



Please send all reports and observations to [jacook@jacook.plus.com](mailto:jacook@jacook.plus.com)

**BAA Radio Astronomy Section.**

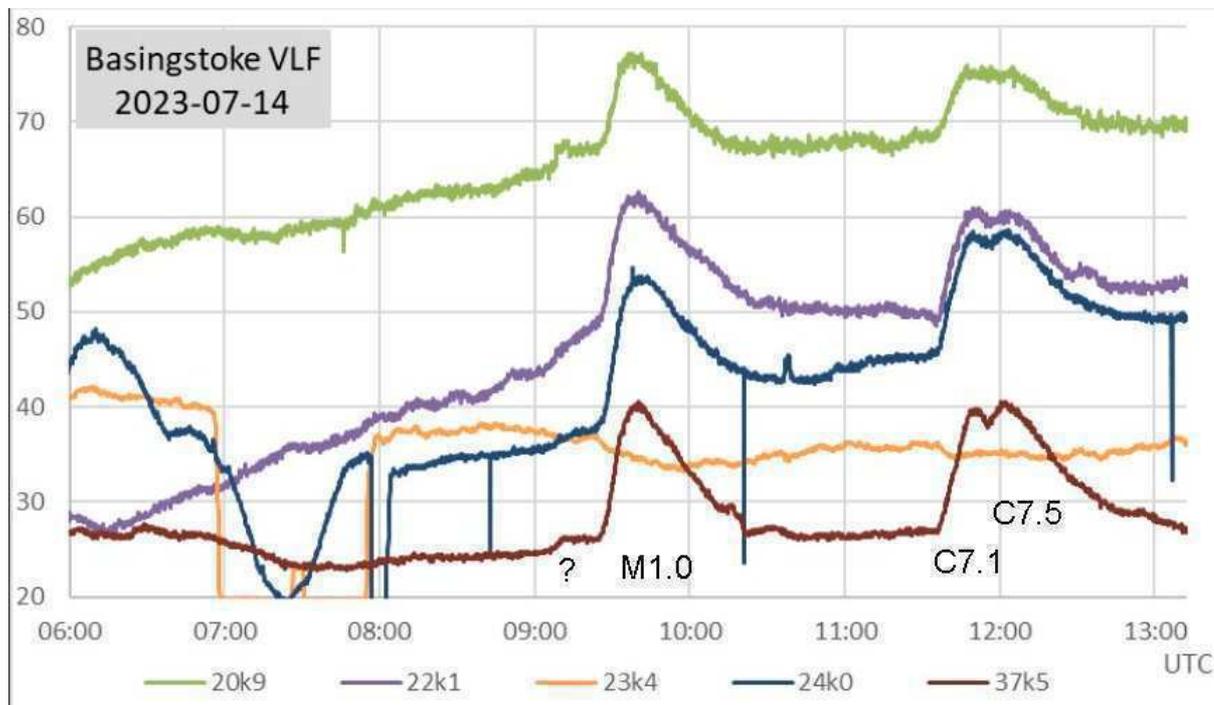
Director Paul Hearn.

## RADIO SKY NEWS

## 2023 JULY.

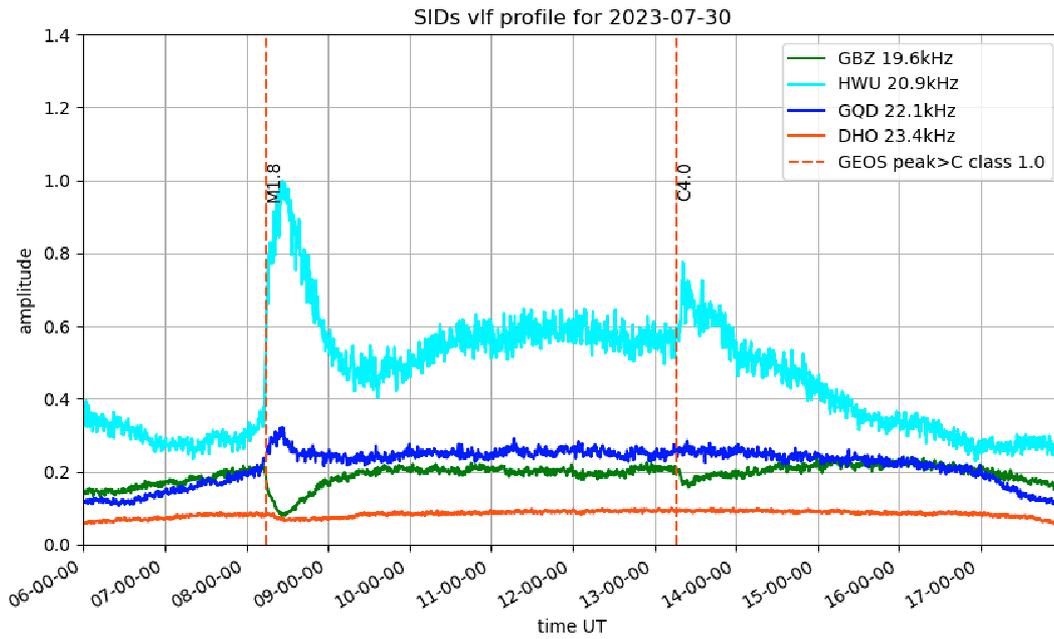
### VLF SID OBSERVATIONS.

July has been another very busy month for solar activity, although not quite as high as the peak in May. We have recorded 117 C-class flares and 34 M-class, the only X-class flare shown in the SWPC data being just before midnight on July 2<sup>nd</sup>. This was too late even for the 24kHz trans-Atlantic path. Once again many of the flares were multiple peaked, some with rather confusing timings. The M1.0 flare on the 14<sup>th</sup> has fairly consistent peak times in our recordings, from 09:37 to 09:46, while the satellite X-ray data gives a peak at 09:13, ending by 09:18.

