

### The British Astronomical Association A company limited by guarantee Astronomical Registered Charity No. 210769

Burlington House, Piccadilly, London, W1J 0DU Telephone: 020 7734 4145 Email: office@britastro.org Website: www.britastro.org



BAA Radio Astronomy Section.

Please send all reports and observations to jacook@jacook.plus.com Director Paul Hearn.

# RADIO SKY NEWS 2022 FEBRUARY.

# VLF SID OBSERVATIONS.

Solar flare activity has increased this month, with 16 SIDs recorded. The satellite data shows activity throughout February, mostly with B- and C-class flares. There were three M-class flares shown, two of which we managed to record. The M1.4 flare peaking at 08:43UT on the 12<sup>th</sup> was the strongest event of the month, and produced a clear SID on Roberto Battaiola's recording:



The most widely recorded event was also the most tricky to decode. My own recording shows the two SIDs well at 23.4kHz, recorded on the 14<sup>th</sup>:



There are clearly two SIDs recorded, the second being the stronger of the pair. The SWPC bulletin lists a C5.0 flare peaking at 13:53UT, followed by an event peaking at 14:33 without a flare magnitude. By far the

majority of observers recorded a peak at around 14:07, matching the second SID in my chart, above. Looking at the German GOES website <u>www.polarlicht-vorhersage.de/goes-archive</u> there was a double peaked flare, the second peak reaching C7.8 and matching the timing of our observations. Another double peaked flare is shown in this recording from February 2<sup>nd</sup> by Mark Prescott:



Individual SIDs show well at 22.1kHz and 20.9kHz, the second being the stronger. As with the previous pair, the second event is not listed in the SWPC bulletin.



Noise on the VLF signals remains a problem in February, but this recording by Paul Hyde shows a clear SID from the C6.5 flare peaking at 15:26 on the 1<sup>st</sup>. 24kHz has a very clean signal, and matches well with the response at 20.9kHz. The more local signals are generally less stable, but the SID is clear. The Icelandic signal at 37.5kHz shows a very weak response to the flare.

#### MAGNETIC OBSERVATIONS.



The month's summary of magnetic activity by Stuart Green shows disturbed conditions throughout the month. A CME recorded in satellite data from January 29<sup>th</sup> reached Earth late on February 1<sup>st</sup>, creating a distinct transient in our magnetometer recordings. This chart by Nick Quinn shows the impact clearly at about 22:20UT:



The chart by Roger Blackwell shows the strong disturbance following the impact over the 3<sup>rd</sup> and 4<sup>th</sup>. Although the CME impact was on the 1<sup>st</sup>, there was only a very mild disturbance on the 2<sup>nd</sup>. It faded out in the early hours of the 5<sup>th</sup>. This CME will no doubt be remembered for its timing during a starlink satellite launch. The initial orbit of the satellites was at a fairly low altitude, in the region severely disturbed by the magnetic disturbance. Most of the satellites were subsequently lost due to the increased atmospheric drag and loss of control.

A C3.1 flare at 12:41UT on the 6<sup>th</sup> was not recorded as a SID, but created a CME that was well recorded from the 10<sup>th</sup>. It produced some very rapid magnetic fluctuations, shown in this recording by Colin Clements:



The disturbance continued on the 11<sup>th</sup>, producing some transients on the 37.5kHz signal from Grindavik, Iceland. This chart shows Mark Edwards' VLF recording (light blue) superimposed on Roger Blackwell's magnetometer:



There is a good match at about 10:40 with the very rapid magnetic pulse, and again after 15:00 with a more wave-like disturbance. Paul Hyde also recorded the morning transient with a very SID-like response at 37.5kHz. 24kHz is in purple, 23.4kHz in orange, showing no sign of the magnetic pulse.





Stuart Green noticed these unusual pulses between 18UT and midnight on the 16<sup>th</sup>. The only activity at the time seems to have been a CME ejected away from Earth. He has found some similarity with an Intermagnet chart on the web, but no source is given. It does not seem to be listed in the STCE bulletin either. Roger Blackwell's recording shows a rapid disturbance around this time, along with a transient at about 10:45: nT \_\_\_\_\_\_ GM4PMK\_ Isle of Mull Scotland (6.0009W, 56.3797N - 1066xj) 11.02.2022 last update 23:52 UT



Coronal hole winds were responsible for disturbances later in February, mostly fairly gentle compared to the CME effects. This recording from the 20<sup>th</sup> by Callum Potter shows a gentle disturbance through the day: Bredons Hardwick Magnetometer (52.02N,2.13W)



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

#### SOLAR EMISSIONS.

Colin Briden recorded a very mild Solar Radio emission at 28MHz, rising about 5dB above the noise at 14:02 on the 2nd:



It lasted for just 30 seconds, and does not seem to be linked to any of the listed flares.

