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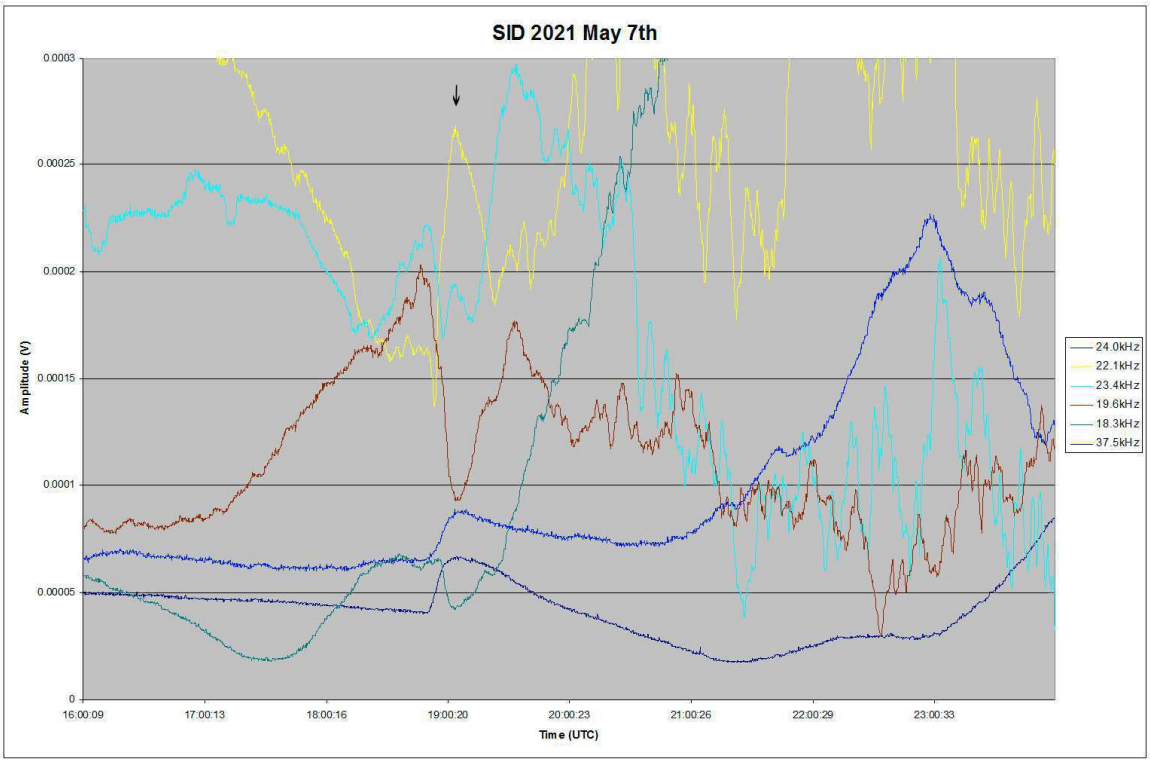
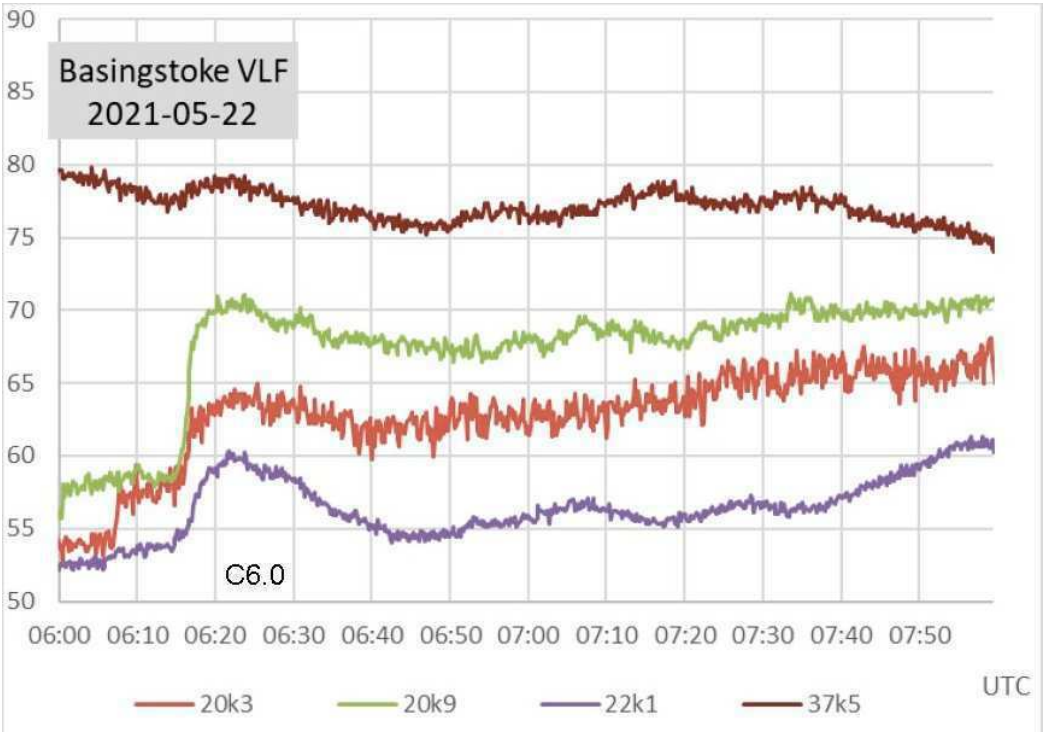
BAA Radio Astronomy Section. 2021 MAY.

