The British Astronomical Association

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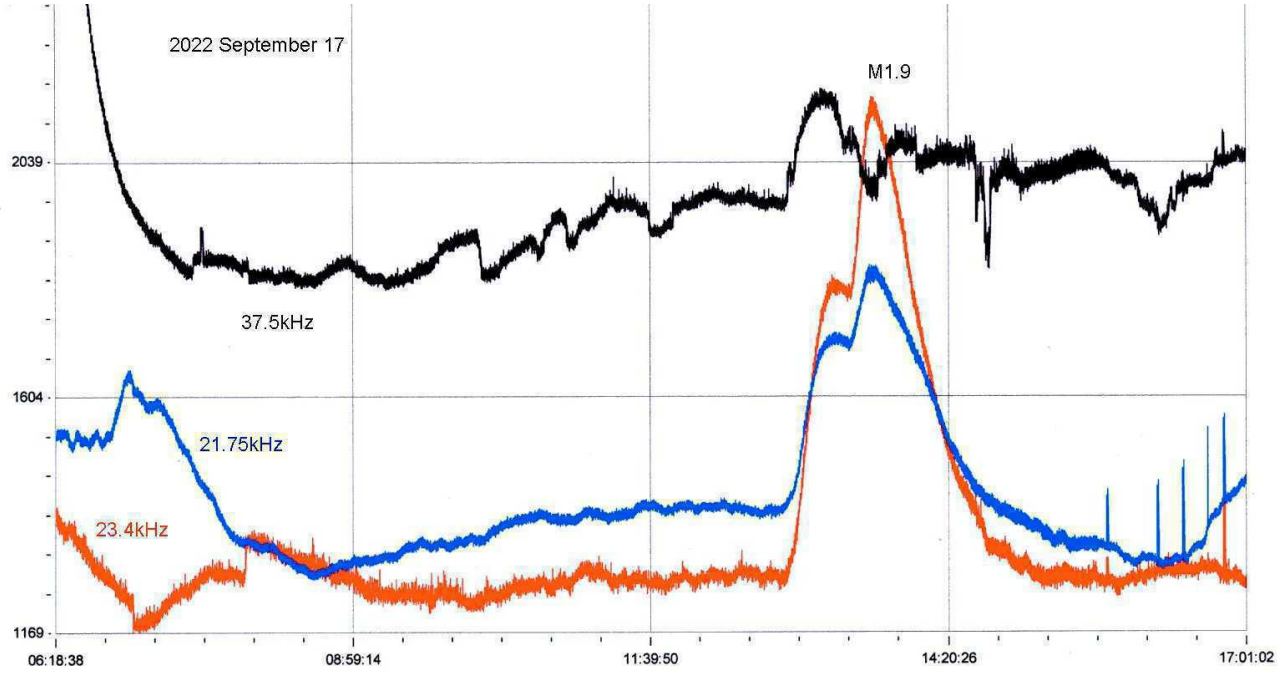
BAA Radio Astronomy Section. Director Paul Hearn.

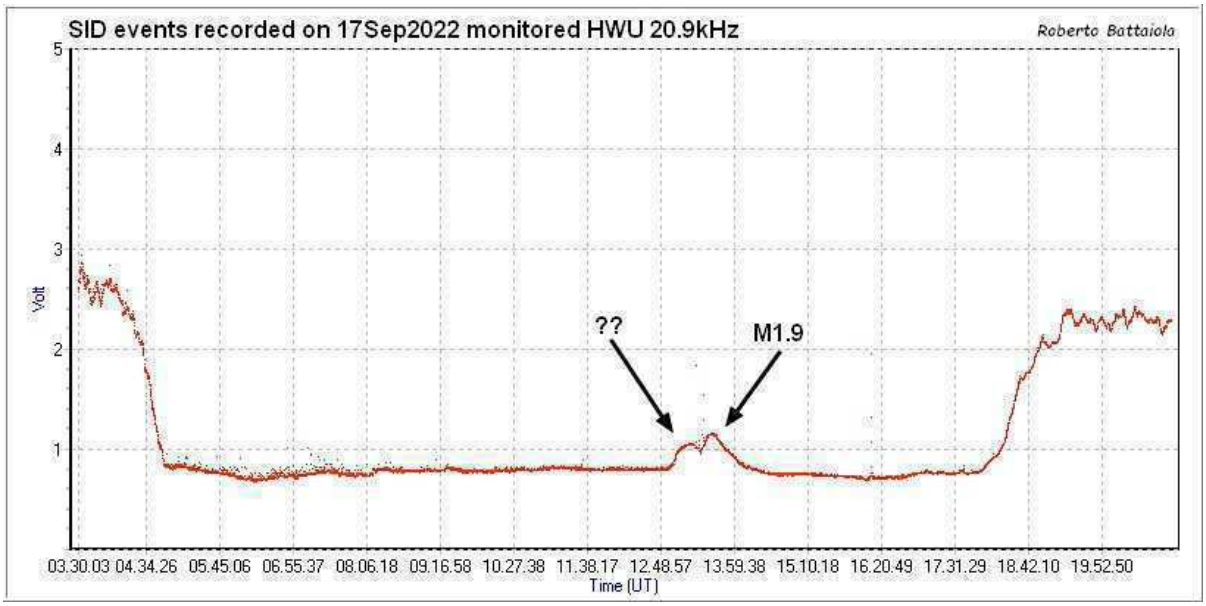
RADIO SKY NEWS 2022 SEPTEMBER.

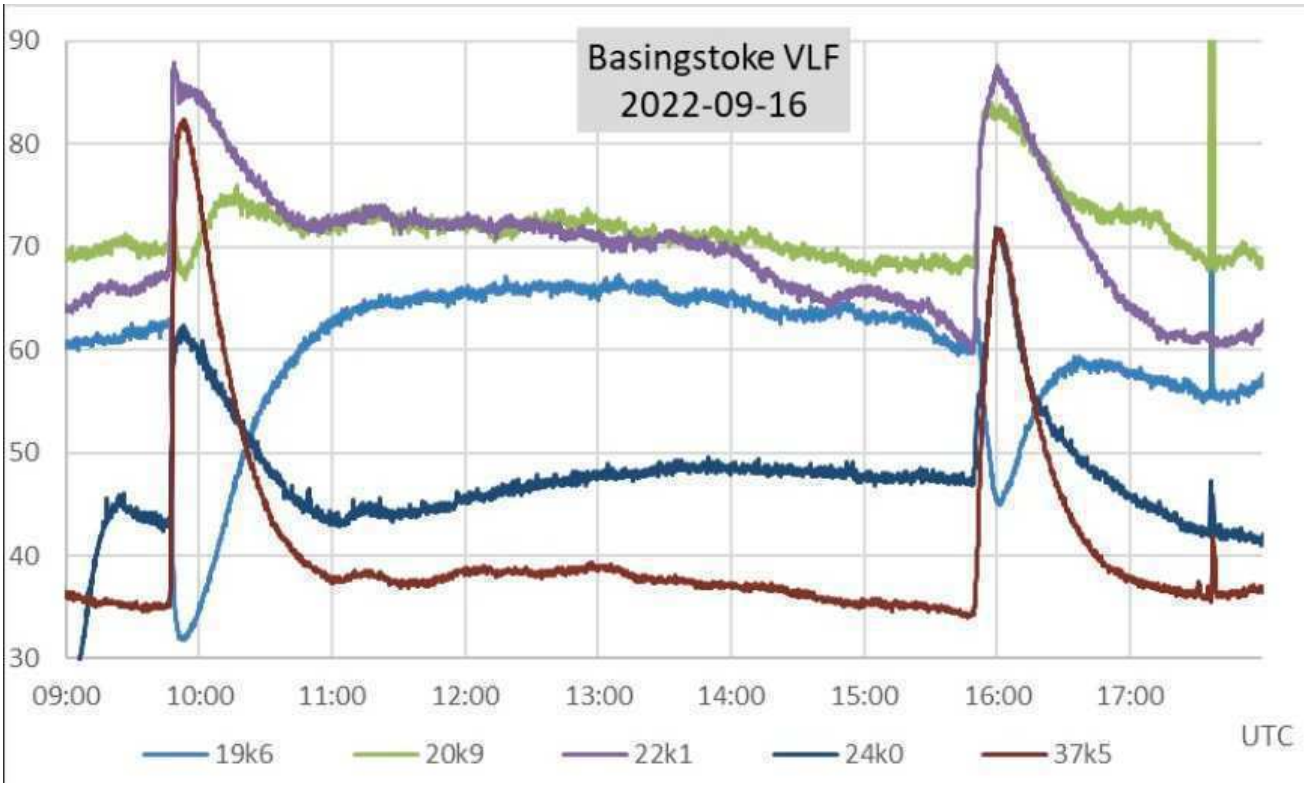
VLF SID OBSERVATIONS.

