

EFFECTS OF STRONG MAGNETIC STORMS OVER GPS SCINTILLATIONS AT EQUATORIAL AND LOW LATITUDE STATIONS

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In collaboration with Cornell University we installed several Global Positioning System (GPS) based scintillation monitors over the Brazilian territory to study L band scintillation. Data from this array of GPS scintillation monitors were used to analyze the effects of strong magnetic storms over the ionospheric scintillations at the equator and under low latitudes, including the southern crest of the Equatorial Ionization Anomaly (EIA). The scintillations are due to the ionospheric irregularities and they can affect the GPS and other satellite based communication systems. The latitudinal scintillation pattern is highly dependent on the background ionization, which is larger over the EIA crests. During strong magnetic storms, eastward magnetospheric electric field can penetrate to the magnetic equator intensifying the EIA, with a consequent shift of the crests to higher latitudes. The latitudinal scintillation pattern changes concomitantly. In this study we observed, during some severe magnetic storms, intensification of the GPS scintillations at the Brazilian stations of So Jos dos Campos (23.21 S, 45.86 W, dip latitude 17.8 S) and So Martinho da Serra (29.28o S, 53.83o W, dip latitude 18.57o S). For the same events, weaker scintillations were observed at the equatorial GPS station in So Lus (2.57o S, 44.00o W, dip latitude 1.3o S) and Cuiab (15.45o S, 56.46o W, dip latitude 6.1o S). The effect of the time of occurrence of the storm sudden commencement over the ionospheric scintillation behavior is analyzed and examples of post-midnight scintillations during magnetic storms are shown. Digisonde and VHF coherent radar data are also used to complement the GPS data.

Abstract Submission Form

2004 National Radio Science
Meeting

Abstract: depaula29693

Date Received: October 1, 2004

1. (a)

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2. G - Ionospheric Radio and
Propagation

3. (a)

4. C - Contributed Paper,
Program chair: Atilla
Komjathy/Paul Kintner

5. Oral presentation