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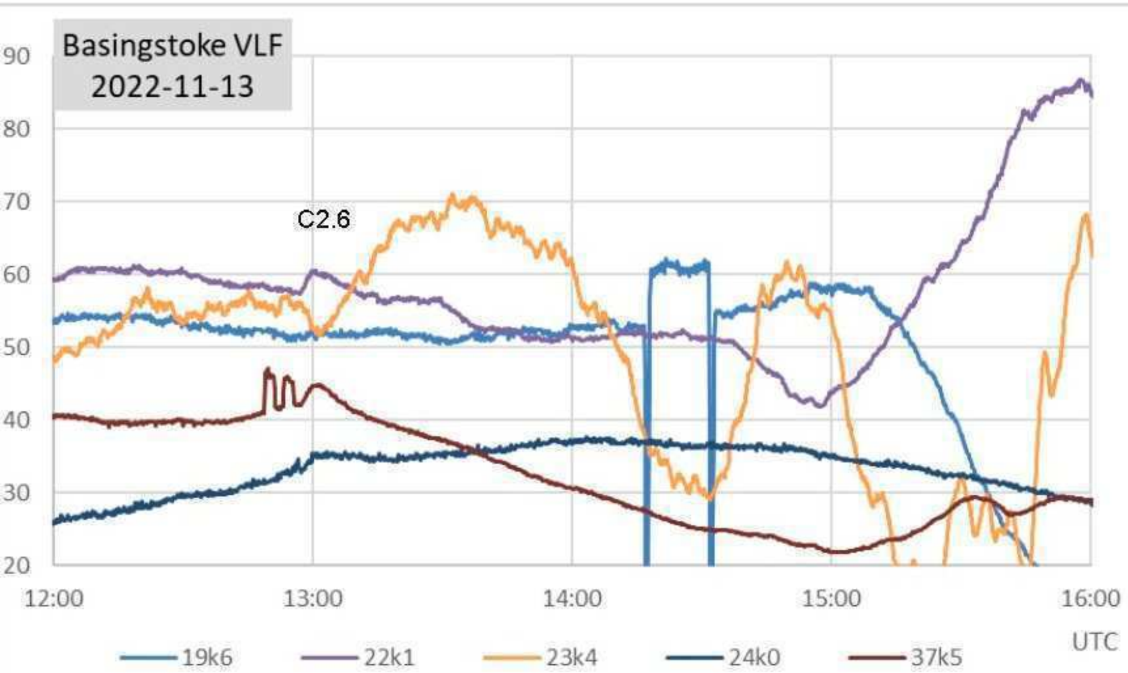
BAA Radio Astronomy Section. Director Paul Hearn.

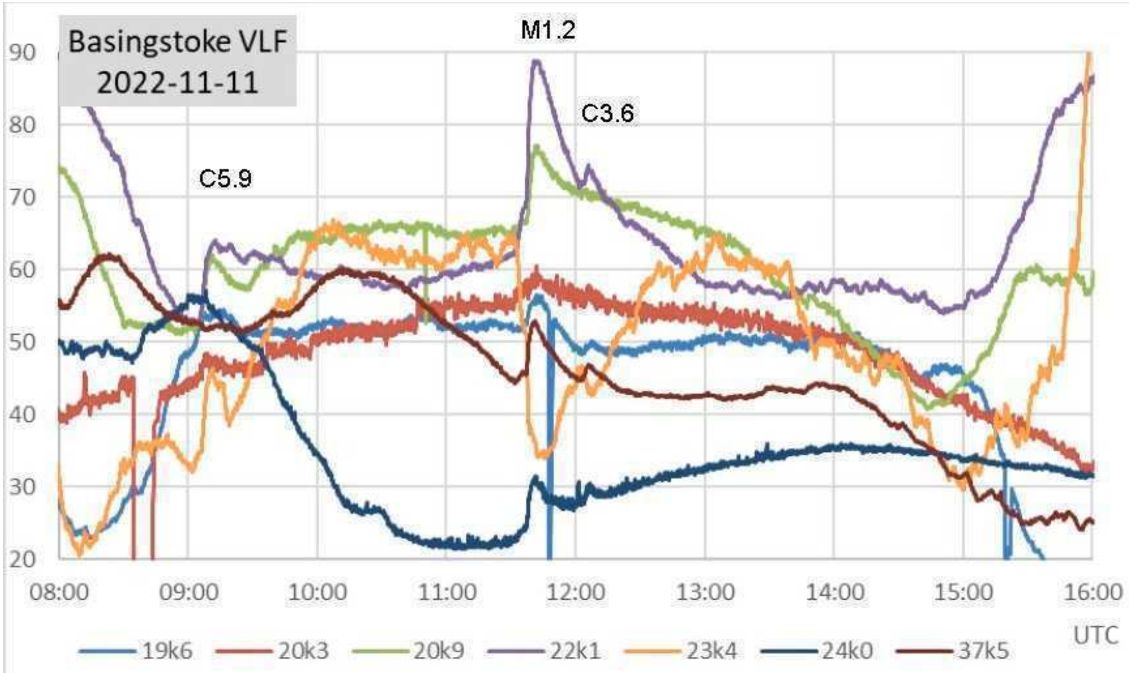
RADIO SKY NEWS 2022 NOVEMBER.

VLF SID OBSERVATIONS.

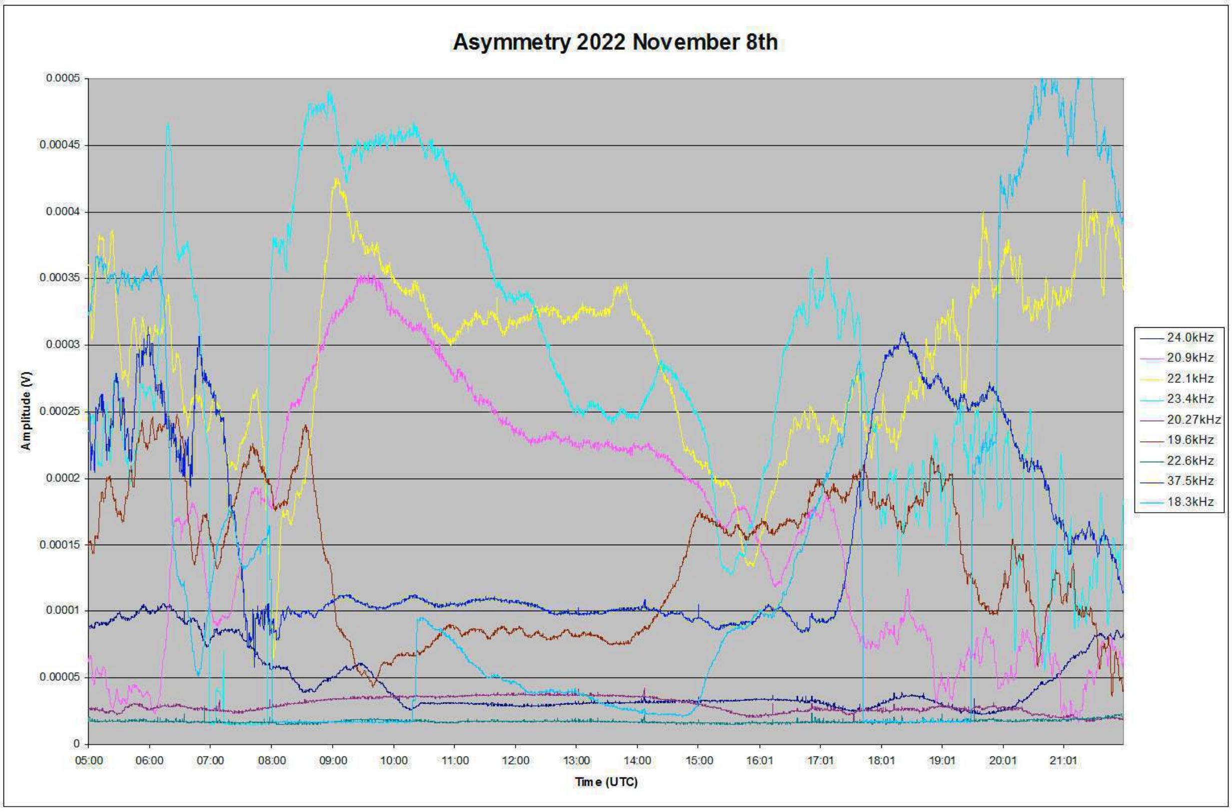
Solar activity has been much lower than in October, with a total of 35 SIDs recorded. Signals have also been very unstable making the smaller flares difficult to detect in the noise. 23.4kHz seems to have been particularly badly affected, while the more northerly / southerly paths have been less affected. Paul Hyde's recording from the 13th shows the problem well:



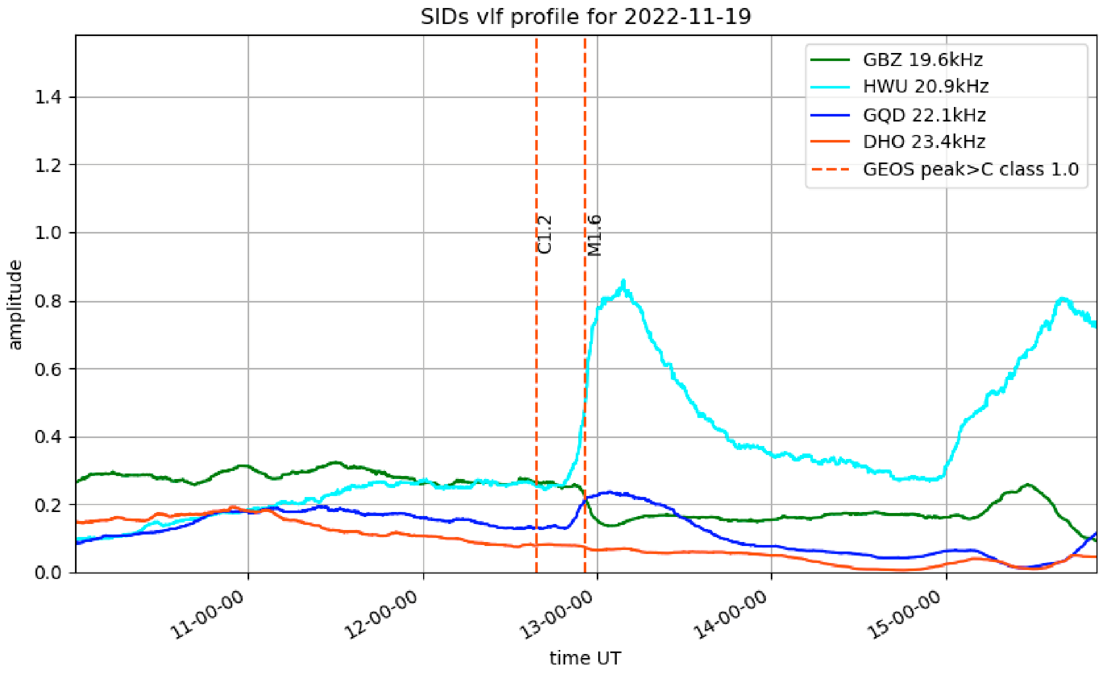
The C2.6 flare stands out well at 22.1 and 37.5kHz, despite some glitches from Grindavik. 23.4kHz shows a good SID, but it is not that obvious on the very unstable signal. It also shows the very early sunset features on the easterly path. Activity on the 11th was rather stronger, and so the SIDs are a little easier to see on Paul's recording on the next page. 19.6kHz from Skelton, just a few miles away from the Anthorn site, has not responded as well on either chart, and 23.4kHz shows much the same instability. The M1.2 flare does stand out on most signals, but not 20.3kHz, from Italy. The much smaller C3.6 flare during the M1.2 decay is also well recorded. Both flares were from the same active region.

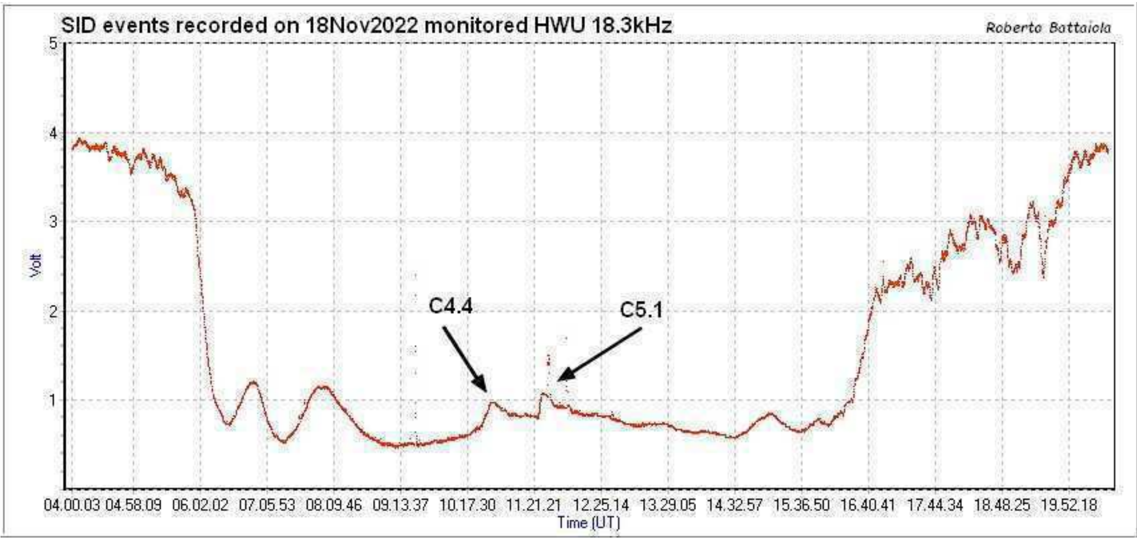


Mark Edwards noted some strong asymmetry in the diurnal curves, particularly on the 8th:

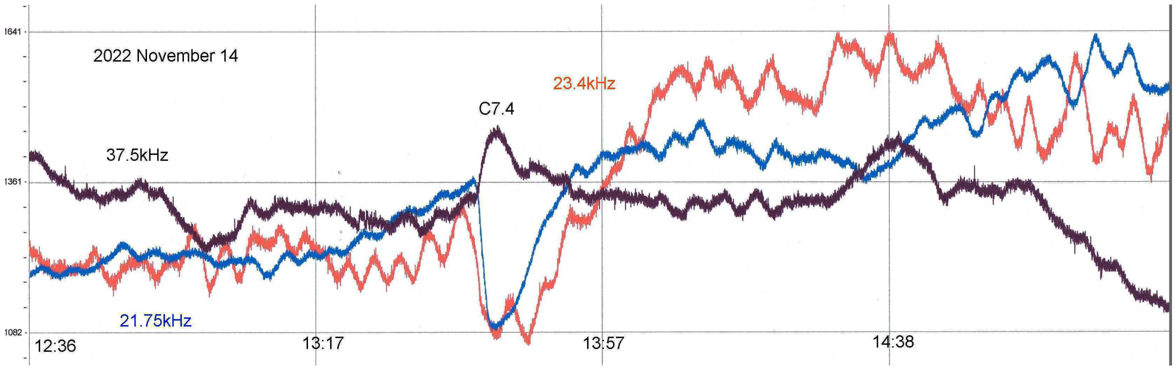


This shows particularly at 23.4kHz (light blue), 22.1kHz (yellow), and 20.9kHz (pink), with an inverted asymmetry at 19.6kHz (brown). My own 23.4kHz recordings also show this asymmetry at 23.4kHz on the 8th, and from the 19th to the 21st. These are mostly days of very low solar activity, although there was an M1.6 in the early afternoon of the 19th. This flare shows well at 20.9kHz in the recording by Mark Prescott, although much less asymmetry in the diurnal curve.



