

Magnetosheath High-speed Jets

Magnetosheath jets are transient enhancements of density and/or velocity. They are found downstream of the quasi-parallel bow shock, while their origin is typically associated with shock's non stationarity (i.e., shock rippling, foreshock transients, & global reformation).

Here we show a different scenario of boundary jet(s) being SW driven (i.e., due to an upstream discontinuity), captured by three different missions (MMS, THEMIS, and Cluster).

Datasets & Method

WIND/THB/THC: Upstream of the shock, B variations observed.

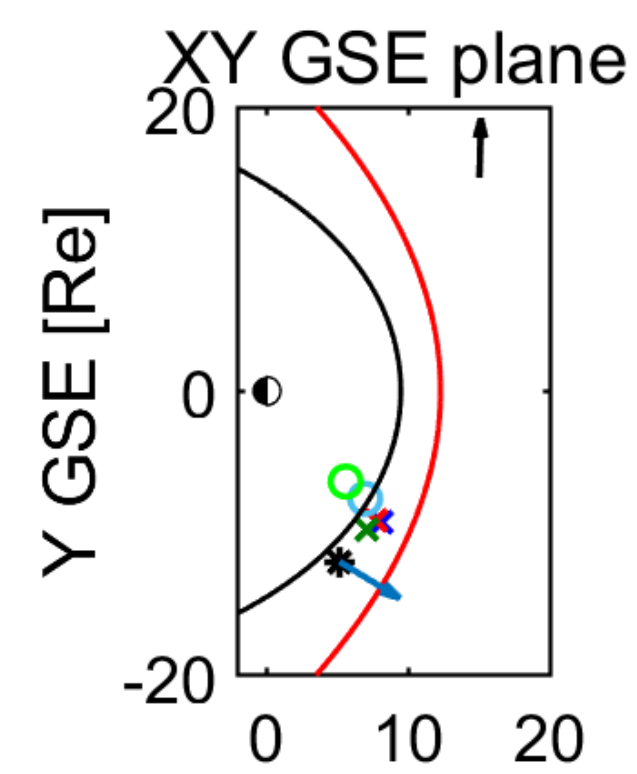
THA/THE/THD: Downstream of the shock, first observations of jets. THD contains burst (high-res) measurements.

MMS: Fast and burst (high-res) measurements available, evolution and structure of jet.

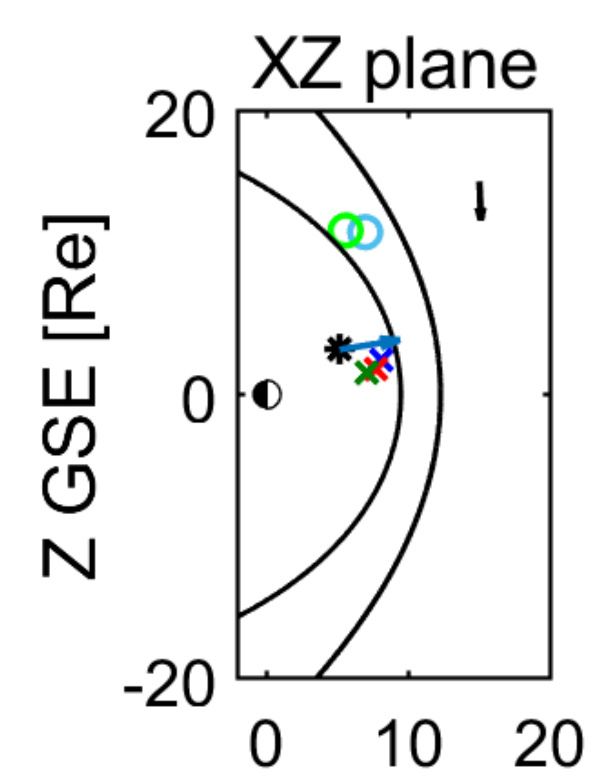
Cluster: Preliminary data available, showing similar flow variations.



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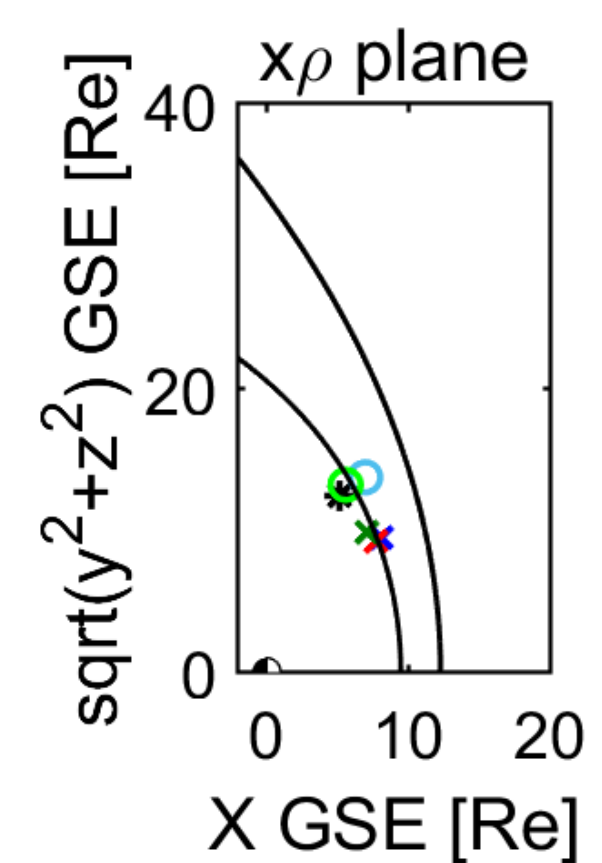


