Turbulence-Driven Reconnection in Earth's Magnetosheath

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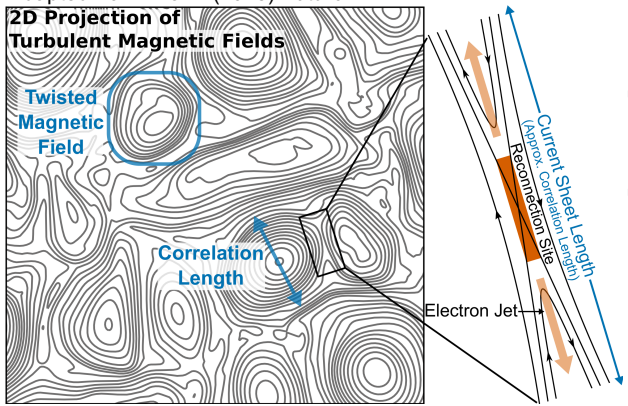

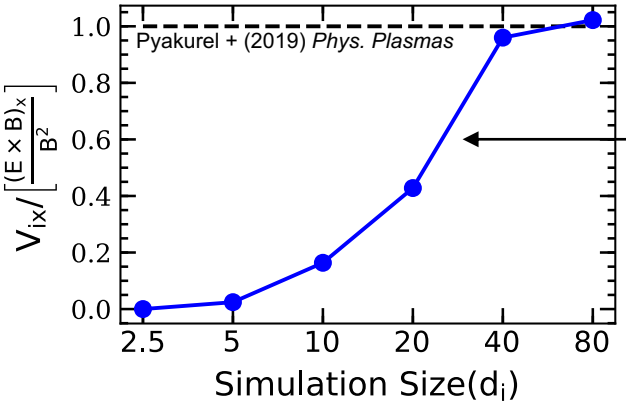

Ion jet speeds reduced if the length of the current sheet along outflow direction is less than ~40d_i

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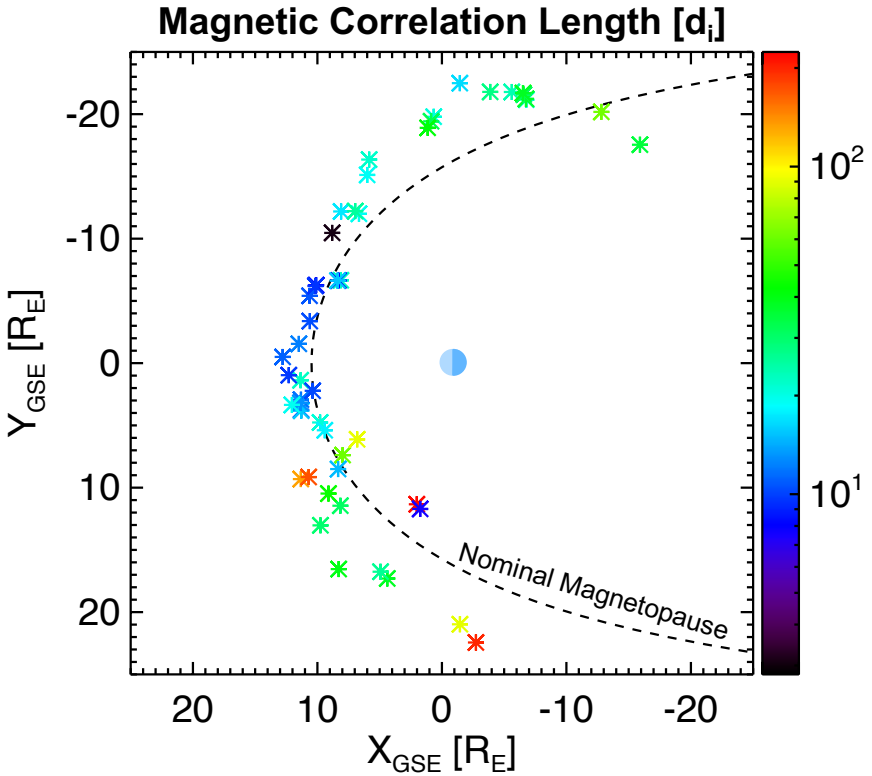
Survey of Turbulence-Driven Reconnection



