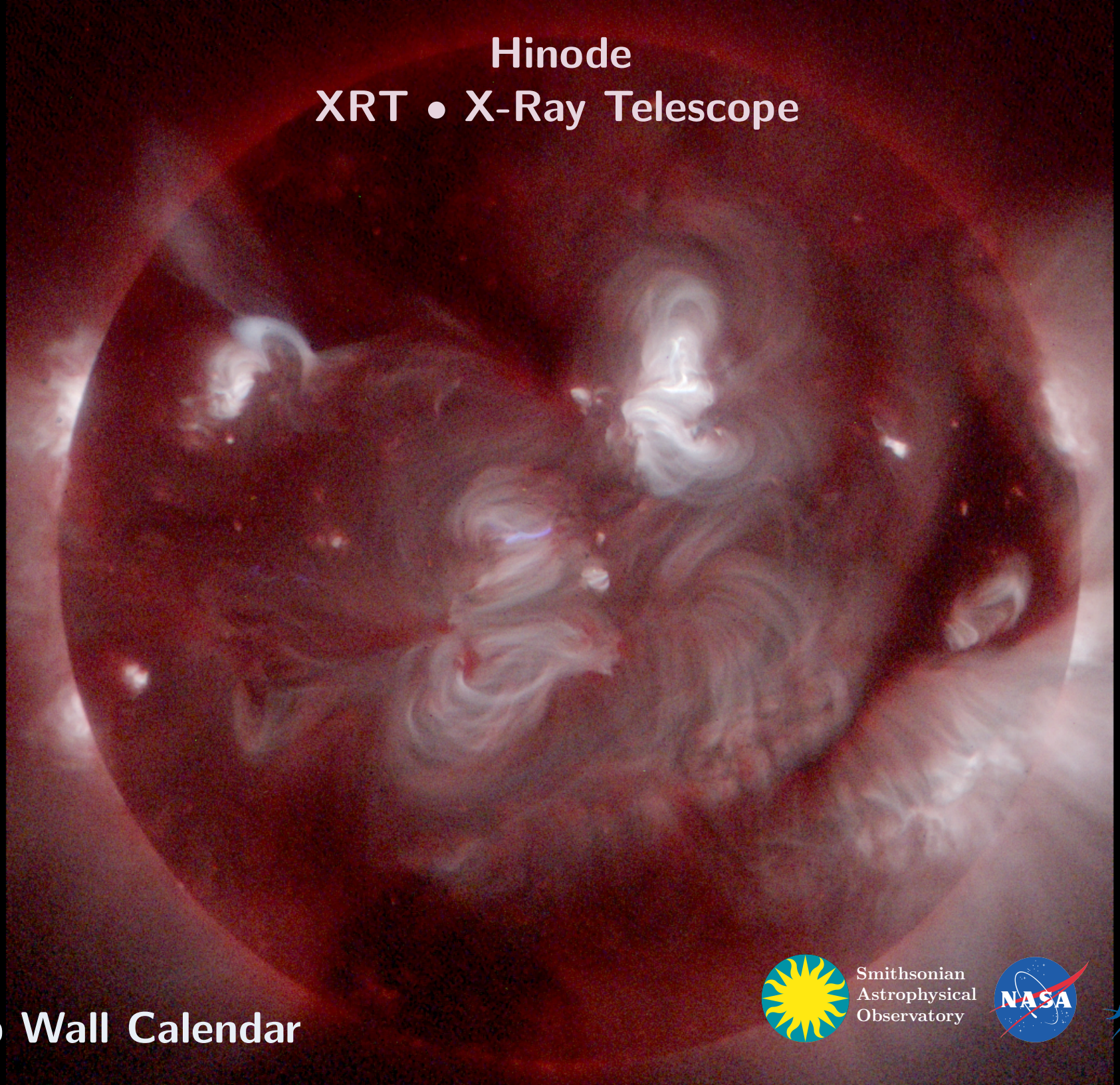
Hinode
XRT • X-Ray Telescope



Smithsonian Astrophysical Observatory

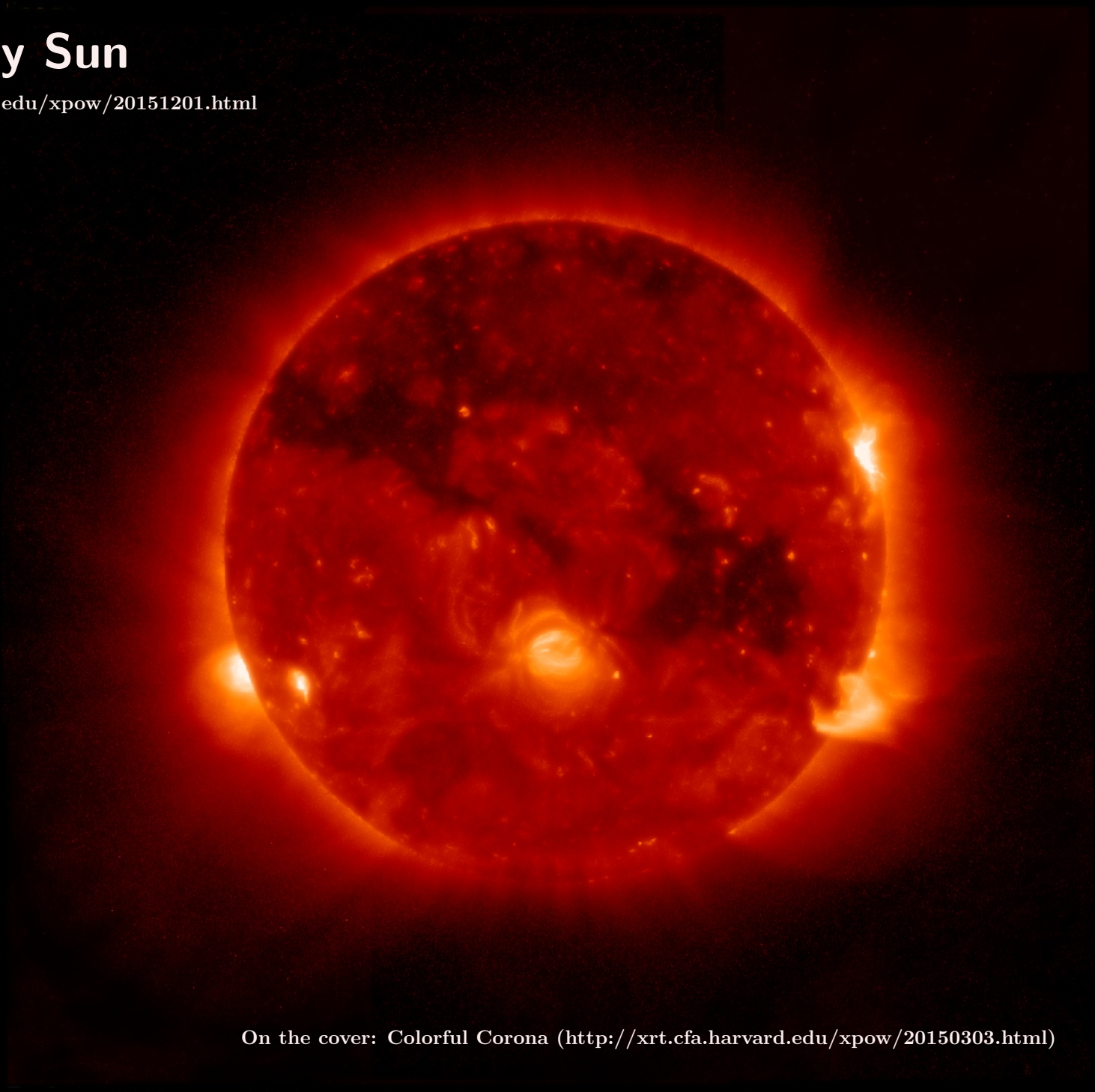
NASA

JAXA

2016 Wall Calendar

X-ray Sun

http://xrt.cfa.harvard.edu/xpow/20151201.html



XRT Picture of the Week
http://xrt.cfa.harvard.edu/xpow/

On the cover: Colorful Corona (http://xrt.cfa.harvard.edu/xpow/20150303.html)

2015

January

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

July

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

August

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

September

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

October

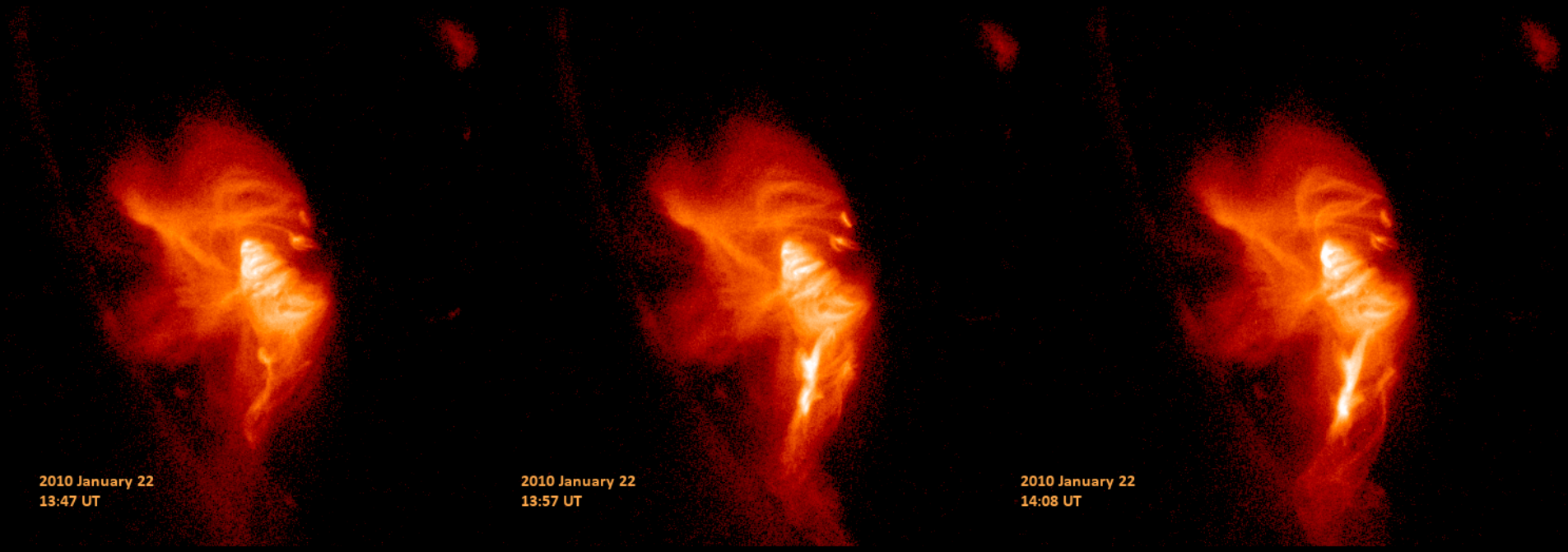
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

November

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

December

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		



Activity Returns to the Sun!

The XRT observed a beautiful CME on 22 January 2010 starting at 13:45UT, erupting toward the SE and unfurling as it propagated outward. TRACE obtained 171A images starting at 13:58UT, showing the rising and twisting filament intertwined with the bright XRT loops. The apparent interleaving of dark absorption features with bright emission features, seen prominently by TRACE, remains a puzzling feature of filament eruptions. There does not seem to be any significant low-corona flare brightening associated with this event.

http://xrt.cfa.harvard.edu/xpow/20100122.html

December

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

January

February

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1 New Year's Day	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18 Martin Luther King Day	19	20	21	22	23
24/31	25	26	27	28	29	30