The high level of solar activity continued into September, with 101 SWPC listed flares recorded as SIDs. Many of these were again multiple peaked, making a total of 134 events recorded. There were also plenty of overlapping flares, making them difficult to separate. This recording by Colin Clements shows the M1.9 flare peaking at 13:37UT on the 17th, overlapping the earlier unlisted flare:

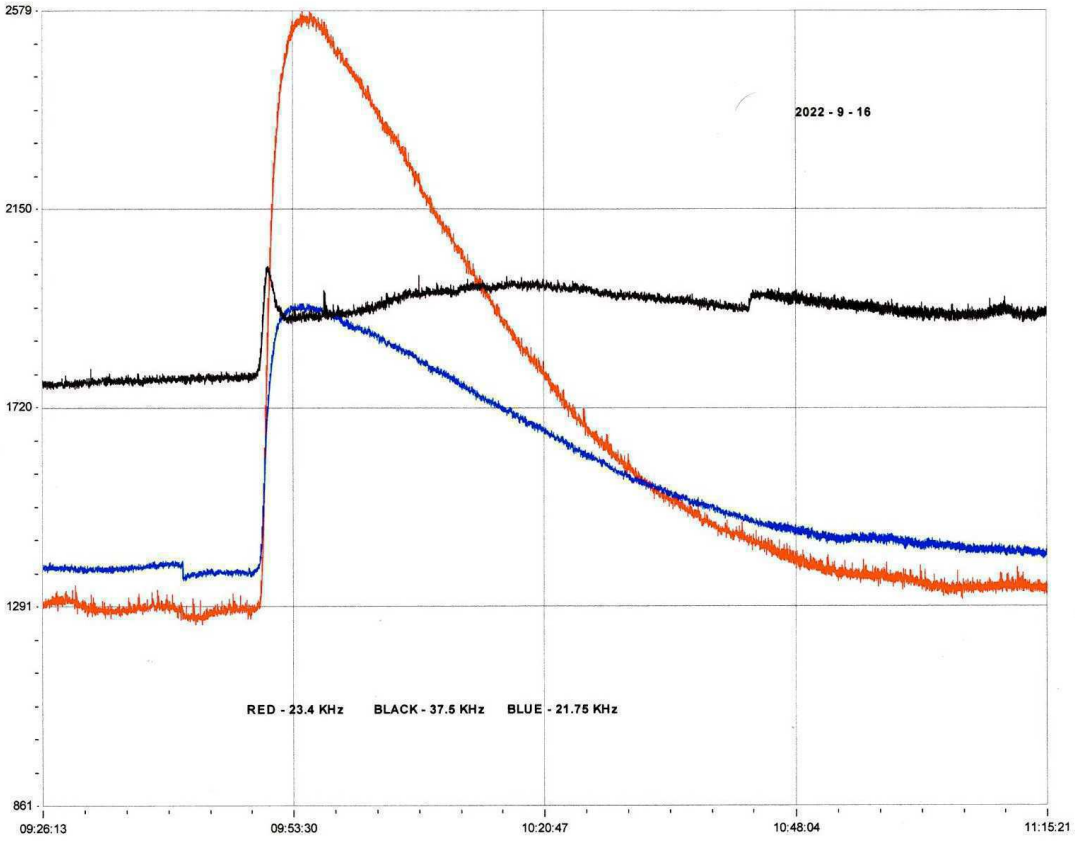


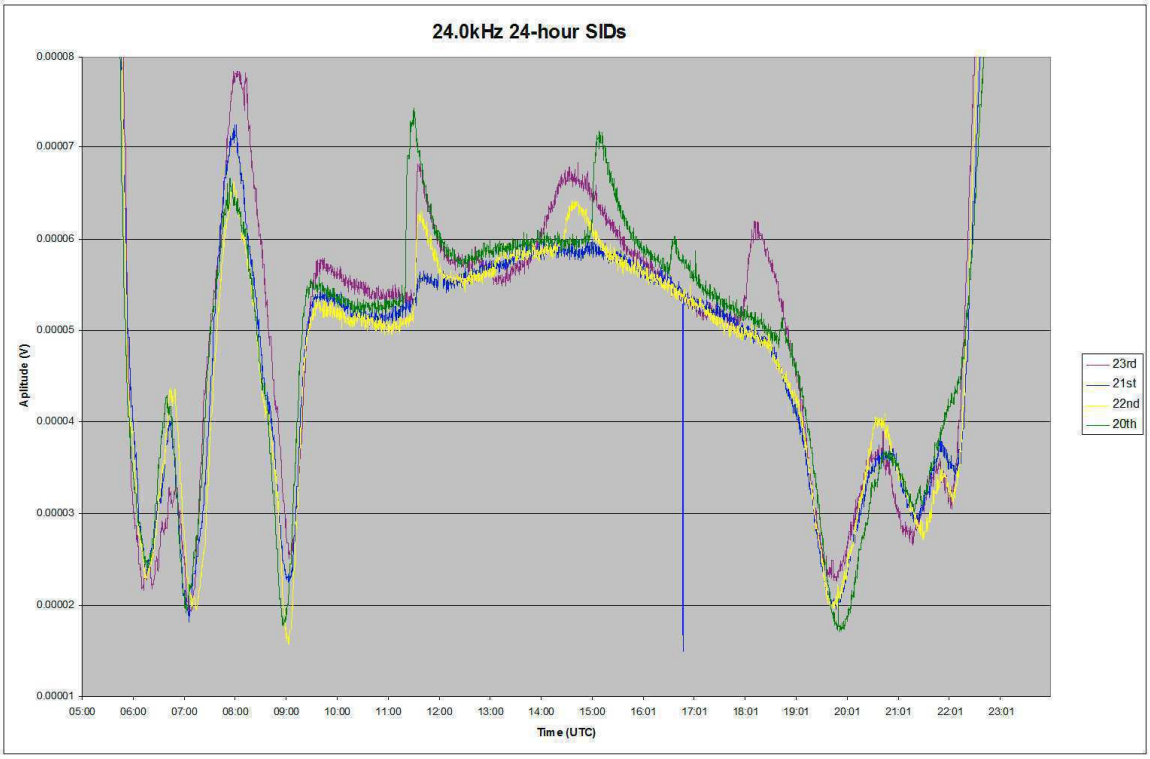
The 37.5kHz signal is tricky to interpret, but appears to show a peak matching the first peak at 21.75 and 23.4kHz, followed by a dip at the M1.9 peak. SIDs on other days do show a rise in signal strength from the 37.5kHz signal. The recording by Roberto Battaiola also shows a very similar SID response:



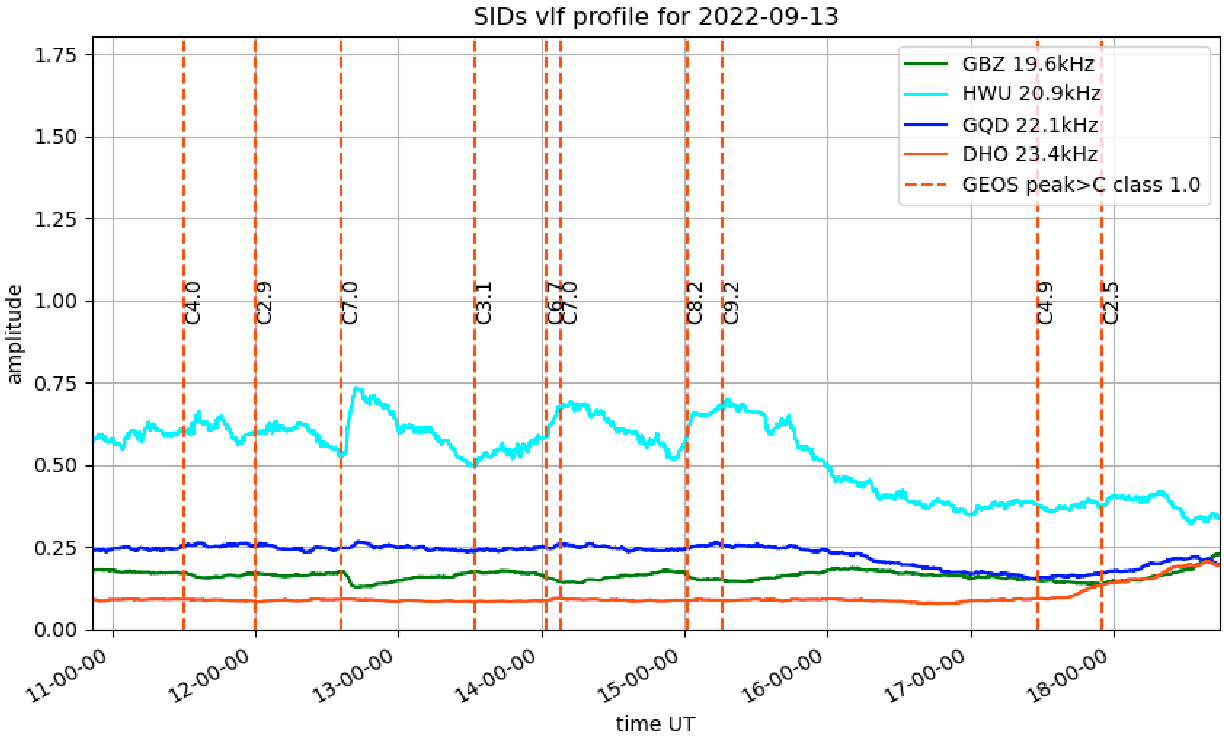


The two strongest flares in September are shown here by Paul Hyde, the M7.9 flare peaking at 09:54, and the M6.2 peaking at 16:04, both well timed in an otherwise very quiet day. They are mostly simple 'shark fin' SIDs, although 22.1kHz shows a hint of a 'spike and wave' SID for the first flare, and 19.6kHz is similar for the second flare. Colin Clements noted a very odd response to the M7.9 flare; 23.4kHz and 21.75kHz both show ordinary 'shark fin' SIDs, while 37.5kH shows a very narrow spike followed by a small dip and then a very small rise over the next hour. It appears to be a 'spike and wave' SID, but very different to those normally recorded.

