

Form 442 Question 6: Description of Research Project

a. A description of the nature of the research project being conducted.

This is a NASA sponsored CubeSat experiment called Scintillation Observations and Response of The Ionosphere to Electrodynamics (SORTIE) for the purpose of mapping electrodynamics in the ionosphere.

Perturbations in the ionospheric plasma density most frequently appear in the form of discrete regions of waves. At low and middle latitudes, these perturbations are thought to provide the seeds for larger amplitude perturbations that may evolve non-linearly to produce irregularities. However, there is currently no comprehensive atlas of measurements describing the global spatial or temporal distribution of wave-like perturbations in the ionosphere.

The SORTIE mission is a 6U CubeSat mission with team members from ASTRA, AFRL, UTD, and COSMIAC. The SORTIE spacecraft is designed to approach the complex challenges in discovering the wave-like plasma perturbations in the ionosphere. SORTIE will provide the initial spectrum of wave perturbations which are the starting point for the RF calculation, provide measured electric fields which determine the magnitude of the RT growth rate near where EPBs are generated, and will provide initial observations of the irregularities in plasma density which result from RT growth. These measurements will compliment the already important measurements being taken from the C/NOFS satellite and will be used to generate inputs for ionospheric models.

The SORTIE mission is slated to launch in early 2018, and will provide a timely overlap with NASA's ICON mission scheduled to launch in the 2017 timeframe. The baseline operational plan will be a year of on-orbit lifetime after deployment from the ISS using NanoRacks deployers, orbiting at 300-440 km altitude over its lifetime.

The SORTIE CubeSat utilizes an L-3 Communications Cadet-U radio transceiver for command, control, and telemetry reception. This radio is exclusively used with the NASA Wallops Flight Facility 18-meter SPANDAR facility and this facility will be used for the SORTIE mission.

b. A showing that the communications facilities requested are necessary for the research project.

The high-speed telemetry requirement of SORTIE requires the use of facilities such as the Wallops UHF facility in order to operate at the 3 Mbps downlink rate. This FCC license covers the transmission of high-resolution research telemetry from the SORTIE CubeSat to the Wallops facility.

c. A showing that existing communications facilities are inadequate

The satellite has not been launched. The downlink communication link from satellite to ground must be licensed independently of the uplink link from ground to satellite provided by NASA Wallops Flight Facility.