Active Region 11589

Observation date: 18 October 2012

http://xrt.cfa.harvard.edu/xpow/20130214.html

January

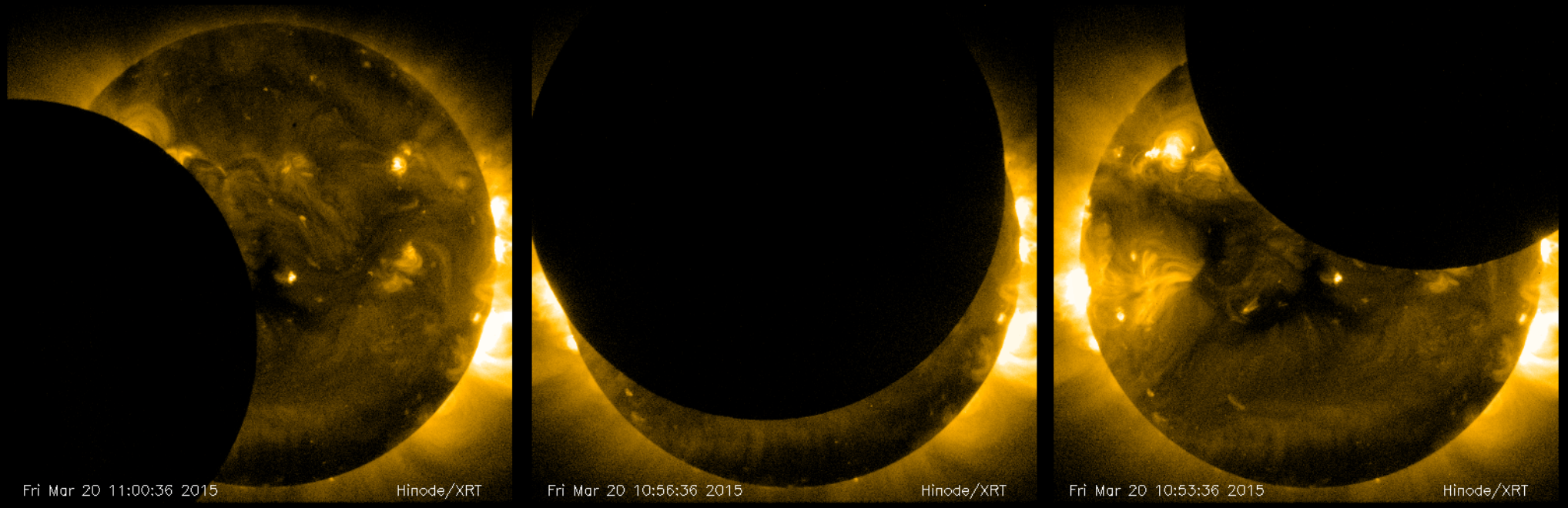
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

February

March

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14 Valentine's Day	15 Presidents' Day	16	17	18	19	20
21	22	23	24	25	26	27
28	29	1	2	3	4	5



Solar Eclipse

This partial eclipse, also visible on Earth, happened on 20 March 2015. Solar eclipses happen only a few times a year with most of them only partially obscuring the Sun. The most exciting solar eclipse event will happen in the summer of 2017 when most of the United States will be able to see a total solar eclipse.

http://xrt.cfa.harvard.edu/xpow/20150324.html

February

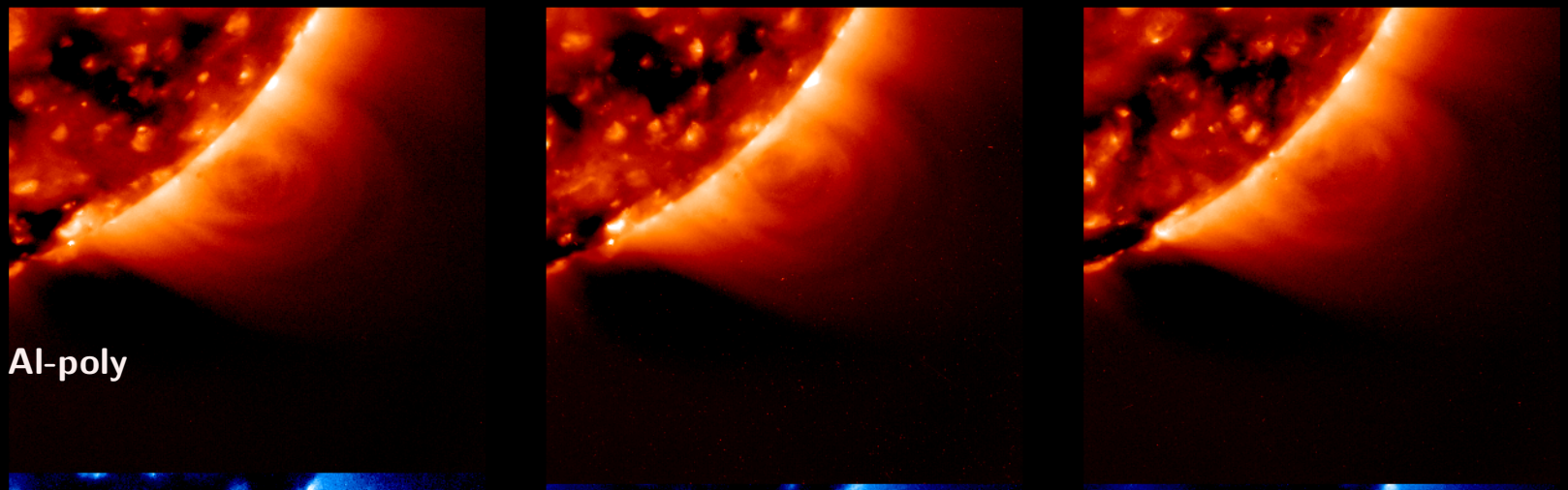
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

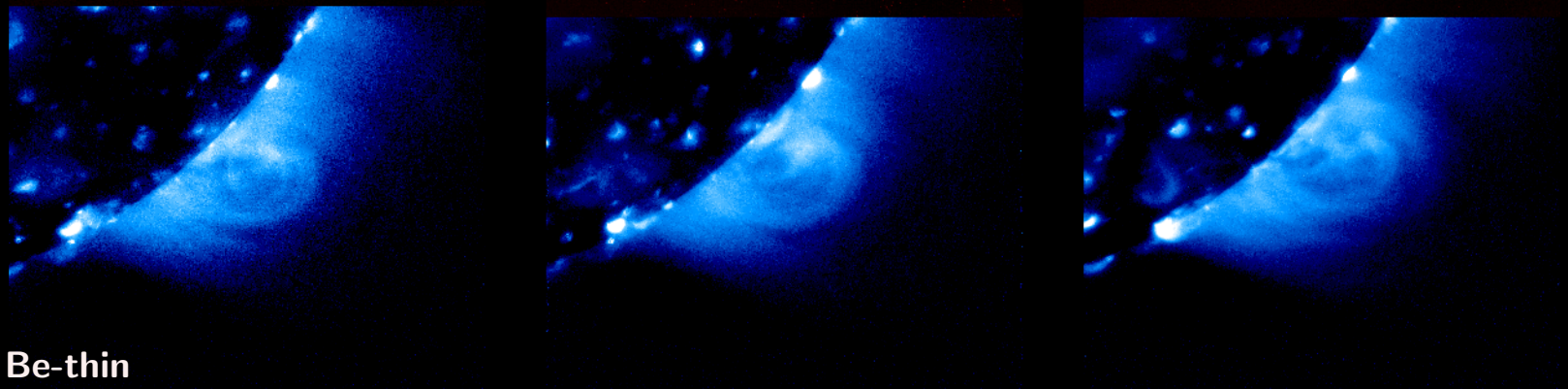
March

April

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17 St. Patrick's Day	18	19
20	21	22	23	24	25	26
27 Easter Sunday	28	29	30	31	1	2





