

The First Joint Observation of EUV Jets and spicules with BBSO/GST and Solar Orbiter/EUI

Jeongwoo Lee New Jersey Institute of Technology, Physics, Newark, United States of America (leej@njit.edu)



1. Goal/Target

Tiny EUV jets occurred on 2022-10-29 around 19:10 UT were jointly observed by the Extreme Ultraviolet Imager (EUI) onboard Solar Orbiter (SO) and the Visible Imaging Spectrometer (VIS) installed on the 1.6 m Goode Solar Telescope (GST) at the Big Bear Solar Observatory (BBSO).

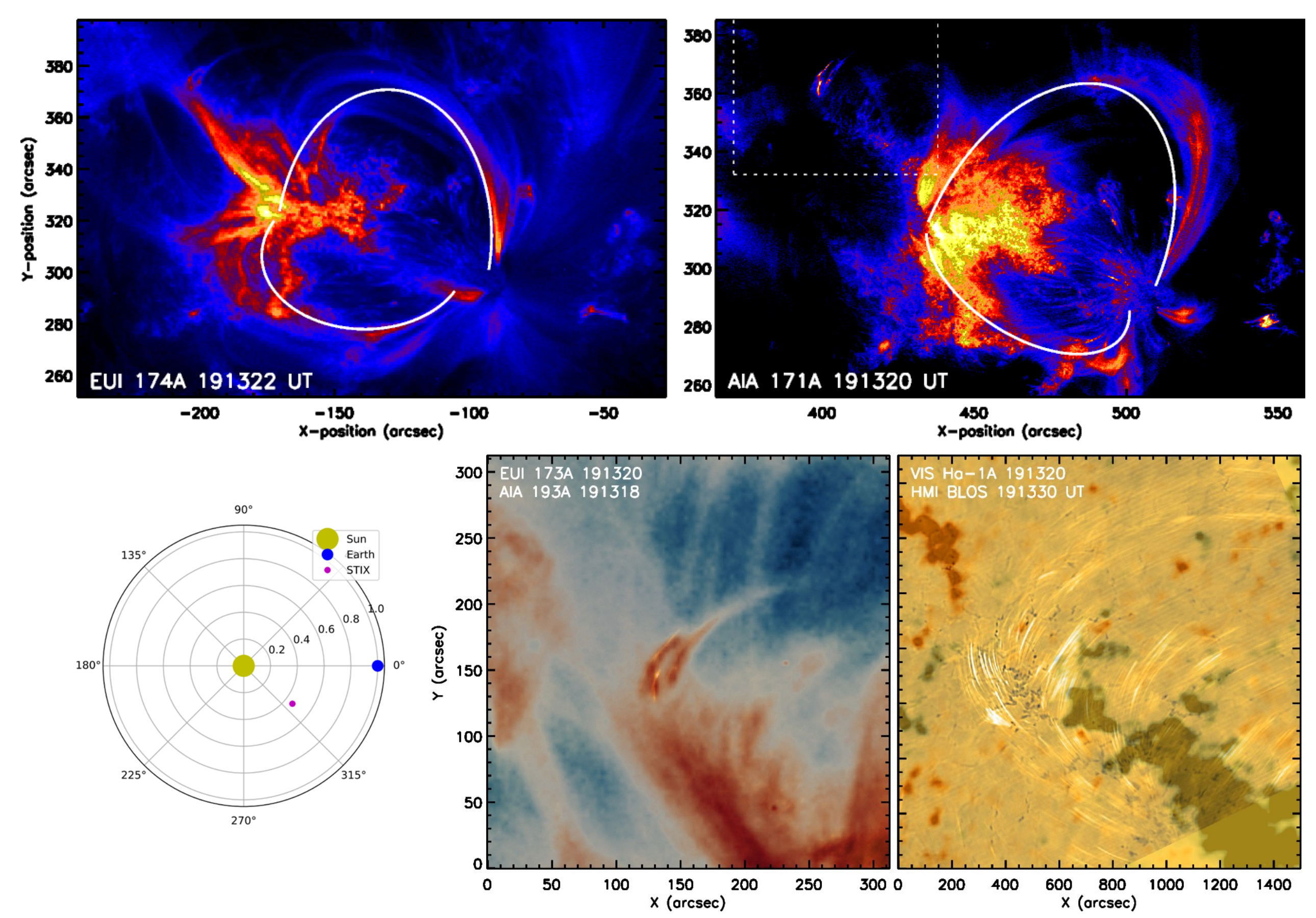


Figure 1. Projection effects in SDO, Solar Orbiter and BBSO/GST.

