

BAA Radio Astronomy Group.

2019 APRIL

DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (20.9kHz)	Paul Hyde (22.1kHz/24kHz)	Mark Edwards (24.0kHz/20.9kHz)	Colin Clements (23.4kHz/18.3kHz)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Spectrum Lab / PC 1.5m frame aerial.	Spectrum Lab / PC 2m loop aerial.	Tuned Radio Frequency receivers, 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)
8	B5.6	2			13:59 14:05 14:39 2	13:58 14:04 14:18 1	
12	B7.1	3			11:33 11:46 12:05 1+	11:35 11:41 11:58 1	
20	B6.8	2			09:26 09:32 10:18 2+	09:26 09:30 09:43 1-	

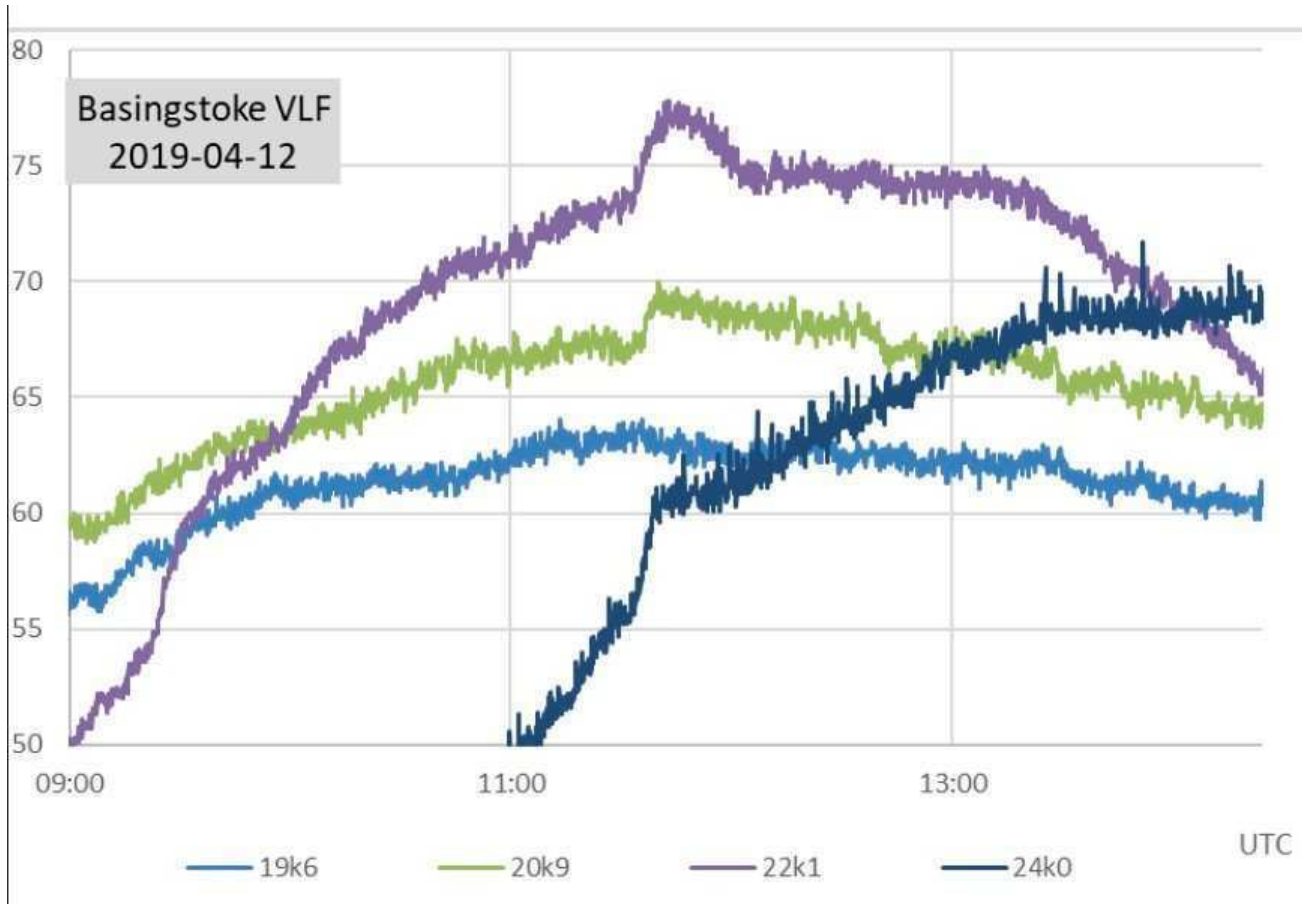
DAY	Xray class	Observers	Steve Parkinson (Various)	Andrew Thomas (23.4kHz)	Phil Rourke (23.4kHz)	Jim Barber	John Elliott (18.3kHz)
			Tuned radio frequency receiver, frame aeriels.	Tuned radio frequency receiver, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Tuned 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)
8	B5.6						
12	B7.1			11:33 11:41 12:11 2			
20	B6.8						

