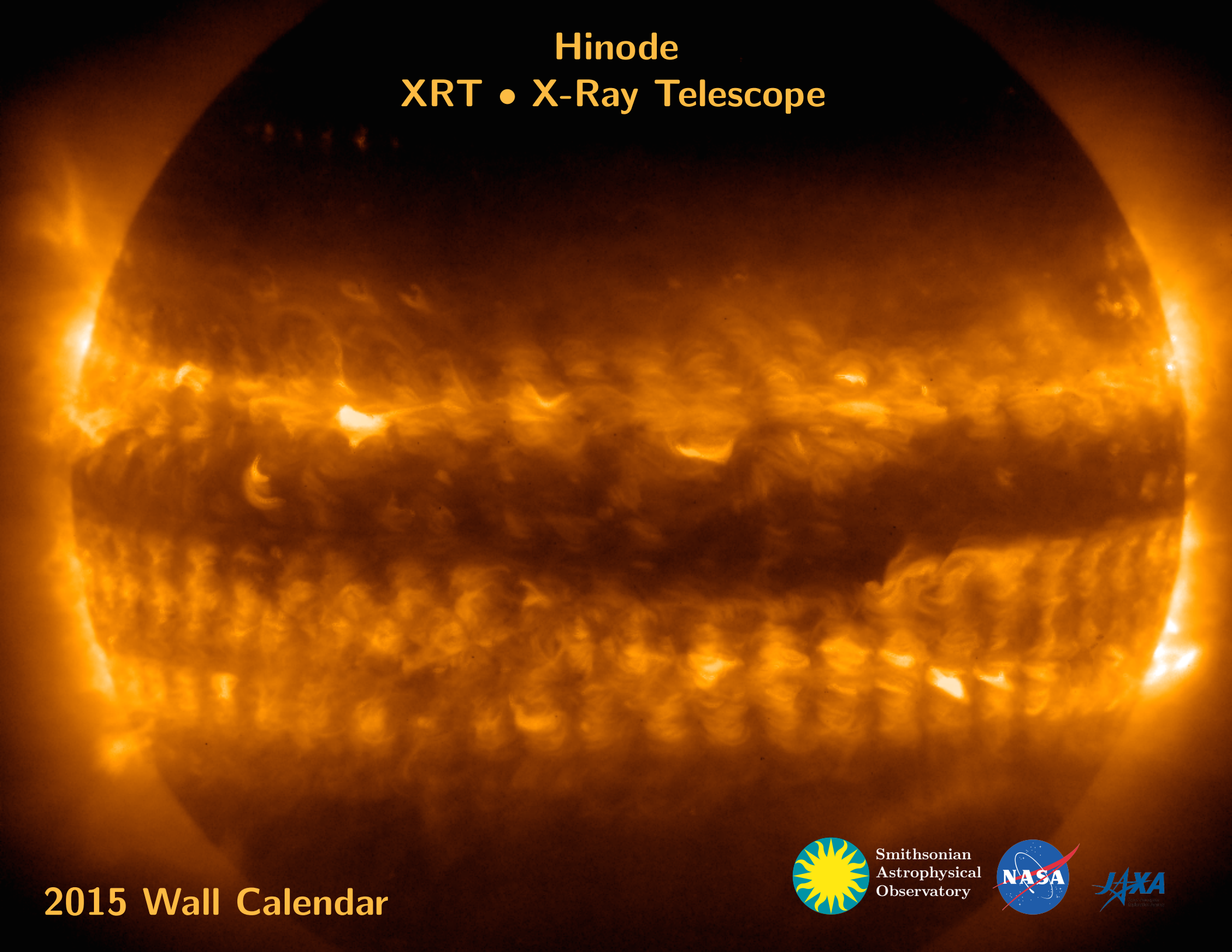
Hinode
XRT • X-Ray Telescope



Smithsonian Astrophysical Observatory

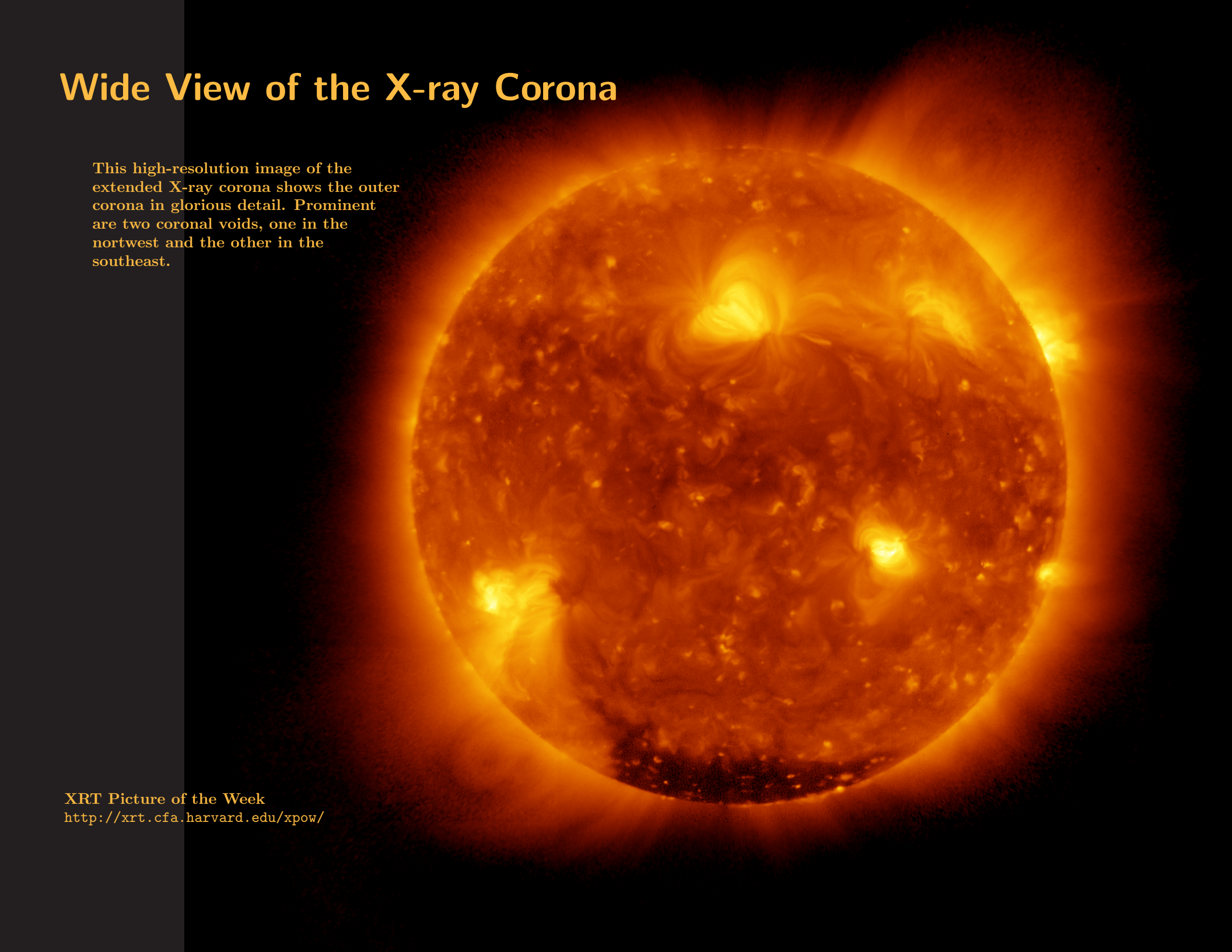
NASA

JAXA

2015 Wall Calendar

Wide View of the X-ray Corona

This high-resolution image of the extended X-ray corona shows the outer corona in glorious detail. Prominent are two coronal voids, one in the nortwest and the other in the southeast.



