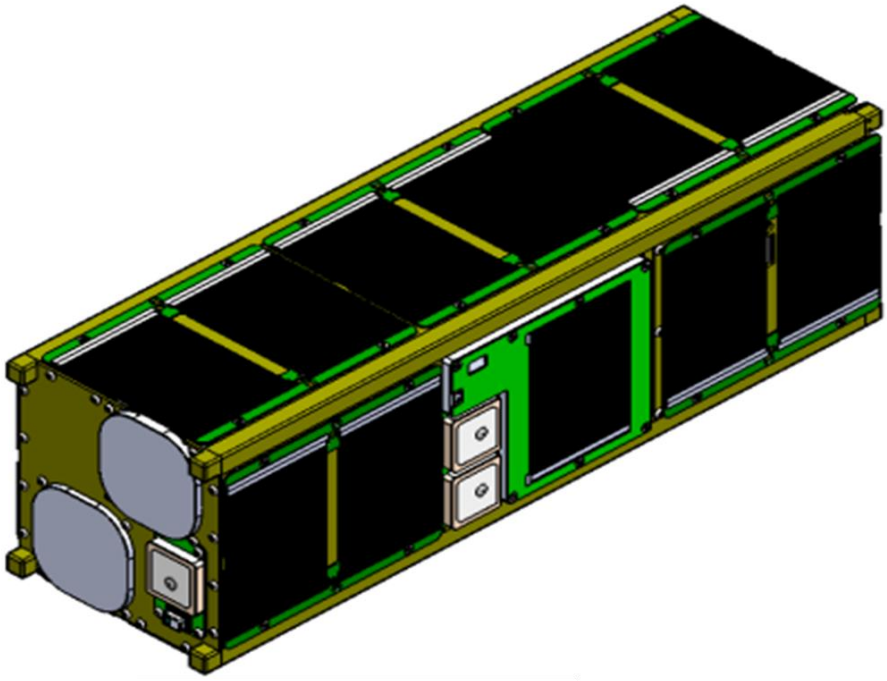

Figure 1 NSLSAT-1 Overview

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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. A GPS receiver is also included.

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 two Near Space launch EyeStar D2 Duplex modules for two way communications to ground operations, via the Globalstar Constellation. Patch antennas are used. In addition, two transmit only radios are included. These are an EyeStar S3 Simplex modules manufactured by Near Space Launch; each uses a separate patch antenna. All transmission can be terminated on command. If communication with the Globalstar constellation is lost, transmission will be terminated until communication is regained. . A GridEye Horizon Sensor on each of the Simplex patch antennas, allows transmitting only when the antenna is pointing away from the earth.

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. The total energy storage capacity is 65 W-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 payloads are the Energetic Particle Detector and the Langmuir probe.