The British Astronomical Association

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Founded in 1890

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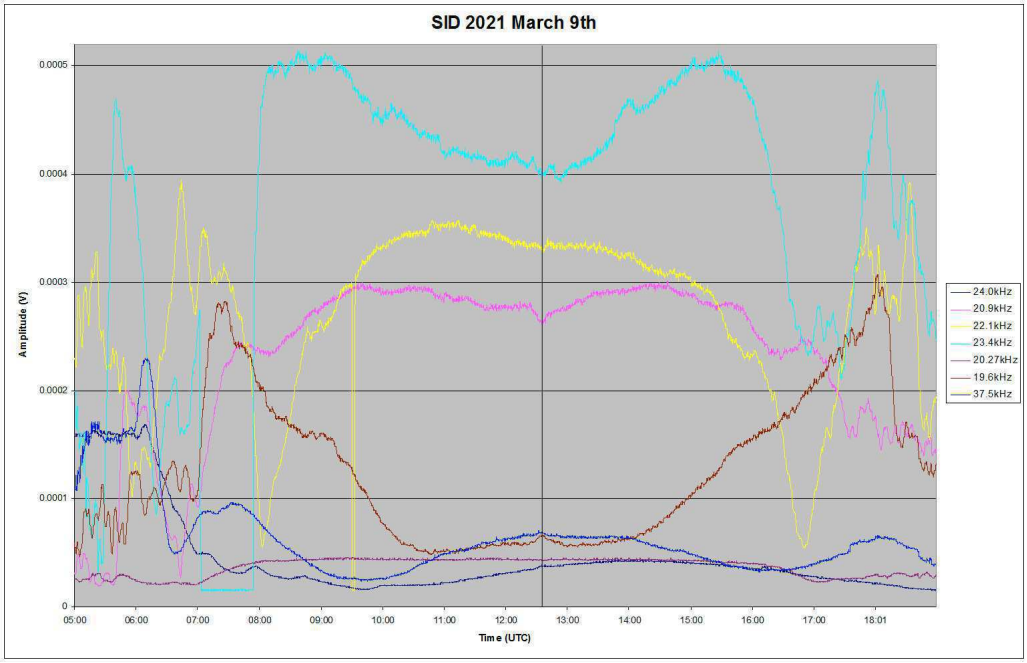
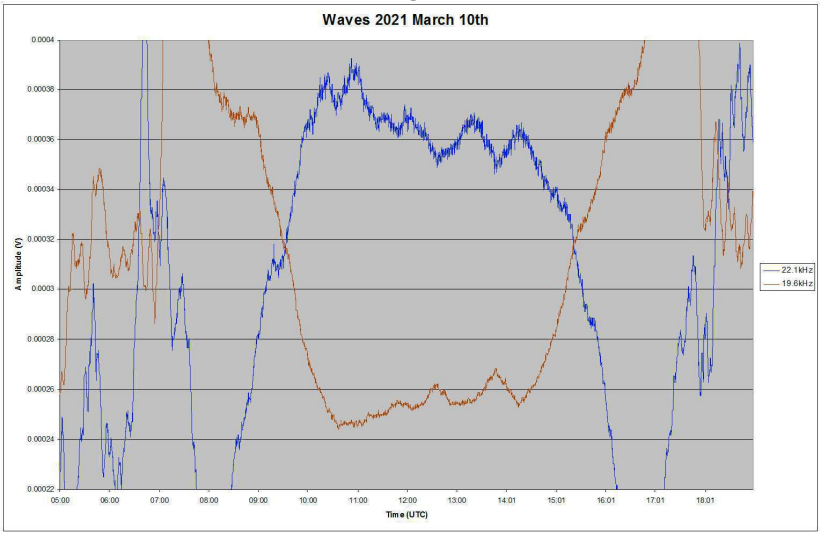
BAA Radio Astronomy Section. 2021 MARCH.

