Geophysical Research Abstracts
Vol. 20, EGU2018-6211, 2018
EGU General Assembly 2018

GNSS-based analysis of ionospheric conditions around the North Pole during sequence of geomagnetic storms in March 2012.

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As a consequence of Earth's ionosphere and magnetosphere coupling, the polar and subpolar ionosphere is featured by different-scale structures of electron content. The generation and further development of these irregularities, intensified during geomagnetic storms, have been an object of multi-instrumental studies. Recently one of the most commonly used techniques for such investigations are multi-frequency GNSS measurements.
This contribution presents a comprehensive analysis of ionospheric response on the string of four geomagnetic storms registered in March 2012. For this purpose we used GNSS data from ∼180 permanent stations belonging to IGS, EPN and UNAVCO CORS networks. The analysis, aimed at characterization of different-scale disturbances, was performed using two parameters: ROTI and relative STEC value. The former is the most commonly applied approach for detection of small scale irregularities and in this case it was used for analysis of auroral oval expansion on both sides of ionosphere. The latter one provides the epoch-wise information on relative ionospheric enhancement or depletion with regard to background STEC variations and thus it is also effective for large-scale structures. In this work the relative STEC values were used to investigate the occurrence of polar cap patches and its dependence on interplanetary magnetic field conditions during particular geomagnetic storm.