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BAA Radio Astronomy Section.

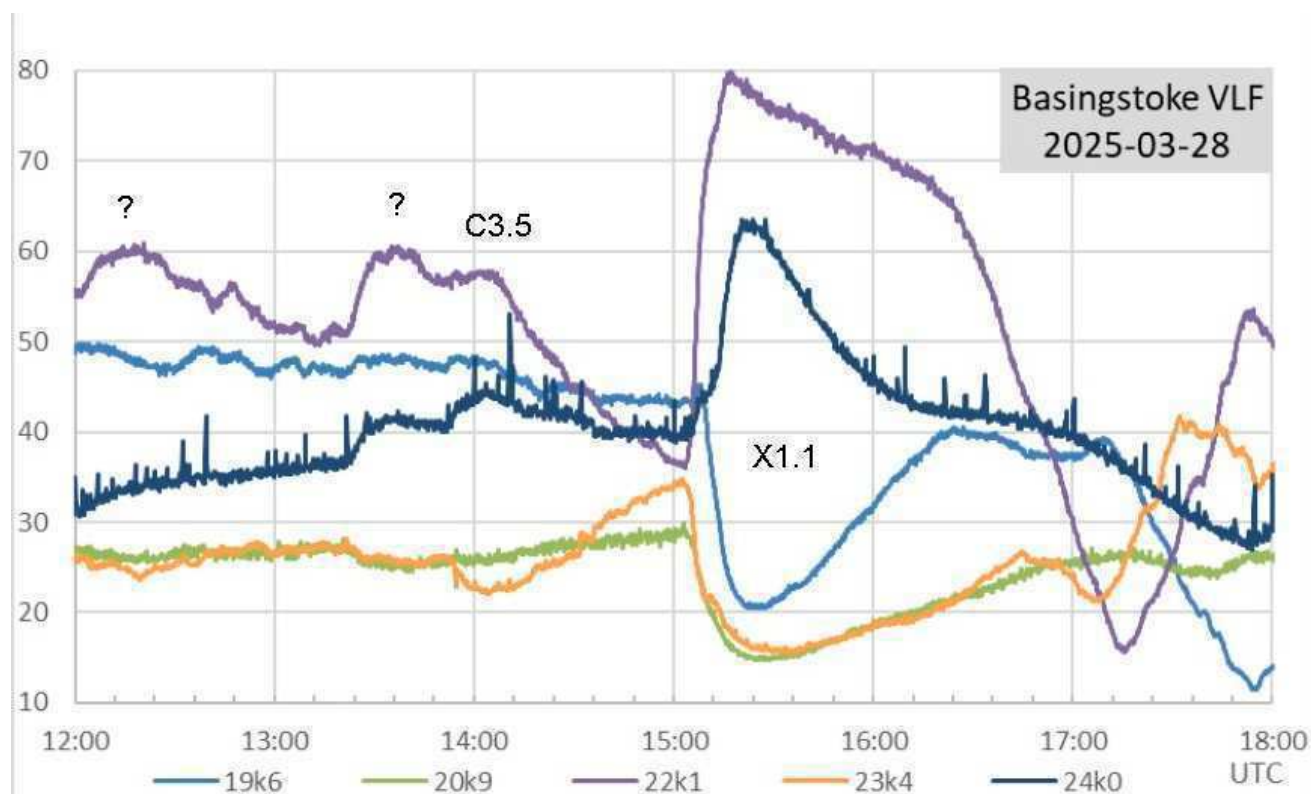
Director Paul Hearn.

RADIO SKY NEWS

2025 MARCH.

VLF SID OBSERVATIONS.

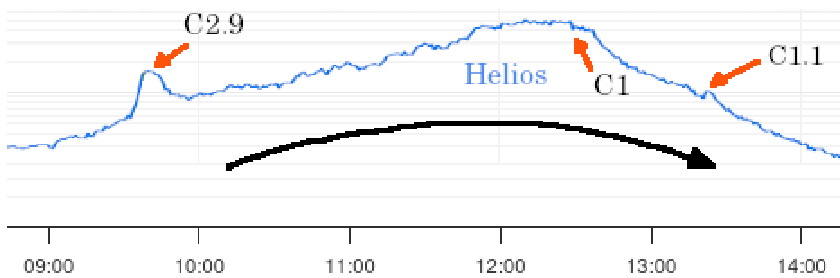
Solar flaring activity in March has been generally weaker than in February. We recorded a total of 83 SIDs compared with 80 in February, although only 9 were of M-class. In February there were 23 M-class SIDs recorded. There was a single X-flare shown in the satellite X-ray data, well timed at 15:30UT on the 28th. Most of the SIDs recorded between the 1st and 20th were from C-class flares, flaring strength increasing after that. Paul Hyde's recording from the 28th shows the X-flare:



The 24kHz and 19.6kHz signals show a nice pair of mirror-SIDs, while the other signals seem to show much longer decay times, influenced perhaps by the sunset. The C3.5 flare has produced quite a weak SID, while the unlisted events both show stronger SIDs. The one at 13:40UT was widely recorded, although the earlier one just had a single observation.

