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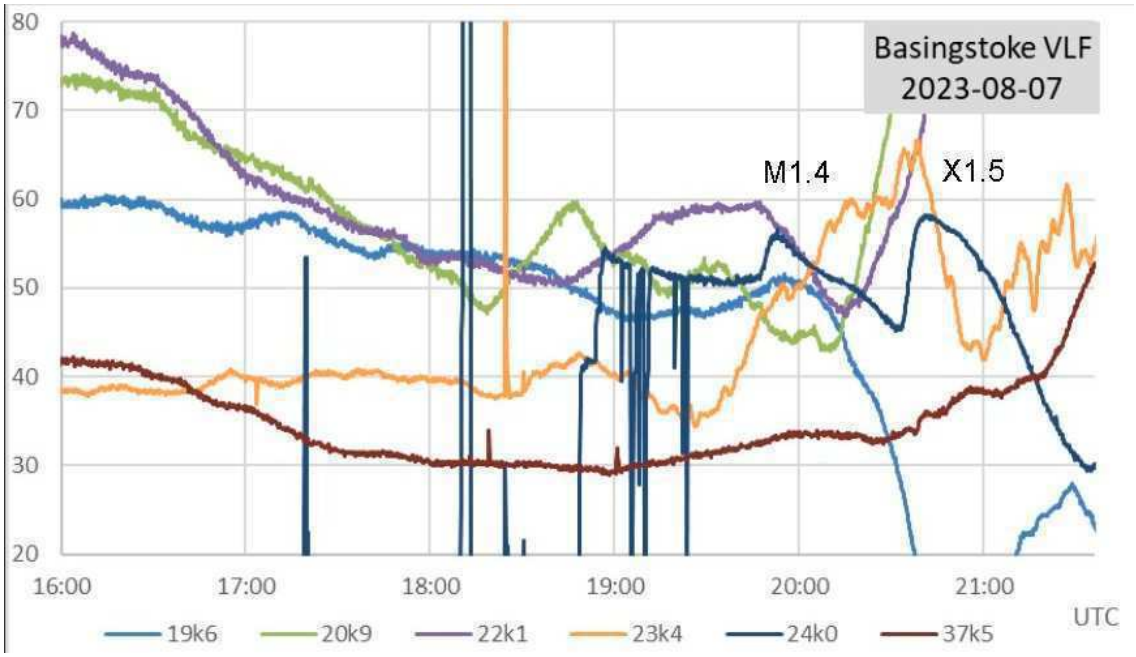
BAA Radio Astronomy Section. Director Paul Hearn.

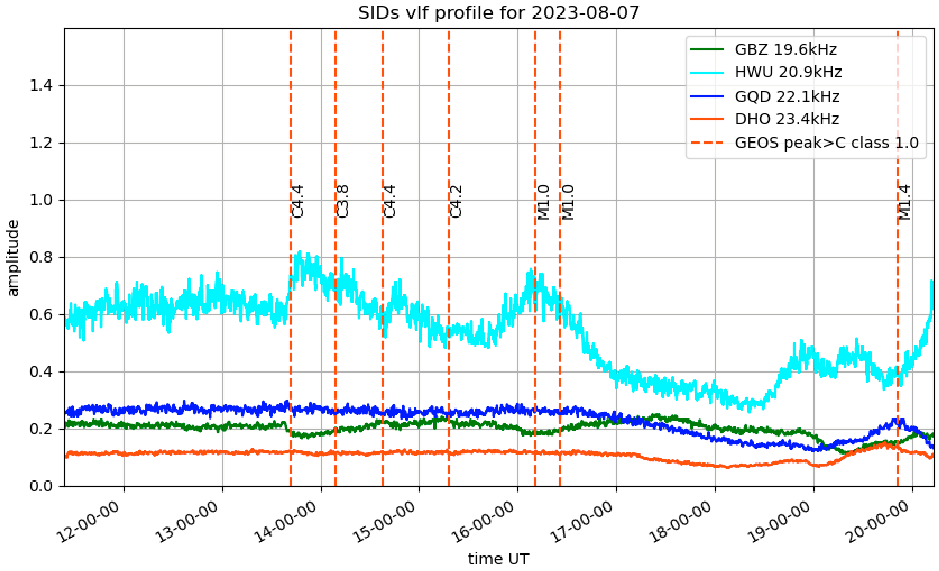
RADIO SKY NEWS 2023 AUGUST.

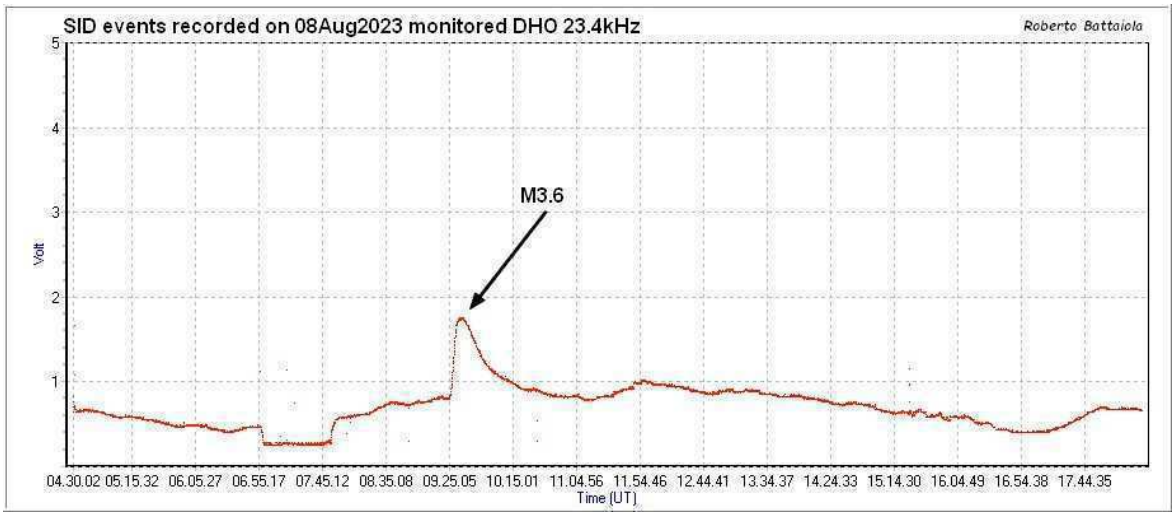
VLF SID OBSERVATIONS.

The strong solar activity in July continued into early August, but then faded away by mid-month. We recorded 68 classified flares in August, compared with 150 in July. There were however two X-class flares recorded, although they were rather late in the evening for the European signals. The background X-ray flux shown in the satellite data was also fairly high, so many of the smaller C-class flares were missed. Many of the stronger flares were also multiple-peaked again, giving plenty of unclassified SIDs.

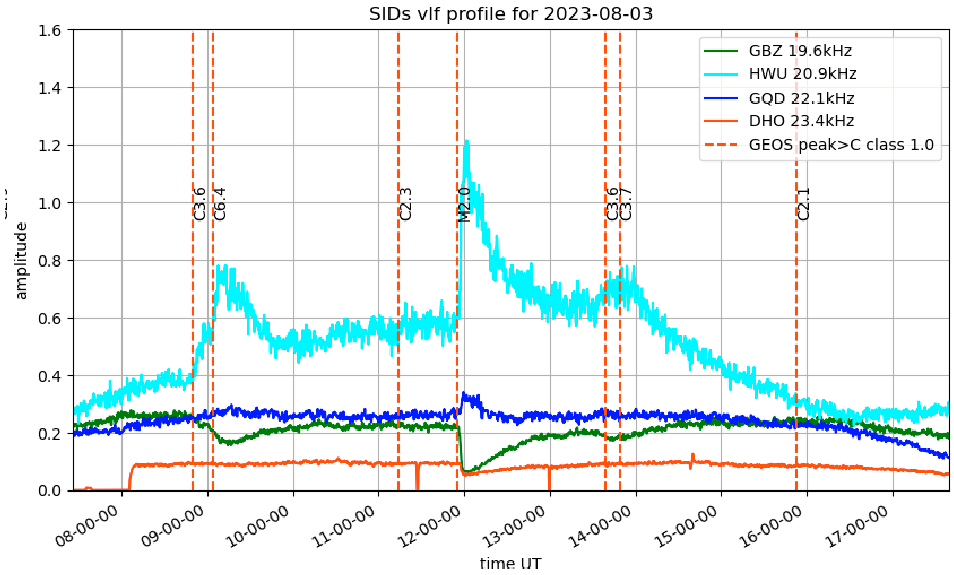


This recording by Paul Hyde shows the X1.5 flare peaking at 20:41UT on the 7th. Most of the signals shown are suffering from the sunset, but the 24kHz trans-Atlantic signal shows a clear SID together with the earlier M1.4 flare. The signal had been off for much of the day, but luckily had come back on in time to catch these flares. 37.5kHz from Iceland shows a very small response. The peak of the earlier M1.0 flare is right on the left edge of the chart. This was a double peaked flare, both peaks of a similar magnitude. It was also a very slow flare, starting around 15:30 with peaks at 16:10 and 16:30. This is shown in the recording by Mark Prescott, along with the rest of the day's activity:

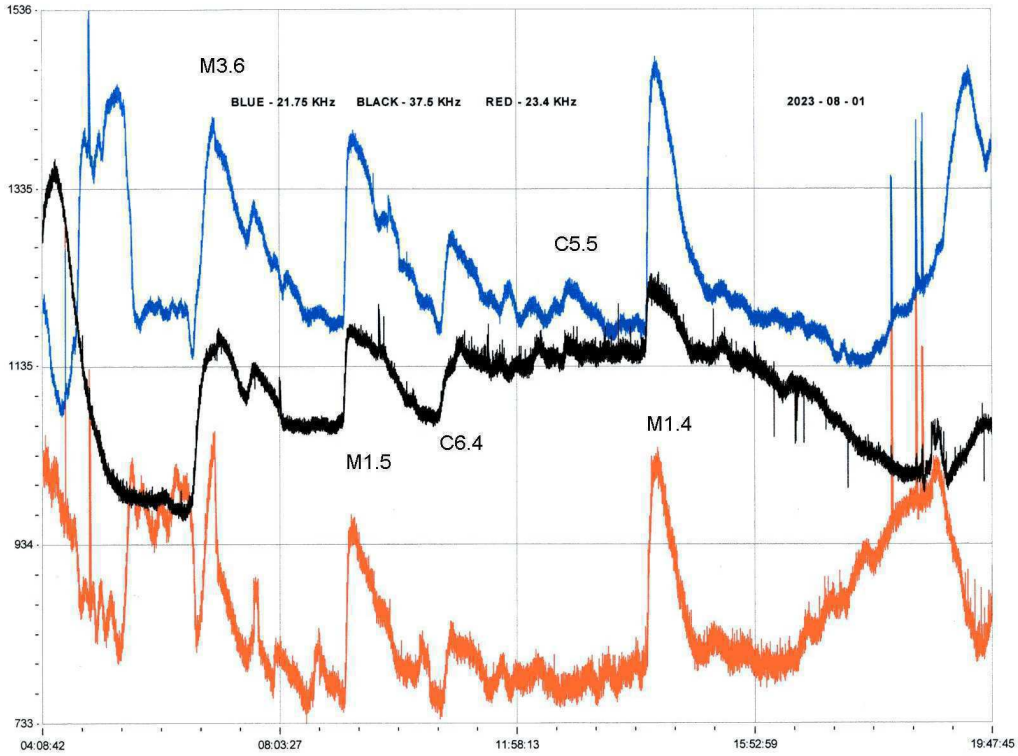




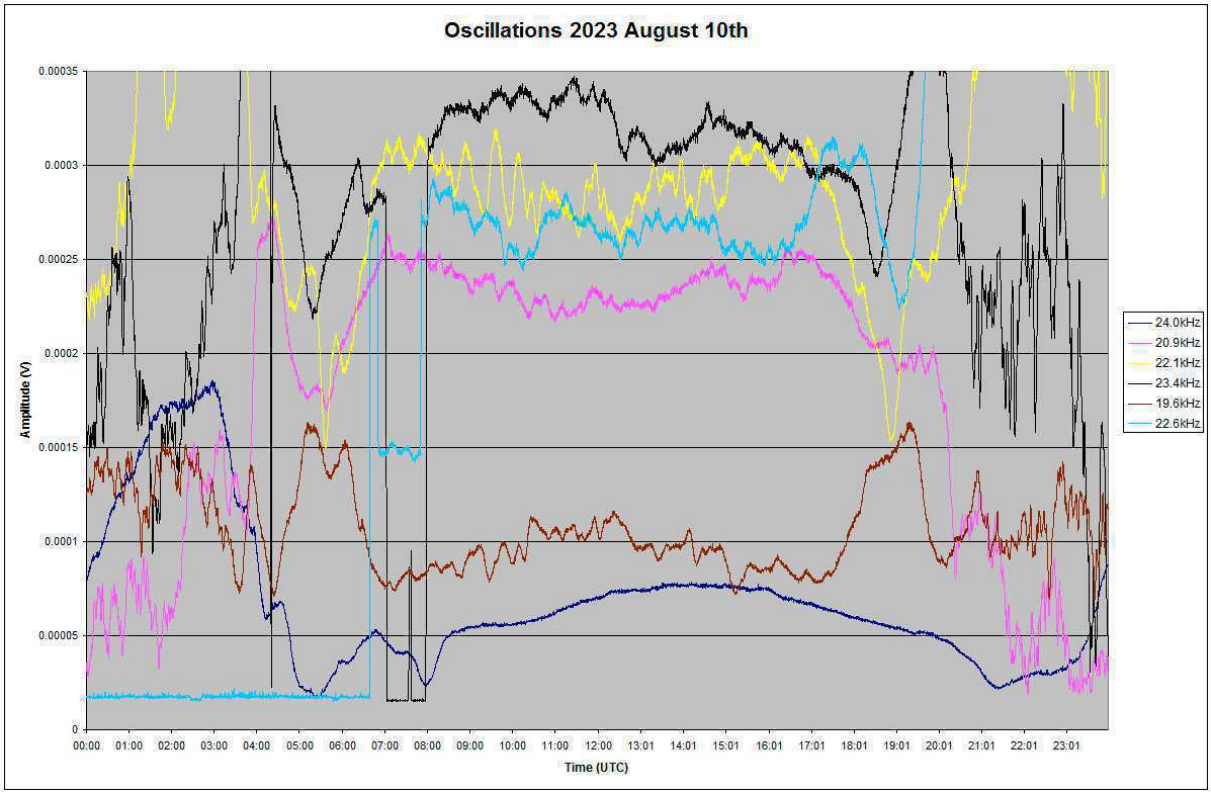
Activity started to decline after this, with just two flares recorded on the 8th. The first of these is shown in this recording by Roberto Battaiola at 23.4kHz. The M3.6 flare at 09:31 produced a clear SID, although the C8.7 flare at 18:12 was too close to the sunset to show on this signal.



Mark Prescott's recording from the 3rd shows the strong M2.0 flare close to midday, its long decay time covering the later C-class flares at 20.9kHz. The earlier C2.3 flare is also well hidden.

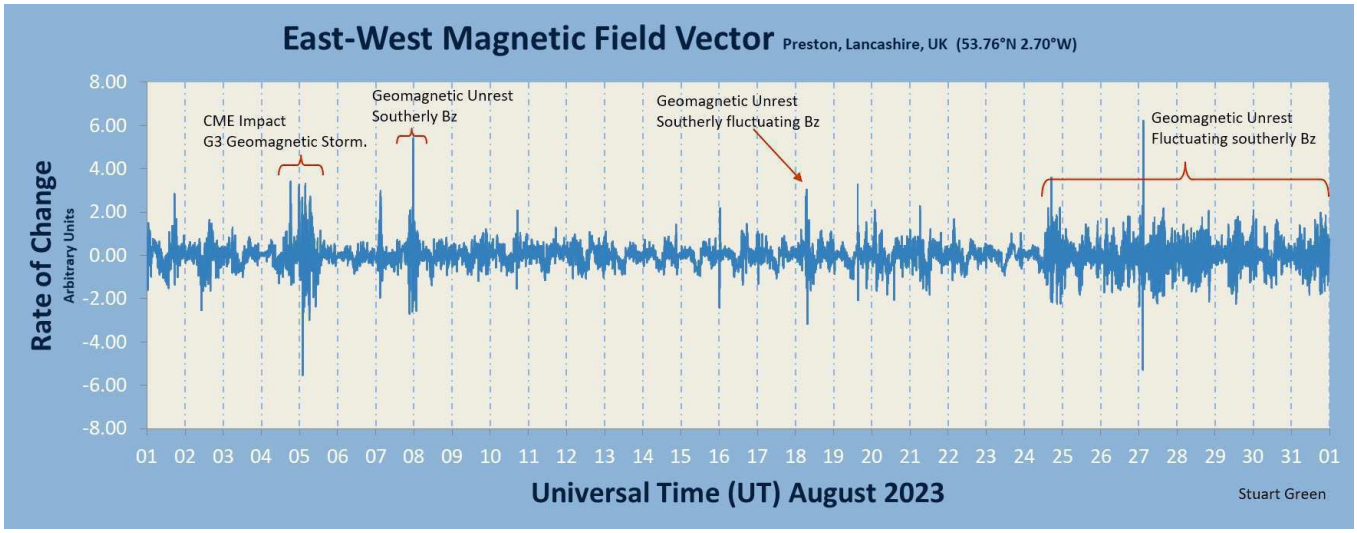


The 1st was one of the busiest days for flares, shown in the recording by Colin Clements. The stronger M-flares are easy to see with clear SIDs, but 21.75kHz (blue) in particular shows many smaller peaks between them. The satellite data shows that the majority of these flares were all from AR13380, an active region very close to the west limb of the sun at the time.