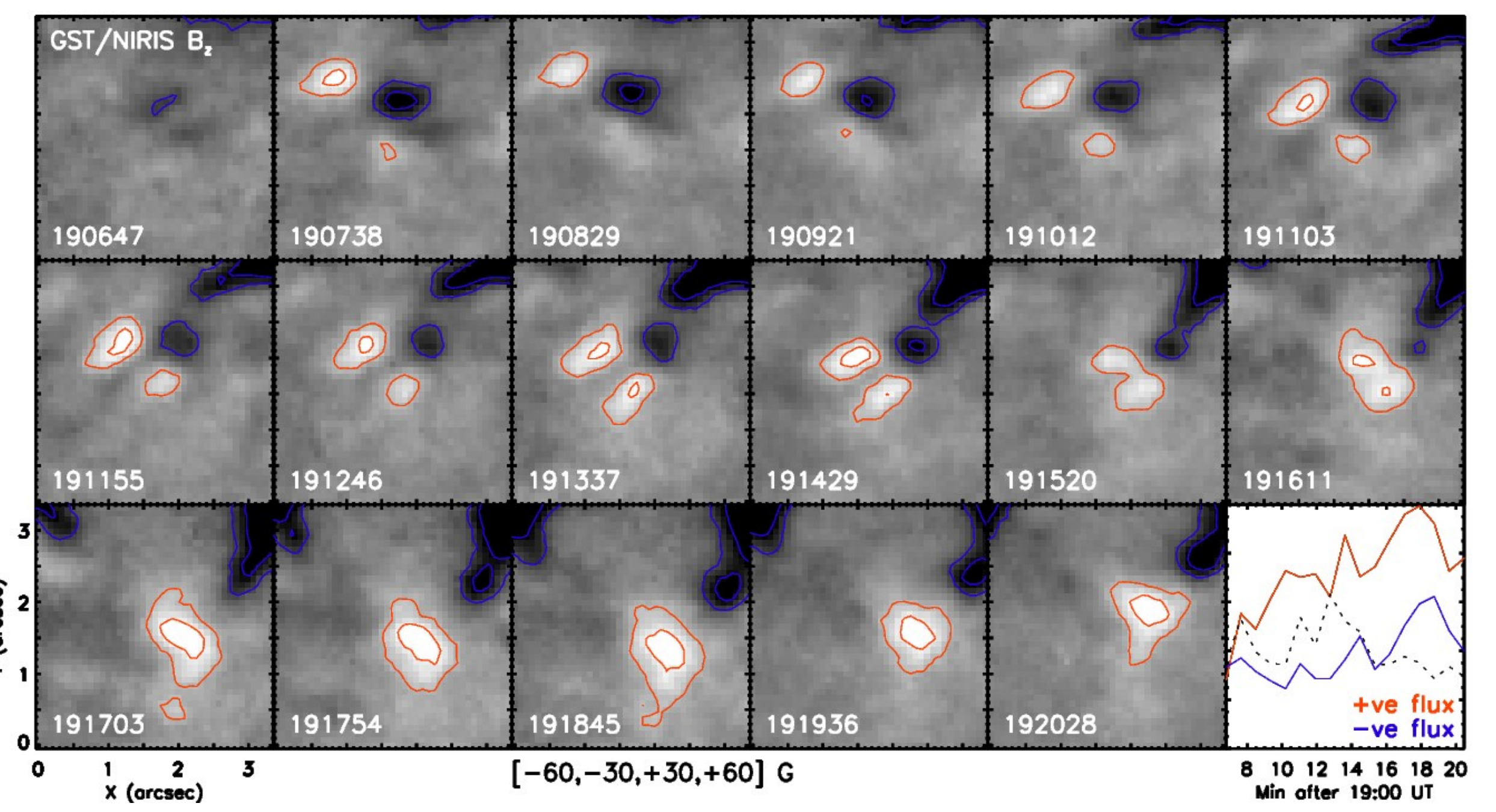