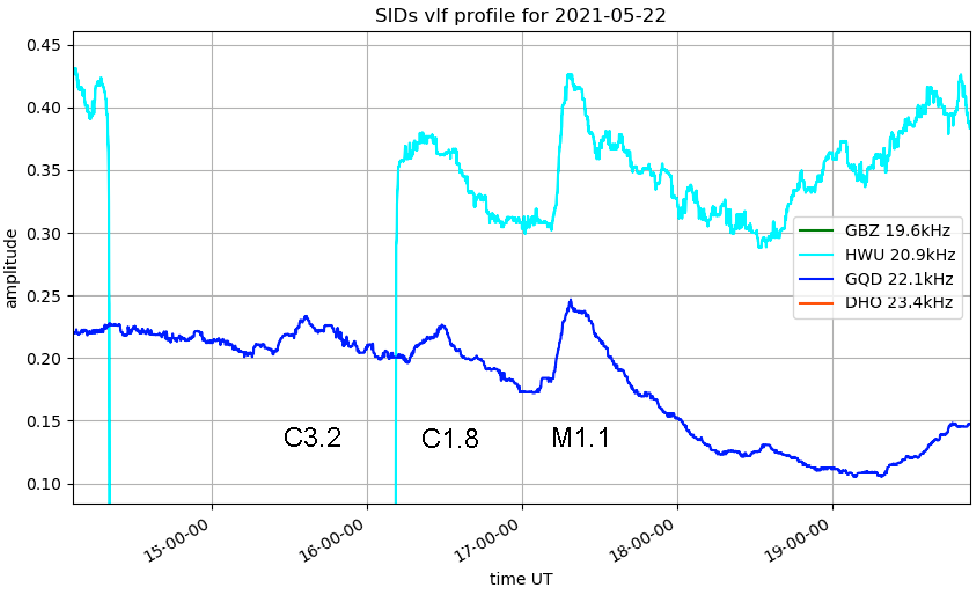
May has been the most active month so far in solar cycle 25, with 26 flares recorded as SIDs including four of M-class. Prior to this, we had just a single M-class in 2020 November, and another in 2020 May. Cycle 24 ended with 12 M and four X-class flares back in 2017 September. The strongest flare was the M3.9 just before sunset on the 7th.



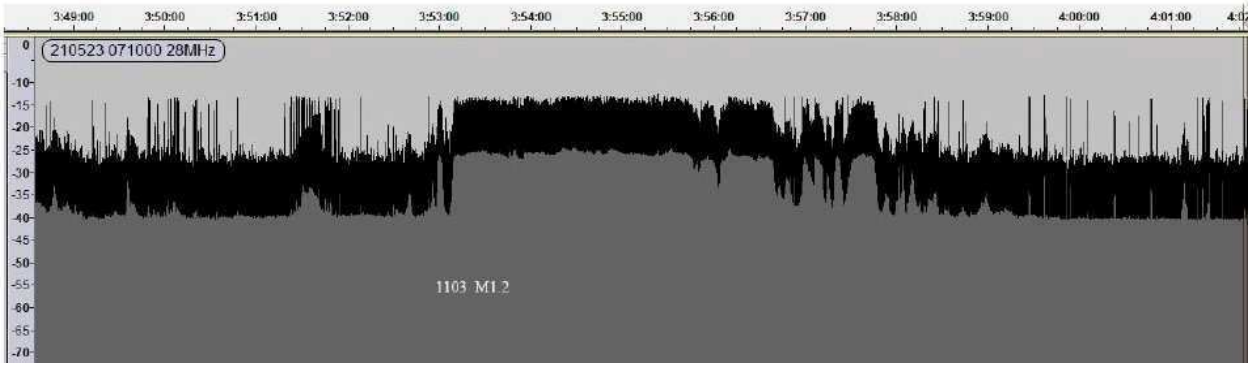
The multiple signals shown in Mark Edwards' recording make it easier to see, particularly on the western paths at 24 and 37.5kHz (black and dark-blue traces). Mark has added an arrow above the 22.1kHz trace (yellow) to identify the SID. Active region AR12822 was responsible for this flare, and continued over the next few days with a few B- and C-class flares as it rotated out of view from Earth.

Most of the activity was later in the month, on the 22nd and 23rd as AR12824 grew and became more active in the northern hemisphere. The first chart on the next page shows the early C6.0 flare recorded by Paul Hyde, even showing a clear SID on the western path at 37.5kHz. The second chart shows the activity later on the 22nd, recorded by Mark Prescott. There is a long break in the 20.9kHz signal, missing the first C3.2 flare.

