

Geomagnetic conjugate observations of plasma bubbles and thermospheric neutral winds at equatorial latitudes

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Eastward-propagating plasma bubbles have been observed in 630-nm airglow images at equatorial latitudes. The eastward propagation of the plasma bubbles is a manifestation of plasma and neutral coupling in the equatorial thermosphere. The plasma bubbles show clear geomagnetic conjugacy [e.g. Otsuka et al., 2002]. However, the relation between drift velocity of the plasma bubbles and neutral wind velocity has not been investigated at geomagnetic conjugate points. In this study, geomagnetic conjugate observations of the plasma bubbles at low latitudes with thermospheric neutral winds were reported.

The plasma bubbles were observed at Kototabang (0.2S, 100.3E, geomagnetic latitude (MLAT): 10.0S), Indonesia and at Chiang Mai (18.8N, 98.9E, MLAT: 8.9N), Thailand, which are geomagnetic conjugate stations, on 5 April, 2011 from 13 to 22 UT (from 20 to 05 LT). These plasma bubbles were observed in 630-nm airglow images taken by using highly-sensitive all-sky airglow imagers at both stations. They propagated eastward with horizontal velocities of about 100-130 m/s. The eastward velocities of the observed plasma bubbles decreased with local time. Background thermospheric neutral winds were also observed at both stations by using two Fabry-Perot interferometers. The eastward wind velocities were about 70-130 m/s at Kototabang, and about 50-90 m/s at Chiang Mai. The drift velocities of plasma bubbles tend to be larger than the eastward neutral wind velocities. In the presentation, we discuss these results by considering the F-region dynamo effects and by comparing with HWM/IRI model data.

Keywords: plasma bubble, thermospheric wind, geomagnetic conjugate observation, airglow observation, F-region dynamo