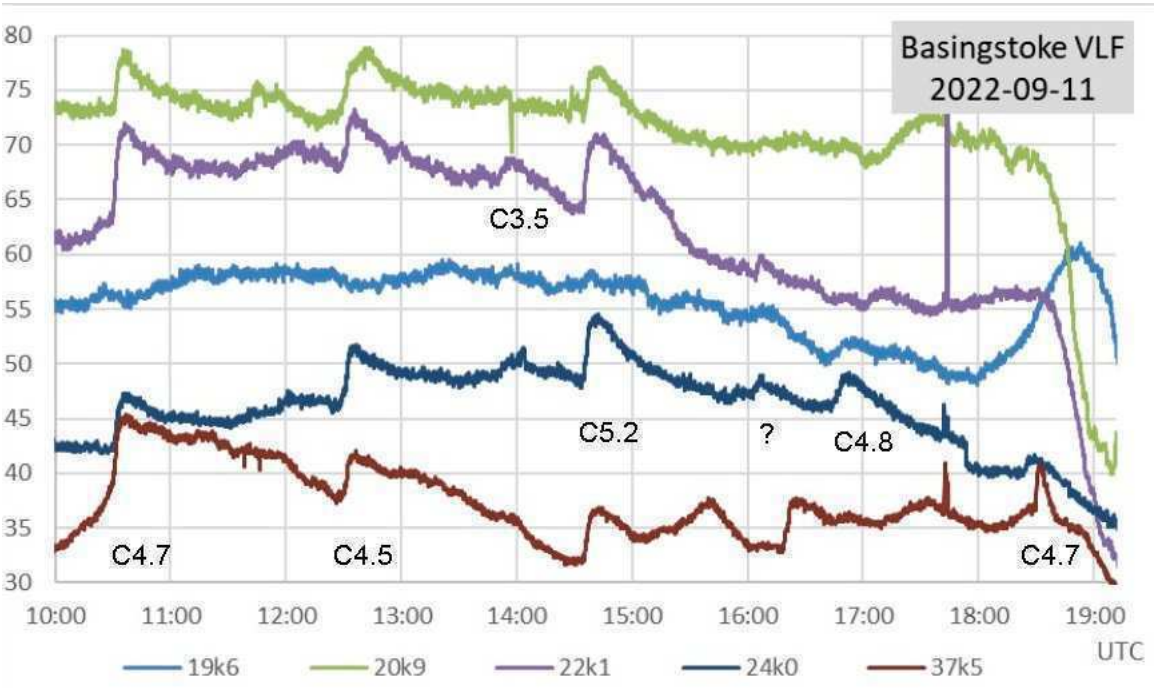




Mark Edwards noticed an apparent 24 hour repetition of flares on the 21st, 22nd and 23rd. His recording shows the three days superimposed, all showing a SID within a few minutes of 11:36, and the 20th just 5 minutes earlier. Just pure chance I suspect!

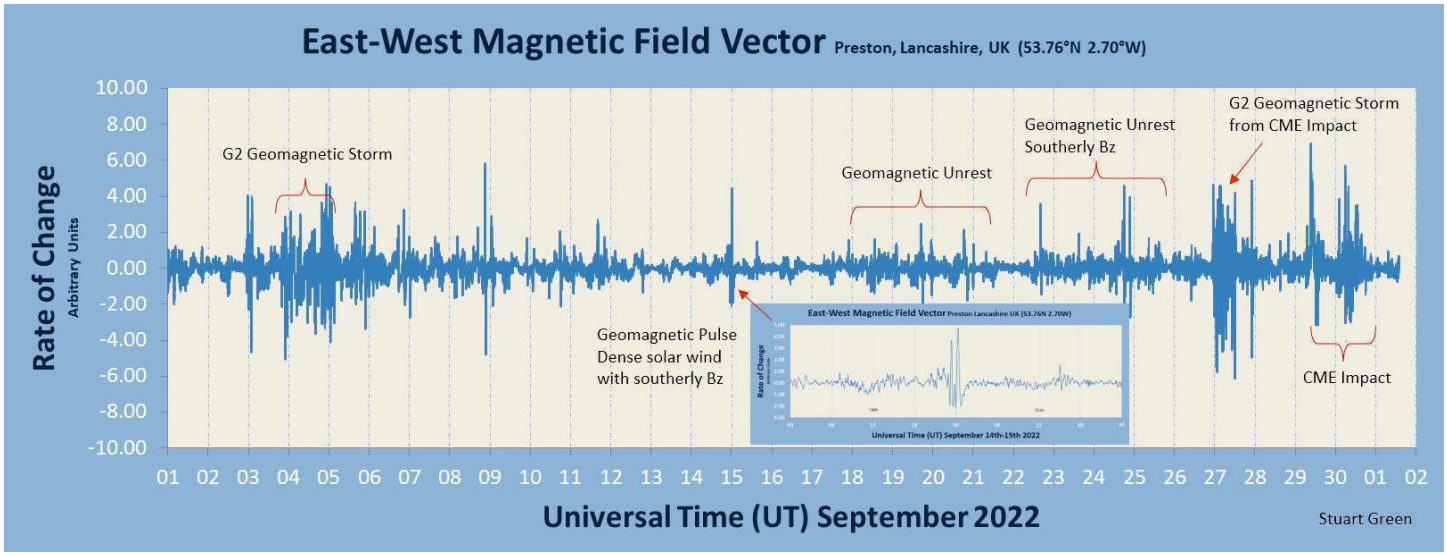


This recording by Mark Prescott on the 13th shows how the many overlapping flares have made analysis very difficult. The C7.0 flare at 12:40 produced a very clear SID, while those through the afternoon have become much less clear.

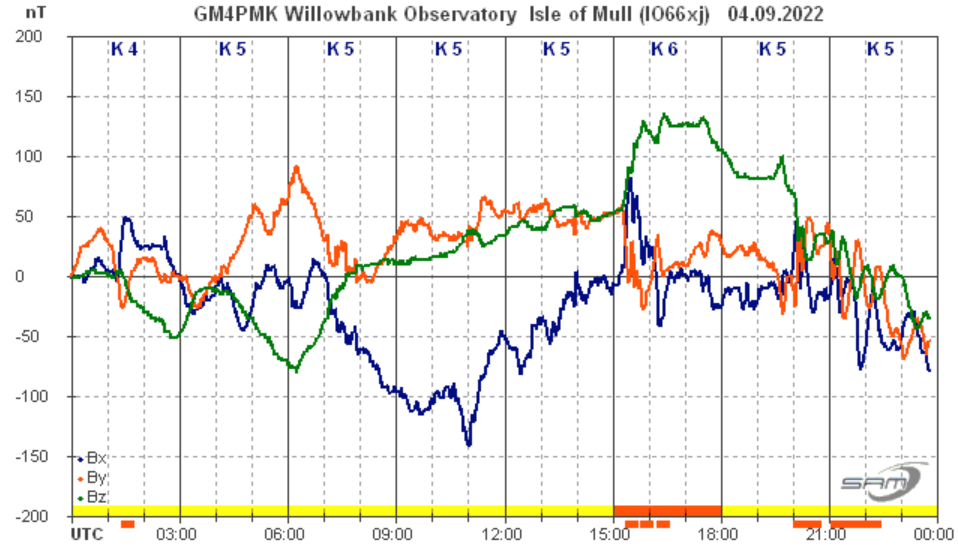


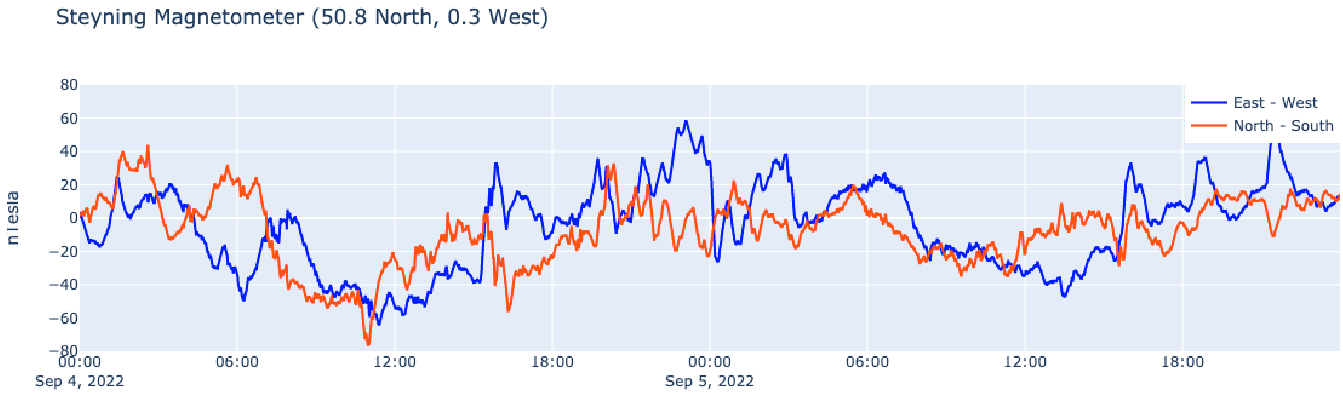
Paul Hyde's recording from the 11th shows a better spaced series of flares, although with some noise present. The spikes seen around 17:50 are from an induction hob, and so easy to eliminate. They can also be seen in the recording from the 16th shown previously.

MAGNETIC OBSERVATIONS.

