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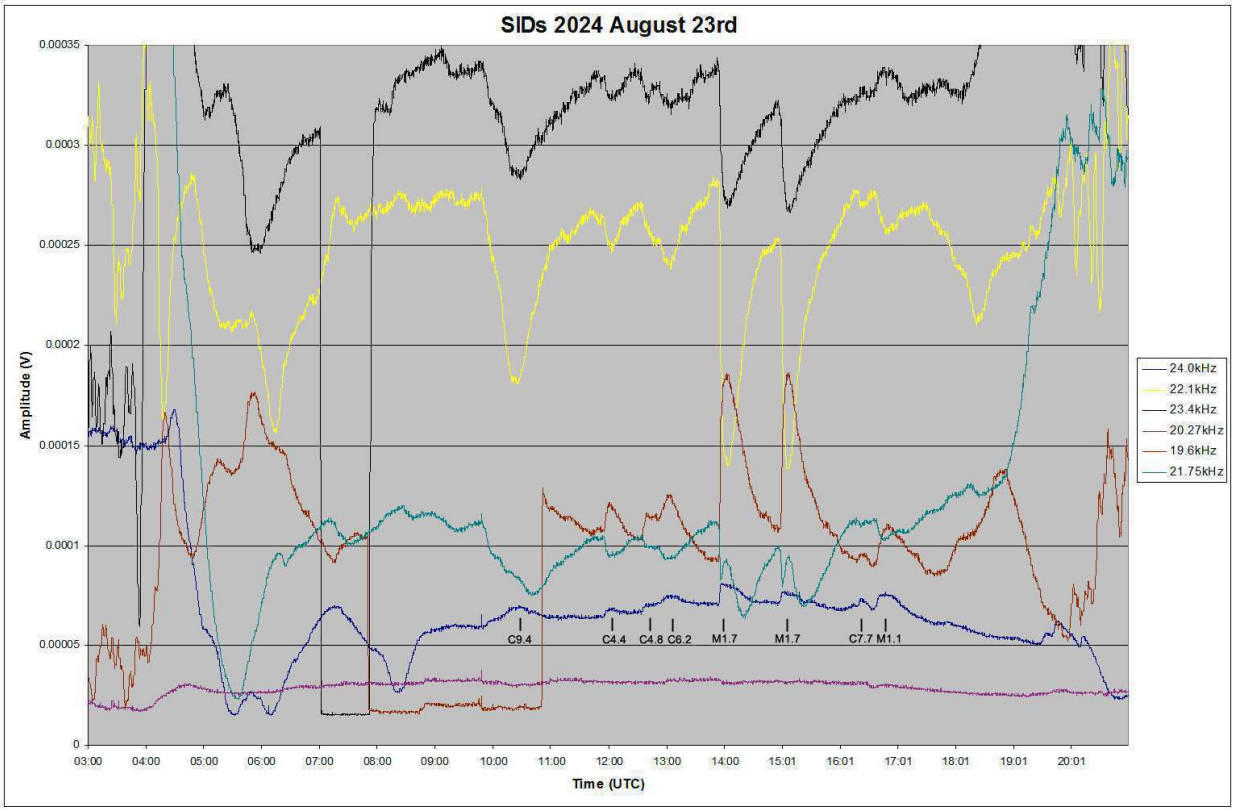
BAA Radio Astronomy Section. Director Paul Hearn.

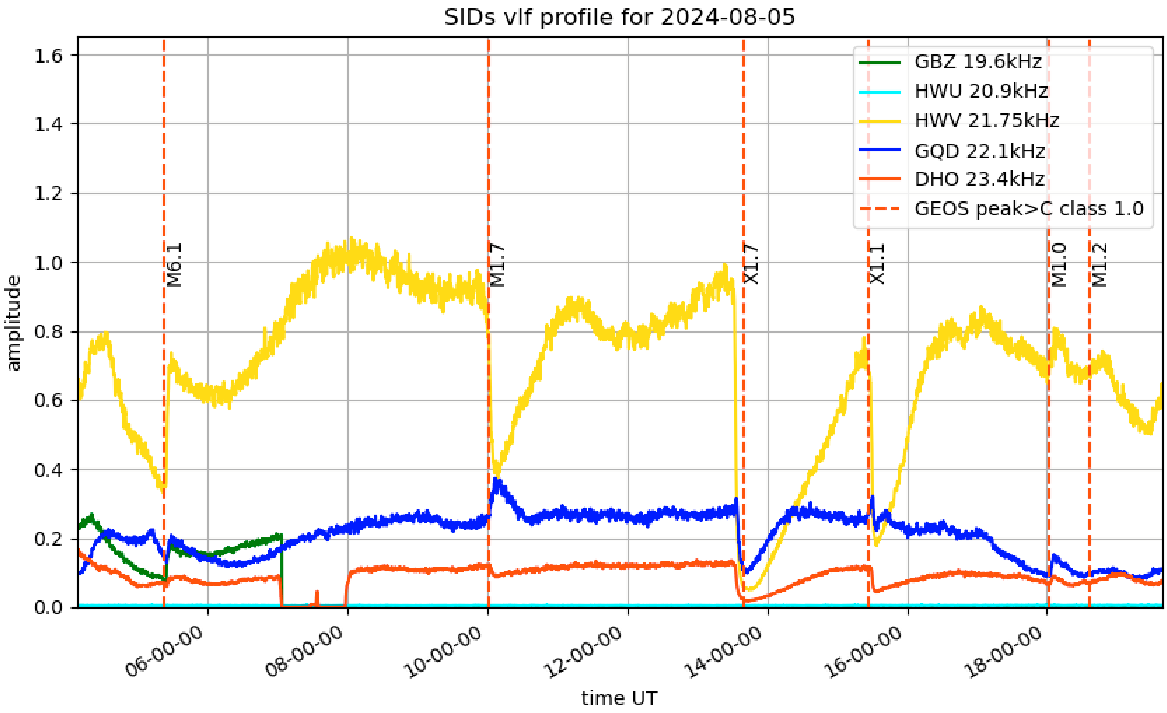
RADIO SKY NEWS 2024 AUGUST.

VLF SID OBSERVATIONS.

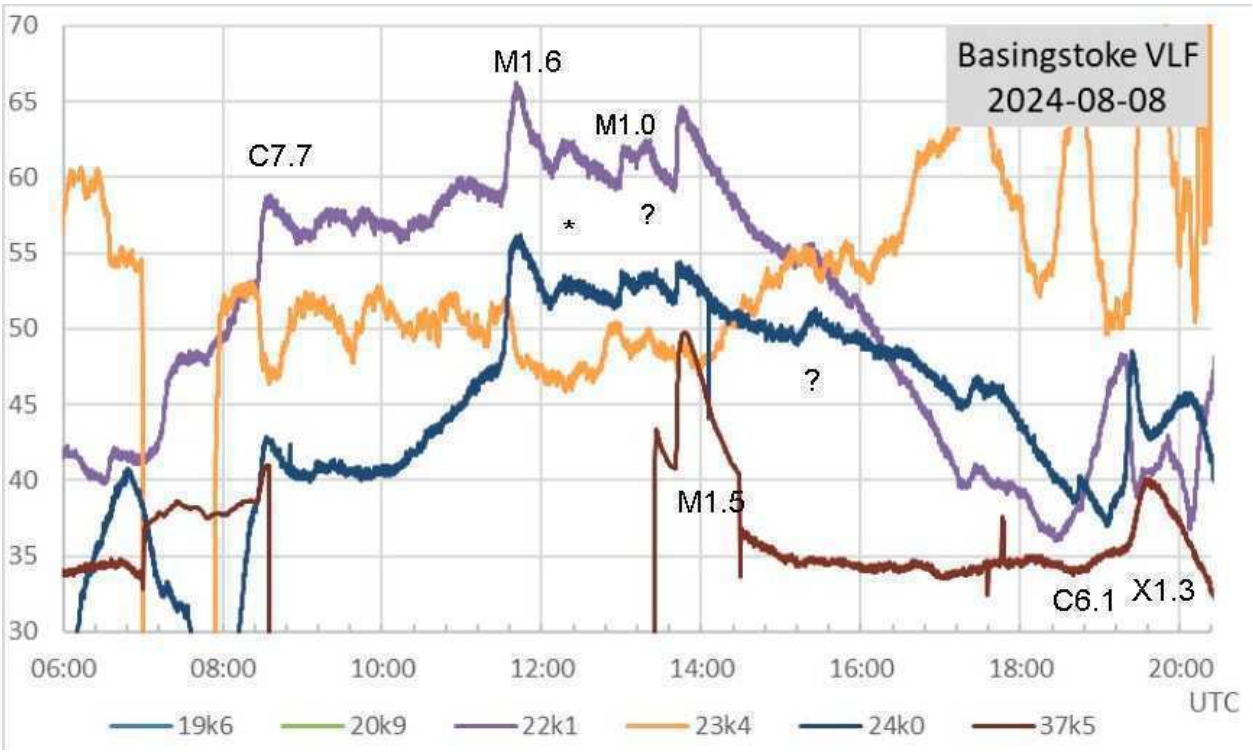
Solar activity again remained high in August, with another 168 classified flares recorded. There were four of X-class that were suitably timed for us to record. The background X-ray flux level also remained high for much of the month, hiding some of the smaller flares. There were also plenty of multi-peaked and simultaneous flares, making many of the SIDs difficult to assign to specific flares. There were also plenty of unclassified events listed in the SWPC weekly bulletins. Those that were listed but without magnitudes are shown as '*', while those not listed are shown as '?'.



Mark Edwards' recording from the 23rd shows how many of the SIDs have merged, making analysis difficult. Mark has identified the stronger flares, but there are plenty of smaller peaks visible in the chart. The small difference in flare magnitudes is due to using different sources of X-ray data.

