

## HIGH SPEED SPECTRAL SPRITE MEASUREMENTS

McHarg, M.G.<sup>1</sup>, Stenbaek-Nielsen, H.C.<sup>2</sup>

<sup>1</sup>United States Air Force Academy

<sup>2</sup>University of Alaska, Fairbanks

The physical processes involved in sprites develop on very fast time scales, and high speed spectroscopy may be the key to unraveling them. For this purpose we conducted a field campaign at the Langmuir Laboratory in Socorro, NM, during the New Moon period in August, 2004. High speed spectra were recorded by two instruments designed to make complimentary high speed measurements. The first instrument is a large aperture imaging spectrograph with the 1000 fps imager previously used by Stenbaek-Nielsen et al. (2002) to image sprites. The recordings were made over two wavelength ranges, 550-730 nm, and 620-800 nm, covering the brightest molecular nitrogen bands in the optical/near infrared emissions previously reported by Hampton et al. (1996). The second instrument is a hyper-spectral photometer based on the multi-anode photometer used by MchHarg et al. (2002) to measure sprite propagation speeds. The hyper-spectral photometer measures colors in 32 wavelength bands from 400-800 nm at 25 kHz per channel. Preliminary analysis of the ms imaging spectra show the band structures to be well resolved, but at the time of this writing it is uncertain if any ionized lines were present. During the evening of 11 August 2004, a large meso-scale thunderstorm was observed. At 08:05:34 UT a series of three positive cloud to ground lightning strokes were observed on the National Lightning Detection Network (NLDN)18. The peak current observed in these three strikes were 146, 88 and 40 kilo amps. There were several smaller positive cloud to ground lightning strikes in the same vicinity during the same time. Three sprites were observed in a narrow field low light level TV camera from the Langmuir Labs site at 08:05:34 UT. These three sprites were within the field of view of the hyper-spectral photometer. Details of analysis for both data sets are ongoing, and will be reported in this paper.

Abstract Submission Form

2004 National Radio Science  
Meeting

Abstract: mcharg8369

Date Received: September 27, 2004

1. (a) Matthew MchHarg  
HQ USAFA/DFP  
2354 Fairchild Drive, Suite, 2A31  
US Air Force Academy, CO  
80840 USA  
matthew.mcharg@usafa.af.mil
- (b) 719-333-2460
- (c) 719-333-3182
2. H - Waves in Plasma
3. (a)
4. C - Contributed Paper,  
Program chair: Cummer
5. No special instructions