

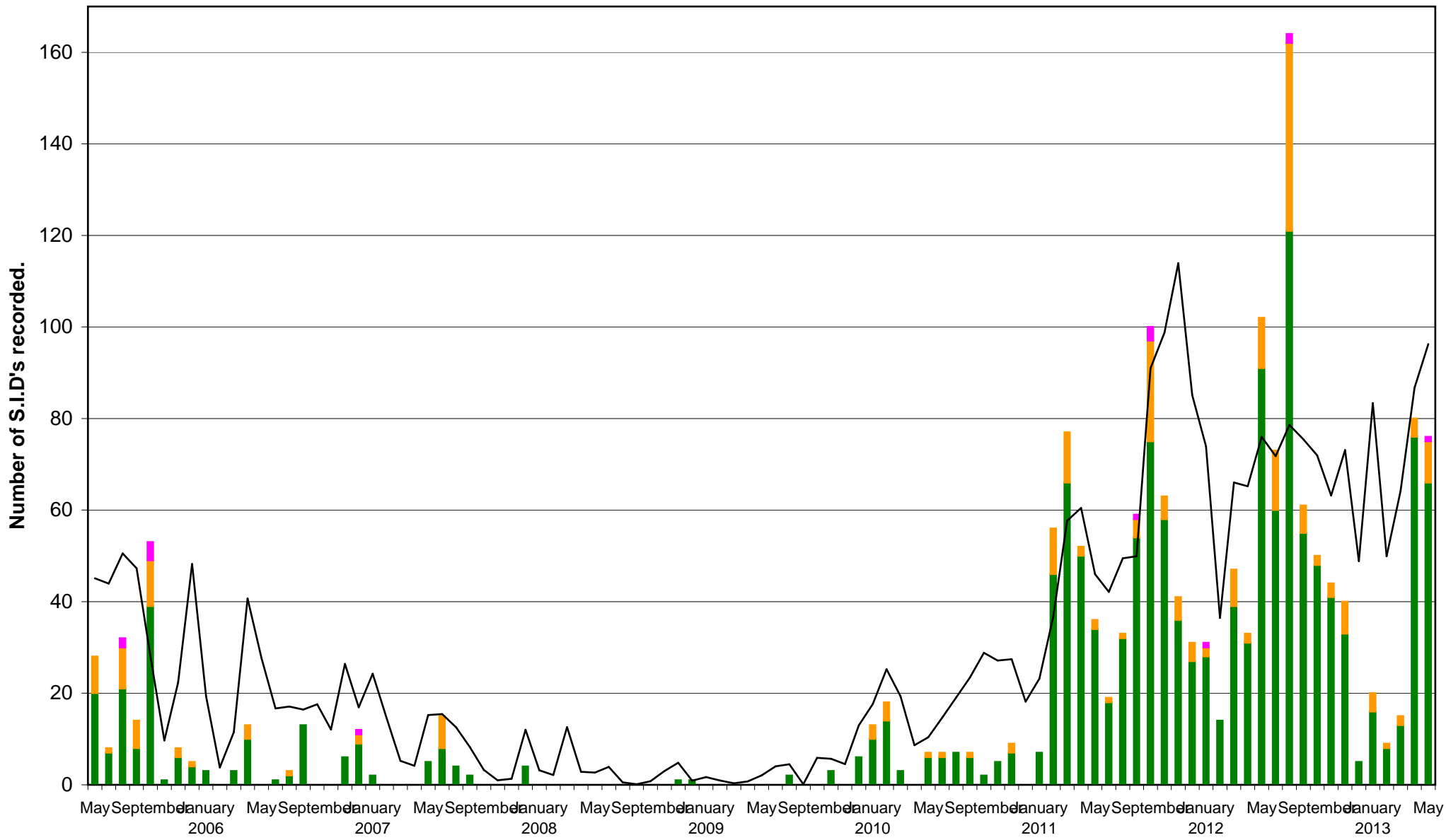
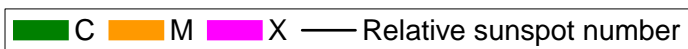
BAA Radio Astronomy Group.