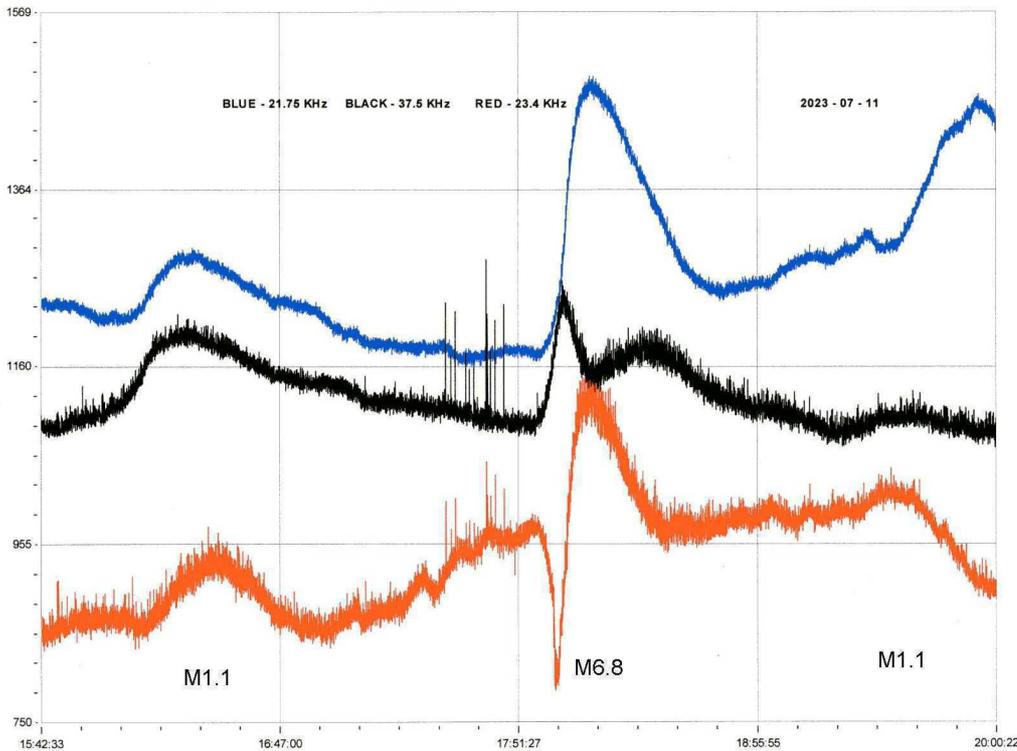


This recording by Paul Hyde clearly shows the stronger SID at around 09:40, preceded by a much weaker SID nearer to 09:13. It also shows the C7.1 and C7.5 flares merged into a twin-peaked SID on most signals, but less clear at 20.9kHz. The 23.4kHz signal also appears very unresponsive to all of these events. Both of the C-flares were from AR13372, while the M1.0 was from AR13363, both very large and complex sunspot groups.

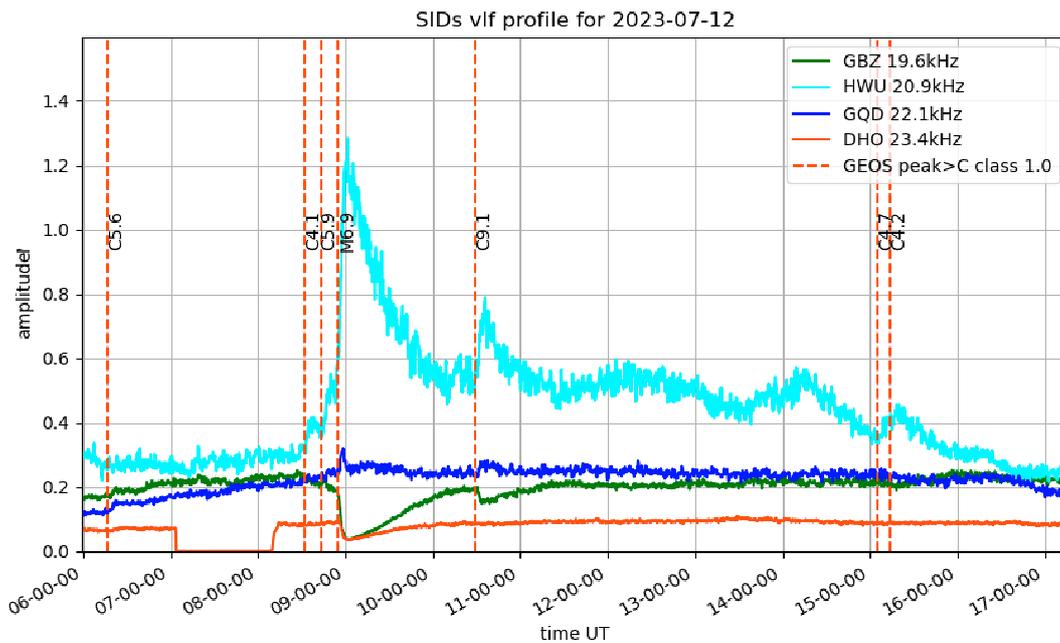
On the 30<sup>th</sup>, two M1.8 flares from AR13390 merged into a single SID in all of our observations. The chart from Mark Prescott shows the activity:



The satellite X-ray data lists identical flares peaking at 08:14 and 08:22. There is just a hint of the first peak visible in the rising edge of the flare in Mark’s recording. AR13390 was a fairly small sunspot group near to the solar East limb at the time.



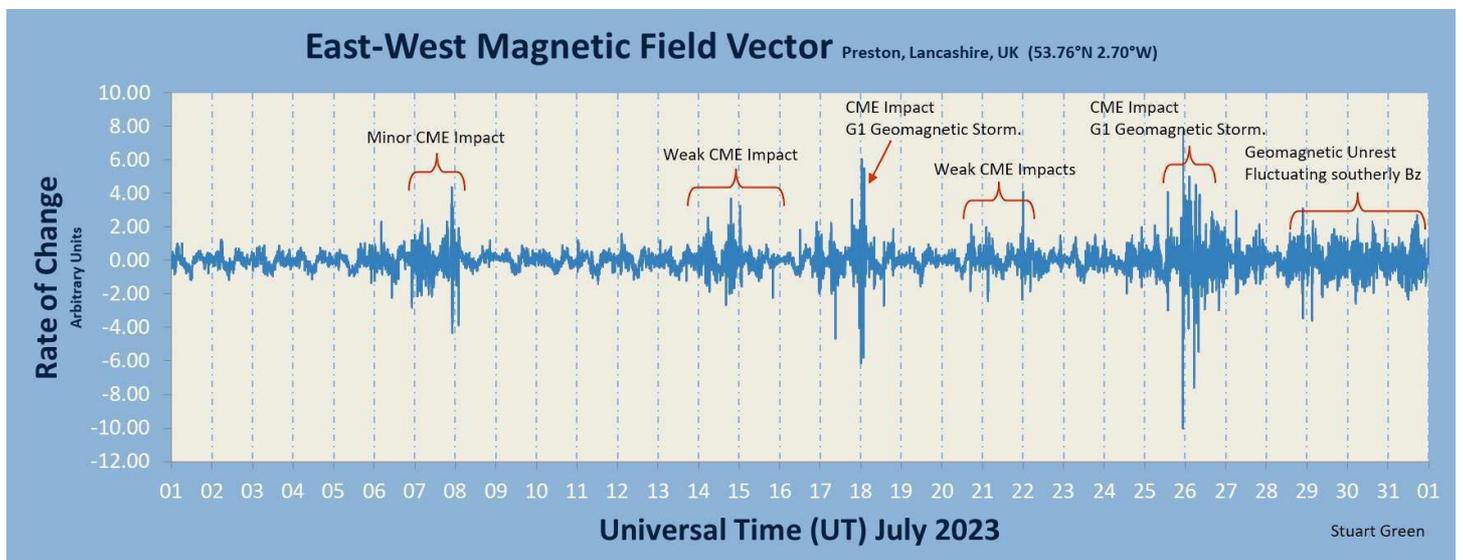
The strongest of the M-flares were recorded on the 11<sup>th</sup> and 12<sup>th</sup>, the M6.8 on the 11<sup>th</sup> shown in this recording by Colin Clements. The 21.75kHz signal from France (blue) has a good symmetrical SID, while the 23.4kHz signal from Germany (red) and 37.5kHz signal from Iceland (black) show mirror image spike and wave SIDs. The combination clearly shows the effects of the ground / sky path phase reversal from the strong flare. The M6.9 flare on the 12<sup>th</sup> had a faster rise time, producing the classic ‘Sharks Fin’ SID.