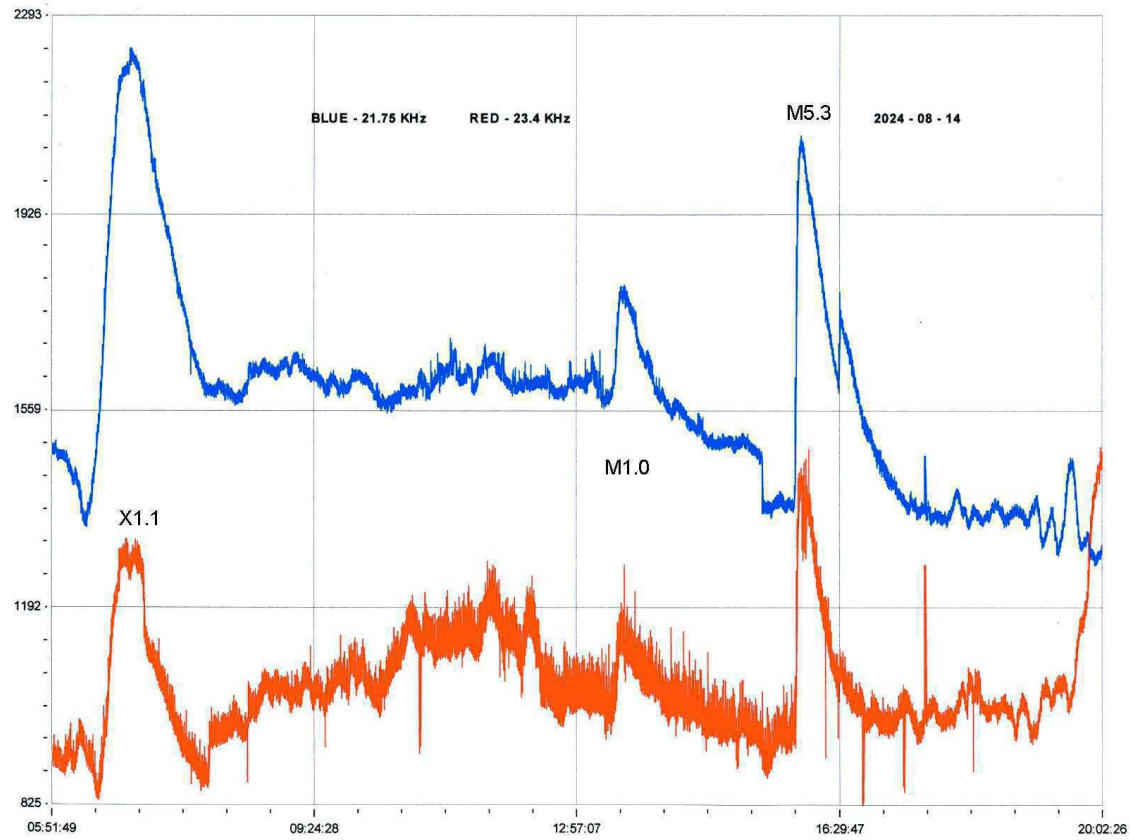


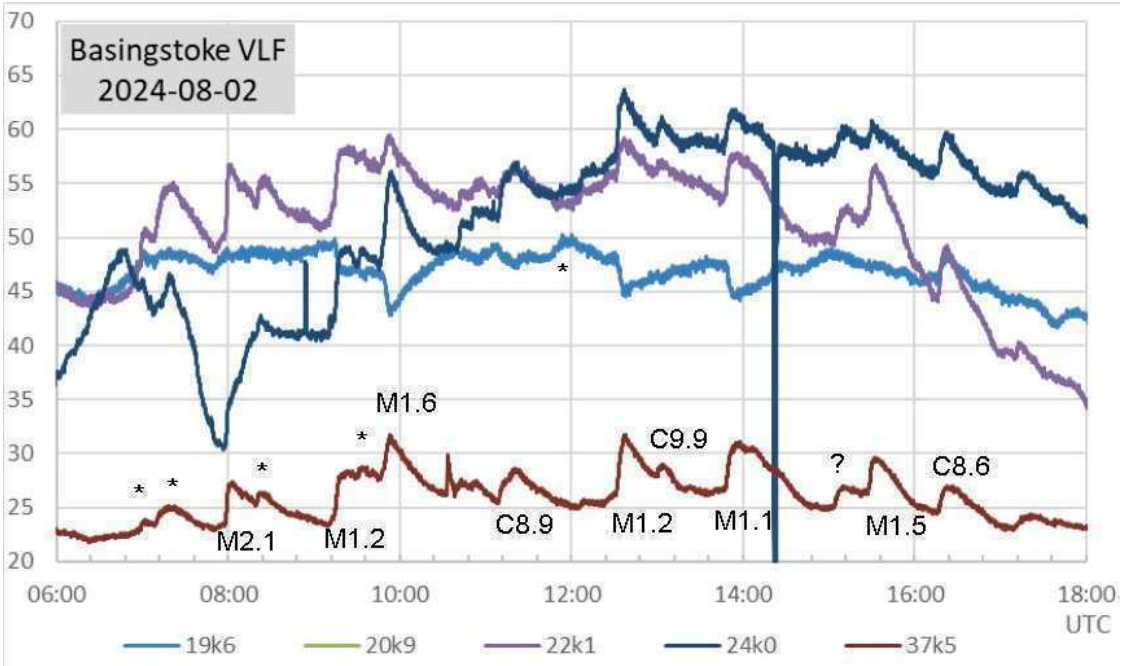
Mark Prescott's recording from the 5th shows the two strong X-flares. The first has merged into the second at 21.75kHz, which has then merged into the sunset period. The 22.1kHz trace is interesting in that the M1.7 SID has a rising peak while the X1.7 shows a falling peak. The X1.1 SID looks like a small 'peak and wave' type, and the later M1.0 again shows a rising peak. The 21.75kHz path is southward into France while the 22.1kHz path is north towards the Solway Firth.



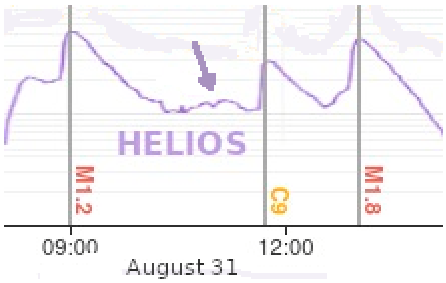
The third of the X-flares was late in the afternoon of the 8th, recorded on the Trans-Atlantic signals by Paul Hyde. The Grindavik signal went off air due to more volcanic activity later in the month, but was still operating on the 8th, showing a clean SID. 24kHz seems to show a 'spike and wave' shape. The chart also shows some of the unclassified events during the day, giving a very complex pattern.

The fourth of the X-flares was early on the 14th, peaking at about 06:45UT, and produced quite strong SIDs on both signals in the recording by Colin Clements. The two M-flares are also well recorded. There were several smaller unclassified events during the day, but not visible in the general background noise on these signals.



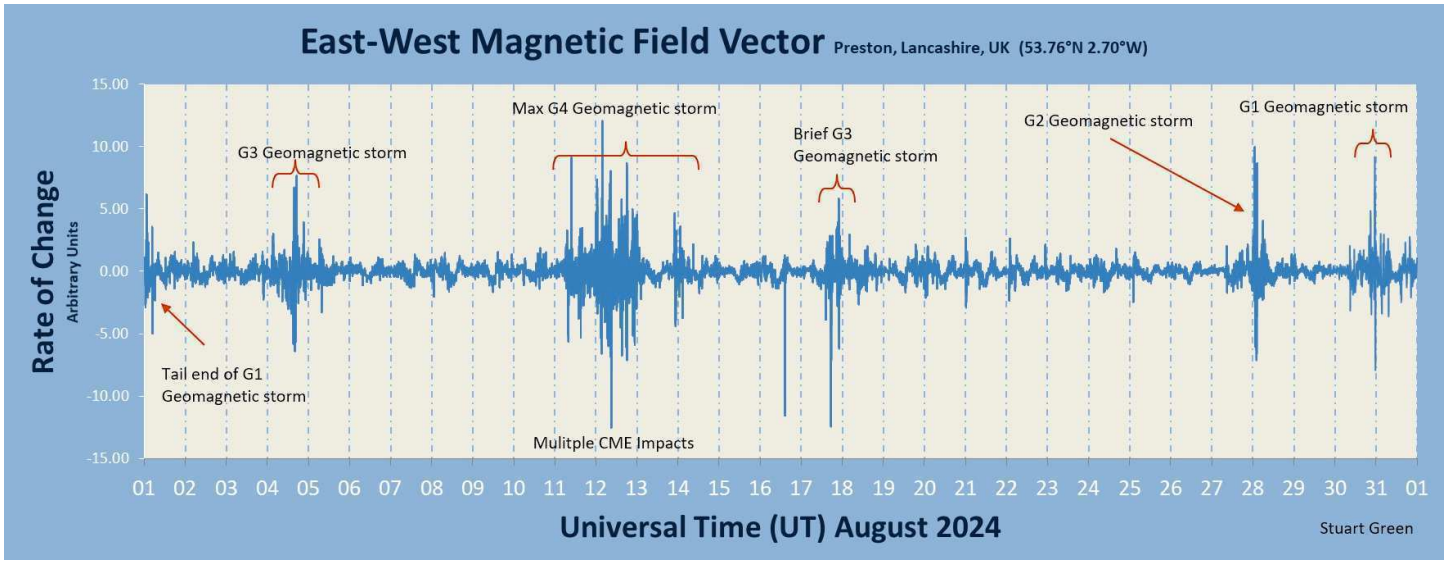


Paul Hyde's recording from the 2nd shows a day full of SIDs, quite well defined at 37.5kHz. I have attempted to label the unclassified events, some of which are quite distinct and show on most of the signals. Strong activity continued through most of August, although with more C-flares later in the month.

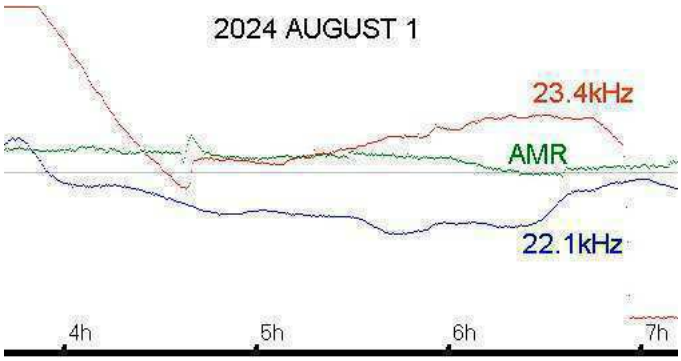


Thomas Mazzi also noted one of these unclassified events with his Helios system. It does match a peak in the X-ray charts, although I do not have the precise timing.

MAGNETIC OBSERVATIONS.

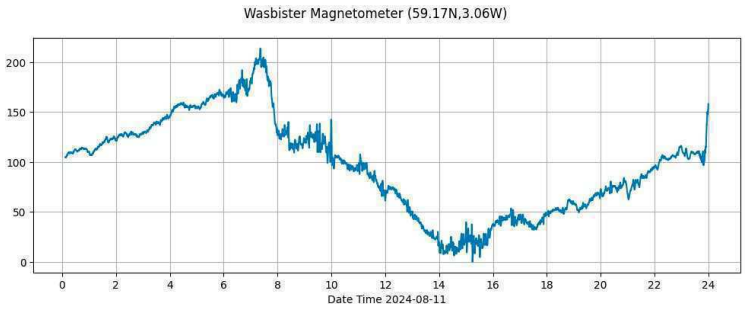


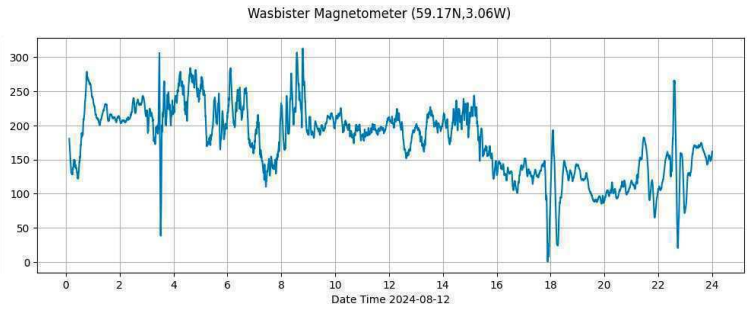
Stuart Green's summary of the month's magnetic activity shows some strong storms, including a G4 storm on the 11th to 14th. August started with the tail end of a storm at the end of July. In the July report I included a magnetic chart by Nick Quinn that included an SFE as a sharp spike. I have expanded my own recording to show the SFE with the M4.0 flare that produced it.



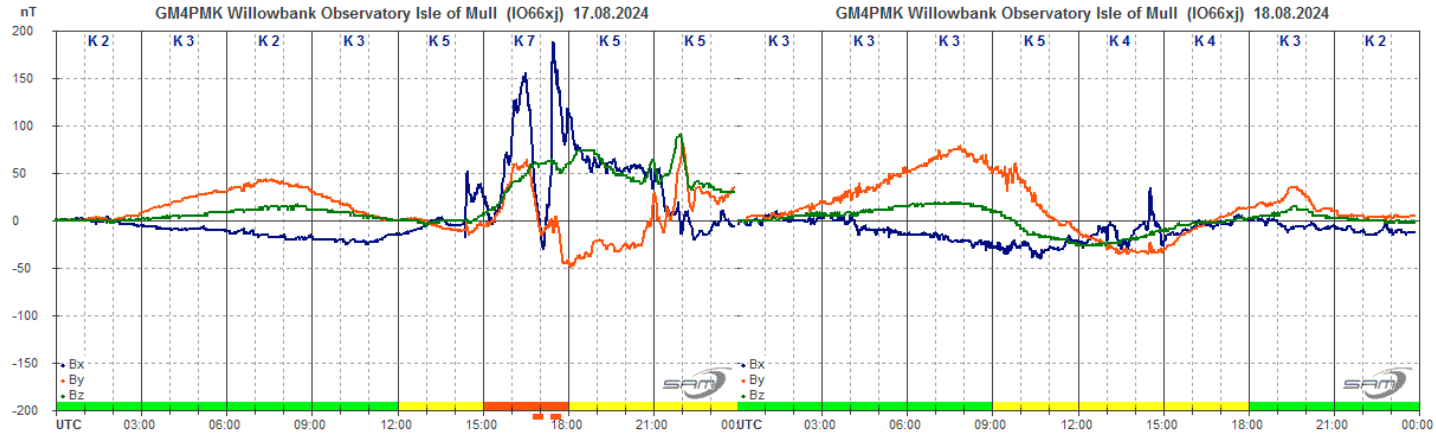
The flare is just visible in the 23.4kHz signal, together with the SFE in the green magnetometer trace. It peaks at 04:41UT, and has a magnitude of 43nT. Roger Blackwell's recordings show a similar amplitude. The disturbance was short-lived, fading out by midday.

The major storm starting on the 11th seems to have been the result of several CMEs combining, so the actual source is not clear. Our SID observations show plenty of strong flares over the previous few days. Callum Potter's recording for the 11th and 12th shows the activity:

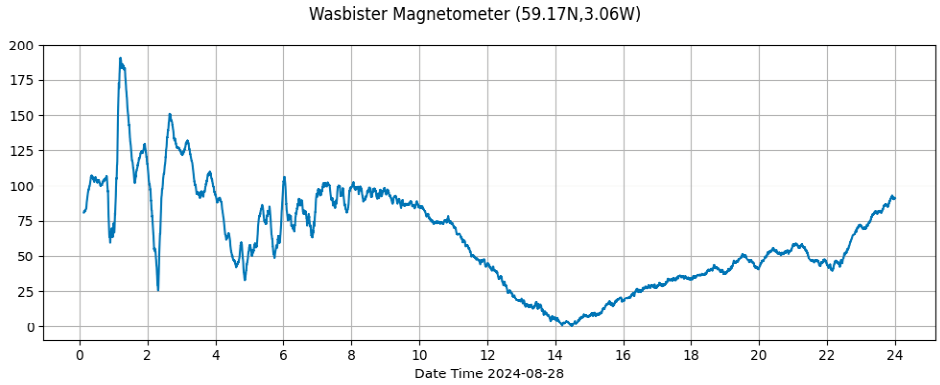




The disturbance is fairly mild on the 11th, but increases rapidly at midnight. Note that the vertical scale changes on the 12th to show the greater amplitude during the day. Activity faded over the next few days.