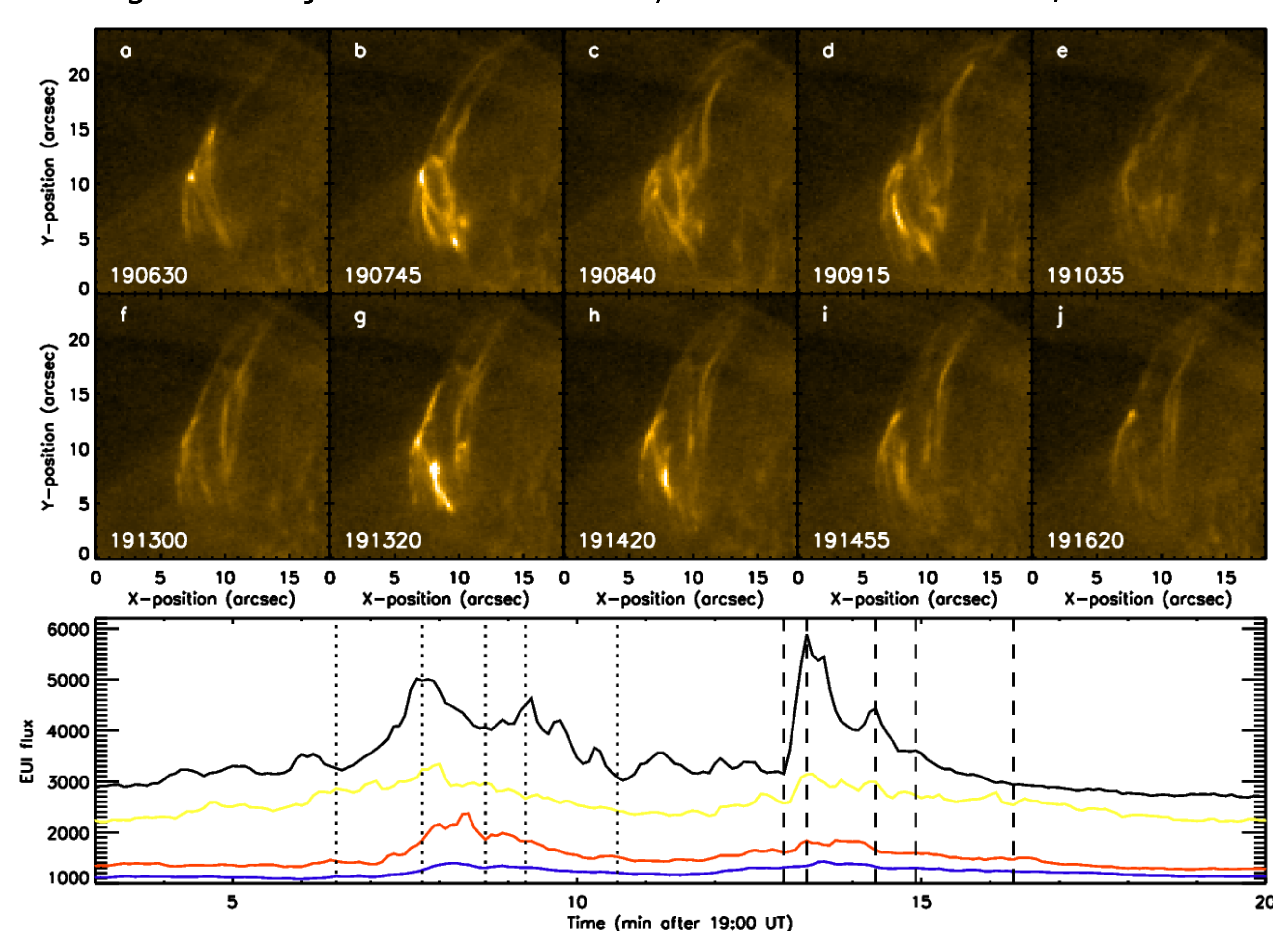