Mark Prescott's recording shows this well, along with the rest of the day's activity.

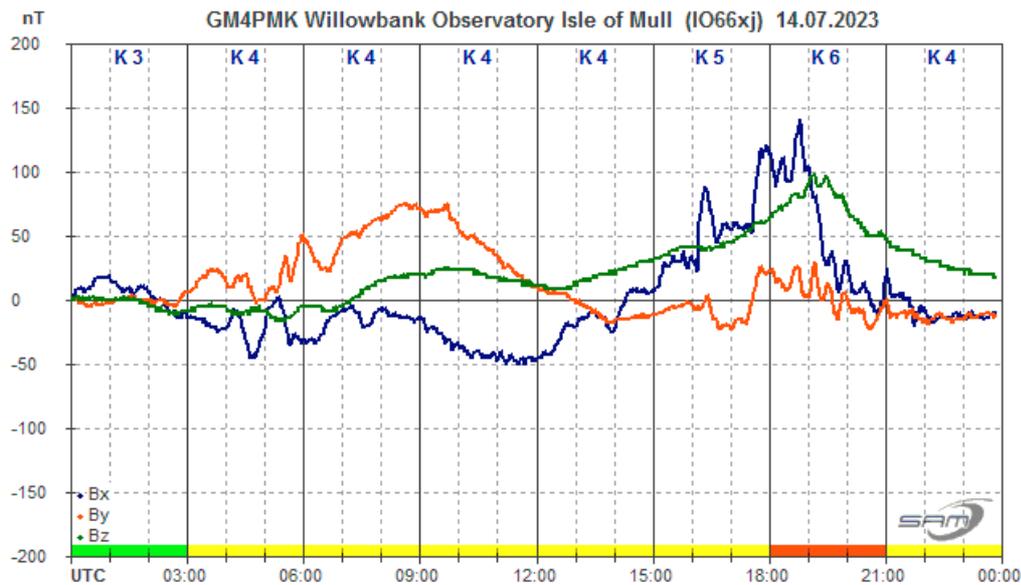
Mark Edwards noted a strong oscillation from about 16:15UT on the 14<sup>th</sup>, on 19.6kHz and 22.1kHz. There were also some disturbances at other frequencies, probably related to the stormy weather conditions.

## MAGNETIC OBSERVATIONS.

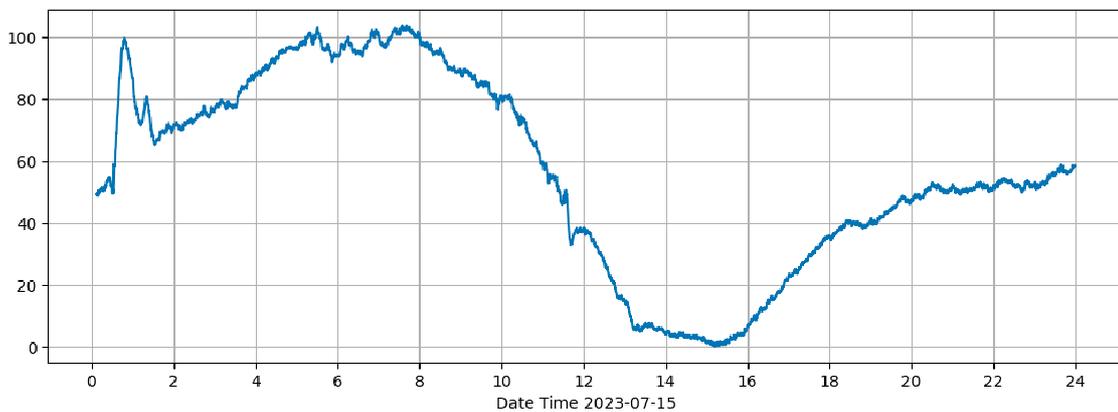


Stuart Green's summary of July's magnetic activity again shows mostly minor disturbances, but getting stronger in the last week. There were plenty of CMEs associated with the strong flaring, but again mostly not Earth directed. No SFEs were recorded either, perhaps reflecting the more complex flare structures recorded.

The small disturbance on the 5<sup>th</sup> and 6<sup>th</sup> was from a CME glancing blow, and lasted a few days. The CME impact on the 14<sup>th</sup> was stronger, producing a short active period shown in the recording by Roger Blackwell:

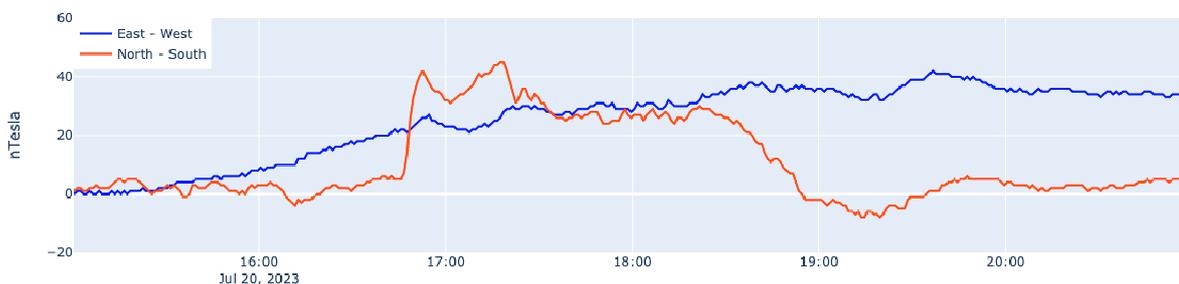


This activity faded in strength, but continued over the 15<sup>th</sup> and 16<sup>th</sup>.  
 Wasbister Magnetometer (59.17N,3.06W)