MMS: 5.15 -12.02 3.16
CL1: 6.96 -7.58 11.43
CL4: 5.58 -6.38 11.55
THE: 7.74 -9.05 1.83
THA: 7.04 -9.78 1.57
THD: 8.03 -9.23 2.38



* MMS1
x THD
x THE
x THA
o C1
o C4

OMNI: B
Bx: 0.16
By: 6.27
Bz: -4.08



MMS - BS: 3.21 | MP: -1.47
CL1 - BS: 1 | MP: -3.64
CL4 - BS: 2.44 | MP: -2.32
THE - BS: 2.43 | MP: 2.43
THA - BS: 2.78 | MP: -1.16
THD - BS: 2.04 | MP: -1.72

Learn about the kinetic structure of jets here or about jets forming due to global shock reformation here



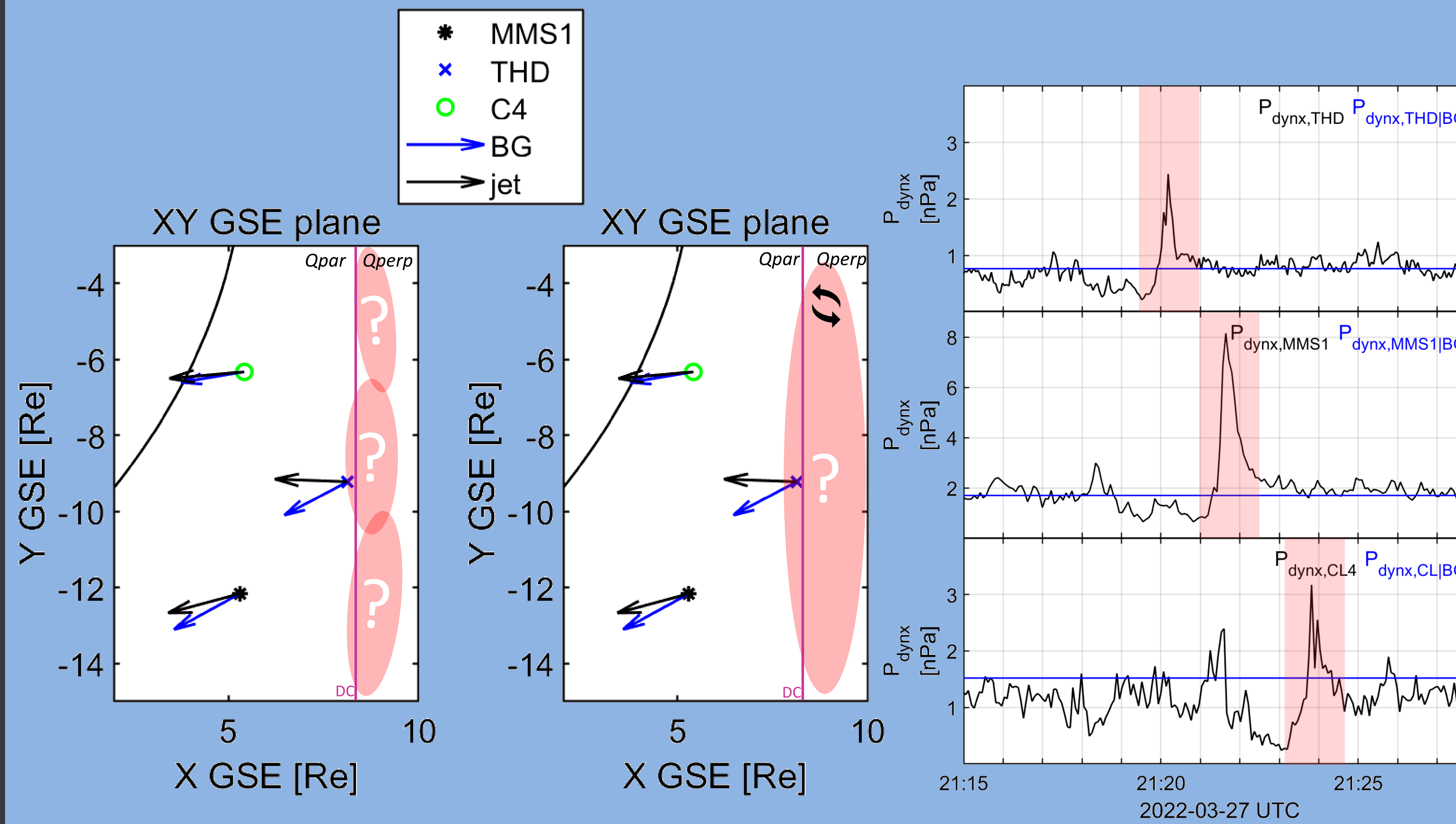
Multi-mission observations of a high-speed jet associated to a solar wind discontinuity



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“Downstream dense high-speed jet(s) throughout the magnetosheath associated to an upstream DC”



Discussion

- **High-speed flows** forming in different locations (i.e., MMS, Cluster, THEMIS) associated to an upstream solar wind discontinuity (WIND, THEMIS). These “boundary” jets are found at the regions where quasi-parallel magnetosheath turns to quasi-perpendicular.
- The **properties** of the jet-like structures change from one location to the other. MMS observes more than twice the dynamic pressure in P_{dyn} . In the future we plan to investigate variability in scale sizes, background flows, and 3D structure of the observed jet(s)
- **Conjunction based studies** such as this one can help us understand the origin and evolution of dayside transient phenomena. See preliminary lists of conjunctions on: <https://www.cosmos.esa.int/web/csa/mms-themis-conjunctions> or contact for custom lists (based on S/C separation and/or distance from boundary surfaces).
- **Ongoing work:** feedback/suggestions/ideas really appreciated!

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