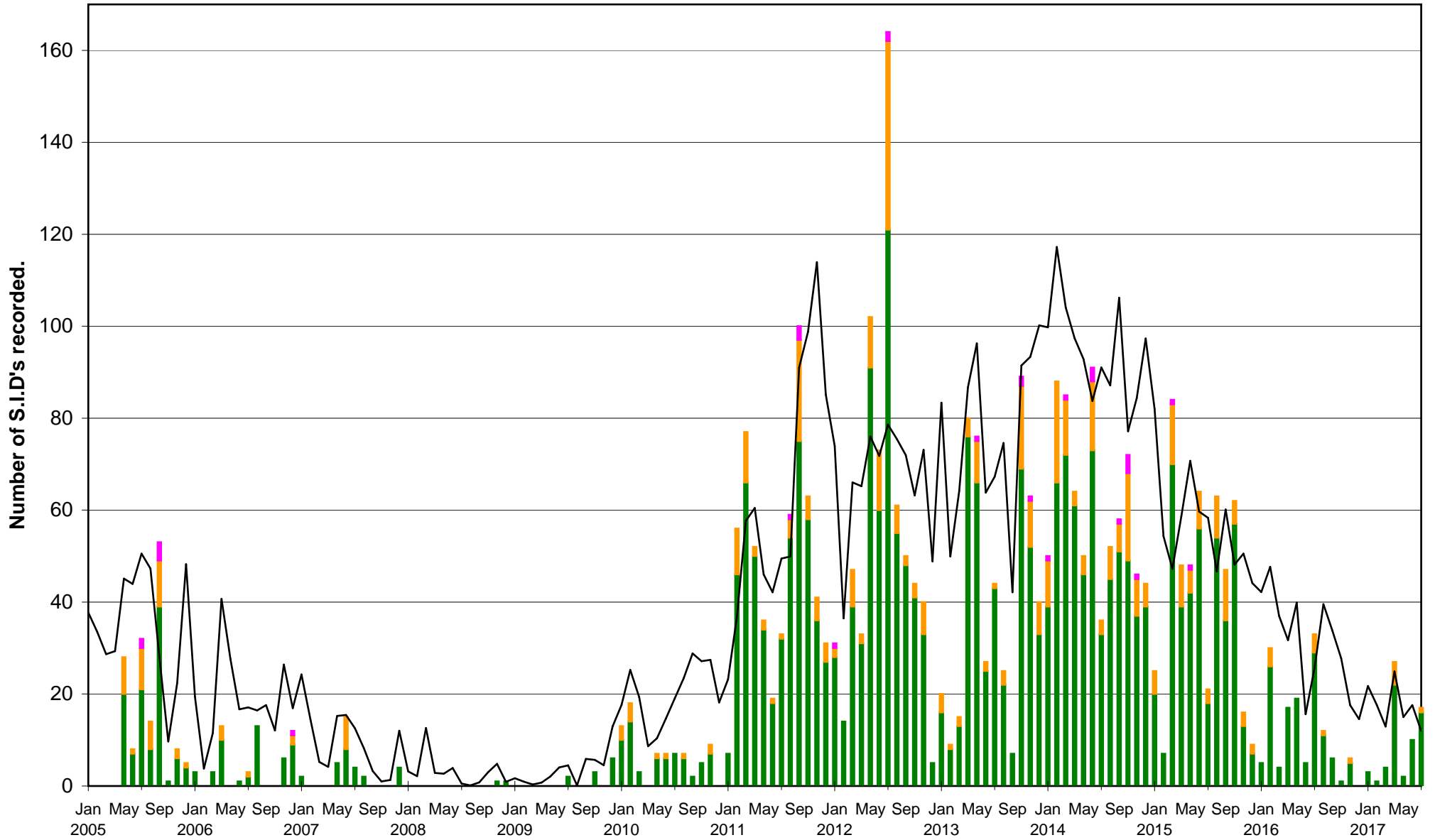


DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (20.9kHz)	Paul Hyde (Various)	Mark Edwards (20.9/24.0/18.3kHz)	Colin Clements (23.4kHz/22.1kHz)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Spectrum Lab / PC 1.5m frame aerial.	Spectrum Lab / PC 2m loop aerial.	AAVSO receiver, 0.76m screened loop aerial.
			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
3	M1.3	5	16:13 16:16 17:00 2+		16:12 16:17 17:46 3	16:10 16:17 17:49 3	16:07 16:15 17:55 3
7	C1.0	3			13:42 13:47 14:18 2	13:42 13:47 ? -	13:34 13:48 14:26 2+
7	?	1				13:48 13:51 14:06 1-	
7	B8.1	1				15:11 15:14 15:18 1-	
9	C1.6	1					
9	C1.2	2	07:29 07:34 07:47 1-				
9	C4.0	7	08:56 09:10 09:36 2		09:02 09:17 10:12 2+	08:58 09:16 10:03 2+	08:55 09:12 10:00 2+
9	B9.8	1			10:22 10:47 11:05 2		
9	C5.3	7	11:56 12:05 13:21 2+		11:56 12:13 13:24 3	11:56 12:07 13:26 3	11:52 12:05 13:27 3
9	B4.4	2			14:04 14:09 14:15 1-		13:56 14:08 14:35 2
9	B8.7	4			14:41 14:48 15:33 2+	14:41 14:46 15:09 1+	14:35 14:43 15:15 2
