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BAA Radio Astronomy Section.

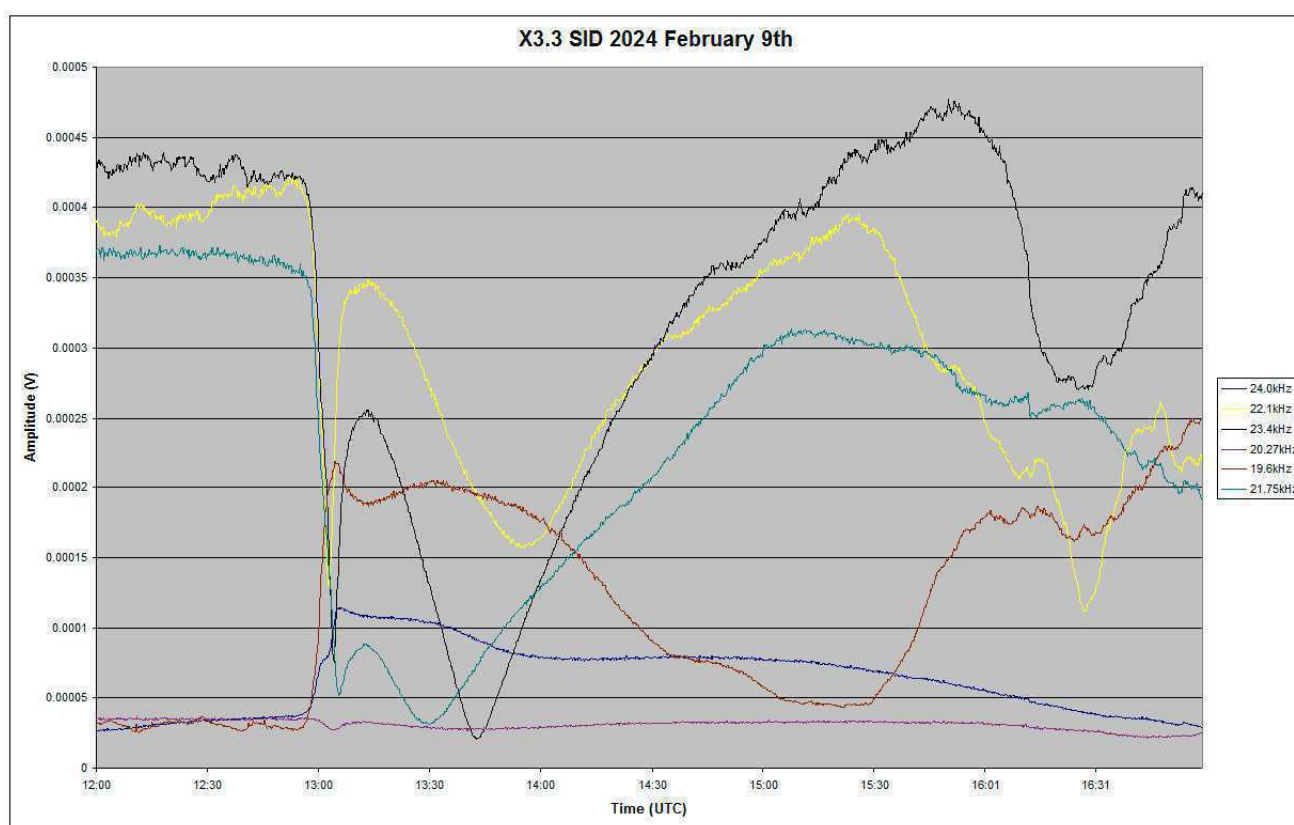
Director Paul Hearn.

RADIO SKY NEWS

2024 FEBRUARY.

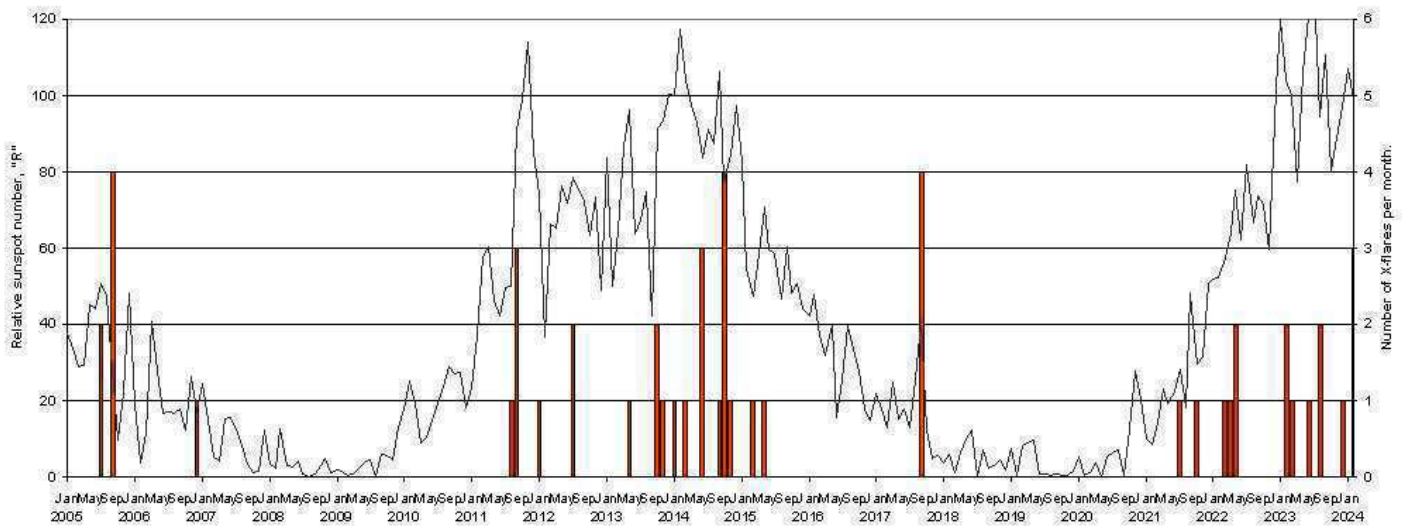
VLF SID OBSERVATIONS.

Solar activity in February was very strong, with a number of X-class flares produced by several large and complex active regions. We managed to record three of these as SIDs, including a strong X3.3 flare well timed at 13:00UT on the 9th. Mark Edwards' recording shows the event on multiple frequencies:

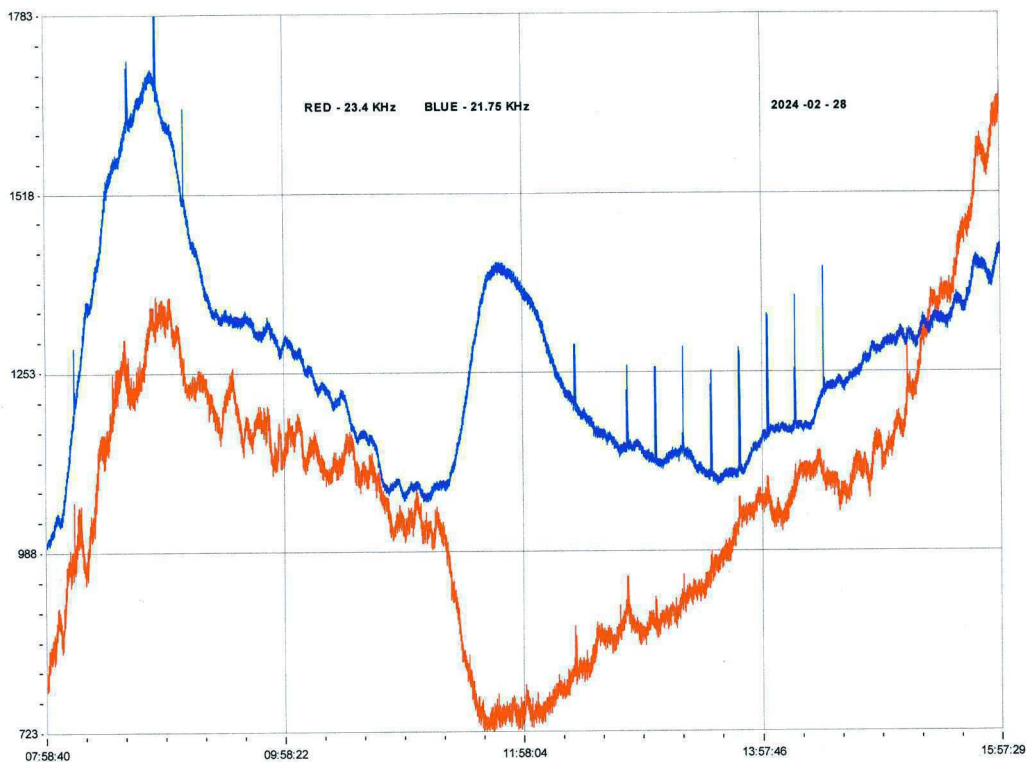


Most of the European signals have produced clear 'spike and wave' SIDs, while 24kHz shows a rather more unusual shape. The SID at 20.27kHz is very weak, barely noticeable at the bottom of the chart. Mark's timings for the peaks are all within 90 seconds. We have recorded a total of 16 X-flares so far in solar cycle 25, compared with a total of 28 in cycle 24. The chart below shows how these compare. We only have the tail-end of cycle 23 in our archive, but it is interesting that both cycles 23 and 24 show a burst of activity later in the cycle.

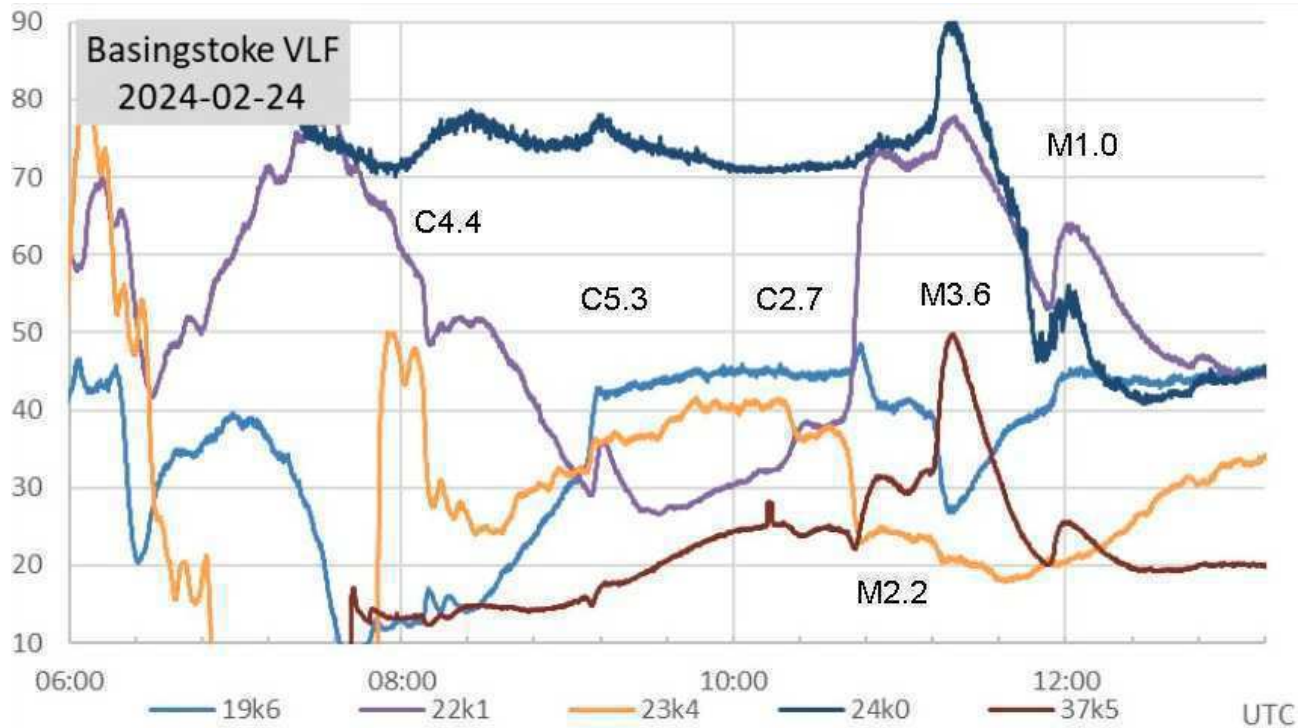
X-class flares 2005-24.



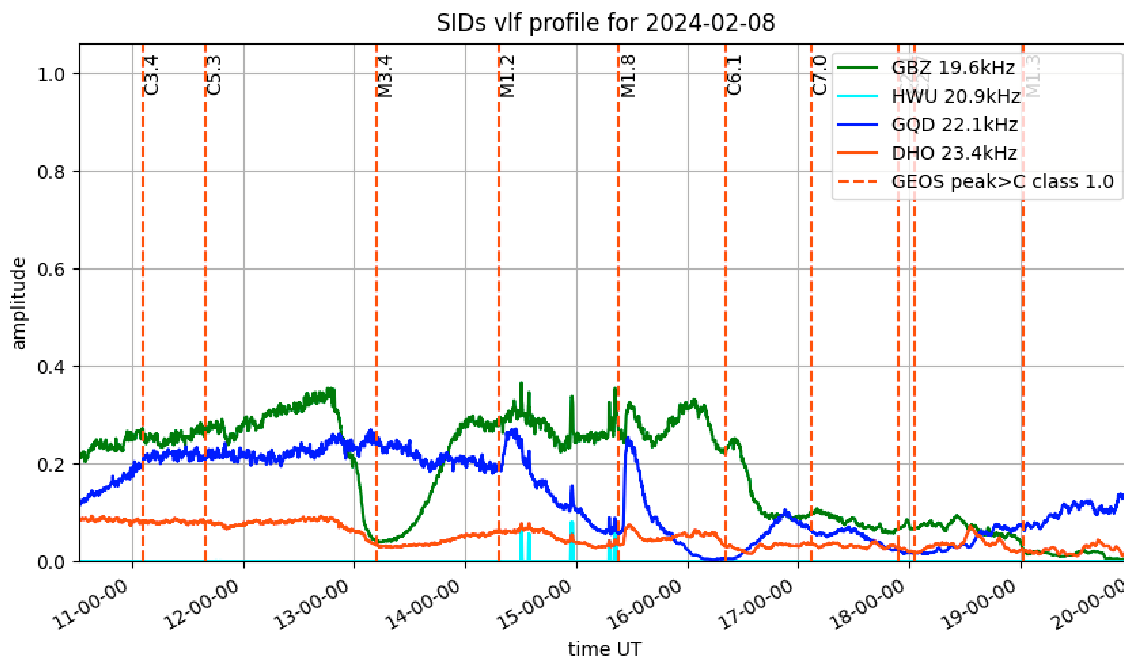
We also recorded a very unusual slow disturbance around midday on the 28th, with nothing shown in the SWPC GOES–satellite X-ray data. It was recorded on most of the signals monitored, and so cannot simply be a transmitter effect.



