

# Measurements of Magnetic Reconnection to/from Emerging Active Regions

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# Magnetic reconnection...

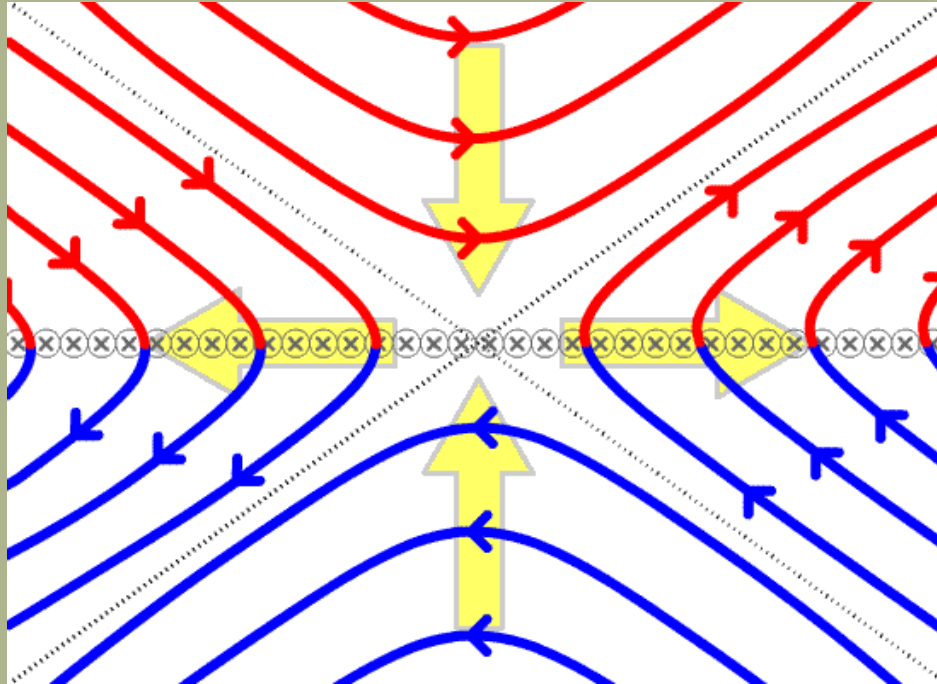
