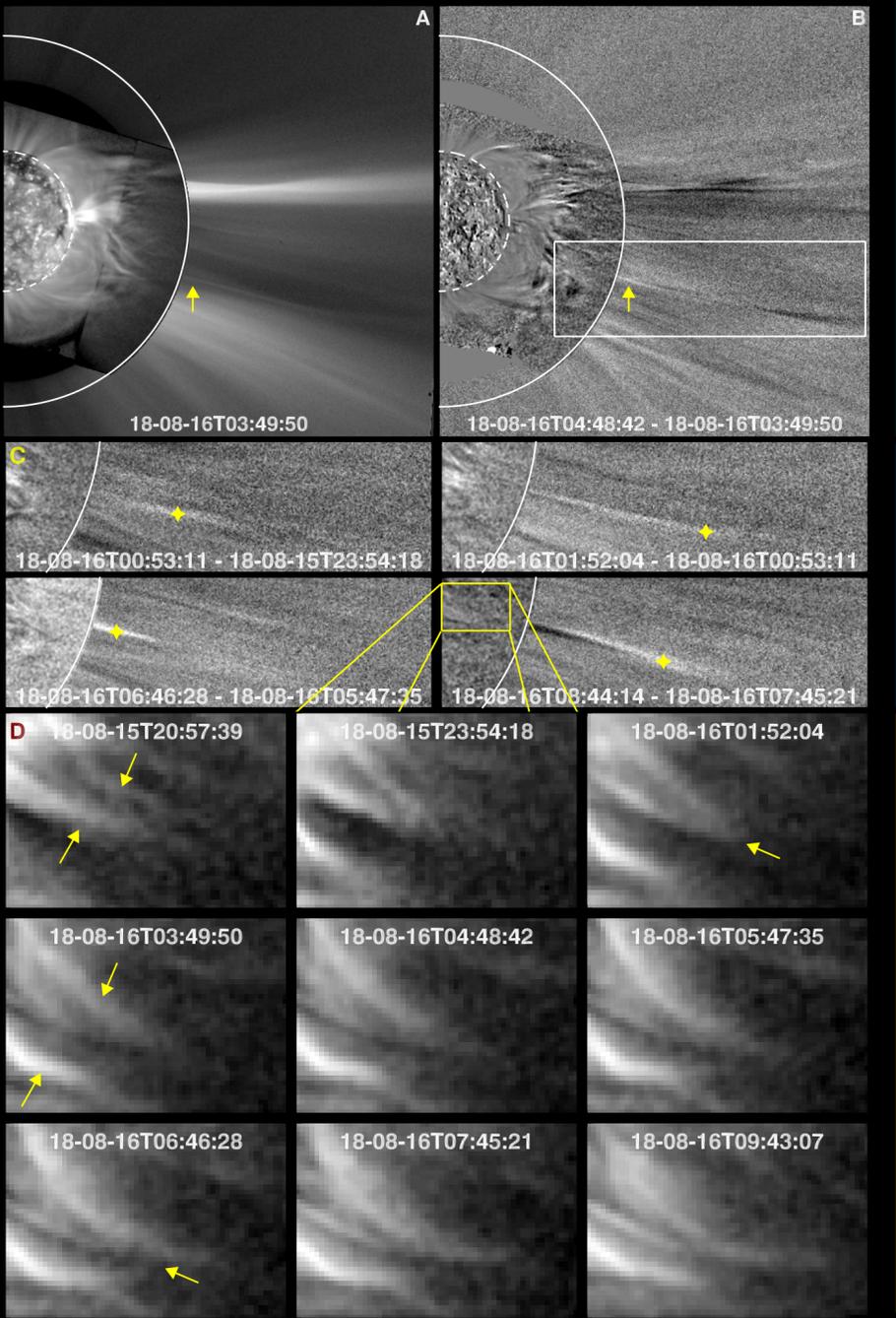
