GEOCENTRAL ARCTIC MAGNETIC SURVEYING AND SPACE GEODESY

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The occurrence of GPS ionospheric scintillation at high latitudes is compared with the occurrence of HF radar backscatter from field-aligned irregularities as a function of magnetic local time and geomagnetic latitude. In the European sector, the scintillation was observed in 2003 and 2008 using GPS Ionospheric Scintillation and TEC Monitors (GISTM) included in a network extending from high to mid latitudes. The data are divided into subsets of quiet and disturbed periods. The results show that both the HF radar backscatter and GPS scintillation predominantly occur in the low portion of the auroral oval and in the ionospheric footprint of the cusp. Data subsets for geomagnetically quiet and disturbed periods show the expected shift in latitude of the ionospheric regions both in the occurrence of phase scintillation and the HF radar backscatter from ionospheric irregularities.

The CHAIN and European GISTM arrays with the field of view and beam 8 of the SuperDARN radars in Saskatoon and Hankasalmi superposed. Corrected geomagnetic (CGM) latitudes 70° and 80° are shown.

Summary

The occurrence of GPS scintillation observed by the CHAIN and European GISTM arrays at high latitudes is compared with the occurrence of HF radar backscatter from E < B drifting field-aligned irregularities observed by SuperDARN. The amplitude scintillation index (S4 index) has remained very low during the current deep solar minimum. The phase scintillation occurrence as a function of magnetic local time and geomagnetic latitude is co-located primarily with the nighttime auroral oval and the ionospheric cusp. Subset climatologies for geomagnetically quiet and disturbed periods show expected shifts in latitude of the ionospheric regions both in the occurrence of phase scintillation and the HF radar backscatter from ionospheric irregularities.

References