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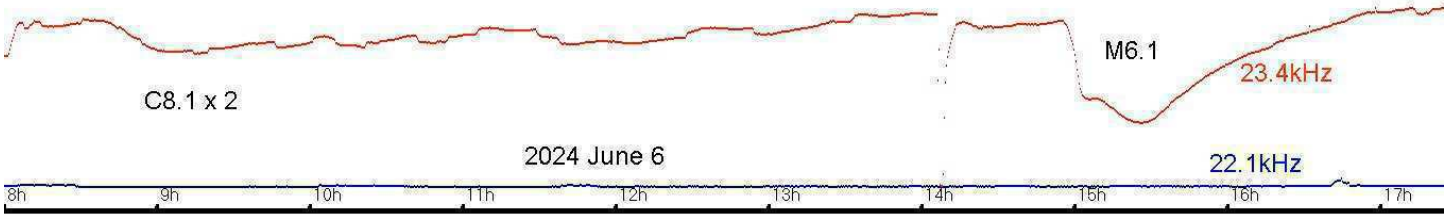
BAA Radio Astronomy Section. Director Paul Hearn.

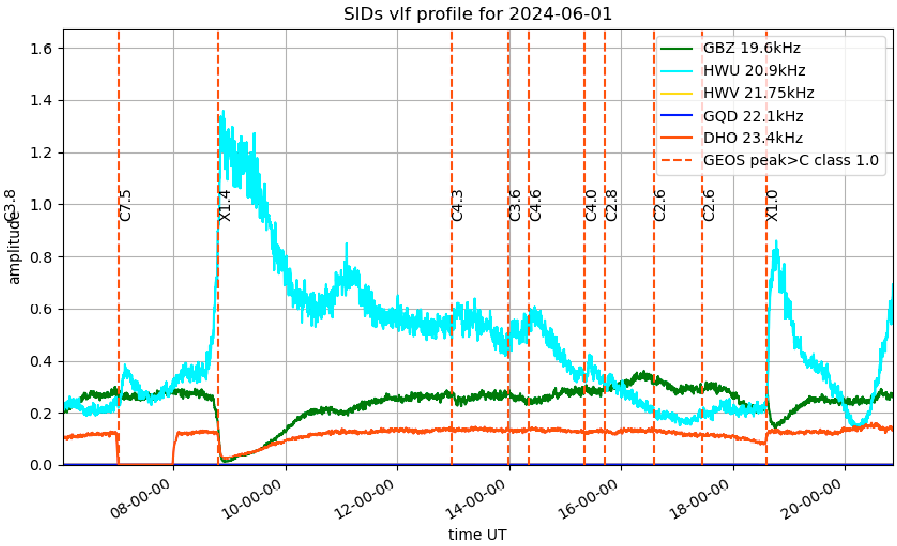
RADIO SKY NEWS 2024 JUNE.

VLF SID OBSERVATIONS.

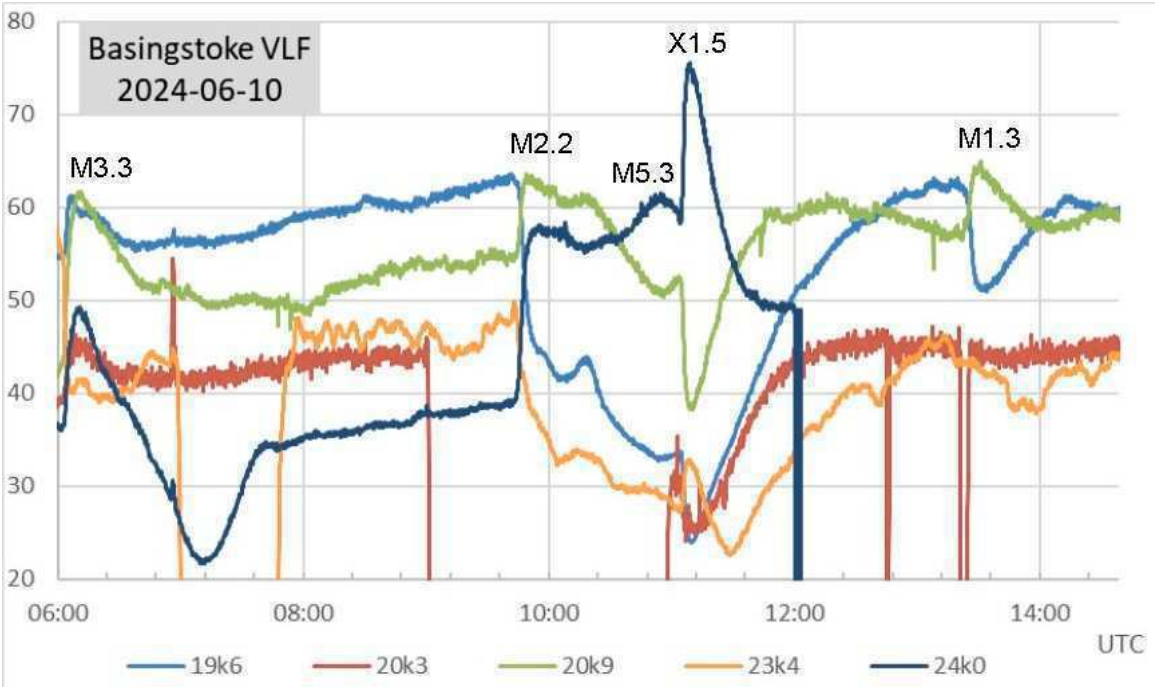
The total number of classified SIDs in June was slightly lower that in May, 161 compared with 178. They were also dominated this time by C-class flares, the number of X-flares reduced from 16 to just 3. That has not made analysis any easier, as there were some more simultaneous flares as well as many that overlapped. This has affected the allocation of some SIDs with their source flares, particularly where the overlapping is so tight that a single SID has been produced. During June the sun reaches its highest daytime altitude in the northern hemisphere, giving the longest day length and the opportunity to record more of the solar activity.



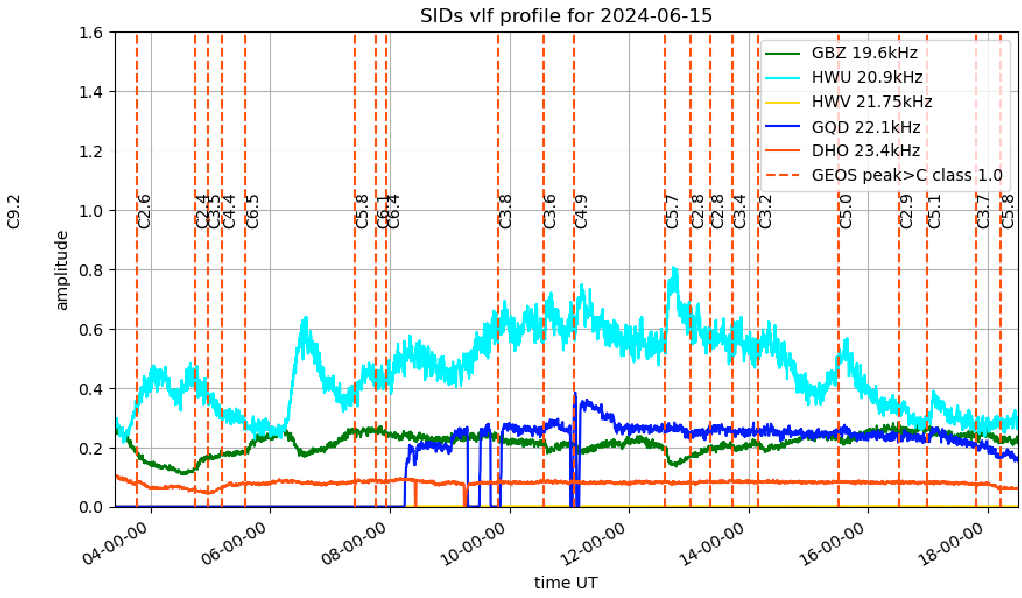
This is my own recording from the 6th showing the double C8.1 flare, X-ray flux peaks listed at 08:50 and 08:58 in the SWPC data. They were both from the same active region, AR13697. There are some non-solar disturbances in the 23.4kHz signal, but it does show a single SID with quite a long recovery time, 22.1kHz was off at the time. The chart also shows the later M6.1 flare with a small 'spike and wave' response.



This recording from Mark Prescott shows the two X-flares on the 1st, continuing the strong activity at the end of May. It also highlights the longer summer recording period, the X1.0 flare peaking at about 18:40UT. The 20.9kHz signal responds very strongly to the activity, 19.6kHz showing a smaller response to both of the X-flares. The unclassified flare at about 11:00 has also produced a small SID on both of these signals.

