



A Preliminary Statistical Analysis of Flux Transfer Events along the Flanks of the Earth's Magnetopause

By Dave Dyer

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Outline

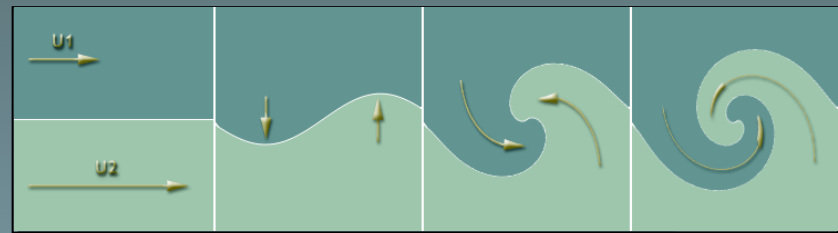
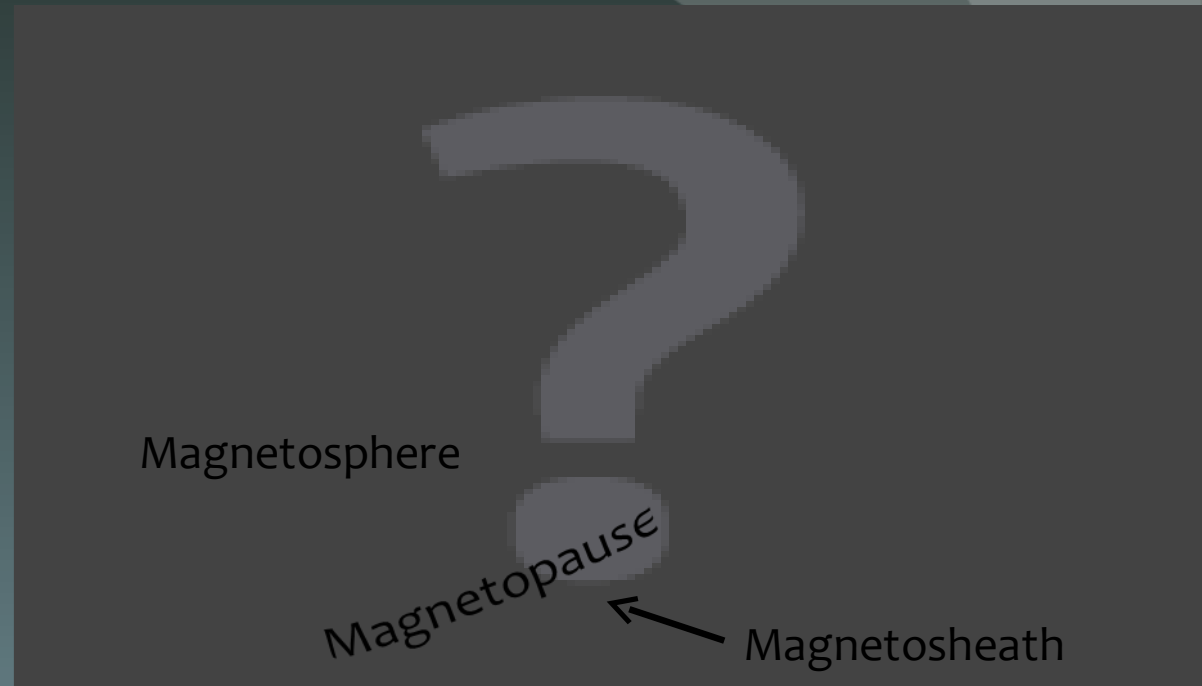
- Motivation
- Background
- Methods
- Results
- Summary
- Acknowledgements
- Questions



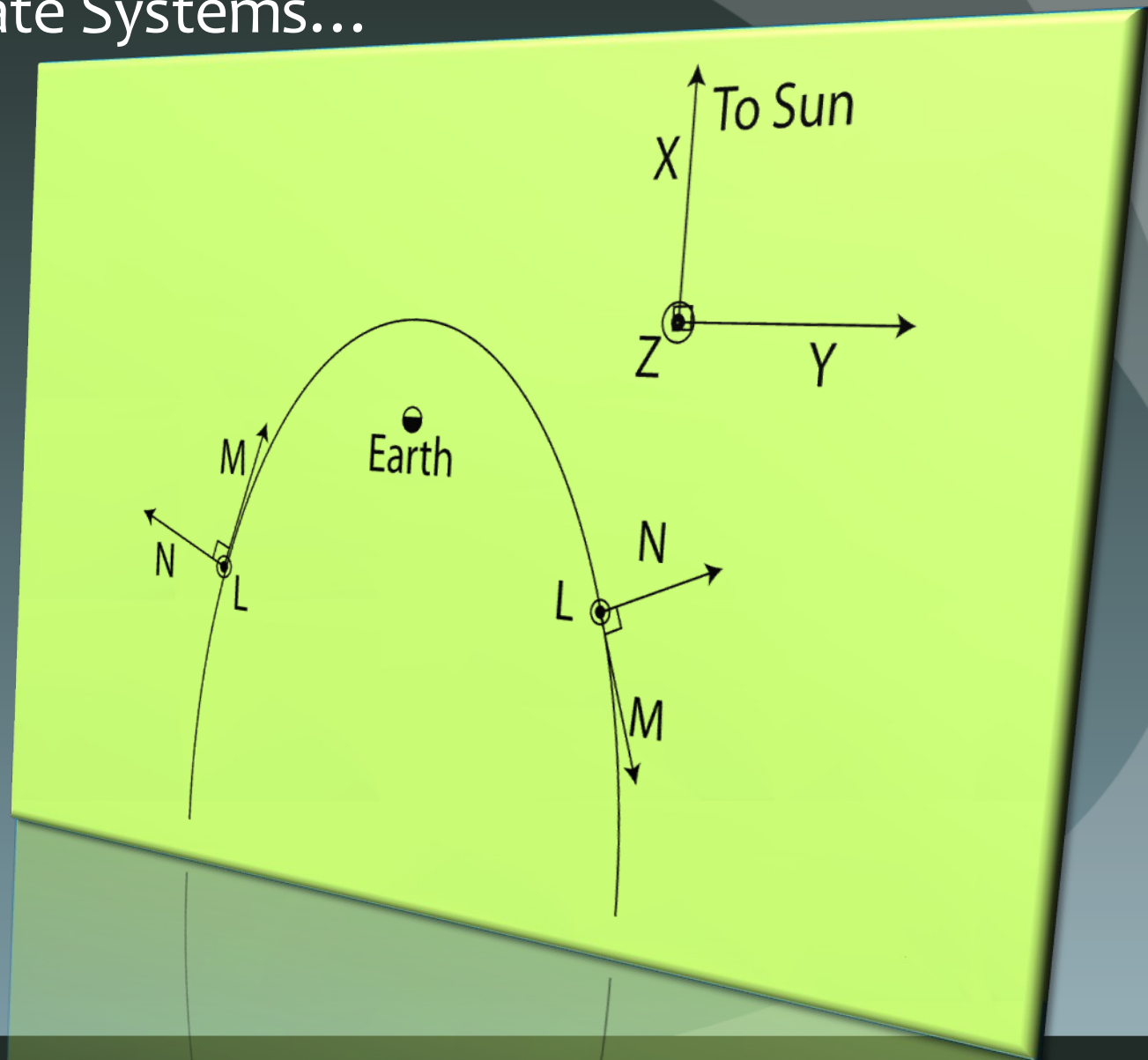
Background 1:

