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Statistical analysis of pulsating auroras from the PAIPS experiment data

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In September 2021, through the joint efforts of the Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University (SINP MSU) and the Polar Geophysical Institute (PGI), a high-sensitivity photometer (PAIP-V) was installed at the PGI's "Verkhnetulomsky" observatory. The detector was installed near the all-sky optical camera and observes the central part of its field of view (20°×20°). The detector's electronics provide a temporal resolution up to 1 ms, and its sensor array (16×16 PMTs) allows recording luminosity in the UV range (300–400 nm). The experiment is described in more detail in [1].

Over four seasons of the project's operation (2021–2025) 246 pulsating aurora (PsA) events were recorded. A statistical analysis of the observation conditions, occurrence time, pulsation duration, and characteristic frequencies was carried out for these events. A database of light curves and scalograms has been compiled on the project's website (https://uhecr.sinp.msu.ru/calendar). The distribution of events by MLT was obtained: most events occur in the night and morning sectors (from midnight to 7 AM, with a peak around 4 AM). The duration varies from 1 to 9 hours. The average duration was 2-4 hours, and it tends to increase during the growth of solar activity in the 25th solar cycle. The geomagnetic conditions under which the PsA events were recorded have been analyzed. Most of them were observed under disturbed geomagnetic conditions (substorm activity or the geomagnetic storm recovery phase), but some events were recorded under relatively quiet conditions. A detailed statistical analysis of the PsA events recorded during the experiment will be presented in the report.

References

1. P. Klimov P, S. Sharakin, A. Belov, B. Kozelov, A. Murashov, R. Saraev, D. Trofimov, A. Roldugin, V. Lubchich. Atmosphere. 2022. 13(10):1572

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