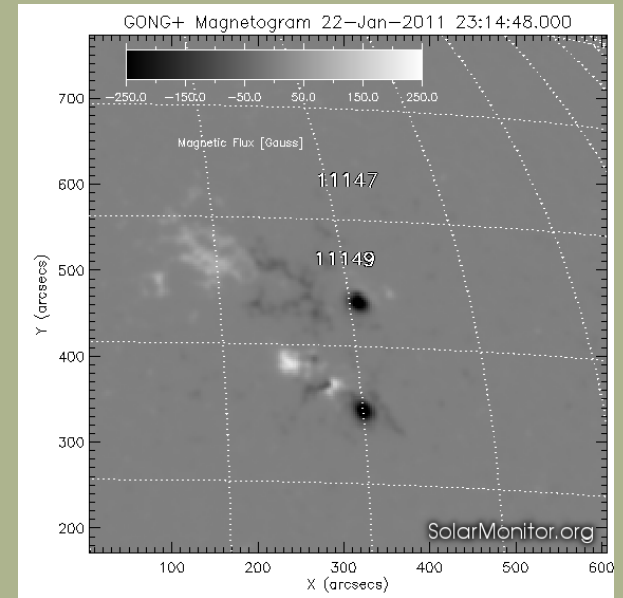
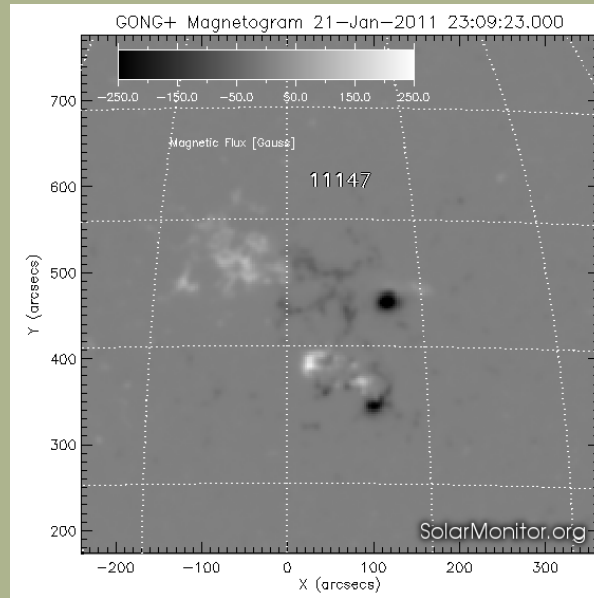
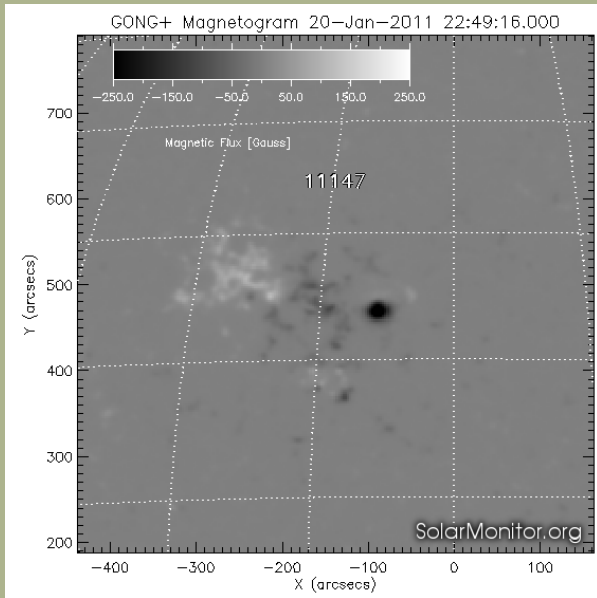
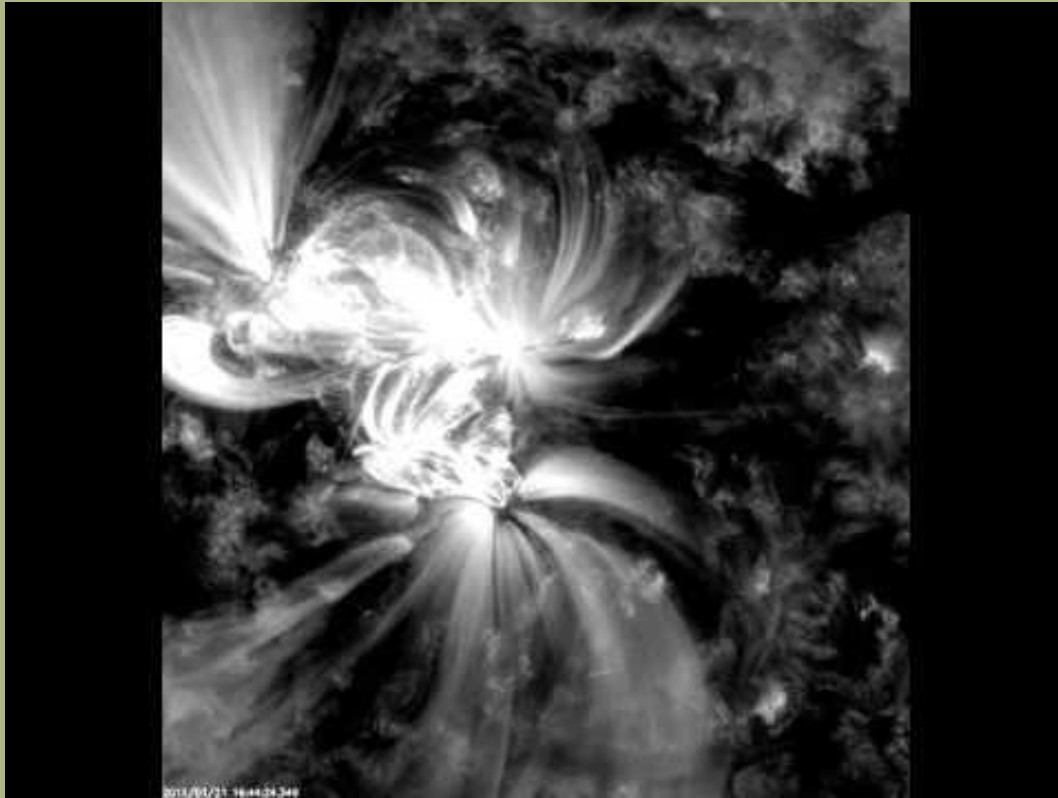