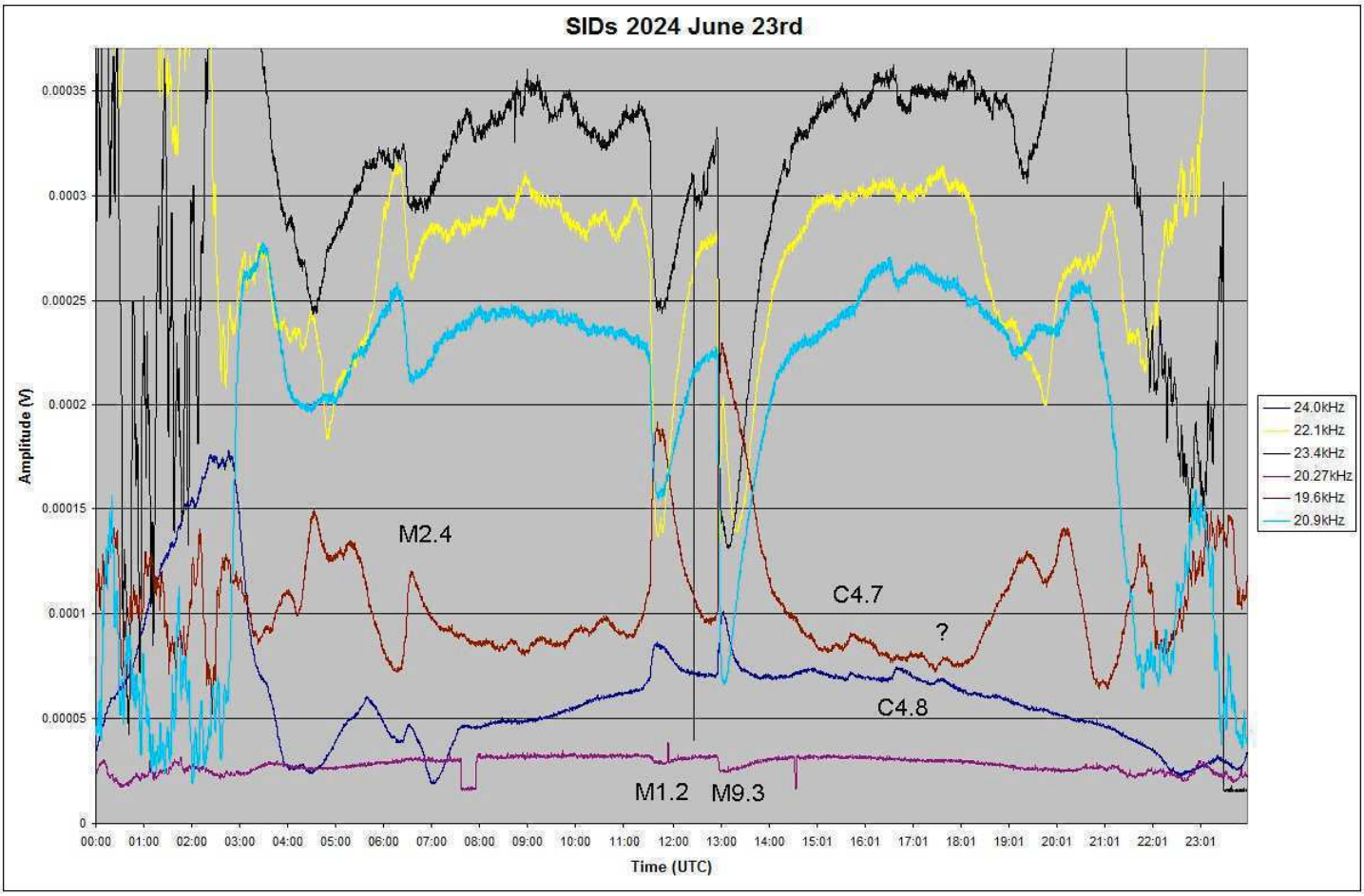


Paul Hyde's recording from the 10th shows one of the more complex days to analyse. The flares between 09:30 and 12:00 have merged into a single 'SID', the 24kHz signal went off-air at 12:00, leaving the decay period after the peaks incomplete. 20.3kHz also has a break during this period. The combination of 19.6 and 20.9kHz are easier to follow, with mirror image SIDs during the day. They do both show the same response to the M3.3 flare just after 06UT, probably because it is so close to the different sunrise times over these north and south paths.



The flare strength reduced through the middle of June, although the number of flares remained very high. This recording by Mark Prescott from the 15th shows another very difficult set of SIDs to untangle. There was an M1.3 flare about 06:30 in the morning, but not labelled on the chart. 23.4kHz has remained very unresponsive, 20.9kHz showing most of the activity.

Flare strengths increased again later in June, shown in Mark Edwards' recording from the 23rd:

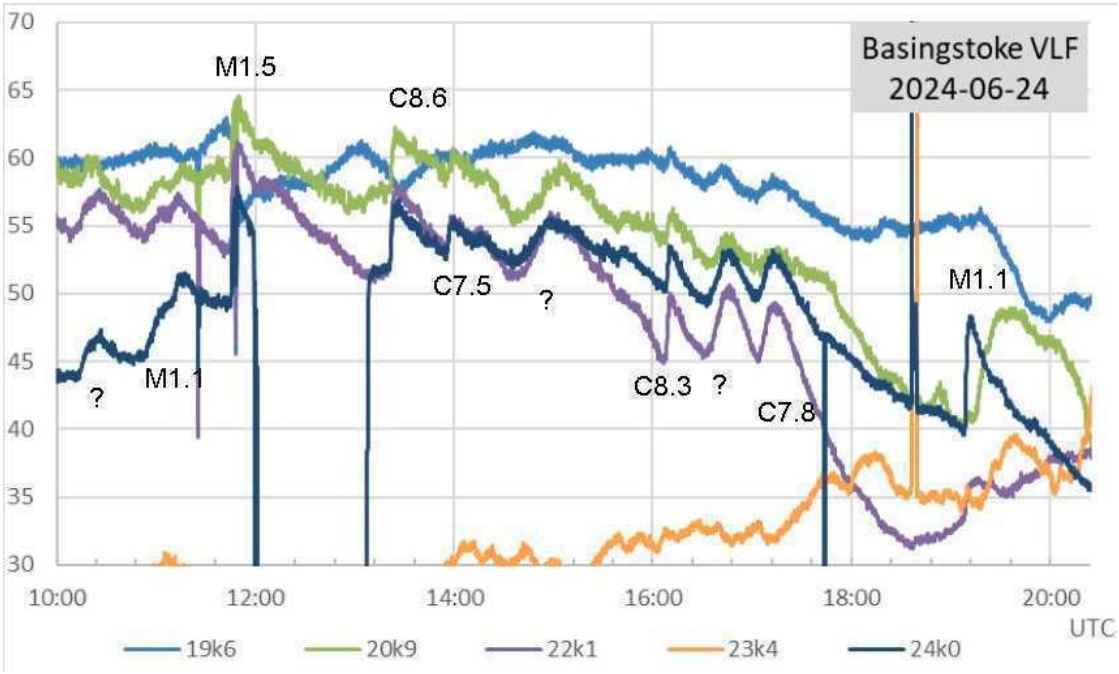


The M9.3 flare peaking at 13:09UT just missed the X-category, and produced some very large SIDs. All signals seem to show the simple 'sharks-fin' shape, although 23.4kHz has been distorted slightly by a large negative spike around 12:30.

Four flares within 35 minutes on the 20th have made analysis difficult. The SWPC bulletin lists their peak times as follows:

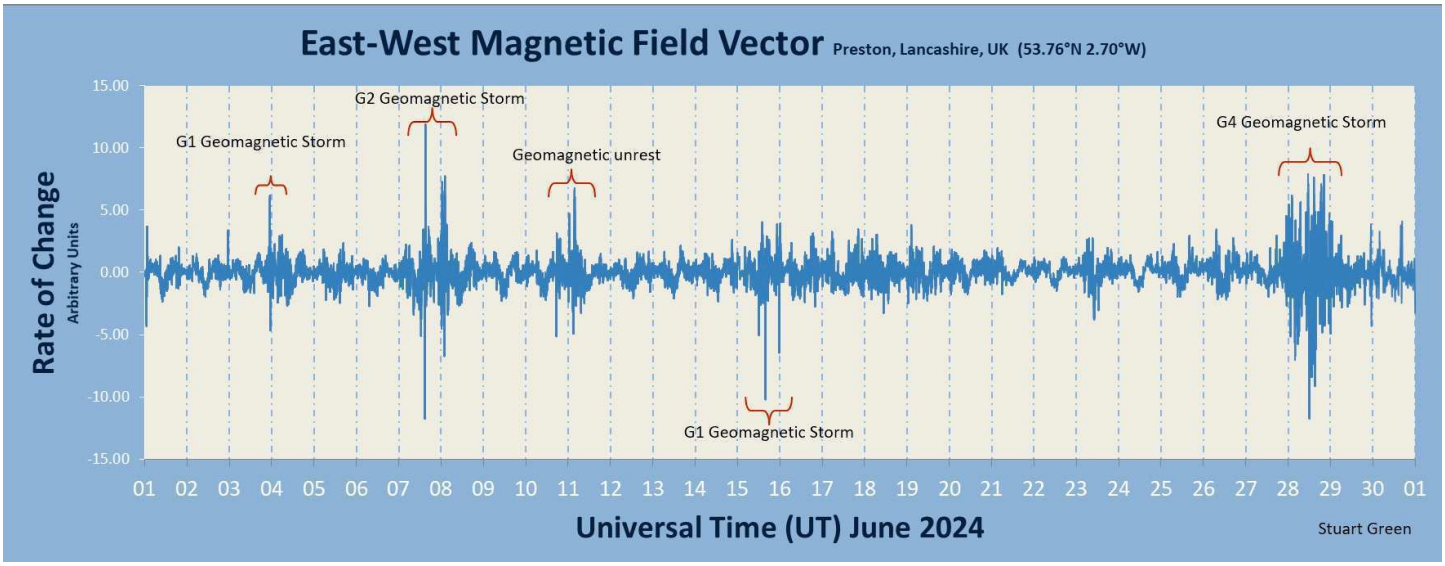
Unclassified: 15:00
M1.1 15:18
Unclassified: 15:35
C8.2 15:15

They are listed in the order of their start times. The M1.1 flare seems to have produced a clean SID, but the SID timings for the C8.2 seem to show the combined effect of the C8.2 and previous unclassified flare. Our timings are all around 16:00UT, probably due to the long decay time of the unclassified flare.

