Lightning and TLEs and their effects on the lower and middle atmosphere

Lightning is the energetic phenomena of electrical breakdown, occurring after charge separation processes operating on micro and macro-scales, leading to strong electric fields within thunderstorms. Lightning has severe impact on the lower and middle atmosphere and can excite transient luminous events (TLEs) occurring at the stratosphere and mesosphere. In addition to this, lightning is always associated with severe weather and tropical storms like typhoons and hurricanes, often accompanied by torrential rains and flash floods. It has significant chemical and physical effects on the troposphere and mesosphere and drives the fair-weather electric field. In this session, new results derived from the recent satellite observations of lightning and TLEs (JEM-GLIMS mission) will be presented. This session also seeks contributions on the meteorology of thunderstorms, the detection of thunderstorms from space and ground networks, using lightning data as proxy for severe weather, the climatic effects of thunderstorms and their impact on the global circuit.

VLF subionospheric disturbances and electrical properties of lightning discharges observed by JEM-GLIMS mission

In this paper we report the preliminary results of ionospheric perturbation and causative lightning discharges observed by JEM-GLIMS mission to study the electromagnetic coupling mechanism between the tropospheric lightning and overlaying ionosphere. Continuous nadir optical observations of lightning discharges are performed by ISS JEM-GLIMS mission and many lightning images have been observed globally. Ionospheric perturbations and electrical properties of causative lightning discharges such as polarity and vertical charge moment changes are derived by the data from UEC's ground-based observation networks of VLF/LF transmitter signal reception and of ELF waveforms respectively. We discuss the electrical coupling efficiencies from the tropospheric lightning to the ionosphere by comparing the area of the lightning flash and corresponding subionospheric VLF disturbances and
lightning properties.