

# The Fundamental Structure of Coronal Loops

**Dr. Amy R. Winebarger (NASA MSFC)**

H.P. Warren (NRL), J.W. Cirtain (NASA MSFC), K. Koboayashi (UAH), K. Korreck (SAO), L. Golub (SAO), S. Kuzin (LI), R.W. Walsh (UCLAN), C. DeForrest (SWRI), B. DePointieu (LMSAL), A. Title (LMSAL), M. Weber (SAO)

# High Resolution Coronal Imager (Hi-C)

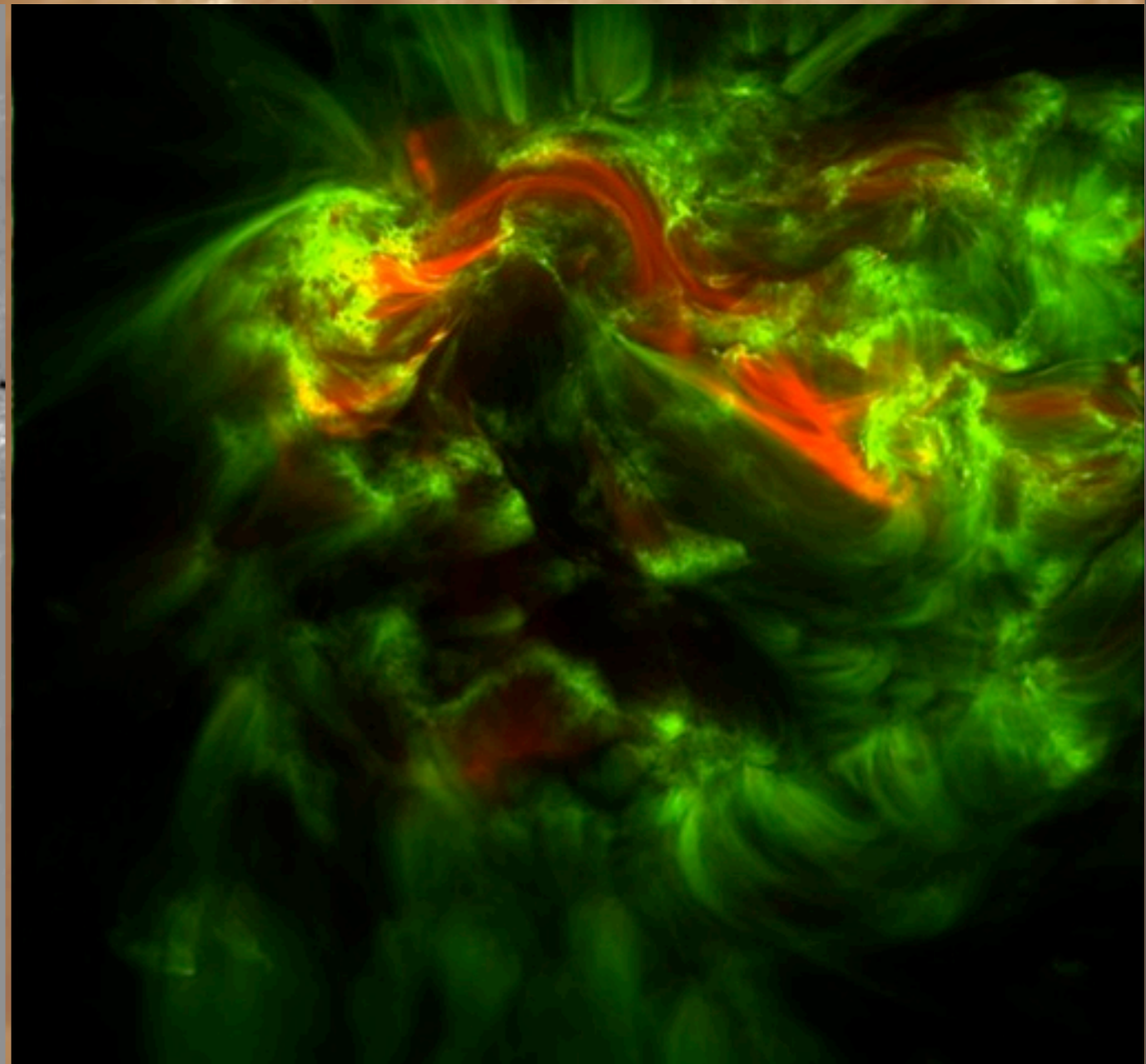
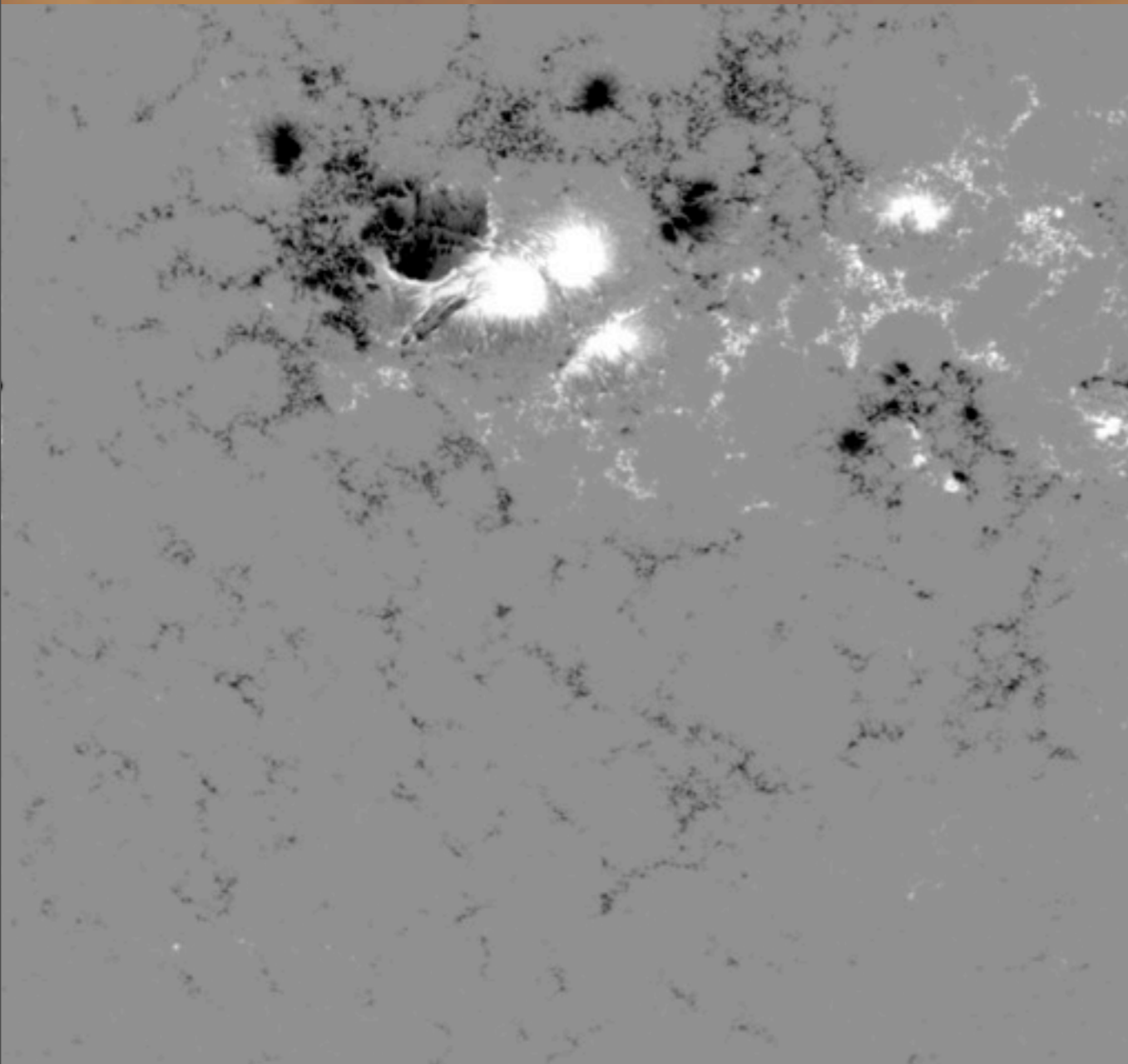
- Flown on a sounding rocket from White Sands on July 11, 2012
- Observed AR 11520 for ~ 5 minutes
- 193 Å channel
- 0.1'' pixels, ~0.25'' resolution
- 6.8' x 6.8' field of view
- 5.4 s cadence

