



Lightning ionospheric effects during 2003 and 2004 Eurosprite campaigns

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During the 2003 and 2004 Eurosprite campaigns, supported by the CAL team, various experiments were realised in Western Europe: optical observations, lightning map, infrasound recordings, narrowband and wideband VLF observations and wideband HF electric field waveform measurements. The CEA installed three stations to measure the vertical electric field with dipole whip antenna. The measurement is triggered when the electric field exceeds a threshold of 3 V/m. The stations are distant from each other of around 400 km. The electric field is digitalised from few kHz to 10 MHz. Lightning are detected on spectrograms of the HF component (0.5 - 10 MHz) as a vertical line; furthermore during the night, the numerous radio carriers appear as horizontal lines. We notice the disappearance of these radio carriers during several milliseconds a millisecond after lightning. For more than 4000 cloud to ground lightning, which had been triggered in one of the station during two months, we measured the amplitude of the fading of few selected carriers from 900 to 1600 kHz, as well as the onset time, the minimum time and the recovery phase time. We plot an impact map of the fading considering the location of the lightning. This fading may be explained by the D region ionisation which is due to the electromagnetic pulse of the lightning and is strong in comparison to the night-time ionisation of this ionospheric region. We estimate the maximum electron density which has been produced, using the maximum fading and an ionospheric propagation model. We show thus that lightning are a main source of the D region ionisation during the night.