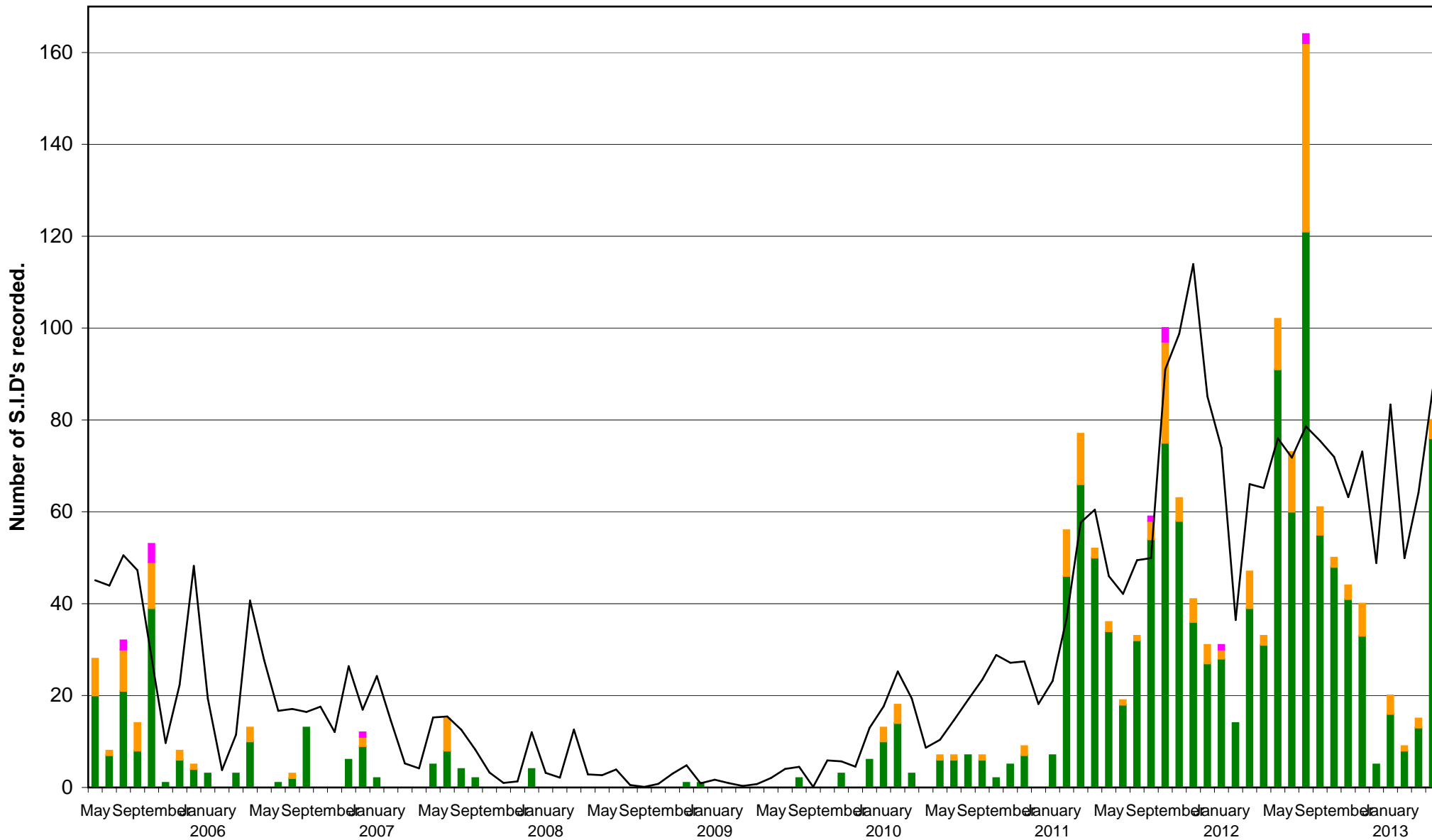
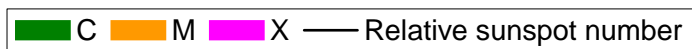


DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)				Roberto Battaiola (21.75kHz)			Paul Hyde (22.1kHz)				Bob Middlefell (22.1kHz)			Mark Edwards (19.6/24.0/22.1kHz)			
			Tuned radio frequency receiver, 0.58m frame aerial.				Modified AAVSO receiver.			Tuned radio frequency receiver, 0.96m frame aerial.				Tuned radio frequency receiver, 0.5m frame aerial.			Spectrum Lab / PC 2m loop aerial.			
			START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)
2	B9.6	1														15:14	15:19	15:29	1-	
3	C2.7	5	09:40	09:45	09:53	1-					09:40	09:46	10:40	2+		09:40	09:45	10:05	1	
3	B9.6	1														17:15	17:18	17:27	1-	
3	C1.7	1														18:39	18:42	18:58	1	
4	C1.2	1														09:54	09:58	10:05	1-	
5	M2.2	5	17:40	17:48	17:54	1-					17:38	17:48	?	-		17:38	17:49	18:38	2+	
6	C1.1	1														09:41	09:45	09:54	1-	
6	C1.7	5	11:24	11:38	12:03	2					11:28	11:40	?	-		11:29	11:39	12:01	1+	
6	C1.4	3									12:24	12:30	13:08	2		12:25	12:30	12:51	1+	
6	C1.4	1																		
7	C3.1	5	15:59	16:03	16:24	1					15:58	16:04	16:21	1		15:59	16:04	16:27	1+	
7	C1.6	1														16:50	16:57	17:20	1+	
8	C1.6	1														15:48	15:52	?	-	
8	?	1														16:08	16:08	16:18	1-	
9	C2.2	1														07:21	07:25	07:35	1-	
9	C2.9	3	08:57	09:01	09:10	1-					08:57	09:01	09:10	1-		08:59	09:00	09:10	1-	
9	?	1														10:32	10:40	10:47	1-	
9	C1.6	3	11:37	11:43	12:15	2					11:37	11:42	11:55	1-		11:38	11:42	12:04	1+	
9	?	1														12:45	12:53	13:21	2	
9	C1.5	2	13:30	13:32	13:37	1-										13:29	13:33	13:50	1	
9	C1.0	1														14:50	14:52	15:04	1-	
10	C1.2	1														09:41	09:46	09:52	1-	
10	*	1														11:12	11:16	11:34	1	
10	?	1														13:23	13:33	13:49	1+	
10	C3.4	1														18:00	18:02	18:20	1	
10	C4.2	1														19:06	19:09	19:43	2	
11	M6.5	3					06:57	07:06	07:14	1-	06:58	07:07	08:07	2+		06:59	07:22	08:03	2+	
11	C4.2	6	10:12	10:15	?	-	10:10	10:14	10:21	1-	10:11	10:15	?	-		10:12	10:15	?	-	
11	C6.2	4	10:28	10:46	?	-					10:29	10:46	12:26	3		10:30	10:45	?	-	
11	*	2	10:55	10:59	12:15	2+										10:55	11:01	11:47	2+	
11	C2.2	5	12:43	12:48	13:03	1	12:42	12:47	12:56	1-	12:43	12:48	13:30	2+		12:43	12:48	13:12	1+	
11	C1.0	1														16:05	16:11	16:23	1-	
11	C1.0	1														16:53	16:54	16:59	1-	
12	C2.1	1														18:45	18:50	18:58	1-	
12	M3.3	1														20:33	20:40	21:02	1+	
13	C1.5	1	09:23	09:31	09:38	1-														
15	C1.2	1																		
16	C1.7	1														16:36	16:40	16:55	1	
16	C1.6	1														18:21	18:26	18:41	1	
18	C6.5	3	18:00	18:15	18:32	1+					18:01	18:14	?	-		18:03	18:21	19:16	2+	
19	C1.1	1														14:41	14:46	14:59	1-	
20	C1.4	1														08:07	08:11	08:29	1	
20	C1.0	2									17:13	17:20	?	-		17:13	17:17	17:31	1-	
21	C2.7	1														05:59	06:03	06:08	1-	
21	C2.5	2									09:22	09:28	09:43	1		09:12	09:25	09:48	2	
21	C1.8	1														10:24	10:25	10:36	1-	
21	C2.2	3	14:19	14:22	14:28	1-					14:18	14:22	14:41	1		14:19	14:24	14:37	1-	
21	C2.9	6	16:02	16:04	16:07	1-					16:02	16:05	16:29	1+		16:02	16:05	16:22	1	
21	C4.5	3	18:36	18:40	18:46	1-										18:36	18:41	19:06	1+	
22	M1.0	7	10:26	10:33	11:20	2+	10:27	10:30	11:04	2	10:20	10:32	11:38	2+		10:26	10:30	11:08	2	
23	C2.1	6	13:31	13:33	13:47	1-					13:31	13:34	13:54	1		13:30	13:33	13:50	1	
23	C8.2	6	14:08	14:16	?	-					14:09	14:15	14:58	2+		14:09	14:15	14:54	2	
23	C1.2	3									14:59	15:01	?	-		14:59	15:00	?	-	
23	C1.5	6	15:06	15:08	?	-					15:06	15:09	?	-		15:06	15:09	?	-	
23	C2.5	6	15:16	15:19	15:38	1					15:16	15:20	15:38	1		15:16	15:20	15:36	1	
23	C3.0	1														18:16	18:30	19:00	2	
23	C1.8	1														19:34	19:37	19:46	1-	
24	C1.6	6	09:59	10:06	10:28	1+					09:58	10:08	10:35	2		09:58	10:07	10:26	1+	
24	?	1														10:58	11:13	?	-	
24	C1.4	3	11:20	11:23	11:28	1-										11:21	11:26	12:06	2	
24	*	2														11:30	11:47	12:21	2+	
24	C1.2	2														13:17	13:29	14:03	2+	
24	C2.5	4					16:53	16:59	17:04	1-	16:53	17:00	17:15	1		16:55	17:01	17:40	2	
25	C2.3	5	08:29	08:33	09:14	2					08:29	08:35	09:30	2+		08:29	08:35	?	-	
25	?	3	09:41	09:45	09:56	1-					09:43	09:47	?	-		09:43	09:47	?	-	
25	C3.4	6	10:46	10:53	?	-					10:46	10:54	12:16	3		10:46	10:54	?	-	
25	*	3	10:57	11:03	11:21	1					10:58	11:04	?	-		10:58	11:04	?	-	
25	*	1														11:24	11:28	?	-	
25	*	4	11:44	11:48	12:02	1-					11:38	11:51	12:07	1+		11:38	11:51	12:07	1+	
25	C1.1	1									14:33	14:40	14:56	1		14:33	14:40	14:56	1	
25	?	1														15:29	15:33	15:48	1	
25	C1.5	2									16:19	16:25	16:33	1-		16:19	16:25	16:33	1-	
25	?	1														16:35	16:39	17:03	1+	
25	C3.9	4					17:11	17:18	17:23	1-	17:13	17:21	?	-		17:13	17:20	?	-	
25	C5.6	4					17:24	17:29	17:34	1-	17:26	17:31	?	-		17:26	17:31	18:37	2+	
25	C5.8	1														19:38	19:42	19:59	1	
26	C7.0	6	06:25	06:26	06:37	1-	06:22	06:27	07:01	2	06:20	06:24	06:42	1		06:22	06:28	06:43	1	
26	?	1														07:19	07:22	07:28	1-	
26	?	1														07:38	07:44	07:58	1	
26	C1.5	1														08:26	08:30	08:43	1-	
26	C3.4	6	08:53	08:59	09:30	2					08:52	09:01	09:36	2		08:53	09:00	09:35	2	
26	C3.5	7	12:53	12:59	13:43	2+	12:51	12:57	13:04	1-	12:54	12:59	13:49	2+		12:53	12:59	13:34	2	
26	C4.4	6	15:40	15:51	16:13	2					15:41	15:49	16:54	2+		15:41	15:50	?	-	
26	?	1														16:02	16:05	16:33	1+	
26	C1.7	1														17:07	17:11	?	-	
26	?	1														17:23	17:26	17:37	1-	
26	C2.3	2														18:27	18:31	19:10	2	
27	?	1														05:39	05:41	05:56	1-	
27	C3.1	5	06:19	06:22	06:26	1-	06:14	06:22	06:39	1	06:20	06:24	06:42	1		06:20	06:26	06:30	1-	
27	?	1																		
27	?	4									10:49	10:56	11:21	1+		09:02	09:19	09:37	2	
27	C3.1	7	12:09	12:15	13:24	2+	12:06	12:16	12:42	2	12:08	12:17	13:05	2+		10:51	10:58	11:25	2	
27	C1.1	1																		

