

Coordinated observations of X-ray and high-resolution EUV active region dynamics

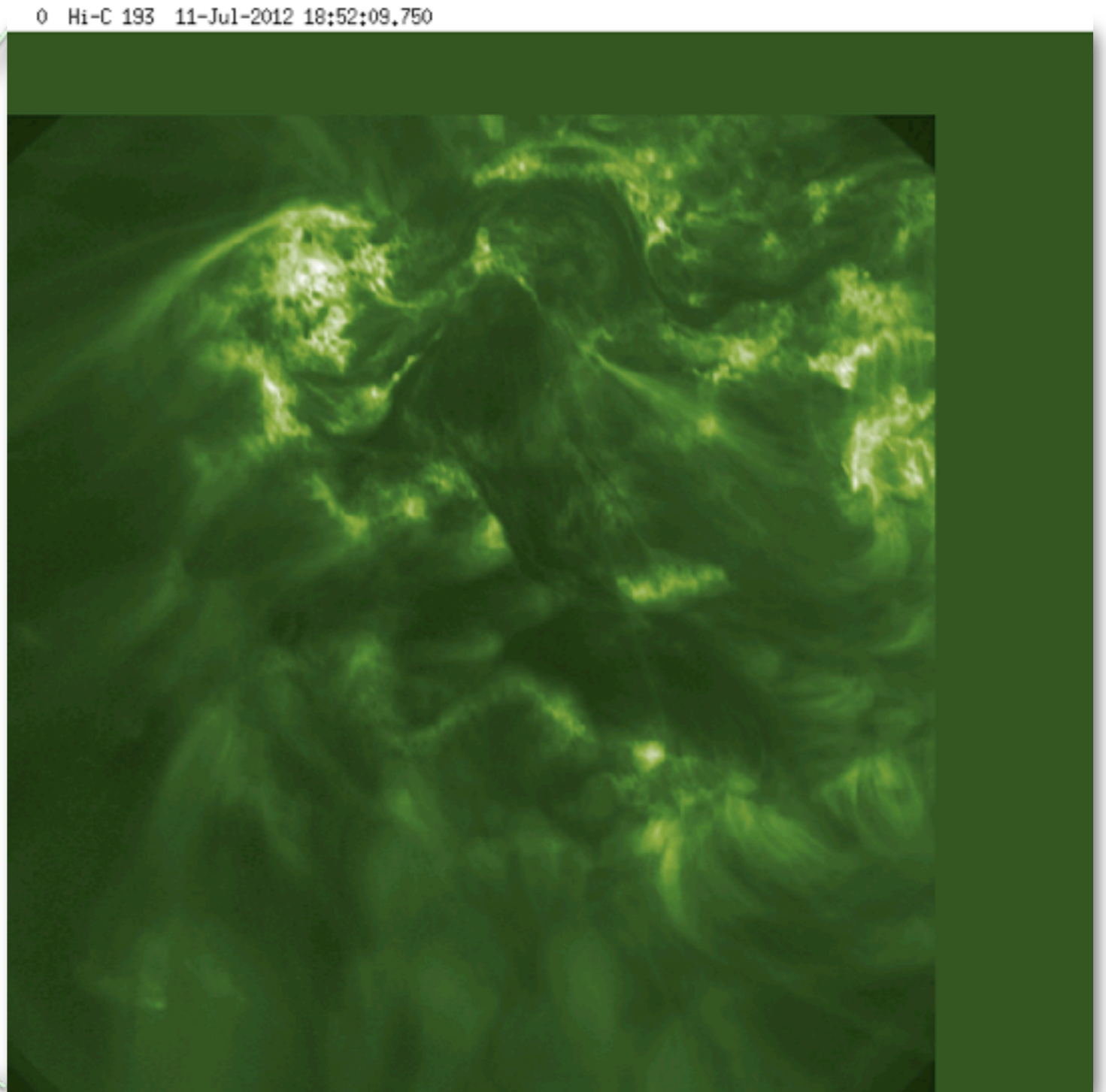
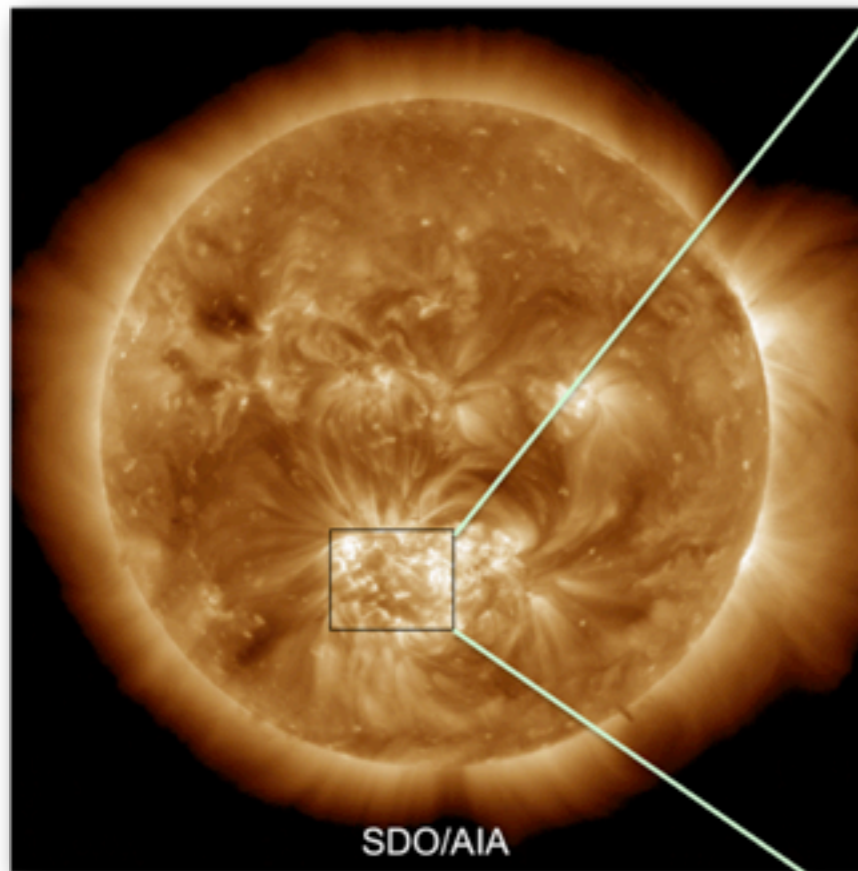
Sabrina Savage

Special Acknowledgements:

Jonathan Cirtain (MSFC), Amy Winebarger (MSFC),
Ken Kobayashi (UAH/MSFC),
Leon Golub (SAO), Kelly Korreck (SAO)

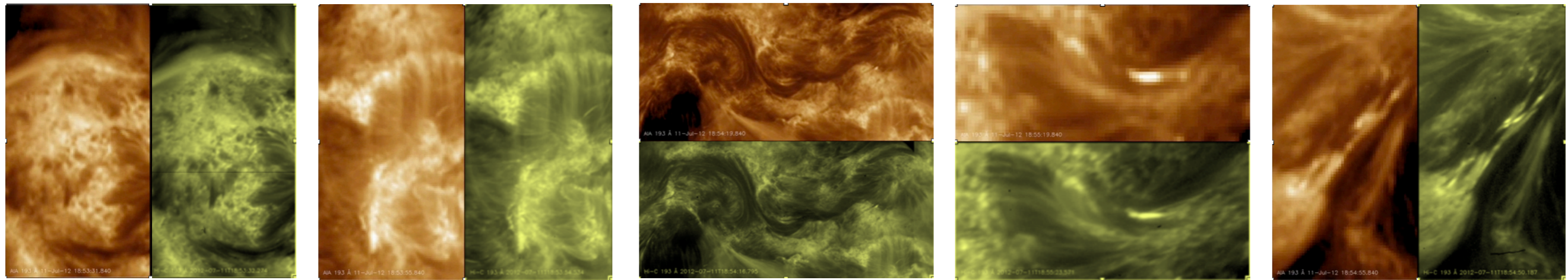


AIA & Hi-C 193 (11 July 2012)



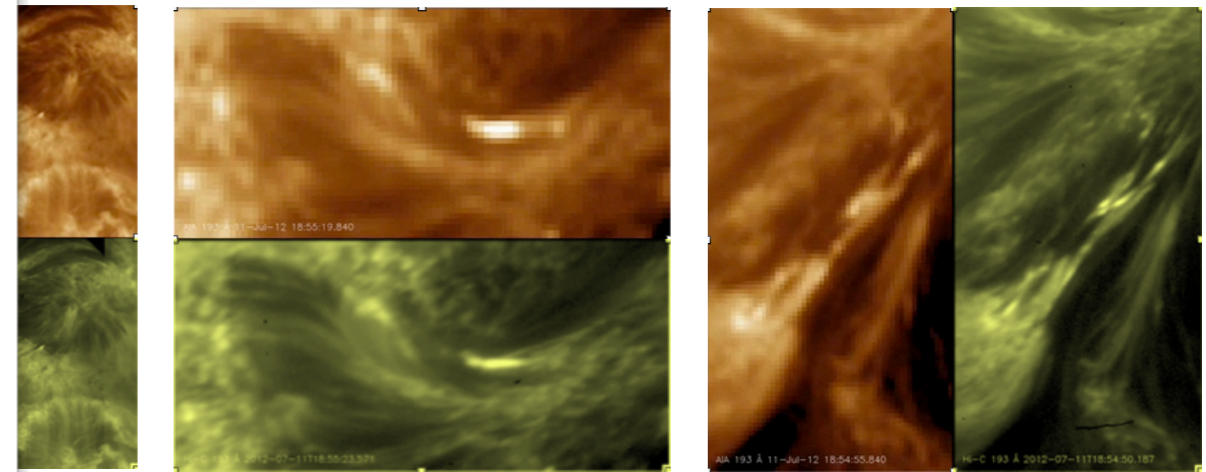
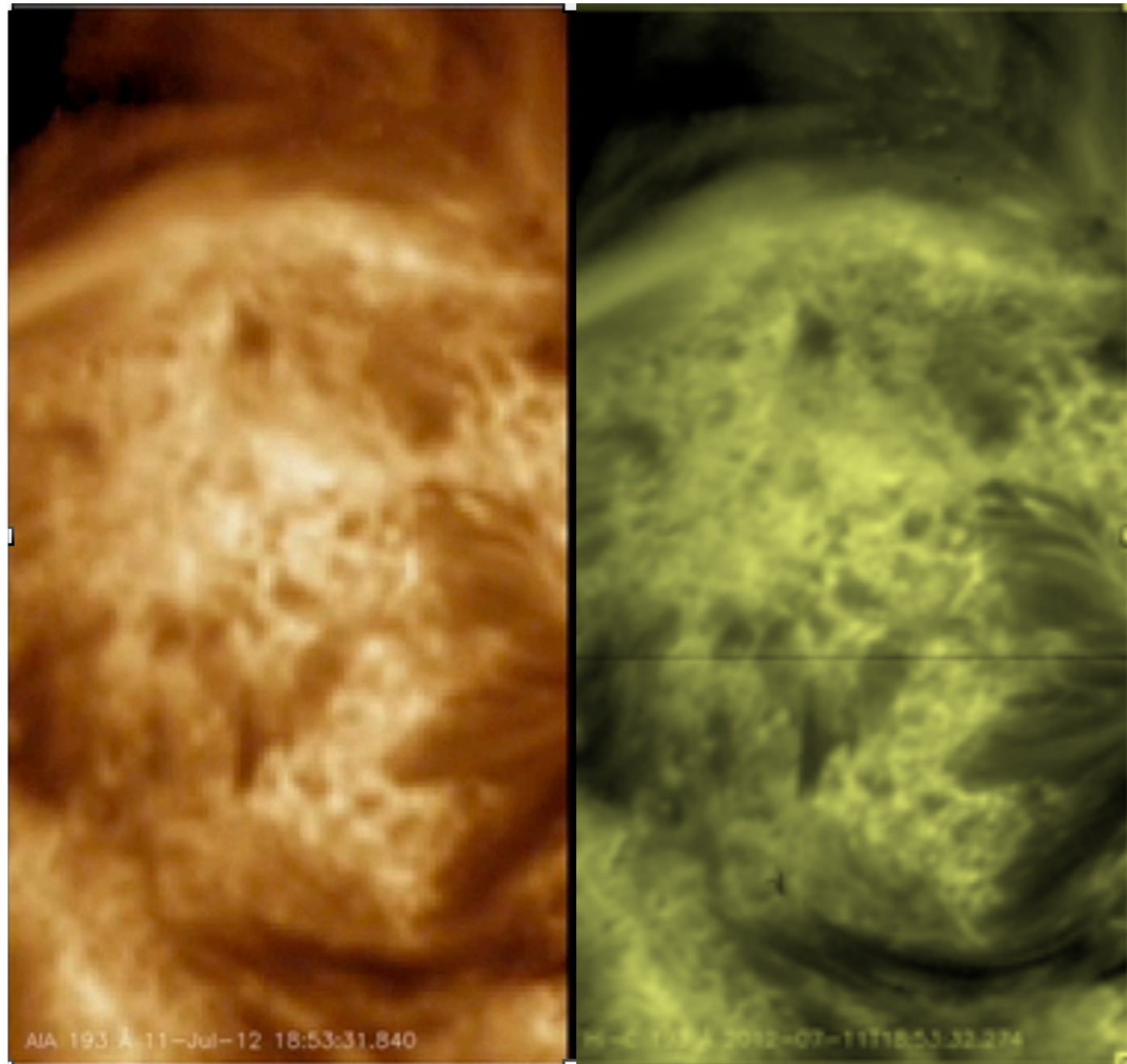
Hi-C: 4K duration ~ 3 min; 1K duration ~ 2 min; Cadence ~ 5.5 sec; **Scale ~ 0.1"/pix**

AIA 193 & Hi-C 193



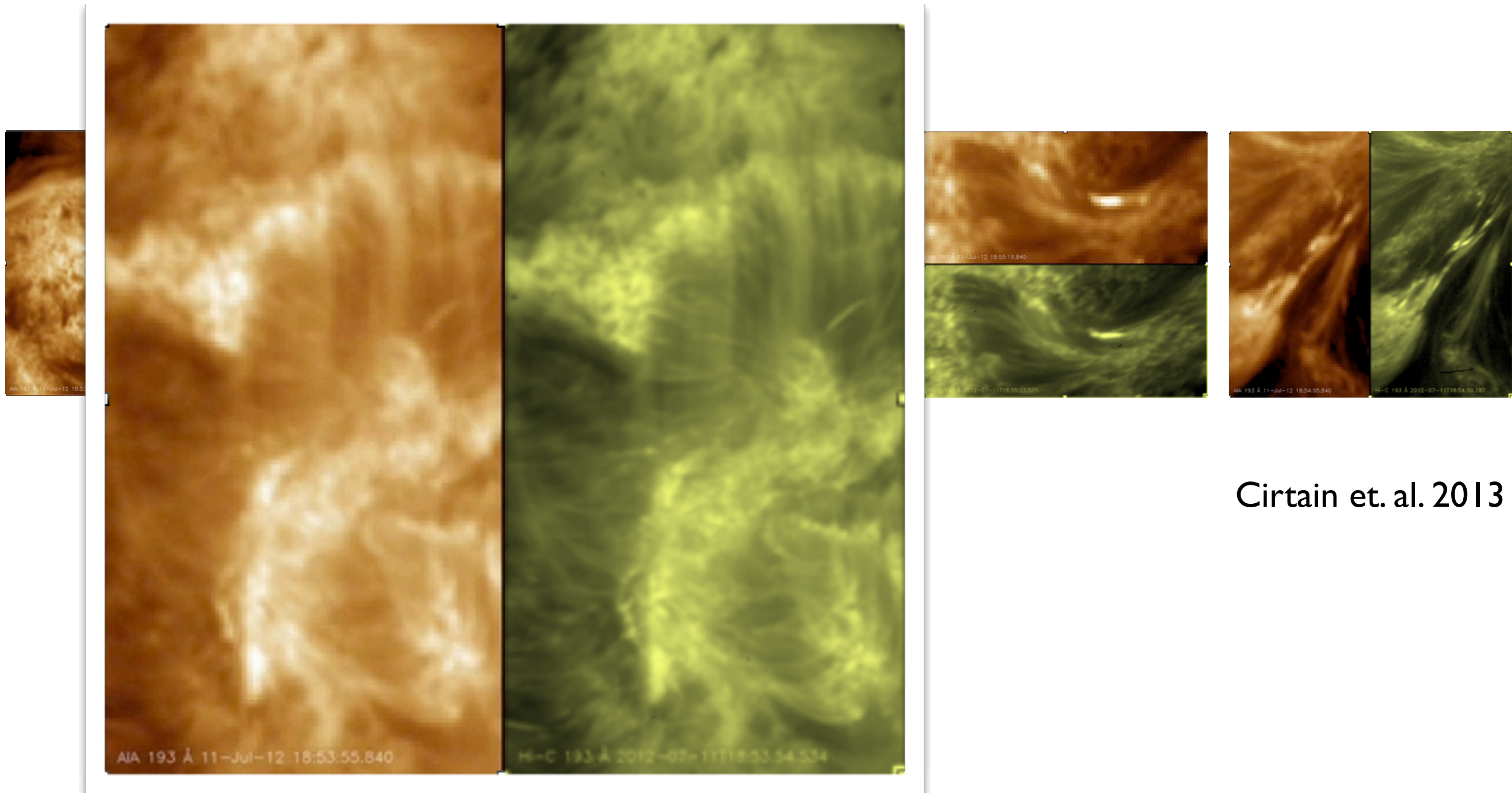
Cirtain et. al. 2013

AIA 193 & Hi-C 193



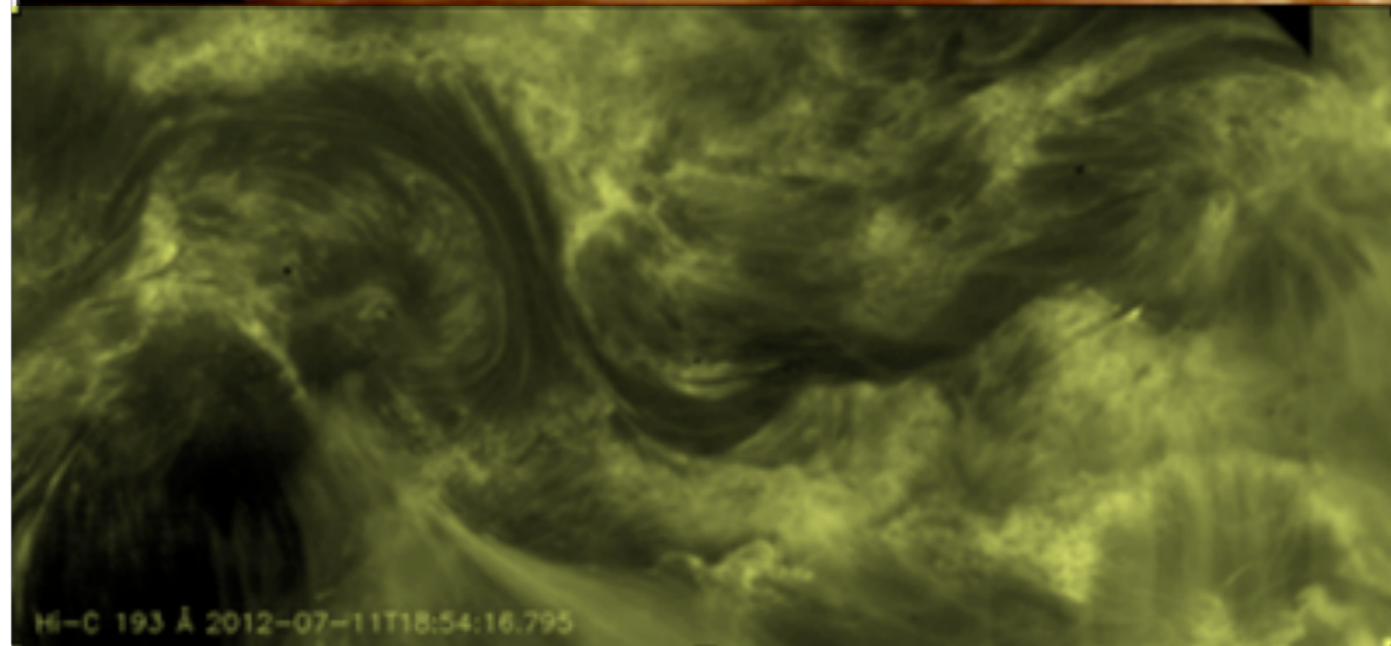
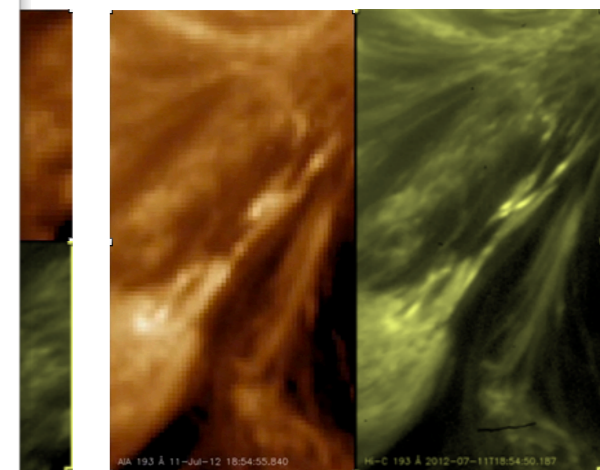
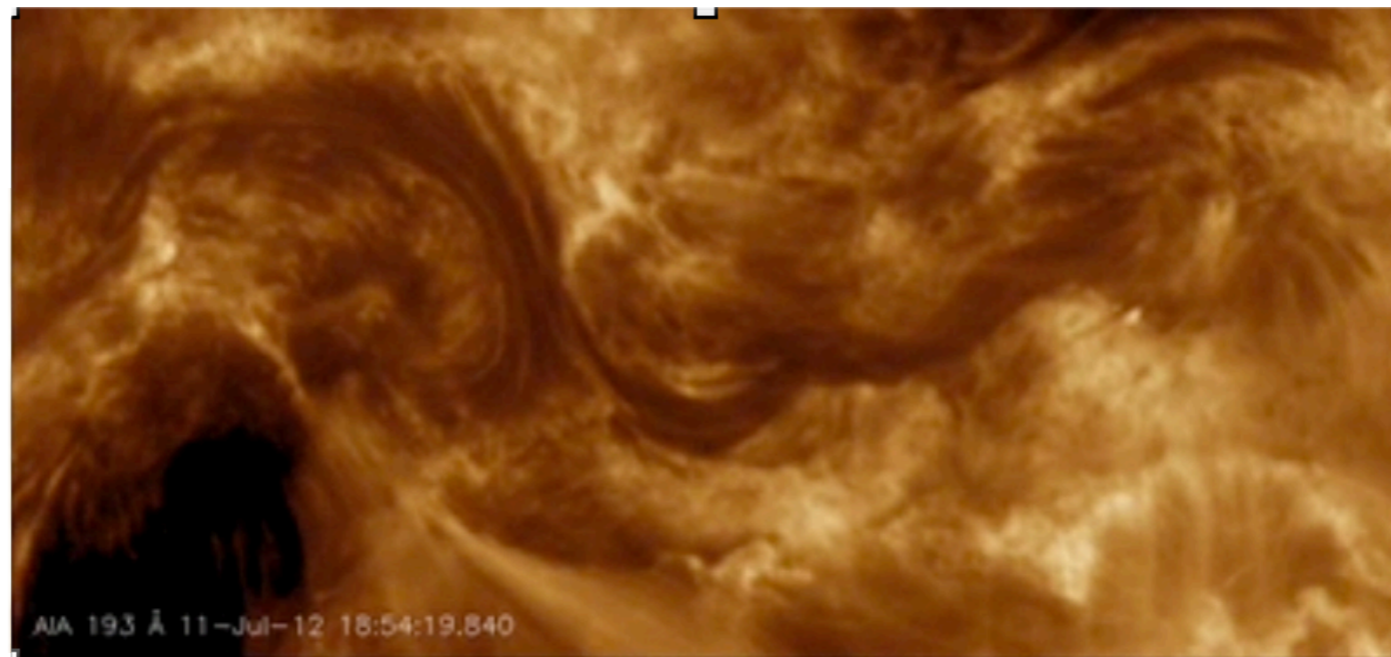
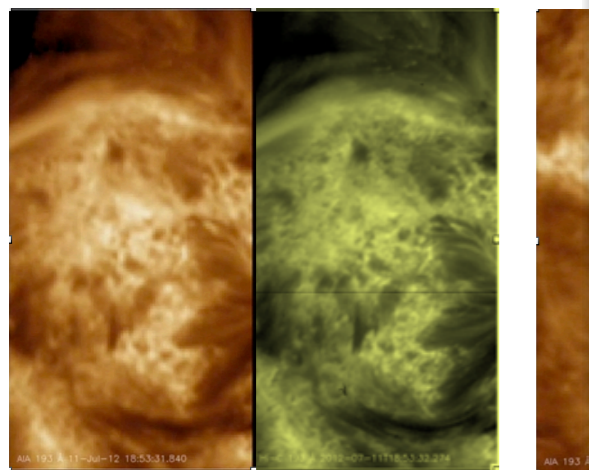
Cirtain et. al. 2013

