

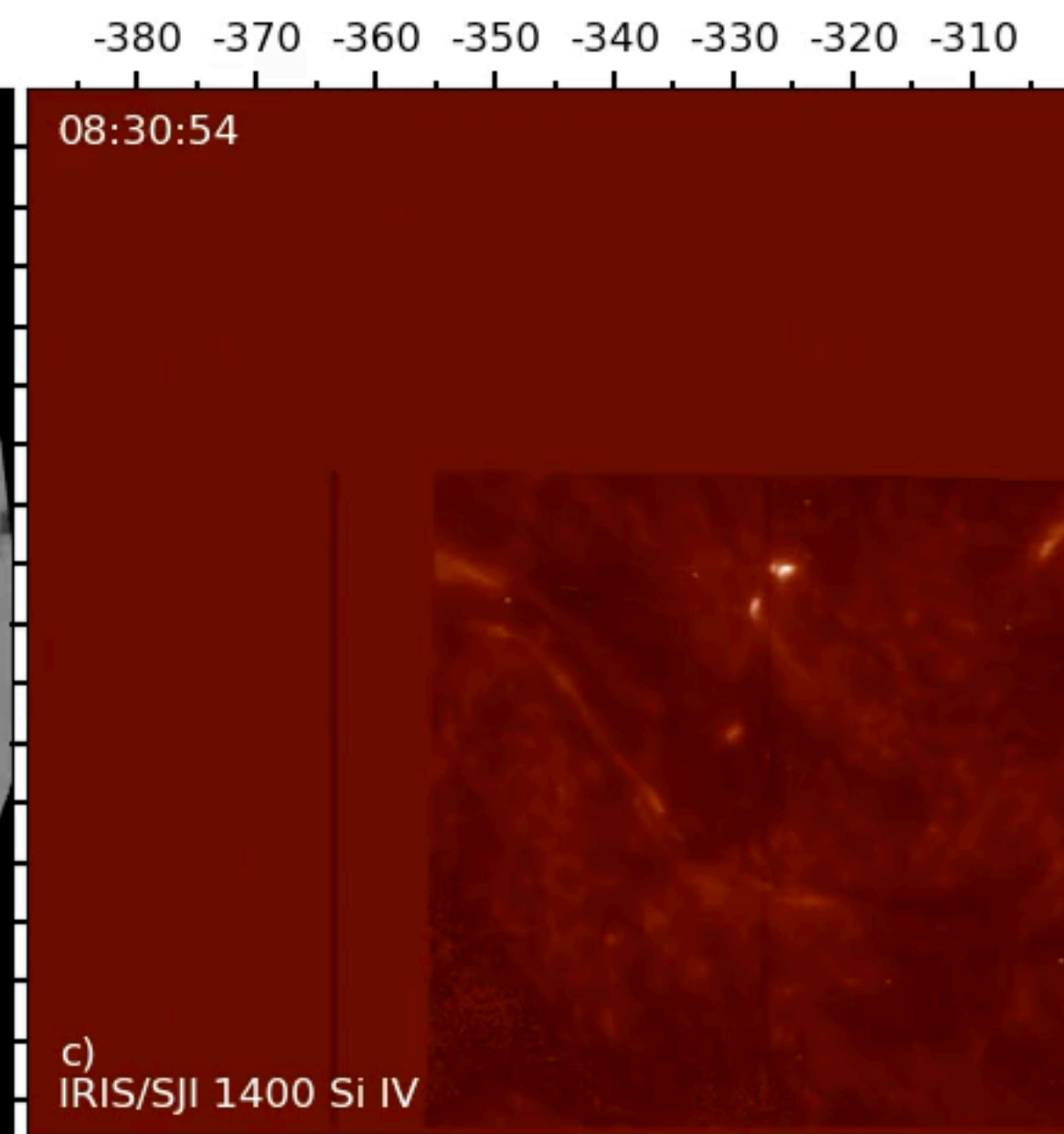
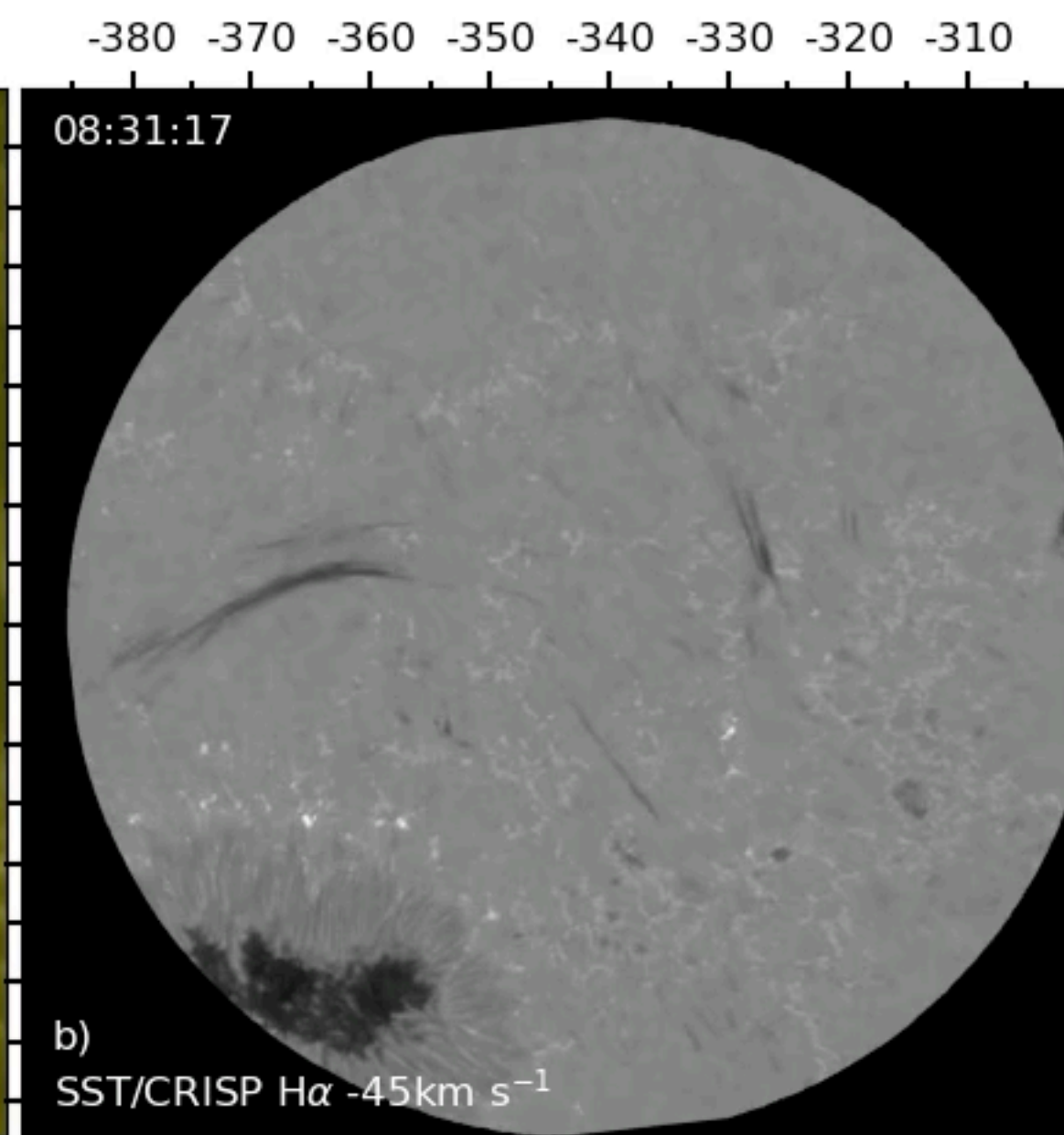
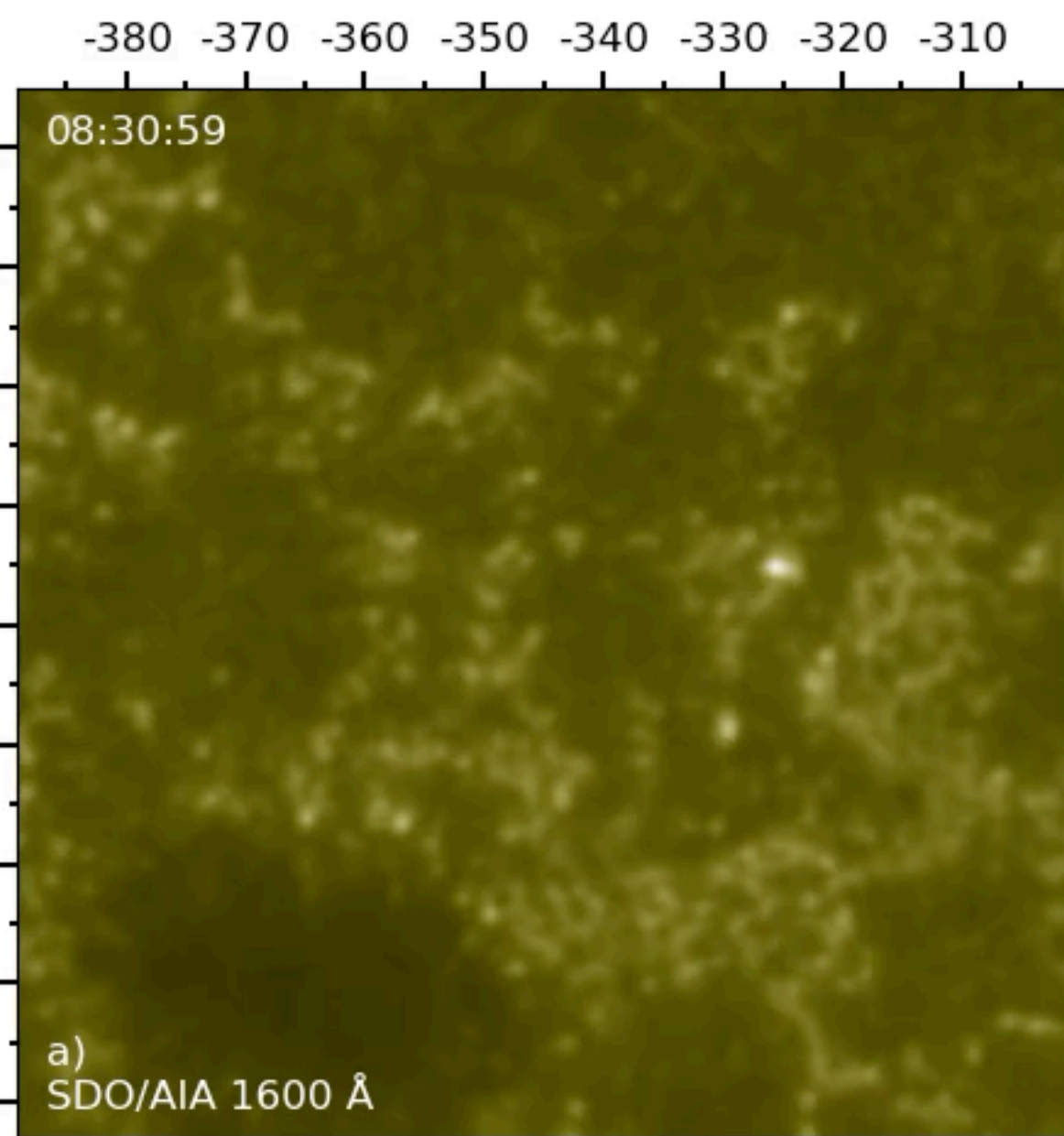
Roseland  
Centre  
for Solar  
Physics

