Linking Slow Wind Intervals to Pseudostreamer Dynamics: Possibilities with PUNCH

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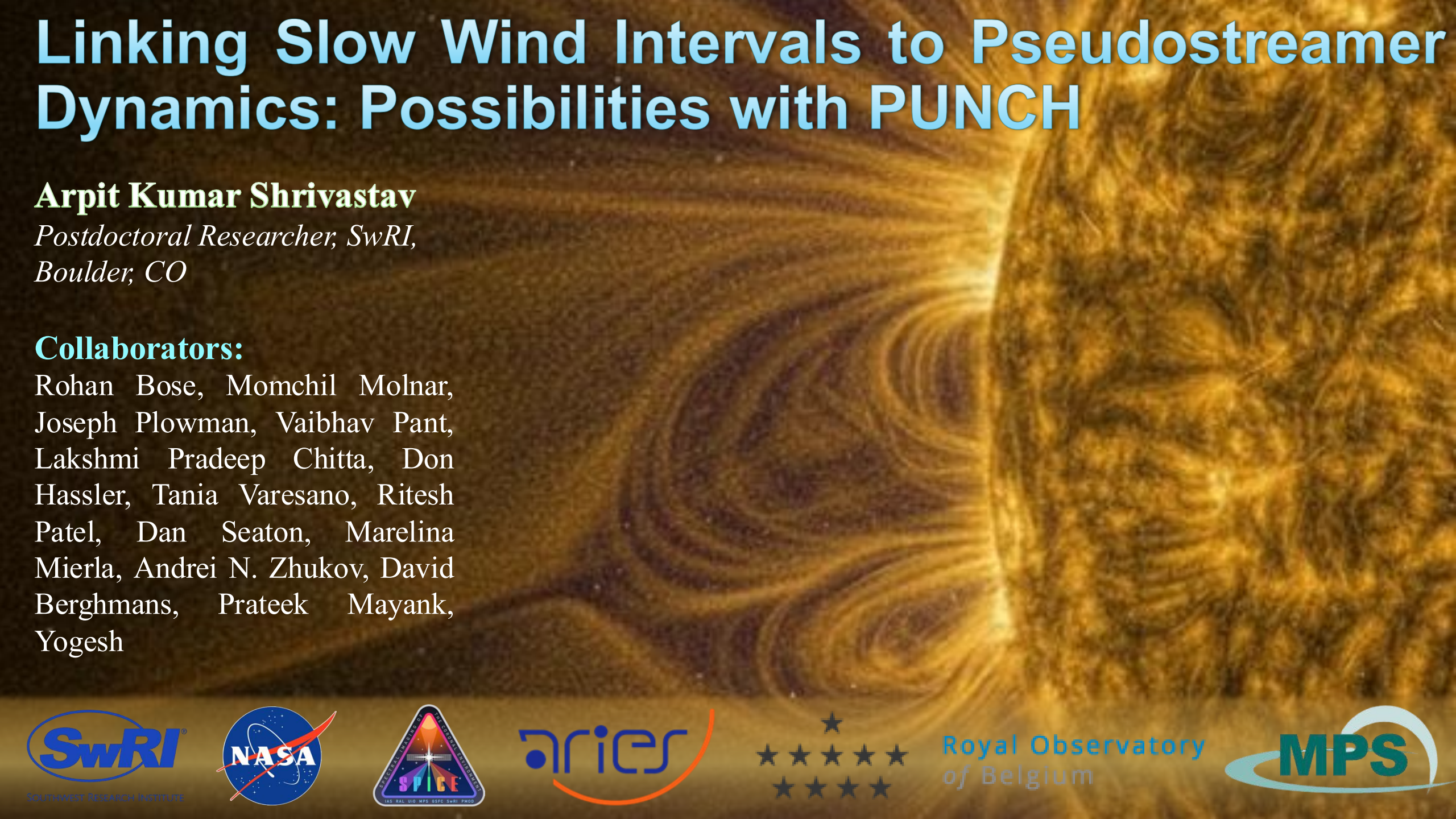
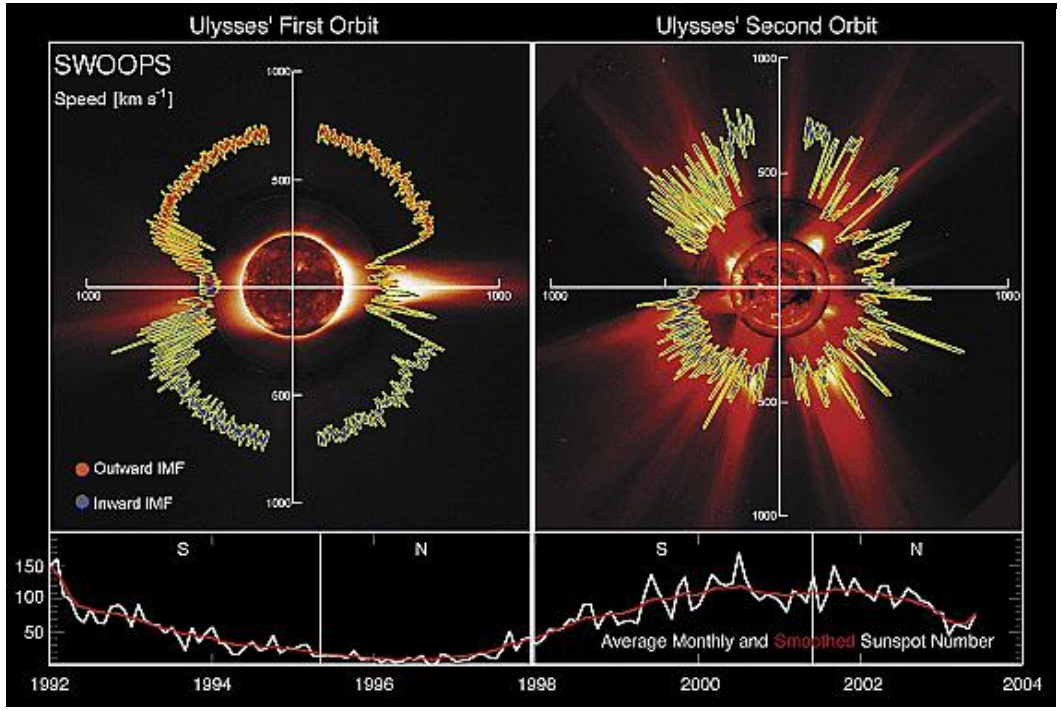
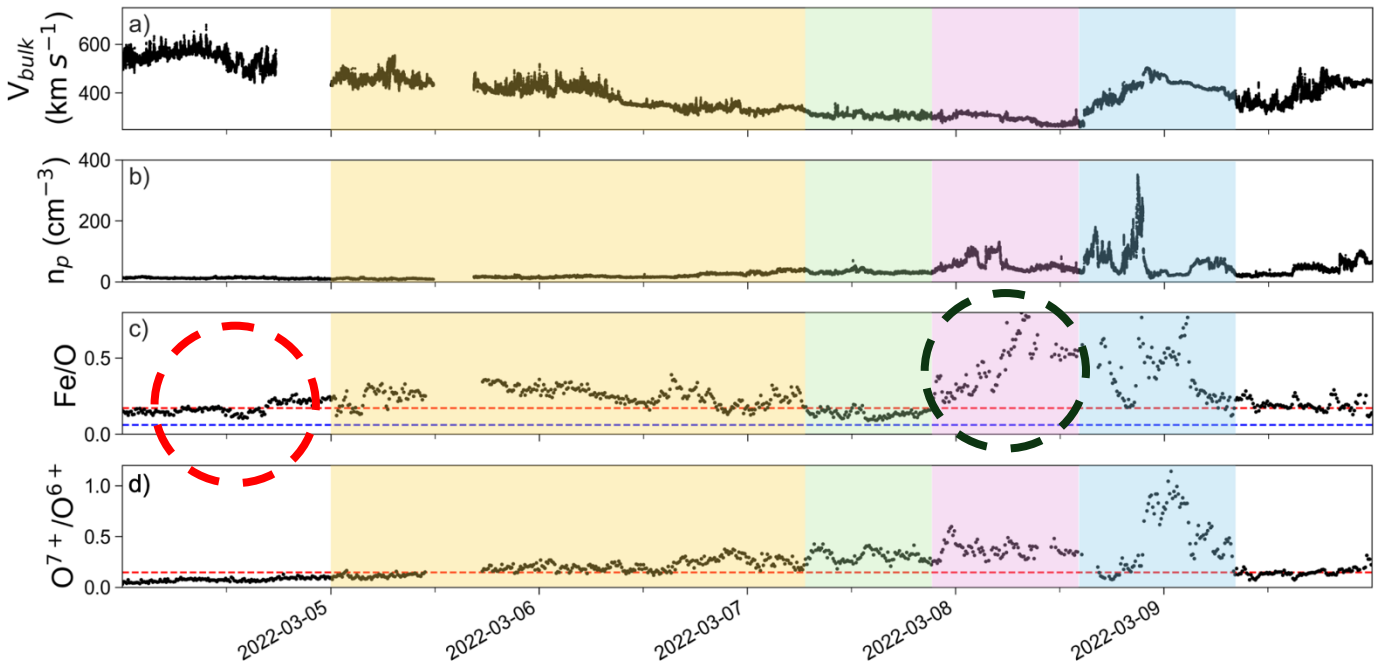


Origins of Solar Wind



McComas et al. (2003)



Wallace et al. (2025)