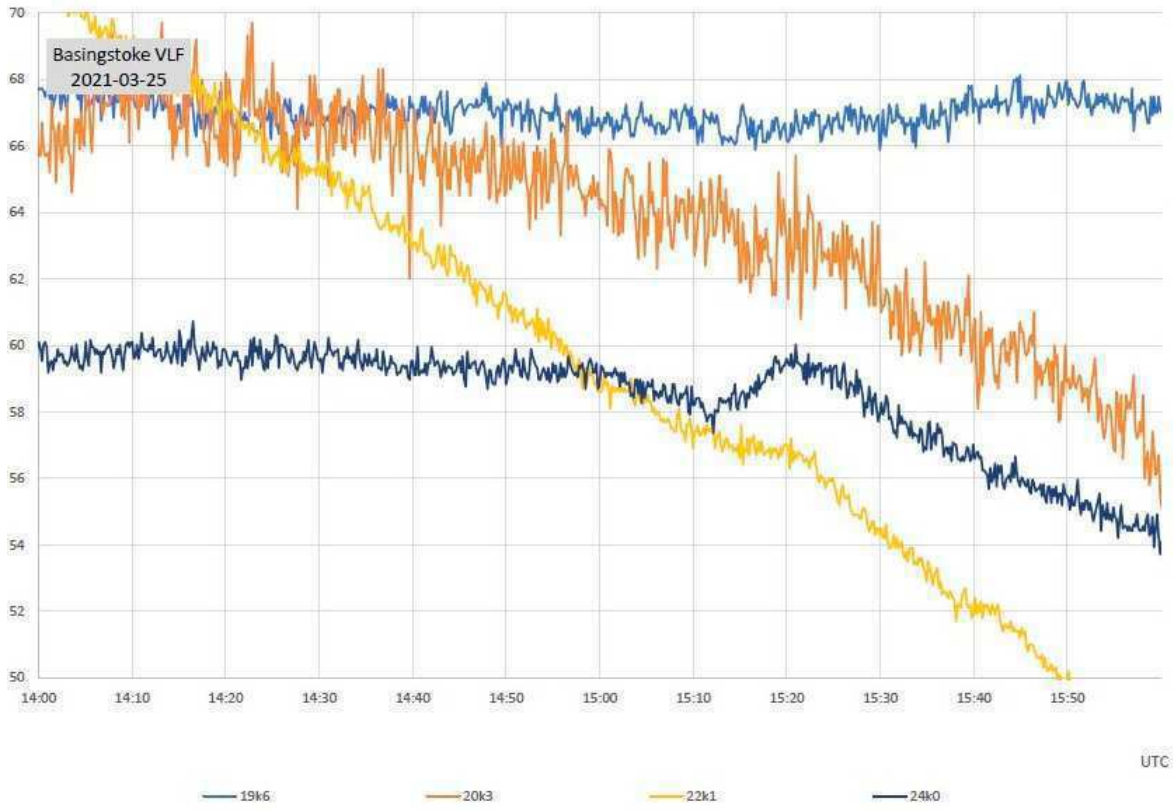
There was a general increase in sunspot numbers in March, with numerous small B-class flares shown in the space weather reports. There were just a couple of flares reaching C-class, the C1.6 recorded on the 9th being the strongest of the month and well timed for European observers.



This recording by Mark Edwards shows distinctive SIDs at 20.9kHz (pink trace) and 19.6kHz (brown trace). Some of the other signals show less distinct SIDs for this event. Mark also recorded ionospheric waves on the 22.1kHz and 19.6KHz signals:



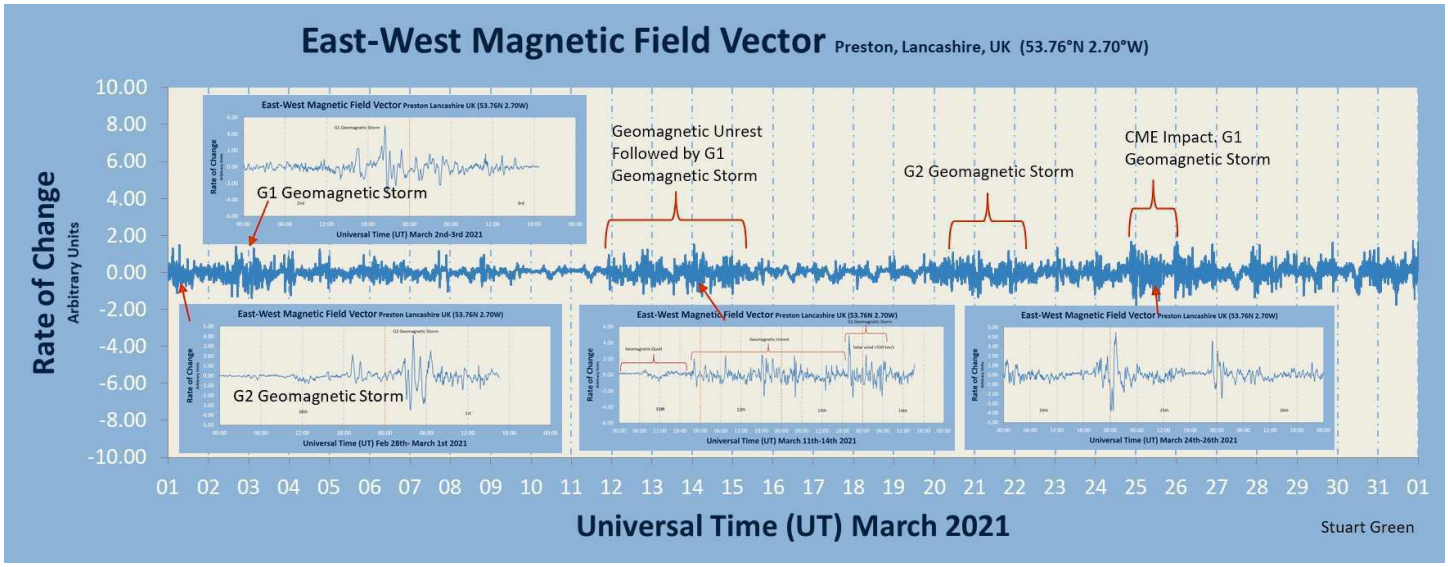
These were recorded on March 10th, the two frequencies being very close mirror images. There is no obvious cause for these, but we have recorded similar effects in the past.



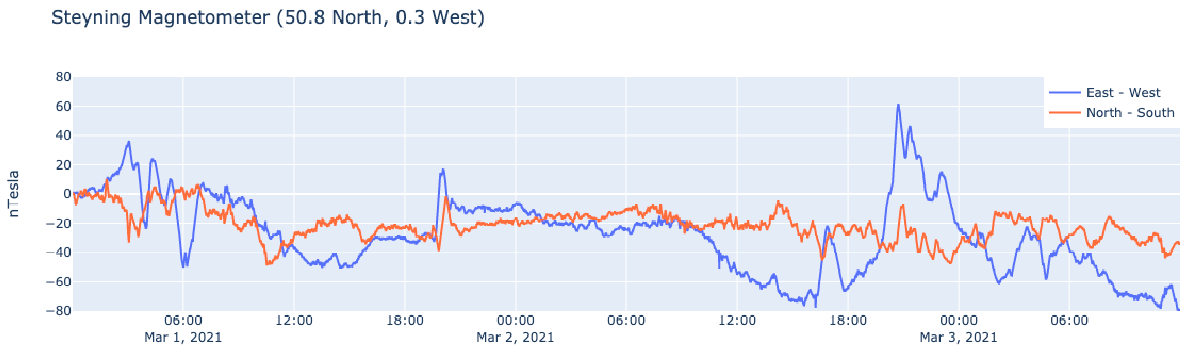
The B8.3 flare on the 25th shows well in this recording by Paul Hyde on the longer path at 24kHz.

MAGNETIC OBSERVATIONS.

