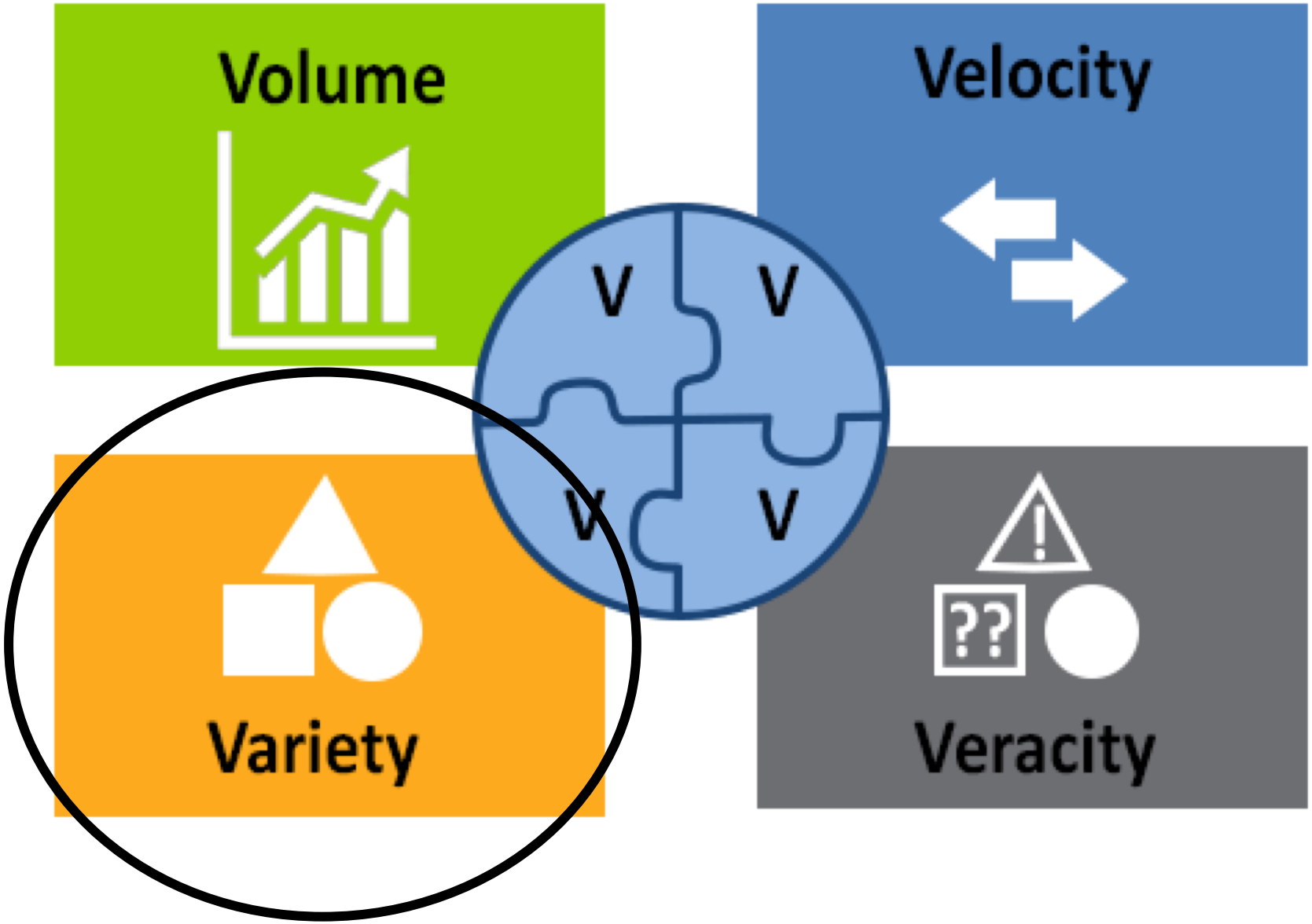

Volume
Velocity
V
V
V
V
Variety
??
Veracity

Does region of energized particles propagate earthward or tailward?

- Satellite data provide multi-point observations, yet no definite conclusion.

Reeves et al. [1996]