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

2014

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

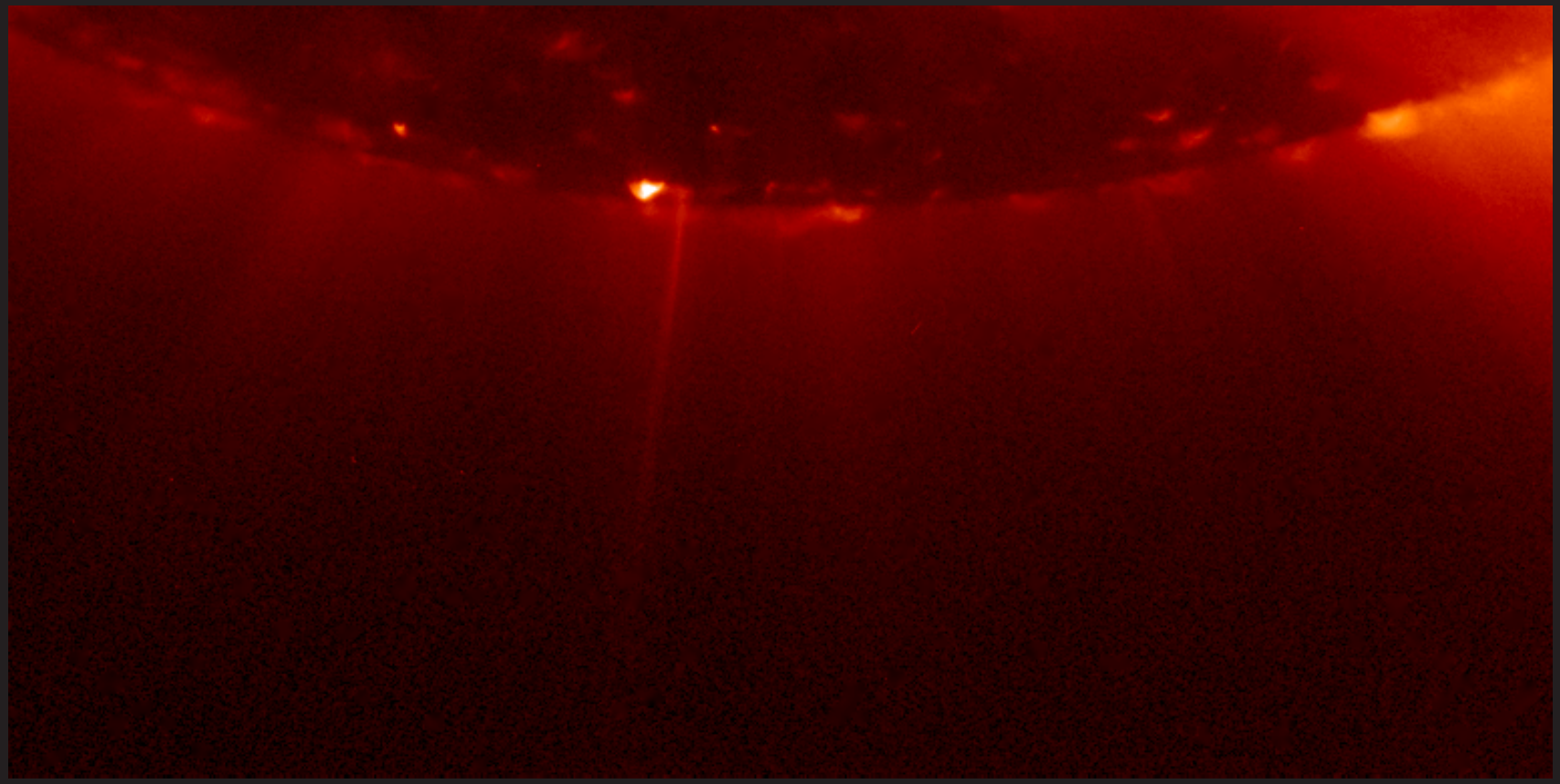
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

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			



Pencil Jet

On the 7th of March 2008, XRT observed the coronal hole located around the south pole of the Sun. There, the magnetic configuration is strikingly different than the usual complex structure seen in coronal active regions: instead of an entangled jumble of loops, most of the magnetic field lines are nicely ordered, shooting straightly away from the Sun. These are called open field lines (though at some point they will bend and come back to the Sun). In the coronal hole, some small loops (or closed field lines) are visible in the image. An X-ray jet is created when a small loop interacts with one of the open field lines, releasing a stream of solar matter propagating along the open field line. In the image, the jet is seen as a very thin and straight pencil beam.

December

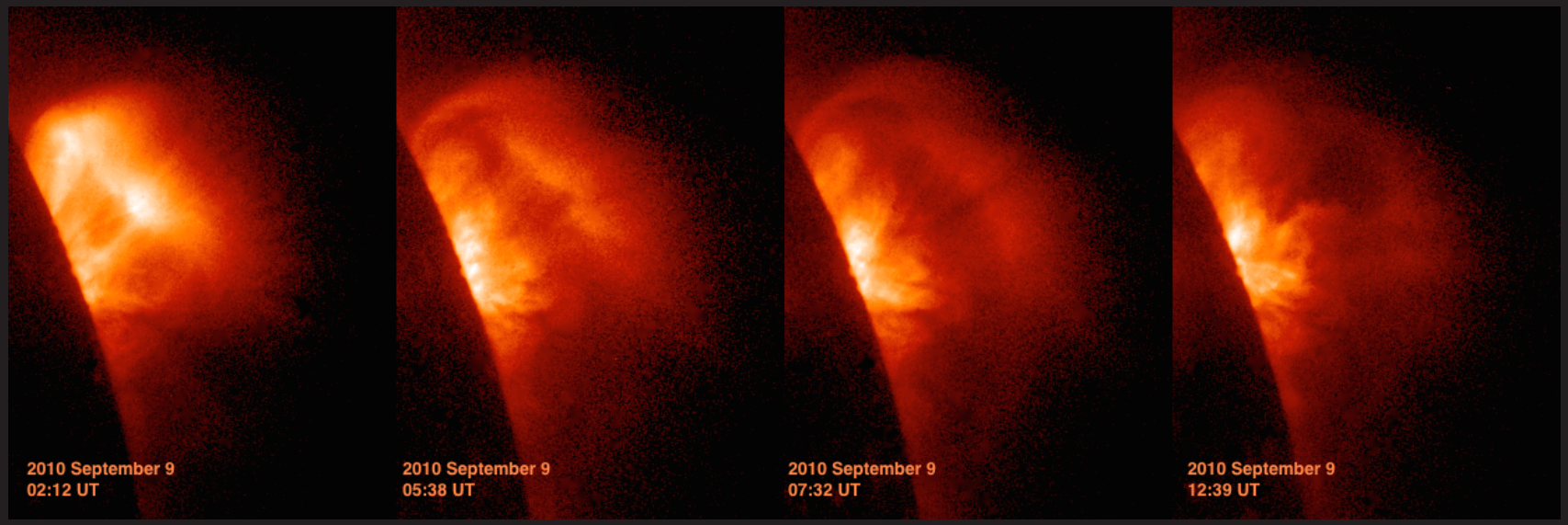
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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	19 Martin Luther King Day	20	21	22	23	24
25	26	27	28	29	30	31



Expansion of Post-Flare Loops

A C3.3 flare occurred at the west limb around 23:05 UT on 2010 September 08. XRT was scheduled to observe the North pole when the flare happened. Fortunately, the XRT flare flag was triggered, and XRT zoomed in on the flaring region to observe this amazing eruption. The sequence of images demonstrates the expansion of loops during the flare as a dark void begins to expand outward.