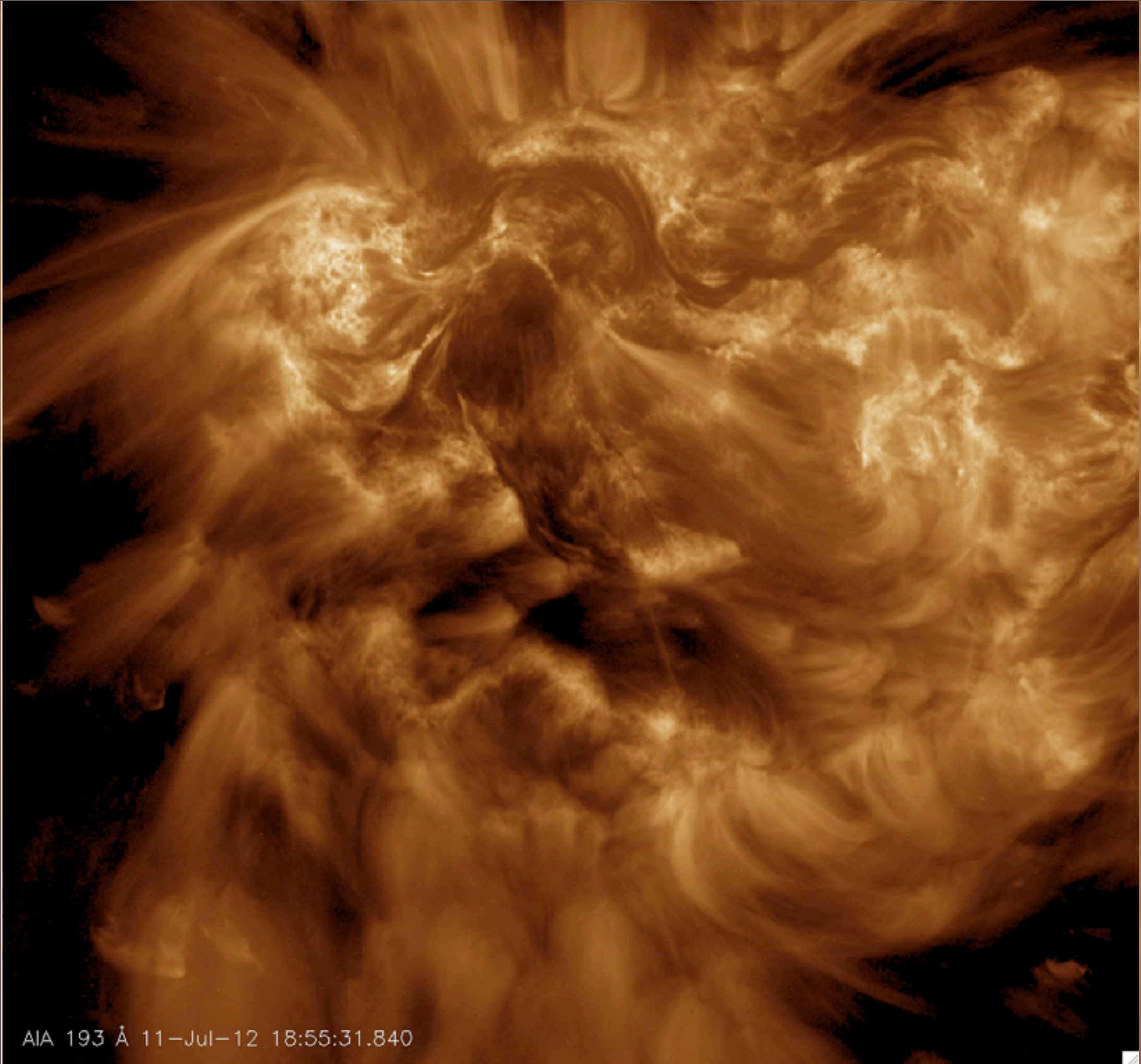
Highest-resolution, fastest-cadence EUV images taken of the corona.

# What to take away

- Hi-C reveals that loops have sub-structure below what can be resolved with AIA.
- The strands appear to be twisted.
- We may need higher resolution yet...

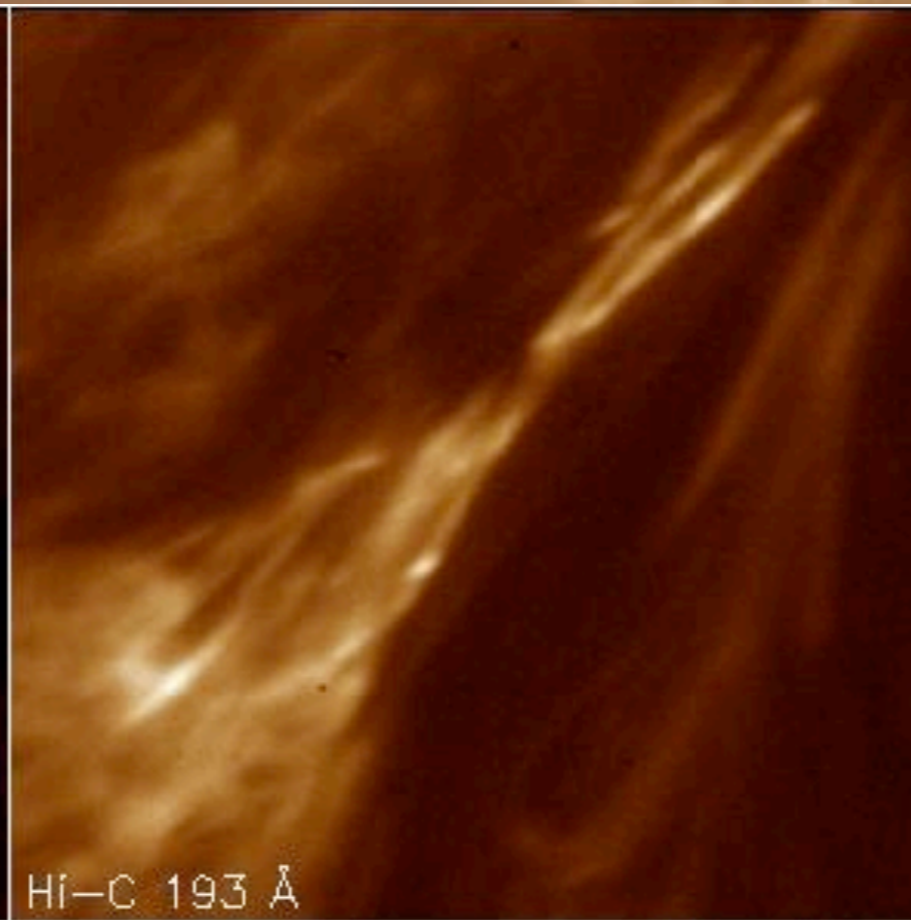
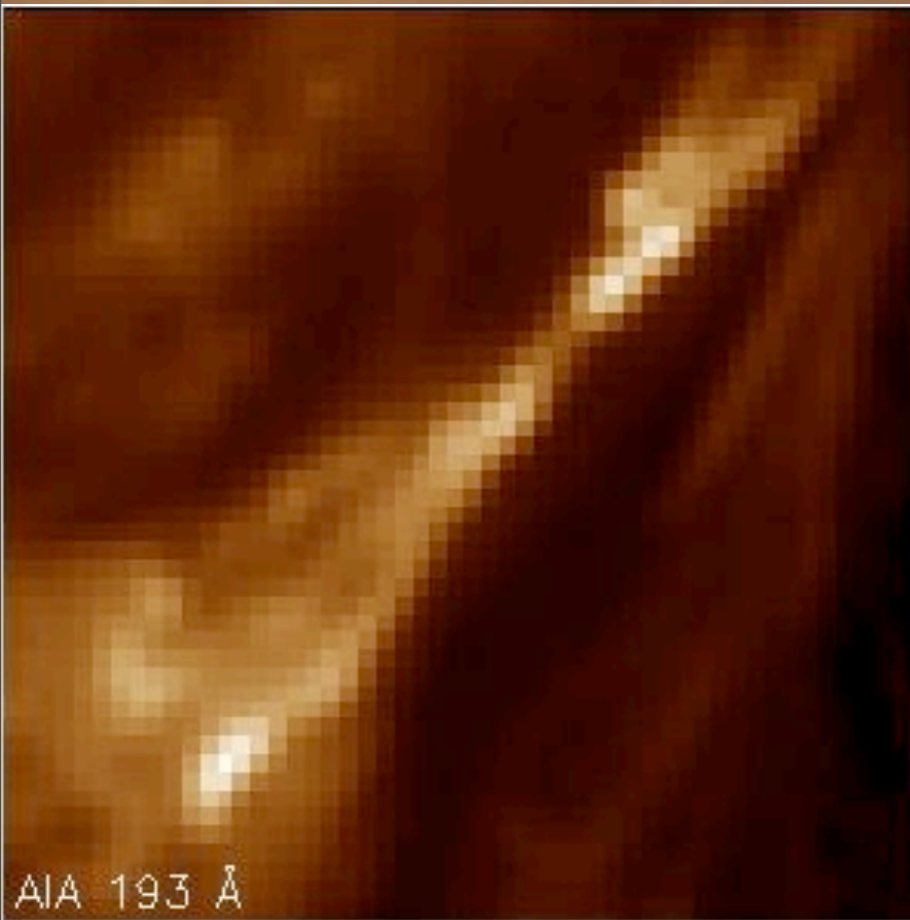
# Hi-C Field of View