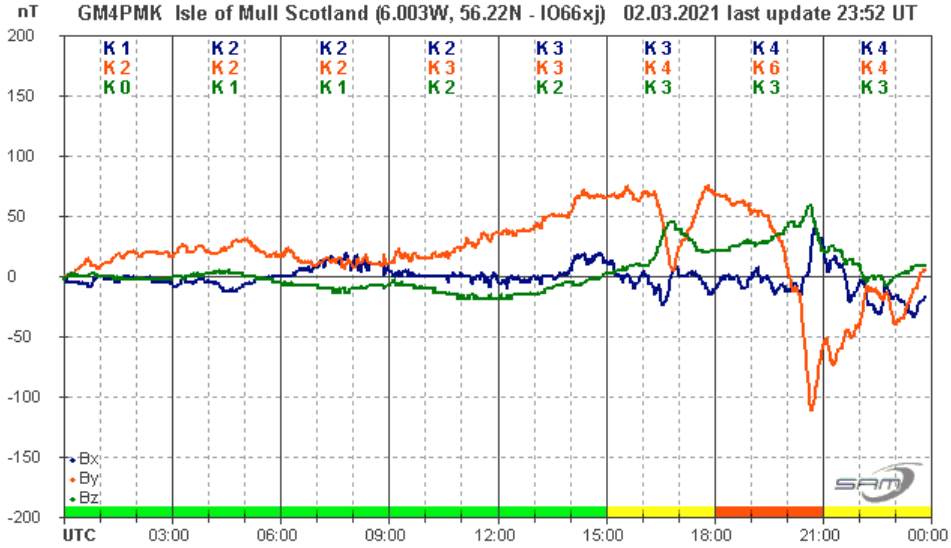
There was also a lot of magnetic activity in March, mostly from a complex coronal hole over the Sun's south polar region with extensions running northwards. Stuart Green's chart shows the Month's activity:



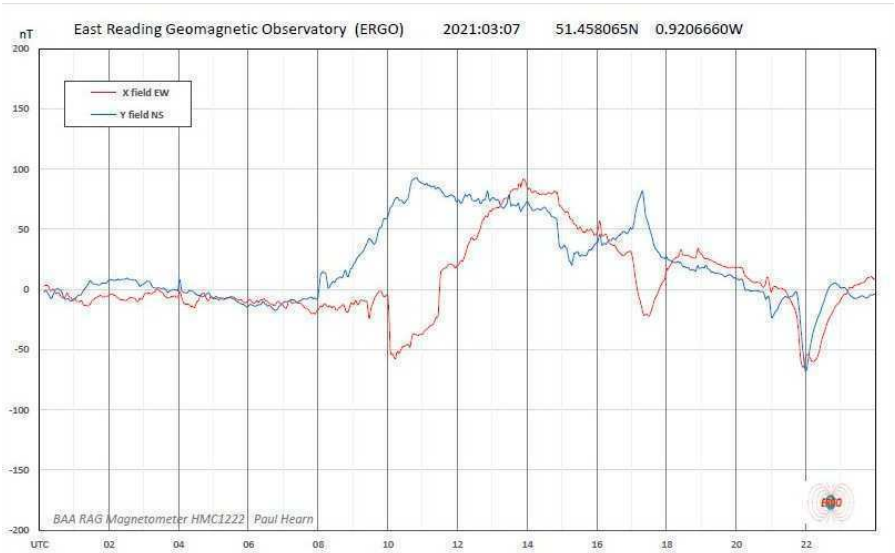
The south polar hole has been present for several months now, with some strong activity shown in late February on the previous rotation. Nick Quinn recorded its effects over March 1st to 3rd:



A period of strong disturbance can be seen in the evening of the 2nd with a large variation in the east-west component. Nick is located near the south coast, and so a comparison with the Mull magnetometer of Roger Blackwell, nearly 6 degrees further north, is of interest:

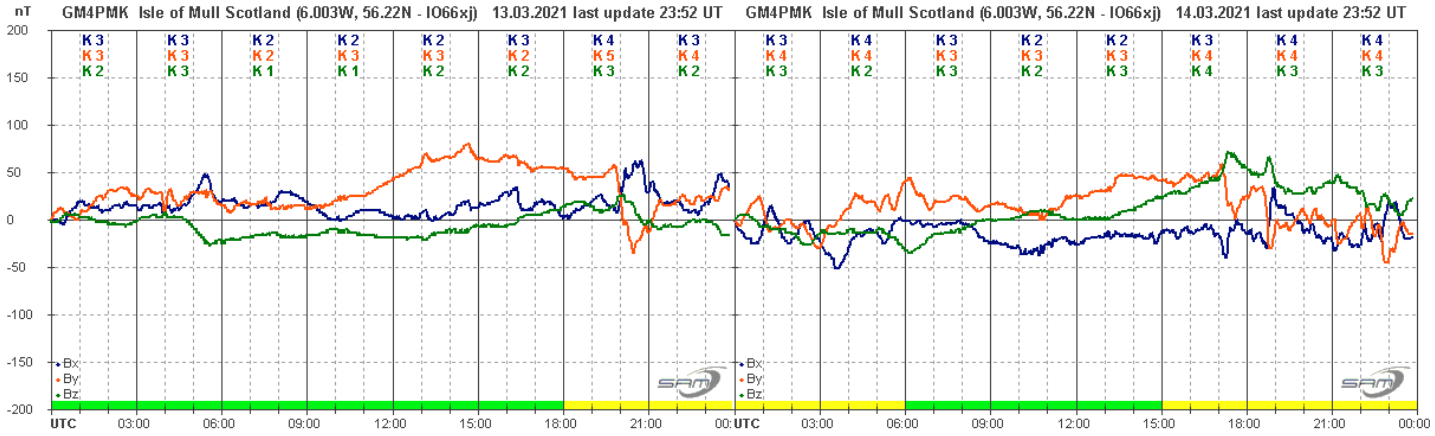


The By component of his 3-axis sensor matches very well the (inverted) east-west signal in Nick's recording. The peak to peak variation in Mull is about 20nT greater than in the south.

