



First satellite measurements of chemical changes in coincidence with sprite activity: characteristics of the TLE-producing convective system

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Sprites are some of the Transient Luminous Events (TLEs) that occur in the upper atmosphere above thunderstorms as a direct consequence of thunderstorm electrical activity. Sprites are formed by mesospheric streamer plasma channels, inside which chemical reactions take place altering the local composition of the atmosphere. Among the gases that may be produced by sprites are the nitric oxides that take part of the ozone destruction cycle, therefore understanding the characteristics and distribution of TLE-producing thunderstorms is necessary to quantify their overall impact on the upper atmosphere. On August 25th, 2003, 20 sprites were observed above a Mesoscale Convective System (MCS) over Corsica, the Mediterranean Sea and Northern Italy, by a camera located at Pic du Midi as part of the Eurosprite campaign. The MCS lasted for 16 h and reached a maximum extent of about 222,000 km² about 6 h after it initiated. Sprite activity was only detected about 2 h later and, during this phase, MIPAS spectrometer onboard the Envisat satellite detected substantial enhancement of ambient NO₂ directly above the sprite producing MCS (see companion paper by Arnone et al. for details on chemical changes). In this paper we present the characteristics of the convective system for which, for the first time, TLE-induced chemical changes were observed. The peculiarities of these systems are discussed in comparison with previously observed systems. On the basis of these observations, we present the prospects of adopting a similar strategy in Brazil and South America, as well as future observation scenarios in this continent.