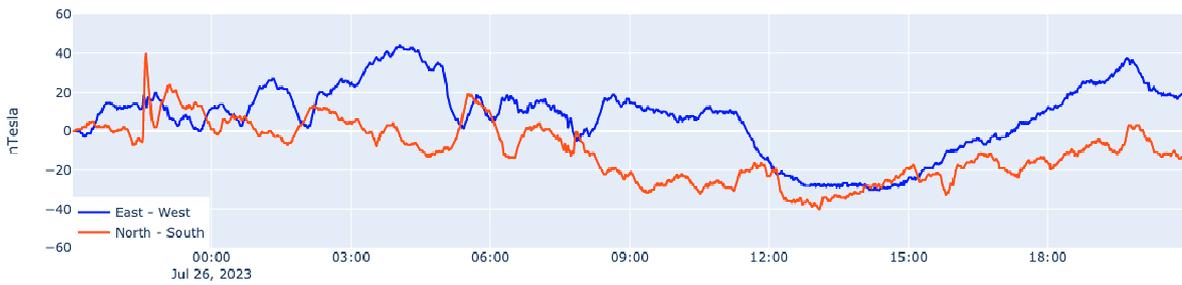
Callum Potter's chart shows this very mild disturbance on the 15<sup>th</sup>, following the end of the strong activity after 02UT. The source of the CME is not clear, but presumed to be from a flare on the 11<sup>th</sup>.

Steyning Magnetometer (50.8 North, 0.3 West)



Nick Quinn's recording from the afternoon of the 20<sup>th</sup> shows what might be a CME impact around 16:45 – 16:50, continuing until 19:00. Stuart Green's summary chart does not show any specific source at this time, although the disturbance does appear to be real and not local interference. A similar effect was also recorded by Roger Blackwell. The STCE report does suggest that a CME from a flare on the 17<sup>th</sup> could impact by the 20<sup>th</sup>. Nick also recorded a clearer CME impact late on the 25<sup>th</sup>:

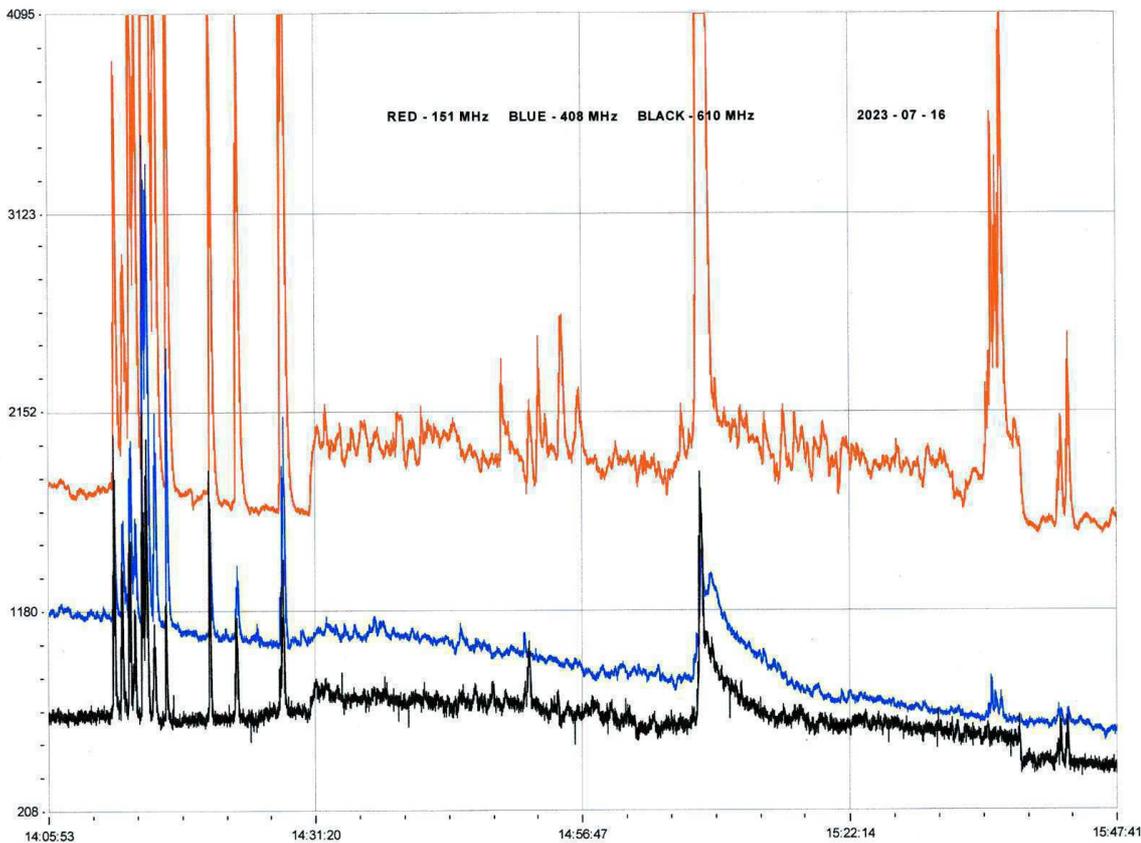
Steining Magnetometer (50.8 North, 0.3 West)



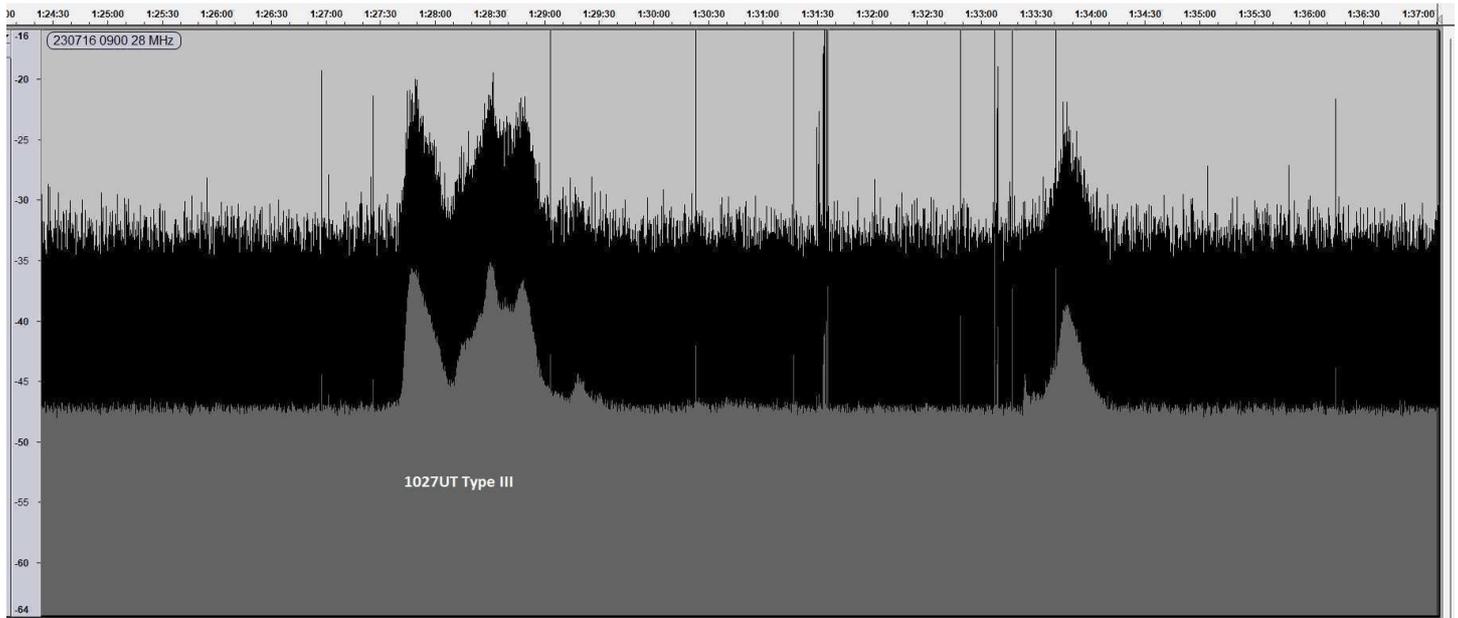
The recording shows a fairly strong disturbance through most of the 26<sup>th</sup>. The disturbance continued to the end of the month, with a turbulent solar wind adding to the CME.

