D-region Ionosphere Diagnostics with Tweeks Records at Allahabad and Nainital

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Lightning generated radio atmospheric that propagates long distances via multiple reflections through reflecting boundaries of the Earth-ionosphere waveguide (EIWG) shows sharp dispersion near the cut off frequency ~1.8kHz of The EIWG. These dispersed atmospherics at lower frequency end are called as 'tweek' radio atmospheric. In this work we have utilized the dispersive property of tweeks observed at low latitude Indian stations Nainital and Allahabad for the estimation of *D*-region electron densities at the ionospheric reflection heights. Direction finding technique has also been applied to determine the source locations of causative lightning discharge of tweeks. Geographic locations is determined by the intersection of two circles drawn taking distance travelled/propagation distance by tweek atmospheric from source location to Allahabad and Nainital stations. The results are in good agreement with World Wide Lightning Location Network (WWLLN) data. The average D-region electron density along the path travelled varied in the range ~20-35 el/cc at ionospheric reflection heights of 70-90km. To validate the obtained results the electron density profile obtained from IRI-2007 model and rocket data are compared. The solar zenith angle dependence of electron density also is in good agreement. The tweek method has unique advantage of monitoring lower boundary D-region of the ionosphere over a wide area of several thousands kilometres surrounding receiving stations.