Image via [https://en.wikipedia.org/wiki/Magnetic\\_reconnection](https://en.wikipedia.org/wiki/Magnetic_reconnection)

# ...to and from emerging active regions



Magnetograms for one of our reconnection events



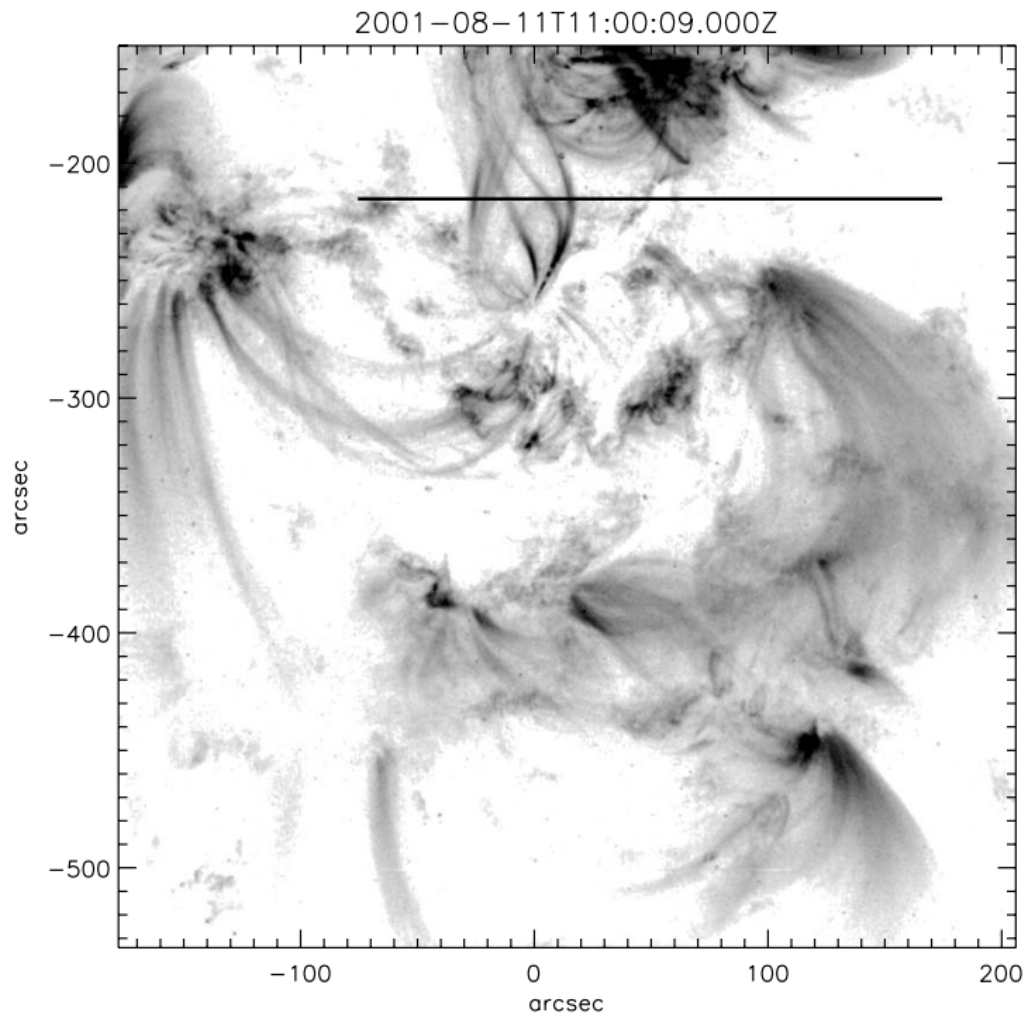
171 Å image from AIA

Video via lmsal cutout service [http://www.lmsal.com/solarsoft/archive/sdo/media/ssw/ssw\\_client/data/ssw\\_service\\_150609\\_133538\\_69278/www/ssw\\_cutout\\_20110121\\_090001\\_AIA\\_171\\_20110121\\_090000\\_j.html](http://www.lmsal.com/solarsoft/archive/sdo/media/ssw/ssw_client/data/ssw_service_150609_133538_69278/www/ssw_cutout_20110121_090001_AIA_171_20110121_090000_j.html)

[http://www.lmsal.com/solarsoft/archive/sdo/media/ssw/ssw\\_client/data/ssw\\_service\\_150609\\_133538\\_69278/www/ssw\\_cutout\\_20110121\\_090001\\_AIA\\_171\\_20110121\\_090000\\_j.html](http://www.lmsal.com/solarsoft/archive/sdo/media/ssw/ssw_client/data/ssw_service_150609_133538_69278/www/ssw_cutout_20110121_090001_AIA_171_20110121_090000_j.html)

