

Bright flashes in upper layers of atmosphere and in gas discharges

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In last decade (from 1990) increases the interest to bright shining objects in upper atmosphere (red sprites and blue jets). Sprite is discharge with intensive radiation in red region of spectrum, arising on heights of 75-90 km under lightning influence. They are generating by pulsed electric fields, accompanied by shock waves, which are propagating from thunderclouds to higher atmosphere. They are observing in places northern then the Caribbean Sea, where in stormy months of summer and autumn are appearing powerful thunderstorms with intensive lightning.

E is the amplitude of electric field and is forming by thunderstorm. E is decreasing with heights slower then atmospheric pressure P. On defined height will establish such E/P, which will lead to gas disruption. This kind of disruption is appearing near the boundary with ionosphere. Charged particles from ionosphere by getting downward can lead to disruption of air. Disruption on boundary with ionosphere can raise an air vortex motion, which will involve in processes of sprite formation.

The duration of red sprites can vary between hundreds of μs and tens of ms. Total average optical energy of transmission from sprites per one action is up to 50 kJ. For sprite average duration 3 ms, optical power can reach 15 MW. From spectral diagram of red sprites we can see clear-cut spectral line with wavelength $\sim 6700 \text{ \AA}$.

In this report we are present an experimental investigations of discharge in the air, oxygen and nitrogen. From this is coming out that in laboratory condition in air were got flashes similar to sprites with radiation of oxygen in red region of the spectrum.

Sprites pulsed character and sufficiently great density of flash's brightness shows that these flashes are induced rather then spontaneous. This is coming out also from registered results.