Identified 60 MMS burst intervals of turbulence across dayside magnetosheath

Correlation lengths systematically varied between sub-solar point and flanks
→ Spanned range expected for transition from ion-coupled to electron-only reconnection

We systematically identified reconnecting current sheets within the intervals
261 verified after manual inspection

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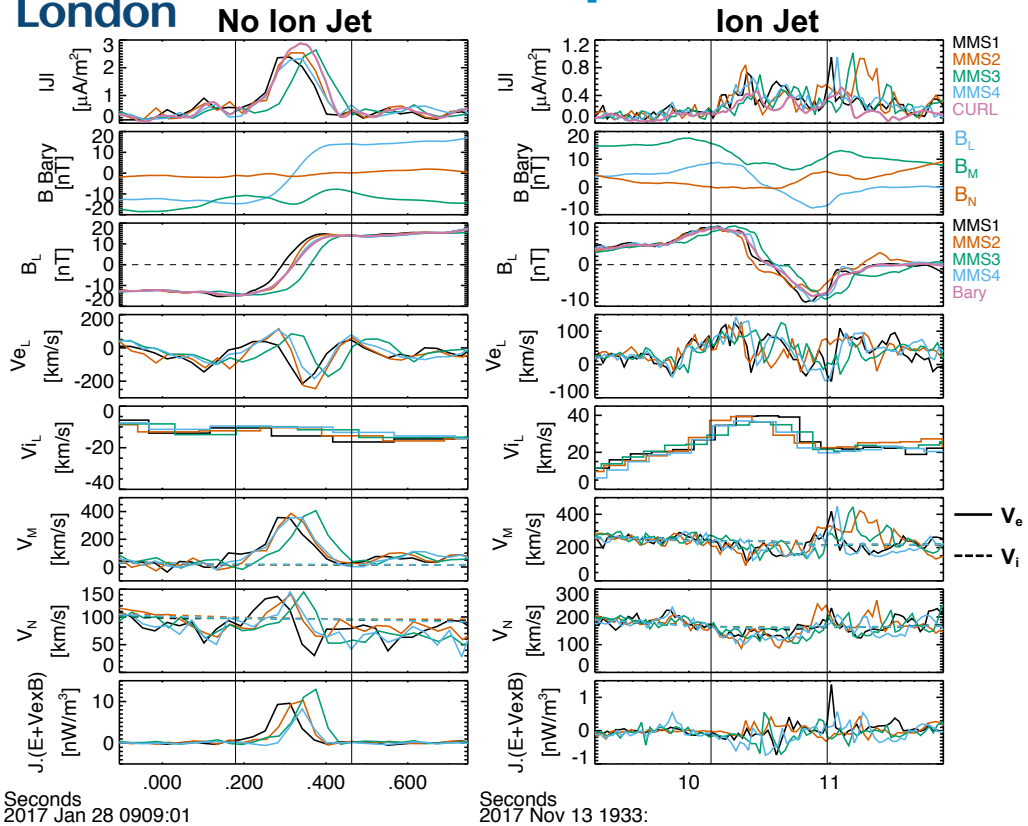
Example Reconnection Events



Most reconnection events have no clear evidence of ion outflows

A smaller subset (~18 events) have evidence of ion jet signatures
→ Change in $V_{iL} - B_L$ correlation centered on B_L reversal

From individual event it is difficult to distinguish crossing at different distances from the x-line and electron-only vs. ion-coupled reconnection