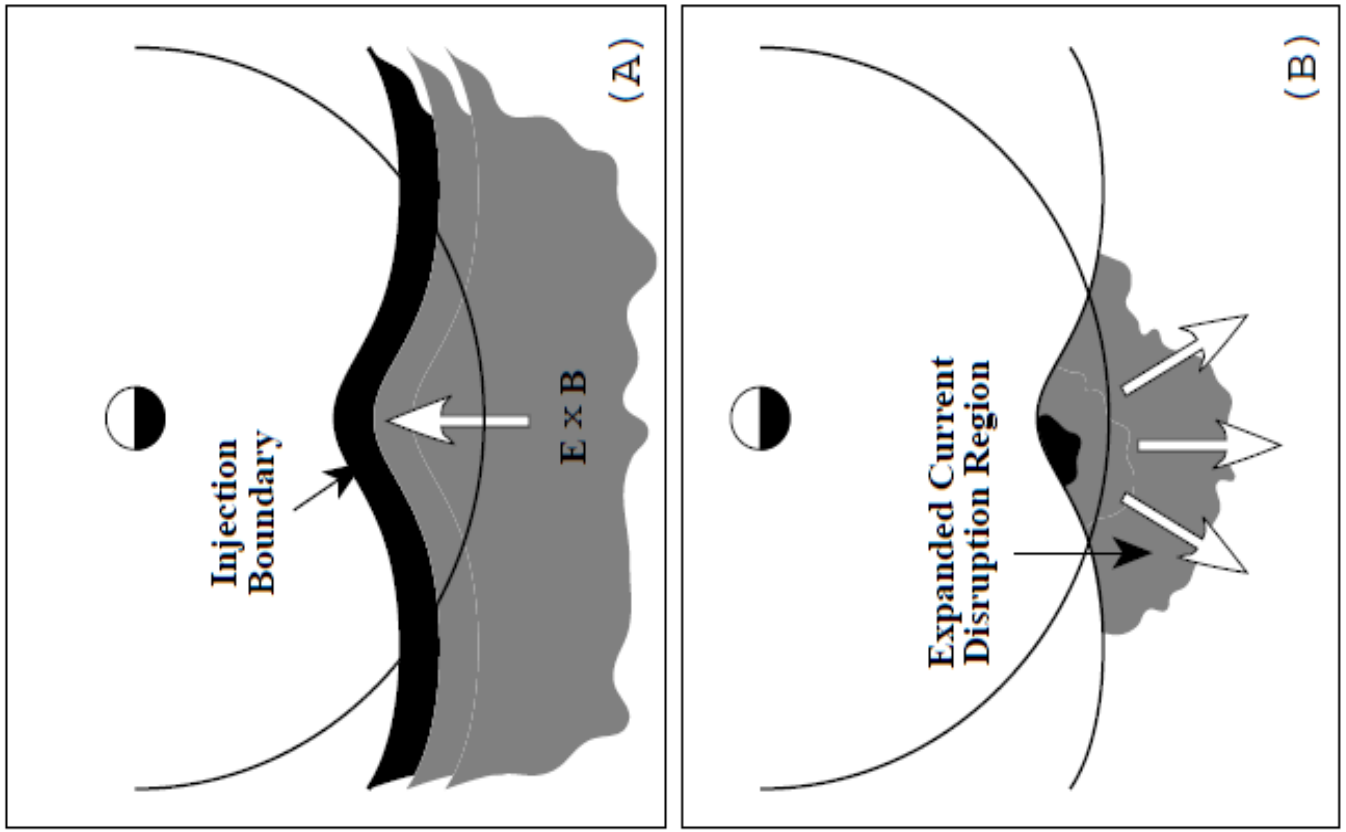
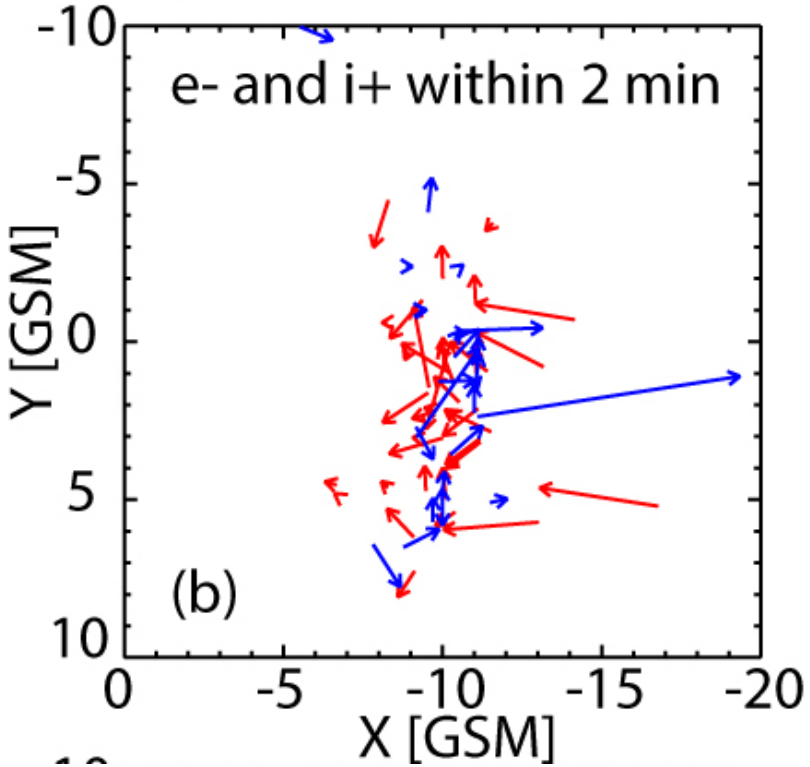
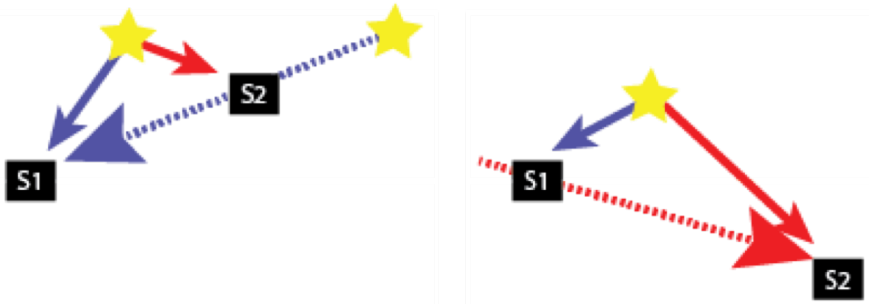
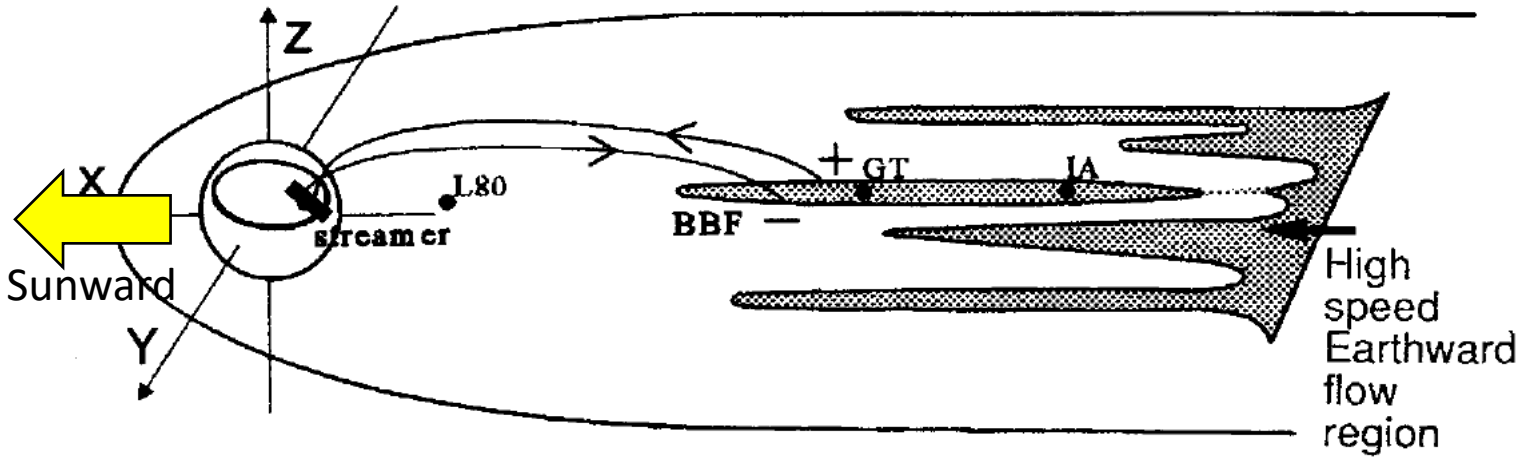


