The International Beacon Satellite Symposium *BSS2010*
P. Doherty, M. Hernández-Pajares, J.M. Juan, J. Sanz and A. Aragon-Angel (Eds)
Campus Nord UPC, Barcelona, 2010

MID-LATITUDE IONOSPHERIC IRREGULARITIES PERSISTING INTO LATE MORNING DURING THE MAGNETIC STORM ON 19 MARCH 2001

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Key words:

Abstract.

Post-sunrise ionospheric irregularities are reported appearing at low to mid-latitudes for the first time. A new method based on spaced-receiver technique is proposed to calculate the drift velocity of the large size frozen irregularity by using the correlation of the slant total electron content (TEC) from different GEONET receivers. The irregularities were detected at low to mid-latitudes by the GPS Earth Observation Network (GEONET) of Japan from 0500 LT to 1015 LT during the recovery phase of a magnetic storm started on 19 March 2001. Accompanying spread F was observed with the meridional ionosondes chain. They were seen as plasma bubbles by the Defense Meteorological Satellite Program (DMSP) in-situ measurements. The plasma bubbles first appeared at 0500 LT and reached 45.4N in latitude (40.5N magnetic latitude). At mid-latitude (45.4N) the plasma bubbles sustained one hour and forty-five minutes even after sunrise. In the mid-low latitude (26.3N), they survived as long as five hours and a quarter and disappeared at 1015 LT. During the evolution of the plasma bubbles, westward drift with the speed of 100m/s have been measured by DMSP and estimated by spaced-receiver from GEONET.