AIA 193 & Hi-C 193



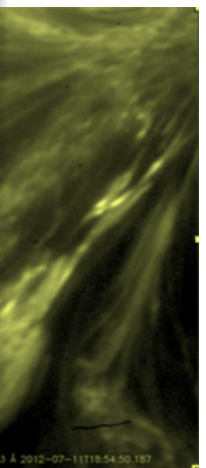
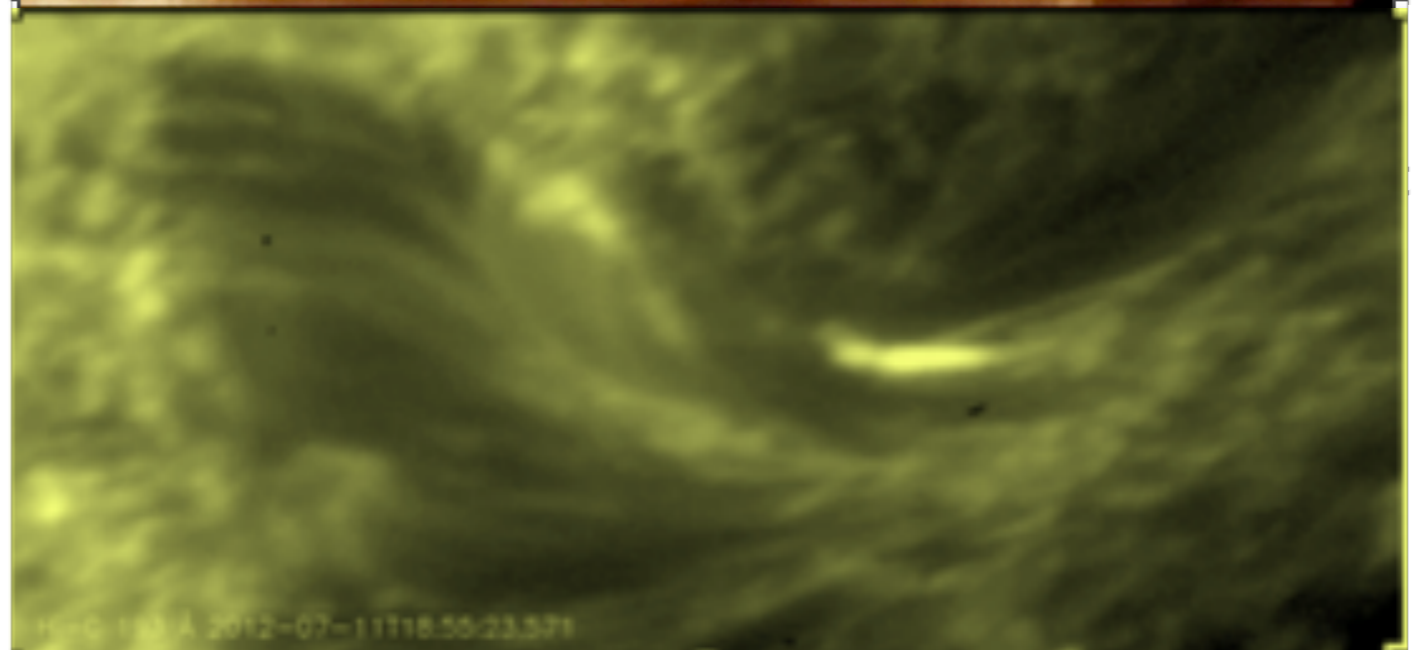
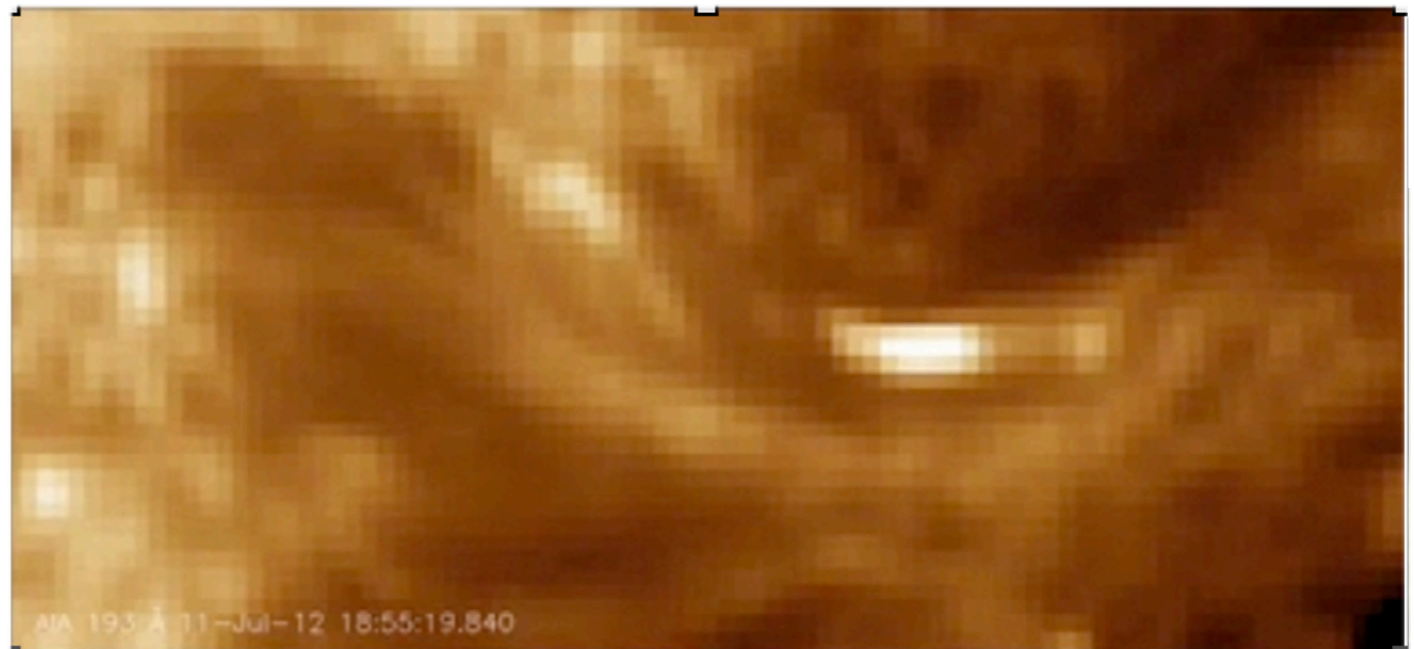
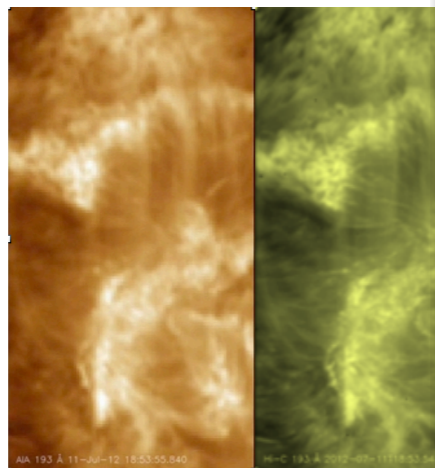
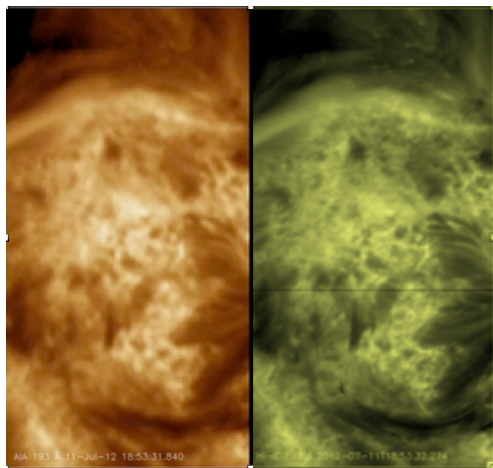
Cirtain et. al. 2013

AIA 193 & Hi-C 193



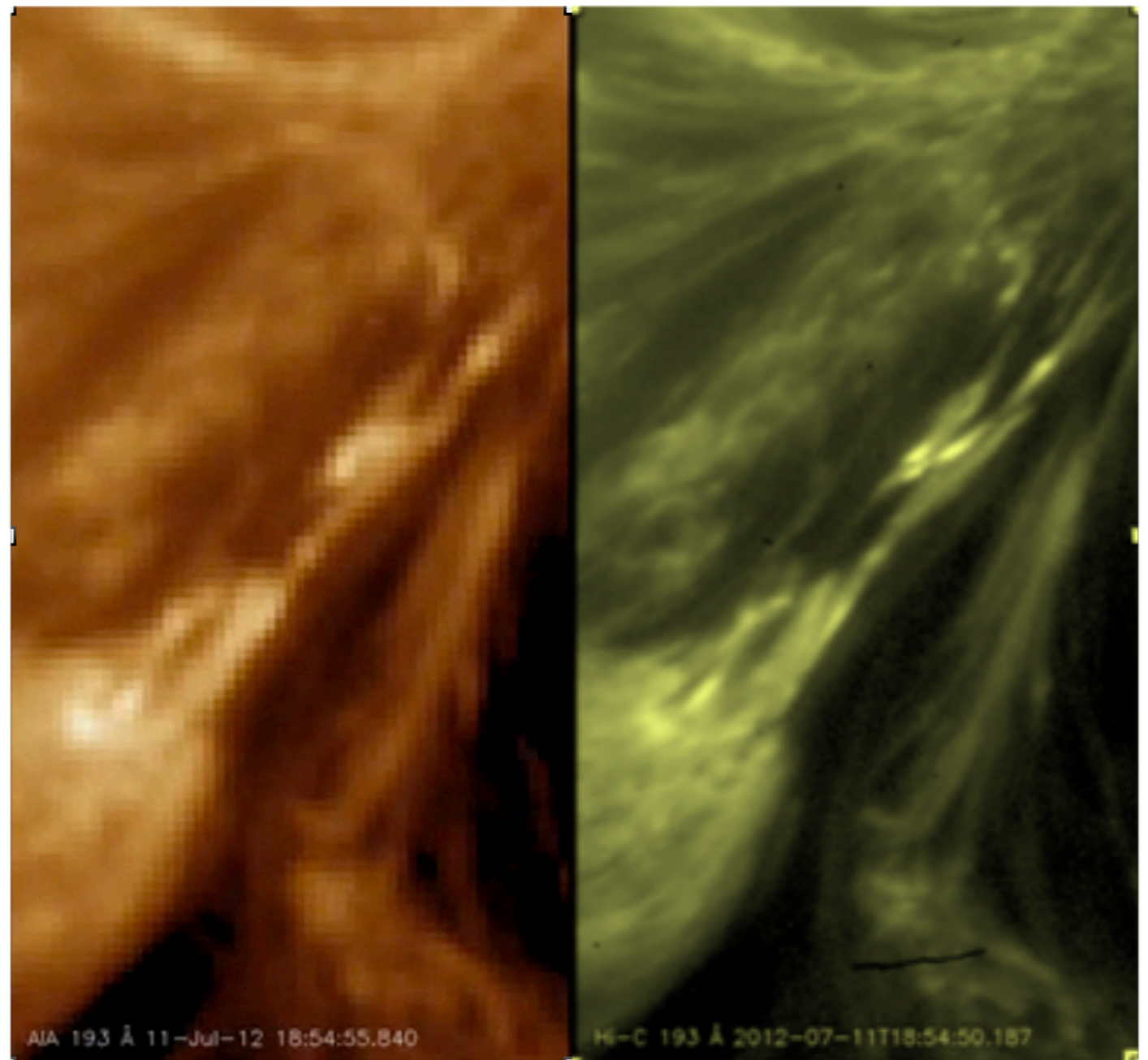
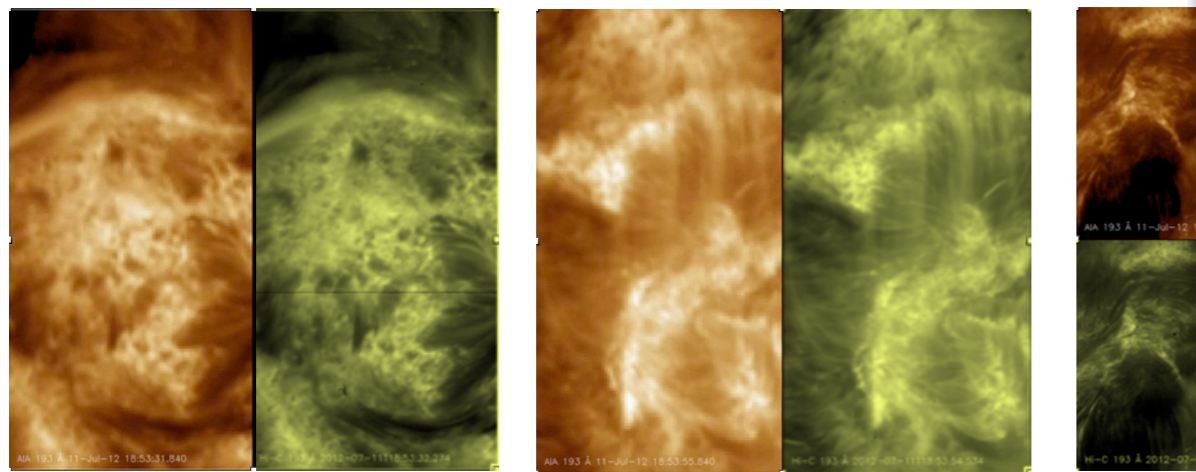
Cirtain et. al. 2013

AIA 193 & Hi-C 193



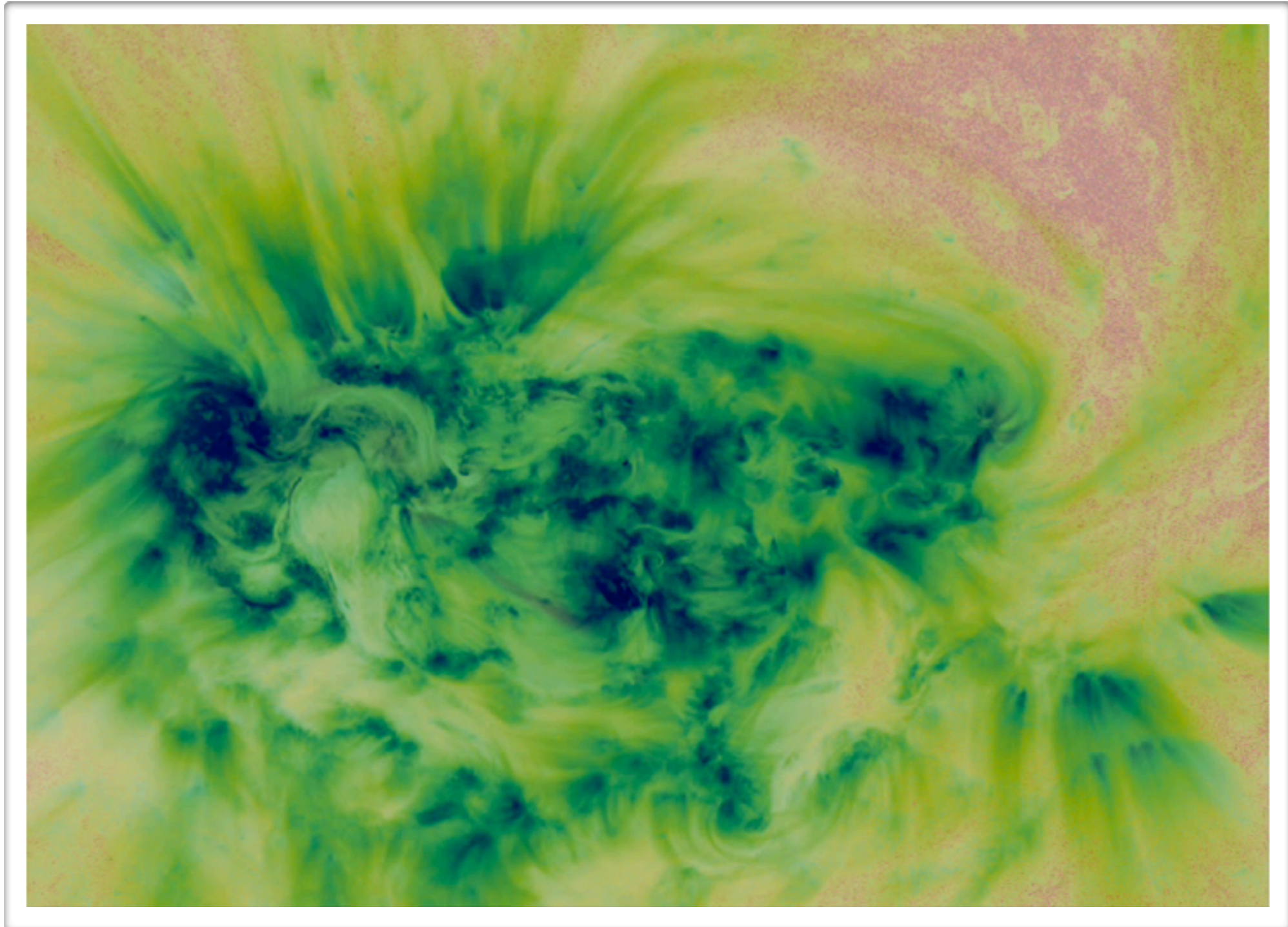
al. 2013

AIA 193 & Hi-C 193



AIA 193 (Red/Blue) + 131 (Green)

11 Jul, 00 UT - 15 Jul, 00 UT



Selected Science Publications

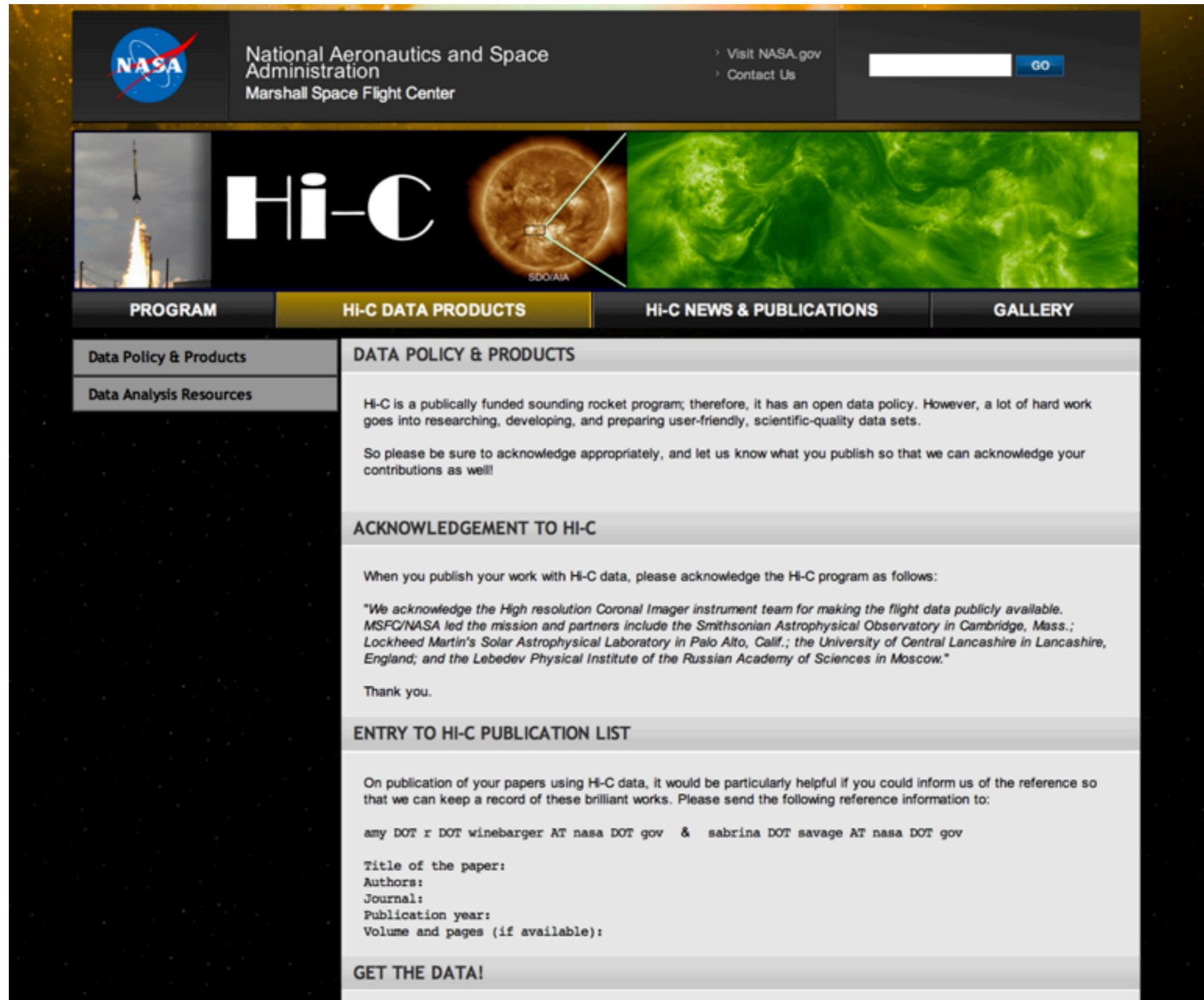
1. *Energy release in the solar corona from spatially resolved magnetic braids*
Cirtain et al. 2013, Nature, 493, 7433, pp 501
2. *Hi-C and AIA observations of transverse magnetohydrodynamic waves in active regions*
Morton & McLaughlin 2013, A&A, 553, 10
3. *Anti-Parallel EUV Flows Observed Along Active Region Filament Threads with Hi-C*
Alexander et al. 2013, ApJ, 775, L32
4. *Observing Coronal Nanoflares in Active Region Moss*
Testa et al. 2013, ApJL, 770, 1
5. *Structure of solar coronal loops: from miniature to large-scale*
Peter et al. 2013, A&A, 556, A104

2 more in press.