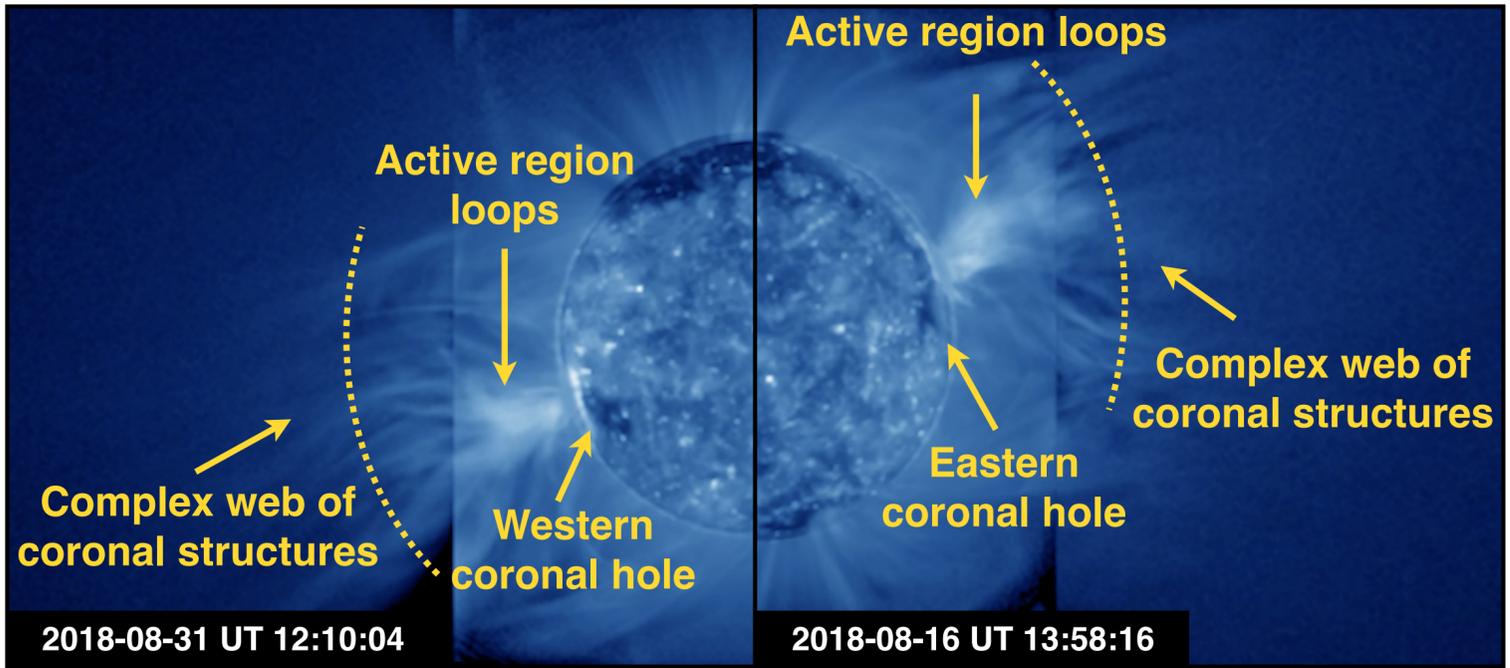