January

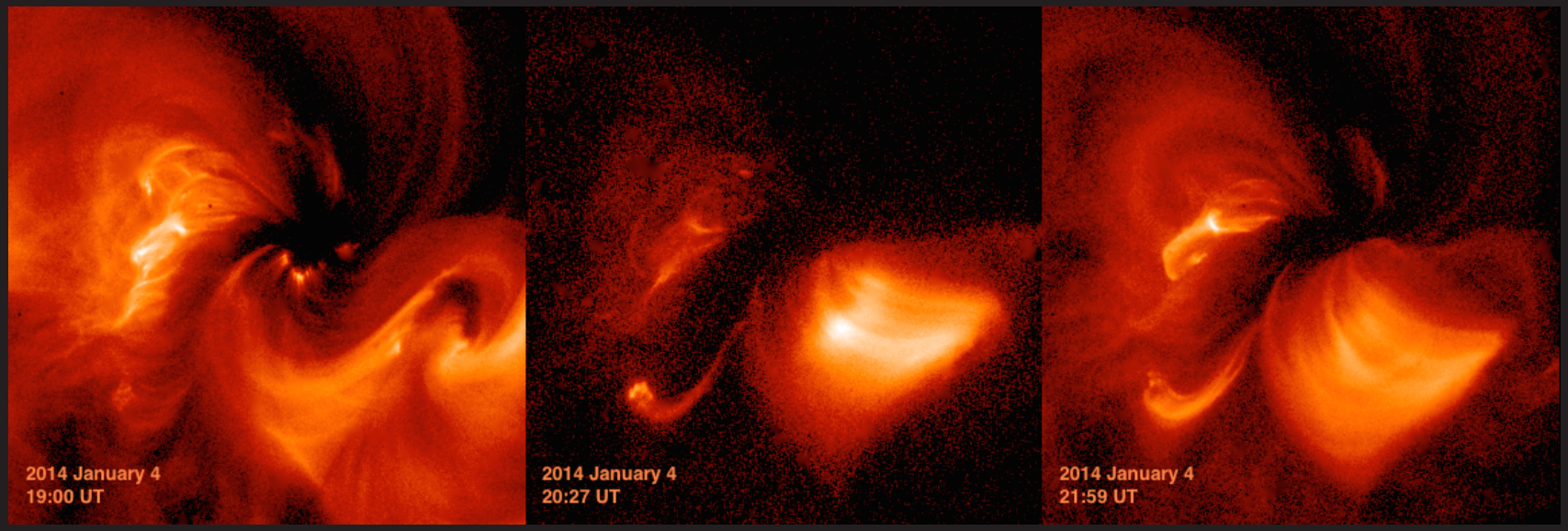
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

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
1	2	3	4	5	6	7
8	9	10	11	12	13	14 Valentine's Day
15	16 President's Day	17	18	19	20	21
22	23	24	25	26	27	28



Mysterious Flare-Ribbon-Like Structure

What is the fan structure at the center of the XRT image on the left? It looks a bit like "flare ribbons," which are the foot points of flaring loops. The strange thing is that typically it's the tops of coronal loops that reach the multi-million degree temperatures needed to be visible to XRT. Flare ribbons are signatures seen in lower-energy light, and the flare doesn't actually happen until after the sequence above. So these aren't flare ribbons, but they do seem to form the base of the loop system that subsequently produces an M4 flare.

February

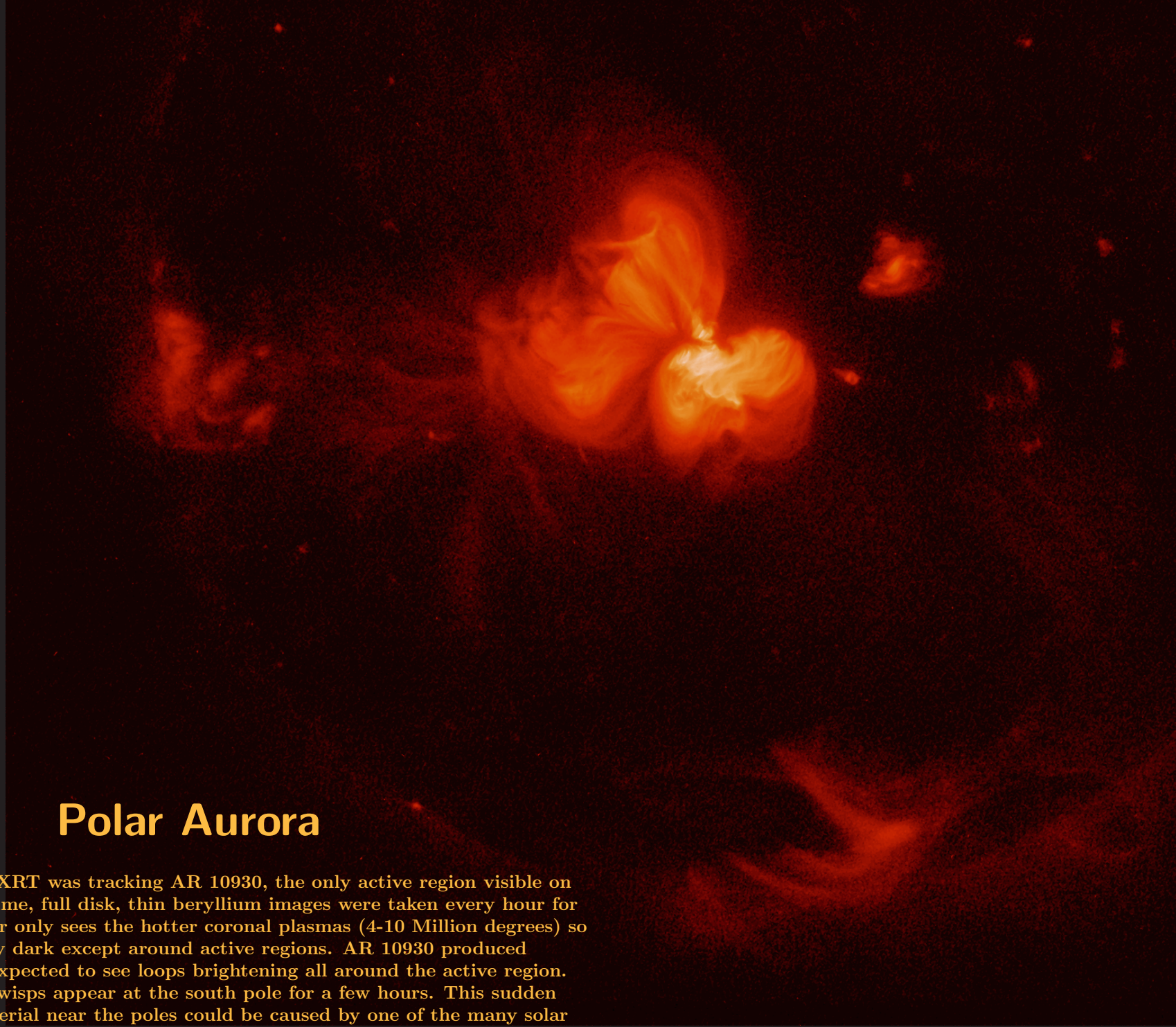
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March

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
1	2	3	4	5	6	7
8 Daylight Savings starts	9	10	11	12	13	14
15	16	17 St. Patrick's Day	18	19	20 Total Solar Eclipse Spring Equinox	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4



Polar Aurora

In December of 2006, XRT was tracking AR 10930, the only active region visible on the sun. During this time, full disk, thin beryllium images were taken every hour for several days. This filter only sees the hotter coronal plasmas (4-10 Million degrees) so the sun appears mostly dark except around active regions. AR 10930 produced several flares and we expected to see loops brightening all around the active region. But, bright loops and wisps appear at the south pole for a few hours. This sudden appearance of hot material near the poles could be caused by one of the many solar flares that AR 10930 produced.

