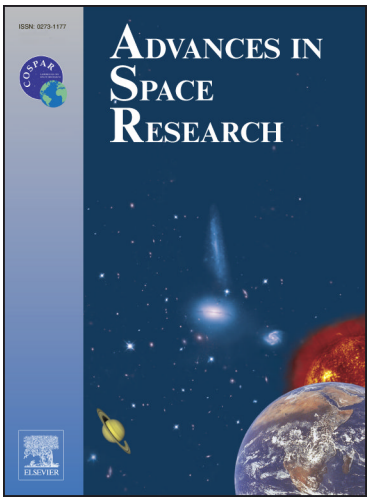

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Study of Ionospheric Disturbances over Mexico Associated with Transient Space Weather Events

E. Romero-Hernandez[a,b,*], J.A. Gonzalez-Esparza[d,*], M. Rodriguez-Martinez[e,*], M. Sergeeva[c,d,*], E. Aguilar-Rodriguez[d,*], J.C. Mejia-Ambriz[c,d,*], V. De la Luz[c,d,*]

[a] *Embrace, Instituto Nacional de Pesquisas Espaciais, São José dos Campos, SP, Brazil. CP 12201-970.*
[b] *LANCE, Universidad Autónoma de Nuevo León, Monterrey, México. CP 66451.*
[c] *CONACyT, Instituto de Geofísica, Unidad Michoacan, Universidad Nacional Autónoma de México, Morelia, Michoacán, México. CP 58190.*
[d] *LANCE, Instituto de Geofísica, Unidad Michoacán, Universidad Nacional Autónoma de México, Morelia, Michoacán, México. CP 58190.*
[e] *Escuela Nacional de Estudios Superiores, Unidad Morelia, Universidad Nacional Autónoma de México, México. CP 58190.*

Abstract

We present an analysis of ionospheric disturbances at a location in Mexico (dip latitude: 28°, geographic latitude: 19° N) using two different parameters: ionospheric scintillation (IONS) and Total Electron Content (TEC). This study employs observations during 2014-2015 of astronomical radio sources at 140 MHz obtained by the MEXican Array Radio Telescope (MEXART) and TEC values from Global Ionospheric Maps data. To identify the ionospheric disturbances two indices were used: the wavelet IONS index based on the wavelet transform function of MEXART data and the ionospheric W-index based on the deviation of TEC. A set of 55 wavelet IONS events and 63 W-index events were identified in this interval. We analyzed the association of theses events with solar flares that occurred around the solar zenith and/or geomagnetic storms. During this period, it was observed an incidence of daytime IONS at hours around the solar zenith. Some possible associations with solar flares were found. The preliminary results pointed out that, for this period, daytime scintillations could be linked to the occurrence of Es_b-layers. In addition, most of the W-index events were possibly related to geomagnetic storms. We found that the majority of these geomagnetic storms were minor and moderate storms and were characterized by steeper falls of Dst. This first analysis revealed that wavelet methodology is useful in identifying and analyzing ionospheric disturbances. Also, MEXART observations provide a good tool for performing IONS studies at mid latitudes.

Keywords: Ionospheric disturbances; Daytime ionospheric scintillation; Geomagnetic storms; Solar flares

*Corresponding author

Email addresses: eromero@igeofisica.unam.mx (E. Romero-Hernandez), americo@igeofisica.unam.mx (J.A. Gonzalez-Esparza), mrodriguez@enesmorelia.unam.mx (M. Rodriguez-Martinez), sergeeva@geofisica.unam.mx (M. Sergeeva), ernesto@geofisica.unam.mx (E. Aguilar-Rodriguez), jcmejia@geofisica.unam.mx (J.C. Mejia-Ambriz), vdelaluz@geofisica.unam.mx (V. De la Luz)