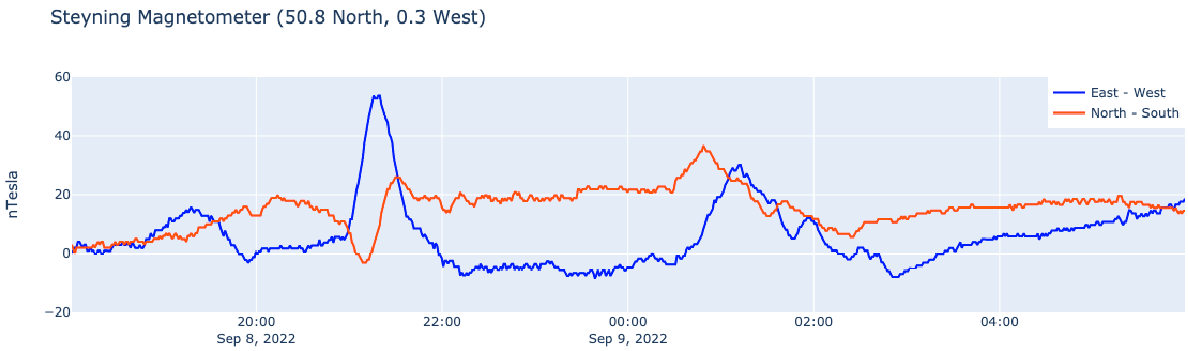


Stuart Green's summary of September's magnetic activity shows a mostly quiet period, with stronger storms to start and end the month. Despite the number of strong flares recorded, there were very few CMEs directed towards Earth. The most active period was the 4th and 5th, due to a mixture of a general high speed solar wind and some glancing blows from CMEs in late August. Roger Blackwell's chart shows the 4th:



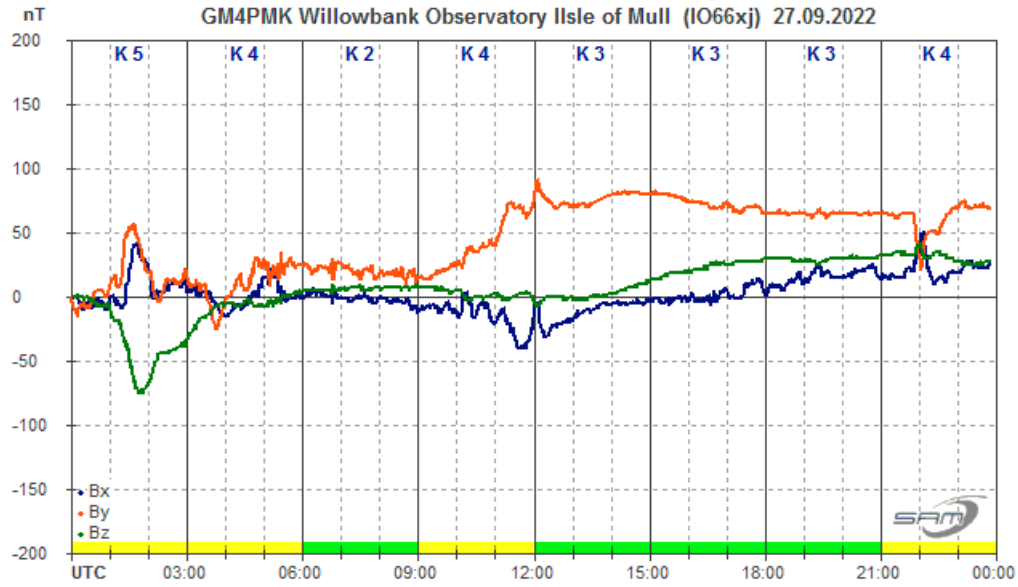


Nick Quinn's chart shows the 4th and 5th, activity decaying slowly through the 5th. Disturbed conditions continued through to the 8th, with a strong pulse about 21:20 shown in his recording:



The source of this sudden pulse does not seem to be CME related.

A large trans-equatorial coronal hole was active towards the end of September, along with some minor CMEs. Magnetic activity started around 23:00UT on the 26th, and continued through the 27th.

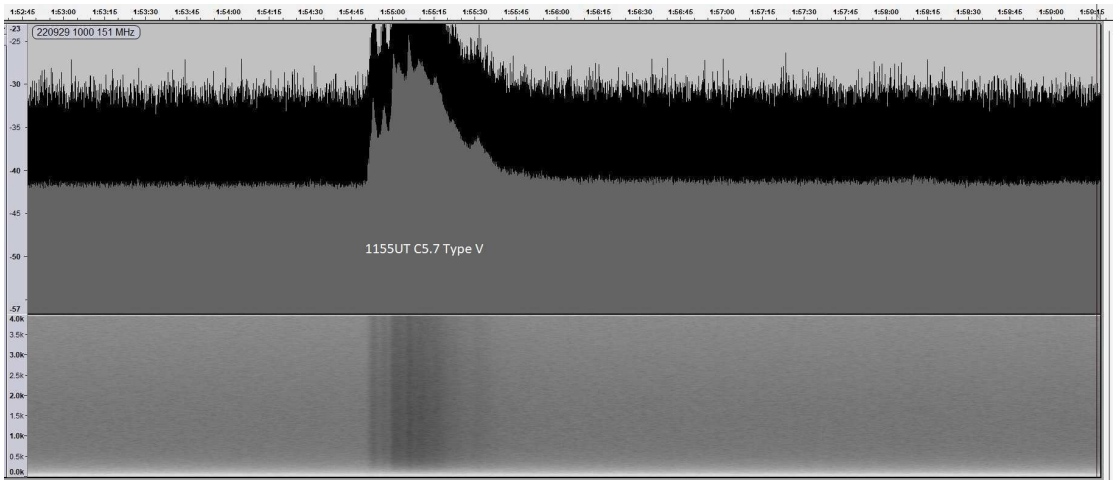


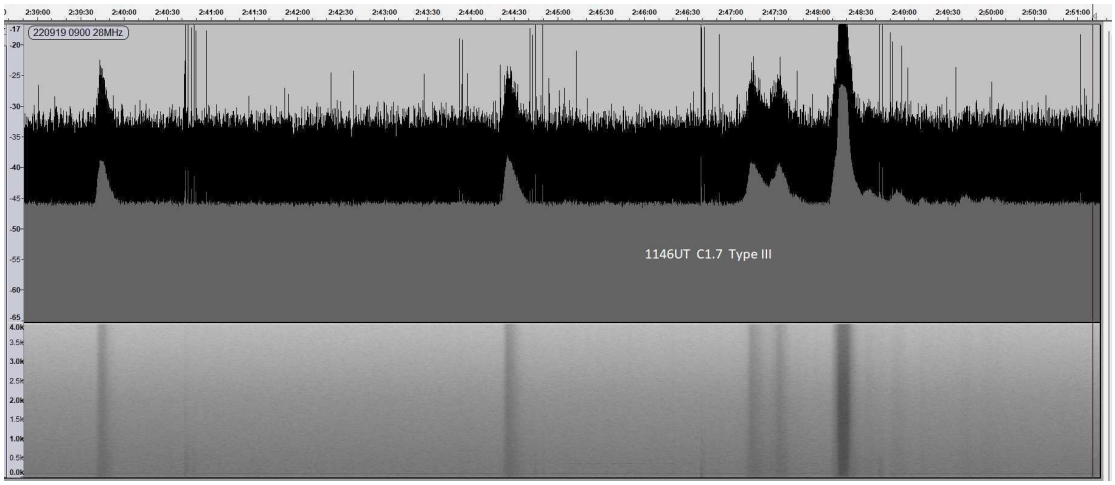
Roger Blackwell's chart shows some very rapid oscillations during the morning. This faded a little in the afternoon, before becoming more disturbed again at the end of the month and into October.

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

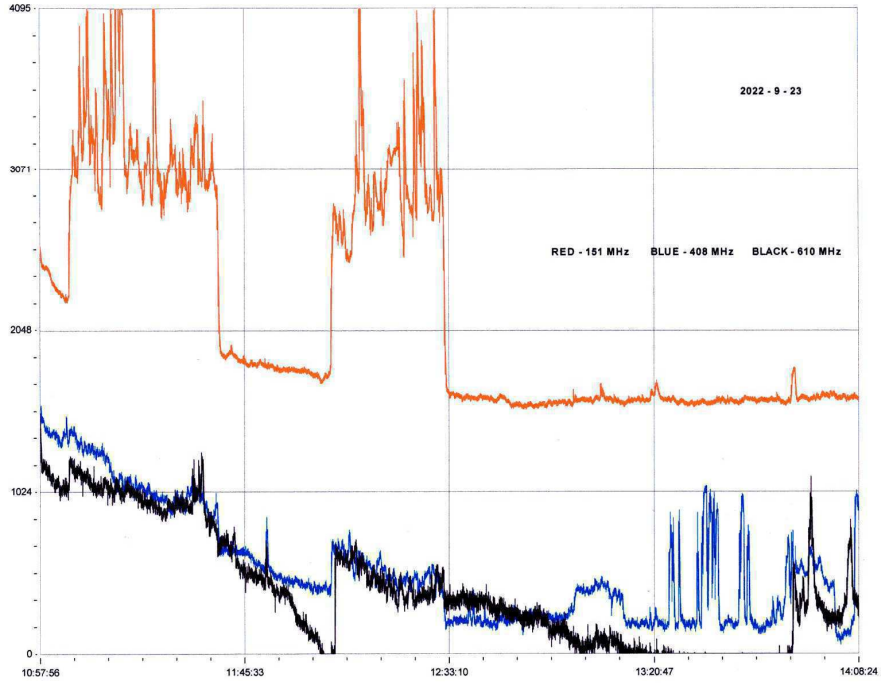
SOLAR EMISSIONS

The sun is now very low in the sky for VHF /UHF monitoring of solar emissions. Colin Clements and Colin Briden did mange to catch some signals, but most of the flares did not appear to have any VHF / UHF activity. Colin Briden's recording of a type V emission at 151MHz matches the C5.7 Flare at 11:55 on the 29th. The signal rises about 17dB above the background, and lasts for just one minute.





This 28MHz type III signal is from the 19th, peaking about 20dB above the background at 11:46 on the 19th. Its timing matches a C1.7 flare, although we did not record a SID from it.

