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POS-11 Determination of the effective parallel geomagnetic field along a path using Faraday rotation and total electron content from Automatic Dependent Surveillance Broadcast signals

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A plane polarized electromagnetic (EM) wave that propagates through a plasma, (anti-)parallel to a magnetic field, experiences a gradual rotation of its plane of polarization called Faraday rotation (FR). Automatic Dependent Surveillance Broadcast (ADS-B) signals are linearly plane polarized and therefore are susceptible to FR as they traverse the ionospheric plasma, where they encounter a field-aligned component of the geomagnetic field and anisotropies in the ionospheric medium. An EM-wave ray tracing model was used to generate simulated ADS-B data to determine the wave path and the polarization state at incremental distances along the ray path resulting in estimates for the total electron content (TEC) and FR received at the satellite receiver position. Results will be discussed that use the TEC and FR values from multiple aircraft at different latitudes transmitting ADS-B signals to a satellite receiver to infer the effective parallel component of the geomagnetic field along the path.

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