This recording by Colin Clements shows a very slow start and end, with nearly mirror-image responses on 23.4kHz and 21.75kHz. There was an earlier C5.1 flare from a filament eruption, but that peaked around 09UT and had ended well before this event started. The STCE bulletin recorded a small increase in its LYRA data covering 6 to 80nm matching this event, while the GOES data covering 0.1 to 0.8nm showed no flaring.

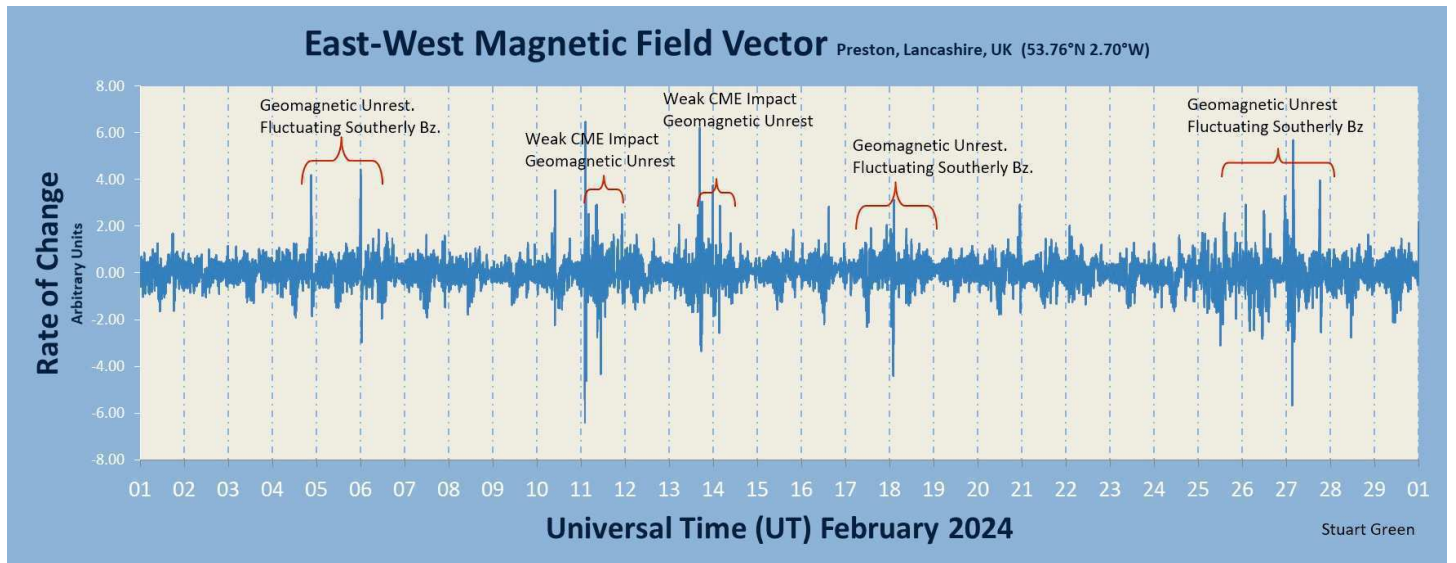


February 24th was very active, with four M-class flares as well as seven C-class and a number of smaller unclassified peaks. The recording by Paul Hyde shows activity during the morning, including the complexity of peaks from the three M-flares around midday. They are best identified at 37.5kHz, while 23.4kHz has merged them all into one SID.



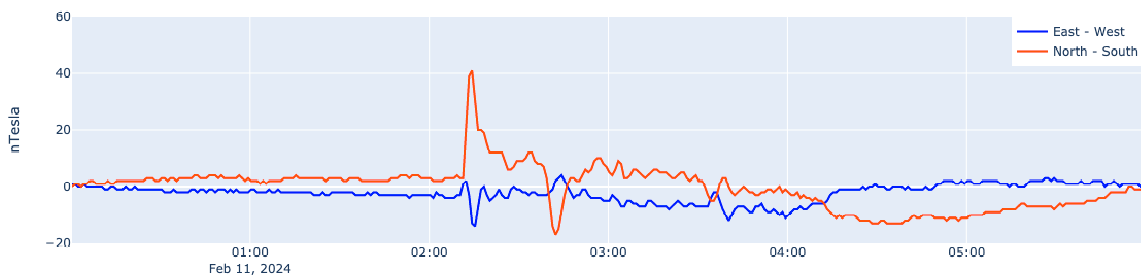
February 8th was also quite busy, shown in Mark Prescott's recording. The series of three M-class flares during the afternoon have left very different SIDs on the three signals active on this recording. 22.1 kHz shows clear SIDs for the M1.2 and M1.8 flares, but the earlier (and stronger) M3.4 is barely visible. This flare had a slow rise time, SWPC listing the start at 12:41, and is well recorded at 19.6kHz. The C6.1 flare has merged into the sunset, and not really visible.

MAGNETIC OBSERVATIONS.



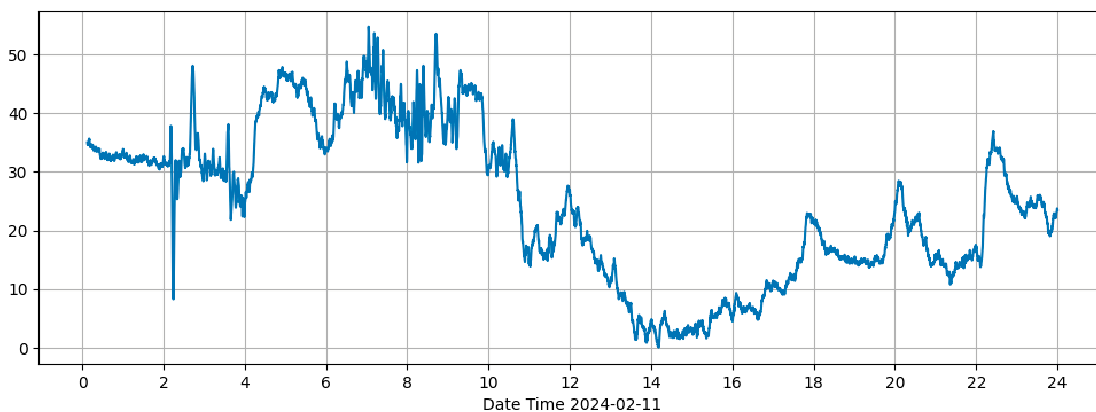
Stuart Green's monthly summary shows plenty of magnetic activity. Many of the flares that we recorded did produce CMEs, but most seem to have managed to avoid a direct impact with Earth's magnetosphere. We did record one very clear CME impact around 02:15UT on the 11th:

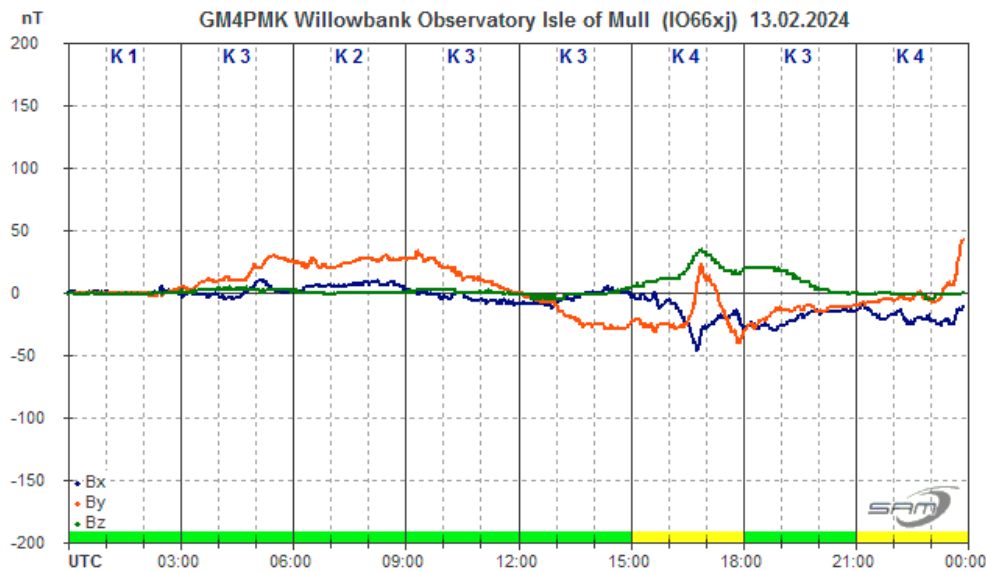
Steinyng Magnetometer (50.8 North, 0.3 West)



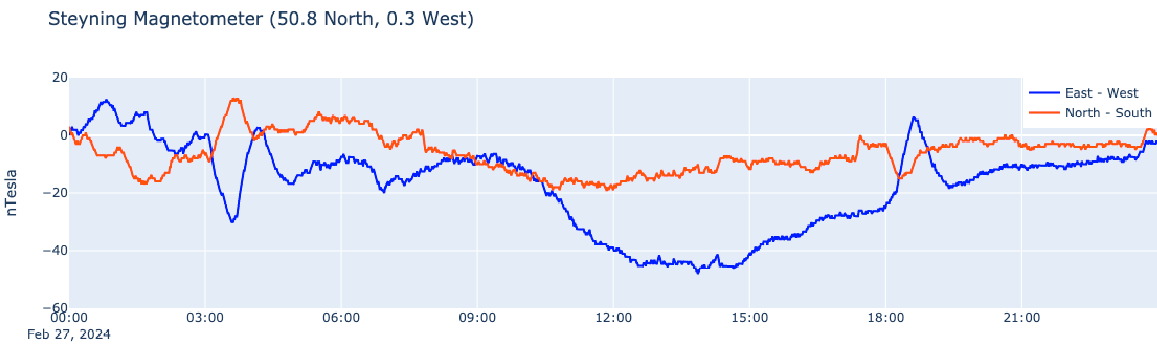
Nick Quinn's recording shows a very quiet period over the first 2 hours, with a distinct Sudden Impulse followed by a mild disturbance. Callum Potter's chart shows the disturbance continuing through the rest of the day. It faded out by midday on the 12th.

Wasbister Magnetometer (59.17N, 3.06W)



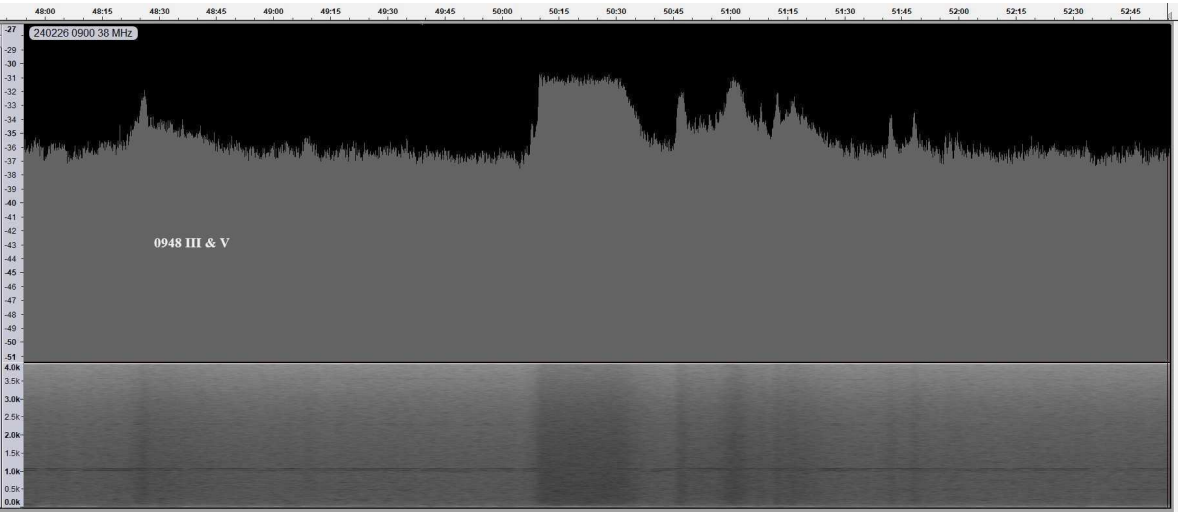


Roger Blackwell's recording from the 13th shows a hint of a possible mild CME impact at 02:30, followed by some mild disturbance. This also faded out over the next day with a few short periods of disturbance. The last few days of February showed some more periods of mild disturbance, but without any clear evidence of CMEs. Our VLF SID recordings shows that flare activity was generally much weaker compared to earlier in the month. Nick Quinn's chart shows activity on the 27th:

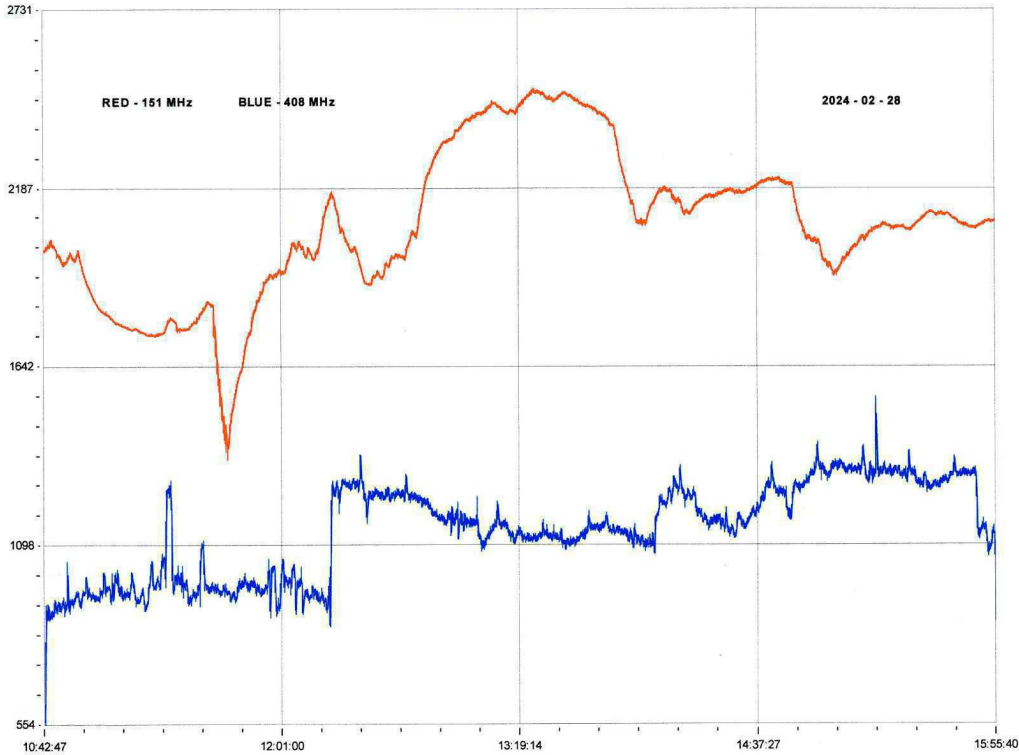


Magnetic observations received from Roger Blackwell, Stuart Green, Callum Potter, Nick Quinn and John Cook.

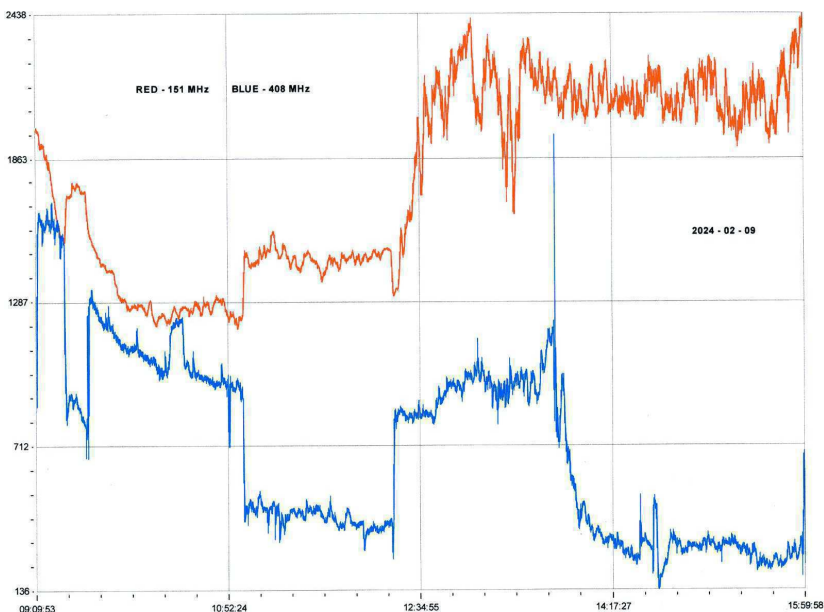
SOLAR EMISSIONS.



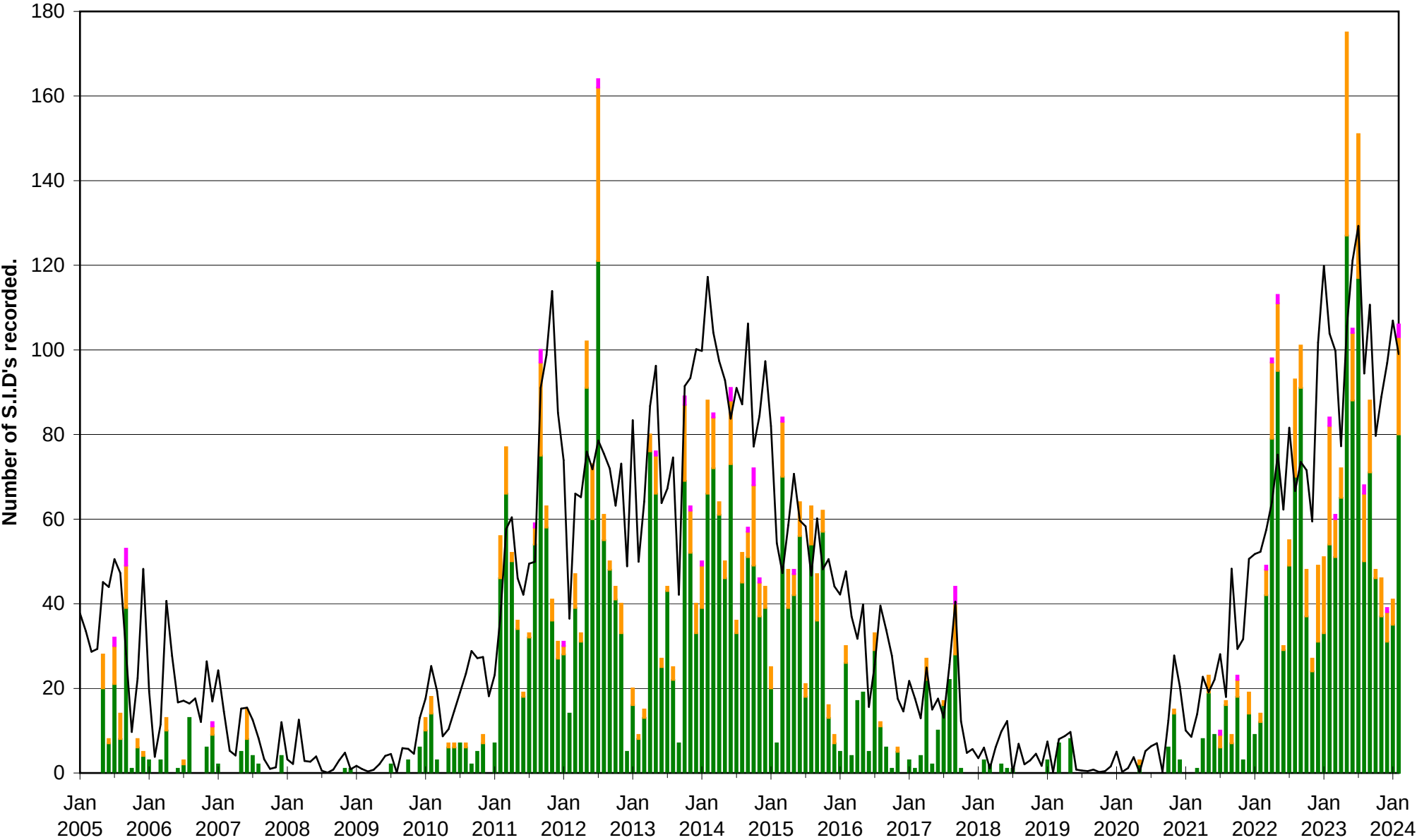
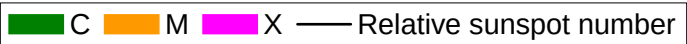
Colin Briden has recorded a type III and V 38MHz emission starting at 09:48UT on the 26th. The small spike on the left of the chart lasts about 30 seconds, with an amplitude of 4dB above the background. It is followed by a flat topped pulse starting at 09:50, together with a train of smaller spikes lasting about two minutes. The peak amplitude is about 6dB. These bursts are confirmed by the SWPC data, although no flares are listed during the morning of the 26th. A similar set of emissions were seen on the 28th, matching the timing of the long SID reported earlier in the summary. Colin Clements recorded 151MHz and 408MHz emissions that also seem to be related to this event:



151Mhz (blue) in particular shows a very smooth rise in strength during the decay phase of this event. Colin did have an increased time-constant in use at the time, accounting for the unusually smooth curve. Colin Clements also reported significant 151MHz activity following the X3.3 flare on the 9th, with a shorter burst on 408Mhz. 151MHz activity was also high throughout the afternoon of the 8th, matching the string of M-flares recorded.