At least 6 more in prep.

Please let me know if you have published a paper with Hi-C data.

Publication Instructions: hic.msfc.nasa.gov



The screenshot shows the Hi-C website interface. At the top, there is a NASA logo and the text "National Aeronautics and Space Administration Marshall Space Flight Center". To the right, there are links for "Visit NASA.gov" and "Contact Us", along with a search bar and a "GO" button. Below this is a banner with a rocket launch, the "Hi-C" logo, a solar image, and a green solar image. A navigation bar contains four tabs: "PROGRAM", "Hi-C DATA PRODUCTS" (which is highlighted), "Hi-C NEWS & PUBLICATIONS", and "GALLERY".

On the left side of the main content area, there are two menu items: "Data Policy & Products" and "Data Analysis Resources".

The main content area is titled "DATA POLICY & PRODUCTS" and contains the following text:

Hi-C is a publically funded sounding rocket program; therefore, it has an open data policy. However, a lot of hard work goes into researching, developing, and preparing user-friendly, scientific-quality data sets.

So please be sure to acknowledge appropriately, and let us know what you publish so that we can acknowledge your contributions as well!

ACKNOWLEDGEMENT TO HI-C

When you publish your work with Hi-C data, please acknowledge the Hi-C program as follows:

"We acknowledge the High resolution Coronal Imager instrument team for making the flight data publicly available. MSFC/NASA led the mission and partners include the Smithsonian Astrophysical Observatory in Cambridge, Mass.; Lockheed Martin's Solar Astrophysical Laboratory in Palo Alto, Calif.; the University of Central Lancashire in Lancashire, England; and the Lebedev Physical Institute of the Russian Academy of Sciences in Moscow."

Thank you.

ENTRY TO HI-C PUBLICATION LIST

On publication of your papers using Hi-C data, it would be particularly helpful if you could inform us of the reference so that we can keep a record of these brilliant works. Please send the following reference information to:

`amy DOT r DOT winebarger AT nasa DOT gov & sabrina DOT savage AT nasa DOT gov`

Title of the paper:
Authors:
Journal:
Publication year:
Volume and pages (if available):

GET THE DATA!


Publication Instructions: hinode.msfc.nasa.gov

The screenshot shows the Hinode website interface. At the top left is the NASA logo and the text "National Aeronautics and Space Administration Marshall Space Flight Center". To the right are links for "Visit NASA.gov" and "Contact Us", along with a search bar and a "GO" button. Below this is a banner with the word "Hinode" and several images: a solar eclipse, the Hinode satellite, and various solar data visualizations. A navigation bar contains "MISSION", "NEWS & RESOURCES", "HINODE DATA & PUBLICATIONS" (highlighted), and "GALLERY". Below the navigation bar is a sidebar menu with "OPERATIONS" highlighted, and sub-items: "Policy", "Data Archive", "Products & Analysis", "Publications", and "Theses". The main content area is titled "POLICY" and contains the following text:

Hinode is a publically funded mission; therefore, it has an open data policy. However, a lot of hard work goes into researching, developing, coordinating, operating, and preparing user-friendly, scientific-quality data sets from such a complicated set of telescopes.

So please be sure to acknowledge appropriately and let us know what you publish so that we can acknowledge your contributions as well!

Full instructions for how to do both:

 **Instruction for *Hinode* data users**

日本語: 日本語

- **Mission Statement**
- **Instruments**
 - Solar Optical Telescope
 - X-Ray Telescope
 - EUV Imaging Spectrometer
- **Operation**
 - This Week
 - Latest Images
 - Observation Proposals
 - Coordinated Observations
 - Eclipse Seasons
 - Science Working Group

Let us stress that the entire Hinode operation relies on public funding, and it is extremely important for us to produce outputs that are visible and accountable, in continuing the current stable and fruitful operation which we hope the scientific community enjoys. As an attempt to ensure this, we would like to present two sets of rules/guidelines.

The first set concerns what you do when you write papers using Hinode data. Please consider this set as rigid rules that you are expected to follow, although there is no way of enforcing them. They are:

1. **Acknowledgements**
When you write a paper, please include the standard acknowledgment sentences to Hinode, which are found [here](#).
2. **Instrumentation papers**
Please also refer to the relevant instrumentation papers listed [here](#).
3. **Entry to publication list**
When your paper is accepted, or when you make a presentation at a conference or hold a press conference on your result, please let us know by sending email to [publ_hinode \(at\) solar-b.nao.ac.jp](mailto:publ_hinode@solab.nao.ac.jp). [[more detail...](#)]

Summary

- **Acknowledgement to Hinode**

When you publish your work on Hinode data, we would like to ask you to acknowledge the Hinode mission as follows:

Selected Science Publications

1. *Energy release in the solar corona from spatially resolved magnetic braids*
Cirtain et al. 2013, Nature, 493, 7433, pp 501
2. *Hi-C and AIA observations of transverse magnetohydrodynamic waves in active regions*
Morton & McLaughlin 2013, A&A, 553, 10
3. *Anti-Parallel EUV Flows Observed Along Active Region Filament Threads with Hi-C*
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4. *Observing Coronal Nanoflares in Active Region Moss*
Testa et al. 2013, ApJL, 770, 1
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2 more in press.

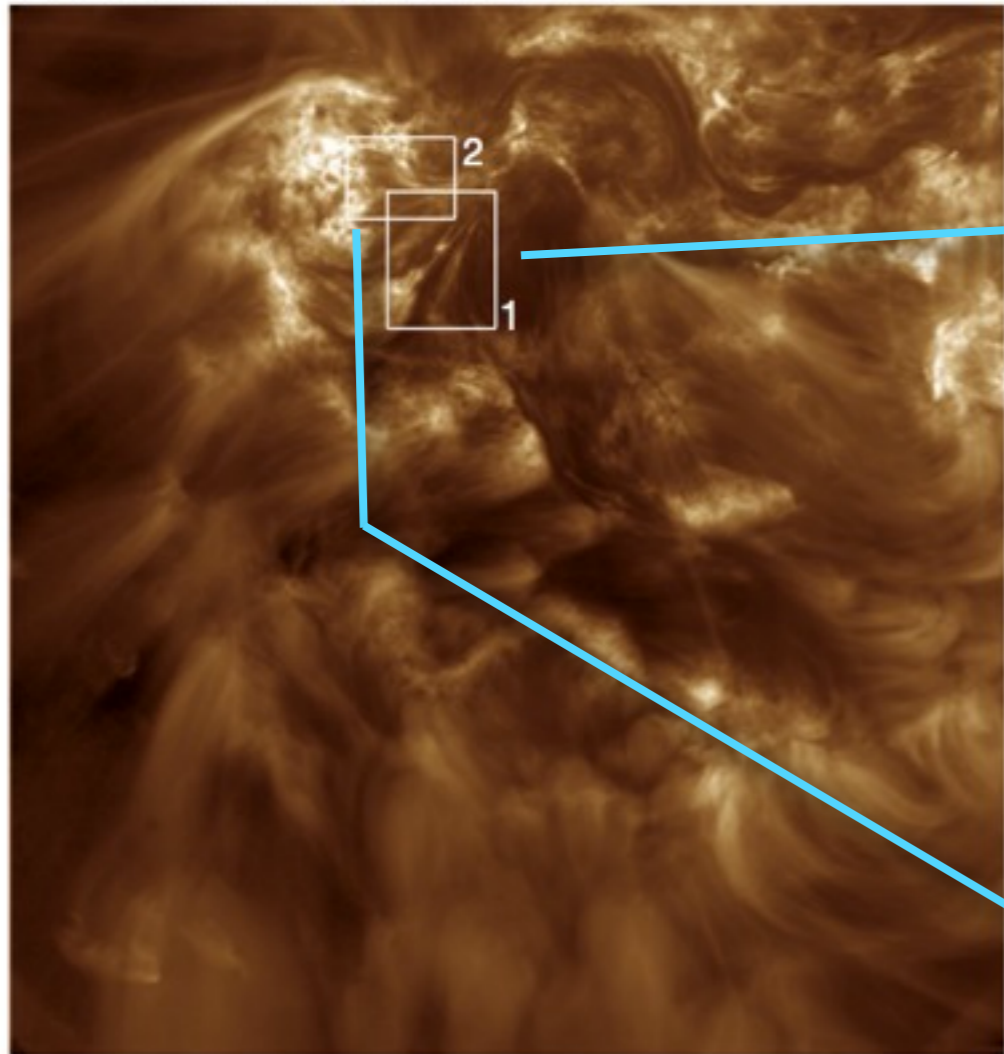
At least 6 more in prep.

Please let me know if you have published a paper with Hi-C data.

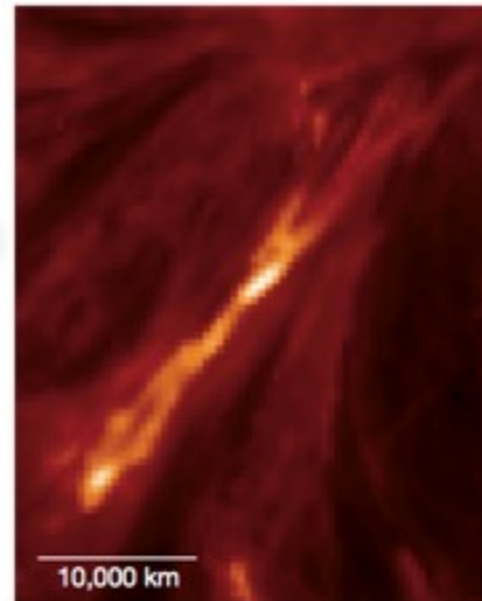
Selected Science Publications

I. *Energy release in the solar corona from spatially resolved magnetic braids* Cirtain et al. 2013, Nature, 493, 7433, pp 501

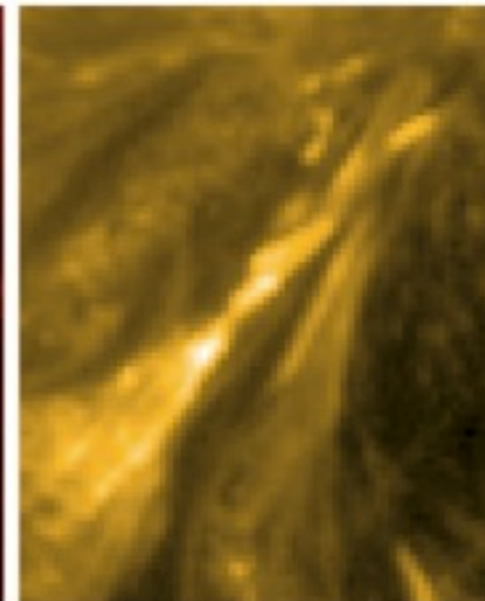
b Hi-C 193 Å: 11 July 2012 18:55:20



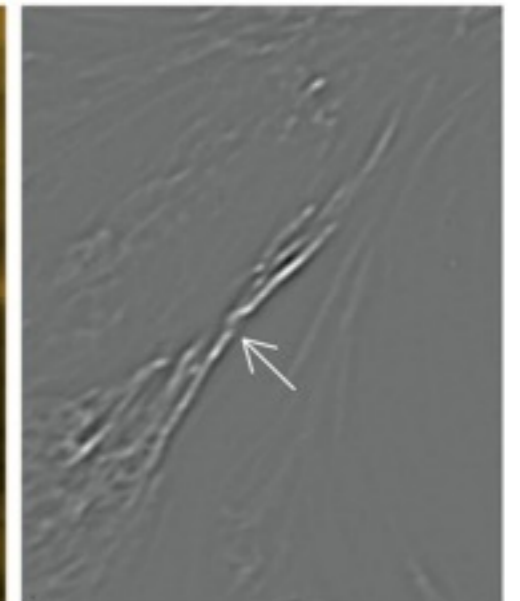
a AIA 304 Å: He II (0.1 MK) 18:55:20



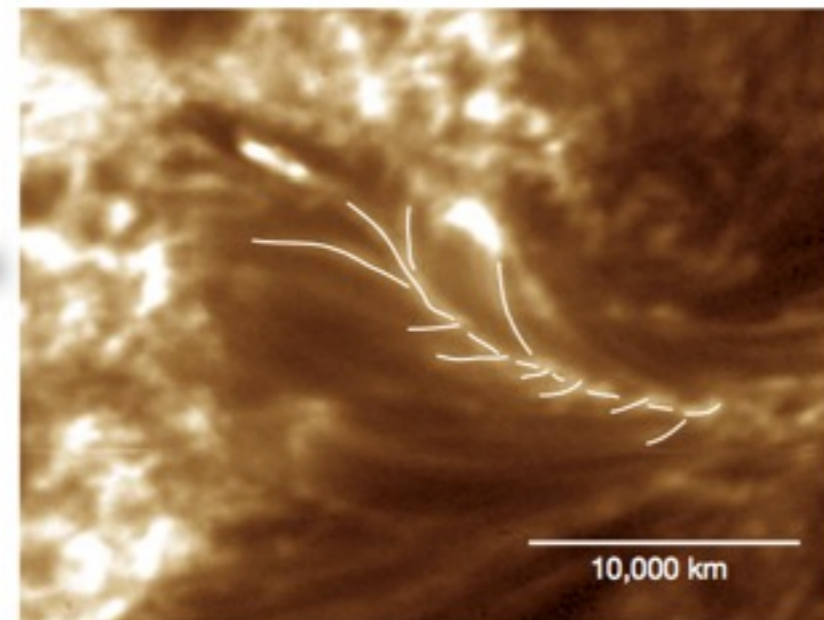
b AIA 171 Å: Fe IX/X (1 MK) 18:55:24



c Hi-C unsharp masked image: 18:56:04

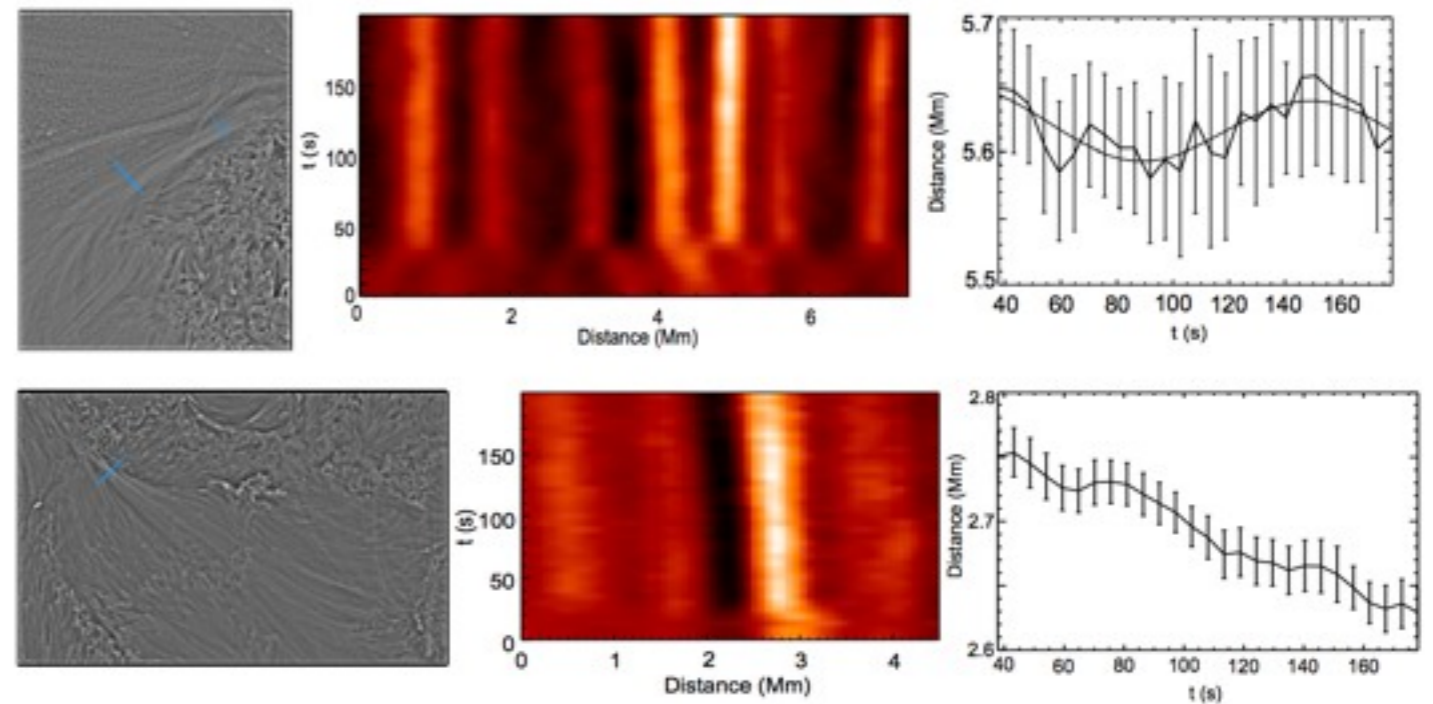
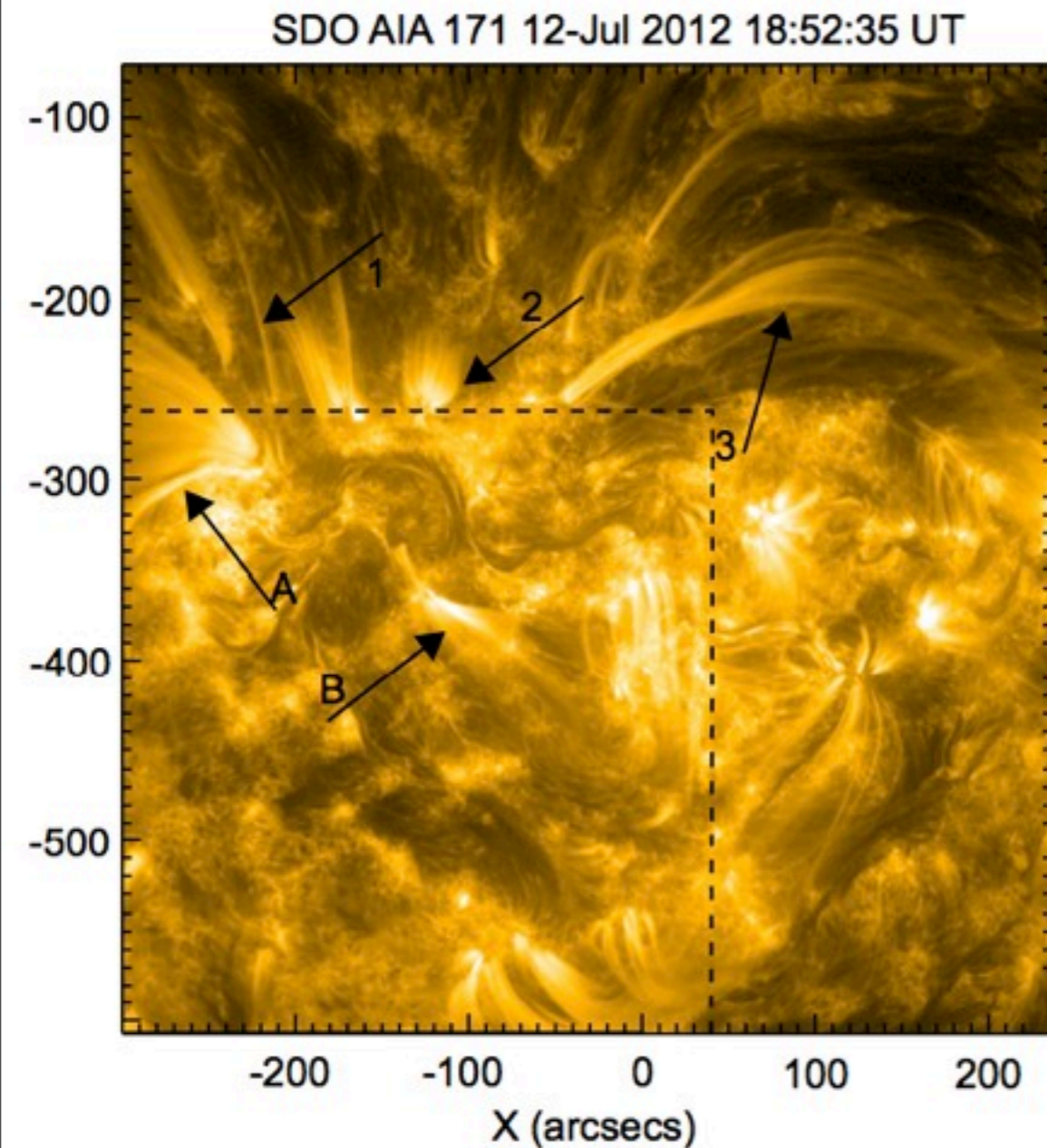


a Hi-C 193 Å: 18:53:28



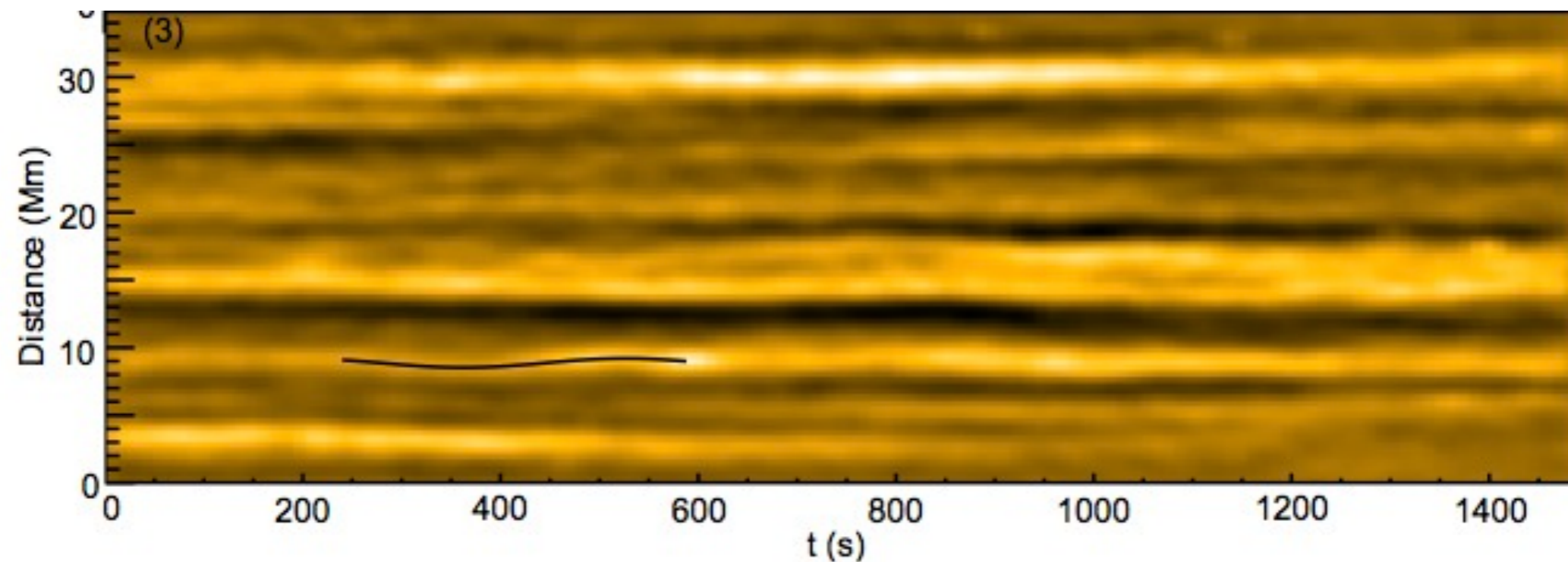
Selected Science Publications

2. *Hi-C and AIA observations of transverse MHD waves in active regions* Morton & McLaughlin 2013, *A&A*, 553, 10



