



## **Diurnal, Seasonal and Solar cycle variation of D-region ionosphere at low equatorial latitude inferred using long term VLF observations**

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### **Abstract**

The probing of D region ionosphere is tricky and complicated as its altitude is too low for satellites and too high for balloons and due to low electron density, ionosonde cannot receive echoes. Hence, the D region remains the least explored region of the Earth's ionosphere even today. Fixed very low frequency (VLF) narrowband signals from various VLF transmitters located across the world propagate by multiple reflections through the waveguide formed by the Earth and the lower ionosphere called Earth-ionosphere waveguide form the novel tools for continuous monitoring of the D region ionosphere. Studies in the recent past depicted interesting results on different solar phenomena such as solar eclipse, geomagnetic storm, and solar flares etc and variation over these temporal scales are chosen, since they correspond with variation in solar irradiance upon the earth's atmosphere known to drive ionosphere height variation. However, detailed analysis on the diurnal, seasonal variation is not dealt yet. In the present study, we perform detailed analysis about the diurnal, seasonal, inter-annual and solar cycle variation by utilizing NWC (19.8 kHz) VLF signal recorded by the VLF stations located at Allahabad (25.75°N, 81.85°E, 230m amsl) and Nainital (29.42°N, 79.23°E, 1950m amsl) during 2007-2017 periods. Also, the vertical profiles of electron density will be computed by using Long Wave propagation model. The obtained results will be discussed in the light of current understanding of low-latitude D-region dynamics.