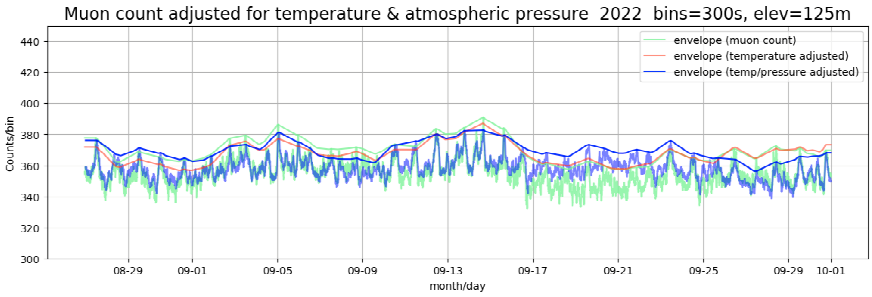


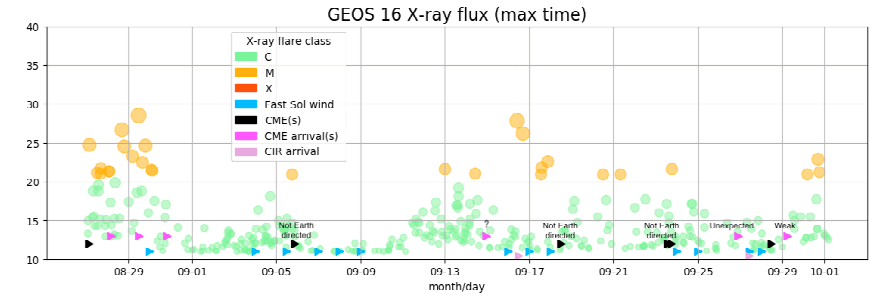
Colin Clements' recording from the 23rd shows two strong signals at 151MHz (red), the second of which matches the C7.2 flare. There is also a small rise at 408MHz (blue) and 610MHz (black). The source of

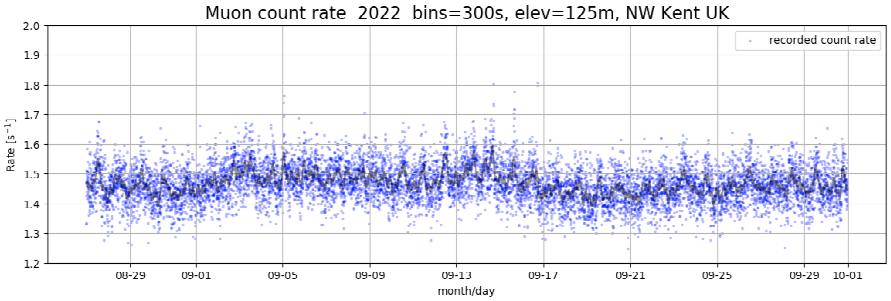
the first signal is not clear, as it starts well after the earlier C2.7 flare. The increase in 408MHz activity after 13:20 may be related to the unclassified flare recorded at 13:24. The SWPC flare list shows quite a number of unclassified flares during the afternoon of the 23rd. Colin Also noted noise bursts on the 16th, 22nd and 24th.

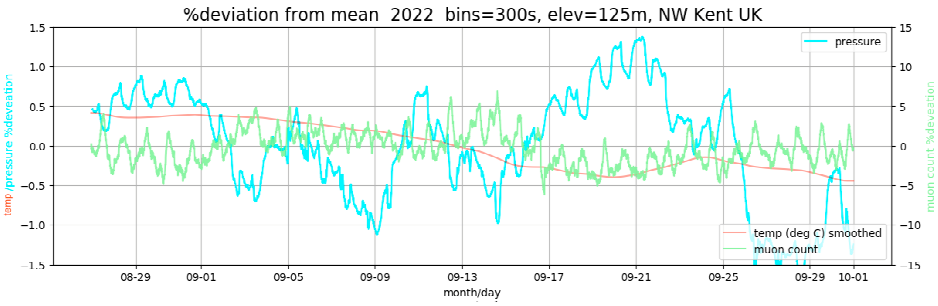
MUON OBSERVATIONS.

Mark Prescott has made further muon counts shown in these charts:

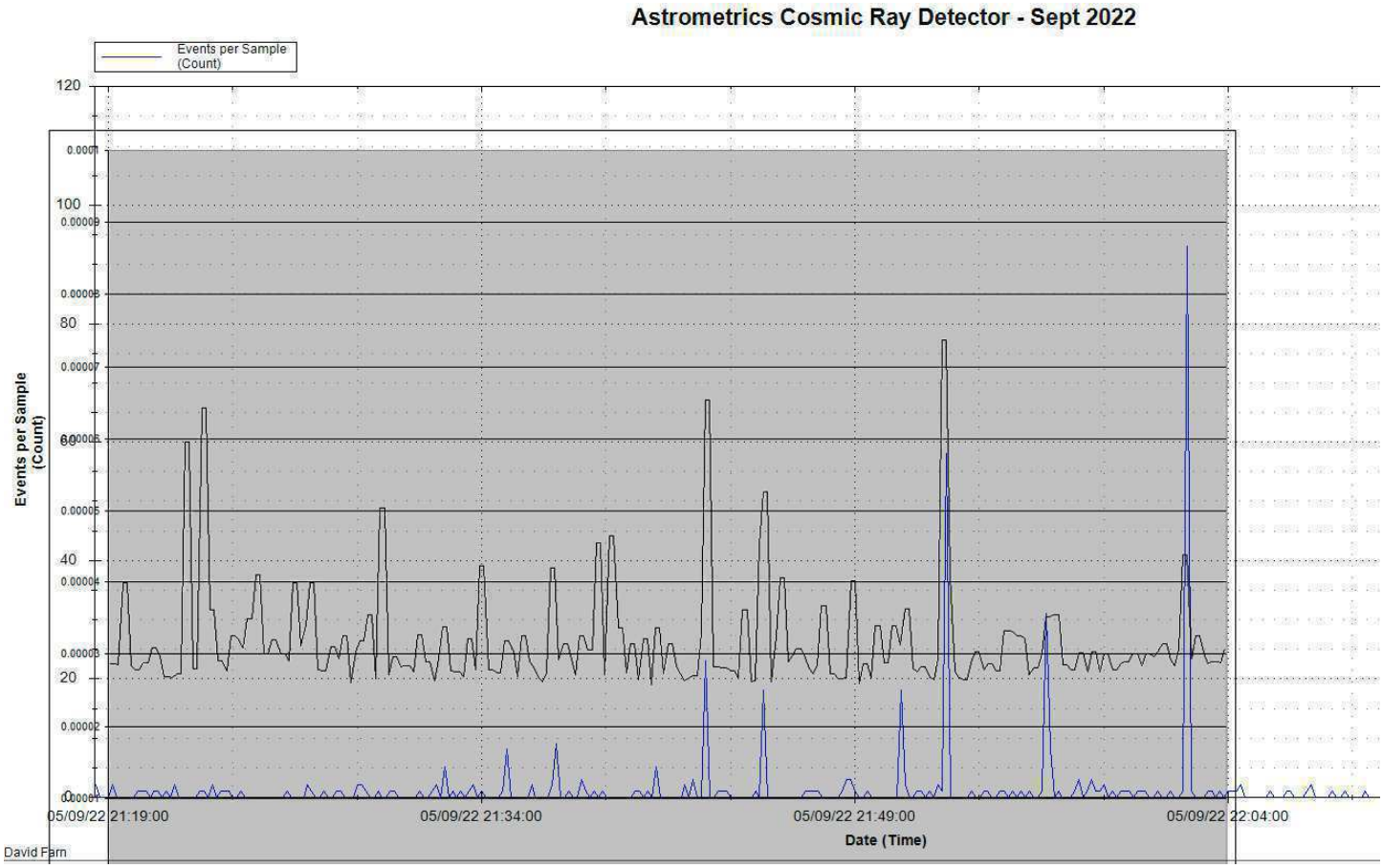








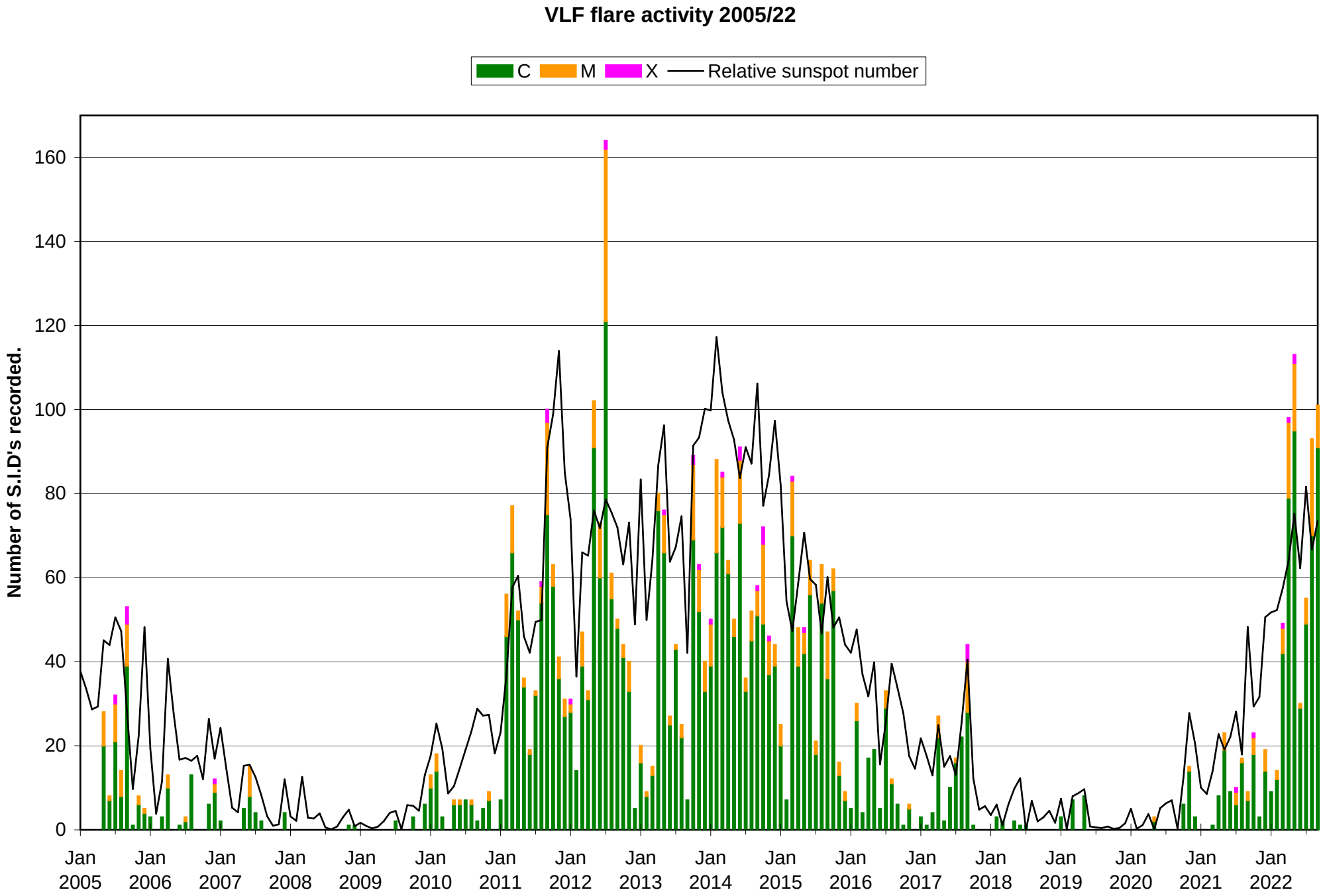
The data has been adjusted for temperature and atmospheric pressure as explained in the August edition. Muon counts can be seen to fall slightly following the stronger solar events as the solar wind speed and density increases.