Figure 2. Evolution of the EUI_HRI jets showing a helical structure and increase in EUV intensity and magnetic flux underneath.

2. Image alignment: GST Ha, AIA EUV, and HMI magnetograms

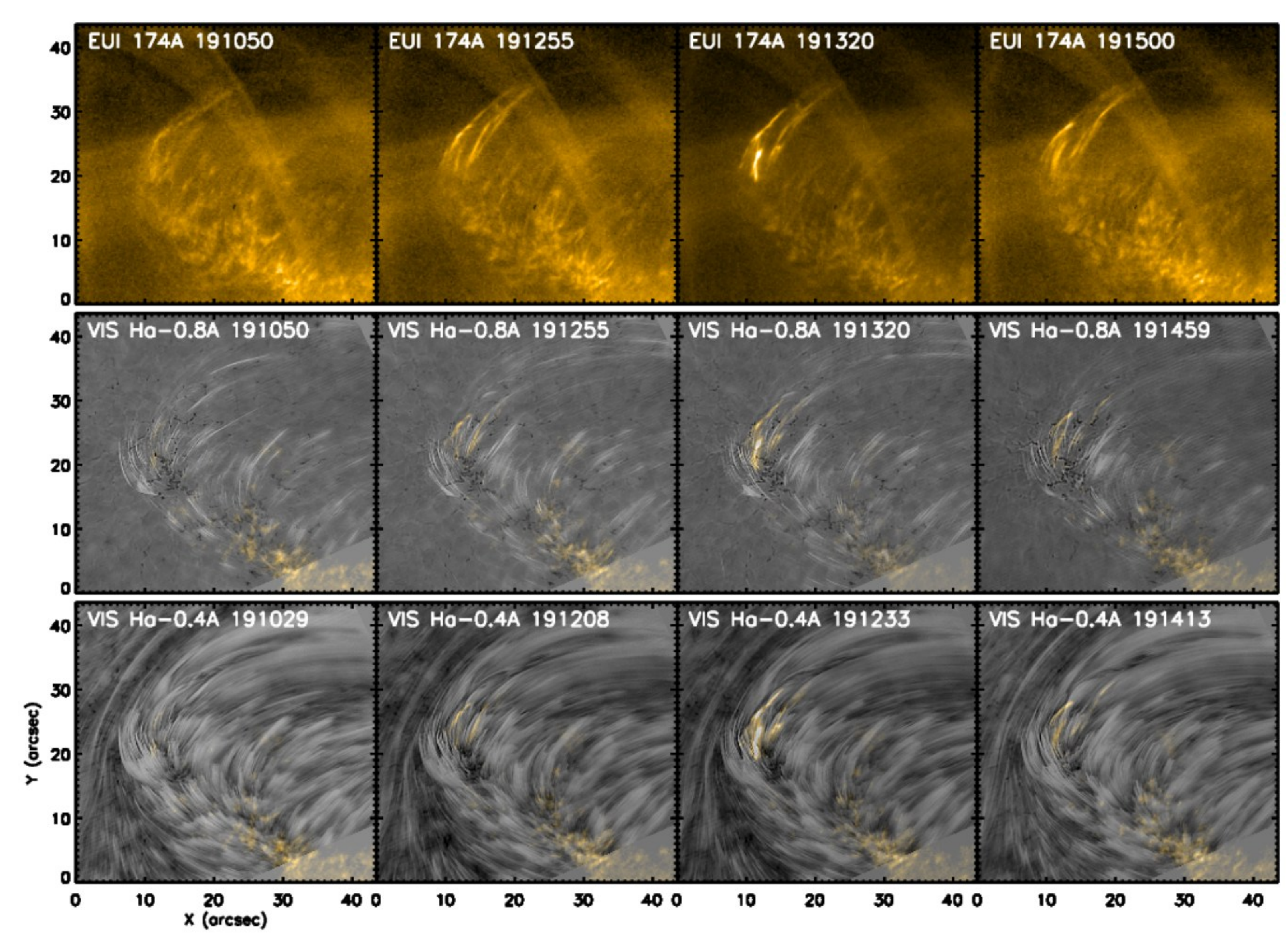


Figure 3. EUV jets by SO/EUI_HRI, GST/VIS spicules in H α -0.8A and H α -0.4A.

