



Analysis of the lightning flashes associated with very large and luminous sprites in Western Europe

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During the last decade, a large number of sprites were observed thanks to low-light video cameras located in southern France, especially at Pic du Midi (2877 m) in the Pyrénées mountain range and at the Albion Plateau (1000 m) in the south-east of France. Sprites are Transient Luminous Events (TLEs) consisting of streamer discharges, that develop at the base of the ionosphere and whose structure, size and brightness are very variable according to the density and the dynamics of these streamers. The largest type is called jellyfish or « A-bomb » sprite, and it corresponds generally to a very impulsive return stroke. Among more than 3000 sprite events in the database, we selected a few cases with large size and very strong light emission. The goal is to determine the characteristics of the flashes that produced them and the storm context in which they occurred. Thus, we analyse the video imagery, the thundercloud structure, the current moment waveform of the lightning strokes, the radiations at various frequencies from the lightning flash. We show that such very bright sprites can occur above thunderstorms at any period of the year. The favourable conditions for their production seem to be stationary thunderstorms and one case of storm produced five of them. All cases of these sprite events are associated with a halo and they are produced with a very short delay after strong positive cloud-to-ground strokes. The peak current of these strokes is about 150 kA in average and their iCMC values can reach close to 2000 C km. The leader processes and the stroke location in the thundercloud are analysed in detail for some cases.