Selected Science Publications

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Selected Science Publications

3. *Anti-Parallel EUV Flows Observed Along AR Filament Threads with Hi-C* Alexander et al. 2013, ApJ, 775, L32

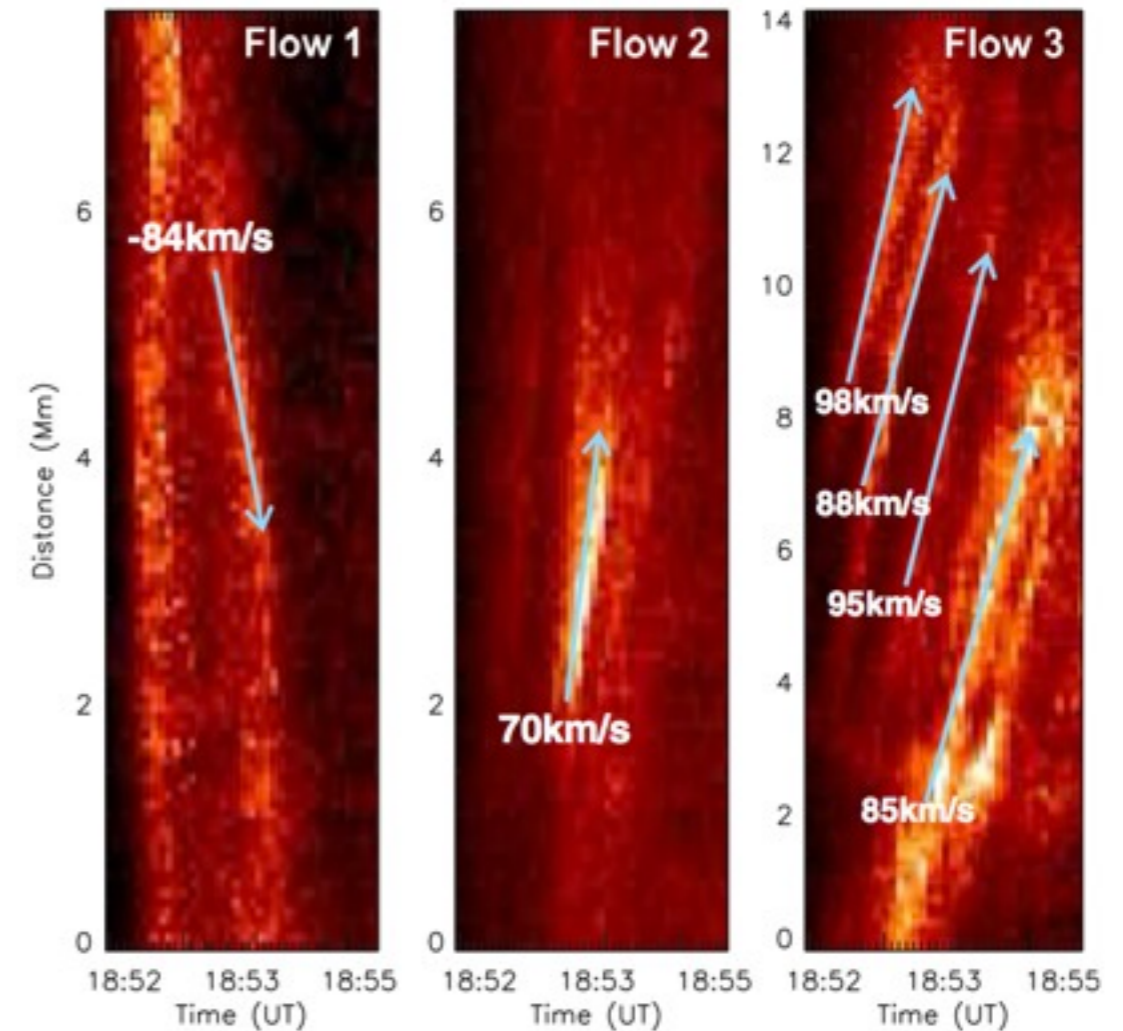
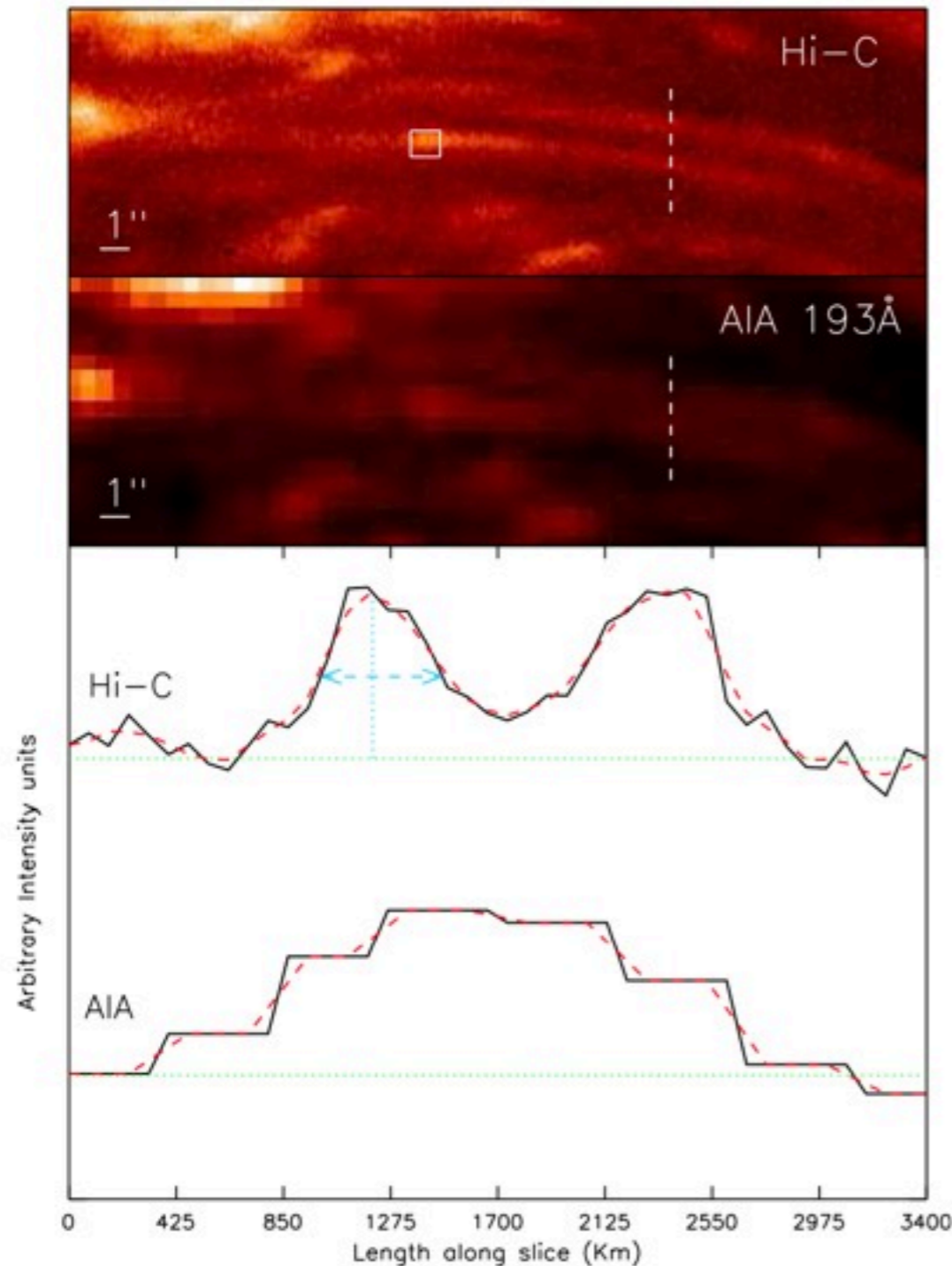


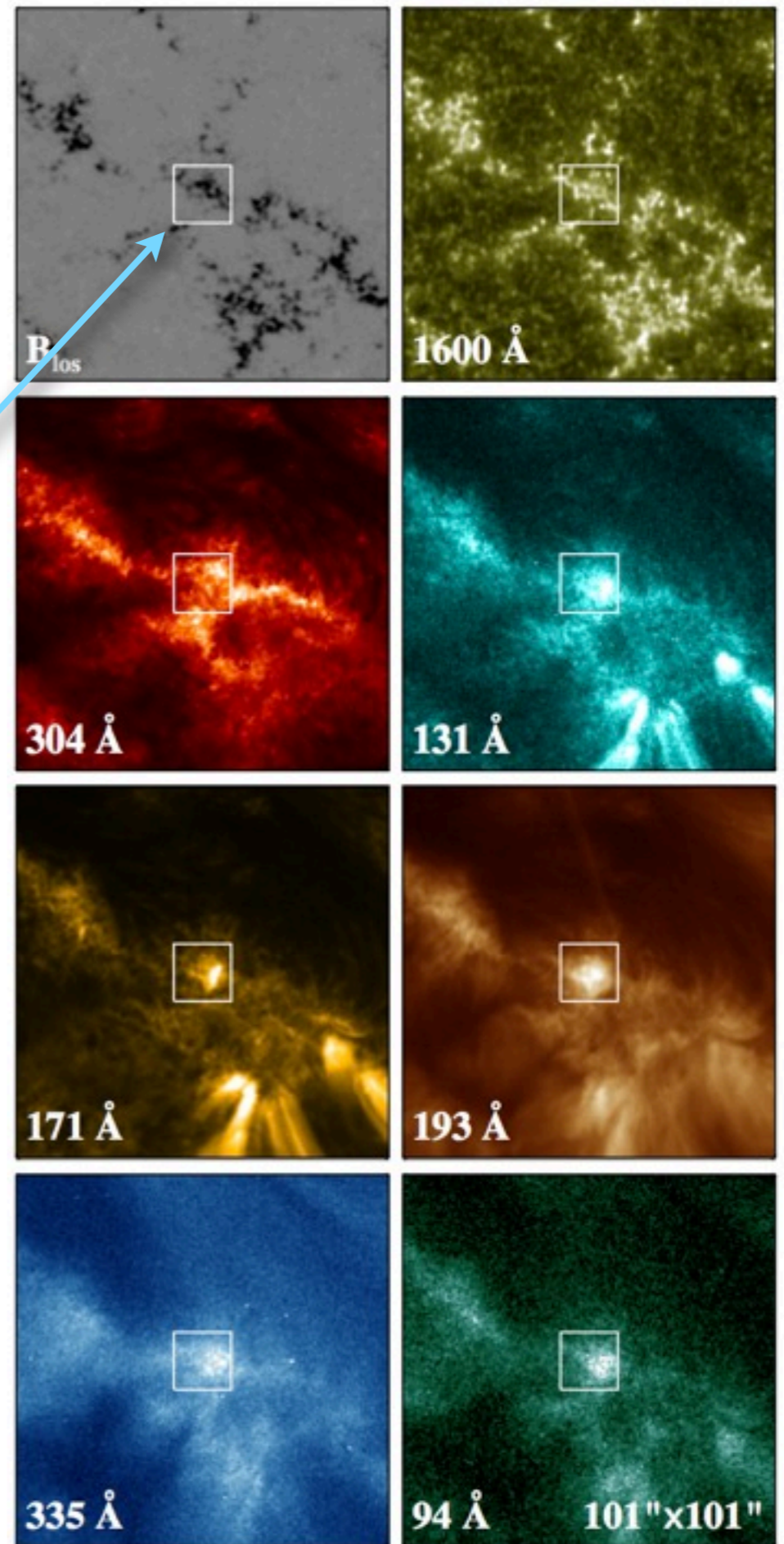
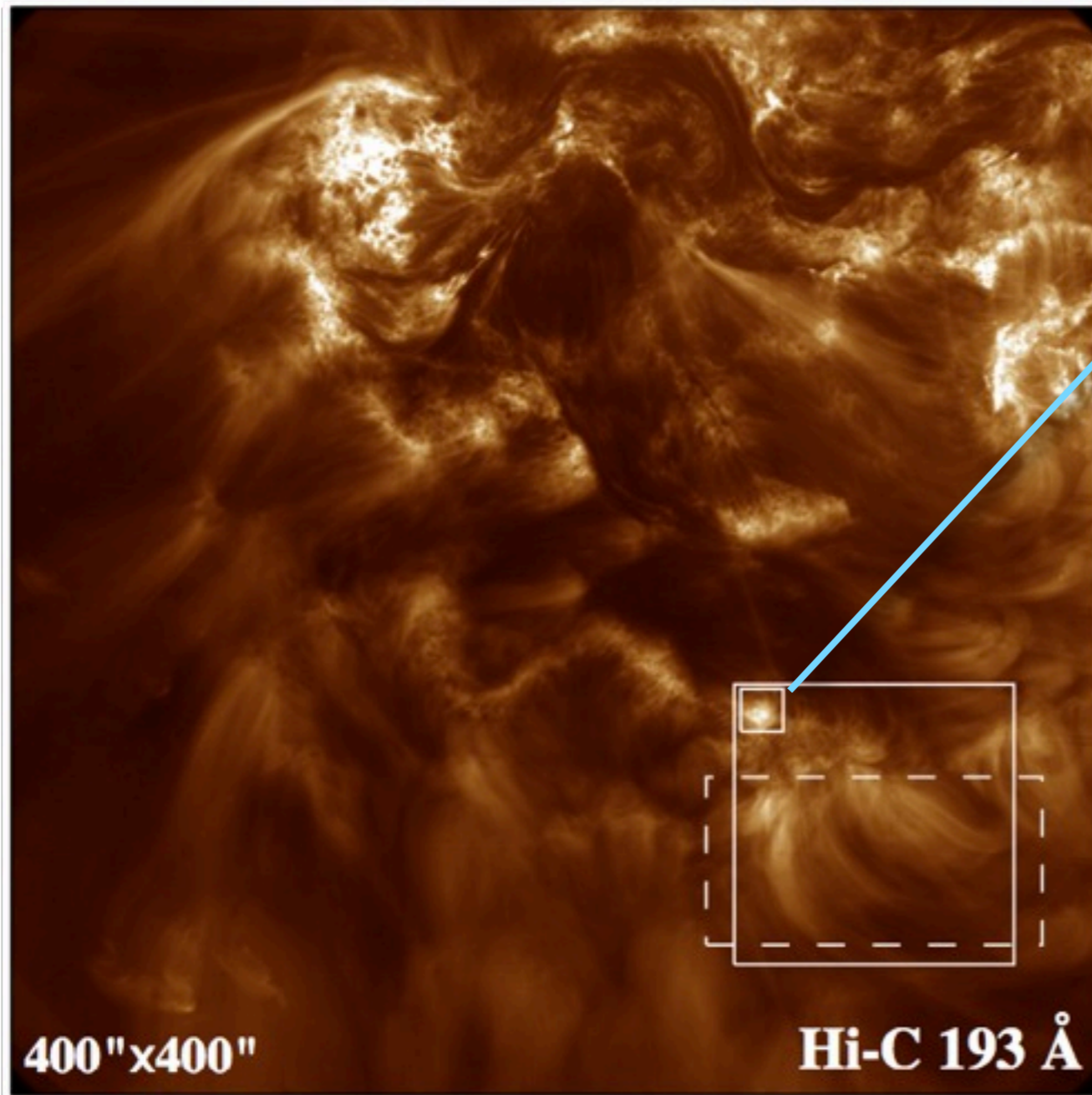
Figure 4. Time–distance plots of flows seen along arrows 1, 2, and 3 in Figure 1(a). The anti-parallel flows are seen in the left and middle panels while multiple mass flows are seen in the right panel representing the flow observed to move around the edge of the sunspot.

(A color version of this figure is available in the online journal.)

Selected Science Publications

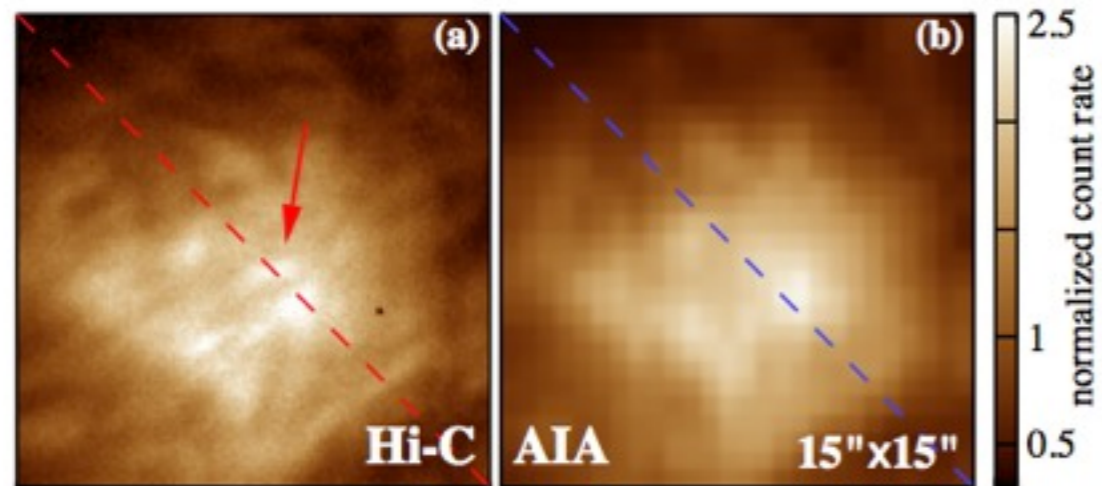
- 4. *Observing Coronal Nanoflares in Active Region Moss*
Testa et al. 2013, ApJL, 770, 1**
- 5. *Structure of solar coronal loops: from miniature to large-scale*
Peter et al. 2013, A&A, 556, A104**

Plage I: Miniature Loops?