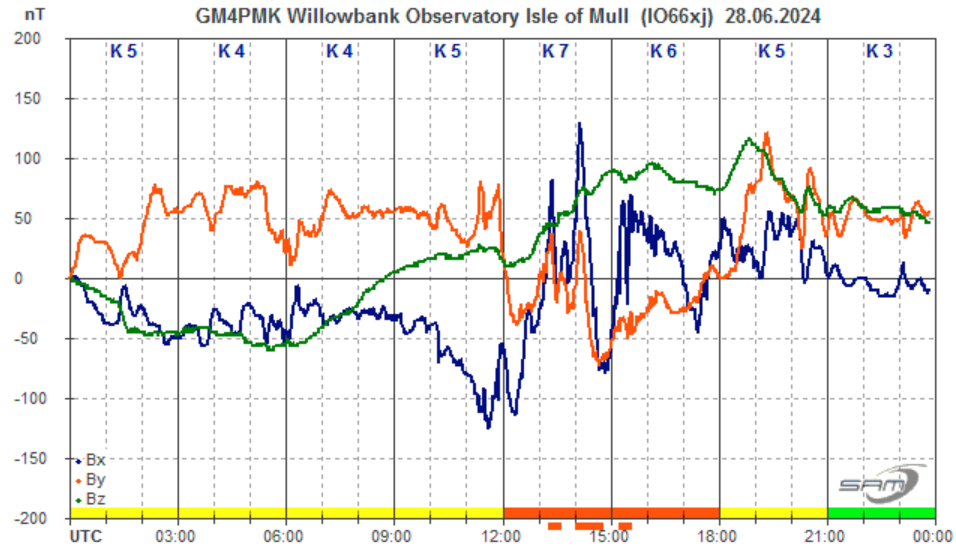


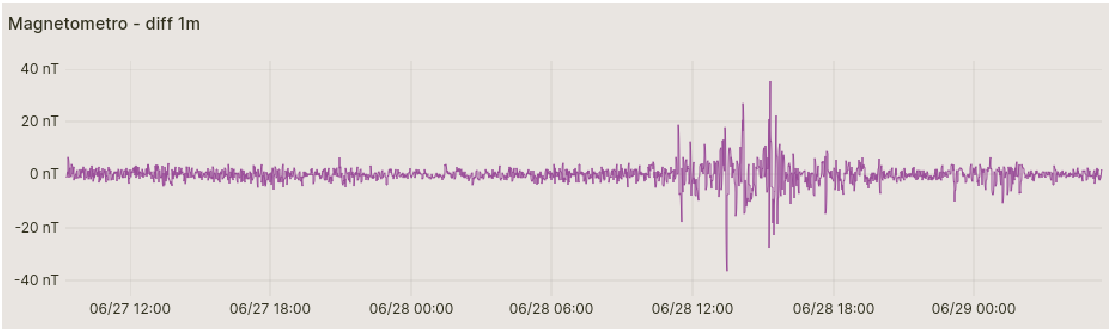
Paul Hyde's recording from the 24th shows more of these unclassified events along with some stronger flares. The SID from the M1.5 flare at midday has a long decay time, including a small secondary peak. The C8.3 peaking at about 16:15 is followed by two more in just over an hour. 24kHz also shows a strong SID from the M1.1 flare just after 19:00.

MAGNETIC OBSERVATIONS.

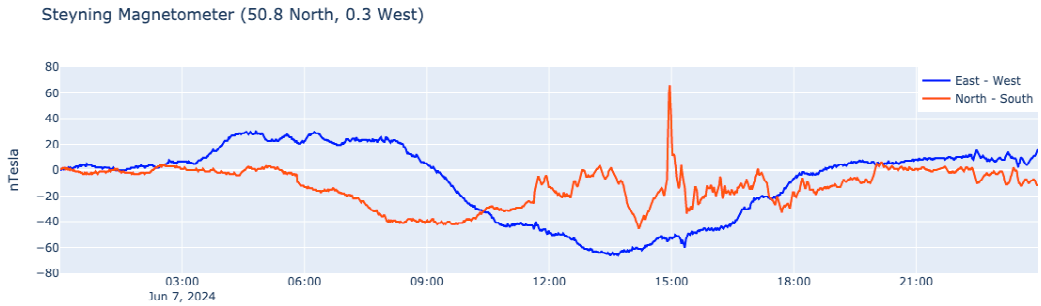


Stuart Green's monthly summary of magnetic activity shows several periods of mild disturbance in the first half of June, along with a much stronger disturbance on the 28th. The background also shows some very mild activity between these events. Many of the strong flares recorded had associated CMEs, but most seem to have been fairly weak or not Earth-directed. The solar wind was also reported as being quite turbulent at times, with some minor coronal holes reported in the STCE bulletin. The most active period shown in our recordings was on the 28th, the effects of several CMEs combining to produce the G4 magnetic storm. Roger Blackwell's recording shows the activity recorded from Mull:

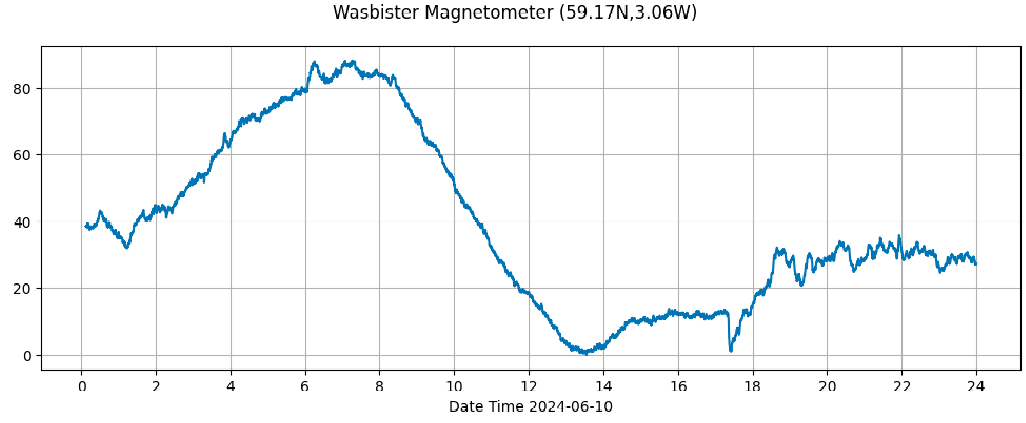




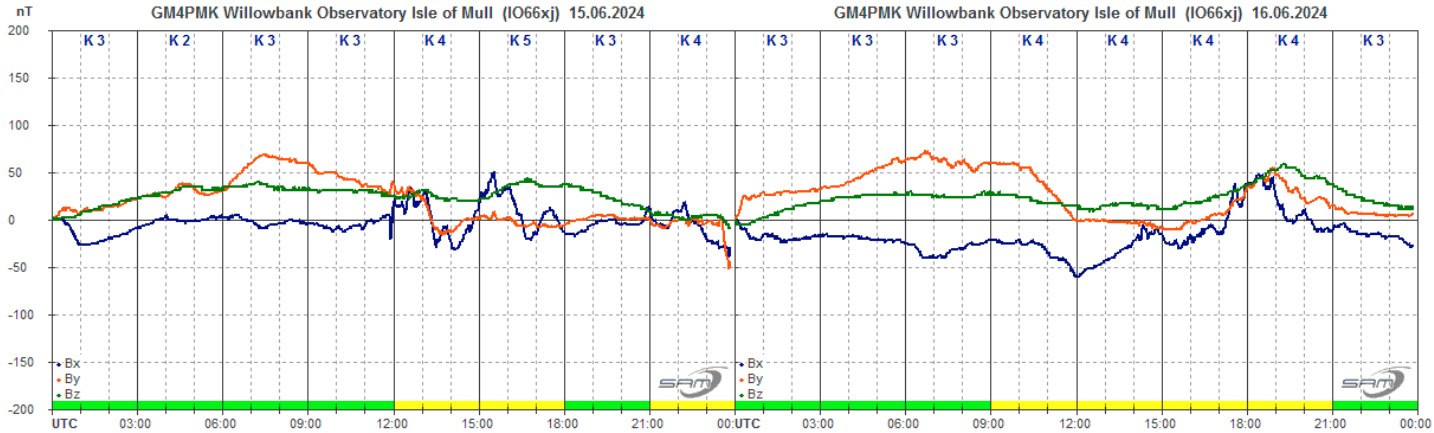
Thomas Mazzi's recording from Renazzo, Italy shows the strongest part of the activity during the afternoon. Mild activity is also present in the early morning of the 29th, but the 27th was very quiet.



Nick Quinn's recording on the 7th shows a very strong spike at 15UT, a feature also seen in recordings from Callum Potter and Roger Blackwell, and so not transient interference. It looks like a CME impact, although I cannot identify a source. There were plenty of strong flares in the preceding days.

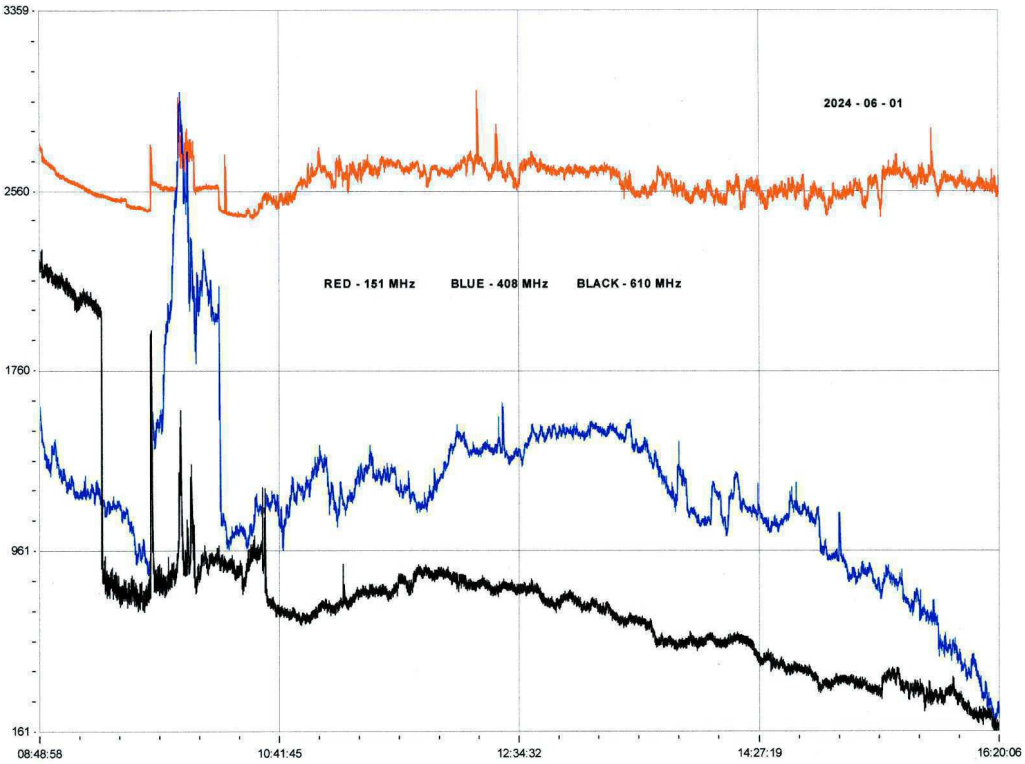


Another possible CME impact is seen at about 17:30 in Callum Potter's recording from June 10th. It is also evident in other recordings, and so is genuine. The resulting disturbance was very mild, fading out by 06UT the following morning. Mild activity started again on the 15th, with another potential impact at 12UT, shown in Roger Blackwell's recording. This continued right through to the 19th followed by another quiet period before the storm on the 28th.

