

Space-time Evolution of Sprite Producing Thunderstorms During CHUVA Sul Campaign in 2012

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During the months of November and December of 2012 the CHUVA Project performed the southern component of its campaigns, designated as CHUVA Sul. During this campaign, a suite of meteorological sensors was installed in the southernmost state of Brazil, Rio Grande do Sul. In order to perform observations of Transient Luminous Events – TLEs, as part of this campaign, a team from the Atmospheric and Space Electrodynamical Coupling – ACATMOS group of INPE set up optical observation sites at the headquarters of Anti-Granizo Fraiburgo-AGF company in Lebon Regis, Santa Catarina State, and at SIMEPAR radar site, near Curitiba, Paraná State.

TLE is the generic term adopted to designate optical emissions excited in the upper atmosphere above thunderstorms as a consequence of intense electric fields of lightning discharges. They are of low luminosity, 100s of kR – 10ths of MR, therefore only observable at night, and of short duration, few ms to few 100s of ms. They signal the electrodynamic coupling between the atmospheric layers and sprites are the most spectacular of these events.

In the nights of 18-19/11/12 e 10-11/12 sprites above Rio Grande do Sul were recorded from the AGF site. A total of 17 sprites were recorded during these observations. This paper will present preliminary results describing the temporal and spatial evolution of the thunderstorms that generated the observed sprites. The work was performed using IR and Water Vapor images from the GOES 12 weather satellite, lightning data from the BrasilDAT network, and estimated locations of the sprites. We will present preliminary information on the life cycle of the storm, its expansion rate and the estimated overshooting of the cloud tops. We will also show the initial results of the relationship between the sprites and the lightning by identifying the cloud top regions above which sprites were generated, as well as the regions where the parent lightning may have withdraw charge from. Other aspects of this research, further characterizing the sprites observed, the parent lightning, the synoptic and thermodynamical scenario that led to the formation of the sprite producing thunderstorms and further details of the internal structure of the storms based on radar data will be presented in different papers from the co-authors of this work.