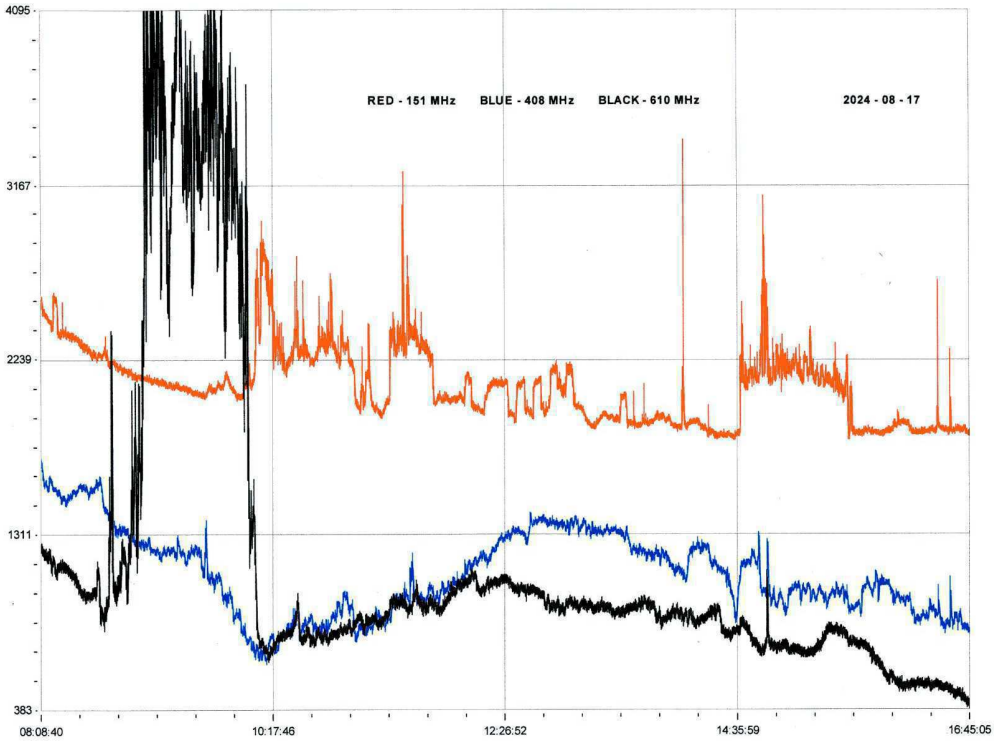
Roger Blackwell recorded the less active storm on the 17th and 18th, starting with a CME impact at about 14:20 on the 17th. The STCE bulletin lists a CME from the X1.4 flare early on the 14th arriving at 13:30. If this is the same event, then it was a very slow CME, taking over three days to reach Earth. The disturbance was much weaker after midnight, with a low amplitude turbulence in the morning of the 18th.

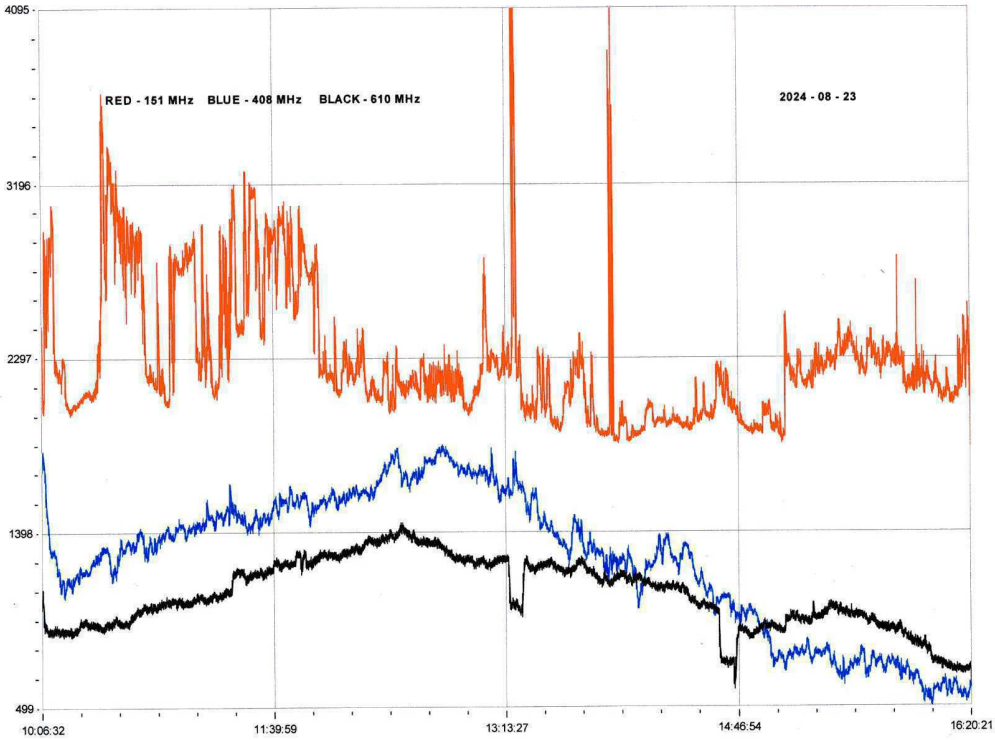


The two minor storms at the end of August were much weaker, callum Potter's chart from the 28th showing activity starting at midnight and fading out before midday. Activity on the 31st was weaker and faded out quite quickly. The source seems to have been a stronger solar wind from a pair of coronal holes.

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

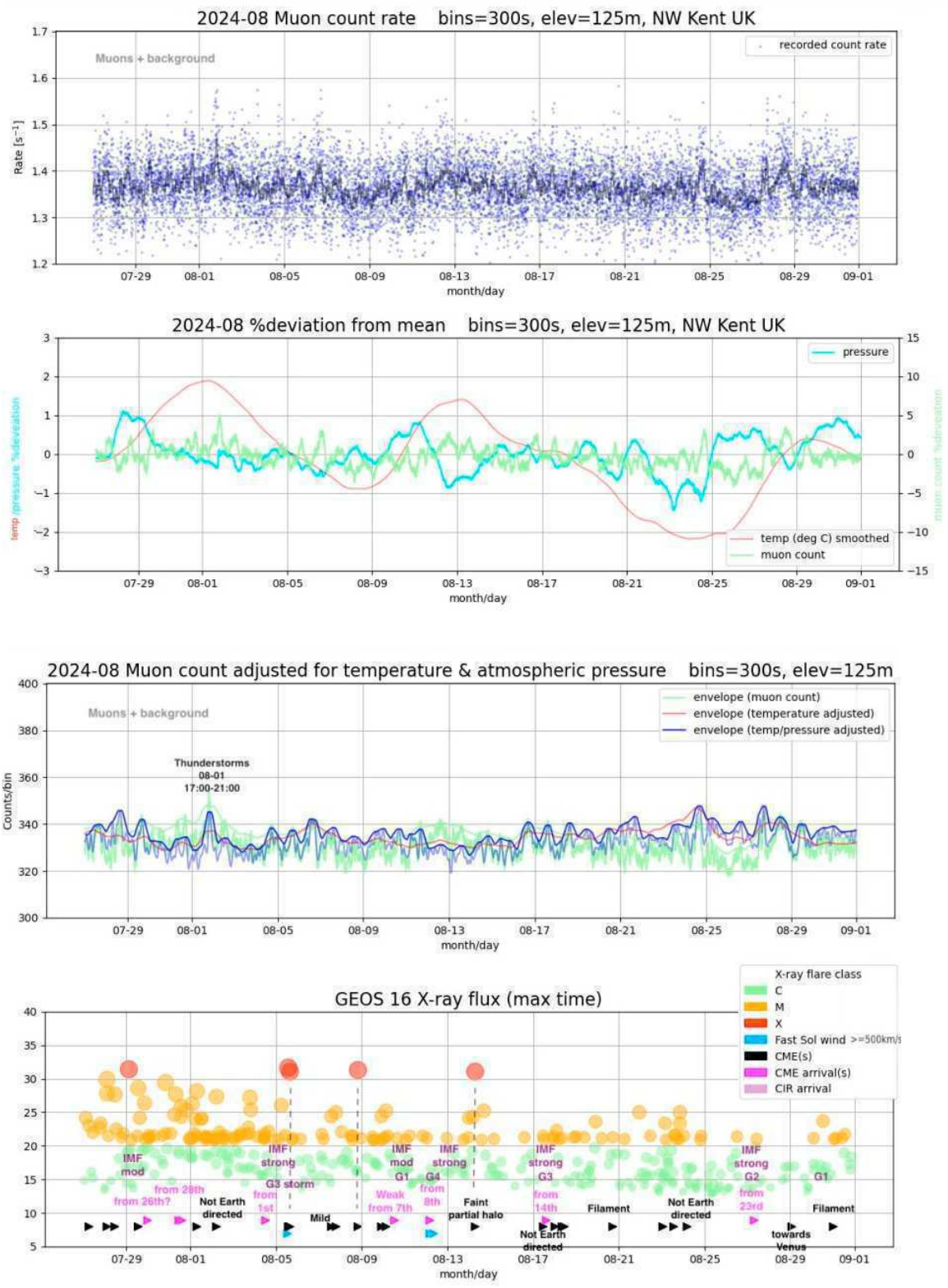
SOLAR EMISSIONS





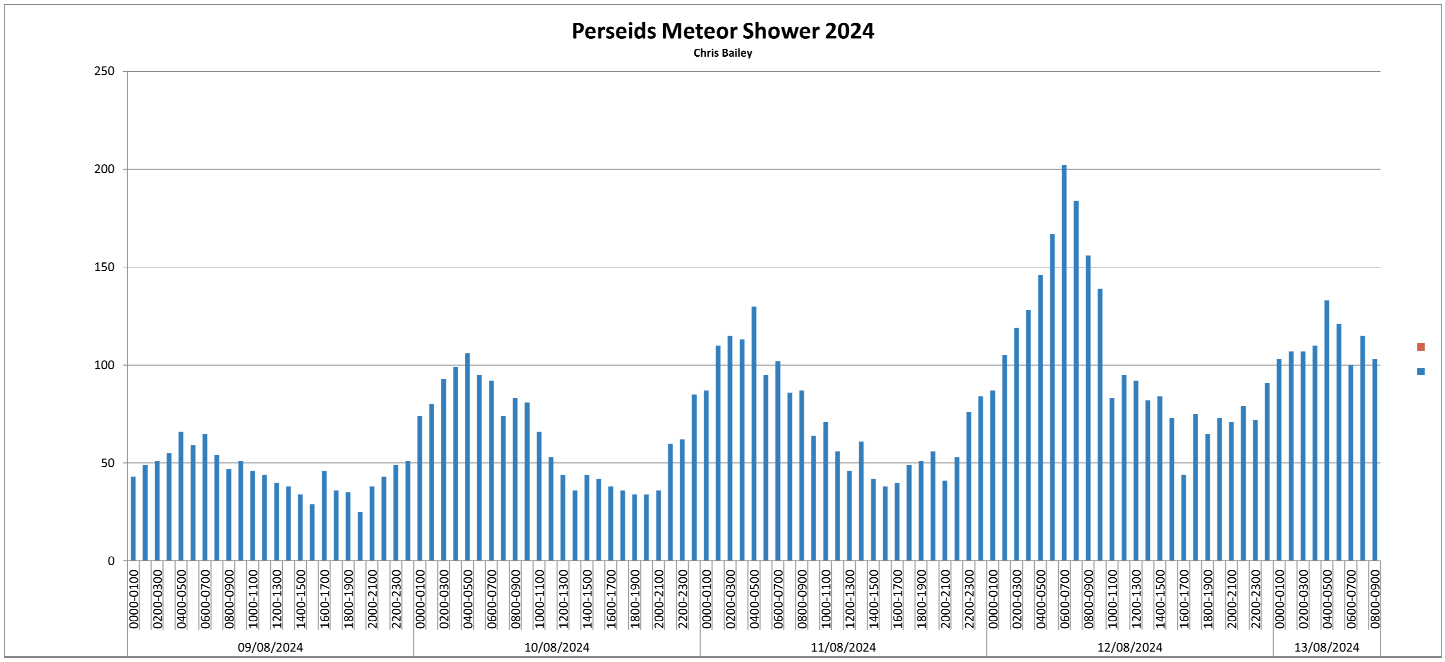
Colin Clements recorded radio emissions on several days in August. The 17th (top chart) shows some 151MHz (red) emissions matching the M1.6 and M1.1 flares, along with some of the unclassified events later in the afternoon. The strong 610MHz (black) burst may match some of the early unclassified flares, but is rather odd. On the 23rd there is long period of 151MHz emission matching the strong C-flares in the morning, as well as a pair of short spikes around 13:15-13:30, perhaps from the afternoon C-flares. 408MHz (blue) has remained quiet on both days. Emissions were also recorded on the 5th, 16th, 19th,30th and 31st.