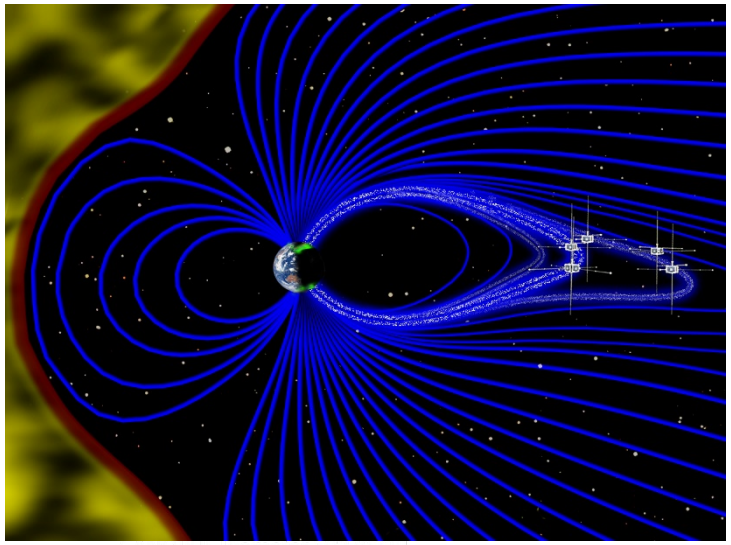
Figure 1: Propagation of the substorm injection region predicted by (A) the Convection Surge model and (B) the Current Disruption model.





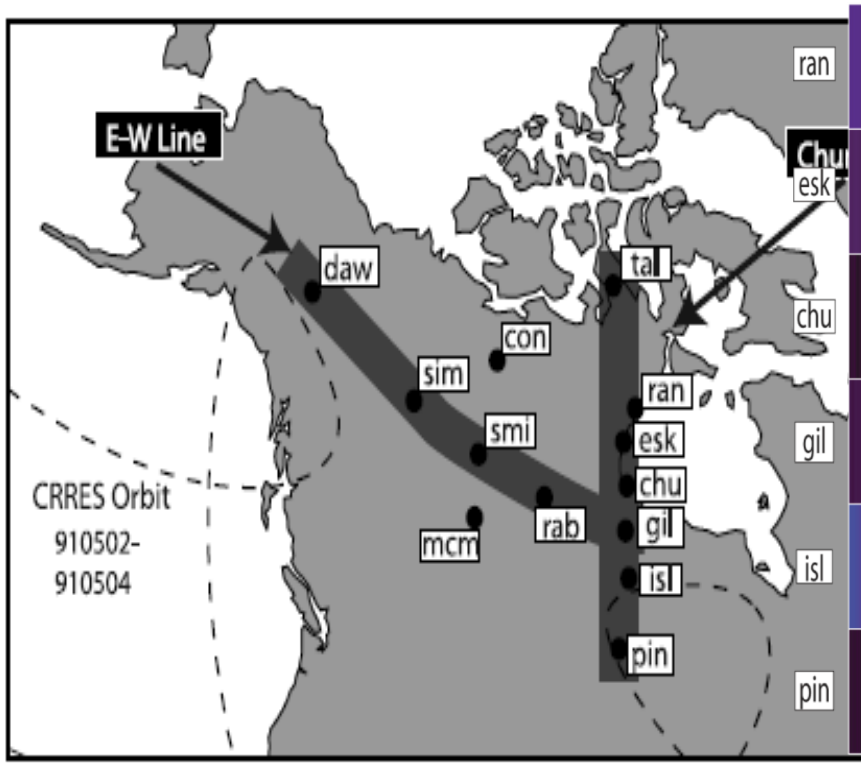
Spanswick et al. [AGU, 2014]

