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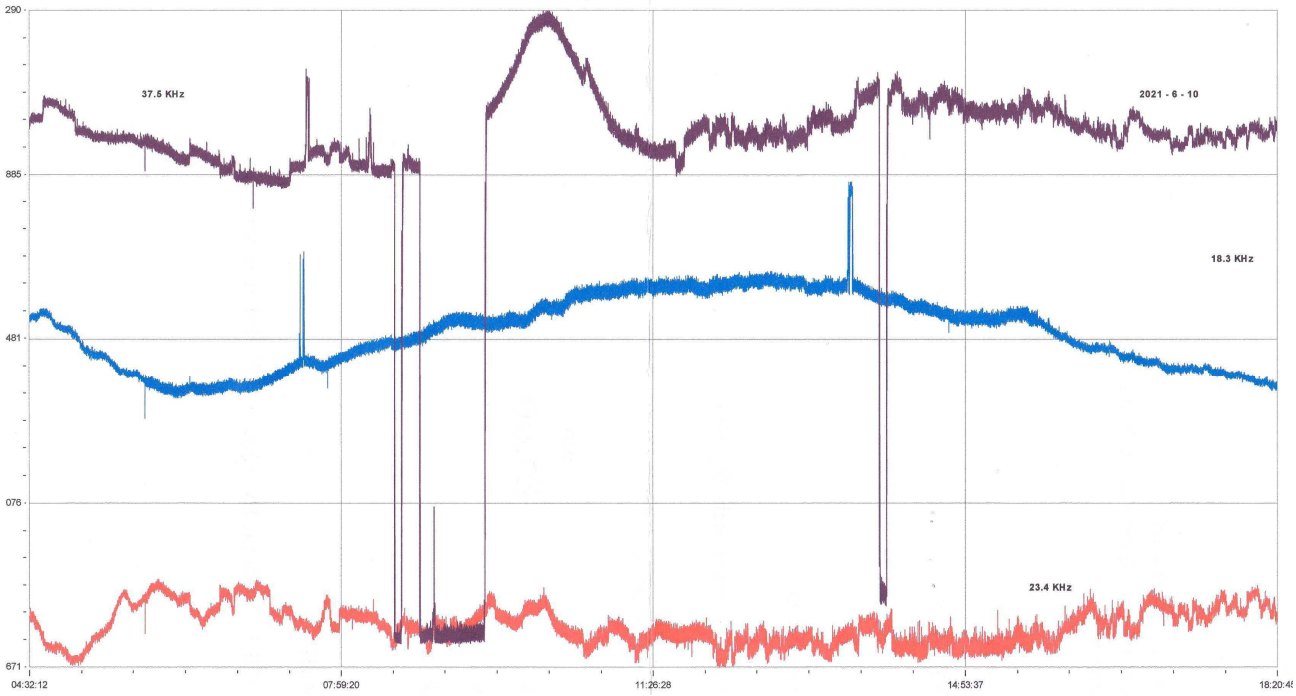
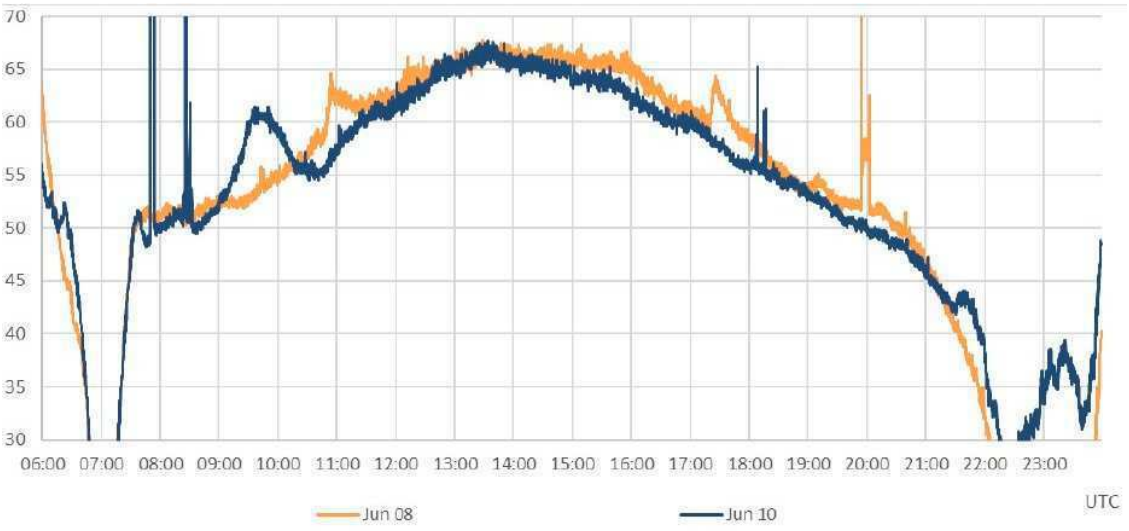
BAA Radio Astronomy Section. 2021 JUNE.

