D-region electron density enhancements due to Solar flares estimated from VLF recordings of close GCPs

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X-ray radiation from Sun in range 0.1-0.8 nm during Solar flare events induce remarkable transient enhancements in D-region electron density height profile, forcing Very Low Frequency (VLF) radio signals to undergo perturbations, causing amplitude and phase delay to distort from their regular unperturbed values and common behavior. This makes VLF radio signals (3-30 kHz) efficient and widely used tool for probing of lower ionosphere ionization within D-region (50-90 km). D-region electron density enhancements, induced by several X-ray Solar flares that occurred in second half of 23rd Solar cycle were estimated, based on narrowband recordings of GQD and NAA VLF signals transmitted from Maine (44.63N, 67.28W) USA and Skelton (54.88N, 3.28W) UK and simultaneously received in Serbia and Hungary. Solar X-ray data were obtained from GOES satellite database. According to observed flare induced amplitude and phase delay perturbations of analyzed VLF signals, D-region electron density height profiles were calculated throughout entire duration of analyzed flare events, by utilization of Long Wave Propagation Capability (LWPC) numeric routine code for modeling VLF subionospheric propagation. Main results are presented in this paper.