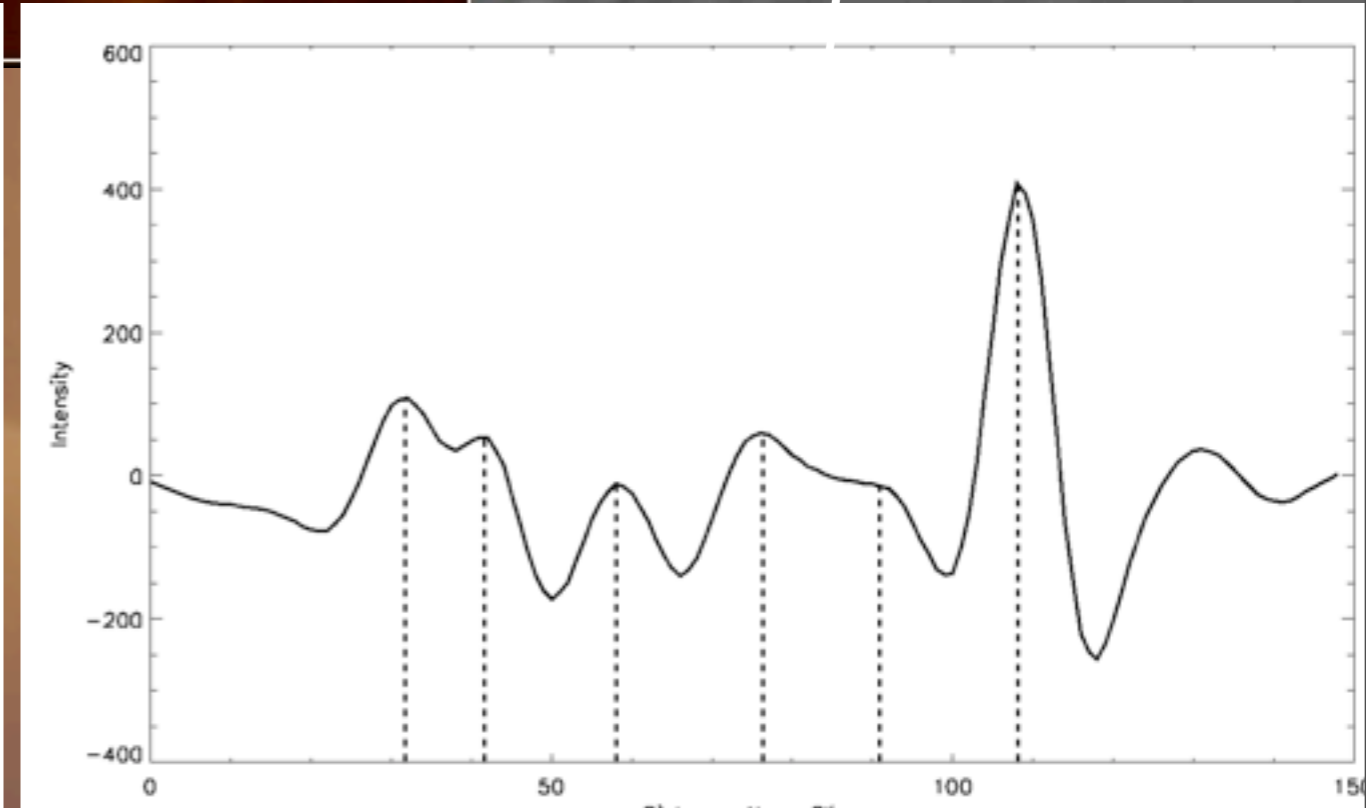
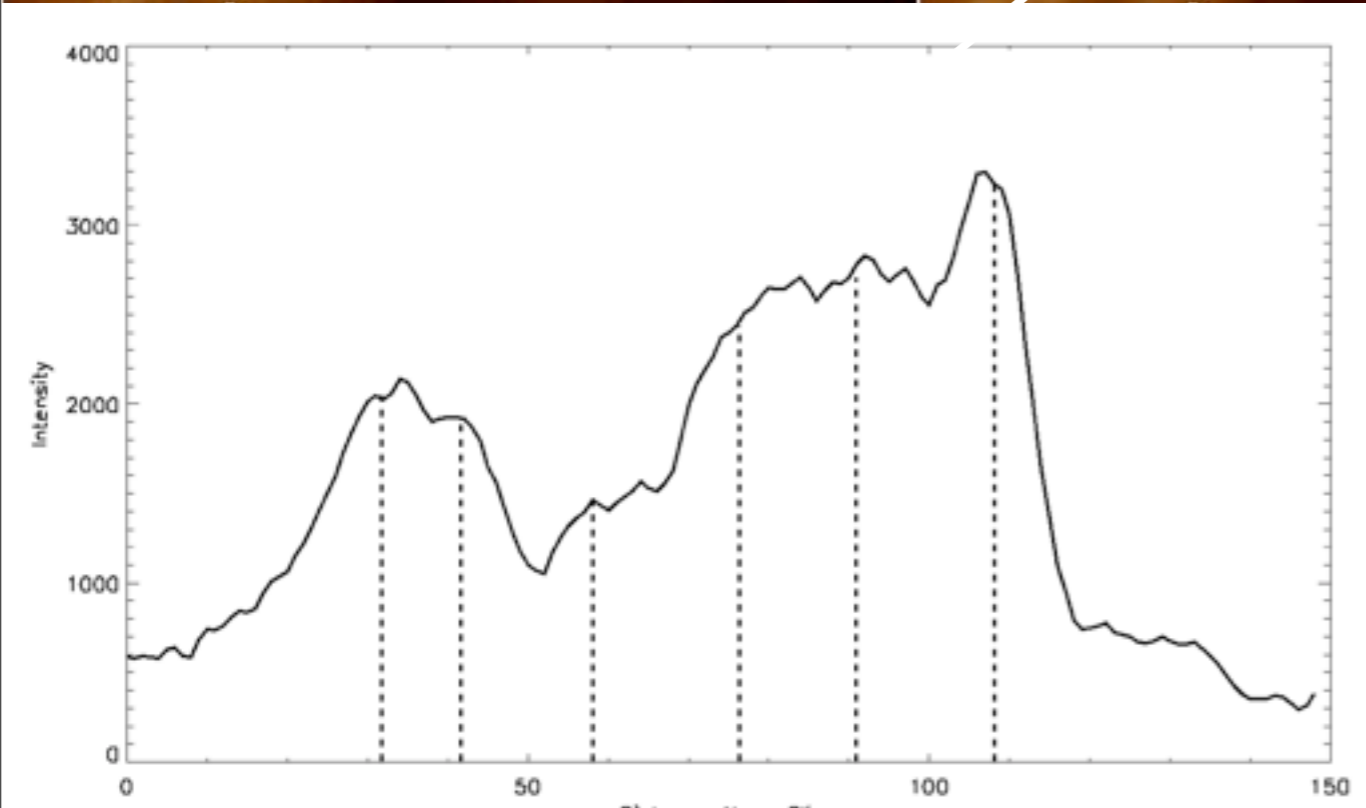
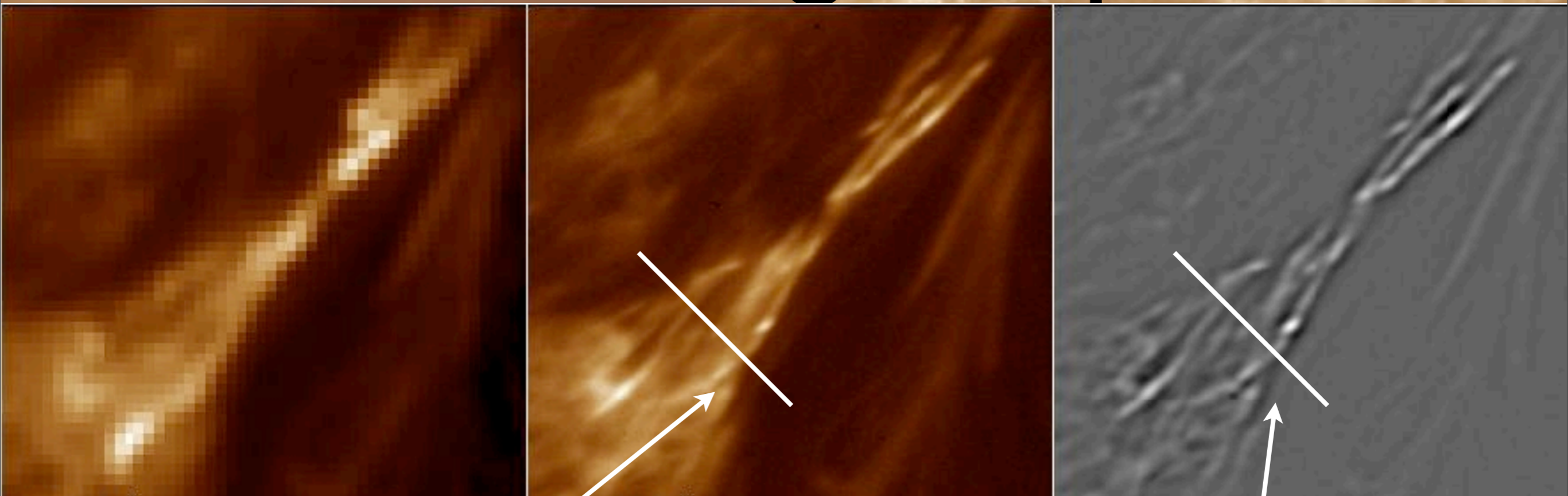
AIA 193 Å 11-Jul-12 18:55:31.840