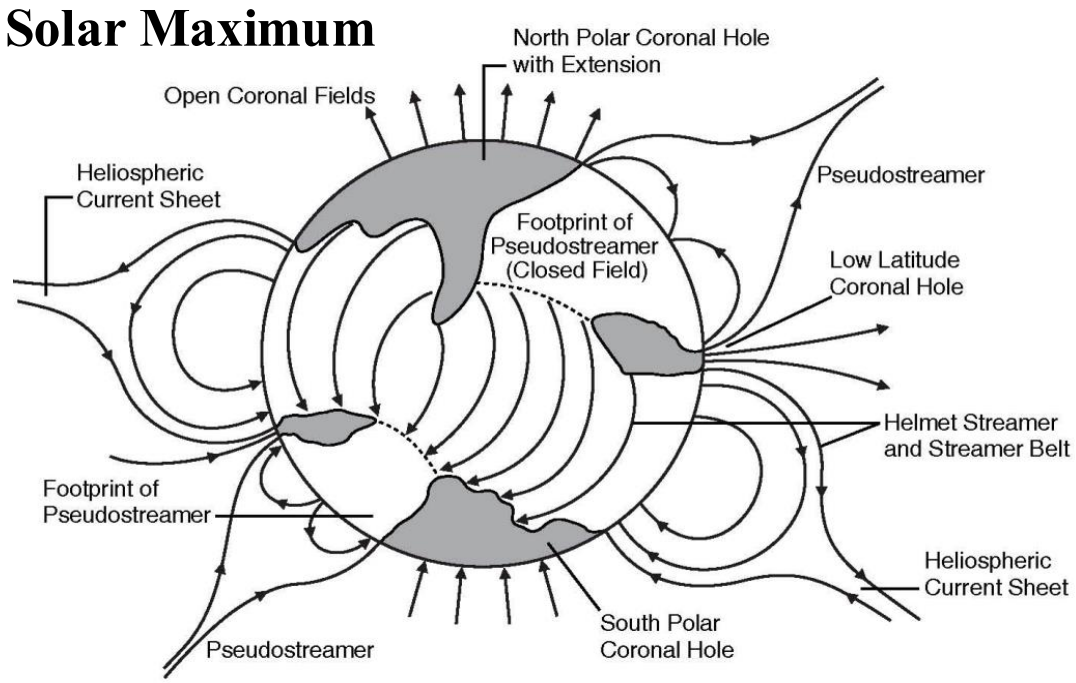
THE COMPOSITION CONFLICT

- If solar wind escapes via field lines **open to heliosphere** — **low Fe/O** ratios.
- Slow wind — high Fe/O ratio which is generally found in **closed field regions**.
- How slow wind is **emerging** from the closed field regions?

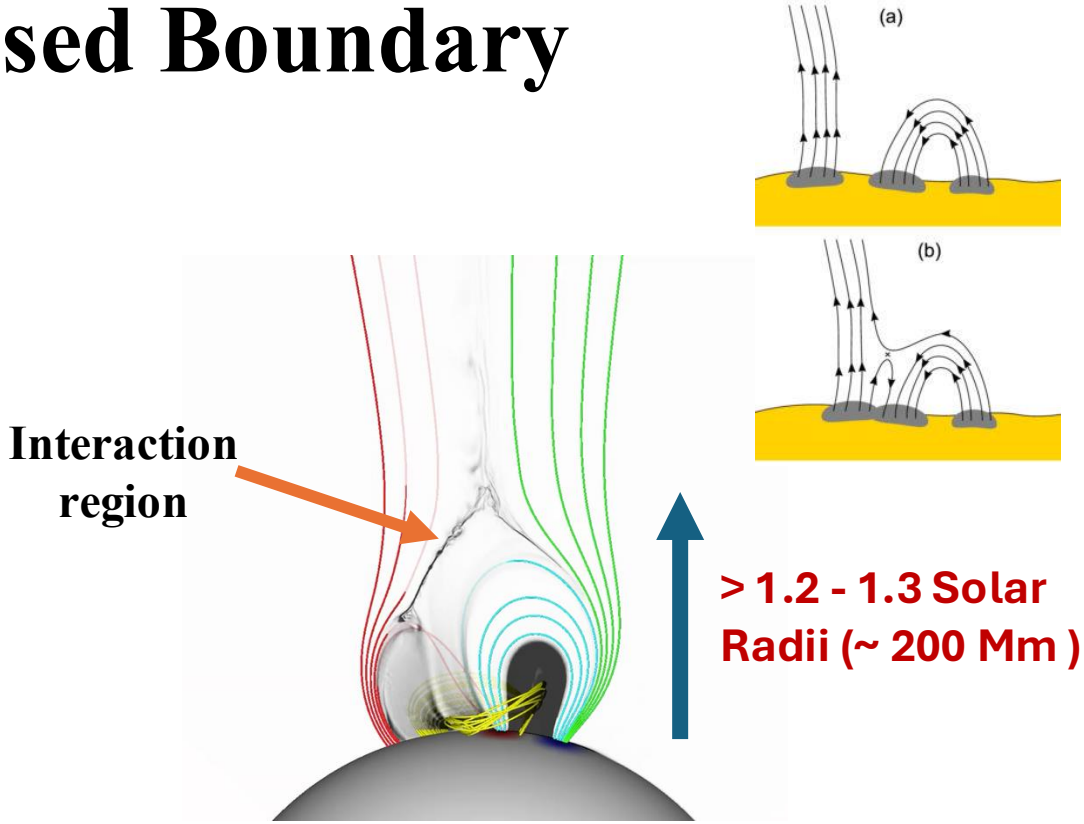
Low Fe/O (open field)

High Fe/O (closed field)

Large-Scale Structures & Open-closed Boundary



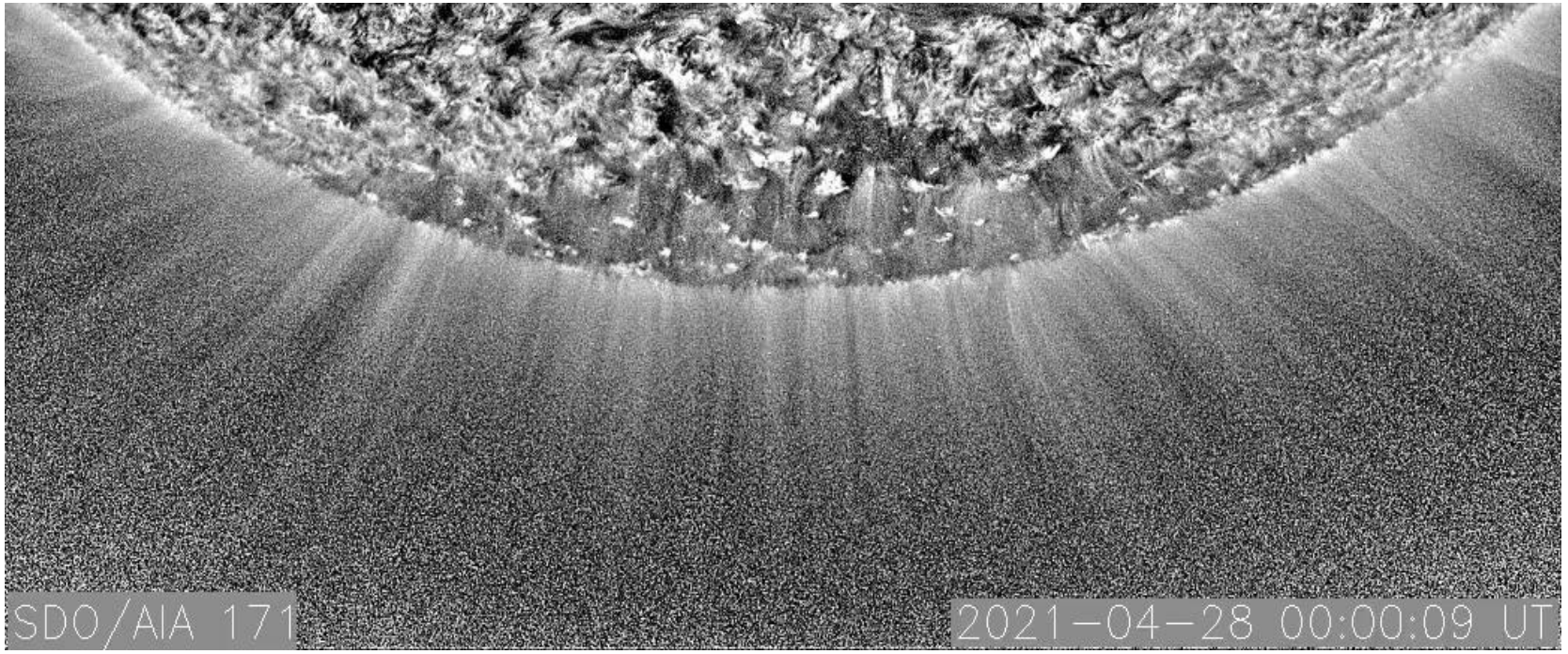
Luhmann, J. et al (2012)

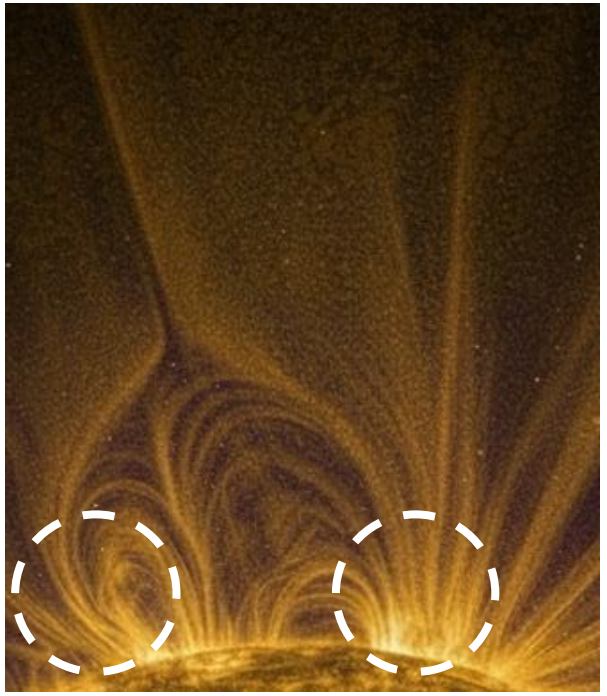


The large-scale structures – **Helmet Streamers and Pseudostreamers** are considered as potential sources of the slow solar wind.

