

New curiosities observed from ground-based data: KHF-VLF Emissions

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Thanks to the implementation of sferics filtering above $f = 4$ kHz, a previously unknown strange spectral world of differently structured high-frequency waves has been observed on the ground station of Kannuslehto (KAN, MLAT=64.4°N, L=5.46). These type of signals were first reported by Manninen et al. 2016 using using 1-hour spectrogram, where they often resembled 'sticks' or 'wands'. However, looking more closely they seem to be mostly composed of hiss bursts with durations of a few seconds. An example of two observations made by KAN is shown in Figure 1. These high frequency VLF emissions have been named KHF-VLF, standing for Kannuslehto High-Frequency VLF.

During campaigns where KAN was active between 2006 and 2015, they KHF-VLFs were observed during 60 to 90% of all campaign days. KHF-VLFs were often detected during the winter campaigns in the period between 2016 and 2019. We noted that when solar activity was high KHF-VLFs were observed very regularly. For example, during the winter 2014-2015 campaign, they were observed on 52 days out of 59, and in winter 2015-2016 on 75 days out of 91.

While these type of emissions are clearly observed quite often, currently there are no statistical studies on the occurrence and properties of these waves. Here, we will present the main characteristics of KHF-VLF emissions, their latest observational results from KAN data, as well as discussing observations at other VLF ground-stations and/or satellites in the inner magnetosphere.

Keywords: ELF/VLF, plasma waves, ground-based observations, subauroral latitudes

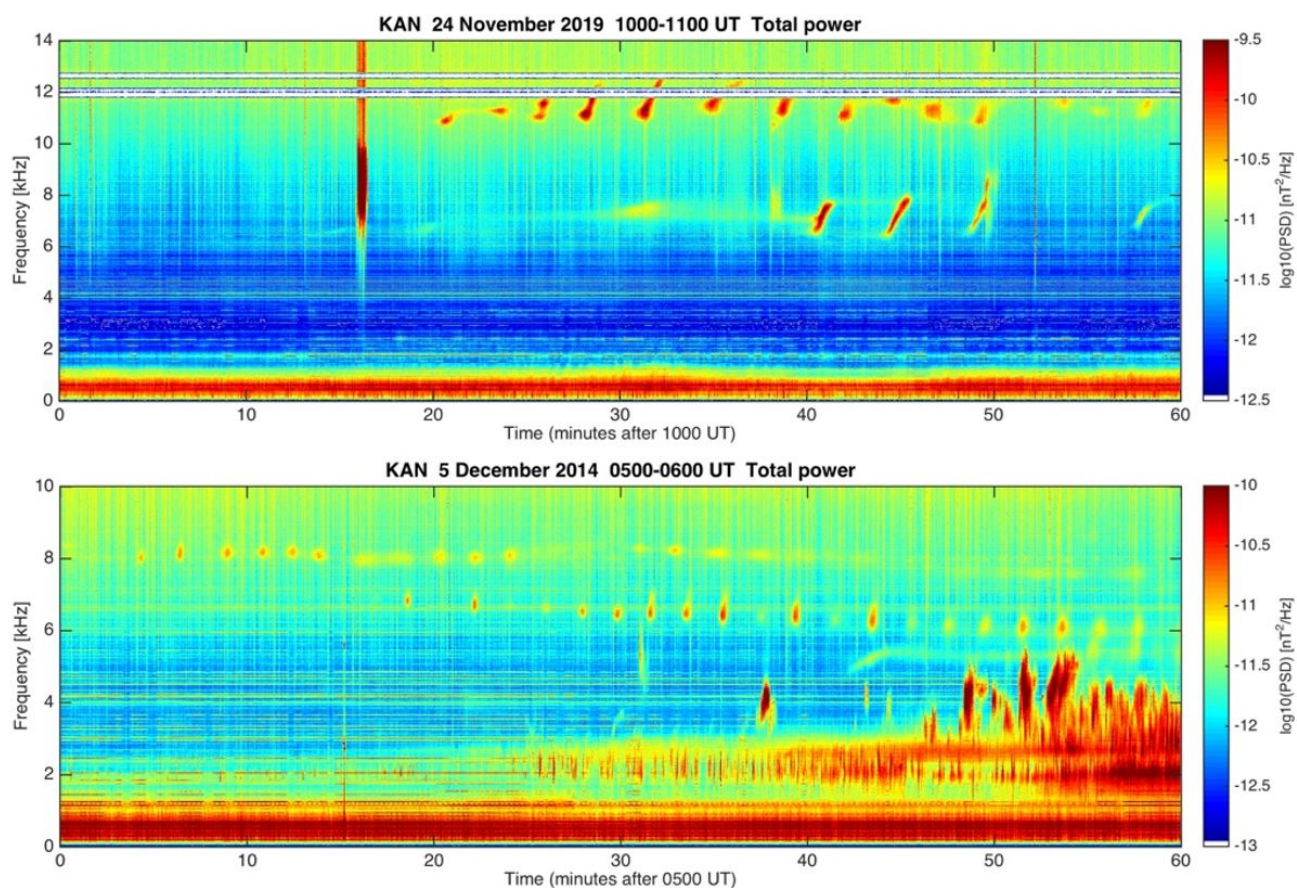


Figure 1. Two examples of KHF-VLF events. Non-typical emissions are seen above 6 kHz.