

A study of east-west asymmetry in the bottomside structures of plasma bubbles by HF-TEP and GPS-TEC observations

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The transequatorial radio-wave propagation experiment at shortwave frequencies (HF-TEP) has been done between Shepparton, Australia, and Oarai, Japan, using the radio broadcasting signals of Radio Australia. The direction of arrival (DOA) of the HF radio waves are sometimes shifted from the great circle directions due to ionospheric irregularities in the equatorial regions, such as plasma bubbles. Maruyama and Kawamura [Ann. Geo., 2006] shows that the count number of DOA shifted to the west is much larger than that to the east, indicating the east-west asymmetry in the existence of equatorial plasma bubbles or in their bottomside structures. To clarify these asymmetry, we study the variations of DOA of HF-TEP and the rate of TEC change index (ROTI) derived from GPS-TEC observations in the west pacific region during Mar-Apr, 2008. Out of 12 nights in which the ROTI at pimo (14.6 deg N, 121.1 deg E) is large, the corresponding count number of DOA (35-deg westward shift from the great circle direction) is also large in all the 12 nights. On the other hand, out of 18 nights in which the ROTI at pohn (7.0 deg N, 158.2 deg E) is large, the corresponding count number of DOA (24-deg eastward shift) is small in 13 nights. These results indicate that the east-west asymmetry in DOA would be caused by that in the bottomside structures of plasma bubbles rather than that in their existence.