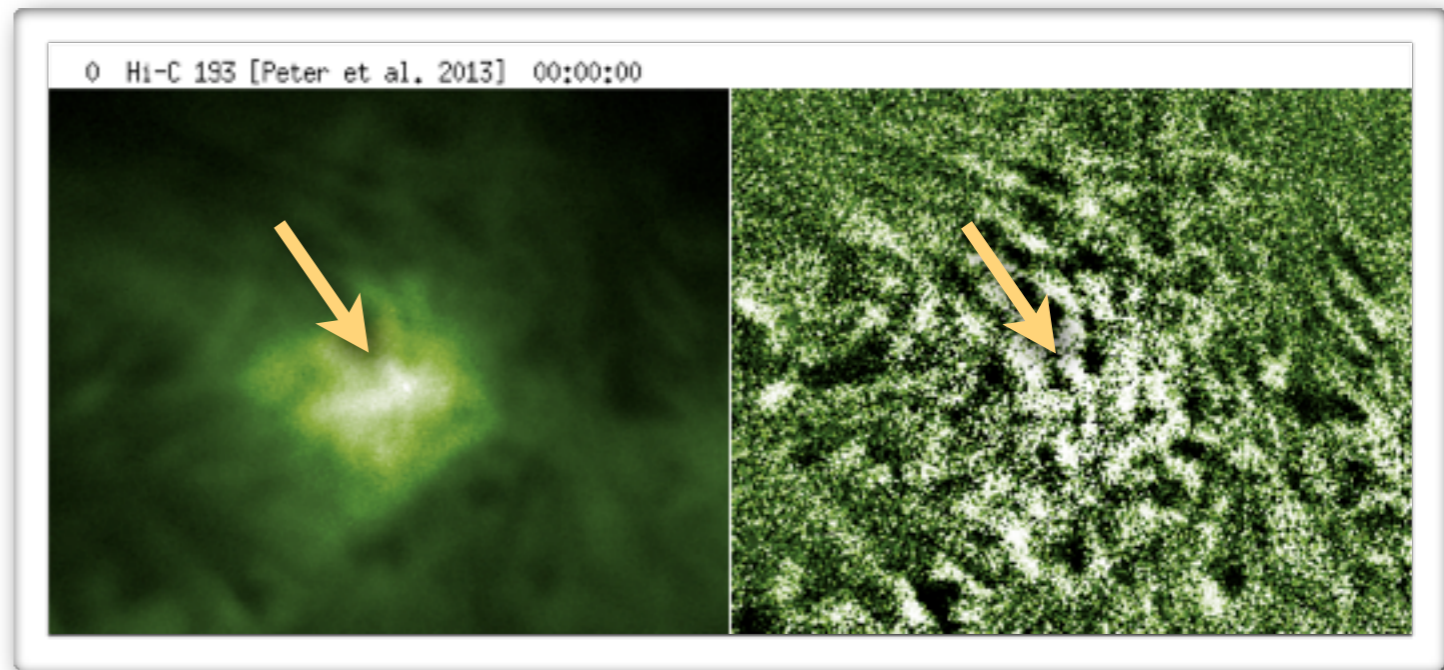
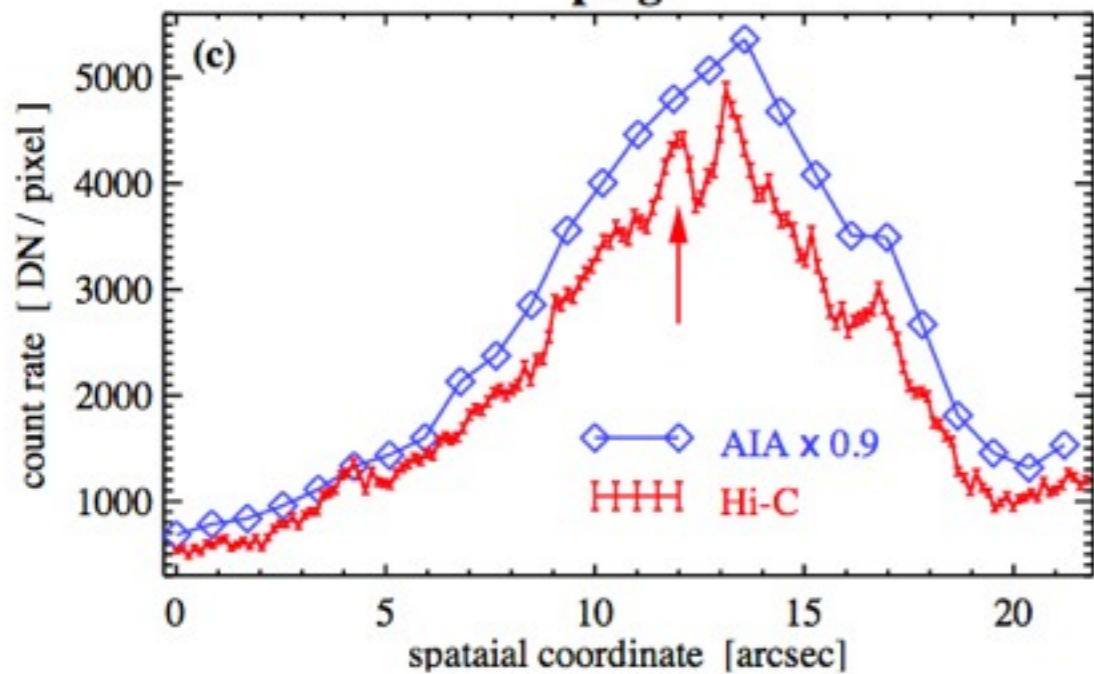


Peter et. al. 2013

Plage I: Miniature Loops?



plage



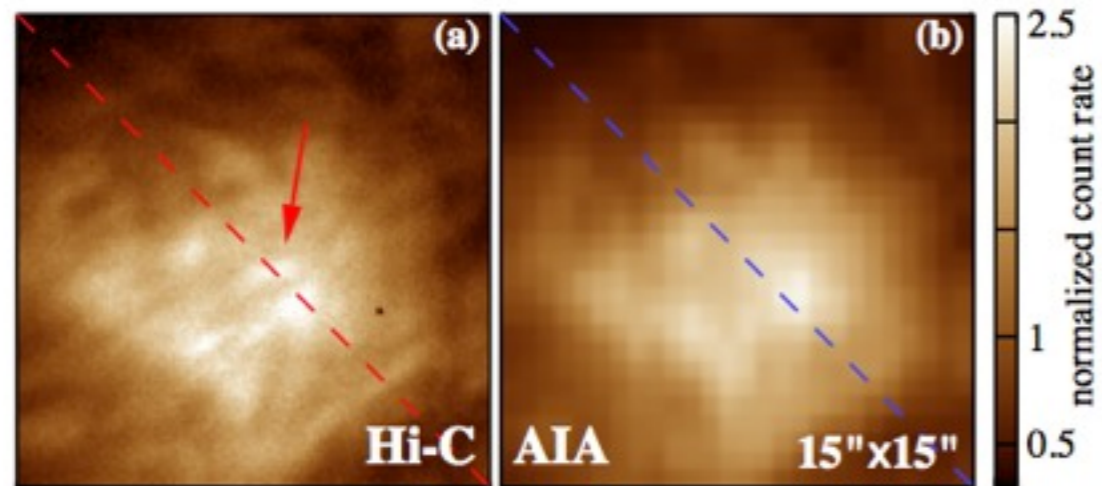
Original

Run-median-differenced

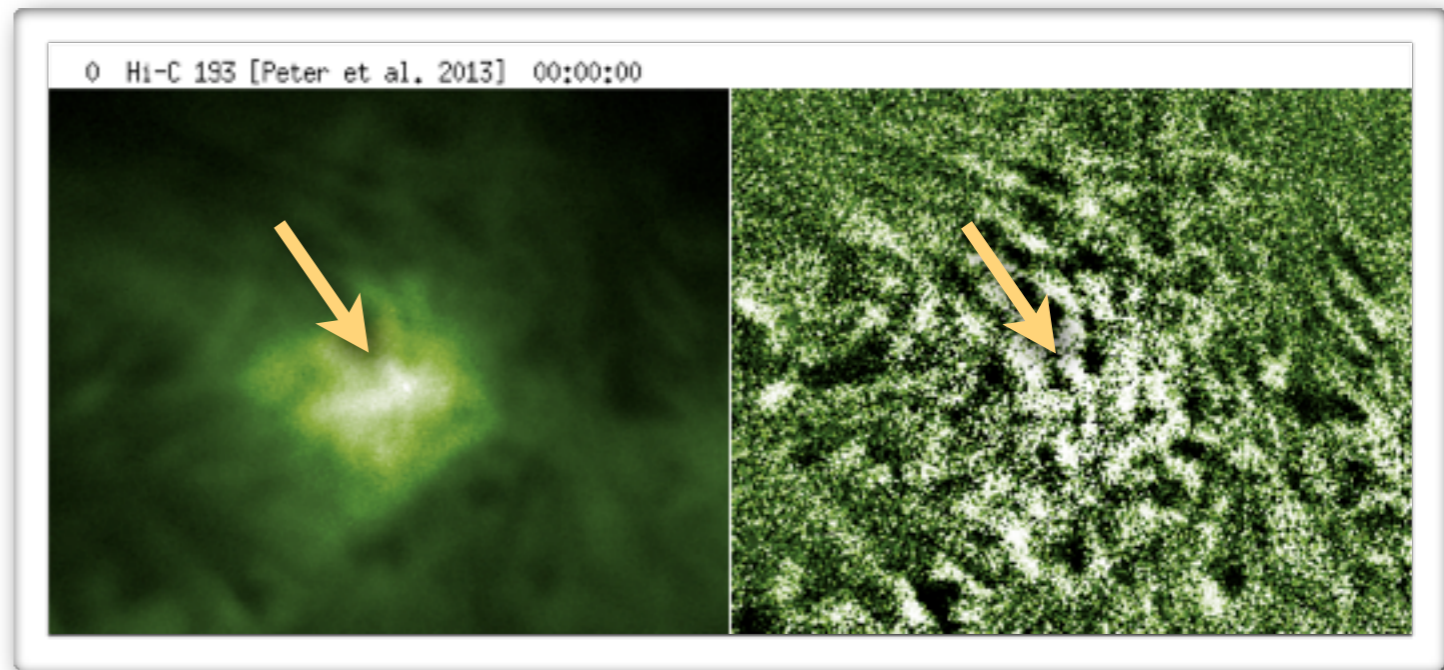
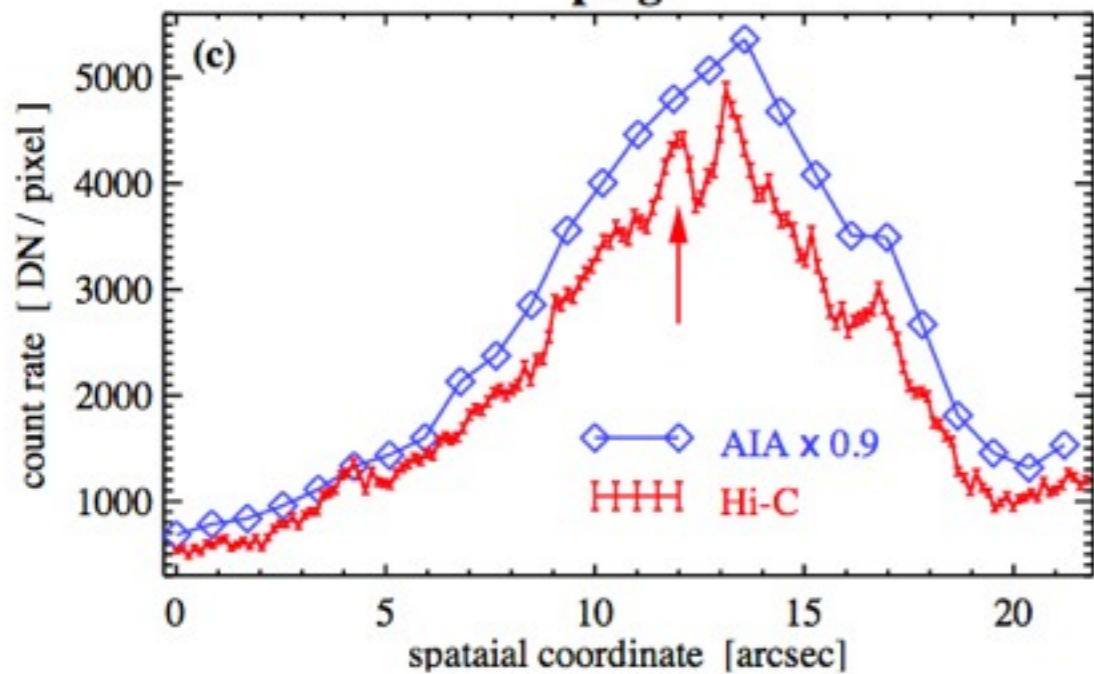
~ 'No associated hot X-ray loop'

Peter et. al. 2013

Plage I: Miniature Loops?



plage



Original

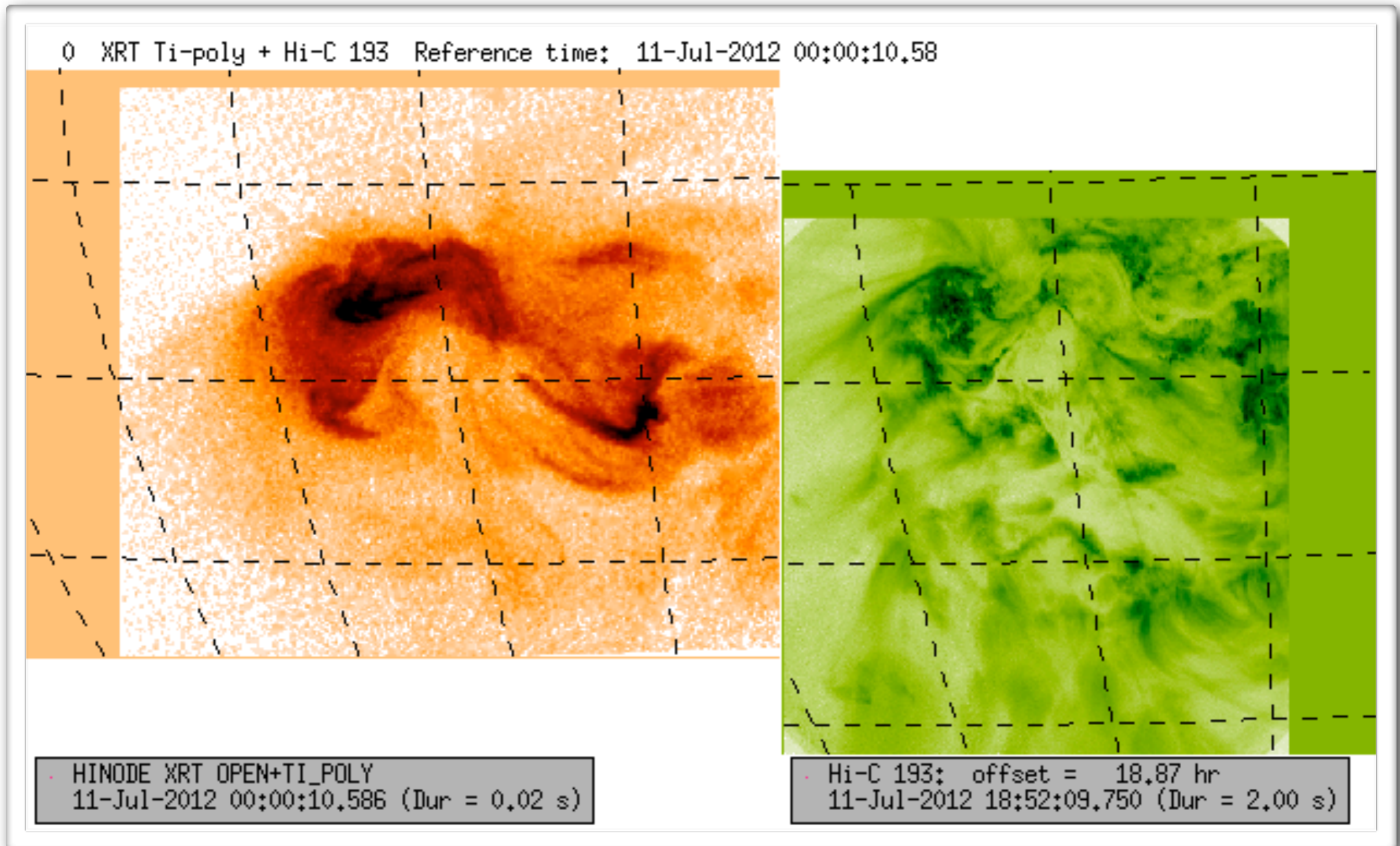
Run-median-differenced

~ ' No associated hot X-ray loop '