# Evolving Loop



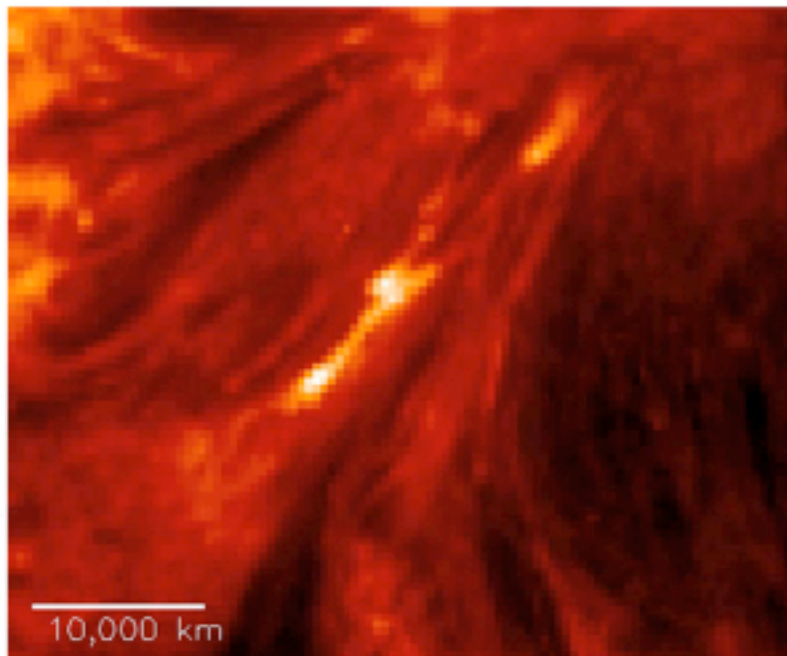
Hi-C resolves several strands wrapping around one another.

