

## ***The Spatial Distribution of Storm Enhanced Density based on analysis of GNSS TEC Measurements***

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Storm Enhanced Density (SED) involves the redistribution of ionospheric and magnetospheric plasmas. It is related to an enhanced upwelling of the equatorial anomaly. Based on the limited number of storm events studied to date, SED is observed primarily in the North American sector. Here, we will address the results of a study into the distribution of SED events.

SED is a plume-like structure of greatly enhanced TEC values (greater than 50 TEC units) that extends in a north-west direction from the east coast of the US, across the continental US, into Canada. SED is associated with large gradients and high ion flux values. It is typically observed between 17:00 and 23:00 UTC over the eastern US coast during moderate to severe geomagnetic storms. It has been shown that within the SED plume, 50% of the TEC is observed to be higher than 800 km based on comparisons between GPS and ISR TEC measurements. SED is associated with electric fields and velocities of 800 m/s, giving a ~2 hour transit time from its source at low latitudes to the polar cap at noon and a plasma flux to the dayside cusp ionosphere of  $10^{14} \text{ m}^{-2}\text{s}^{-1}$ .

To accomplish our study of the distribution of SED in latitude and longitude, we create a global TEC database by using measurements from GPS, JASON, and TOPEX, from the mid-1990s onward. We then perform statistical studies of the latitudinal and longitudinal distribution of SED to determine if there is evidence of the phenomenon in places other than the American sector. Next, we use the TEC database to develop a statistical study of the evolution of the observed SED structures as a function of onset time. Using our database, we characterize the distribution of SED over large regions of the globe and relate this distribution to a wide variety of geophysical conditions and parameters. We will report on the results of this study here.