# Energetic events following magnetic flux emergence into the photosphere

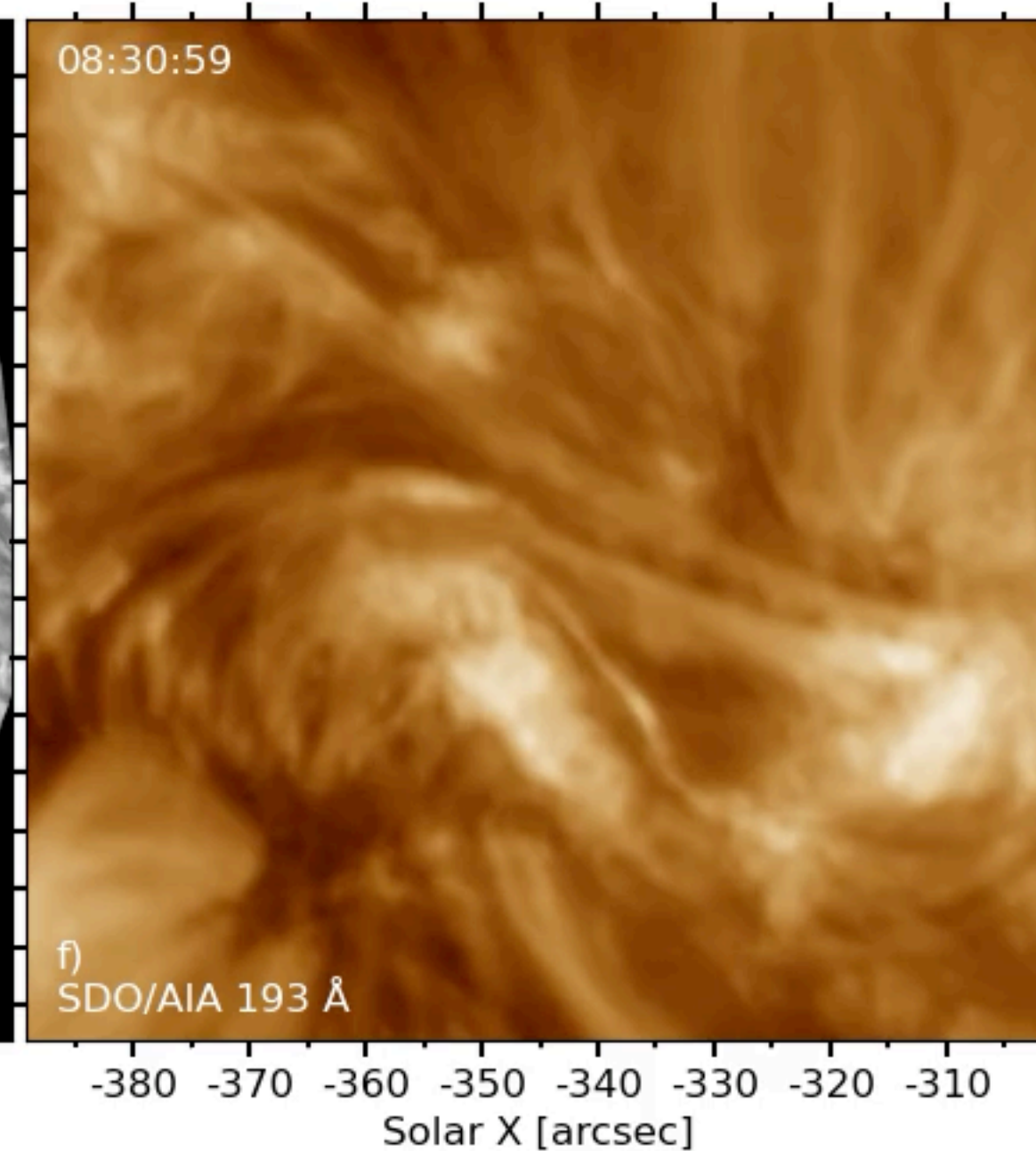
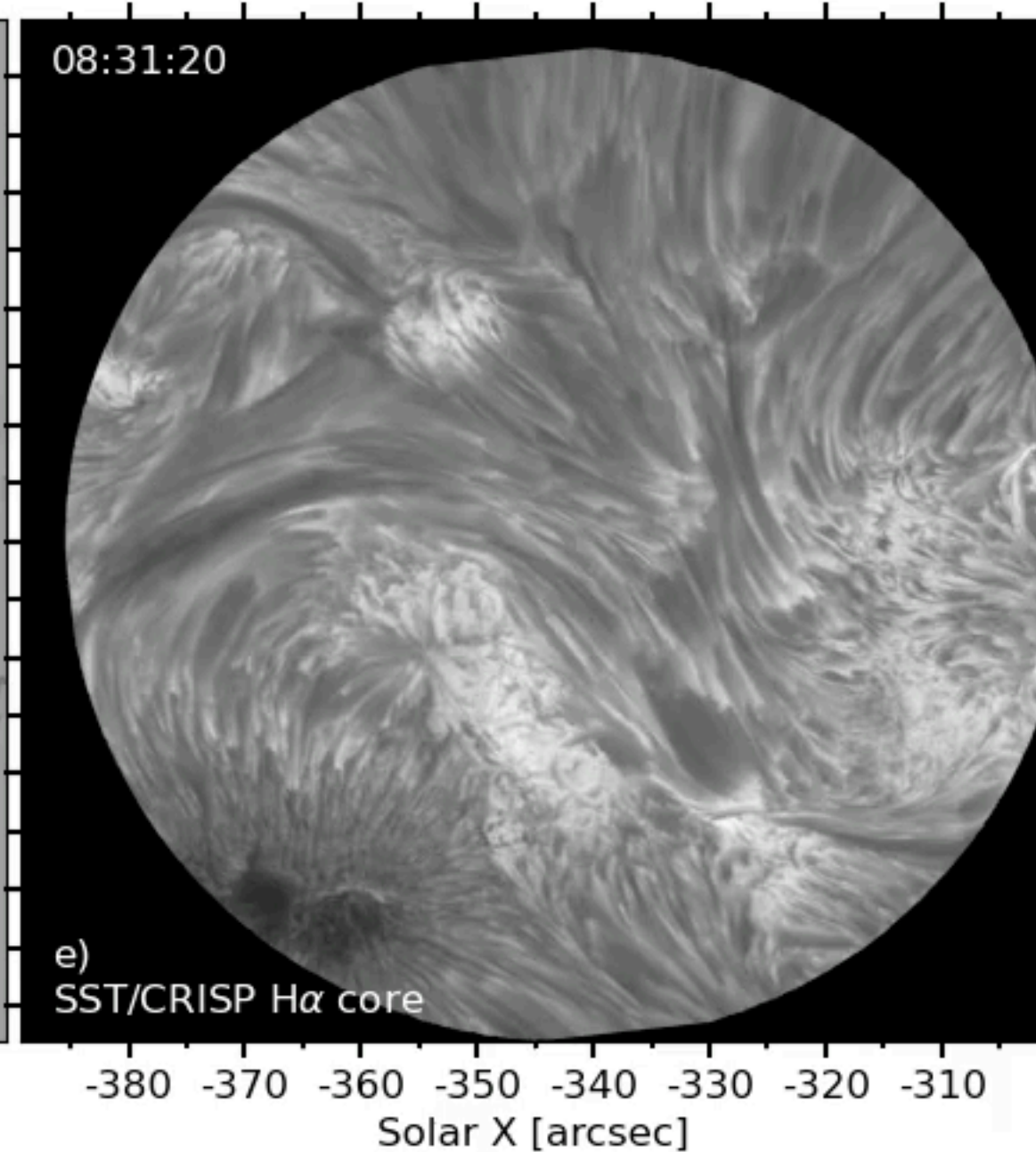
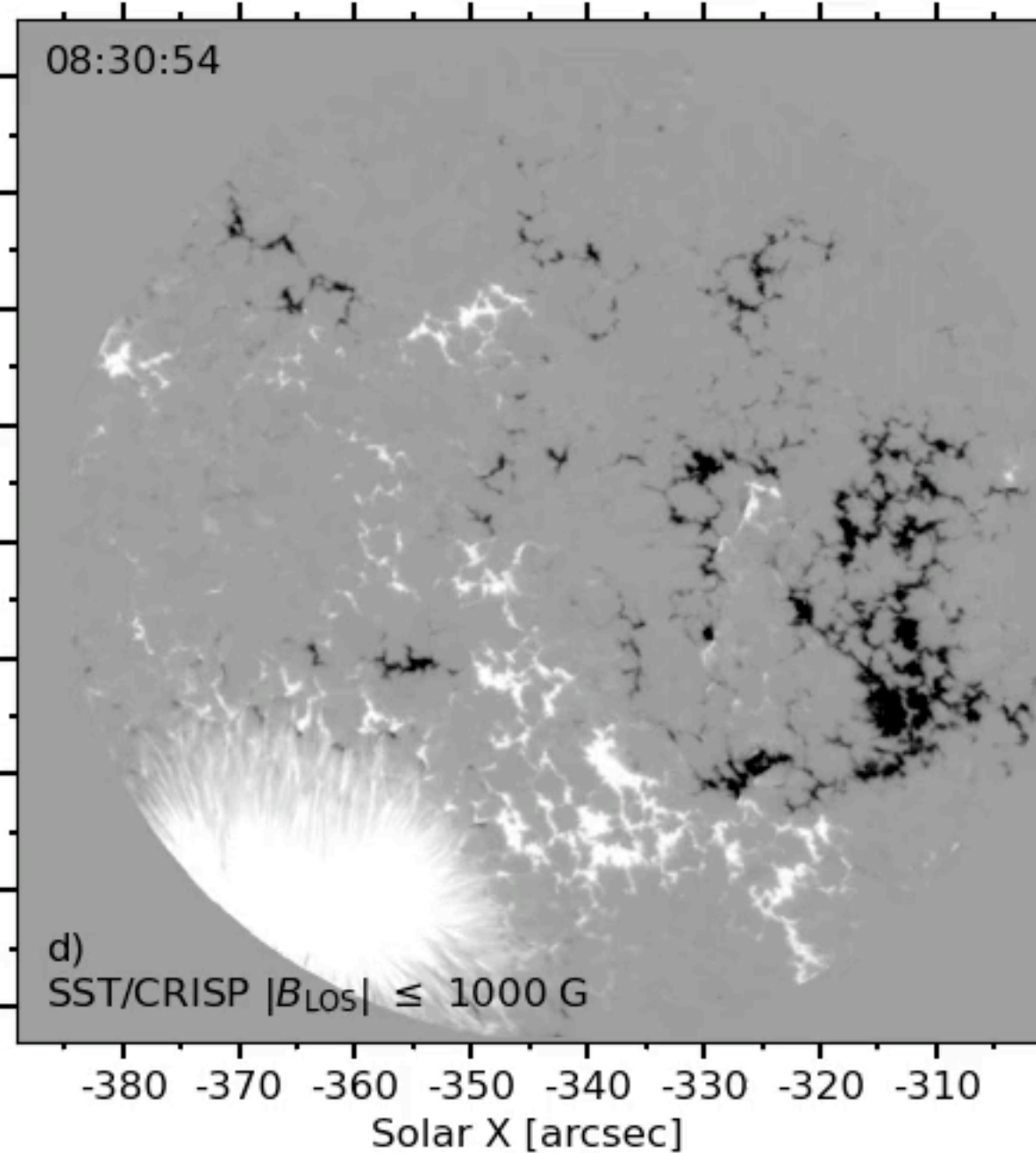
Luc Rouppe van der Voort

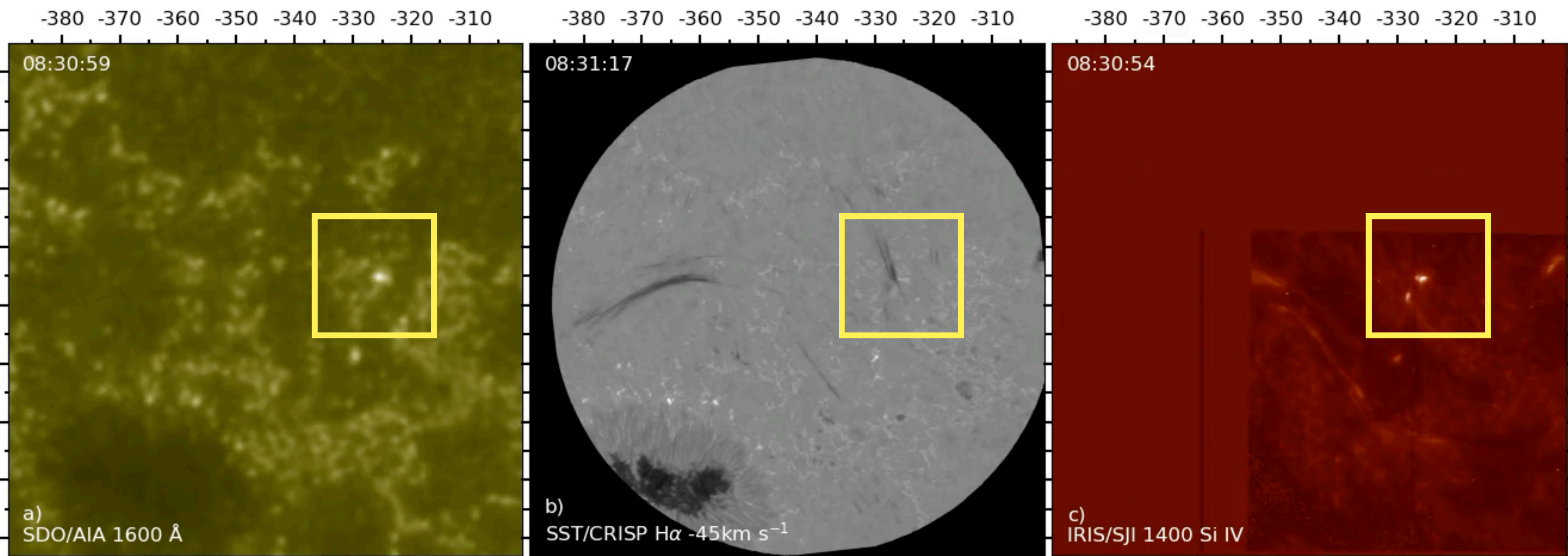
Roseland Centre for Solar Physics (RoCS), University of Oslo

In collaboration with Mats Ola Sand, Ignasi Soler Poquet, Souvik Bose, Daniel Nóbrega-Siverio, Reetika Joshi, Jonas Thoen Faber