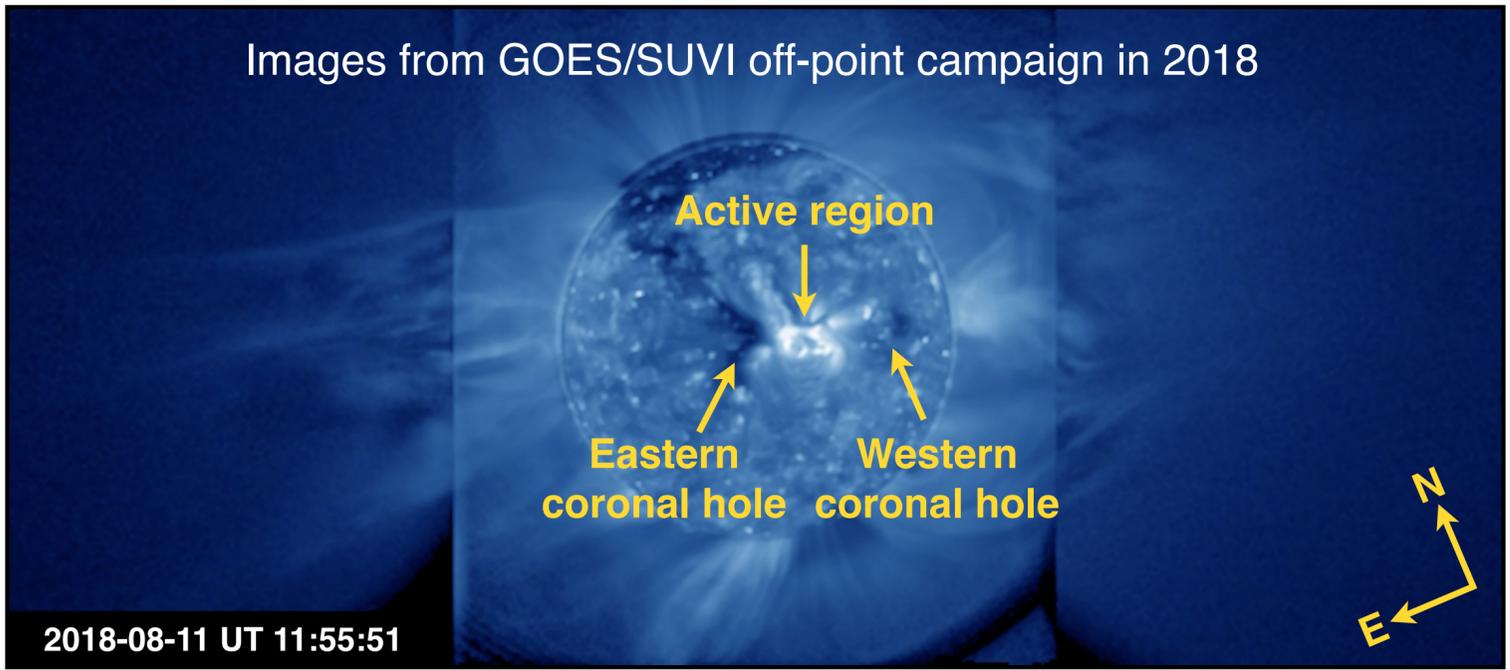


