

BAA Radio Astronomy Group.

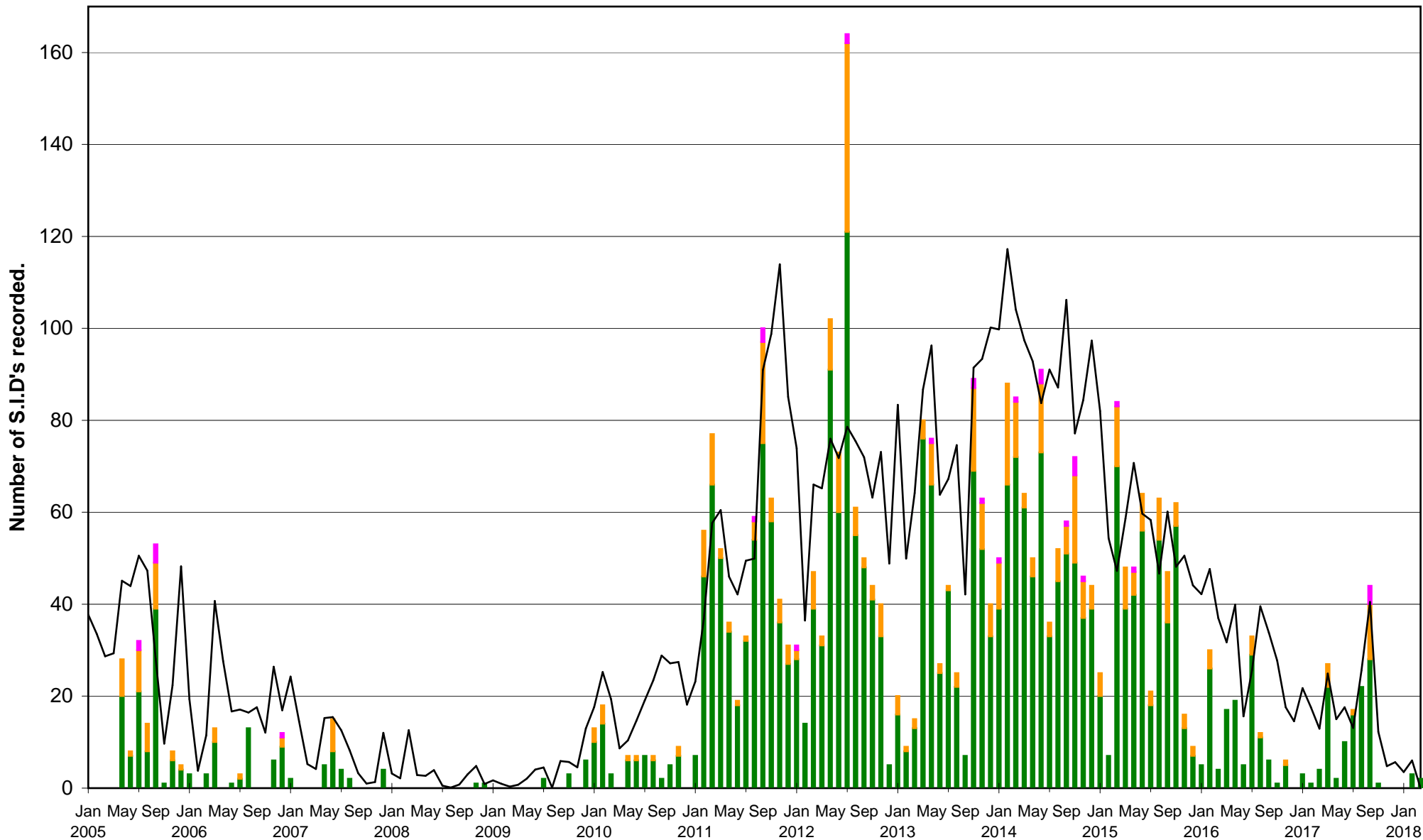
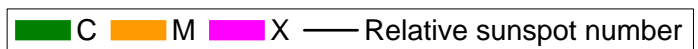
2018 MARCH

DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (18.3kHz)	Paul Hyde (22.1kHz/24kHz)	Mark Edwards (24.0kHz)	Colin Clements (23.4kHz/22.1kHz)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Spectrum Lab / PC 1.5m frame aerial.	Spectrum Lab / PC 2m loop aerial.	AAVSO receiver, 0.76m screened loop aerial.
			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
2	C1.9	4	11:03 11:08 11:19 1-		11:03 11:09 11:27 1	11:04 11:08 11:20 1-	
30	C4.6	6	08:02 08:06 08:21 1	08:00 08:07 08:17 1-	08:00 08:06 08:20 1	08:01 08:05 08:19 1-	

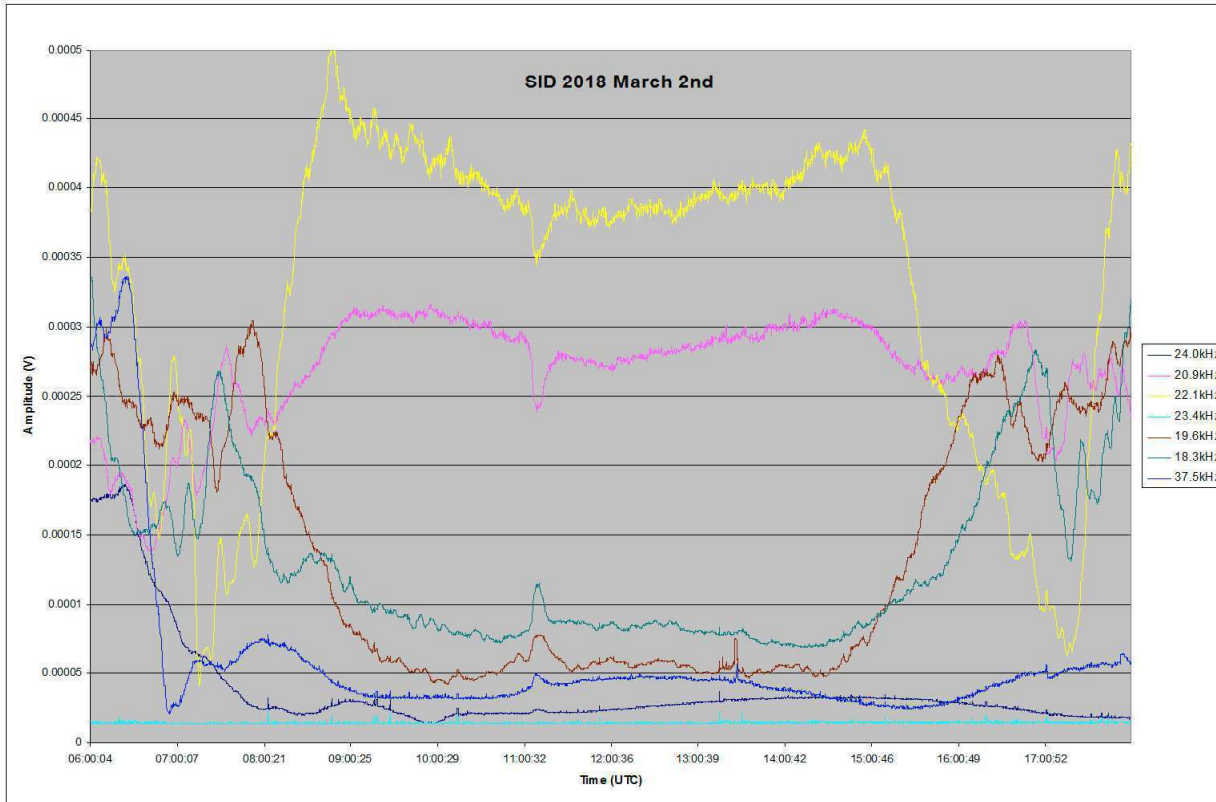
DAY	Xray class	Observers	Steve Parkinson (Various)	Andrew Thomas (23.4kHz)	Phil Rourke (23.4kHz)	Jim Barber	John Elliott (18.3kHz)
			Tuned radio frequency receiver, frame aeriels.	Tuned radio frequency receiver, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Tuned radio frequency receiver, 0.5m frame aerial.
			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
2	C1.9		11:03 11:09 11:22 1				
30	C4.6		08:00 08:05 08:32 1+				