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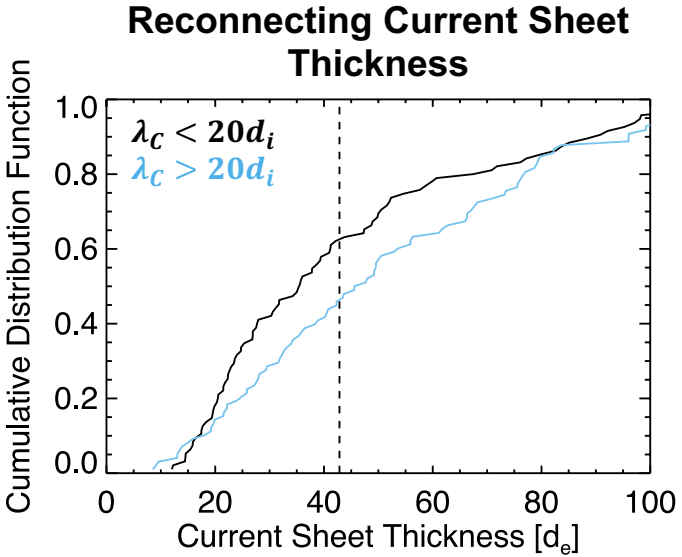
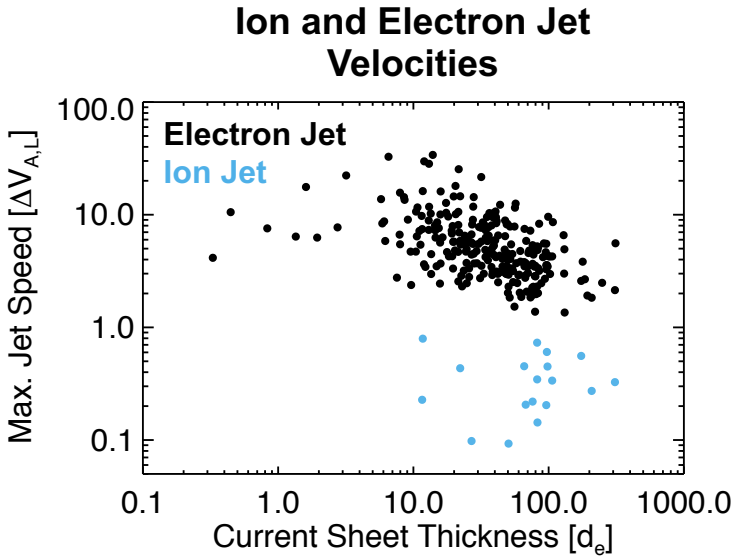
Reconnection Event Properties





Intervals with shorter correlation lengths tend to have thinner reconnecting current sheets

Faster electron jets tend to be present at the thinner current sheets

Majority of ion jets occurs at ion scale current sheets

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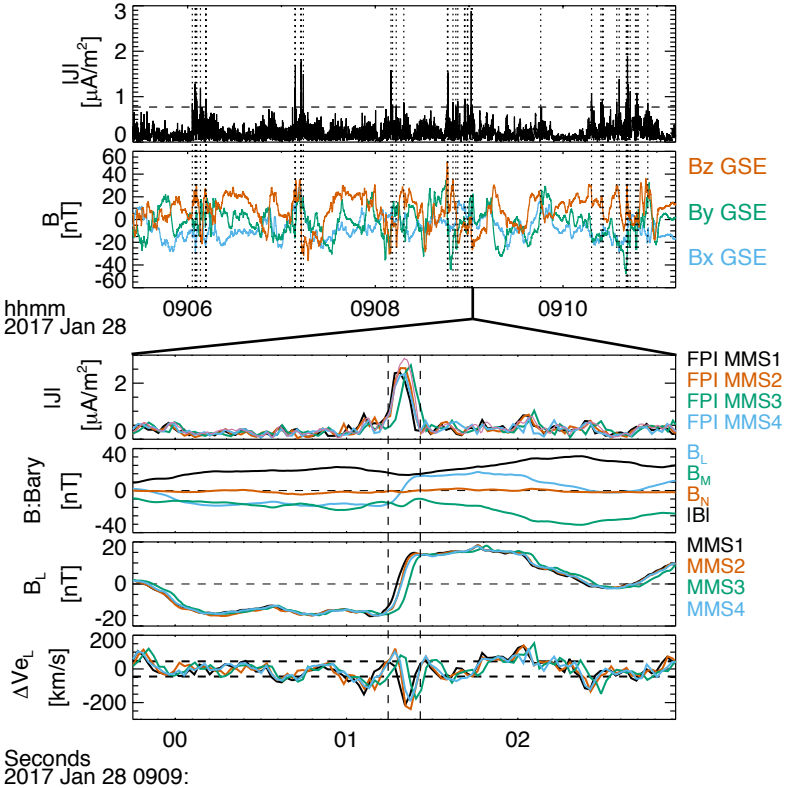
Identifying Reconnection Events



Current Structure Identification

Local maxima in $|\boldsymbol{J}| > 3J_{rms}$ are identified

Adjacent maxima considered unique structures if minimum between them $< J_{peak}/2$

