

EGU22-751

<https://doi.org/10.5194/egusphere-egu22-751>

EGU General Assembly 2022

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Can ground infrasound measurements be a useful complementary technology in studies of streamer events?

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Streamer events are induced by breaking of planetary waves near the tropopause. Streamers are significant transient disturbances to the seasonal circulation patterns in the tropopause-stratosphere region at mid latitudes. They modify dynamics of the polar jet stream and of the lower stratosphere. At streamers' flanks, strong wind shear occurs and gravity waves can be excited. Western Europe and the surrounding regions of the North Atlantic are typical regions where streamer events develop.

Long range infrasound propagation is mainly controlled by temperature and wind fields in the atmosphere. Zonal winds in the stratosphere and jet stream near the tropopause belong to key factors that drive infrasound propagation.

A feasibility study on utilisation of ground infrasound measurements in research of streamer events was performed under the ESA's Aeolus+Inovation project Lidar Measurements to Identify Streamers and Analyse Atmospheric Waves. Three western stations of the Central and Eastern European Infrasound Network WBCI (50.25°N 12.44°E), PVCI (50.53°N 14.57°E), and PSZI (47.92°N 19.89°E) were included in the study of streamer events from February 2020 to March 2021. WBCI is a large aperture array used for observations of low frequency infrasound in the frequency range of 0.0033-0.4 Hz. The stations PVCI and PSZI operate in the infrasound band of 0.05-5 Hz. We focused on statistical comparison of infrasound arrival parameters in periods influenced by streamer events and on calm days.

The presented analysis of the data of the three infrasound stations located in Central Europe did not identify significant first order phenomena related to streamer events. Considering further streamer events and including more stations is necessary to find out if ground infrasound observations could serve for monitoring of streamer events.