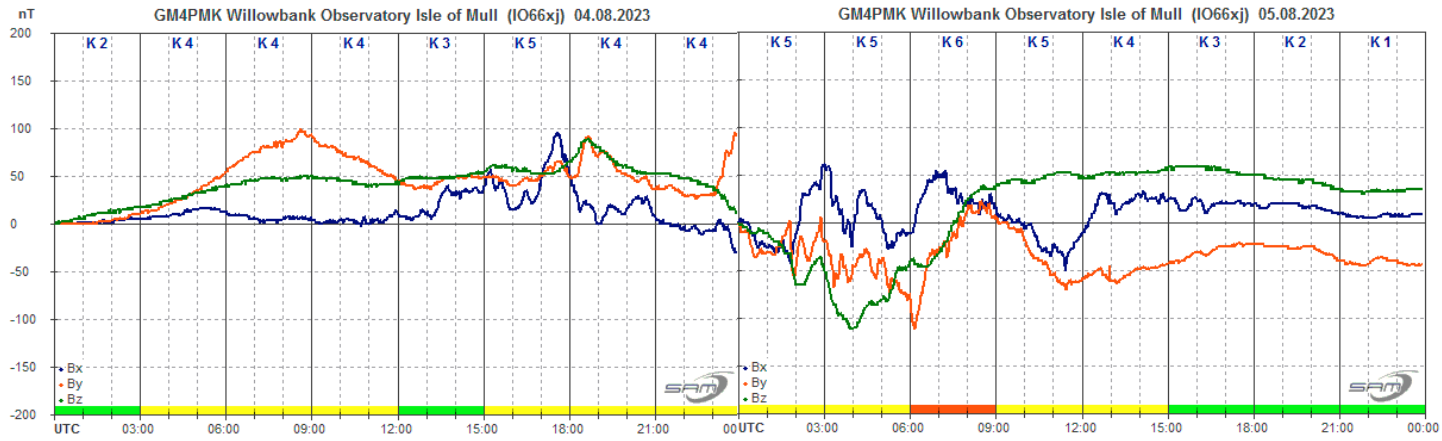


The recording from the 10th by Mark Edwards shows some significant oscillations on all of the European signals throughout the day, while 24kHz just shows a normal quiet diurnal curve. The two British signals, 19.6 and 22.1kHz show the most distinct pattern, followed by the French signal at 20.9kHz. This appears to be due to the more active weather pattern over Europe compared to the North Atlantic. Satellite data shows just a few small flares during the day. Mark also recorded oscillations on the 4th, again leaving 24kHz with a clean diurnal curve showing the two small SIDs.

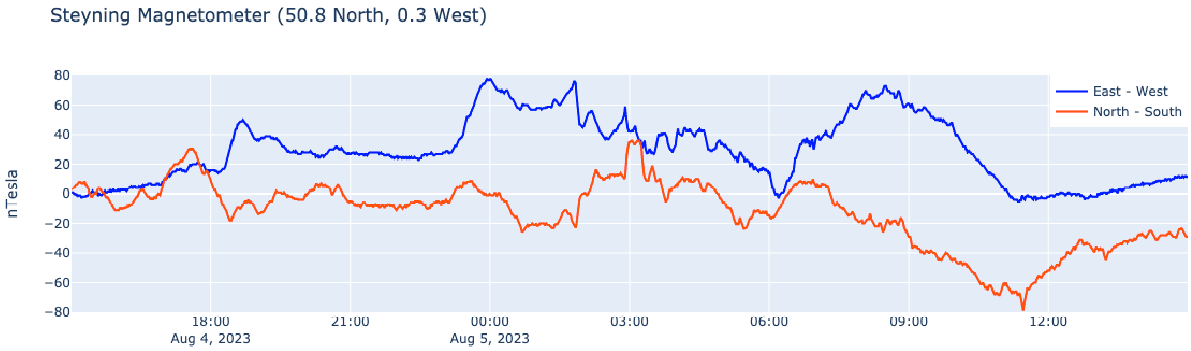
MAGNETIC OBSERVATIONS.

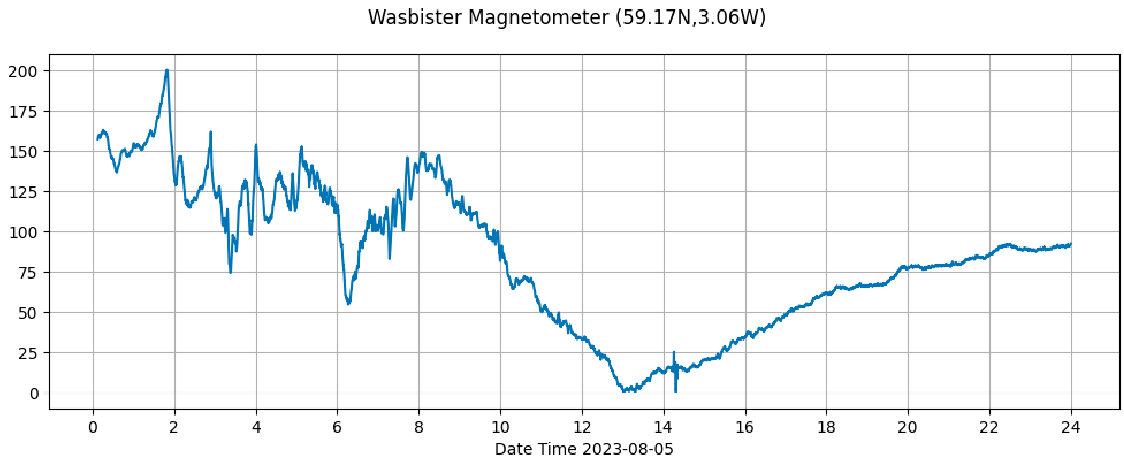


Stuart Green's summary of the magnetic activity in August shows a mostly quiet month, disturbances mostly due to the solar wind. The CME impact on the 5th appears to be from a filament eruption, as the satellite images show a full halo CME from near the centre of the visible disc. The strong flares were from active regions much nearer to the limb. Whatever the source, it gave rise to the most active magnetic disturbance of the month, shown in Roger Blackwell's recording:

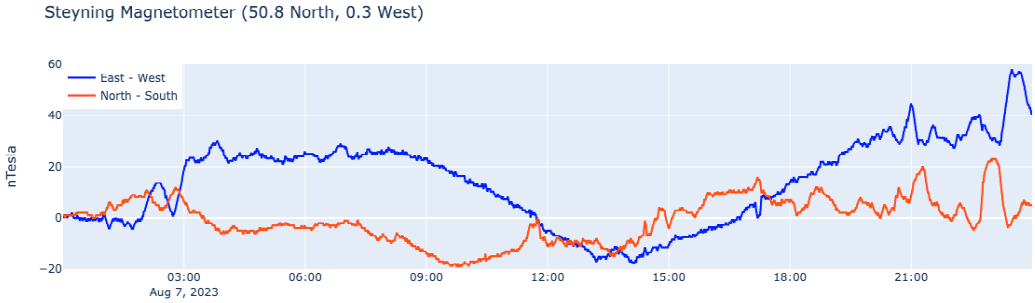


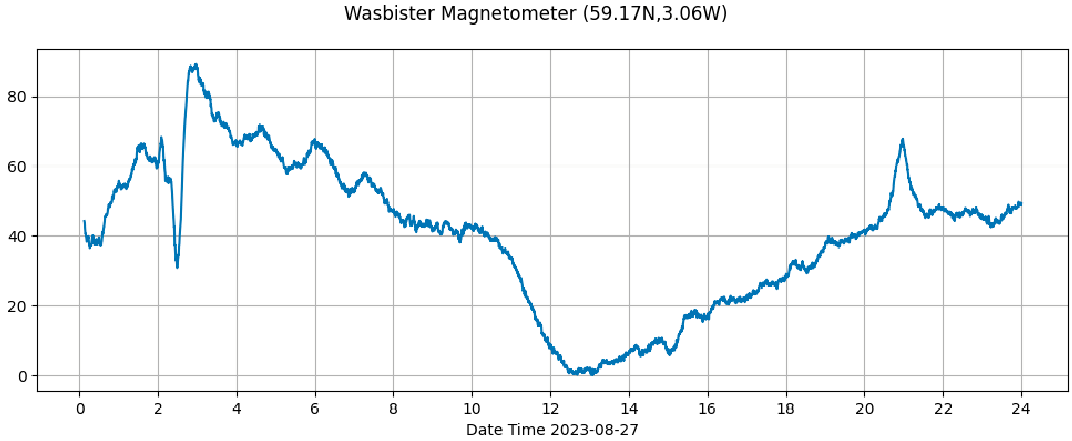
The sensor is reset at midnight, and so there is an offset between the 4th and 5th clearly seen in the afternoon of the 5th. Nick Quinn (Steyning) and Callum Potter (Wasbister) also made recordings of the disturbance with respectively, two and singe axis sensors:





The rest of the month was much quieter, with disturbance mainly from a more active solar wind. Nick Quinn's recording shows a mild disturbance starting on the 7th:

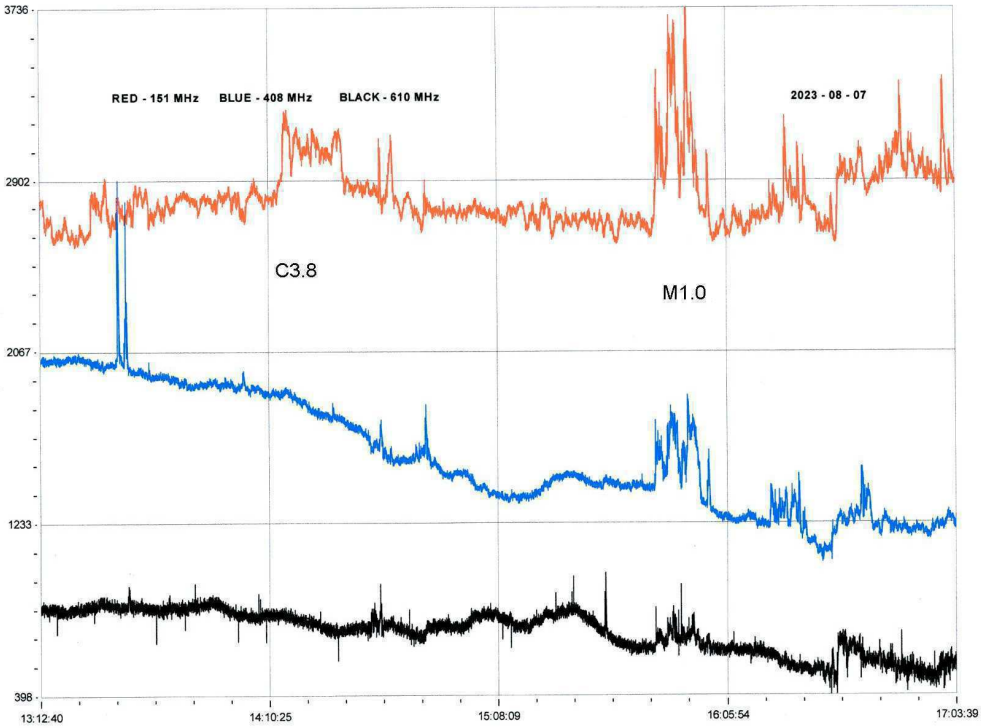




Callum Potter's chart shows more solar wind disturbance on the 27th, possibly aided by CME glancing blows. The sharp pulse around 02:30 looks like a CME impact, although it was not recorded by other observers, so may just be from the solar wind.

Magnetic observations received from Roger Blackwell, Stuart Green, Callum Potter, Nick Quinn and John Cook.

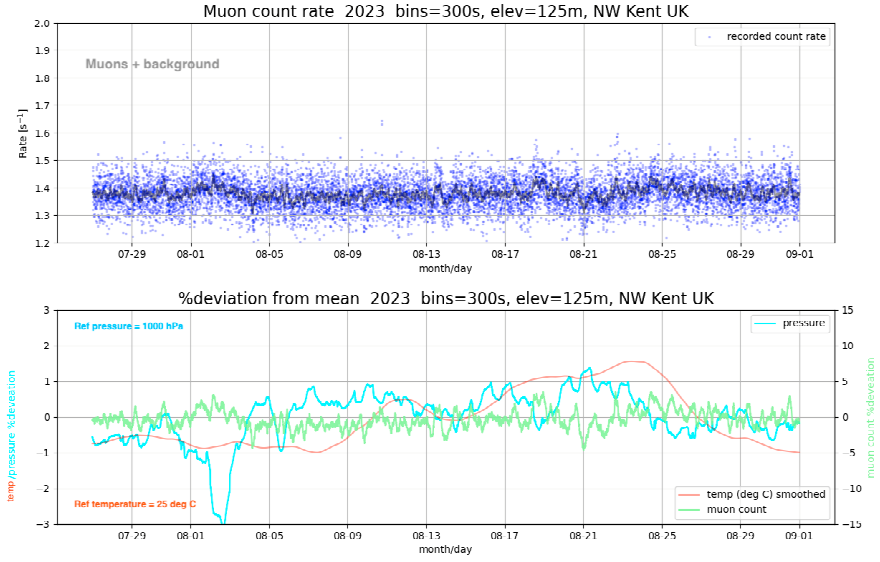
SOLAR EMISSIONS.

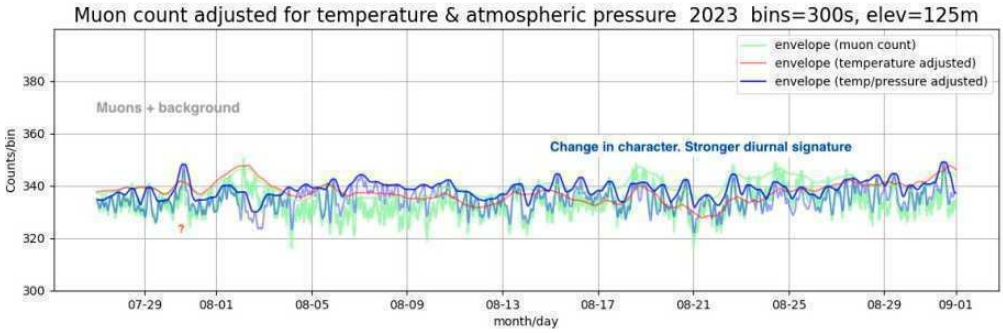


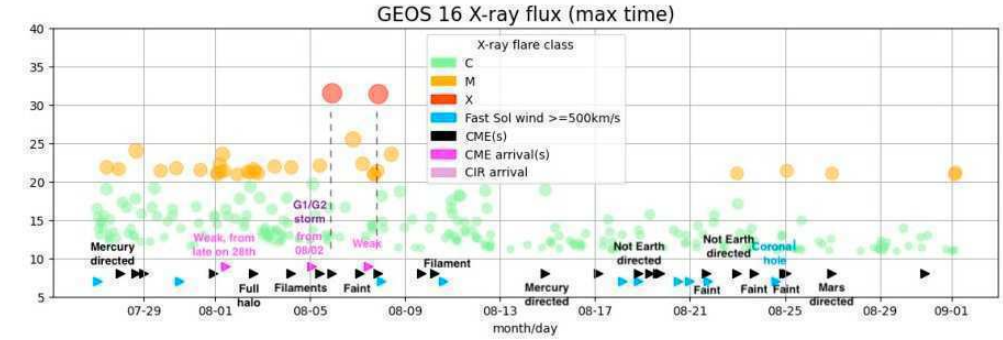
Colin Clements recorded some VHF/UHF emissions associated with flare activity on the 7th. The 151MHz burst just after 14:10UT matches the timing of a C3.8 flare that occurred between the pair of C4.4 flares that we recorded. The stronger 151MHz burst aligns with the M1.0 flare, and is accompanied by smaller signals at 408MHz and 610MHz. The SID recording by Mark Prescott already illustrated shows that this was a very slow flare, and so links to the complex noise peaks after 16UT in Colin's recording.

Colin recorded similar activity from the M1.7 flare on the 2nd, with a strong 151MHz signal and much less response at 408MHz and 610MHz.