Definitions...

- FTE
- THEMIS
- Plasma
- Magnetosphere
- Magnetosheath
- Magnetopause
- Kelvin-Helmholtz wave and vortex

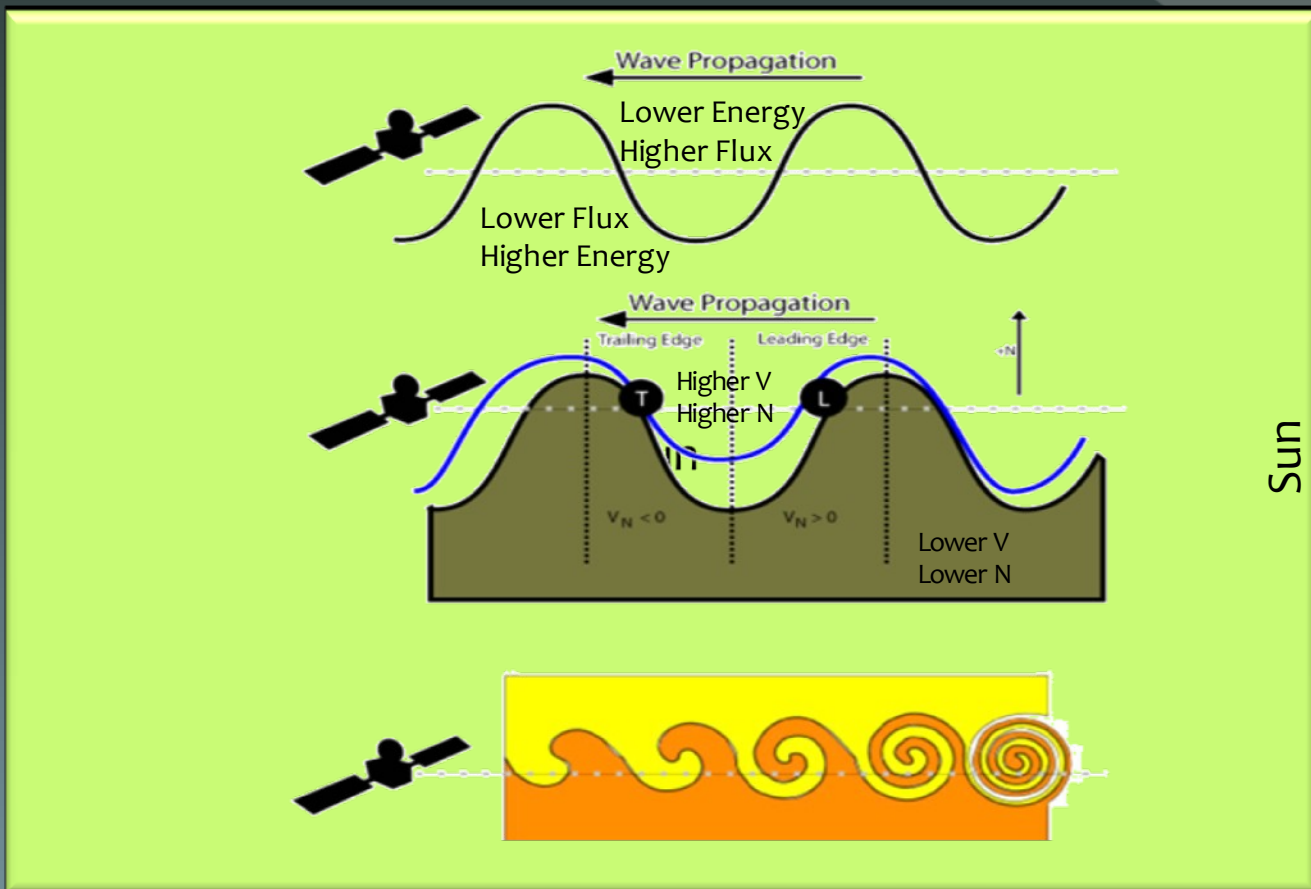


Background 2: Coordinate Systems...



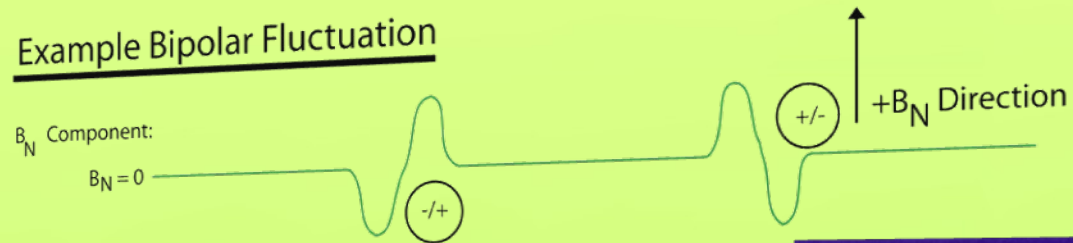
Background 3:

Plasma flow across THEMIS probes...