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)
8	B5.6						
12	B7.1						
20	B6.8						



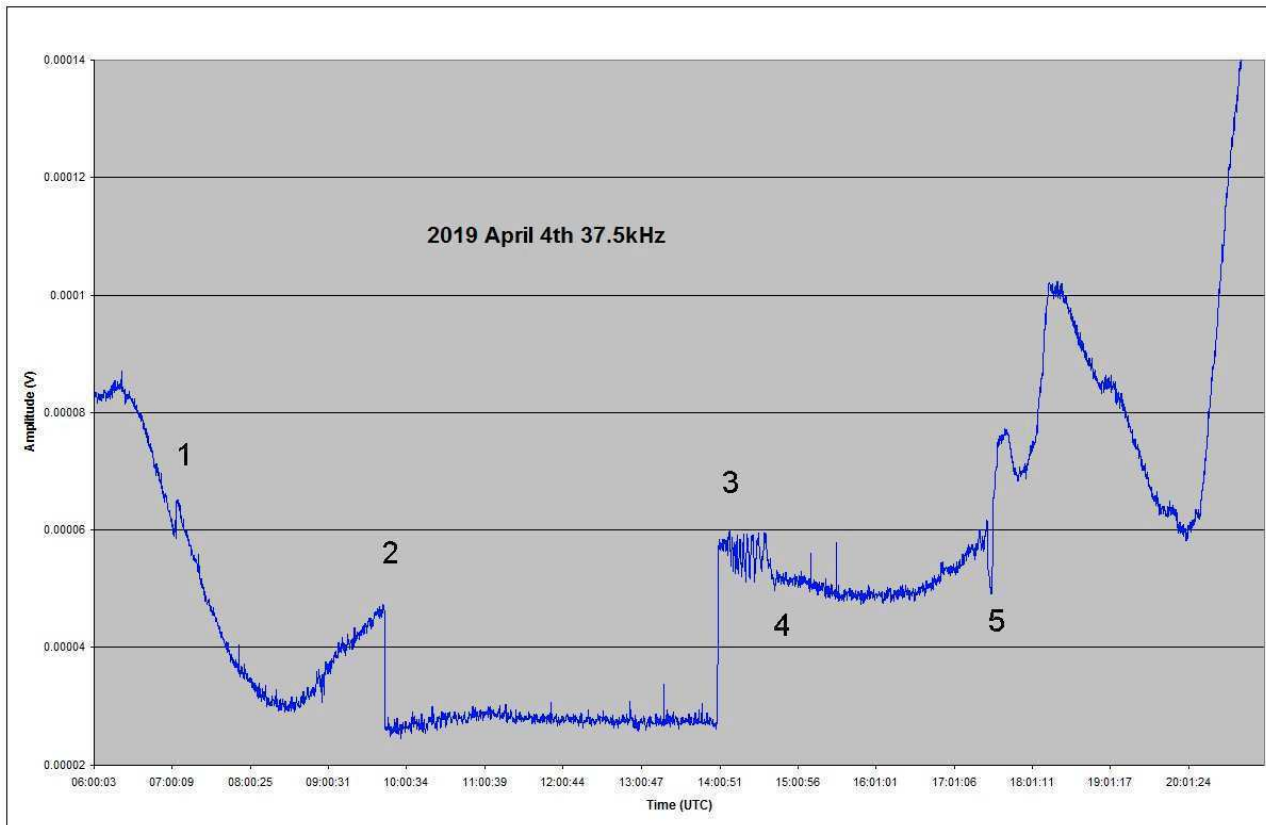


The sunspot groups present during April were fairly active with small B-class flares, three of which were recorded as SIDs. The background level measured by GOES15 rose to B1 by the 6<sup>th</sup>, falling again after the 15<sup>th</sup>. The satellite data then shows a sudden increase back to B1 late on the 18<sup>th</sup>, looking like a re-calibration rather than a genuine solar event. The strongest of the three SIDs was the B7.1 peaking at 11:46UT on the 12<sup>th</sup>, shown in this recording by Paul Hyde:



The SID is very well defined at 22.1 kHz, but not visible at 19.6 kHz. This is quite surprising as the paths are very close for these signals. It is also just visible in the trans-Atlantic path at 24 kHz.