David Farn has been comparing his muon data with lightning strikes. Lightning is often recored on our VLF SID charts as interference, and so David has overlaid MarkEdwards' VLF data from the 5th onto the muon counts. Both observers are near Coventry. The chart shows data from 21:19 to 22:04, with VLF in black and muons in blue. A good match can be seen, particulalrly for the stronger lightning strikes. David has found an online paper that investigates how this occurs:

https://www.science.org/content/article/cosmic-rays-could-reveal-secrets-lightning-earth

Included with this month's edition is an article by Andrew Thomas examining the use of the UKRAA dual axis magnetometer.


VLF flare activity 2005/22
C
M
X
Relative sunspot number
Number of S.I.D's recorded.
0
20
40
60
80
100
120
140
160
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

BAA Radio Astronomy Section. **2022 SEPTEMBER.**

	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 (22.1kHz/*24kHz*) Spectrum Lab / PC 1.5m frame aerial.				Mark Edwards (24.0/*22.1*/**20.9kHz**) Spectrum Lab / PC 2m loop aerial.				Colin Clements (21.75kHz) 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	?	1													10:20	10:21	10:29	1-				
1	C1.6	2													12:20	12:22	12:31	1-				
1	C4.1	6									13:53	14:02	14:42	2+	13:54	14:01	15:04	2+	13:54	14:03	14:55	2+
2	?	1													09:24	09:27	09:36	1-				
2	C1.6	2													10:06	10:11	10:22	1-				
2	?	2													12:33	12:36	12:42	1-				
2	C2.1	4									13:24	13:28	13:35	1-	13:26	13:27	13:43	1-				
2	C2.4	2													13:45	13:52	13:55	1-				
2	?	3									14:00	14:08	14:26	1+	14:03	14:11	14:29	1+				
2	C2.6	4									15:00	15:16	15:49	2+	15:00	15:21	15:44	2				
2	C3.5	2									16:18	16:27	16:40	1	16:19	16:29	16:46	1+				
2	C2.9	1													16:46	16:51	16:57	1-				
2	C3.8	2									17:07	17:18	17:41	2	17:08	17:20	17:37	1+				
3	?	1													12:11	12:12	12:15	1-				
3	C2.1	3									12:21	12:31	13:03	2	12:23	12:28	12:46	1				
3	C1.3	1													13:43	13:43	?	-				
3	?	1													14:07	14:10	14:26	1				
3	C1.0	1													15:19	15:22	15:25	1-				
3	C3.1	3									16:43	16:52	17:16	2	16:45	16:49	17:16	1+				
4	C2.3	3									10:16	10:23	10:47	1+	10:19	10:23	10:42	1				
4	C2.5	3									10:52	10:56	11:10	1-	10:54	11:03	11:23	1+				
4	?	2													*11:06*	*11:16*	*11:27*	*1*				
4	C3.1	4													11:29	11:36	?	-				
4	?	1													11:42	11:48	12:11	1+				
4	C4.3	7	12:14	12:17	12:34	1					12:13	12:19	?	-	12:16	12:21	?	-				
4	?	2									12:22	12:30	12:52	1+	12:23	12:28	12:56	2				
4	?	1													12:58	13:03	13:12	1-				
4	C2.5	2									13:52	13:56	?	-	13:53	13:57	?	-				
4	C2.9	5									14:04	14:10	14:50	2+	14:05	14:14	14:51	2+				
4	C2.1	2													16:23	16:26	17:11	2+				
4	C8.2	6					16:31	16:37	16:49	1-	16:33	16:40	17:38	2+	16:34	16:41	?	-				
5	C3.9	1																				
5	C3.8	3									08:04	08:23	08:42	2	*08:20*	*08:24*	*08:31*	*1-*				
5	C4.0	7	08:55	08:58	09:28	2					08:52	09:02	09:26	2	*08:53*	*09:04*	*09:21*	*1+*				
5	C1.6	1																				
5	C3.1	6	10:36	10:40	10:46	1-					10:35	10:45	?	-	10:37	10:45	?	-				
5	C4.1	3	11:00	11:08	?	-					10:58	11:09	11:43	2	10:58	11:08	?	-				
5	C5.3	6	11:13	11:15	11:30	1-									11:12	11:20	11:38	1+				
5	C4.7	1													17:21	17:28	?	-				
5	?	1													17:38	17:46	?	-				
5	**M1.0**	2													18:02	18:10	18:45	2				
6	C2.3	2									11:23	11:31	11:57	2	11:21	11:34	12:28	2+				
6	C3.2	2									18:28	18:38	19:19	2+	18:30	18:31	18:58	1+				
10	C2.6	1													11:14	11:24	11:36	1				
11	C4.7	7	10:32	10:35	10:49	1-					10:28	10:40	11:23	2+	10:31	10:36	11:31	2+	10:33	10:38	11:22	2+
11	C4.5	7	12:30	12:35	13:02	1+					12:28	12:39	13:36	2+	12:29	12:36	13:15	2+	12:08	12:42	13:37	3
11	C3.5	2									13:46	13:49	14:19	2	13:51	13:56	14:17	1+				
11	C5.2	6	14:36	14:39	14:49	1-					14:34	14:45	15:34	2+	14:35	14:40	15:18	2				
11	?	2									16:02	16:11	16:27	1	16:05	16:10	16:20	1-				
11	C4.8	2									16:44	16:53	17:30	2+	16:45	16:54	17:24	2				
11	C3.5	1													18:13	18:14	18:22	1-				
11	C4.7	2									18:21	18:31	?	-	18:25	18:30	18:45	1				
12	C3.7	3									09:13	09:27	09:40	1+	**09:23**	**09:32**	**09:42**	**1**				
12	?	2									10:06	10:23	10:38	1+	10:15	10:21	10:31	1-				
12	C3.5	1													***11:25***	***11:28***	***11:36***	***1-***				
12	C6.3	8	12:16	12:26	?	-	12:11	12:24	12:36	1	12:12	12:26	?	-	*12:15*	*12:31*	?	-	12:14	12:31	13:00	2+
12	C7.4	9	12:56	12:59	13:42	2+	12:55	13:01	13:13	1-	12:57	13:04	14:13	2+	*12:58*	*13:03*	*13:30*	*1+*	13:00	13:06	13:51	2+
12	?	1													***15:30***	***15:32***	***15:41***	***1-***				
13	?	1													**10:09**	**10:13**	**10:21**	**1-**				
13	C4.0	4	11:27	11:34	11:39	1-					11:26	11:35	11:49	1	11:29	11:34	11:59	1+				
13	C7.0	10	12:35	12:38	?	-	12:33	12:37	12:48	1-	12:33	12:39	13:26	2+	12:35	12:39	13:28	2+	12:37	12:41	13:48	2+
13	?	7									13:55	14:08	?	-	13:57	14:12	14:54	2+	13:48	14:12	14:52	2+
13	?	6									14:53	15:02	16:34	3	14:55	15:06	?	-				
