**NASA EdgeCube project**

(1) The name, mailing address and telephone number of the licensee and any affiliates or subsidiaries;

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(2) A general description of the system, its orbit(s) and the type of data to be acquired;

**Science:** EdgeCube is a 1U CubeSat that is being built by undergraduates at Sonoma State University through NASA’s USIP and CSLI programs. EdgeCube will make a global measurement of the red edge that monitors a sharp change in leaf reflectance in the range 680 to 750 nm from changes in vegetation chlorophyll absorption and mesophyll scattering due to seasonal leaf phenology or stress. EdgeCube has been specifically designed to monitor the red edge characteristics of ~300 km areas of the earth using ~five narrow spectral bands in the wavelength range 630-800 nm. Two additional sensors will be flown: one will measure the broadband signal in order to measure the incoming solar radiance, and one will be entirely blocked in order to provide on-board calibration with respect to thermal drifts, dark noise signals, etc. The incoming solar radiance is needed in order to calculate the top-of-atmosphere reflectance (at-sensor radiance/incoming solar radiance), thus normalizing the data through the seasons and by latitude. Although EdgeCube’s ground spatial resolution is substantially less than conventional multispectral satellites, its design will test the red-edge monitoring concept within the limitations of a CubeSat project.

**Data:** EdgeCube includes a camera for accurate after-the-fact pointing information. The camera will also produce images of the Earth to verify the NIR sensor pointing direction. EdgeCube’s camera is a $30 COTS device that produces jpg compressed images of extremely low quality. Typical compressed images are 120 x 190 pixels with a total size of ~4000 bytes. The only technical purpose of these images is to improve the aspect of the spacecraft that is crudely determined by magnetometer measurements (~3 degrees). Using the low quality camera will improve the pointing to ~1 degree. Each camera pixel is ~0.4 degrees in size. We will only download these jpg compressed images at a rate of 1 per day initially and perhaps 1 per week as the mission proceeds. We have extremely limited telemetry bandwidth and can only rarely spot check the pointing accuracy. We have limited on board processing capacity and will telemeter each image in a sequence of ~40 byte packets in jpg format. There is no in-flight processing capability to decode or modify these images.
**Orbit:** We now have an official launch manifest from NASA HQ. We are part of CubeSat Launch Initiative (CSLI) Educational Launch of Nanosatellites (ELaNa) 28 Mission aboard SpaceX-19. We expect launch to the International SpaceStation on December 4, 2019. We will be boosted to a 500 km circular orbit with inclination 51.5 degrees in January 20, 2020. We expect on orbit operations to begin after that time.

(3) The name and address upon whom service of all documents may be made.
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