Slow solar wind streams driven by magnetic reconnection in the middle corona

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**Tracing the origins and driver of
the slow solar wind**

Complex coronal web and reconnection-driven slow wind streams



Connection through the inner, middle and extended solar corona (arrow points to a solar wind stream).

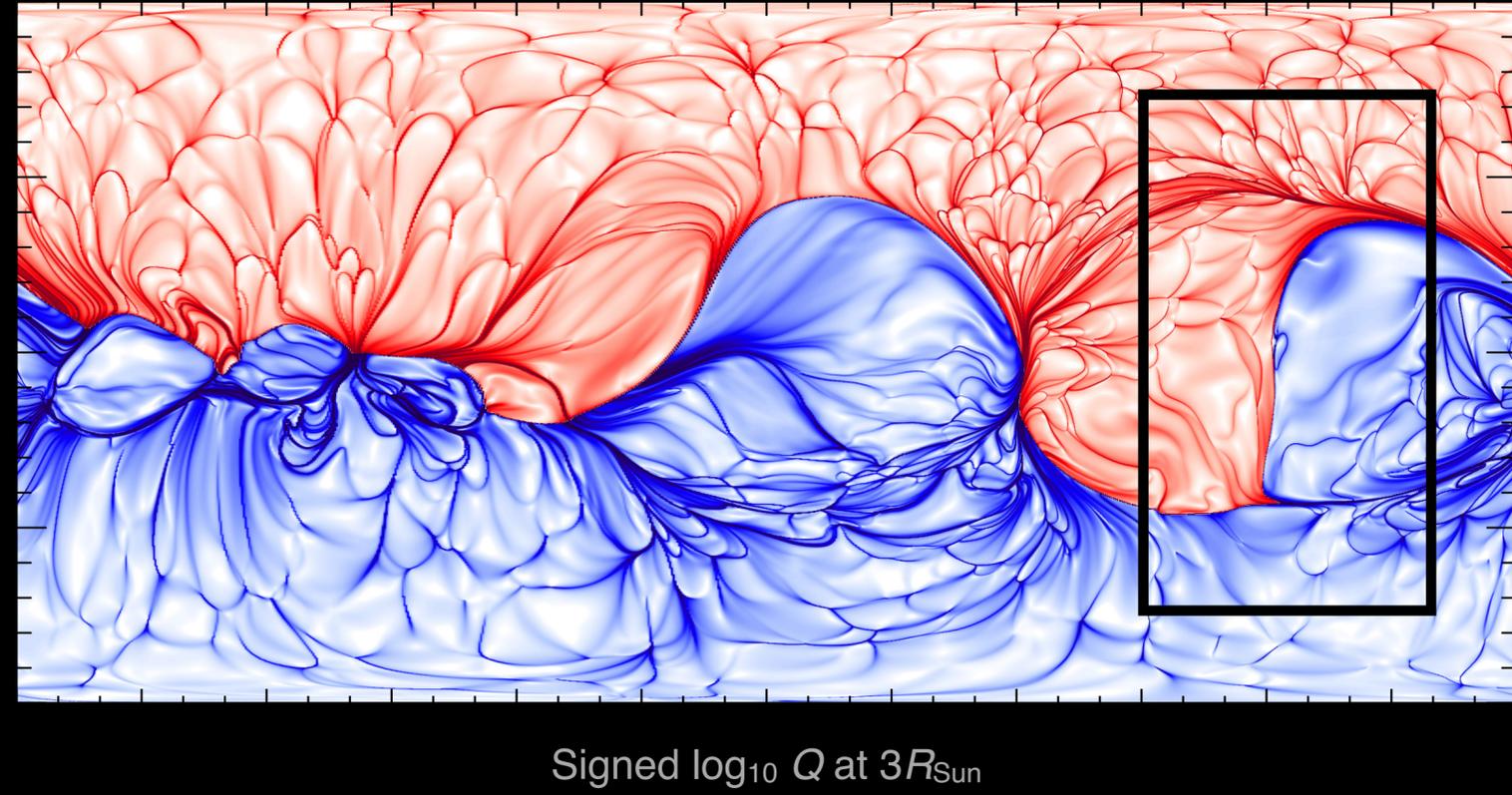
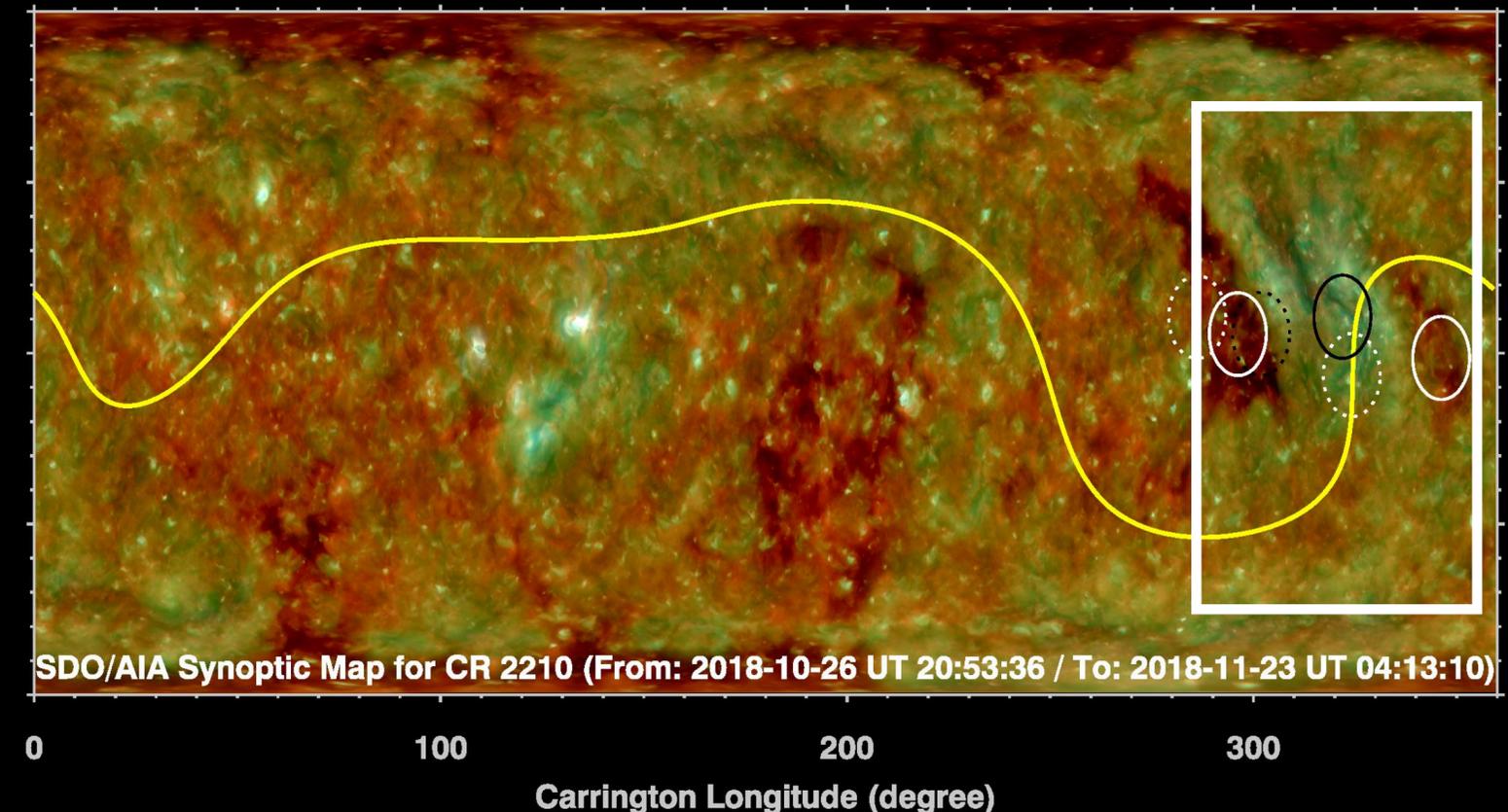
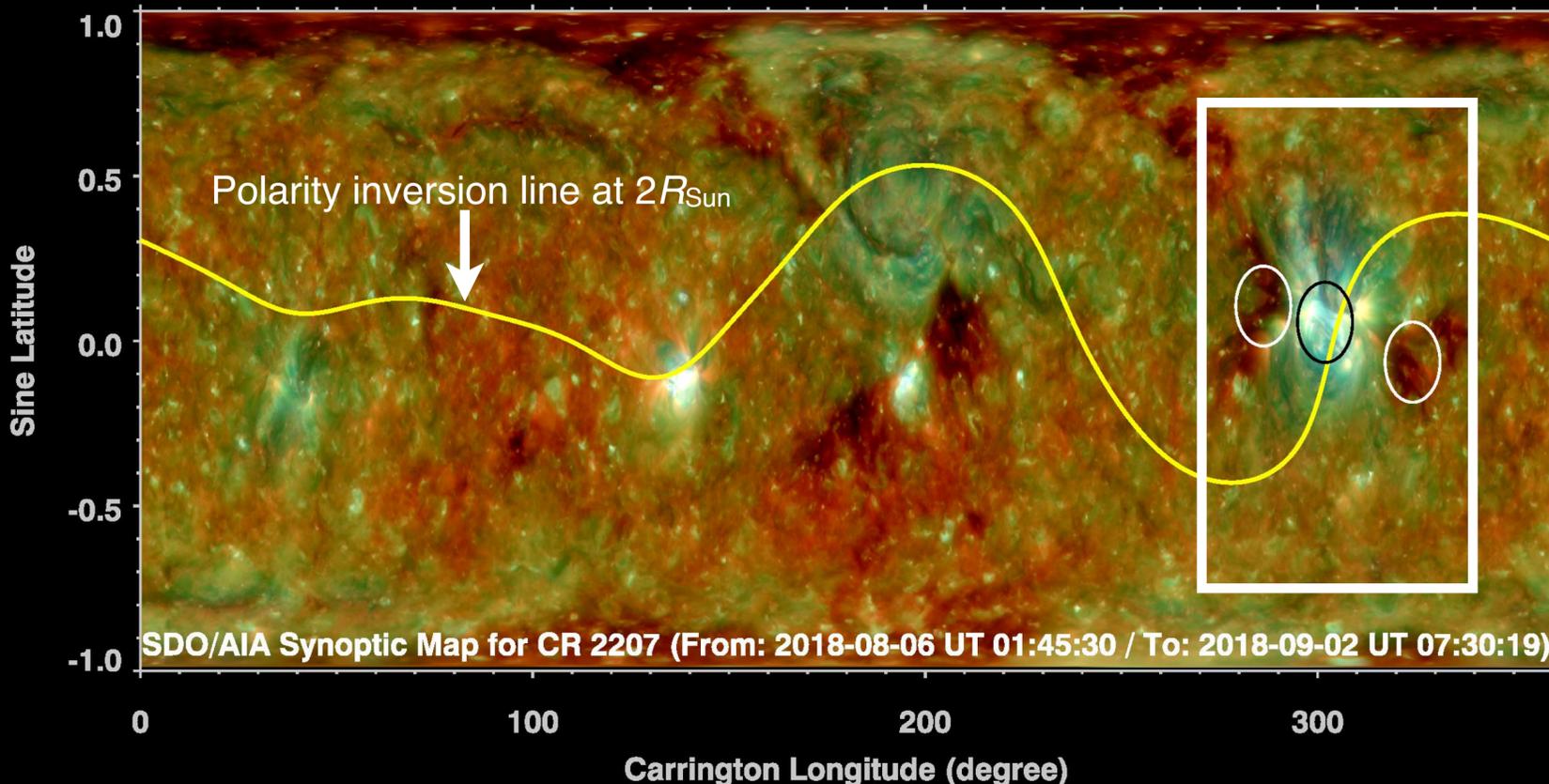
Solar wind streams emerging from the middle corona.