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

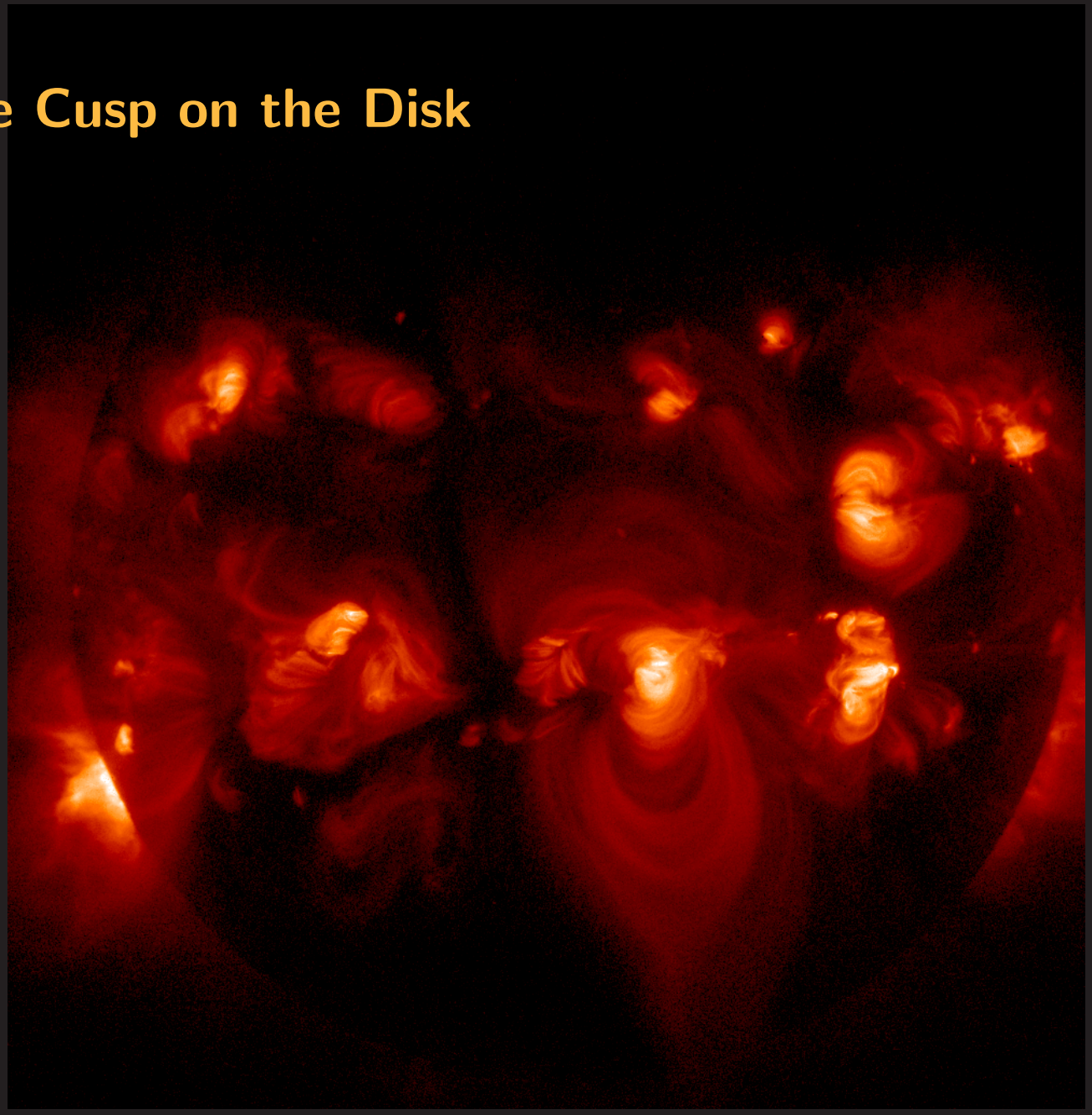
May

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
29	30	31	1	2	3	4
5 Easter Sunday	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	1	2

Beautiful Candle Flame Cusp on the Disk

This beautiful candle flame cusp on the disk is brought to us by Active Region 12035 (just right of center). In addition to being aesthetically pleasing, cusp loops are beloved by scientists because they're thought to be tell-tales signs of magnetic reconnection, an energetic phenomenon that is ubiquitous on the Sun but often difficult to pinpoint. Magnetic field lines momentarily intersect and reconfigure above the cusp, releasing energy and producing a sunward plasma flow along the arch. This heats the cusp enough to produce the X-ray emission seen here, which can last for several hours as new field lines are continuously forced into the reconnection site. Based on how diffuse the cusp is in this image, we're probably catching it after its full glory. But as the saying goes, it's better to have seen a decaying cusp than to have seen no cusp at all.



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		

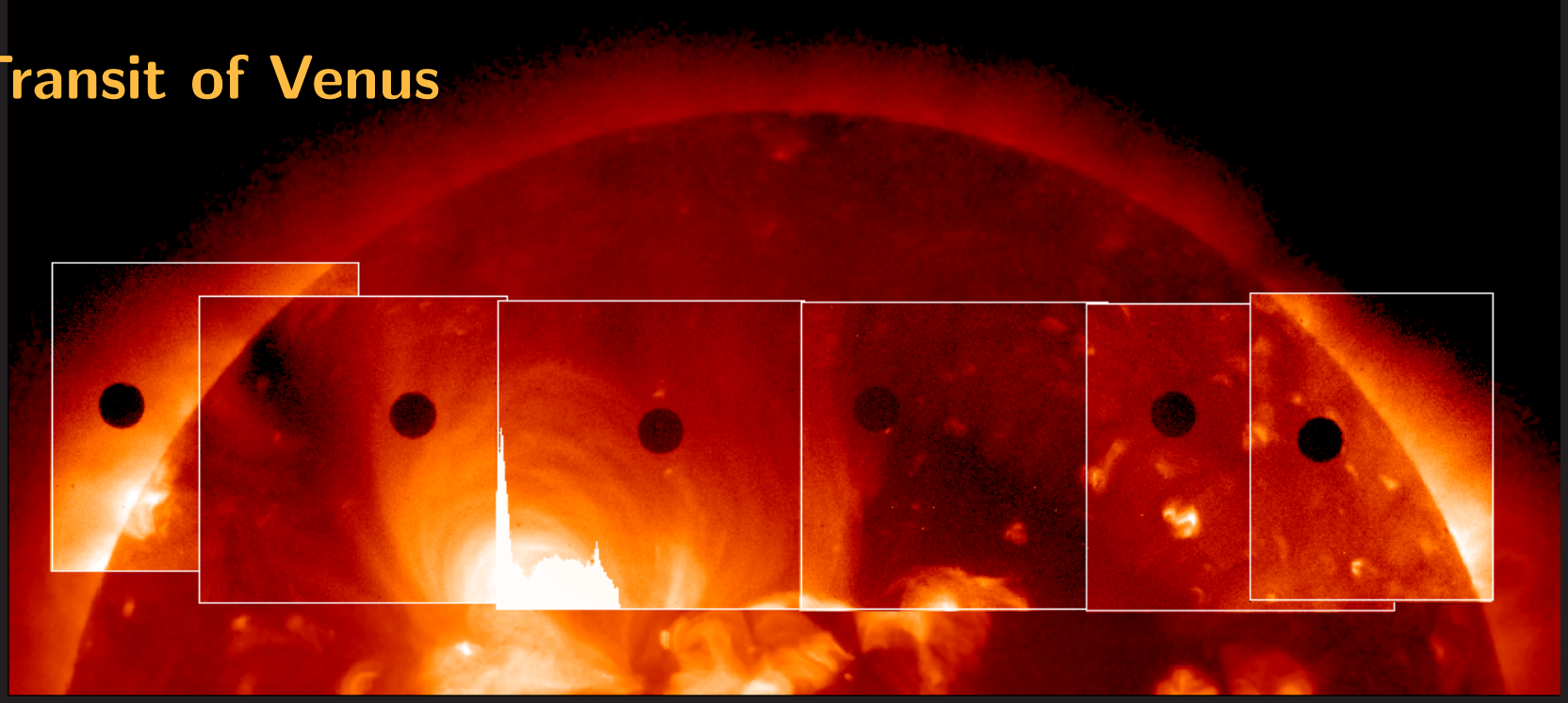
May

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

The Transit of Venus



The sun and I are face to face;
He glares at me, I stare at him;
And lo! my straining eye has found
A little spot that, black and round,
Lies near the crimsoned fire-orb's rim.
O blessed, beauteous evening star,
Well named for her whom earth adores, –
...

