

SURVEY OF ENERGETIC PARTICLE PRECIPITATION - AUTOMATIC DETECTION OF ENHANCED TRANSIENT IONISATION IN THE MESOSPHERE USING SUBIONOSPHERIC NARROW BAND VLF SIGNALS

PÉTER STEINBACH (1,2), János Lichtenberger (2), and Csaba Ferencz (2)

(1) MTA-ELTE Research Group for Geol., Geophys and Space Sci, HAS, Budapest, Hungary (steinb@sas.elte.hu)

(2) Space Research Group, Eötvös University, Budapest, Hungary (spacerg@sas.elte.hu)

Powerful signals of VLF transmitters, propagating long range in the Earth-ionosphere waveguide have been widely applied as effective tools for monitoring transient mesospheric ionization. Perturbations in recorded amplitude and/or phase data series may refer to the effect of loss-cone precipitation of trapped energetic electrons (Carpenter et al., 1984, Dowden and Adams, 1990), burst of solar plasma particles (Clilverd et al., 2001). The contribution of precipitating particles are thought to be substantial in certain Sun-to-Earth energy flow processes in the upper atmosphere (Rodger et al., 2005). Hungarian narrow band VLF measuring network has been operated in Hungary in the last decade almost continuously, dedicated to monitor ionization enhancement regions along numerous transmitter-receiver paths. This setup is based on Omnipal and Ultra-MSK equipment, logging amplitude and phase data of received signals, sampled at frequencies of selected VLF transmitters. Signal trajectories, selected for recording represent proper configuration to survey transient ionization caused by energetic particles in the sub-polar region, such as effect of scattered particles of the inner radiation belt. Data processing results in the mass archived VLF recordings is presented based on an automated event detection procedure, developed recently. Occurrence rates, daily and seasonal variation, statistics of transient ionization enhancements, their geographic distribution within the surveyed range and time period are the primal outcome of this analysis.

References:

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Trimpi perturbations, event detection

P. Steinbach, Space Research Group, Eötvös Univ., Budapest, Hungary, (+36 1 3722906), steinb@sas.elte.hu