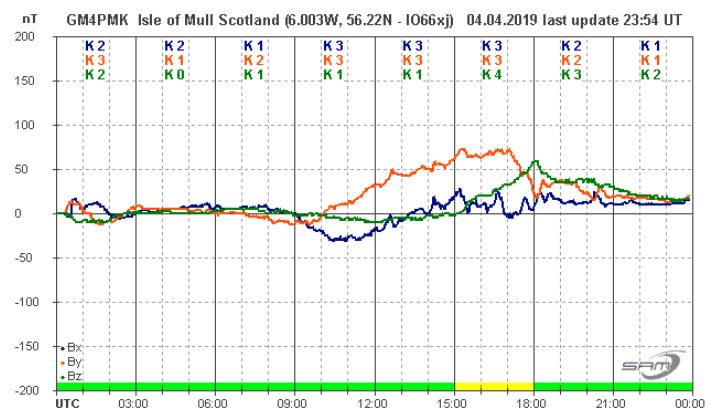
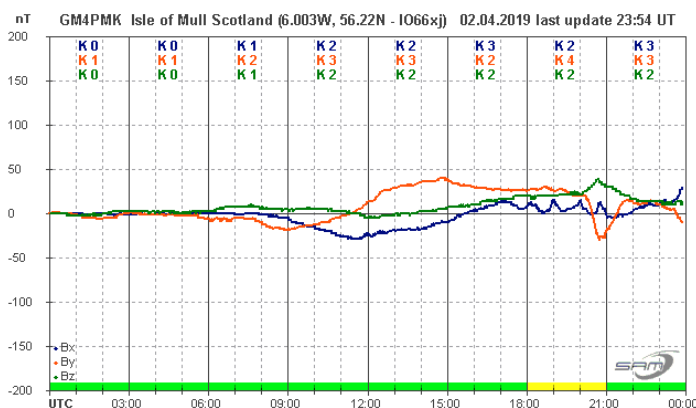
For some time now, Mark Edwards has been investigating the strange 'chirps' that are often recorded on the 37.5 kHz signal from Grindavik. These do not seem to correspond with the magnetic effects that are also recorded on this signal, but a lucky observation may well provide the answers. On April 4<sup>th</sup>, Mark was monitoring the signal when a glitch appeared that exactly matched a change from data modulation to the 50 Hz test-tone. This is marked '1' on the chart on the next page, and occurs at 07:02 UT. Point 2 is where the carrier is turned off, with the signal strength falling to zero at 09:44. The carrier comes back on again at 13:59, and is followed by a period of oscillations marked '3'. This period of oscillations was seen to involve some complex test-tone modulation during which the carrier does indeed rise and fall in amplitude in phase with the oscillation, while the modulation side-bands remain at a constant amplitude. Normal data modulation then resumes at 14:44 as the oscillation stops (4). Point 5 marks what is probably a genuine magnetically induced transient at 17:26. This is then followed by sunset as the signal level rises rapidly after 18:00.



The 23.4kHz signal has again been off-air for most of the month, with just a few overnight appearances.

## MAGNETIC OBSERVATIONS.

The larger coronal holes seen in previous months have mostly broken up into groups of much smaller holes, resulting in a few very weak magnetic disturbances in April. The strongest of these were recorded on the 2<sup>nd</sup> and 4<sup>th</sup>, shown here in the recording by Roger Blackwell:



The disturbance on both days was less than 100nT, with smaller disturbances present on the other days shown in the Bartels diagram. There were no Earth-directed CMEs shown in satellite images.