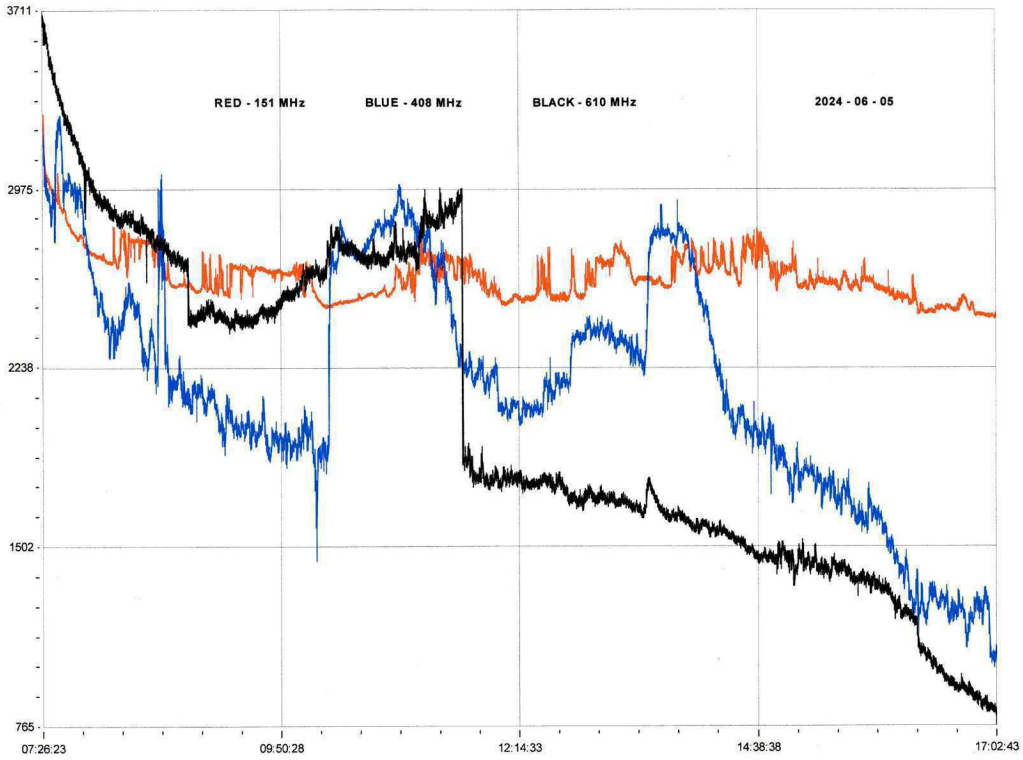


Magnetic observations received from Roger Blackwell, Thomas Mazzi, Callum Potter, Nick Quinn and John Cook.

SOLAR EMISSIONS

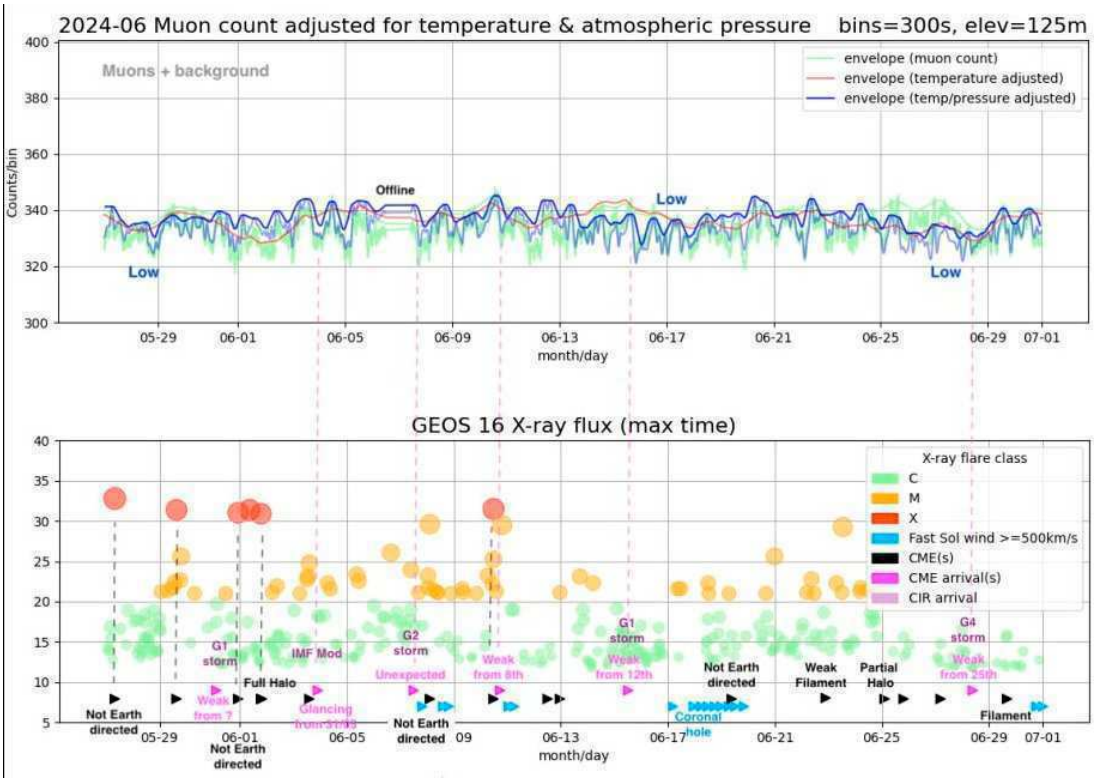


The X1.4 flare recorded on June 1st has produced a significant 408MHz noise burst, recorded by Colin Clements. 151MHz and 610MHz also show smaller bursts. The numerous smaller flares through the middle of the day seem to have produced a generally high noise level on 408MHz and 610MHz, while 151MHz again shows a similar pattern, but with much less amplitude.

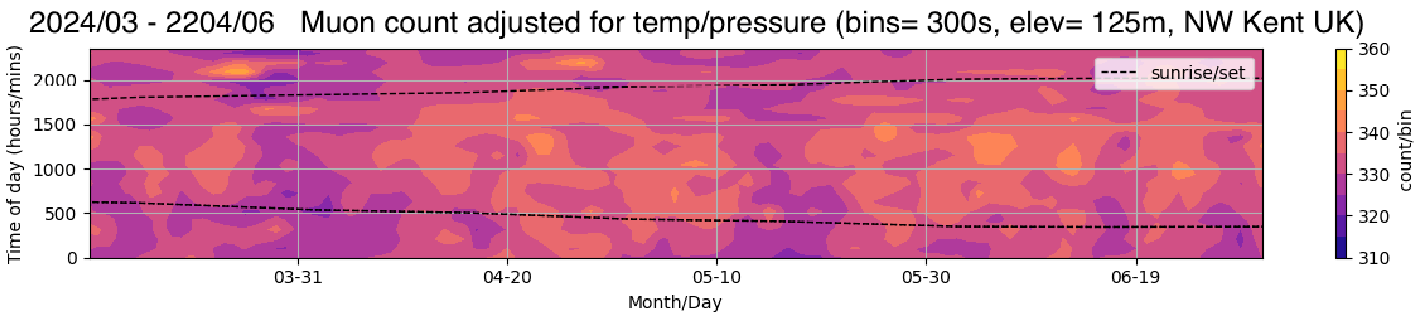


Colin's recording on the 5th is harder to analyse. The M3.4 and M2.6 flares in the morning may be seen in the 408MHz signal, again with contributions from the smaller afternoon flares. 151Mhz seems to be far more random. Recordings from the 7th were even more confusing, with 408MHz saturating after 10UT until well into the afternoon. There was an M4 flare at 09:16, but the link is not clear.