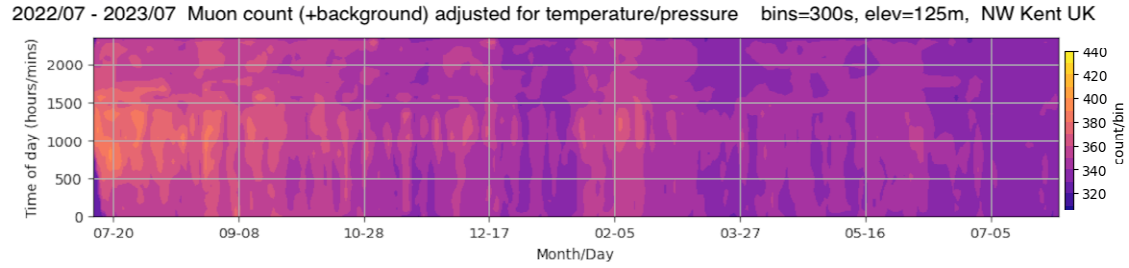
MUONS.

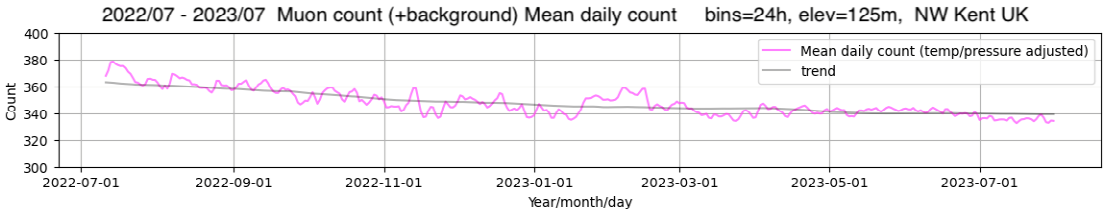






Mark Prescott recorded the Muon flux during August, noting the strong change in behaviour after the 13th. During the period of high flare activity the muon counts are highly variable. After the 13th when the flare activity declined, the diurnal curve is much clearer on most days.