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

### SOLAR EMISSIONS.

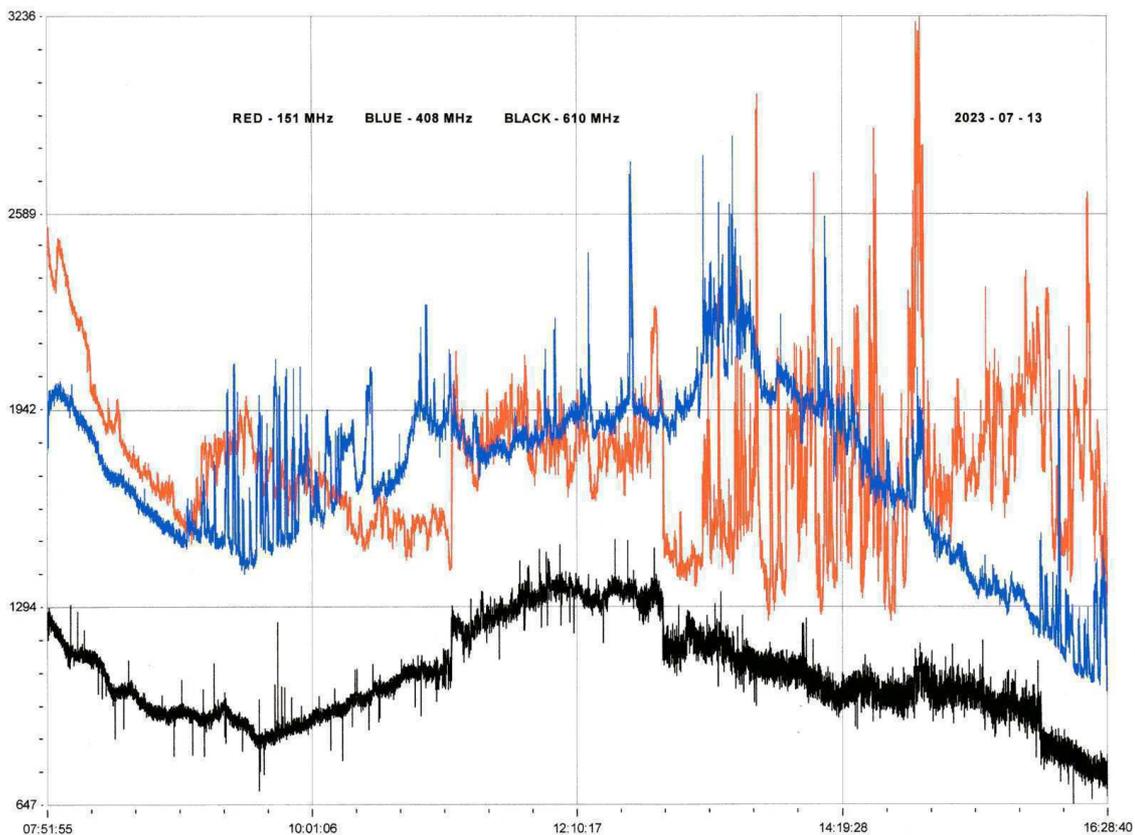


There was a burst of activity on the BAA-RAG forum regarding a solar noise burst in the afternoon of the 16<sup>th</sup>. Colin Clements recorded this activity at VHF / UHF, showing activity at all three frequencies. The C3.0 flare at 14:05UT produced a series of noise spikes over about 20 minutes, followed by a small rise in the background level. The SID-like burst on 408 and 610MHz is from the M1.7 flare at 15:10UT, and is the source of the forum discussion. The SWPC alert lists a type IV radio burst at 15:09, matching well with Colin's recording. 610MHz shows more of a spike at the start of the burst, and also shows another strong spike around 15:35. This may be related to the earlier flare, as no further flare activity is listed until 16:27.