DAY	Xray class	Observers	Colin Briden (22.1kHz)				
			Spectrum Lab / PC, 1.2m frame aerial.				
			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
2	C1.9						
30	C4.6		08:03 08:09 08:18 1-				

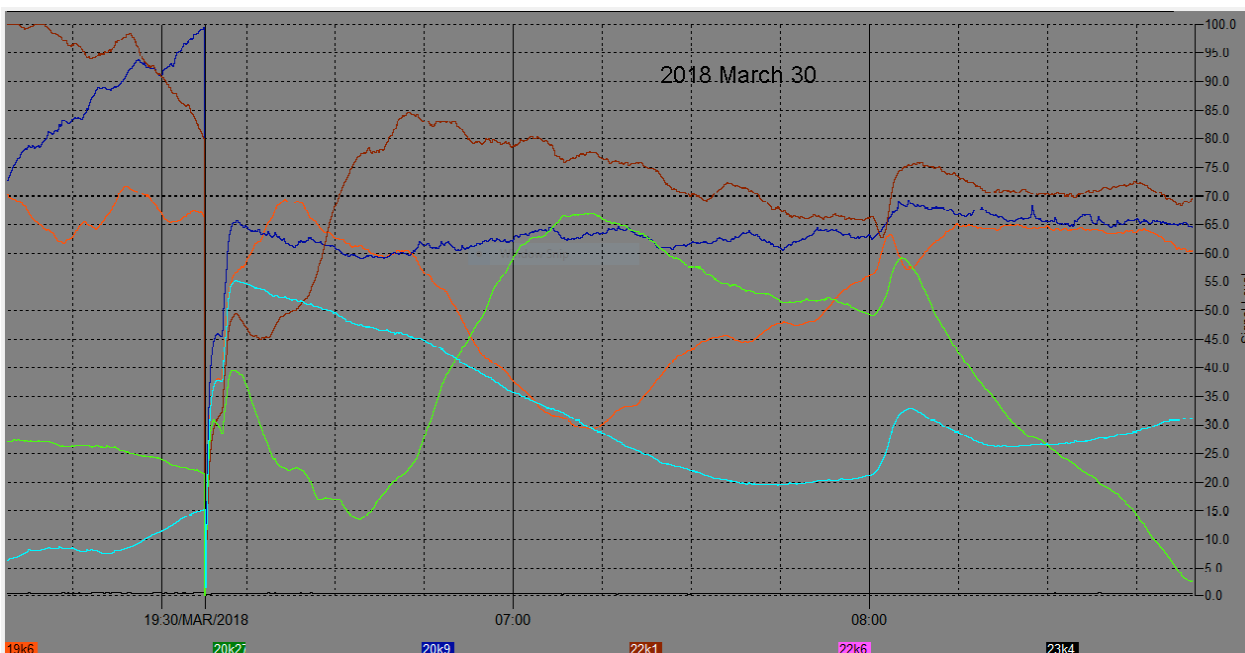
### VLF flare activity 2005/18.



Solar flare activity remained low through March, with just two flares being recorded as SIDs. The background X-ray flux as measured by GOES15 was close to A2/3 all month apart from a few days around the two flares listed. The active regions responsible were very small, and did not remain visible for very long.