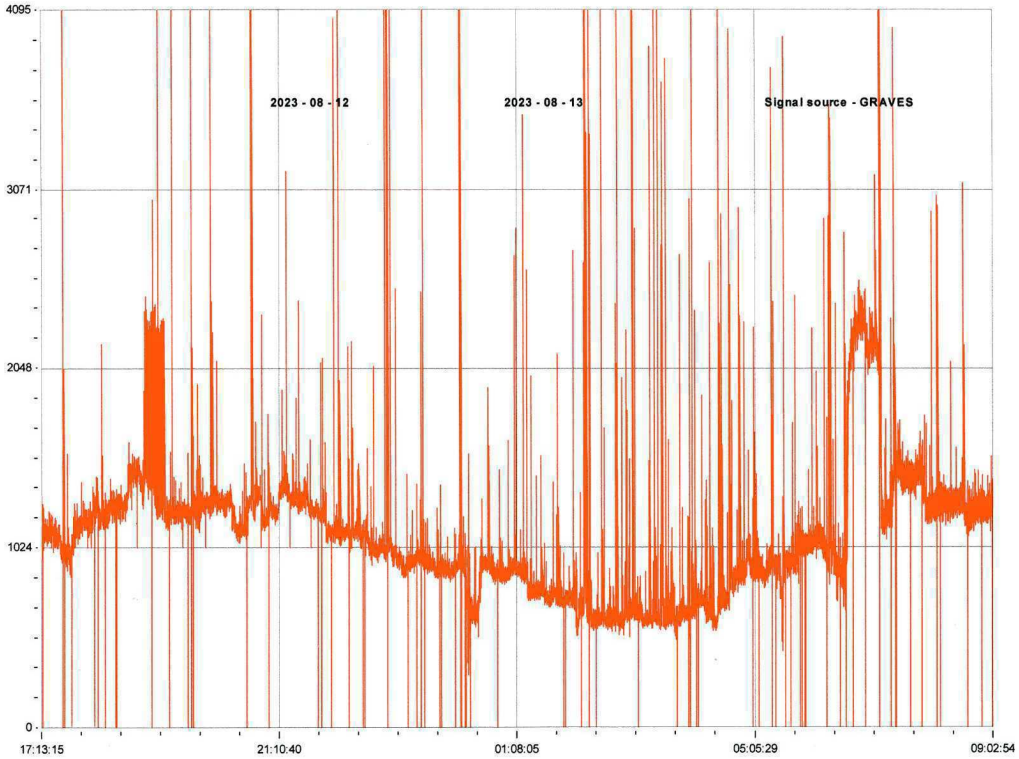


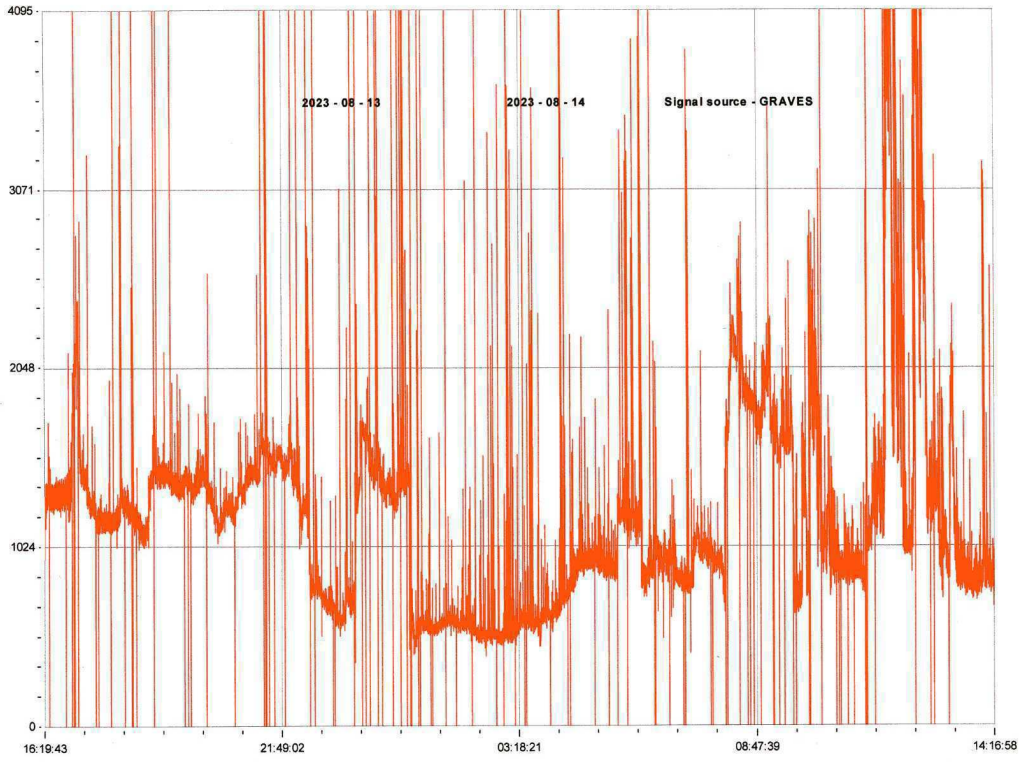


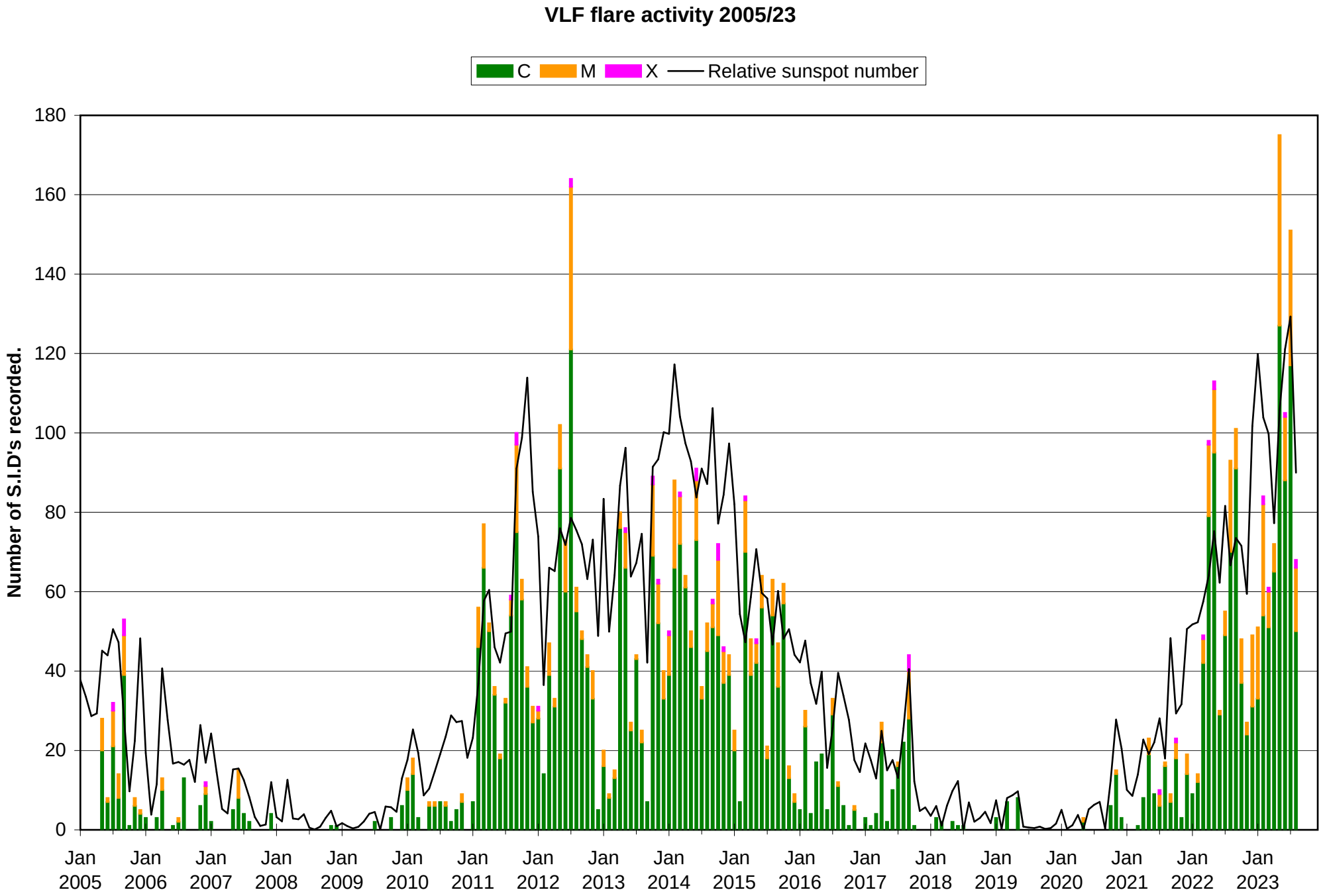
Mark has also produced a chart showing the change in Muon count over the last 12 months. From 2022 July 1 to 2023 July 31 the temperature / pressure corrected mean daily count has fallen by about 6.8%.

PERSEID METEORS

Colin Clements made meteor recordings from the 10th to 14th using the GRAVES radar signal. A low level of activity was seen in the afternoon of the 10th, increasing very slightly overnight into the 11th. Similar activity was again seen overnight 11th to 12th. Much stronger activity was recorded in the evening of the 12th, increasing again in the early hours of the 13th. The afternoon of the 13th was very quiet, but then the strongest activity was recorded from about 21UT on the 13th to 14UT on the 14th when recording ended.


4095
3071
2048
1024
0
2023 - 08 - 12
2023 - 08 - 13
Signal source - GRAVES
17:13:15
21:10:40
01:08:05
05:05:29
09:02:54


4095
3071
2048
1024
0
2023 - 08 - 13
2023 - 08 - 14
Signal source - GRAVES
16:19:43
21:49:02
03:18:21
08:47:39
14:16:58


VLF flare activity 2005/23
C
M
X
Relative sunspot number
Number of S.I.D's recorded.
180
160
140
120
100
80
60
40
20
0
Jan 2005
Jan 2006
Jan 2007
Jan 2008
Jan 2009
Jan 2010
Jan 2011
Jan 2012
Jan 2013
Jan 2014
Jan 2015
Jan 2016
Jan 2017
Jan 2018
Jan 2019
Jan 2020
Jan 2021
Jan 2022
Jan 2023

BAA Radio Astronomy Section.

BARTELS DIAGRAM

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

ROTATION	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
2552	7 F	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	4 F	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	31 F	2237 1 B	2020 November 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	27 F	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	24 F	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	20 F	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	16 F	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	15 F 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	11 F	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	8 F 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	4 F	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	2021 July 1 F	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	28 F	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	24 F C	25	26	27 CCCC	28 MCCC	2248 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	20 F	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	17 F	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	13 F 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	10 F	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	6 F	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	2022 February 2 F 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	2022 March 1 F 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	28 F 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	24 F	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	21 F 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	17 F 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	14 F 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	10 F	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	6 F	7 CC	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	2022 October 3 F 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	30 F	31	2022 November 1	2	3	4	5	6 C	7 C	2264 8	9	10 C	11 MCCM	12 CC	13 C	14 C	15 CCC	16 CC	17 CCC	18 CCC	19 M	20	21	22 CCC	23	24	25			
2582	26 F	27	28	29 C	30	2022 December 1	2 C	3 M	4	2265 5	6	7 C	8	9	10	11 C	12	13	14 MMMM	15 CMCM	16 MMMC	17	18 CC	19 CCC	20 M	21 C	22 C			
2583	23 F CC	24 C	25	26 CCC	27 CM	28	29 CM	30 CCCM	31 C	2023 January 1	2	3	4	5	6	7 CC	8 MCCM	9 MM	10 MCMM	11 MC	12 MCMC	13 MC	14 CCC	15 CM	16 C	17	18 MC			
2584	19 F MMC	20 CC	21 CC	22 CMCM	23 C	24 CCC	25 MCM	26 CMCC	27	28 C	2267 29	30 C	31 CC	2023 February 1	2 C	3	4 C	5 C	6 C	7 CC	8 CM	9 MMMM	10 MCCM	11 MMXM	12 MMMM	13 CCCM	14 CCM			
2585	15 F CCCC	16 C	17 CX	18 C	19 CC	20 CMCC	21 MCCM	22 CCCM	23 CMCC	24 CCM	2268 25 CCMM	26 CC	27 CC	28	2023 March 1 CC	2 CCCC	3 MCCX	4 CMMC	5 CCMC	6 MCCC	7 C	8 MC	9 CCC	10 CCCC	11 C	12	13			
2586	14 F C	15	16 C	17 CCCM	18 C	19 CCC	20 C	21 C	22	23	2269 24 C	25	26 CC	27 CCC	28 CC	29 MC	30 M	31 CC	2023 April 1	2	3	4	5 CCC	6 MC	7	8 CC	9 CCCC			
2587	10 F MCCC	11 MC	12 CCC	13 CCCC	14 CCMC	15 CCCC	16 C	17 CC	18 CCC	19 CCC	20 CCCC	2270 21 M	22 CC	23	24 CC	25	26 C	27 M	28 CC	29 CCCC	30 CCM	2023 May 1 CCMC	2 CCCC	3 MMMM	4 MCCC	5 CMM	6 CC			
2588	7 F C	8 CCCM	9 MCMM	10 MCCC	11 MCCM	12 CCCC	13 CCCC	14 C	15 C	16 CCCM	17 CCCC	2271 18 MMMM	19 MCCM	20 MMMM	21 CCCM	22 CCMC	23 CCMC	24 MCCM	25 CCMC	26 CCC	27 CCC	28 MC	29 C	30 MMMC	31 CMCM	2023 June 1 CCCC	2 CC				
2589	3 F CC	4 CCCC	5 C	6 CCCC	7 CMCC	8 CC	9 CM	10 C	11	12 CCCC	13 CCCC	2272 14 CC	15 CC	16 MCMM	17 CC	18 M	19 MC	20 CCMX	21 CMMC	22 CMCC	23 C	24 CCMC	25 CCCC	26 CCMC	27 CMCC	28 MCC	29 CCCM			
2590	30 F CCCC	2023 July 1 CCCC	2 CCCC	3 MCCC	4 MC	5 CCCM	6 CCM	7 MC	8 C	9 CCC	10 CCCC	2273 11 MMMM	12 MMCC	13 CCCM	14 MCCC	15 MMMC	16 MCMM	17 CCC	18 MMMM	19 CMCM	20 C	21 C	22 CC	23 CC	24 C	25 CCCM	26 CMCM				
2591	27 F CMCC	28 CMCC	29 CCCM	30 MC	31 CMCC	2023 August 1 MMMM	2 MMMM	3 CMCC	4 CC	5 MMCX	6 CM	2274 7 CMMX	8 MC	9 C	10	11 CCCC	12 CCCC	13 C	14	15 C	16 CC	17 CCC	18	19 C	20 CC	21 CC	22			
2592	23 F CCC	24 C	25 C	26 C	27	28	29	30 C	31	2023 September 1	2	2275 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18			