Filament Channel on the Limb

Arcade loop systems were observed above a filament cavity on 27 July 2008 . The inner arcade looks a bit brighter than the outer in the Be-thin images, vice versa in the Al-poly images. The top row shows one hour averages of Al-poly and the bottom row shows the same for the Be-thin images.

http://xrt.cfa.harvard.edu/xpow/20080727.html

March

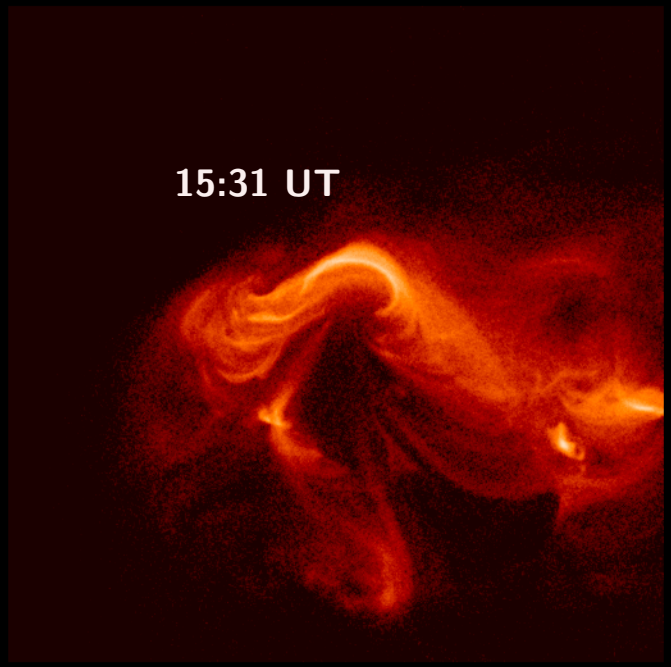
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

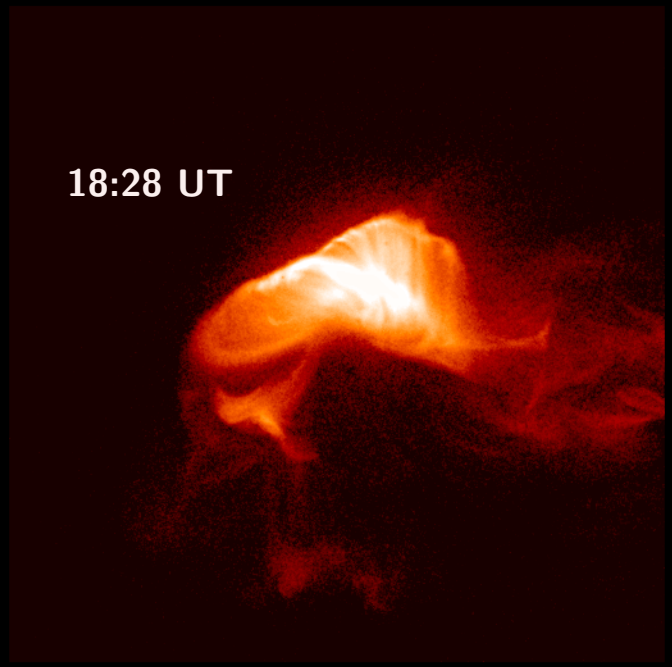
April

May

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	31	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30





X1.4 Flare of July 12, 2012

On 12 July 2012, XRT observed an X1.4 flare from AR1150. This region had been a sigmoid (S-shape) before the eruption. After the X-flare, new loops perpendicular to the original S shape were formed and dominate the region.

http://xrt.cfa.harvard.edu/xpow/20120731.html

April

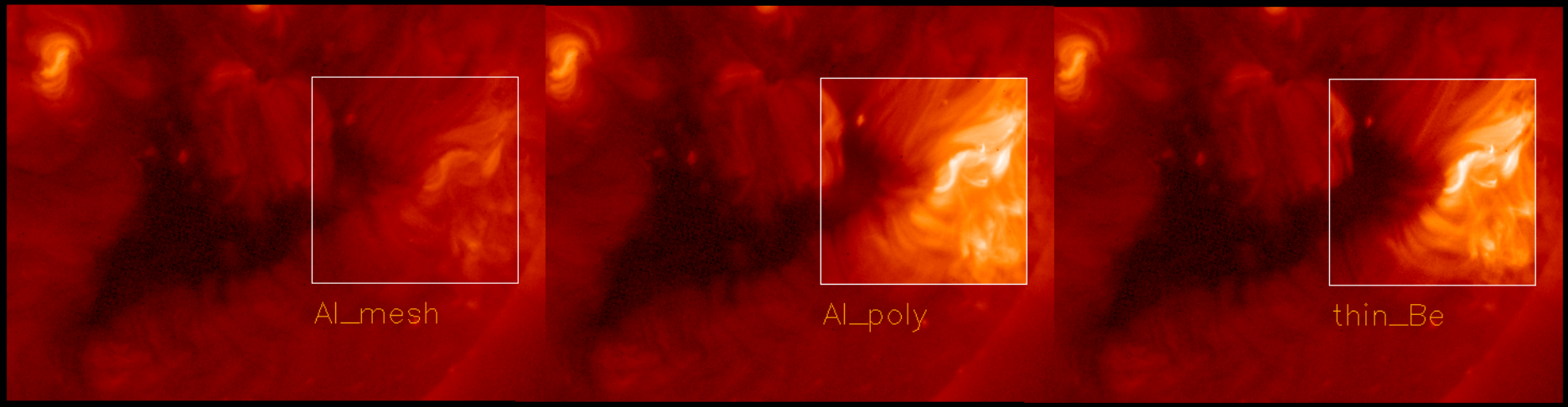
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

May

June

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
8 Mother's Day	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30 Memorial Day	31	1	2	3	4



Expanding Boundaries

Coronal holes are easy to spot in X-rays but they are neither static or simple solar features. In fact, just determining the boundary of a coronal hole is quite difficult and depends on many factors including the wavelength of light we observe it in. So when Hinode planners noticed there were no active regions near the west limb they seized the opportunity to take long exposures of this coronal hole boundary.