VLF flare activity 2005/24



[illegible]

	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaola	Paul Hyde (22.1kHz/24kHz)	Mark Edwards (24.0/18.3/23.4kHz)	Colin Clements (23.4kHz/21.75kHz)
			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	C1.6	1				14:46 14:46 ? -	
1	C2.5	1				14:58 15:01 15:04 1-	
1	C5.6	5	10:55 10:57 11:07 1-		10:54 10:58 11:06 1-	10:57 10:59 11:08 1-	
2	C6.5	3	11:20 11:32 11:43 1			11:18 11:34 11:52 2	
2	C3.0	2			15:28 15:35 15:46 1-	15:31 15:35 15:43 1-	
2	C3.1	2			16:27 16:32 16:40 1-	16:30 16:36 16:41 1-	
2	?	1				16:44 16:49 16:53 1-	
3	C5.8	2	10:38 10:43 10:57 1			10:40 10:43 11:00 1	
3	C3.7	1				11:26 11:33 11:37 1-	
3	C4.3	7	12:46 12:49 12:57 1-		12:45 12:50 12:57 1-	12:47 12:49 12:56 1-	
3	C3.1	2				13:05 13:08 13:15 1-	
3	C2.2	1				14:12 14:16 14:17 1-	
3	C3.1	1			15:22 15:26 15:32 1-	15:24 15:27 15:33 1-	
3	?	1				16:10 16:12 16:22 1-	
3	C4.4	1				17:56 17:57 18:03 1-	
4	M1.4	9	11:47 11:54 12:27 2		11:44 11:52 12:24 2	11:47 11:52 12:18 1+	11:48 11:56 12:21 2
4	C8.4	9	13:44 13:47 14:04 1		13:21 13:47 14:02 2	13:45 13:48 14:05 1	13:44 13:51 14:05 1
4	C4.3	1				15:09 15:15 15:30 1	
4	C6.0	2			15:52 15:58 16:05 1-	15:55 15:57 16:07 1-	
4	?	2			16:24 16:31 ? -	16:26 16:33 ? -	
4	M1.5	2			16:35 16:40 16:54 1	16:36 16:39 16:54 1-	
4	M1.3	2			17:08 17:14 17:34 1+	17:09 17:14 17:32 1	
4	M1.1	2			18:22 18:30 18:47 1	18:22 18:31 18:47 1	
5	C9.6	7	11:03 11:10 11:22 1		11:02 11:09 11:17 1-	11:04 11:10 11:22 1-	
5	C6.3	4	13:11 13:17 13:28 1-			13:04 13:19 13:37 2	
6	C4.5	2	11:44 11:46 11:50 1-				
6	C9.4	9	12:50 12:58 13:16 1+		12:48 12:58 13:21 2	12:50 12:58 13:20 1+	12:51 13:03 13:43 2+
7	C2.8	1				10:35 10:49 11:00 1	
7	?	1				13:22 13:29 ? -	
7	C4.9	1				13:33 13:45 14:01 1+	
7	M1.3	1				17:51 18:06 ? -	
7	?	1				18:19 18:21 18:31 1-	
8	C4.3	1				08:44 08:49 08:56 1-	
8	C5.3	2	11:34 11:41 ? -			11:35 11:41 ? -	
8	C9.8	7	11:42 11:47 12:06 1		11:42 11:48 11:59 1-	11:45 11:48 12:01 1-	11:46 11:49 12:03 1-
8	M3.4	8	12:47 13:10 14:02 2+		12:58 13:10 13:59 2+	13:02 13:08 13:18 1-	12:57 13:15 13:40 2-
8	M1.2	8	14:16 14:19 14:27 1-		14:14 14:21 14:34 1	14:17 14:24 14:34 1-	14:17 14:23 14:36 1
8	?	2			14:35 14:38 14:45 1-	14:53 14:57 15:15 1-	
8	M1.8	8	15:21 15:23 15:41 1		15:19 15:24 15:48 1+	15:22 15:27 15:37 1-	
8	C6.1	2			16:13 16:23 16:34 1	16:16 16:24 16:30 1-	15:21 15:24 15:31 1-
8	C7.0	2			17:03 17:07 17:18 1-	17:05 17:08 17:18 1-	
8	M1.3	1				19:00 19:04 19:24 1	
9	C6.2	8	10:18 10:22 10:29 1-		10:16 10:22 10:32 1-	10:17 10:22 10:25 1-	10:25 10:35 10:56 1+
9	X3.3	10	12:55 13:11 15:06 3+		12:53 13:06 14:48 3	12:56 13:14 14:14 2+	12:56 13:15 14:34 3
9	M1.2	2			17:56 18:02 18:18 1	17:58 18:01 18:14 1-	
10	C8.7	1	09:36 09:38 09:45 1-				
11	C2.9	2			14:00 14:06 14:13 1-	14:02 14:11 16:08 3+	
12	C3.8	1				10:56 11:06 11:18 1	
12	C4.0	3	12:40 12:42 12:56 1-			12:37 12:45 12:54 1-	
12	M1.1	9	13:00 13:08 13:33 2		12:59 13:10 13:34 2	12:59 13:10 13:38 2	13:00 13:07 13:34 2
12	C4.5	1				14:30 14:32 14:37 1-	
12	M1.4	6	15:39 15:45 15:55 1-		15:38 15:49 16:06 1+	15:38 15:51 16:13 2	15:48 16:00 16:24 ###
13	C3.1	3				12:19 12:22 12:26 1-	
13	C3.1	1				17:03 17:08 17:11 1-	
14	M1.0	1				07:32 07:37 07:45 1-	
14	C2.6	1				09:14 09:22 09:24 1-	
14	C4.6	4	10:04 10:07 10:16 1-		10:02 10:07 10:13 1-	10:02 10:08 10:12 1-	
14	C2.8	2			10:26 10:31 10:39 1-	10:28 10:30 10:39 1-	
14	?	2			11:00 11:04 11:10 1-	11:02 11:05 11:12 1-	
14	?	1				11:25 11:28 ? -	
14	?	3			11:32 11:36 11:47 1-	11:35 11:38 11:45 1-	
14	?	1				14:19 14:22 ? -	
14	C3.8	3			14:28 14:33 14:47 1	14:29 14:33 14:48 1	
14	C2.6	2			14:49 14:54 15:05 1-	14:52 14:56 15:07 1-	
14	?	1			15:15 15:18 ? -		
14	C3.4	2			15:19 15:20 15:28 1-	15:17 15:21 15:33 1-	