June flare activity was lower than in May, with no M-class flares recorded. The strongest flare in the X-ray data being the C3.7 flare widely recorded on the 9th. There were plenty of small B-class flares, mostly far too weak for detection as SIDs. The annular solar eclipse on June 10th has created some interesting VLF recordings. The path of annularity was from central Canada through northern Greenland and on to eastern Siberia. Here in the UK it was a small partial eclipse, but its effects were recorded on the 24kHz and 37.5kHz signals.

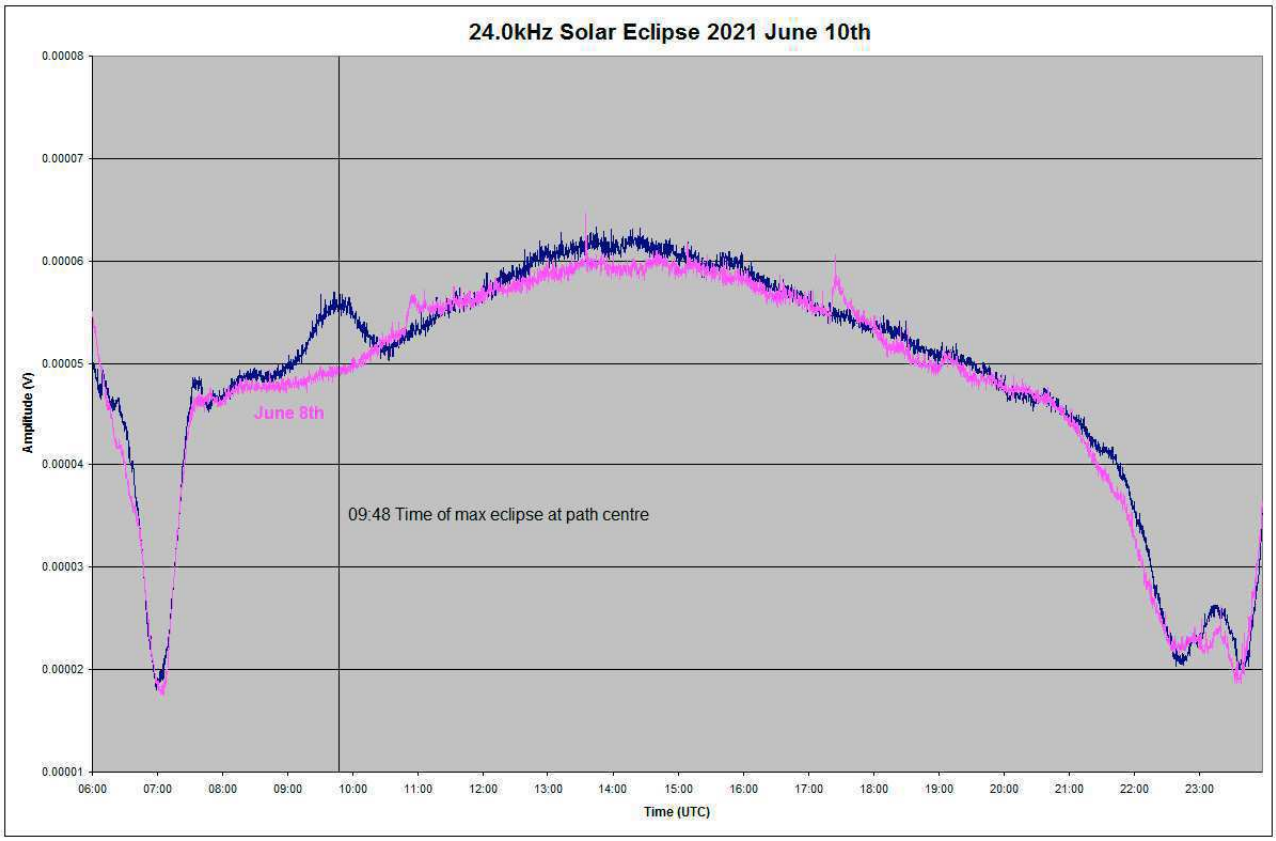


This recording by Colin Clements shows the 37.5kHz signal from Grindavik, Iceland, at the top, with 18.3kHz (blue) and 23.4kHz (red) for comparison. There is a break in the 37.5kHz signal just before a distinct rise in strength during the eclipse. The signal then returns back to normal with another small break in the afternoon. The other two signals remain unaffected during the eclipse period. The centre point of the path to Iceland would have seen a much greater partial phase compared to the other two signals.