MUONS



There were plenty of thunderstorms around the UK in August, Mark Prescott seeing one on the 1st. It has created a small increase in his Muon counts. This sits in the middle of a period of lower counts during the high density of M-flares in late July / early August. The large magnetic storm starting on the 11th produced a drop in the muon count lasting four days. There are also some small drops matching other minor magnetic activity.

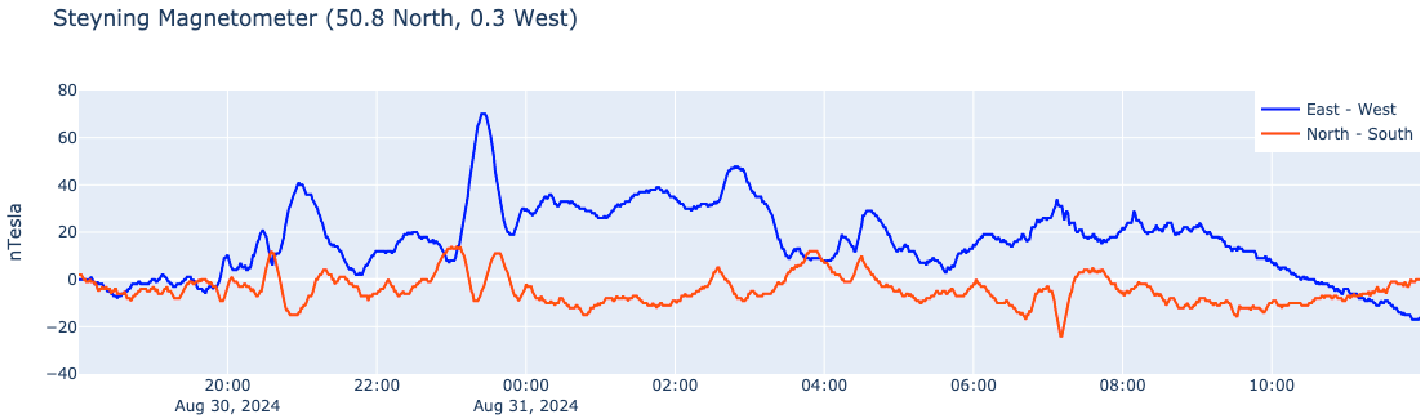
PERSEIDS

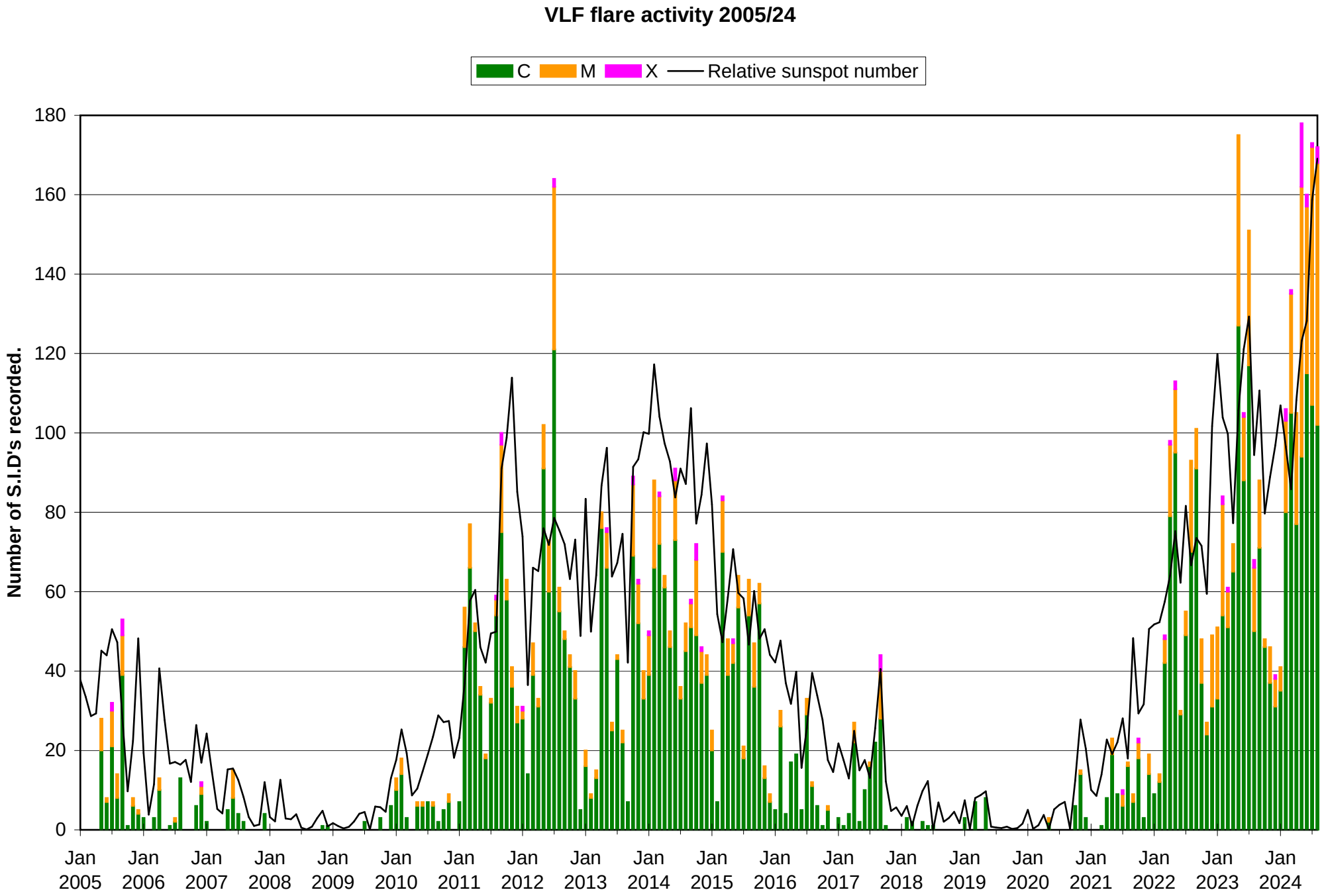


Chris Bailey's chart of Perseid echos runs from the 9th to 09:00UT on the 13th. There is a clear peak between 06 and 07UT on the 12th. The afternoon and evening counts are also fairly high, much as predicted in the BAA handbook. Counts were also quite high in the early hours of the 11th and 13th.

The weather was generally nice and warm on the night of the 12th, so I was able to make a visual count between 22:00 and 23:00, seeing 7 Perseids (plus a few satellites and aeroplanes!) looking to the north east away from the worst of the local lighting. I was also aware of a faint auroral glow at the time, an unexpected addition from the strong magnetic storm. Observers from my local library astronomy group had similar counts.

A late report from Nick Quinn includes the mild magnetic disturbance at the end of August:




VLF flare activity 2005/24
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
Jan 2024

BAA Radio Astronomy Section.

BARTELS DIAGRAM

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

2570

6	7	8	9	10	11	2253 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1
F							C	C											C	CC		C	BCCC			C

2571

2022 February 2	3	4	5	6	7	2254 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
F CC		CC					C			MCCC		CCM														C

2572

2022 March 1	2	3	4	5	6	2255 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
F CM					C	C				CCCC	C		M	CCMC					CC		CC	CCCC	C		C	C

2573

2022 April 28	29	30	31	1	2	3	2256 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
F CMC	MCCC	CCCC	CCCX	CCCC	CCMM	CC	C		C		CC	C			CBCC			MMCC	CCCM	CCCM	MMCM	CCCC	CMCC	CC	CMC	C

2574

24	25	26	27	28	29	30	2022 May 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
F	MCCC	CCCC	CCC	CC	MCCM	MMXM	CCCC		MCX	BMCM	CMMC	CC	CC	CCC	C	CCX	CCMM	CCCM	CCCC	CCCC	C	CMC	CCCC	CCCC	CMMM	CMM

2575

21	22	23	24	25	26	27	2258 28	29	30	31	2022 June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
F CCC	CC	CC	CC	CCM	CC	CC	CC												CC	CCMC	C		C	CCCC		C

2576

17	18	19	20	21	22	23	2259 24	25	26	27	28	29	30	2022 July 1	2	3	4	5	6	7	8	9	10	11	12	13
F CCCC	CCC	C	CC	C	CC	CC	C	C								BC	C	CC			M	CCCC	CCCC	CM	CCCC	CCC

2577

14	15	16	17	18	19	20	21	2260 22	23	24	25	26	27	28	29	30	31	2022 August 1	2	3	4	5	6	7	8	9
F CMCM	CCC	MCM	CCCC		C	CCCC			CCCC	C		C	C						CC	C		CC				

2578

10	11	12	13	14	15	16	17	2261 18	19	20	21	22	23	24	25	26	27	28	29	30	31	2022 September 1	2	3	4	5
F	C	CC	CCCC	C	CMMM	MCC	CCMM	CMMM	MCCC		C	C			CCCM	CMMM	CMMM	CCMM	CMMM	CCCM	C	CC	CCCC	CCCC	CCCC	CCMC

2579

6	7	8	9	10	11	12	13	2262 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	2022 October 1	2
F CC				C	CCCC	CCCC	CCCC	MCCC		MM	M	CC	C	MCCC	M	CCCC	CCCM	CCCC		CCC	CCCC		CC	CCMM	CC	CMMC

2580

2022 October 3	4	5	6	7	8	9	10	2263 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
F CMMM	M	C		CM	C	CCCC	CM	MMCC	CC	C	M	C	C		C		CC		CB		CC	C	C			

2581

2022 November 30	31	1	2	3	4	5	6	7	2264 8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
F							C	C			C	MCCM	CC	C	C	CCC	CC	CC	CCC	M			CCC			

2582

26	27	28	29	30	2022 December 1	2	3	4	2265 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
F			C		C	M					C				C			MMMM	CMCM	MMMC		CC	CCC	M	C	C

2583

23	24	25	26	27	28	29	30	31	2023 January 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
F CC	C		CCC	CM		CM	CCCM	C							CC	MCCM	MM	MCMM	MC	MCMC	MC	CCC	CM	C		MC

2584

19	20	21	22	23	24	25	26	27	28	2267 29	30	31	2023 February 1	2	3	4	5	6	7	8	9	10	11	12	13	14
F MMC	CC	CC	CMCM	C	CCC	MCM	CMCC		C		C	CC		C		C	C	C	CC	CM	MMMM	MCCM	MMXM	MMMM	CCCM	CCM

2585

15	16	17	18	19	20	21	22	23	24	2268 25	26	27	28	2023 March 1	2	3	4	5	6	7	8	9	10	11	12	13
F CCCC	C	CX	C	CC	CMCC	MCCM	CCCM	CMCC	CCM	CCMM	CC	CC		CC	CCCC	MCCX	CMMC	CCMC	MCCC	C	MC	CCC	CCCC	C		

2586

14	15	16	17	18	19	20	21	22	23	2269 24	25	26	27	28	29	30	31	2023 April 1	2	3	4	5	6	7	8	9
F C		C	CCCM	C	CCC	C	C			C		CC	CCC	CC	MC	M	CC					CCC	MC		CC	CCCC

2587

10	11	12	13	14	15	16	17	18	19	20	2270 21	22	23	24	25	26	27	28	29	30	2023 May 1	2	3	4	5	6
F MCCC	MC	CCC	CCCC	CCMC	CCCC	C	CC	CCC	CCC	CCCC	M	CC		CC		C	M	CC	CCCC	CCM	CCMC	CCCC	MMMM	MCCC	CMM	CC

2588

7	8	9	10	11	12	13	14	15	16	17	2271 18	19	20	21	22	23	24	25	26	27	28	29	30	31	2023 June 1	2
F C	CCCM	MCMM	MCCC	MCCM	CCCC	CCCC	C	C	CCCM	CCCC	MMMM	MCCM	MMMM	CCCM	CCMC	CMCC	MCCM	CCMC	CCC	MC	C	MMMC	CMCM	CCCC	CC	

2589

3	4	5	6	7	8	9	10	11	12	13	2272 14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
F CC	CCCC	C	CCCC	CMCC	CC	CM	C		CCCC	CCCC	CC	CC	MCMM	CC	M	MC	CCMX	CMMC	CMCC	C	CCMC	CCCC	CCMC	CMCC	MCC	CCCM