MUONS

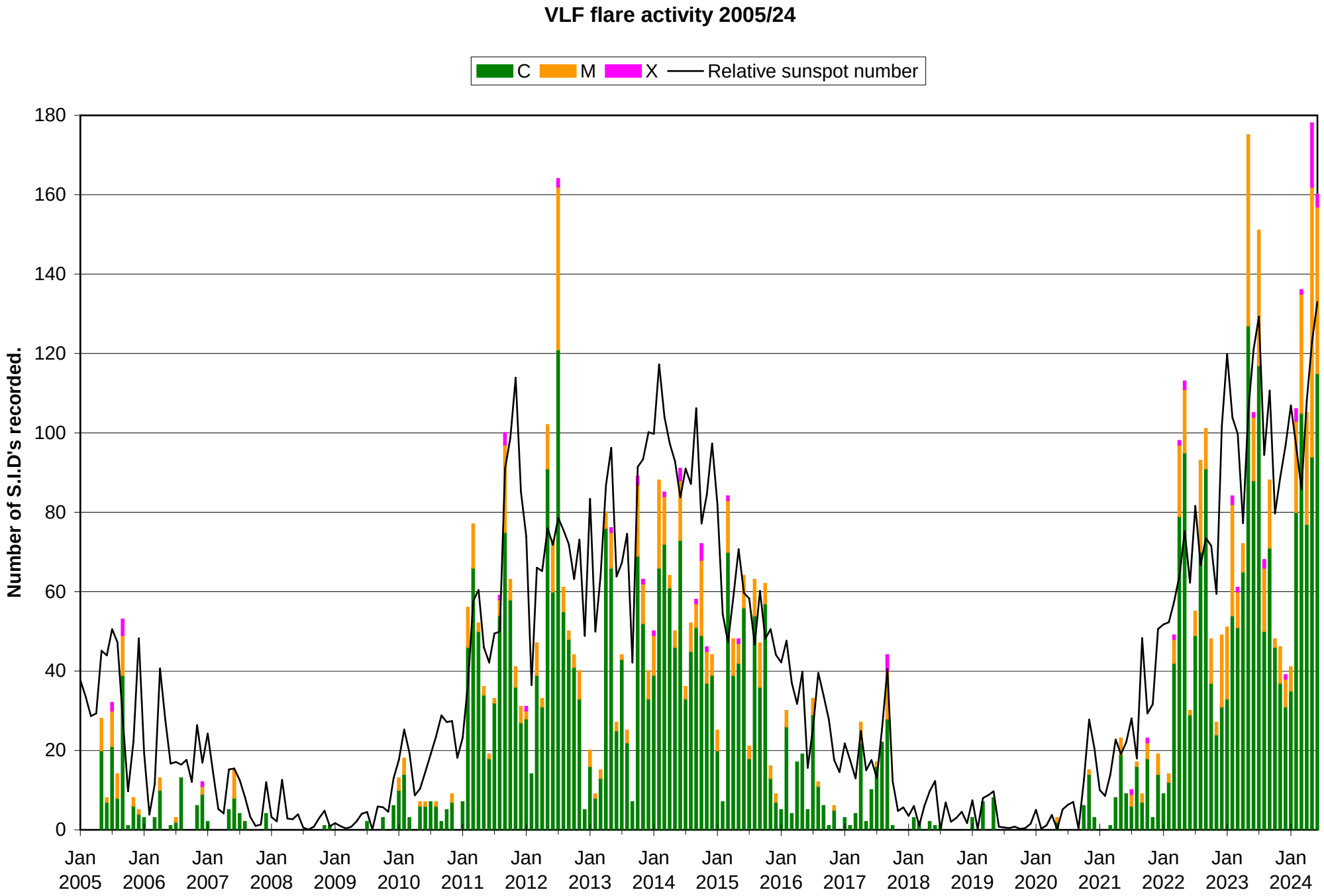


Mark Prescott's Muon recordings from June were interrupted by a short period offline, but still shows plenty of interesting activity. There is a general drop in Muon counts at the end of May and into early June from the stronger flares. CMEs and solar winds have also produced lower counts around the 17th and 28th. The diurnal trend is also visible between these events.



Mark has produced this chart showing how the counts have changed over the last four months, the sunrise and sunset times added. The counts tend to be higher during the day, midday running along the centre of the chart. There are two periods where the daytime counts are low, around March 31st and after May 10th. These follow periods when the solar wind was particularly active. A strong X-flare in late March caused a CME to join the solar wind, reported in our March report. Events leading up to May 10th were reported in our May report, leading to a magnetic storm that I'm sure we will all remember!. The smaller gaps in June match the dips shown in the chart on the previous page.

Included with this edition is a paper by David Hardwick on Muon detection, describing an experiment to combine the data from five observers in three countries.


VLF flare activity 2005/24
C
M
X
Relative sunspot number
Number of S.I.D's recorded.
0
20
40
60
80
100
120
140
160
180
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

28	29	30	31	2022 April 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			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

30	31	2022 November 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	MCCM	CCMC	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	1	2	2023 September 3	4	5	6	7	8	9	10	11	2275 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	2284 6	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	MMMC	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												

BAA Radio Astronomy Section. **2024 JUNE.**

	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*) Tuned radio frequency receiver, 0.58m frame aerial.				Roberto Battaiola (20.9kHz) Modified AAVSO receiver.				Paul Hyde (Various) Spectrum Lab / PC 1.5m frame aerial.				Mark Edwards (24.0/*19.6*/**20.9kHz**) Spectrum Lab / PC 2m loop aerial.				Colin Clements (21.75/*23.4kHz*) 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	C3.8	1	04:55	04:58	05:17	1																
1	C7.5	5					06:54	07:02	07:15	1	06:56	07:02	07:18	1	06:59	07:02	07:10	1-				
1	**X1.4**	10	08:37	08:51	10:31	3	08:23	08:49	10:01	3	08:37	08:51	10:08	3	08:38	08:51	?	-	08:37	08:55	10:22	3
1	?	1													09:09	09:14	10:14	2+				
1	?	1													10:48	11:02	11:26	2				
1	C4.3	3	12:57	13:00	13:15	1-									12:57	13:01	13:20	1				
1	?	1													13:59	14:01	?	-				
1	C4.6	1													14:13	14:24	14:52	2				
1	C4.0	1													15:21	15:22	15:33	1-				
1	C2.8	2	15:45	15:47	16:10	1									***15:46***	***15:50***	***16:03***	***1-***				
1	**X1.0**	5									18:30	18:40	19:02	1+	18:31	18:41	?	-	18:34	18:44	20:19	3
1	**M7.3**	1													19:02	19:50	21:13	3+				
2	C3.5	1					06:19	06:36	06:29	1-												
2	C2.7	1	08:04	08:08	08:22	1-																
2	C3.7	1	08:26	08:30	?	-																
2	**M2.0**	9	08:46	08:51	10:06	2+	08:46	08:52	09:20	2	08:47	08:53	10:02	2+	08:46	08:55	?	-	08:51	08:59	09:28	2
2	C6.0	1													09:21	09:27	09:57	2				
2	C4.6	2	10:26	10:29	10:45	1									10:26	10:30	?	-				
2	?	1													10:33	10:40	?	-				
2	?	1													10:33	10:40	?	-				
2	C5.7	5	10:55	10:59	11:30	2					10:55	11:03	11:31	2	10:54	11:02	?	-				
2	?	1													11:11	11:19	11:32	1				
2	?	2	12:11	12:14	12:21	1-									***11:57***	***12:15***	***12:53***	***2+***				
2	?	1	12:31	12:34	12:50	1																
2	C4.8	1													16:58	17:06	17:25	1+				
2	C5.6	2									17:51	17:57	18:18	1+	17:53	17:57	18:14	1				
3	**M1.0**	1													*05:09*	*05:22*	*05:31*	*1*				
3	C5.5	1													**06:46**	**06:54**	**07:19**	**2**				
3	C4.9	7	09:33	09:37	10:02	1+					09:25	09:31	09:51	1+	09:29	09:32	10:01	1+				
3	C5.1	3	11:42	11:50	?	-	11:48	11:54	12:19	1+					11:39	11:47	?	-				
3	**M3.2**	9	11:57	12:04	?	-					11:50	11:56	?	-	*11:50*	*11:57*	?	-	11:55	12:02	12:27	1+
3	**M2.8**	8					12:19	12:26	12:57	2	12:23	12:28	13:27	2+	*12:21*	*12:28*	*13:39*	*2+*	12:27	12:34	13:06	2
3	?	1													*13:40*	*13:44*	*14:00*	*1*				
3	**M4.8**	10	14:08	14:18	15:35	3	13:57	14:11	14:40	2	14:02	14:15	15:22	2+	*14:01*	*14:13*	*15:37*	*3*	14:07	14:22	15:00	2+
3	?	1													**15:34**	**15:36**	**15:50**	**1-**				
4	**M2.4**	3													*06:18*	*06:36*	*07:33*	*2+*				
4	**M1.6**	6									09:01	09:06	09:35	2	09:01	09:05	09:29	1+				
4	?	1													09:39	09:40	09:42	1-				
4	?	1													10:23	10:34	10:56	2				
4	C4.8	5									12:45	12:50	13:17	1+	12:45	12:52	13:20	2				
4	C4.7	5									15:33	15:41	16:51	2+	15:34	15:43	16:37	2+				
5	**M3.4**	10	08:44	08:56	?	-	08:31	08:56	09:37	2+	08:44	08:59	?	-	08:43	09:00	?	-	08:45	09:05	09:46	2+
5	**M2.6**	9	09:50	10:15	11:25	3	09:43	10:07	10:38	2+	09:45	10:09	11:19	3	09:41	10:07	11:05	2+	09:46	10:13	11:03	2+
5	C3.9	3	11:30	11:32	11:49	1									11:31	11:36	11:47	1-				
5	C4.7	4													12:01	12:11	12:29	1+				
5	C6.8	1													19:05	19:14	19:31	1+				
6	C8.1/C8.1	6	08:43	08:59	09:37	2+	08:42	08:47	08:53	1-	08:43	08:56	09:39	2+	08:44	08:56	09:40	2+				
6	?	1													*09:23*	*09:28*	*09:42*	*1*				
6	C4.9	2	10:10	10:11	10:23	1-									10:21	10:25	10:52	1+				
6	?	1													*14:15*	*14:23*	*14:32*	*1-*				
6	**M6.1**	8	14:56	15:09	16:55	3	14:52	15:07	14:52	1-	14:55	15:10	16:17	2+	14:56	15:10	15:46	2+	15:02	15:15	16:09	2+
6	C7.8	1													19:50	19:56	20:21	1+				
6	C8.7	1													20:39	20:42	20:55	1-				
7	C7.7	3									07:13	07:20	07:49	2	*07:11*	*07:24*	*07:45*	*2*				
7	**M4.0**	8	08:45	09:16	10:37	3	08:42	09:12	09:55	2+	08:43	09:14	10:45	3	08:45	09:14	10:13	3	08:51	09:23	10:06	2+
7	?	1													*10:13*	*10:15*	*10:23*	*1-*				
7	?	1													10:58	11:09	11:29	1+				
7	C7.0	5	12:11	12:18	12:28	1-									12:10	12:21	?	-				
7	?	2	13:15	13:20	13:35	1									13:06	13:24	14:45	3				
7	?	1													15:17	16:00	?	-				
7	**M1.2**	6									16:14	16:23	16:43	1+	16:17	16:23	17:28	2+				
7	?	1													17:49	17:53	18:02	1-				
7	C7.0	2									19:03	19:07	19:28	1	19:04	19:10	19:30	1+				
8	**M1.5**	2					05:21	05:26	05:27	1-					**05:24**	**05:37**	**05:43**	**1**				
8	**M1.2**	8	08:37	08:45	09:43	2+					08:37	08:46	09:48	2+	08:39	08:50	?	-				
8	**M1.2**	1													08:58	08:59	09:49	2+				
8	C5.0	6	10:58	11:04	11:25	1+					10:58	11:06	11:35	2	11:00	11:13	11:37	2				
8	?	1													11:50	12:00	12:17	1+				
8	?	2													14:57	15:01	15:23	1+				
8	C5.7	2									17:20	17:27	18:05	2	17:23	17:28	18:00	2				
9	**M1.6**	8	06:57	07:03	07:41	2	06:57	06:59	07:03	1-	06:56	07:00	07:37	2	*06:57*	*07:07*	*?*	-				
9	?	2													*07:38*	*07:44*	*?*	-				
9	**M1.2**	7	08:05	08:20	08:55	2+					08:06	08:20	08:57	2+	*08:04*	*08:22*	*09:09*	*2+*				
9	?	1													*10:36*	*10:52*	*?*	-				
9	?	2									11:03	11:15	12:04	2+	11:03	11:14	11:30	1+				
9	C3.1	1													15:19	15:22	15:29	1-				
9	C3.2	1													15:56	15:59	16:07	1-				
9	**M1.0**	1													19:56	20:16	20:45	2+				
10	**M3.3**	8	06:03	06:10	?	-	06:01	06:11	06:59	2+	06:02	06:07	06:39	2	06:04	06:11	07:04	2+				
10	C2.8	1													*08:42*	*09:04*	*09:22*	*2*				
10	**M2.2**	5	09:45	10:04	?	-	09:27	10:03	10:18	2+	09:44	10:07	?	-	09:44	10:03	?	-				
10	**M5.3**	2	?	10:53	?	-									10:21	10:52	?	-				
10	**X1.5**	10	11:05	11:10	?	-	10:18	11:08	11:45	3	11:04	11:10	13:07	3	*11:05*	*11:07*	*?*	-	09:43	11:03	12:47	3+
10	**M1.3**	9	13:24	13:30	14:11	2+	13:23	13:33	13:53	1+	13:22	13:32	14:13	2+	*13:20*	*13:33*	*?*	-				
10	?	1													*14:16*	*14:27*	*?*	-				
10	?	1													*14:30*	*14:35*	*?*	-				
10	**M9.5**	9	18:22	18:36	?	-					18:17	18:32	19:32	2+	*18:20*	*18:35*	*19:38*	*2+*	18:19	18:48	20:16	3
11	C2.7	1													14:02	14:09	14:30	1+				
11	C3.5	1													14:33	14:41	15:05	1+				
12	C4.4	4	13:02	13:09	13:35	2									13:02	13:07	13:31	1+				
12	C3.3	1													15:19	15:27	15:45	1+				
13	C3.7	1													13:17	13:18	13:28	1-				
13	C4.6	5	15:04	15:14	16:08	2+					14:59	15:13	15:49	2+	15:02	15:24	16:23	2+				
13	**M3.2**	8	16:38	16:47	17:43	2+					16:36	16:46	17:12	2	16:36	16:41	17:33	2+				
13	C9.0	2									18:50	18:56	19:18	1+	18:51	18:56	19:40	2+				
13	C7.8	2									19:44	19:54	20:18	2	19:47	19:55	20:16	1+				
14	C3.8	4	08:29	08:34	08:59	1+					08:29	08:35	09:04	2	08:31	08:46	08:59	1+				
14	?	3	09:50	09:56	10:16	1+					09:49	09:54	10:08	1	09:50	09:58	10:13	1				
14	?	1													10:24	10:34	10:40	1-				
14	C6.3	6	11:03	11:07	11:42	2					11:01	11:08	11:41	2	11:02	11:10	11:43	2				
14	?	1													**12:14**	**12:25**	**12:43**	**1+**				
14	?	1													13:00	13:04	13:32	1+				
14	?	1													15:16	15:29	15:56	2				
14	C2.4	1													17:26	17:32	17:48	1				
14	C2.9	1													***19:16***	***19:20***	***19:25***	***1-***				
15	**M1.3**	3	06:08	06:31	07:06	2+									*06:05*	*06:35*	*?*	-				
15	?	1													*07:22*	*07:29*	*07:38*	*1-*				
15	C3.8	1													09:46	09:54	10:04	1-				
15	C3.6	5	10:30	10:35	10:50	1					10:30	10:35	?	-	10:32	10:38	10:47	1-				
15	C4.9	5	11:03	11:06	11:26	1					11:02	11:07	11:34	1+	*11:00*	*11:12*	*11:37*	*2*				
15	C5.7	6	12:32	12:36	12:59	1+					12:32	12:37	12:58	1+	12:33	12:39	?	-				
15	C2.8	1													13:00	13:08	?	-				
15	C2.8	1													13:19	13:22	?	-				