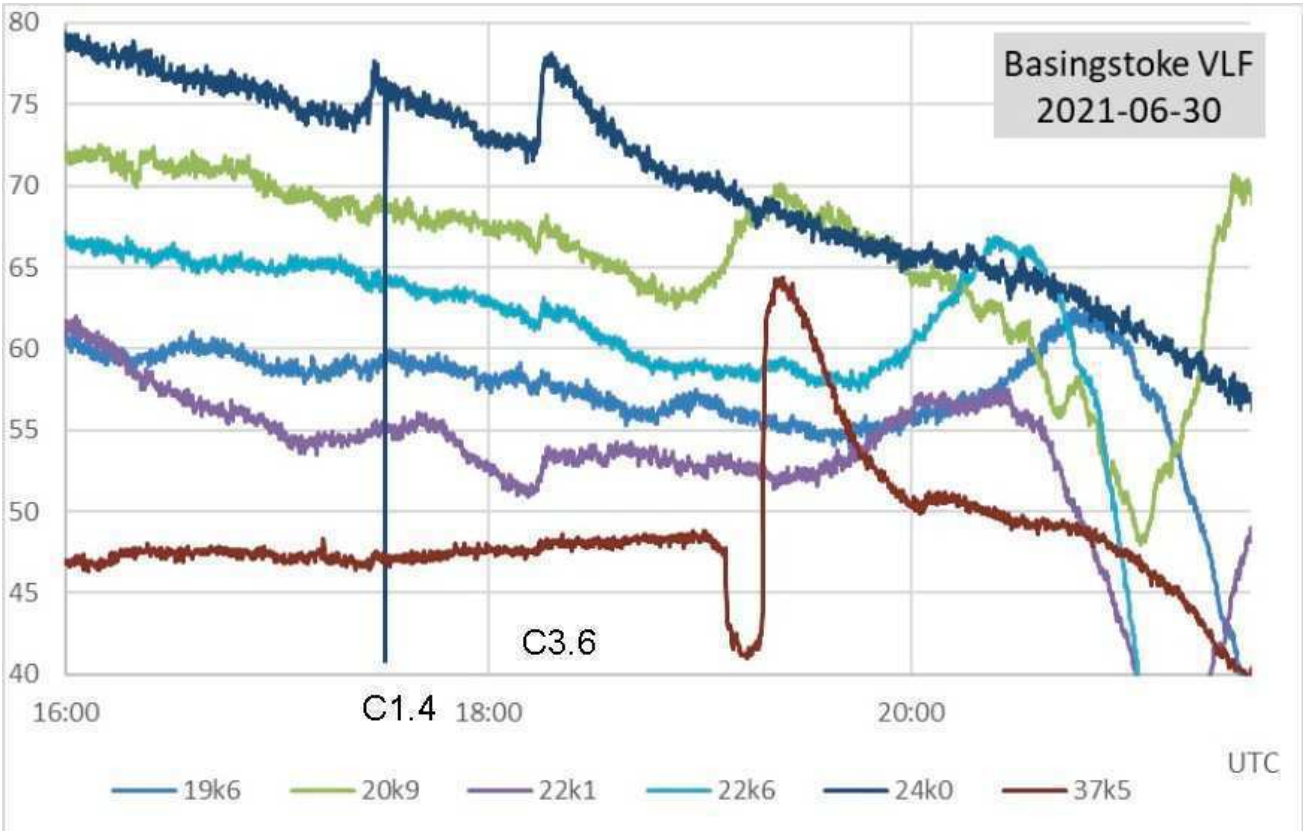
Paul Hyde monitored the 24kHz signal from Cutler, USA. The centre point of this path is also much further into the eclipse path, and his recording on the next page shows another rise in signal strength during the eclipse (blue trace). The orange trace shows the same signal on June 8th including the two SIDs present.