Coordinated observations  
SST & IRIS,  
SDO, Hinode

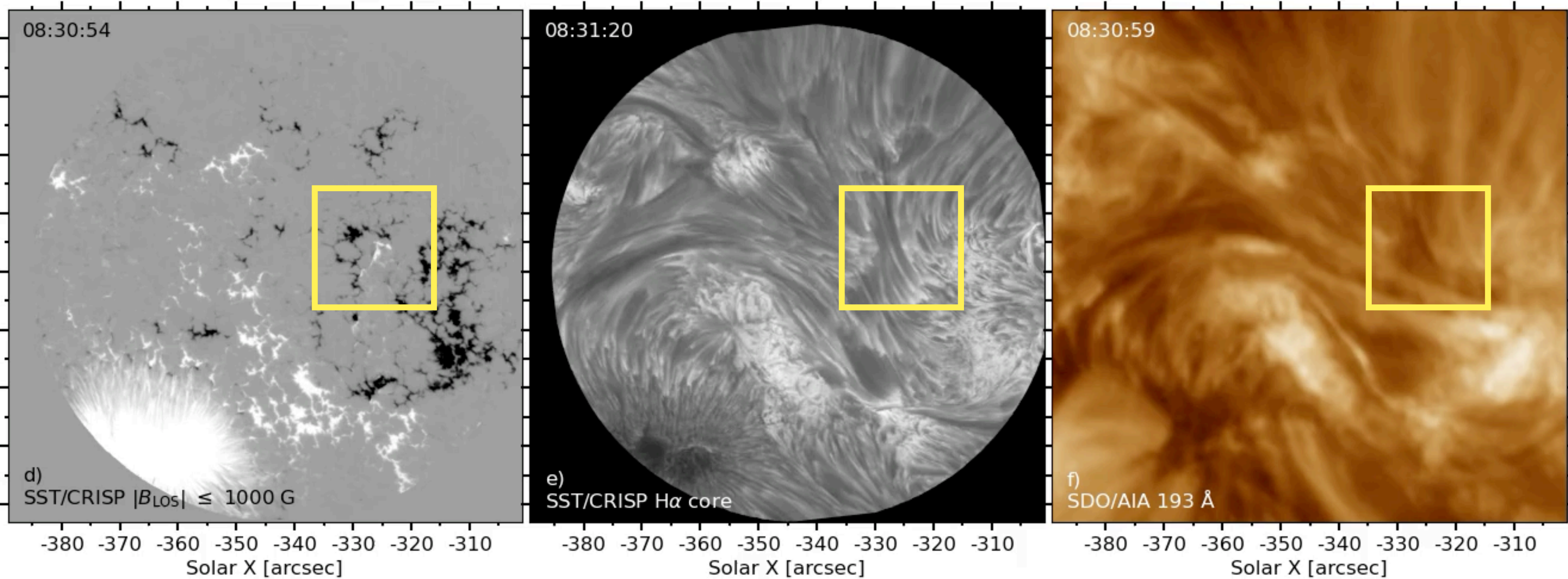


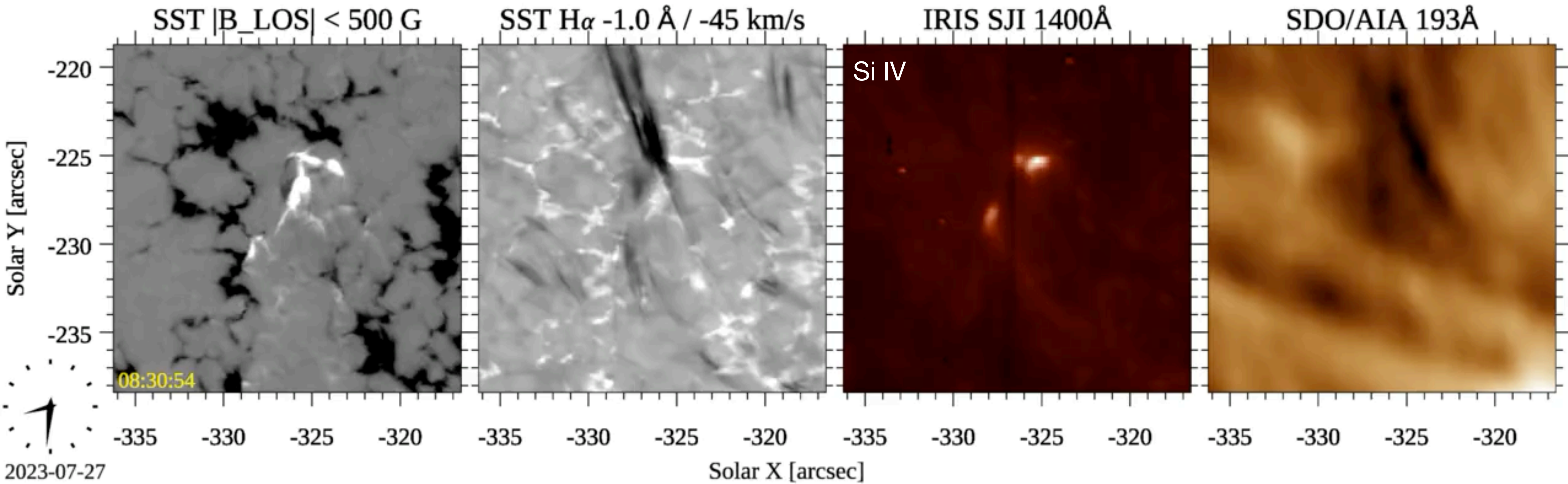


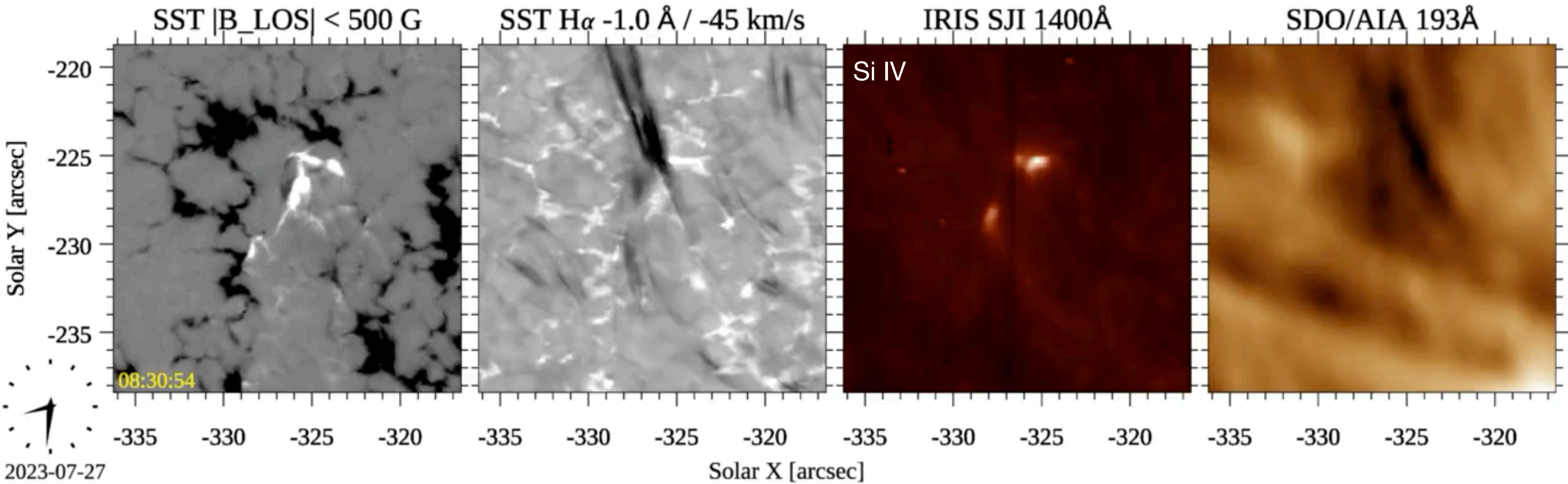
Coordinated observations

SST & IRIS,

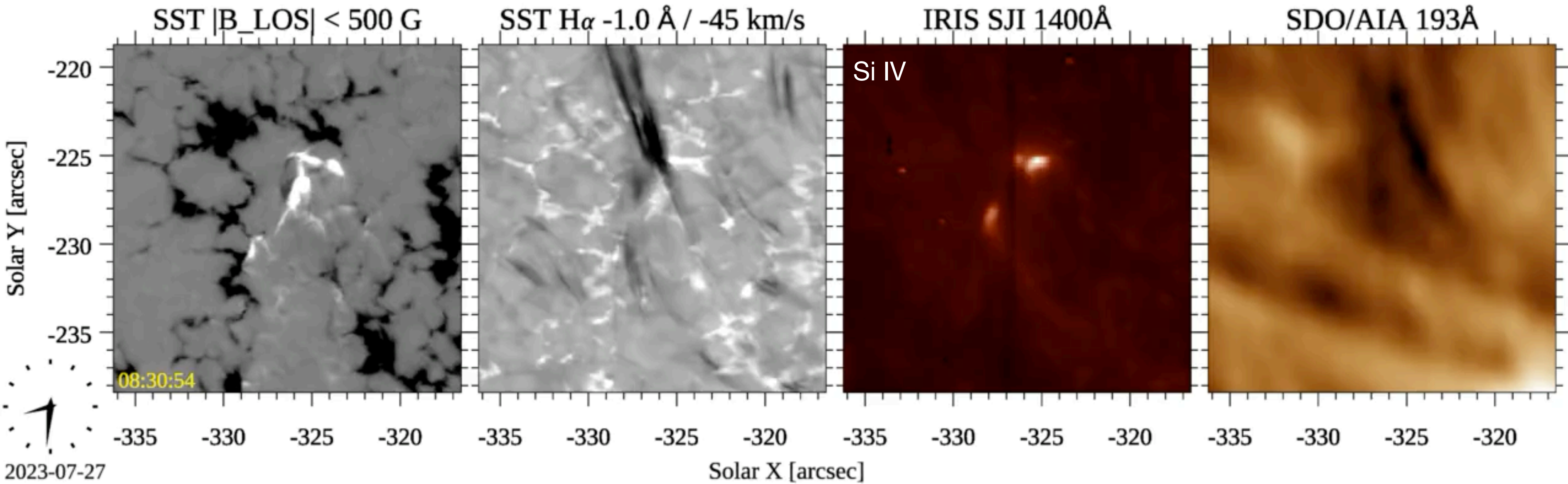
SDO, Hinode





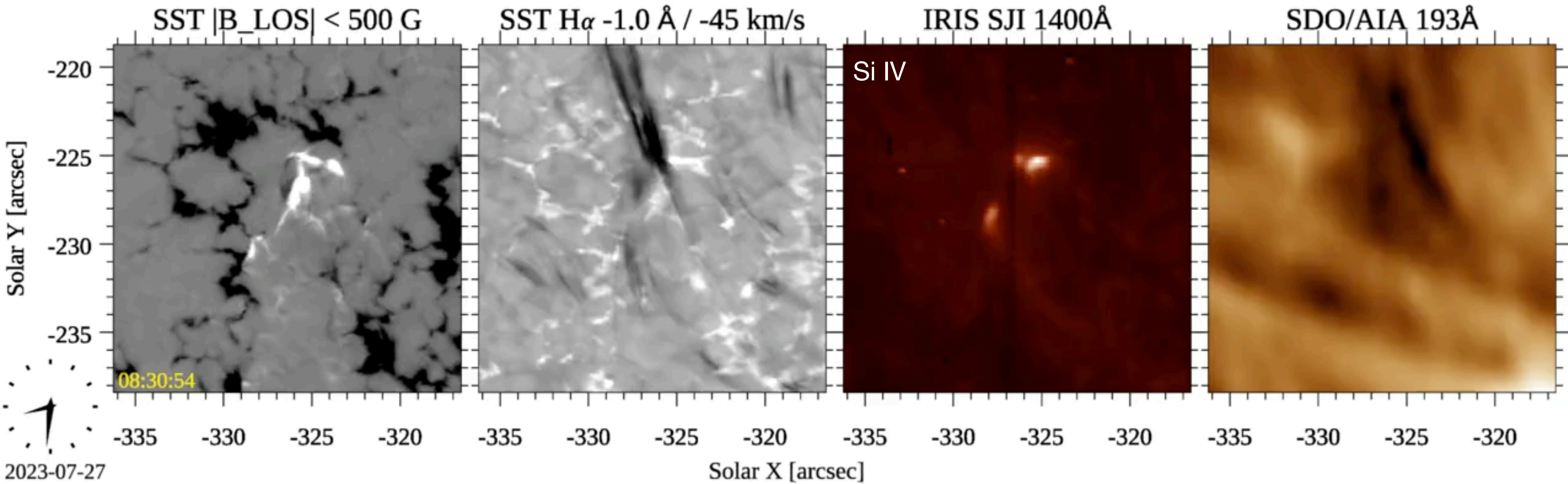


Flux emergence



Flux emergence

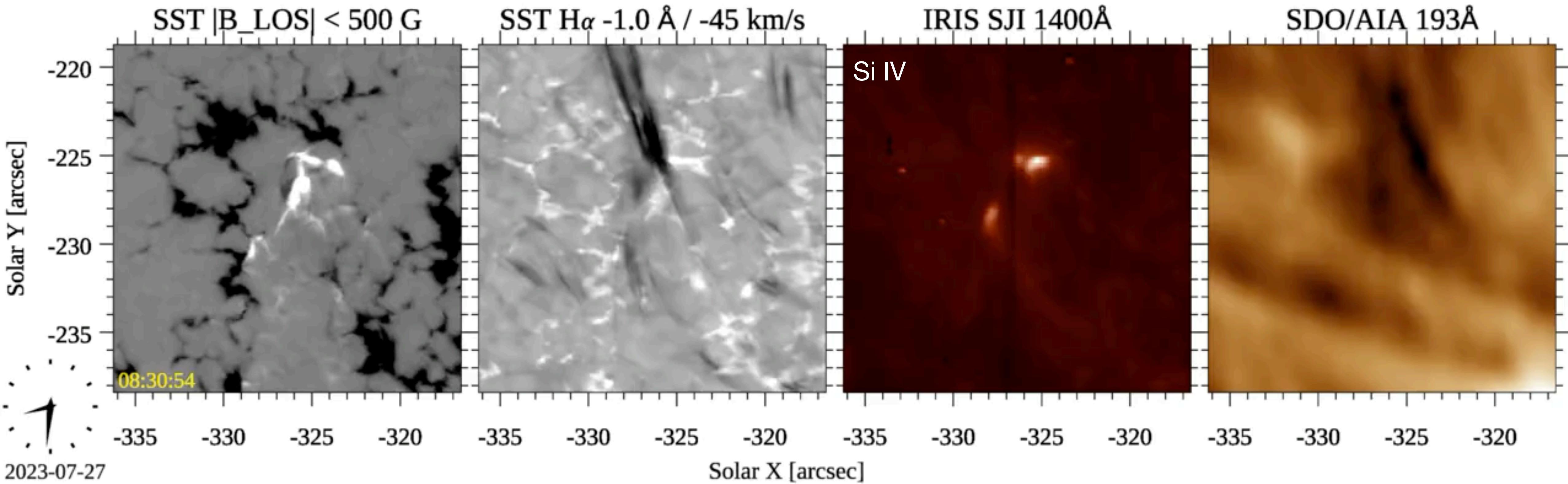
Ellerman bombs  
 Dome  
 Surge



Flux emergence

Ellerman bombs  
 Dome  
 Surge