Interchange Reconnection near open-closed flux boundary – Outflows and downflow signatures (*Wyper et al., 2022*)

Solar wind generation near the base of corona





Small-scale reconnection at coronal base in coronal holes producing waves and flows (*Roauafi et al, 2023*)

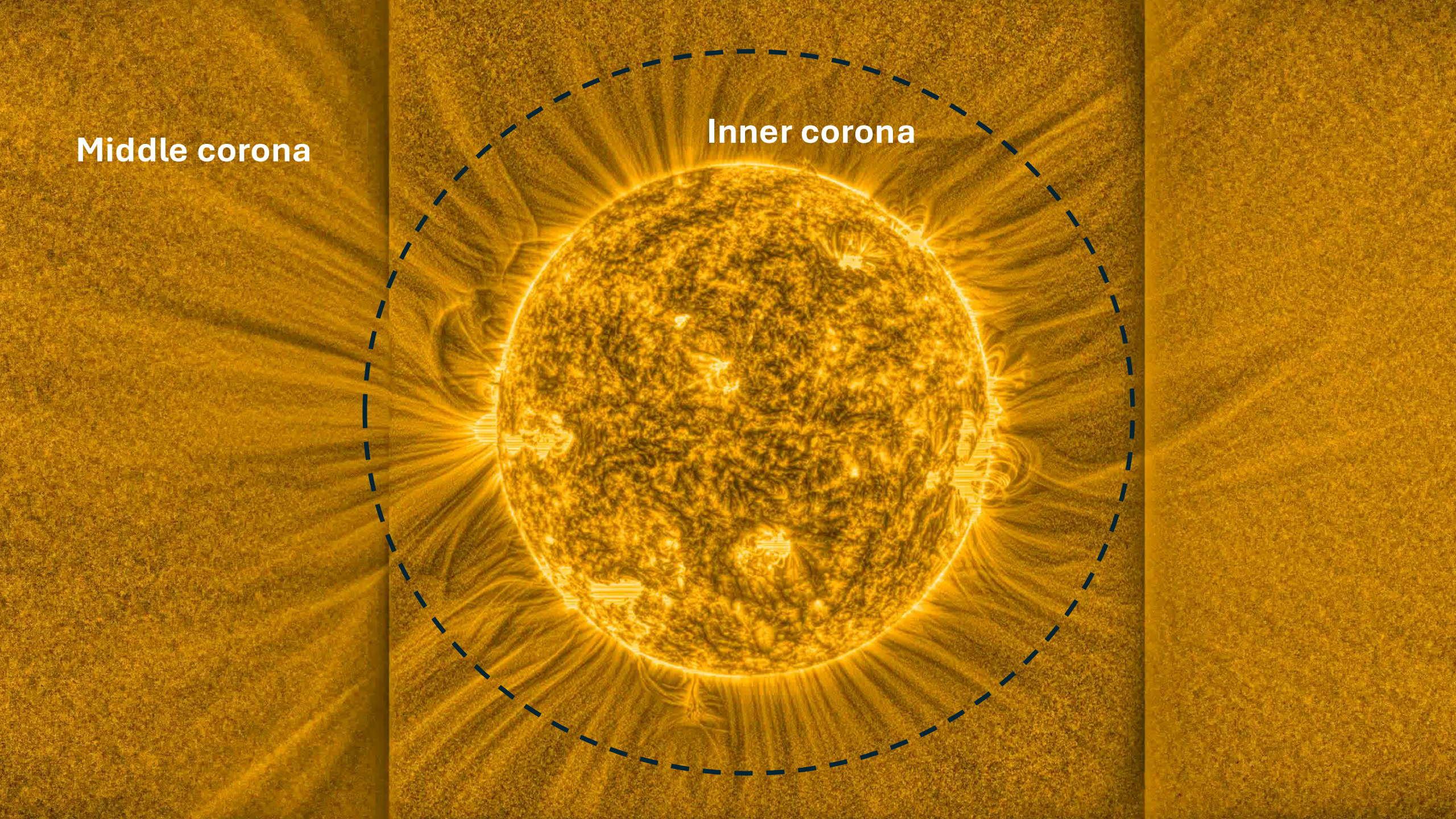
What kind of dynamics near the base of the large-scale structures contribute to solar wind?

Probing solar wind origin in Pseudostreamers

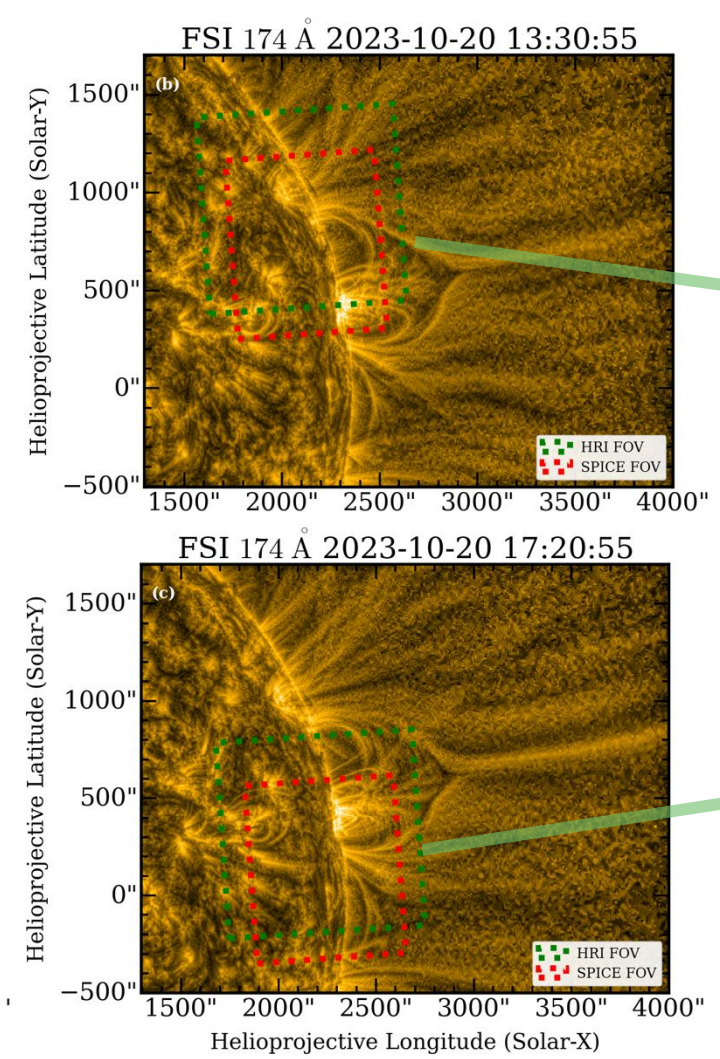
1. Waves & Flows
Do we see signatures of waves or outflows, at the base of these structures?

2. Reconnection Signatures
Can we detect evidences of interchange reconnection in the Pseudostreamers?

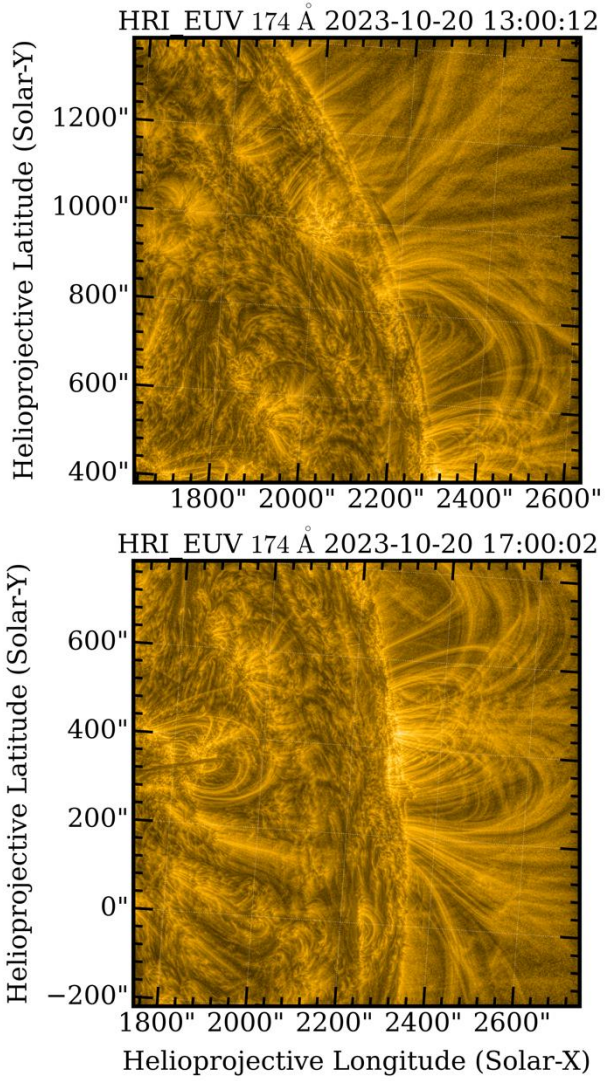
3. Composition
What composition do we observe at the base of large-scale structures?