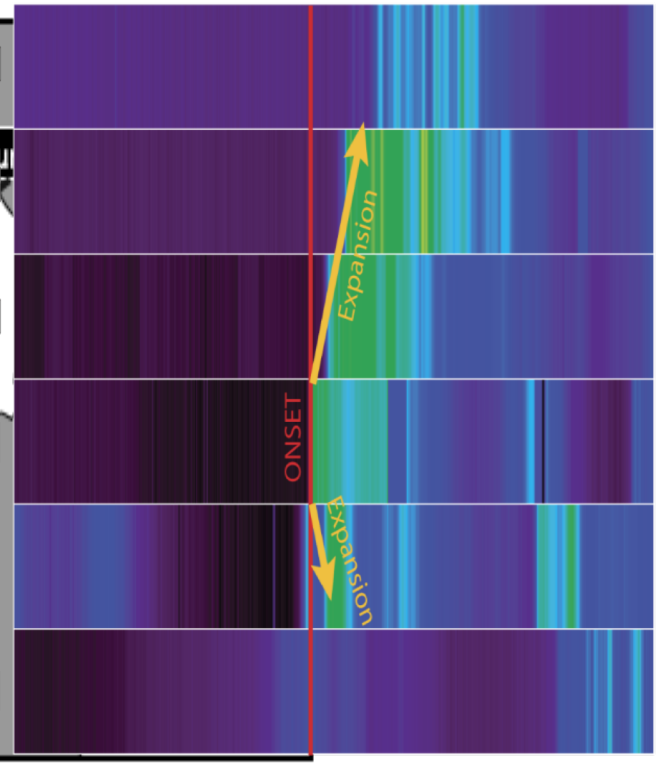




Does region of energized particles propagate earthward or tailward?

- Riometer data suggested mostly poleward/tailward propagation.
- But how do we explain the earthward transport in space?