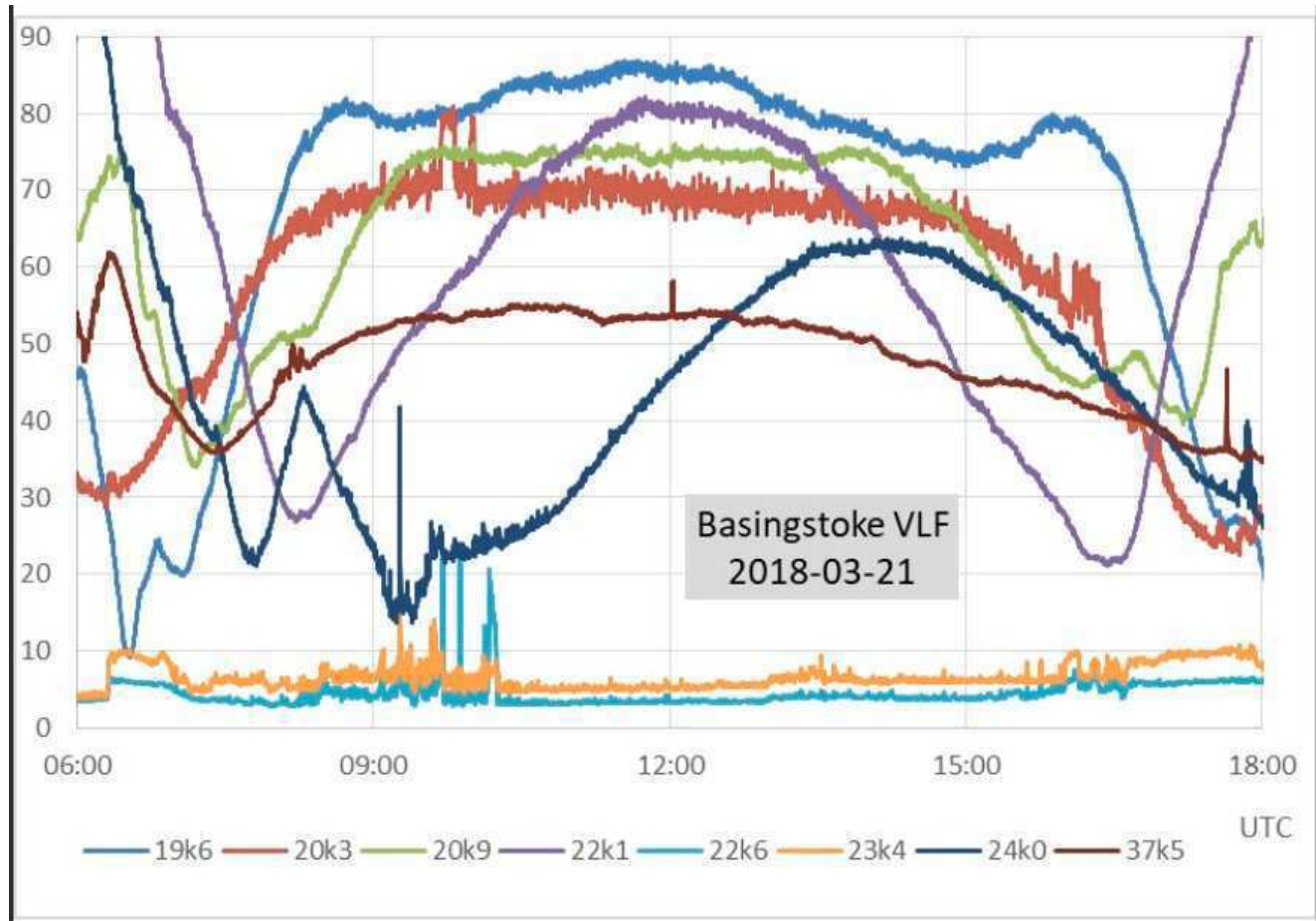


The first of the flares was at 11:08UT on the 2<sup>nd</sup>, shown in this recording by Mark Edwards. There were several small B-class flares before the C1.9, but they were too small to produce SIDs. Note the light blue trace at the bottom of the chart, showing that 23.4kHz was off-air. Apart from a few brief appearances, it was off for the entire month.



The second flare was at 08:09UT on the 30<sup>th</sup>, shown in the above recording by Colin Briden. There is a transient at the left of the chart where the day's recording starts. The C4.6 flare shows well at all frequencies, with strong 'spike-and-wave' SIDs at 22.1kHz and 19.6kHz. There were also some weaker B-class flares, again too small to produce SIDs.