A black, round spot, –and that is all;
And such a speck our earth would be
If he who looks upon the stars
Through the red atmosphere of Mars
Could see our little creeping ball
Across the disk of crimson crawl
As I our sister planet see.

Excerpt from "The Flneur: Boston Common, During the Transit of Venus"
by Oliver Wendell Holmes, Sr. (1882)

May

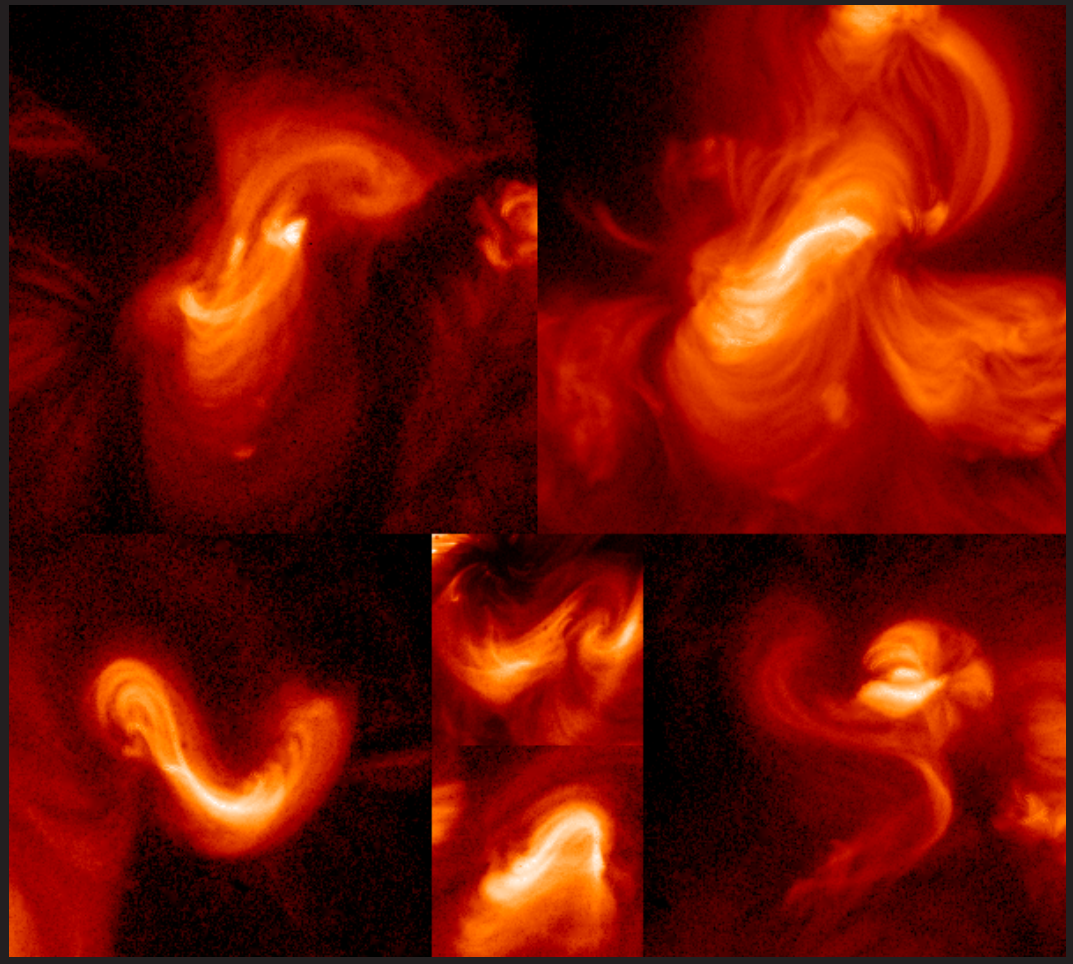
S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

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
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21 Father's Day Summer Solstice	22	23	24	25	26	27
28	29	30	1	2	3	4



Sigmoids on Parade!

Sigmoids are a type of active region that has an 'S' (or 'reversed–S') shape because of their bending or twisted magnetic field structures. Since such distorted structures are unstable, sigmoids often erupt and sometimes become a source of big flares and coronal mass ejections (CMEs).

Although there are days and weeks when sigmoids are rarely seen, they sometimes appear in herds and adorn the solar disk. Early January of 2014 was such a period. We observed at least 6 different sigmoids in the first 15 days of the month.

June

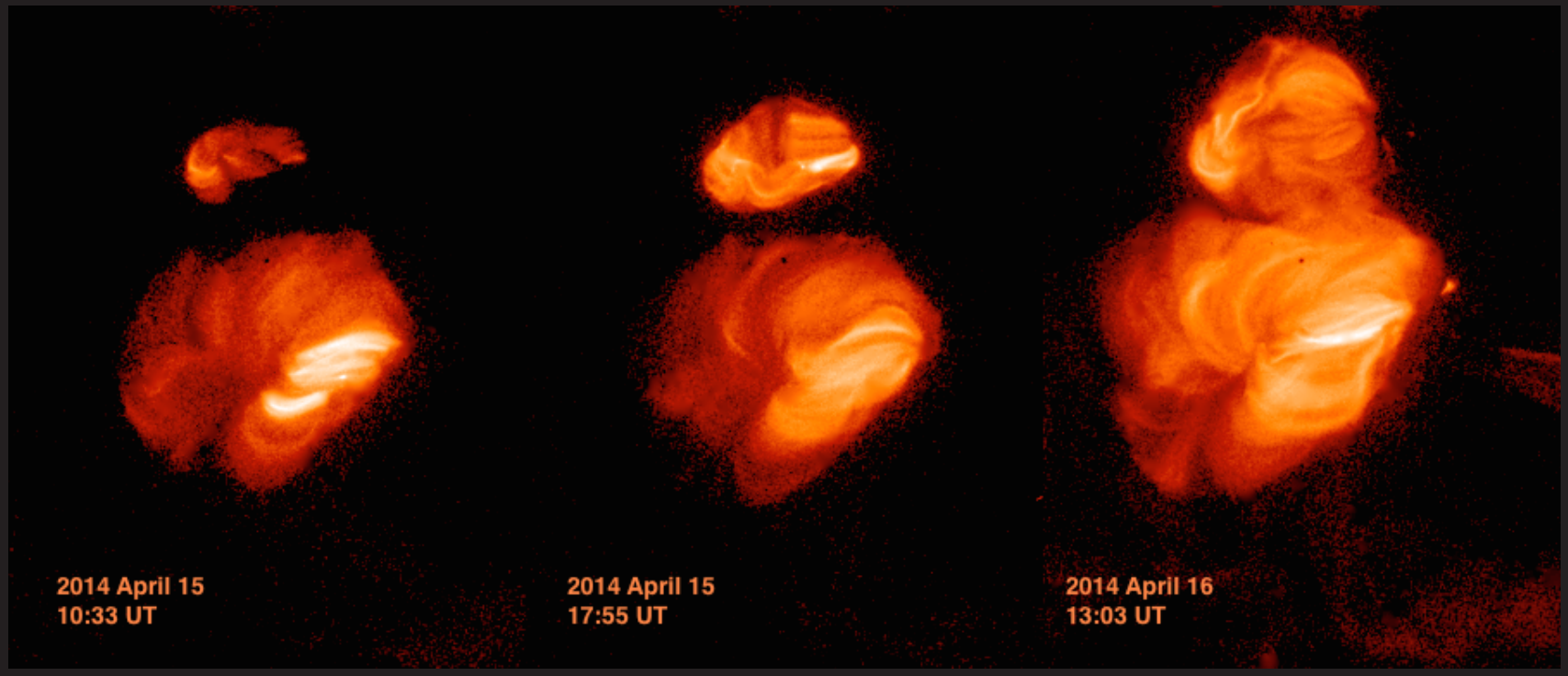
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

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
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	25
26	27	28	29	30	31	1



Emerging Active Regions

This is a glimpse at the early stages of an active region (well, 2 actually). Both of these active regions (12036 on bottom, 12037 on top) emerged quickly on the Sun on April 14, the day before you see them in the left panels. The image shows how much they developed and grew in a single day. Combined, these two regions produced over 2 dozen flares in the C range, and AR12036 was responsible for an M7.3 flare on April 18.