2590

30	2023 July 1	2	3	4	5	6	7	8	9	10	2273 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
F CCCC	CCCC	CCCC	MCCC	MC	CCCM	CCM	MC	C	CCC	CCCC	MMMM	MMCC	CCCM	MCCC	MMMC	MCMM	CCC	MMMM	CMCM	C	C	CC	CC	C	CCCM	CMCM

2591

27	28	29	30	31	2023 August 1	2	3	4	5	6	2274 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
F CMCC	CMCC	CCCM	MC	CMCC	MMMM	MMMM	CMCC	CC	MMCX	CM	CMMX	MC	C		CCCC	CCCC	C		C	CC	CCC		C	CC	CC	

2592

23	24	25	26	27	28	29	30	31	2023 September 1	2	2275 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
F CCC	C	C	C				C			MC	MCC	CC	MCC	CCCC	CCM	CCC	C	C	CCCM	MCCC	C	CCM	C	CC	C	C

2593

19	20	21	22	23	24	25	26	27	28	29	30	2023 October 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F MCCC	CMCC	M	CCMM	CCCC	CCMC	C	CC		MCC	CCC	CCCM	CCCC	CCM	CCCC	C	C	CC	CC	CCC	CMCC	CC				C	C

2594

16	17	18	19	20	21	22	23	24	25	26	27	2277 28	29	30	2023 November 1	2	3	4	5	6	7	8	9	10	11	12
F CCC			C	C					CC	CC			CCCC		MCM	CCM			MCM	C		C	C	C	CCC	

2595

13	14	15	16	17	18	19	20	21	22	23	24	2278 25	26	27	28	29	30	2023 December 1	2	3	4	5	6	7	8	9
F C	CCCC	C			CM	CC	MCCC	CCCC		CCMC	MC		C			C		CC				CCC	C			MCM

2596

10	11	12	13	14	15	16	17	18	19	20	21	2279 22	23	24	25	26	27	28	29	30	31	2024 January 1	2	3	4	5
F CCC	CCCC	CC	C	MMX	MCCM	CC	C	C						MM							C	CCCC	M			

2597

6	7	8	9	10	11	12	13	14	15	16	17	2280 18	19	20	21	22	23	24	25	26	27	28	29	30	31	1
F C		CC		CM	CCM	C		CC						C	CCC	C	CMMM	CCC	CCCC			CCC	CCC	C	C	CC

2598

2024 February 2	3	4	5	6	7	8	9	10	11	12	13	14	2281 15	16	17	18	19	20	21	22	23	24	25	26	27	28
F CCCC	CCCC	MMMM	CC	CC	CCM	MMMM	CXM	C	C	CMCM	CC	MCCC	CCCM	XCC	C	C	CC	CC	CCCC	XCCM	CMMM	MMMM	CM	C	C	CC

2599

29	2024 March 1	2	3	4	5	6	7	8	9	10	11	12	2282 13	14	15	16	17	18	19	20	21	22	23	24	25	26
F		CCC		C	CC	C	CCCC	C		CMCC	CC	CCCC		MCC		CCMC	CCCC	CCCC	CCCC	MCCC	CC	CCCM	MMMM	MMMM	MCCC	MMMM

2600

27	28	29	30	31	2024 April 1	2	3	4	5	6	7	8	2283 9	10	11	12	13	14	15	16	17	18	19	20	21	22
F MCCC	MMMX	CCCC	CCCC	CCCC					C					CCCC	CCCM	CCCC	MCCC	CCCC	MMMM	CCCM	CCCC	CMCC	MCCC	CCCC	MMM	MMMM

2601

23	24	25	26	27	28	29	30	2024 May 1	2	3	4	5	6	2284 7	8	9	10	11	12	13	14	15	16	17	18	19
F MCCM	CCMC	CMCM	CC	MC	CC	CCC	CCMM	MC	CCCM	CMCC	MMCM	XMXM	MXMC	MMMM	XMMX	MXMX	XMMM	MXMM	MMMX	XCXM	CMMX	M	CCC		MM	

2602

20	21	22	23	24	25	26	27	28	29	30	31	2024 June 1	2	2285 3	4	5	6	7	8	9	10	11	12	13	14	15
F	CCCM	CM	CMMM	MCCC	C	CCCC	XCC	CCCC	MMXM	CM	CMCX	XCXM	CMCC	MMMM	MMCC	MMCC	CCMC	CMCM	MMMC	MMCM	MMXM	CC	CC	CCMC	CCCC	MCCC

2603

16	17	18	19	20	21	22	23	24	25	26	27	28	29	2286 30	2024 July 1	2	3	4	5	6	7	8	9	10	11	12
F CCCC	MCMM	CMMC	MCCC	CMCC	CCCC	MMCC	MMMC	MMCM	MC	C	CC	CC	CC		MC		MCC	CCMM	CCCC	CCCC	CCMM	CMCC	CCCC	MMMM	CMCC	CCC

2604

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2024 August 1	2	3	4	5	6	7	8
F MMMM	MCCM	MMCC	MCXM	MMMM	MMCC	CMCM	MCCM	MCCM	MCMC	CM	MCMC	CCM	MCC	MMMM	MMMM	MMMM	MMMM	MMMM	MMMM	MMMM	MMMM	MMMM	MMXX	CCCC	CCMM	MMMX

2605

9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2024 September 1	2	3	4
F MMMM	CCMM	MCCM	MC	CCCM	XMMC	CCCC	CMC	MM	MCM	MCCC	CCM	MCCC	CCMC	CCMM	CCMM	CCCC	CMC	CMCC	C	CCC	CMCC	MCMC				

BAA Radio Astronomy Section. **2024 AUGUST.**

			John Cook (23.4kHz/*22.1kHz*)				Roberto Battaiola (23.4/*21.75kHz*)				Paul Hyde (Various)				Mark Edwards (24.0/*19.6*/**22.1kHz**)				Colin Clements (21.75/*23.4kHz*)			
	Xray class	Observers	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)	
1	**M4.0**	1	04:39	04:41	05:09	1+																
1	**M1.5**	1	05:54	05:57	06:04	1-																
1	**M8.2**	6	*07:03*	*07:14*	*07:37*	*2*									06:47	07:08	07:41	2+	06:39	07:24	09:34	3+
1	*	1													*08:28*	*08:30*	*09:00*	*1+*				
1	*	1													*09:33*	*09:43*	*09:50*	*1-*				
1	?	2									09:53	09:57	10:05	1-	09:54	10:00	10:05	1-				
1	*	1													10:31	10:36	10:43	1-				
1	**M4.1**	3	11:13	11:21	?	-					11:11	11:23	12:12	2+	10:58	11:07	?	-				
1	?	1													11:09	11:19	?	-				
1	?	6													*11:35*	*11:41*	*?*	-	11:03	11:43	14:23	3+
1	?	2													*12:13*	*12:18*	*?*	-				
1	*	1													*12:36*	*12:37*	*?*	-				
1	*	1													12:54	13:04	?	-				
1	*	1													13:33	13:43	?	-				
1	*	1													***14:15***	***14:21***	***14:29***	***1-***				
1	*	2													14:04	14:43	15:00	2+				
1	C8.8	6	15:13	15:16	15:38	1					15:14	15:18	15:39	1	15:14	15:17	15:35	1	15:18	15:24	15:43	1
1	*	1													15:41	15:44	15:53	1-				
1	?	1													15:56	16:00	?	-				
1	**M1.0**	2	*16:04*	*16:12*	*16:27*	*1*									16:05	16:17	?	-				
1	**M1.3**	5	*16:35*	*16:38*	*17:02*	*1+*					16:35	16:41	?	-	*16:34*	*16:39*	*?*	-				
1	?	3													16:36	16:49	?	-	16:41	16:48	17:32	2+
1	*	1													17:03	17:05	?	-				
1	**M1.3**	5	*17:26*	*17:31*	*18:30*	*2+*					17:26	17:36	18:11	2	17:26	17:31	17:55	1+	17:32	17:39	18:06	2
1	C8.5	1													18:53	19:03	19:10	1-				
1	**M1.2**	2									20:17	20:25	?	-	20:19	20:25	20:56	2				
2	*	2									06:58	07:02	07:08	1-	*06:56*	*07:04*	*?*	-				
2	*	1													*07:07*	*07:21*	*?*	-				
2	**M2.1**	7	*07:58*	*08:00*	*08:20*	*1*					07:57	08:01	?	-	*07:58*	*08:03*	*?*	-	08:04	08:09	08:25	1
2	*	2									08:20	08:24	08:41	1	*08:20*	*08:24*	*09:06*	*2+*				
2	**M1.2**	8	09:15	09:17	?	-					09:14	09:19	?	-	09:13	09:25	?	-	09:16	09:28	09:37	1
2	*	1													*09:31*	*09:33*	*?*	-				
2	**M1.6**	8	09:46	09:52	10:22	2					09:45	09:53	10:26	2	09:46	09:53	10:27	2	09:51	09:59	10:45	2+
2	?	2									10:40	10:44	?	-	10:41	10:45	?	-				
2	?	2									10:50	10:53	11:04	1-	10:49	10:57	?	-				
2	C8.9	4	11:09	11:13	11:18	1-					11:08	11:21	11:50	2	11:09	11:16	?	-	11:14	11:27	12:11	2+
2	*	1													11:17	11:20	11:37	1				
2	*	1													12:07	12:12	12:17	1-				
2	**M1.2**	7	12:32	12:37	?	-					12:31	12:36	?	-	12:32	12:38	12:54	1	12:37	12:42	13:04	1+
2	C9.9	4	12:58	13:02	?	-					12:59	13:00	13:18	1	13:00	13:04	13:14	1-	13:04	13:11	13:53	2+
2	?	1													13:22	13:26	13:28	1-				
2	**M1.1**	7	13:48	13:52	?	-					13:47	13:53	14:33	2+	13:48	13:57	14:26	2	13:53	14:04	15:07	2+
2	?	2									15:03	15:11	?	-	15:06	15:08	?	-				
2	**M1.5**	7	15:02	15:30	?	-					15:27	15:32	16:00	2	15:23	15:32	16:12	2+	15:33	15:38	16:22	2+
2	C8.6	5	16:17	16:18	16:39	1					16:16	16:21	16:58	2	16:17	16:23	17:02	2	16:22	16:27	16:42	1
2	C6.1	2									17:10	17:14	17:29	1	17:12	17:17	17:36	1				
2	C8.2	1													18:13	18:23	18:47	2				
3	**M1.9**	6	*06:55*	*07:02*	*07:58*	*2+*					06:53	07:02	08:20	3	*06:55*	*07:23*	*08:56*	*3*				
3	*	1													***09:33***	***09:37***	***09:45***	***1-***				
3	C6.6	4	*10:30*	*10:35*	*10:48*	*1-*					10:30	10:40	11:22	2+	10:31	10:44	11:08	2				
3	C4.6	5	*12:27*	*12:34*	*12:51*	*1*					12:26	12:31	12:42	1-	12:28	12:31	12:55	1+				
3	**M1.8**	8	13:31	13:43	14:45	2+					13:30	13:46	14:29	2+	13:32	13:45	14:25	2+	13:36	13:51	16:12	3+
3	*	1													15:00	15:02	15:15	1-				
3	*	1													15:24	15:26	15:40	1-				
3	C6.6	3	*16:06*	*16:11*	*16:41*	*2*					16:04	16:09	16:45	2	16:06	16:12	?	-				
3	?	1													16:21	16:23	?	-				
3	**M2.8**	7	*16:53*	*16:55*	*?*	-					16:50	16:57	?	-	16:53	16:54	?	-	16:59	17:03	17:28	1+
3	**M1.9**	5	*17:22*	*17:26*	*18:02*	*2*					17:21	17:28	?	-	17:21	17:28	?	-	17:28	17:32	18:09	2
3	?	2									18:02	18:12	?	-	18:03	18:13	?	-				
3	**M7.3**	5	*18:37*	*18:40*	*?*	-					18:36	18:43	19:03	1+	18:35	18:44	?	-				
3	**M5.4**	3	*19:23*	*19:30*	*19:41*	*1-*					19:19	19:25	19:48	1+	19:19	19:32	20:14	2+				
4	C5.6	3	*08:02*	*08:08*	*08:16*	*1-*					08:02	08:12	08:38	2	*08:04*	*08:18*	*?*	-				
4	?	1													*08:22*	*08:34*	*08:43*	*1*				
4	C5.7	3	09:03	09:08	09:29	1+					09:02	09:13	09:37	2	09:04	09:10	09:34	1+				
4	?	1													*09:40*	*09:46*	*?*	-				
4	**M1.1**	6	09:41	09:50	?	-					09:41	09:47	10:04	1	*09:50*	*10:02*	*?*	-				
4	**M1.4**	4	09:58	10:02	?	-									*10:05*	*10:09*	*?*	-	10:10	10:15	10:27	1-
4	**M1.9**	6	10:26	10:52	12:22	3					10:24	10:45	12:11	3	*10:20*	*10:52*	*12:37*	*3+*	10:27	10:56	12:39	3+
4	*	1													*12:42*	*12:46*	*?*	-				
4	*	2	12:56	12:59	?	-									*12:56*	*13:00*	*?*	-				
4	C8.5	5	13:14	13:25	13:51	2									*13:14*	*13:28*	*13:54*	*2*	13:19	13:34	14:55	3
4	?	1													13:50	14:01	14:30	2				
4	C6.1	2	14:47	14:59	?	-									14:52	15:02	?	-				
4	**M2.2**	8	15:13	15:17	16:18	2+					15:13	15:17	15:52	2	15:13	15:14	15:45	1+	15:19	15:23	17:14	3
5	**M6.1**	3	05:21	05:24	05:43	1									*04:55*	*05:18*	*05:35*	*2*				
5	**M1.7**	8	09:57	10:03	10:55	2+	*09:55*	*10:01*	*10:24*	*1+*	09:53	10:01	10:57	2+	09:53	10:02	10:55	2+	09:52	10:11	11:23	3
5	**X1.7**	8	13:28	13:38	15:19	3	*13:25*	*13:30*	*14:57*	*3*	13:27	13:40	14:11	2	**13:28**	**13:39**	**?**	**-**	13:34	13:38	15:24	3
5	**X1.1**	8	15:25	15:30	16:59	3	*15:21*	*15:27*	*16:01*	*2*	15:19	15:29	16:40	2+	**15:19**	**15:37**	**?**	**-**	15:25	15:36	17:31	3+
5	*	1													**16:17**	**16:25**	**16:39**	**1**				
5	**M1.0**	5	*18:00*	*18:02*	*18:09*	*1-*					17:59	18:04	18:16	1-	**17:59**	**18:02**	**18:28**	**1+**				
6	C4.9	1	*06:59*	*07:02*	*07:35*	*2*																
6	C8.1	8	11:30	11:36	12:28	2+	11:25	11:33	12:03	2	11:29	11:39	12:15	2+	11:30	11:40	12:10	2	11:33	11:44	12:27	2+
6	?	2													14:16	14:22	?	-	14:19	14:29	14:50	1+
6	C6.8	6	14:14	14:25	15:06	2+	14:10	14:18	14:55	2	14:13	14:23	14:59	2+	14:43	14:47	15:02	1				
6	?	1													***14:59***	***15:10***	***15:18***	***1***				
6	C5.8	6	16:14	16:16	16:29	1-	16:10	16:18	16:26	1-	16:12	16:19	16:56	2	16:14	16:18	16:30	1-	16:18	16:22	16:35	1-
6	*	1													18:26	18:27	18:40	1-				
7	*	1													10:11	10:13	10:22	1-				
7	C5.3	2									10:37	10:43	10:57	1	10:39	10:43	11:01	1				
7	C4.5	1													12:27	12:32	12:52	1				
7	**M4.5**	8	13:46	13:53	?	-					13:33	13:53	14:28	2+	13:35	13:49	14:10	2	13:40	13:58	15:06	3
7	*	4									15:02	15:09	15:51	2+	15:03	15:07	15:50	2+	15:06	15:17	16:58	3
7	*	1													17:15	17:23	17:31	1-				
7	**M5.0**	4	*18:39*	*18:51*	*19:17*	*2*					18:37	18:46	?	-	18:38	18:45	19:55	2+				
8	C7.7	7	08:27	08:31	08:54	1+	08:20	08:31	08:47	1+	08:27	08:34	08:59	1+	**08:27**	**08:35**	**09:00**	**2**	08:31	08:42	09:16	2
8	**M1.6**	8	11:30	11:42	?	-					11:29	11:44	12:08	2	11:31	11:42	?	-	11:35	11:50	13:04	3
8	*	2	12:08	12:10	?	-									12:06	12:17	?	-				
8	**M1.0**	5	12:58	13:01	?	-					12:58	13:03	13:28	1+	12:59	13:03	?	-	13:04	13:08	13:15	1-

