Subauroral GPS TEC and phase variations during geomagnetic storms

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High-latitude ionospheric structure caused by precipitation of energetic particles, strong ionospheric currents and convection results in changes of the GPS total electron content (TEC) and rapid variations of GPS signal amplitude and phase. The phase variations, called phase scintillation, are typically observed in the ionospheric cusp, polar cap and auroral zone. They are particularly intense during geomagnetic storms when the aurora and ionospheric convection expand further equatorward. The ionospheric structure is also affected at subauroral latitudes resulting in the GPS TEC changes and phase scintillation. The focus of this paper will be the subauroral GPS TEC and phase variations that are caused by storm-enhanced plasma density (SED) on the dayside, and subauroral polarization streams (SAPS) on the nightside. Phase scintillation index is computed for specialized GPS scintillation receivers in Canada and Norway, at sampling rate of 50 Hz. A proxy scintillation index is obtained from dual frequency measurements of geodetic-quality GPS receivers sampling at 1 Hz, which include receivers operated by the Norwegian Mapping Authority (NMA), Greenland GPS Network (GNET) and globally distributed receivers of RT-IGS network that are monitored by the Canadian Geodetic Survey in near-real-time.

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