2021 Solar eclipse at 24 kHz from Basingstoke UK

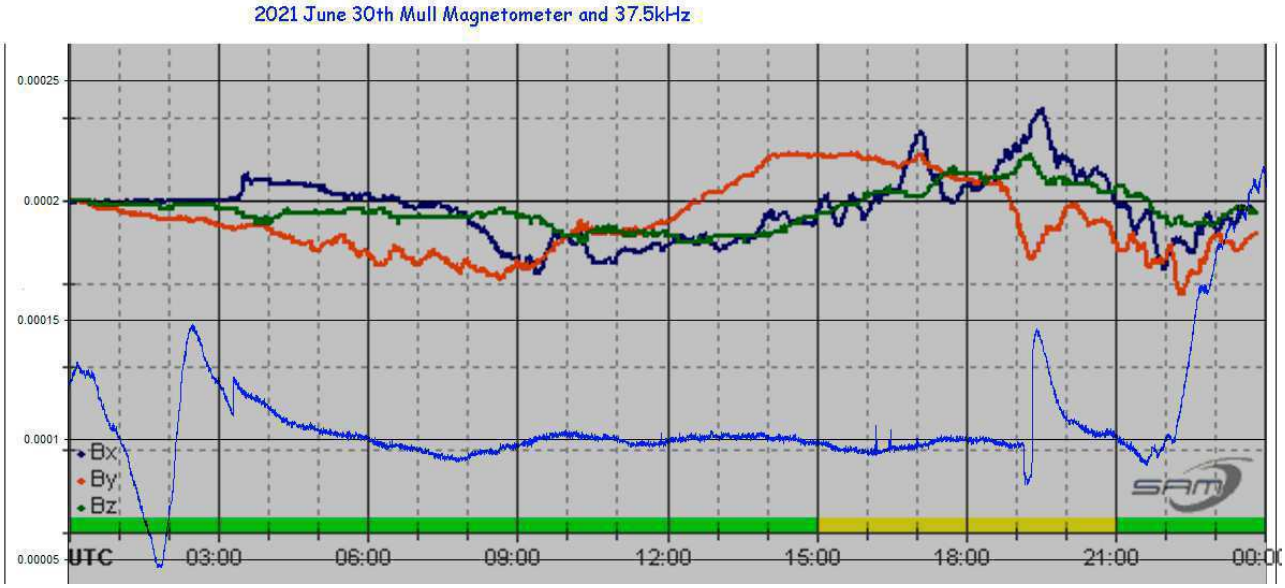


This recording by Mark Edwards again shows a rise in signal strength at 24kHz during the eclipse, with June 8th added for comparison. During a solar eclipse, the ionisation level of the D-region would be expected to decrease, similar to that seen during sunset. The sunset signal strength falls, while it has risen in all three recordings during the eclipse, a result that was not expected. It is interesting comparing this with the much larger partial eclipse of 2015 March 20th. An analysis of observations from that eclipse was published in the section's ragazine Volume 2 issue 4 from 2015 May. It can be downloaded from our pages on the BAA web site. Some recordings were also included in the 2015 March Summary.