Paul Hyde made a 'clean' recording on March 21<sup>st</sup>, close to the spring equinox:

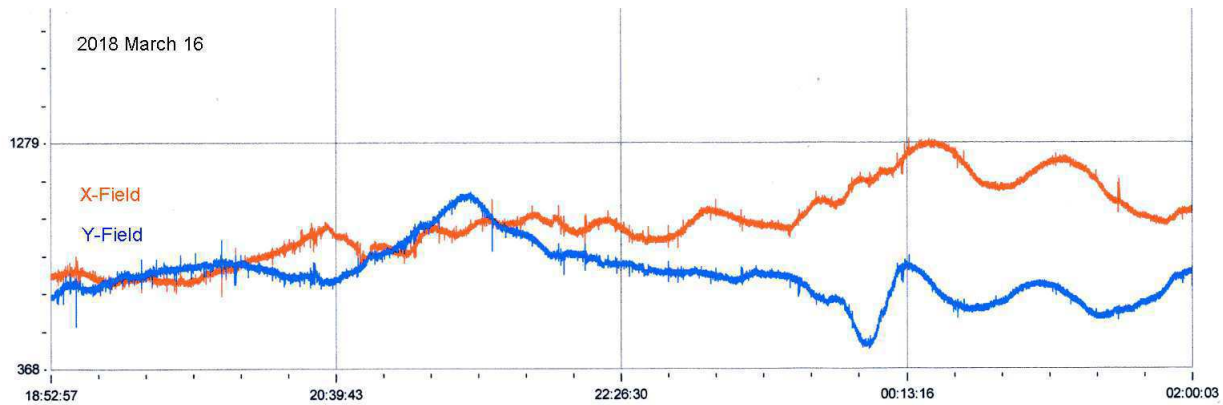


The 22.1kHz and 19.6kHz signals show nice diurnal curves with peaks in signal strength close to 12UT, while the more southerly paths at 20.9kHz and 20.3kHz show much flatter curves centred around 12UT. 24kHz and 37.5kHz are both westerly paths, but show very different diurnal curves. 24kHz peaks at around 14UT, as might be expected, but 37.5kHz appears to be peaking before 12UT which is rather odd. 23.4kHz and 22.6kHz are both off, although showing some interference. It would be interesting to repeat the recording close to the autumn equinox to see how it compares.

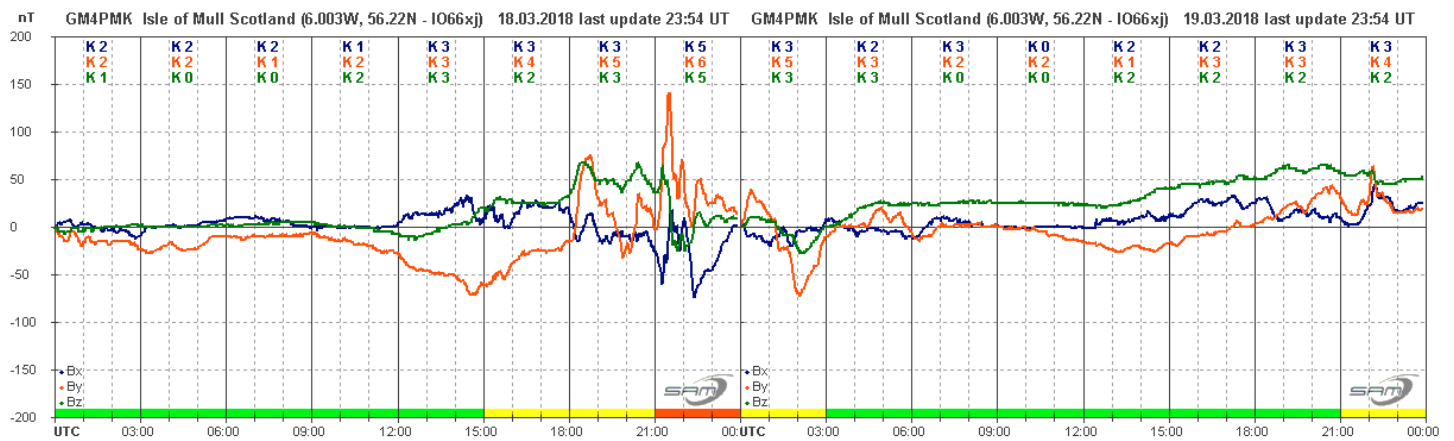
## MAGNETIC OBSERVATIONS.

Satellite images showed a small CME leaving the sun early on the 6<sup>th</sup>, although no flares were seen at the time. This gave rise to some minor magnetic disturbances on the 9<sup>th</sup> and 10<sup>th</sup>. Small transients between 17:30 and 18:20UT in our magnetic recordings show its arrival. With a transit time of about three and a half days, this was a very slow CME, its effects fading by about 06UT on the 10<sup>th</sup>. The remainder of the magnetic activity was from coronal holes, starting with the stream seen at the end of February. This produced very minor activity on the 1<sup>st</sup> and 2<sup>nd</sup>.