14	C3.0	2			16:04 16:07 16:21 1-	16:06 16:08 16:20 1-	
14	C7.5	2			17:54 17:57 18:06 1-	17:56 17:58 18:06 1-	
15	C4.5	4	10:14 10:21 10:32 1-		10:10 10:21 10:33 1	10:14 10:22 10:38 1	
15	C3.3	4	11:10 11:14 11:18 1-		11:09 11:13 ? -	11:11 11:15 ? -	
15	?	2			11:17 11:19 11:24 1-	11:18 11:21 11:35 1-	
15	C2.7	3			11:40 11:42 11:53 1-	11:42 11:45 11:55 1-	
15	C2.6	4	12:12 12:15 12:35 1		12:11 12:15 12:26 1-	12:12 12:17 12:25 1-	
15	C2.7	3			12:47 12:51 13:05 1-	12:48 12:54 12:56 1-	
15	?	1				14:04 14:12 ? -	
15	?	2			14:13 14:16 14:24 1-	14:13 14:20 14:36 1-	
15	C4.3	3	14:49 14:55 15:00 1-		14:49 14:56 ? -	14:51 14:56 ? -	
15	C4.7	3	15:16 15:20 15:26 1-		15:14 15:20 15:31 1-	15:15 15:21 15:30 1-	
15	M1.8	2			16:53 17:06 17:40 2+	16:54 17:09 17:41 2+	
16	X2.5	1				06:50 06:56 07:18 1+	
16	C6.1	2			16:18 16:24 16:45 1+	16:20 16:30 16:55 2	
16	C8.9	2			18:25 18:27 ? -	18:25 18:32 18:44 1	
17	C2.9	8	12:29 12:33 12:53 1		12:25 12:34 12:51 1+	12:26 12:34 12:48 1	12:28 12:35 12:57 1+
18	C2.6	3			12:05 12:07 12:14 1-	12:04 12:09 12:15 1-	
18	?	2			12:46 12:56 13:06 1	12:49 12:59 13:09 1	
19	C6.7	6	09:37 09:41 10:00 1		09:34 09:42 10:08 2	09:36 09:44 10:16 2	
19	C5.7	8	12:45 12:48 12:55 1-		12:44 12:48 13:41 2+	12:45 12:49 ? -	12:47 12:52 13:19 1+
19	?	1				12:58 13:05 13:28 1+	
20	C2.8	2			15:50 15:57 16:11 1	15:54 15:59 16:07 1-	
20	C2.7	1				17:04 17:11 17:25 1	
21	C1.7	2			10:24 10:27 10:35 1-	10:27 10:30 10:36 1-	
21	C1.4	2			13:12 13:15 13:20 1-	13:12 13:16 13:23 1-	
21	C2.1	1				13:49 13:50 14:01 1-	
21	?	2			14:04 14:07 14:10 1-	14:05 14:09 14:13 1-	
21	C1.9	1				14:20 14:23 14:30 1-	
21	C4.1	1				15:49 15:59 16:12 1	
22	X1.7	1	06:29 06:31 06:33 1-				
22	C3.4	4	11:38 11:40 11:46 1-		11:35 11:40 11:47 1-	11:38 11:41 11:49 1-	
22	C3.4	2			15:30 15:36 15:50 1	15:32 15:36 15:44 1-	
22	C9.4	3	16:25 16:31 16:41 1-		16:24 16:31 16:56 1+	16:25 16:31 16:57 1+	
22	C4.6	1				17:14 17:17 17:23 1-	
22	M4.8	1				20:40 20:43 20:54 1-	
23	C3.8	3	09:47 09:50 09:58 1-		09:45 09:50 10:01 1-	09:46 09:50 10:03 1-	
23	?	1				10:58 11:04 11:19 1	
23	M1.0	8	13:20 13:30 14:04 2		13:17 13:27 14:15 2+	13:15 13:28 14:12 2+	13:19 13:31 14:06 2+
23	?	2			15:05 15:13 ? -	15:10 15:13 ? -	
23	?	4			15:15 15:24 ? -	15:15 15:25 ? -	
23	M1.4	4			15:41 15:51 ? -	15:42 15:49 ? -	15:30 15:43 15:53 1
23	?	3			16:13 16:20 16:38 1	16:14 16:20 16:34 1	16:17 16:22 16:37 1
23	M2.6	2			17:34 17:45 18:16 2	17:34 17:45 18:19 2	
24	M4.5	1				06:31 06:36 06:49 1-	
24	C4.4	2			08:07 08:11 08:28 1	08:09 08:12 ? -	
24	?	1				08:16 08:19 08:26 1-	
24	C5.3	5	09:09 09:12 09:31 1		09:08 09:12 09:26 1-	09:07 09:14 09:30 1	
24	C2.7	2				10:22 10:28 10:32 1-	
24	M2.2	7	10:44 10:54 ? -		10:40 10:49 ? -	10:35 10:59 ? -	10:29 10:34 10:51 1
24	?	1				11:06 11:10 ? -	10:49 11:00 11:07 1-
24	M3.6	7	11:14 11:18 12:45 3		11:12 11:18 ? -	11:14 11:21 ? -	11:16 11:26 11:45 1+
24	M1.0	6	11:56 12:02 12:30 2		11:55 12:01 12:40 2	11:56 12:03 12:43 2+	11:45 11:57 12:05 1
24	?	2			12:45 12:49 12:56 1-	12:47 12:50 12:58 1-	
24	?	1				14:14 14:18 14:30 1-	
24	C3.9	7	14:42 14:45 14:57 1-		14:39 14:45 15:11 1+	14:41 14:47 15:08 1+	14:40 14:48 15:01 1
24	?	1				15:28 15:34 15:36 1-	
24	?	1				16:30 16:34 16:39 1-	
24	C4.1	2			16:44 16:49 16:53 1-	16:46 16:48 16:54 1-	
24	C5.8	1				17:16 17:21 17:37 1	
24	C7.8	1				17:45 17:46 17:52 1-	
25	C3.1	4	10:58 11:01 11:07 1-		10:56 11:02 11:17 1	11:00 11:02 11:11 1-	
25	M2.0	1				16:51 17:16 18:11 2+	
26	C1.5	1				15:57 16:01 16:10 1-	
27	C1.5	1				14:26 14:31 14:47 1	
28	C5.1	2	08:53 09:04 09:09 1-		09:03 09:08 09:31 1+		
28	?	5	11:02 11:45 12:44 3		11:12 11:46 12:50 3	11:23 11:49 12:18 2+	
29	C2.3	5	13:30 13:35 13:40 1-		13:27 13:35 13:47 1	13:29 13:36 13:44 1-	