13	?	1													15:13	15:16	?	-				
13	C9.2	2													15:33	15:38	16:09	2				
13	C4.9	2													17:27	17:29	17:53	1+				
14	**M1.1**	10	09:52	10:11	?	-	09:48	10:18	10:40	2+	09:43	10:16	11:10	3	09:55	10:19	11:02	2+	09:42	10:16	11:09	3
14	C5.9	6	11:16	11:22	?	-					11:14	11:21	11:54	2	11:16	11:29	11:58	2	11:17	11:27	12:09	2+
14	C7.7	10	12:09	12:16	13:22	2+	12:05	12:16	12:34	1+	12:05	12:20	13:01	2+	12:10	12:17	13:17	2+	12:09	12:21	13:18	2+
14	C1.8	1																				
14	C3.6	5	14:25	14:50	15:27	2+					14:55	15:04	15:33	2	14:55	15:03	15:36	2				
16	**M7.9**	10	09:47	09:53	11:26	3	09:47	09:50	10:35	2+	09:46	09:54	11:08	2+	09:47	09:51	11:03	2+	09:48	09:54	11:15	3
16	**M6.2**	9	15:51	16:00	16:40	2+	15:48	16:00	16:31	2	15:55	16:04	17:16	2+	15:50	16:03	17:25	3				
17	?	7					12:55	13:14	13:24	1+	12:54	13:16	?	-	12:51	13:17	?	-	12:47	13:20	?	-
17	**M1.9**	10	*13:27*	*13:37*	*14:00*	*2*	13:26	13:37	14:17	2+	13:24	13:34	15:04	3	13:30	13:35	15:24	3	?	13:38	15:26	-
18	C3.6	5									13:00	13:04	13:57	2+	13:00	13:08	?	-				
18	?	1													***13:21***	***13:24***	***13:33***	***1-***				
18	?	1													13:38	13:38	13:49	1-				
18	C2.2	1													15:10	15:15	?	-				
18	?	4									15:21	15:41	16:58	3	15:21	15:44	16:40	2+				
19	C2.5	4									13:54	14:01	14:49	2+	13:53	14:01	14:18	1				
20	C2.4	3	09:23	09:26	09:40	1-					09:19	09:28	09:51	1+								
20	**M1.0**	9	11:20	11:27	12:52	3	11:18	11:27	11:37	1	11:18	11:30	12:29	2+	11:20	11:32	12:25	2+	11:21	11:32	14:20	3+
20	C7.7	6					14:59	15:15	15:23	1	14:58	15:06	15:50	2+	14:59	15:09	15:48	2+	15:00	15:09	15:36	2
20	C3.8	2									16:29	16:32	16:52	1	16:31	16:38	17:01	1+				
20	C4.5	1													18:41	18:43	18:55	1-				
21	**M1.0**	2									06:55	07:05	07:50	2+	*06:53*	*07:00*	*07:09*	*1-*				
21	?	4									11:27	11:39	11:58	1+	11:32	11:43	12:08	2				
22	C1.7	1													***08:45***	***08:51***	***08:57***	***1-***				
22	C1.8	1													10:24	10:26	10:29	1-				
22	?	0																				
22	C7.8	11	11:30	11:35	12:18	2+	11:29	11:34	11:42	1-	11:29	11:38	12:16	2+	11:30	11:36	12:05	2	11:32	11:41	12:46	2+
22	?	2									13:04	13:16	13:30	1+	13:06	13:17	13:33	1+				
22	C3.6	4									14:25	14:36	15:18	2+	14:27	14:41	15:21	2+	14:28	14:42	15:08	2
23	C2.8	2									08:53	08:59	09:23	1+	***08:52***	***08:58***	***09:19***	***1+***				
23	C2.7	4									09:30	09:44	10:26	2+	*09:34*	*09:43*	*10:00*	*1+*				
23	C7.2	9	11:32	11:35	12:21	2+					11:31	11:38	?	-	11:32	11:36	12:18	2+	11:32	11:38	12:26	2+
23	C1.8	2									12:39	12:49	13:18	2	12:41	12:43	12:54	1-				
23	?	1													13:12	13:20	13:37	1				
23	C4.7/5.	5	14:13	14:35	15:26	2+					13:45	14:30	17:14	3+	13:50	14:34	15:45	3	13:51	14:32	15:33	3
23	C3.6	1													17:17	17:20	17:37	1				
23	**M1.7**	3									17:55	18:14	?	-	17:58	18:14	18:52	2+				
24	?	2													***11:33***	***11:42***	***11:51***	***1-***				
24	C4.3	6	12:19	12:30	12:47	1+					12:22	12:36	12:53	1+	12:24	12:38	?	-	12:25	12:39	13:01	2
24	C5.1	5									13:08	13:21	14:15	2+	12:59	13:22	14:28	3	13:01	13:29	14:20	2+
24	C3.0	3									14:27	14:35	?	-	14:32	14:40	?	-	14:31	14:39	14:50	1
24	C3.8	3									14:51	14:55	15:13	1	14:50	14:55	15:16	1+				
24	C7.2	7	16:04	16:07	16:15	1-	16:00	16:07	16:15	1-	16:00	16:11	16:43	2	16:02	16:11	16:45	2				
24	C2.9	1													16:49	16:53	17:00	1-				
24	C7.2	2													17:11	17:20	17:57	2+				
24	C6.1	1													18:47	18:50	18:54	1-				
25	?	1													17:45	17:47	17:53	1-				
26	C4.7	6	*09:00*	*09:07*	*09:24*	*1*					08:59	09:15	09:57	2+	*09:01*	*09:09*	*09:31*	*1+*				
26	C2.1	1													*12:43*	*12:52*	*13:04*	*1*				
26	C2.9	2									15:41	15:48	16:04	1	*15:45*	*15:47*	*15:56*	*1-*				
27	C4.0	8	11:51	11:57	12:28	2					11:50	12:01	12:32	2	11:50	12:01	12:40	2+	11:51	12:01	13:43	3
27	C2.1	5	13:49	13:54	?	-					13:46	13:56	14:36	2+	13:49	13:54	14:38	2+				
27	C1.1	1													14:48	14:50	?	-				
27	?	1													14:55	15:00	15:12	1-				
27	C2.0	1													16:49	16:50	16:58	1-				
29	C5.7	9	11:55	12:05	13:23	3					11:53	12:06	13:19	3	11:55	12:15	13:11	2+	11:56	12:17	13:40	3
29	C5.0	6									13:37	13:47	14:19	2	13:37	13:46	14:16	2	13:40	13:49	14:20	2
29	?	2									14:40	14:51	15:22	2	14:44	14:49	?	-				
29	?	1													15:03	15:09	15:32	1+				
30	C5.5	1									06:53	07:00	?	-								
30	C2.8	3	*08:40*	*08:45*	*09:00*	*1*					08:38	08:49	09:07	1+	*08:41*	*08:47*	*08:57*	1-				
30	?	2									09:08	09:19	09:36	1+	***09:14***	***09:18***	***09:41***	***1+***				
30	C3.0	5									11:34	11:43	?	-	11:37	11:44	11:56	1				
30	?	4									11:57	11:59	12:22	1	12:01	12:04	12:25	1				
30	C7.8	9	14:12	14:17	?	-					14:06	14:20	?	-	14:08	14:20	?	-	14:09	14:22	14:52	2
30	C4.0	4	15:17	15:27	15:36	1					15:05	15:17	?	-	15:06	15:16	?	-				
30	C4.0	3									15:29	15:39	15:59	1+	15:30	15:35	16:07	2				
30	**M2.9**	10	16:15	16:21	16:54	2	16:14	16:22	16:40	1+	16:13	16:26	16:53	2	16:14	16:22	?	-	16:13	16:20	16:24	1-
30	**M1.3**	2													17:32	17:39	18:17	2				