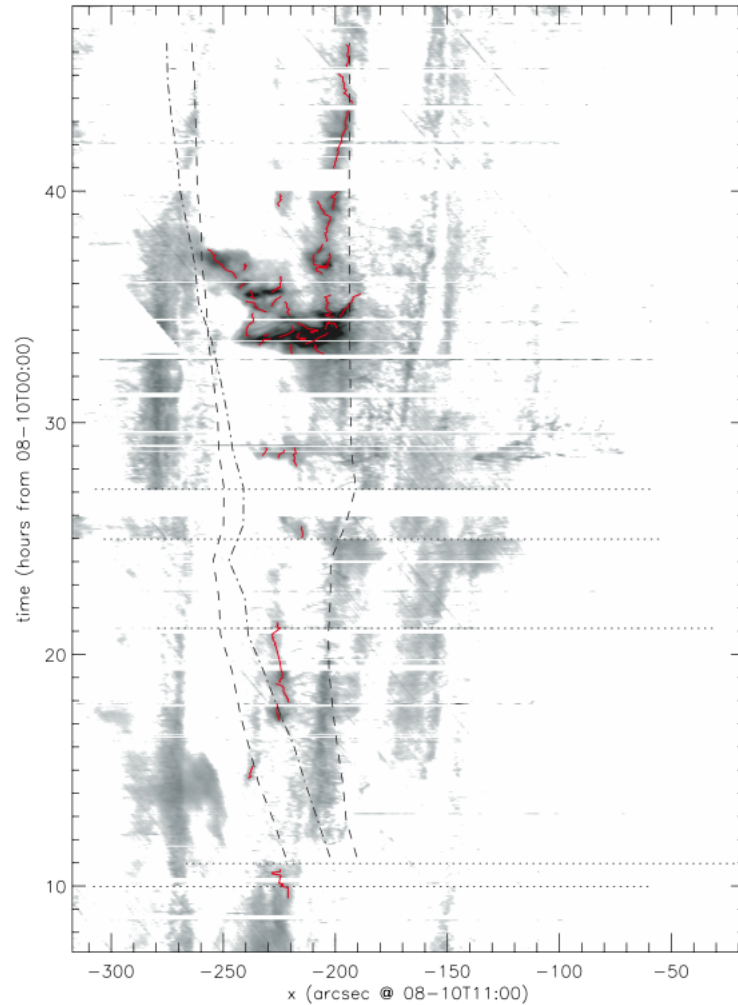
What is motivating this?

171 Å from TRACE



Longcope, et. al.  
"Observations of  
separator  
reconnection to an  
emerging active  
region." 2005

Stack plot using 171 Å  
TRACE images



Longcope, et. al.  
"Observations of  
separator  
reconnection to an  
emerging active  
region." 2005

# Primary motivation: Only one case of this in literature

Table of events proposed for analysis (via “Using EUV image sequences to quantify magnetic reconnection in the solar corona” proposal)

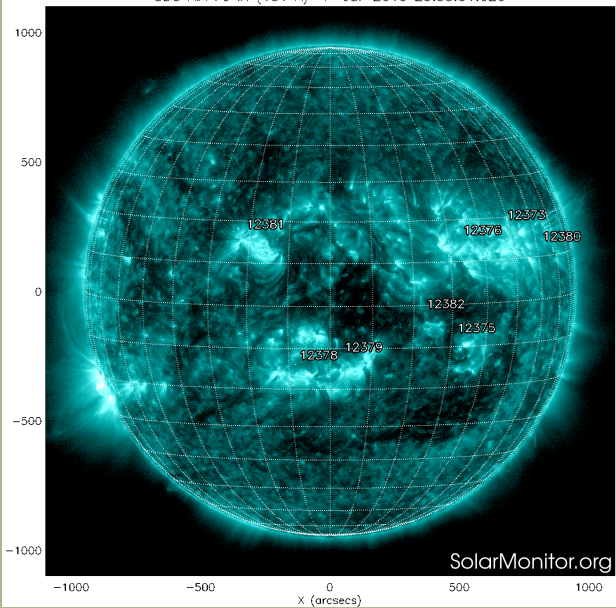
#	date y-m-d	ARs old/new	helio. loc.	ang. sep.	flares C/M	#	date y-m-d	ARs old/new	helio. loc.	ang. sep.	flares C/M/X
1	2011-01-20	1147/1149	N17W04	6.3°	11/1	9	2012-01-14	1395/1398	N18E04	8.2°	3/0
2	2011-02-17	1161/1162	N17W05	7.2°	20/4	10	2012-04-18	1458/1460	N18E17	9.0°	5/0
3	2011-05-15	1214/1217	S18E36	5.1°	0/0	11	2013-01-10	1649/1655	S22W02	5.1°	0/0
4	2011-08-29	1277/1282	N23E01	6.1°	0/0	12	2013-02-19	1671/1678	N09W26	9.8°	10/0
5	2011-10-12	1313/1320	S19W22	8.1°	7/0	13	2013-10-13	1865/1870	S13W05	9.2°	18/3
6	2011-10-29	1334/1335	N15E40	8.6°	7/0	14	2013-11-11	1893/1900	S15E15	9.2°	31/4/1
7	2011-12-05	1367/1370	S29E25	8.0°	18/0	15	2013-12-03	1908/1914	S18W19	7.6°	0/0
8	2011-12-18	1381/1382	S18E36	6.0°	11/0	16	2014-04-14	2036/2037	S10E29	9.4°	31/1

- Goals are to make quantitative measurements of magnetic reconnection to better understand this phenomena