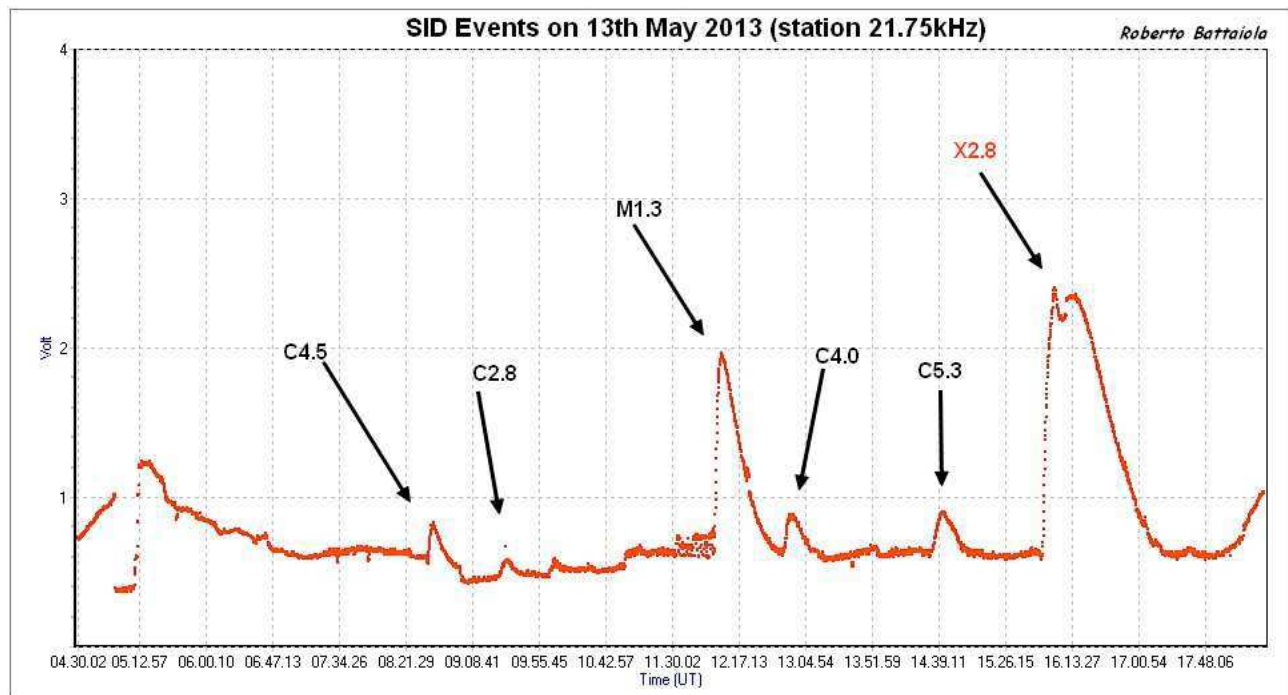
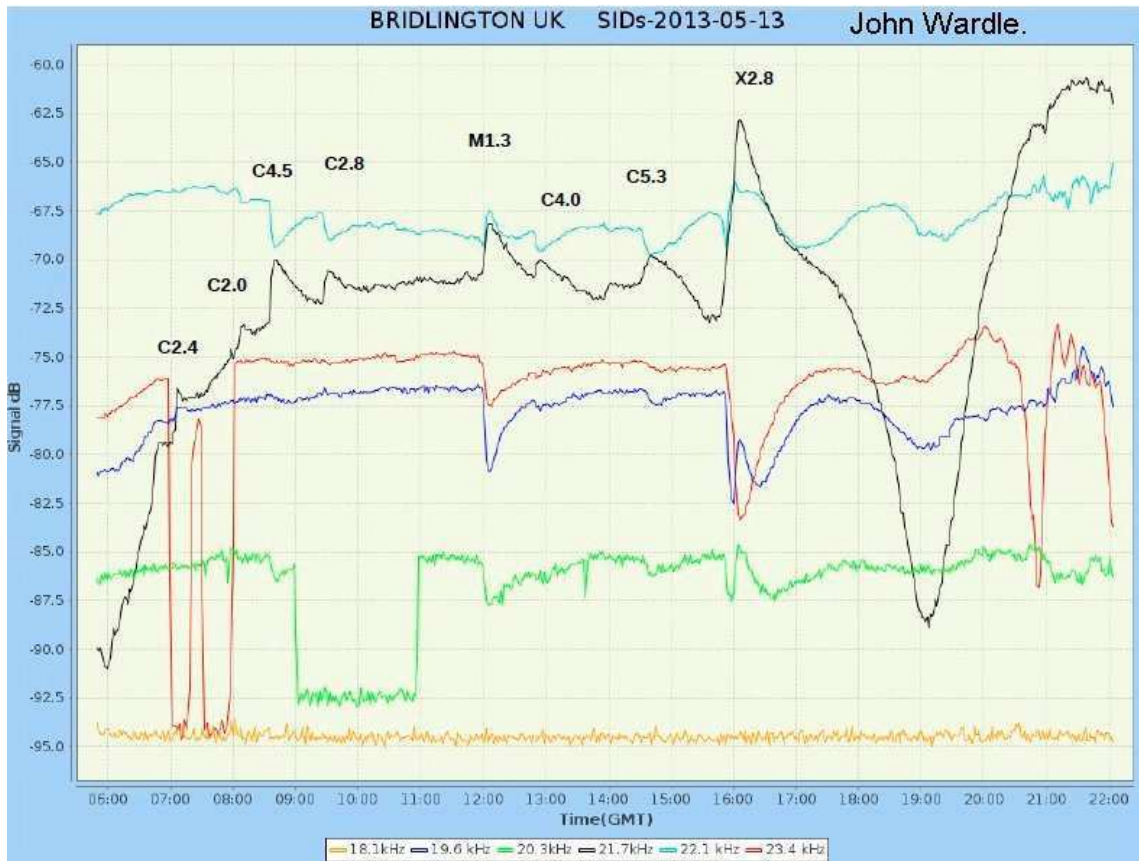
2013 MAY

DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)				Roberto Battaiola (21.75kHz)				Paul Hyde (22.1kHz/23.4kHz)				Bob Middlefell (22.1kHz)				Mark Edwards (19.6/24.0/21.75kHz)			
			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)	
1	C2.0	1																				
1	C5.5	5	07:26	07:30	07:50	1					07:26	07:33	08:10	2			06:52	06:58	07:17	1		
1	?	1															07:27	07:29	07:43	1-		
1	C1.1	1															10:34	10:43	11:17	2		
1	C1.8	6	11:58	12:06	12:17	1					11:45	11:51	?	-								
1	*	1									11:57	12:07	12:35	2			11:57	12:06	12:40	2		
1	C6.6	7	14:10	14:17	15:14	2+	14:11	14:16	14:43	1+	14:10	14:14	14:57	2+			12:58	13:10	13:21	1		
1	C2.5	1															14:10	14:18	15:02	2+		
1	C2.3	1															16:09	16:14	16:24	1-		
2	M1.1	2															18:49	18:51	19:03	1-		
2	C1.4	3									05:02	05:14	05:37	2			05:07	05:15	05:28	1		
3	C1.7	4	12:05	12:11	12:26	1					16:14	16:19	16:28	1-			16:14	16:19	16:40	1+		
3	?	1															12:07	12:11	12:36	1+		
3	C1.7	7	15:00	15:05	15:20	1											13:00	13:06	13:22	1		
3	M1.3	7	16:45	16:55	?	-					15:00	15:05	15:19	1			15:01	15:05	15:24	1		
3	?	1									16:43	16:53	?	-			16:44	16:53	?	-		
3	M5.7	9	17:26	17:37	18:04	2	17:22	17:33	17:48	1+	17:26	17:28	18:00	2			17:06	17:08	?	-		
4	C3.7	6	07:55	08:02	08:20	1											17:25	17:34	18:38	2+		
4	C5.6	8	12:27	12:38	13:20	2+	12:26	12:37	12:54	1+	07:54	08:02	08:38	2			07:59	08:04	08:17	1-		
4	C2.0	2									12:26	12:39	14:40	3+			12:27	12:38	13:33	2+		
4	C1.6	2									16:14	16:21	17:07	2+			16:13	16:21	16:50	2		
4	C2.2	1															18:19	18:23	18:45	1+		
5	C8.4	7	06:42	06:47	07:15	2	06:38	06:45	07:05	1+	06:43	06:47	17:19	3+			19:35	19:40	20:10	2		
5	C1.1	1															06:42	06:46	07:07	1		
5	C2.3	5	09:33	09:35	09:55	1											08:53	08:56	09:03	1-		
5	C1.7	1									09:33	09:36	09:40	1-			09:33	09:35	09:58	1		