BAA Radio Astronomy Section. **2023 AUGUST.**

	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*) Tuned radio frequency receiver, 0.58m frame aerial.				Roberto Battaiola 23.4kHz Modified AAVSO receiver.				Paul Hyde (Various) Spectrum Lab / PC 1.5m frame aerial.				Mark Edwards (24.0/*19.6*/**37.5kHz**) Spectrum Lab / PC 2m loop aerial.				Colin Clements (21.75/*23.4*/**37.5kHz**) 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)	
1	**M2.2**	1													*04:43*	*04:45*	*14:58*	*3+*				
1	**M3.6**	7	*06:35*	*06:41*	*07:02*	*1+*	06:32	06:56	07:26	2+	06:34	06:53	?	-	*06:39*	*06:59*	*?*	-	06:37	07:00	09:06	3+
1	?	4					07:30	07:39	07:53	1	07:25	07:35	?	-	*07:28*	*07:37*	*?*	-	**07:29**	**07:37**	**08:08**	**2**
1	?	2									08:05	08:10	08:28	1	*08:06*	*08:10*	*08:26*	*1*				
1	**M1.5**	8	09:05	09:13	?	-	09:03	09:14	09:38	2	09:03	09:12	?	-	09:05	09:18	?	-	09:06	09:17	10:41	3
1	?	2									09:38	09:46	09:59	1	09:41	09:45	10:18	2				
1	C6.4	5	10:41	10:50	11:10	1+					10:37	10:51	11:51	2+	10:41	11:00	?	-	10:41	10:52	11:40	2+
1	?	1													11:25	11:31	11:53	1+				
1	?	1									11:52	12:06	12:37	2								
1	C5.5	2									12:39	12:47	13:11	1+	12:42	12:47	13:08	1+				
1	?	1													*13:35*	*13:40*	*13:48*	*1-*				
1	**M1.4**	8	14:05	14:14	15:06	2+	14:02	14:12	14:36	2	14:01	14:11	14:53	2+	14:03	14:07	14:56	2+	14:03	14:15	15:06	2+
1	?	1													15:10	15:16	15:21	1-				
1	?	1													15:35	15:41	15:49	1-				
1	?	2									15:49	15:54	16:03	1-	15:51	15:56	16:07	1-				
1	?	1													16:27	16:38	16:42	1-				
2	?	1													**07:56**	**07:58**	**?**	**-**				
2	**M1.3**	8	08:05	08:12	08:42	2	08:03	08:13	08:34	1+	08:02	08:11	08:41	2	**08:05**	**08:14**	**08:33**	**1+**	07:59	08:16	08:44	2
2	?	1													*09:23*	*09:27*	*09:40*	*1-*				
2	?	1													*10:35*	*10:39*	*?*	-				
2	**M1.2**	8	10:48	10:51	?	-	10:46	10:50	11:06	1	10:45	10:50	?	-	*10:47*	*10:51*	*?*	-	10:48	10:53	11:16	1+
2	C9.4	8	11:16	11:19	12:12	2+	11:14	11:20	11:28	1-	11:14	11:18	11:54	2	*11:14*	*11:20*	*11:49*	*2*	11:16	11:20	12:03	2+
2	?	1													*12:13*	*12:18*	*12:29*	*1-*				
2	?	1													*13:33*	*13:38*	*13:45*	*1-*				
2	**M1.7**	8	14:51	14:53	?	-	14:48	14:52	15:12	1	14:49	14:54	?	-	14:51	14:53	15:13	1	14:51	14:56	16:21	3
2	?	2									15:14	15:20	15:30	1-	15:17	15:20	15:34	1-				
2	**M1.3**	6	*16:20*	*16:24*	*16:53*	*2*					16:18	16:23	?	-	16:20	16:28	16:53	2	16:21	16:25	17:50	3
2	?	1													**16:32**	**16:34**	**?**	**-**				
2	?	3									16:54	16:59	17:23	1+	**16:55**	**17:05**	**17:41**	**2+**	**16:56**	**17:06**	**17:32**	**2**
2	??	1													*17:30*	*17:38*	*18:00*	*1+*				
2	?	1													18:17	18:25	?	-				
2	?	1													18:58	19:05	?	-				
2	**M1.1**	2									19:08	19:16	19:34	1+	19:11	19:19	19:32	1				
3	?	1	*07:12*	*07:15*	*07:58*	*2+*																
3	C3.6	2	*08:46*	*08:51*	*?*	-					08:44	08:51	?	-								
3	C6.4	6	*08:59*	*09:07*	*09:30*	*1+*	08:56	09:04	09:23	1+	08:58	09:04	09:55	2+	08:46	09:12	09:32	2+				
3	**M2.0**	7	11:52	11:56	12:53	2+	11:45	12:03	12:22	2	11:49	11:56	12:59	2+	11:52	11:56	12:35	2				
3	C3.6	2									13:27	13:37	14:18	2+	13:32	13:39	14:34	2+				
3	C3.7	1													*13:48*	*13:53*	*14:10*	*1*				
3	C2.1	1													15:56	15:56	16:05	1-				
3	C3.3	2									17:59	18:04	18:16	1-	18:02	18:03	18:16	1-				
3	C5.0	1													20:18	20:21	20:30	1-				
4	C2.7	1													12:39	12:56	13:37	2+				
4	?	1													17:38	17:40	?	-				
4	?	1													17:44	17:49	17:57	1-				
4	C5.2	1													19:55	20:00	20:06	1-				
5	**M1.6**	2	*06:50*	*07:11*	*07:41*	*2+*													06:48	07:37	08:05	2+
5	**M2.1**	8	*09:28*	*09:33*	*10:08*	*2*	09:20	09:34	10:15	2+	09:25	09:37	10:42	2+	09:27	09:41	10:23	2+	09:25	09:37	11:09	3
5	C3.1	4					14:42	14:49	15:01	1	14:45	14:53	15:01	1-	14:51	14:53	15:02	1-				
5	?	1													*15:11*	*15:17*	*15:30*	*1*				
5	C2.4	2									16:16	16:25	16:33	1-	16:24	16:31	16:39	1-				
5	C2.8	2									16:55	17:01	17:13	1-	16:57	17:02	17:09	1-				
5	C6.7	2									19:00	19:11	19:43	2	19:04	19:10	19:36	1+				
5	**X1.6**	1													21:57	22:20	23:16	2+				
6	C6.7	8	10:52	11:03	12:02	2+	10:40	11:03	11:29	2+	10:49	11:02	12:04	2+	10:52	11:07	12:09	2+	10:51	11:06	12:02	2+
6	?	1													12:30	12:35	12:44	1-				
6	?	1													16:13	16:34	16:59	2+				
6	**M5.5**	5	18:31	18:35	19:00	1+					18:25	18:38	19:42	2+	18:27	18:43	20:27	3	18:32	18:41	19:04	1+
7	?	1													*09:52*	*10:03*	*10:09*	*1-*				
7	?	1													*10:15*	*10:25*	*10:30*	*1-*				
7	?	1													*10:56*	*11:05*	*11:11*	*1-*				
7	?	1													*12:00*	*12:04*	*12:14*	*1-*				
7	?	1													*12:31*	*12:34*	*12:41*	*1-*				
7	?	1													*12:48*	*12:54*	*13:04*	*1-*				
7	C4.4	5					12:38	13:41	14:08	3					*13:34*	*13:44*	*14:33*	*2+*	13:34	13:47	14:36	2+
7	C4.4	4					14:33	14:40	14:52	1					*14:37*	*14:45*	*15:04*	*1+*	14:36	14:45	15:15	2
7	?	1													*15:15*	*15:21*	*?*	-				
7	?	3					15:33	16:02	17:08	3					*15:41*	*16:10*	*17:01*	*2+*	15:37	16:07	17:38	3
7	**M1.0**	2													**16:27**	**16:29**	**16:56**	**1+**				
7	**M1.4**	2									19:47	19:52	20:09	1	19:49	19:54	20:15	1+				
7	**X1.5**	2									20:32	20:41	21:33	2+	20:35	20:43	21:38	2+				
8	**M3.6**	7	*09:27*	*09:30*	*10:15*	*2+*	09:19	09:31	10:33	2+	09:22	09:32	10:48	3	09:26	09:35	10:45	2+	09:26	09:36	11:22	3
8	C8.7	2									17:55	18:08	18:59	2+	17:59	18:12	19:02	2+				
9	C5.1	1									06:56	07:03	07:32	2								
11	C8.2	1	*06:42*	*06:59*	*07:20*	*2*																
11	?	1													*08:32*	*08:42*	*09:12*	*2*				
11	C4.7	4	11:13	11:19	12:15	2+					11:11	11:19	11:52	2	11:12	11:25	?	-	11:03	11:22	12:18	2+
11	C3.7	1													11:35	11:41	12:00	1				
11	C3.4	3									12:39	12:49	13:10	1+	12:44	12:50	13:15	1+	12:43	12:54	14:05	2+
11	C3.7	2									19:04	19:09	19:28	1	19:07	19:11	19:32	1				
12	C8.8	7	09:11	09:17	09:50	2	09:06	09:13	09:38	1+	09:08	09:20	09:51	2	09:12	09:21	10:15	2+	09:13	09:21	10:43	3
12	C6.6	8	10:41	10:49	11:11	1+	10:39	10:49	11:06	1+	10:39	10:48	11:20	2	10:43	10:50	11:18	2	10:43	10:51	11:31	2+
12	?	1													14:12	14:13	?	-				
12	C3.1	4					14:19	14:24	14:32	1-	14:16	14:24	14:35	1	14:21	14:24	14:46	1	*14:19*	*14:26*	*14:37*	*1-*
12	C1.4	1													15:34	16:07	16:18	2				
12	?	1													16:24	16:27	16:29	1-				
12	C4.9	2									18:53	18:59	19:27	2	18:56	19:02	19:28	1+				
13	C2.4	6	09:48	09:53	10:27	2					09:46	09:55	10:36	2+	09:50	09:57	10:29	2	09:49	10:03	10:44	2+
15	C2.9	3	11:30	11:34	11:40	1-					11:28	11:34	11:48	1	11:31	11:35	11:59	1+				
16	C1.8	2													***10:25***	***10:34***	***10:46***	***1***				
16	?	1													***10:49***	***10:59***	***11:29***	***2***				
16	C3.3	5					13:37	13:58	14:26	2+	13:42	13:59	14:34	2+	13:48	13:58	14:37	2+	13:38	14:02	14:42	2+
17	C5.1	4	12:22	12:33	12:55	2									12:28	12:50	?	-	12:26	12:56	14:01	3
17	?	2									13:25	13:31	13:37	1-	13:28	13:33	13:51	1				
17	C3.5	5					14:12	14:20	14:35	1	14:15	14:22	14:42	1+	14:18	14:23	15:14	2+	*14:01*	*14:29*	*16:02*	*3*
17	C2.2	1													17:21	17:32	17:47	1+				
19	C5.8	3	*06:48*	*06:53*	*07:07*	*1*					06:46	06:52	06:59	1-	06:47	06:51	06:58	1-				
20	C3.3	3					12:25	12:32	12:43	1-	12:25	12:31	12:45	1	12:30	12:37	?	-				
20	?	1													12:47	12:52	13:18	1+				
20	C2.0	2									18:22	18:32	18:55	2	18:27	18:36	19:14	2+				
21	C4.3	3	*07:48*	*07:55*	*08:22*	*2*					07:46	07:54	08:26	2	*07:49*	*08:00*	*?*	-				
21	?	1													*08:29*	*08:36*	*09:11*	*2*				
21	C3.1	3	12:25	12:30	13:07	2					12:22	12:30	13:01	2	*12:24*	*12:37*	*13:06*	*2*				
22	?	1													*11:54*	*12:08*	*12:22*	*1+*				
23	C3.2	5	10:05	10:14	10:40	2	10:05	10:13	10:35	1+	10:06	10:16	10:34	1+	10:08	10:20	10:38	1+	10:08	10:17	10:41	2
23	C3.9	7	14:04	14:08	14:20	1-	13:57	14:07	14:26	1+	13:53	14:09	14:50	2+	14:04	14:08	14:46	2	14:04	14:10	14:59	2+
23	?	1													14:59	15:00	15:09	1-				
23	?	1													15:35	15:40	15:48	1-				
23	C2.4	1													16:04	16:26	16:31	1+				
24	C1.4	1													18:01	18:08	18:15	1-				
24	?	1													19:28	19:34	19:41	1-				
25	C5.0	6					15:45	15:49	16:03	1-	15:42	15:49	16:36	2+	15:45	15:51	16:10	1	15:37	15:52	16:34	2+
26	C2.2	2	10:00	10:08	10:38	2					09:59	10:10	10:48	2+								
30	C2.8	2									16:31	16:41	16:58	1+	16:35	16:41	17:11	2				