# Evolving Loop

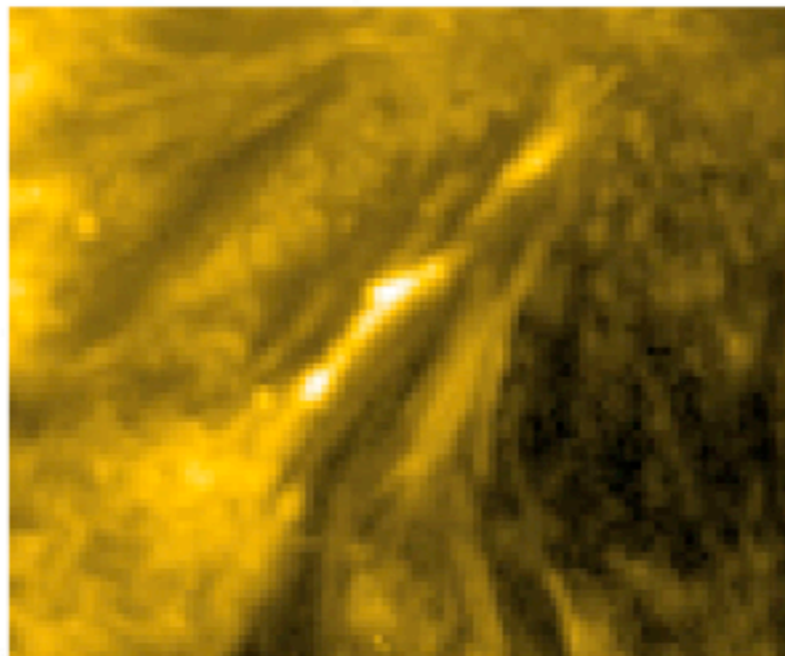


# Evolving Loop

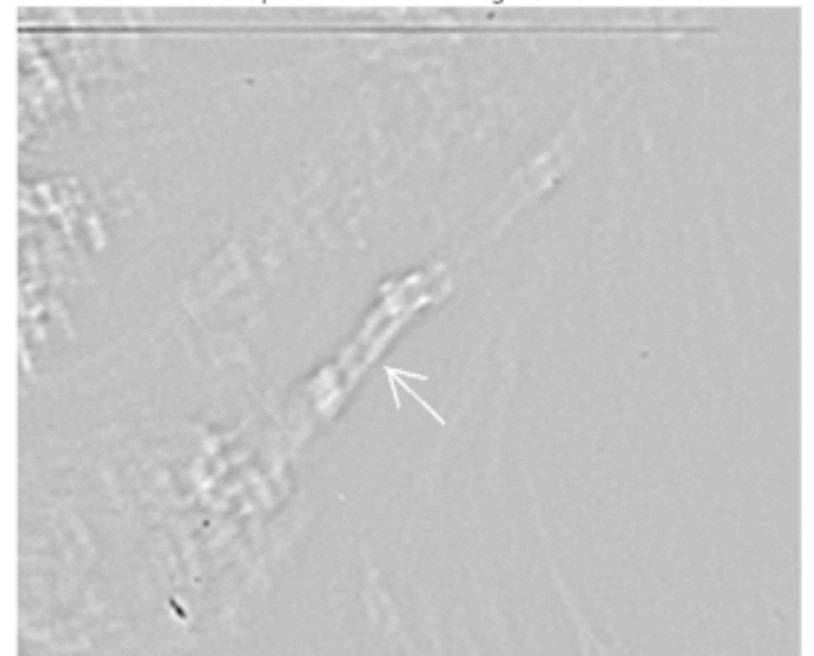
a AIA 304-Å 18:52:08



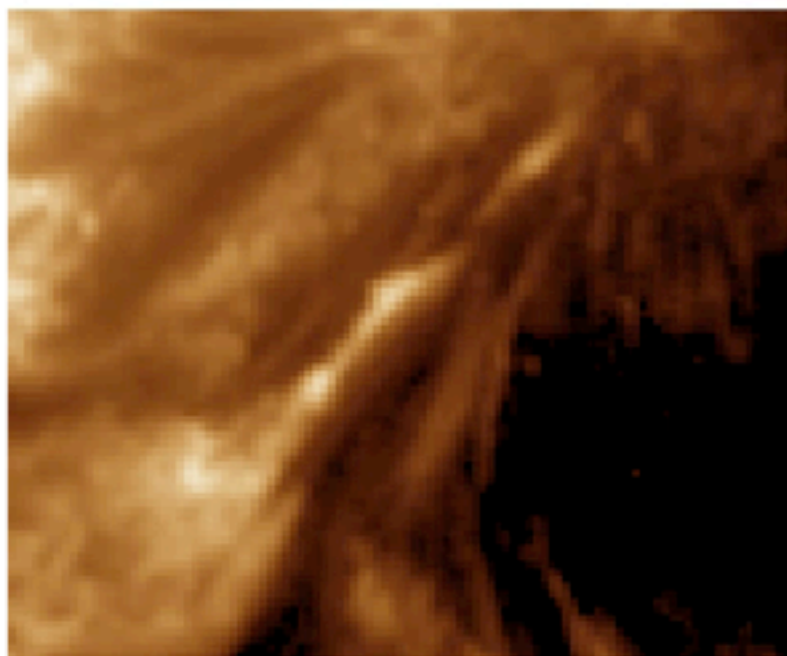
b AIA 171-Å 18:52:12



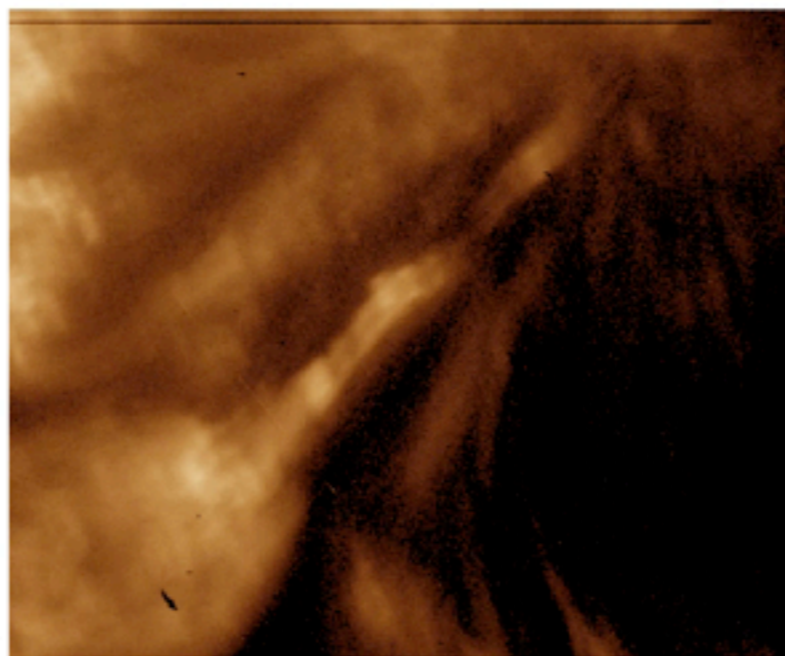
c Hi-C Unsharp Masked Image



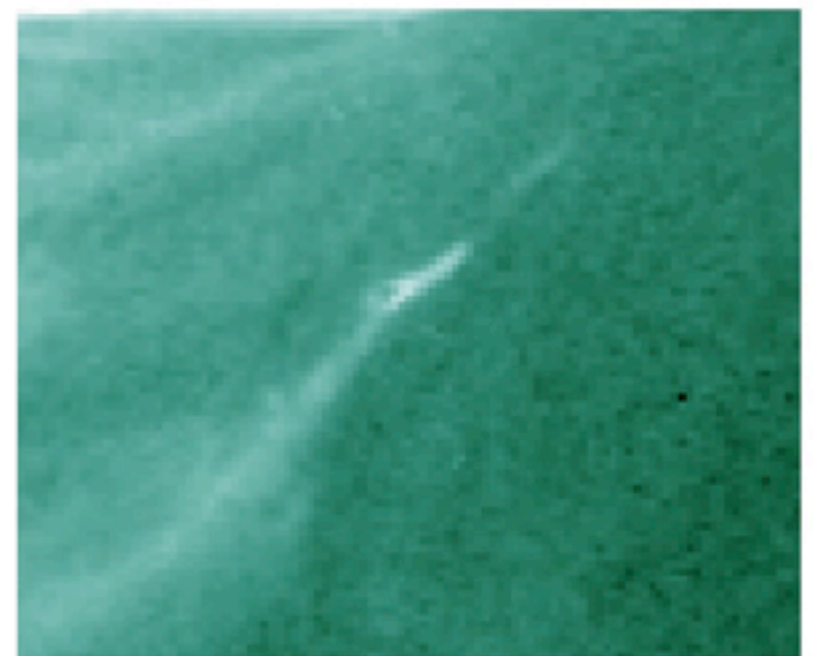
d AIA 193-Å 18:52:07



e Hi-C 193-Å 18:52:08



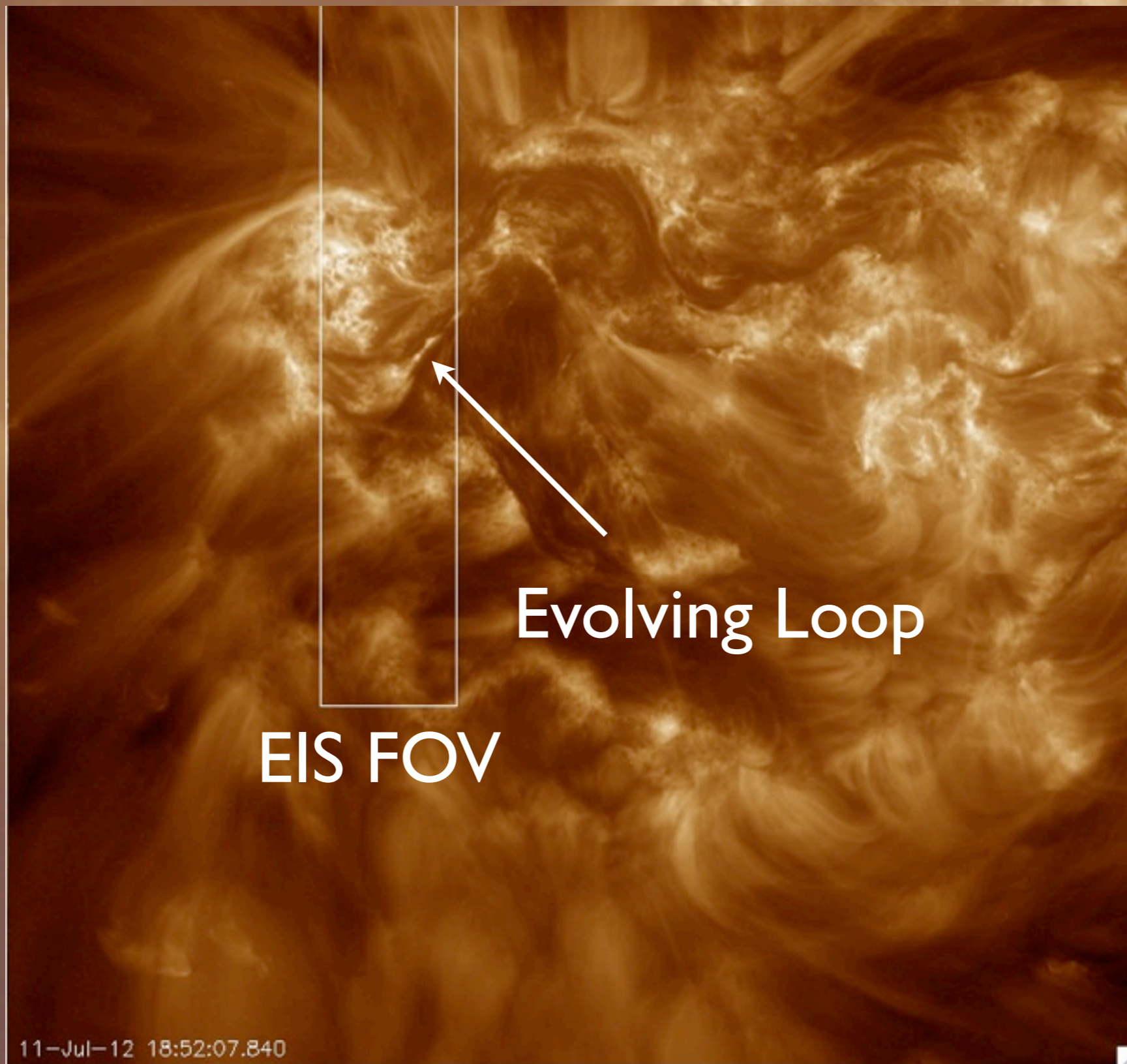
f AIA 94-Å 18:52:14



Shortly after Hi-C, an event occurred at the crossing.