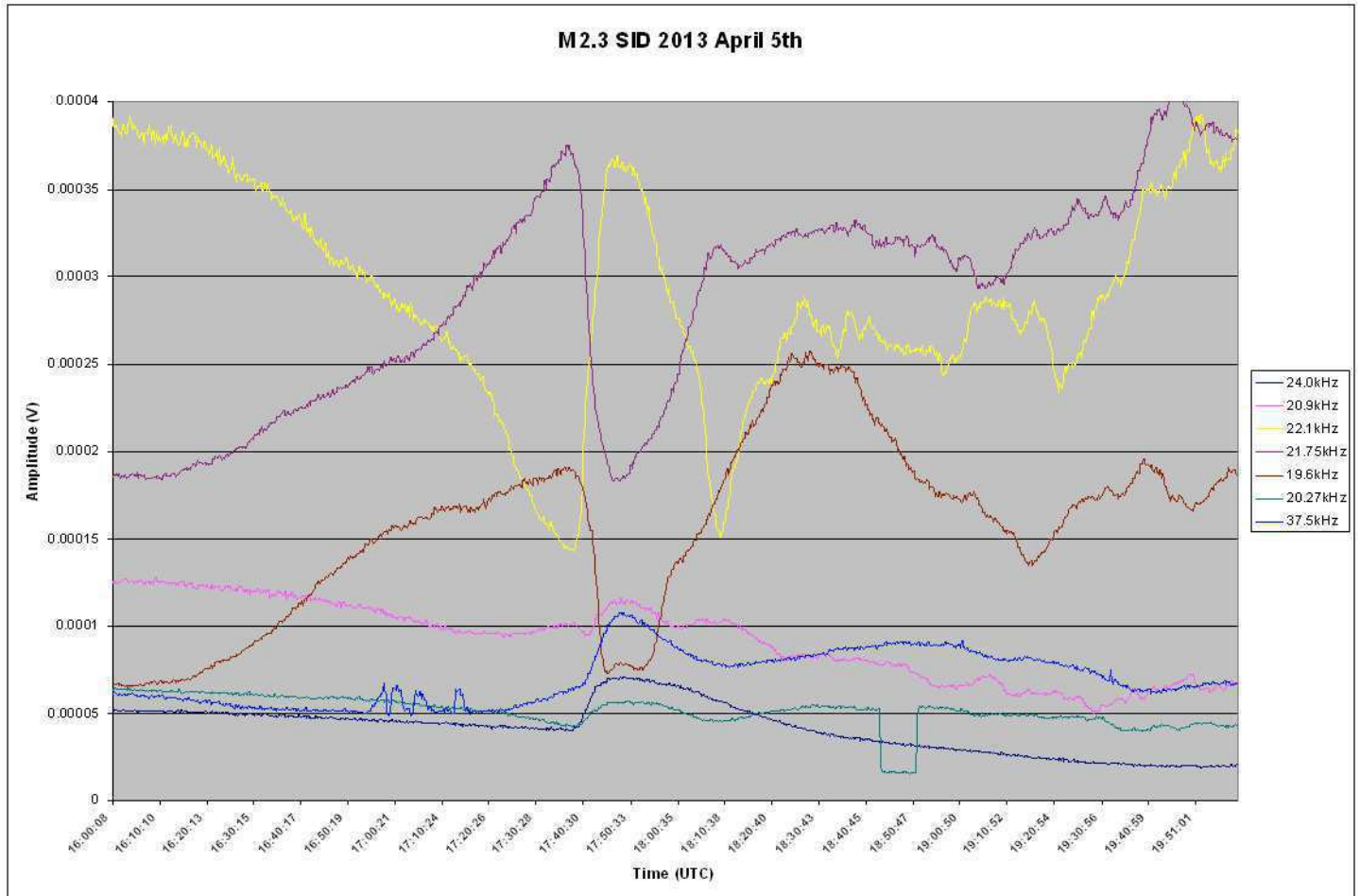
DAY		Colin Clements (23.4kHz/22.1kHz)				Peter King (18.3kHz)			Tarif Rashid Santo (19.8kHz)			John Wardle (19.6/23.4kHz)			Steve Parkinson (Various)				
		AAVSO receiver, 0.76m screened loop aerial.				Own designed receiver, 1.4m loop aerial.			Spectrum Lab, Half-wave dipole. 15m			PC soundcard, long wire aerial.			Tuned radio frequency receiver, 0.58m frame aerial.				
		START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)		
2	B9.6																		
3	C2.7	09:41	09:46	10:05	1										09:40	09:45	10:10	1+	
3	B9.6																		
3	C1.7																		
4	C1.2																		
5	M2.2	17:38	17:46	18:15	2										17:39	17:48	18:03	1	
6	C1.1																		
6	C1.7	11:27	11:40	11:57	1+										11:30	11:38	11:55	1	
6	C1.4	12:23	12:28	12:47	1														
6	*	13:36	13:37	14:22	2+														
7	C3.1	15:58	16:01	16:10	1-										15:59	16:02	16:25	1+	
7	C1.6																		
8	C1.6																		
8	?																		
9	C2.2																		
9	C2.9																		
9	?																		
9	C1.6																		
9	*																		
9	C1.5																		
9	C1.0																		
10	C1.2																		
10	*																		
10	?																		
10	C3.4																		
10	C4.2																		
11	M6.5																		
11	C4.2	10:12	10:14	10:22	1-										10:12	10:14	10:24	1-	
11	C6.2	10:26	10:45	12:10	3														
11	*																		
11	C2.2	12:42	12:47	13:12	1+														
11	C1.0																		
11	C1.0																		
12	C2.1																		
12	M3.3																		
13	C1.5																		
15	C1.2	13:55	14:04	14:50	2+														
16	C1.7																		
16	C1.6																		
18	C6.5																		
19	C1.1																		
20	C1.4																		
20	C1.0																		
21	C2.7																		
21	C2.5																		
21	C1.8																		
21	C2.2																		
21	C2.9	16:01	16:06	16:45	2							16:00	16:03	16:17	1-	16:01	16:04	16:21	1
21	C4.5											18:37	18:40	18:45	1-				
22	M1.0	10:24	10:30	11:30	2+							10:20	10:28	11:20	2+	10:26	10:30	11:03	2