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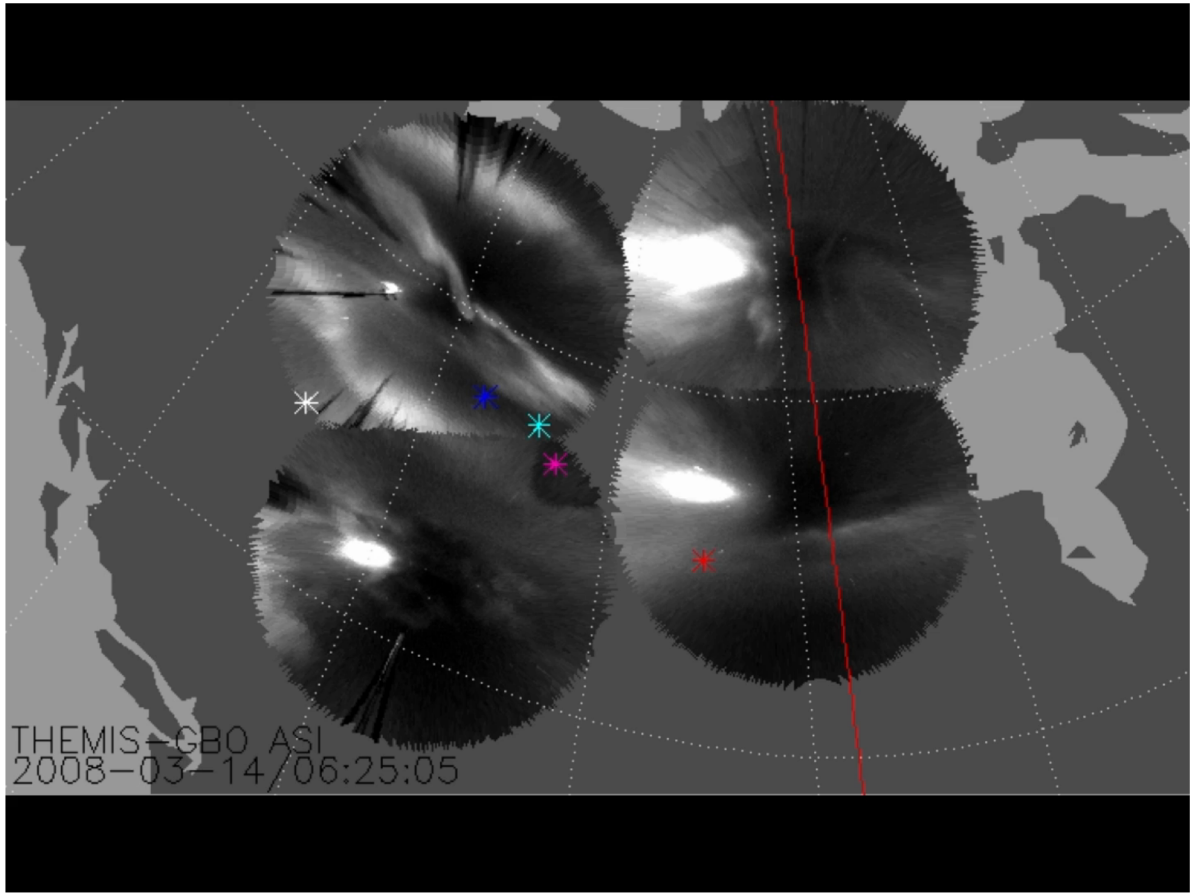
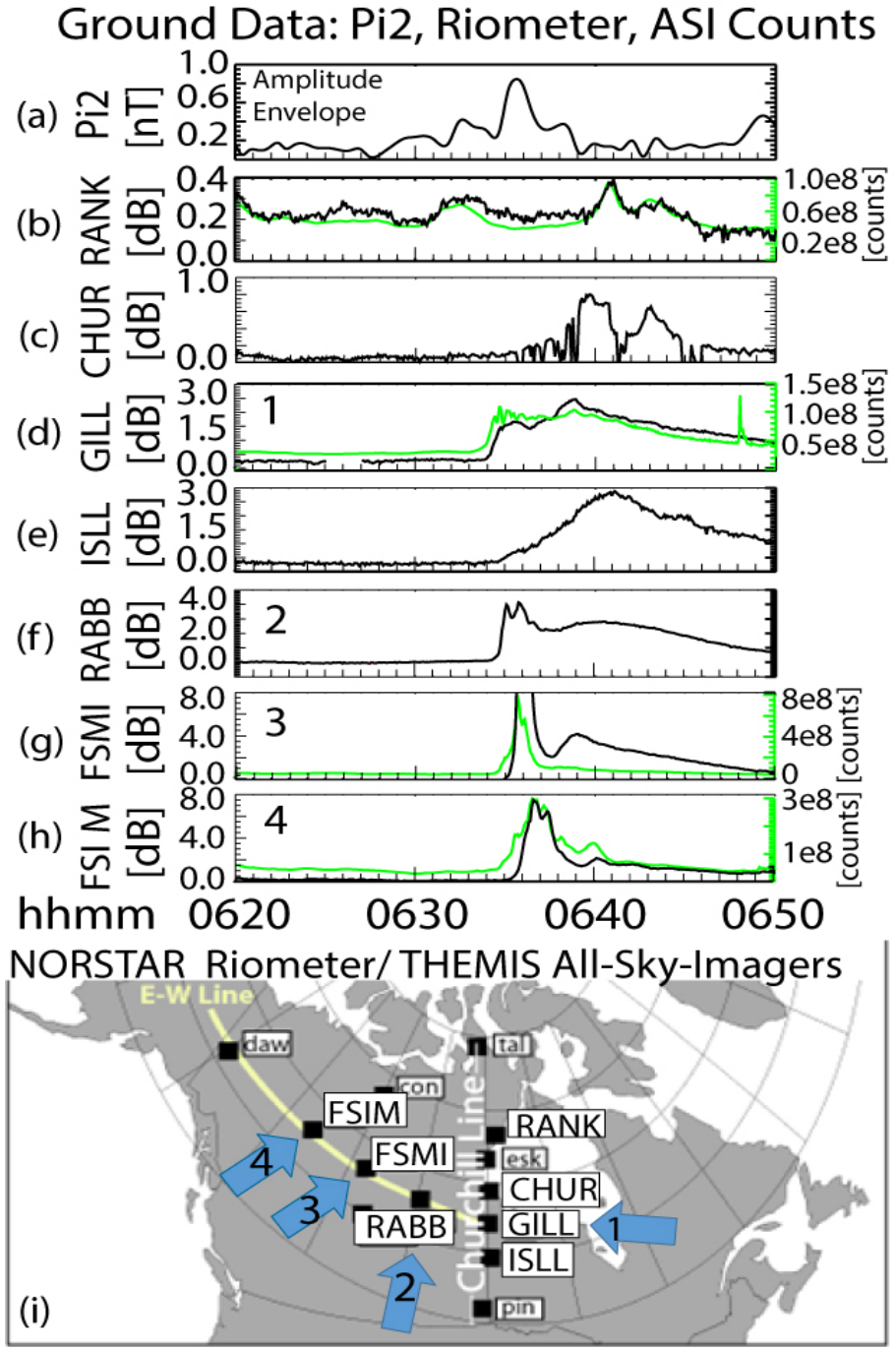
Does region of energized particles propagate earthward or tailward?