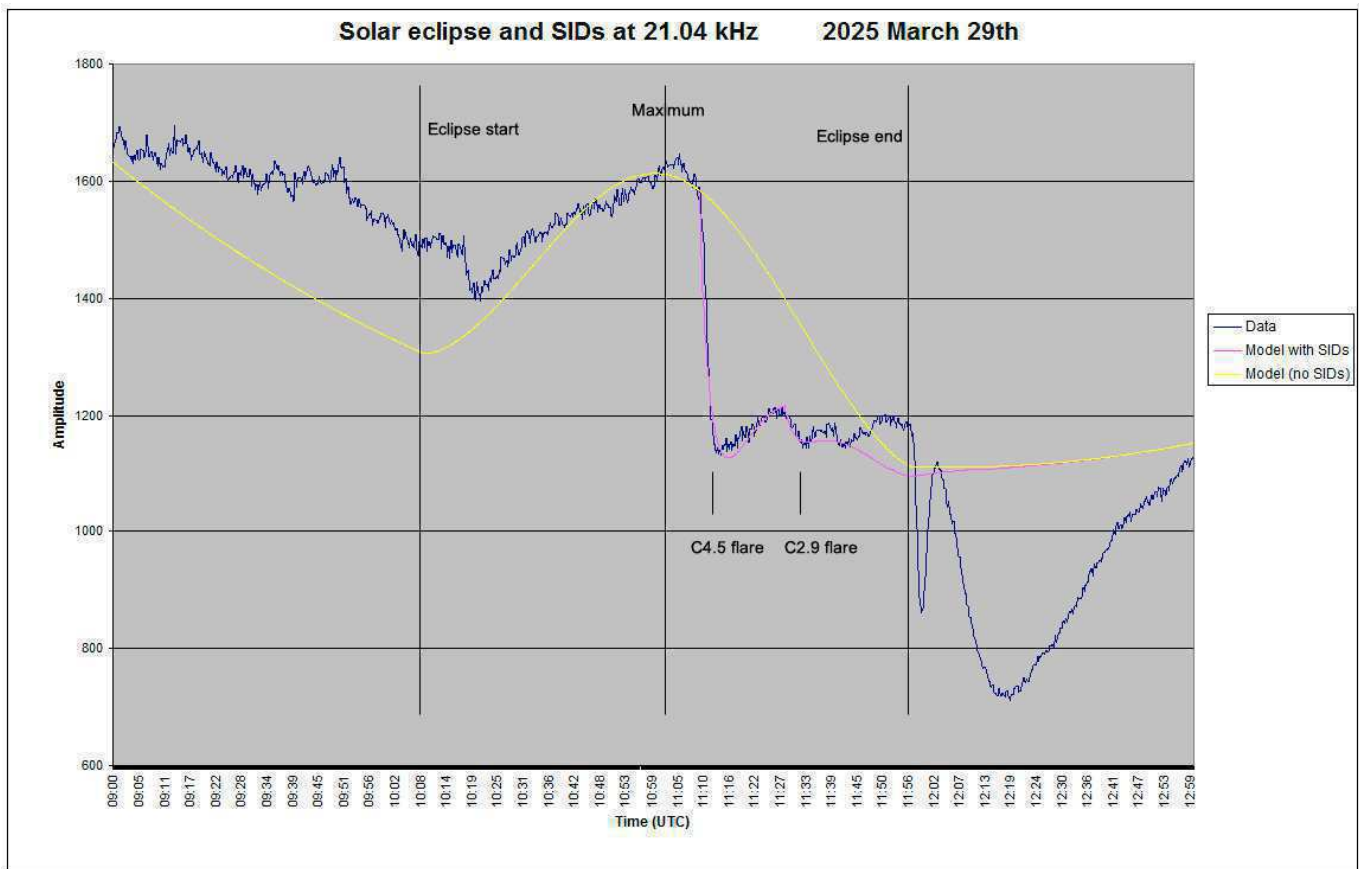
2 Mar 2025

Freq 45.9 kHz

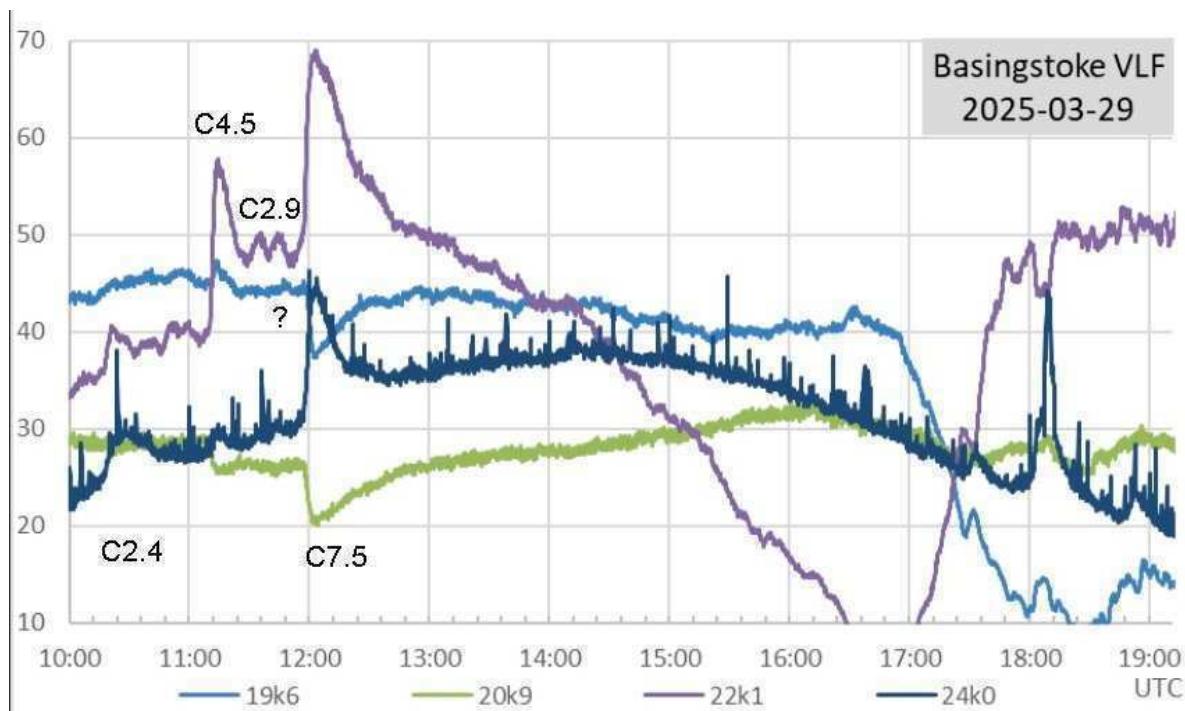


Thomas Mazzi in Italy recorded some of the weakest flares seen for a long time. The one marked C1 is not listed in the satellite data, but the other two are listed. We had two other observations of the C2.9 flare, while the C1.1 was missed.

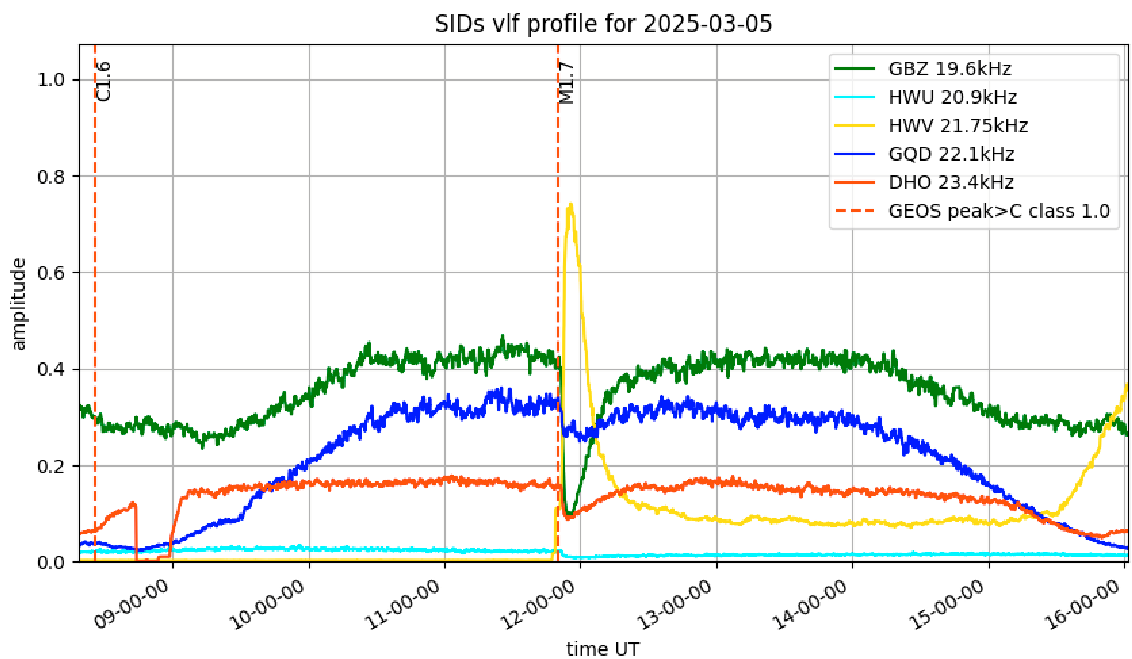
On Saturday 29th March we had some mixed weather here in the UK for observing the partial solar eclipse. It was about 40% maximum, and well seen visually. Looking at the radio data however showed that there were flares going off at the same time, rather confusing our VLF recordings. Mark Edwards has used his modelling method to show the effect both with and without the SIDs present. It required a few modifications to the model used for the last partial eclipse in order to get it to work. The C7.5 flare started after the eclipse had ended, but is included in the chart.



Our recordings of the 2015 March partial eclipse showed an increase in some signals, with a drop in others. Most showed a double peak, but that partial eclipse had a much larger phase compared to this one. There were no SIDs present!