15	C3.4	2	13:38	13:44	13:56	1-							13:35	13:46	?	-						
15	C3.2	2	14:07	14:12	14:40	2							14:08	14:13	14:29	1						
15	C5.0	3	15:30	15:31	15:39	1-							15:15	15:32	15:58	2						
15	C5.1	4	16:58	17:01	?	-		16:57	17:02	17:24	1+		16:56	17:04	17:25	1+						
15	C3.7	2						17:46	17:52	18:09	1		17:47	17:52	18:05	1-						
15	C5.8	3	17:58	18:09	?	-		18:10	18:13	18:32	1		18:11	18:14	18:26	1-						
16	?	1											*07:11*	*07:14*	*07:30*	*1*						
16	?	1											*07:51*	*08:01*	*08:09*	*1-*						
16	?	7	08:11	08:15	08:41	1+		08:10	08:15	08:48	2		08:11	08:17	08:55	2						
16	?	5	09:01	09:07	09:29	1+		09:00	09:12	09:30	1+		09:03	09:14	09:35	1+						
16	C2.8	2						11:25	11:29	11:44	1		11:27	11:32	11:44	1-						
16	C2.3	1											*11:46*	*11:59*	*12:14*	*1+*						
16	C3.1	2						12:34	12:42	?	-		12:37	12:45	?	-						
16	C4.0	4	12:56	12:59	13:20	1		12:55	12:59	13:36	2		12:55	13:00	13:20	1						
16	?	1											***13:48***	***13:51***	***14:08***	***1***						
16	?	1											14:10	14:19	14:25	1-						
16	C3.2	4						14:33	14:40	15:00	1+		14:36	14:42	14:56	1						
16	C4.9	6	15:12	15:16	15:31	1		15:10	15:18	15:40	1+		15:12	15:18	15:37	1	15:12	15:25	15:46	2		
16	C6.7	6	15:41	15:47	16:19	2		15:41	15:46	16:06	1		15:43	15:47	?	-	15:46	15:54	16:25	2		
16	C4.7	3	*16:08*	*16:12*	*16:27*	*1*		16:08	16:14	16:33	1		16:07	16:11	16:36	1+						
16	C4.0	2											17:00	17:14	17:56	2+						
16	C3.5	2						19:06	19:15	19:29	1		19:07	19:18	19:31	1						
16	C5.2	2						20:18	10:24	?	-		20:19	20:22	20:38	1						
16	C2.3	1						20:29	20:32	20:54	1											
16	C6.6	1											21:23	21:25	21:37	1-						
17	**M1.5**	9	07:57	08:03	08:58	2+		07:55	08:06	09:13	2+		07:56	08:09	09:25	3	07:59	08:13	08:58	2+		
17	C3.1	2											09:36	09:41	10:00	1						
17	**M1.5**	9	10:45	10:48	11:30	2		10:43	10:47	12:05	2+		10:44	10:47	11:20	2	10:49	10:52	11:21	1+		
17	**M1.3**	1											20:08	20:37	21:16	2+						
18	C4.0	3	10:00	10:02	?	-							09:59	10:03	10:11	1-						
18	C5.0	5	10:14	10:18	?	-		10:12	10:17	?	-		10:13	10:24	?	-	10:18	10:29	10:42	1		
18	C5.1	6	10:38	10:42	11:00	1		10:38	10:43	11:03	1		10:37	10:43	11:09	1+	10:42	10:49	11:07	1		
18	**M2.4**	9	11:19	11:27	?	-		11:16	11:26	11:52	2		11:18	11:22	?	-	11:23	11:31	11:56	2		
18	C7.9	2											11:50	12:00	?	-	11:56	12:00	12:16	1		
18	**M1.1**	9	12:12	12:18	13:10	2+		12:12	12:20	13:05	2+		12:12	12:21	?	-	12:16	12:28	12:41	1		
18	?	1											12:35	12:39	13:04	1+						
18	C3.0	1											13:22	13:28	13:32	1-						
18	C5.5	3	15:39	15:45	16:15	2		15:36	15:43	15:52	1-		15:40	15:44	?	-						
18	C2.8	1											15:53	15:56	16:14	1						
18	?	1											18:42	18:44	18:48	1-						
18	C6.1	1											21:06	21:07	21:19	1-						
18	C8.1	1											21:50	21:50	22:00	1-						
19	**M1.1**	2						06:26	06:40	07:35	2+											
19	C5.9	3						09:09	09:22	09:53	2		09:17	09:26	09:49	1+						
19	C3.3	2											11:29	11:31	11:54	1						
19	C4.6	2											12:51	13:09	13:46	2+						
19	?	1											15:37	15:46	16:11	2						
19	?	1											16:44	16:55	17:09	1						
19	?	1											17:52	17:56	18:03	1-						
20	C7.1	8	09:37	09:43	10:01	1		09:35	09:43	10:13	2		09:37	09:44	?	-	09:32	09:50	10:16	2		
20	?	1											10:09	10:23	10:41	1+						
20	?	2						12:18	12:25	13:23	2+		12:19	12:39	13:05	2+						
20	**M1.1**	8	15:16	15:19	15:28	1-		15:09	15:19	15:41	1+		15:13	15:19	15:49	2	15:16	15:27	15:54	2		
20	?	1											***15:42***	***15:49***	***?***	***-***						
20	C8.2	6						15:58	16:04	16:30	1+		15:59	16:09	?	-						
20	?	5	*16:43*	*16:49*	*?*	-		16:42	16:54	17:14	1+		16:31	16:54	17:29	2+						
20	C6.5	2						19:31	19:40	20:03	1+		19:34	19:43	20:02	1+						
21	C3.9	3	11:06	11:11	11:19	1-		11:01	11:06	11:20	1		11:07	11:15	11:26	1						
21	?	1											12:13	12:18	12:21	1-						
21	C4.2	3	12:38	12:42	?	-		12:37	12:42	13:14	2		*12:39*	*12:43*	*?*	-						
21	?	1											*12:46*	*12:55*	*13:04*	*1-*						
21	?	1											13:19	13:20	13:23	1-						
21	C3.6	1	14:05	14:07	14:12	1-																
21	?	2						14:43	14:49	15:25	2		**14:44**	**14:51**	**?**	**-**						
21	C4.6	1											**14:58**	**15:02**	**15:43**	2						
21	C4.6	1											15:57	15:59	16:14	1-						
21	?	2						16:36	16:42	17:09	2		16:38	16:42	17:17	2						
21	C5.1	1											**16:50**	**16:56**	**17:21**	**1+**						
21	C5.1	2						18:26	18:32	19:16	2+		18:28	18:34	18:47	1						
21	C3.4	2						19:34	19:39	19:47	1-		19:18	19:21	19:28	1-						
22	**M2.8**	9	08:47	08:57	10:18	3		08:46	08:58	10:20	3		08:47	08:59	10:15	3	08:52	09:06	10:16	2+		
22	?	1											*10:28*	*10:35*	*10:45*	*1-*						
22	?	2	10:43	10:46	10:59	1-							*10:50*	*10:56*	*11:02*	*1-*						
22	**M1.0**	8	11:05	11:07	11:47	2		11:02	11:08	11:35	2		11:03	11:08	11:35	1+	11:07	11:12	11:36	1+		
22	C6.0	7	12:12	12:15	13:11	2+		12:10	12:15	12:26	1-		12:12	12:15	?	-						
22	C5.0	2						12:36	12:42	12:59	1		12:38	12:43	13:01	1						
22	?	1											13:18	13:25	13:42	1						
22	?	1											14:48	14:51	?	-						
22	?	2											14:56	15:03	15:25	1+						
22	?	1											16:09	16:25	16:53	2						
22	C4.4	1											17:42	17:49	?	-						
22	C5.9	1											17:57	18:02	18:25	1+						
22	C8.7	2						19:38	19:48	20:20	2		19:41	19:49	20:32	2+						
23	**M2.4**	7	06:24	06:33	07:18	2+		06:21	06:34	08:10	3		*06:22*	*06:35*	*07:11*	*2+*						
23	**M1.2**	9	11:33	11:40	12:27	2+		11:27	11:36	12:32	2+		*11:24*	*11:41*	*?*	-	11:11	11:53	13:01	3		
23	?	1											*12:54*	*13:02*	*14:07*	*2+*						
23	**M9.3**	9	12:57	13:04	14:45	3		12:56	13:02	15:05	3+		12:57	13:04	13:47	2+	13:01	13:03	14:43	3		
23	C4.7	3	15:39	15:43	?	-		15:37	15:44	16:04	1+		15:40	15:43	15:57	1-						
23	C4.8	3	16:41	16:42	?	-		16:32	16:41	17:04	1+		16:35	16:41	17:11	2						
23	?	1											17:31	17:37	17:48	1-						
23	C4.0	1											18:16	18:19	18:27	1-						
24	?	2						09:49	09:53	10:08	1		09:51	09:57	10:04	1-						
24	?	1											10:15	10:26	10:45	1+						
24	?	1											10:55	11:06	?	-						
24	**M1.1**	1											11:09	11:15	11:27	1-						
24	**M1.5**	8	11:46	11:48	12:32	2+		11:45	11:47	13:08	2+		*11:43*	*11:50*	*13:03*	*2+*	11:50	11:55	12:43	2+		
24	C8.6	6	13:22	13:25	?	-							13:22	13:29	?	-						
24	?	1											**13:37**	**13:39**	**?**	**-**						
24	C7.5	3											13:57	14:00	?	-						
24	?	1											14:10	14:17	14:37	1+						
24	?	1											14:47	15:01	?	-						
24	?	2											*15:09*	*15:14*	*?*	-						
24	C8.3	5	*16:08*	*16:11*	*16:31*	*1*		16:06	16:13	16:32	1+		16:09	16:11	16:24	1-						
24	?	3						16:34	16:47	?	-		16:37	16:47	?	-						
24	C7.8	3						17:04	17:14	17:42	2		17:05	17:14	17:42	2						
24	**M1.1**	3	*19:10*	*19:12*	*19:21*	*1-*		19:08	19:13	19:47	2		19:09	19:12	20:20	2+						
25	**M1.0**	9	12:32	12:44	13:53	2+		12:26	12:43	13:45	2+		12:28	12:48	13:38	2+	12:33	12:55	14:15	3		
25	?	1											***14:33***	***14:44***	***?***	***-***						
25	?	2											***14:54***	***14:57***	***15:17***	***1***						
25	C5.6	2						19:21	19:27	19:39	1-		19:23	19:28	19:47	1						
26	C6.2	1											15:02	15:29	16:04	2+						
27	C3.1	1											14:37	14:42	14:56	1						
27	C2.1	1											15:49	15:51	15:57	1-						
27	?	1											16:25	16:27	16:34	1-						
28	C3.2	1											14:32	14:42	15:04	1+						
28	C2.3	1											18:44	18:46	18:51	1-						
29	C2.3	1											13:11	13:16	13:33	1						
29	C5.9	6	15:25	15:31	15:50	1		15:24	15:36	16:19	2+		15:25	15:34	16:18	2+						