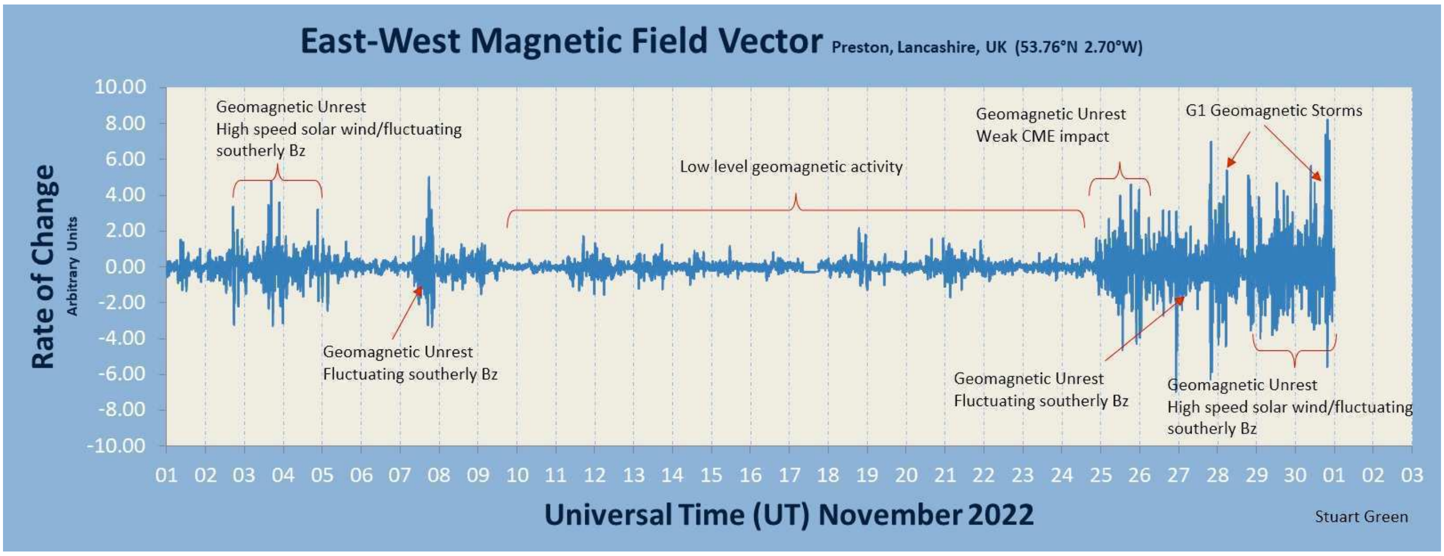


Two much smaller flares have produced very clear SIDs at 18.3kHz in this recording by Roberto Battaiola on the 18th.

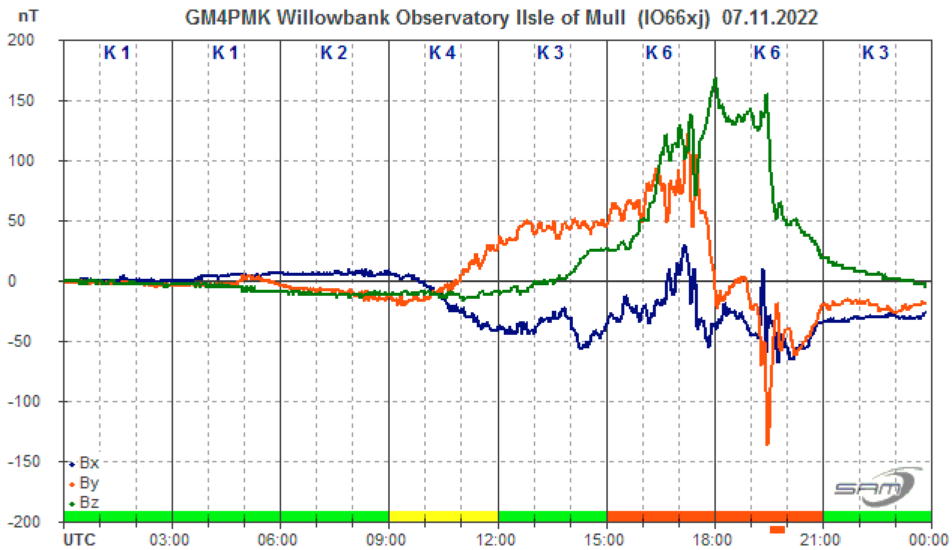


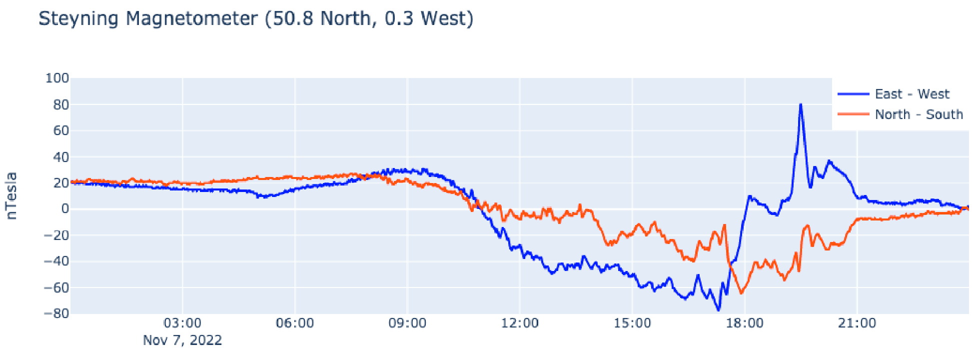
Colin Clements' recording from the 14th shows the C7.4 flare, once again on very unstable signals. 23.4kHz also again seems to be the worst affected.

MAGNETIC OBSERVATIONS.



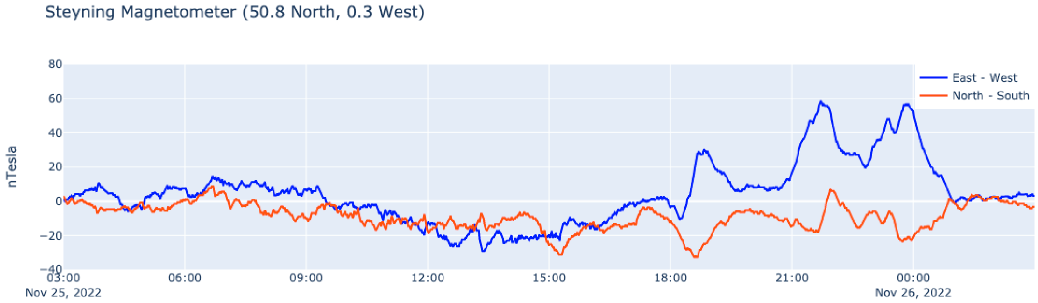
Stuart Green's monthly summary shows a very quiet magnetosphere through most of November, starting with some weak solar wind effects and ending with an extended active period during the last week.