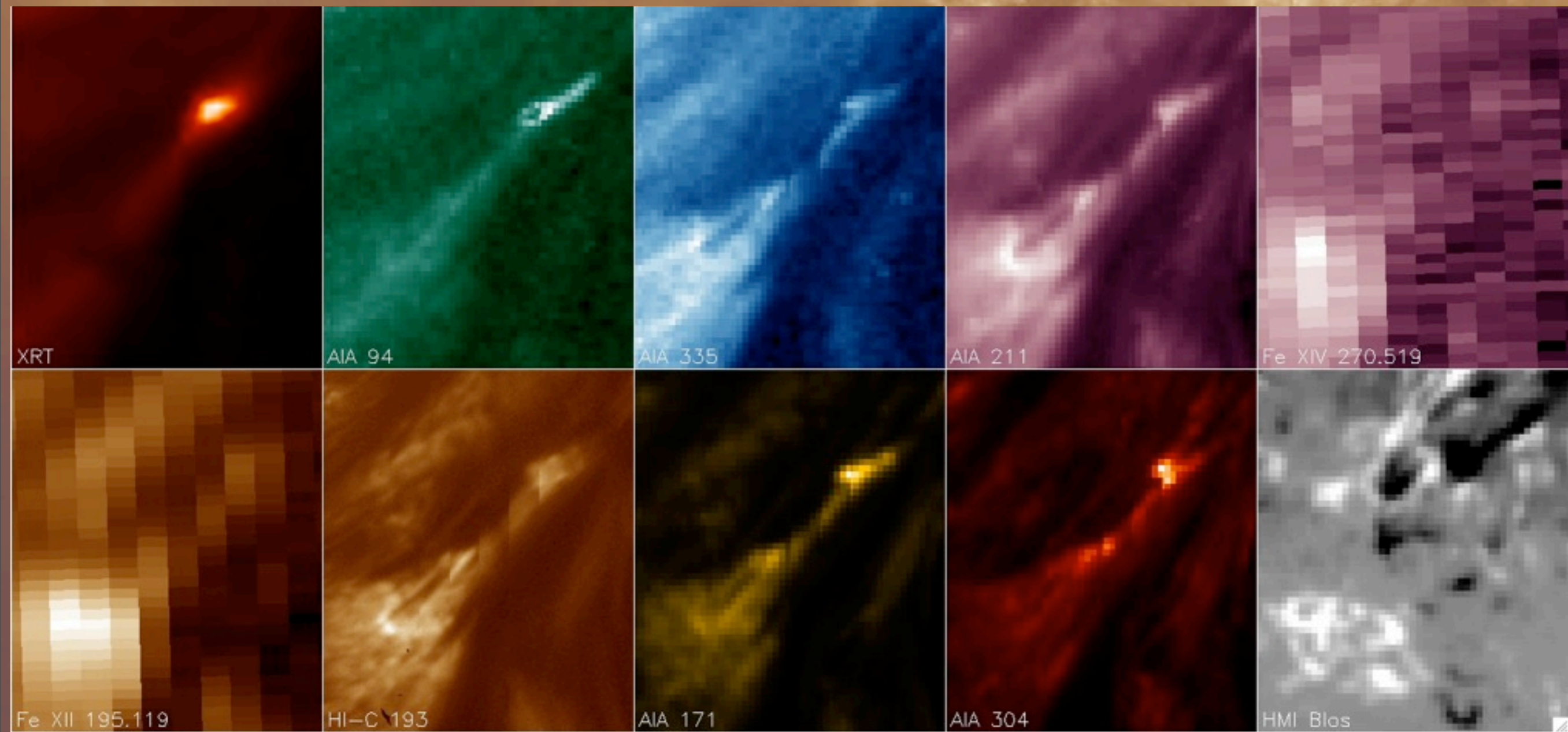


# Are we resolving the sub-structure?

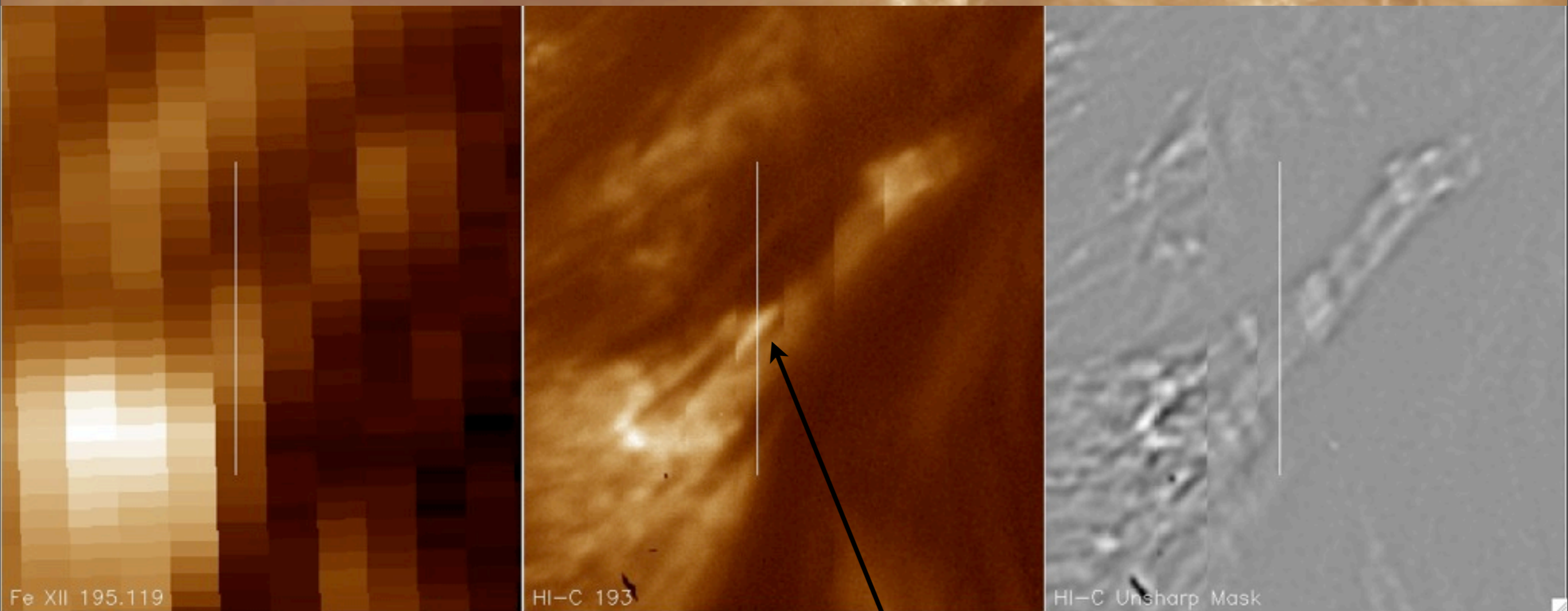


# EIS, Hi-C and AIA Rasters

← time