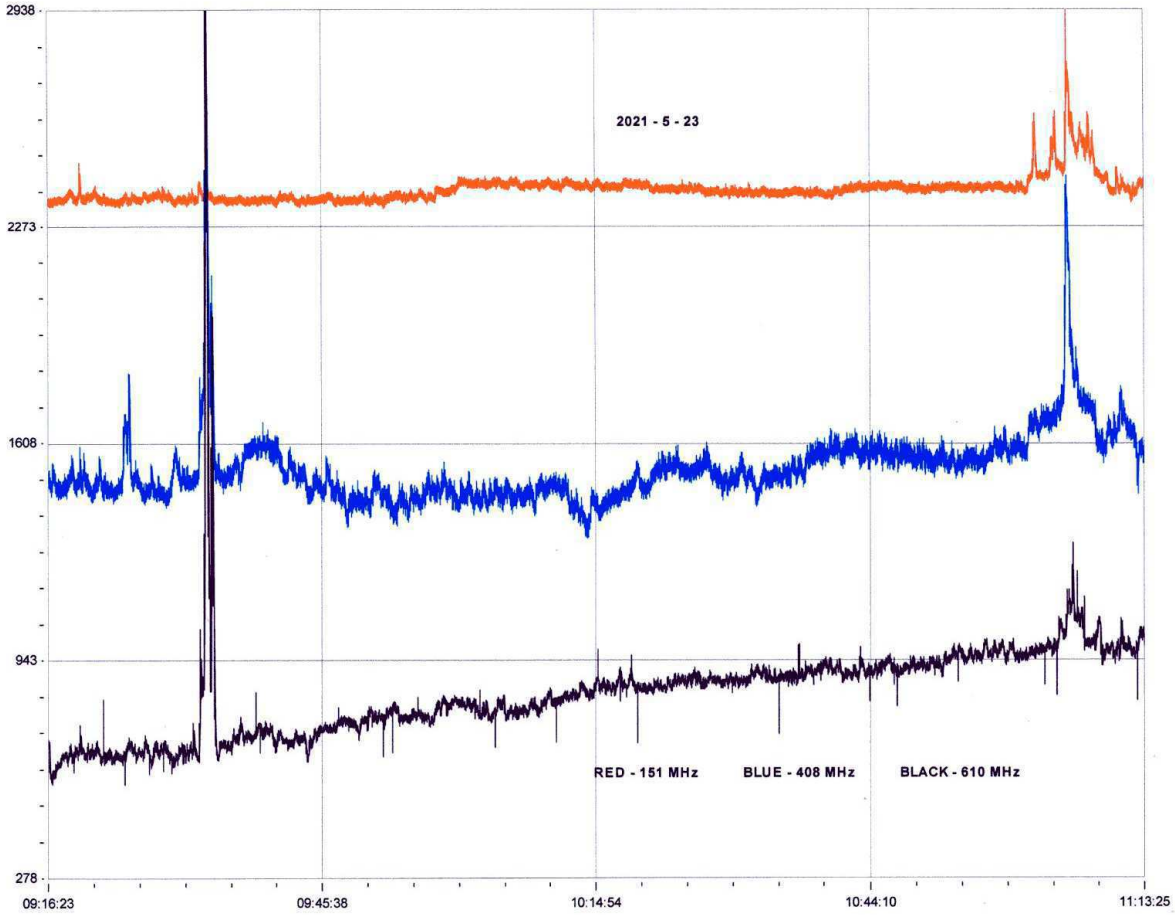




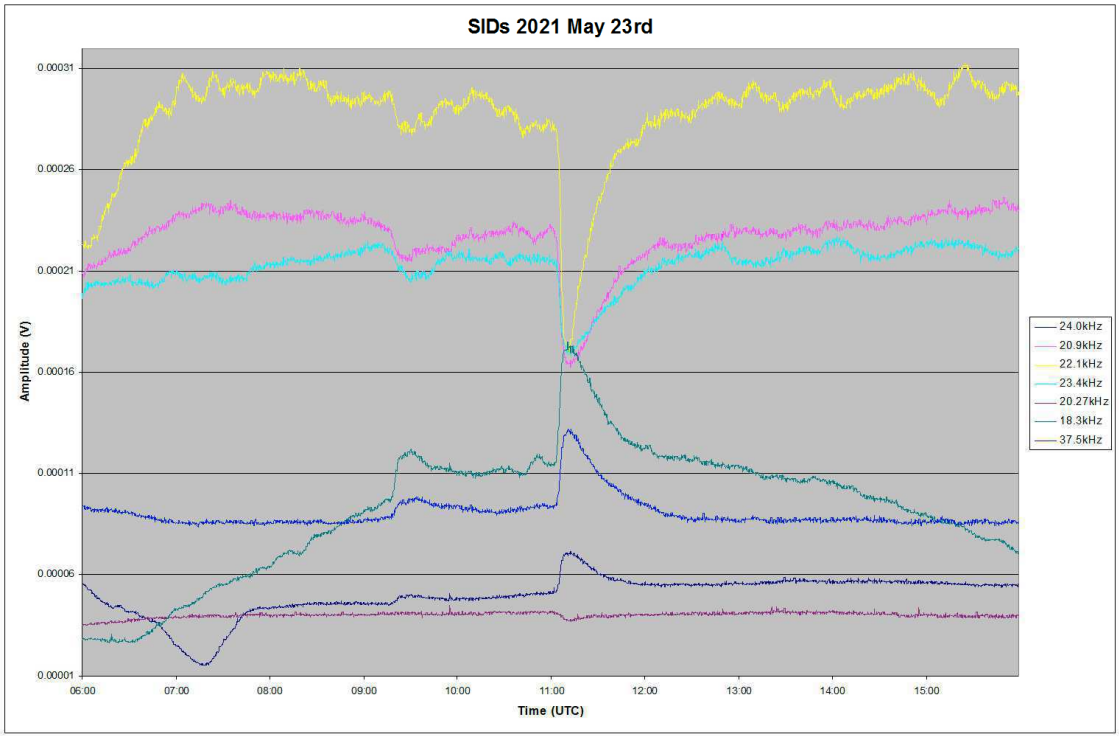
AR12824 continued its activity on the 23rd, with another M1.1 flare close to midday. There were also some HF and VHF radio noise bursts recorded by Colin Briden at 28MHz and Colin Clements at 151, 408 and 610MHz.

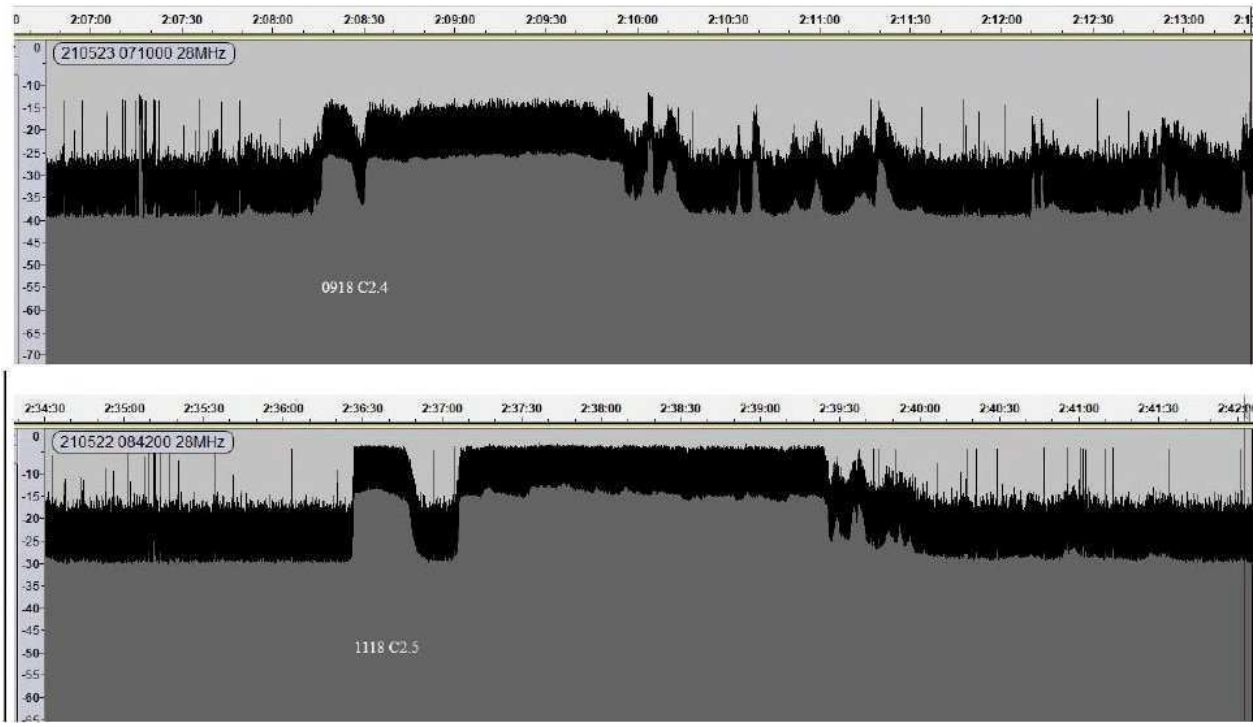


This 28MHz recording by Colin Briden shows the M1.1 flare, starting at 11:03UT, lasting for about 7 minutes. The Black band shows the peaks of the signal.