11	B8.5	2			13:01 13:08 13:32 1+	13:01 13:10 13:34 2	
11	B9.4	2			18:24 18:30 18:45 1	18:24 18:29 18:33 1-	
11	C1.2	1				20:23 20:36 20:52 1+	
13	C8.4	2			20:02 20:10 ? -	20:04 20:11 20:57 2+	
14	C1.4	2			19:21 19:28 19:58 2	19:21 19:29 19:58 2	
15	C1.4	4	? 10:54 11:05 -		10:54 10:56 11:29 2	10:53 10:56 11:20 1+	10:44 10:52 11:37 2+
15	C1.1	4			16:26 16:35 17:10 2	16:32 16:36 16:54 1	16:29 16:35 17:09 2
15	C5.8	2			19:28 19:42 20:48 2+	19:32 19:39 20:25 2+	
16	C1.1	1			07:25 07:30 07:54 1+		
16	C1.3	4		10:31 10:37 10:47 1-	10:29 10:38 ? -	10:33 10:38 ? -	10:30 10:35 10:50 1
16	C1.5	4		10:55 10:59 11:16 1	10:54 11:01 11:28 2	10:56 11:00 11:19 1	10:50 10:56 11:12 1
16	B8.7	3			12:16 12:20 ? -	12:16 12:19 12:31 1-	12:13 12:16 12:33 1
16	B8.3	3			12:35 12:41 13:16 2	12:37 12:39 12:55 1-	12:33 12:36 12:49 1-
16	C1.2	1				18:02 18:06 18:22 1	
18	C1.7	2				08:27 08:30 ? -	
18	?	1				08:36 08:38 09:10 2	
31	B9.2	6	09:09 09:14 09:34 1	09:04 09:14 09:31 1+	09:08 09:14 09:47 2	09:07 09:15 09:35 1+	09:04 09:11 09:32 1+