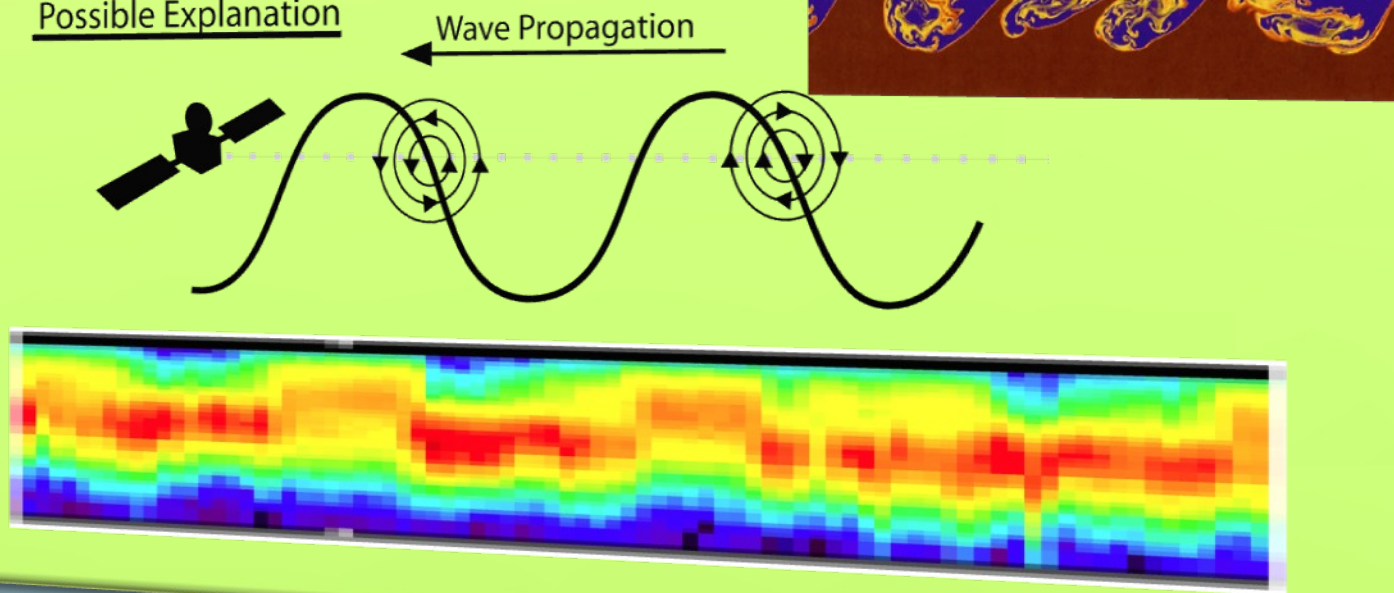


Background 4: Magnetic field lines and bipolar events...

Example Bipolar Fluctuation

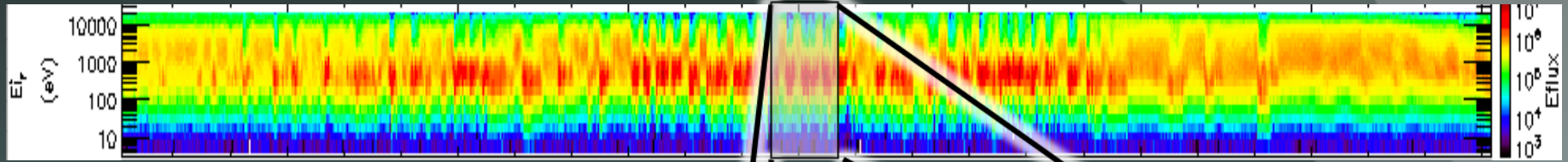


Possible Explanation



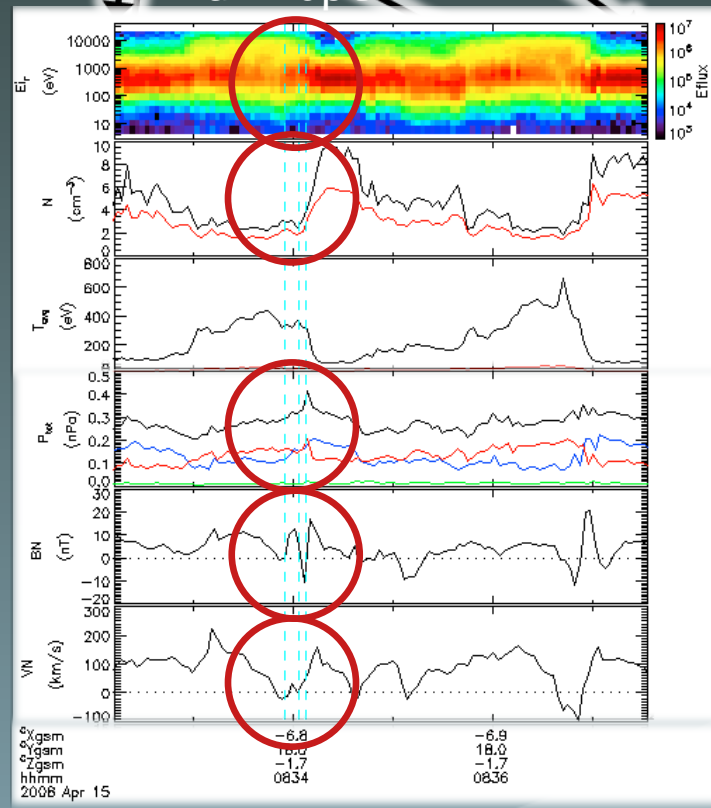
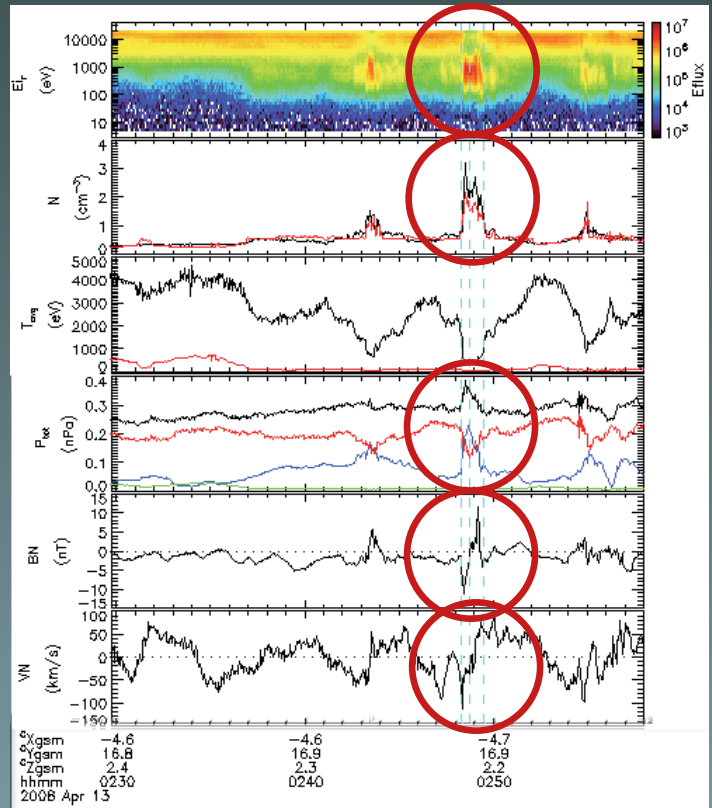
Background 5:

What do the data look like?

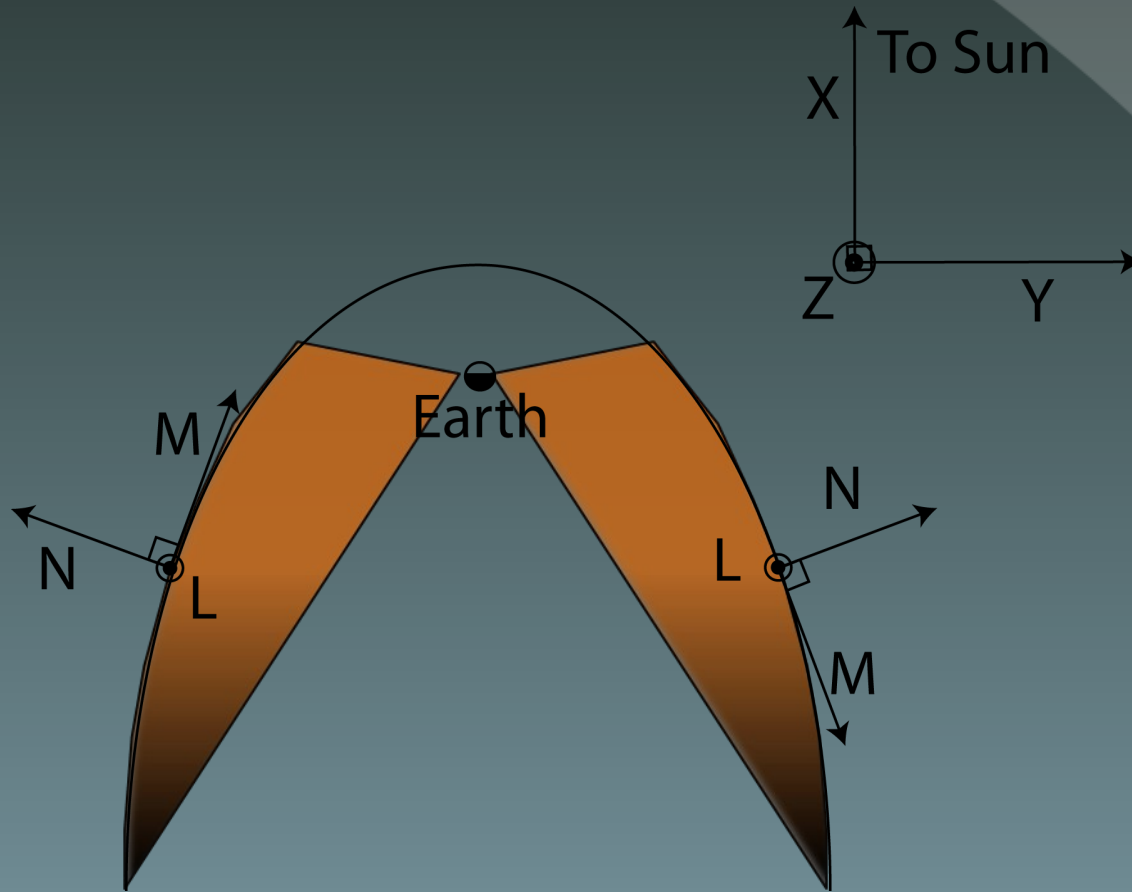


KH Surface Wave

Flux Rope



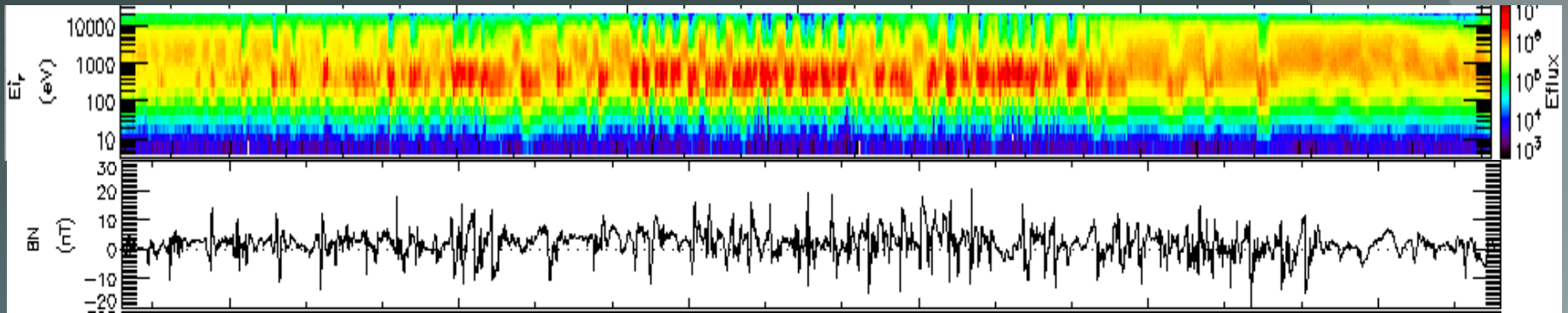
Methods 1: Choosing probe survey dates...