5	*	1															10:39	10:43	11:03	1		
5	*	1															11:33	11:38	11:45	1-		
5	C1.3	1															11:42	11:47	11:55	1-		
5	?	1															13:48	13:55	?	-		
5	C1.3	1															14:00	14:03	14:35	2		
5	C3.2	5									16:10	16:14	?	-			15:59	16:02	?	-		
5	C3.8	4									16:21	16:24	17:08	2+			16:10	16:14	?	-		
5	C2.2	1															16:21	16:25	?	-		
5	M1.4	8	17:55	17:57	18:10	1-	17:52	17:56	18:04	1-	17:55	17:58	18:33	2			16:50	16:55	17:21	1+		
5	C8.3	2															17:54	17:58	18:58	2+		
7	C1.6	2	08:19	08:23	08:40	1											20:00	20:05	20:30	1+		
7	B9.0	1															08:21	08:23	08:40	1		
7	C1.4	1															11:20	11:22	11:35	1-		
9	C3.4	1									05:19	05:26	06:07	2+			15:48	15:54	16:21	2		
9	C1.4	5									16:35	16:44	17:39	2+			16:35	16:42	17:12	2		
9	C2.7	2															17:40	17:45	18:20	2		
10	C1.8	6	09:46	09:52	10:12	1+					09:46	09:51	10:07	1			09:46	09:51	10:12	1+		
10	M1.3	9	12:40	13:06	14:10	3	12:35	12:55	13:23	2+	12:40	12:58	14:14	3			12:40	12:57	14:03	2+		
10	C2.5	7	14:33	14:39	15:07	2	14:28	14:34	14:46	1-	14:34	14:38	15:14	2			14:34	14:39	15:08	2		
10	C2.5	3									16:34	16:45	17:08	2			16:36	16:46	17:36	2+		
11	C1.4	1															12:44	12:50	13:10	1+		
11	C2.2	3	13:42	14:00	14:22	2											13:40	13:57	14:23	2		
11	C1.5	1															16:37	16:45	17:02	1		
11	C2.8	1															19:00	19:11	?	-		
11	C8.0	1															19:31	19:50	20:52	2+		
12	C1.5	1															08:28	08:39	08:48	1		
12	C1.6	1															08:59	09:04	09:32	2		
12	*	2	11:02	11:06	11:30	1+											11:03	11:11	11:36	2		
12	?	1															13:10	13:14	13:42	1+		
12	C2.0	2	15:58	16:02	16:12	1-					15:58	16:04	16:23	1								
13	?	1															05:32	05:36	06:01	1+		
13	?	1															06:41	06:49	?	-		
13	C2.4	3									07:04	07:09	07:27	1			06:59	07:08	07:18	1		
13	C2.0	5	08:05	08:08	08:15	1-					08:05	08:10	?	-			08:05	08:09	08:24	1		
13	C4.5	7	08:36	08:41	09:22	2+	08:32	08:40	08:56	1	08:36	08:41	09:14	2			08:36	08:41	09:18	2		