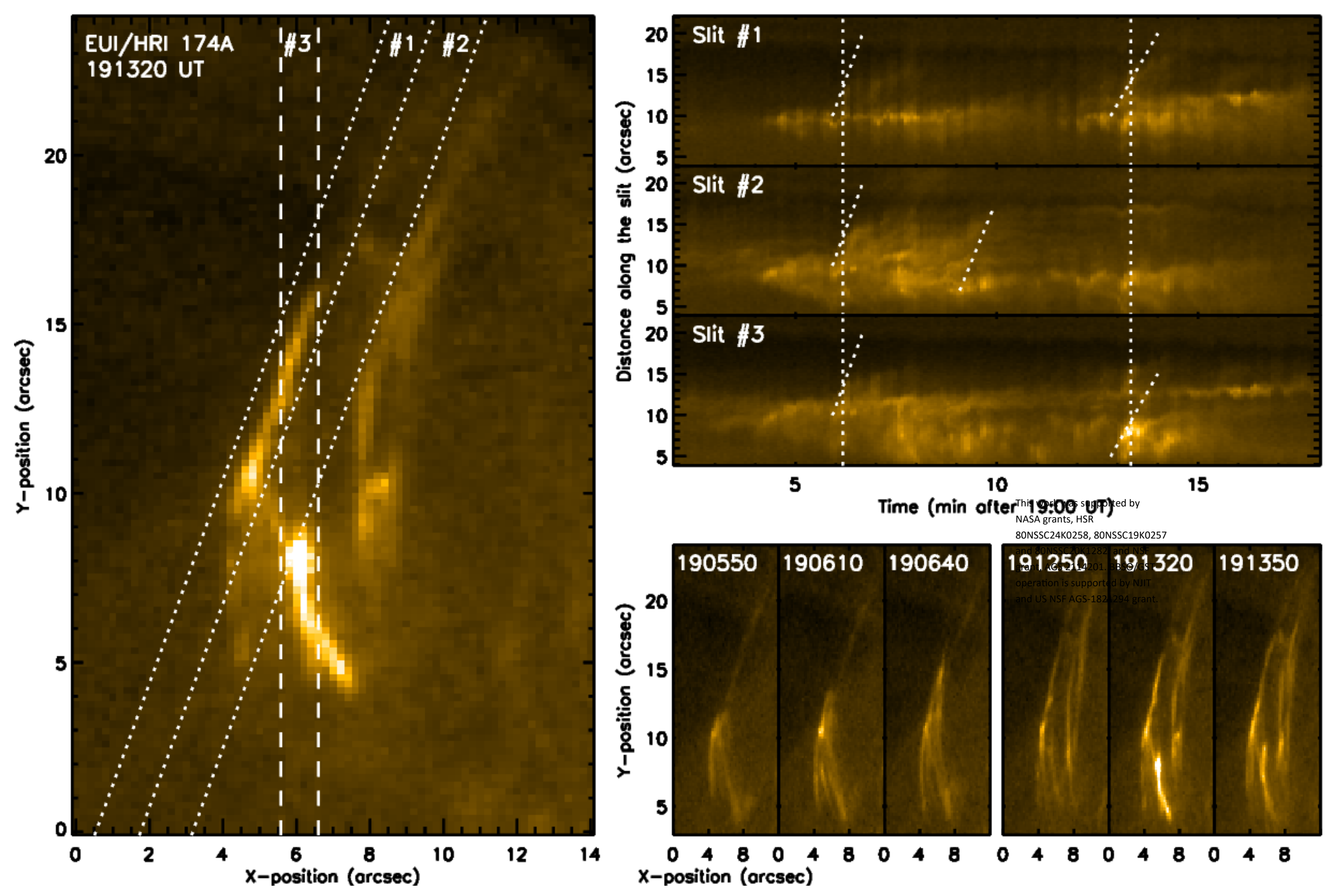


Figure 5. Time-Distance map for EUI_HRI 174A jets.

4. Conclusion

- SoO/EUI shows much finer coronal jet structure of the tiny EUV jets 2022-10-29T19:10 UT not clearly identified with AIA. GST/VIS images shows even finer structure, but the straight trajectory of the H-alpha spicules in the chromosphere in contrast with the evolving helical structure in EUV.
- An agreement between the orientation of the SO/EUI jets and GST/VIS spicules, and the red shift of Ha under the EUI jets suggest that EUI jets may manifest Alfvén wavefronts generated as a result of interchange reconnection, and Ha Doppler motion, a downward reconnection outflow from the coronal X-point.