8	?	1													13:13	13:18	?	-				
8	**M1.5**	7	13:41	13:44	14:33	2+					13:40	13:47	14:39	2+	13:41	13:44	14:18	2	13:44	13:54	14:51	2+
8	?	1													15:06	15:08	15:13	1-				
8	?	1													15:18	15:25	15:39	1				
8	C6.4	1													17:24	17:25	?	-				
8	C6.5	1													17:38	17:45	18:04	1+				
8	C6.1	1													18:43	18:45	19:02	1				
8	**X1.3**	3	*19:21*	*19:29*	*?*	-					19:17	19:26	19:37	1	19:17	19:37	19:55	2				
9	*	1													**07:31**	**07:38**	**07:50**	**1**				
9	?	1													***09:54***	***09:56***	***10:02***	***1-***				
9	**M1.2**	3	11:12	11:19	?	-									10:50	11:20	11:49	2+	10:51	11:25	12:05	2+
9	**M1.4**	7	11:59	12:06	?	-					11:58	12:08	12:23	1	11:59	12:09	?	-	12:05	12:14	12:29	1
9	?	1													12:23	12:35	?	-				
9	**M1.0**	2	12:40	12:46	?	-									12:40	12:44	?	-				
9	**M1.0**	2	12:58	13:01	?	-									12:54	13:00	?	-				
9	*	2	13:08	13:13	13:41	2									13:09	13:17	13:46	2				
9	*	1													13:57	14:04	14:13	1-				
9	C7.6	6	14:17	14:20	?	-	14:13	14:20	14:36	1	14:17	14:21	14:38	1	14:18	14:22	14:38	1	14:21	14:28	14:45	1
9	C7.5	5	14:42	14:45	?	-	14:39	14:44	15:07	1+	14:40	14:45	15:08	1+	14:41	14:48	15:27	2+				
9	C7.2	6	15:42	15:48	16:19	2	15:38	15:48	16:08	1+	15:43	15:49	16:07	1	15:44	15:51	16:06	1	15:44	15:58	16:34	2+
9	C7.1	2									17:45	17:49	18:06	1	17:47	17:50	17:57	1-				
9	**M1.0**	1													20:33	20:38	20:45	1-				
10	C8.9	3	*07:24*	*07:27*	*07:46*	*1*					07:23	07:30	07:44	1	***07:25***	***07:30***	***07:36***	***1-***				
10	C8.2	4	08:54	08:57	09:33	2	08:50	08:57	09:08	1-	08:52	09:01	09:51	2+	08:53	09:00	09:44	2+				
10	*	1													**09:07**	**09:14**	**09:26**	**1**				
10	C6.1	4	09:52	09:54	10:01	1-	09:48	09:55	10:04	1-	09:52	09:59	10:34	2	09:53	09:57	10:22	1+				
10	*	1													***10:59***	***11:04***	***11:20***	***1***				
10	*	2	11:31	11:34	11:45	1-									11:32	11:35	?	-				
10	*	2	11:58	12:03	12:14	1-									11:40	11:58	12:06	1+				
10	*	2													12:18	12:36	?	-	12:24	12:43	13:21	2+
10	?	1													12:53	12:58	13:05	1-				
10	?	1													13:43	13:50	14:03	1				
10	**M1.3**	5	14:16	14:25	?	-	14:08	14:27	15:08	2+	14:15	14:28	?	-	14:15	14:20	?	-	*14:22*	*14:39*	*15:17*	*2+*
10	**M1.2**	4	15:11	15:15	15:36	1	15:08	15:15	15:33	1	15:11	15:19	15:32	1	15:12	15:17	15:32	1				
10	?	1													16:40	16:43	16:51	1-				
10	C6.9	1													16:59	17:04	17:14	1-				
10	*	1													17:21	17:25	17:32	1-				
10	C9.8	2									19:51	19:57	?	-	19:52	19:57	20:10	1-				
11	**M1.6**	1	05:26	05:30	05:50	1																
11	*	1													11:57	11:59	12:06	1-				
11	*	1													***13:01***	***13:13***	***?***	***-***				
11	?	2									13:18	13:22	13:40	1	***13:18***	***13:27***	***14:32***	***2+***				
11	?	1													**13:41**	**13:44**	**13:58**	**1-**				
11	?	1													14:57	15:02	15:12	1-				
11	?	2									15:52	16:03	16:21	1+	15:51	16:02	16:24	2				
11	C5.0	2									16:50	16:56	17:03	1-	16:51	16:54	?	-				
11	?	1													17:01	17:08	17:28	1+				
11	C5.3	1													18:31	18:31	18:40	1-				
11	**M1.6**	1													20:07	20:14	20:37	1+				
12	**M1.0**	2	08:40	08:49	09:28	2+									**08:35**	**08:54**	**?**	**-**				
12	?	1													**09:03**	**09:16**	**09:42**	**2**				
12	*	1													10:52	11:05	11:19	1+				
12	*	1													***11:35***	***11:49***	***?***	***-***				
12	?	1													***12:01***	***12:13***	***12:18***	***1-***				
12	?	1													**12:57**	**12:59**	**?**	**-**				
12	C6.6	3	13:08	13:18	13:57	2+	13:04	13:15	13:28	1					**13:08**	**13:19**	**?**	**-**				
12	?	1													**13:24**	**13:26**	**13:47**	**1**				
13	*	1	05:51	05:57	06:07	1-																
13	C8.9	3	*07:14*	*07:15*	*?*	-					07:13	07:18	07:32	1	07:10	07:15	?	-				
13	C6.6	3	*07:34*	*07:39*	*07:50*	*1-*					07:34	07:38	07:52	1-	07:34	07:43	08:01	1+				
13	C7.3	4	*08:03*	*08:05*	*08:21*	*1-*	07:57	08:04	08:20	1	08:02	08:03	08:15	1-	**08:03**	**08:10**	**?**	**-**				
13	?	1													**08:18**	**08:29**	**08:54**	**2**				
13	C8.3	4	10:19	10:22	10:41	1	10:05	10:20	10:41	2					10:20	10:22	10:37	1-	10:14	10:30	11:07	2+
13	*	1													***11:02***	***11:08***	***?***	***-***				
13	?	1													***11:16***	***11:22***	***?***	***-***				
13	?	1													***11:35***	***11:46***	***?***	***-***				
13	?	1													***11:58***	***12:06***	***?***	***-***				
13	?	1													***12:11***	***12:32***	***?***	***-***				
13	*	1													***12:57***	***13:03***	***13:28***	***1+***				
13	?	1													13:43	14:10	14:28	2				
13	*	1													***14:31***	***14:34***	***14:45***	***1-***				
13	C6.0	2	*16:25*	*16:28*	*?*	-					16:22	16:28	?	-								
13	C7.3	4	*16:32*	*16:34*	*16:57*	*1*					16:32	16:36	16:50	1-	16:24	16:35	16:58	2	16:27	16:43	17:34	2+
13	**M1.0**	6	*17:28*	*17:30*	*18:06*	2					17:29	17:33	18:06	2	17:28	17:29	17:50	1	17:34	17:37	18:05	1+
13	C6.6	1													18:11	18:15	18:21	1-				
13	*	1													18:29	18:35	?	-				
14	**X1.1**	4	*06:11*	*06:42*	*07:17*	*2+*					06:11	06:46	?	-	06:14	06:49	07:38	2+	06:19	06:56	08:03	3
14	*	2									08:21	08:31	08:44	1	08:22	08:30	08:48	1+				
14	?	1													**10:57**	**11:04**	**?**	**-**				
14	*	1													**11:12**	**11:19**	**?**	**-**				
14	*	1													**11:27**	**11:34**	**11:43**	**1-**				
14	**M1.0**	5	13:21	13:26	14:07	2+	13:18	13:25	13:49	1+					**13:11**	**13:27**	**13:59**	**2+**	13:19	13:33	14:46	3
14	**M5.3**	7	15:46	15:51	17:05	2+	15:39	15:47	16:15	2	15:47	15:51	17:12	2+	15:48	15:53	16:08	1	15:52	15:57	17:36	3
14	*	1													***17:13***	***17:16***	***18:02***	***2+***				
14	C8.6	1													***18:00***	***18:07***	***18:31***	***1+***				
15	C5.7	2									09:08	09:14	09:38	1+	09:10	09:12	09:21	1-				
15	?	1													**11:32**	**11:35**	**11:41**	**1-**				
15	C7.7	5	11:49	11:53	12:03	1-					11:48	11:54	12:30	2	11:50	11:53	12:06	1-	11:55	11:59	13:10	2+
15	?	1													**12:05**	**12:09**	**12:25**	**1**				
15	*	1													13:52	13:56	?	-				
15	C5.5	5	14:04	14:09	14:37	2	14:03	14:10	14:35	1+	14:02	14:10	14:27	1	14:06	14:09	14:17	1-	14:00	14:19	14:55	2+
15	?	1													15:04	15:08	15:15	1-				
15	?	1													***17:17***	***17:28***	***17:49***	***1+***				
16	C6.7	6	10:00	10:03	10:15	1-	09:55	10:03	10:26	1+	09:58	10:08	10:39	2	10:02	10:07	10:14	1-	10:00	10:12	10:49	2+
16	?	1													**10:19**	**10:23**	**?**	**-**				
16	*	1													**10:42**	**10:50**	**11:24**	**2**				
16	?	1													11:45	11:46	?	-				
16	*	4	11:48	11:51	12:17	1+					11:48	11:53	12:20	1+	11:48	11:52	?	-				
16	?	1													12:07	12:08	?	-				
16	*	1													12:18	12:20	?	-				
16	?	1													12:36	12:43	?	-				
16	?	1													12:58	13:08	?	-				
16	**M1.3**	7	13:16	13:22	14:26	2+	13:14	13:26	13:57	2	13:16	13:26	14:01	2	13:16	13:25	13:48	1+	13:21	13:30	14:08	2+
16	*	1													***14:28***	***14:31***	***14:36***	***1-***				
16	?	1													***14:52***	***14:59***	***15:16***	***1***				