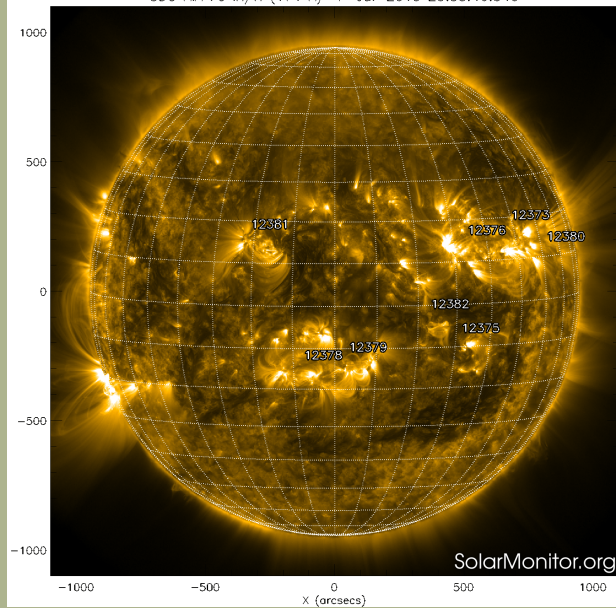
# AIA

SDO AIA Fe IX (131 Å) 7-Jul-2015 23:33:31.620



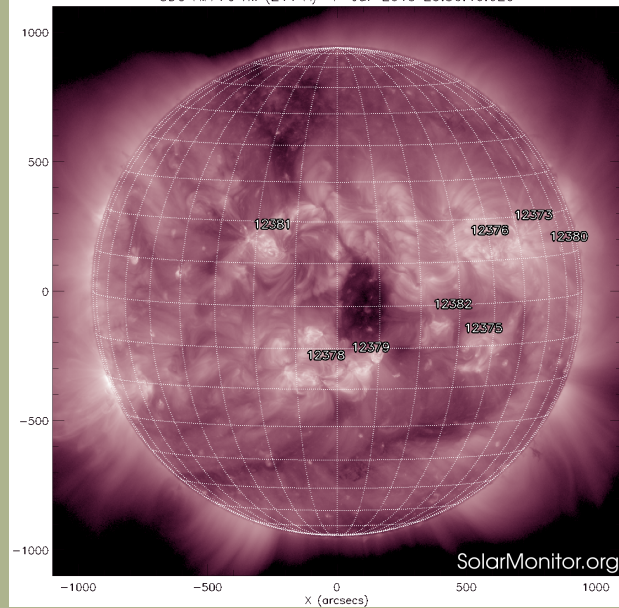
131 Å 10 MK

SDO AIA Fe IX/X (171 Å) 7-Jul-2015 23:33:46.340



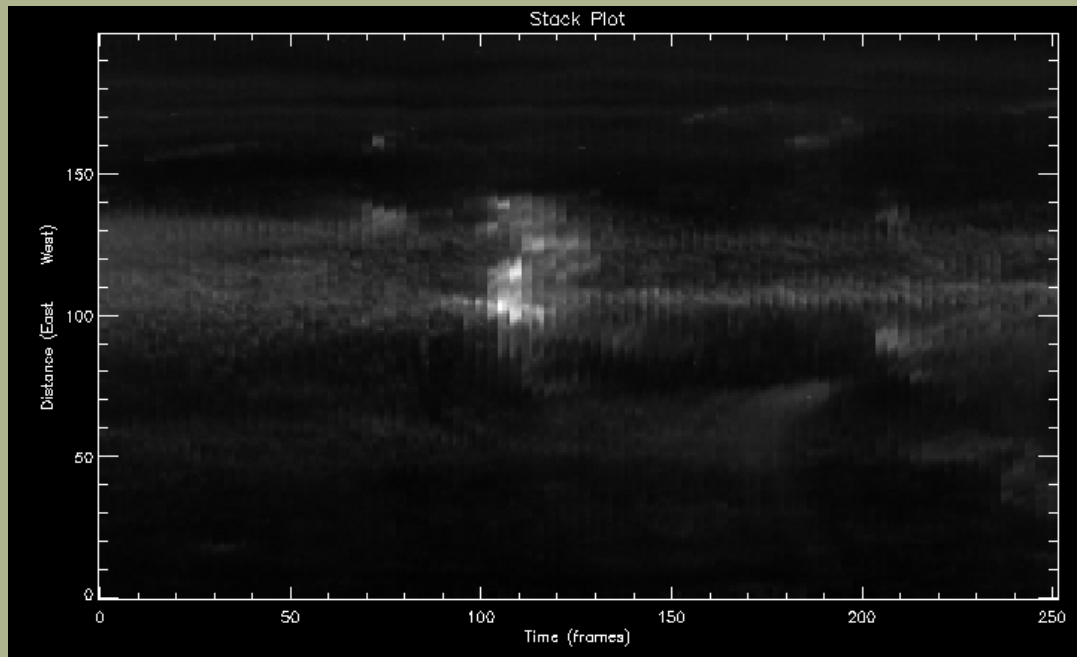
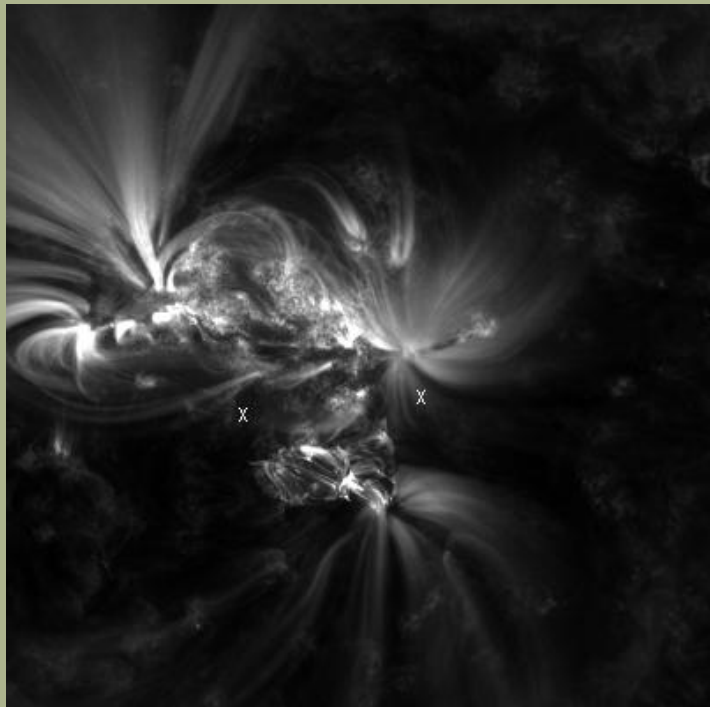
171 Å 1 MK