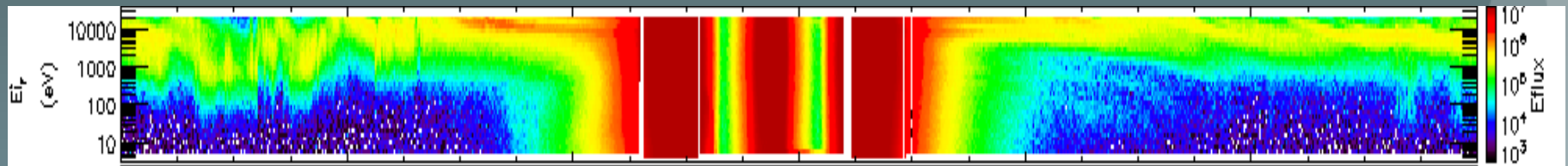
Methods 2:

Surveying ESA particle data for active KH dates...

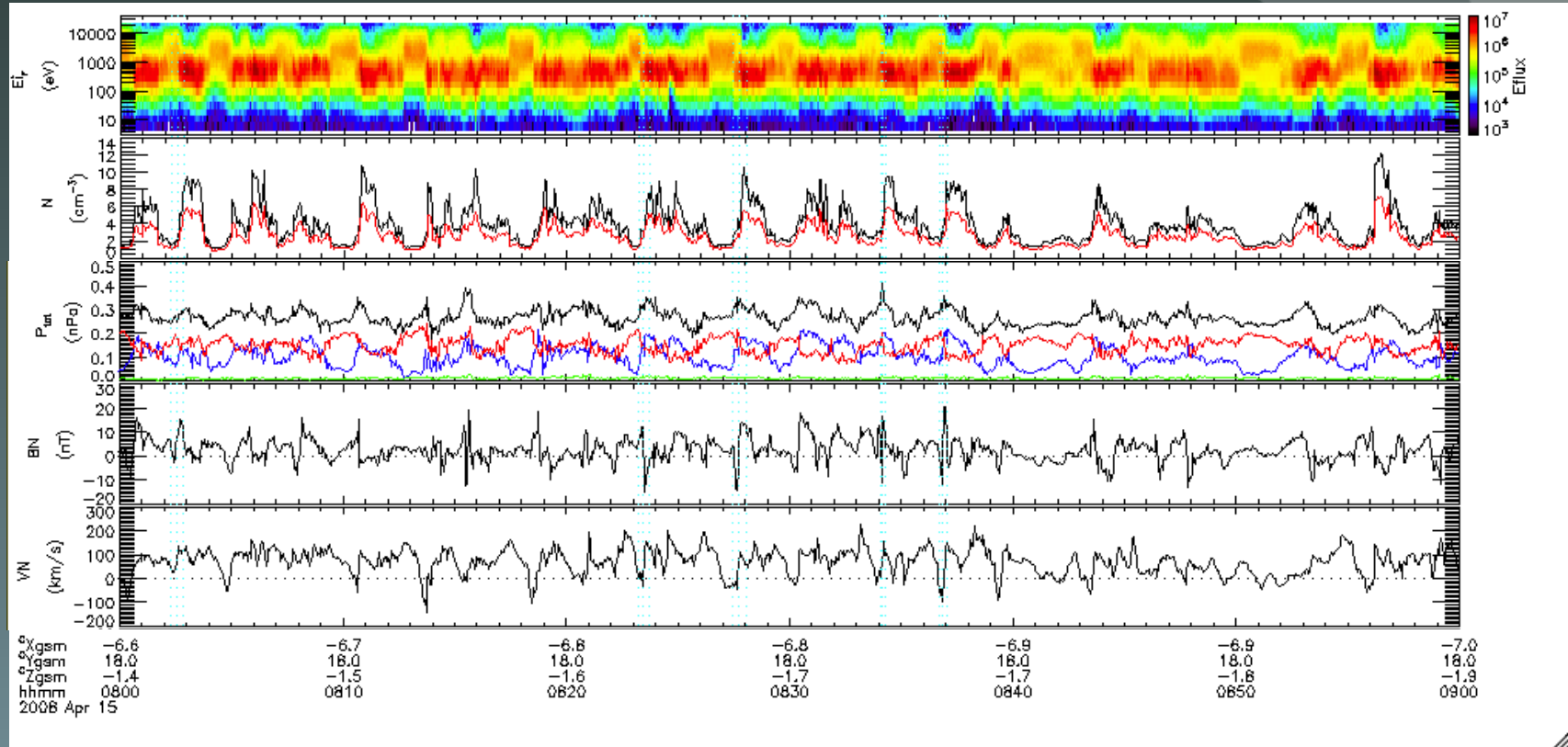
- Yes!



