R005-33
Zoom meeting C ：11/2 AM2 (10:45-12:30)
11:30-11:45

GPS Total Electron Content Observation of Plasma Bubbles Surviving in the Daytime during Recovery Phase of Geomagnetic Storm

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Plasma bubble is a localized plasma density depletion in the ionosphere. The plasma bubble is generated at the magnetic equator through the Rayleigh-Taylor instability and extend to higher altitudes and latitudes with a structure elongating along the magnetic field line. For the generation of plasma bubble, eastward electric field pay an important role. In general, plasma bubbles are generated at the evening terminator, survive during nighttime, and disappear after sunrise due to the plasma production by solar EUV radiation. During magnetic storms, the plasma bubbles can be generated around midnight and/or near sunrise. In this study, we found that plasma bubbles generated near sunrise reached middle latitudes during a recovery phase of geomagnetic storm, and survived until noon.
We have analyzed GPS data in Japan to investigate temporal variation of horizontal two-dimensional distribution of total electron content (TEC) during a geomagnetic storm on May 28 2017. Dst index reached -125 nT at 08 UT on May 28, 2017. TEC depletions extending up to approximately 38° N in the meridional direction appeared sequentially over Japan around 20 UT on May 28 (05 JST on May 29), when TEC rapidly increased at sunrise due to the solar EUV radiation. The TEC depletions could be caused by plasma bubbles. The TEC depletions disappeared around noon on May 29. In this event, the plasma bubbles over Japan survived for approximately 7 hours in the sunlit condition. The background TEC was approximately 15 TECU at 20 UT on May 28 (05 JST on May 29) when the plasma bubble appeared over Japan, and approximately 12 TECU during 00-04 UT (09-13 JST) on May 29. In this event, the plasma density in the ionosphere did not increased after the plasma bubble appearance over Japan so that the plasma density during daytime would not be large enough to fill the plasma depletions caused by the plasma bubbles. This could be a reason why the plasma bubbles survived during the daytime in this event.