

Very Active Sprite-Producing Thunderstorms Observed Over Argentina and Brazil

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To investigate sprite activity over Argentina and Brazil, a field campaign was conducted from the Brazilian Southern Space Observatory near Santa Maria, Rio Grande do Sul. We observed more than 500 sprites and halos during two large thunderstorm systems on February 23 and March 4, 2006, which included the third most active sprite-producing storm ever reported. We present an overview of the campaign, which includes sprite video images and extremely low to very low frequency (ELF/VLF) electric and magnetic field data recorded at the observatory, along with coincident lightning location data from the World Wide Lightning Location Network (WWLLN). We also present meteorological conditions inferred from GOES Infrared imagery, TRMM rainfall data, WWLLN lightning locations, local radar data, and the BRAMS mesoscale model. Within the high sprite activity, we identified several sprites driven by negative cloud-to-ground (CG) lightning. Downward directed electric fields should be absent following negative CG lightning, so the observation of negative CG sprites challenges runaway breakdown theories of sprite production. We show that the negative CG sprites were less bright and had limited vertical extent compared with positive CG sprites from the same storm. A second finding is that these storms were large mesoscale convective systems with total cloud shields of 200,000 to 500,000 km² and that most sprites occurred in stratiform regions where cloud-top temperatures were about 15°C warmer than spriting regions of US High Plains storms.

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