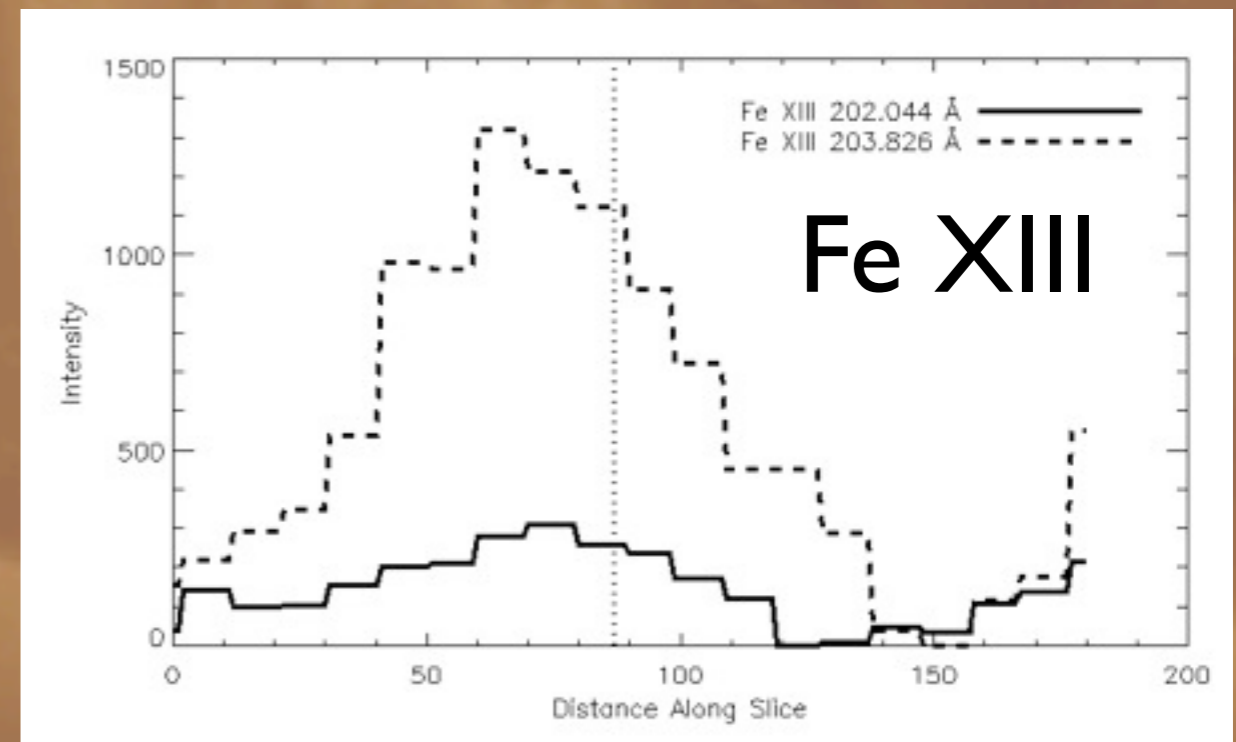
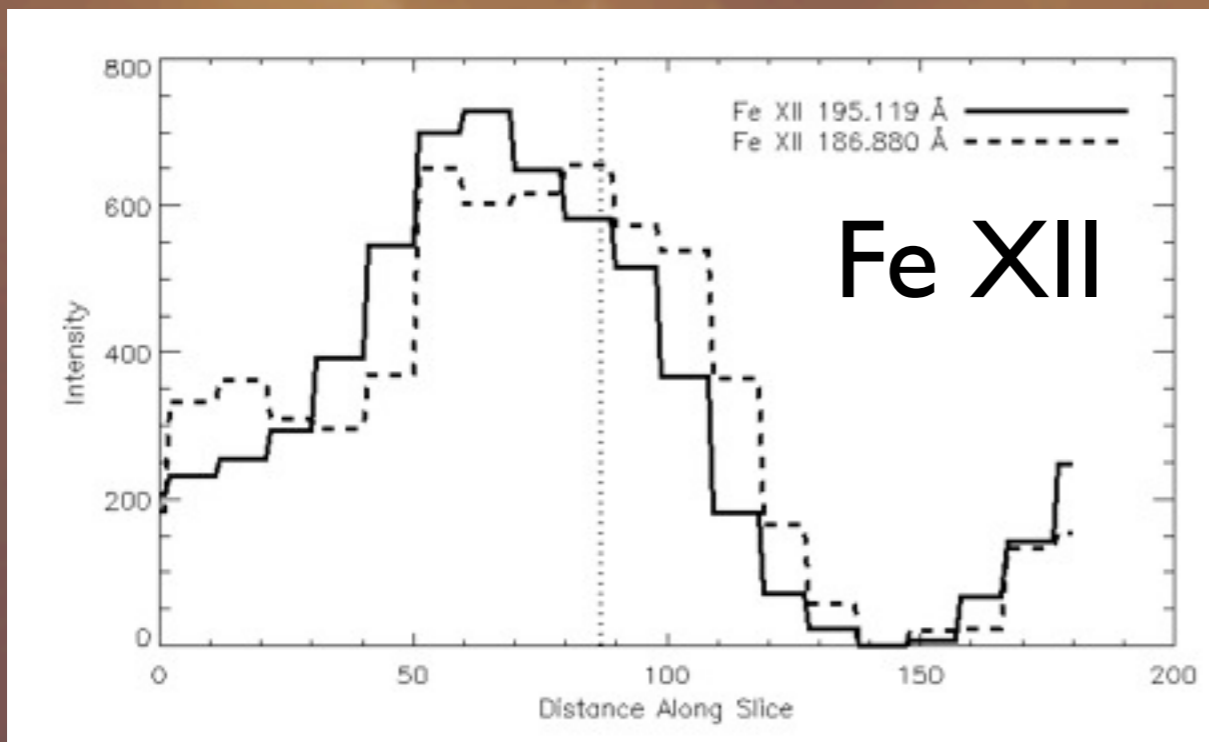
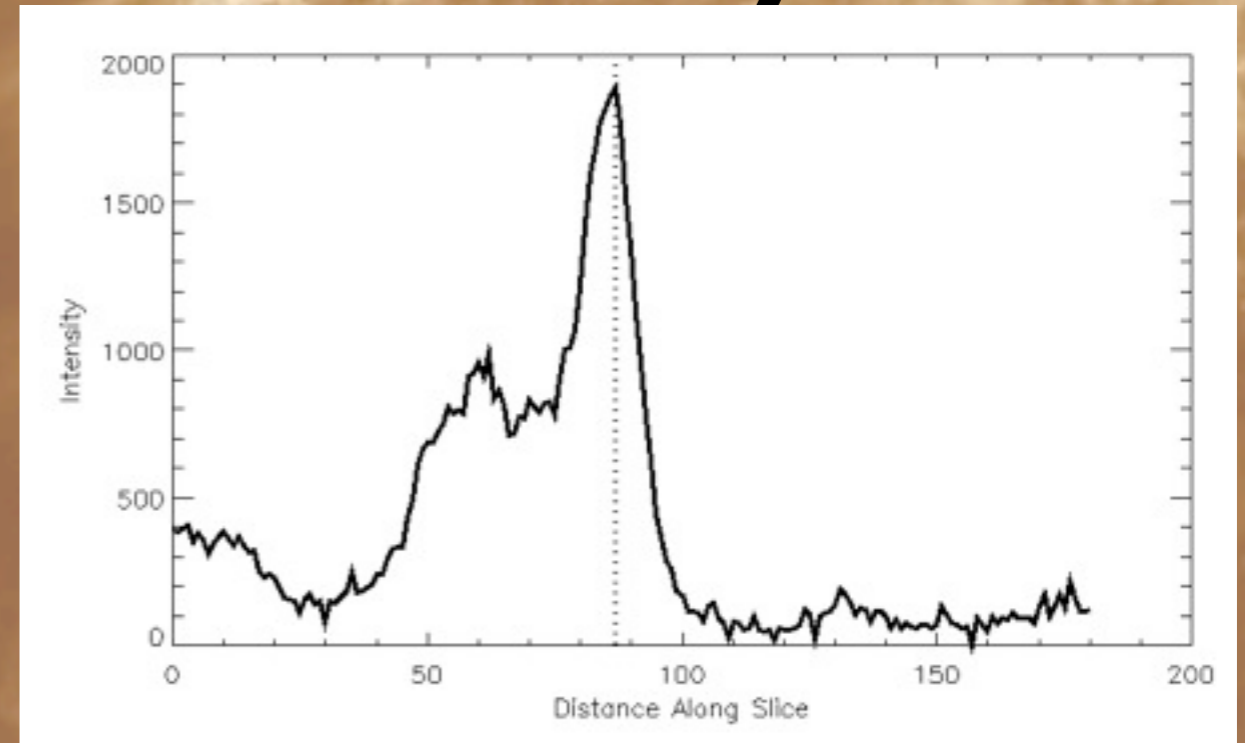
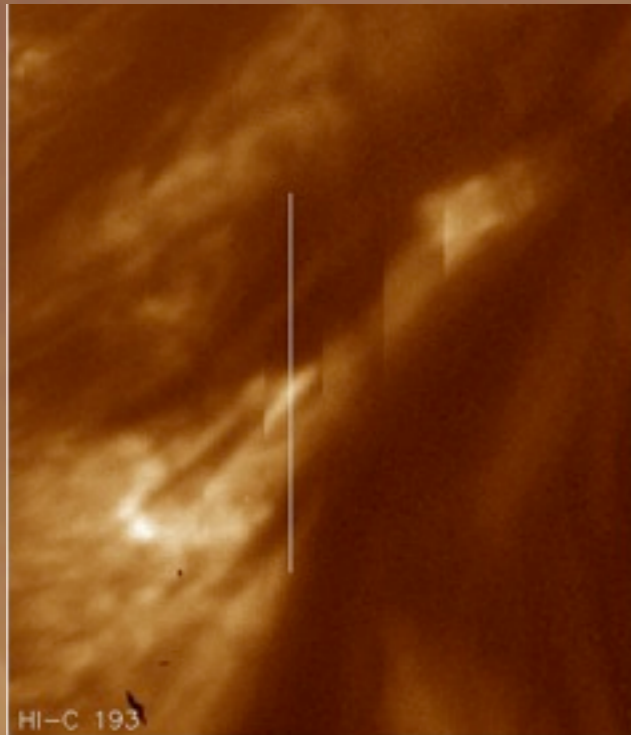