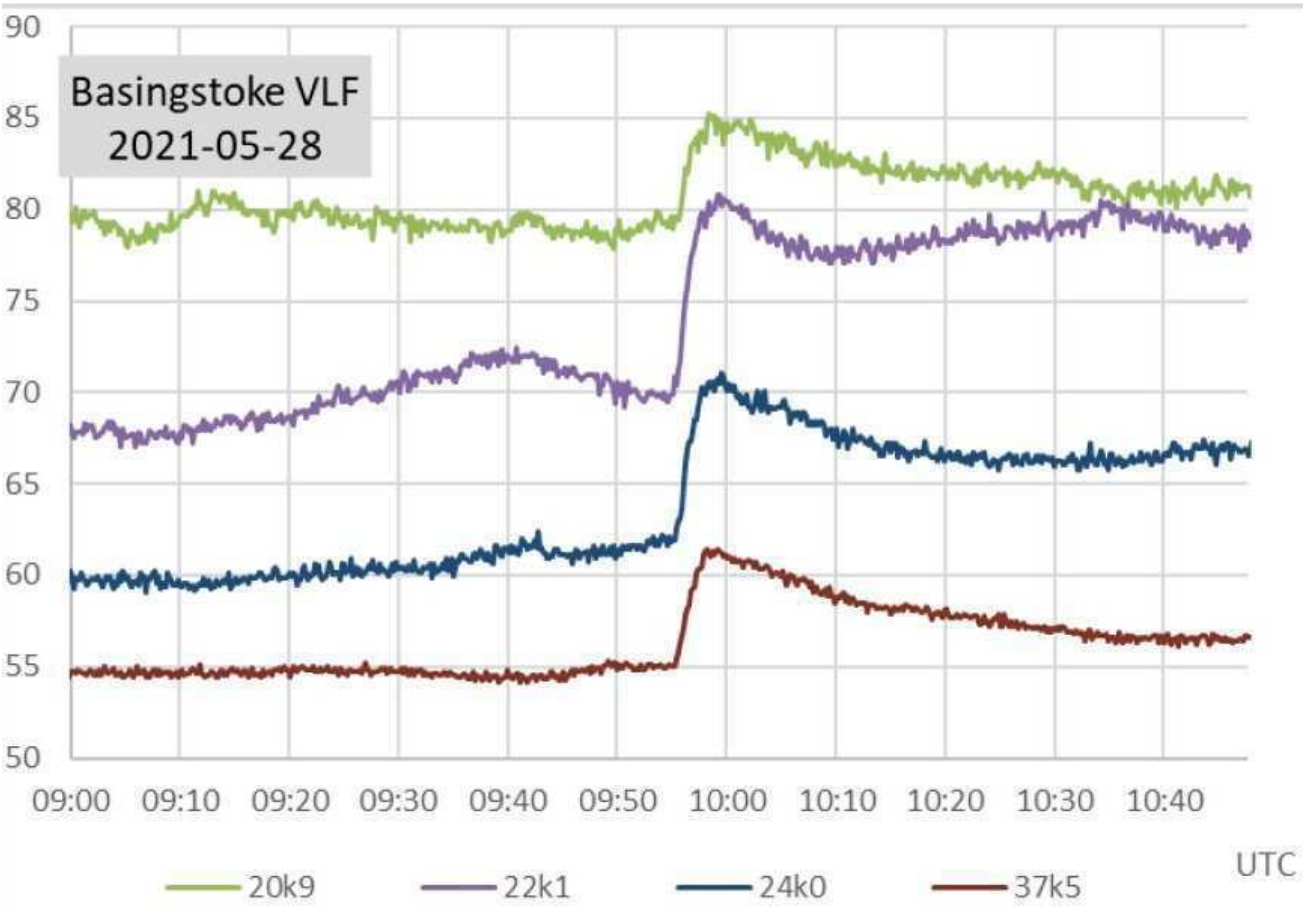


In Colin Clements' recording, above, the M1.1 flare is at the far right, with the C2.4 flare at the left. Mark Edwards' VLF chart is shown below, the 18.3kHz signal (green) also showing a clear SID for the B9.0 flare at 10:50.