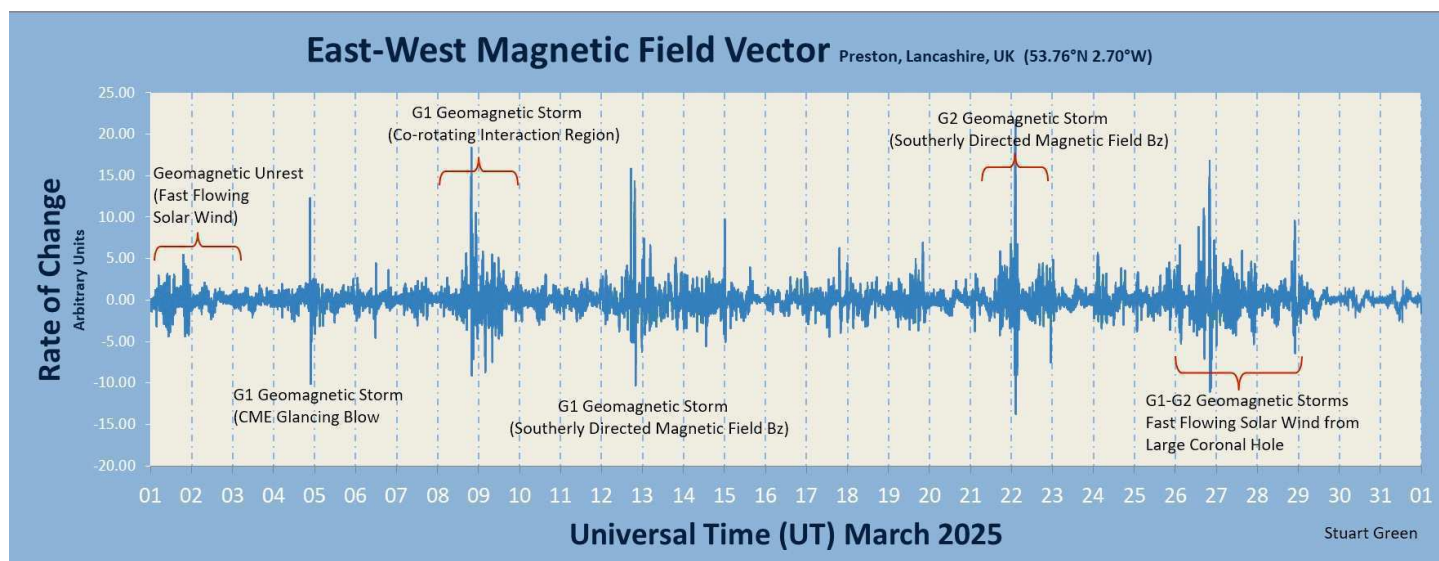


This recording from Paul Hyde shows very little effect from the eclipse, the SIDs dominating the picture on all four signals. 22.1kHz shows the C2.9 and unlisted flares best.

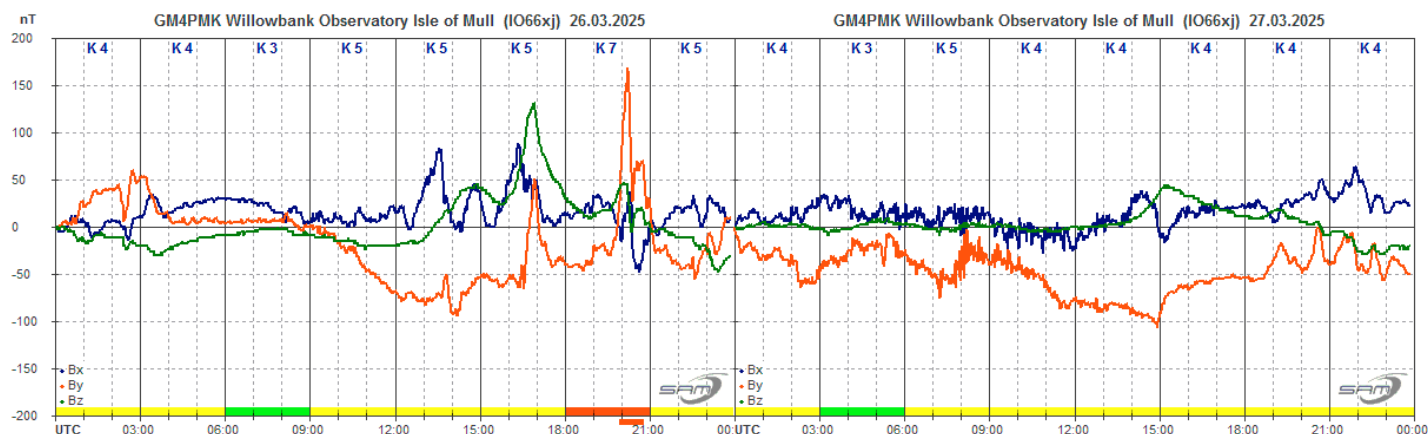


Activity at the start of March was much lower, and generally weaker. We did however catch the M1.7 flare peaking just before midday on the 5th, shown in Mark Prescott's recording. 20.9kHz appears to be off all day, although there is a tiny drop in signal level matching the start of the flare. All of the other signals show clear SIDs, 21.75kHz being particularly strong, although it also appears to have been off before the flare. 19.6kHz, 22.1kHz and 23.4kHz all show an excellent diurnal curve between sunrise and sunset, not often seen during the periods of higher solar activity.

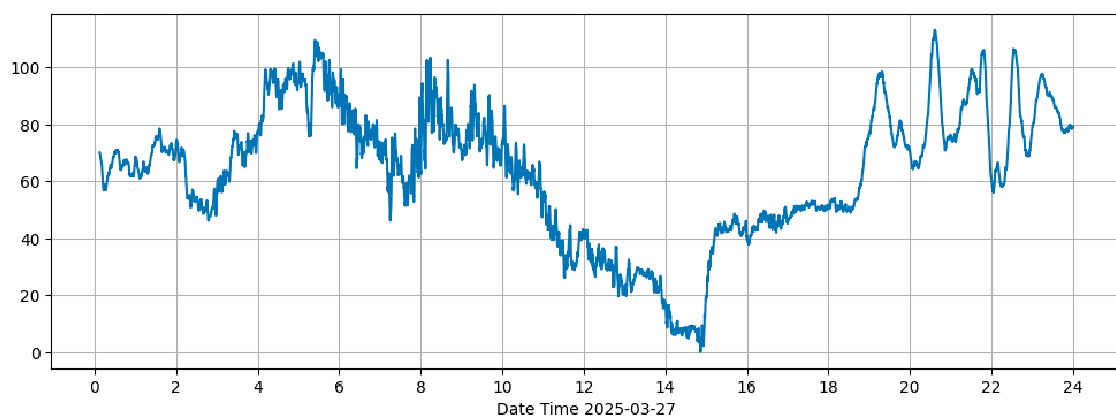
MAGNETIC OBSERVATIONS.



Stuart Green's chart of magnetic activity in March shows plenty of disturbances, mostly from fast solar winds. Coronal holes are starting to become more common with the lower level of flaring, Roger Blackwell's recording from the 26th and 27th showing a very turbulent period:

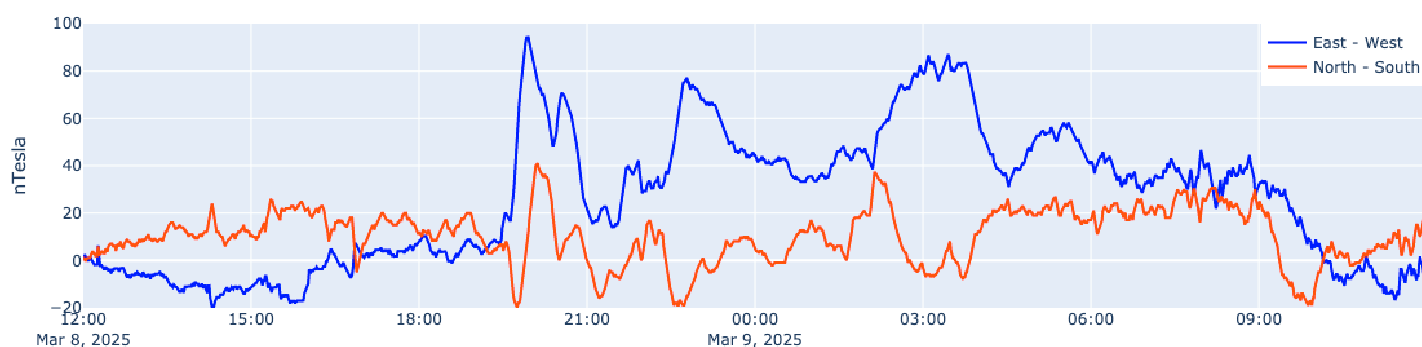


Wasbister Magnetometer (59.17N,3.06W)

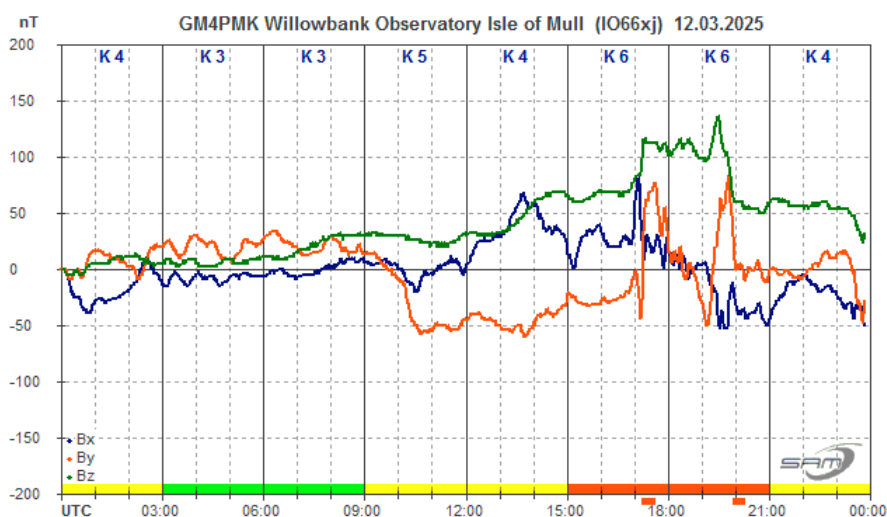


Callum Potter's recording on the 27th shows the very rapid variations in field strength during the morning.

