

AN INTERPRETATION OF SHORT TERM TEC VARIATIONS IN THE CONTEXT OF SPACE-BASED RADARS

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Abstract:

Code carrier divergence and range rate variations are important, but often overlooked issues in the design of navigation and other trans-ionospheric systems. The code carrier divergence is important whenever the system under consideration includes both carrier (phase path) and code (group path) tracking loops which progressively diverge as a consequence of both multipath and ionospheric dispersion. The range rate variations are important in velocity estimates. This paper will examine these issues in the light of trans-ionospheric data collected from Ascension Island which lies near the equatorial anomaly. The reported data will concentrate on data from the period covering November 2004. Although the smoothed sunspot number was low and the ionosphere was consequently characterised by relatively low densities there were several days when the ionosphere was very disturbed. Analysis of data from 9 November 2004 shows a period of strong ionospheric scintillation between ~21 and 24 UT. During this period the standard deviation of the code carrier divergence measured over one minute was typically 0.1 to 0.2 m with much higher values being measured on occasions. The corresponding one minute, average values ranged up to 10 metres. The analysis has also examined the multipath contribution to the code carrier divergence error with interesting results in respect to the combinatorial algorithms. This paper will extend this analysis of code carrier divergence and range rate on various time scales from seconds to hours.