

# **Ionosphere-thermosphere weather at middle and low latitudes**

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It has been clearly established that the ionosphere-thermosphere system exhibits both a background state (climatology) and a disturbed state (weather). At mid-latitudes, the background state is characterized by an electron density distribution that tends to be uniform, with a gradual transition from high electron densities on the dayside to low electron densities on the nightside. The background thermospheric state also tends to be uniform, with gentle winds blowing around the globe from the sub-solar point. The main characteristic feature seen at low latitudes is the equatorial anomaly, which corresponds to ionization peaks that are located on both sides of the magnetic equator. However, superimposed on the background state are stormtime disturbances, mesoscale (100-1000 km) structures, and plasma irregularities. For the ionosphere, these include traveling ionospheric disturbances (TIDs), sporadic E layers, sporadic He<sup>+</sup> layers, descending intermediate layers, ridges of enhanced ionization (storm enhanced densities), spread-F, and equatorial plasma bubbles. For the thermosphere, the weather disturbances include upward propagating tides and gravity waves, O/N<sub>2</sub> depletions, and neutral gas perturbations in the regions containing equatorial plasma bubbles. These and other weather disturbances in the middle and low latitude ionosphere-thermosphere system will be discussed.