The thinnest filter, Al-mesh, sees cool (500,000 degrees) features. The coronal hole appears smallest in this filter. You'll also notice the Al-mesh image is not as bright as the other two boxed images. That is because it is has the shortest exposure time.

The next boxed image was taken with the Al-poly filter. This filter sees mostly million degree plasma making the hole appear slightly larger. However, X-rays from cool plasma are not completely blocked and therefore those regions will appear faint in this filter.

The coronal hole appears largest in the Be-thin filter, this filter blocks all X-ray emission from the cool plasma and really only sees the million degree corona. Even though the exposure time is almost 10 times longer for the Be-thin image, it cannot detect the cool boundary plasma.

http://xrt.cfa.harvard.edu/xpow/20150608.html

May

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

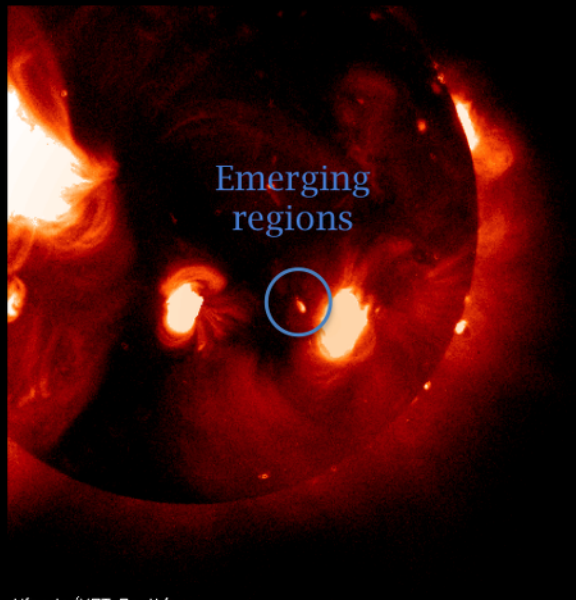
June

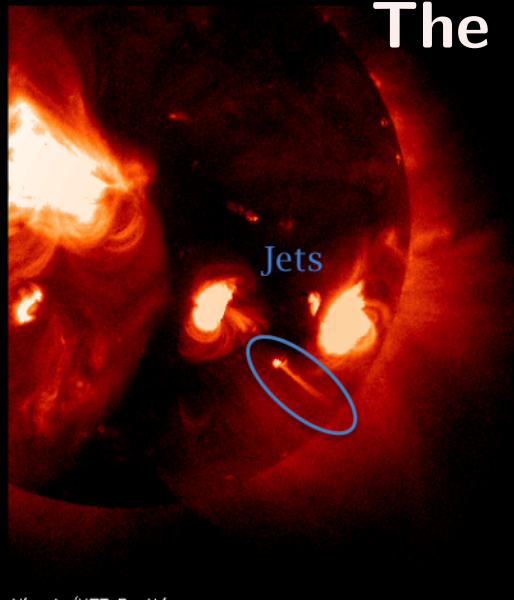
July

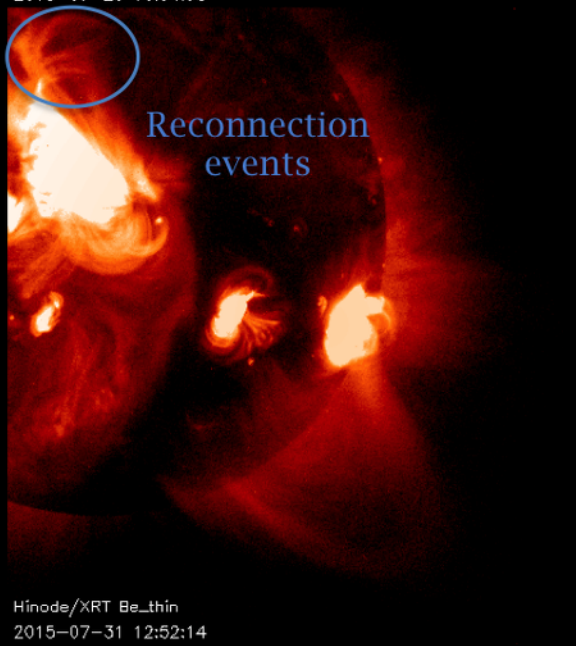
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

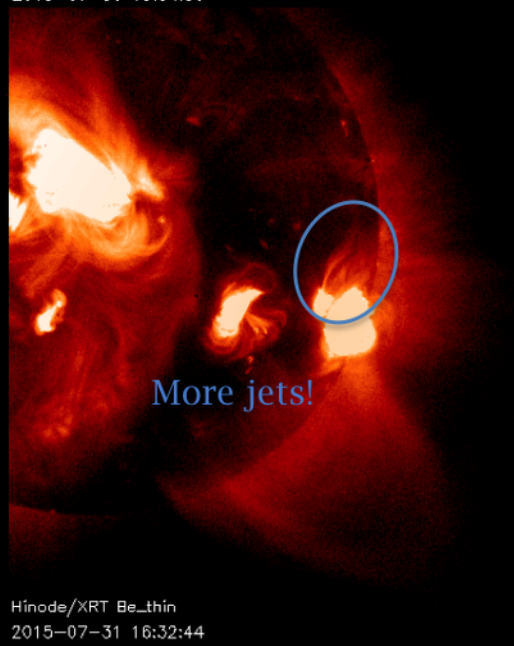
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
29	30	31	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19 Father's Day	20	21	22	23	24	25
26	27	28	29	30	1	2

The Sun in Focus (Mode)









At certain times of the year, usually when XRT goes through its eclipse season (when Earth gets in the way of the Sun briefly every orbit), XRT goes into what we call 'focus mode'. This means the XRT chief observer uploads one plan for an entire week of observations.

During one of these weeks, XRT ran a continuous program spanning several days. This observing program took images of the majority of the Sun rather than zooming in on a small region of interest, which brought out a lot of large scale structural changes that are ordinarily not observed.

