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Number of transients/Q-bursts in ELF-band as possible criterion for global thunderstorm activity estimation.

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Schumann resonances (SR) are resonant electromagnetic oscillations in extremely low frequency band (ELF, 3 Hz – 3 kHz), which arise in the Earth-ionosphere cavity due to lightning activity in planetary range. The time records in the ELF-band consist of background signals and ELF transients/Q-bursts superimposed on the background exceeding it by a factor of 5 – 10. The former are produced by the common worldwide thunderstorm activity (100 – 150 events per second), the latter origin from individual intense distant lightning discharges (100 – 120 powerful strokes per hour). A Q-burst is produced by a combination of direct and antipodal pulses and the decisive factor for its shape follows from the source-to-observer distance (SOD).
Diurnal/seasonal variations of global thunderstorm activity can be deduced from spectral amplitudes of SR modes. Here we focus on diurnal/seasonal variations of the number of ELF-transients assuming that it is another way of lightning activity estimation. To search for transients, our own code was applied to the SR vertical electric component measured in October 2004 – December 2008 at the Astronomical and Geophysical Observatory of FMPI CU, Slovakia. Limits (min-max) for the width of primary spike, time difference between primary and secondary spike and the amplitude of the spike were chosen as criteria for the identification of the burst. Cumulative spectral amplitude of the first three SR modes compared with number of ELF-transients in monthly averaged diurnal variations quite successfully confirmed, that the number of transients can be a suitable criterion for the quantification of global lightning activity.