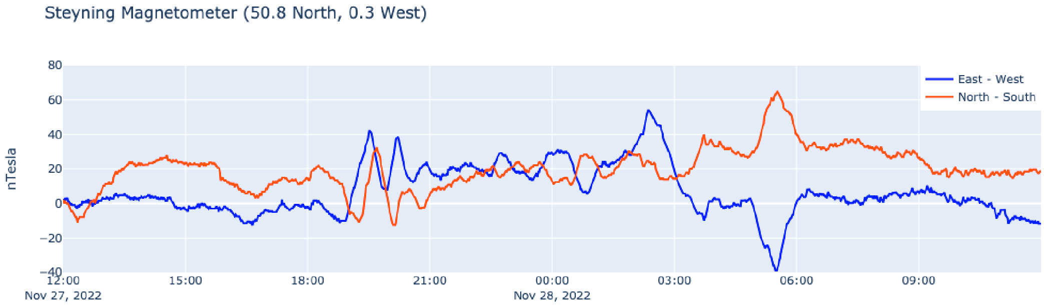




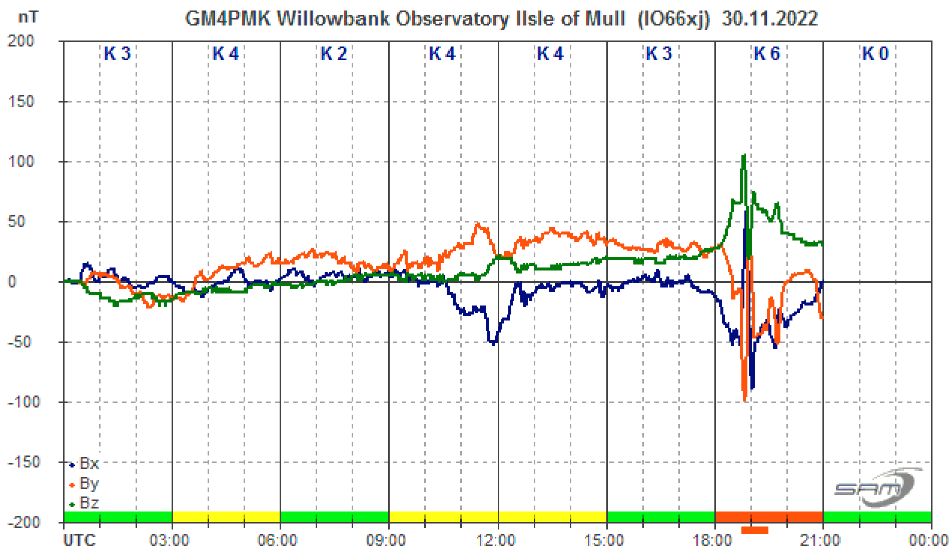
The most active magnetic disturbance was recorded in the afternoon and evening of the 7th, shown in the top recording by Mark Edwards, and the lower chart by Nick Quinn. The sensitivities of these two sensors have opposite polarities, but the dominant features are clear in both, with a strong transient at 19:30UT. The source of the disturbance appears to be a brief period of fast solar wind, lasting just 12 hours.

There were a number of CMEs associated with the stronger flares, but they were all from active regions near the solar limb, and so had limited effect on our magnetic field. Stuart Green's summary chart indicates a weak CME impact around the 25th/26th, although its source is not clear. Most of this disturbance seems to have been form a coronal hole high speed wind.





Nick Quinn's recordings from the 25th and 27th/28th show some of this activity. There is no clear sign of a CME impact, indicating that it may have been just a glancing blow.

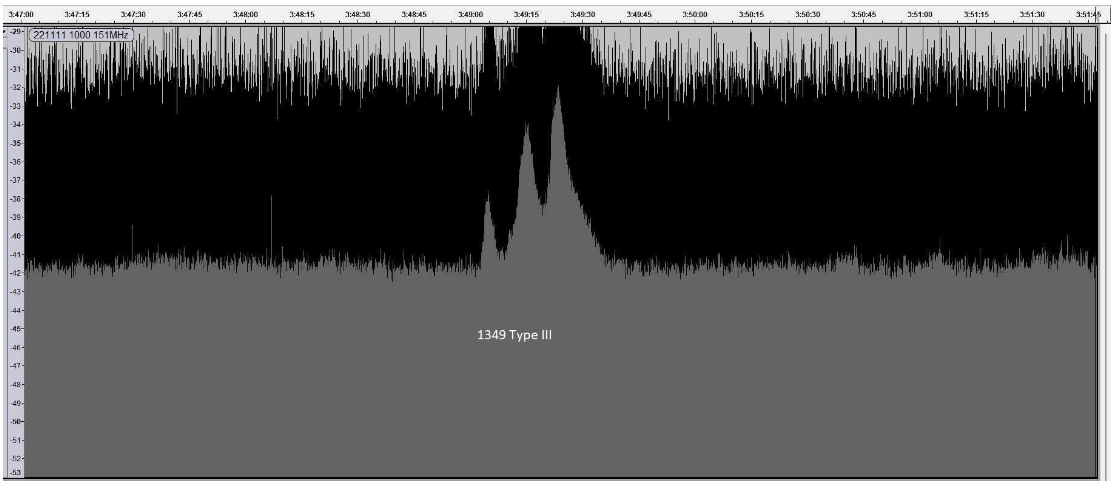


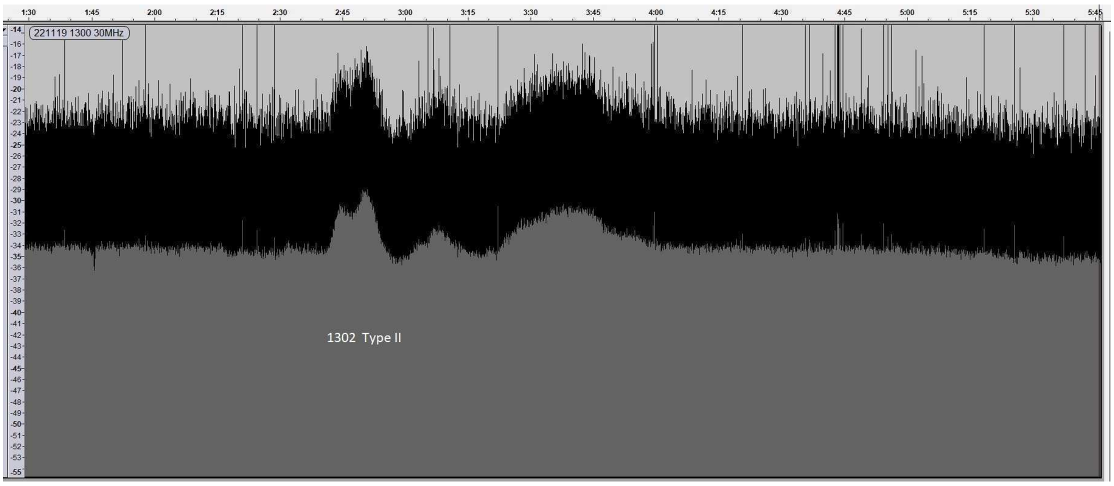
Roger Blackwell's recording from the 30th shows further high speed wind effects building up in the evening of the 30th, although his recording terminated early for some reason.