- Ground-based data provide a 2D image upon which to put the spacecraft data into context





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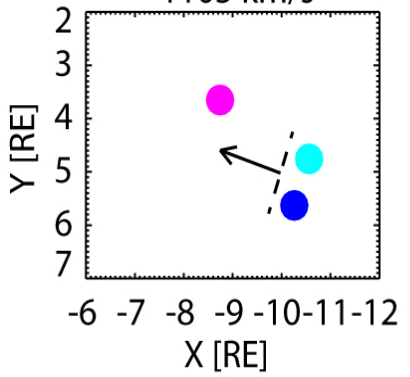
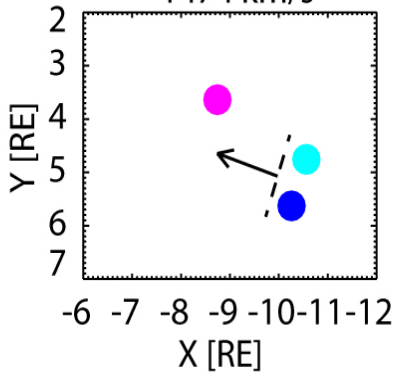
An Interpretation

Gabrielse et al., Under Review

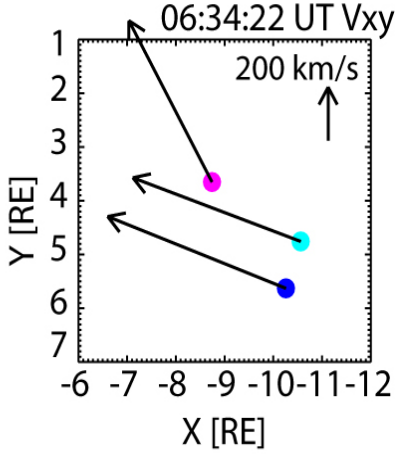
Electron injection boundary
(>11.6keV First increase)
N=0.94, -0.33
1105 km/s



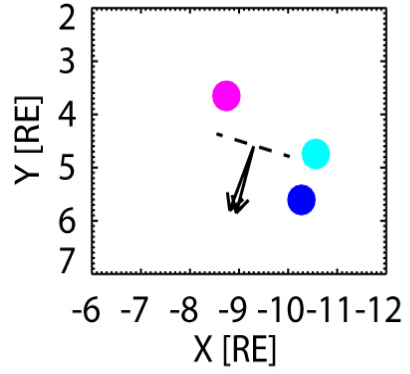
Ion injection boundary
(First increase)
N=0.94, -0.33
1474 km/s



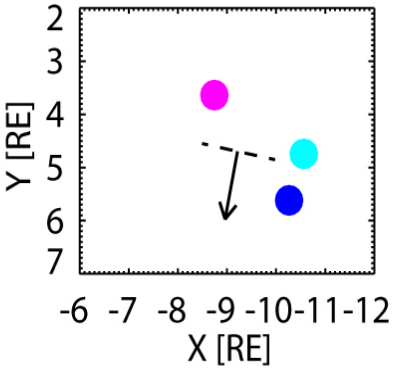
Flow Vectors
06:34:22 UT Vxy
200 km/s



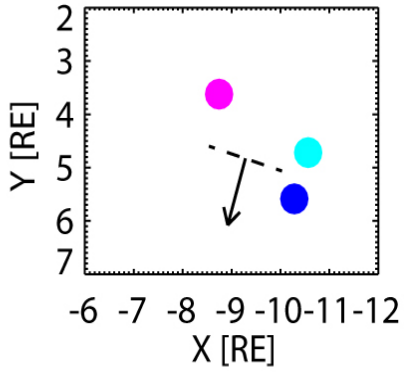
Electron injection boundary
>11.6keV: N=0.27, 0.96
71.6 km/s
>30keV: N=0.38, 0.93
74.4 km/s