	Xray class	Steve Parkinson (Various)				Andrew Thomas (19.6kHz/22.1kHz)				Phil Rourke (23.4kHz)				Mark Prescott (19.6kHz/22.1kHz)				John Elliott (19.6kHz)			
		Tuned radio frequency receiver, frame aerials.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.				SpectrumLab/Starbase, mini-whip aerial. Active				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	C1.6																				
1	C2.5																				
2	C5.6	10:56	10:58	11:05	1-	10:56	10:57	11:06	1-												
2	C6.5					11:23	11:31	11:56	2												
2	C3.0																				
2	C3.1																				
2	?																				
3	C5.8																				
3	C3.7																				
3	C4.3	12:47	12:49	12:55	1-	12:45	12:48	12:56	1-	12:47	12:49	12:55	1-	12:51	12:53	12:58	1-				
3	C3.1					13:05	13:07	13:09	1-												
3	C2.2																				
3	C3.1																				
3	?																				
3	C4.4																				
4	M1.4	11:46	11:53	12:27	2	11:46	11:51	12:40	2+	11:45	12:04	13:42	3	11:51	11:57	12:55	2+	11:45	11:50	12:30	2
4	C8.4	13:43	13:47	14:05	1	13:42	13:47	14:02	1	13:44	13:47	14:01	1-	13:47	13:51	14:08	1	13:45	13:50	14:10	1
4	C4.3																				
4	C6.0																				
4	?																				
4	M1.5																				
4	M1.3																				
4	M1.1																				
5	C9.6	10:58	11:09	11:25	1+	10:54	11:09	11:47	2+	11:03	11:10	11:39	2	11:01	11:14	11:38	2				
5	C6.3									13:11	13:18	13:27	1-	13:09	13:22	13:35	1+				
6	C4.5									11:44	11:45	11:53	1-								
6	C9.4	12:50	13:00	13:25	2	12:50	12:57	13:24	2	12:50	12:58	13:31	2	12:55	13:01	13:15	1	12:50	12:55	13:20	1+
7	C2.8																				
7	?																				
7	C4.9																				
7	M1.3																				
7	?																				
8	C4.3																				
8	C5.3																				
8	C9.8	11:45	11:48	11:57	1-	11:44	11:47	12:08	1	11:45	11:48	12:00	1-								
8	M3.4					12:43	13:10	14:02	2+	12:42	13:00	14:11	3	12:50	13:14	14:01	2+	13:00	13:15	14:00	2+
8	M1.2	14:17	14:21	14:36	1	14:16	14:19	14:29	1-	14:16	14:21	14:33	1-	14:20	14:26	14:38	1-				
8	?																				
8	M1.8	15:21	15:24	15:37	1-	15:21	15:29	15:36	1-	15:21	15:24	15:40	1	15:26	15:29	15:42	1-				
8	C6.1																				
8	C7.0																				
8	M1.3																				
9	C6.2	10:18	10:22	10:29	1-	10:18	10:22	10:29	1-	10:17	10:22	10:36	1	10:22	10:30	10:44	1				
9	X3.3	12:57	13:01	13:10	1-	12:54	13:13	15:20	3+	12:55	13:01	15:41	3+	13:01	13:17	15:07	3+	12:58	13:40	15:20	3+
9	M1.2																				
10	C8.7																				
11	C2.9																				
12	C3.8																				
12	C4.0					12:37	12:43	12:54	1-	12:36	13:08	13:46	2+	13:06	13:11	13:26	1	13:05	13:15	13:30	1
12	M1.1	13:00	13:08	13:33	2	12:59	13:07	13:31	1+												
12	C4.5																				
12	M1.4	15:38	15:45	15:55	1-					15:37	15:46	15:59	1								
13	C3.1	12:17	12:20	12:28	1-					12:18	12:21	12:34	1-								
13	C3.1																				
14	M1.0																				
14	C2.6																				
14	C4.6	10:03	10:07	10:15	1-																
14	C2.8																				
14	?																				
14	?																				
14	?	11:34	11:37	11:48	1-																
14	?																				
14	C3.8	14:29	14:32	14:42	1-																
14	C2.6																				
14	?																				
14	C3.4																				
14	C3.0																				
14	C7.5																				
15	C4.5	10:14	10:23	10:35	1																
15	C3.3	11:11	11:14	11:28	1-																
15	?																				
15	C2.7					12:49	12:51	13:00	1-												
15	C2.6	12:13	12:17	12:23	1-																
15	C2.7	12:49	12:52	13:15	1+																
15	?																				
15	?																				
15	C4.3																				
15	C4.7																				
15	M1.8																				
16	X2.5																				
16	C6.1																				
16	C8.9																				
17	C2.9	12:28	12:33	12:51	1	12:27	12:33	12:46	1	12:27	12:32	12:56	1+	12:32	12:37	13:43	2+				
18	C2.6									12:01	12:08	12:22	1								
18	?																				
19	C6.7	09:37	09:42	10:10	2	09:37	09:41	10:01	1</												

2024 FEBRUARY.

		Chris Bailey			Colin Briden			Richard Coffey (19.6kHz/24kHz)			Stephen Crook					
		Spectrum Lab.			Spectrum Lab frame Aerial.			Spectrum Lab Frame aerial.								
		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)
1	C1.6															
1	C2.5															
2	C5.6															
2	C6.5															
2	C3.0															
2	C3.1															
2	?															
3	C5.8															
3	C3.7															
3	C4.3															
3	C3.1															
3	C2.2															
3	C3.1															
3	?															
3	C4.4															
4	M1.4															
4	C8.4															
4	C4.3															
4	C6.0															
4	?															
4	M1.5															
4	M1.3															
4	M1.1															
5	C9.6															
5	C6.3															
6	C4.5															
6	C9.4															
7	C2.8															
7	?															
7	C4.9															
7	M1.3															
7	?															
8	C4.3															
8	C5.3															
8	C9.8															
8	M3.4															
8	M1.2															
8	?															
8	M1.8															
8	C6.1															
8	C7.0															
8	M1.3															
9	C6.2															
9	X3.3										12:53	13:14	13:32		2	
9	M1.2															
10	C6.7															
11	C2.9															
12	C3.8															
12	C4.0															
12	M1.1															
12	C4.5															
12	M1.4															
13	C3.1															
13	C3.1															
14	M1.0															
14	C2.6															
14	C4.6															
14	C2.8															
14	?															
14	?															
14	?															
14	C3.8															
14	C2.6															
14	?															
14	C3.4															
14	C3.0															
14	C7.5															
15	C4.5															
15	C3.3															
15	?															
15	C2.7															
15	C2.6															
15	C2.7															
15	?															
15	?															
15	C4.3															
15	C4.7															
15	M1.8															
16	X2.5															
16	C6.1															
16	C8.9															
17	C2.9															
18	C2.6															
18	?															
19	C6.7															
19	C5.7															
19	?															
20	C2.8															
20	C2.7															
21	C1.7															
21	C1.4															
21	C2.1															
21	?															
21	C1.9															
21	C4.1															
22	X1.7															
22	C3.4															
22	C3.4															
22	C9.4															
22	C4.6															
22	M4.8															
23	C3.8															
23	?															
23	M1.0															
23	?															
23	?															
23	M1.4															
23	?															
23	M2.6															
24	M4.5															
24	C4.4															
24	?															
24	C5.3															
24	C2.7															
24	M2.2															
24	?															
24	M3.6															
24	M1.0															
24	?															
24	?															
24	C3.9															
24	?															
24	?															
24	C4.1															
24	C5.8															
24	C7.8															
25	C3.1															
25	M2.0															
26	C1.5															
27	C1.5															
28	C5.1															
28	?															
29	C2.3															