Stuart Green's summary chart shows activity based on the rate of change in the magnetic field, while the other charts all show the field intensity over time, accounting for the apparent weaker activity at the end of November that appears to be stronger in the summary chart.

Magnetic observations received from Roger Blackwell, Colin Clements, Stuart Green, Nick Quinn and John Cook.

SOLAR EMISSIONS.



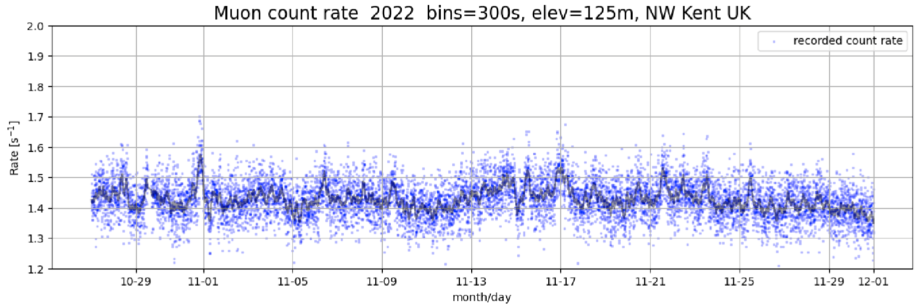


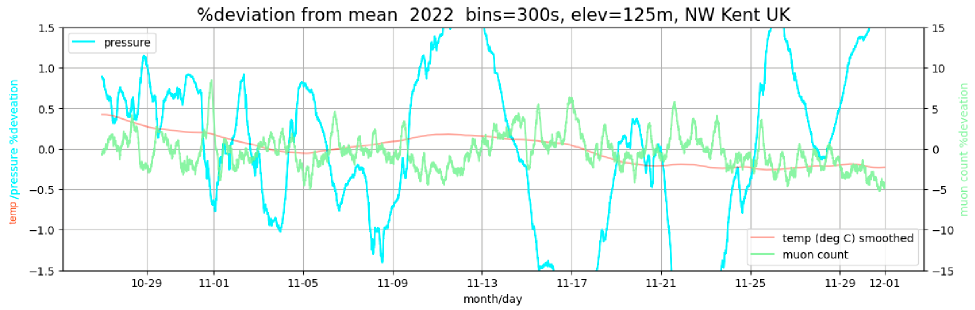
Colin Briden made two solar emission recordings, the first a type III burst at 13:49UT on the 11th at 151MHz. Shown in the top image, this lasts for just 30 seconds, with an amplitude of about 10dB. It does not match any of our recorded flares, but does match the timing of a C1.0 flare listed in the SWPC satellite data. The second recording shows a type II burst at 13:02UT on the 19th at 30MHz. This lasts for about one minute, with a 5dB amplitude. This one matches the M1.6 flare shown in our SID recordings.

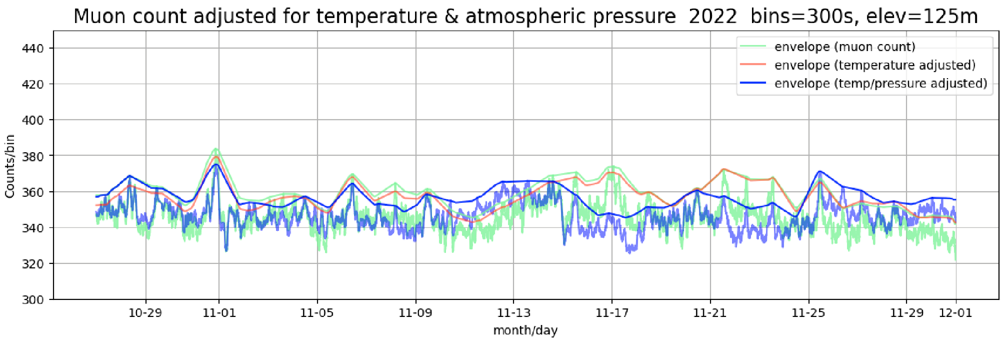
Colin has noticed that the 28-30MHz band is becoming more noisy with interference as the increased solar activity allows better HF propagation. There is also the problem of the sun being much lower in the sky at this time of year. These recordings are currently made using a simple dipole aerial that can easily be trimmed to suit different frequencies. Colin Clements is unable to make VHF recordings while the sun remains below his aerial's horizon.

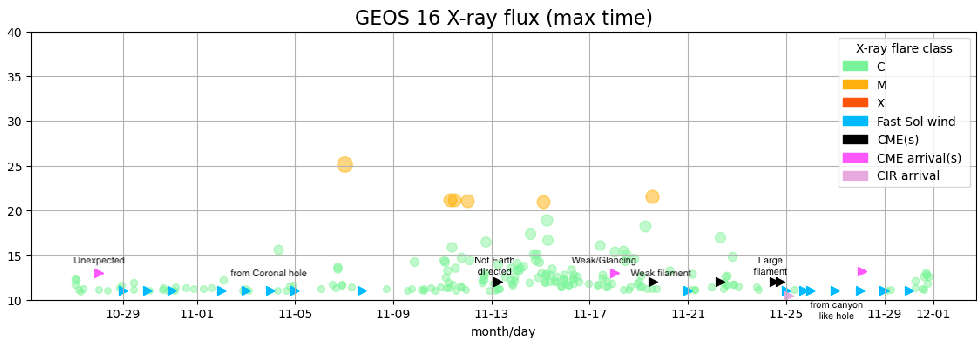
MUON OBSERVATIONS.

Mark Prescott has continued his muon recordings, shown in the charts on the next page. There does not appear to be any stand-out events this time, but it does seem that the general muon count is lower during periods of faster solar wind.