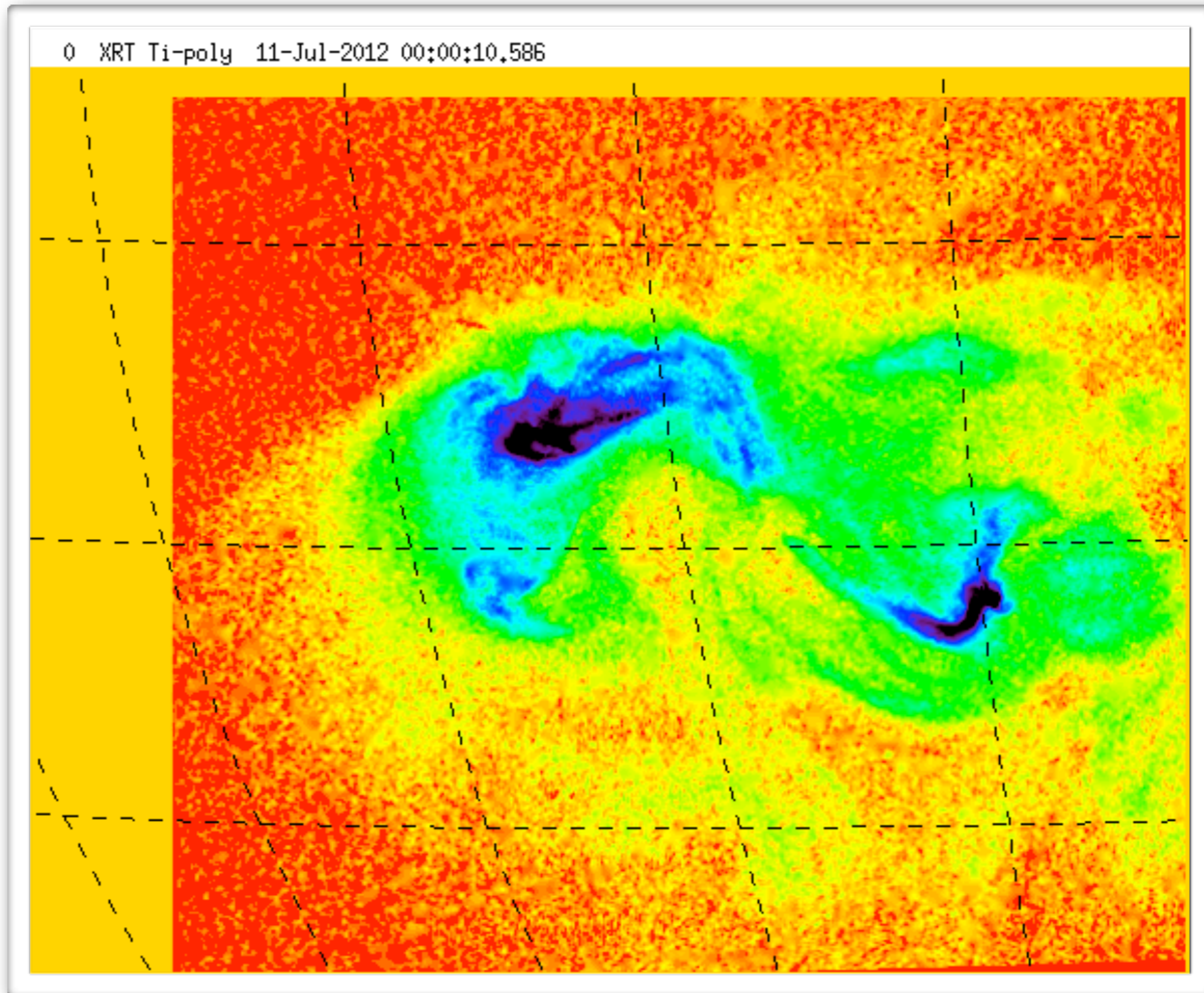
...not so fast

Peter et. al. 2013

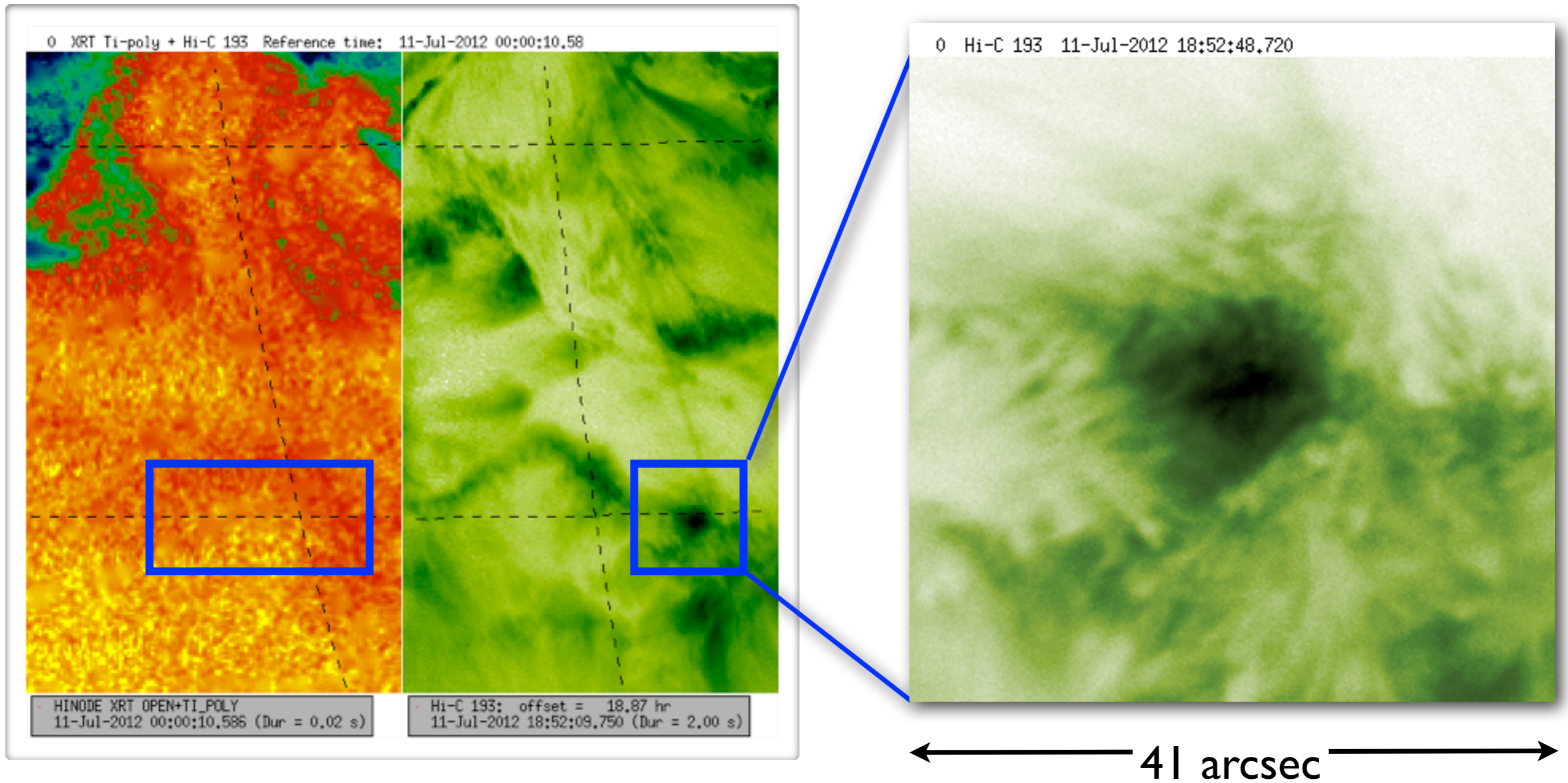
XRT Ti-Poly + Hi-C 193



XRT: Large-scale structure

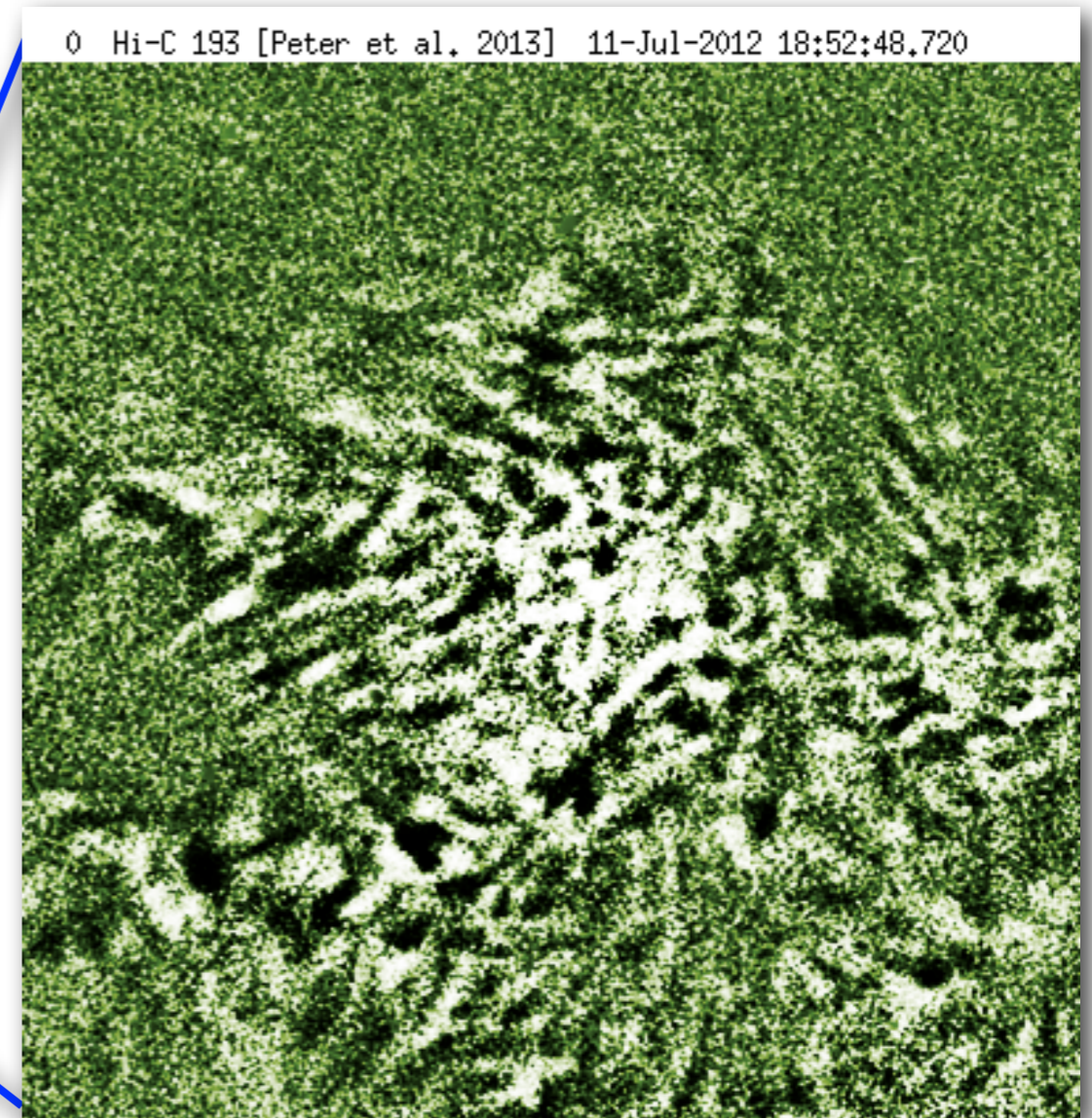
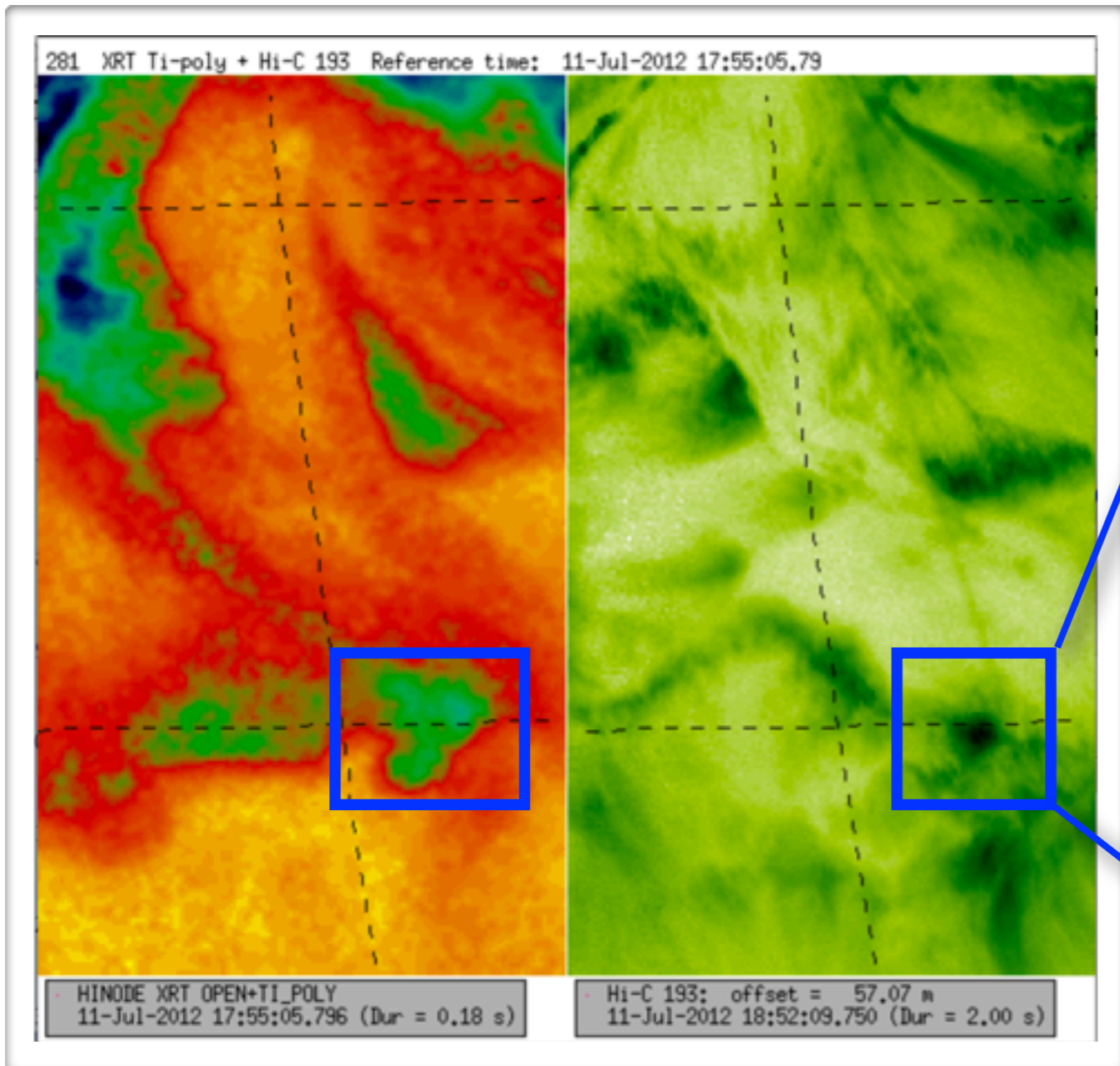


XRT + Hi-C Plage Region I



Focus from Peter et. al. 2013

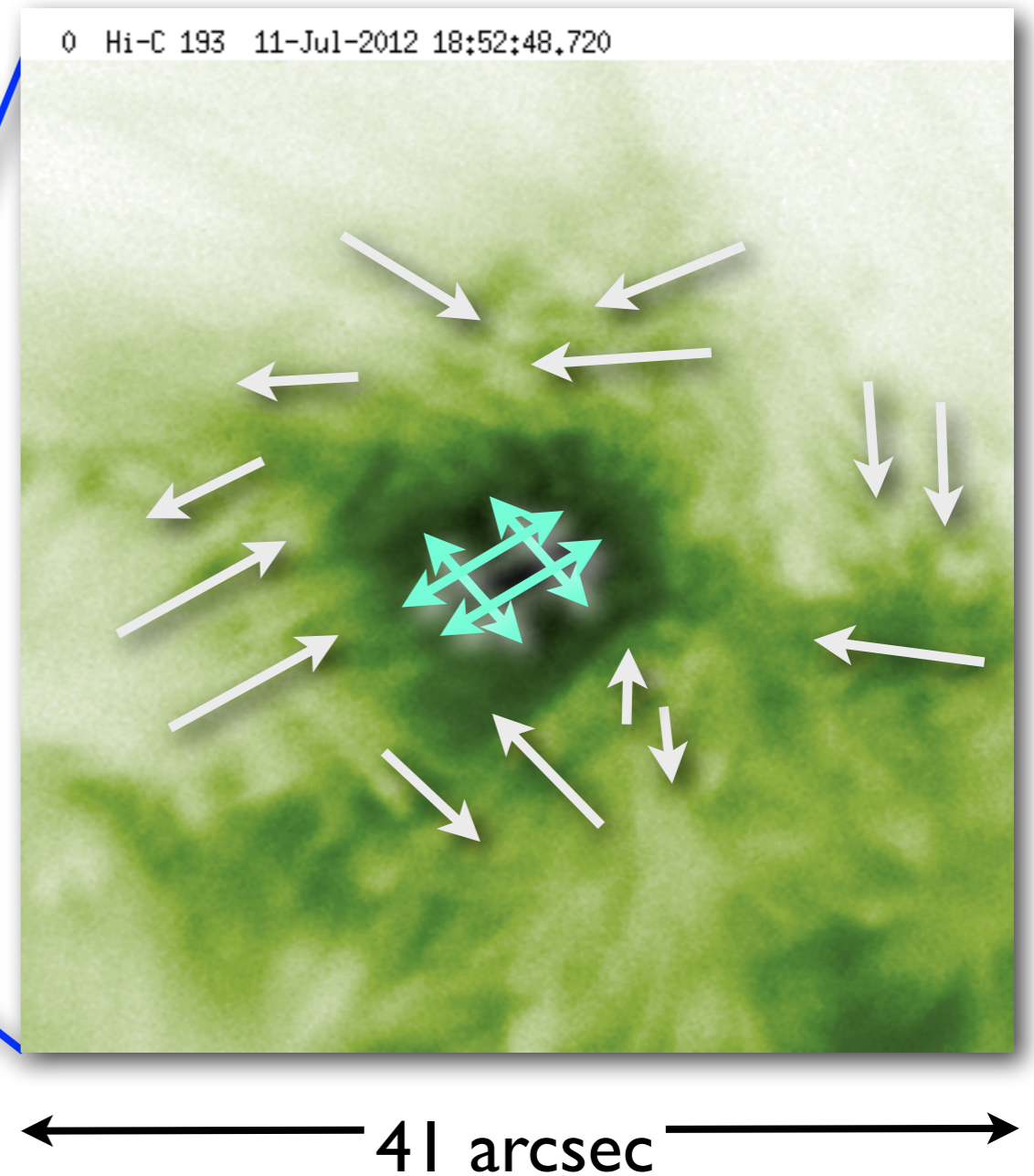
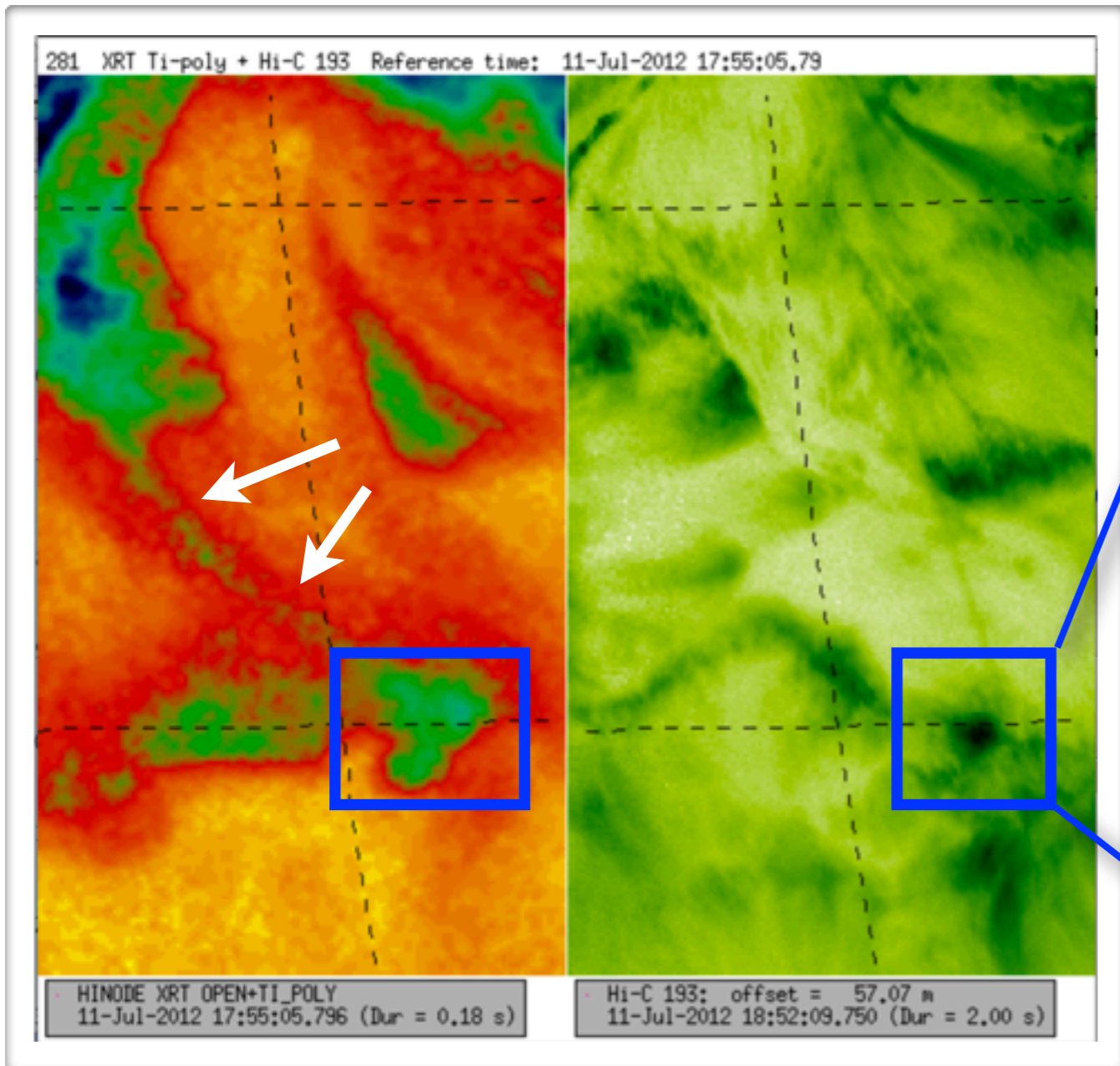
XRT + Hi-C Plage Region I



41 arcsec

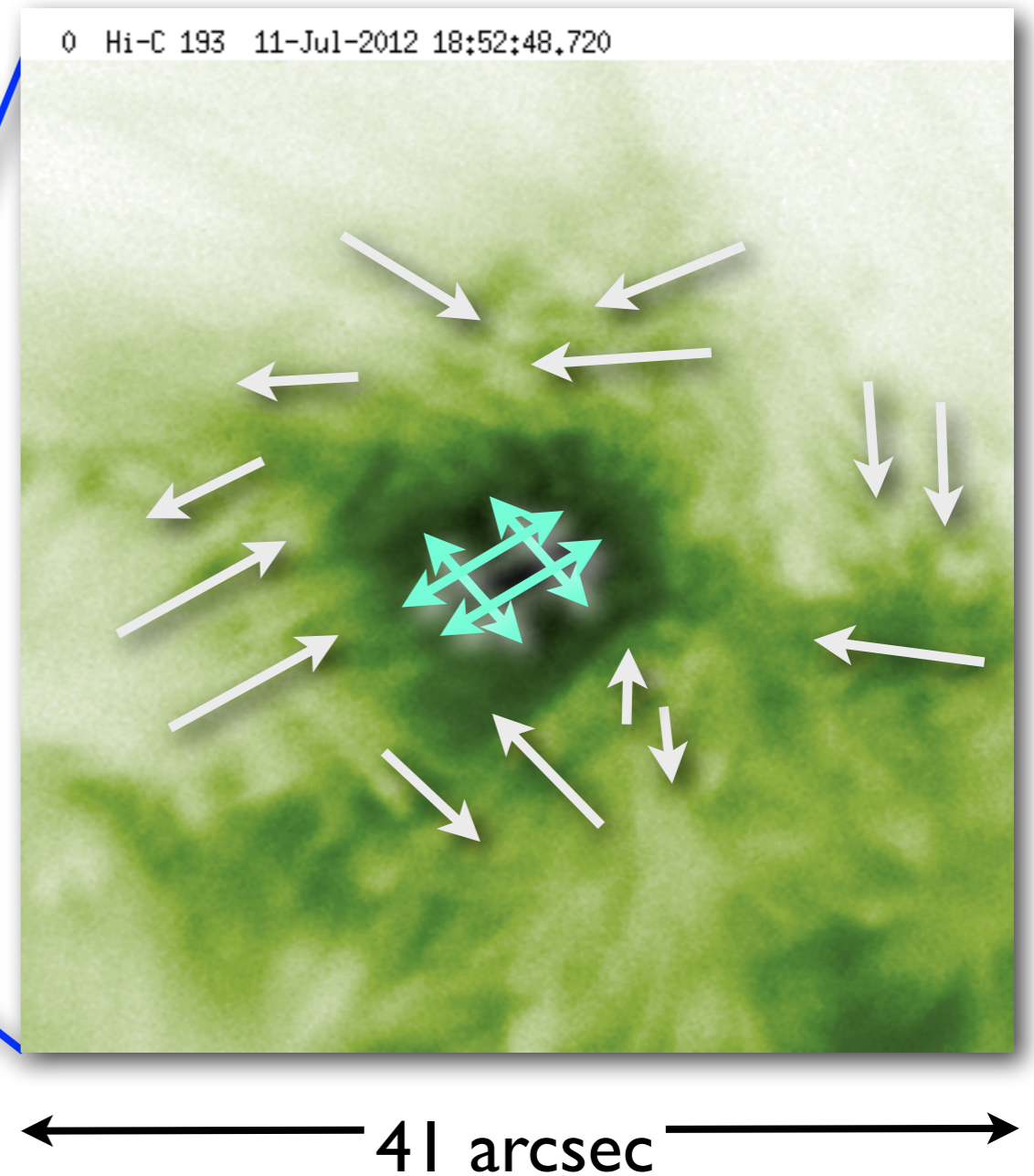
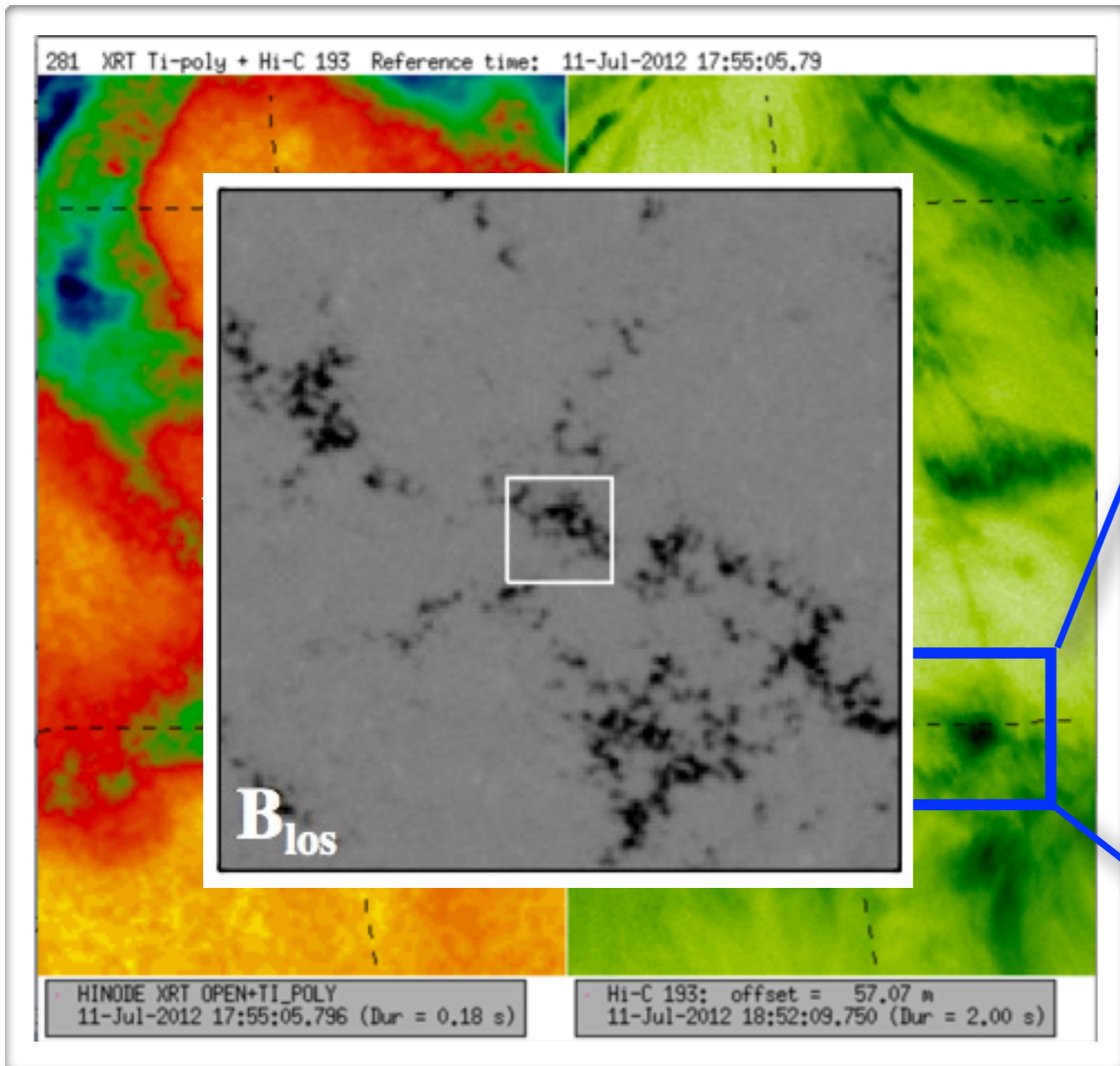
Focus from Peter et. al. 2013