12222	8	12	2239				_		2021 Ja	anuary	8				- 1				8					6			
2556	24 F	25	26	27	28	29	38	31	1	2	3	4	5	8	7	8	9	10	. 44	12	13	14	-16	16	17	18	19
2557		- 24		2240	24	- Arr	-	-				-	2021 Fe	ebruary	6	- 2	2		-			40	10	-6	-		-
2007	20 F	21	22	23	24	25	20	- 40	28	29	30	31		<u>2</u>	đ	4	þ	8	di -	8	9	IU.		-12	13	14	. 15
2559	40	47	10	2241	20	24	10	72	74	-	-		9	2021 N	arch		10					0	40	4.4	40	40	44
2000	F	18	10	19	20	- 21	22	23.	24	28	246	21	20			9	4		10	ЧК-		9 C	×10×	814	1124	18	(1)4
2559	10	16	17	2242	10	20	24	22	22	74	- 100	76	37	700	20	20	-21	2021 A	pril D	2	4	E	e l	7	a	0	10
2000	F B	10	317	10	15	20.7	- 61.	22	20	29	B	-40	-24	-20	23	500			Z		243	9	0	<i></i>		3	10
2560	11	12	13	2243 14	16	16	17	18	19	20	21	22	98	24	-25	36	27	28	29	30	2021 M: 1	ay D	3	Ă	5	6	7
	F	1.04			3.86		В	196	1997	C	21	cccc						20	20				Ű				M
2561	8	9	10	2244	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2021 Ju 1	ine 2	3
	F CC	CC			C	1 5216	00402	2015.1	1.459654.5	0.000	-	1.000	and the	С	CCMM	ССВМ	007/0620	1200.00	0000		С	sagaras.	CHECK NEWS			10006	1941147
2562	4	5	6	7	2245 8	9	10	11	12	13	14	16	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	F 2021 July				000	CCB		9			8		1				0000000	00000	2022	2		C			CBC		CC
2563	2021 July	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
	F		MCXM	MC	2021 A	uquist			CCB							С		С			-						
2564	28	29	30	31	1	2.	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	F			-	2248				2021 S	eptembe	er													000		С	
2565	24	25	26	27	28	29	30	31	1	2	З	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	F C			CCCC	MCCC	2249	C				-	2021 Oc	tober			CC	C										
2566	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	M	12	13	14	15	16
	F	U	<b>1</b> 6	IVIIVI		2250	0		0		U.		1	-		2021 No	vembe	-	_	IVI							
2567	17	18	19	20	21	22	23	24	25	26 CCCM	27	28 CMMY	29	30	31	1	2	3	4	5	6	7	8	9	18	11	12
						2251				CCCIW	0000	CIVILITA		000					2021 D	ecember							
2568	13 F C	14	15	16	17	18	19	20	21	22	23	24	25	26	27	.28	29	30	1	2	3	4	5 M	6	7	8	9
			and then	100 0000		2252		10.000.000		P	1.00				(automatic)			-					2022 Ja	nuary			1000
2569	10 F	11	12	13	14	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	1	2	3	4	5
0570	-		P				2253		- nin									1000	1	-	-					-	
2570	F 6	7	8	9	10	11	12	13 C	14 C	15	18	47	18	19	20	21	22	23	24	25 C	26. CC	27	28 C	BCCC	30	31	C
2574	2022 Fe	bruary			( <b>6</b> 1)	-	2254				14 10	4.00			-		40		50		00	200		00	200	07	
2011	F CC	4	4 CC		10	6	ð	9 9	48	16	MCCC	18	CCM	15	10	W.	18	19	20	<i>8</i> [	42	25	24	25	26	21	28 C

# **BARTELS CHART**

#### BAA Radio Astronomy Section.

2022 FEBUARY.

	SS	rs	John C	John Cook (23.4kHz/22.1kHz)			Roberto Battaiola 20.9kHz				Paul H	Hyde (22	.1kHz/24kl	Hz)	Mark Edwards (24.0kHz/37.5kHz)				Colin Clements (23.4kHz/18.3kHz)			
	Xray cla	Observe	Tuned radio frequency receiver, 0.58m frame aerial.				Mod	lified AA	VSO receiver.	Spectru	/ um Lab aer	PC 1.5m fi ial.	Spectrun	n Lab / F	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 2 4 4 7 7 9	C6.5 C5.5 C7.8 C2.1 C2.0 C1.3 C3.8 C5.7	2 6 5 2 1 3 9 2	15:21 10:00 10:18 12:37	15:25 10:04 10:25 12:40	15:40 10:15 10:43 12:57	1 1- 1	09:55	10:04	10:14 12:50	1 1-	15:19 10:00 10:19 15:46 11:06 12:36	15:26 10:04 10:25 15:52 11:10 12:40	15:48 10:14 10:49 15:56 11:18 13:08	1+ 1- 1+ 1- 1-	15:45 16:00 11:07 <i>12:36</i> 17:33	15:52 16:11 11:10 <i>12:4</i> 2 17:38	? 16:50 11:14 <i>13:09</i> 17:49	- 2+ 1- 2 1-				
12	M1.4	3	08:34	08:45	?	-	08:26	08:43	09:08	2					40.50	40.50	0					
12	( ()	1													16:52	16:59	? 17·17	- 1-				
12	C8.0	1													17:22	17:25	17:29	1-				
14	C5.0	3	13:51	13:54	?	-									13:52	13:55	14:01	1-				
14	?	9	14:03	14:07	14:25	1	14:03	14:07	14:12	1-					14:03	14:08	14:20	1-				
14	M1.0	1													17:18	17:30	17:45	1+				
28	C3.1	2													09:16	09:20	09:26	1-				

