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The ionospheric response at magnetically conjugate points in equatorial region during the 23rd solar cycle minimum

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The paper investigates the ionospheric response at two couple of GPS stations located at approximate geomagnetic conjugate points in the equatorial regions. These stations are Karratha station (Karr) in Australia (Geo: -20.98° S, 117.10°E; CGM: 31.59°S, 189.10°E) and Suwan-Shi station (Suwn) in Korea (Geo: 37.28°N, 127.05°E ; CGM: 31.00°N, 199.72°E), Cachoeira Paulista station (Chpi) in Brazil (-Geo: 22.687°S, 315.015°E; CGM: 18.03°S, 22.00°E) and Christiansted station (Cro1) in Virgin Islands, USA (Geo: 17.7569°N, 295.4157°E; CGM: 21.75°N, 14.11°E). In the analysis, statistics of GPS absolute Total Electron Content (TEC) measurements for 7 months period from January to July 2007 at both Suwn and Karratha conjugate stations were analyzed and compared. Furthermore, the conjugacy effect of the TEC and scintillation variations to storm response was determined by analyzing 9 minor to major geomagnetic storms in the period 2005-2007. The results show that the ionospheric response at conjugate points in the equatorial region follows each other particularly during quiet solar activities. During geomagnetic storm periods, it is found that the TEC and scintillation activities are asymmetrical in both hemispheres with a maximum activity was seen during maximum 3-hours Kp and Disturbance Storm Time (Dst) indices. The GPS TEC measurements at four conjugate stations were validated by comparing the measurements with DMSP and CHAMP satellites measurements. Further investigation is being done to determine the impact of storms on the geomagnetic field variations at both hemispheres based on magnetometer measurements.