Middle corona
Inner corona

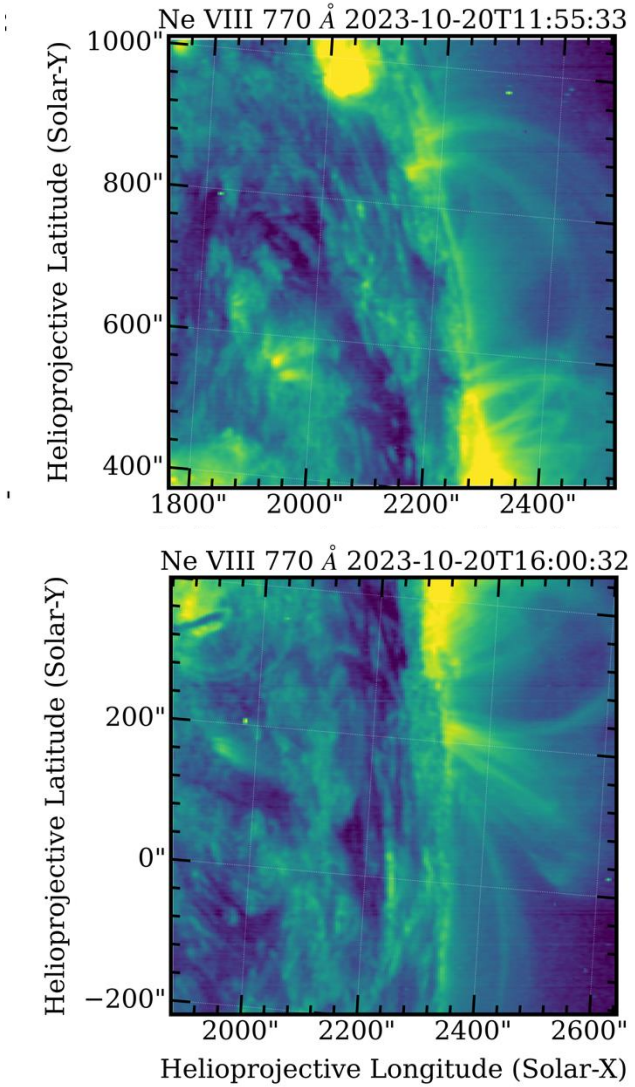
Solar Orbiter Observations: FSI, HRI_{EUV}, SPICE



Inner + Middle corona (Broader Context of the structures)

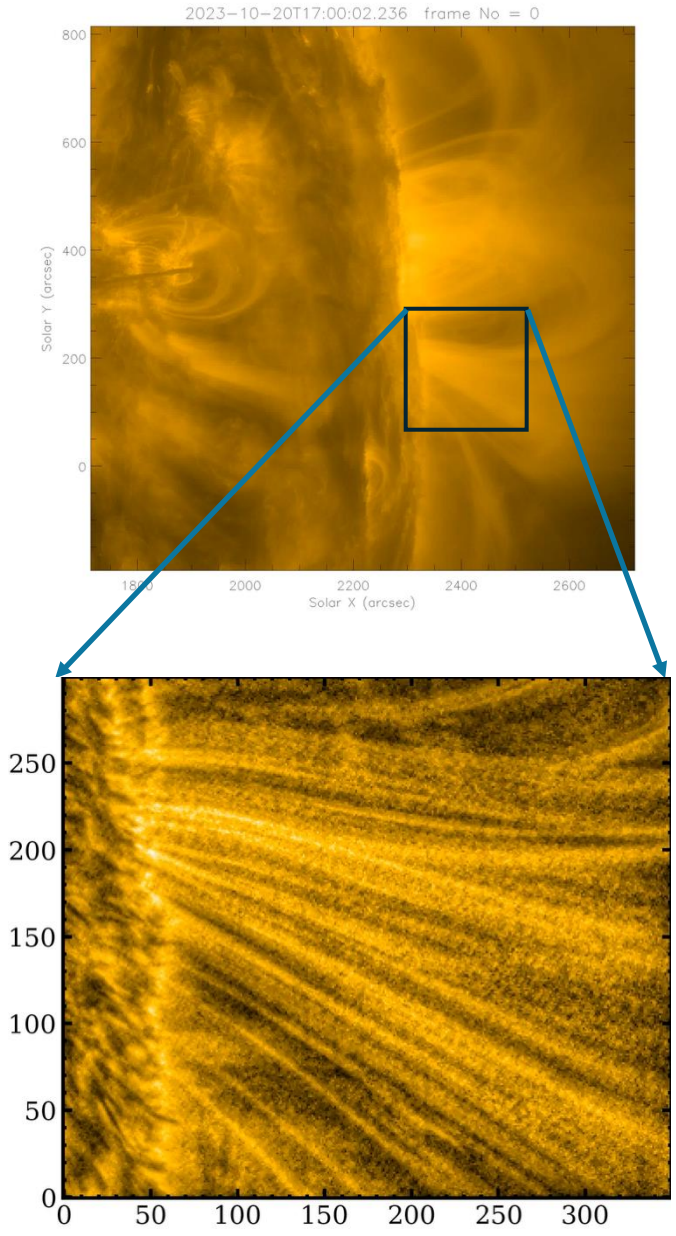


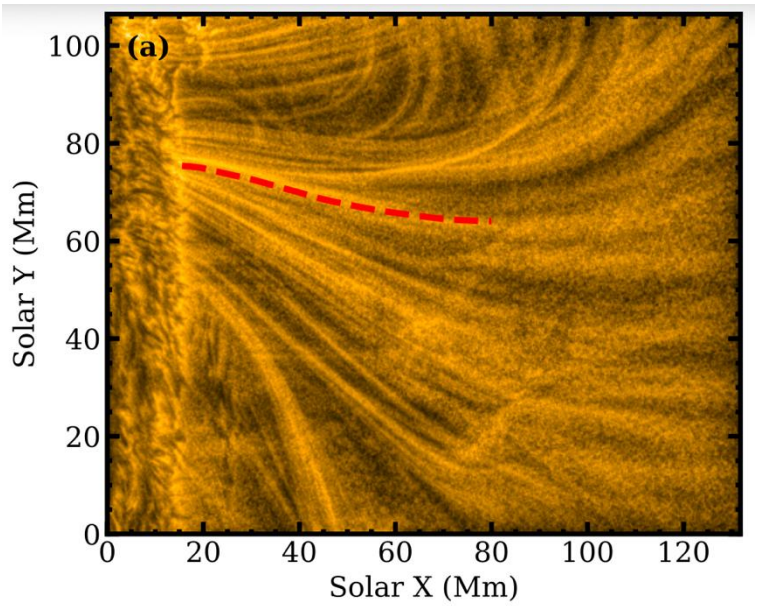
Inner corona

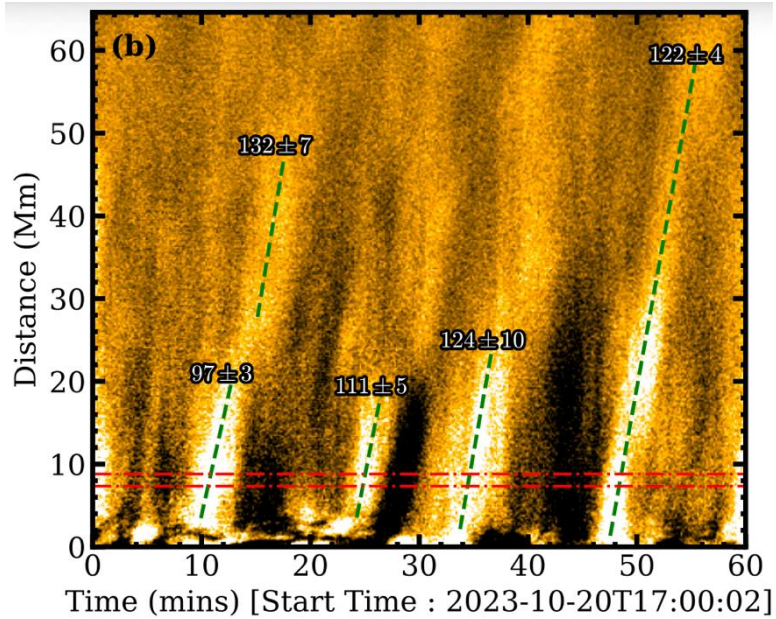


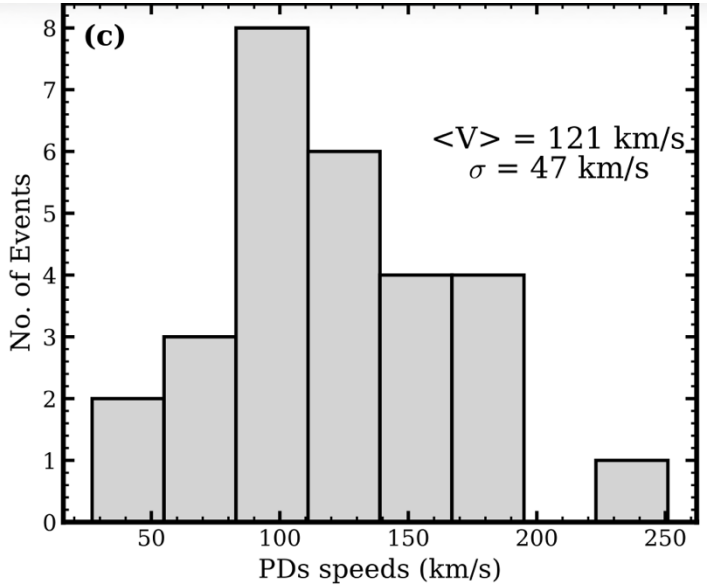
Inner corona

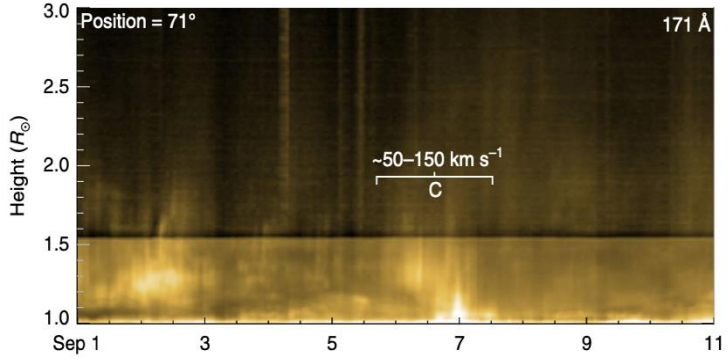
Propagating Disturbances (PDs): HRI_{EUV} Observations





