



Contribution ID: 165

Type: Oral Presentation

Multi-spectral observations of sprites: N₂(1PG) and N₂⁺(2PG) Emissions

Wednesday, 27 June 2018 14:20 (20 minutes)

We present a series of simultaneous ground-based observations of sprite events over convective thunderstorms in southern Africa. These observations were made at the South African Astronomical Observatory in Sutherland during the austral summer of 2016/17 and 2017/18, using multiple cameras to record unfiltered images in white light and filtered images at 426-438 nm and 640 – 675 nm, which correspond to the N₂⁺ and N₂ emission spectra of sprites. The orientation of the camera (azimuth and elevation angle) was determined during the analysis by identifying the stars recorded in the image, which was done to single-pixel accuracy. The sprite locations were compared with the lightning locations derived from the lightning detection network operated by the South African Weather Service (SAWS). Low-Frequency radio waveforms associated the observed events were inferred from Extremely Low-Frequency electric field measurements recorded at Sutherland simultaneously with the optical measurements. The results are presented and discussed.

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Session Classification: Space Science

Track Classification: Track D2 - Space Science