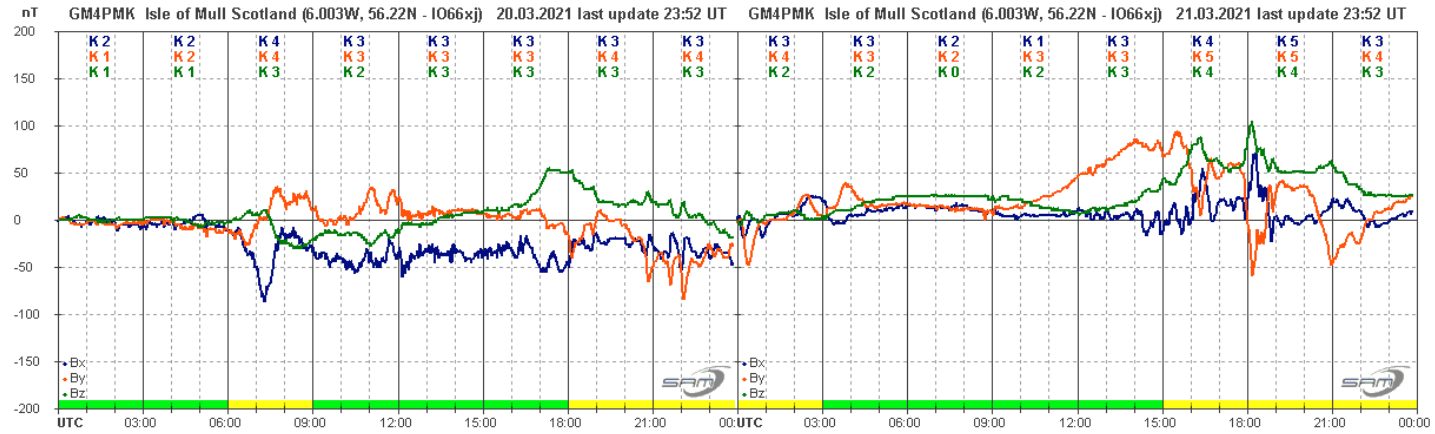


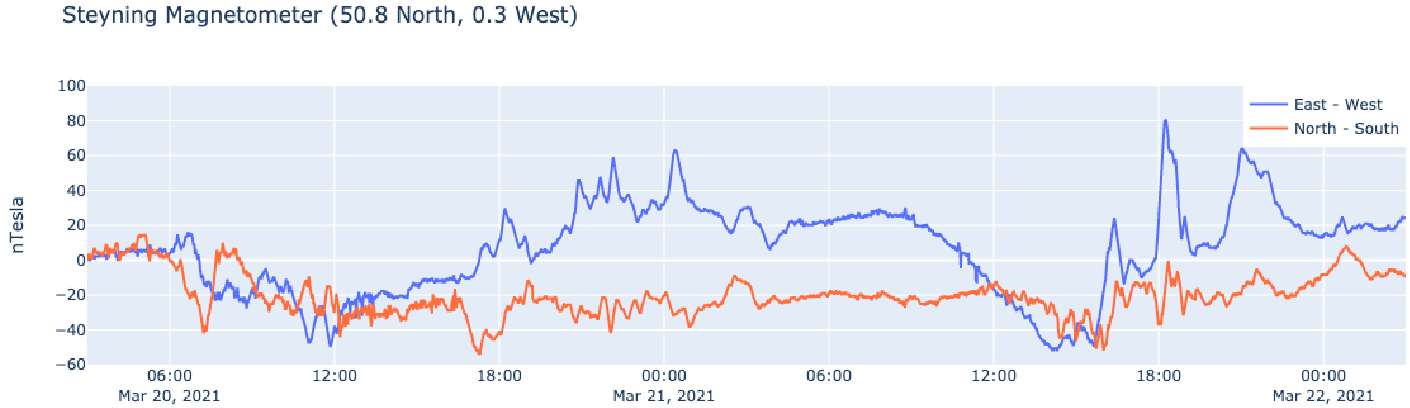
This recording By Paul Hearn shows a more moderate disturbance on March 7th, resulting from

another coronal hole high speed wind. This was the least turbulent of the month, fading out on the 8th. The south polar hole became effective again in the afternoon of the 12th, with some strong disturbances seen on the 13th and 14th, shown here in the recording by Roger Blackwell:



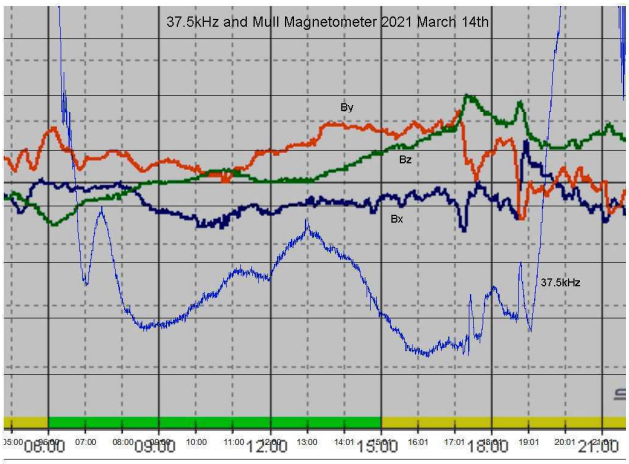
A combination of minor CME's and the high speed wind produced further disturbances towards the end of March. Roger's recordings show some of this activity on the 20th and 21st:

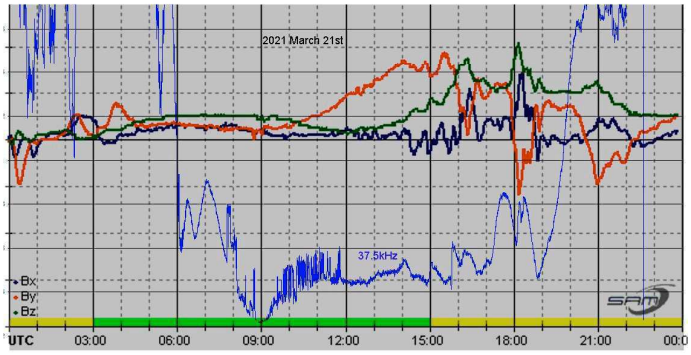




Nick Quinn's recording over the same period shows very similar disturbances, again at slightly lower magnitude. Mild activity continued on the 24th and 25th, fading out from the 26th to the end of the month.