UV burst  
 Dome

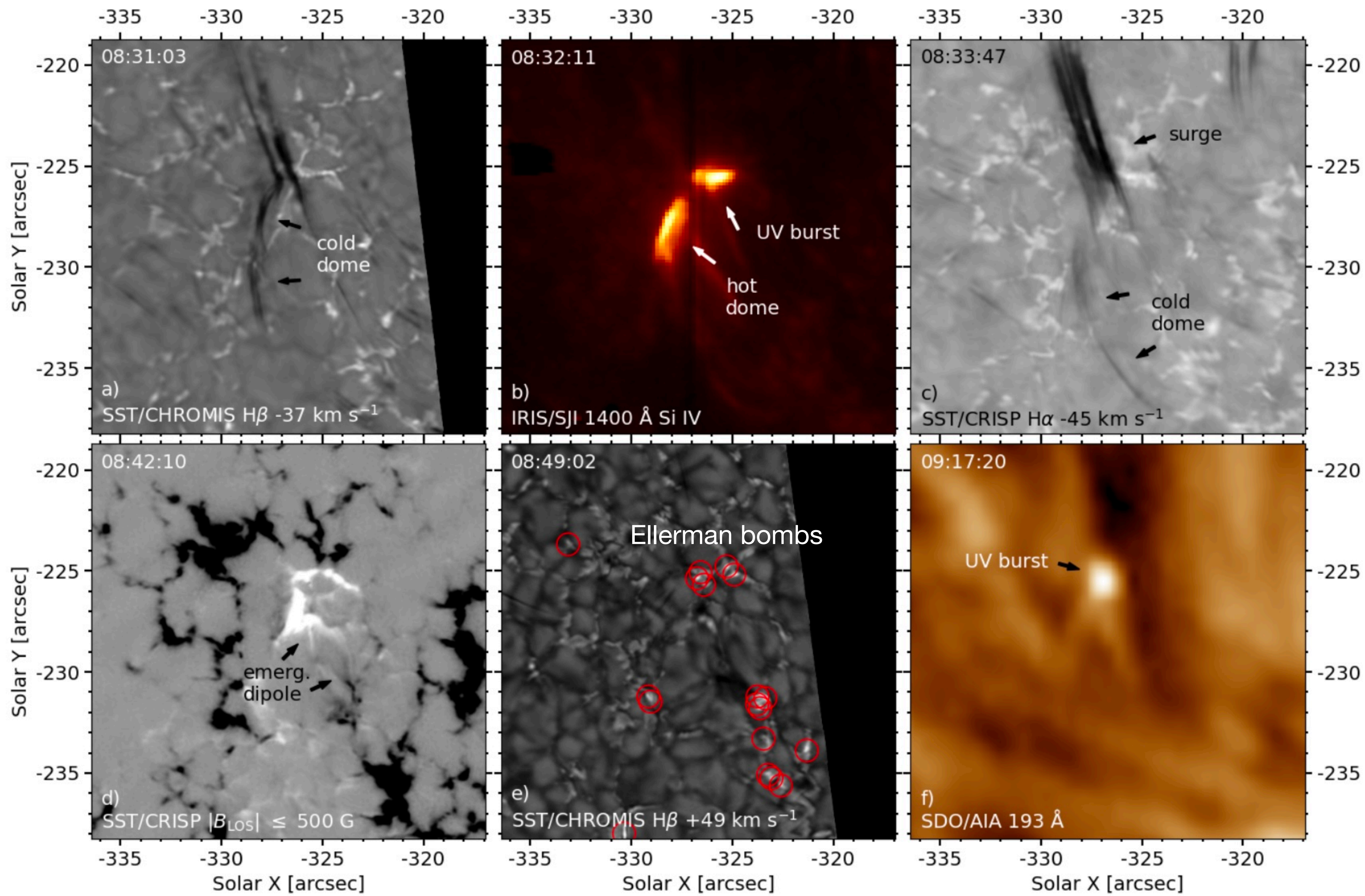


Flux emergence

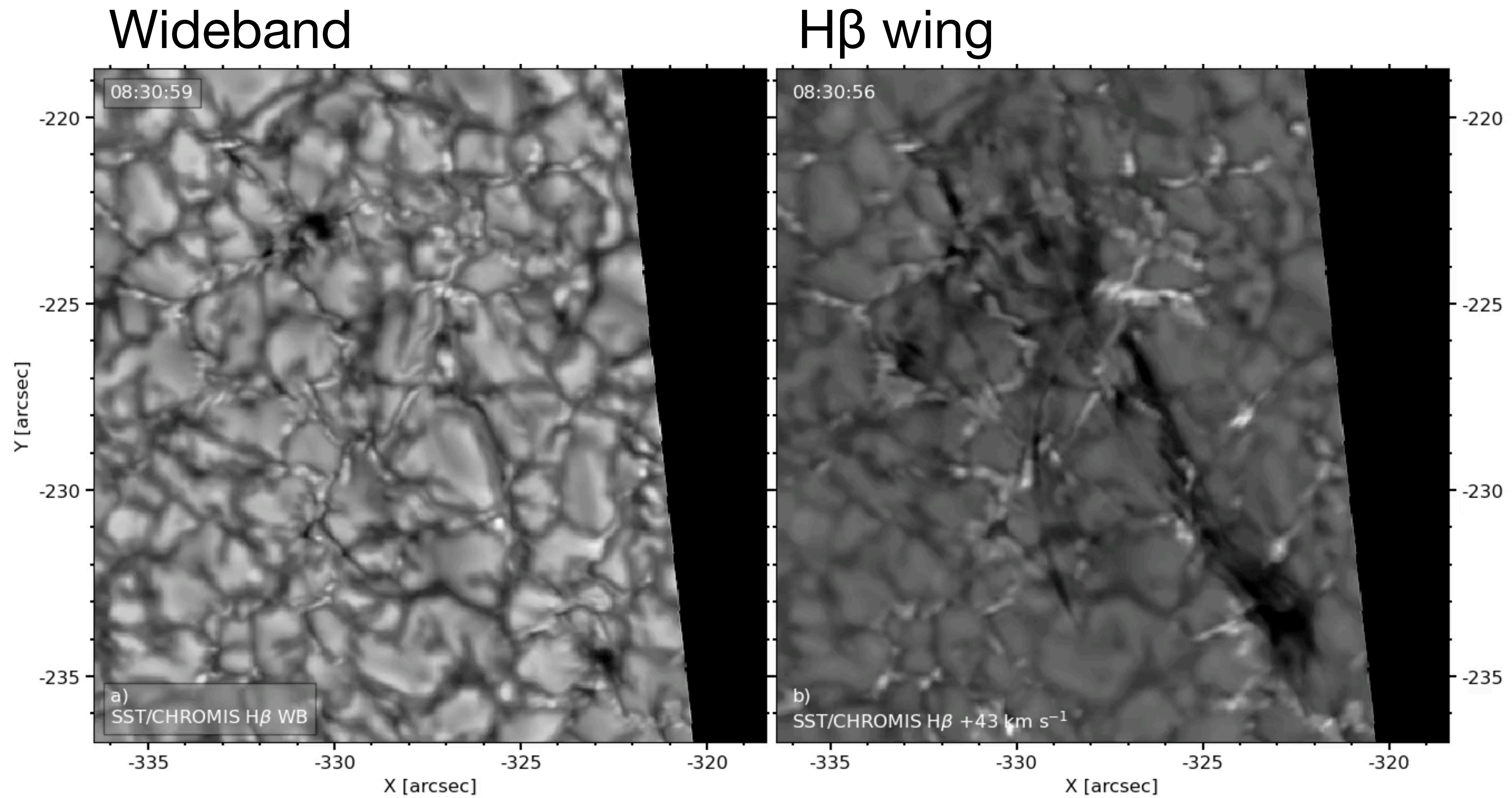
Ellerman bombs  
 Dome  
 Surge

UV burst  
 Dome

UV burst  
 Dome  
 Surge

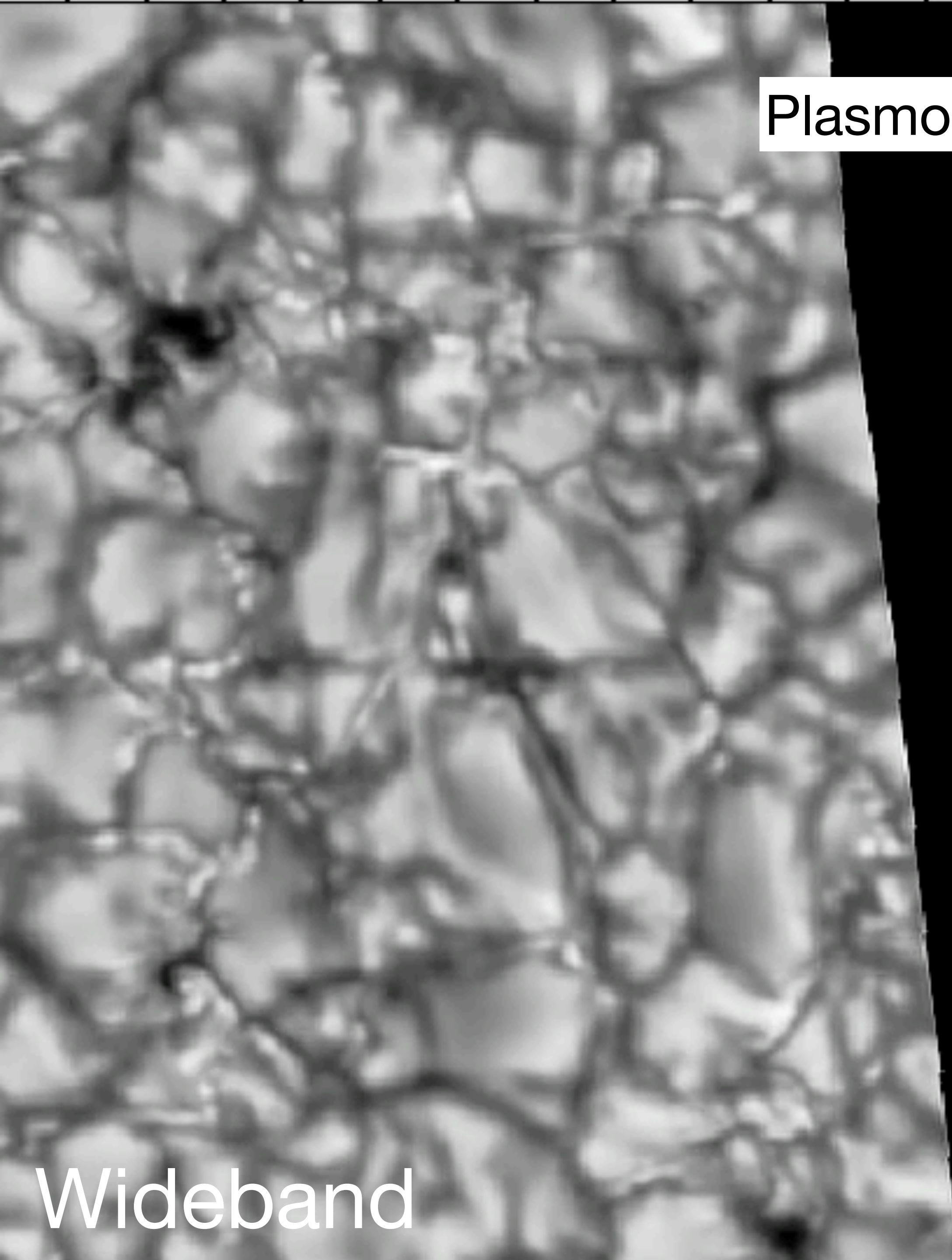


# Plasmoid-like blobs in dome

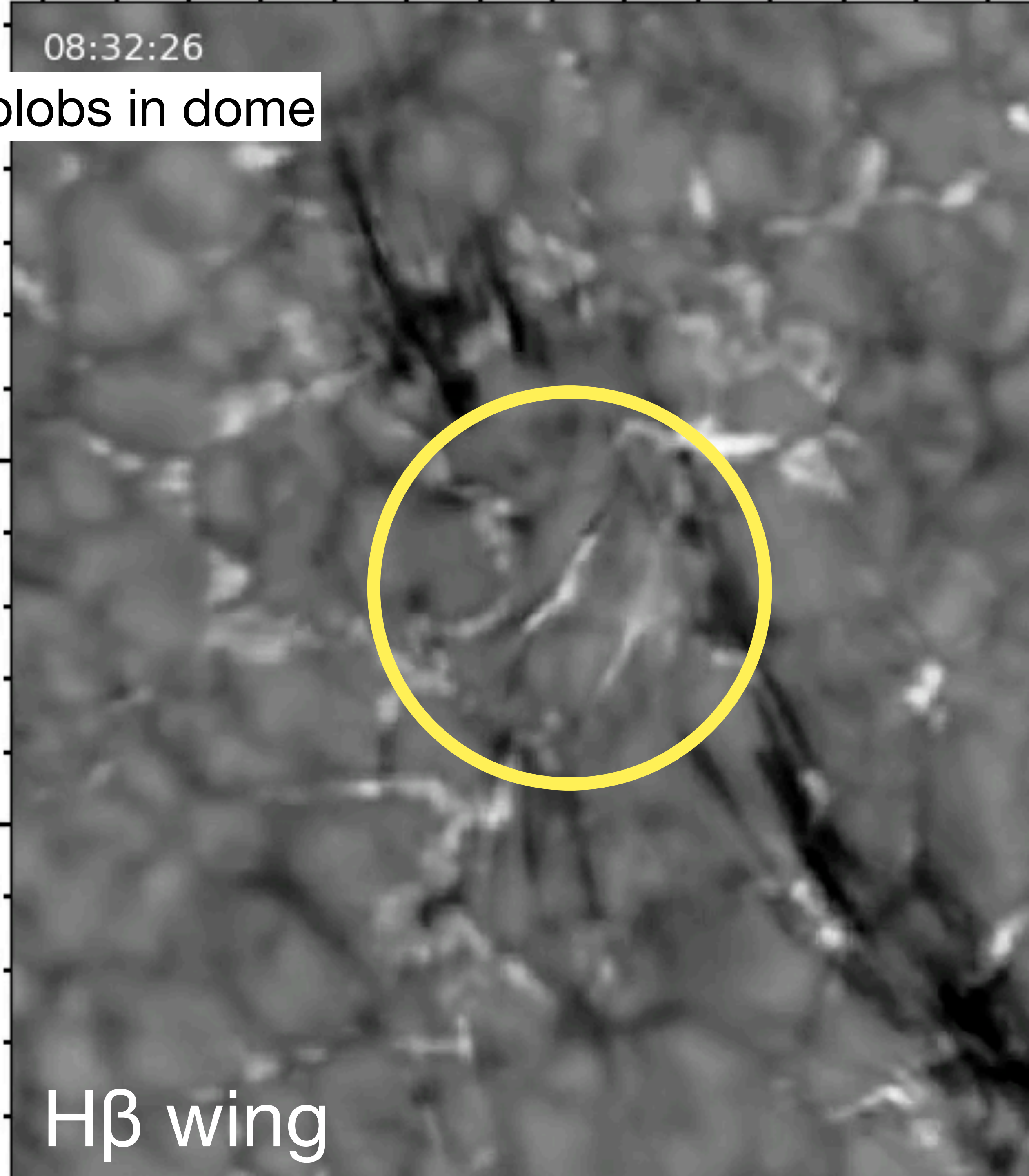


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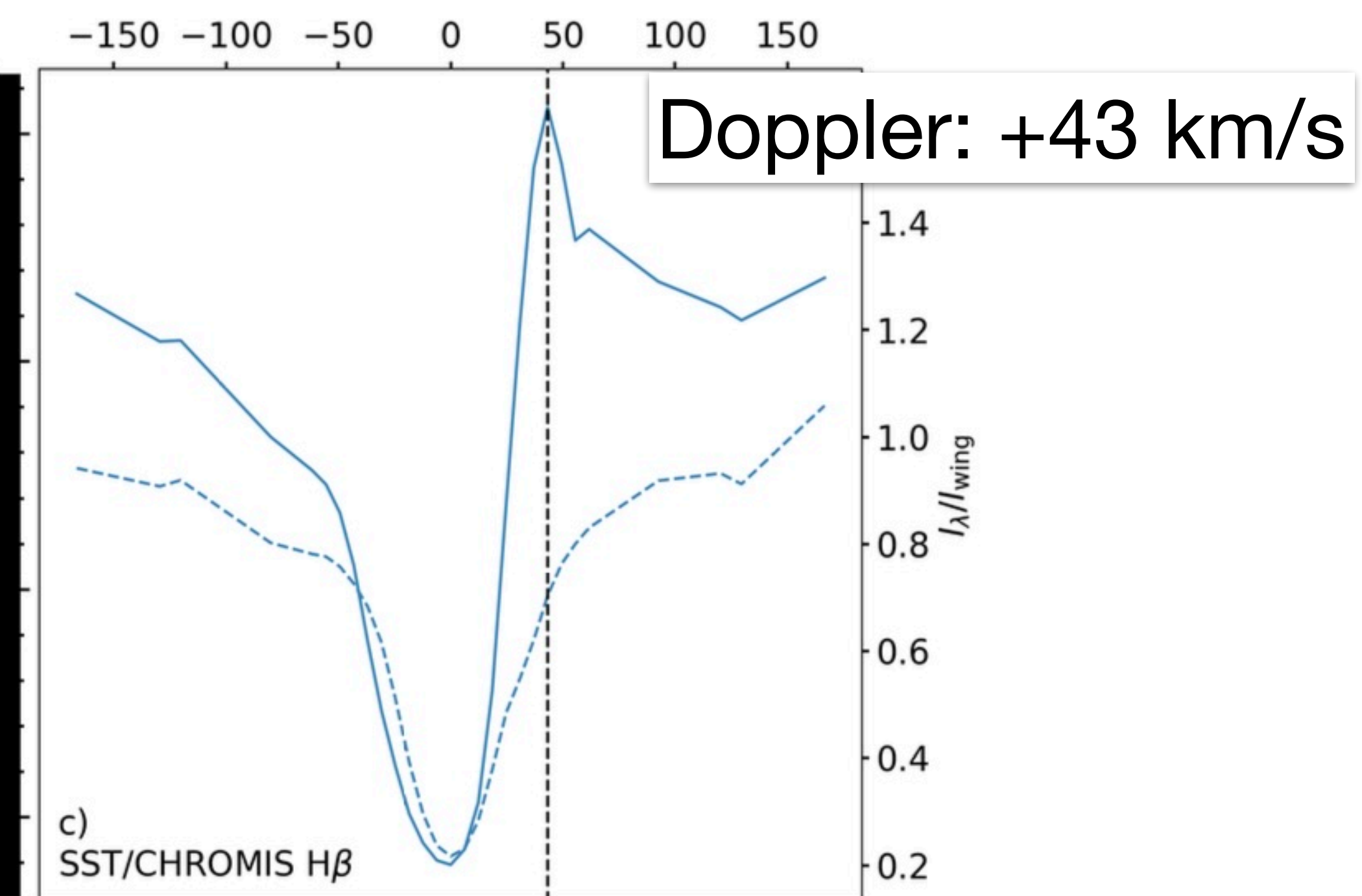
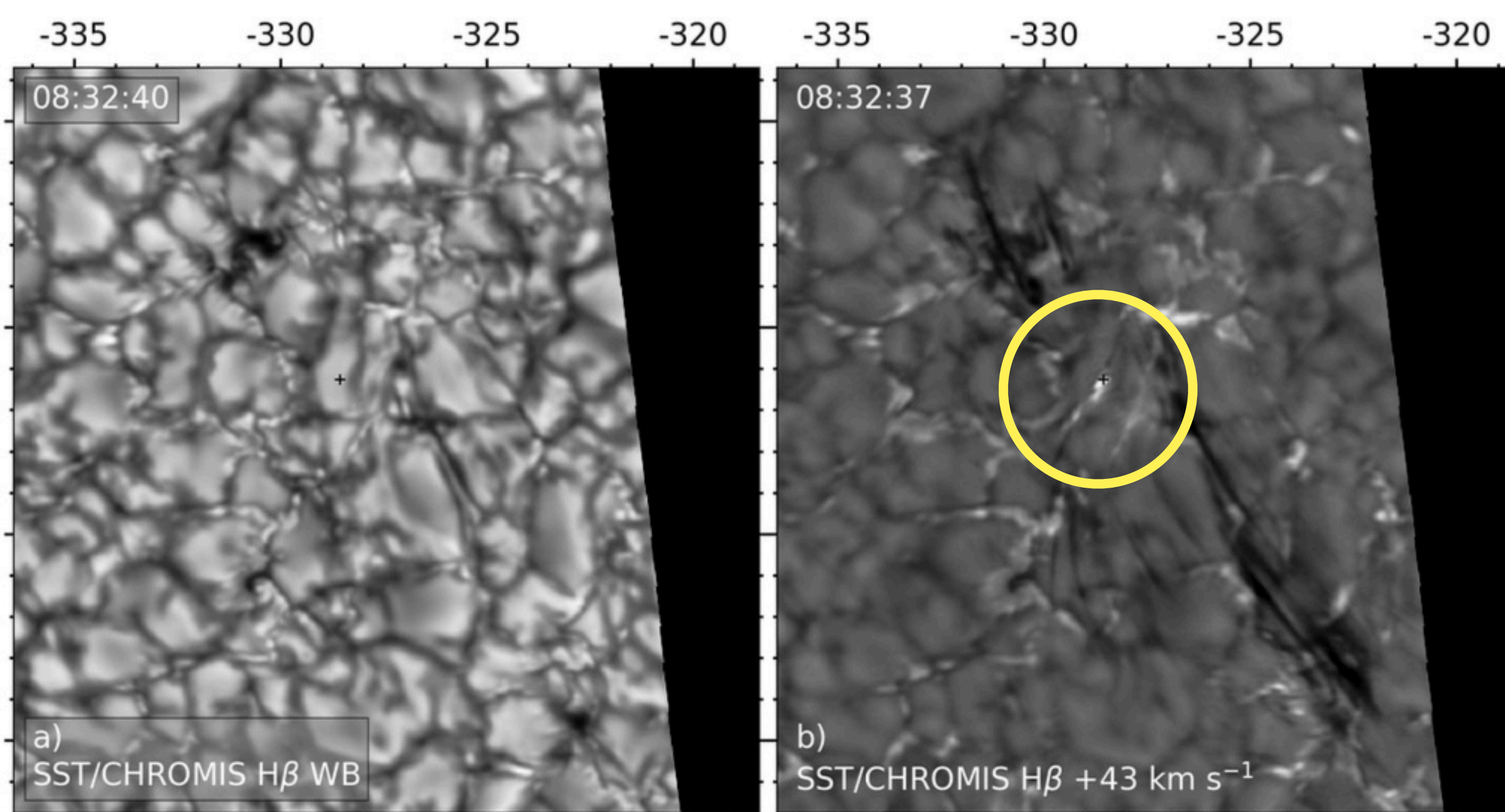
Plasmoid-like blobs in dome