23	C2.1	13:29	13:34	14:07	2							13:28	13:35	13:59	1+	13:30	13:33	13:48	1-
23	C8.2	14:07	14:15	14:59	2+							14:07	14:16	15:04	2+	14:10	14:15	14:43	2
23	C1.2	15:02	15:03	15:05	1-														
23	C1.5	15:05	15:08	15:16	1-							15:04	15:09	15:14	1-	15:06	15:08	15:14	1-
23	C2.5	15:16	15:21	15:34	1-							15:14	15:21	15:35	1	15:17	15:19	15:33	1-
23	C3.0																		
23	C1.8																		
24	C1.6	09:57	10:10	10:35	2							09:58	10:08	10:56	2+	09:58	10:09	10:30	1+
24	?																		
24	C1.4											11:22	11:24	11:30	1-				
24	*	12:17	12:19	12:54	2														
24	C1.2											13:17	13:26	13:46	1+				
24	C2.5											16:52	16:57	17:11	1				
25	C2.3											08:27	08:34	08:50	1	08:29	08:33	08:50	1
25	?															09:41	09:45	10:05	1
25	C3.4	10:46	11:04	11:41	2+							10:44	11:00	11:22	2	10:46	10:53	?	-
25	*															11:43	11:50	12:10	1+
25	*	11:41	11:48	12:06	1							11:42	11:49	12:05	1				
25	C1.1																		
25	?																		
25	C1.5											16:20	16:27	16:33	1-				
25	?																		
25	C3.9											17:13	17:21	17:25	1-				
25	C5.6											17:25	17:33	17:52	1+				
25	C5.8																		
26	C7.0											06:21	06:24	06:51	1+	06:25	06:30	06:40	1-
26	?																		
26	?																		
26	C1.5																		
26	C3.4	08:52	09:00	09:47	2+							08:52	09:01	09:32	2	08:53	09:01	09:26	2
26	C3.5	12:52	12:58	13:46	2+							12:51	12:58	13:30	2	12:53	12:58	13:25	1+
26	C4.4	15:37	15:50	16:46	2+							15:34	15:53	16:25	2+	15:41	15:50	?	-
26	?																		
26	C1.7																		
26	?																		
26	C2.3											18:29	18:34	18:44	1-				
27	?																		
27	C3.1											06:15	06:22	06:34	1				
27	?																		
27	?	10:50	10:59	11:28	2											10:52	11:00	11:25	2
27	C3.1	12:08	12:25	13:18	2+							12:08	12:19	12:48	2	12:09	12:18	13:00	2+
27	C1.1																		
27	?	13:40	13:54	15:07	3											13:42	13:50	14:15	2
27	C1.9	15:07	15:17	15:41	2							15:09	15:17	15:48	2	15:11	15:18	15:30	1
28	C1.9	14:54	14:58	15:39	2							14:53							

