THE IONOSPHERIC RESPONSE TO THE TOTAL SOLAR ECLIPSE ON 1st AUGUST 2008 OVER NORTHERN HEMISPHERE

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ABSTRACT

The paper examines the ionospheric response to the total eclipse of the Sun on 1st August 2008 over northern polar hemisphere. The solar eclipse event took place during quiet solar and magnetic activities with maximum Kp and Dst indices are 2 and -10 nT with the external and internal contacts of penumbra occurred between 8:04:06.8 and 12:38:27.7 UT respectively. The GPS Total Electron Content (TEC) measurements obtained from 20 GPS stations belonging to International GNSS Service (IGS) network over Canada, Greenland, Russia, Kazakhstan, Mongolia and China have been employed in the analysis. Geomagnetic field data obtained from magnetometer stations along the solar eclipse totality path was used to determine the effect of solar eclipse on geomagnetic field measurements at the ground level. The results show a significant decrease in the ionospheric TEC occurring during the whole period of solar eclipse at different GPS stations with maximum magnitude and duration of the TEC depletion varies from one site to another. A strong correlation was observed between the solar eclipse magnitude and the values of TEC depletion at different GPS stations. The geomagnetic field measurements during the solar eclipse event showed a pronounced decrease in the north-south component (Bx), while no effect was seen on the east-west (By) and down-up (Bz) components. Further analyses are being done to examine the impact of solar eclipse on generation the Traveling Ionospheric Disturbances (TID) induced by the supersonic motion of the Moon's cool shadow.

Keywords – Solar Eclipse, GPS, Ionosphere, TEC, TID