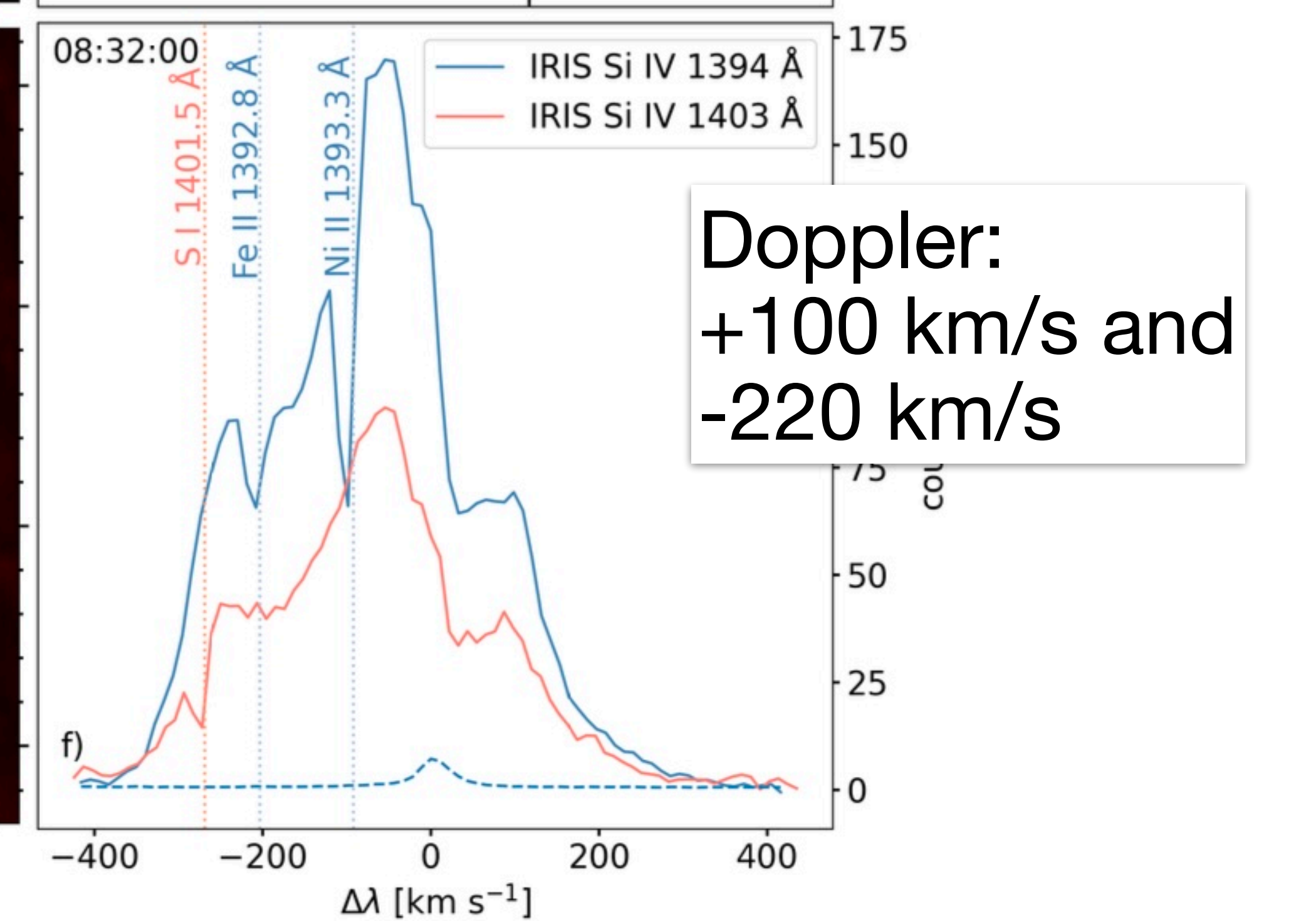
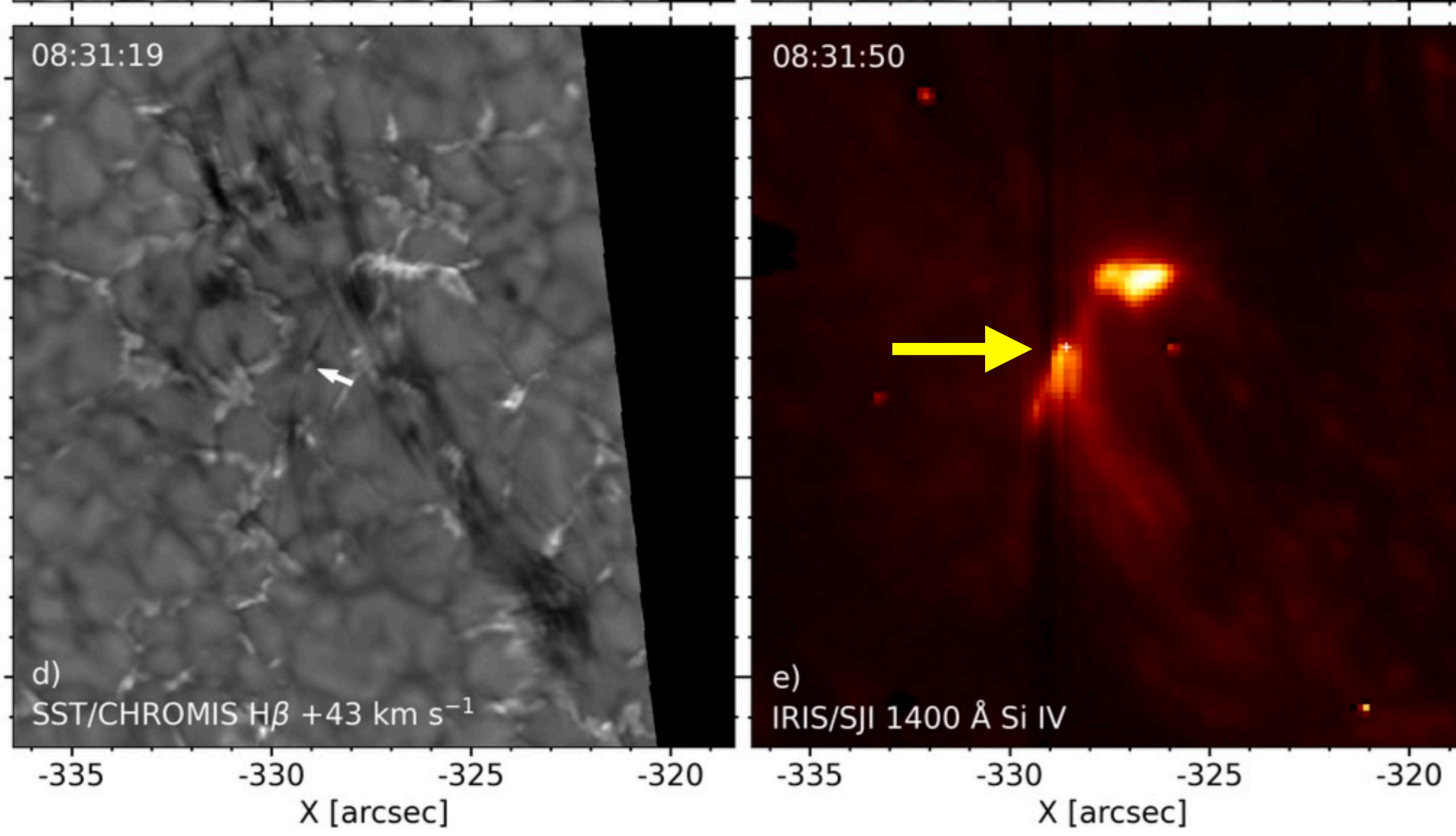
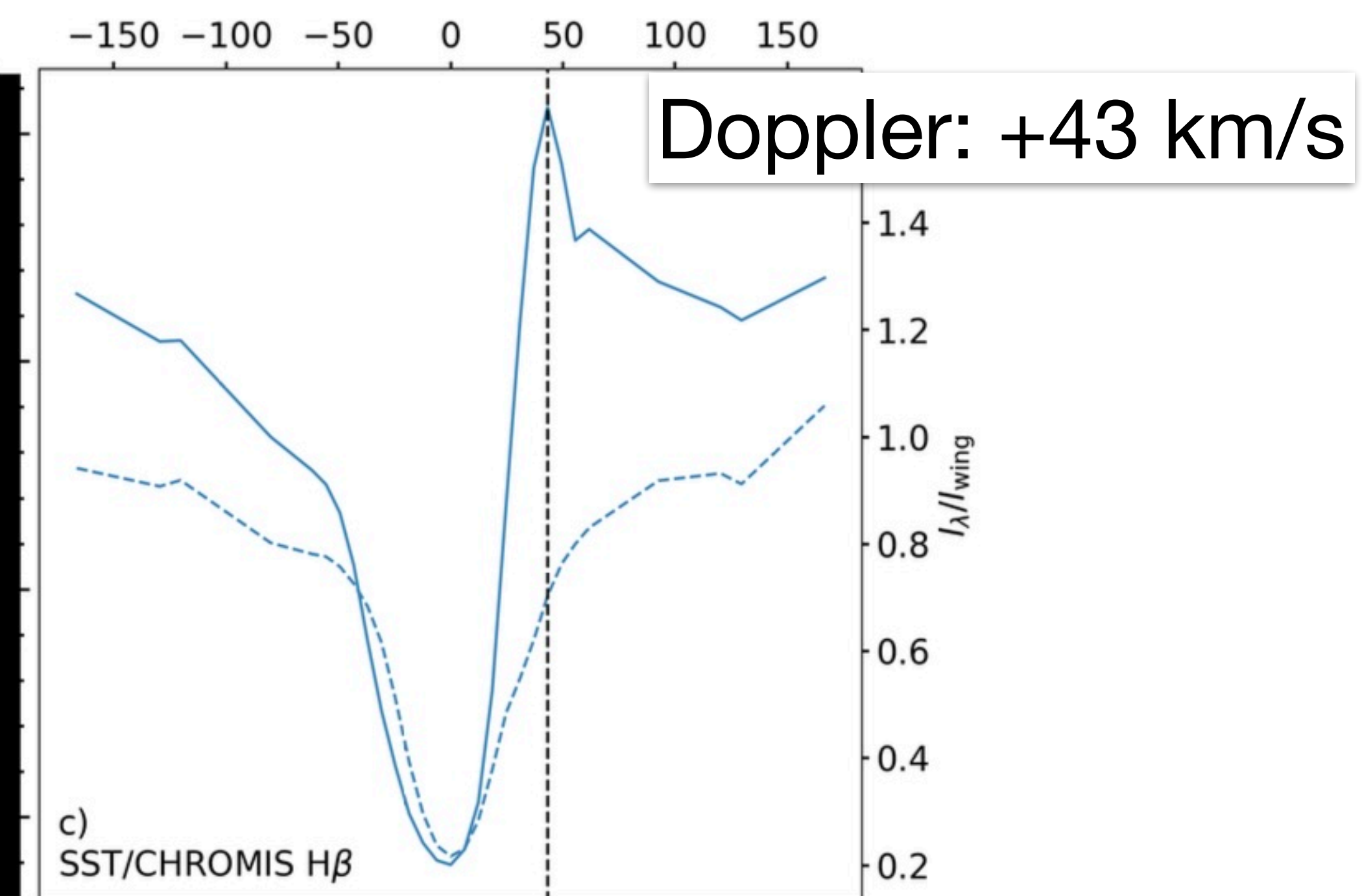
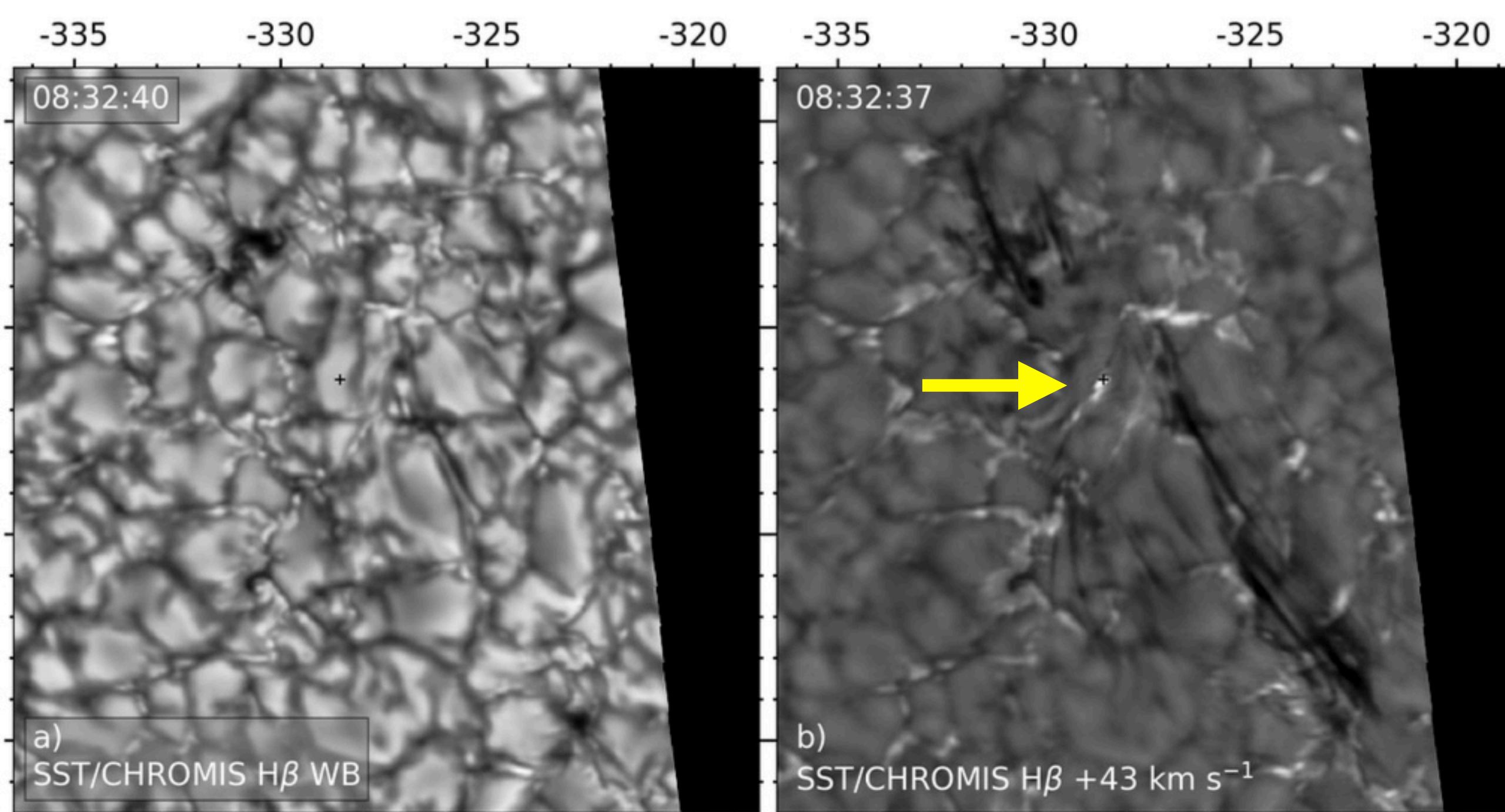


Wideband



H $\beta$  wing

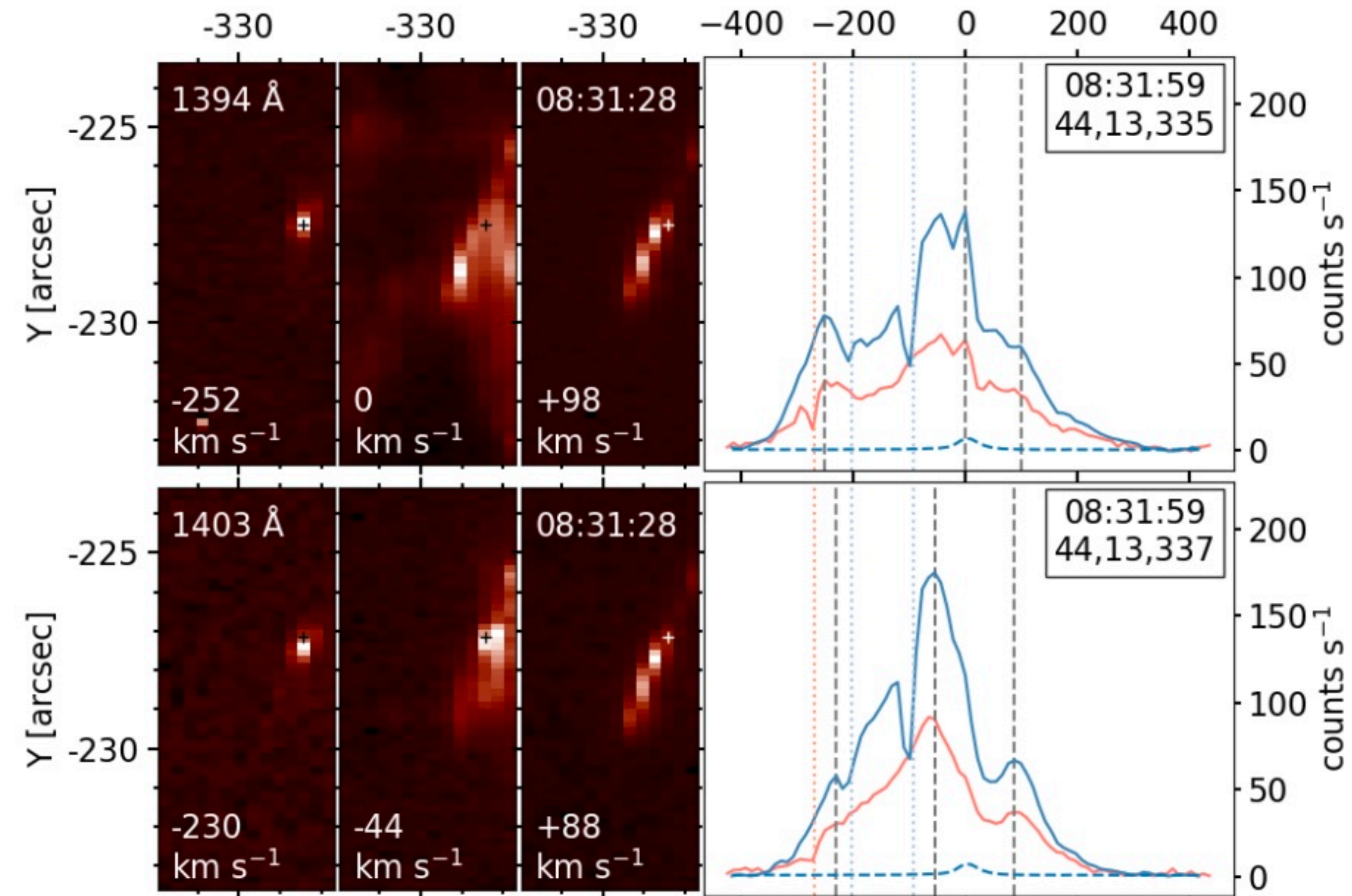




# IRIS Si IV raster maps

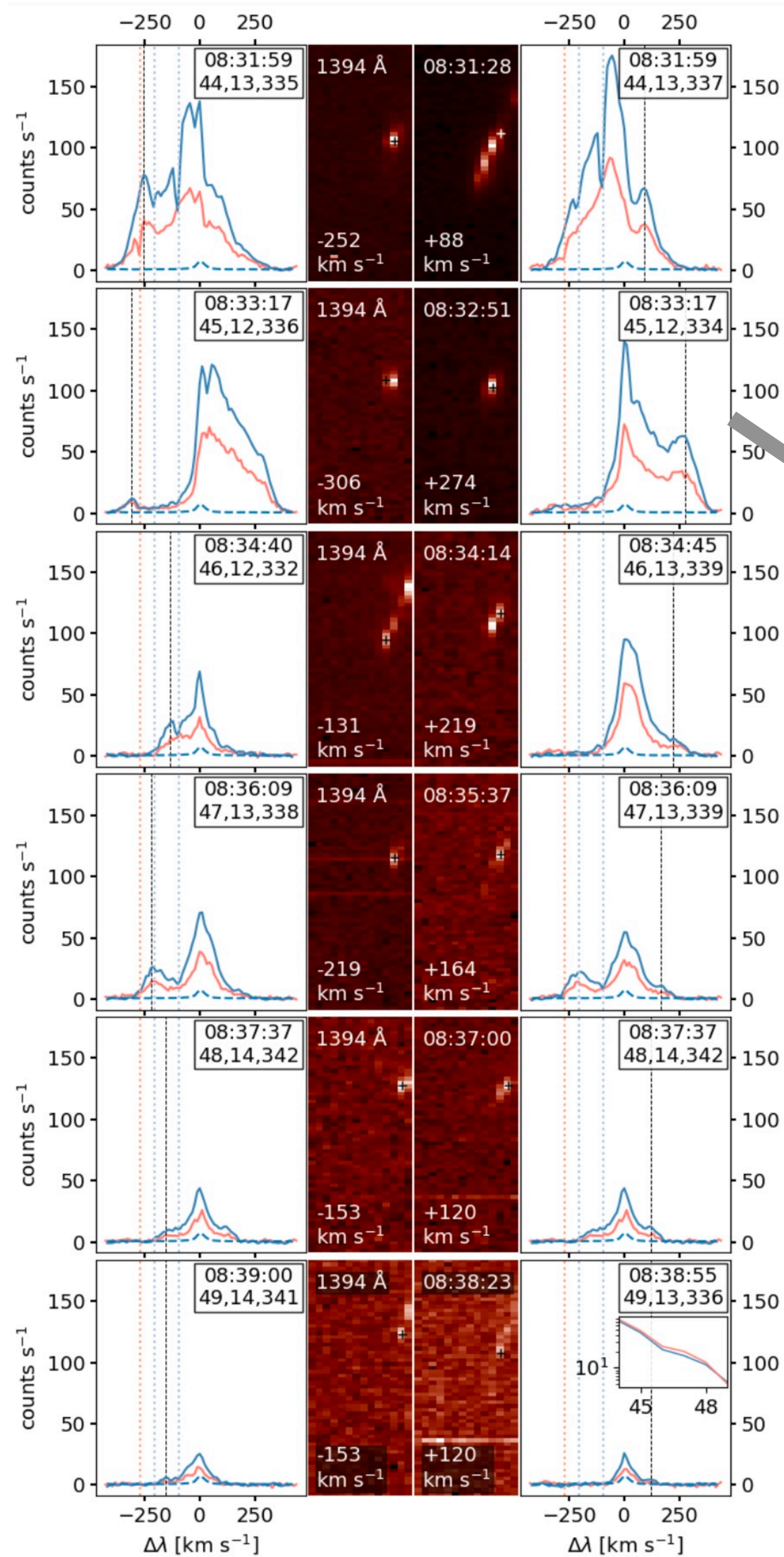
Complex Si IV profiles:  
non-Gaussian and multiple components