3. Temporal Evolution

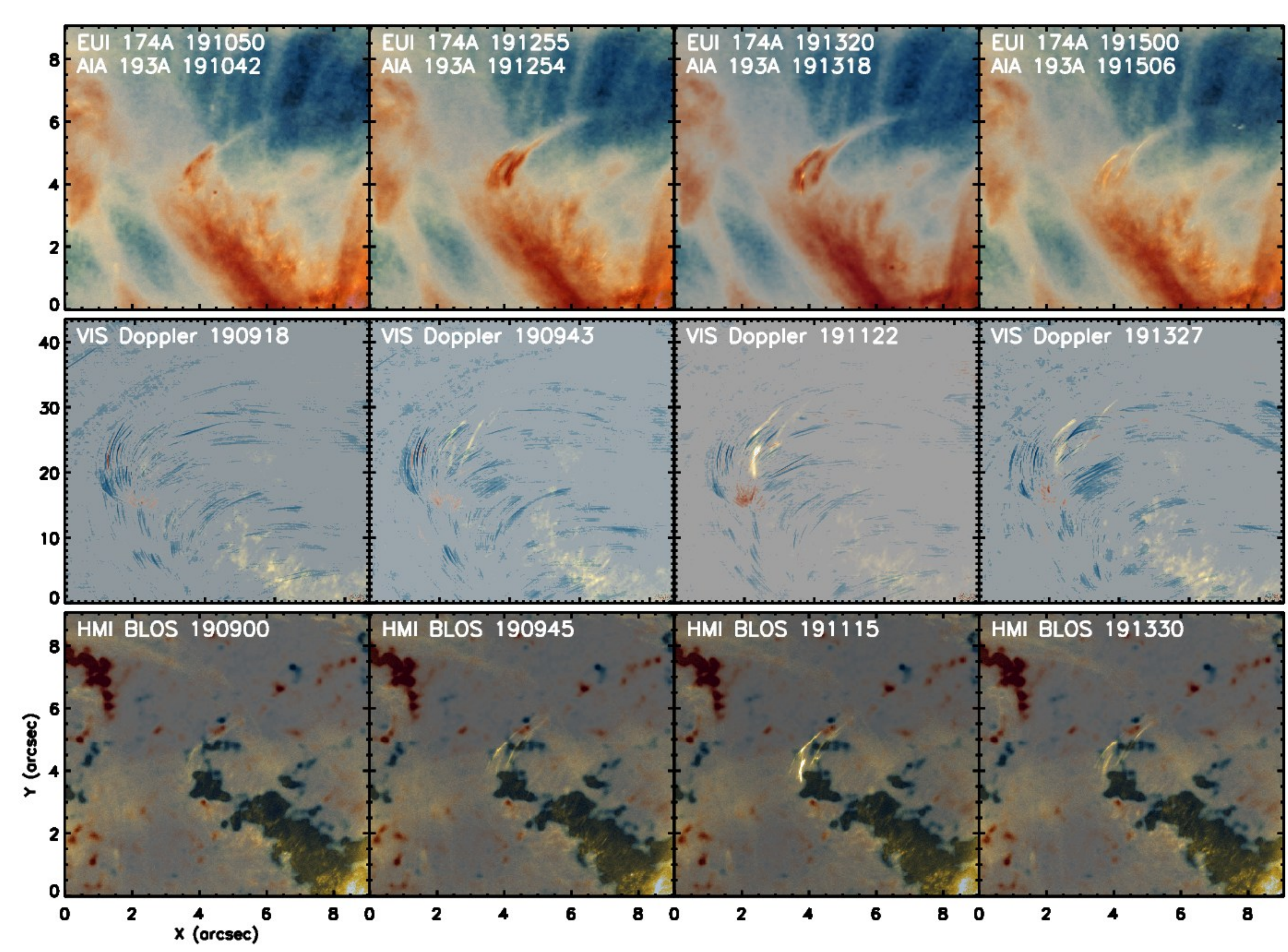


Figure 4. EUI/HRI jets over AIA, GST/VIS H α Dopplergram, and HMI LOS magnetograms.