SDO AIA Fe XII (211 Å) 7-Jul-2015 23:36:46.620

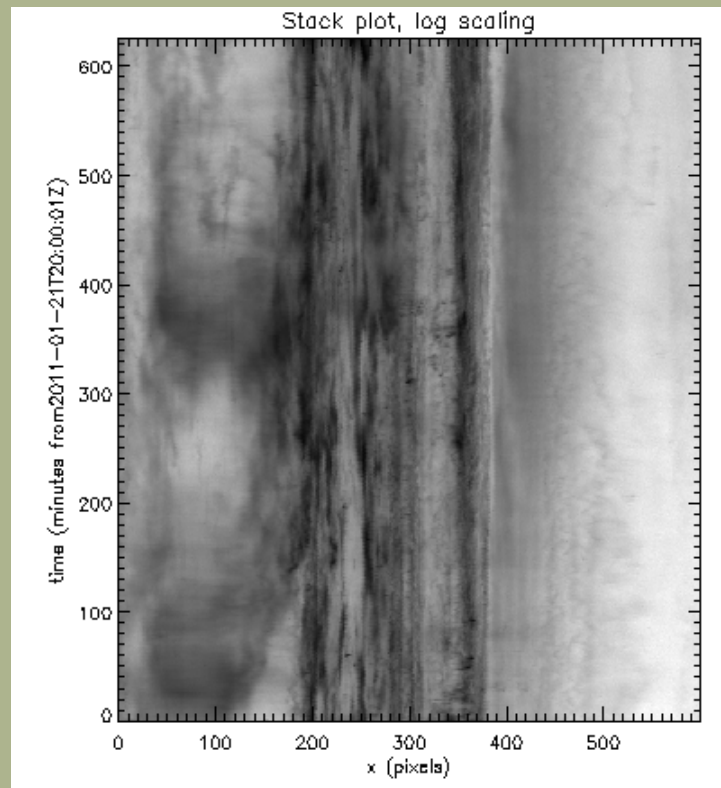
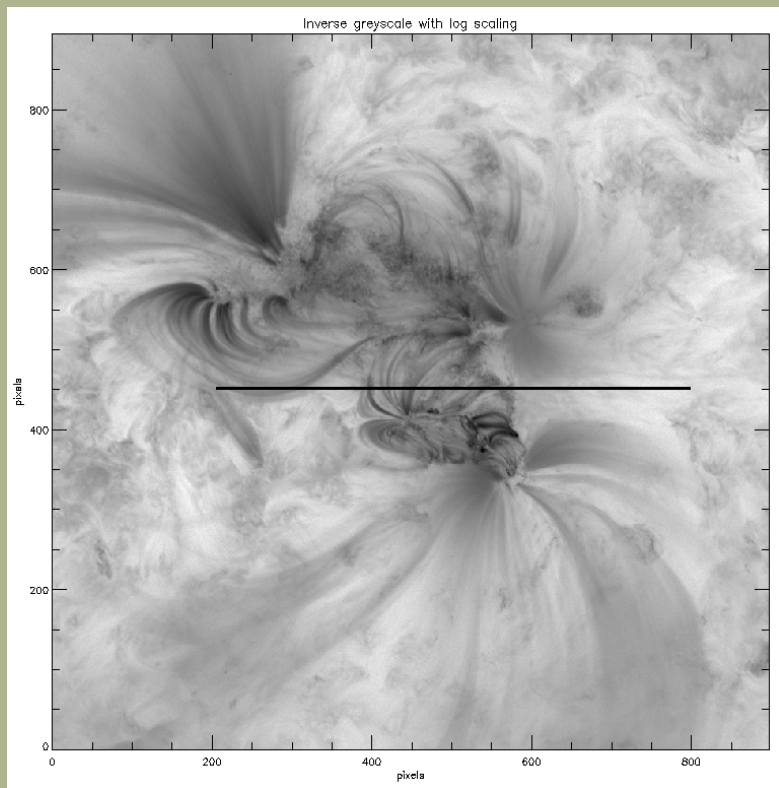


