

E-CANES: Toward a Global Research Community in Electromagnetic Coupling of the Atmosphere with Near-Earth Space

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Transient luminous events, denoted sprites, elves, blue jets and gigantic jets, are observed in association with particularly intense lightning discharges above thunderclouds. In addition to their optical signatures, transient luminous events can also be characterized by their distinct radio wave signatures. They also produce infrasound in the atmosphere and they have been associated with X- and gamma ray emissions in the Earth's atmosphere. Their occurrence rate may depend both on extraterrestrial phenomena (e.g. cosmic rays, meteorites, solar activity) and on environmental conditions (e.g. volcanoes, geomagnetic field, geomagnetic latitude). Transient luminous effects also have an influence on global processes (e.g. the global electric circuit).

New space missions are now planned to understand these phenomena and their origin, and to tackle the role of relativistic processes in atmospheric electrodynamics, e.g. the micro-satellite TARANIS, the ASIM payload on board the International Space Station and the sprite watch satellite. All these ground breaking space missions will result in challenging new data, which require knowledge based capacity building to underpin the new experimental observations with improved statistical data analysis and theoretical modelling. We propose to establish a global framework for research on (1) the triggering of lightning discharges and transient luminous events, (2) the physical coupling mechanisms between cosmic rays, lightning discharges, transient luminous events and terrestrial gamma ray flashes, and (3) the environmental impact of the above physical processes on the atmosphere, near-Earth space and mankind.

This is the aim of the E-CANES european research group (GDRE) on 'electromagnetic coupling of the atmosphere with the near-earth space'. This research network comfortably complements in a synergistic way the former Research Training Network 'Coupling of Atmospheric Layers', the existing COST action on 'the physics of lightning flash and its effects' and other programs. The main objective is to initiate and promote coordination activities towards a global research community on the subject trough,

among others, international conferences, focus workshops, exchange visits, review panels and technical coordination activities.