XRT + Hi-C Plage Region I



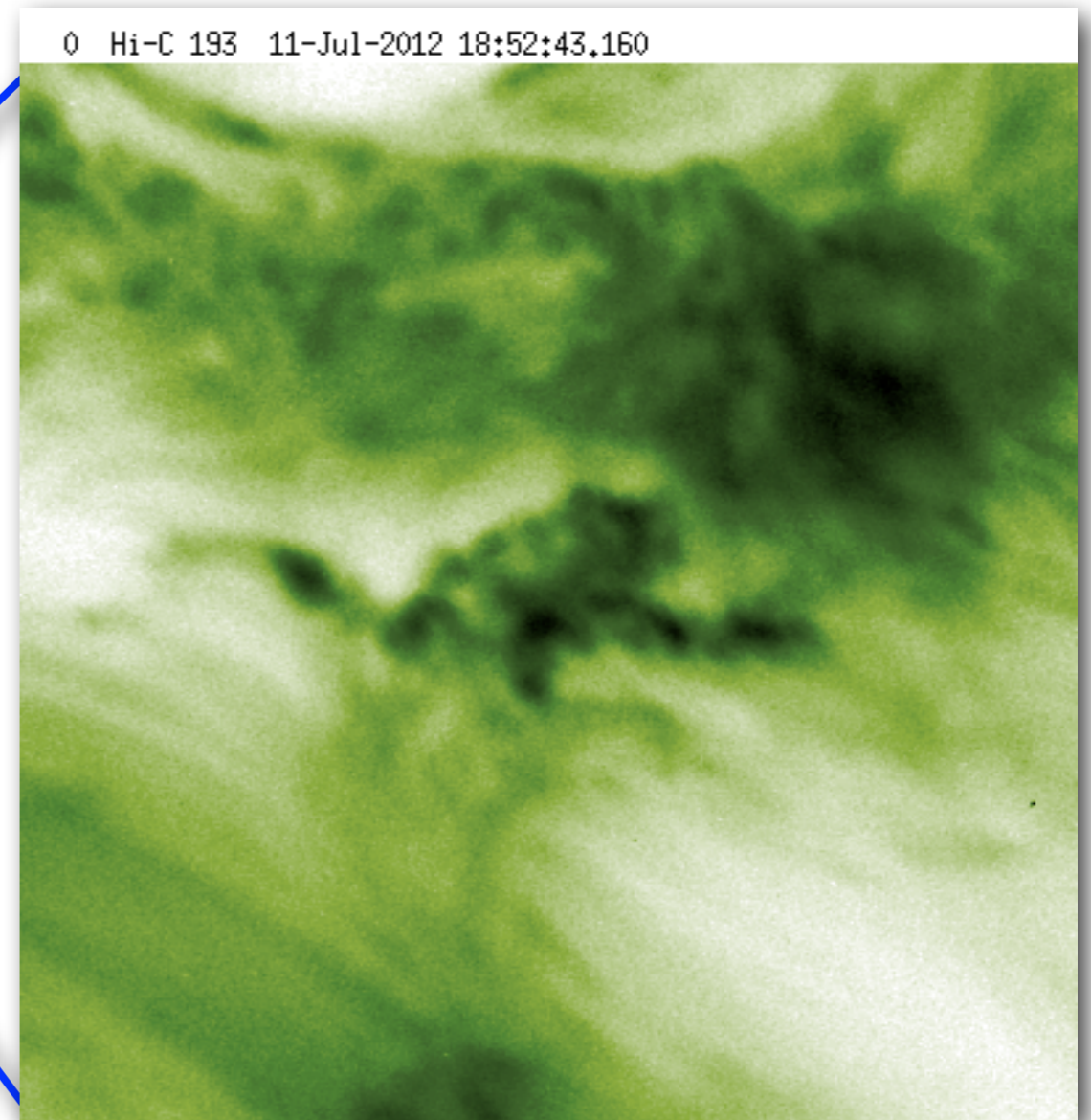
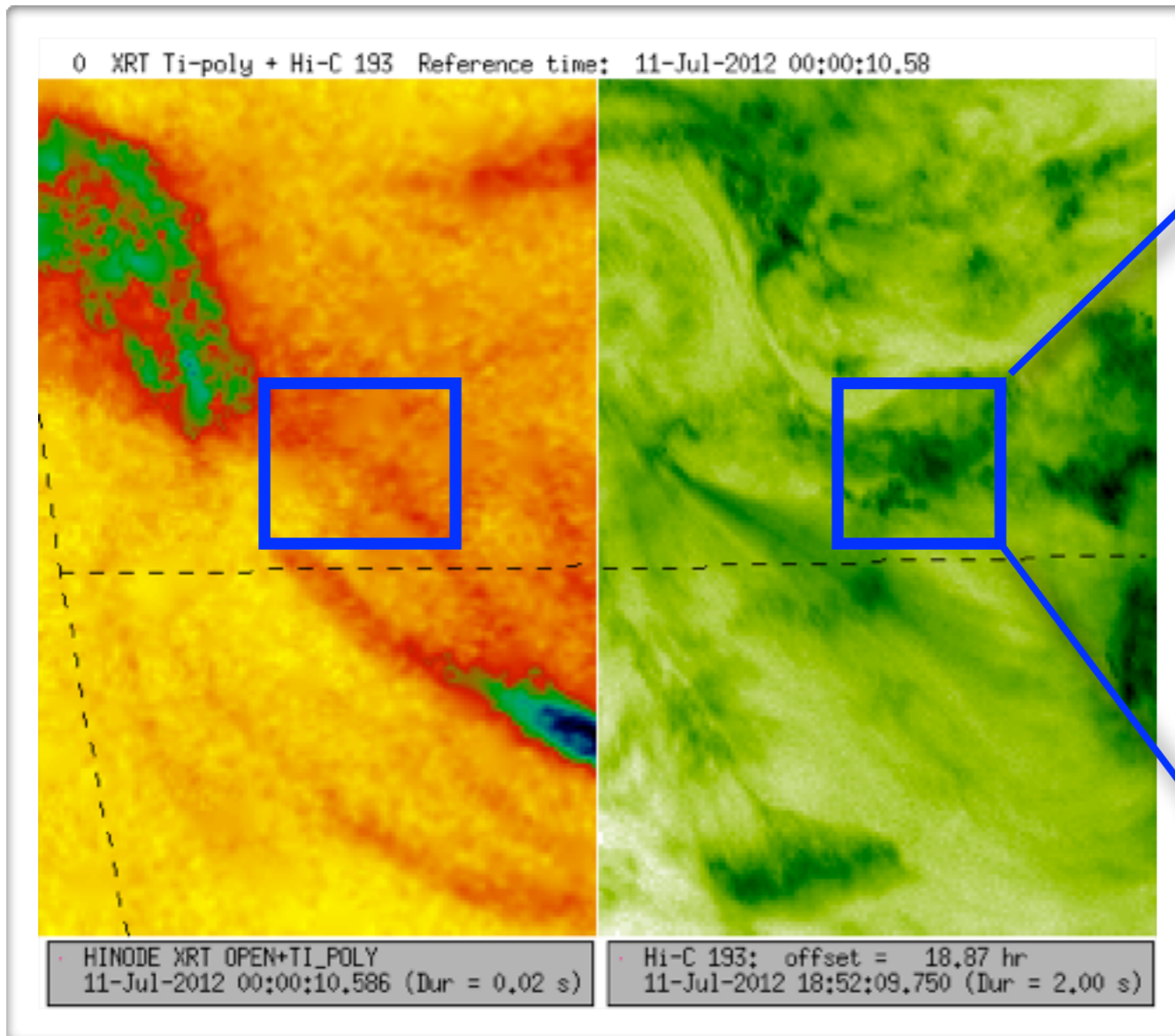
Focus from Peter et. al. 2013

XRT + Hi-C Plage Region I



Focus from Peter et. al. 2013

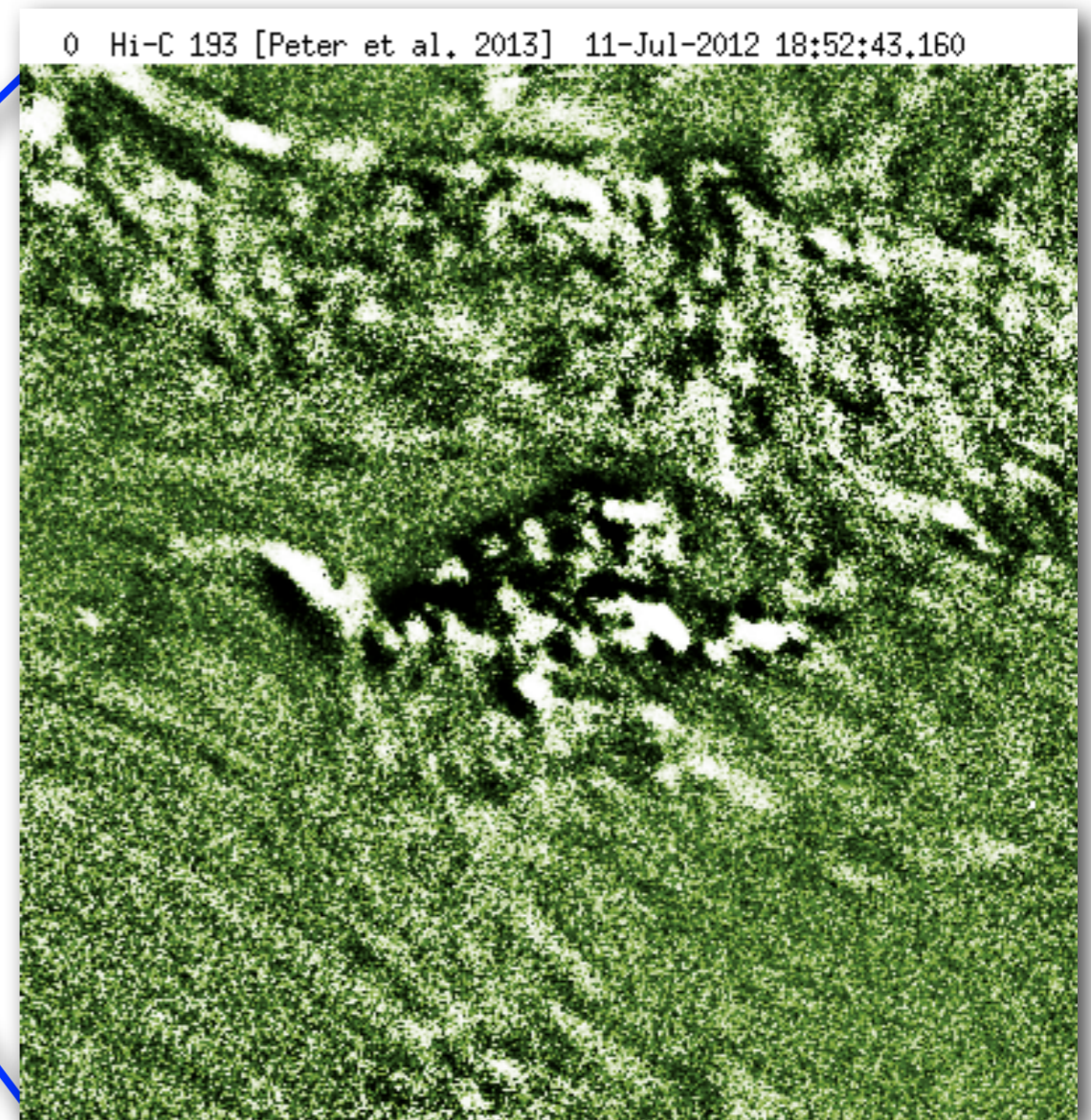
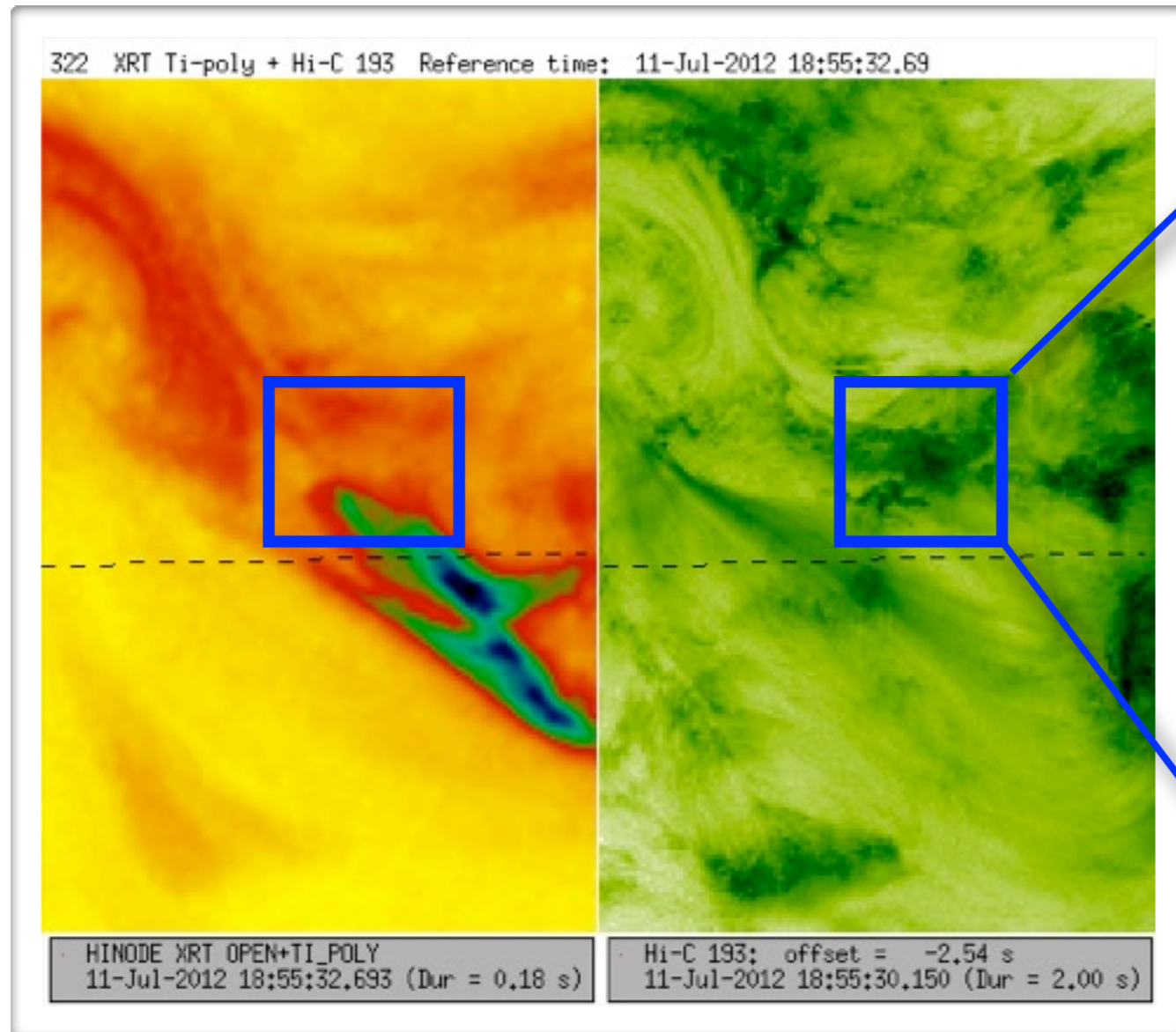
XRT + Hi-C Plage Region 2



← 41 arcsec →

Focus from Testa et. al. 2013

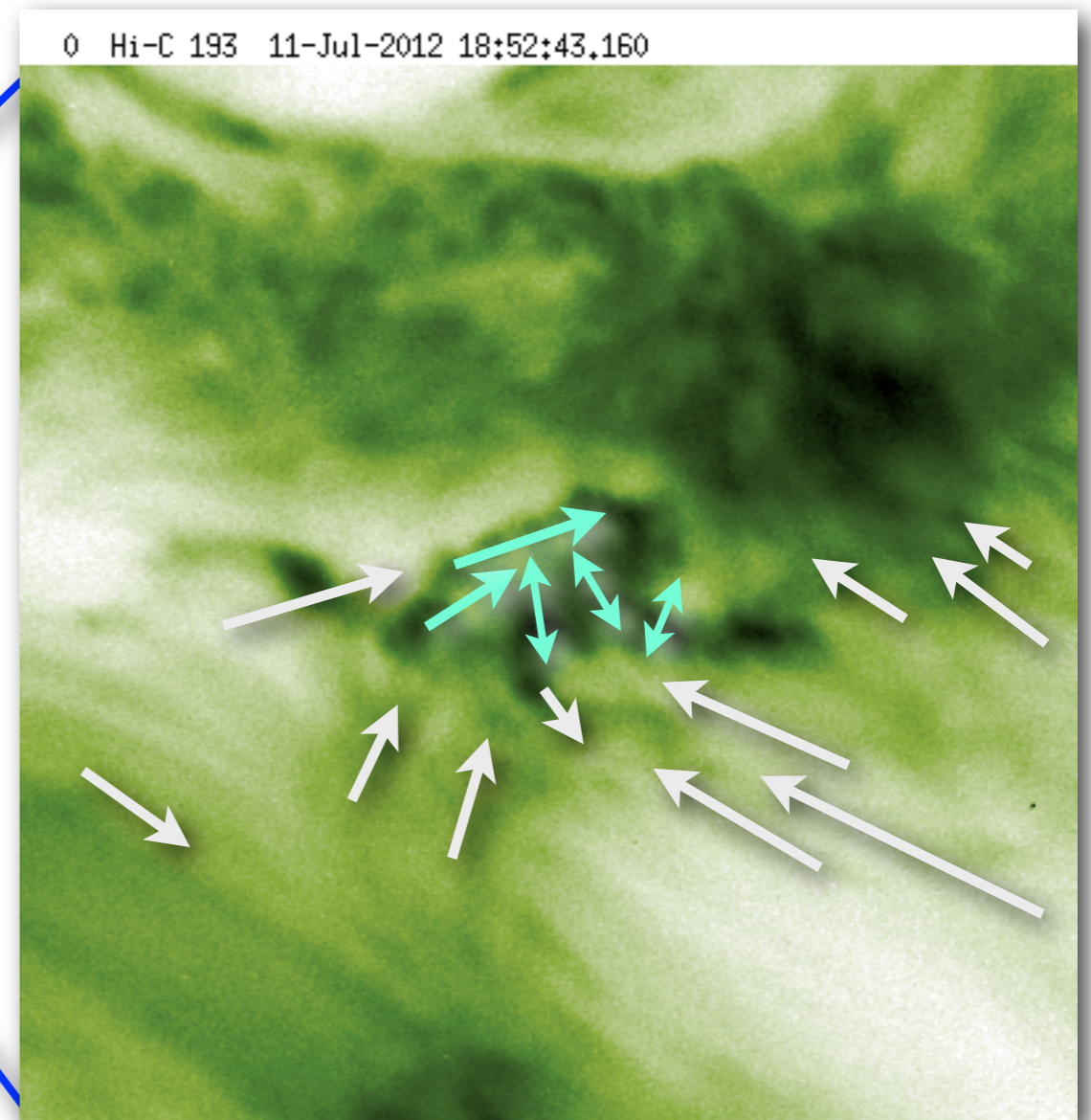
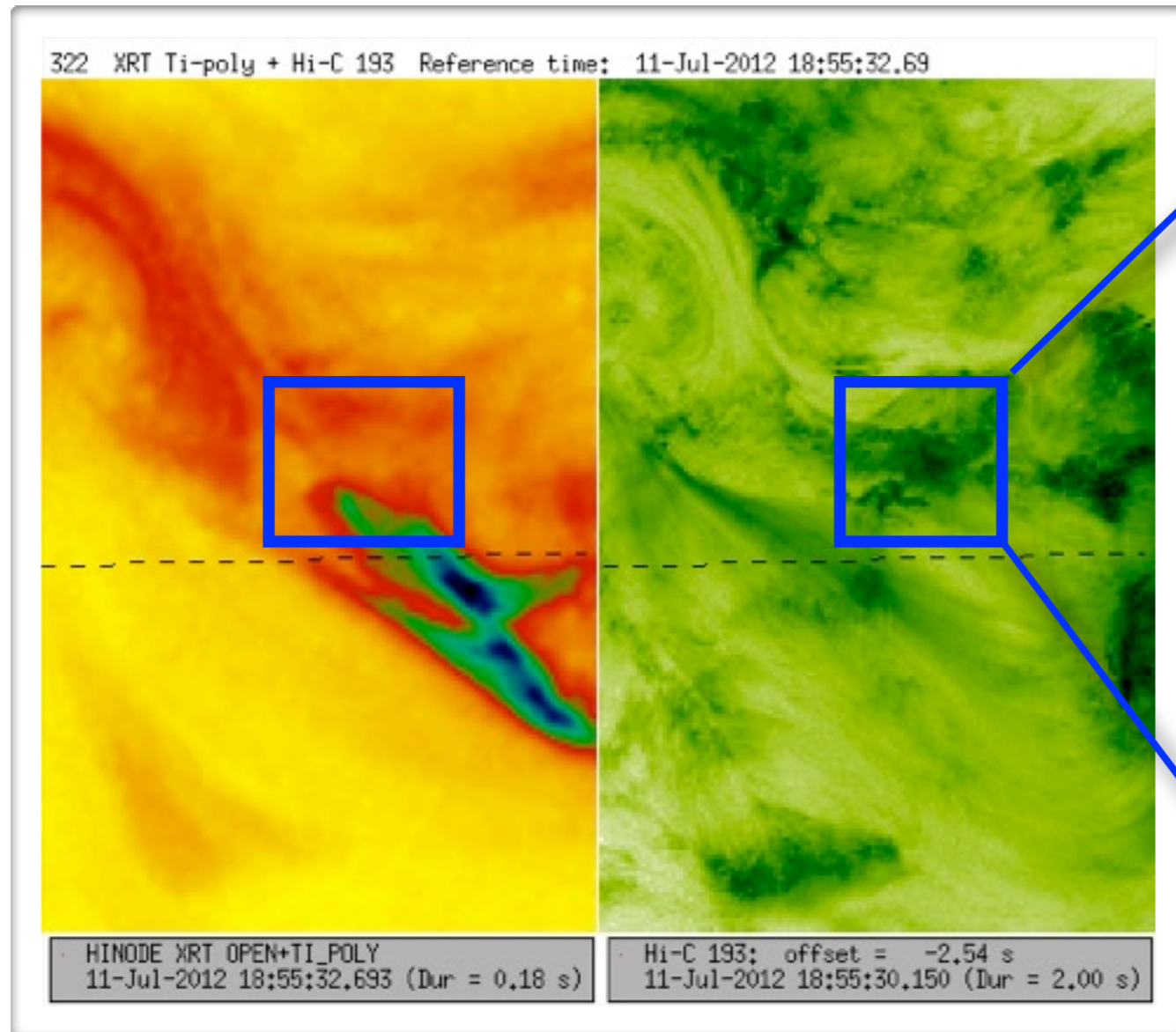
XRT + Hi-C Plage Region 2