This image shows 4 of the more interesting features that we observed during the week.

http://xrt.cfa.harvard.edu/xpow/20150811.html

June

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

July

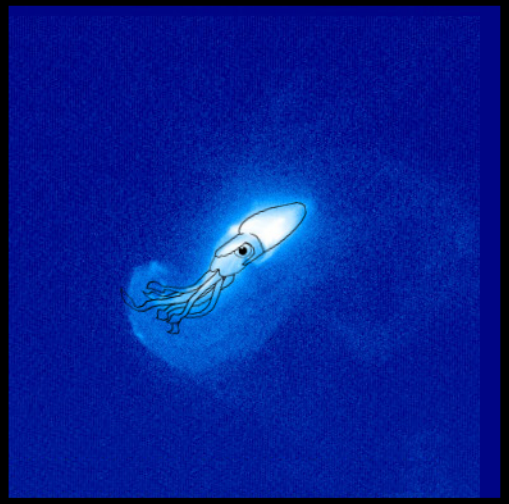
August

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
26	27	28	29	30	1	2
3	4 Independence Day	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

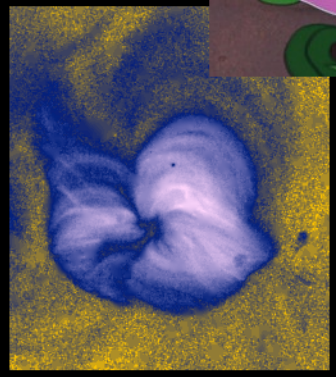
http://xrt.cfa.harvard.edu/xpow/20070713.html

http://xrt.cfa.harvard.edu/xpow/20130904.html

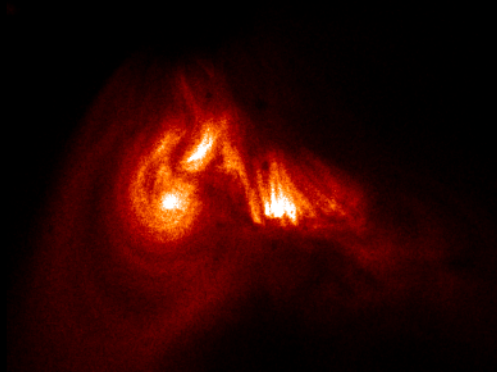


Solar Pareidolia

Over the years, solar scientists have seen many interesting shapes in the X-ray Sun: yummy solar donuts throughout its atmosphere, solar campfires for roasting marshmallows, beautiful blooming flowers, and even a squid.



http://xrt.cfa.harvard.edu/xpow/20140422.html



http://xrt.cfa.harvard.edu/xpow/20080104.html

July

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

August

September

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3

http://xrt.cfa.harvard.edu/xpow/20150922.html

Happy 10th Anniversary

Hinode (Solar-B) was launched 23 September 2006 at 6:36 AM from Kagoshima, Japan. Hinode rode an M-V rocket and after the 3 minute journey to space, it was maneuvered into a polar, Sun-synchronous orbit 600 kilometers above the earth's surface.

August

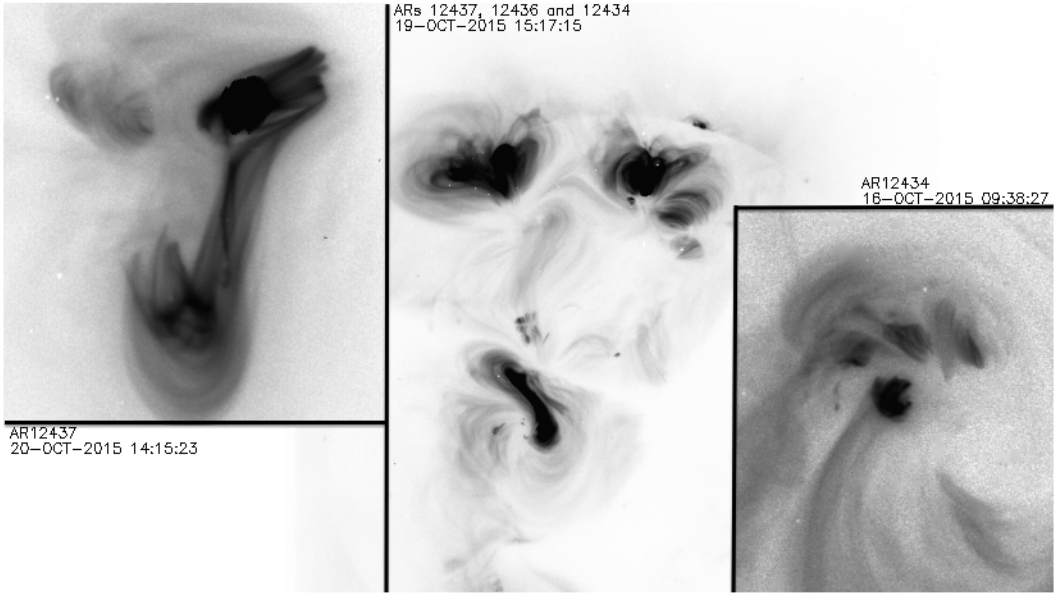
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

September

October

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	30	31	1	2	3
4	5 Labor Day	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23 Hinode Launch	24
25	26	27	28	29	30	1



The Faces of Grieving Ghosts

The faces of grieving ghosts hidden in X-ray images of the Sun. Their real identities are active regions 12434, 12436, and 12437, all observed in mid-October of 2015. The center image was taken with a wide field of view, which covers the Eastern half of the solar disk and includes all three active regions listed above. To see the grieving ghost the original image was rotated so that East is up. The face of a suffering ghost is revealed with AR12437 (the ghost's right eye), AR12436 (left eye) and AR12434 (mouth).

The image on the left is the close-up of the AR12437 (North is up, this time) observed on 20 October 2015. This image looks like another face of a sobbing ghost. The tears running out of its right eye are the ejection of plasma associated with a C1.1 flare from this region.

