



Equatorward Propagating Auroral Arcs Driven by ULF Wave Activity: Multipoint Ground and Space Based Observations in the Dusk Sector Auroral Oval

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Observations of multiple equatorward propagating arcs driven by a resonant Alfvén wave on closed field lines are presented. Datasets from the EISCAT Svalbard Radar (ESR) and Meridian Scanning Photometer in Longyearbyen, All-Sky Camera in Ny Ålesund, ground magnetometer data on Svalbard and DMSP F16 satellite were utilized to study the arc structures. The arcs had an equatorward phase propagation of $\sim 0.46 \text{ km s}^{-1}$ and were observed in the dusk ionosphere from 1800 – 2030MLT. Analysis of the optical data indicates the Alfvén wave had a frequency of 1.63 mHz and an azimuthal wave number, $m \sim -20$ (the negative sign indicating a westward propagation). Inverted-V electron populations associated with field aligned currents (FACs) of between 0.5 and $0.8 \mu\text{A m}^{-2}$ are observed by DMSP F16 inside the arc structures. In addition to electron density enhancements associated with the arcs, the ESR data show elevated ion temperatures in between the arcs consistent with electric field enhancements and ionospheric heating effects. The combination of ESR and DMSP F16 data indicate the wave energy was dissipated through ionospheric Joule and/or ion frictional heating and acceleration of particles into the ionosphere, generating the auroral displays. The fine scale structuring, in addition to the propagation direction and scale size would suggest the auroral features are the signatures of a FLR driven by an interaction with a compressional fast mode wave propagating earthward from the magnetotail