Geophysical Research Abstracts
Vol. 16, EGU2014-445, 2014
EGU General Assembly 2014

Modeling D region Electron Density Enhancement Due to Solar Flares and Comparison with Algiers VLF Receiver Data

Yasmina BOUDERBA (1), Samir NAIT AMOR (2), and Mouloud TRIBECHE (3)

(1) Research Center on Astronomy, Astrophysics and Geophysics (CRAAG), Algiers, Algeria (yasminabdb@hotmail.com),
(2) Research Center on Astronomy, Astrophysics and Geophysics (CRAAG), Algiers, Algeria (naitamorsamir@hotmail.com),
(3) University of Sciences and Technology Houari Boumediene (USTHB), Algiers, Algeria (mouloudtribeche@yahoo.fr)

Solar flares cause additional ionization in the D layer of the ionosphere (60-90 Km), which appears as amplitude and phase perturbations on the VLF signal. In this work, we present results of the properties of the VLF signals perturbations (amplitude, phase, h' and β) and their dependences with solar flares flux (For the period: 2007-2012). In this analysis two VLF transmitters paths are chosen, a short path: NSC (45.9 KHz, 941 Km) and long path NRK (37.5 KHz, 3495 km). In addition to the VLF data analysis, a numerical modeling of the D layer ionization due to solar flares was made at different heights (65-80 km). Qualitatively, the data analysis showed that the perturbed signal behavior is different from one path to another. In fact, some solar flares are associated with decreasing amplitude and increasing phase, increasing amplitude and decreasing phase, and finally decreasing or increasing in both amplitude and phase. This behavior is independent on the solar flares flux, but it is closely related to the modal structure of the VLF signal.Numerical results show that the increasing solar flares flux leads to the increasing of electron density and thus reducing the reflection height of VLF signal. Therefore, the recovery times of perturbed signal depend on the reflection height lifetime. The comparison between the calculated and measured densities as a function of solar flares flux at different heights gives similar profiles.