Reconnection Identification

Each structure rotated into local current sheet coordinate system

$\widehat{\boldsymbol{N}} = \widehat{\boldsymbol{b}}_1 \times \widehat{\boldsymbol{b}}_2$, (current sheet normal)

$\widehat{\boldsymbol{M}} = \widehat{\boldsymbol{x}}_{max} \times \widehat{\boldsymbol{N}}$, (guide field direction)

$\widehat{\boldsymbol{L}} = \widehat{\boldsymbol{M}} \times \widehat{\boldsymbol{N}}$ (outflow direction)

Check for reversals in B_L and perturbations in $|\Delta V_{e,L}| > 0.7V_{A,L}$

Manually verified each potential reconnection event

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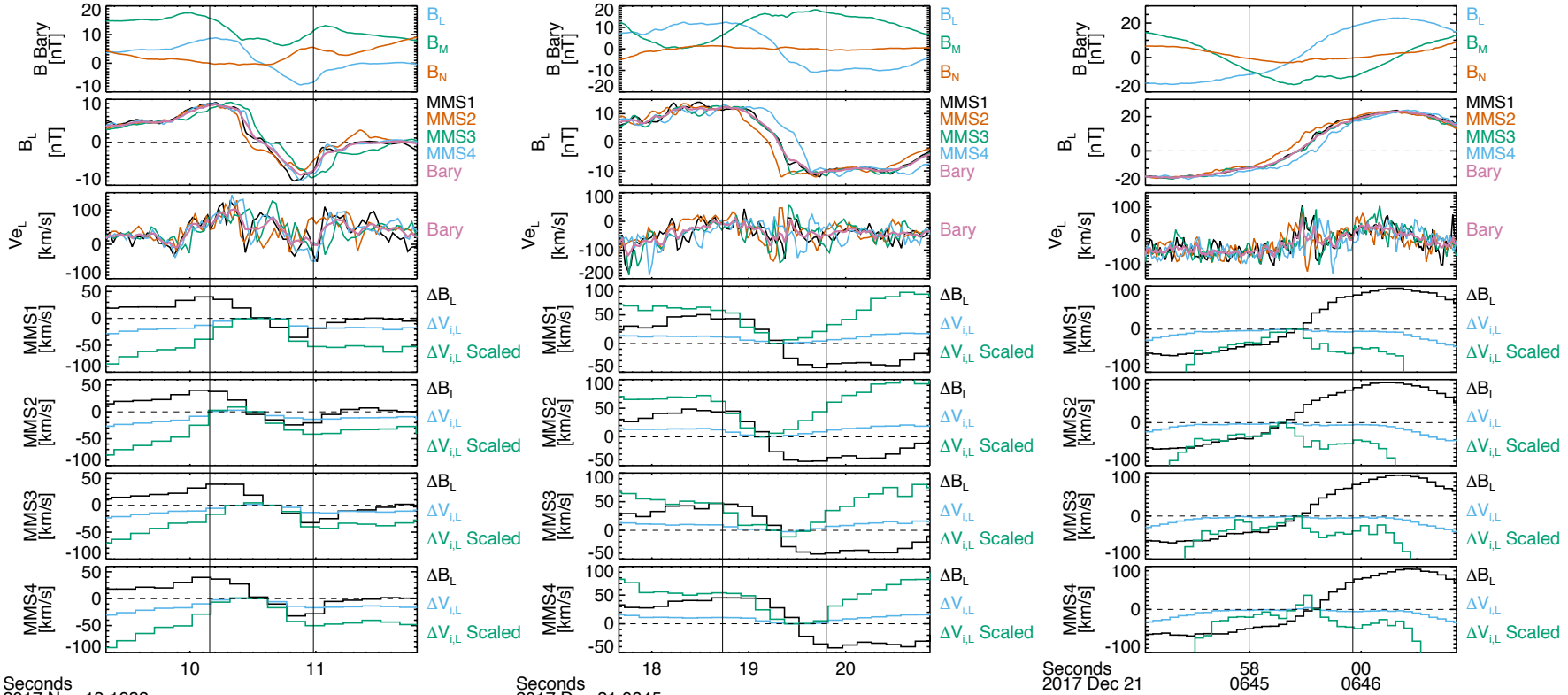
Ion Jet Signatures



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