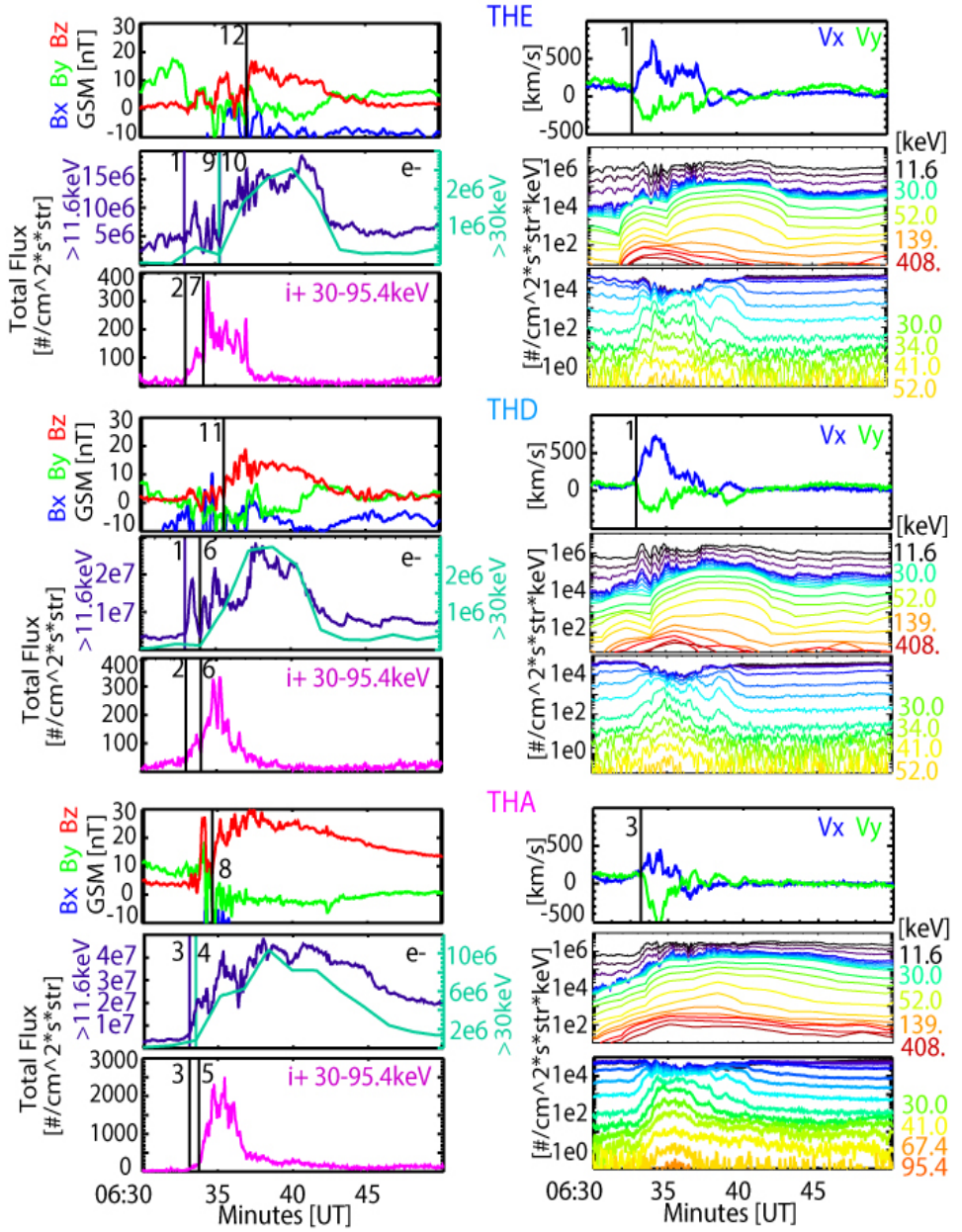


Ion injection boundary
(Sustained increase)
N=0.19, 0.98
389 km/s



Bz Boundary
(Sustained increase)
N=0.28, 0.96
64.6 km/s





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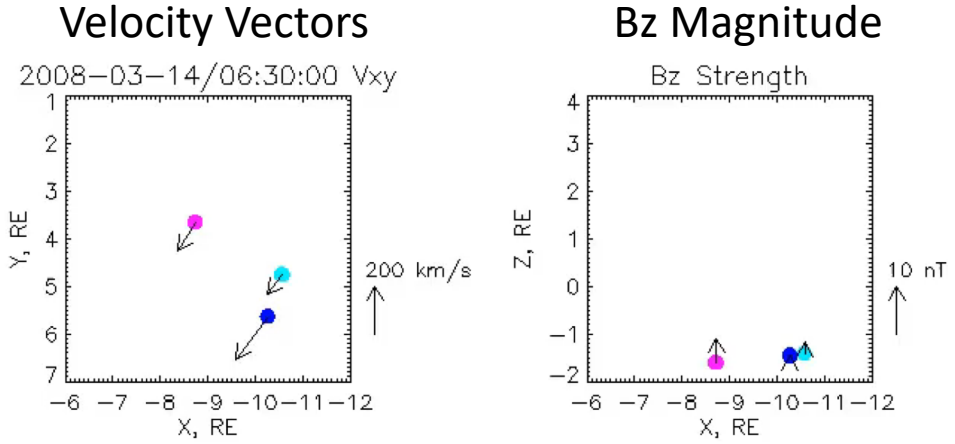
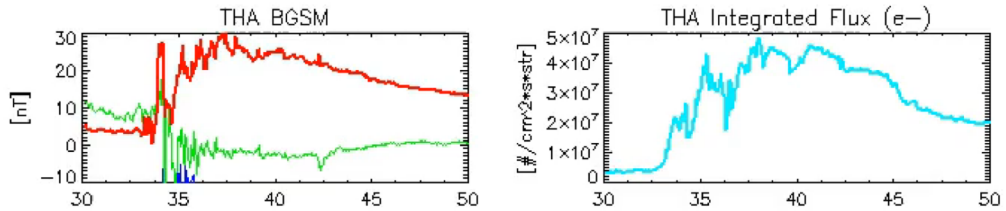
An Interpretation

