

Statistical study of daily and seasonal variation of the equatorial anomaly in Asia based on satellite-ground beacon experiment

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Studies of ionospheric structures by the satellite-ground beacon experiment were conducted in southeast Asia. We have deployed a meridional chain of five beacon receivers from 8S to 27N along 100E meridian, they showed meridional distribution of total-electron content (TEC) of the ionosphere. We revealed time and spatial variabilities of the equatorial anomaly in a certain period of time (Watthanasangmechai et al., 2014, 2015). The data analysis was, however, not easy mainly because of difficulty in estimating bias of the measurement to get the absolute TEC.

In this study, we developed the method of bias estimation. As a result, we can get TEC distribution by computers automatically. Using this method, we analyzed latitude distribution of TEC from Thai to Indonesia in 2012-2015. It is valuable to measure such latitudinal distribution of TEC in the wide latitudinal range from the ground fixed sites.

Using these data, we classified TEC distribution with the equatorial anomaly. It shows some distribution patterns depends on season or time. Classifying the TEC distribution data of LT14-17 and LT20-23, assuming after the formation of the equatorial anomaly (EIA), we take the average in 2012-2015. The plasma fountain makes the 2 peaks (northern and southern of the magnetic equator) in the TEC-Lat graph. In the northern hemisphere summer, the northern peak is larger than the southern one. In winter, the southern peak is larger than the northern one. Classifying the data of LT10-13, assuming the right after formation of the EIA. It shows the opposite result. In summer, the southern one is larger. In winter, the northern one is larger. We will compare these analysis results with atmospheric parameters from the whole atmosphere model GAIA and MSIS.

Keywords: total-electron content, equatorial anomaly