

Contribution ID: 44

Canadian Association of Physicists

Association canadienne des physiciens et physiciens

Type: Oral (Non-Student) / Orale (non-étudiant(e))

Density structures observed by the Radio Receiver Instrument on e-POP/Swarm-E

Monday 9 June 2025 11:15 (15 minutes)

The Radio Receiver Instrument (RRI) on e-POP/Swarm-E detects ground-based HF radio waves. As HF radio waves traverse the ionosphere, variations in ionospheric density influence propagation. Using the Faraday rotation approach with RRI measurements enables the determination of density variations along the propagation path. The high sampling rate of RRI allows for the detection of plasma structures across multiple scales from a transmitter in Ottawa. Observed structures have scales ranging from half a km to 1500 km. Small-scale variations exhibit magnitudes comparable to large-scale variations, but remain confined to narrow latitude bands. In addition, the scale sizes from GPS Total Electron Content (TEC) suggest similar scale sizes as observed by RRI. The variation of density scale sizes extracted from RRI gives more insight into the structure of the ionosphere and can lead to more accurate modelling for HF radio wave propagation.

Keyword-1

RRI/e-POP/Swarm-E

Keyword-2

HF radio waves

Keyword-3

Total Electron Content (TEC)

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Session Classification: (DASP) M1-2 Magnetosphere and Magnetospheric Dynamics | Magnétosphère et dynamique magnétosphérique (DPAE)

Track Classification: Technical Sessions / Sessions techniques: Atmospheric and Space Physics / Physique atmosphérique et spatiale (DASP/DPAE)