BAA Radio Astronomy Section. **2022 SEPTEMBER.**

	Xray class		Steve Parkinson (Various)				Andrew Thomas (19.6kHz/*22.1kHz*)				Phil Rourke (23.4kHz)				Mark Prescott (20.9kHz/*19.6kHz*)				Colin Briden (22.1kHz)			
			Tuned radio frequency receiver, frame aerials.				Tuned radio frequency receiver, 0.6m frame aerial.				0.6m cross loop aerial.				SpetrumLab/Starbase, mini-whip aerial. Active				Spectrum Lab / PC, frame aerial. 1.2m			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
1	?																					
1	C1.6																		12:18	12:23	12:27	1-
1	C4.1		13:53	14:01	14:26	2	13:12	14:02	14:51	3	13:55	14:03	14:18	1								
2	?																					
2	C1.6																		10:03	10:07	10:09	1-
2	?																		12:23	12:27	12:36	1-
2	C2.1		13:25	13:27	13:33	1-													13:24	13:29	13:35	1-
2	C2.4																		13:51	14:11	14:31	2
2	?		14:02	14:09	14:25	1																
2	C2.6		15:01	15:18	15:40	2													15:01	15:07	15:24	1
2	C3.5																					
2	C2.9																					
2	C3.8																					
3	?																					
3	C2.1																		12:23	12:27	12:35	1-
3	C1.3																					
3	?																					
3	C1.0																					
3	C3.1																		16:46	16:50	16:55	1-
4	C2.3																		10:17	10:22	10:27	1-
4	C2.5																		10:54	10:57	11:03	1-
4	?																		11:27	11:30	11:42	1-
4	C3.1										11:23	11:50	?	-	11:30	11:40	12:07	2	11:42	11:46	11:55	1-
4	?																					
4	C4.3		12:14	12:20	12:35	1					?	12:19	12:56	-	12:14	12:28	12:57	2	12:14	12:19	12:47	2
4	?																					
4	?																					
4	C2.5																					
4	C2.9		14:06	14:11	14:29	1									14:08	14:17	14:40	1+	14:04	14:11	14:25	1
4	C2.1																		16:09	16:26	?	-
4	C8.2		16:04	16:40	17:43	3					15:49	16:29	?	-					16:34	16:42	16:55	1
5	C3.9														08:09	08:15	?	-				
5	C3.8														?	08:27	08:47	-				
5	C4.0		08:55	09:02	09:35	2					08:55	09:04	09:44	2+	08:56	09:11	09:44	2+	08:54	08:58	09:06	1-
5	C1.6														10:19	10:28	10:37	1-				
5	C3.1		10:36	?	?	-					10:35	10:47	?	-	10:38	10:45	10:59	1				
5	C4.1																					
5	C5.3		11:00	11:15	11:27	1+					?	11:15	12:02	-	11:01	11:21	11:36	2	10:59	11:15	11:30	1+
5	C4.7																					
5	?																					
5	**M1.0**																		18:05	18:07	18:10	1-
6	C2.3																					
6	C3.2																					
10	C2.6																					
11	C4.7		10:30	10:38	11:17	2+	10:32	10:38	11:18	2+					10:32	10:39	11:12	2				
11	C4.5		12:30	12:35	12:55	1					12:31	12:36	12:54	1	12:32	12:43	13:47	2+				
11	C3.5																					
11	C5.2		14:35	14:46	15:75	3					14:38	14:43	14:58	1	14:38	14:49	15:35	2+				
11	?																					
11	C4.8																					
11	C3.5																					
11	C4.7																					
12	C3.7		09:20	09:30	09:55	2																
12	?																					
12	C3.5																					
12	C6.3						12:14	12:29	12:57	2					12:16	12:31	12:58	2	12:14	12:29	12:36	1
12	C7.4		12:57	13:03	13:18	1	12:57	13:03	13:37	2					12:59	13:07	13:20	1	12:58	13:03	13:12	1-
12	?																					
13	?																					
13	C4.0																		11:28	11:33	11:43	1-
13	C7.0		12:34	12:38	13:15	2	12:35	12:38	13:29	2+	12:35	12:41	13:16	2	12:37	12:42	13:01	1	12:35	12:38	12:56	1
13	?						13:54	14:09	14:56	2+	13:55	14:08	14:33	2	14:02	14:12	14:51	2+	13:52	13:58	14:02	1-
13	?		14:54	15:04	15:50	2+	14:56	15:04	15:57	2+					14:55	15:03	?	-	14:53	15:02	15:12	1
13	?																					
13	C9.2														?	15:16	15:49	-				
13	C4.9																		17:28	17:29	17:31	1-
14	**M1.1**		09:50	10:17	11:04	2+	09:48	10:15	11:16	3	09:51	10:16	11:12	2+	09:56	10:22	11:09	2+	09:58	10:15	10:36	2
14	C5.9						11:15	11:24	11:57	2									11:16	11:18	11:36	1
14	C7.7		12:10	12:18	13:00	2+	12:09	12:17	12:57	2+	12:09	12:19	12:55	2+	12:11	12:21	13:16	2+	12:10	12:17	12:47	2
14	C1.8																		14:57	15:01	15:09	1-
14	C3.6		14:56	15:02	15:20	1													14:57	15:01	15:09	1-
16	**M7.9**		09:47	09:53	11:25	3	09:46	09:52	11:56	3+	09:48	09:53	10:53	2+	09:49	09:56	11:15	3	09:48	09:52	10:28	2
16	**M6.2**		15:50	16:02	17:10	2+	15:51	16:02	16:52	2+	15:50	16:01	17:05	2+	15:53	16:05	16:51	2+	15:51	16:02	16:20	1+
17	?										12:55	13:19	?	-	12:55	13:19	?	-	12:50	13:11	?	-
17	**M1.9**		12:50	13:40	15:20	3+	12:48	13:37	15:36	3+	?	13:37	14:44	-	13:30	13:37	15:15	3	13:25	13:38	14:03	2
18	C3.6		13:00	13:07	13:40	2									13:03	13:13	13:47	2	13:01	13:07	13:18	1-
18	?																					
18	?																					
18	C2.2																					
18	?		15:23	15:39	16:05	2													15:19	15:39	16:05	2+
19	C2.5		13:52	14:00	14:18	1+													13:52	14:00	14:09	1-
20	C2.4		09:23	09:29	09:55	1+																
20	**M1.0**						11:18	11:28	12:37	2+	11:19	11:30	12:18	2+	*11:23*	*11:32*	*12:11*	*2+*	11:21	11:29	11:42	1
20	C7.7		14:59	15:09	15:50	2+													14:58	15:09	15:28	1+
20	C3.8																					
20	C4.5																					
21	**M1.0**																					
21	?		11:32	11:41	12:00	1+													11:29	11:39	11:44	1-
22	C1.7																					
22	C1.8																					
22	?																					
22	C7.8		11:30	11:36	12:10	2	11:28	11:36	12:28	2+	11:30	11:38	12:28	2+	*11:34*	*11:41*	*12:36*	*2+*	11:31	11:37	11:55	1
22	?																					
22	C3.6																		14:25	14:38	14:58	2
23	C2.8																					
23	C2.7		09:34	09:42	09:56	1													09:32	09:44	09:51	1
23	C7.2		11:32	11:37	12:30	2+	11:23	11:36	12:36	2+	11:32	11:36	12:13	2	*11:34*	*11:38*	*12:31*	*2+*	11:32	11:36	11:55	1
23	C1.8																					
23	?																					
23	C4.7/5.6																		13:53	14:25	14:51	2+
23	C3.6																					
23	**M1.7**																		17:56	18:12	18:37	2
24	?																		09:46	10:52	11:09	2+
24	C4.3										12:25	12:39	?	-					12:24	?	?	-
24	C5.1										?	13:20	14:05	-					13:04	13:22	13:37	2
24	C3.0																					
24	C3.8																		14:53	14:55	14:58	1-
24	C7.2						*16:03*	*16:09*	*16:45*	*2*	16:04	16:11	16:32	1+					16:00	16:09	16:23	1
24	C2.9																					
24	C7.2																		17:09	17:20	17:33	1
24	C6.1																					
25	?																					
26	C4.7		08:59	09:13	09:50	2+					09:01	09:15	10:06	2+					09:00	09:11	09:22	1
26	C2.1																					
26	C2.9																					
27	C4.0		11:51	12:01	12:30	2	11:50	11:59	12:30	2	11:52	12:01	12:26	2					11:51	11:59	12:14	1
27	C2.1		13:48	13:54	14:10	1													13:48	13:53	14:06	1-
27	C1.1																					
27	?																					
27	C2.0																					
29	C5.7		11:55	12:12	?	-	11:54	12:11	14:16	3+	11:54	12:12	13:30	3	*11:58*	*12:11*	*13:35*	*3*	11:55	12:10	13:00	2+
29	C5.0		13:39	13:45	14:10	1+					13:38	13:45	14:16	2					13:37	13:45	14:01	1
29	?																					
29	?																					
30	C5.5																					
30	C2.8																					
30	?																					
30	C3.0		11:36	11:42	?	-					11:36	11:43	?	-					11:36	11:40	11:53	1-
30	?		11:59	12:03	12:50	2+					?	12:05	12:38	-								
30	C7.8		14:09	14:19	15:09	2+	14:12	14:19	15:05	2+	14:08	14:21	15:09	2+	*14:14*	*14:21*	*15:15*	*2+*	14:07	14:19	14:40	2
30	C4.0																		15:08	15:17	15:23	1-
30	C4.0																		15:31	15:38	15:46	1-
30	**M2.9**		16:16	16:23	16:50	2	*16:14*	*16:25*	*17:08*	*2+*	16:14	16:18	16:30	1-	*16:18*	*16:23*	*17:08*	*2+*	16:15	16:22	16:50	2
30	**M1.3**																		17:32	17:39	17:56	1

BAA Radio Astronomy Section. **2022 SEPTEMBER.**

	Xray class		Chris Bailey	Andrew Lutley (23.4kHz)	Peter Meadows (23.4kHz)	John Elliott (18.3kHz)	John Wardle
			Spectrum Lab	Tuned radio frequency receiver, 0.6m frame aerial.	Tuned radio frequency receiver, 0.6m frame aerial.	Tuned radio frequency receiver, 0.5m frame aerial.	SpectrumLab/Starbase, Active mini-whip aerial.
DAY			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
1	?						
1	C1.6						
1	C4.1						
2	?						
2	C1.6						
2	?						
2	C2.1						
2	C2.4						
2	?						
2	C2.6						
2	C3.5						
2	C2.9						
2	C3.8						
3	?						
3	C2.1						
3	C1.3						
3	?						
3	C1.0						
3	C3.1						
4	C2.3						
4	C2.5						
4	?						
4	C3.1						
4	?						
4	C4.3						
4	?						
4	?						
4	C2.5						
4	C2.9						
4	C2.1						
4	C8.2						
5	C3.9						
5	C3.8						
5	C4.0						
5	C1.6						
5	C3.1						
5	C4.1						
5	C5.3						
5	C4.7						
5	?						
5	**M1.0**						
6	C2.3						
6	C3.2						
10	C2.6						
11	C4.7						
11	C4.5						
11	C3.5						
11	C5.2						
11	?						
11	C4.8						
11	C3.5						
11	C4.7						
12	C3.7						
12	?						
12	C3.5						
12	C6.3						
12	C7.4						
12	?						
13	?						
13	C4.0						
13	C7.0						
13	?						
13	?						
13	?						
13	C9.2						
13	C4.9						
14	**M1.1**						
14	C5.9						
14	C7.7						
14	C1.8						
14	C3.6						
16	**M7.9**						
16	**M6.2**						
17	?						
17	**M1.9**						
18	C3.6						
18	?						
18	?						
18	C2.2						
18	?						
19	C2.5						
20	C2.4						
20	**M1.0**						
20	C7.7						
20	C3.8						
20	C4.5						
21	**M1.0**						
21	?						
22	C1.7						
22	C1.8						
22	?						
22	C7.8		11:30 11:35 11:57 1+				
22	?						
22	C3.6						
23	C2.8						
23	C2.7						
23	C7.2						
23	C1.8						
23	?						
23	C4.7/5.6						
23	C3.6						
23	**M1.7**						
24	?						
24	C4.3						
24	C5.1						
24	C3.0						
24	C3.8						
24	C7.2						
24	C2.9						
24	C7.2						
24	C6.1						
25	?						
26	C4.7						
26	C2.1						
26	C2.9						
27	C4.0						
27	C2.1						
27	C1.1						
27	?						
27	C2.0						
29	C5.7						
29	C5.0						
29	?						
29	?						
30	C5.5						
30	C2.8						
30	?						
30	C3.0						
30	?						
30	C7.8						
30	C4.0						
30	C4.0						
30	**M2.9**						
30	**M1.3**						

BAA Radio Astronomy Section.

BARTELS DIAGRAM

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

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