

THE ALTITUDE DEPENDENCE OF SPRITE INFLUENCE ON THE CHEMICAL BALANCE OF THE MESOSPHERE

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A great interest is shown to the high altitude discharges: sprites, elves and jets lately. Lot of experimental data was accumulated, yet the question of sprite influence on the chemical balance of the mesosphere is still open. Recent researches gave evidence that a sprite discharge provides increasing of electron temperature and electrical field at mesospheric altitudes. As the rates of many chemical reactions depend on the above mentioned parameters, sprites provide the variations in excited atoms, molecules and charged-particle composition.

We have developed a plasma-chemical model including 200 reactions and 40 chemical components. It had been analyzed for the altitude of 85 and 75 km, both for day and night conditions. Those altitudes differ in ions structures, which means the differences in the relaxation time of perturbation of chemical components, as well as the components themselves. The components most sensitive to variations of external parameters have been determined. We have analyzed the dynamic of relaxation, marked the reactions, responsible for the perturbation of chemical components.

It is of a great interest taking into account an evidence that positive cloud-to-ground lightning flashes and sprites may appear as often as several per minute for most intensive thunderstorm systems. In this way, the influence of sprite on the chemical components with short and long time of relaxation would be different. For the long relaxation period components, such as NO^+ and electrons perturbations on several consecutive sprites may accumulate. This was proved on the example of two consecutive sprites.

sprite, chemical balance

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