211 Å 2 MK

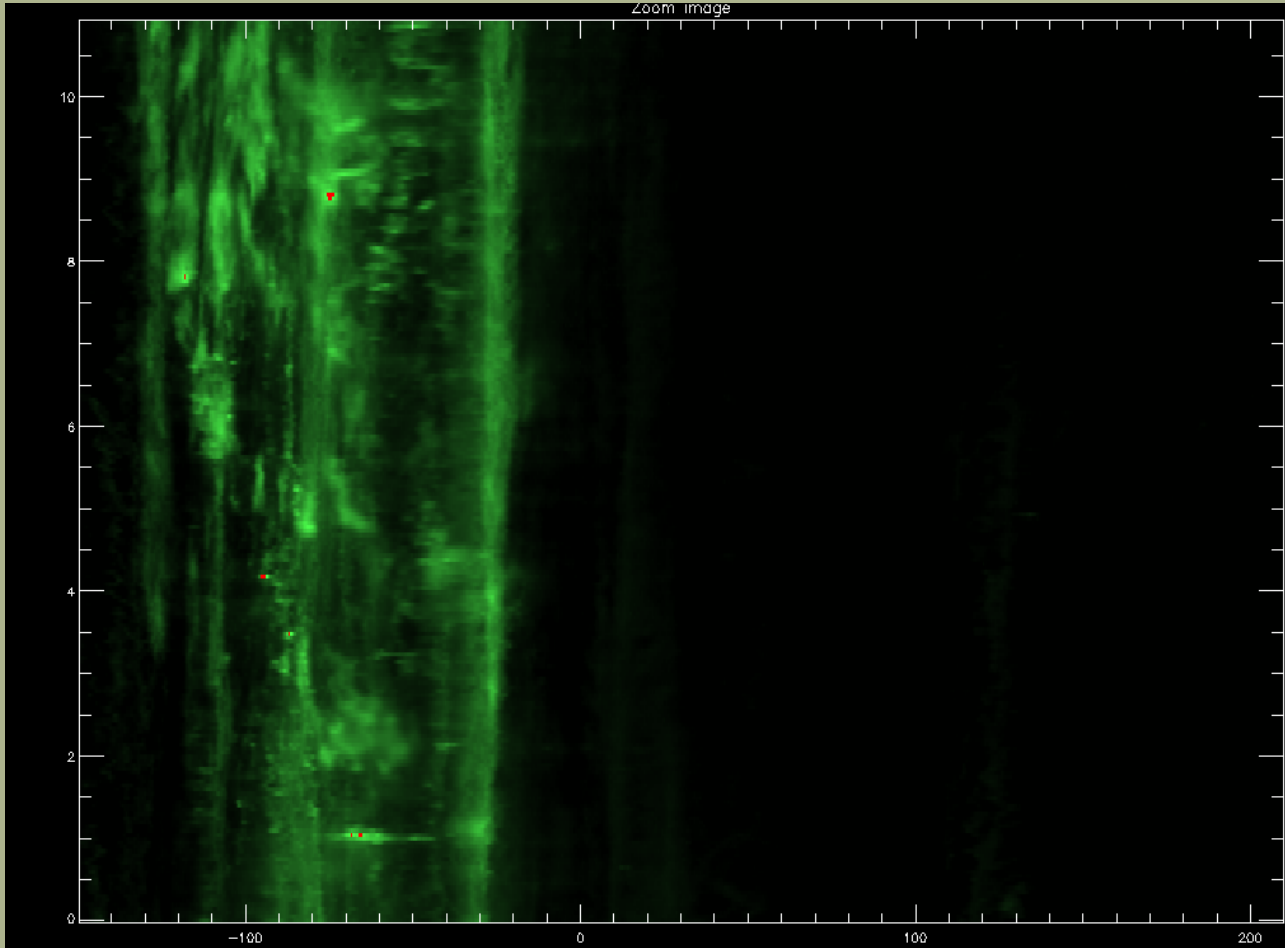
# Stack plot

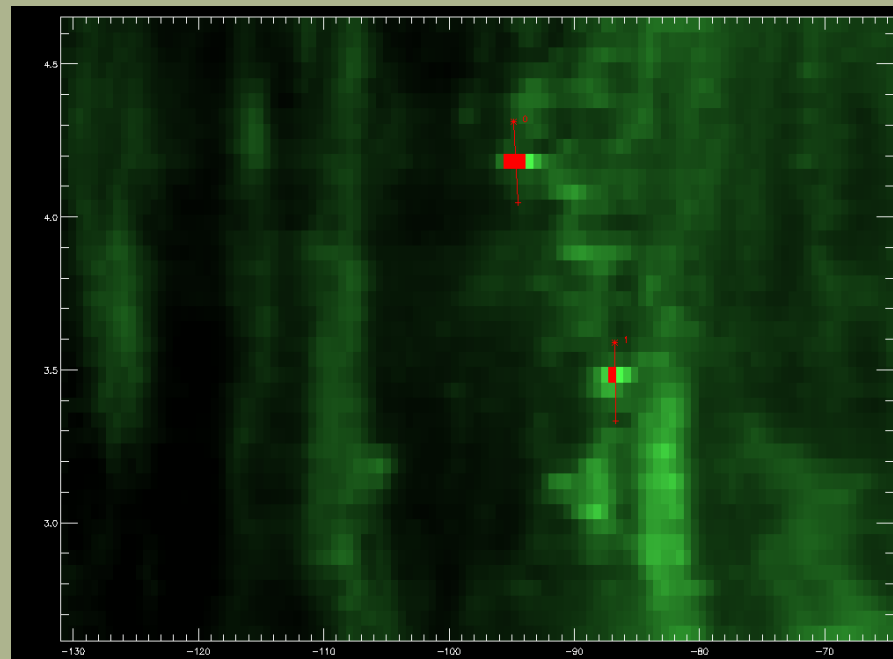
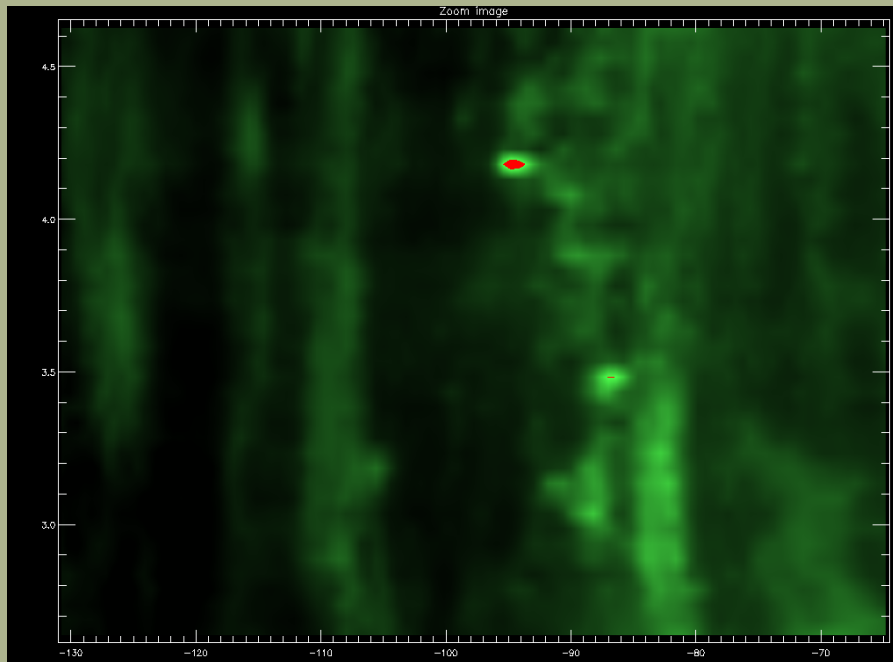


# Adapting stack plot to fit Anna's pipeline



Zoom image





# Adjustments to be made to pipeline

- Enable hardwired-in plot procedures to be adjusted

# Next steps

- Using the adapted pipeline on AIA data
- More pipeline
  - Implementing creation of the magnetic model

- Besides quantifying the observed time delay...
  - How much coronal current builds up before reconnecting?
  - What is the relationship between topological change and energy release?
  - What range of reconnection electric fields is observed in these reconnection events?
  - What is the distribution of flux tube diameters (and fluxes) created by the reconnection process? Does it vary or is it a fundamental characteristic of coronal reconnection?



Questions?