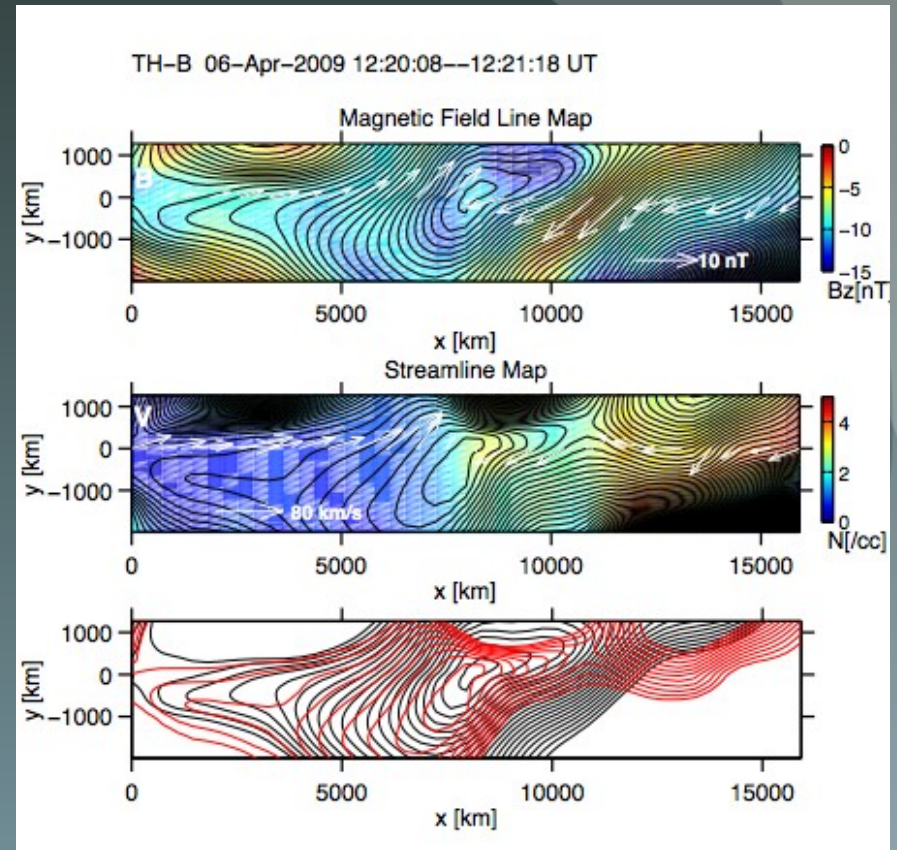
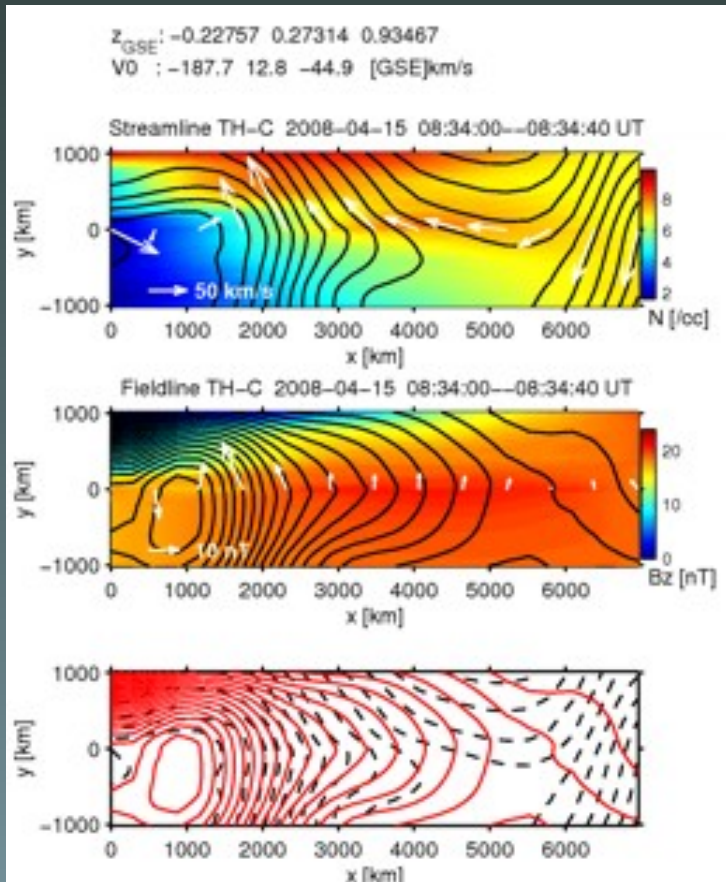
- No!



Methods 3: The search for bipolar B_N fluctuations...



Methods 4: MHD Reconstruction...



Results:

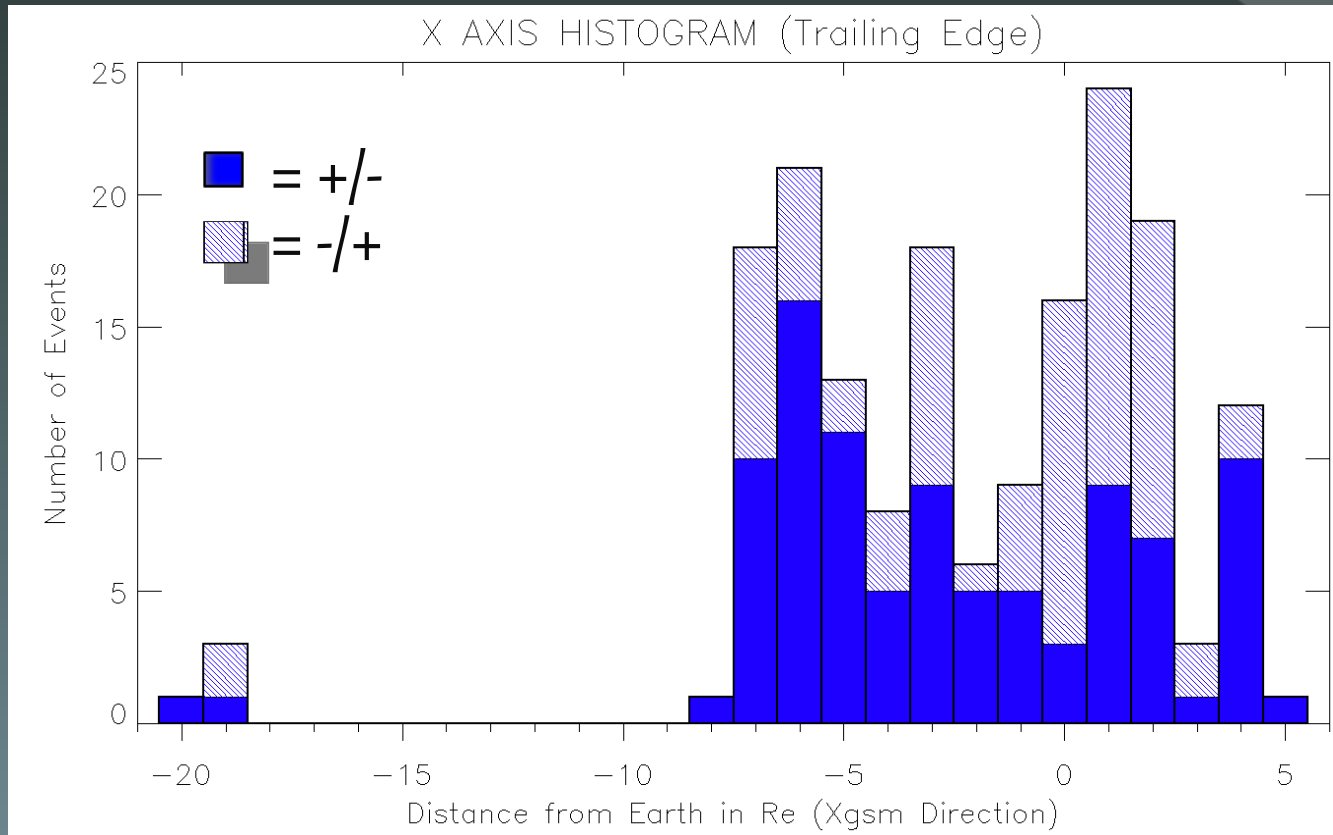
Looking for patterns in FTE location...