Maps show small blobs with large  
Doppler offsets



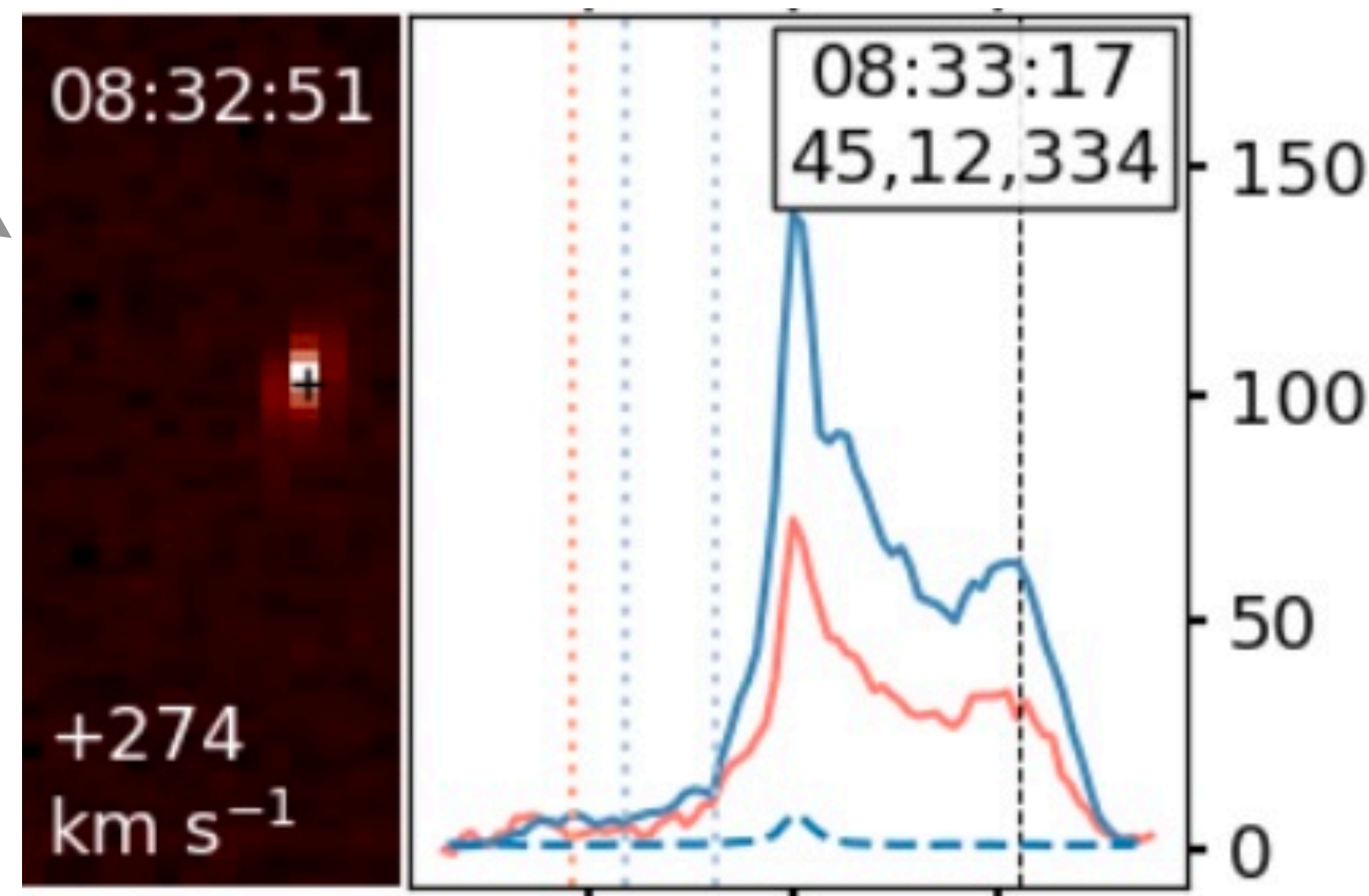


←time

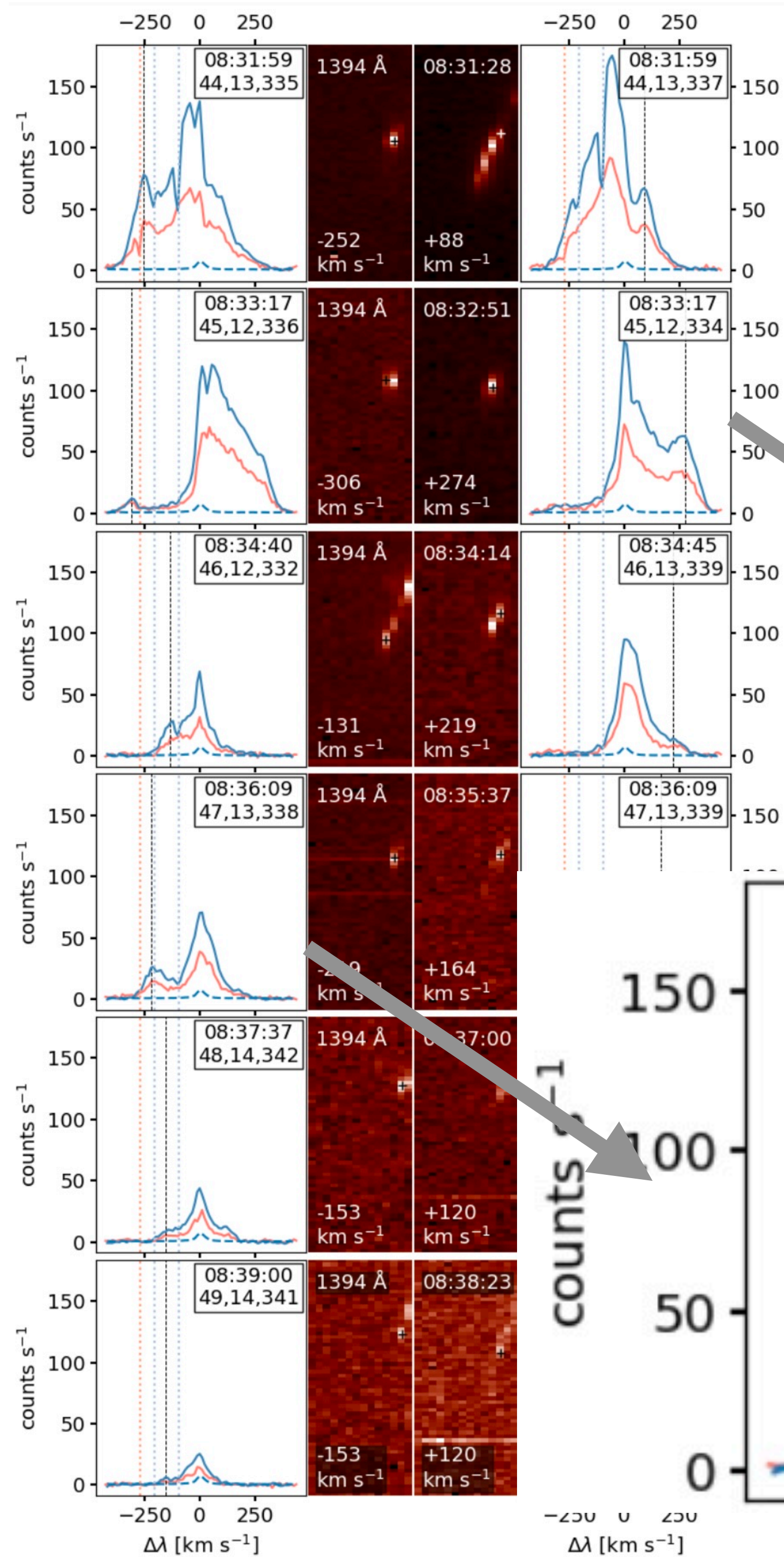


Complex Si IV profiles:  
non-Gaussian and multiple components

Maps show small blobs with large  
Doppler offsets

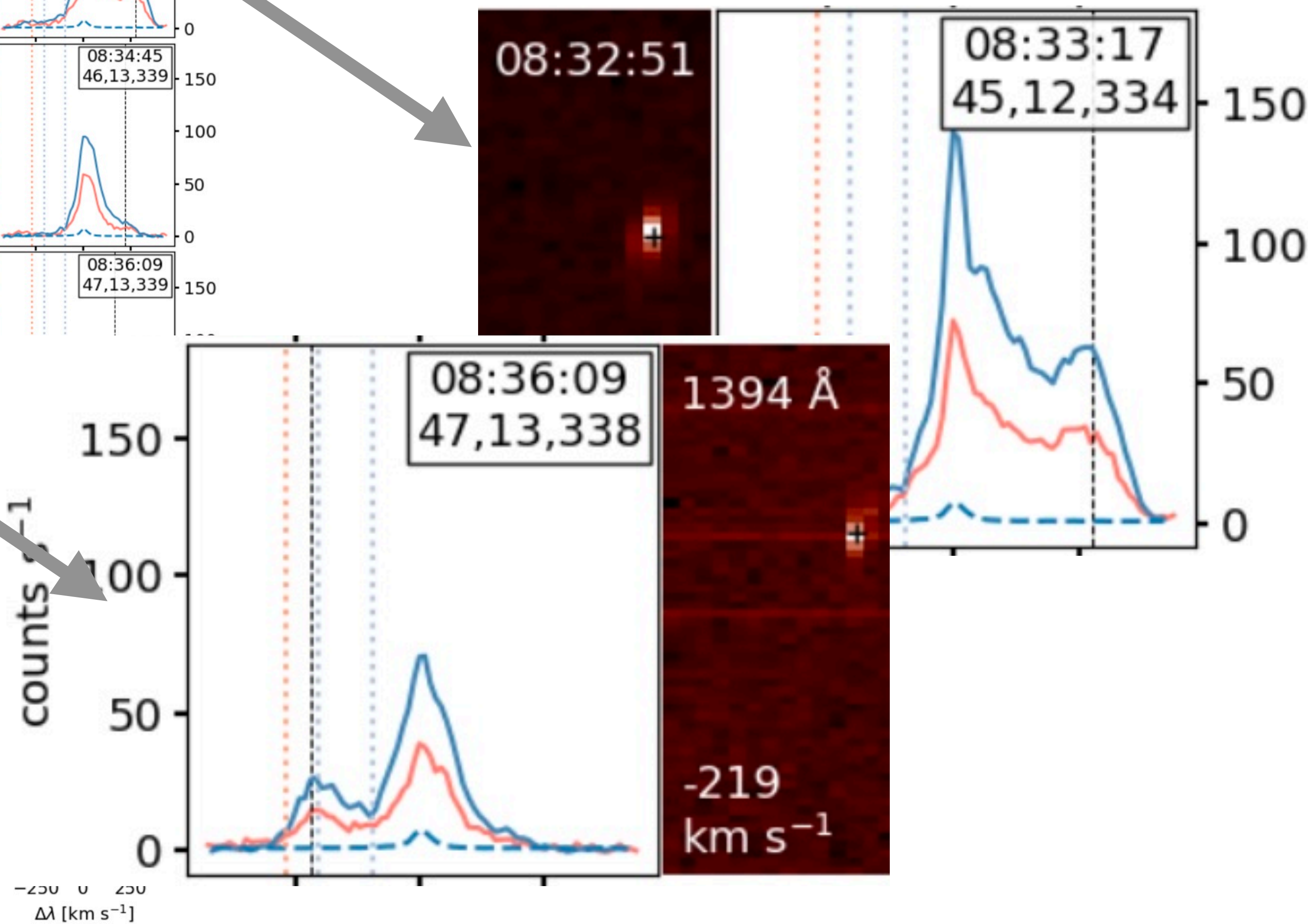