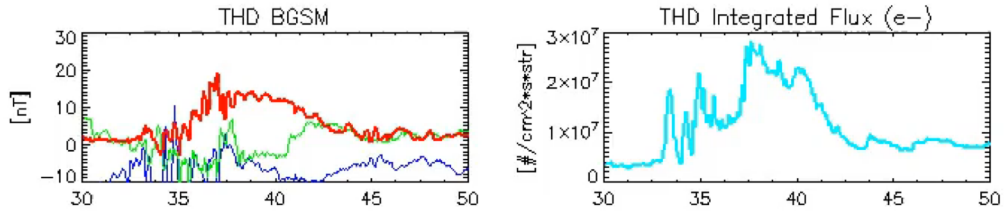
Gabrielse et al., Under Review



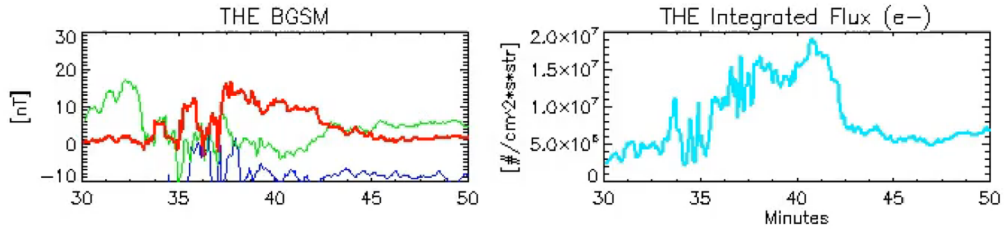
THA (inner) Bz

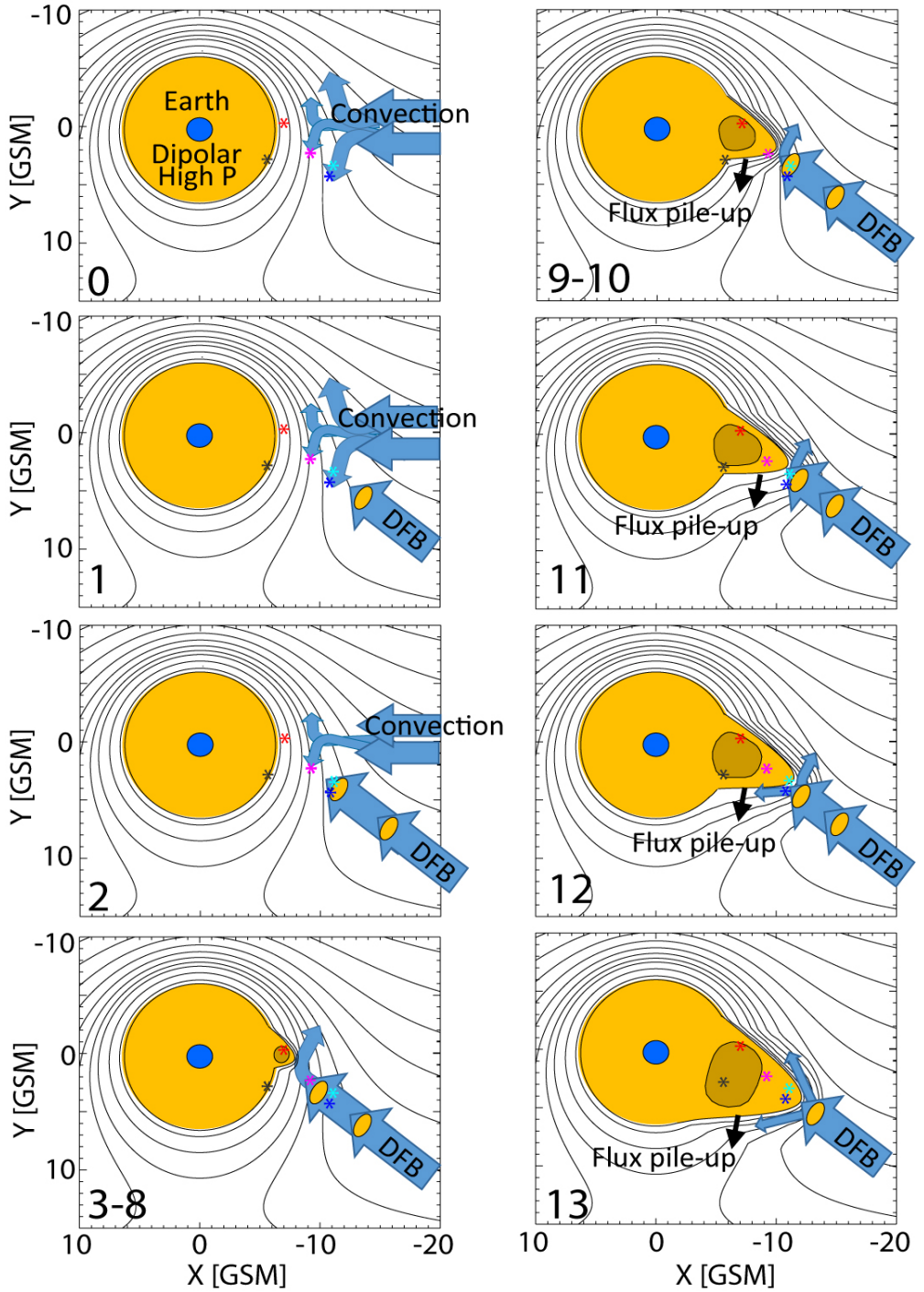


THD (outer) Bz



THE (outer) Bz





Next Generation CEDAR Science Questions

- What are the powerful use cases for applying data science in geospace?

- What are the immediate next steps to embrace data science approaches in geospace?

I advocate for embracing data variety, using a combination of in-situ and ground-based observations.