LEONA for TLE and HEET Research in South America

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Abstract Text:

In 2014 the core of LEONA, which is the “Transient Luminous Event and Thunderstorm High Energy Emission Collaborative Network in Latin America”, was established in Brazil with 4 ground stations equipped to perform Transient Luminous Events – TLEs. This year a neutron detector was also installed to collect data on neutron flashes produced by lightning and thunderstorms themselves. Neutrons are one of the several types of High Energy Emissions from Thunderstorms – HEETs. The TLE stations are operated remotely via internet, by users logged in LEONA website, and the HEET station is continuously and automatically operated. Now a proposal to expand LEONA to have 12 TLE ground stations, 2 HEET ground stations (for neutrons, gamma and X rays) and 1 HEET mobile station (for gamma and X rays) is currently under evaluation by the Brazilian São Paulo Research Foundation – FAPESP, and if funded will start to be carried out in early 2018. The expanded version of LEONA will cover the Central Region of South America, including Southeast and Southern Brazil, Northern Argentina, Paraguay and Uruguay, which compose the most electrically active Region of South America. It will also have one TLE station in the Amazon and Northeast Regions of Brazil. South America is one of the most active thunderstorm regions of the world, with extremely large and long lived thunderstorms. Due to the South Atlantic Magnetic Anomaly – SAMA, covering most of its territory, scientific satellites routinely turn off their equipment while flying over South America, therefore a ground network like LEONA is the only way to make consistent long term measurements of TLEs and HEET in this important region of the world. This paper will present LEONA in detail, its current operational status and its expansion plan over the next 4 years. It will also highlight the main results of the different TLE observations performed from Brazil up to date by the Atmospheric and Space Electrodynamical Coupling – ACATMOS group at the Brazilian National Institute for Space Research – INPE, undertaking this challenging enterprise.