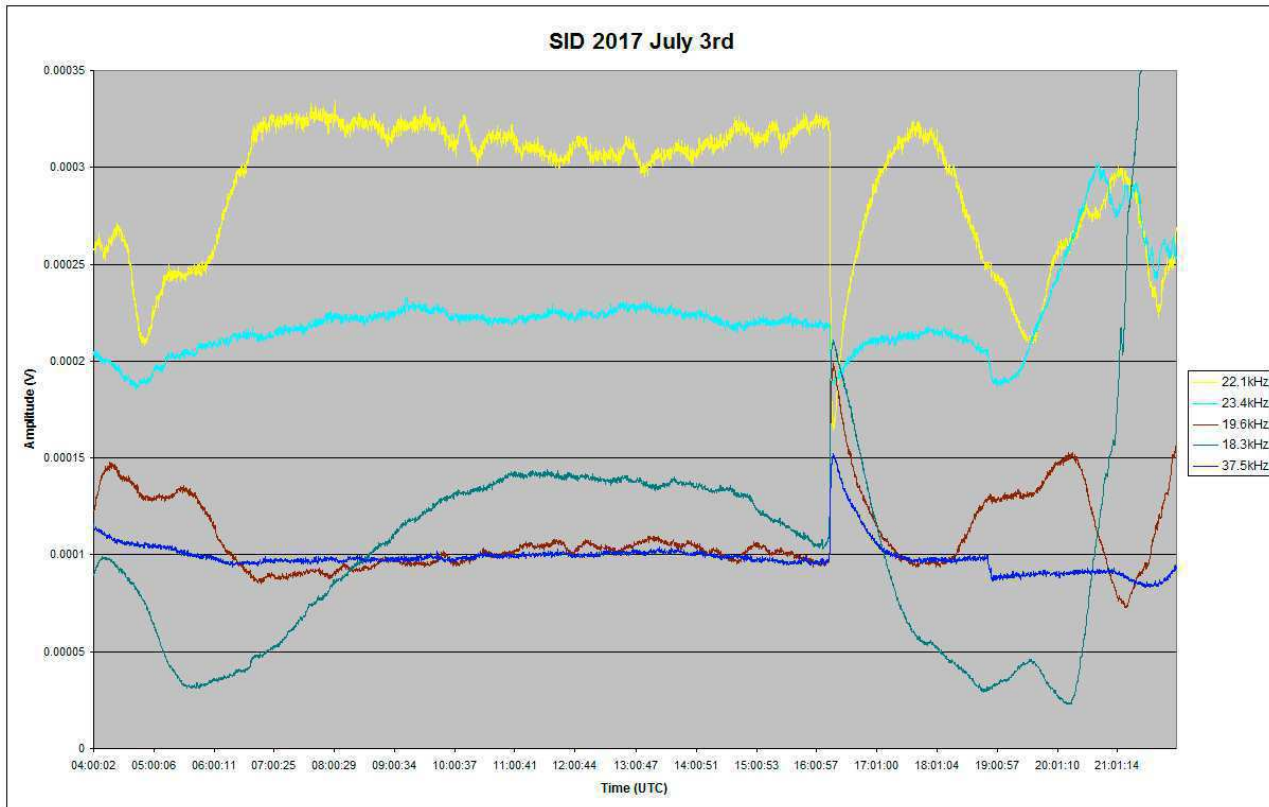


### VLF flare activity 2005/17.

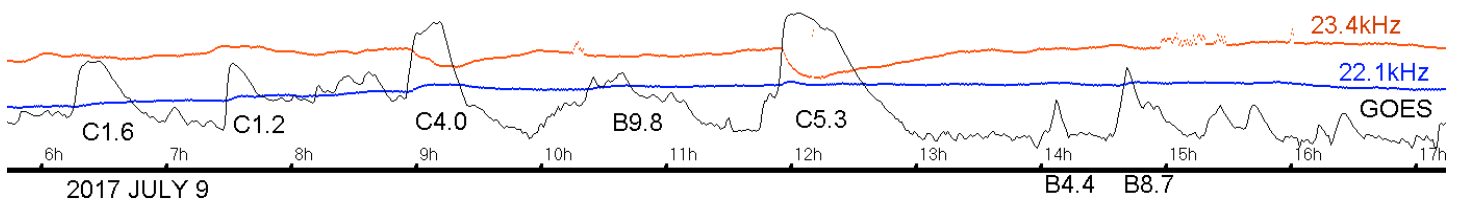
C M X — Relative sunspot number



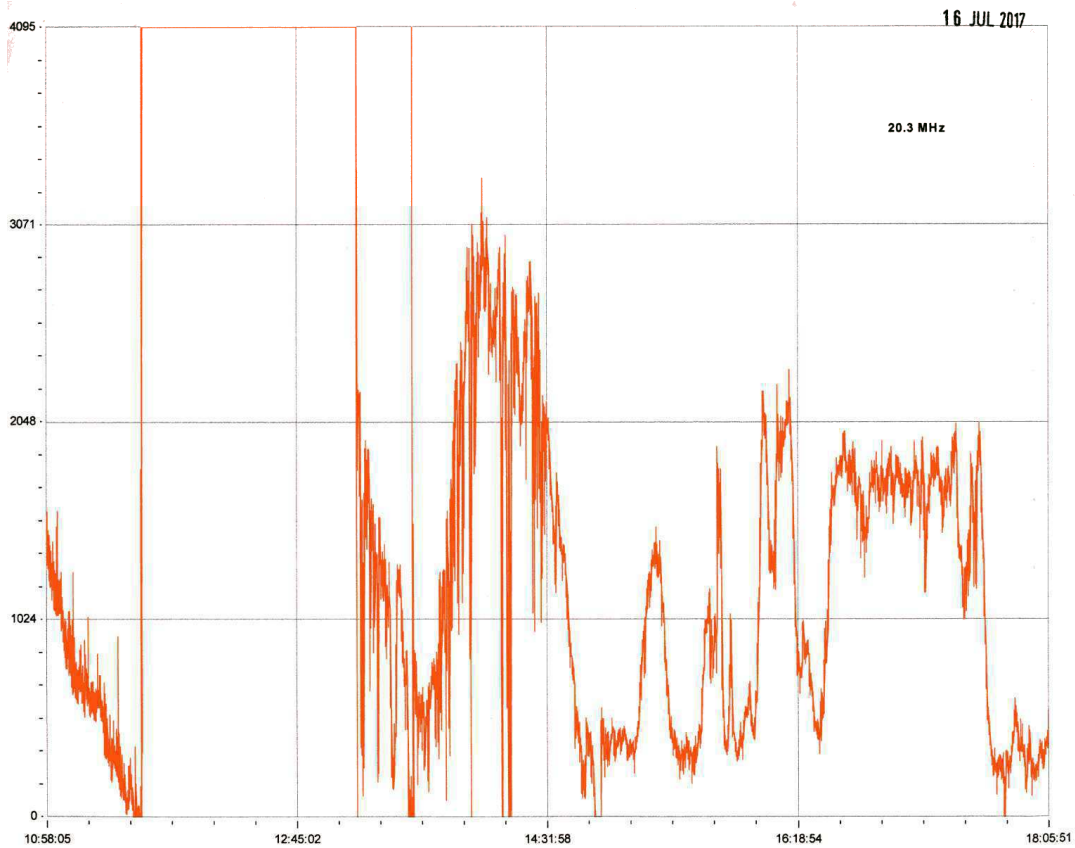
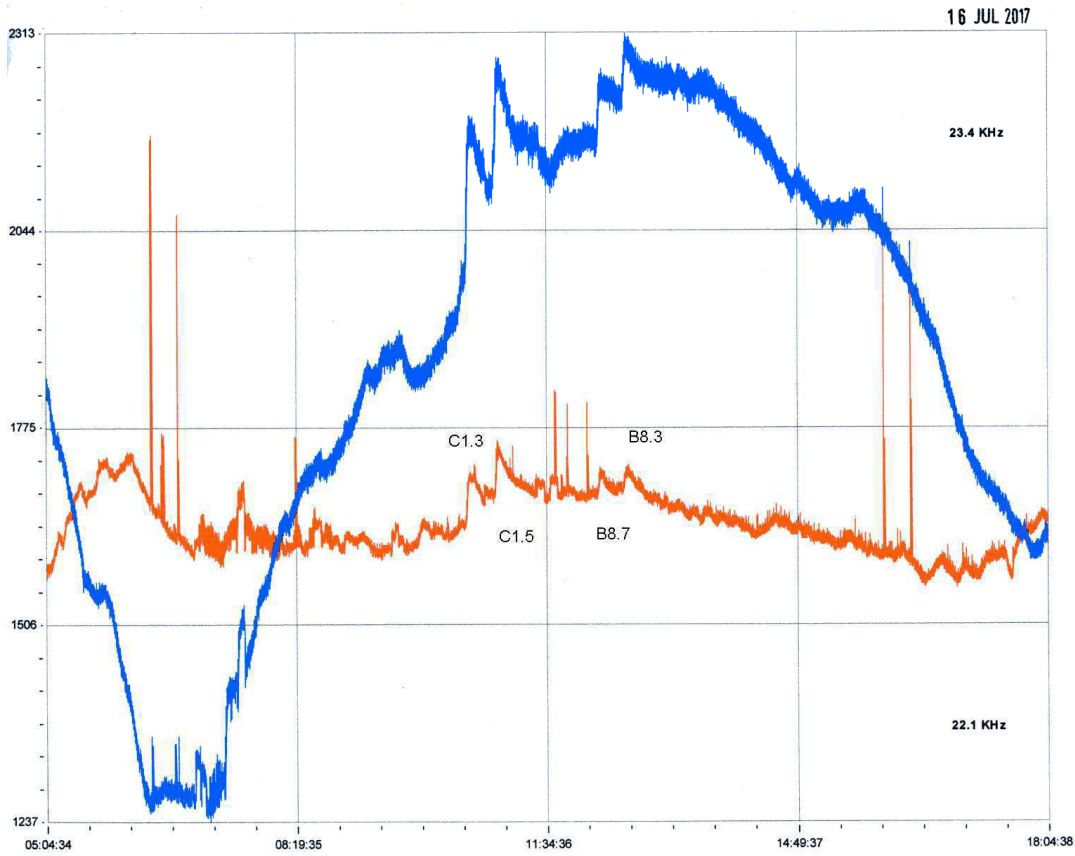
Activity in July was much higher than in June, with a notable increase in the number of B-class flares recorded. While most of these were only just below the C-class, there was also a B4.4 flare recorded. There was also a strong M1.3 flare well timed in the afternoon of the 3<sup>rd</sup>, although we missed the strongest flare of the month, M2.4, at 02:09UT on the 14<sup>th</sup>. Background X-ray flux started the month at A3, rising to B2 by the 7<sup>th</sup>. It continued at this level until the 21<sup>st</sup>, falling back to about A5 by the end of the month. Once again there has been plenty of noisy recordings, Colin Clements noting the 18<sup>th</sup>, 19<sup>th</sup>, 20<sup>th</sup>, 26<sup>th</sup> and 30<sup>th</sup> as suffering substantial noise, with oscillations also present on the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> at 22.1kHz.