	Trailing FTE's	Leading Edge FTE's	Internal FTE's	Total Events
All	173	10	17	200
+/- Polarity	95	7	10	112
-/+ Polarity	78	3	7	88

- Trailing-Edge FTEs dominate
- No correlation between location and polarity

Results 2:

Looking for polarity patterns...



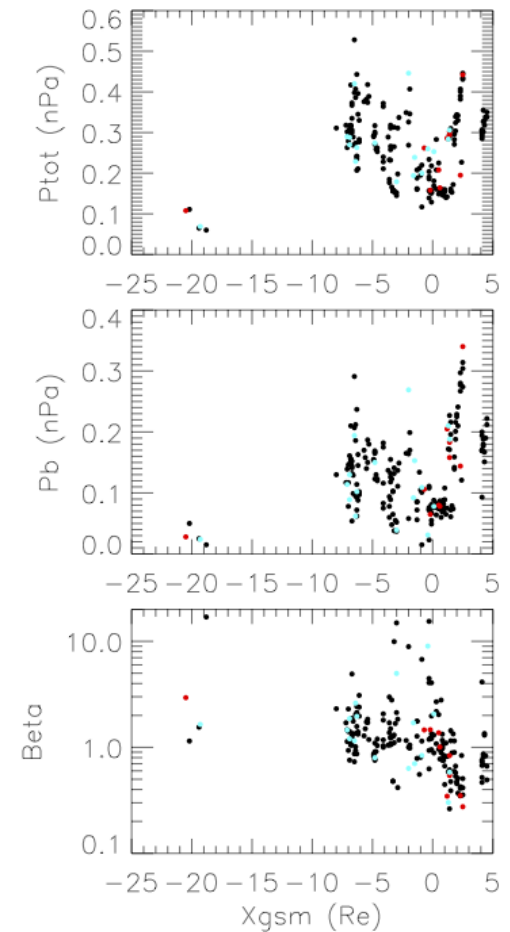
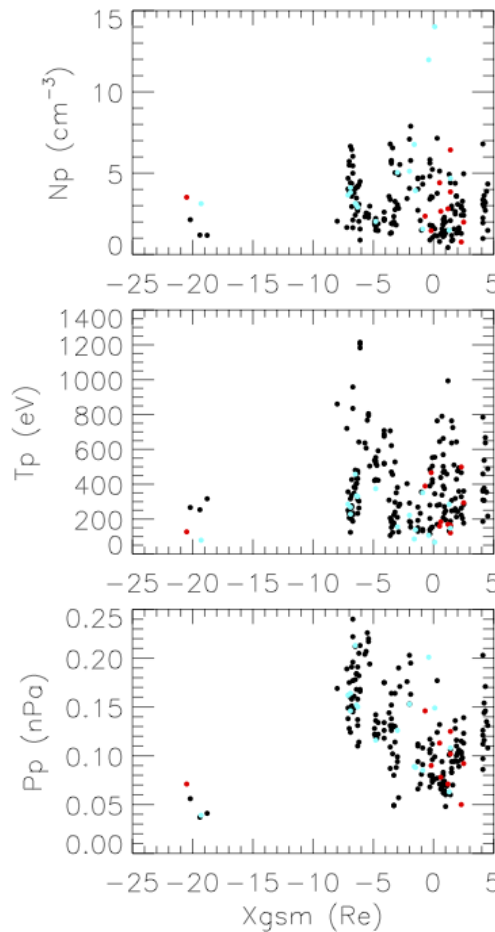
- No dominant trend is readily apparent
- Gap in data from $-9 R_E$ to $-20 R_E$
- Not enough data for conclusive results

Results 3:

Looking for patterns with respect to distance down tail...

- Gap between -9 and $-20 R_E$
- No significant patterns stand out for pressure, density, temperature or beta vs. distance down tail.

