R005-15
A 会場 ：11/24　PM2 （15:30-18:15）
17:15〜17:30

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North－ south asymmetry during the decay phase of mid-latitude plasma bubbles during a geomagnetic storm in March 2013

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During a geomagnetic storm on 1 March 2013, an equatorial plasma bubble was generated over the magnetic equator after sunset in the Japanese－ Australian longitude sector. The plasma bubble extended to the mid-latitudes in both hemispheres with a geomagnetic conjugacy. On the other hand, the plasma bubbles were decayed during the recovery phase of the geomagnetic storm. The plasma density irregularity at the mid-latitudes related to the plasma bubble decayed earlier in the northern hemisphere than in the southern hemisphere. A background ionospheric plasma density in total electron content data was much smaller in the northern hemisphere than in the southern hemisphere. In this study, we clarify the cause of the north-south asymmetry of the mid-latitude plasma bubble decay during the geomagnetic storm using the Ground-to-topside model of Atmosphere and Ionosphere for Aeronomy (GAIA) model.

An ionospheric virtual height (h'F) at 3 MHz over Wakkanai (45.16° N, 141.75° E) estimated by the GAIA model declined by a few ten kilometers during 12:30－ 14:00 UT and rapidly increased during 14:00－ 17:00 UT. This resembled the temporal variation of h'F obtained from the ionosonde at Wakkanai. A meridional neutral wind at 142° E calculated by the GAIA model blew northward at 20－ 70 m/s in the northern hemisphere during 12:00－ 14:00 UT (21:00－ 23:00 LT) while it blew southward during the geomagnetically quiet day on 8 March. From these results, the ionospheric plasmas in the northern hemisphere were carried downward along magnetic field lines due to the enhanced northward neutral wind. At night, the ionospheric plasmas decreased at lower altitudes due to the increase in the recombination rate at lower altitudes, resulting in the rapid rise in h'F after 14:00 UT. On the other hand, the meridional neutral wind in the southern hemisphere blew northward during 10:00－ 12:30 UT and 15:00－ 20:00 UT although it was almost zero during 12:30－ 15:00 UT. This suggests that the mid-latitude ionospheric plasmas in the southern hemisphere were higher than those in the northern hemisphere. The mid-latitude plasma bubbles during geomagnetic storms can be asymmetric between northern and southern hemispheres because the background ionospheric plasmas in the northern hemisphere decreased due to the disturbed neutral wind.