BAA Radio Astronomy Section. **2023 AUGUST.**

	Xray class		Steve Parkinson (Various) Tuned radio frequency receiver, frame aerials.				Andrew Thomas (18.3kHz) Tuned radio frequency receiver, 0.6m frame aerial.				Phil Rourke (23.4kHz) Spectrum Lab, 0.6m frame aerial.				Mark Prescott (20.9kHz) SpectrumLab/Starbase, Active mini-whip aerial.				John Elliott (18.3kHz) 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)
1	**M2.2**																				
1	**M3.6**		06:33	06:57	07:30	2+									06:39	07:04	08:53	3+			
1	?																				
1	?																				
1	**M1.5**		09:05	09:12	10:35	3					09:07	09:14	10:17	2+	09:09	09:20	10:36	3			
1	?																				
1	C6.4														10:45	10:59	11:43	2+			
1	?																				
1	?																				
1	C5.5																				
1	?																				
1	**M1.4**		14:04	14:14	15:00	2+					14:05	14:13	15:41	3	14:07	14:18	15:37	3			
1	?																				
1	?																				
1	?																				
1	?																				
2	?																				
2	**M1.3**		08:05	08:14	08:45	2					08:06	08:14	08:35	1+	08:08	08:17	08:34	1+			
2	?																				
2	?																				
2	**M1.2**		10:48	10:52	?	-					10:47	10:52	11:11	1	10:51	10:59	?	-			
2	C9.4		11:16	11:20	12:00	2					11:15	11:19	11:37	1	11:18	11:24	11:54	2			
2	?																				
2	?																				
2	**M1.7**		14:50	14:54	15:50	2+					14:52	14:55	15:59	2+	14:54	15:01	16:01	2+			
2	?																				
2	**M1.3**		16:20	16:24	16:56	2									16:23	16:28	17:01	2			
2	?																				
2	?																				
2	??																				
2	?																				
2	?																				
2	**M1.1**																				
3	?																				
3	C3.6																				
3	C6.4		08:46	09:08	09:50	2+									09:03	09:07	09:51	2+			
3	**M2.0**		11:53	11:57	13:00	2+					11:53	11:57	13:32	3	11:56	12:02	12:57	2+			
3	C3.6																				
3	C3.7																				
3	C2.1																				
3	C3.3																				
3	C5.0																				
4	C2.7																				
4	?																				
4	?																				
4	C5.2																				
5	**M1.6**																				
5	**M2.1**		09:28	09:38	10:50	2+					09:25	09:36	10:40	2+	09:31	09:41	10:24	2+			
5	C3.1		14:49	14:53	15:08	1															
5	?																				
5	C2.4																				
5	C2.8																				
5	C6.7																				
5	**X1.6**																				
6	C6.7		10:53	11:05	12:00	2+					11:00	11:05	11:41	2	10:56	11:11	12:01	2+			
6	?																				
6	?																				
6	**M5.5**		18:29	18:40	19:10	2															
7	?																				
7	?																				
7	?																				
7	?																				
7	?																				
7	?																				
7	C4.4		13:35	13:43	14:00	1									13:40	13:47	?	-			
7	C4.4														14:39	14:47	?	-			
7	?																				
7	?																				
7	**M1.0**														15:45	16:08	16:56	2+			
7	**M1.4**																				
7	**X1.5**																				
8	**M3.6**		09:27	09:35	10:45	2+									09:30	09:35	10:43	2+			
8	C8.7																				
9	C5.1																				
11	C8.2																				
11	?																				
11	C4.7																				
11	C3.7																				
11	C3.4																				
11	C3.7																				
12	C8.8		09:12	09:20	10:00	2+									09:15	09:30	10:19	2+			
12	C6.6		10:43	10:51	11:15	1+					10:45	10:51	11:04	1	10:49	10:53	11:28	2			
12	?																				
12	C3.1																				
12	C1.4																				
12	?																				
12	C4.9																				
13	C2.4		09:49	09:57	10:30	2									09:54	10:01	10:24	1+			
15	C2.9																				
16	C1.8										10:15	10:30	11:20	2+							
16	?																				
16	C3.3														13:49	14:00	14:52	2+			
17	C5.1														12:40	12:43	?	-			
17	?																				
17	C3.5														14:21	14:25	?	-			
17	C2.2																				
19	C5.8																				
20	C3.3																				
20	?																				
20	C2.0																				
21	C4.3																				
21	?																				
21	C3.1																				
22	?																				
23	C3.2																				
23	C3.9		14:03	14:10	14:40	2									14:07	14:13	14:36	1+			
23	?																				
23	?																				
23	C2.4																				
24	C1.4																				
24	?																				
25	C5.0		15:45	15:50	16:20	2									15:49	15:56	16:24	2			
26	C2.2																				
30	C2.8																				