

## Global Ionospheric TEC Changes during January 10, 1997 Storm Monitored by the Worldwide GPS Network

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Using the data from 12 SATLOC GPS stations which are nearly uniformly distributed over the US continent, for the first time, we have detected a significant ionospheric TEC disturbance in real time on January 10, 1997. The TEC data retrieved from these GPS receivers were transferred to our ionospheric storm monitoring facilities with a latency of about 3 seconds. Around 1630 UT of the day, the TEC enhancement reached its maximum (-40 TECU, equivalent to 4.5111 error in  $L_1$  band) in the southern US area from Florida to Baja California. This was an increase of more than 100% relative to the quiet time ionosphere. Within an hour, the data from 24 GPS stations distributed over the globe confirmed our finding of the enhancement and further showed that it was probably related to an equatorward expansion of another enhancement at high latitudes (north European) around local noon. The TEC data from more than 150 GPS stations coming within 24 hours generated more detailed global ionospheric TEC pictures. Significant response to the January 10 storm in the ionospheric TEC first was seen at 0300 UT as a subauroral enhancement around Alaska. Then this enhancement band extended from noon to midnight. Around 0900 UT, the enhancement at noon broke from the subauroral band and moved to low latitudes. At 1500 UT the enhancement around Mexico and southern US became obvious, and persisted until 2200 UT. This dayside northern hemispheric enhancement also corresponded to a conjugate enhancement in the southern hemisphere. However, the northern subauroral enhancement almost always corresponded to a conjugate depression in the southern hemisphere. During this period, some latitudinal structures (enhancements and depressions) were also seen. On January 11, a negative phase gradually became stronger (especially in the southern hemisphere). But the northern subauroral enhancement still persisted there one more day. The entire ionosphere gradually recovered to normal on January 12. Thus, equatorward motion of the dayside enhancement (probably related to a TID), the persistence of the subauroral enhancement, and their conjugate features in the southern hemisphere are the main characteristics of this storm.

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