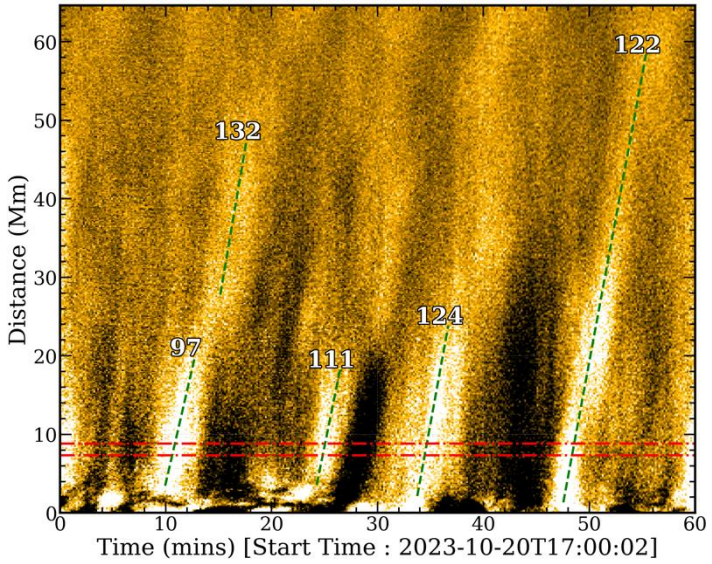


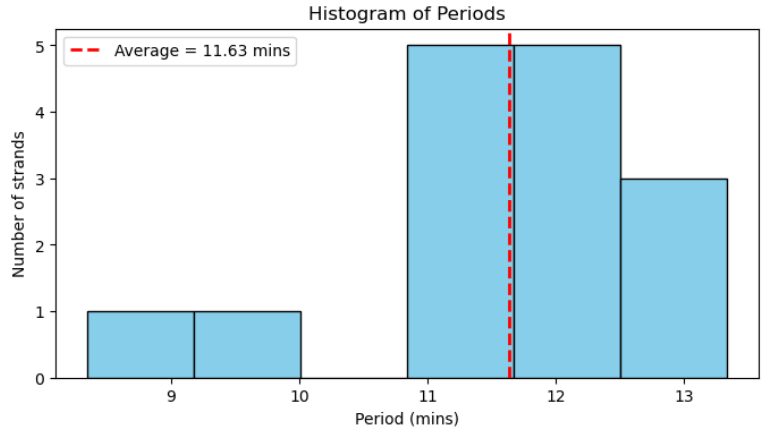


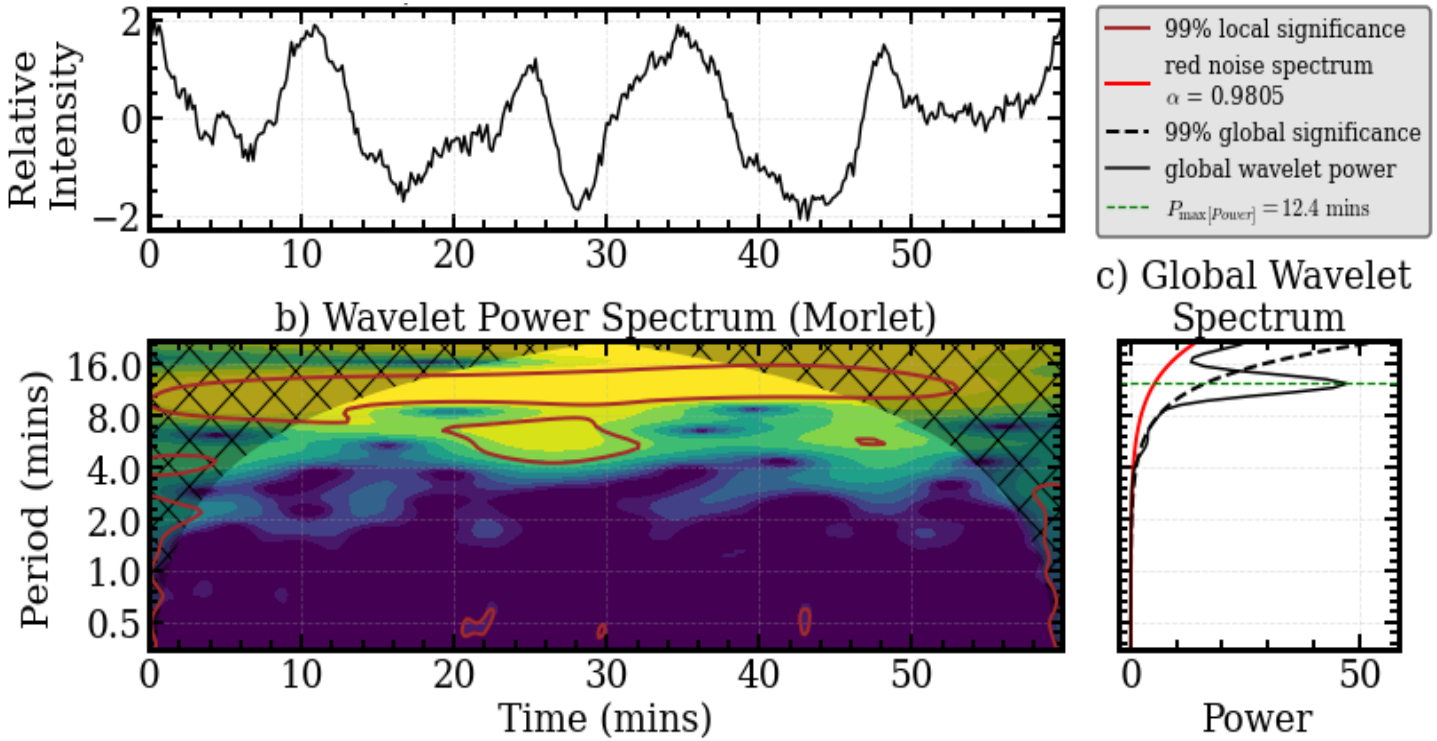


Middle corona *(Seaton et al 2021)*

Periodicities of Propagating Disturbances (PDs)