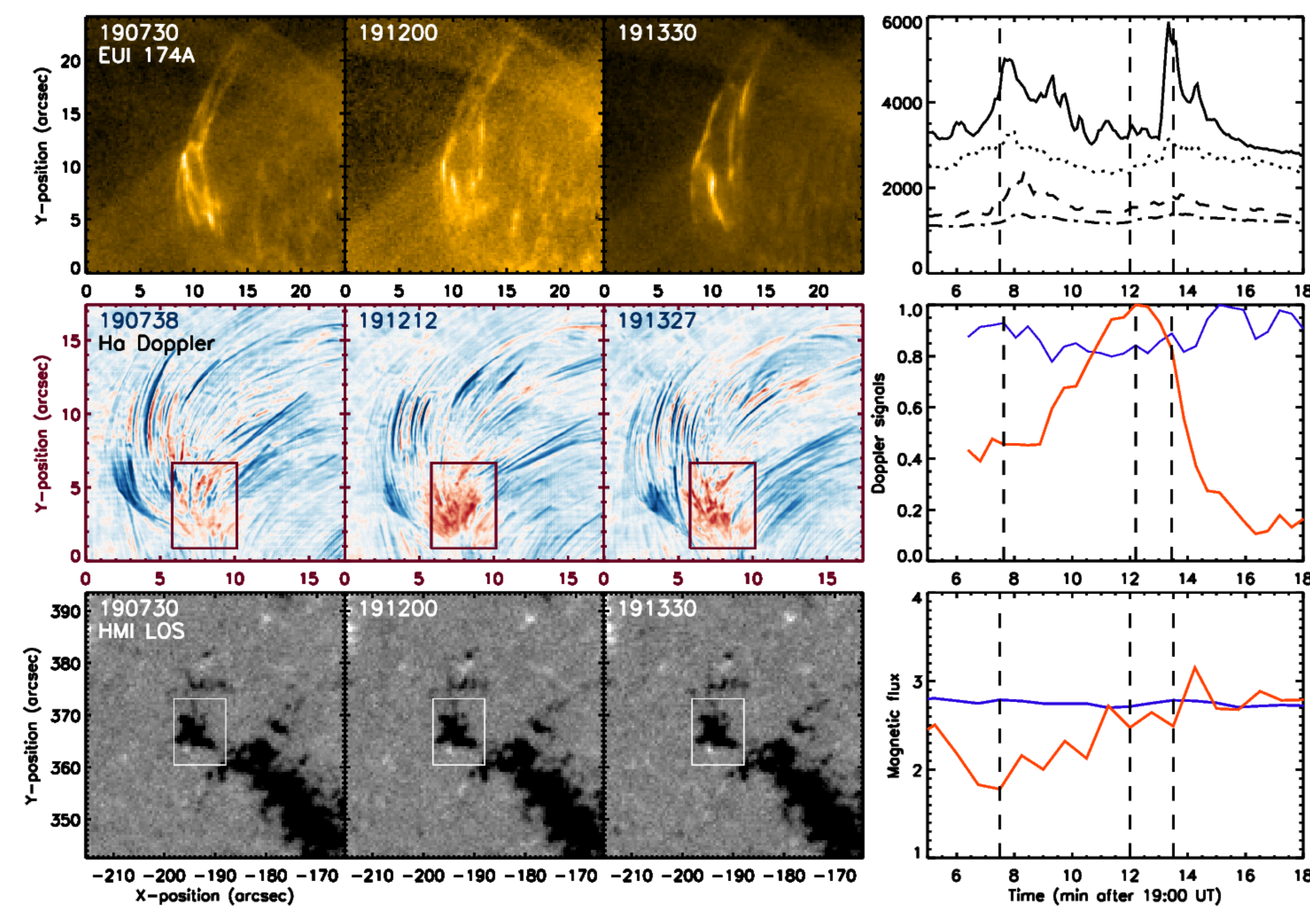


Figure 6. Temporal evolution of EUV intensity, Doppler signals, and magnetic flux.

- The detection of a sophisticated coronal evolution decoupled from chromospheric dynamics is made possible by the Solar Orbiter's high resolution and a distinctive viewing angle, furthering its goal of understanding how the Sun generates small-scale ejections in the chromosphere and corona.

This work was supported by NASA grants, HSR 80NSSC24K0258, 80NSSC19K0257 and 80NSSC20K1282, and NSF grant, AGS 2114201. BBSO/GST operation is supported by NJIT and US NSF AGS-1821294 grant.