Mark Edwards noted these magnetic disturbances on the 37.5kHz signal from Grindavik, Iceland, particularly on the 14th and 21st, shown in these charts:

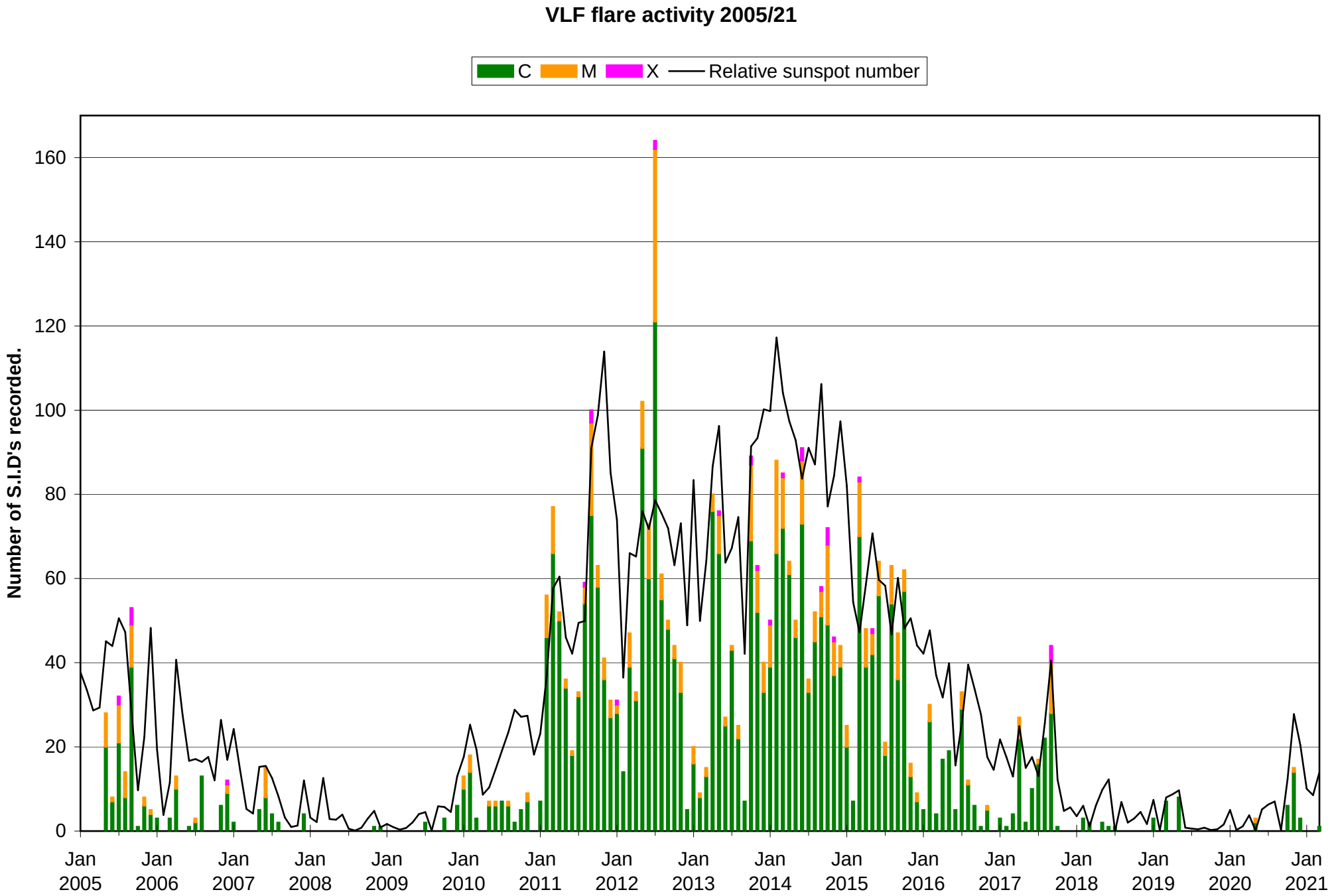




Mark has overlaid his VLF recording on Roger Blackwell's magnetometer charts. The effects are again most noticeable in the late afternoon and evening, running into the VLF sunset around 19:00UT. The recording from the 21st also shows some disturbance to the 37.5kHz signal from 06:00UT, followed by interference from 10 to 12UT. The interference was from some broadband noise around the signal frequency. This recording also covers the period of volcanic activity in Iceland, in a region just to the north of the transmiiter site. Luckily there were only small local lava flows from the volcano, with no threats to Grindavik itself.