13	C2.8	7	09:28	09:33	10:12	2	09:21	09:32	09:37	1-	09:26	09:33	10:20	2+			09:28	09:35	10:09	2		
13	C1.7	3	10:36	10:39	10:50	1-					10:36	10:39	10:48	1-			10:37	10:39	10:46	1-		
13	?	1															10:51	10:56	11:20	1+		
13	M1.3	10	11:57	12:05	?	-	11:59	12:05	12:37	2	12:00	12:07	?	-	11:52	?	?	?	?	-		
13	C4.0	9	12:44	12:54	13:42	2+	12:47	12:55	13:07	1	12:50	12:55	13:35	2	?	12:56	?	?	?	-		
13	?	5	13:57	14:02	?	-					13:56	14:02	14:20	1			13:57	14:04	14:21	1		
13	C5.3	8	14:31	14:42	15:39	2+	14:31	14:41	14:56	1	14:32	14:43	15:36	2+			14:32	14:42	15:34	2+		
13	X2.8	10	15:50	16:06	18:00	3+	15:52	16:05	17:17	2+	15:54	16:08	17:42	3	16:52	16:55	?	?	?	-		
14	C1.8	4	12:21	12:24	12:41	1					12:21	12:24	12:45	1			12:21	12:26	12:41	1		
14	*	1															18:36	18:51	19:16	2		
16	C1.2	1															12:19	12:28	12:39	1		
16	C4.8	1															19:21	19:26	20:08	2+		
17	M3.2	8	08:41	09:00	11:00	3+	08:47	09:00	10:00	2+	08:42	09:11	11:42	3+			08:46	09:02	11:01	3+		
18	C1.1	1															18:21	18:24	18:32	1-		
19	C3.4	7	09:11	09:18	10:00	2+					09:11	09:20	10:09	2+			09:13	09:20	09:48	2		
19	C1.1	1															14:15	14:22	14:35	1		
19	C6.3	7	15:14	15:18	15:43	1+					15:10	15:20	16:47	3			15:14	15:21	?	-		
19	?	1															15:44	15:48	16:43	2+		
19	C4.2	6	17:09	17:25	?	-					17:11	17:26	?	-			17:09	17:26	?	-		
19	C9.9	6	17:38	17:47	18:34	2+					17:38	17:48	18:05	1+			17:39	17:50	18:50	2+		
20	C2.7	6	14:25	14:31	14:38	1-					14:25	14:30	?	-			14:25	14:31	14:58	2		
20	C9.6	9	15:04	15:09	15:55	2+	15:00	15:08	15:19	1	15:03	15:09	?	-			15:03	15:09	15:58	2+		
20	C6.0	7	16:25	16:29	17:00	2					16:24	16:29	17:05	2			16:25	16:30	16:51	1+		
22	M5.0	7	12:34	13:26	15:11	3+	12:42	13:25	14:37	3	12:35	13:18	15:57	3+			12:34	13:28	16:17	3+		
23	C3.9	8	14:46	14:51	15:10	1	14:44	14:48	15:03	1	14:46	14:52	15:24	2			14:46	14:52	?	-		

DAY		Simon Dawes (Various)	Gordon Fiander (19.6/22.1kHz)	John Elliott (19.6kHz)	Martyn Kinder (19.6kHz/22.1kHz)	Mark Horn (23.4kHz)