BAA Radio Astronomy Section. **2024 JUNE.**

	Xray class		Steve Parkinson (Various) Tuned radio frequency receiver, frame aerials.				Andrew Thomas (19.6kHz) Tuned radio frequency receiver, 0.6m frame aerial.				Phil Rourke (23.4kHz) Spectrum Lab, 0.6m frame aerial.				Mark Prescott (19.6kHz/*20.9kHz*) SpectrumLab/Starbase, Active mini-whip aerial.				John Elliott (19.6kHz) 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	C3.8																					
1	C7.5		06:58	07:05	07:33	2									*07:02*	*07:02*	*07:33*	*1+*				
1	**X1.4**		08:42	08:54	10:40	3	08:33	08:54	11:40	3+	08:37	08:49	10:50	3+	08:43	08:56	10:39	3	08:40	08:53	09:35	2+
1	?																					
1	?																					
1	C4.3																		12:56	13:00	13:25	1+
1	?																					
1	C4.6																					
1	C4.0																					
1	C2.8																					
1	**X1.0**														18:37	18:46	19:29	2+	18:33	18:47	20:13	3
1	**M7.3**																					
2	C3.5																					
2	C2.7																					
2	C3.7																					
2	**M2.0**		08:47	08:51	10:10	2+	08:45	08:52	10:25	3					08:51	08:58	?	-	08:47	08:53	10:20	3
2	C6.0																					
2	C4.6																					
2	?																					
2	?																					
2	C5.7						10:52	11:03	11:30	2					*11:00*	*11:05*	*11:32*	*1+*				
2	?																					
2	?																					
2	?																					
2	C4.8																					
2	C5.6																					
3	**M1.0**																					
3	C5.5																					
3	C4.9		09:27	09:34	10:10	2	09:28	09:32	09:54	1+					09:30	09:36	09:53	1	09:25	09:32	10:00	2
3	C5.1																					
3	**M3.2**		11:52	11:58	?	-	11:51	11:57	12:24	2	11:52	11:57	12:20	1+	11:56	12:02	?	-	11:52	11:58	?	-
3	**M2.8**						12:24	12:29	13:43	2+	12:22	12:29	13:36	2+	12:28	12:33	13:07	2	12:23	12:28	13:15	2+
3	?																					
3	**M4.8**		14:03	14:17	15:50	3	14:00	14:15	16:02	3	14:03	14:13	15:10	2+	14:06	14:19	15:32	3	14:02	14:16	15:40	3
3	?																					
4	**M2.4**						06:16	06:36	07:48	3					06:27	06:44	10:17	3+				
4	**M1.6**		09:02	09:04	10:19	2+	09:01	09:04	10:07	2+					*09:05*	*09:12*	*09:54*	*2+*	09:00	09:05	09:30	1+
4	?																					
4	?																					
4	C4.8						12:46	12:50	13:18	1+					*12:48*	*12:59*	*13:17*	*1+*	12:45	12:50	13:15	1+
4	C4.7						15:34	15:52	16:10	2					15:38	15:48	?	-	15:38	15:40	15:43	1-
5	**M3.4**		08:45	09:02	11:30	3+	08:37	08:56	09:44	2+	08:48	08:59	09:44	2+	08:50	09:02	09:46	2+	08:45	08:58	?	-
5	**M2.6**						09:44	10:12	11:27	3	09:46	10:08	11:20	3	10:02	10:14	11:04	2+	09:53	10:08	10:50	2+
5	C3.9														*11:34*	*11:40*	*11:54*	*1*				
5	C4.7						11:59	12:05	12:30	1+					*?*	*12:20*	*12:36*	-	12:00	12:05	12:35	2
5	C6.8																					
6	C8.1/C8.1		08:43	09:02	09:45	2+	08:37	09:07	11:03	3+												
6	?																					
6	C4.9																					
6	?																					
6	**M6.1**		14:57	15:07	16:25	3	14:55	15:11	17:05	3+									14:57	15:10	17:05	3+
6	C7.8																					
6	C8.7																					
7	C7.7						07:09	07:22	07:57	2+												
7	**M4.0**		08:46	09:16	10:30	3	08:44	09:15	10:45	3									08:45	09:15	10:55	3+
7	?																					
7	?																					
7	C7.0						12:09	12:20	13:37	3					*12:17*	*12:28*	*12:51*	*2*	12:10	12:20	12:55	2
7	?																					
7	?																					
7	**M1.2**		16:18	16:27	17:00	2	16:16	16:27	17:20	2+					16:21	16:31	17:28	2+	16:15	16:27	17:00	2
7	?																					
7	C7.0																					
8	**M1.5**																					
8	**M1.2**		08:38	08:48	09:47	2+	08:38	08:46	10:01	2+	08:39	08:55	09:44	2+	08:42	08:51	10:28	3	08:37	08:46	?	-
8	**M1.2**																					
8	C5.0						10:59	11:09	12:21	2+					*11:06*	*11:41*	*?*	-	11:00	11:05	?	-
8	?																					
8	?														*14:42*	*15:06*	*15:44*	*2+*				
8	C5.7																					
9	**M1.6**		06:58	07:07	07:40	2					06:59	07:06	07:34	2	07:02	07:12	07:49	2+	06:57	07:08	07:40	2
9	?						06:55	07:59	08:06	2+												
9	**M1.2**		08:08	08:22	09:00	2+	08:06	08:23	09:37	3	08:05	08:20	09:23	2+	08:13	08:27	09:23	2+				
9	?																					
9	?																					
9	C3.1																					
9	C3.2																					
9	**M1.0**																					
10	**M3.3**						06:04	06:12	07:30	3	06:03	06:12	06:41	2	06:10	06:15	06:50	2	06:05	06:12	07:15	2+
10	C2.8																					
10	**M2.2**														09:49	10:12	?	-				
10	**M5.3**																					
10	**X1.5**		09:46	11:10	?	-	09:44	11:19	13:22	3+	09:45	11:10	12:22	3+	?	11:15	12:17	-	09:45	11:17	13:00	3+
10	**M1.3**		13:24	13:30	14:16	2+	13:22	13:30	15:58	3+	13:25	13:32	14:03	2	13:28	13:35	14:20	2+	13:24	13:30	14:15	2+
10	?																					
10	?																					
10	**M9.5**		18:21	18:38	20:00	3	18:23	18:37	19:25	2+	18:25	18:39	19:05	2	18:27	18:46	19:31	2+	18:22	18:38	19:35	2+
11	C2.7																					
11	C3.5																					
12	C4.4														*13:07*	*13:14*	*13:36*	*1+*	12:50	13:10	13:40	2+
12	C3.3																					
13	C3.7																					
13	C4.6						15:02	15:25	16:19	2+					15:12	15:28	?	-				
13	**M3.2**		16:38	16:47	18:10	3	16:38	16:47	17:32	2+	16:40	16:47	17:48	2+	16:43	16:51	17:37	2+	16:35	16:54	18:05	3
13	C9.0																					
13	C7.8																					
14	C3.8														*08:34*	*08:50*	*09:10*	*2*				
14	?																					
14	?																					
14	C6.3						11:01	11:07	11:40	2					11:07	11:11	?	-	11:03	11:08	11:50	2+
14	?																					
14	?																					
14	?																					
14	C2.4																					
14	C2.9																					
15	**M1.3**														06:19	06:35	07:20	2+				
15	?																					
15	C3.8																					
15	C3.6						10:32	10:36	10:54	1									10:33	10:37	10:55	1
15	C4.9						11:02	11:09	11:27	1									11:04	11:08	11:25	1
15	C5.7						12:33	12:39	13:21	2+					12:37	12:45	?	-	12:33	12:38	13:00	1+
15	C2.8																					
15	C2.8																					
15	C3.4																					
15	C3.2																					