The image on the right is the AR12434 (North is up) observed on 16 October 2015. This movie was made three days before the time the center image was taken. This looks like a portrait of a troubled ghost. Tear drops are falling out from its right eye, and in the end the ghost blows out a fire-breath (a C4.2 flare).

http://xrt.cfa.harvard.edu/xpow/20151027.html

September

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

October

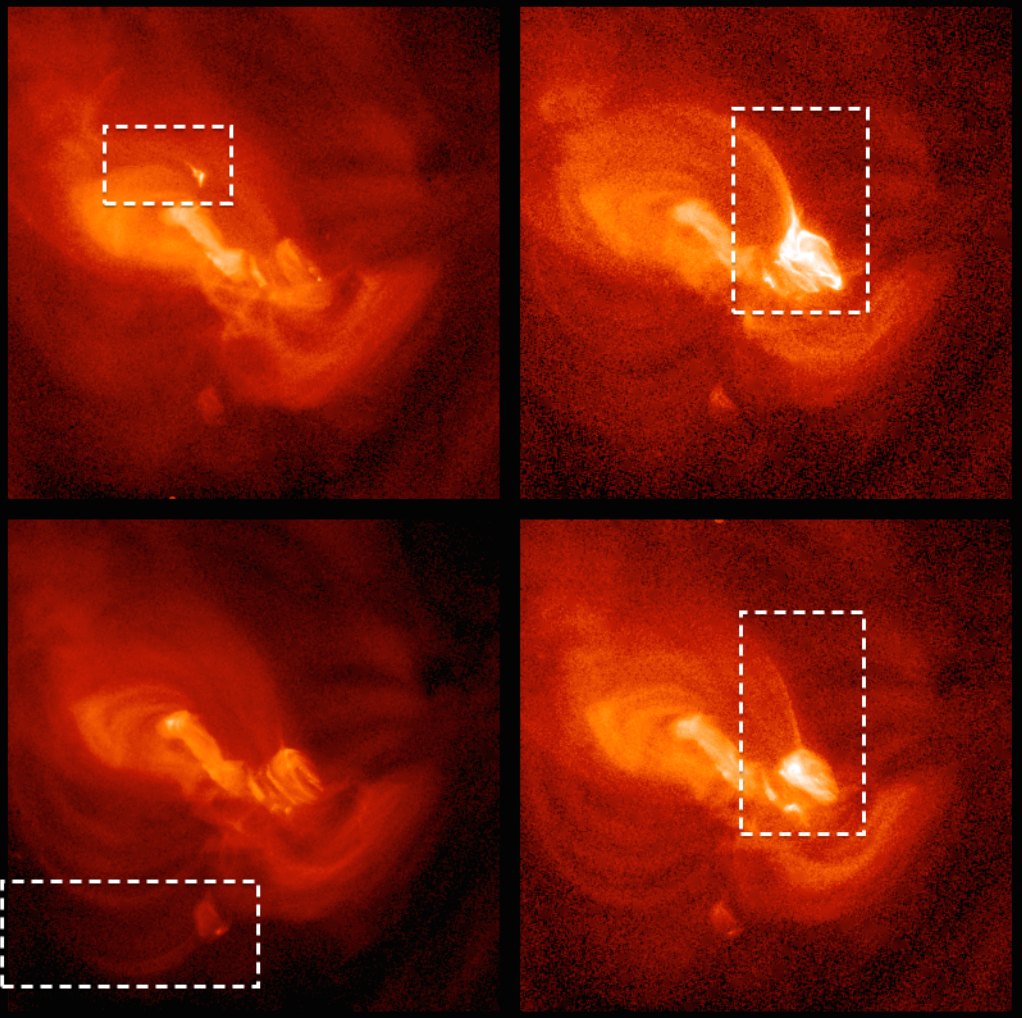
November

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10 Columbus Day	11	12	13	14	15
16	17	18	19	20	21	22
23/30	24/31 Halloween	25	26	27	28	29

X-ray Jets

Active Region 12149 had been particularly active in late August 2014, producing more than 35 C-class flares. XRT observed several nice jets from this region between 01:20 and 06:18 UT on the 24th. The boxes in the image show 4 separate jets that happened within 3 hours of each other. These jets are likely caused by magnetic reconnection between the overlying loop system and new loops emerging from below.