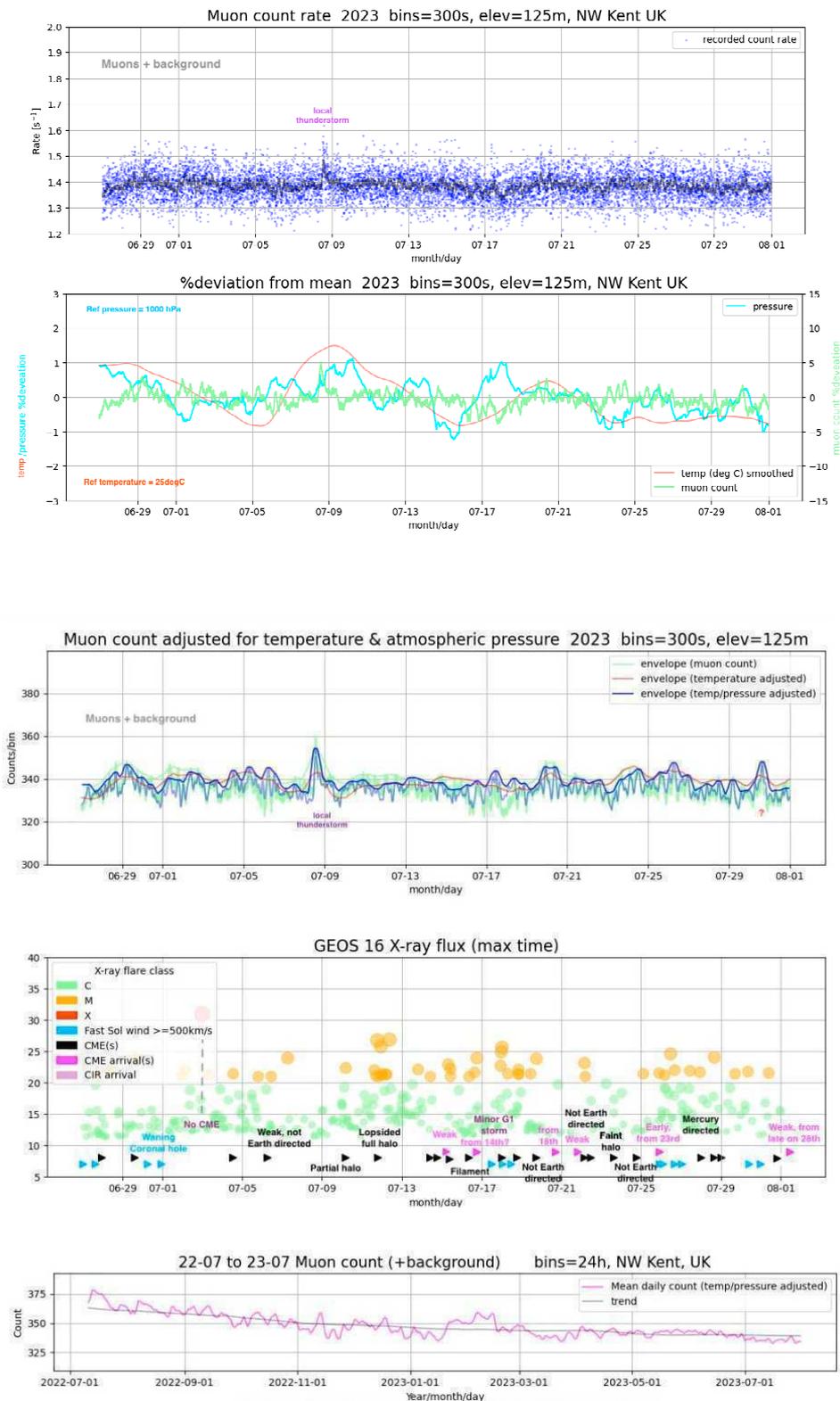
Colin Briden made a 28MHz recording earlier on the 16<sup>th</sup> showing a type III emission. This matches the C2.9 flare that we recorded starting at about 10:27 and peaking at 10:40UT. The first set of bursts rise about 12dB above the background level.

Colin Clements also recorded a very noisy outburst on the 13<sup>th</sup>, mostly at 151 and 408MHz:



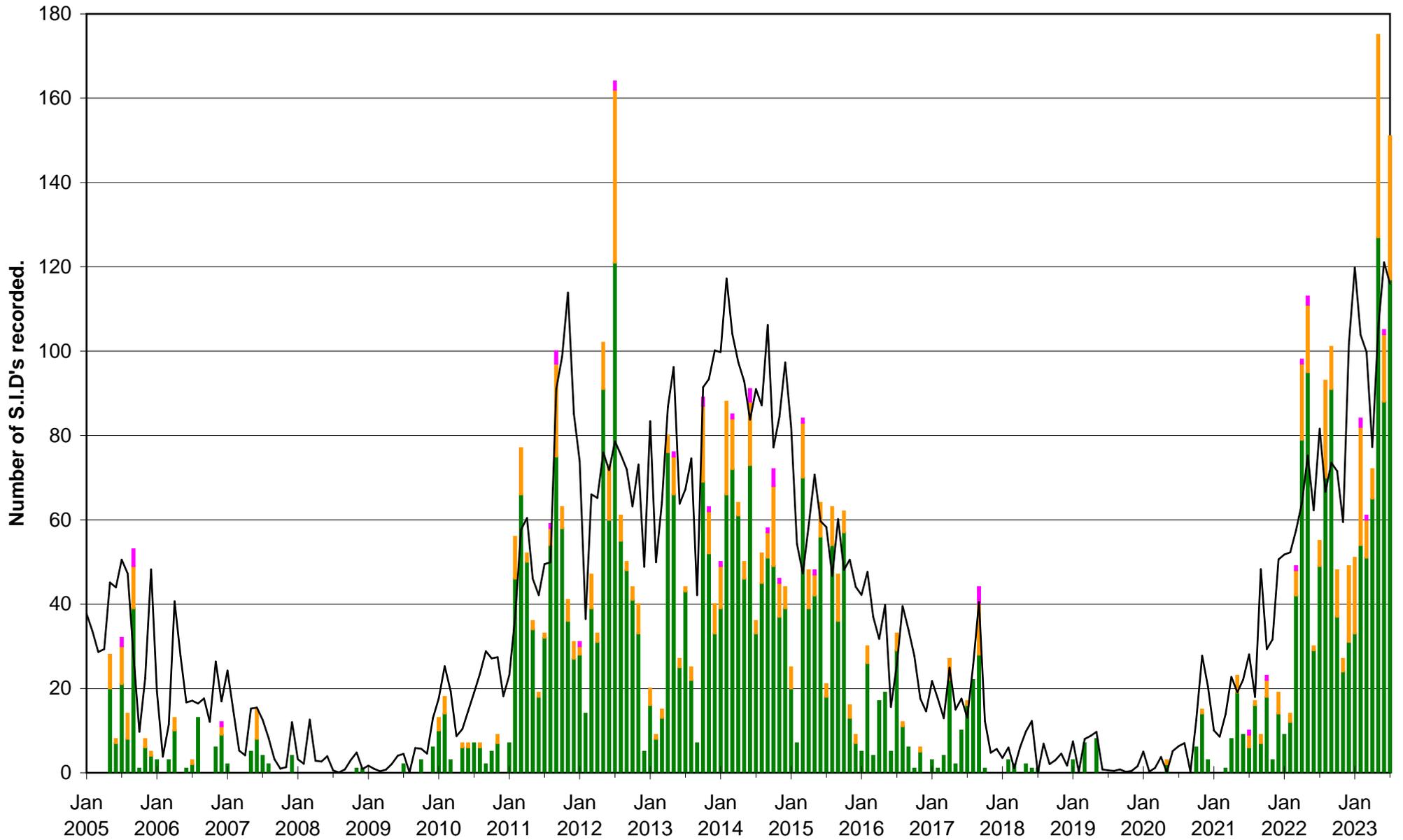
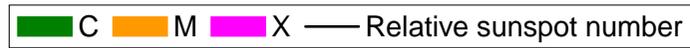
The chart covers 07:52 to 16:29, including the C4.7 flare at 11:27 and the C9.7 at 12:40. The X-ray data shows a number of unclassified flares in this period, along with a C5.1 at 09:55 that we did not record as a SID. The complexity makes this chart very difficult to analyse, but the peaks in 151 and 408MHz do match with these timings. The activity at 610MHz is rather unusual, just showing a rise in the background level around midday.