VLF flare activity 2005/13.



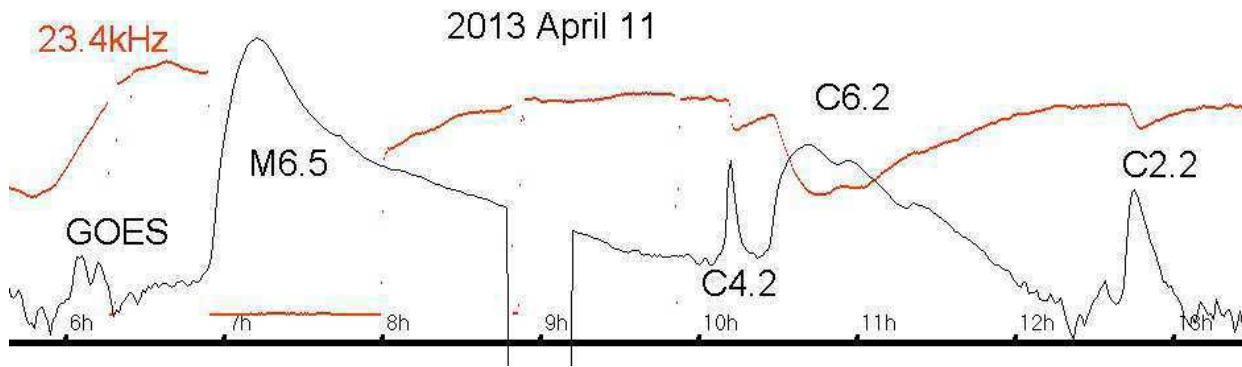
Solar activity has dramatically increased this month, with SID counts back to the level seen last summer. There are a total of four M-class flares listed in the SWPC lists, all of which we have managed to record as SIDs. There were no X-class flares in the SWPC lists.