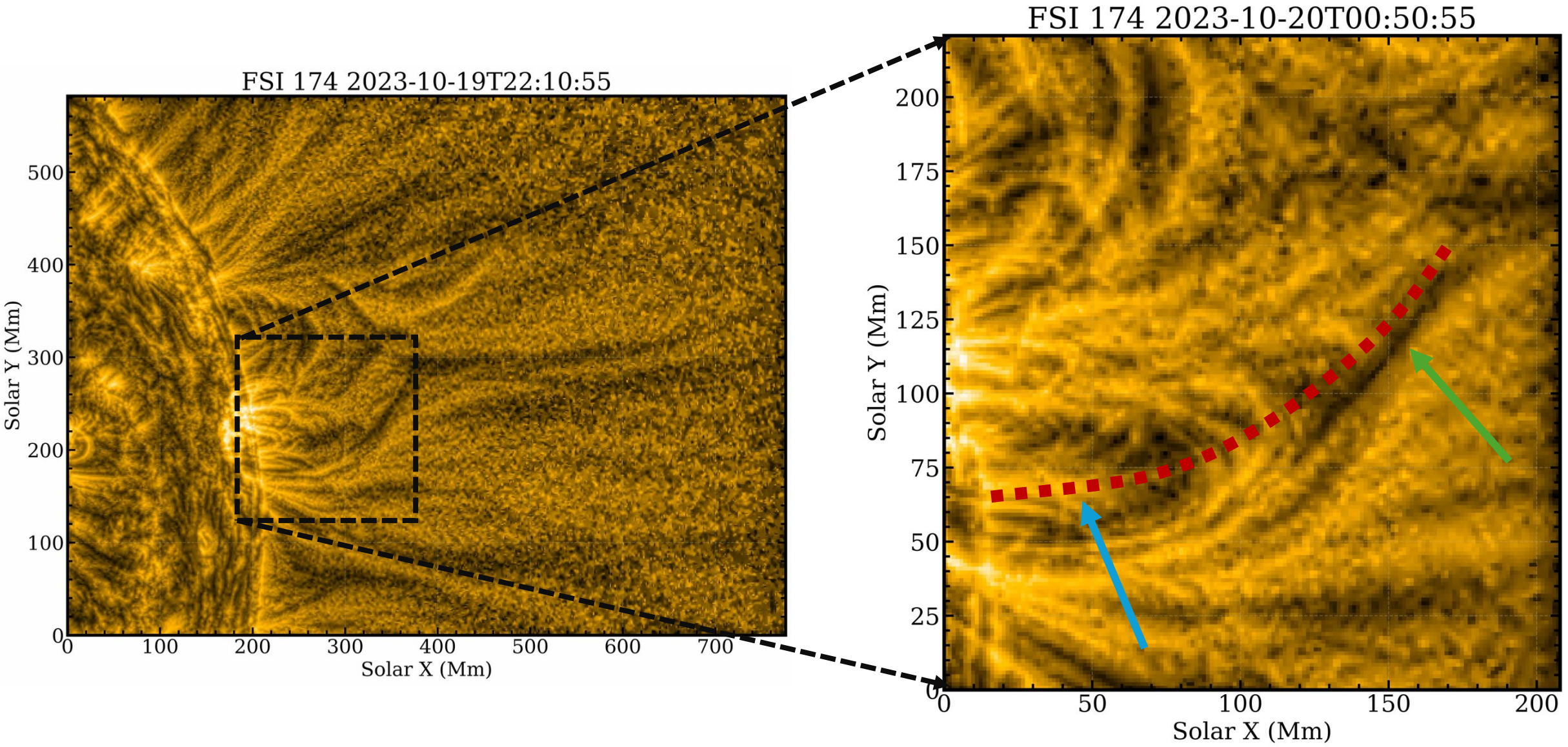






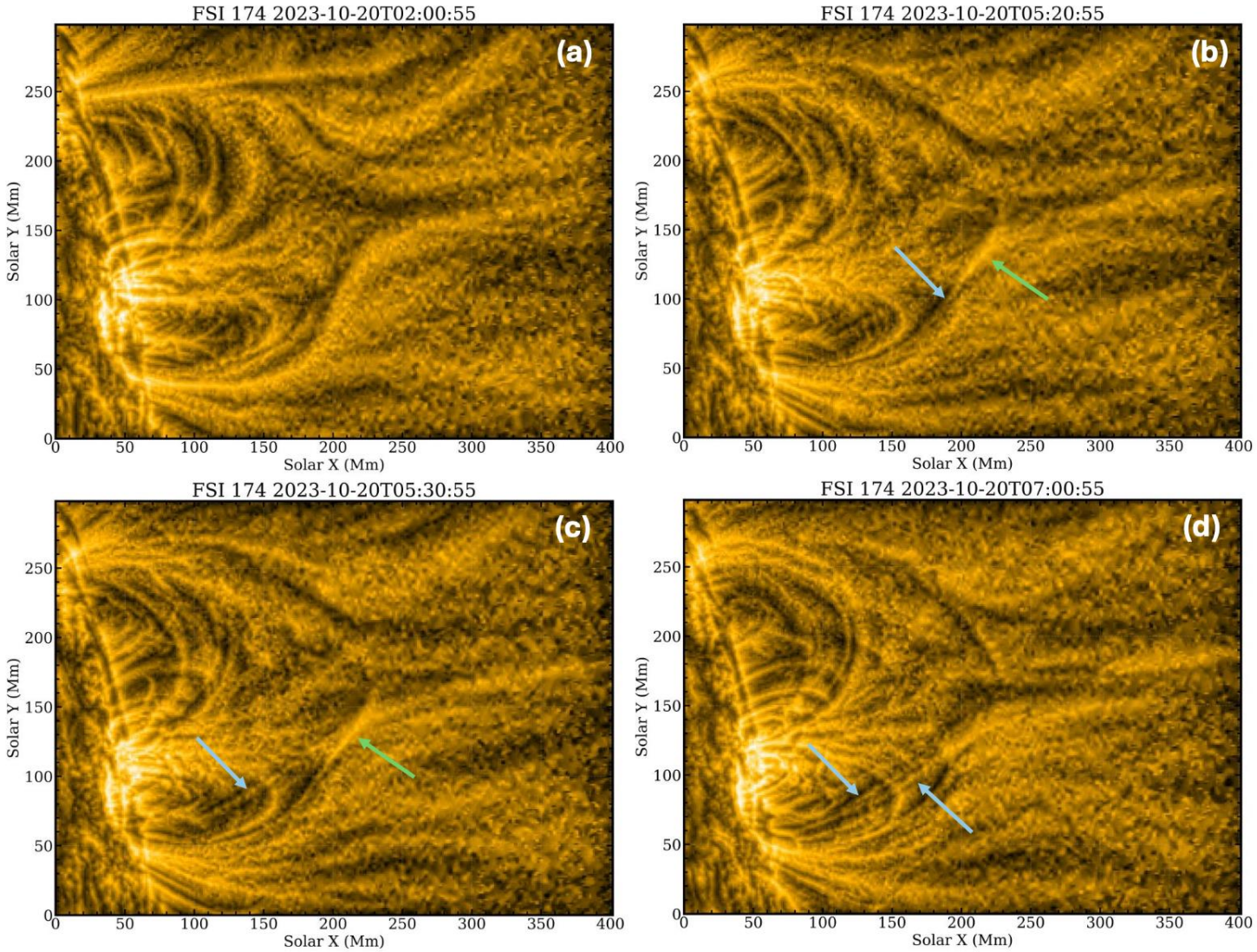
These PDs can supply the mass flux to solar wind from pseudostreamers.

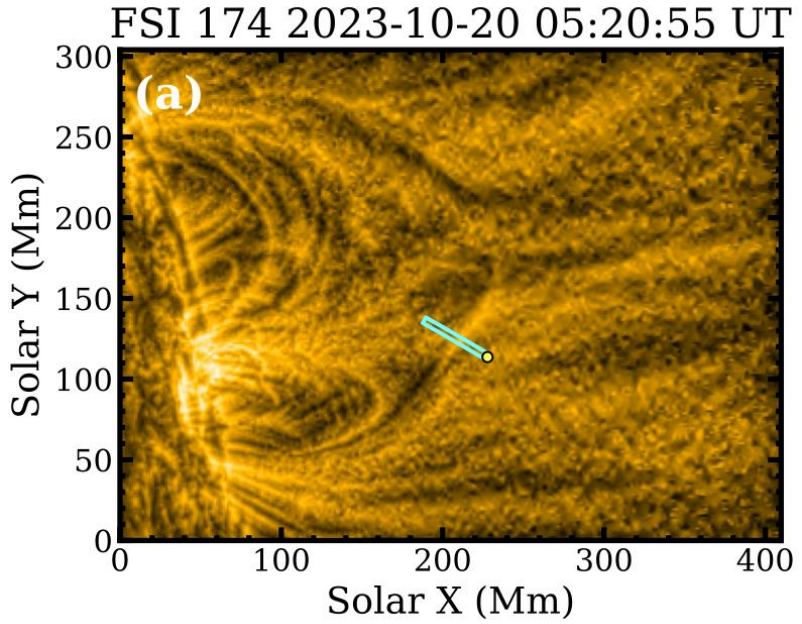
Dynamics near Pseudostreamer Cusp from FSI

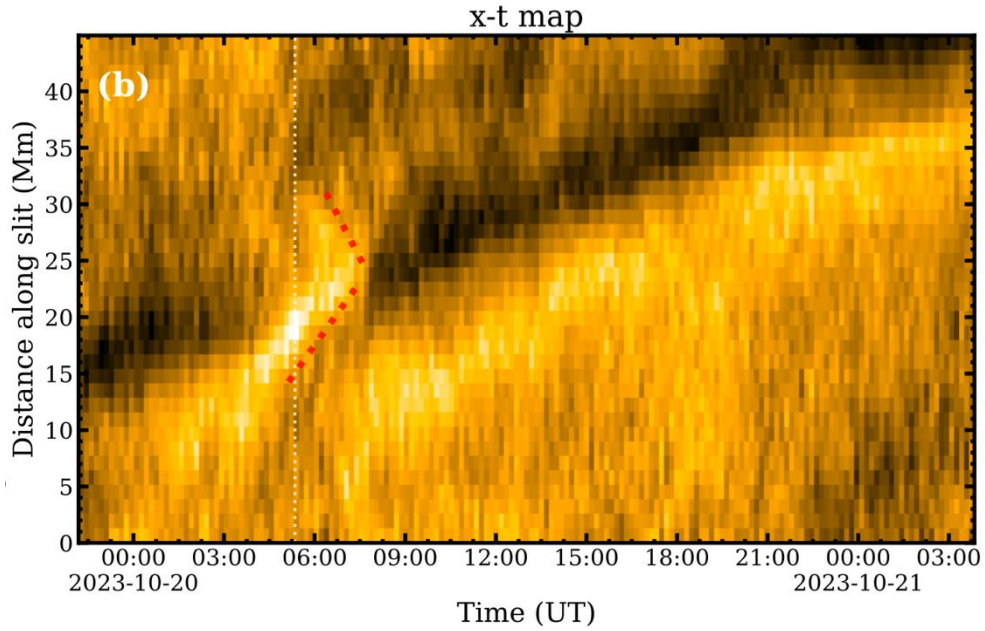


Interactions near pseudostreamer open-closed boundary generating the downflows.