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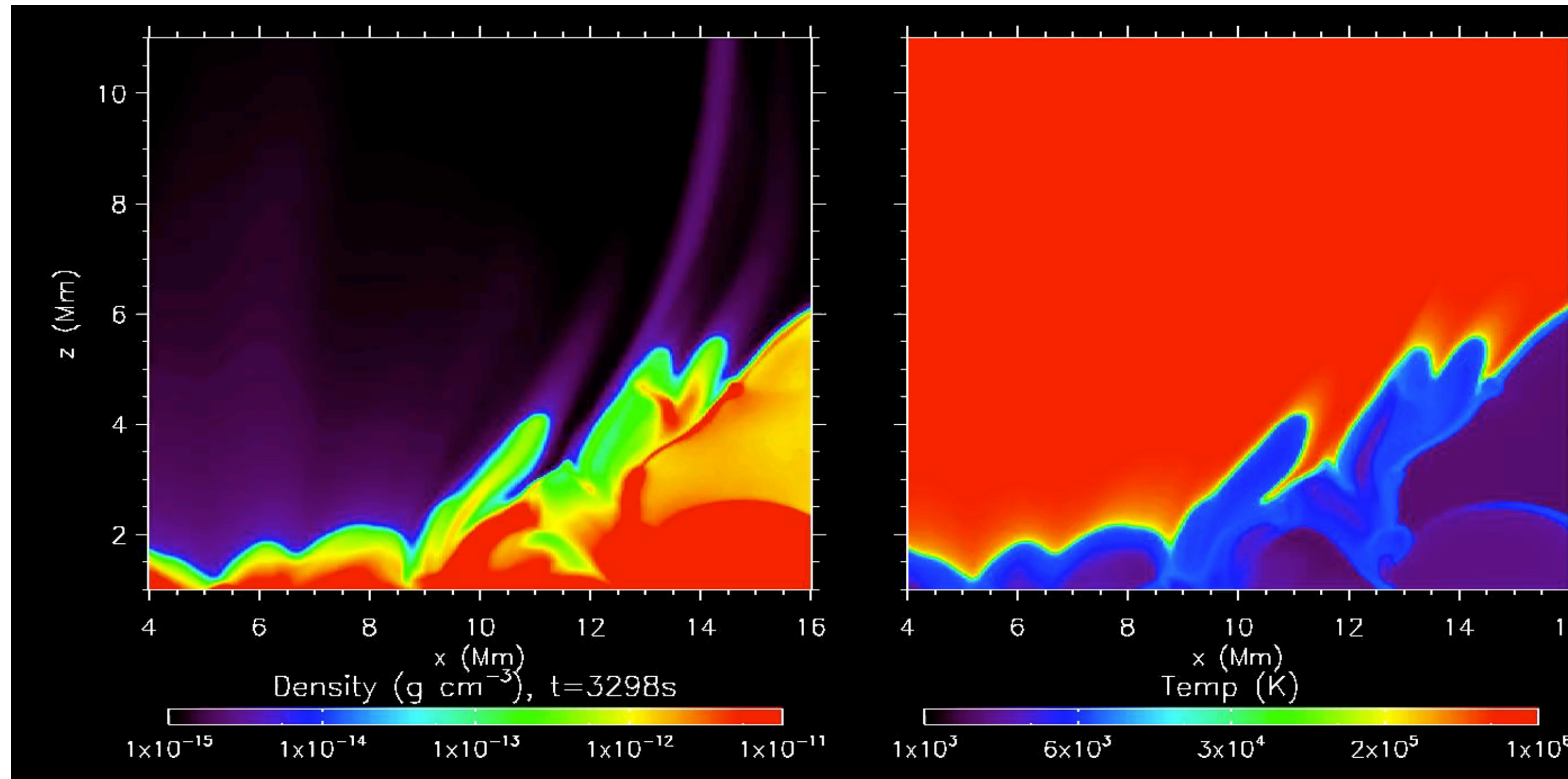
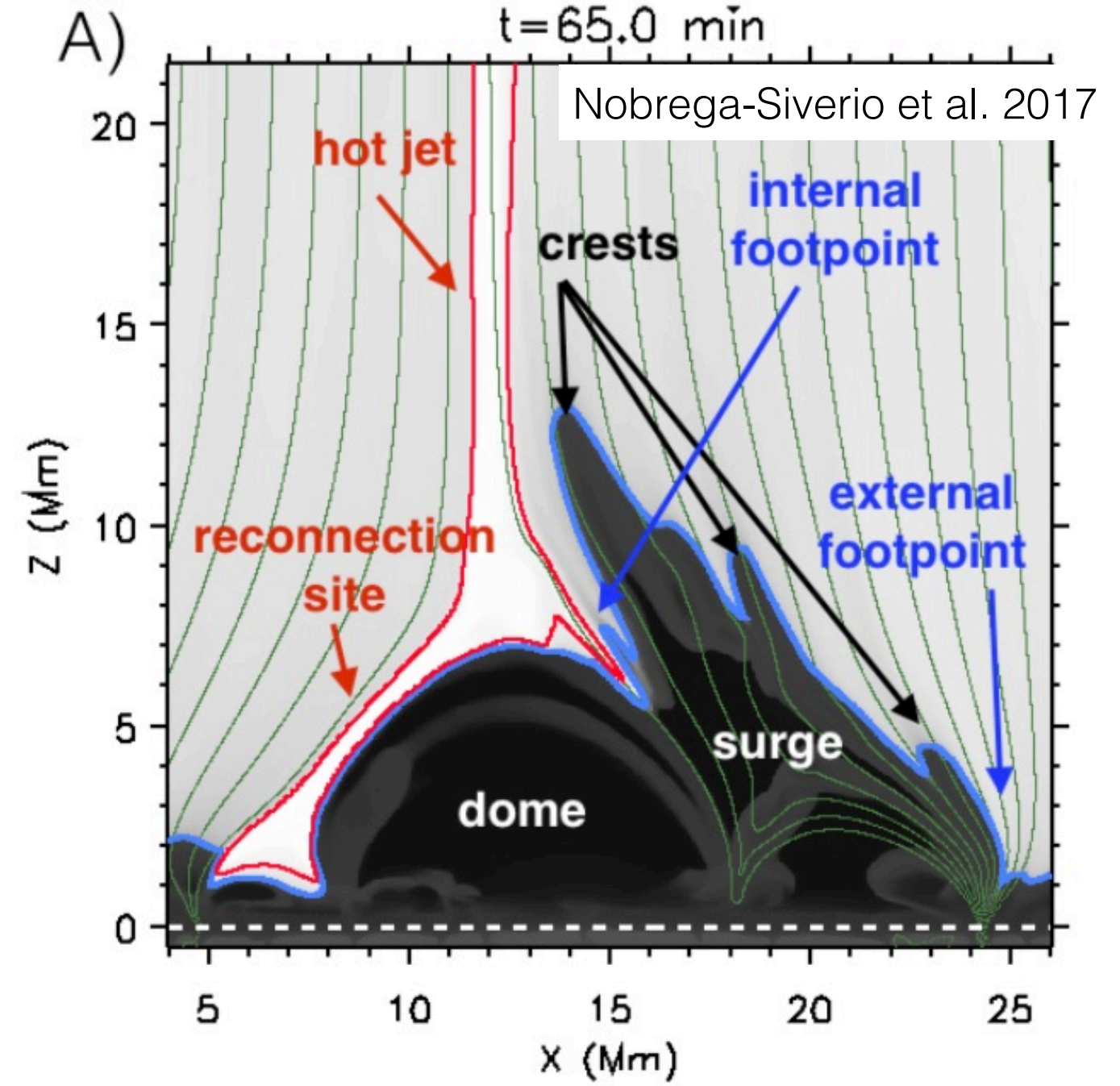
Complex Si IV profiles:  
non-Gaussian and multiple components

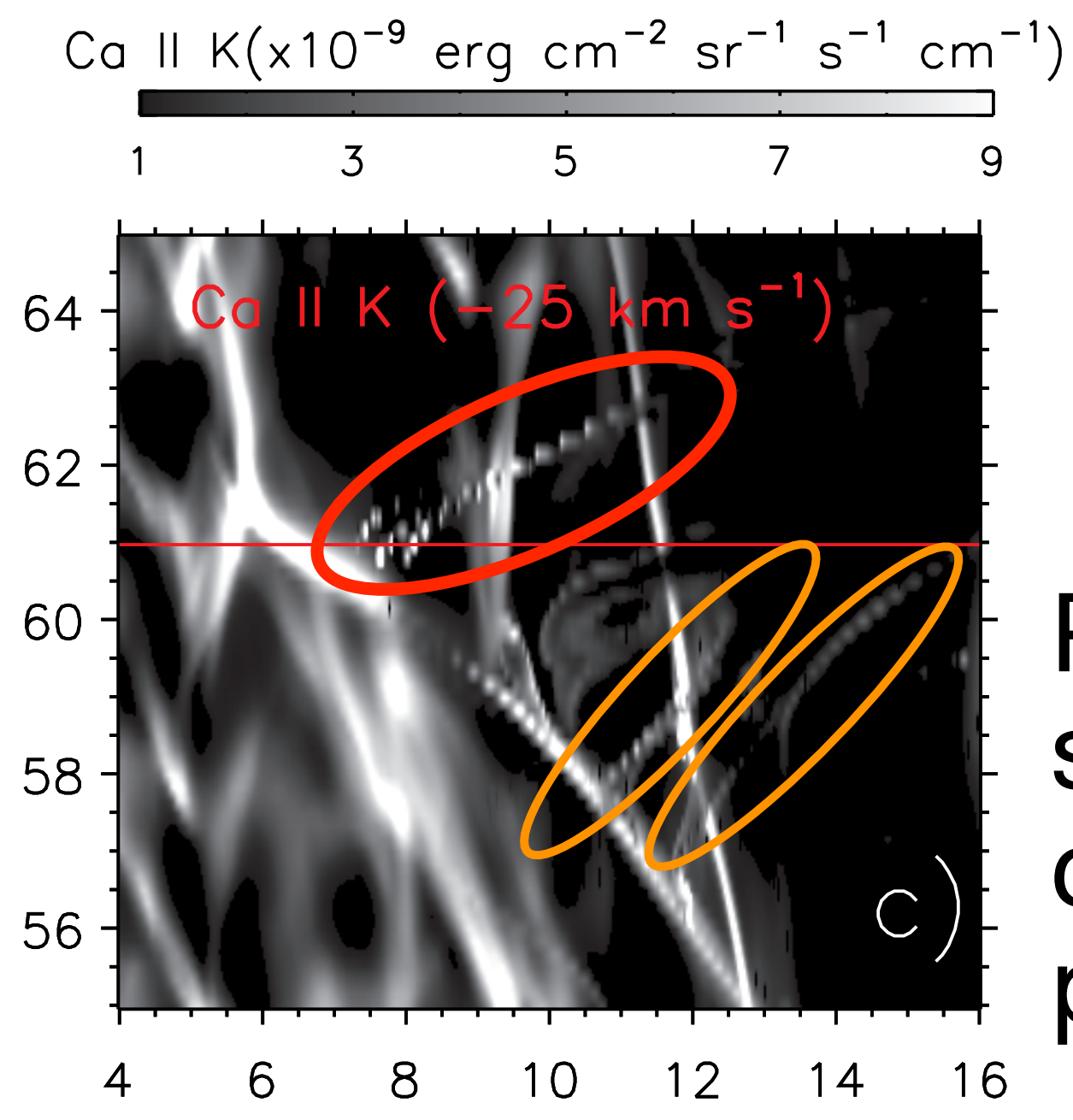
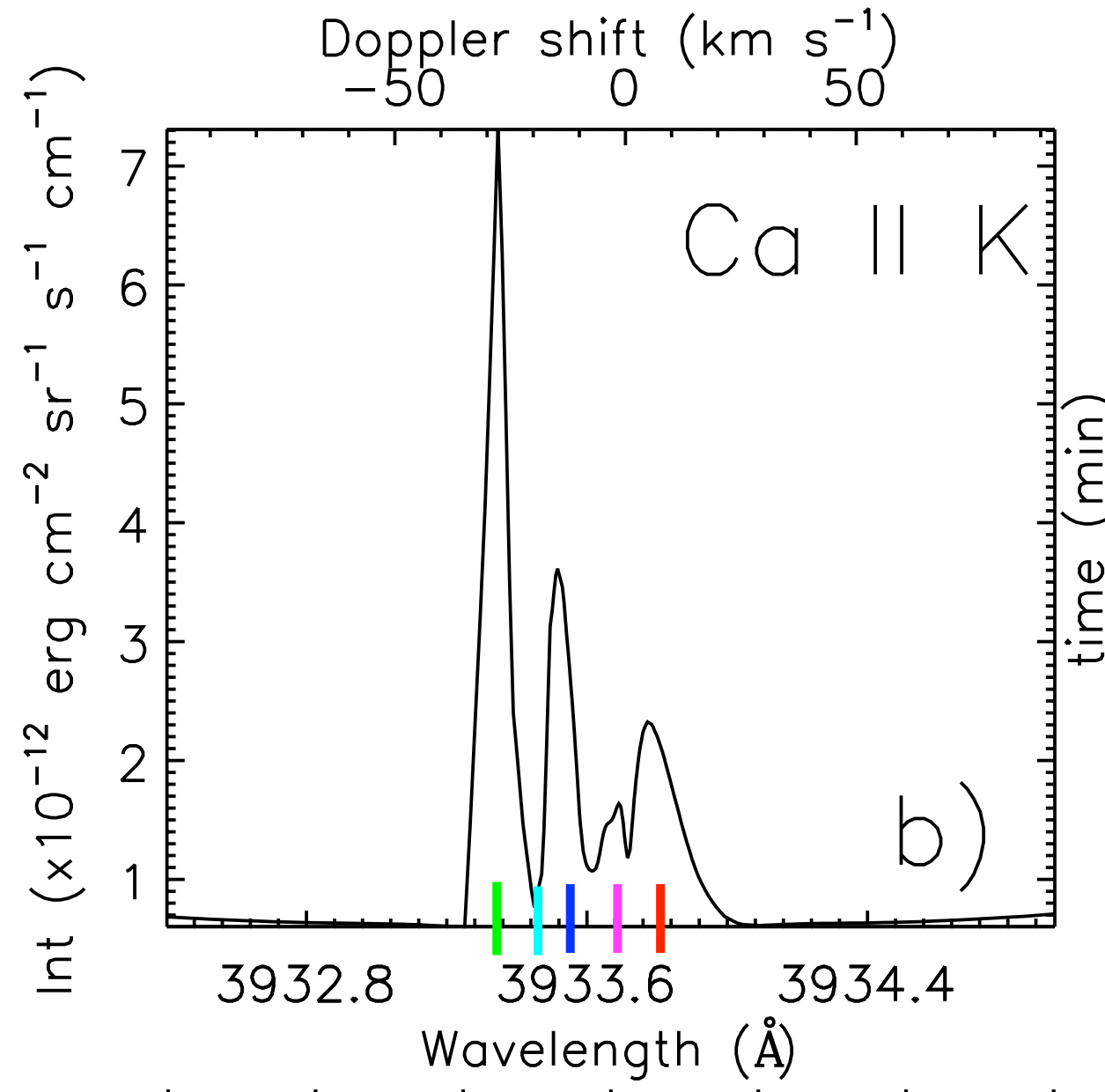
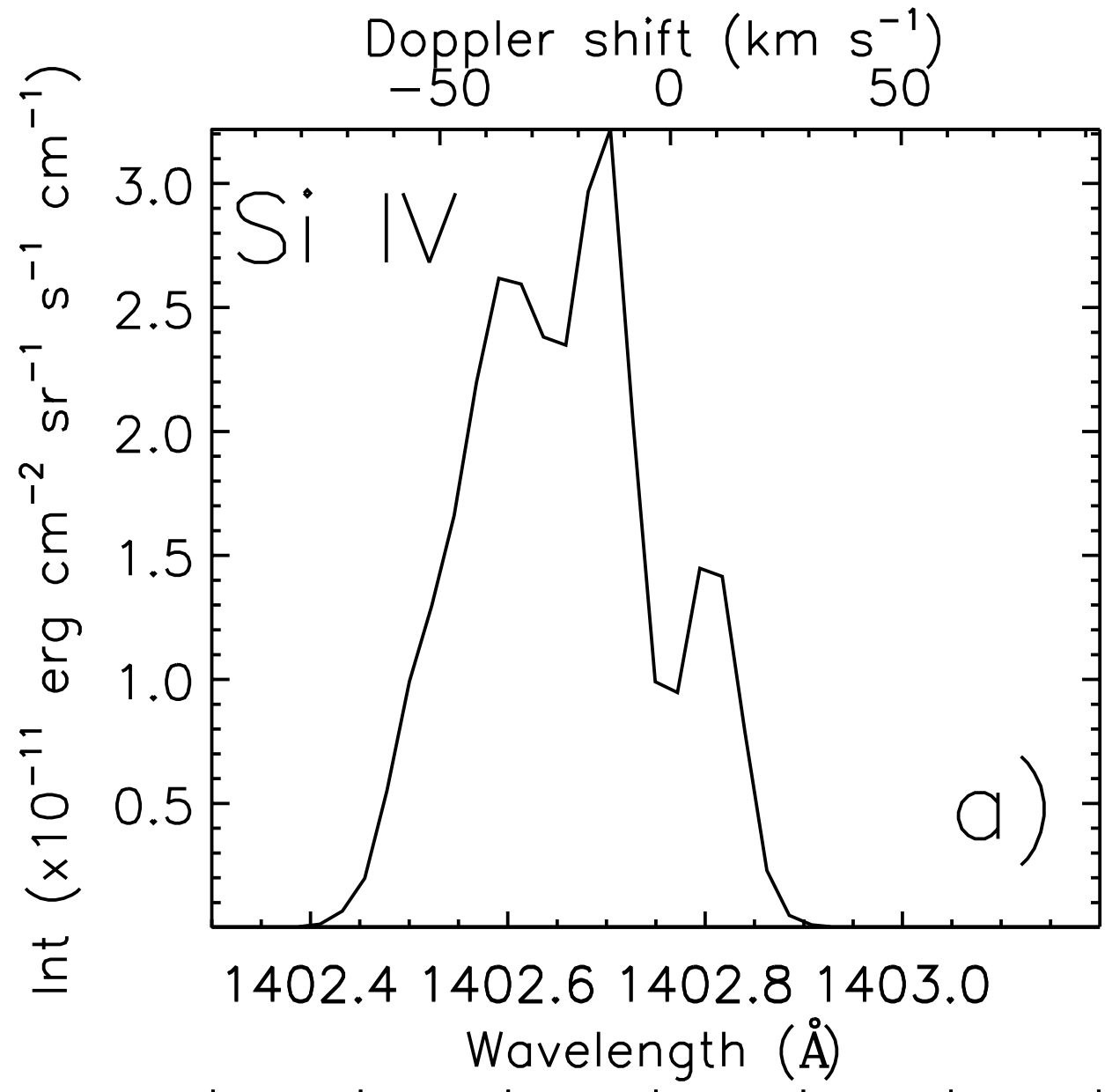
Maps show small blobs with large  
Doppler offsets