# MUONS.



Mark Prescott has provided his Muon data for July, along with a summary of the last 12 months. A local thunderstorm has caused a minor peak in the data, a problem faced with SID recording as well. The 12 month summary shows a gradual decrease in Muon counts as the level of solar activity has increased, an effect that was expected due to its effect on the Earth's atmosphere/ionosphere/magnetosphere. It will be interesting to see how this continues with the solar cycle over the next few years. Solar maximum is predicted in 2025 or 2024.

### VLF flare activity 2005/23





BAA Radio Astronomy Section.

2023 JULY.

DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)				Roberto Battaiola 21.75kHz				Paul Hyde (22.1kHz/24kHz)				Mark Edwards (24.0/20.9/37.5kHz)				Colin Clements (21.75kHz/37.5kHz)			
			Tuned radio frequency receiver, 0.58m frame aerial.				Modified AAVSO receiver.				Spectrum Lab / PC 1.5m frame aerial.				Spectrum Lab / PC 2m loop aerial.				Tuned Radio Frequency receivers, 0.76m screened loop aerial.			
			START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	
1	C2.1	1	09:16	09:21	09:33	1-																
1	C3.5	2								11:35	11:43	12:06	1+	11:38	11:42	11:59	1					
1	C4.1	2								12:50	12:57	13:14	1	12:55	12:58	13:07	1-					
1	?	1												13:38	13:43	13:54	1-					
1	C3.7	2								13:57	14:10	?	-	14:04	14:24	14:56	2+					
1	C3.0	2								15:56	16:00	16:16	1	15:57	16:02	16:44	2+					
1	C4.0	2								19:08	19:14	?	-	19:12	19:18	19:45	2					
2	C6.5	6	08:20	08:24	08:37	1-				08:15	08:24	?	-	08:20	08:30	?	-	08:19	08:26	08:46	1+	
2	C8.8	7	08:49	08:53	09:31	2				08:43	08:51	09:20	2	08:48	08:54	09:31	2	08:46	08:55	09:34	2+	
2	C2.6	1												17:33	17:43	17:48	1-					
2	C7.3	1												21:25	21:29	21:40	1-					
3	M1.3	7	06:50	06:54	07:36	2+				06:44	06:54	07:32	2+	06:50	06:53	07:07	1-	06:48	06:56	07:44	2+	
3	?	2								10:41	10:47	11:03	1	10:44	10:46	11:04	1					
3	C4.6	1								12:24	12:39	13:25	2+									
3	C3.5	4	14:44	14:48	15:02	1-				14:42	14:50	?	-	14:44	14:49	?	-	14:36	14:52	15:07	1+	
3	C5.0	5	15:08	15:21	15:50	2				15:04	15:22	15:49	2	15:06	15:20	15:45	2	15:05	15:25	15:55	2+	
3	C8.9	1												21:09	21:13	21:26	1-					
4	M1.4	10	12:25	12:32	13:20	2+	12:22	12:33	12:58	2	12:28	12:34	13:09	2	12:26	12:34	?	-	12:23	12:36	14:03	3
4	?	3								13:18	13:29	13:53	2	13:11	13:33	14:03	2+					
4	?	3								14:11	14:32	15:02	2+	14:15	14:34	15:03	2+					
4	?	1												18:51	18:54	19:10	1					
4	C8.0	2								19:14	19:27	19:57	2	19:17	19:30	20:00	2					
5	?	2								09:23	09:33	09:46	1	09:30	09:33	09:43	1-					
5	C7.5	7	10:38	10:44	?	-	10:36	10:44	10:54	1-	10:36	10:46	?	-	10:38	10:46	?	-	10:38	10:48	10:58	1
5	C8.1	7	10:59	?	?	-	10:55	11:00	11:20	1	10:55	11:02	11:32	2	10:57	11:05	11:34	2	10:58	11:02	11:56	2+
5	C2.5	2								13:44	13:56	14:18	2	13:49	13:56	14:05	1-					
5	C6.2	6	15:47	15:52	?	-	15:45	15:56	?	-	15:48	15:54	?	-	15:48	15:54	?	-	15:46	15:54	16:09	1
5	C5.4	5	16:09	16:13	16:35	1+				16:04	16:15	16:51	2+	16:07	16:13	16:55	2+	16:09	16:13	16:45	2	
5	C4.3	2								18:12	18:19	18:32	1	18:15	18:19	18:33	1-					
5	M1.0	2								18:37	18:56	19:44	2+	18:43	18:58	19:34	2+					
6	C8.9	1												04:39	04:42	04:53	1-					
6	C3.5	3	08:22	08:26	08:48	1+				08:22	08:26	08:52	1+	08:24	08:31	08:59	2					
6	M1.0	9	10:38	10:49	11:46	2+	10:32	10:49	11:25	2+	10:29	10:46	11:37	2+	10:33	10:50	11:53	2+	10:33	10:51	12:07	3
7	M4.0	8	06:24	06:28	07:17	2+	06:23	06:31	07:03	2	06:25	06:32	07:24	2+	06:26	06:31	07:00	2				
7	C2.7	1												18:18	18:19	18:35	1-					
8	C3.3	7	11:15	11:30	11:58	2								11:15	11:31	12:11	2+	11:17	11:34	12:18	2+	
9	?	1												08:37	08:38	08:43	1-					
9	C3.8	2								11:02	11:19	12:12	2+	11:07	11:25	?	-					
9	?	1												11:40	11:45	12:20	2					
9	C4.2	4								13:45	13:55	14:52	2+	13:47	13:55	14:24	2					
9	?	1												17:17	17:23	17:29	1-					
9	C3.7	2								18:08	18:13	18:38	1+	18:11	18:17	18:26	1-					
10	C3.1	2								09:10	09:14	09:37	1+	09:14	09:14	09:26	1-					
10	C2.9	2								09:45	09:49	10:06	1	09:48	09:52	10:01	1-					
10	C3.0	2								10:13	10:17	10:35	1	10:17	10:27	10:46	1+					
10	C5.3	1												19:24	19:33	19:40	1-					
11	?	2								08:37	08:54	09:07	1+	08:46	08:53	09:03	1-					
11	C4.8	4	09:23	09:25	09:36	1-				09:19	09:25	09:57	2	09:22	09:26	10:00	2					
11	C4.5	5	11:18	11:25	11:36	1-				11:15	11:23	11:54	2	11:19	11:31	11:57	2	10:48	11:34	11:49	2+	
11	C6.5	6	12:56	13:03	13:21	1				12:51	13:03	13:19	1+	12:53	13:02	?	-	12:49	13:03	13:23	2	
11	C7.6	7	13:31	13:37	14:08	2	13:28	13:36	13:46	1-	13:20	13:35	14:08	2+	13:21	13:37	14:19	2+	13:23	13:38	14:25	2+
11	M2.0	10	14:26	14:36	15:25	2+	14:26	14:36	15:06	2	14:22	14:33	15:27	2+	14:25	14:34	15:25	2+	14:25	14:37	16:05	3
11	?	2								15:30	15:37	15:42	1-	15:32	15:37	15:45	1-					
11	M1.1	7					15:57	16:08	16:19	1	16:03	16:13	16:54	2+	16:01	16:16	16:52	2+	16:05	16:24	17:56	3
11	?	1												16:56	16:58	17:01	1-					
11	?	1												17:03	17:08	17:17	1-					
11	M6.8	10					17:43	18:12	18:25	2	17:55	18:10	19:21	3	17:54	18:09	19:06	2+	17:56	18:11	18:44	2+
11	M1.0	2								19:23	19:30	19:50	1+	19:25	19:30	19:47	1					
11	?	1												20:19	20:23	20:31	1-					
11	M5.8	1												22:13	22:18	22:23	1-					
12	M1.3	1					04:51	05:13	05:43	2+												
12	C5.6	1								06:10	06:15	06:39	1+	08:31	08:34	08:42	1-	08:35	08:41	08:45	1-	
12	C4.1	3								08:26	08:34	?	-	08:41	08:46	?	-					
12	?	1																				
12	M6.9	11	08:50	08:57	10:09	2+	08:48	08:55	09:50	2+	08:39	08:57	10:06	3	08:51	08:59	10:09	2+	08:48	08:58	10:26	3
12	?	2								10:07	10:10	10:16	1-	10:10	10:13	10:18	1-					
12	C9.1	10	10:27	10:30	10:40	1-	10:25	10:28	10:39	1-	10:23	10:30	11:0									