Signature of Interactions near Open-closed Boundary



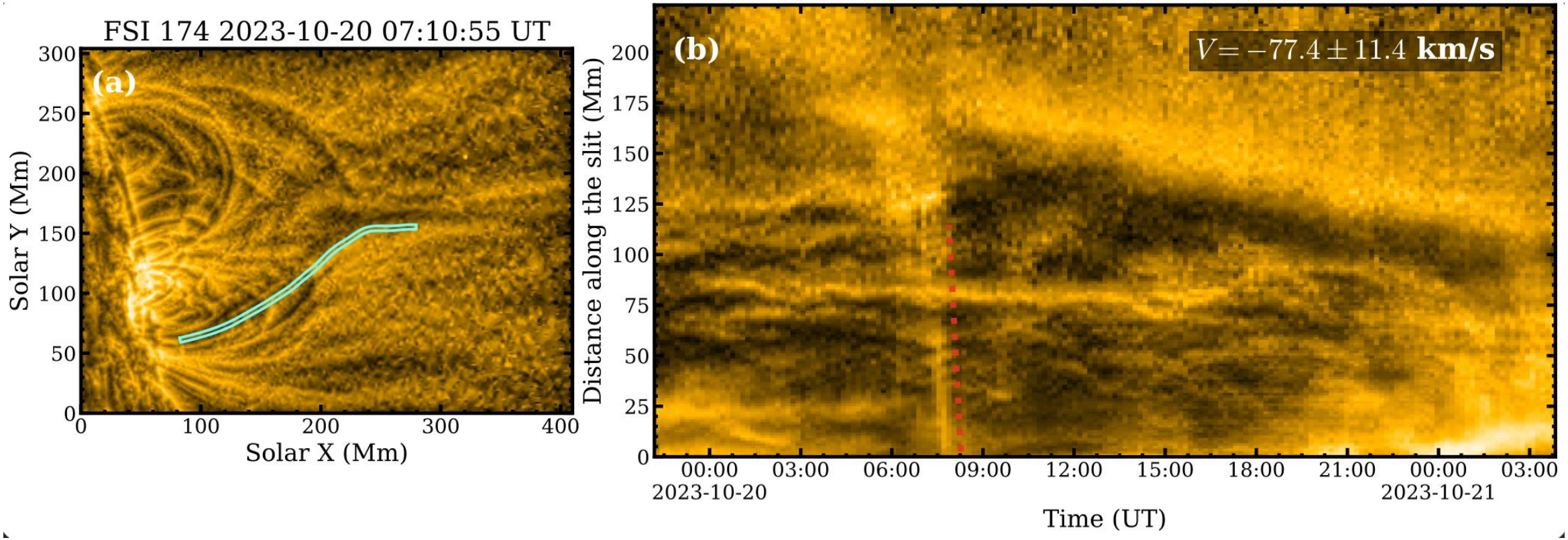




Generation of Downflows after interactions

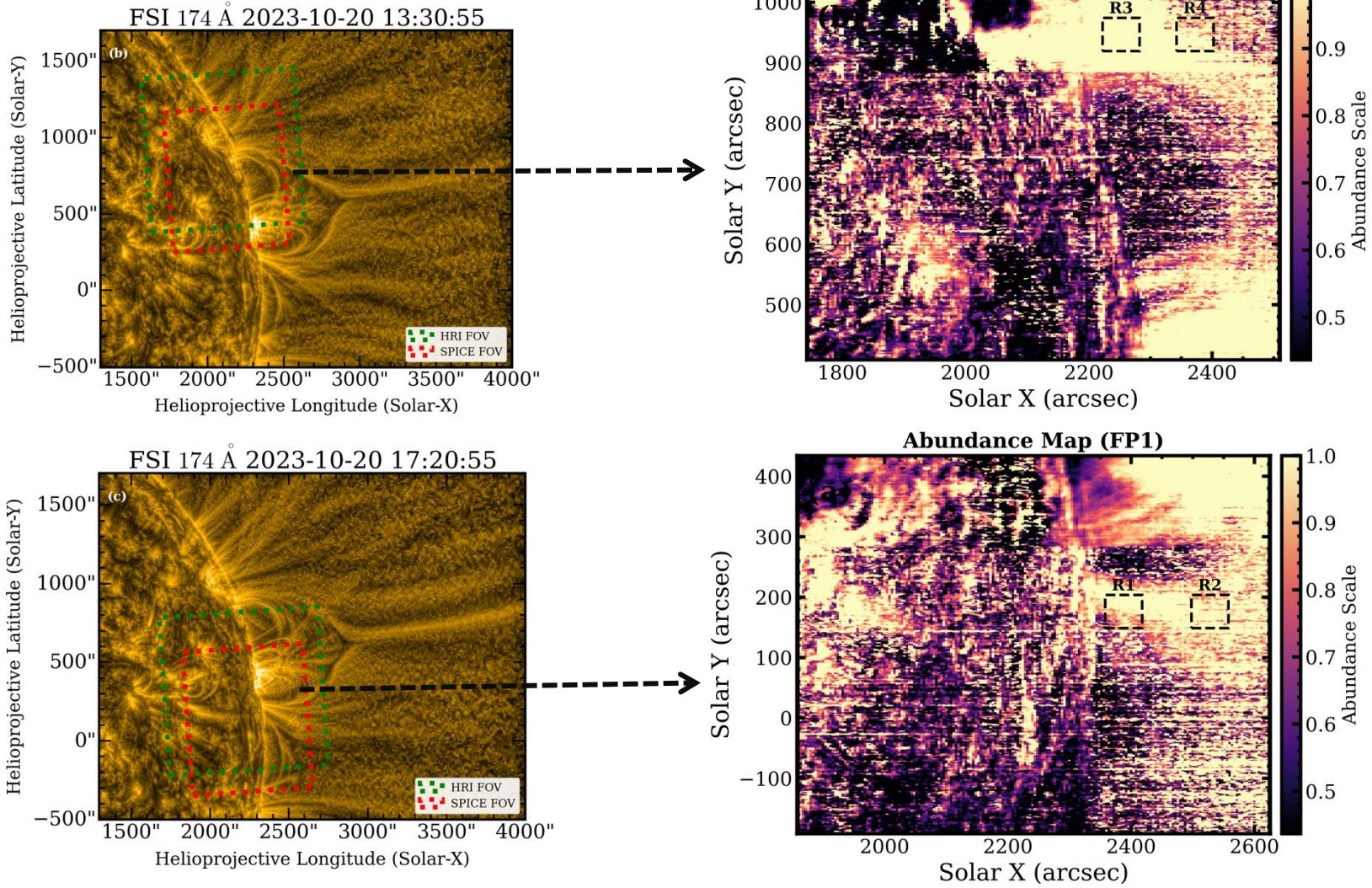
Artificial slit locations

Time-Distance Maps



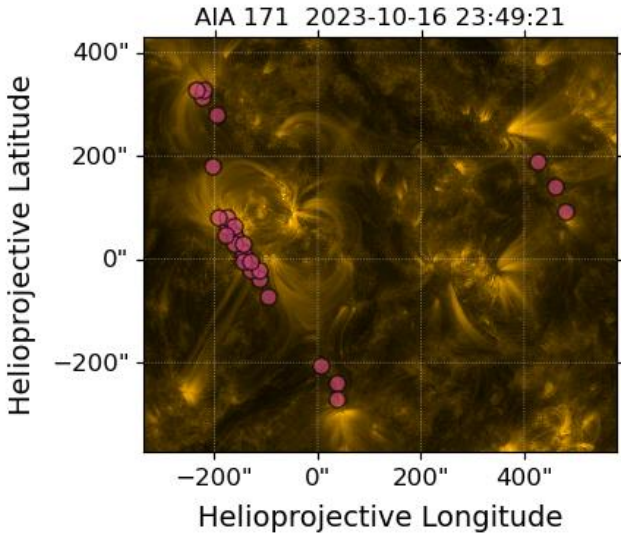
These downflows provides the evidence of interchange reconnection occurring near open-closed boundary.

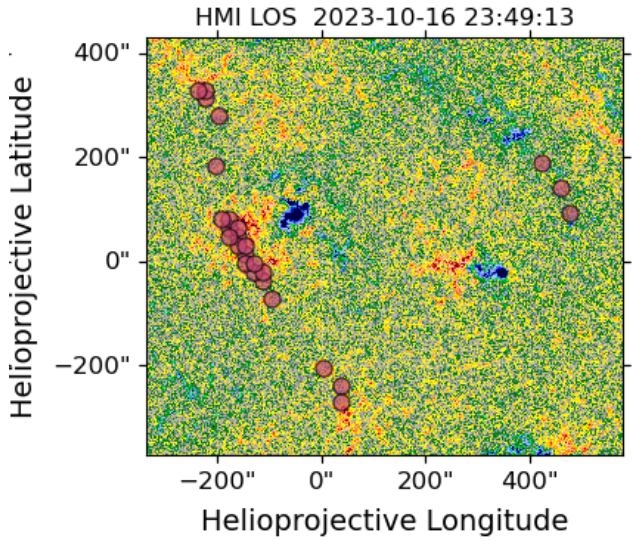
Abundances near Open-closed Boundary using SPICE

