LIGHT SPOT TEST

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Annotation: The article relates to atmospheric optics, it describes a field technique for determining the presence in the atmosphere of conditions for the formation of the optical phenomenon of light pillars.

It is known that the atmospheric optical phenomenon of light pillars is observed in the presence of two conditions: the presence of ice crystals in the atmosphere with a dominant reflective surface and their position oriented in the atmosphere. For example, flat ice crystals have two dominant reflective surfaces. Crystal orientation refers to the location in the atmosphere of a sufficient number of crystals in a similar position relative to, for example, the zenith point. For the formation of the effect of pillars from the light source, it is required that the orientation of the crystals leads to the coincidence of a sufficient number of reflection effects of the dominant reflective surfaces from the light source.

To determine the presence in the atmosphere of conditions for the formation of the effect of light pillars in the field, it is possible to conduct the described light spot sample. To conduct the sample, the atmosphere is illuminated by a wide-angle light source, and the atmosphere is observed near the lighting source.

If there are regions in the atmosphere in which ice crystals have a dominant reflective surface, and they are oriented, then an increase in reflection in accordance with Fresnel's law in the form of a light spot will be observed from the atmosphere along the normal of the reflective surface of oriented crystals (Fig. 1a).

Most often, with the effect of light pillars, the dominant reflective surfaces of crystals are located parallel to the surface of the earth, then the light spot during the sample will be observed at the zenith. If the ice crystals in the atmosphere do not have dominant reflective surfaces, or if the crystals in the atmosphere are not oriented, that is, they are located randomly, then the reflection of light from the specified source from the surrounding atmosphere will be random, and will be

spherically symmetrical and no light spot will be observed (Fig. 1b). The more pronounced the light spot will be, the larger the area of ordered crystals and the greater the degree of their ordering.

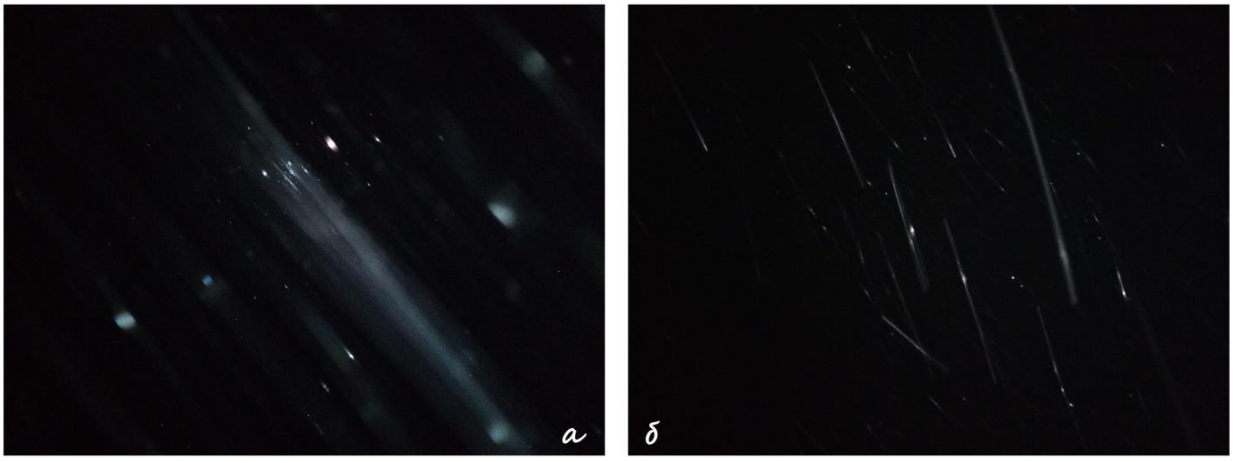

Figure 1. Light spot sample at dusk (a – positive, b – negative).

Literature:

Meteorology and Climatology. S.P.Khromov, M.A. Petrosyants. 7th ed/ Publishing house "Science"/ M. 2006.