Steying Magnetometer (50.8 North, 0.3 West)

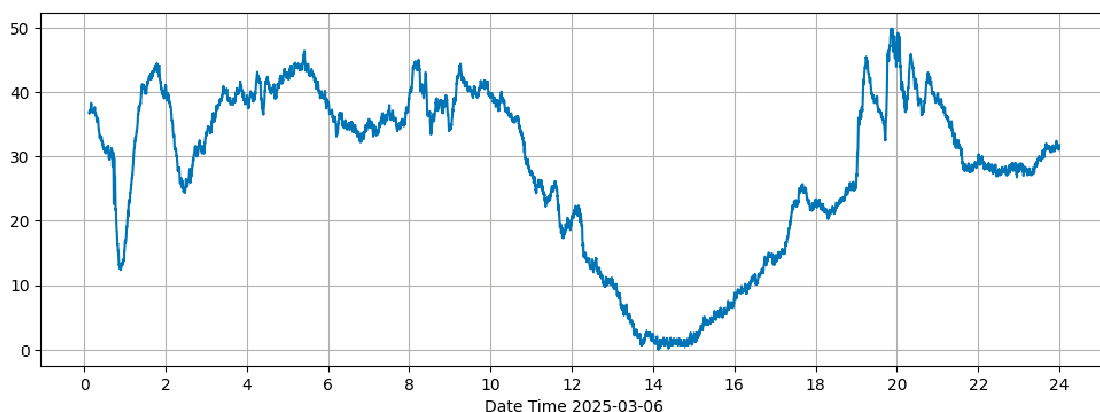


Nick Quinn's recording from the 8th / 9th also shows solar wind turbulence, this time from a co-rotating interaction region (CIR), where magnetic polarities rapidly change. There is also a high speed wind present, although it faded out later on the 9th. Activity increased again on the 12th, a strong disturbance in the evening shown in Roger Blackwell's recording. This continued over the next few days, but not quite as strong.

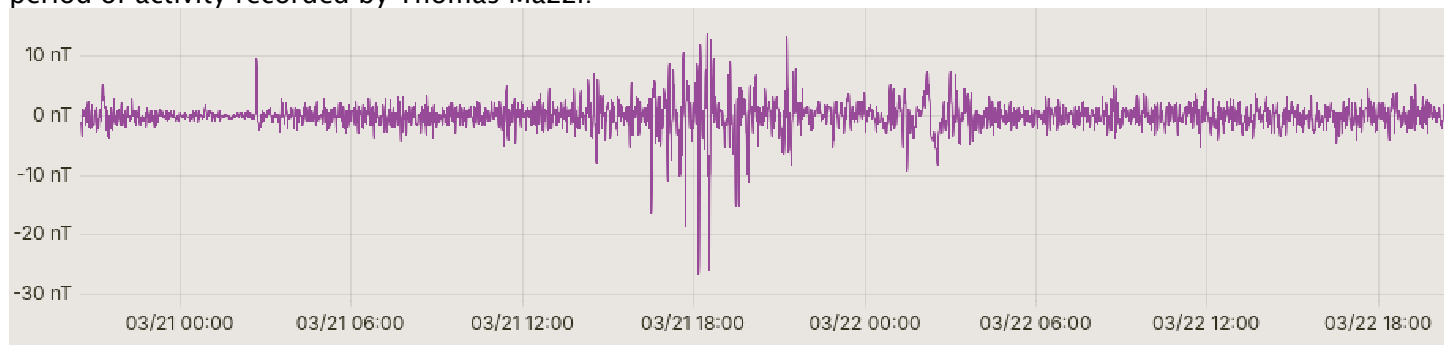


The STCE bulletin reports a CME impact late on the 5th, although none of our recordings show the impact. Callum Potter recorded a fairly mild disturbance on the 6th, possibly related to the CME. This was much weaker on the 7th, fading out after that.

Wasbister Magnetometer (59.17N,3.06W)



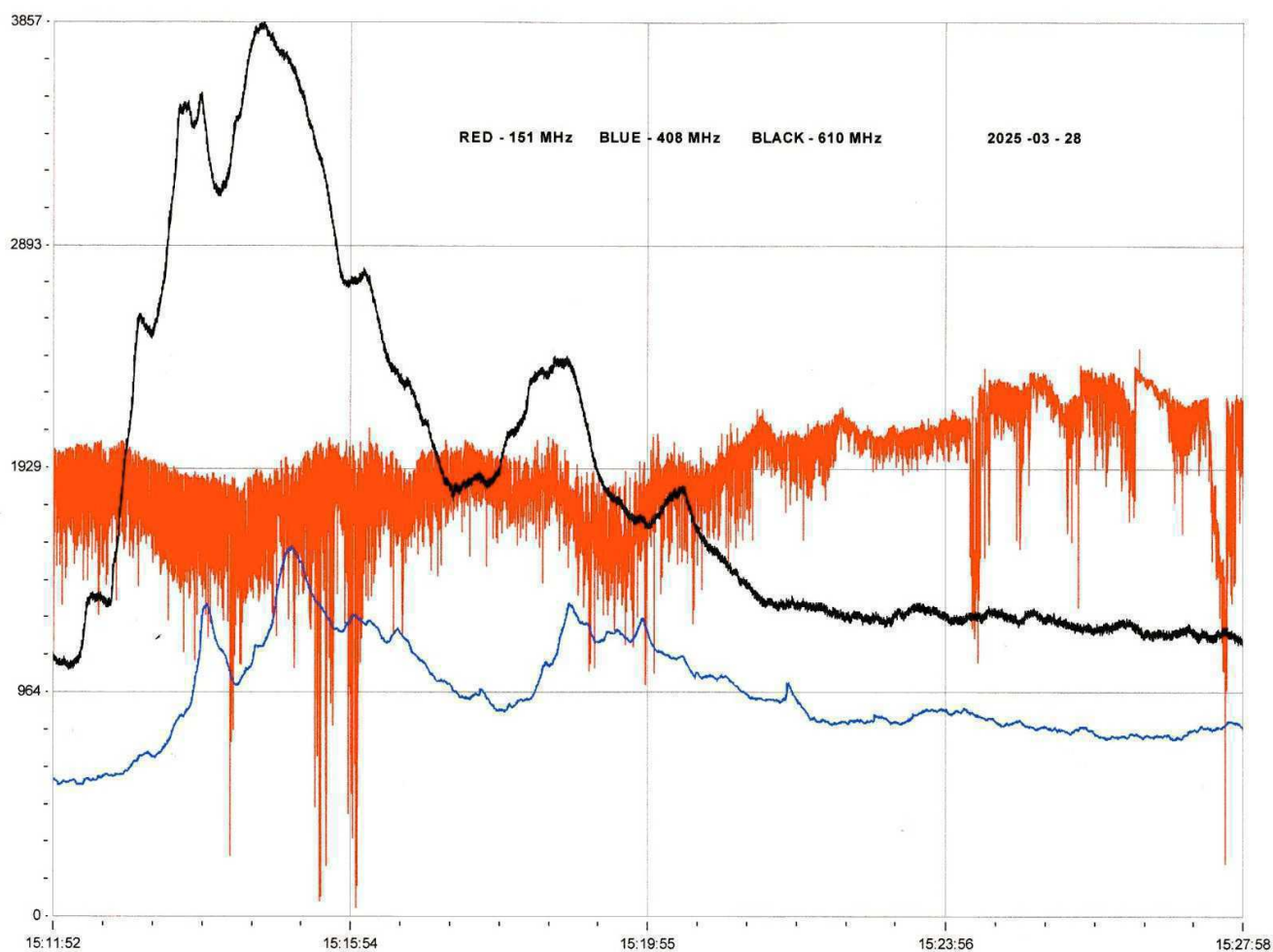
The STCE bulletin does list a CME from the X1.1 flare on the 28th, but our recordings show little evidence other than mild activity at the end of the month. There was also a CME on the 22nd with a short period of activity recorded by Thomas Mazzi:



Activity starts mid-afternoon on the 21st with a quiet period over midnight and further activity early morning on the 22nd.