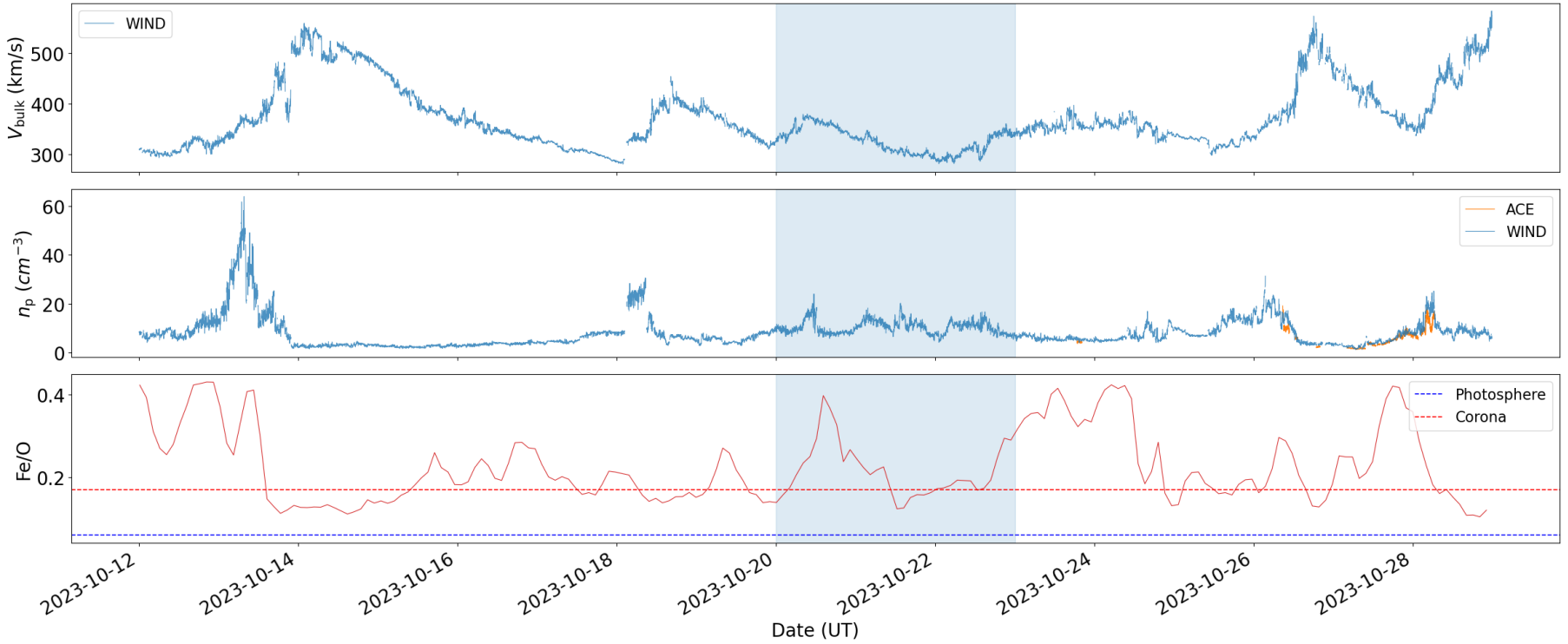


Elemental abundances near the base have coronal compositions.

Magnetic connectivity with source region



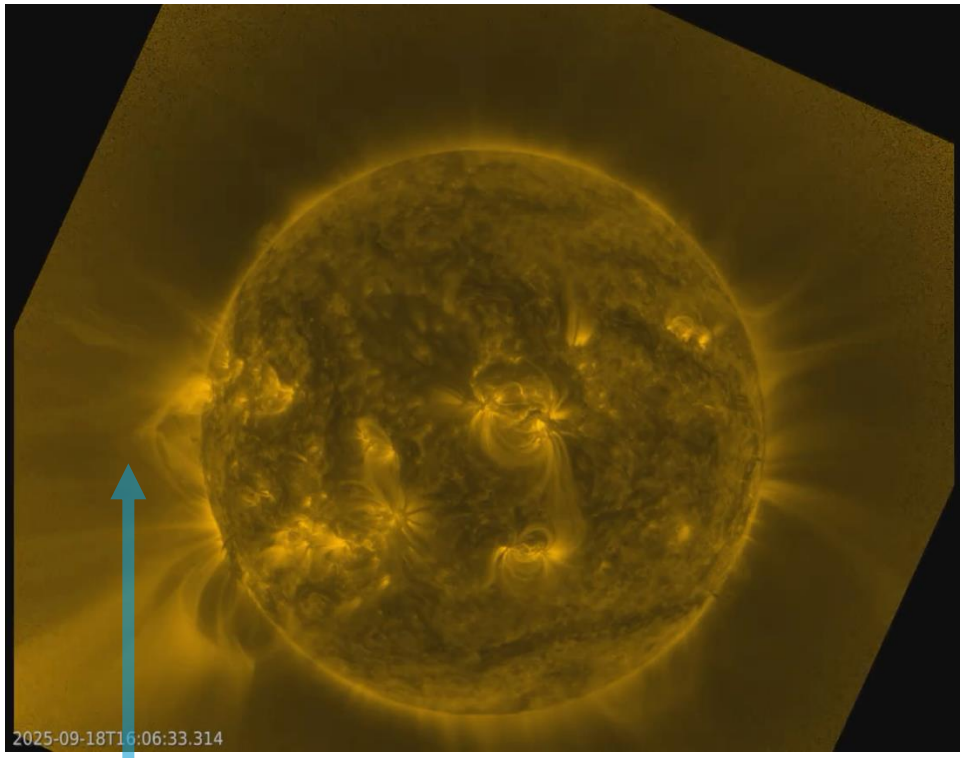




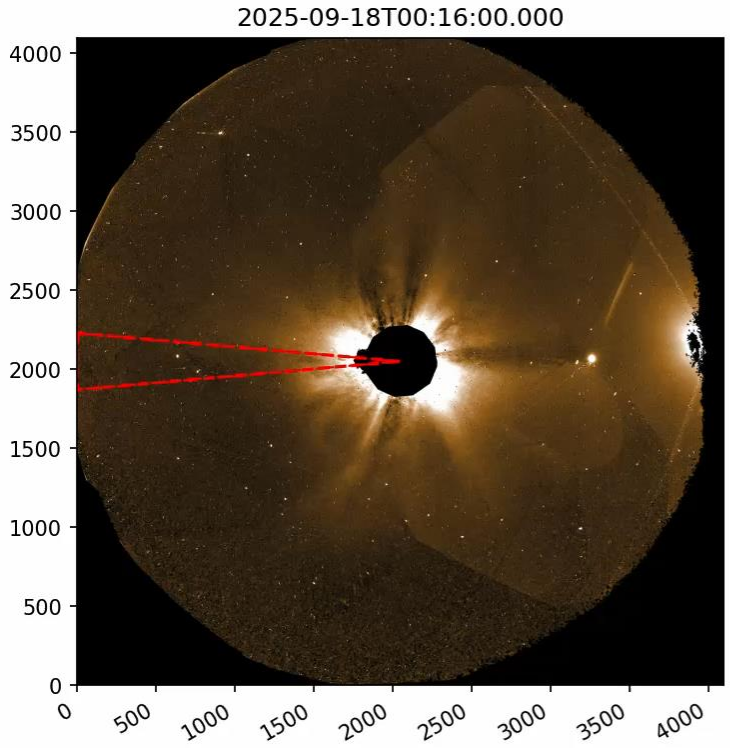
The in-situ Fe/O measurements agree with the abundances derived from SPICE observations.

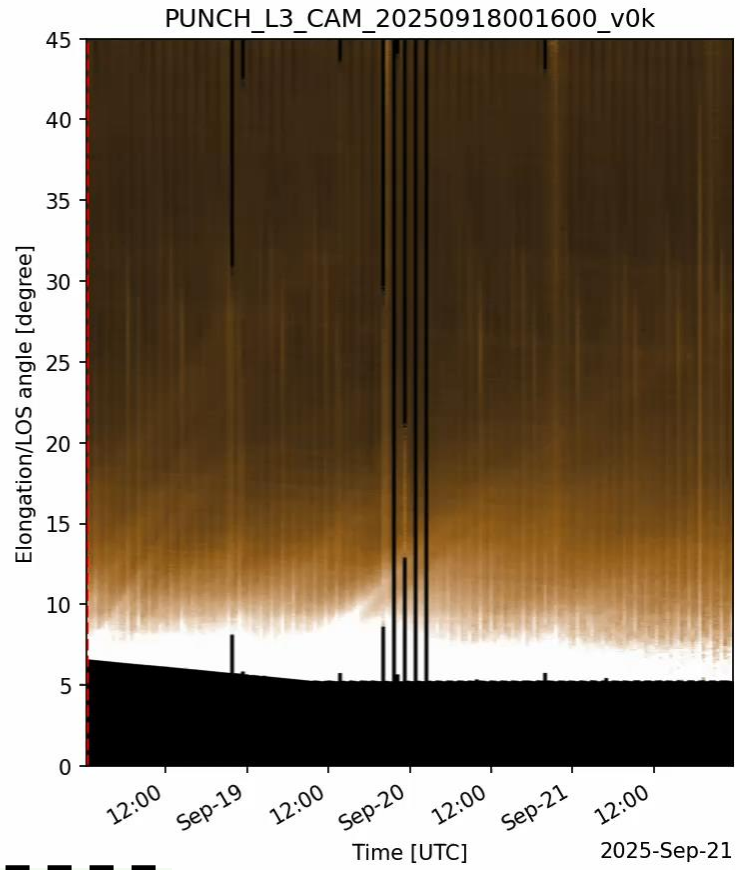
Connecting with PUNCH Observations

SUVI 171



Credit: Ritesh Patel





Pseudostreamer Dynamics in the inner–middle corona

1. Evolution of PDs from inner to outer corona
2. Origins of mesoscale structures and their evolution (Viall, DeForest & Kepko 2021)

Summary

Processes in both the inner and middle corona can contribute to the solar wind flows in pseudostreamers.

The base regions of pseudostreamers are potential locations of the slow solar wind origin.

Coordination with PUNCH: Origin and evolution of features such as PDs and mesoscale structures in the solar wind.

We appreciate your feedback, comments and suggestions.