Geophysical Research Abstracts
Vol. 21, EGU2019-5264, 2019
EGU General Assembly 2019

Enhanced whistler occurrence rates close to VLF transmitters

Jan Zahlava (1), Frantisek Nemec (1), Ondrej Santolik (2,1), Michel Parrot (3), Ivana Kolmasova (2,1), and Jean Luis Pincon (3)

(1) Charles University, Faculty of Mathematics and Physics, Department of Surface and Plasma Science, Prague, Czech Republic (jan.zahlava@centrum.cz), (2) Czech Academy of Sciences, Institute of Atmospheric Physics, Department of Space Physics, Prague, Czech Republic, (3) LPC2E/CNRS Orléans, Orléans, France

Ground-based military very low frequency (VLF) transmitters produce strong narrowband emissions. These propagate in the Earth–ionosphere waveguide and eventually penetrate through the ionosphere and propagate to larger radial distances. Significant ionospheric perturbations can be induced during the process, and, additionally, energetic electrons at a given L-shell can be precipitated due to their interaction with the transmitter signals. The plasma wave environment around the transmitter locations might thus be different than elsewhere. We use electromagnetic wave measurements performed by the DEMETER spacecraft to investigate this phenomenon. The neural network onboard DEMETER allows us to identify individual lightning whistlers observed by the spacecraft and to analyze their occurrence rates as a function of the distance from a VLF transmitter. We show that while for some transmitters lightning whistler occurrence rates peak close to the transmitter locations, for some transmitters no such effect is observed. We discuss this in terms of different transmitter frequencies and locations. We also investigate the significance of lightning whistler dispersion and local time.