

## First fast snapshots of mid-latitude ionospheric trough by TEC data of American-wide GPS network

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<http://stdb2.stelab.nagoya-u.ac.jp/GPS/TEC-DAWN/>

We report the first fast snapshots of mid-latitude ionospheric trough observed in the total electron content (TEC) data of American-wide GPS network (TEC-DAWN). Recently developed TEC-DAWN provides dense and wide TEC maps over North America, which cover a wide region of 60-130 deg W and 24-54 deg N (30-65 deg N in geomagnetic latitude), and have a spatial resolution of 1.05 x 1.05 deg in latitude and longitude (0.15 x 0.15 deg with 7 x 7 pixel smoothing) and a temporal resolution of 30 seconds. Using 1-hour detrended TEC-DAWN maps, we observe mid-latitude trough, a sharp band-like TEC depletion which has the latitudinal width of 200-300 km and extends more than 5,000 km along a geomagnetic latitude line. The trough structure appears in the northern edge of TEC observation area around 6 UT (local midnight) on July 5, 2006 when AE index is 800 nT and SYM-H index reaches the minimum of -50 nT. Then the structure moves equatorward with a velocity of about 180 m/s, accompanied with a similar band-like TEC enhancement, probably due to auroral precipitations, at the poleward side of the depletion. These structures disappear around 55 deg N MLAT at about 7 UT when AE and SYM-H indices begin to recover to quiet levels. Observations of mid-latitude trough with such a wide spatial coverage and a high temporal resolution have not been attained in the past. The dynamic motion of the observed trough could not be reproduced by any empirical model such as Moffett and Quegan [1983]. We will discuss what mechanisms determine the sharp band-like structure, the equatorward motion, and the disappearance of the observed mid-latitude trough.