16	C8.1	5	15:38	15:42	?	-	15:36	15:43	16:04	1+	15:38	15:44	16:10	1+	15:40	15:46	16:00	1	15:46	15:51	16:05	1
17	*	1													***07:09***	***07:19***	***07:32***	***1***				
17	*	1													***09:21***	***09:44***	***?***	***-***				
17	*	1													***09:53***	***09:59***	***?***	***-***				
17	**M1.6**	6									10:29	10:38	11:14	2	***10:27***	***10:36***	***?***	***-***	10:32	10:42	11:32	2+
17	**M1.1**	4									11:25	11:33	?	-	***11:26***	***11:29***	***13:00***	***3***	11:32	11:51	12:17	2
17	*	2									11:38	11:44	12:02	1	11:41	11:45	12:11	1+				
17	*	1													***13:13***	***13:15***	***13:43***	***1+***				
18	**M1.2**	3	*07:22*	*07:32*	*07:57*	*2*									**07:28**	**07:45**	**08:00**	**1+**				
18	?	1													10:39	10:55	11:22	2				
18	*	1													**12:08**	**12:18**	**12:45**	**2**				
18	*	1													***13:00***	***13:06***	***13:17***	***1-***				
18	C5.0	1													13:19	13:26	13:53	2				
18	*	1													**13:40**	**13:55**	**14:21**	**2**				
18	C4.5	1													17:36	17:46	18:20	2				
19	**M1.3**	7	09:36	09:39	10:23	2+	09:28	09:36	10:14	2+	09:32	09:41	10:21	2+	09:33	09:42	10:02	1+	09:41	09:46	10:34	2+
19	C5.7	6	11:35	11:38	12:01	1+	11:31	11:37	11:48	1-	11:34	11:40	11:47	1-	**11:32**	**11:41**	**12:04**	**1+**	11:40	11:45	12:21	2
19	*	2					13:54	14:04	14:22	1+					**13:57**	**14:07**	**?**	**-**				
19	*	1													**14:26**	**14:43**	**15:12**	**2+**				
19	C4.4	2					15:45	15:51	16:09	1					**15:37**	**15:52**	**16:01**	**1**				
19	C7.1	5	*16:29*	*16:32*	*17:03*	*2*	16:22	16:30	16:58	2	16:27	16:34	16:59	1+	**16:27**	**16:42**	**16:56**	**1+**				
19	C5.1	1									17:12	17:23	17:37	1								
20	?	1													**11:27**	**11:42**	**12:12**	**2**				
20	C7.4	7	12:27	12:30	12:54	1+	12:21	12:27	13:08	2+	12:23	12:33	12:59	2	12:25	12:31	13:10	2	12:29	12:36	13:43	2+
20	C8.7	7	14:48	14:51	15:23	2	14:44	14:53	15:34	2+	14:48	14:56	15:59	2+	14:49	14:53	15:21	1+	14:52	15:00	16:35	3
20	*	1													16:38	16:42	16:51	1-				
20	**M1.3**	5	*17:09*	*17:10*	*17:40*	*1+*	17:06	17:08	17:26	1	17:08	17:13	17:22	1-	17:08	17:11	17:39	1+				
21	**M1.1**	1	*05:50*	*05:57*	*06:02*	*1-*																
21	C4.7	1													09:50	09:53	10:17	1+				
21	*	1													***11:36***	***11:39***	***11:58***	***1***				
21	*	1													12:33	12:39	13:11	2				
21	C3.8	2	14:27	14:29	14:37	1-									14:23	14:28	14:35	1-				
21	C8.8	5	16:35	16:37	16:50	1-	16:16	16:32	17:32	2+	16:13	16:40	17:23	2+	15:59	16:29	17:38	3				
22	C8.3	1	06:11	06:18	06:40	1+																
22	C5.6	1													***08:06***	***08:11***	***08:25***	***1***				
22	**M1.5**	9	10:36	10:41	11:48	2+	10:32	10:47	11:17	2	10:35	10:41	11:13	2	10:37	10:42	11:18	2	10:41	10:48	11:34	2+
22	?	1													11:47	11:53	12:02	1-				
22	C5.7	4	12:55	12:59	13:05	1-					12:57	13:00	13:21	1	12:56	13:06	?	-	13:02	13:08	13:28	1+
22	*	1													13:16	13:28	13:43	1+				
22	C7.8	5	15:27	15:31	16:10	2	15:22	15:31	16:43	2+					15:27	15:32	16:11	2	15:34	15:39	16:54	2+
22	C3.9	1													18:50	18:53	19:07	1-				
23	C5.2	1	05:21	05:42	06:24	2+																
23	C7.6	2	*06:21*	*06:26*	*?*	-									***06:20***	***06:26***	***06:35***	***1-***				
23	C7.4	1	*07:16*	*07:22*	*07:59*	*2*																
23	C4.9	2					08:21	08:37	08:53	1+					***08:27***	***08:37***	***08:50***	***1***				
23	C9.5	5	10:09	10:20	10:41	1+	09:47	10:23	11:11	2+					09:54	10:27	11:01	2+	09:52	10:35	11:22	3
23	C4.4	3					11:55	12:01	12:26	1+	11:55	12:02	12:16	1	11:56	12:02	12:21	1				
23	C4.8	3	12:34	12:39	12:45	1-					12:35	12:39	12:54	1	12:36	12:40	?	-				
23	C6.2	2	12:54	13:03	13:12	1-									12:48	13:05	13:35	2+				
23	**M1.7**	8	13:56	13:59	14:42	2+	13:52	13:58	14:41	2+	13:54	14:04	14:44	2+	13:54	13:58	14:29	2	14:02	14:10	15:03	2+
23	**M1.7**	8	14:59	15:04	15:29	1+	14:51	15:03	16:02	2+	14:56	15:07	16:02	2+	14:57	15:03	?	-	15:03	15:14	16:10	2+
23	*	1													15:23	15:27	15:39	1-				
23	*	2									16:09	16:14	?	-	16:08	16:15	?	-				
23	*	4					16:16	16:20	16:28	1-	16:18	16:24	?	-	16:19	16:23	?	-				
23	**M1.1**	7	*16:38*	*16:42*	*17:17*	*2*	16:36	16:45	17:26	2+	16:35	16:48	17:44	2+	16:35	16:48	17:36	2+	16:41	16:56	17:32	2+
23	*	1													17:44	17:51	18:03	1				
23	**M1.1**	2									19:29	19:35	?	-	19:29	19:34	?	-				
23	**M3.4**	2									19:41	19:46	?	-	19:40	19:43	?	-				
23	**M5.1**	2									20:10	20:15	?	-	20:10	20:14	20:48	2				
24	C6.8	7	09:01	09:04	?	-	08:49	09:03	09:24	2					*08:55*	*09:10*	*?*	-	08:53	09:17	09:33	2
24	C6.6	5	09:25	09:30	?	-	09:25	09:28	09:38	1-					*09:27*	*09:29*	*09:51*	*1*	09:33	09:35	09:59	1+
24	C3.8	2					13:33	13:38	13:42	1-					13:37	13:40	?	-				
24	C4.4	2					13:44	13:48	13:54	1-					13:45	13:51	?	-				
24	C3.6	1													14:07	14:14	?	-				
24	*	1													14:23	14:34	14:52	1+				
24	C4.6	1													16:49	16:54	17:17	1+				
24	**M1.0**	1													18:55	18:59	?	-				
24	**M1.4**	1													19:20	19:25	19:53	2				
25	C7.1	2	*06:51*	*06:55*	*07:17*	*1+*									**06:50**	**06:55**	**07:03**	**1-**				
25	?	1													09:58	09:59	?	-				
25	C4.6	3					10:01	10:07	10:19	1-					10:05	10:11	?	-	10:05	10:30	11:15	2+
25	?	1													10:18	10:22	10:44	1+				
25	C3.3	3					12:10	12:19	12:32	1					12:17	12:25	12:37	1	12:16	12:35	13:04	2+
25	C3.7	5					15:17	15:26	15:46	1+	15:19	15:24	15:49	1+	15:22	15:26	15:52	1+	15:23	15:33	15:54	1+
25	C4.1	3					16:28	16:32	16:45	1-	16:30	16:35	16:42	1-	16:31	16:36	16:47	1-				
25	C5.8	2	*17:30*	*17:35*	*17:55*	*1*									17:31	17:41	18:02	1+				
26	C9.0	9	10:59	11:04	?	-	10:53	11:02	11:12	1	10:57	11:06	?	-	10:59	11:06	?	-	11:04	11:11	11:41	2
26	**M1.4**	8	11:35	11:41	12:39	2+					11:34	11:42	12:38	2+	*11:35*	*11:44*	*?*	-	11:41	11:52	12:52	2+
26	C5.5	2	12:54	12:55	13:11	1-									*12:52*	*13:05*	*13:37*	*2*				
27	C9.9	6	08:07	08:11	08:20	1-					08:06	08:12	08:54	2+	*08:07*	*08:14*	*?*	-				
27	?	1													*08:25*	*08:34*	*08:58*	*2*				
27	**M1.1**	3	09:35	09:43	10:44	2+									09:24	09:48	10:24	2+				
27	C4.5	2									12:37	12:41	12:59	1	12:40	12:43	13:05	1				
27	C5.0	5	15:37	15:40	?	-	15:26	15:42	15:55	1+	15:36	15:41	?	-	15:37	15:41	?	-				
27	?	2									15:44	15:47	16:02	1-	15:45	15:51	15:56	1-				
27	?	1													16:13	16:15	16:20	1-				
28	C5.0	3					14:54	14:59	15:09	1-	14:54	15:00	15:13	1	14:57	15:01	15:18	1				
28	C6.9	1													18:02	18:06	18:33	1+				
28	C5.3	1													18:55	19:02	19:16	1				
29	C5.3	7	*15:30*	*15:36*	*16:00*	*1+*	15:21	15:36	16:04	2	15:22	15:34	16:01	2	15:22	15:35	16:08	2+	15:16	15:45	16:45	3
30	C7.2	5	*08:51*	*08:54*	*?*	-	08:46	08:55	09:35	2+	08:49	08:57	09:38	2+	*08:50*	*08:58*	*?*	-				
30	C6.1	2	*09:05*	*09:08*	*09:21*	*1-*									*09:01*	*09:08*	*09:36*	*2*				
30	**M3.8**	9	12:18	12:24	13:37	2+	12:15	12:22	12:48	2	12:19	12:24	14:24	3	12:18	12:20	?	-	12:24	12:30	15:17	3+
30	C6.3	1													12:50	12:55	14:13	2+				
30	C5.5	3					15:05	15:17	15:25	1	15:09	15:18	15:28	1	15:10	15:19	?	-				
30	C6.9	4	*15:34*	*15:41*	*16:14*	*2*	15:27	15:37	15:48	1	15:34	15:39	15:51	1-	15:31	15:39	16:10	2				
30	C5.1	2									17:46	17:52	18:06	1	17:47	17:53	18:07	1				
31	**M1.2**	9	08:53	08:59	10:08	2+	08:50	08:56	09:29	2	08:52	09:03	09:54	2+	08:48	09:03	10:11	2+	09:00	09:10	10:16	2+
31	C9.0	8	11:41	11:46	12:18	2	11:37	11:44	12:15	2	11:42	11:46	12:14	1+	11:41	11:51	12:16	2	11:47	11:55	12:35	2+
31	**M1.8**	8	12:57	13:03	13:58	2+	12:35	13:10	14:02	3	12:55	13:06	13:45	2+	12:39	13:00	13:40	2+	13:02	13:12	14:54	3
31	*	3					14:47	14:58	15:24	2	14:49	14:59	15:27	2	14:50	15:01	15:17	1+				
31	C7.3	3	*17:45*	*17:49*	*17:59*	*1-*					17:45	17:54	18:22	2	17:46	17:58	18:21	2				