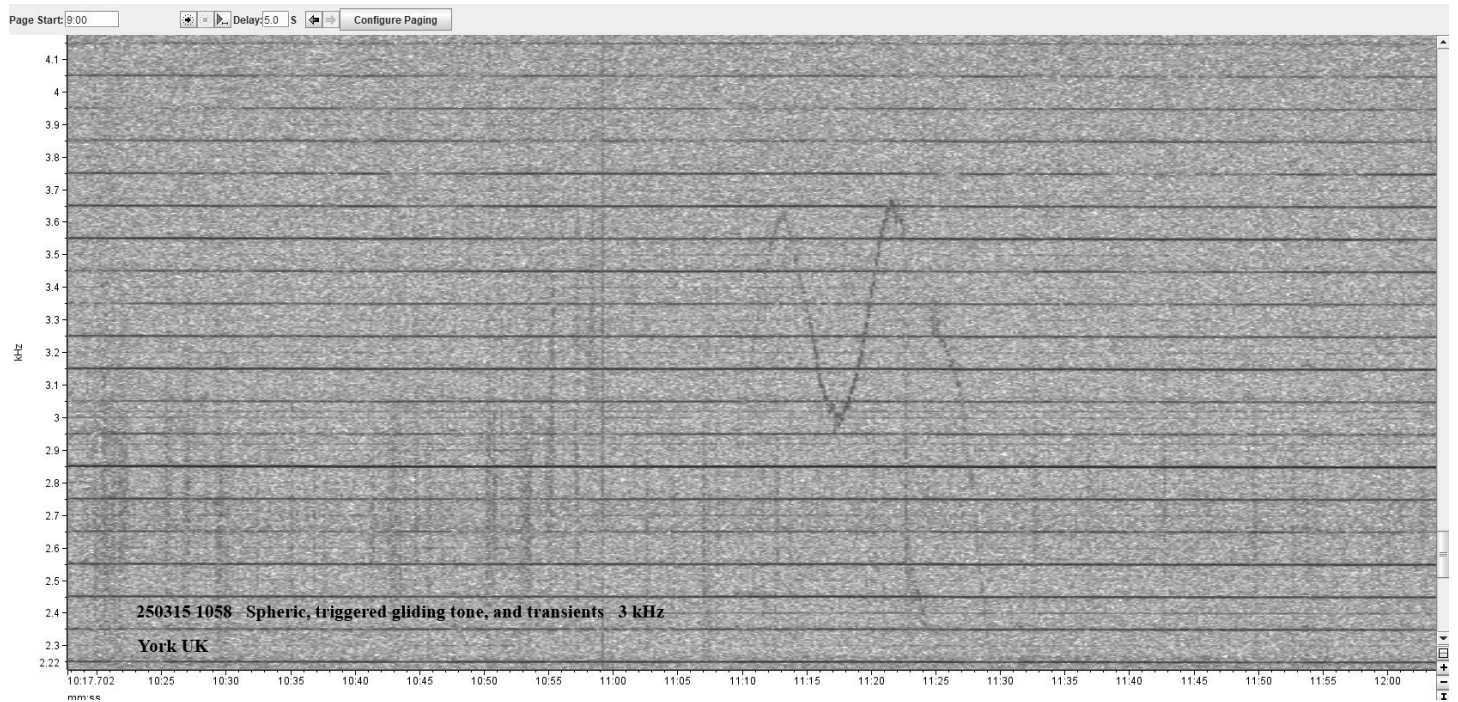
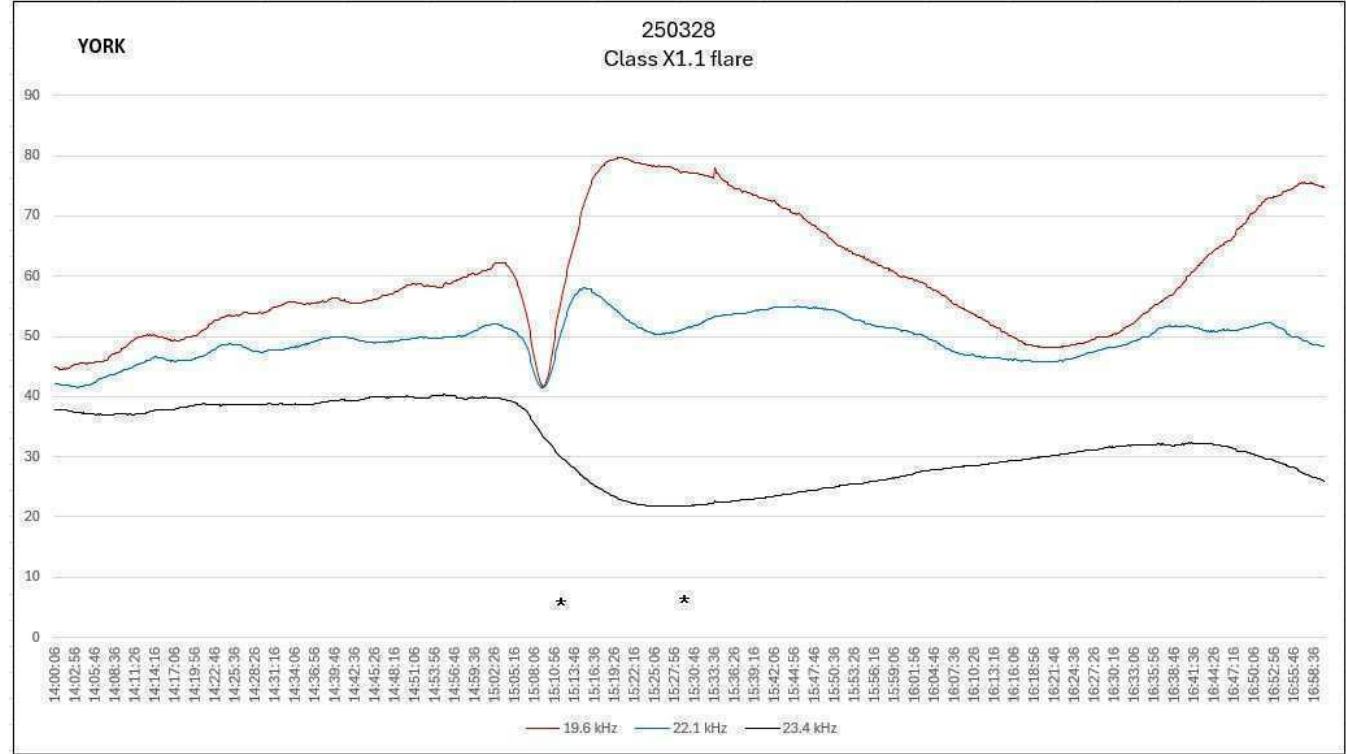
Magnetic observations received from Roger Blackwell, Stuart Green, Thomas Mazzi, Callum Potter, Nick Quinn and John Cook.