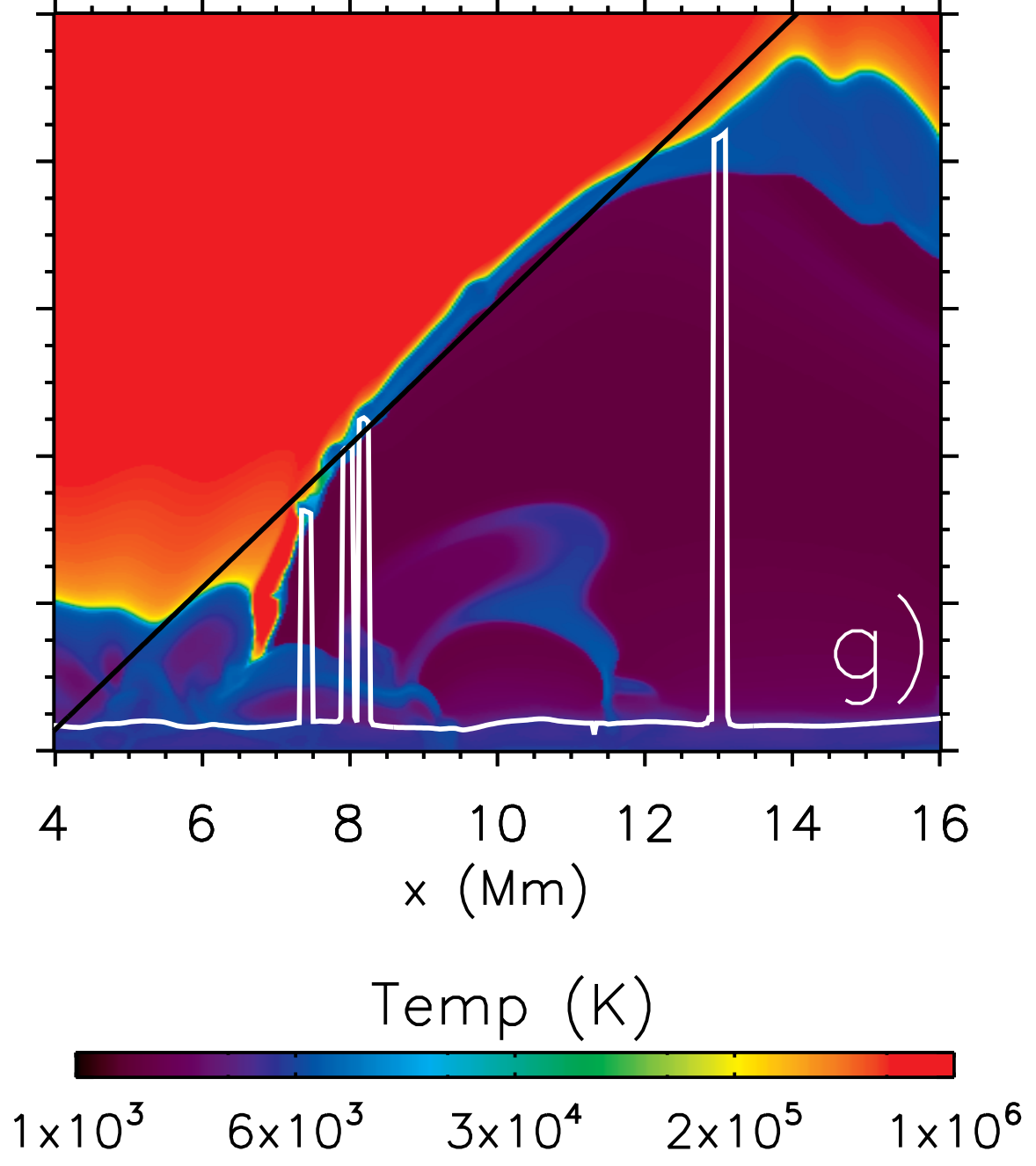
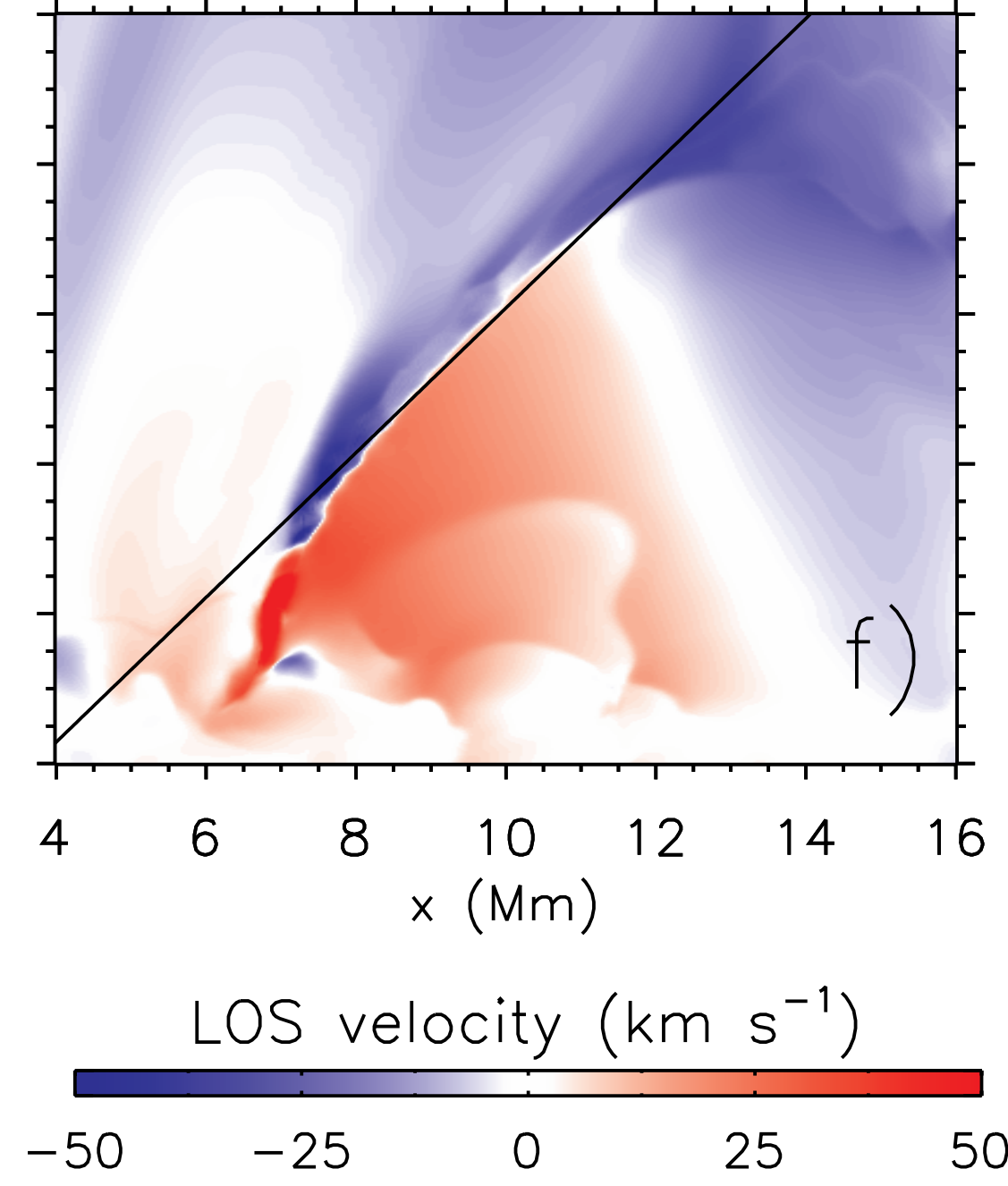
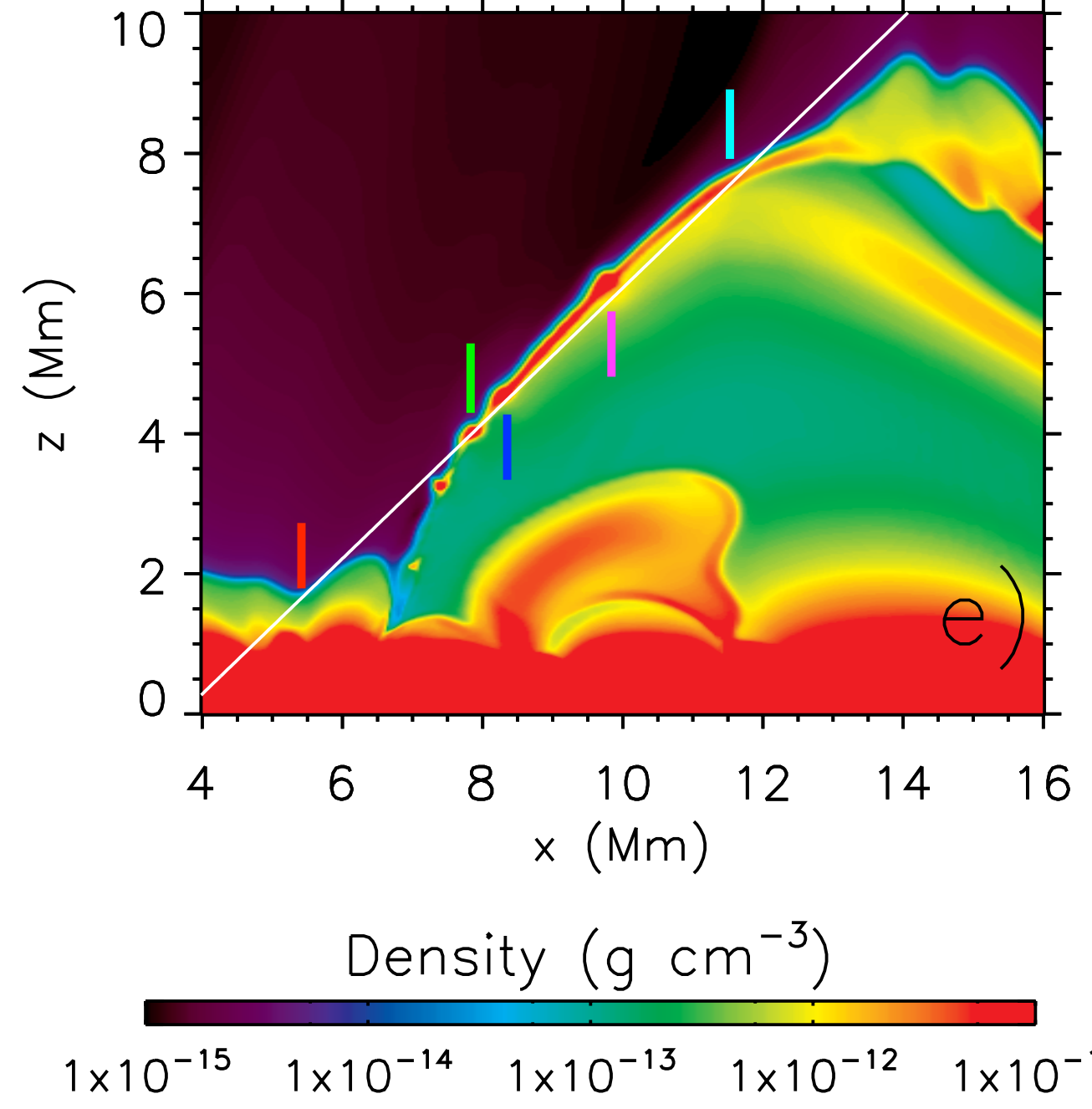
2.5D Bifrost rMHD simulation of emergence of twisted magnetic flux tube

- reconnection with ambient field
- plasmoids

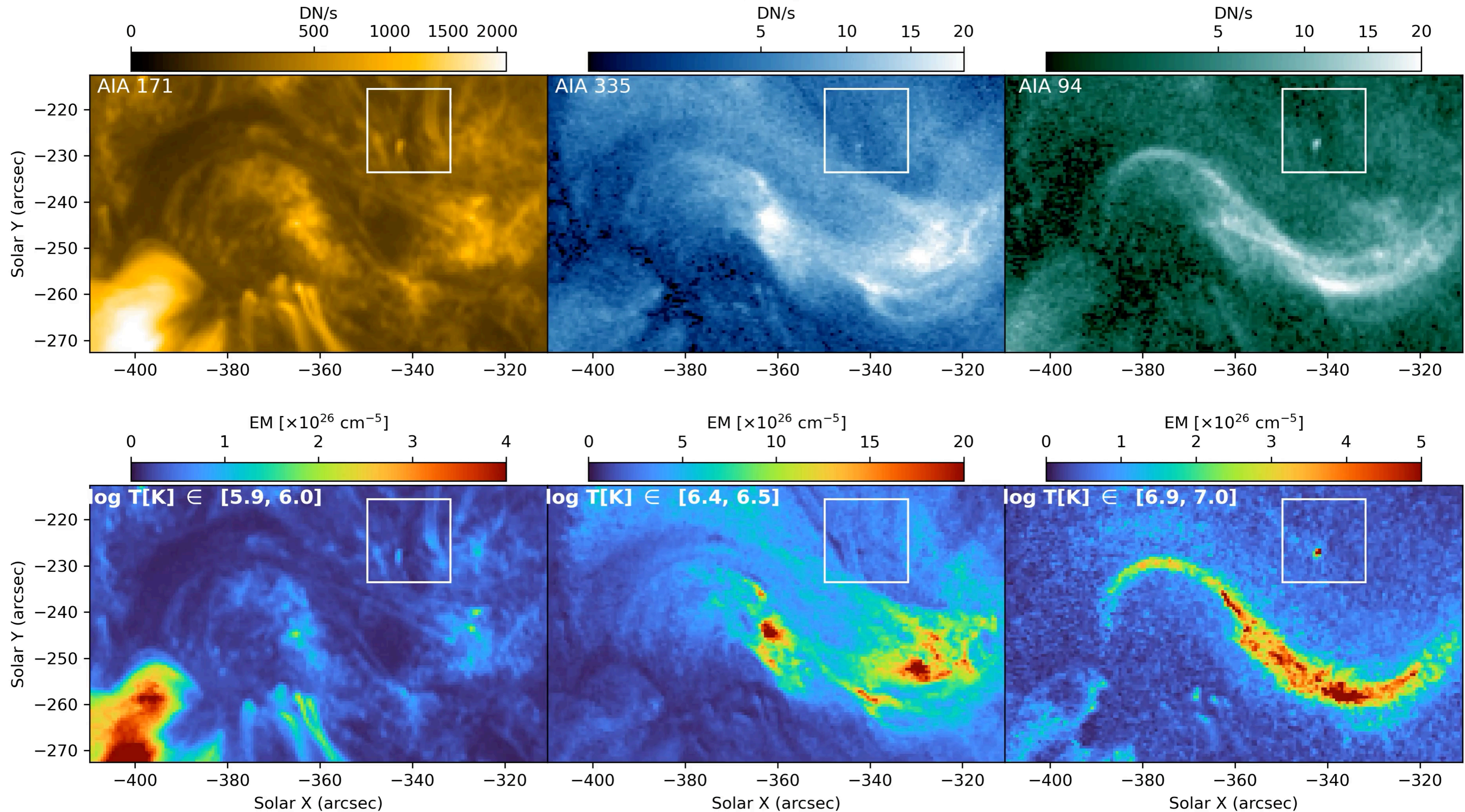




Plasmoids in current sheet produce complex spectral profiles

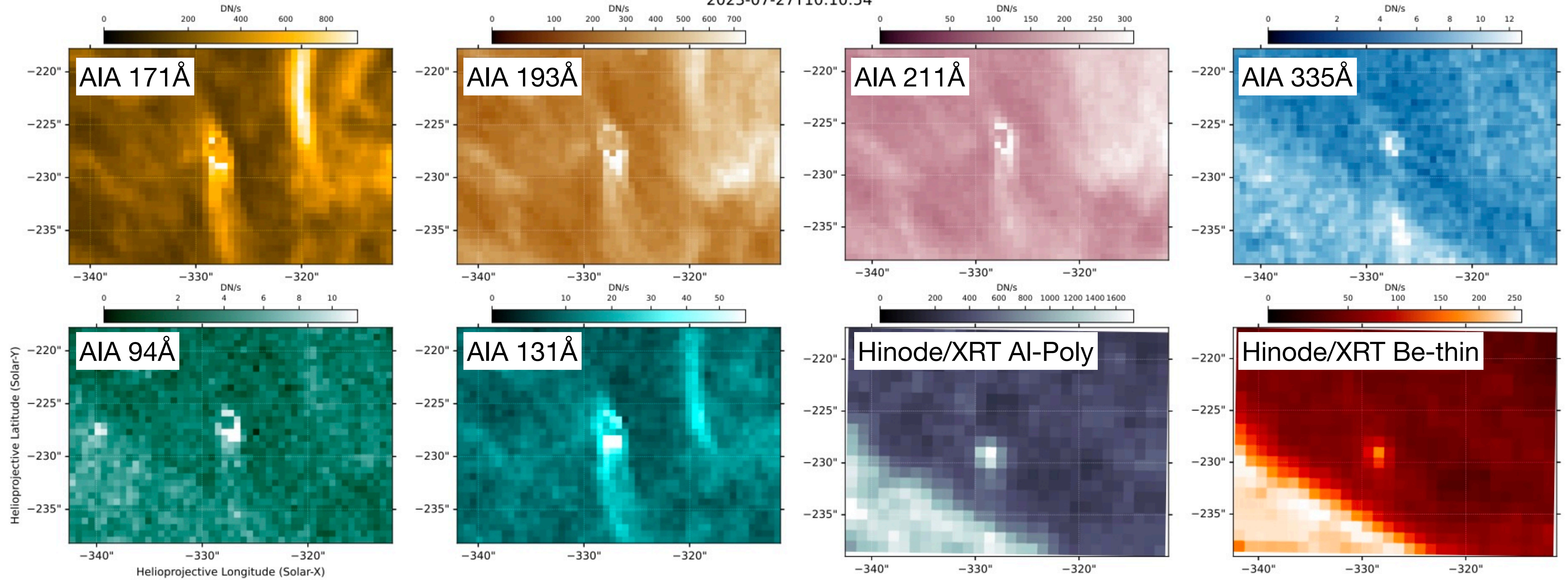


# Extreme UV burst: multi-thermal plasma >1 MK



# Extreme UV burst: multi-thermal plasma >1 MK

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Flux emergence is followed by a chain of events:

- Ellerman bombs
- UV burst
- Dome structure
- Plasmoids: blobs in H-beta and complex Si IV profiles
- Surge activity
- EUV burst and dome: multi-thermal plasma with  $>1$  MK

*Coordinated observations are required to unravel nature of energetic solar events*