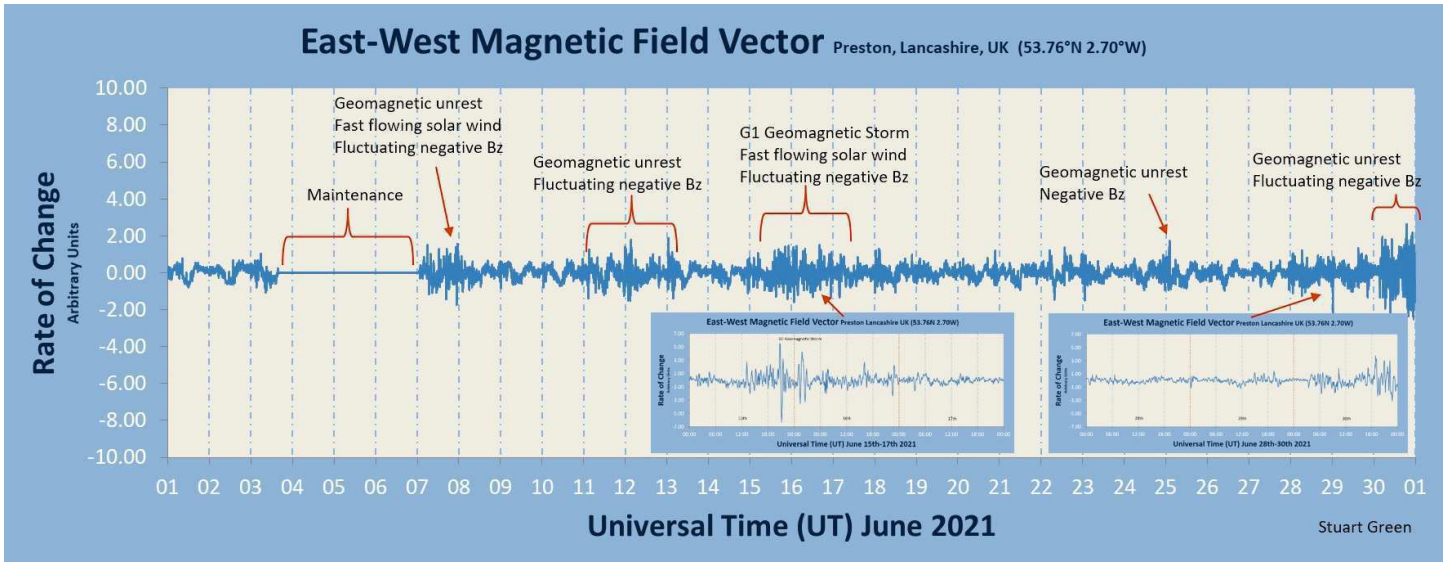


This recording by Paul Hyde shows activity on June 30th, both SIDs showing clearly at 24kHz. The other signals are far less clear, the flares occurring as they fade towards sunset. They do not show at all at 37.5kHz, with just a very odd transient visible around 19:00 – 19:30.

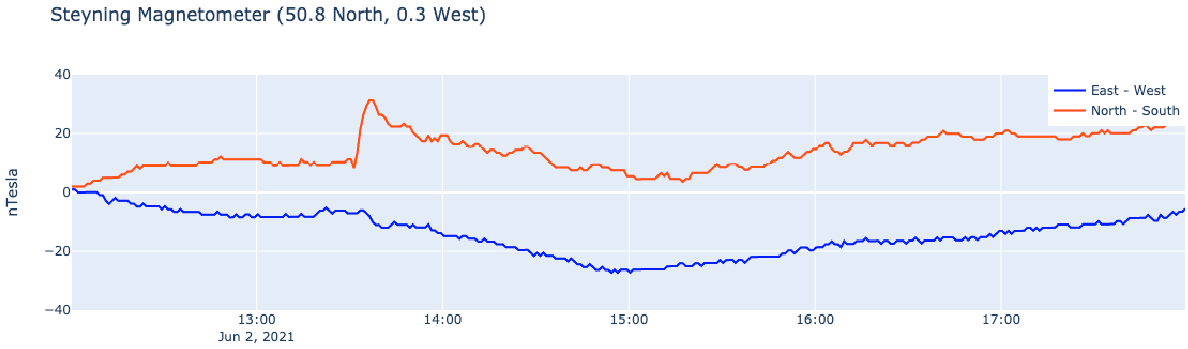
MAGNETIC OBSERVATIONS.



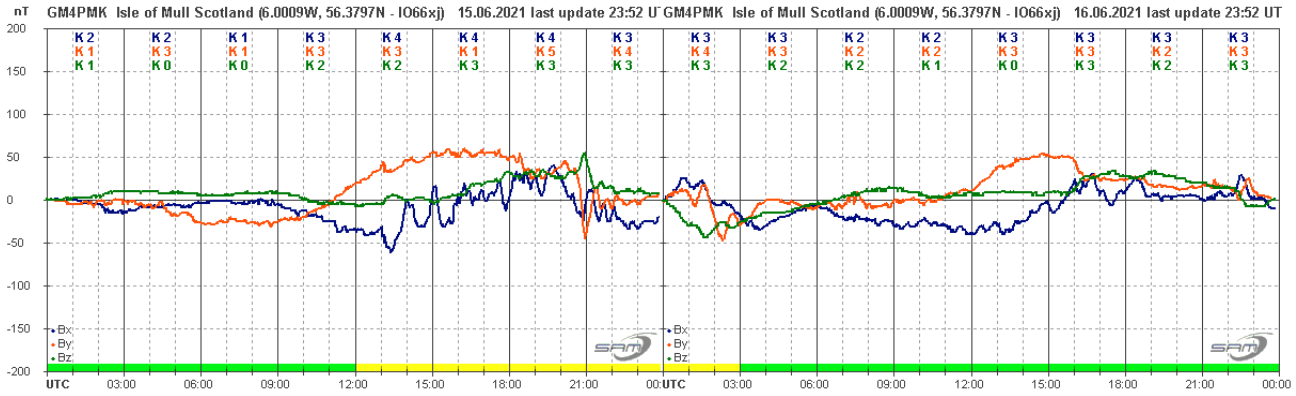
Mark Edwards has overlaid his 37.5kHz signal from the 30th on the magnetometer recording by Roger Blackwell. This also shows the unusual transient seen in Paul's recording above. The peak of the transient aligns well with the dip in the By magnetic signal. There is also a sharp rise in the signal at 03:18, occurring before the small Bx magnetic signal. This 37.5kHz rise matches the amplitude of the fall just after 19:00, giving the impression of a transmitter change. Subtracting that change leaves a much clearer magnetic effect on the VLF signal, similar to those seen before.