July

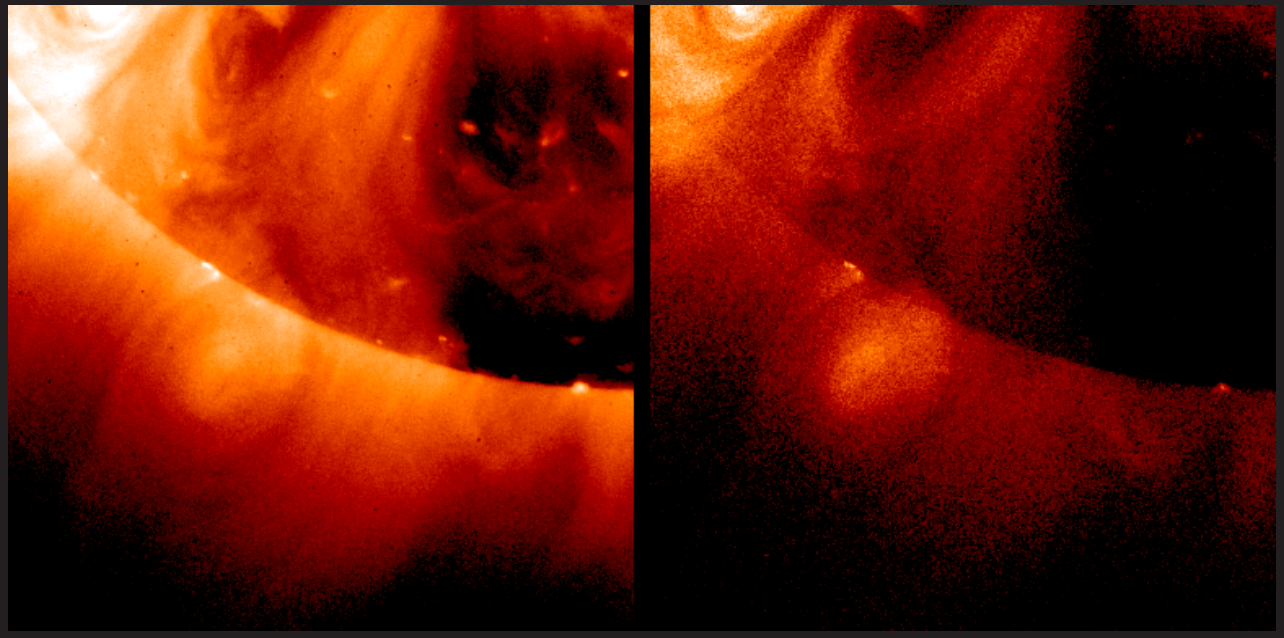
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

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
26	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
23/30	24/31	25	26	27	28	29



Coronal Cavity with Bright Core

These images of a coronal cavity were taken on 2013 February 9. The left image was taken in the Al-poly filter and while the right image was taken in the Be-thin filter. Coronal cavities are voids in coronal emission often observed surrounding quiescent prominences at high latitude. An unusual bright core located in the cavity's center is observed in the hot X-ray images by XRT.

August

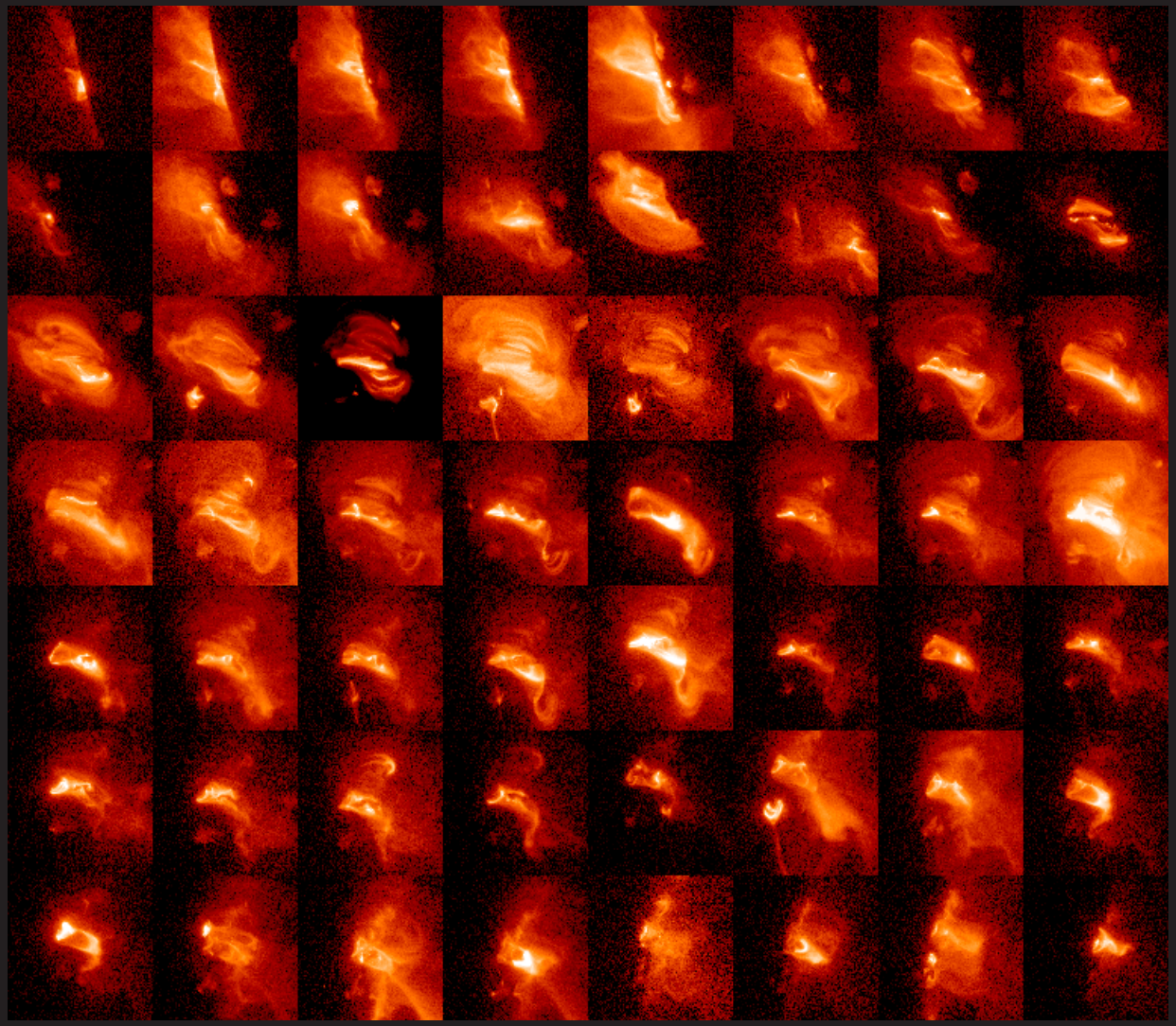
S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

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
30	31	1	2	3	4	5
6	7 Labor Day	8	9	10	11	12
13 Partial Solar Eclipse	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3



AR12192

AR12192 is the largest active region in two solar cycles. Larger than Jupiter, and with a very complicated magnetic field pattern, it provided a spectacular show as it crossed the solar disk. XRT observed 6 X-flares and 50 C and M class flares. Above, is a collage of all 56 events recorded by XRT. Each image represents a separate flare observed between October 16 and October 29, 2014.