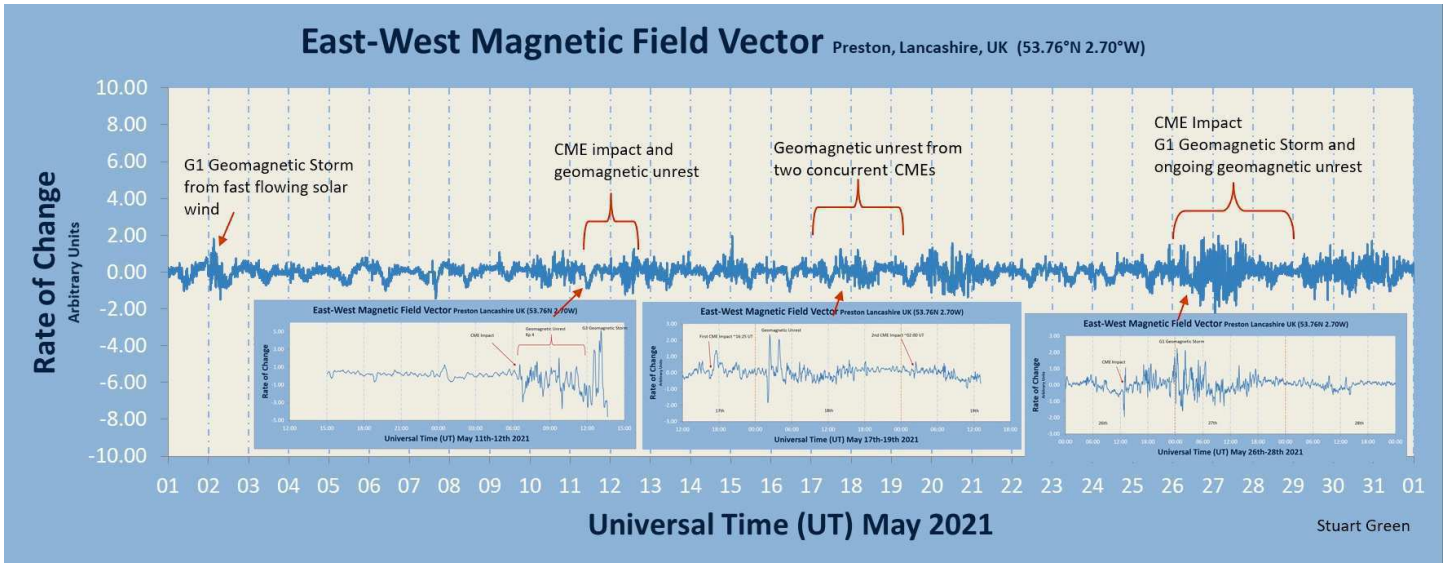




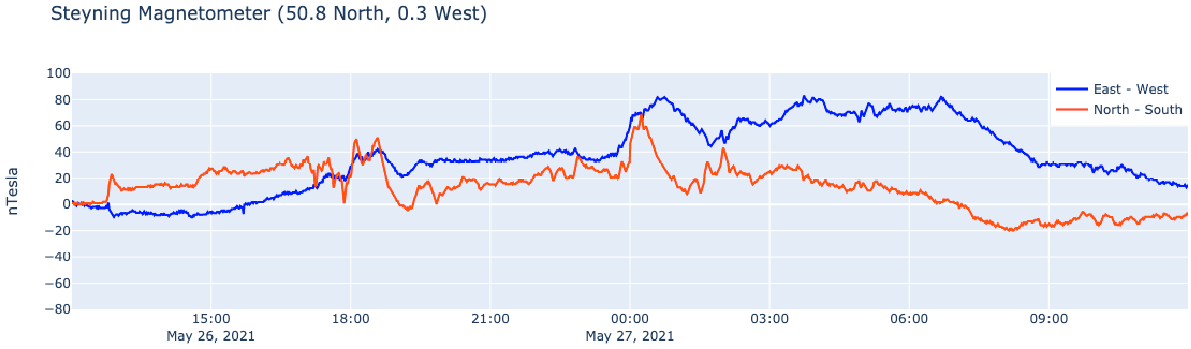
These are the 28MHz recordings by Colin Briden of the C2.4 and C2.5 flares on the 23rd. Note that the horizontal axis shows time since the start of the recording, not actual time. The C2.4 burst lasts for about 2 minutes, while the C2.5 burst is about 3 minutes with a 10dB stronger peak signal. The month ended with a C3.0 flare shown as four well-matched SIDs in Paul Hyde's recording:



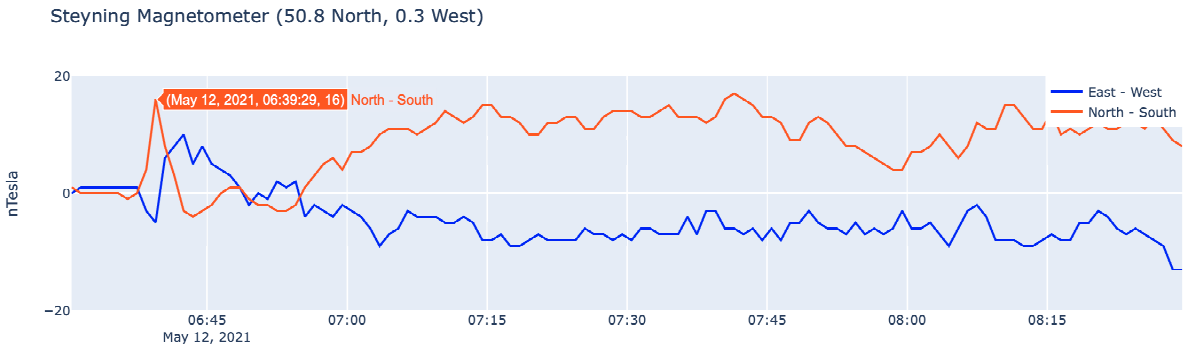
MAGNETIC OBSERVATIONS.



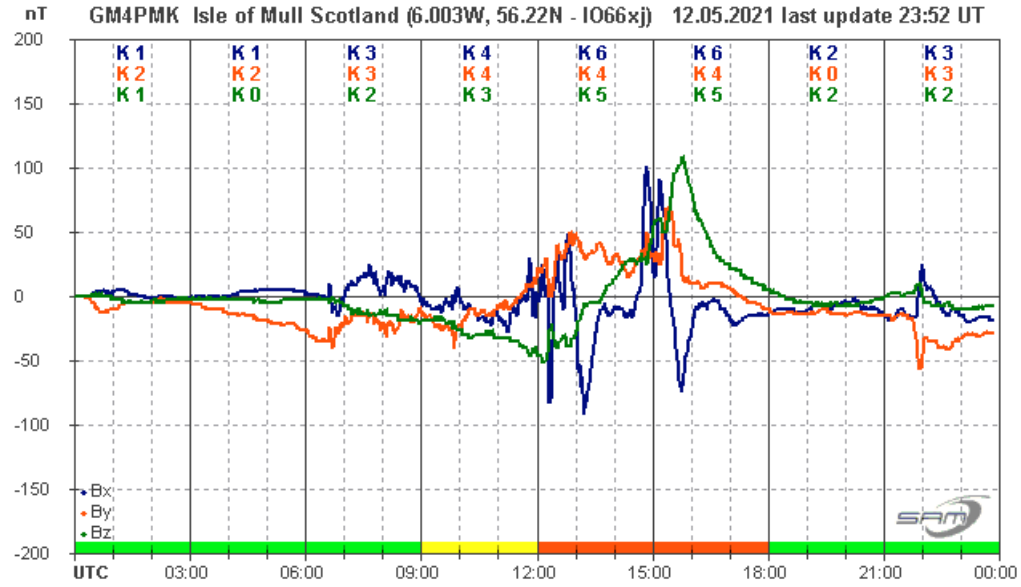
The increased solar activity has resulted in more CME than coronal hole disturbances in May. Stuart Green's chart of the month's activity shows the greatest disturbance at the end of the month with CMEs associated with the M-class flares. Our recordings show a fairly small shock at the CME arrival time around 13:00UT on the 26th, visible in the chart from Nick Quinn:

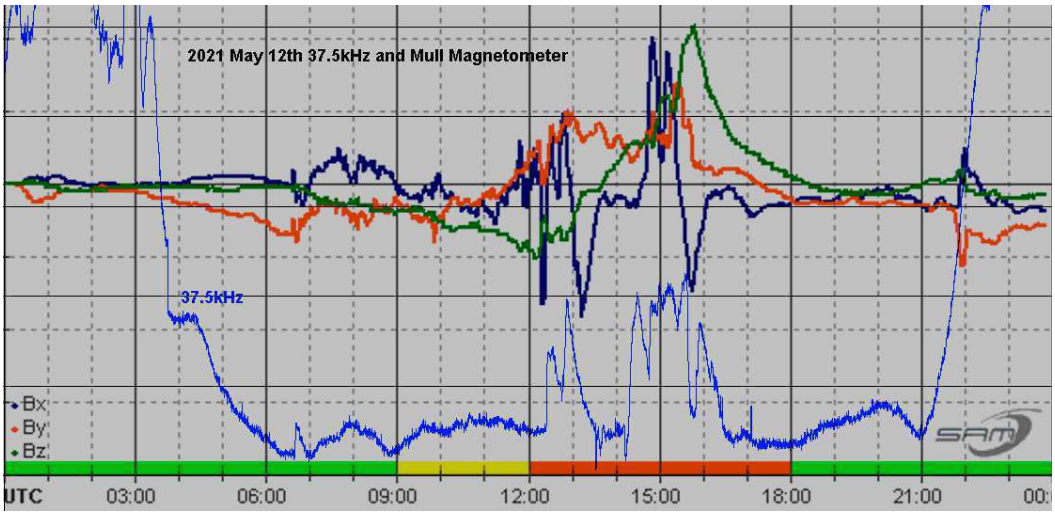


A disturbance of up to 100nT followed into the morning of the 27th, fading out by midday. SOHO images show this to be linked to the flares on the 22nd. A much clearer shock arrival can be seen at 06:39:29UT in Nick's chart from the 12th:



SOHO images first show the CME on May 9th from a filament eruption. The disturbance continued through the day, but had largely faded out by midnight. The activity is shown in Roger Blackwell's recording on the next page:

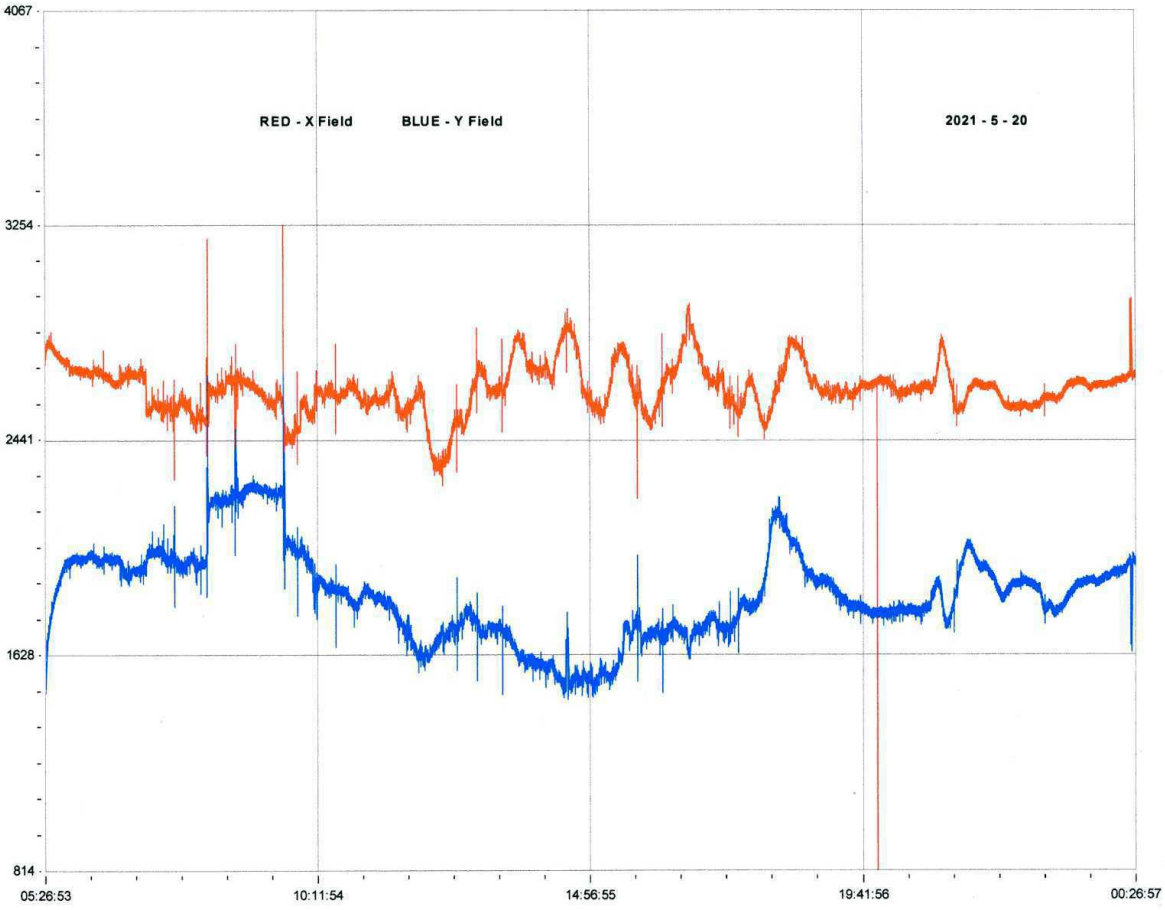


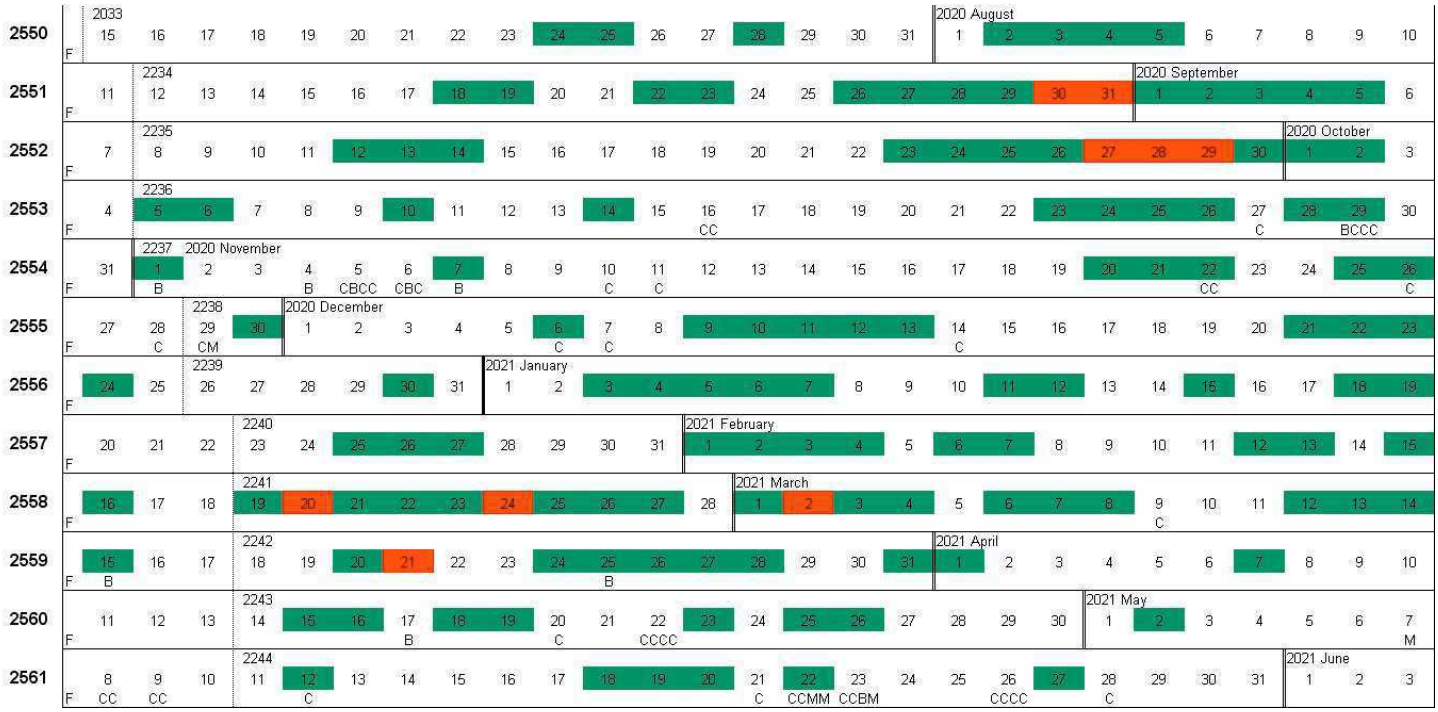


Mark Edwards has added his 37.5kHz recording to Roger's magnetometer, showing some strong VLF activity during the afternoon. The small burst of activity around 22:00 does not appear to be another CME impact, but was too late to cause any VLF disturbance. Also of note is the very small SID-like feature coincident with the initial CME shock. This also shows well in Colin Clements' 37.5kHz recording, timed at 06:40UT.

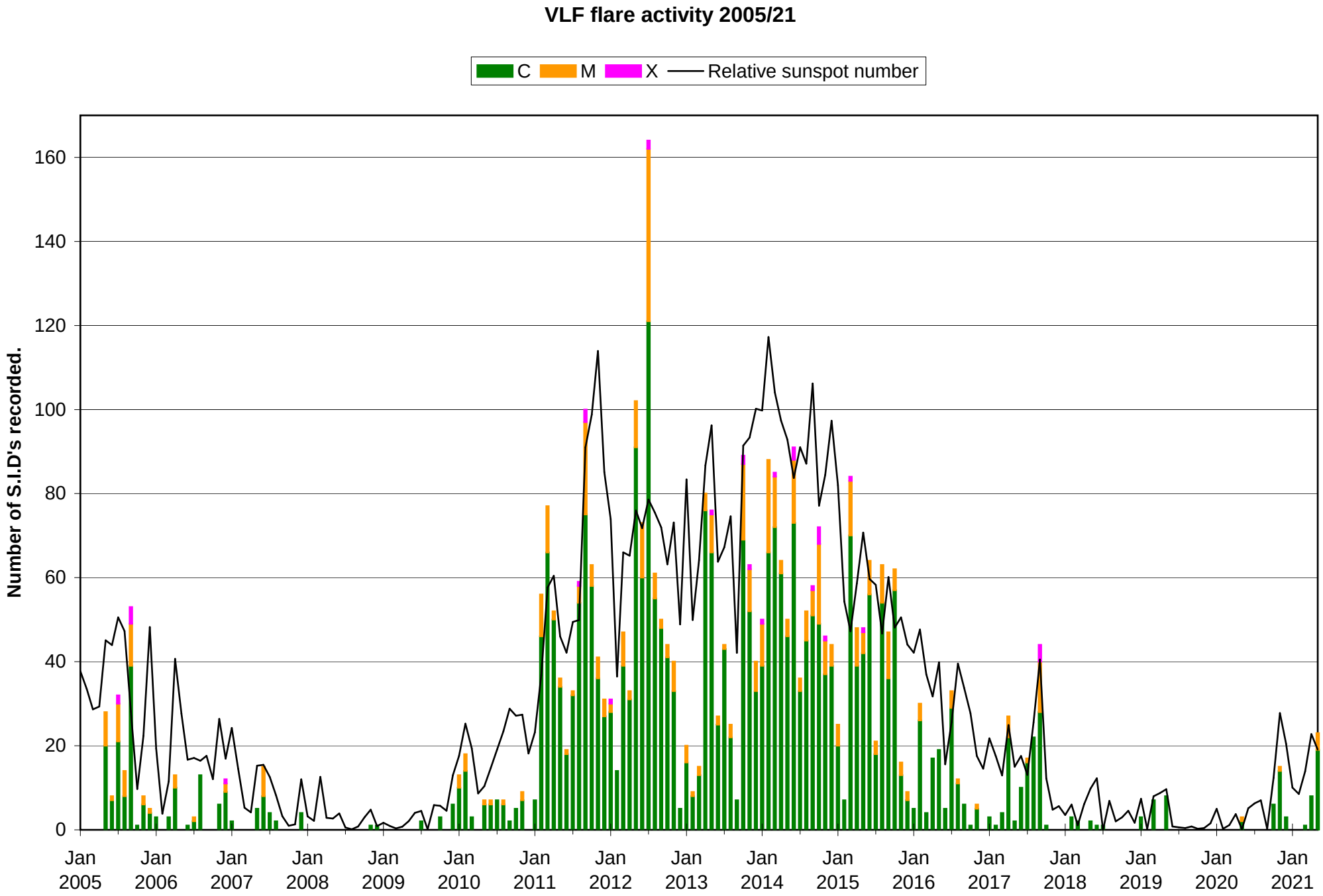
SOHO images show another strong CME leaving the sun in the evening of the 13th, although no source was given. It produced a very small magnetic disturbance on the 18th. A coronal hole high speed wind became effective late on the 19th, with some fairly mild disturbances through the day on the 20th. Colin Clements' chart on the next page shows this well, despite some local interference between 09 and 10UT.

The Radio astronomy Section webinar series has been very popular, and will be continuing. For full details of the programme and joining instructions, please go to the BAA website where they are listed along with the other BAA events.





