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A technique for reconstructing the spatial characteristics of a long-lived meteor trails on all-sky cameras

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Over the years, reports of meteor trails lasting up to one hour have periodically appeared in the literature. These observations are usually associated with particularly strong meteor showers, such as Leonids. In [Kelley et al. 2000] some interesting observations of such trails related to the 1998 Leonid meteor shower event are presented [2]. In publications devoted to the study of this phenomenon in the optical range, the main attention is paid to processes that cause a prolonged luminescence of meteor showers [Kelley et al., 2000]. Meanwhile, this phenomenon is of great interest for diagnosing the Earth upper atmosphere state and the ionosphere. The bulk of the work in this direction is based on radar observations of ionization traces, the duration of which in some cases reaches several minutes [Kashcheev et al., 1967].

This paper reports on long-lived meteor trails (LMT), which was recorded simultaneously using two optical instruments recording night sky emissions. The first all-sky camera is located at the Geophysical Observatory of the ISTP SB RAS, near the Tory (51.80 N, 103.10 E) and is designed to record the spatial picture of the 630 nm emission intensity [<http://atmos.iszf.irk.ru/ru/data/keo>]. The second all-sky camera is located in the Sayan Solar Observatory of the ISTP SB RAS, near the Mondy (51.60 N, 100.90 E). A meteor trail lasting 35-40 minutes was recorded on November 18, 2017 after a meteoroid explosion on 22.23.19 UT with two cameras from different directions. Further, an algorithm was developed with the Python programming language the geographical coordinates of this event were calculated, as well as the height of the highlight

. The meteoroid explosion height and the ellipsoidal trail was being 65-70 km. Then the meteor track bow spread horizontally in a southward for 30-40 minutes at an average velocity of 58 m/s. This technique can be used to determine the main characteristics of various phenomena in the atmosphere, such as waves, SAR-arcs, meteor tracks and others.

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