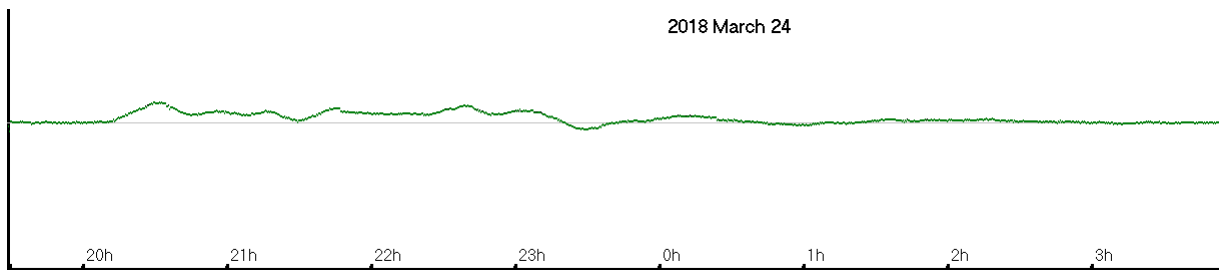
A much larger equatorial hole produced disturbances starting on the 14<sup>th</sup>. Initially these were fairly mild, as shown in this recording by Colin Clements from the 16<sup>th</sup> and 17<sup>th</sup>:



It became far more active overnight on the 18<sup>th</sup> and 19<sup>th</sup>, as recorded by Roger Blackwell:



A much smaller coronal hole appeared a few days later, giving further mild disturbances. My own single-axis recording shows the minor disturbance from about 20UT on the 23<sup>rd</sup>, and fading just after midnight. Similar minor disturbances followed on the 24<sup>th</sup> and 25<sup>th</sup>.



As can be seen from the Bartels diagram, these coronal holes are recurrent features that have been seen over the last three solar rotations, changing only in size and geometry.

Magnetic observations received from Colin Clements, Roger Blackwell, Gonzalo Vargas and John Cook.

BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).	
2478	F	20 21 22 23 24 C	25 26 27 CC	28 29 30 C	31	2015 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 M CCCC CCCC C CC C	
2479	F	16 17 18 CCCC C	19 20 CCC	21 22 23 MMMM CMCC CMCC	24 25 26 C C	27 28 29 30 C C	2015 May 1 2 3 4 5 6 7 8 9 10 11 12 C C C C C C C C C C C C
2480	F	13 14 15 CCCC CCCC	16 17 C	18 19 20 C C	21	2015 June 1 2 3 4 5 6 7 8 C C C C C C C C	
2481	F	9 10 11 CCC CMCC	12 13 CC MCCC	14 15 16 17 C CC CC CC	18 19 20 CCM CCCC MC	21 22 23 24 M C C C	2015 July 25 26 27 28 29 30 1 2 3 4 5 C C C C C C C C C C C C
2482	F	6 7 8 MCCM C	9 10 C	11 12 13 14 C	15 16 17 C	18 19 20 21 22 C C	2015 August 23 24 25 26 27 28 29 30 31 C C C C C C C C C C C
2483	F	2 3 4 5 6 C	7 8 CBCC CC	9 10 11 C	12 13 14 C	15 16 17 18 19 C C	20 21 22 23 24 25 26 27 28 C C M C M C C C C C C C C C C
2484	F	29 30 31 CCC	2015 September 1 2 C	3 4 5 6 C	7 8 9 10 C C	11 12 13 C	2015 October 14 15 16 17 18 19 20 21 22 23 24 C C C C C C C C C C C C C C C C
2485	F	25 26 27 C	28 29 30 CMCC M C M M M C M C M	31 C	1 2 3 C C M C C M M C C C C C	4 5 6 7 8 9 10 C C	2015 November 11 12 13 14 15 16 17 18 19 20 21 C C C C C C C C C C C C C C C C
2486	F	22 23 24 25 26 C	27 28 C	29 30 31 C C C C C C C C C C	1 2 3 C C C C C C C C C C	4 5 6 7 8 9 10 11 12 C C M M C C C C C C C C C C	2015 December 13 14 15 16 17 C C C C C C C C C C C C C C C C
2487	F	18 19 20 C	21 22 23 24 25 26 C	27 C	28 29 30 C	2015 December 1 2 3 C	2016 January 4 5 6 7 8 9 10 11 12 13 14 C C C C C C C C C C C C C C C C
2488	F	15 16 17 18 C	19 20 M	21 22 23 24 C	25 26 27 C	28 29 30 M C	2016 January 31 1 2 3 4 5 6 7 8 9 10 C C C C C C C C C C C C C C C C
2489	F	11 12 13 C	14 15 16 17 C	18 19 20 21 C	22 23 24 C	25 26 27 28 29 30 C C C C C C C C C C C C C C C C	2016 February 31 1 2 3 4 5 6 C C C C C C C C C C C C C C C C
2490	F	7 8 9 C	10 11 12 C	13 14 MC CMCM	15 16 17 18 CMCC CC CCCC	19 20 21 22 23 24 C C	2016 March 25 26 27 28 29 1 2 3 4 C C C C C C C C C C C C C C C C
2491	F	5 6 7 8 CB	9 10 11 12 C	13 14 15 16 C	17 18 19 C	20 21 22 23 24 25 26 27 C C C C C C C C C C C C C C C C	2016 April 28 29 30 31 C C C C C C C C C C C C C C C C
2492	F	1 2 3 4 5 C	6 7 8 C C C B C B C	9 10 11 C C C	12 13 C C	14 15 16 17 18 C C C C C C C C C C C C C C C C	2016 April 19 20 21 22 23 24 25 26 27 C C C C C C C C C C C C C C C C
2493	F	28 29 30 CCC	2016 May 1 2 3 4 5 C C C C C	6 7 8 9 C C C C C	10 11 12 13 C C C C C	14 15 16 17 18 19 20 C C C C C C C C C C C C C C C C	2016 May 21 22 23 24 C C C C C C C C C C C C C C C C
2494	F	25 26 CC	27 28 29 30 31 CC	2016 June 1 2 3 4 C C C C	5 6 C C	7 8 9 10 C C C C	2016 June 11 12 13 14 15 16 17 18 19 20 C C C C C C C C C C C C C C C C
2495	F	21 22 23 24 25 C	26 27 28 29 30 C	2016 July 1 2 3 C C C	4 5 6 C C C	7 8 9 10 C C C C	2016 July 11 12 13 14 15 16 17 C C C C C C C C C C C C C C C C
2496	F	18 19 20 C C	21 22 23 C C B C B C C C	24 25 26 C C M M C C M B C M C C	27 28 29 30 C C B B C C	2016 August 31 1 2 3 4 5 6 7 8 9 10 11 12 13 C C C C C C C C C C C C C C C C	
2497	F	14 15 16 C	17 18 C	19 20 21 22 C	23 24 25 26 C C C C C C C C C C C C C C C C	2016 September 27 28 29 30 31 C C C C C C C C C C C C C C C C	
2498	F	10 11 12 13 14 C	15 16 17 18 19 C	20 21 22 C C B C C C C C C C	23 24 25 26 27 28 29 30 C C C C C C C C C C C C C C C C	2016 October 1 2 3 4 5 6 C C C C C C C C C C C C C C C C	