SOLAR EMISSIONS



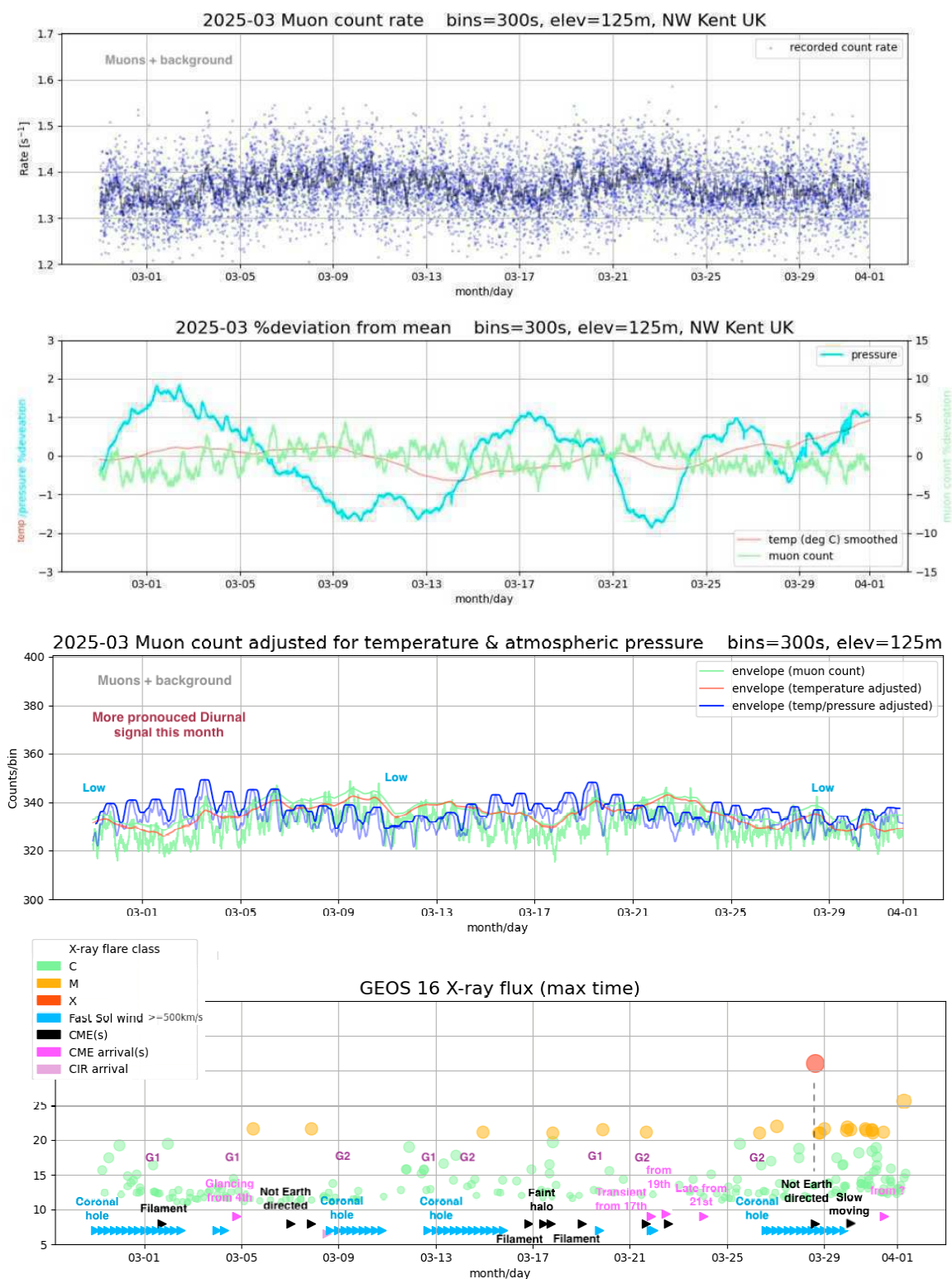
Significant VHF / UHF emissions were recorded by Colin Clements from the X1.1 flare. 408MHz and 610MHz both show a very clean rise in signal level, peaks shifted barely a minute apart. 151MHz shows

more noise, but the pattern is very similar with just a small delay. Colin Briden provided an expanded VLF recording showing 19.6kHz, 22.1kHz and 23.4kHz. I have added ‘*’ marks to show where the VHF / UHF chart starts and ends. This also shows the short delay between the X-ray output and the RF output.



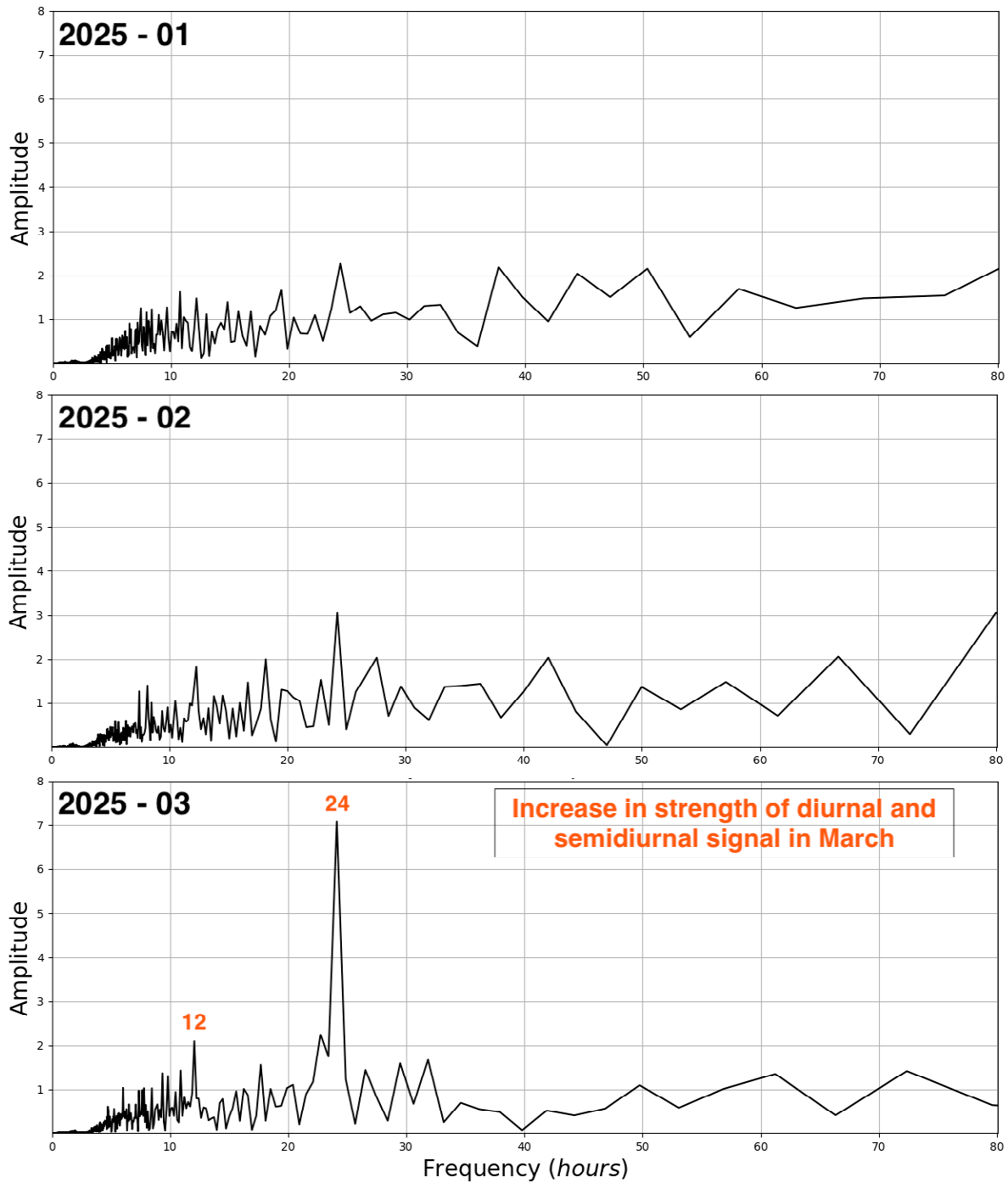
Colin Briden also recorded spherics at 3kHz on the 15th. His chart runs from 11:17 to 12:00, showing transients and a gliding tone. The vertical axis covers 2.3kHz to 4kHz. I have enhanced the contrast a little to make them a little easier to see.