# Isolate a structure



Is this structure resolved?

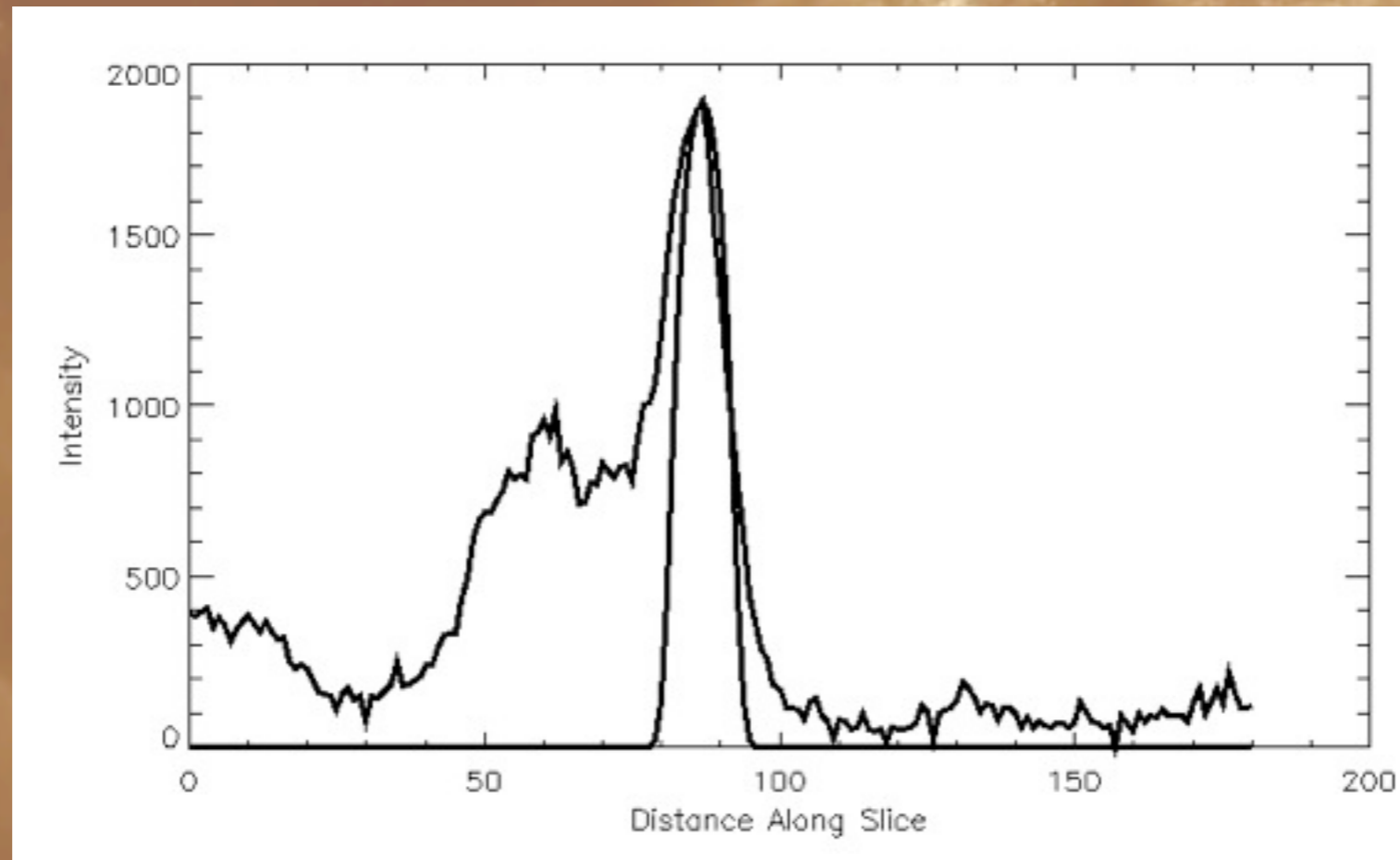
# Calculate a density



$$n_e = 2-7 \times 10^{10} \text{ cm}^{-3}$$

$$n_e = 0.5-6 \times 10^{10} \text{ cm}^{-3}$$

# Potentially resolved



To replicate Hi-C emission:

$$T = 1.5 \text{ MK}$$

Radius of structure = 435 km

$$n_e = 1 \times 10^{10} \text{ cm}^{-3}$$

Densities measured from EIS:  $0.5\text{-}7 \times 10^{10} \text{ cm}^{-3}$

# Hi-C: A New View of the Sun



Data will be released in January.