Interacting and reconnecting middle-coronal structures underlying the solar wind streams.

– SUVI observed a spatially complex, latitudinally extended, and persistent coronal web over a low-latitude coronal hole and active region system.

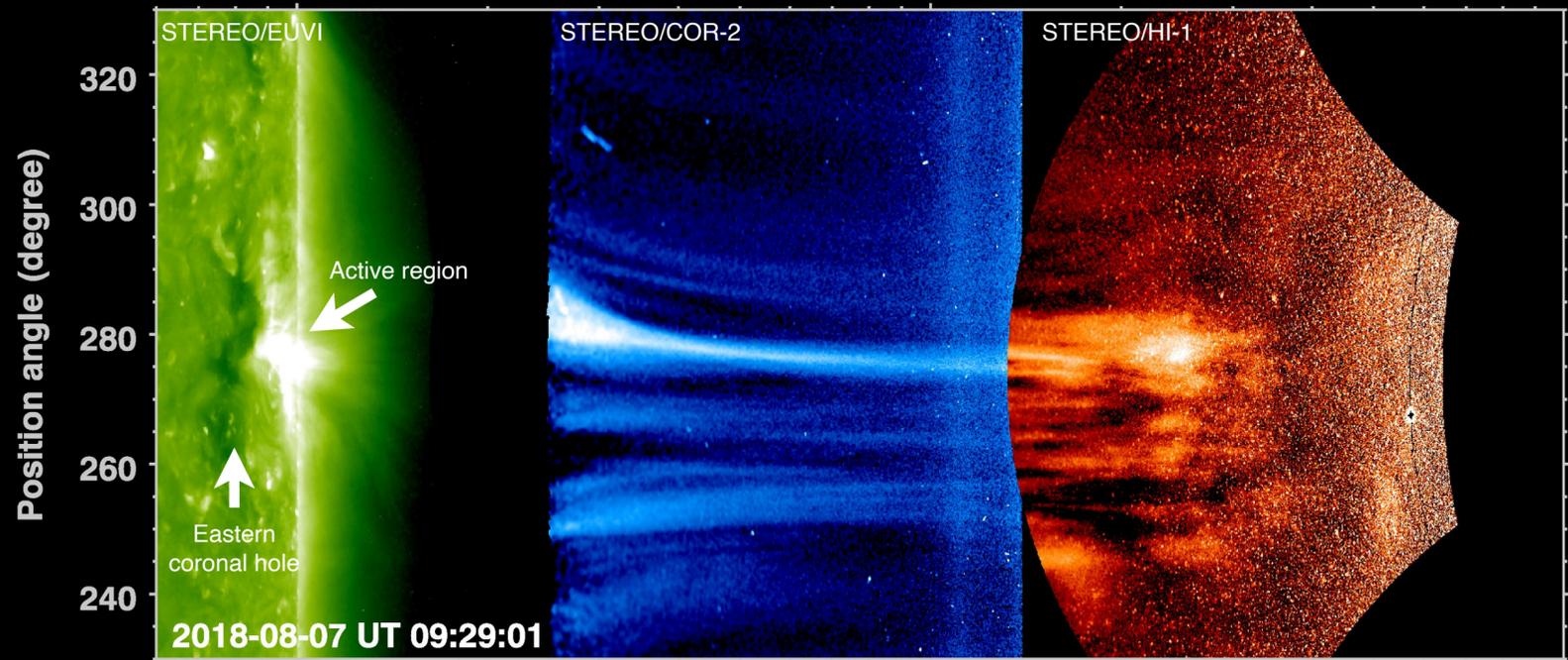
– Using first-ever long-term EUV observations of the middle corona, we found that slow solar wind is persistently driven by reconnection in the complex coronal web.