MUONS



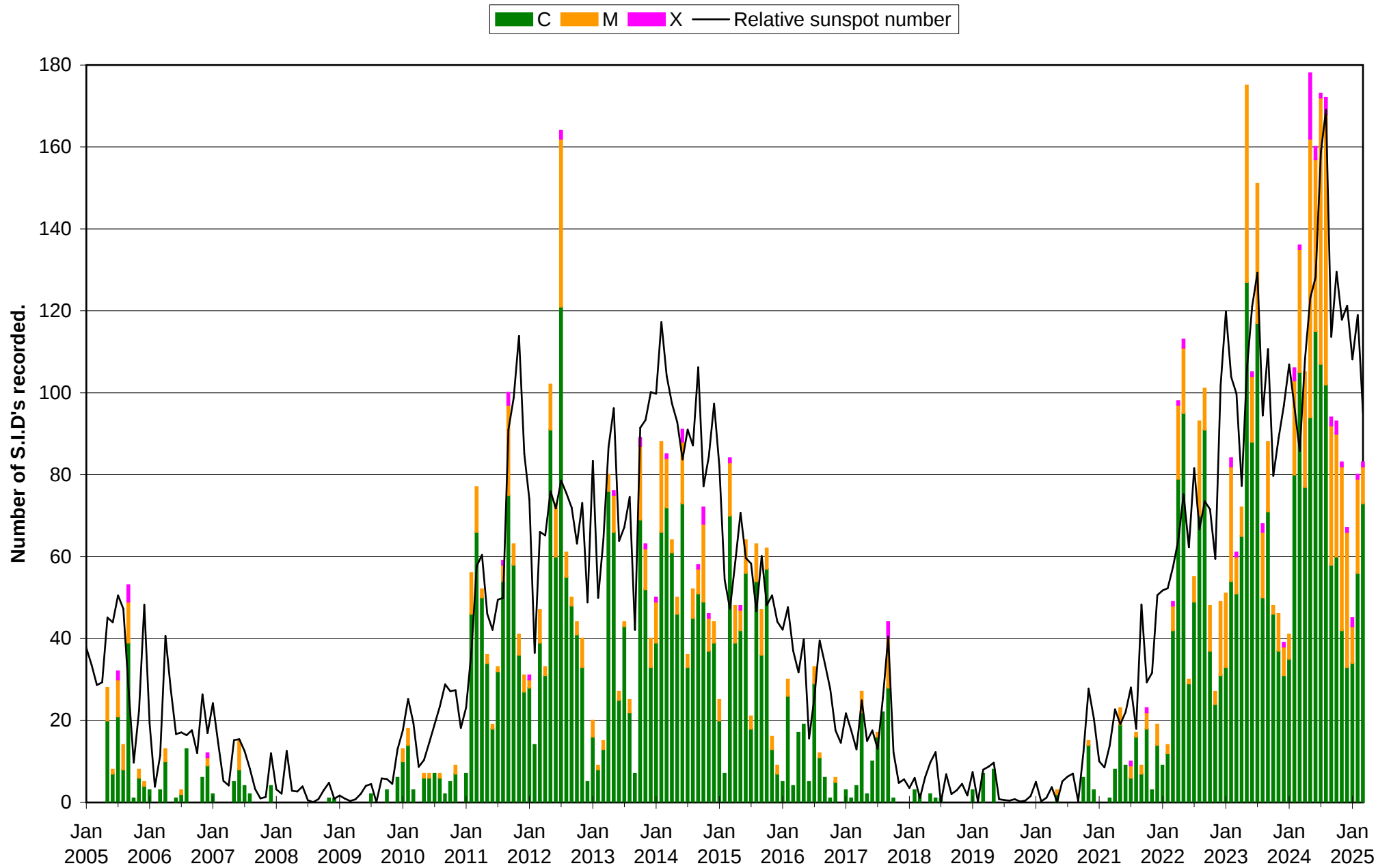
The raw muon data in the top chart from Mark Prescott shows a very slow variation through the month, perhaps reflecting the generally weaker flaring activity. Mark has also noticed a more pronounced diurnal variation, illustrated in his FFT analysis of data recorded over January to March on the next page:

Muon count (+background) adjusted for Atmospheric Pressure and local Temperature - FFT spectra



The top two charts from January and February both show peaks at 12 hour and 24 hour intervals, but the peaks in March are considerably stronger. The peaks at longer intervals are far more random.

VLF flare activity 2005/25



BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2575	F	21 CCC 22 CC 23 CC 24 CC 25 CCM 26 CC 27 CC	2258 28 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 26 27	2022 July 1 2 3 BC 4 C 5 6 7 8 M 9 CCCC CCCC 10 CM CCCC 11 12 13		
2577	F	14 CCMC 15 CCC 16 MCM CCCC 17 C CCCC	2260 18 19 20 21 22 23 24 25 26 C 27 C 28 29 30 31	2022 August 1 2 3 C 4 5 CC 6 7 8 9		
2578	F	10 11 12 CC CCCC 13 C CMMM 14 MCC CMMM 15 16 17 18 19 20 21 22 C 23 24 CCMC CMMM CMMM CMMM CMMM CCMC 31 C	2261 22 23 24 25 26 27 28 29 30 31	2022 September 1 CC CCCC CCCC CCCC CCMC		
2579	F	6 7 8 9 10 11 12 13 14 C CCCC CCCC CCCC 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2262 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2022 October 1 CC CCMC		
2580	F	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2263 11 12 13 C M C C	2022 November 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25		
2581	F	30 31	2264 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2022 December 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25		
2582	F	26 27 28 29 30	2265 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	2023 January 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22		
2583	F	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	2023 February 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18		
2584	F	19 MMC 20 CC 21 CC CCMC 22 C CCC 23 MCM CMC 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		
2585	F	15 CCCC 16 CX 17 C 18 CC CMC 19 CCM 20 21 CCM 22 23 24 CCM 25 26 27 28	2268 25 26 27 28	2023 March 1 CC CCCC MCCX CMMC CCMC MCCX C MC CCCC CCCC		
2586	F	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2269 1 2 3 4 5 6 7 8 9	2023 April 1 2 3 4 5 6 7 8 9		
2587	F	10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30	2270 21 22 23 24 25 26 27 28 29 30	2023 May 1 2 3 4 5 6 7 8 9		
2588	F	7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2271 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2023 June 1 2 3 4 5 6 7 8 9		
2589	F	3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	2272 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2023 July 1 2 3 4 5 6 7 8 9		
2590	F	30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	2273 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	2023 August 1 2 3 4 5 6 7 8 9		
2591	F	27 28 29 30 31	2274 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	2023 September 1 2 3 4 5 6 7 8 9		
2592	F	23 24 25 26 27 28 29 30 31	2275 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	2023 October 1 2 3 4 5 6 7 8 9		
2593	F	19 20 21 22 23 24 25 26 27 28 29 30 31	2276 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	2023 November 1 2 3 4 5 6 7 8 9		
2594	F	16 17 18 19 20 21 22 23 24 25 26 27	2277 28 29 30	2023 December 1 2 3 4 5 6 7 8 9		
2595	F	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		
2596	F	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		
2597	F	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	2024 January 1 2 3 4 5		
2598	F	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	2281 15 16 17 18 19 20 21 22 23 24 25 26 27 28	2024 February 1 2 3 4 5 6 7 8 9		
2599	F	29 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	2282 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2024 March 1 2 3 4 5 6 7 8 9		
2600	F	27 28 29 30 31	2283 9 10 11 12 13 14 15 16 17 18 19 20 21 22	2024 April 1 2 3 4 5 6 7 8 9		
2601	F	23 24 25 26 27 28 29 30 31	2284 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	2024 May 1 2 3 4 5 6 7 8 9		
2602	F	20 21 22 23 24 25 26 27 28 29 30 31	2285 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2024 June 1 2 3 4 5 6 7 8 9		
2603	F	16 17 18 19 20 21 22 23 24 25 26 27 28 29	2286 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2024 July 1 2 3 4 5 6 7 8 9		
2604	F	13 14 15 16 17 18 19 20 21 22 23 24 25 26	2287 27 28 29 30 31	2024 August 1 2 3 4 5 6 7 8 9		
2605	F	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2288 23 24 25 26 27 28 29 30 31	2024 September 1 2 3 4 5 6 7 8 9		
2606	F	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2289 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2024 October 1 2 3 4 5 6 7 8 9		
2607	F	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	2290 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2024 November 1 2 3 4 5 6 7 8 9		
2608	F	29 30 31	2291 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	2024 December 1 2 3 4 5 6 7 8 9		
2609	F	25 26 27 28 29 30 31	2292 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	2025 January 1 2 3 4 5 6 7 8 9		
2610	F	22 23 24 25 26 27 28 29 30 31	2293 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	2025 February 1 2 3 4 5 6 7 8 9		
2611	F	18 19 20 21 22 23 24 25 26 27 28 29 30 31	2294 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	2025 March 1 2 3 4 5 6 7 8 9		
2612	F	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2295 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	2025 April 1 2 3 4 5 6 7 8 9		
2613	F	13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2296 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	2025 May 1 2 3 4 5 6 7 8 9		

