Algorithmic Identification of STEVE-SAID Events in Swarm Data
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Background
- Strong Thermal Emission Velocity Enhancement (STEVE) is an optical phenomenon
- Observed as a purple band of light equatorward of auroral oval (Archer et al. 2019)

• STEVE found to be associated with intense Subauroral Ion Drift (SAID) under following conditions (Archer et al. 2019): (1) High electron temperature (2) Low plasma density (3) High peak ion velocities
• Motivations: Provide an algorithmic approach to identify coupled STEVE and SAID events

Methodology
• Create spike finding routine for electron temperature that matches SWARM A spikes identified in Archer et al. 2019

• Parameters: Height (3000 – 2000 K), Distance (100 samples), Width (4 – 40 samples), Prominence (1250 – 5000 samples)
• Run all available data through spike finding routine
• Apply cross-correlation filtering with respect to plasma density

• Filter all identified electron temperature spikes using minimum cross-correlation factor (-.8)
• Identify visual patterns

Results
- Hotter temperature spikes generally toward magnetic noon
- Bands of hot spikes visible towards magnetic midnight
- Three-band structure separating towards midnight

• Similar concentration of hot spikes seen in Southern Hemisphere
• Singular band of hot spikes occurring towards magnetic midnight
• Separation in subauroral zone

• Filtered temperature spikes + plasma drops occur in polar and subauroral zone
• subauroral zone spikes occurring toward magnetic night
• Tighter spread present in Northern Hemisphere in comparison to Southern Hemisphere

Summary
• Algorithm to identify STEVE-SAID coupled events exist under 3 conditions: (1) High electron temperature (2) Low plasma density (3) High peak ion velocities
• Incorporating electron temperatures and plasma density, results show events in polar and subauroral zone
• Future Works:
  • Incorporate ion flow
  • Incorporate magnetic field vectors