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


VLF flare activity 2005/21
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

BAA Radio Astronomy Section. **2021 MAY.**

	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/*20.9*/**37.5**kHz) Spectrum Lab / PC 2m loop aerial.				Colin Clements (37.5kHz) 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)	
7	**M3.9**	6	*18:56*	*19:02*	*19:15*	*1*					18:50	19:00	?	-	18:50	19:05	20:11	2+				
8	C1.5	6					12:42	13:00	13:17	2	12:49	13:01	13:33	2	12:47	13:02	13:32	2	12:43	13:04	13:22	2
8	C8.6	4									18:30	18:49	19:40	2+	18:31	18:48	19:43	2+	18:31	18:47	19:11	2
9	C4.0	8	13:52	13:59	14:22	1+	13:49	14:00	14:22	2	13:51	14:00	14:48	2+	13:53	14:01	?	-	13:53	14:05	14:37	2
9	C2.0	2	14:41	14:48	14:59	1-									14:27	14:36	15:29	2+				
12	C1.5	2													09:33	09:36	09:49	1-				
21	C4.8	2									19:24	19:31	20:01	2	19:25	19:31	20:06	2				
22	C6.0	5					06:12	06:21	06:32	1	06:14	06:22	06:43	1+	*06:15*	*06:19*	*06:26*	*1-*				
22	C1.3	1													*08:44*	*08:51*	*08:57*	*1-*				
22	C2.5	5	11:20	11:24	11:31	1-	11:18	11:24	11:33	1-	11:19	11:25	12:01	2	11:21	11:25	11:51	1+				
22	C1.1	1																				
22	C3.2	6	15:25	15:33	15:45	1	15:23	15:34	15:43	1	15:24	15:33	16:13	2+	15:24	15:36	16:03	2	15:26	15:37	16:14	2+
22	C1.8	3	*16:14*	*16:20*	*16:34*	*1*									16:16	16:20	16:40	1				
22	**M1.1**	8	*17:09*	*17:14*	*17:42*	*2*	17:06	17:12	17:21	1-	17:08	17:15	17:44	2	17:08	17:15	18:00	2+	17:10	17:17	18:19	2+
22	**M1.4**	1													21:34	21:36	21:41	1-				
23	C2.7	1													*05:06*	*05:16*	*05:45*	*2*				
23	C2.4	6	09:19	09:22	09:47	1+					09:17	09:30	09:54	2	**09:19**	**09:26**	**?**	**-**	09:20	09:34	09:52	1+
23	?	1													**09:28**	**09:34**	**10:16**	**2+**				
23	B9.0	1													*10:45*	*10:49*	*11:01*	*1-*				
23	**M1.1**	9	11:04	11:08	12:17	2+	11:02	11:08	11:31	1+	11:03	11:11	11:57	2+	11:03	11:13	12:11	2+	11:05	11:13	12:10	2+
23	C2.2	4									17:01	17:07	17:17	1-	17:04	17:09	17:23	1				
26	C1.2	1													09:55	09:57	10:06	1-				
26	C1.2	1													17:11	17:17	17:23	1-				
26	C1.6	1													18:29	18:32	18:44	1-				
26	C3.0	1													20:35	20:39	20:53	1-				
28	C3.0	5	09:54	09:58	10:15	1					09:54	09:59	10:24	1+					09:57	10:01	10:56	2+

	Xray class		Steve Parkinson (Various) Tuned radio frequency receiver, frame aerials.				Andrew Thomas (23.4kHz/*19.6kHz*) Tuned radio frequency receiver, 0.6m frame aerial.				Phil Rourke (23.4kHz) Spectrum Lab, 0.6m frame aerial.				John Wardle SpetrumLab/Starbase, Active mini-whip aerial.				Chrostopher Bailey Spectrum Lab			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
7	**M3.9**						18:56	19:06	19:12	1-	18:55	19:08	19:16	1								
8	C1.5		12:49	12:59	13:40	2+																
8	C8.6						18:37	18:43	18:52	1-												
9	C4.0		13:53	14:02	14:47	2+	*13:51*	*14:02*	*14:44*	*2+*												
9	C2.0																					
12	C1.5																					
21	C4.8																					
22	C6.0						06:15	06:21	06:45	*1+*												
22	C1.3																					
22	C2.5																					
22	C1.1																					
22	C3.2																					
22	C1.8																					
22	**M1.1**						17:08	17:14	17:43	*2*												
22	**M1.4**																					
23	C2.7																					
23	C2.4																					
23	?																					
23	B9.0																					
23	**M1.1**		11:03	11:12	12:00	2+	11:04	11:11	11:49	*2*												
23	C2.2						17:02	17:07	17:14	*1-*												
26	C1.2																					
26	C1.2																					
26	C1.6																					
26	C3.0																					
28	C3.0		09:55	10:00	10:20	1																

	Xray class		Colin Briden (22.1kHz) Spectrum Lab / PC, 1.2m frame aerial.				Andrew Lutley (23.4kHz) Tuned radio frequency receiver, 0.6m frame aerial.				Peter Meadows (23.4kHz) Tuned radio frequency receiver, 0.6m frame aerial.				John Elliott (18.3kHz) Tuned radio frequency receiver, 0.5m frame aerial.				Mark Prescott (19.6/*20.9*/**22.1kHz**)			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
7	**M3.9**																		18:30	18:53	19:00	1+
8	C1.5																		12:54	13:07	13:36	2
8	C8.6																					
9	C4.0																		13:53	14:07	15:14	2+
9	C2.0																					
12	C1.5																		*09:27*	*09:41*	*10:22*	*2+*
21	C4.8																					
22	C6.0																		**06:18**	**06:26**	**06:50**	**1+**
22	C1.3																					
22	C2.5		11:18	11:30	11:49	1+																
22	C1.1		14:10	14:26	14:46	2																
22	C3.2		15:22	15:39	?	-																
22	C1.8		?	16:24	17:02	-																
22	**M1.1**		17:06	17:14	17:49	2													17:11	17:18	18:10	2+
22	**M1.4**																					
23	C2.7																					
23	C2.4		09:18	09:30	09:41	1													09:23	09:34	10:04	2
23	?																					
23	B9.0																					
23	**M1.1**		11:03	11:12	11:51	2+													11:06	11:14	12:03	2+
23	C2.2		17:02	17:07	17:15	1-																
26	C1.2																					
26	C1.2																					
26	C1.6																					
26	C3.0																					
28	C3.0		09:55	09:57	10:15	1																