Analysis of High-Latitude Ionospheric Processes During HSS and CME-Induced Geomagnetic Storms

Durgonics, Tibor; Komjathy, Attila; Verkhoglyadova, Olga; Høeg, Per; Paul, Ashik

Publication date: 2016

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Key Points

- Vertical total electron content (VTEC) maps inferred from Greenland GNSS stations are used for the first time to investigate differences in ionospheric disturbances caused by high speed streams (HSS) and corrus mass ejections (CME).
- TEC mapping reveals pronounced negative storm phase and significantly decreased polar patch formation due to increased atmospheric heating.
- On the day following the HSS event (Nov, 4, 2016), a solar radio burst (SRB) caused anomalies in European and Greenlandic air navigation. We present our findings related to this rare event.

Observations and Mapping Technique

From the total number of 82 QNET stations 16 were selected. This selection was based on their geographic distribution, latitude and distance to each other. The goal was to provide an even event distribution along the coastline, which resulted in the best IP coverage. The white dots in the right side panel of Fig A shows an example IP presentation for a given epoch.

The geostationary GARS receiver is capable of tracking several observables, such as geomagnetic disturbance (DST) and F and P indices. However, major disturbances occur in the ionosphere, which is not visible on the GARS system. Therefore, the ionosphere is often represented by the polar cap and auroral zone of the ionosphere, providing a complete set of parameters. The fundamental system of the ionosphere is shown in Fig. 1 of (Bouvron et al., 1990). The ionosphere is divided into three main regions: the troposphere, the stratosphere, and the thermosphere. The thermosphere is further divided into the mesosphere and the thermosphere. The thermosphere is further divided into the ionosphere and the exosphere.

The ionosphere is divided into three main regions: the troposphere, the stratosphere, and the thermosphere. The thermosphere is further divided into the mesosphere and the thermosphere. The thermosphere is further divided into the ionosphere and the exosphere.

Results

HSS-Induced Storm

An example for a large HSS-driven ionospheric storm is the 19 February 2016 storm, which impacted the northern part of Europe and the Arctic region. The storm was observed by the polar cap and auroral zone of the ionosphere, providing a complete set of parameters. The fundamental system of the ionosphere is shown in Fig. 1 of (Bouvron et al., 1990). The ionosphere is divided into three main regions: the troposphere, the stratosphere, and the thermosphere. The thermosphere is further divided into the mesosphere and the thermosphere. The thermosphere is further divided into the ionosphere and the exosphere.

The ionosphere is divided into three main regions: the troposphere, the stratosphere, and the thermosphere. The thermosphere is further divided into the mesosphere and the thermosphere. The thermosphere is further divided into the ionosphere and the exosphere.

Solar Radio Burst and Ray Tracing During the Event

A solar radio burst (SRB) is a type of solar radio emission that occurs when a large amount of energy is released from the Sun. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth. The energy is released in the form of electromagnetic waves, which can be detected by radio telescopes on Earth.

Bibliography