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

**BARTELS DIAGRAM**

ROTATION	KEY:	DISTURBED	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2493	F	28 CCC	29 C	30 C	2016 May 1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C 9 C	2177 10 11 12 13 14 CCBBC 15 C 16 C 17 18 19 20 21 BC 22 B 23 24 BBC
2494	F	25 CC	26 CC	27 CC	2016 June 1 2 3 4 5	2178 6 7 8 9 BCC 10 B 11 C 12 C 13 C 14 15 16 17 18 19 C 20
2495	F	21	22	23	2016 July 1 2 3	2179 4 5 6 7 C 8 C 9 C 10 11 12 13 14 15 C 16 CCBBC 17 C
2496	F	18 C	19 C	20 C	2016 August 1 C 2 C 3 C 4 C 5 C 6 C 7 C 8 C 9 C 10 C 11 C 12 C 13 C	2180 14 C 15 C 16 C 17 18 19 20 21 22 23 24 C 25 C 26 C 27 C 28 C 29 C 30
2497	F	14 C	15 C	16 C	2016 September 1 2 3 4 5 6 7 8 9	2181 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
2498	F	10	11	12	2016 October 1 2 3 4 5 6	2182 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2499	F	7	8	9	2016 November 1 2	2183 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
2500	F	3	4	5	2016 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	2184 17 18 19 20 21 22 23 24 25 26 27 28 C 29 CCM
2501	F	30 CC	1	2	2017 January 1 2 3 4 5 6 7 8 9 10 11 12 13	2185 14 15 16 17 18 19 20 21 22 23 24 25 26
2502	F	27	28	29	2017 February 1 2 3 4 5 6 7 8 9 10	2186 11 12 13 14 15 16 17 18 19 20 21 22
2503	F	23	24	25	2017 March 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	2187 19 20 21 22 23 24 25 26 27 28 29 30 31
2504	F	19 BB	20 BB	21 C	2017 April 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	2188 18 19 20 21 22 23 24 25 26 27 28 B 29 C 30 C 31 C
2505	F	18	19	20	2017 May 1 2 3 4 5 6 7 8 9 10 11 12 13	2189 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
2506	F	14	15	16	2017 June 1 2 3 4 5 6 7 8 9 10	2190 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
2507	F	11	12	13	2017 July 1 2 3 4 5 6	2191 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
2508	F	7 CB	8	9	2017 August 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	2192 23 24 25 26 27 28 29 30 31
2509	F	4	5	6	2017 September 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	2193 20 21 22 23 24 25 26 27 28 29 30
2510	F	31 B	1	2	2017 October 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	2194 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
2511	F	27 C	28 B	29 B	2017 November 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	2195 13 14 15 16 17 18 19 20 21 22
2512	F	23	24	25	2017 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	2196 10 11 12 13 14 15 16 17 18 19
2513	F	20	21	22	2018 January 1 2 3 4 5	2197 6 7 8 9 10 11 12 13 14 15
2514	F	16	17	18	2018 February 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	2198 4 5 6 7 8 9 10 11 12
2515	F	13	14	15	2018 March 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	2199 31 1 2 3 4 5 6 7 8
2516	F	9	10	11	2018 April 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	2200 27 28 29 30 31
2517	F	5	6	7	2018 May 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	2201 24 25 26 27 28 29 30 31
2518	F	4	5	6	2018 June 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	2202 23 24 25 26 27 28 29 30
2519	F	31 B	1	2	2018 July 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	2203 19 20 21 22 23 24 25 26
2520	F	27	28	29	2018 August 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	2204 15 16 17 18 19 20 21 22 23 24 25 26
2521	F	24 B	25 B	26 BC	2018 September 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	2205 13 14 15 16 17 18 19
2522	F	20	21	22	2018 October 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	2206 10 11 12 13 14 15 16
2523	F	17	18	19	2018 November 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	2207 6 7 8 9 10 11 12
2524	F	13	14	15	2018 December 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	2208 1 2 3 4 5 6 7 8
2525	F	9	10	11	2019 January 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	2209 30 1 2 3 4 5
2526	F	6	7	8	2019 February 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	2210 27 28 29 30 31
2527	F	2	3	4	2019 March 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	2211 23 24 25 26 27 28
2528	F	29	30	1	2019 April 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	2212 19 20 21 22 23 24 25
2529	F	26	27	28	2019 May 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	2213 14 15 16 17 18 19 20 21
2530	F	22	23	24	2019 June 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	2214 13 14 15 16 17
2531	F	18	19	20	2019 July 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	2215 13 14 15 16
2532	F	17	18	19	2019 August 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	2216 9 10 11 12 B
2533	F	13	14	15	2019 September 1 2 3 4 5 6 7 8 9	2217 6 7 8 9