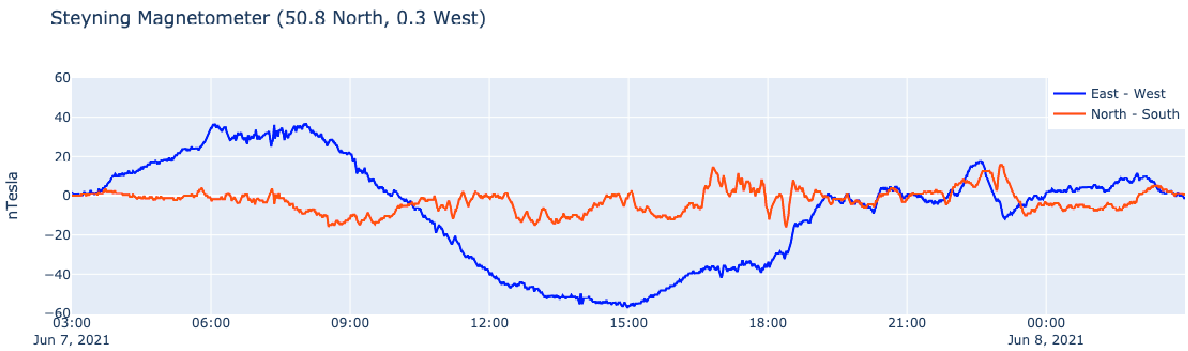
Stuart Green's summary for June shows a lower level of activity compared to previous months. There was a three day break for maintenance early in the period, but nothing of interest seems to have been missed. The most active period was on the 30th, already illustrated above. The Bx transient at about 03:30 in Roger Blackwell's recording appears to be the arrival shock of a CME seen in satellite data from the 27th. Its source is not clear, but may have been a glancing blow from an eruption on the solar limb as seen from Earth. The build-up of activity can be seen through the day, and continued into the morning of July 1st. Another CME arrival shock can be seen in this recording by Nick Quinn at about 13:30 on June 2nd:



Satellite data links this to a CME on May 28th, but it produced no further significant magnetic disturbance.