Mark Edwards has provided a recording of the M2.2 flare peaking at 17:48 on the 5th:

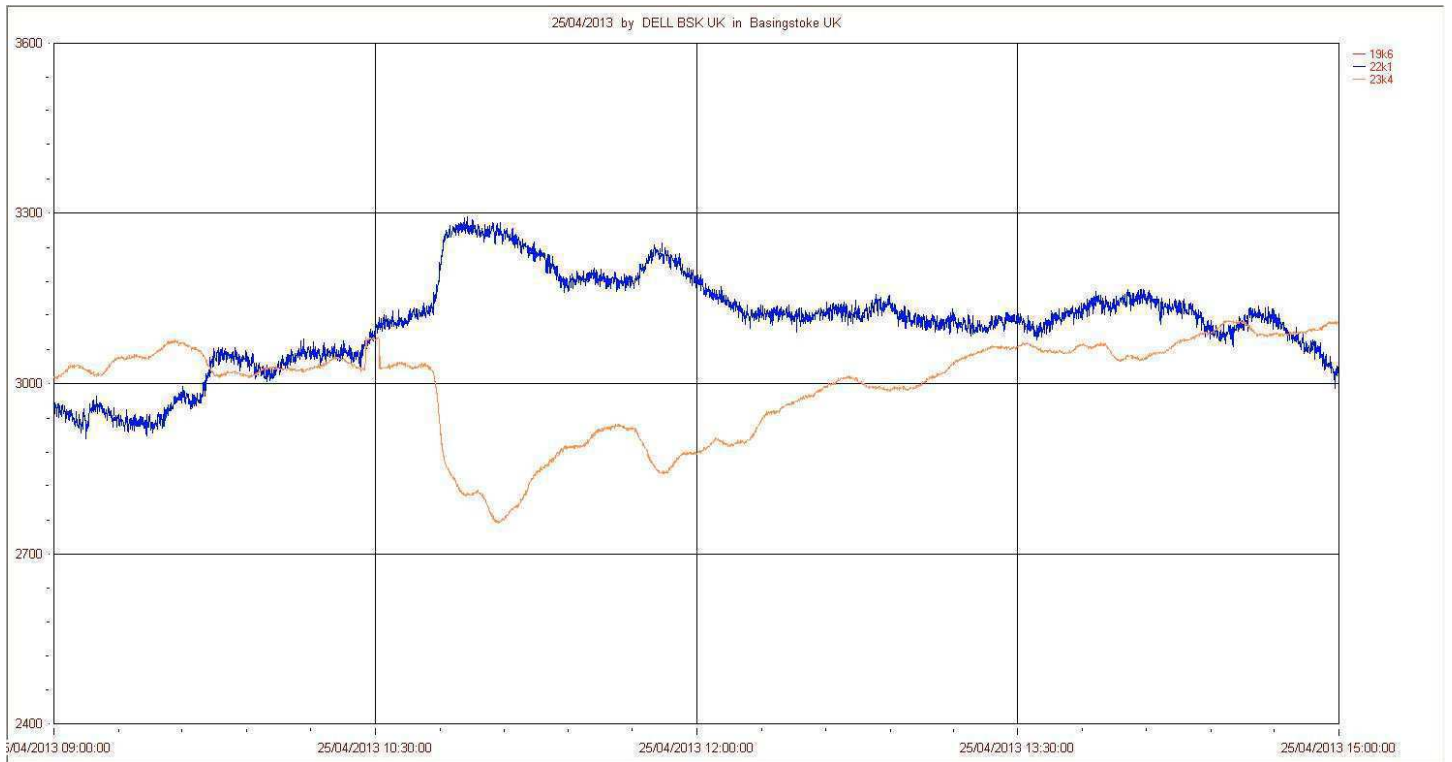


This shows a strong response at several frequencies despite the late afternoon timing. Particularly note the shape of the SID recorded at 22.1 kHz (yellow trace) where the ground/skywave interference pattern has shifted enough to change from cancellation to enhancement at the peak. As it shifts back again the enhancement reverts to cancellation before the SID ends. Compare this with the SID at 37.5 kHz (blue trace) where a straightforward enhancement of the signal has occurred.