September

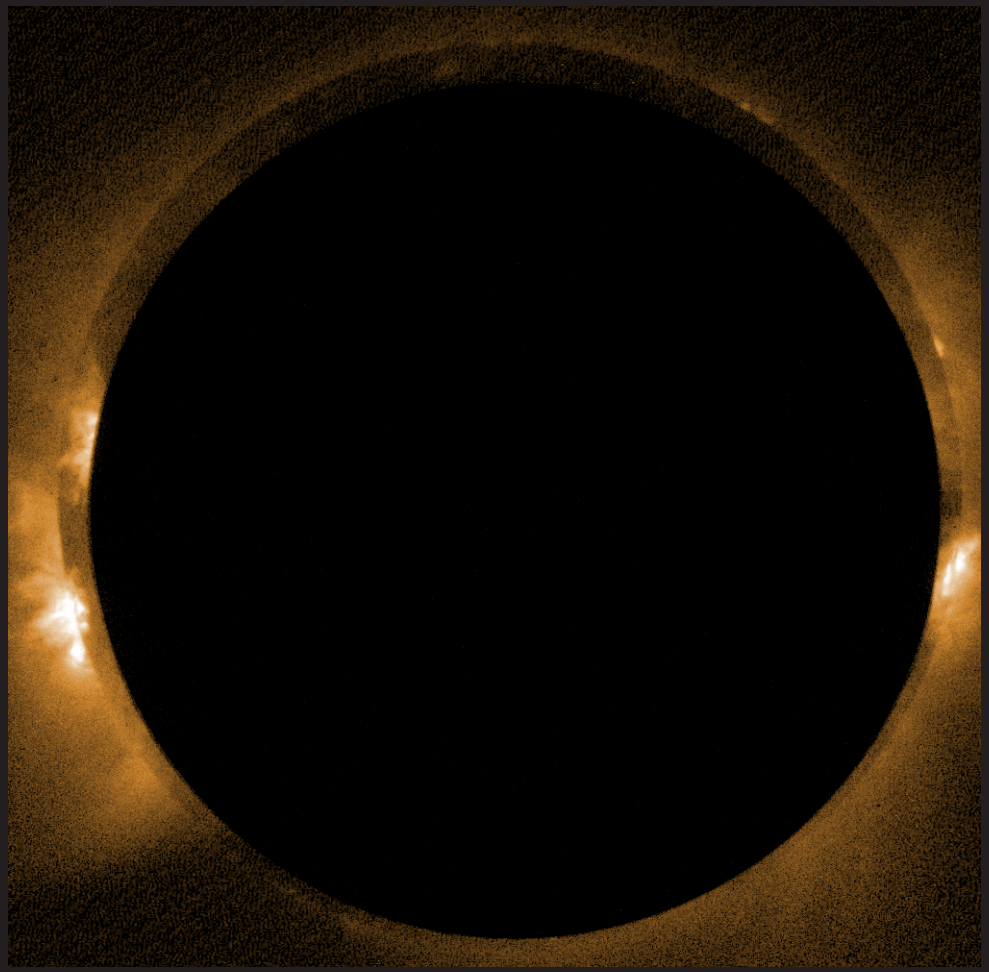
S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

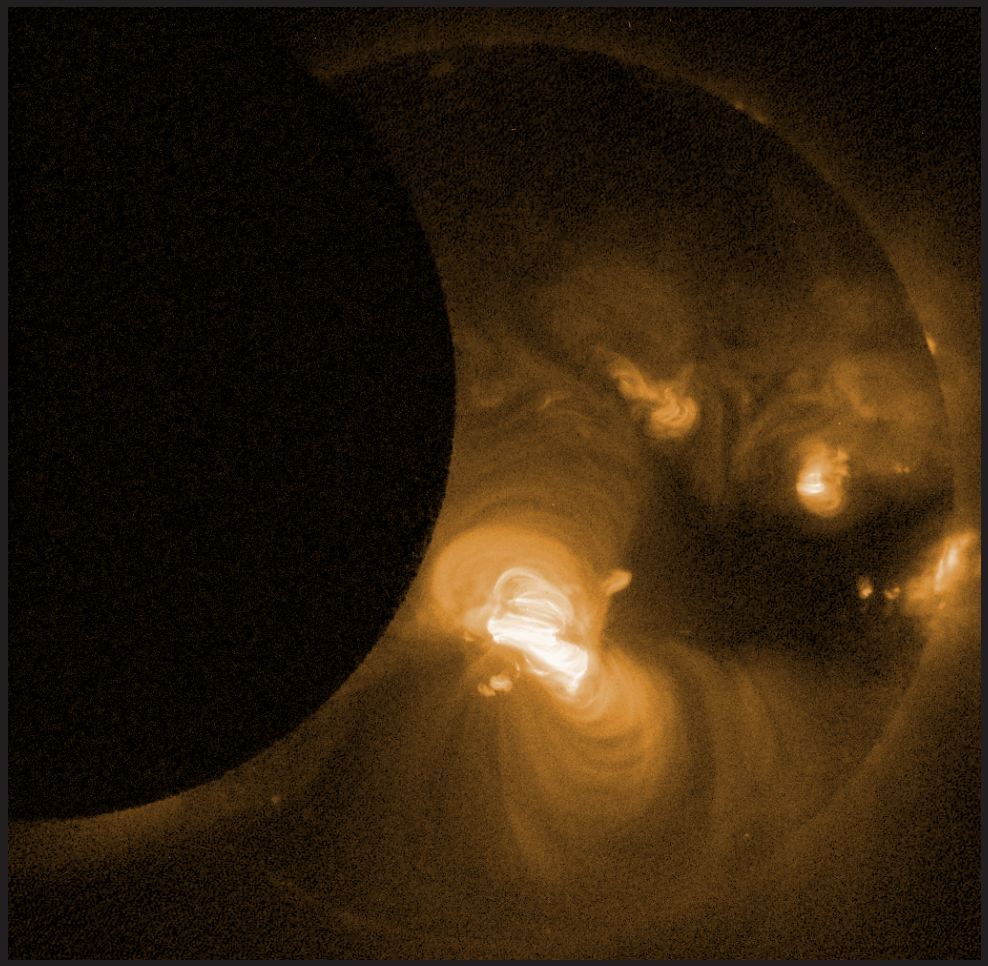
October

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
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12 Columbus Day	13	14	15	16	17
18	19	20	21	22	23 Fall Equinox	24
25	26	27	28	29	30	31





Annular Solar Eclipse

On 23 October 2014, observers across most of North America were treated to a solar eclipse just before sunset. The center of the Moon's shadow was cast over the Earth's north pole, so it was seen as only a partial eclipse from the ground. Hinode circles Earth in a polar orbit at an altitude of about 680 km, which put it directly into the center of the Moon's shadow for the annular eclipse shown here with images from XRT. Annular eclipses occur when the Moon passes directly between the observer and the Sun, but the apparent diameter of the Moon isn't quite large enough to block out the entire solar disk for a total eclipse. This was only the second annular eclipse observed by XRT.