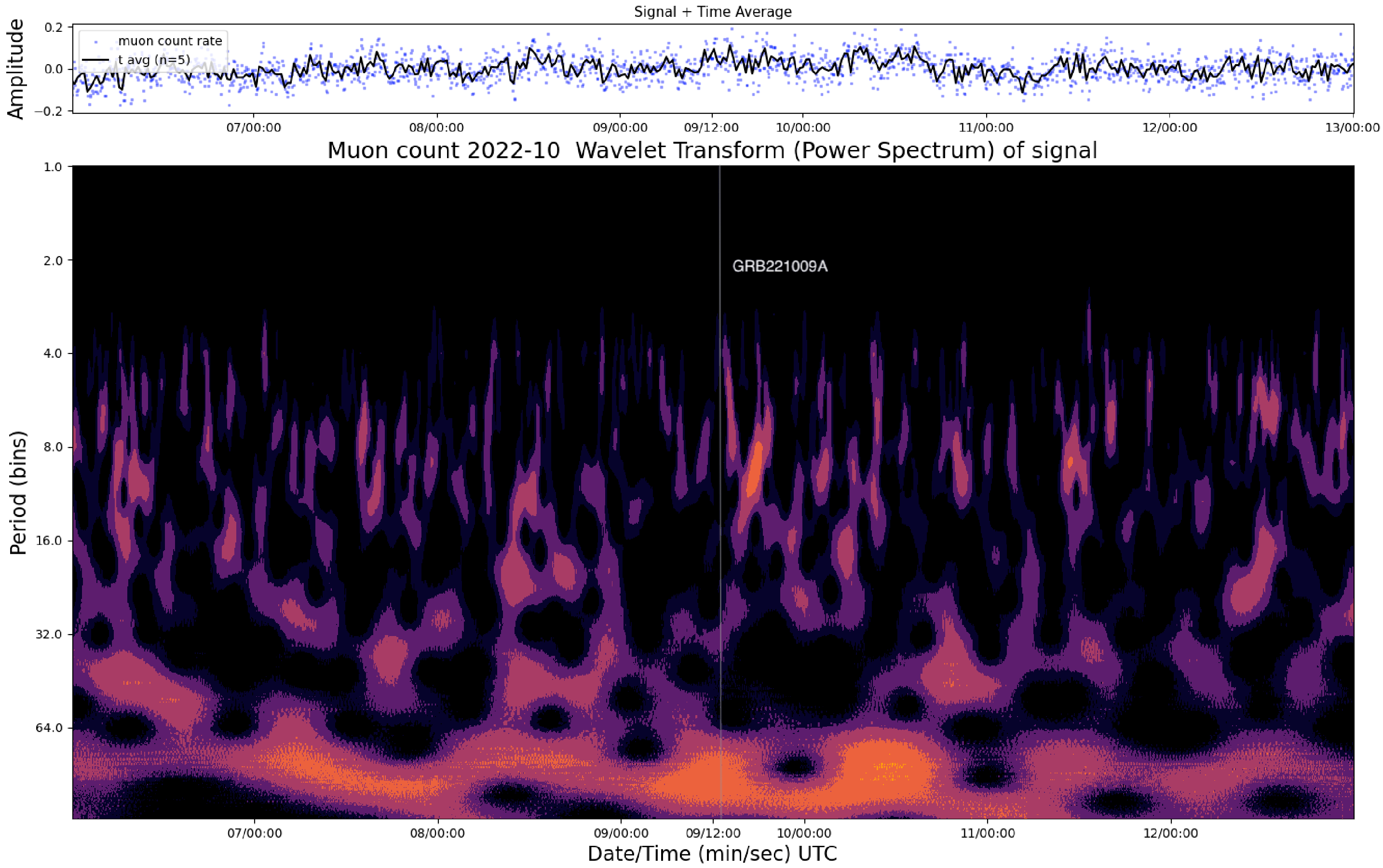






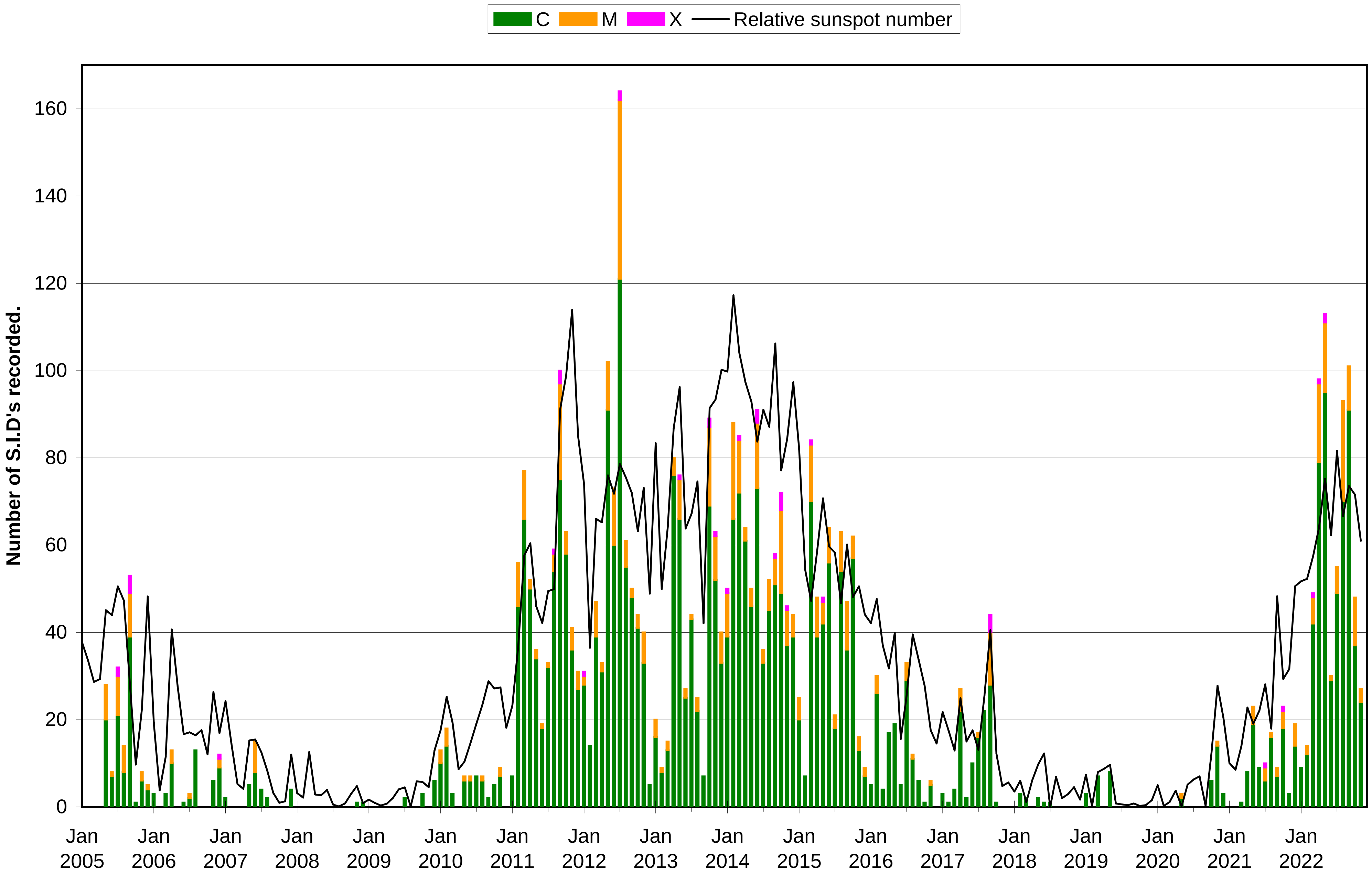


Mark has also been analysing his data during the GRB recorded on October 9th. The chart on the next page shows a wavelet transform, indicating a slightly higher muon count on the 9th and 10th. The GRB timing is marked with a vertical line near the centre of the chart. The vertical axis represents the wavelet period in recording bins, with colour indicating the intensity. There is also a higher count on the 10th. There is a general trend of increased intensity during daylight hours compared with night. This represents just a single observation, and so the link to the GRB is probably weak. It is however a useful recording that can be used to compare with other active and quiet periods over the next year or so as we learn to interpret the data.



There will be a solar section Zoom webinar on February 18th, including a radio astronomy contribution from Paul Hearn. Full details can be found on the BAA website.