- Trailing Edge FTE
- Leading Edge FTE
- Internal FTE

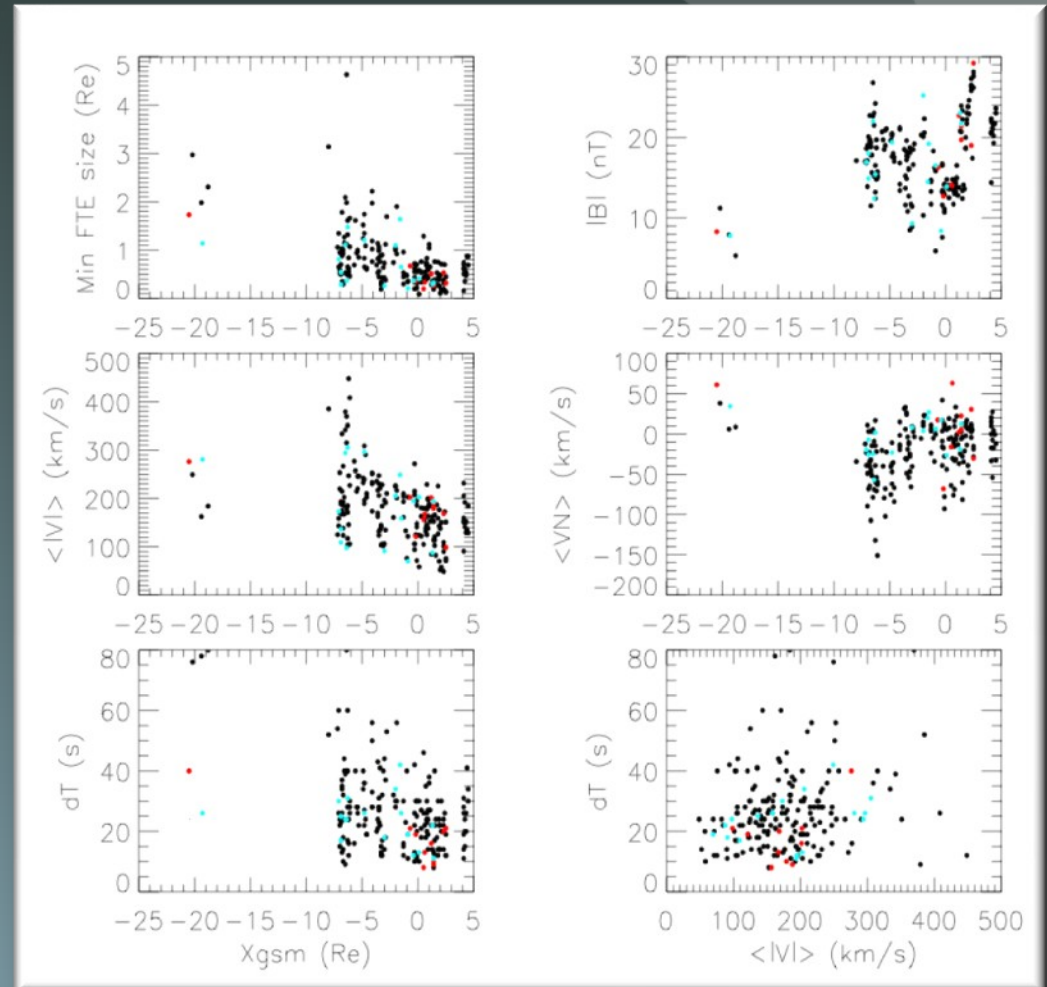


Results 4:

Still looking for patterns...

- Wide scatter for avg. $|V|$ vs. dT (s)
- However, general trend toward larger FTEs farther down tail.
- $\langle V_N \rangle$ is mostly negative.

- Trailing Edge FTE
- Leading Edge FTE
- Internal FTE



Summary

- Preliminary Analysis
 - 11 dates out of 123
 - Missing data from -9 to -20 R_E
 - Still have probes A, D and E to survey
- Conclusive Results
 - The non-result is a result
 - Majority trailing-edge FTEs
 - Mostly negative $\langle V_N \rangle$ reinforces above result
- Possible Results
 - Larger FTEs occur farther down tail
 - Polarity may switch from mostly -/+ to mostly +/- farther down tail

Acknowledgments



GO BUFFS!

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References

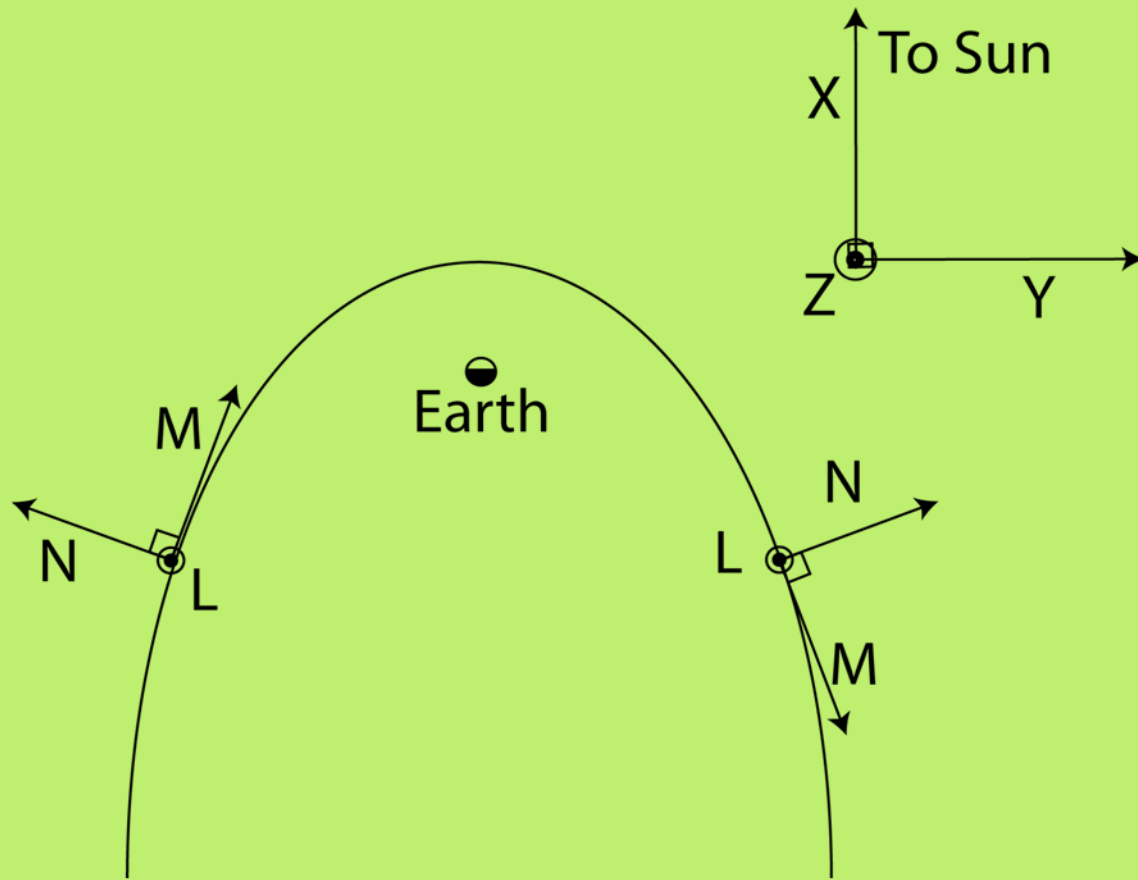
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Coordinate Systems Redux



Flux Rope Model



A more modern flux rope model

