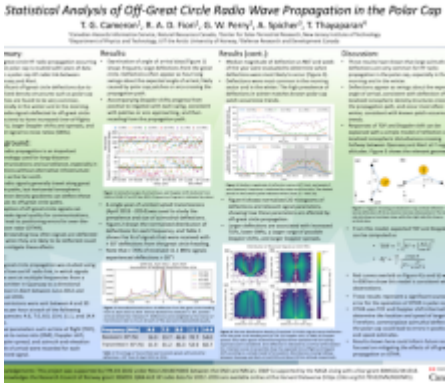
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Poster
High Frequency radio waves propagating in the polar cap are often deflected to off-great circle paths by localized ionospheric electron density structures such as polar cap patches and arcs. These off-great circle deflections can reduce signal quality for communications, and lead to large errors in positioning for over-the-horizon radar. In this study, nearly 2.5 years of multi-frequency transmissions from Qaanaaq, Greenland to Alert, Canada are used to perform a statistical analysis of the occurrence and impacts of off-great circle propagation in the polar cap. Off-great circle deflections are shown to be very common in the polar cap. For example, averaged over one year, 11.1 MHz signals experienced deflections > 30 degrees from the great circle direction 70.7% of the time. The occurrence of off-great circle deflections is shown to be at a maximum in the winter and close to zero in summer, and higher in the morning sector than the evening sector for frequencies < 14.4 MHz. A comparison of the angle of arrival of signals with relevant signal parameters shows that off-great circle deflections are associated with increased time-of-flights, a larger range of possible Doppler shifts, increased Doppler spreads, and lower signal-to-noise ratios. These results are discussed and explained in the context of space weather-related ionospheric phenomena in the polar cap. Implications for over-the-horizon radar operation at high latitudes are also discussed.


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