BAA Radio Astronomy Section.

2023 JULY.

DAY	Xray class	Steve Parkinson (Various)				Andrew Thomas (20.9kHz)				Phil Rourke (23.4kHz)				Mark Prescott (20.9/19.6/22.1kHz)				John Elliott (18.3kHz)			
		Tuned radio frequency receiver, frame aeriels.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.				SpectrumLab/Starbase, Active mini-whip aerial.				Tuned radio frequency receiver, 0.5m frame aerial.			
		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
1	C2.1																				
1	C3.5																				
1	C4.1																				
1	?																				
1	C3.7																				
1	C3.0																				
1	C4.0																				
2	C6.5													08:24	08:30	?	-				
2	C8.8									08:49	08:54	09:59	2+	08:53	08:57	09:29	2				
2	C2.6																				
2	C7.3																				
3	M1.3	06:49	06:56	07:48	2+									06:53	07:00	07:41	2+				
3	?																				
3	C4.6																				
3	C3.5																				
3	C5.0													15:11	15:20	?	-				
3	C8.9																				
4	M1.4	12:26	12:36	13:26	2+	12:25	12:35	13:12	2+	12:19	12:34	14:23	3	12:29	12:40	15:02	3+				
4	?					13:23	13:31	14:04	2												
4	?																				
4	?																				
4	C8.0																				
5	?																				
5	C7.5					10:37	10:47	11:45	2+					10:43	10:50	?	-				
5	C8.1	10:38	11:03	12:40	3									?	11:06	11:55	-				
5	C2.5																				
5	C6.2													15:50	15:56	16:04	1-				
5	C5.4													16:12	16:17	16:56	2				
5	C4.3																				
5	M1.0																				
6	C8.9																				
6	C3.5																				
6	M1.0	10:39	10:51	11:48	2+					10:38	10:50	12:15	3	10:40	10:52	11:42	2+				
7	M4.0	06:26	06:33	07:23	2+					06:25	06:33	07:00	2	06:30	06:39	07:45	2+				
7	C2.7																				
8	C3.3	11:16	11:30	11:54	2	11:16	11:33	12:09	2+					11:15	11:32	12:17	2+				
9	?																				
9	C3.8																				
9	?																				
9	C4.2	13:47	14:00	14:30	2	13:49	13:57	14:32	2												
9	?																				
9	C3.7																				
10	C3.1																				
10	C2.9																				
10	C3.0																				
10	C5.3																				
11	?																				
11	C4.8																				
11	C4.5																				
11	C6.5													12:58	13:08	?	-				
11	C7.6													?	13:41	14:16	-				
11	M2.0	14:26	14:38	15:30	2+	14:26	14:37	15:20	2+	14:29	14:38	16:00	3	14:29	14:41	15:29	2+				
11	?																				
11	M1.1					16:06	16:20	16:49	2					16:12	16:22	17:03	2+				
11	?																				
11	?																				
11	M6.8	17:58	18:11	19:28	3	18:01	18:10	18:54	2+	18:00	18:11	19:01	2+	18:03	18:18	19:10	2+				
11	M1.0																				
11	?																				
11	M5.8																				
12	M1.3																				
12	C5.6																				
12	C4.1																				
12	?																				
12	M6.9	08:52	08:59	10:09	2+	08:30	08:57	10:09	3	08:51	08:58	10:27	3	08:53	09:02	10:07	2+				
12	?																				
12	C9.1	10:27	10:30	10:47	1	10:25	10:31	11:17	2+	10:27	10:31	10:40	1-	10:29	10:36	11:13	2				
12	?																				
12	C4.7																				
12	C4.2																				
12	?																				
12	C4.9																				
13	C7.7													08:12	08:21	08:47	2				
13	C4.8													11:21	11:27	11:41	1				
13	C4.7													12:31	12:44	13:48	2+	12:30	12:40	13:30	2+
13	C9.7	12:28	12:42	13:26	2+	12:26	12:43	13:39	2+	12:28	12:43	13:30	2+								
13	?																				
13	?																				
13	C4.7																				
13	?																				
13	?																				
13	M2.1					19:14	19:21	19:51	2												
14	?																				
14	M1.0	09:27	09:42	10:40	2+	09:27	09:42	10:49	2+	09:31	09:43	11:12	3	09:31	09:49	10:44	2+				
14	C7.1	11:39	11:55	12:30	2+	11:36	11:57	13:02	3	11:42	11:52	13:06	2+	11:43	12:07	15:56	3+				
14	C7.5																				
14	C3.5	13:32	13:38	?	-	13:32	13:38	13:56	1					?	13:40	?	-				
14	C4.9	13:57	14:05	14:30	2	13:56	14:05	14:36	2					?	14:08	?	-				
14	?																				
14	C8.8																				
14	C3.6																				
15	M2.9	07:29	07:45	09:00	3	07:28	07:47	08:51	2+					07:32	07:46	09:00	3				
15	C4.6																				
15	M1.0	09:50	09:56	?	-					09:25	09:55	?	-	09:53	10:01	?	-				
15	M2.2	10:08	10:11	11:05	2+	09:50	10:12	11:18	3	10:07	10:11	11:11	2+	10:12	10:15	11:01	2+				
15	C3.4																				
15	C8.8																				
16	M1.0	08:24	08:27	09:15	2+	08:25	08:28	09:25	2+					08:28	08:31	?	-				
16	C4.7													?	08:47	09:31	-				