This shows the M1.3 flare on the 3<sup>rd</sup> as recorded by Mark Edwards. All five signals have produced well defined ‘shark-fin’ SIDs. Note also the higher noise levels on the 22.1kHz signal (yellow) and 19.6kHz signal (brown).



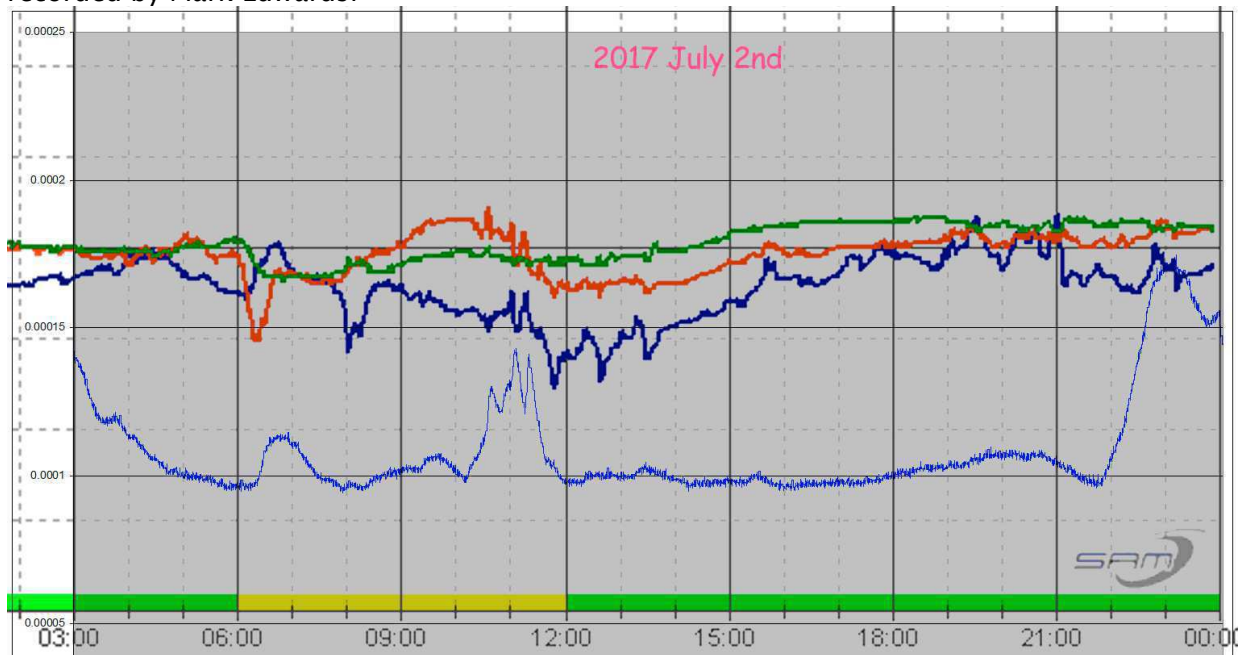
This is my own recording from the 9<sup>th</sup>, including the very weak B4.4 flare. It has not produced a SID for me, although it was recorded by Paul Hyde. The C5.3 flare shows a clear SID at 23.4kHz, although it is less well recorded at 22.1kHz. Conversely, the earlier C4.0 flare is well recorded at both frequencies. The C1.2 flare at 07:34 also shows well at 22.1kHz.



These two recordings by Colin Clements show activity on the 16<sup>th</sup>. Despite the relatively weak flares, the SIDs show well at both frequencies in the top chart. The lower chart is an associated noise burst at 20.3MHz that has sent Colin's recorder off-scale. Note that the time scale is not the same on each recording.

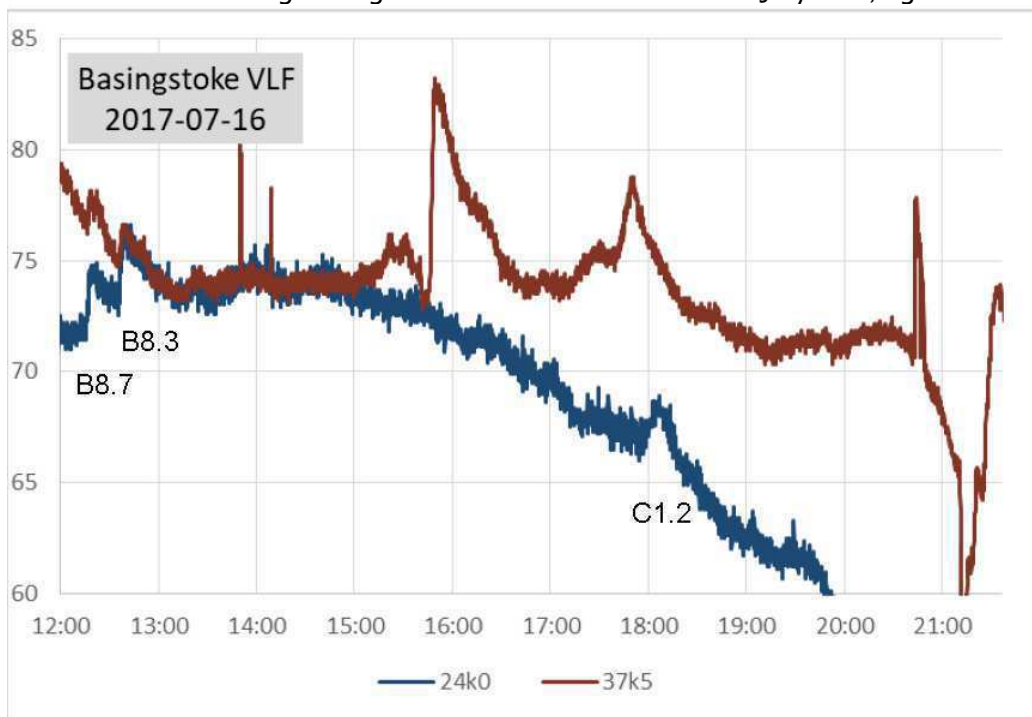
## MAGNETIC OBSERVATIONS.