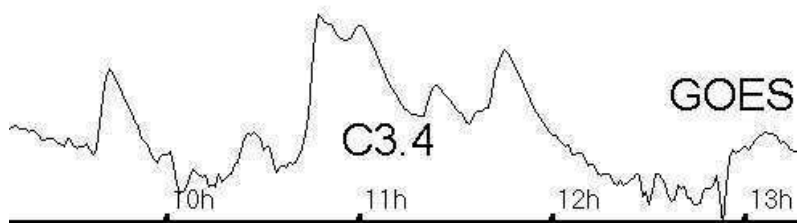
Several of April's flares have had multiple peaks in the X-ray flux, resulting in multiple SIDs. The chart on the next page shows my own recording on April 11th. The M6.5 flare was the most energetic of the month, but occurred while 23.4 kHz was off. The C4.2 flare peaking at 10:14 was quite short and has produced a well defined SID. In contrast, the C6.2 flare appears to have at least three X-ray peaks, and has produced SID peaks at 10:46 and 10:59 UT in my recording. The second of these is shown in the table as '*'. The SWPC do not list the active region responsible for this event.



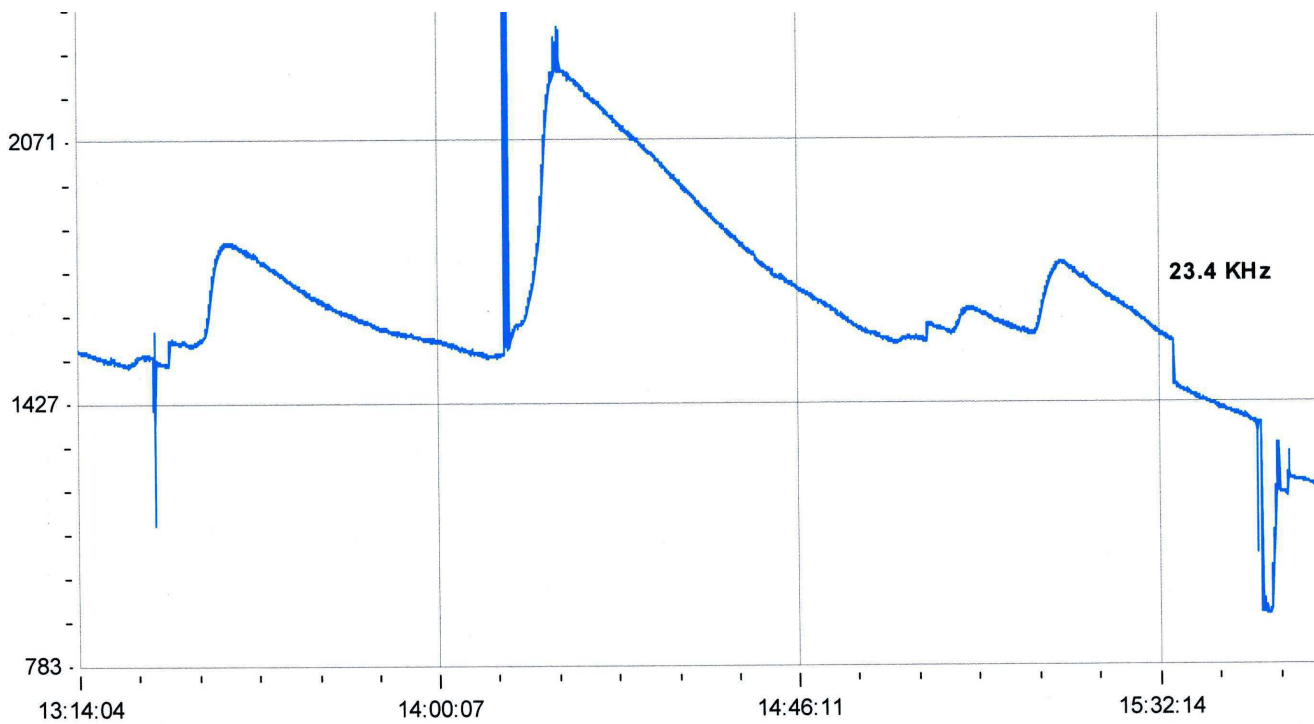
Paul Hyde reported a similar multiple SID on the 25th:



There are numerous SID peaks in his recording from the C3.4 flare peaking at 10:52UT. Although listed as just a single flare from AR11726, the X-ray flux shows four clear peaks, the last of which is at 11:46. Again, these are shown as '*' in the tables.