BAA Radio Astronomy Section. **2024 AUGUST.**

	Xray class		Steve Parkinson (Various) Tuned radio frequency receiver, frame aerials.				Andrew Thomas (21.7kHz/*19.6kHz*) Tuned radio frequency receiver, 0.6m frame aerial.				Phil Rourke (23.4kHz) Spectrum Lab, 0.6m frame aerial.				Mark Prescott (21.75kHz) SpectrumLab/Starbase, Active mini-whip aerial.				John Elliott (19.6kHz/*21.7kHz*) 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	**M4.0**																					
1	**M1.5**																					
1	**M8.2**		06:30	07:13	08:10	3									06:53	07:18	08:55	3	06:50	07:15	09:10	3+
1	*																					
1	*																					
1	?																					
1	*																					
1	**M4.1**																					
1	?																					
1	?		11:13	11:40	13:18	3					11:13	12:13	?	-	11:15	11:48	13:48	3+	11:10	11:45	13:15	3
1	?										?	12:18	13:13	-								
1	*																					
1	*																					
1	*																					
1	*																					
1	*														14:35	14:46	?	-				
1	C8.8		15:14	15:18	15:40	1+									15:17	15:20	?	-				
1	*																					
1	?																					
1	**M1.0**																					
1	**M1.3**		16:35	16:42	17:00	1									16:39	16:43	?	-				
1	?														?	16:52	17:00	-				
1	*																					
1	**M1.3**		17:28	17:33	18:00	1+																
1	C8.5																					
1	**M1.2**																					
2	*																					
2	*																					
2	**M2.1**		07:58	08:01	08:50	2+									08:02	08:09	08:23	1	07:58	08:03	09:05	2+
2	*																					
2	**M1.2**		09:13	09:20	?	-					09:17	09:20	09:40	1	09:18	09:28	?	-	09:12	09:25	?	-
2	*																					
2	**M1.6**		09:50	09:53	10:10	1					09:46	09:53	10:12	1+	09:54	09:57	10:29	2	09:45	09:53	10:15	1+
2	?																					
2	?																					
2	C8.9																					
2	*																					
2	*																					
2	**M1.2**		12:32	12:37	12:57	1									12:35	12:41	12:57	1	12:30	12:37	?	-
2	C9.9																					
2	?																					
2	**M1.1**		13:47	13:56	14:25	2									13:51	14:00	?	-	13:47	13:55	14:25	2
2	?																					
2	**M1.5**		15:27	15:31	15:50	1									15:32	15:37	?	-	15:27	15:33	15:55	1+
2	C8.6		16:17	16:22	16:40	1																
2	C6.1																					
2	C8.2																					
3	**M1.9**		06:55	07:06	08:20	2+									07:01	07:31	08:15	2+	06:55	07:20	08:45	3
3	*																					
3	C6.6		10:30	10:37	11:00	1+																
3	C4.6		12:28	12:31	12:50	1													12:28	12:30	12:50	1
3	**M1.8**		13:32	13:45	14:10	2					13:14	13:46	14:13	2+	13:36	13:48	14:41	2+	13:10	13:45	14:45	3
3	*																					
3	*																					
3	C6.6																					
3	?																					
3	**M2.8**		16:53	16:57	?	-									16:57	17:00	?	-	16:53	?	?	-
3	**M1.9**		17:23	17:27	17:45	1																
3	?																					
3	**M7.3**		18:37	18:41	19:10	2									18:41	18:44	19:03	1				
3	**M5.4**																					
4	C5.6																					
4	?																					
4	C5.7																					
4	?																					
4	**M1.1**		09:41	09:45	11:45	3									09:46	09:48	?	-	09:40	09:45	12:20	3+
4	**M1.4**														?	10:14	?	-				
4	**M1.9**										10:23	10:49	11:47	2+	10:33	10:52	12:02	3				
4	*																					
4	*																					
4	C8.5		13:15	13:25	13:50	2									13:18	13:32	13:52	2				
4	?																					
4	C6.1																					
4	**M2.2**		15:13	15:17	15:50	2					15:13	15:17	15:55	2	15:17	15:21	16:05	2+	15:13	15:18	16:02	2+
5	**M6.1**																		05:20	05:25	05:30	1-
5	**M1.7**		09:57	10:05	11:15	2+					09:58	10:04	11:27	3	10:00	10:09	10:55	2+				
5	**X1.7**		13:28	13:40	?	-					13:28	13:38	15:10	3	13:31	13:45	15:16	3				
5	**X1.1**		15:25	15:30	17:00	3					15:24	15:30	16:49	2+	15:27	15:34	16:19	2+				
5	*																					
5	**M1.0**		17:59	18:05	18:24	1									18:01	18:06	18:21	1				
6	C4.9																					
6	C8.1		11:28	11:35	12:25	2+					11:32	11:39	12:10	2	11:34	11:42	12:27	2+				
6	?																					
6	C6.8		14:14	14:21	14:54	2									14:18	14:27	15:10	2+				
6	?																					
6	C5.8		16:13	16:17	16:39	1+																
6	*																					
7	*																					
7	C5.3																					
7	C4.5																					
7	**M4.5**		13:37	13:54	15:00	2+					13:46	13:52	15:09	2+	13:30	13:58	14:42	2+	*13:45*	*13:53*	*15:00*	*2+*
7	*		15:03	15:10	15:42	2																
7	*																					
7	**M5.0**		18:40	18:56	19:20	2																
8	C7.7		08:27	08:32	08:50	1									08:31	08:41	?	-				
8	**M1.6**		11:31	11:43	12:48	2+					11:31	11:42	12:08	2	11:36	11:47	12:13	2	*11:30*	*11:40*	*12:30*	*2+*
8	*																					
8	**M1.0**														13:02	13:05	?	-				
8	?																					

8	**M1.5**		13:41	13:47	14:10	1+			13:40	13:46	14:35	2+	13:44	13:51	14:21	2							
8	?																						
8	?																						
8	C6.4																						
8	C6.5																						
8	C6.1																						
8	**X1.3**																						
9	*																						
9	?																						
9	**M1.2**																						
9	**M1.4**		11:59	12:08	13:00	2+			12:01	12:07	12:20	1	12:04	12:11	12:25	1							
9	?																						
9	**M1.0**																						
9	**M1.0**																						
9	*																						
9	*																						
9	C7.6		14:17	14:21	14:30	1-																	
9	C7.5		14:41	14:45	15:00	1																	
9	C7.2		15:42	15:50	16:06	1																	
9	C7.1																						
9	**M1.0**																						
10	C8.9																						
10	C8.2																						
10	*																						
10	C6.1																						
10	*																						
10	*																						
10	*																						
10	*																						
10	?																						
10	?																						
10	**M1.3**																						
10	**M1.2**																						
10	?																						
10	C6.9																						
10	*																						
10	C9.8																						
11	**M1.6**																						
11	*																						
11	*																						
11	?																						
11	?																						
11	?																						
11	?																						
11	C5.0																						
11	?																						
11	C5.3																						
11	**M1.6**																						
12	**M1.0**																						
12	?																						
12	*																						
12	*																						
12	?																						
12	?																						
12	C6.6																						
12	?																						
13	*																						
13	C8.9																						
13	C6.6																						
13	C7.3																						
13	?																						
13	C8.3																						
13	*																						
13	?																						
13	?																						
13	?																						
13	?																						
13	*																						
13	?																						
13	*																						
13	C6.0																						
13	C7.3																						
13	**M1.0**		17:28	17:33	18:08	2							17:31	17:34	18:05	2							
13	C6.6																						
13	*																						
14	**X1.1**																						
14	*																						
14	?																						
14	*																						
14	*																						
14	**M1.0**												13:24	13:29	14:05	2							
14	**M5.3**		15:46	15:54	17:06	2+							15:23	15:55	16:28	2+							
14	*																						
14	C8.6																						
15	C5.7																						
15	?																						
15	C7.7												11:52	11:59	12:45	2+							
15	?																						
15	*																						
15	C5.5																						
15	?																						
15	?																						
16	C6.7												10:03	10:11	10:25	1							
16	?																						
16	*																						
16	?																						
16	*												11:52	11:59	?	-							
16	?																						
16	*																						
16	?																						
16	?																						
16	**M1.3**												13:22	13:28	14:12	2+	*13:18*	*13:37*	*14:00*	*2*			
16	*																						
16	?																						
16	C8.1																						

17	*																						
17	*																						
17	*																						
17	**M1.6**		10:27	10:34	11:26	2+							10:32	10:38	?	-	*10:28*	*10:40*	*11:20*	*2+*			
17	**M1.1**												11:30	11:48	12:30	2+							
17	*																						
17	*																						
18	**M1.2**		07:22	07:37	08:35	2+																	
18	?																						
18	*																						
18	*																						
18	C5.0																						
18	*																						
18	C4.5																						
19	**M1.3**		09:35	09:37	10:10	2							09:39	09:44	10:22	2							
19	C5.7												11:38	11:43	12:16	2							
19	*																						
19	*																						
19	C4.4																						
19	C7.1		16:28	16:32	16:57	1+																	
19	C5.1																						
20	?																						
20	C7.4												12:28	12:33	13:08	2							
20	C8.7		14:47	14:52	15:30	2					12:22	12:29	12:50	1+	14:52	14:59	15:25	2					
20	*																						
20	**M1.3**		17:08	17:11	17:30	1																	
21	**M1.1**																						
21	C4.7																						
21	*																						
21	*																						
21	C3.8																						
21	C8.8		16:18	16:34	17:20	2+																	
22	C8.3																						
22	C5.6																						
22	**M1.5**		10:36	10:41	11:30	2+					10:37	10:42	11:41	2+	10:40	10:44	11:30	2+	*10:37*	*10:40*	*11:30*	*2+*	
22	?																						
22	C5.7																						
22	*																						
22	C7.8		15:27	15:31	16:05	2																	
22	C3.9																						
23	C5.2																						
23	C7.6																						
23	C7.4																						
23	C4.9																						
23	C9.5										09:54	10:25	11:21	3									
23	C4.4																						
23	C4.8																						
23	C6.2																						
23	**M1.7**		13:55	14:03	14:45	2+									13:59	14:08	14:45	2+	*13:55*	*14:10*	*14:55*	*2+*	
23	**M1.7**		14:57	15:07	15:40	2									15:03	15:10	16:05	2+	*14:58*	*15:08*	*15:50*	*2+*	
23	*																						
23	*																						
23	*		16:19	16:22	?	-																	
23	**M1.1**		16:37	16:47	17:20	2													*16:40*	*16:50*	*17:15*	*2*	
23	*																						
23	**M1.1**																						
23	**M3.4**																						
23	**M5.1**																						
24	C6.8		08:56	09:09	09:50	2+									09:02	09:12	?	-	08:50	09:10	?	-	
24	C6.6																		09:27	09:29	10:10	2	
24	C3.8																						
24	C4.4																						
24	C3.6																						
24	*																						
24	C4.6																						
24	**M1.0**																						
24	**M1.4**																						
25	C7.1																						
25	?																						
25	C4.6																						
25	?																						
25	C3.3																						
25	C3.7		15:21	15:26	15:45	1																	
25	C4.1																						
25	C5.8																						
26	C9.0		10:59	11:05	11:20	1					11:00	11:06	11:27	1+	11:03	11:09	?	-	10:58	11:05	?	-	
26	**M1.4**		11:36	11:46	12:10	2					11:35	11:45	12:34	2+	11:39	11:46	12:45	2+	11:35	11:45	12:50	2+	
26	C5.5																						
27	C9.9		08:07	08:13	08:58	2+					08:09	08:13	08:24	1-					08:07	08:12	?	-	
27	?																						
27	**M1.1**										09:26	09:45	10:14	2+									
27	C4.5																						
27	C5.0		15:37	15:48	16:21	2																	
27	?																						
27	?																						
28	C5.0																						
28	C6.9																						
28	C5.3																						
29	C5.3		15:26	15:35	16:05	2													15:23	15:38	16:10	2+	
30	C7.2		08:51	08:57	09:40	2+																	
30	C6.1																						
30	**M3.8**		12:18	12:24	14:00	3					12:18	12:24	13:43	2+	12:22	12:26	13:30	2+	12:17	12:23	13:59	3	
30	C6.3																						
30	C5.5																						
30	C6.9																						
30	C5.1																						
31	**M1.2**		08:54	09:02	09:30	2					08:52	09:01	10:09	2+	08:58	09:04	10:05	2+	08:54	09:03	10:03	2+	
31	C9.0		11:42	11:47	12:15	2					11:41	11:48	12:16	2	11:45	11:50	12:30	2					
31	**M1.8**		12:57	13:06	13:30	2					12:57	13:05	13:38	2	13:01	13:08	13:50	2+					
31	*																						
31	C7.3																						