Magnetic topology giving rise to the complex coronal web

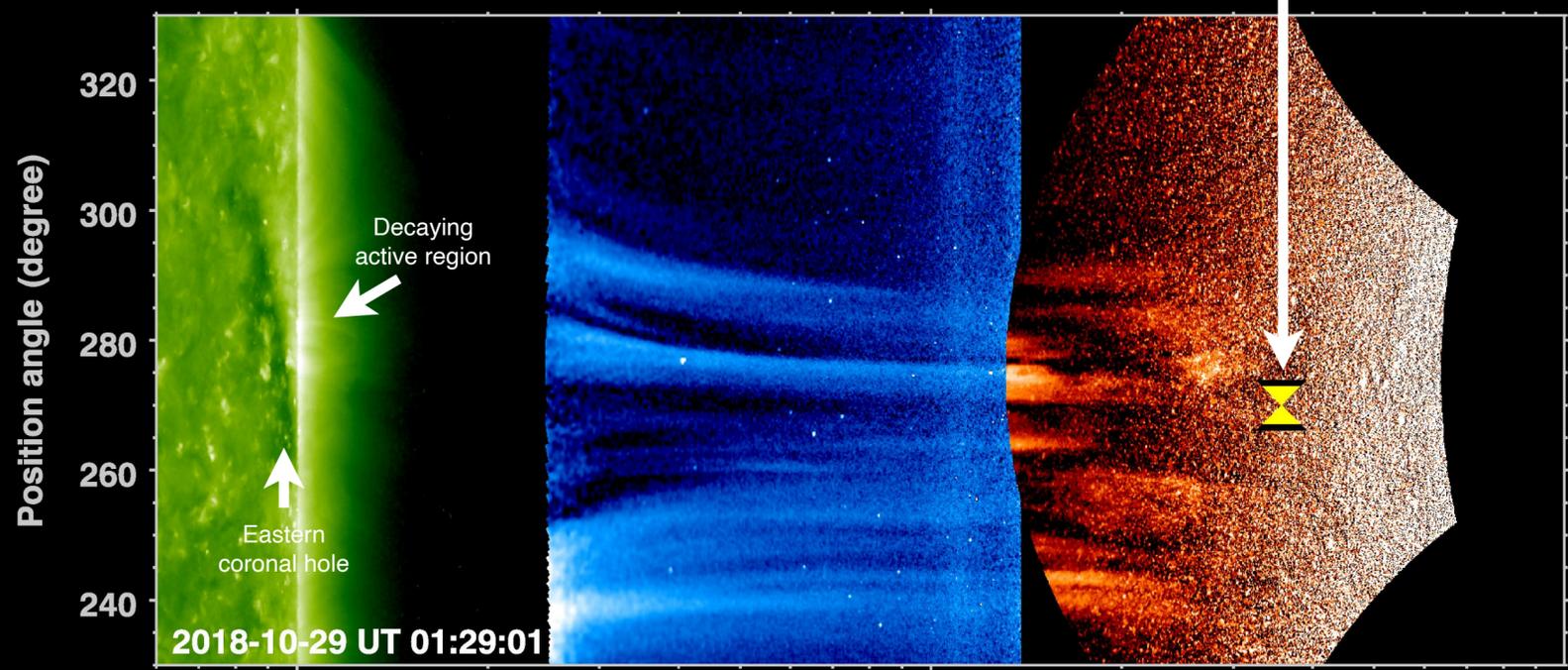


– The near east-west alignment of a coronal hole pair with an embedded (decaying) active region gave rise to a near north-south aligned polarity inversion line (heliospheric current sheet). This favorable arrangement of magnetic features caused the complex coronal web apparent in the plane-of-sky (top left: synoptic view closer to SUVI observations; top right: closer to PSP 1st perihelion; bottom left: synoptic view of magnetic topological structures based on a global MHD simulation).

Heliospheric connection



Plane-of-sky position of PSP during 1st perihelion on 2018-Nov-06



– The long lifetime of the coronal hole active region system (at least five solar rotations) enabled us to probe its heliospheric connection at different epochs.

– In absence of SUVI observations, we used STEREO-A data to probe the heliospheric connection. Structures similar to those found using SUVI are observed to extend into the heliosphere.

– PSP was magnetically connected to the same system in 2018 November (to the western coronal hole during its first perihelion; e.g. Bale et al. Nature, 576, 237, 2019). Days before its perihelion, heliospheric structures over the system were similar to those observed two months earlier during SUVI campaign.

Our findings point to the persistence and widespread nature of a complex coronal web and its key role in driving the slow solar wind. Our study emphasizes the importance of middle coronal observations for a better understanding of heliospheric impact of Sun's magnetic activity.

Chitta et al. (in prep)