2025 MARCH.

			John Cook (23.4kHz/22.1kHz)				Roberto Battaiola 20.3kHz				Paul Hyde (22.1kHz/24kHz)				Mark Edwards (24.0/21.04/19.6kHz)				Colin Clements (21.75kHz/23.4kHz)			
	Xray class	Observers	Tuned radio frequency receiver, 0.58m frame aerial.				Modified AAVSO receiver.				Spectrum Lab / PC 1.5m frame aerial.				Spectrum Lab / PC 2m loop aerial.				Tuned Radio Frequency receivers, 0.76m screened loop aerial.			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
1	C6.4	3	08:28	08:30	08:37	1-									08:27	08:31	08:42	1-				
1	C2.7	2	09:28	09:32	09:35	1-																
1	C2.7	5	10:14	10:17	10:31	1-					10:13	10:17	10:37	1	10:13	10:17	10:22	1-				
1	C2.5	1	10:49	10:56	11:03	1-																
1	C2.3	1													13:20	13:25	13:34	1-				
1	C2.3	2	14:34	14:39	14:43	1-									14:36	14:39	14:55	1				
2	C2.9	2	09:35	09:39	09:44	1-									09:34	09:41	09:44	1-				
3	C2.5	1													14:45	14:53	15:04	1				
3	C2.8	1													16:44	16:47	16:56	1-				
4	C2.6	1													13:51	13:56	14:06	1-				
4	C4.6	3													15:41	15:46	15:59	1-				
4	C3.9	1													16:18	16:22	16:31	1-				
5	M1.7	10	11:48	11:51	12:14	1+					11:47	11:50	12:18	1+	11:47	11:51	12:07	1	11:47	11:53	12:13	1+
8	C1.9	1													12:21	12:30	12:46	1				
8	C2.5	1													14:09	14:18	14:46	2				
11	M1.1	10	13:04	13:06	13:26	1	13:02	13:05	13:24	1	13:05	13:07	13:24	1	13:03	13:06	13:25	1	13:06	13:09	13:37	1+
11	C5.8	1													18:28	18:32	18:40	1-				
12	C3.3	1					07:33	07:38	07:43	1-												
12	C5.7	9	09:45	09:49	10:00	1-	09:40	09:49	10:07	1+	09:43	09:51	10:17	2	09:45	09:49	10:01	1-	09:48	09:53	10:00	1-
12	C2.0	2													11:08	11:11	11:15	1-				
12	C2.1	2													11:58	12:01	12:05	1-				
12	C6.0	9	12:13	12:19	?	-	12:08	12:17	12:55	2+	12:12	12:20	12:55	2	12:13	12:19	?	-	12:13	12:21	13:02	2+
12	C5.8	3	12:23	12:26	?	-									12:22	12:26	?	-				
12	C4.1	2	12:34	12:36	12:43	1-									12:35	12:37	12:49	1-				
12	C2.9	5					14:52	14:58	15:18	1+	14:54	14:57	15:08	1-	14:54	14:58	15:06	1-				
13	C6.8	2					07:48	07:53	08:07	1					07:49	07:53	08:02	1-				

			Steve Parkinson (Various)				Andrew Thomas (19.6kHz/21.7kHz)				Phil Rourke (23.4kHz)				Mark Prescott (21.75kHz/22.1kHz)				John Elliott (19.6kHz)			
	Xray class		Tuned radio frequency receiver, frame aerals.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.				SpetrumLab/Starbase, Active mini-whip aerial.				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	C6.4										08:25	08:30	08:40	1-								
1	C2.7										09:27	09:31	09:39	1-								
1	C2.7		10:14	10:17	10:25	1-					10:13	10:17	10:33									
1	C2.5																					
1	C2.3																					
1	C2.3																					
2	C2.9																					
3	C2.5																					
3	C2.8																					
4	C2.6																					
4	C4.6		15:41	15:45	15:54	1-					15:39	15:45	16:01	1								
4	C3.9																					
5	M1.7		11:47	11:52	12:30	2	11:47	11:51	12:37	2+	11:45	11:54	12:59	2+	11:51	11:56	12:20	1+	11:48	11:52	12:30	2
8	C1.9																					
8	C2.5																					
11	M1.1		13:03	13:07	13:40	2					13:02	13:06	13:39	2	13:07	13:10	13:30	1	13:03	13:07	13:35	1+
11	C5.8																					
12	C3.3																					
12	C5.7		09:44	09:49	10:10	1+	09:43	09:49	10:02	1	09:42	09:49	10:30	2+	09:49	09:53	10:05	1-				
12	C2.0										11:03	11:12	11:27	1								
12	C2.1										12:11	12:18	?	-								
12	C6.0		12:13	12:20	13:06	2+	11:54	12:21	12:48	2+	?	12:25	?	-	12:17	12:23	?	-				
12	C5.8														?	12:28	13:03	-				
12	C4.1																					
12	C2.9		14:55	14:58	15:05	1-					14:53	14:59	15:12	1								
13	C6.8																					
13	*																					
14	C3.4										14:44	14:48	14:57	1-								
14	?																					
14	C3.7		11:19	11:31	12:00	2					11:17	11:30	12:00	2	11:22	11:36	12:05	2				
14	C2.4		12:32	12:38	12:50	1-																
14	C4.4		14:23	14:28	14:50	1+					14:21	14:27	14:49	1+								
15	C2.6																					
15	C4.1																					
16	C4.2																					
17	C2.9																					
17	C2.7																					
17	C6.6														15:57	16:05	16:22	1				
17	C5.3																					
18	C2.1																					
19	C2.9		11:22	11:36	12:10	2+									11:25	11:38	12:15	2+				
19	C2.8																					
20	C4.4																					
21	M1.2		15:46	16:01	16:40	2+									15:50	16:04	16:37	2+				
22	*						14:20	14:28	14:50	1+												
22	*																					
22	C5.0																					
23	C2.6		10:25	10:33	10:41	1-																
23	C2.9																					
23	C4.5		14:21	14:28	14:50	1+					14:19	14:27	14:58	2	14:26	14:31	15:00	2				
24	C5.2																					
24	C2.3		13:33	13:37	14:00	1+	13:33	13:36	13:54	1	13:31	13:38	14:01	1+								
25	C4.4		09:45	09:51	10:10	1																
25	C9.5		12:24	12:32	13:27	2+	12:21	12:37	13:36	2+	12:21	12:39	15:13	3+	12:29	12:39	13:50	2+				
26	M1.0																					
26	C6.5		09:10	09:16	09:30	1	09:13	09:16	09:28	1-					09:14	09:21	09:50	2				
26	C2.8		11:51	11:56	12:16	1	11:49	11:54	12:20	1+					11:55	12:00	12:40	2				
26	C2.7																					
27	C2.1		09:16	09:22	09:30	1-																
27	C3.2		09:51	10:01	10:25	2	09:53	10:01	10:23	1+					09:54	10:05	10:35	2				
27	*																					
27	C3.9																					
28	?																					
28	?																					
28	?																					
28	?		13:23	13:34	13:50	1+									13:26	13:37	14:27	2+				
28	C3.5																					
28	X1.1		15:05	15:24	16:20	2+	15:05	15:25	16:43	3					15:09	15:29	16:51	3	15:04	15:25	16:30	3
28	M1.0																					
28	?																					
28	M1.1																					
29	C2.4																					
29	C4.5		11:10	11:14	11:29	1	11:10	11:15	11:57	2+	11:08	11:14	11:33	1	11:14	11:19	?	-	11:09	11:14	11:30	1
29	C2.9																					
29	?																					
29	C7.5		11:57	12:02	12:40	2	11:57	12:03	13:46	3	11:54	12:23	13:12	2+	12:01	12:07	13:00	2+	11:58	12:03	12:55	2+
29	C2.2																					

[illegible]