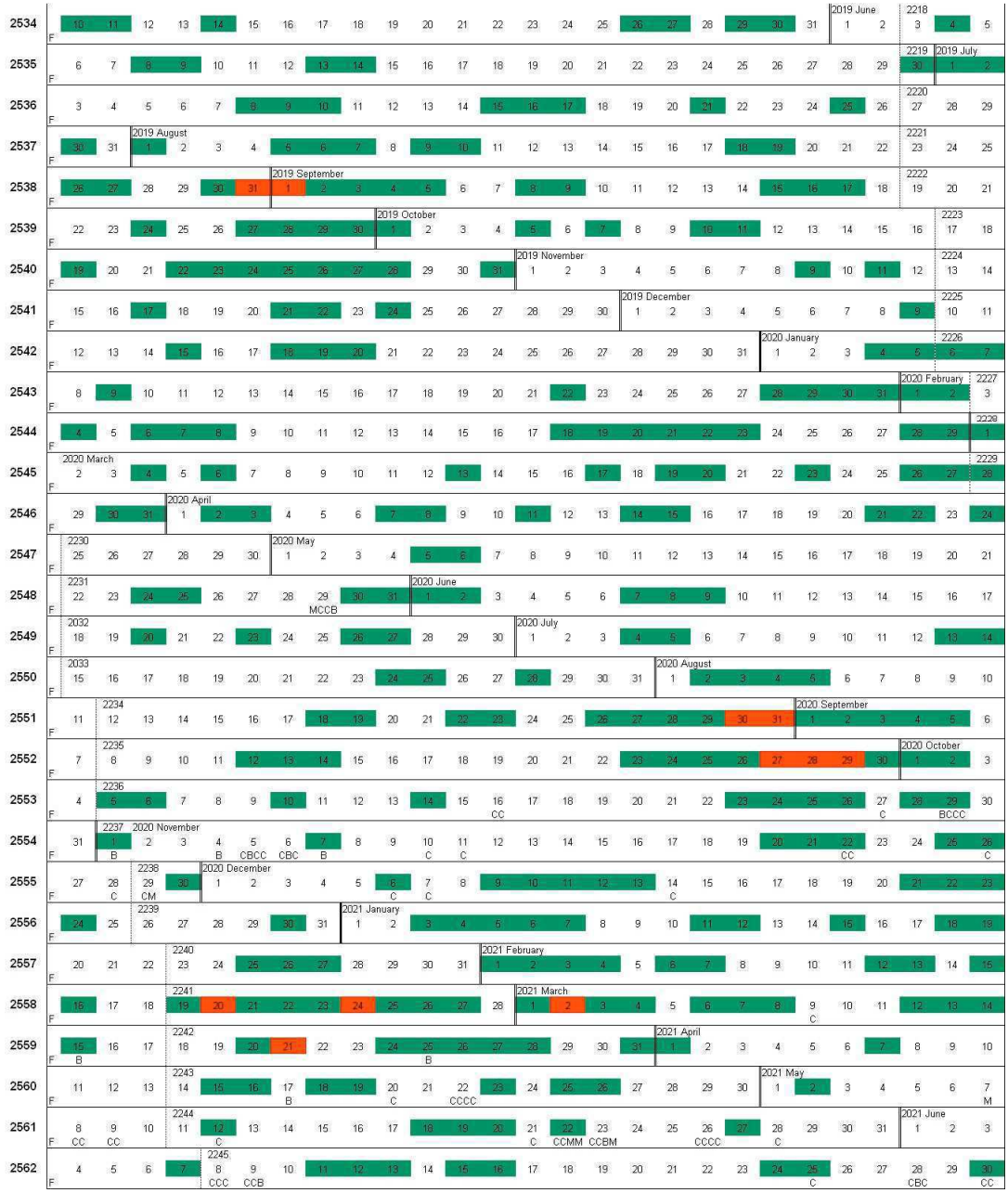


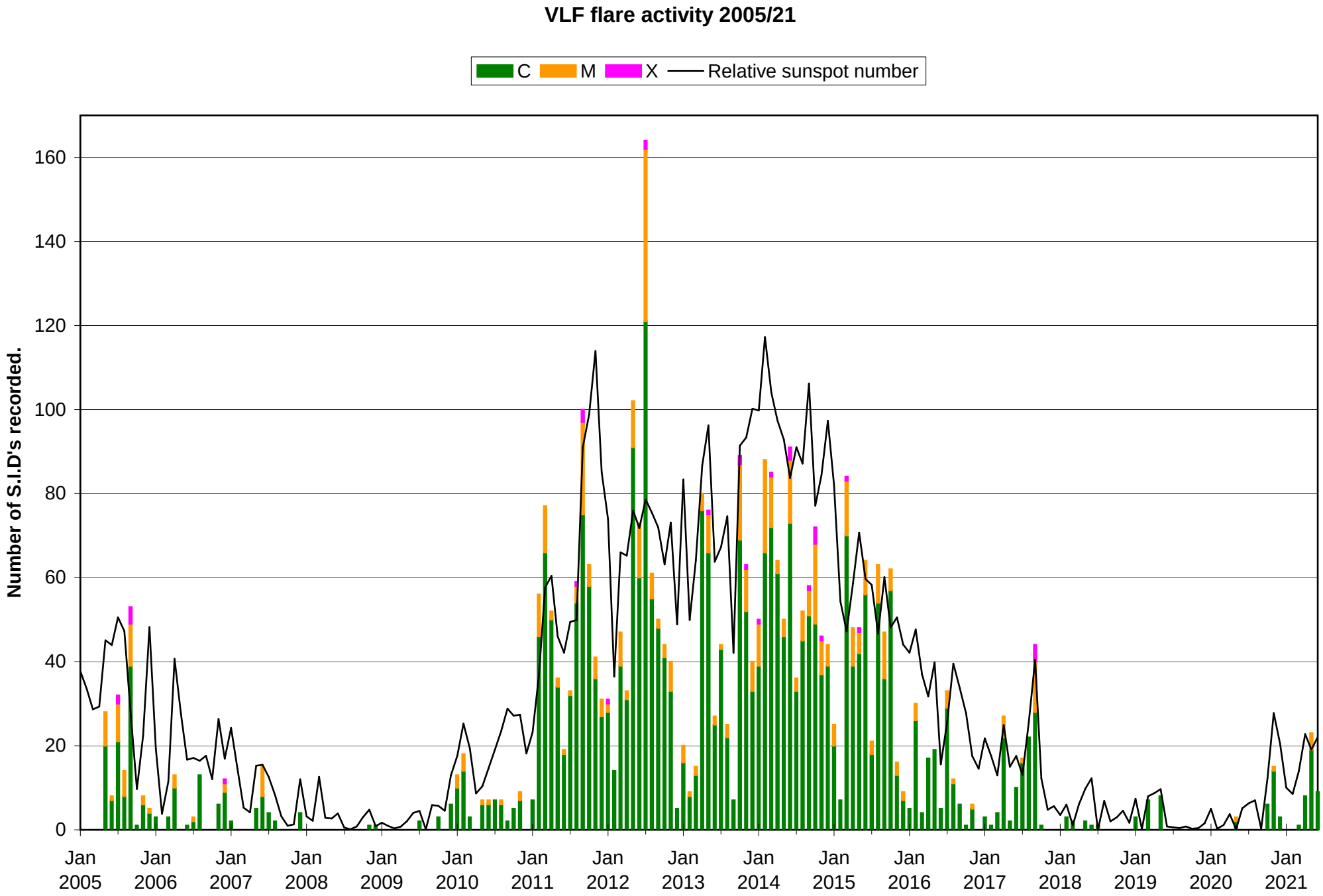
Coronal holes have been much less frequent over the last few months as sunspot activity has increased. A large south pole to equator coronal hole was present around mid-month, its high speed winds producing the disturbance shown in this recording of June 15th and 16th by Roger Blackwell. It may well be a reappearance of the coronal hole seen on May 19th.