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

The Zoom meetings organised by Paul Hearn have been a great success so far, with several more programmed over the next few weeks. Full details of the programme can be found on the BAA website, along with the other BAA meetings. If you are interested in joining any of these, please follow the notes given in the listing.


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 MARCH.**

	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*)	Roberto Battaiola 20.9kHz	Paul Hyde (22.1kHz/*24kHz*)	Mark Edwards (24.0kHz)	Colin Clements (23.4kHz/*18.3kHz*)
			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)
9	C1.6	3			12:29 12:36 12:46 1-	12:29 12:37 12:45 1-	
15	B3.0	2					
25	B8.3	2			15:13 15:20 15:42 1+	15:18 15:20 15:24 1-	

	Xray class		Steve Parkinson (Various)	Andrew Thomas (23.4kHz)	Phil Rourke (23.4kHz)	John Wardle	Chrostopher Bailey
			Tuned radio frequency receiver, frame aerials.	Tuned radio frequency receiver, 0.6m frame aerial.	Spectrum 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)
9	C1.6						12:20 12:26 12:47 1+
15	B3.0						09:56 10:10 10:16 1
25	B8.3						

	Xray class		Colin Briden (22.1kHz)	Andrew Lutley (23.4kHz)	Peter Meadows (23.4kHz)	John Elliott (18.3kHz)	Mark Prescott
			Spectrum Lab / PC, 1.2m frame aerial.	Tuned radio frequency receiver, 0.6m frame aerial.	Tuned radio frequency receiver, 0.6m frame 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)
9	C1.6						
15	B3.0				09:50 09:58 10:03 1-		
25	B8.3						

BAA Radio Astronomy Section.

BARTELS DIAGRAM

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

ROTATION																												
2529	26 F	27	28	29	30	31	2019 January 1	2	3	4	5	6 C	7	8	9	10	11	12	13	14	15	16	2213 17	18	19	20	21		
2530	22 F	23	24	25	26 CB	27	28	29 C	30	31	2019 February 1	2	3	4	5	6	7	8	9	10	11	12	2214 13	14	15	16	17		
2531	18 F	19	20	21	22	23	24	25	26	27	28	2019 March 1	2	3	4	5	6	7	8	9	10	11	12	2215 13	14	15	16		
2532	17 F	18	19	20 C	21 CCC	22 CCCB	23 B	24	25	26	27	28	29	30	31	2019 April 1	2	3	4	5	6	7	8 B	2216 9	10	11	12 B		
2533	13 F	14	15	16	17	18	19	20 B	21	22	23	24	25	26	27	28	29	30	2019 May 1	2	3	4	5 BB	2217 6 CCCC	7 BCC	8	9 C		
2534	10 F	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2019 June 1	2	2218 3	4	5		
2535	6 F	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	2219 30	2019 July 1	2		
2536	3 F	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	2220 27	28	29		
2537	30 F	31	2019 August 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	2221 23	24	25		
2538	26 F	27	28	29	30	31	2019 September 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	2222 19	20	21		
2539	22 F	23	24	25	26	27	28	29	30	2019 October 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2223 17	18		
2540	19 F	20	21	22	23	24	25	26	27	28	29	30	31	2019 November 1	2	3	4	5	6	7	8	9	10	11	12	2224 13	14		
2541	15 F	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	2019 December 1	2	3	4	5	6	7	8	9	2225 10	11		
2542	12 F	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2020 January 1	2	3	4	5	2226 6	7		
2543	8 F	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	4 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	2228 1		
2545	2020 March 2 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	2229 28		
2546	29 F	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	2230 25 F	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	2231 22 F	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	2032 18 F	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	2033 15 F	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	11 F	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	7 F	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	4 F	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	31 F	2237 1 B	2020 November 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	27 F	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	24 F	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	20 F	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	16 F	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	15 F 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		