TRAVELLING IONOSPHERIC DISTURBANCES OBSERVED BY ALL-SKY IMAGING IN THE 630 nm EMISSION: A CASE STUDY IN THE BRAZILIAN TROPICAL SECTOR

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Using data from ground-based and satellite measurements we investigate the behavior and cause of an unusual Travelling Ionospheric Disturbance (TID) event that occurred over Cachoeira Paulista (22.7°S, 45°W, magnetic declination 20°W), Brazil, on the night July 13, 1999. During this night, the all-sky imaging measurements of the OI 630 nm emission showed light and dark bands, stretched across the entire imager, propagating from southeast to northwest. These patches moved at about 230 m/s at an altitude of 250-300 km, which is the typical altitude range of the OI 630.0 nm airglow emission. Also, ionosonde observations registered an abrupt enhancement in the F-layer peak heights (hpF2), as well as in the F-layer base virtual heights (h'F), when the TID's passed over Cachoeira Paulista. This behavior seems to be related to equatorward wind velocity enhancements, which push the F-layer plasma to higher altitudes along the geomagnetic field lines, thus causing the 630 nm airglow intensity reductions. It is shown that this thermospheric event is not related to geomagnetic disturbed conditions. Also, measurements of NIR OH, OI (557.7 nm) and O_2(0,1) showed active wave structures in the mesospheric region. At these mesospheric heights, around midnight, the all-sky imaging showed a bore-like wave-front passing overhead and propagating equatorward. In addition, GOES satellite images show, during this night, intense convection over tropics (a mesoscale convective systems) and middle latitudes (a cold front associated with a strong jet stream) usually associated with internal gravity waves in the tropospheric region. . In this work we present and discuss the influence of internal gravity waves, generated in the troposphere (propagating upward through the mesosphere and reaching the bottomside of the nighttime F region), as the main cause of these ionospheric disturbances.