This recording by Nick Quinn shows a large swing in the east-west component of the field through the day on the 7th, the north-south component showing more rapid variations. The source appears to have been a high speed wind as noted by Stuart Green.

Magnetic observations received from Roger Blackwell, Colin Clements, Stuart Green, 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 JUNE.**

	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*)				Roberto Battaiola 20.9kHz				Paul Hyde (22.1kHz/*24kHz*)				Mark Edwards (24.0/*37.5* kHz)				Colin Clements (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)	
8	C1.4	3									10:49	10:54	11:27	2	10:50	10:55	11:16	1+	10:48	10:56	11:49	2+
8	C2.4	3	*17:21*	*17:25*	*17:31*	*1-*					17:19	17:27	17:54	2	17:22	17:27	17:49	1+				
8	C1.1	1													19:03	19:06	19:22	1				
9	C3.7	9	08:53	09:04	09:50	2+	08:53	09:06	09:31	2	08:51	09:07	09:59	2+	*08:53*	*09:07*	*09:48*	*2+*	08:52	09:08	10:04	2+
9	?	5									11:57	12:03	12:38	2	11:58	12:02	?	-				
9	?	1													12:19	12:30	13:06	2+				
9	B8.1	1													19:09	19:23	19:52	2				
25	C1.7	2									13:50	14:05	14:31	2	13:54	14:07	14:26	1+				
28	C2.0	2									09:25	09:32	10:02	2	09:29	09:36	10:08	2				
28	B9.2	1									14:24	14:32	14:57	2								
28	C1.6	2									19:09	19:13	19:17	1-	19:10	19:11	19:19	1-				
30	C1.4	2									17:21	17:27	17:42	1	17:27	17:28	17:48	1				
30	C3.6	4	18:10	18:16	18:25	1-					18:13	18:18	18:51	2	18:15	18:18	18:39	1				

	Xray class		Steve Parkinson (Various)				Andrew Thomas (22.1kHz)				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)	
8	C1.4																					
8	C2.4																					
8	C1.1																					
9	C3.7		08:52	09:04	09:55	2+					08:57	09:08	09:32	2					08:45	09:05	09:35	2+
9	?		11:57	12:01	12:15	1-													11:57	12:03	12:10	1-
9	?																					
9	B8.1																					
25	C1.7																					
28	C2.0																					
28	B9.2																					
28	C1.6																					
30	C1.4																					
30	C3.6						18:09	18:17	18:31	1												

	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)	
8	C1.4																					
8	C2.4																					
8	C1.1																					
9	C3.7		08:52	09:08	09:22	1+																
9	?		11:58	12:02	12:30	1+																
9	?																					
9	B8.1																					
25	C1.7																					
28	C2.0																					
28	B9.2																					
28	C1.6																					
30	C1.4																					
30	C3.6																					