← 41 arcsec →

Focus from Testa et. al. 2013

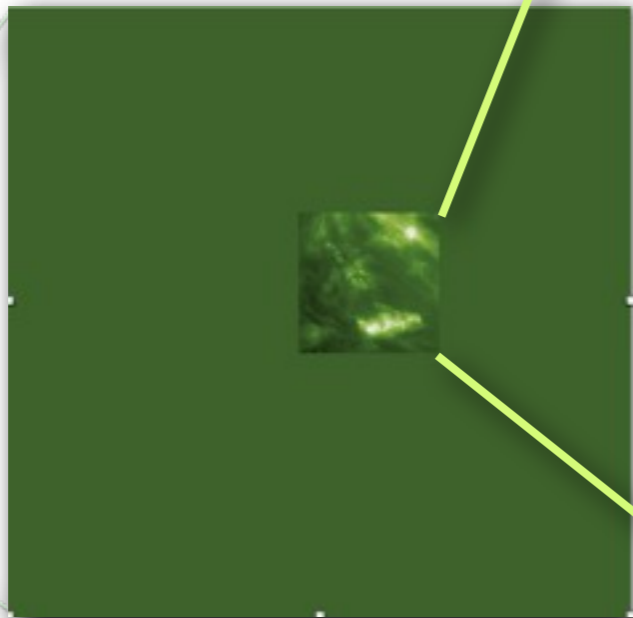
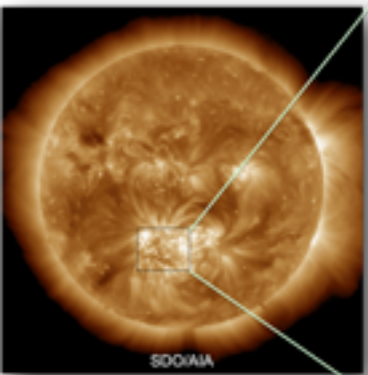
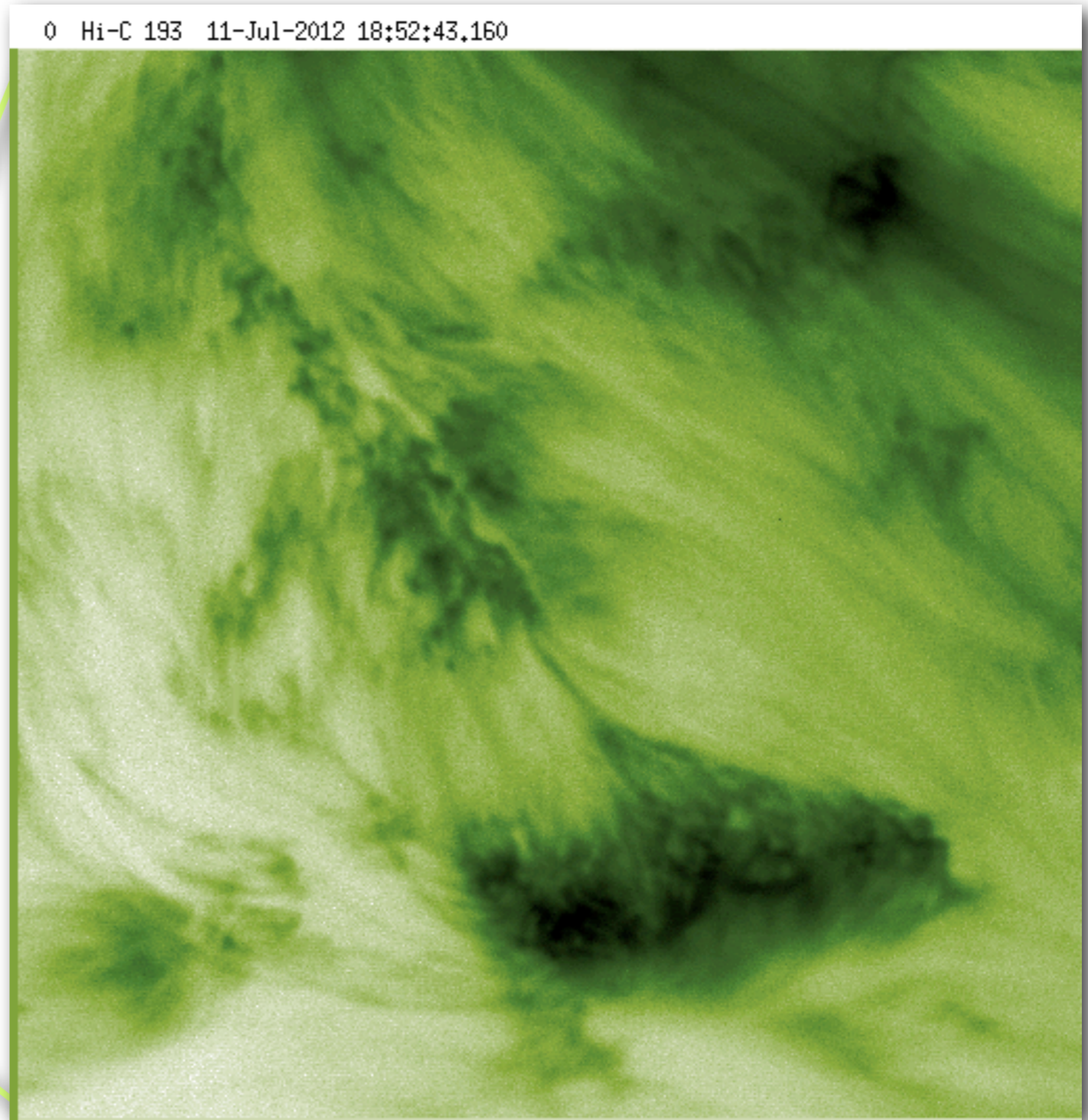
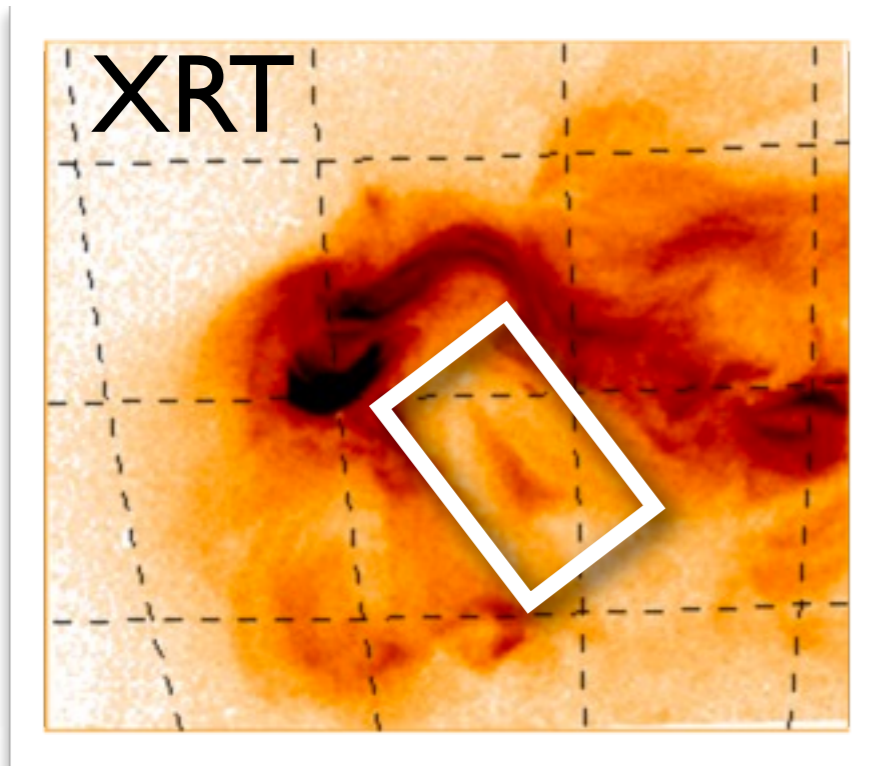
XRT + Hi-C Plage Region 2



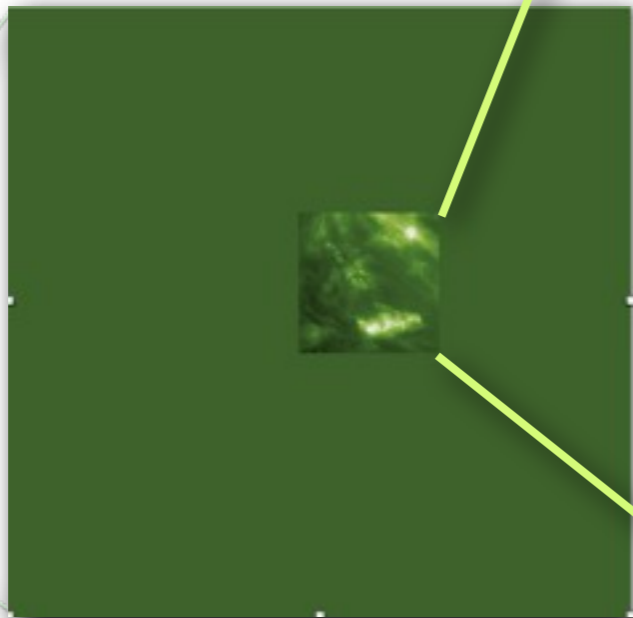
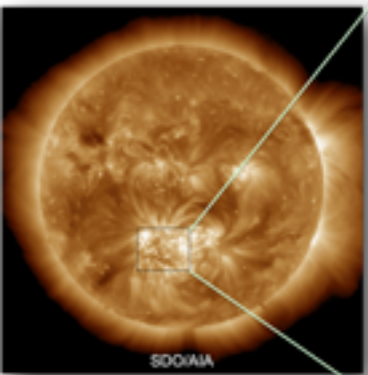
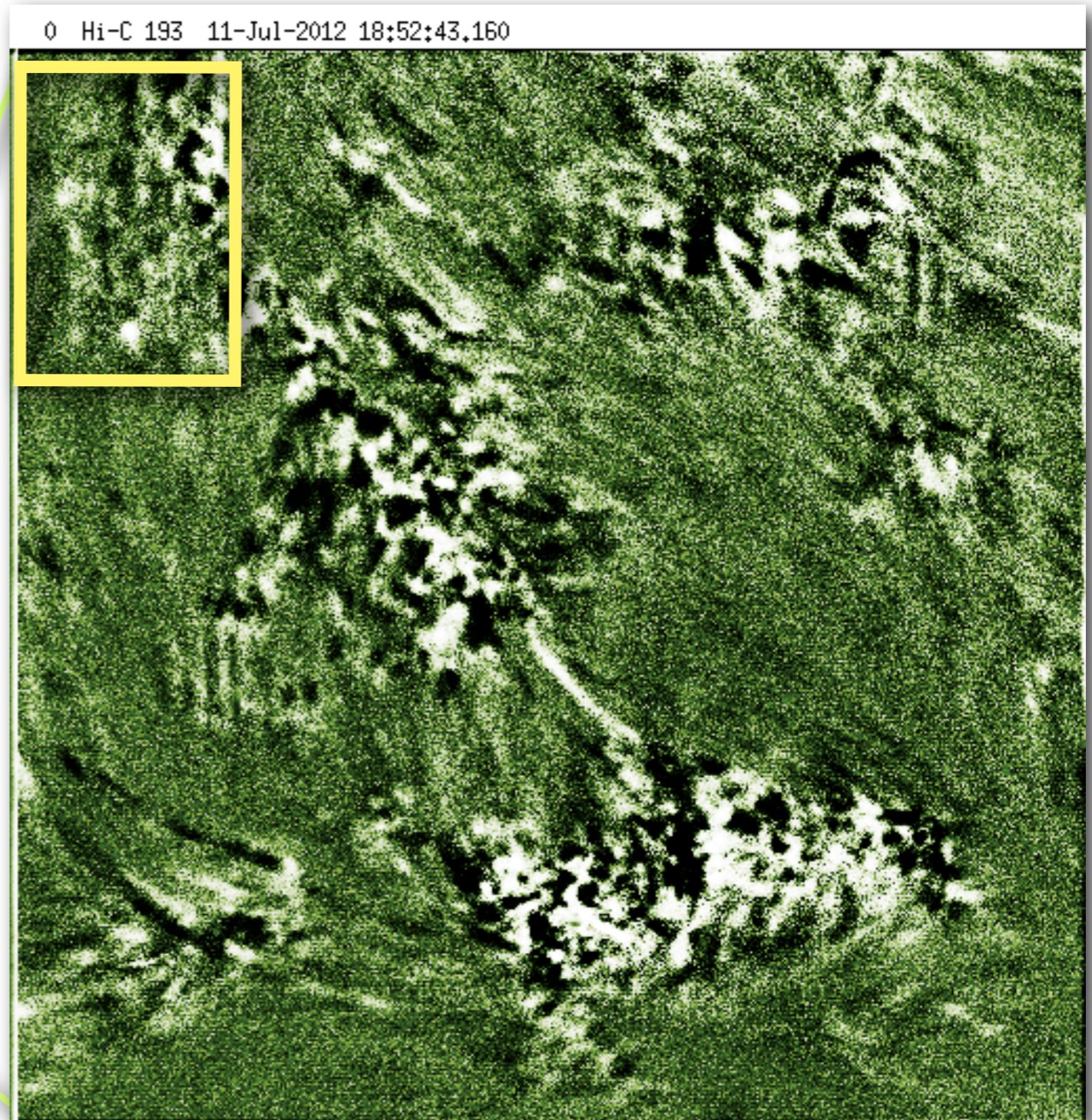
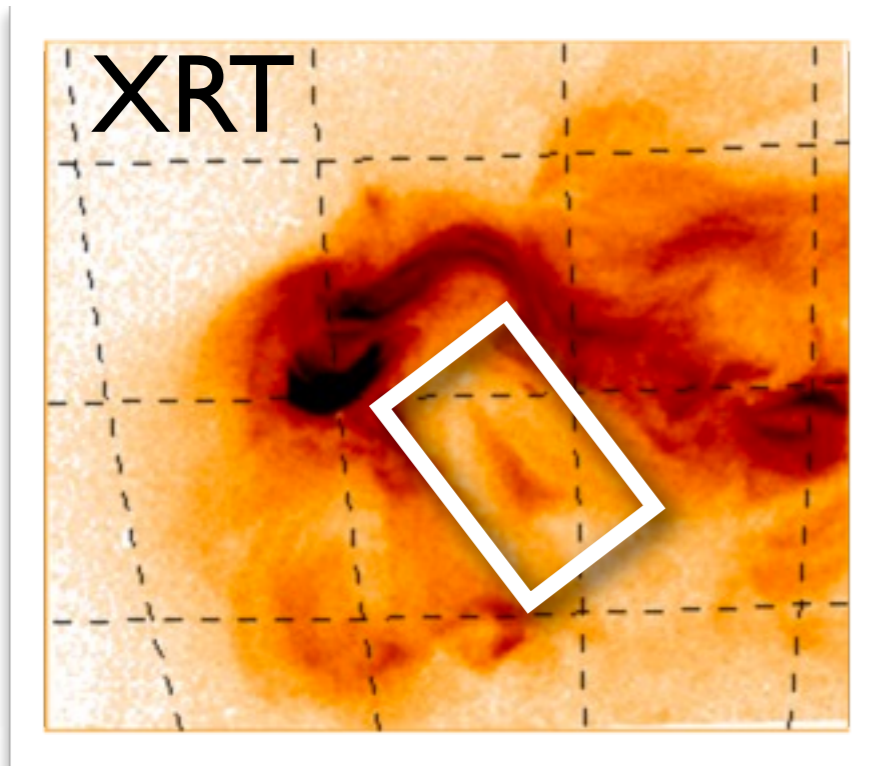
41 arcsec

Focus from Testa et. al. 2013

Hi-C 193 1K region

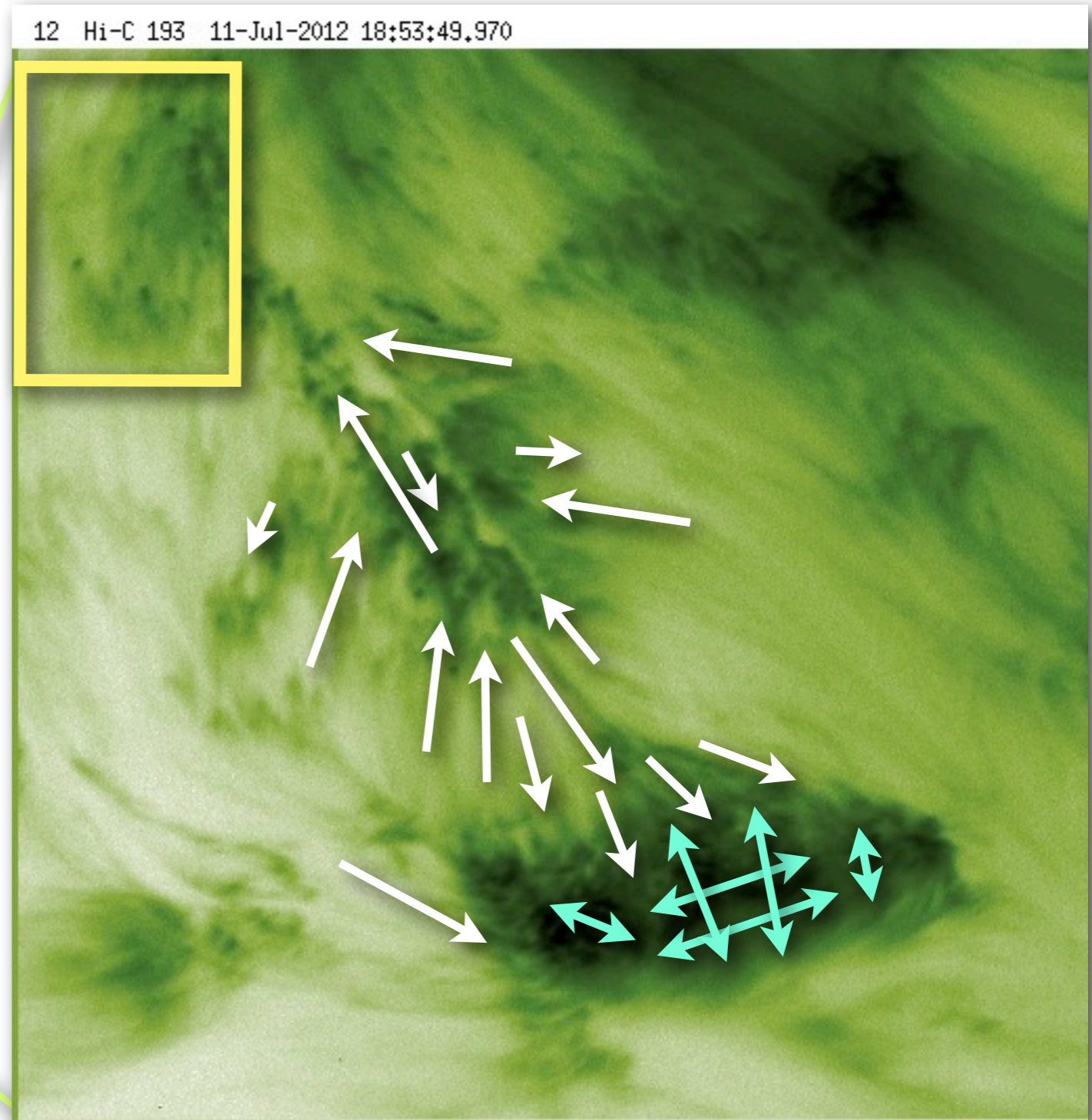
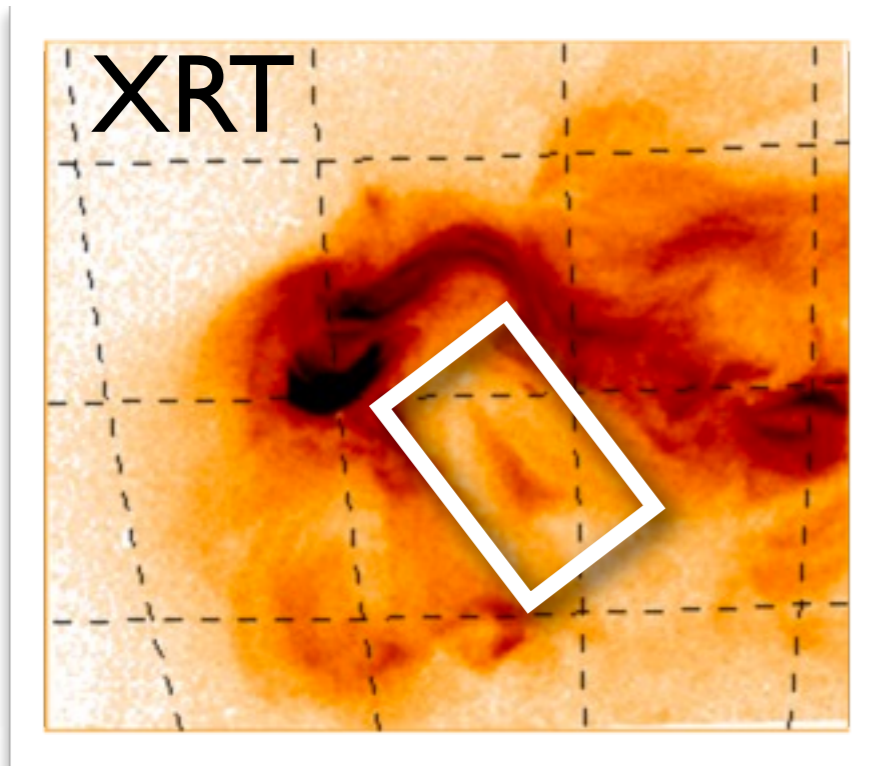


Hi-C 193 1K region

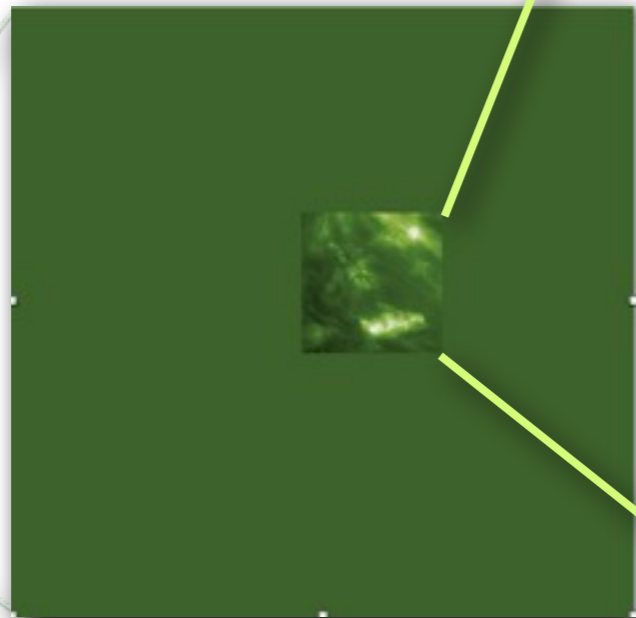
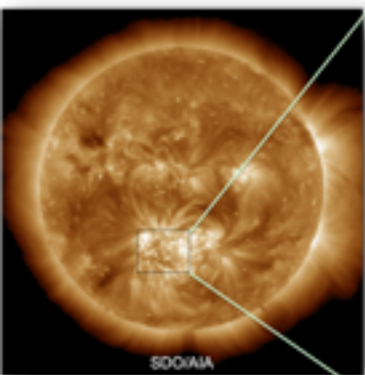


105 arcsec

Hi-C 193 1K region



105 arcsec



Sum up

- Are there micro-loops in the “dynamic moss”? (Not obviously)
- Can we say anything about nanoflares or heating mechanisms? (Promising, but need longer data sets at Hi-C spatial and temporal resolution.)
- Is there more to do with the 5-minute Hi-C data set? (Absolutely! RHESSEI signal in the region, possibly associated with the unbraiding loops. High resolution images of a filament channel. Many more bi-directional flows and other small-scale dynamic events. Etc. Etc. Etc.)