

Canadian Association of Physicists Division of Atmospheric and Space Physics  
Annual Workshop 18-21 February 2020, Fredericton, NB Canada

Ashanthi Maxworth, F. Hird, G.C Hussey, K.A. McWilliams, A. Yau

University of Saskatchewan

Observed and modelled ellipticity angle behaviour of trans-ionospheric propagation of HF radio waves

Radio Receiver Instrument (RRI) on the enhanced Polar Outflow Probe (e-POP/ SWARM-E) consists of two orthogonal dipole antennas. This orthogonal dipole configuration allows accurate polarization calculations using in-phase and quadrature components of natural and man-made signals. Using SuperDARN as the source of man-made radio signals, HF trans-ionospheric propagation behavior of the radio wave polarization state has been observed by RRI. Previously, the trans-ionospheric propagation behavior of the orientation angle polarization parameter was both modeled and physically explained. Recently, we have developed an explanation, at least partially, for the trans-ionospheric propagation behavior of the ellipticity angle polarization parameter.

The polarization state gives information on the electron density experienced by a trans-ionospheric radio wave. Due to the importance of the geomagnetic field in trans-ionospheric radio wave propagation, a comparison of the ePOP MGF (MaGnetic Field) instrument and IGRF (International Geomagnetic Reference Field) is discussed. If time allows, initial comparisons between RRI electron density determinations and those determined from the GAP (Global Position System (GPS) receiver-based Attitude, Position, and profiling experiment) instrument on ePOP will be presented.

Ionospheric, Radio Waves, Polarization