15	C5.0																*15:27*	*15:39*	*16:10*	*2*			
15	C5.1																				16:58	17:03	17:50	2+
15	C3.7																						
15	C5.8																						
16	?																						
16	?																						
16	?		08:11	08:18	08:45	2	08:10	08:19	08:48	2							08:15	08:24	?	-	08:12	08:20	09:03	2+
16	?						09:03	09:12	09:33	1+							*09:06*	*09:14*	*09:37*	*1+*			
16	C2.8																						
16	C2.3																						
16	C3.1																						
16	C4.0						12:56	12:58	13:11	1-													
16	?																						
16	?																						
16	C3.2						14:35	14:41	14:59	1							*14:39*	*14:45*	*15:00*	*1*			
16	C4.9						15:11	15:18	15:42	1+							15:17	15:20	?	-			
16	C6.7						15:42	15:47	16:38	2+							15:46	15:52	?	-			
16	C4.7																						
16	C4.0																				16:38	16:54	18:03	2+
16	C3.5																						
16	C5.2																						
16	C2.3																						
16	C6.6																						
17	**M1.5**		07:56	08:07	09:20	2+	07:56	08:06	09:12	2+	07:56	08:07	09:34	3	08:01	08:08	09:09	2+	07:56	08:07	09:20	2+
17	C3.1																				09:35	09:40	10:00	1
17	**M1.5**		10:45	10:49	11:40	2+	10:44	10:49	12:04	2+	10:45	10:48	11:45	2+	10:49	10:52	11:47	2+	10:45	10:48	12:15	3
17	**M1.3**																						
18	C4.0						09:58	10:04	10:13	1-													
18	C5.0						10:13	10:20	10:34	1													
18	C5.1						10:39	10:42	10:57	1-							*10:42*	*10:46*	*?*	-			
18	**M2.4**		11:20	11:24	?	-	11:18	11:26	12:12	2+	11:19	11:27	11:54	2	11:22	11:30	?	-	11:18	11:27	?	-
18	C7.9																						
18	**M1.1**		12:14	12:22	13:00	2+	12:12	12:22	13:36	2+	11:56	12:22	13:15	2+	12:16	12:24	13:17	2+	12:13	12:22	14:40	3+
18	?																						
18	C3.0																						
18	C5.5																						
18	C2.8																						
18	?																						
18	C6.1																						
18	C8.1																						
19	**M1.1**																*06:38*	*06:48*	*07:20*	*2*			
19	C5.9																*09:15*	*09:26*	*?*	-			
19	C3.3																*?*	*11:32*	*11:58*	-			
19	C4.6																12:59	13:17	14:01	2+			
19	?																						
19	?																						
19	?																						
20	C7.1		09:38	09:42	10:05	1+	09:36	09:43	10:29	2+							09:42	09:51	?	-	09:37	09:45	10:05	1+
20	?																						
20	?																						
20	**M1.1**		15:11	15:20	15:50	2	15:12	15:19	16:01	2+							15:20	15:24	15:56	2	15:15	15:20	15:55	2
20	?																						
20	C8.2		15:59	16:08	16:26	1+	15:33	16:06	16:41	2+							*16:04*	*16:16*	*?*	-	16:00	16:06	16:35	2
20	?						16:41	16:55	17:23	2							*?*	*16:46*	*17:31*	-			
20	C6.5																						
21	C3.9																						
21	?																						
21	C4.2																						
21	?																						
21	?																						
21	C3.6																						
21	?																						
21	C4.6																						
21	C4.6																						
21	?																						
21	C5.1																						
21	C5.1																						
21	C3.4																						
22	**M2.8**		08:47	09:00	10:10	2+	08:46	08:59	10:24	3	08:47	08:59	10:30	3	08:52	09:01	10:25	3	08:47	09:00	10:25	3
22	?																						
22	?																						
22	**M1.0**		11:05	11:08	11:36	1+	11:04	11:07	11:44	2					11:09	11:12	11:49	2	11:05	11:07	11:50	2
22	C6.0		12:12	12:15	12:38	1+	12:10	12:15	13:11	2+					12:15	12:20	?	-	12:12	12:15	13:10	2+
22	C5.0																						
22	?																						
22	?																						
22	?																*14:53*	*15:06*	*15:21*	*1+*			
22	?																						
22	C4.4																						
22	C5.9																						
22	C8.7																						
23	**M2.4**		06:23	06:35	07:30	2+	06:23	06:35	07:11	2+					06:31	06:36	07:24	2+	06:28	06:35	07:20	2+
23	**M1.2**		11:32	11:43	12:45	2+	11:22	11:44	12:56	3	11:32	11:40	12:16	2	11:37	11:47	?	-	11:32	11:40	12:55	2+
23	?																						
23	**M9.3**		12:57	13:05	15:00	3	12:56	13:02	14:47	3	12:56	13:04	14:38	3	13:01	13:08	14:30	3	12:56	13:03	15:35	3+
23	C4.7																						
23	C4.8																						
23	?																						
23	C4.0																						
24	?																						
24	?																						
24	?																						
24	**M1.1**																						
24	**M1.5**		11:46	11:50	12:40	2+	11:45	11:49	12:40	2+					11:50	11:53	12:36	2+	11:46	11:48	13:00	2+
24	C8.6		13:22	13:27	13:53	1+	13:21	13:26	13:55	2					13:25	13:31	?	-	13:22	13:25	13:55	2
24	?																						
24	C7.5		13:56	13:59	14:10	1-	13:55	14:00	14:25	1+													
24	?																						
24	?																						
24	?																*?*	*15:08*	*15:44*	-			
24	C8.3		16:09	16:12	16:27	1-															16:10	16:13	16:25	1-
24	?		16:37	16:47	?	-																	
24	C7.8		17:06	17:12	17:35	1+																	
24	**M1.1**																						
25	**M1.0**		12:32	12:45	13:30	2+	12:26	12:48	14:24	3	12:36	12:46	13:19	2	12:34	12:56	13:58	2+	12:32	12:50	13:25	2+
25	?																						
25	?		14:51	14:57	15:12	1																	
25	C5.6																						
26	C6.2																						
27	C3.1																						
27	C2.1																						
27	?																						
28	C3.2																						
28	C2.3																						
29	C2.3																						
29	C5.9						15:26	15:42	16:22	2+					15:27	15:41	16:26	2+	15:25	15:37	16:25	2+