VLF flare activity 2005/22



BAA Radio Astronomy Section. **2022 NOVEMBER.**

	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*)				Roberto Battaiola 18.3kHz				Paul Hyde (22.1kHz/*24kHz*)				Mark Edwards (24.0/*18.3*/**20.9kHz**)				Colin Clements (37.5kHz)			
			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.			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
6	C1.7	1													12:09	12:11	12:16	1-				
7	C3.1	1													***14:52***	***15:19***	***15:56***	***2+***				
10	C1.3	1													12:11	12:15	12:27	1-				
11	**M1.2**	3					07:09	07:13	07:18	1-					***07:11***	***07:16***	***07:30***	***1***				
11	C5.9	8	09:06	09:09	09:13	1-	09:04	09:11	09:20	1-	09:06	09:14	09:27	1	*09:03*	*09:13*	*09:42*	*2*				
11	C1.7	1													09:43	09:47	09:55	1-				
11	**M1.2**	10	11:39	11:44	12:30	2+	11:27	11:40	12:34	2+	11:33	11:43	?	-	11:39	11:43	11:57	1-	11:38	11:43	11:55	1-
11	C3.6	3									12:04	12:08	13:00	2+	12:04	12:09	12:10	1-				
12	C1.9	1													14:57	14:58	15:04	1-				
12	?	1													15:38	15:45	16:06	1+				
12	C2.2	1													16:32	16:33	16:47	1-				
13	C2.6	5					12:57	13:02	13:12	1-	12:57	13:03	13:17	1	12:59	13:05	13:15	1-				
14	?	1					11:23	11:31	11:46	1												
14	C7.4	8	13:38	13:40	14:00	1	13:36	13:41	14:00	1	13:38	13:41	13:52	1-	*13:40*	*13:42*	*13:55*	*1-*	13:41	13:43	13:53	1-
15	C2.8	1					09:14	09:18	09:29	1-												
15	?	1													10:37	10:47	?	-				
15	C3.5	9	10:50	10:53	11:15	1	10:45	10:52	11:10	1	10:48	10:52	11:35	2+	10:51	10:53	?	-				
15	?	1													11:03	11:06	11:16	1-				
15	C2.6	2													**15:08**	**15:17**	**15:29**	**1**				
16	C2.6	1													*11:26*	*11:27*	*11:33*	*1-*				
16	?	1													**11:56**	**11:57**	**12:07**	**1-**				
16	C2.0	1													*13:06*	*13:10*	*13:15*	*1-*				
16	?	1													**13:14**	**13:20**	**13:26**	**1-**				
16	?	1													***13:29***	***13:40***	***?***	***-***				
16	?	1													***13:52***	***13:57***	***14:08***	***1-***				
17	C6.1	3	*09:17*	*09:30*	*09:57*	*2*	09:10	09:26	09:42	1+												
17	C2.8	5					12:15	12:23	12:31	1-	12:18	12:24	12:32	1-	12:21	12:25	12:34	1-				
18	C5.5	1													*09:04*	*09:06*	*09:13*	*1-*				
18	C4.4	5	10:30	10:38	11:02	1+	10:25	10:39	10:56	1+	10:21	10:41	11:02	2	**10:33**	**10:41**	**11:12**	**2**				
18	C5.1	8	11:26	11:29	11:43	1-	11:22	11:28	11:40	1-	11:23	11:30	12:02	2	11:26	11:31	11:39	1-				
19	**M1.6**	11	*12:48*	*12:54*	*13:48*	*2+*	12:42	12:53	14:04	2+	12:48	12:59	13:59	2+	12:46	13:00	13:58	2+	12:49	13:03	13:48	2+
22	C2.6	2									12:21	12:36	12:34	1-	**12:24**	**12:37**	**12:36**	**1-**				
22	C1.6	1													*12:53*	*12:55*	*13:04*	*1-*				
22	C2.7	1													13:51	13:55	14:01	1-				
29	C4.2	1																				

BAA Radio Astronomy Section. **2022 NOVEMBER.**

		Steve Parkinson (Various)				Andrew Thomas (18.3kHz/*19.6kHz*)				Phil Rourke (23.4kHz)				Mark Prescott (20.9kHz)				John Elliott (18.3kHz)			
	Xray class	Tuned radio frequency receiver, frame aerials.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.				SpetrumLab/Starbase, mini-whip aerial.			Active	Tuned radio frequency receiver, 0.5m frame aerial.			
DAY		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
6	C1.7																				
7	C3.1																				
10	C1.3																				
11	**M1.2**																				
11	C5.9					09:06	09:12	09:28	1	09:06	09:12	09:31	1	09:08	09:23	10:07	2+				
11	C1.7																				
11	**M1.2**	11:38	11:43	12:35	2+	11:33	11:42	12:57	2+	11:33	11:40	12:20	2+	11:38	11:48	13:09	3				
11	C3.6													12:07	12:12	12:24	1-				
12	C1.9																				
12	?																				
12	C2.2																				
13	C2.6									13:00	13:03	13:11	1-								
14	?																				
14	C7.4	13:39	13:42	13:52	1-									13:42	13:45	13:55	1-				
15	C2.8																				
15	?																				
15	C3.5	10:50	10:54	11:20	1+	*10:49*	*10:53*	*11:19*	*1+*	10:50	10:53	11:12	1	10:45	10:58	11:45	2+				
15	?																				
15	C2.6																				
16	C2.6																				
16	?																				
16	C2.0																				
16	?																				
16	?																				
16	?																				
17	C6.1																				
17	C2.8													12:24	12:27	12:49	1				
18	C5.5																				
18	C4.4									10:25	10:40	10:57	1+								
18	C5.1	11:26	11:29	11:44	1-	11:26	11:30	11:48	1	11:24	11:29	11:42	1-	11:27	11:36	11:48	1				
19	**M1.6**	12:47	12:59	13:50	2+	12:37	12:59	14:26	3	11:50	12:55	14:40	3+	12:47	13:09	13:48	2+	12:50	13:00	13:20	1+
22	C2.6																				
22	C1.6																				
22	C2.7																				
29	C4.2																				

BAA Radio Astronomy Section. **2022 NOVEMBER.**

	Xray class		Chris Bailey				Andrew Lutley (23.4kHz)			Peter Meadows (23.4kHz)								
			Spectrum Lab.				Tuned radio frequency receiver, 0.6m frame aerial.			Tuned radio frequency receiver, 0.6m frame aerial.								
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)
6	C1.7																	
7	C3.1																	
10	C1.3																	
11	**M1.2**		07:03	07:19	07:50	2+												
11	C5.9		09:06	09:12	09:25	1												
11	C1.7																	
11	**M1.2**		11:33	11:43	12:25	2+												
11	C3.6																	
12	C1.9																	
12	?																	
12	C2.2																	
13	C2.6		12:55	13:04	13:15	1												
14	?																	
14	C7.4		13:38	13:41	14:07	1+												
15	C2.8																	
15	?																	
15	C3.5		10:48	10:53	11:20	1+												
15	?																	
15	C2.6		15:10	15:30	15:50	2												
16	C2.6																	
16	?																	
16	C2.0																	
16	?																	
16	?																	
16	?																	
17	C6.1		09:13	09:25	09:50	2												
17	C2.8		12:19	12:25	13:00	2												
18	C5.5																	
18	C4.4																	
18	C5.1																	
19	**M1.6**		12:35	12:50	14:08	3												
22	C2.6																	
22	C1.6																	
22	C2.7																	
29	C4.2		13:35	13:59	14:35	2+												

BAA Radio Astronomy Section.

BARTELS DIAGRAM

KEY: DISTURBED. ACTIVE SFE B, C, M, X = FLARE MAGNITUDE. Synodic rotation start (carrington's).

