

The Long Time Variation of the Estimated GPS Satellite Differential Code Bias and Its Possible Connection with Ionosphere

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ABSTRACT

The resolution of the ionospheric total electron content (TEC) from the GPS observations is affected by estimated GPS differential code bias (DCB). In this study, the variation of GPS satellite DCBs estimated from measurements of a single receiver from 1999 to 2013 with the least-square method under the assumption of smooth ionosphere is analyzed statistically. It is found that the estimated DCBs exhibit some featured variation. Summarily, there are obvious three types of variation of DCB value on different time scales, the first type is the day-to-day variation that exhibits more obviously during the period from 1999 to 2002, the second type is the variation with about one year periodic variation that reveals more obviously from 1999 to 2004 and 2010 to 2013, the last type is the monotonously descending tendency from 1999 to 2010 and ascending tendency from 2010 to 2013. In order to confirm these featured variations, the DCBs issued by CODE are also obtained and analyzed. The similar featured variations also exist in the DCBs from CODE. In order to understand the reason of these featured variations, the ionospheric variations and space environment condition during the same period are analyzed too.

Key words: GPS, DCB, Ionosphere, CODE.