October

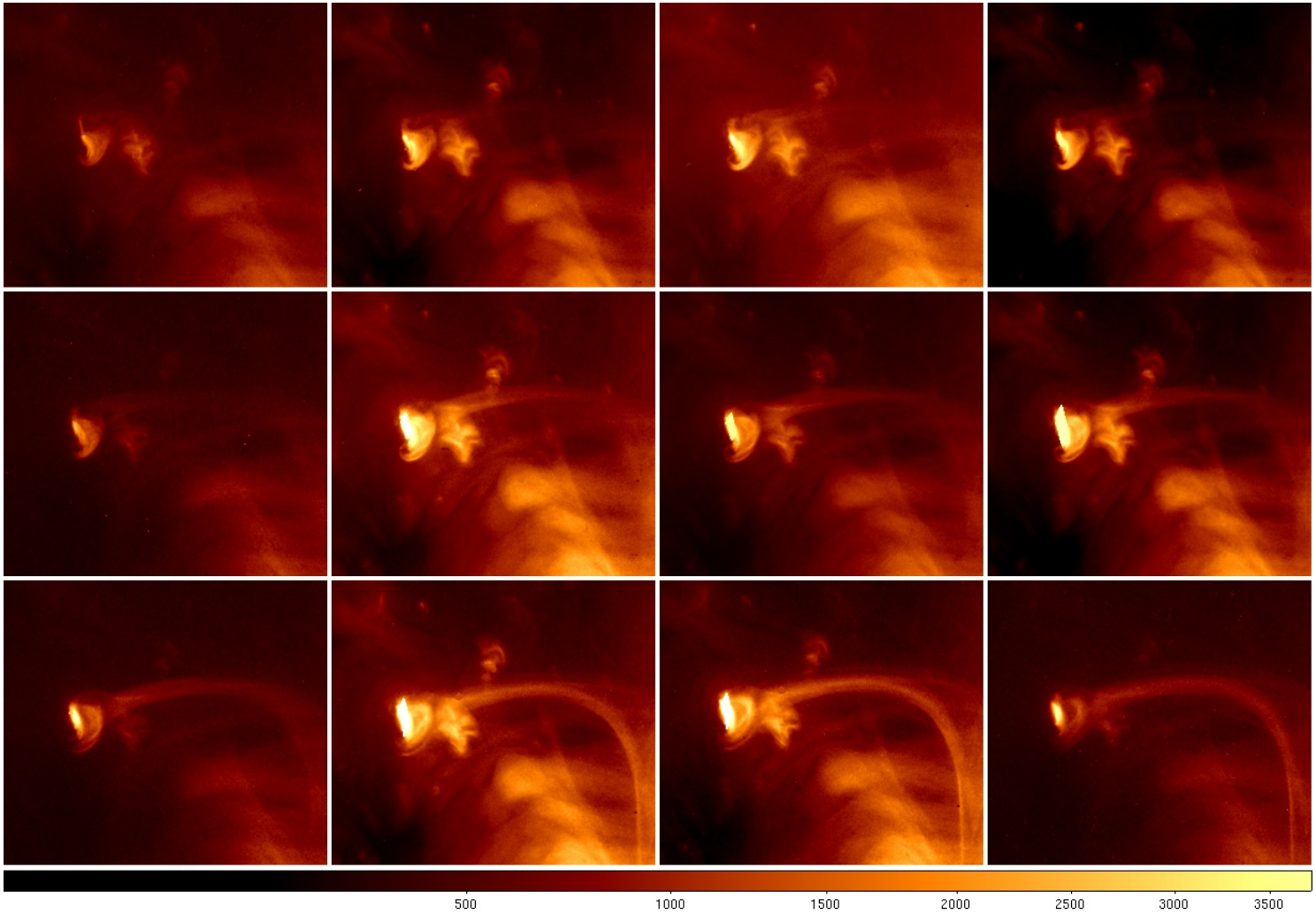
S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

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
1 Daylight Savings ends	2	3	4	5	6	7
8	9	10	11 Veterans Day	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26 Thanksgiving Day	27	28
29	30	1	2	3	4	5



Mystery Jet

XRT observed an impressive on-disk jet at 01:20-01:40 UT on 7 February 2008. The jet originates in a small emerging flux region (EFR) and curves over toward a larger pre-existing active region (AR). There are several mysteries though: the jet seems to originate somewhere in the space above the EFR but does not connect in any obvious way with any of the loops seen in the emerging region; the jet curves toward the large AR, but does not seem to reach it; and the jet splits into numerous strands (at least three) as it develops.

November

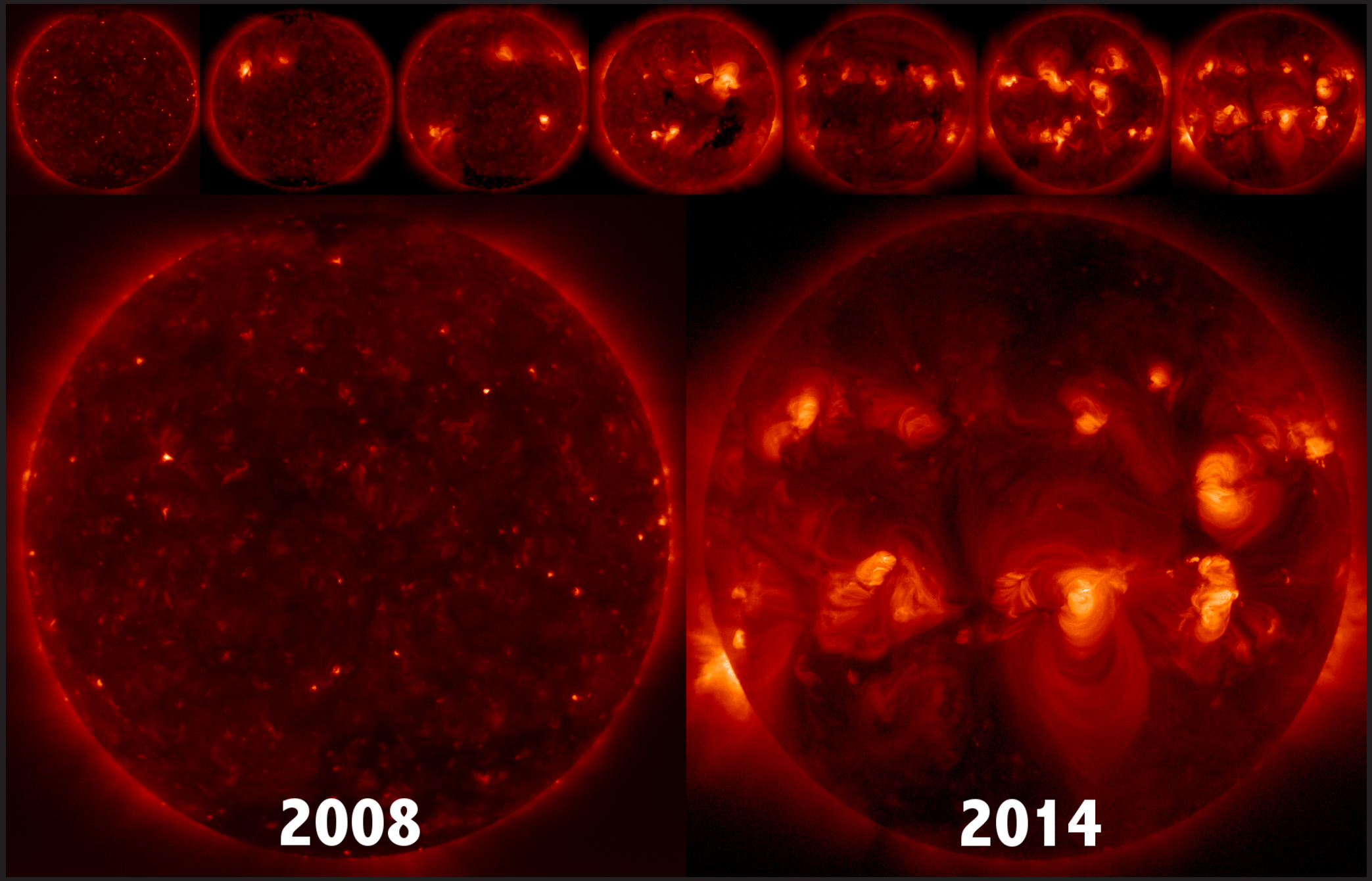
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

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



Solar Cycle 24

2016

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	29					

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