Magnetic Impulse Events at Night

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At night, both against the background of substorms, and during magnetically quiet time, magnetic impulse events (MIE) are often recorded at high-latitude magnetic stations. MIEs are pulses of large amplitude (of the order of tens to hundreds of nT in both horizontal and vertical components) with a characteristic duration of 5 to 10 minutes, localized in space with scales of about first hundred kilometers order. It is known that rapid geomagnetic field changes can cause extreme values of geoelectric fields and geo-induced currents that have a negative impact on power lines, automation systems for high-latitude railways and other infrastructure objects, failures in operation of which are associated with significant material damage to national economy and reduce the safety of their operation. Field variations caused by geomagnetic field impulse disturbances reach 30 nT / s, which significantly exceeds the variations (10 nT / s) that during the magnetic storm of 1986 caused both multiple local failures in the power systems of Quebec (Canada), up to the destruction of transformers, and a violation of high-frequency radio communications around the world. The paper represents the results of a comparative analysis of statistical distributions for the values of amplitude and rate of change of MIE variations at night, recorded during 2016-2017 at the polar and auroral latitudes in northeastern Canada. Questions concerning the frequency of occurrence of magnetic impulse events, their connection with magnetic storms and substorms, and possible generation mechanisms are considered.