Space Dynamics Laboratory
Utah State University Research Foundation

FCC FORM 442: Exhibit A

OPAL Research Project Description

Submitted To:
Federal Communications Commission
Office of Engineering and Technology

Submitted By:
Space Dynamics Laboratory
Utah State University Research Foundation
1695 North Research Park Way
North Logan, Utah 84341

DOCUMENT NUMBER: SDL/17-676
REVISION: -
DATE: MAY 8, 2017

TABLE OF CONTENTS

1. INTRODUCTION

The Space Dynamics Laboratory (SDL) submits this document as Exhibit A of FCC Form 442 in response to question 6: Description of Research Project.

2. OVERVIEW

The Optical Profiling of the Atmospheric Limb (OPAL) experiment is designed to measure temperature-altitude profiles of molecular oxygen in the middle atmosphere from 90-140 km. These profiles are also sampled across the limb, effectively sampling three-dimensional temperature. OPAL plans to observe the temperature response of the atmosphere during geomagnetic storms and as gravity waves propagate upwards. The OPAL payload is a hyperspectral imager that focuses incoming light onto a slit array, re-collimates the light, disperses it through a transmissive grating, then re-images onto the a focal plane array. This technique allows for high-resolution vertical sampling, low-resolution horizontal sampling, and sufficient spectral resolution to determine oxygen temperatures, all with no moving parts. The spacecraft is a 3-axis stabilized 3U CubeSat, approximately 10 x 10 x 34 cm, pointing continuously at the atmospheric limb.

3. CONCEPT OF OPERATIONS

CONOPS: Upon deployment from the International Space Station via the NanoRacks Deployer, OPAL will power up and start counting down timers. At 30 minutes, the antennas and solar array will be deployed, then at 45 minutes the UHF Radio will be activated and able to transmit but still only upon command from the ground. For the first few passes the ground station operators will attempt communications to perform checkouts of the spacecraft. Approximately 4 days from launch, payload tests will begin and continue for 6-8 months until the spacecraft burns up in the atmosphere.