The month started with a minor magnetic disturbance on July 2<sup>nd</sup>, with an associated 37.5kHz effect recorded by Mark Edwards:

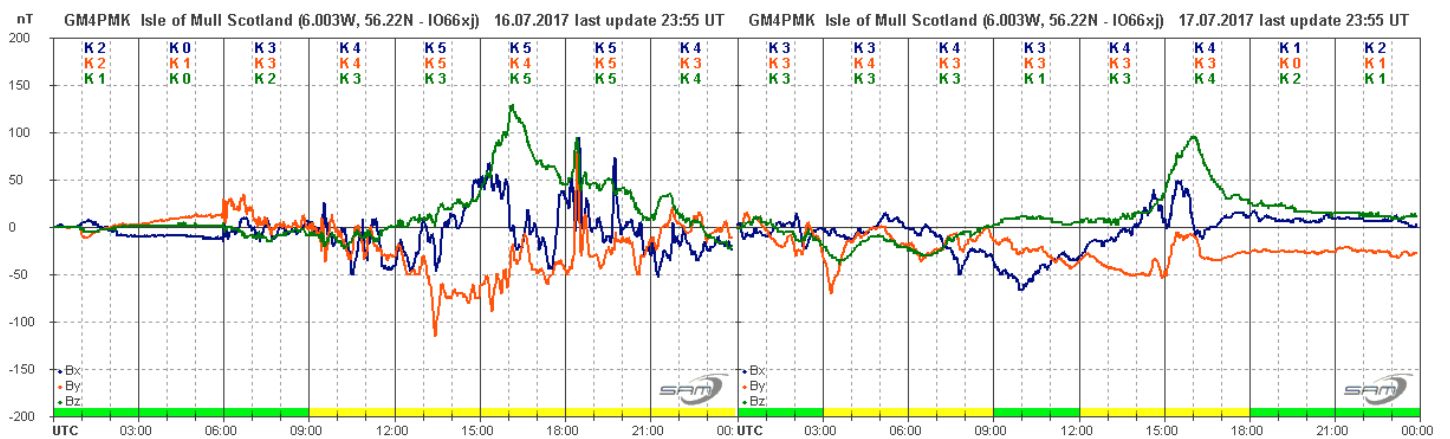
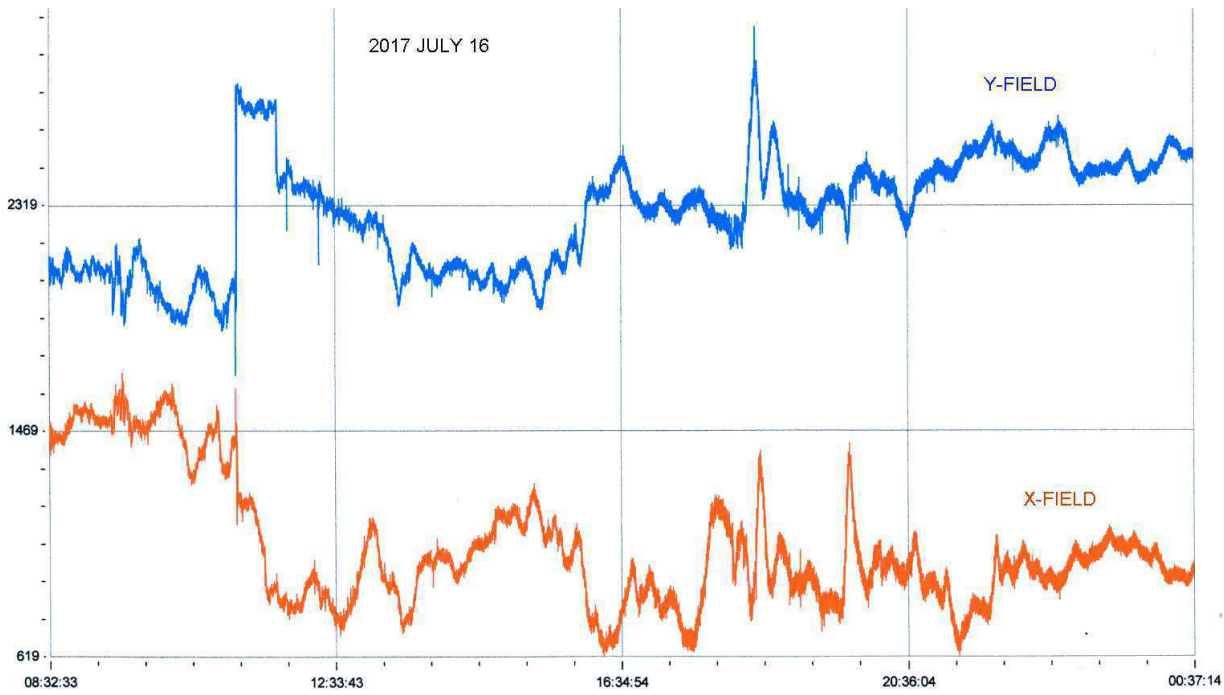