ROTATION																											
2543	F 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2020 February 1	2	2227 3
2544	F 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	2228 1
2545	F 2020 March 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	2229 28
2546	F 29	30	31	2020 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
2547	F 2230 25	26	27	28	29	30	2020 May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
2548	F 2231 22	23	24	25	26	27	28	29 MCCB	30	31	2020 June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
2549	F 2032 18	19	20	21	22	23	24	25	26	27	28	29	30	2020 July 1	2	3	4	5	6	7	8	9	10	11	12	13	14
2550	F 2033 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2020 August 1	2	3	4	5	6	7	8	9	10
2551	F 11	2234 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2020 September 1	2	3	4	5	6
2552	F 7	2235 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	2020 October 1	2	3
2553	F 4	2236 5	6	7	8	9	10	11	12	13	14	15	16 CC	17	18	19	20	21	22	23	24	25	26	27 C	28	29 BCCC	30
2554	F 31	2237 2020 November 1 B	2	3	4 B	5 CBCC	6 CBC	7 B	8	9	10 C	11 C	12	13	14	15	16	17	18	19	20	21	22 CC	23	24	25	26 C
2555	F 27	28 C	2238 29 CM	30	2020 December 1	2	3	4	5	6 C	7 C	8	9	10	11	12	13	14 C	15	16	17	18	19	20	21	22	23
2556	F 24	25	2239 26	27	28	29	30	31	2021 January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2557	F 20	21	22	2240 23	24	25	26	27	28	29	30	31	2021 February 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2558	F 16	17	18	2241 19	20	21	22	23	24	25	26	27	28	2021 March 1	2	3	4	5	6	7	8	9 C	10	11	12	13	14
2559	F 15 B	16	17	2242 18	19	20	21	22	23	24	25 B	26	27	28	29	30	31	2021 April 1	2	3	4	5	6	7	8	9	10
2560	F 11	12	13	2243 14	15	16	17 B	18	19	20 C	21	22 CCCC	23	24	25	26	27	28	29	30	2021 May 1	2	3	4	5	6	7 M
2561	F 8 CC	9 CC	10	2244 11	12 C	13	14	15	16	17	18	19	20	21 C	22 CCMM	23 CCBM	24	25	26 CCCC	27	28 C	29	30	31	2021 June 1	2	3
2562	F 4	5	6	7	2245 8 CCC	9 CCB	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25 C	26	27	28 CBC	29	30 CC
2563	F 2021 July 1	2	3 MCXM	4 MC	2246 5	6	7	8	9 CCB	10	11	12	13	14	15	16 C	17	18 C	19	20	21	22	23	24	25	26	27
2564	F 28	29	30	31	2021 August 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20 CCC	21	22 C	23
2565	F 24 C	25	26	27 CCCC	2248 28 MCCC	29 CC	30 C	31	2021 September 1	2	3	4	5	6	7	8 CC	9 C	10	11	12	13	14	15	16	17	18	19
2566	F 20	21 C	22	23 MM	24	2249 25	26 C	27	28 C	29	30 C	2021 October 1	2	3	4	5	6	7	8	9 M	10	11	12	13	14	15	16
2567	F 17	18	19	20	21	2250 22	23	24	25	26 CCCM	27 CCCC	28 CMMX	29 CC	30 CCC	31	2021 November 1	2	3	4 CC	5	6	7	8	9	10	11	12
2568	F 13 C	14	15	16	17	2251 18	19	20	21	22	23	24	25	26	27	28	29	30	2021 December 1	2	3	4	5 M	6	7	8	9
2569	F 10	11	12	13	14	2252 15 CCC	16 CC	17 C	18	19	20 CM	21 M	22 MCC	23	24 CC	25 CCCM	26	27	28	29	30	31	2022 January 1	2	3	4	5
2570	F 6	7	8	9	10	11	2253 12	13 C	14 C	15	16	17	18	19	20	21	22	23	24	25 C	26 CC	27	28 C	29 BCCC	30	31	1 C
2571	F 2022 February 2 CC	3	4 CC	5	6	7	2254 8	9 C	10	11	12 MCCC	13	14 CCM	15	16	17	18	19	20	21	22	23	24	25	26	27	28 C
2572	F 2022 March 1 CM	2	3	4	5	6 C	2255 7 C	8	9	10	11 CCCC	12 C	13	14 M	15 CCMC	16	17	18	19	20 CC	21	22 CC	23 CCCC	24 C	25	26 C	27 C
2573	F 28 CMC	29 MCCC	30 CCCC	31 CCCX	2022 April 1 CCCC	2 CCMM	3 CC	2256 4 C	5	6 C	7	8 CC	9 C	10	11	12 CBCC	13	14	15 MMCC	16 CCCM	17 CCCM	18 MMCM	19 CCCC	20 CMCC	21 CC	22 CMC	23 C
2574	F 24	25 MCCC	26 CCCC	27 CCC	28 CC	29 MCCM	30 MMXM	2022 May 1 CCCC	2	3 MCX	4 BMCM	5 CMMC	6 CC	7 CC	8 CCC	9 C	10 CCX	11 CCMM	12 CCCM	13 CCCC	14 CCCC	15 C	16 CMC	17 CCCC	18 CCCC	19 CMMM	20 CMM
2575	F 21 CCC	22 CC	23 CC	24 CC	25 CCM	26 CC	27 CC	2258 28 CC	29	30	31	2022 June 1	2	3	4	5	6	7	8	9 CC	10 CCMC	11 C	12	13 C	14 CCCC	15	16 C
2576	F 17 CCCC	18 CCC	19 C	20 CC	21 C	22 CC	23 CC	2259 24 C	25 C	26	27	28	29	30	2022 July 1	2	3 BC	4 C	5 CC	6	7	8 M	9 CCCC	10 CCCC	11 CM	12 CCCC	13 CCC
2577	F 14 CMCM	15 CCC	16 MCM	17 CCCC	18	19 C	20 CCCC	21	2260 22	23 CCCC	24 C	25	26 C	27 C	28	29	30	31	2022 August 1	2 CC	3 C	4	5 CC	6	7	8	9
2578	F 10	11 C	12 CC	13 CCCC	14 C	15 CMMM	16 MCC	17 CCMM	2261 18 CMMM	19 MCCC	20	21 C	22 C	23	24	25 CCCM	26 CMMM	27 CMMM	28 CCMM	29 CMMM	30 CCCM	31 C	2022 September 1 CC	2 CCCC	3 CCCC	4 CCCC	5 CCMC
2579	F 6 CC	7	8	9	10 C	11 CCCC	12 CCCC	13 CCCC	2262 14 MCCC	15	16 MM	17 M	18 CC	19 C	20 MCCC	21 M	22 CCCC	23 CCCM	24 CCCC	25	26 CCC	27 CCCC	28	29 CC	30 CCMM	2022 October 1 CC	2 CMMC
2580	F 2022 October 3 CMMM	4 M	5 C	6	7 CM	8 C	9 CCCC	10 CM	2263 11 MMCC	12 CC	13 C	14 M	15 C	16 C	17	18 C	19	20 CC	21	22 CB	23	24 CC	25 C	26 C	27	28	29
2581	F 30	31	2022 November 1	2	3	4	5	6 C	7 C	8	9	10 C	11 MCCM	12 CC	13 C	14 C	15 CCC	16 CC	17 CC	18 CCC	19 M	20	21	22 CCC	23	24	25
2582	F 26	27	28	29 C	30	2022 December 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22