	SS	Stev	e Parkin	son (Various	s)	And	nas (22.1kH	z)	Ph	il Rourke	e (23.4kHz)		John Wardle		Christopher Bailey				
	Xray cla	Tuned radio frequency receiver, frame aerials.			Tuned radio frequency receiver, 0.6m frame aerial.				Spectru	m Lab, 0	.6m frame aerial	SpetrumLab/Starbase, Active mini-whip aerial.			Spectrum Lab				
DAY		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK END (UT	)	START	PEAK	END (UT)	
1 2 2 4 4	C6.5 C5.5 C7.8 C2.1 C2.0					09:56	10:15	10:36	2							10:18	10:26	10:41	1
7 9 12 12 12 12	C1.3 C3.8 C5.7 <b>M1.4</b> ? C9.2 C8.0	12:37	12:41	12:58	1	12:37	12:40	12:58	1							12:32 17:30 08:33	12:41 17:36 08:43	12:55 17:55 08:58	1 1 1
14 14 14 28	C5.0 ? <b>M1.0</b> C3.1	14:03	14:08	14:18	1-	14:02	14:06	14:15	1-	14:03	14:08	14:18 1-				13:56 09:07	14:07 09:10	14:16 09:40	1 2
										_									
	sse	Co	lin Bride	n (22.1kHz)		And	drew Lutle	ey (23.4kHz	)	Pete	r Meado	ws (23.4kHz)	Jo	hn Elliott (18.3kHz	:)	Ма	rk Presco	ott (20.9kHz)	
	Xray class	Co S	lin Bride pectrum 1.2m frar	n (22.1kHz) Lab / PC, ne aerial.		And Tuned rad	drew Lutle lio freque frame	ey (23.4kHz ency receive aerial.	) er, 0.6m	Pete Tuned	r Meado radio free ).6m frar	ws (23.4kHz) quency receiver, me aerial.	Jo Tuned I (	hn Elliott (18.3kHz adio frequency red ).5m frame aerial.	:) ceiver,	Ma	rk Presco	ott (20.9kHz)	
DAY	Xray class	Co S START	lin Bride pectrum 1.2m frar PEAK	n (22.1kHz) Lab / PC, ne aerial. END (UT)		And Tuned rad	drew Lutle lio freque frame PEAK	ey (23.4kHz ency receive aerial. END (UT)	) r, 0.6m	Pete Tuned ( START	r Meado radio free 0.6m frar PEAK	ws (23.4kHz) quency receiver, ne aerial. END (UT)	Jo Tuned I ( START	hn Elliott (18.3kHz adio frequency red ).5m frame aerial. PEAK END (UT	:) ceiver, )	Ma	rk Presco PEAK	ott (20.9kHz) END (UT)	
DAY 1 2 4	Xray class C6.5 C7.8 C2.1	Co S START 10:00 10:18	lin Brider pectrum 1.2m frar PEAK 10:04 10:27	n (22.1kHz) Lab / PC, ne aerial. END (UT) ? 10:37	- 1	And Tuned rad	drew Lutk lio freque frame PEAK	ey (23.4kHz ency receive aerial. END (UT)	) ır, 0.6m	Pete Tuned	r Meado radio freo 0.6m fran PEAK	ws (23.4kHz) quency receiver, ne aerial. END (UT)	Jo Tuned r ( START	hn Elliott (18.3kHz adio frequency rer 0.5m frame aerial. PEAK END (UT	:) ceiver, )	Ma START 09:58 10:20	PEAK 10:08 10:30	END (UT) 10:15 10:45	1- 1
DAY 1 2 4 4 7 7 9 12 12	C6.5 C5.5 C7.8 C2.0 C1.3 C3.8 C5.7 <b>M1.4</b> ?	Co S START 10:00 10:18 11:03 12:37	lin Bride pectrum 1.2m frar PEAK 10:04 10:27 11:08 12:41	n (22.1kHz) Lab / PC, ne aerial. END (UT) ? 10:37 11:15 12:47	- 1 1- 1-	And Tuned rad	drew Luth lio freque frame PEAK	ey (23.4kHz ancy receive aerial. END (UT)	) vr, 0.6m	Pete	r Meado radio free ).6m frar PEAK	ws (23.4kHz) quency receiver, ne aerial. END (UT)	Jo Tuned I (	hn Elliott (18.3kHz adio frequency red ).5m frame aerial. PEAK END (UT	:) ceiver, )	Ma START 09:58 10:20 12:38	PEAK 10:08 10:30 12:45	END (UT) 10:15 10:45 12:58	1- 1 1

#### VLF flare activity 2005/22

C – M – X – Relative sunspot number