Mark has superimposed the magnetogram by Roger Blackwell onto his VLF recording, showing the link. The first VLF disturbance is from about 06:20UT to 07:30, with a more significant disturbance from 10:15 to 11:30. The lower light-blue trace is 37.5kHz, while the upper three traces are the magnetometer. The source of the magnetic disturbance may be a CME associated with a minor B1.3 flare on June 28<sup>th</sup>. Satellite images show a partial halo CME. There were also solar wind transients from a coronal hole at the same time.

A much stronger magnetic storm was recorded on July 16<sup>th</sup>, again with 37.5kHz links:



This recording by Paul Hyde also includes the 24kHz signal to identify the ordinary SIDs present. The two additional SID-like features seen at 37.5kHz are from the magnetic storm.



The first chart above is from Colin Clements using a dual axis sensor. The lower chart is the 3-axis recording by Roger Blackwell covering the 16<sup>th</sup> and 17<sup>th</sup>. They both show the storm in progress, with some significant magnetic transients around the time of Paul's VLF transient. Roger's chart clearly shows the initial transients at 01UT and 06UT. The source of the storm was a CME associated with the long duration M2.4 flare peaking at 02:09UT on July 14<sup>th</sup>.

There were periods of mild disturbance from the 20<sup>th</sup> to 24<sup>th</sup> of July, caused by a combination of coronal hole effects and a sector boundary crossing. None were particularly strong, with a maximum of about +/-50nT shown on Roger Blackwell's charts.

Magnetic observations received from Roger Blackwell, Colin Clements, Gonzalo Vargas and John Cook.

BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED		ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2469						2014 August	
2470						2014 September	
2471						2014 October	
2472						2014 November	
2473						2014 December	
2474						2015 January	
2475						2015 February	
2476						2015 March	
2477						2015 April	
2478						2015 May	
2479						2015 June	
2480						2015 July	
2481						2015 August	
2482						2015 September	
2483						2015 October	
2484						2015 November	
2485						2015 December	
2486						2016 January	
2487						2016 February	
2488						2016 March	
2489						2016 April	
2490						2016 May	
2491						2016 June	
2492						2016 July	
2493						2016 August	
2494						2016 September	
2495						2016 October	
2496						2016 November	
2497						2016 December	
2498						2017 January	
2499						2017 February	
2500						2017 March	
2501						2017 April	
2502						2017 May	
2503						2017 June	
2504						2017 July	
2505						2017 August	
2506						2017 September	
2507						2017 October	
2508						2017 November	
2509						2017 December	
2510						2018 January	