

## **Coordinated investigations of sprite characteristics and energetics over Brazil**

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In November, 2002, and March, 2003, two coordinated campaigns were conducted over southeastern Brazil to investigate the existence, characteristics and energetics of transient luminous events (TLE), in the mesosphere which are associated with large positive lightning discharges. The campaign comprised three main components: (1) high-altitude, balloon-borne measurements of the sprite electromagnetic signatures and their energetics, (2) aircraft and ground-based intensified image measurements of sprite occurrence and their spatial characteristics, and (3) ground-based lightning detection and location measurements. Two stratospheric balloons were successfully flown over large, active thunderstorms and we recorded electromagnetic data on the largest electric field transients from positive lightning ever obtained over thunderstorms above 30 km. Optical measurements, using intensified CCD video cameras equipped with GPS timing, were made from the balloon launching station at Cachoeira Paulista (23°S, 45°W), and from an Embraer aircraft (operated by the Instituto Nacional de Pesquisas Espaciais; INPE). These observations provided the first quantitative measurements of sprites over Brazil from which we have been able to investigate the charge moment distribution for the sprites. However, the weather conditions prevented simultaneous in-situ balloon and optical observations.

A new coordinated campaign has recently been funded by the U.S. National Science Foundation to continue our coordinated investigations and two campaigns will be conducted – in October 2005 and in February-March, 2006. The new measurements will be made from Santa Maria (29.7°S, 53.8°W), Rio Grande do Sul, in order to fly over some of the largest storms in the world (which occur over southern Brazil and northern Argentina). In addition to the previous electronic and optical capabilities, two major improvements have been developed: video image measurements from the balloon itself, and the addition of a down-range telemetry receiving station for accessing more distant sprite-active thunderstorm data. Charge moment changes and related lightning parameters will be measured using a set of ground-based extremely-low and very low frequency electric and magnetic field sensors (from Duke University), complemented by lightning timing and geo-location information provided by the Brazilian lightning detection network that is currently being extended into southern Brazil. This talk will highlight results from the first campaign and will discuss the planned new observations.