

ORSSQRD Satellite Technical Description

Attachment to SpaceCap Application

The ORSSQRD satellite is the being launched by the Configurable Space Microsystems Innovations and Applications Center (COSMIAC) at the University of New Mexico (UNM). COSMIAC is a Tier-2 Research Center under the School of Engineering at UNM. The overall goal is to perform a series of space weather experiments.

The satellite will be launched in September 2014 as a secondary payload aboard the ORS-4 launch vehicle from the Pacific Missile Range Facility on Kauai, Hawaii, USA. The estimated orbit is 430 x 505 km with an inclination of 91-93 degrees. Transmissions will begin immediately after deployment into orbit, and cease upon de-orbiting or at the end of the mission; the current estimated mission lifetime is 2 years maximum. 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 satellite uses a six unit Cubesat configuration, with deployable solar panels. The satellite is roughly 10cm x 20cm x 30cm in volume (stowed), and its mass is approximately 5 kg.

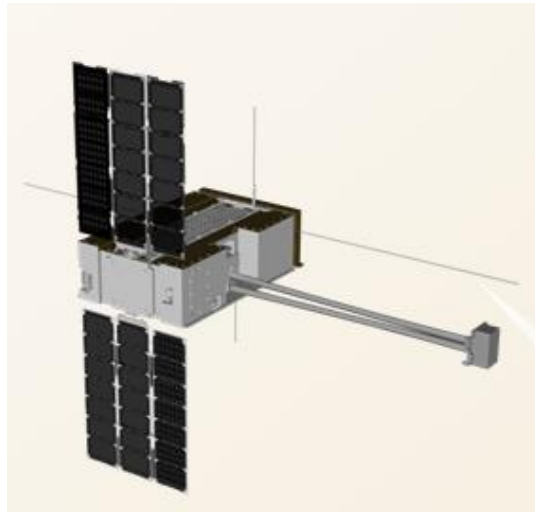


Figure 1 ORS Squared Overview

The satellite itself is being built by students and faculty at the UNM. Parts are being supplied by a variety of different organizations as donations to the university. Operation of the satellite in space will measure environmental effects through the onboard Magnetometer and Dosimeter. The satellite contains the following systems:

EPS – Electrical Power Subsystem: This system provides for battery charging and overcharging protection. It also provides the supply and management of the various power sources used on the spacecraft

Telecom – There are two main radio systems on the spacecraft. The first is the Astrodev Corporations He-100 radio which will receive VHF and transmit UHF from/to the mission control ground station at UNM. This communication will be accomplished through the ISIS Corporations VHF/UHF crossed dipole antenna system. The second radio is the Iridium radio system with an

ORSSQRD Satellite Technical Description

Attachment to SpaceCap Application

associated patch antenna. Two ground stations are available as backups to assure positive control: one in Colorado Springs, and another in Huntsville, AL (Drake State Technical College).

ISC – Integrated Spacecraft Controller: The onboard controller is a Beagle Bone Black board that will be flying the latest iteration of the Space Plug-and-play Architecture for performing spacecraft command and control.

ADCS – Attitude Determination and Control System: The spacecraft will have minimal ADAC systems. The MAI-400 unit will be used but the only portion activated will be magnetic torque rods, allowing the spacecraft to stabilize or detumble, but not have any active pointing capability. This stability is required to be able to deploy the boom and solar array.

Release Imager – This system will record the release of the satellite from the deployer. Optics are designed for items within 25 feet. This is a C329 LVS camera, similar to those on a cell phone.

TCS – Thermal Control Subsystem: There are no active thermal control systems

Structures and Mechanisms – Packages satellite into structure suitable for flight. The structure is assembled from approximately 14 pieces of milled and anodized aluminum.

There are three deployable systems. The first is the ISIS antenna for UHF/VHF communications. The second is the boom which holds the magnetometer. The final deployable is the MMA Corporations solar array.

Dosimeter – The system will fly the UNM developed dosimeter for radiation measurements.

Magnetometer – This device (at the end of a boom) will be used to measure the strength and direction of the Earth's magnetic fields for space weather analysis.