2499	F	7 8 9 C	10 11 C	12 13 14 C B	15 16 17 18 19 C C C C C C C C C C C C C C C C	2016 November 20 21 22 23 24 25 26 27 28 29 30 31 C C C C C C C C C C C C C C C C	
2500	F	3 4 5 6 7 8 C	9 10 11 12 13 14 15 C	2016 December 16 17 18 19 20 C C C C C C C C C C C C C C C C	21 22 23 24 25 26 27 28 29 C C C C C C C C C C C C C C C C	2016 December 30 31 C C C C C C C C C C C C C C C C	
2501	F	30 CC	2016 December 1 2 3 4 5 C C C C C	6 7 8 9 10 11 12 13 C C C C C C C C C C C C C C C C	2016 December 14 15 16 17 18 19 20 21 22 23 24 25 26 C C C C C C C C C C C C C C C C		
2502	F	27 28 29 30 31 C	2017 January 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 C	2017 January 23 24 25 26 27 28 29 30 31 C			
2503	F	23 24 25 C	26 27 28 29 30 31 C	2017 February 1 2 3 4 5 6 7 C C C C C C C C C C C C C C C C	2017 February 8 9 10 11 12 13 14 15 16 17 18 C C C C C C C C C C C C C C C C		
2504	F	19 20 21 22 23 24 B B C	25 26 C	27 28 29 30 31 B C C C C C C C C C C C C C C C	2017 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 C		
2505	F	18 19 20 C	21 22 23 24 C	25 26 C	27 28 29 30 31 C C C C C C C C C C C C C C C C	2017 April 1 2 3 4 5 6 7 8 9 10 11 12 13 C C C C C C C C C C C C C C C C	
2506	F	14 15 16 17 18 C	19 20 21 22 C B	23 24 C	25 26 27 28 29 C	2017 May 30 1 2 3 4 5 6 7 8 9 10 C C C C C C C C C C C C C C C C	
2507	F	11 12 13 14 C	15 16 17 18 19 20 21 22 C	23 24 25 26 C	27 28 29 30 31 C C C C C C C C C C C C C C C C	2017 June 1 2 3 4 5 6 C C C C C C C C C C C C C C C C	
2508	F	7 8 9 10 C B	11 12 13 14 15 16 17 C	18 19 20 21 22 C	23 24 25 26 27 28 29 30 C C C C C C C C C C C C C C C C	2017 July 1 2 3 C C C C C C C C C C C C C C C C	
2509	F	4 5 6 7 C B	8 9 10 C C B B	11 12 13 14 15 C C C C C C C C C C C C C C C C	16 17 C C C C C C C C C C C C C C C C	2017 August 18 19 20 21 22 23 24 25 26 27 28 29 30 C C C C C C C C C C C C C C C C	
2510	F	31 B	2017 August 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 C C C C C C C C C C C C C C C C	2017 August 17 18 19 20 21 22 23 24 25 26 C C C C C C C C C C C C C C C C	2017 August 27 28 29 30 31 C C C C C C C C C C C C C C C C		
2511	F	27 28 29 30 C	2017 September 31 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 C	2017 September 23 24 25 26 27 28 29 30 31 C C C C C C C C C C C C C C C C			
2512	F	23 24 25 26 C	27 28 29 30 C	2017 October 1 2 3 4 5 6 7 8 9 C C C C C C C C C C C C C C C C	2017 October 10 11 12 13 14 15 16 17 18 19 C C C C C C C C C C C C C C C C		
2513	F	20 21 22 23 C	24 25 26 27 28 29 30 31 C	2017 November 1 2 3 4 5 C C C C C C C C C C C C C C C C	2017 November 6 7 8 9 10 11 12 13 14 15 C C C C C C C C C C C C C C C C		
2514	F	16 17 18 19 C	20 21 22 23 24 25 26 27 28 29 30 C	2017 December 1 2 3 C C C	2017 December 4 5 6 7 8 9 10 11 12 C C C C C C C C C C C C C C C C		
2515	F	13 14 15 16 C	17 18 19 20 C	21 22 23 24 25 26 27 28 29 30 C	2018 January 31 1 2 3 4 5 6 7 8 C C C C C C C C C C C C C C C C		
2516	F	9 10 11 12 13 C	14 15 16 17 18 C	19 20 21 22 23 24 25 26 C	2018 February 27 28 29 30 31 C C C C C C C C C C C C C C C C		
2517	F	5 6 7 8 C C	9 10 C B B	11 12 13 14 C	15 16 17 18 19 20 21 C C C C C C C C C C C C C C C C	2018 March 22 23 24 25 26 27 28 C C C C C C C C C C C C C C C C	
2518	F	4 5 6 7 8 C	9 10 11 12 13 C	14 15 16 17 18 19 20 C	21 22 23 24 25 26 27 28 29 30 C C C C C C C C C C C C C C C C		
2519	F	31 C	2018 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 C C C C C C C C C C C C C C C C	2018 April 19 20 21 22 23 24 25 26 C C C C C C C C C C C C C C C C			