http://xrt.cfa.harvard.edu/xpow/20140827.html

October

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

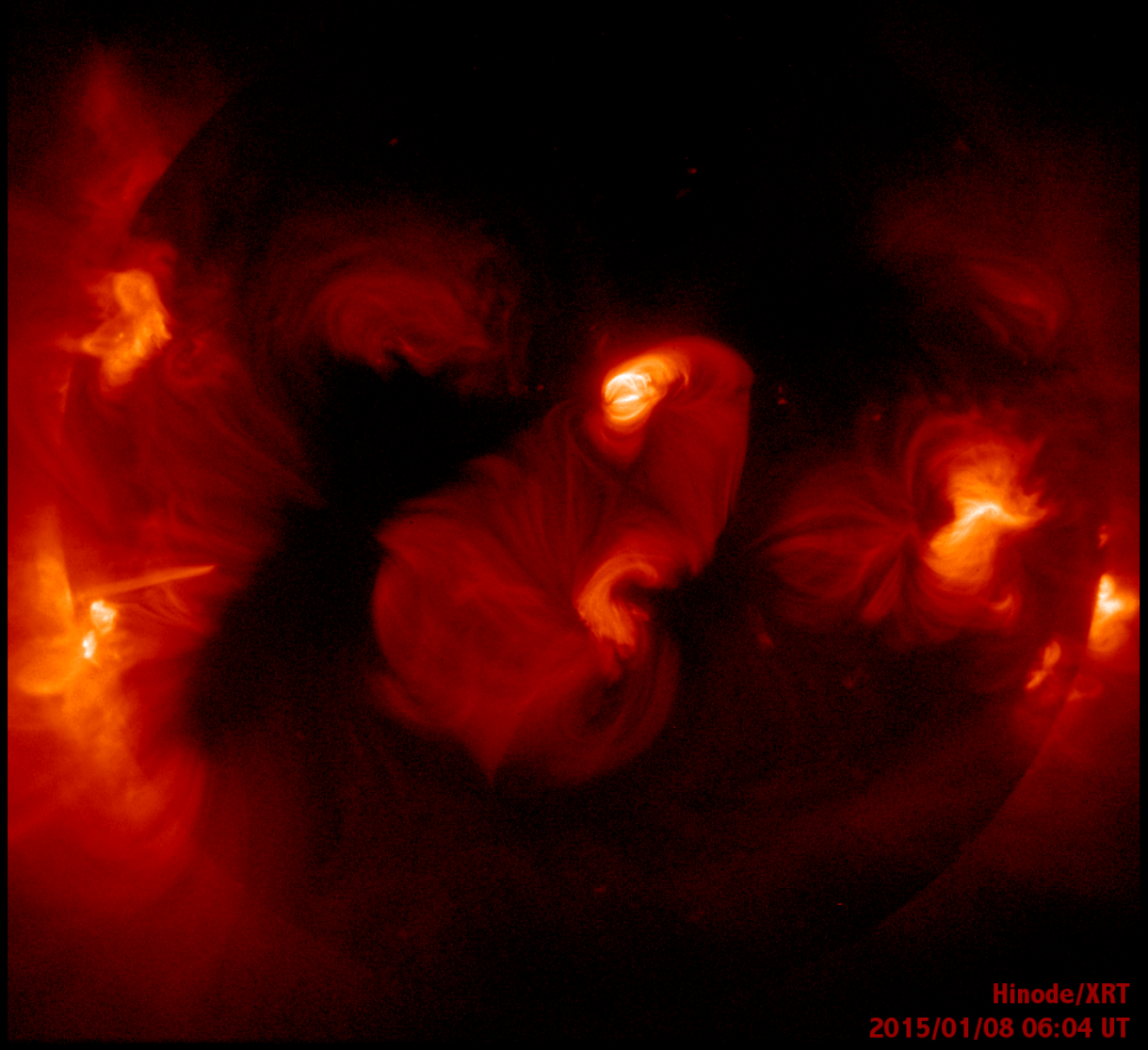
November

December

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2	3	4	5
6	7	8 Election Day	9	10	11 Veterans Day	12
13	14	15	16	17	18	19
20	21	22	23	24 Thanksgiving Day	25	26
27	28	29	30	1	2	3

Unusual Linear Feature



It's not often that XRT sees bright, long, linear structures like the one on the left side of the Sun. That's because XRT detects plasma at several million degrees, which is generally confined to the bent, non-potential magnetic field lines energetic enough to do the heating. X-ray jets and emission associated with current sheets are linear features that XRT might detect.

http://xrt.cfa.harvard.edu/xpow/20150127.html

November

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December

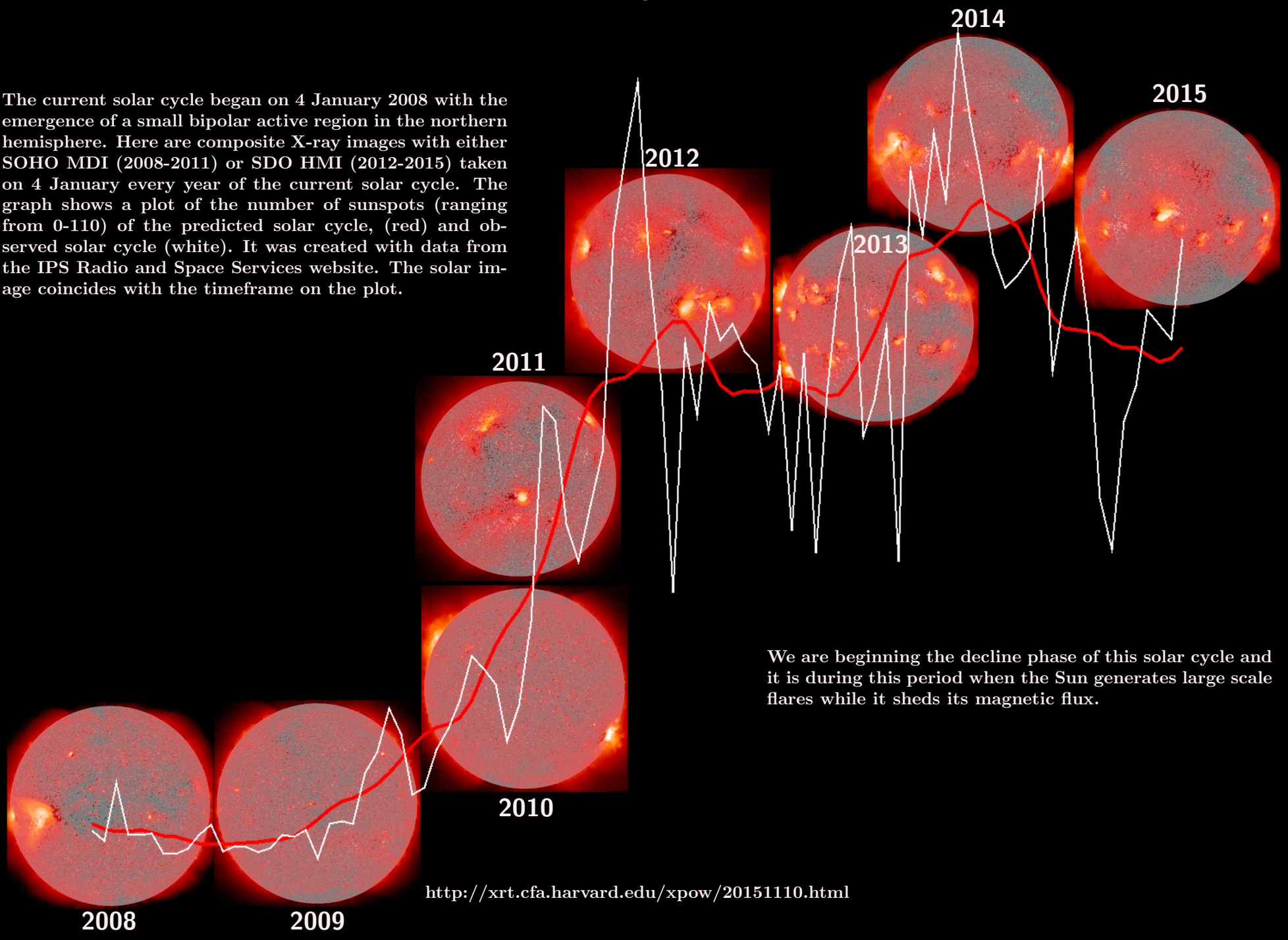
January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25 Christmas Day	26	27	28	29	30	31 New Year's Eve

Solar Cycle 24

The current solar cycle began on 4 January 2008 with the emergence of a small bipolar active region in the northern hemisphere. Here are composite X-ray images with either SOHO MDI (2008-2011) or SDO HMI (2012-2015) taken on 4 January every year of the current solar cycle. The graph shows a plot of the number of sunspots (ranging from 0-110) of the predicted solar cycle, (red) and observed solar cycle (white). It was created with data from the IPS Radio and Space Services website. The solar image coincides with the timeframe on the plot.



We are beginning the decline phase of this solar cycle and it is during this period when the Sun generates large scale flares while it sheds its magnetic flux.

http://xrt.cfa.harvard.edu/xpow/20151110.html

2017

January

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

February

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

March

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

April

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

May

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

July

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

August

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

September

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

November

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

December

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						