April 23rd included a series of seven distinct flares, including a C8.2 at 14:15UT. These were also from AR11726, a fairly large and complex region of sunspots approaching the Sun's western limb at the time.



This chart from Colin Clements shows most this activity at 23.4kHz in a neat series of classic ‘shark fin’ SIDs. The small pulse at the right edge is a drop-out of the transmitter, following a reduction of the transmitter power.

VLF Interference:

Until recently, I have not been aware of any significant interference at the frequencies that we monitor. However, I now find that a large part of the spectrum is being covered by strong signals at 100Hz intervals. The AC mains frequency in the UK is 50Hz, and so it does seem to be linked to that. I also noticed that it was strongest during daylight hours, becoming very dominant in strong sunlight. At 19.5 – 20.5kHz, they are the strongest signals present, but can be seen from 18kHz to 22kHz. I believe that they are related to the inverters used with roof-mounted domestic solar panels, as I have several of these on nearby houses. The Anthorn 19.6kHz signal is no longer detectable, and Skelton at 22.1kHz is only just useable. Fortunately they do not extend to 23.4kHz, and so that remains useable. European EMC regulations cover the spectrum above 150kHz, and so do not help. They are easily seen with a loop aerial connected to spectrum lab software.

MAGNETIC OBSERVATIONS.

Given the high flare activity, magnetic activity has been surprisingly low. There were some very minor disturbances through the first half of the month. The M6.5 flare on the 11th did produce a CME and associated radio bursts, but its effects were minimal and only just measurable on our recordings. The BGS timed the CME arrival at 22:55UT on the 13th, with a minor disturbance lasting until about 3AM on the 14th.

A more sustained disturbance began about 22:30 on the 23rd, continuing through to 00:30 on the 27th. This was due to a coronal hole high speed stream, and despite the large number of flares over this period there were no Earth-directed CMEs. I measured a total disturbance of about 70nT on the morning of the 25th.

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

Observations to jacook@jacook.plus.com

BARTEL DIAGRAM

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.										Synodic rotation start (carrington's).																															
2407	F	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2010 January	1	2	3	2092	4	5	6	7	8	9	10	11	12	13																
2408	F	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2093	2010 February										1	2	3	4	5	6	7	8	9							
2409	F	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	2094	2010 March										28	1	2	3	4	5	6	7	8							
2410	F	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	2095	2010 April										27	28	29	30	31	1	2	3	4							
2411	F	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	2096	2010 May										23	24	25	26	27	28	29	30	1							
2412	F	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2097	2010 June										21	22	23	24	25	26	27	28							
2413	F	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2098	2010 July										17	18	19	20	21	22	23	24							
2414	F	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	2099	2010 August										14	15	16	17	18	19	20	21							
2415	F	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	2100	2010 September										11	12	13	14	15	16	17	18	18						
2416	F	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	2101	2010 October										7	8	9	10	11	12	13	14							
2417	F	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	2102	2010 November										4	5	6	7	8	9	10	11						
2418	F	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2103	2010 December										1	2	3	4	5	6	7							
2419	F	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	2104	2011 January										28	29	30	1	2	3	4							
2420	F	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	2105	2011 February										25	26	27	28	29	30	31							
2421	F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2106	2011 March										21	22	23	24	25	26	27							
2422	F	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2107	2011 April										17	18	19	20	21	22	23	23						
2423	F	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	2108	2011 May										17	18	19	20	21	22								
2424	F	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	2109	2011 June										12	13	14	15	16	17	18	18						
2425	F	19	20	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	2110	2011 July										9	10	11	12	13	14	15							
2426	F	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	2111	2011 August										6	7	8	9	10	11							
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2430	F	1	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	2115	2011 December										23	24	25	26	27		
2431	F	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	24	2116	2012 January										21	22	23	24		
2432	F	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2117	2012 February										15	16	17	18	19	20	
2433	F	21	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	2118	2012 March										14	15	16	17			
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2435	F	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	2120	2012 May										3	4	5	6	7	8	9
2436	F	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	1	2	3	4	5	6	7	2121	2012 June										1	2	3	4	5	6	7
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2440	F	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	2125	2012 October										17	18	19	20	21	22	
2441	F	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2126	2012 November										15	16	17				
2442	F	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2127	2012 December										15						
2443	F	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	2128	2013 January										12						
																													2129	2013 February																