		PC soundcard and TRF receiver with 1m loop aerial.	PC sound card.	Tuned radio frequency receiver, 0.5m frame aerial.	Tuned radio frequency receiver, 0.58m frame 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)
1	C2.0					
1	C5.5					
1	?					
1	C1.1					
1	C1.8					
1	*					
1	C6.6					
1	C2.5					
1	C2.3					
2	M1.1					
2	C1.4					
3	C1.7					
3	?					
3	C1.7		14:55 15:04 ? -			
3	M1.3		16:40 16:55 17:25 2			
3	?					
3	M5.7		17:25 17:35 18:31 2+	17:25 17:30 18:07 2		
4	C3.7		07:56 08:02 08:15 1			
4	C5.6		12:27 12:40 13:05 2			
4	C2.0					
4	C1.6					
4	C2.2					
5	C8.4		06:41 06:45 07:35 2+			
5	C1.1					
5	C2.3					
5	C1.7					
5	*					
5	*					
5	C1.3					
5	?					
5	C1.3					
5	C3.2		16:08 16:12 16:45 2			
5	C3.8					
5	C2.2					
5	M1.4		17:55 18:01 18:20 1			
5	C8.3					
7	C1.6					
7	B9.0					
7	C1.4					
9	C3.4					
9	C1.4					
9	C2.7					
10	C1.8					
10	M1.3		12:39 12:48 13:40 2+	12:40 12:56 14:00 2+		
10	C2.5					
10	C2.5					
11	C1.4					
11	C2.2					
11	C1.5					
11	C2.8					
11	C8.0					
12	C1.5					
12	C1.6					
12	*					
12	?					
12	C2.0					
13	?					
13	?					
13	C2.4					
13	C2.0					
13	C4.5					
13	C2.8					
13	C1.7					
13	?					
13	M1.3		11:56 12:04 12:40 2	12:00 12:05 13:10 2+		
13	C4.0		12:47 12:55 13:12 1			
13	?					
13	C5.3		14:23 14:42 15:17 2+			
13	X2.8		15:50 16:04 16:44 2+	15:53 16:04 16:22 1+		
14	C1.8					
14	*					
16	C1.2					
16	C4.8					
17	M3.2		08:44 08:58 10:12 3			
18	C1.1					
19	C3.4		09:09 09:16 09:45 2			
19	C1.1					
19	C6.3		15:06 15:16 16:08 2+			
19	?					
19	C4.2		17:05 17:11 ? -			
19	C9.9		17:24 17:49 18:34 2+			
20	C2.7					
20	C9.6		15:00 15:07 15:55 2+	15:05 15:08 15:50 2		
20	C6.0		16:22 16:30 17:01 2			
22	M5.0					
23	C3.9		14:42 14:49 15:20 2			
23	C2.6					
23	*					
23	C1.8					
23	C3.4					
24	*					
25	C2.1					
26	C3.8					
31	M1.0					

VLF flare activity 2005/13.

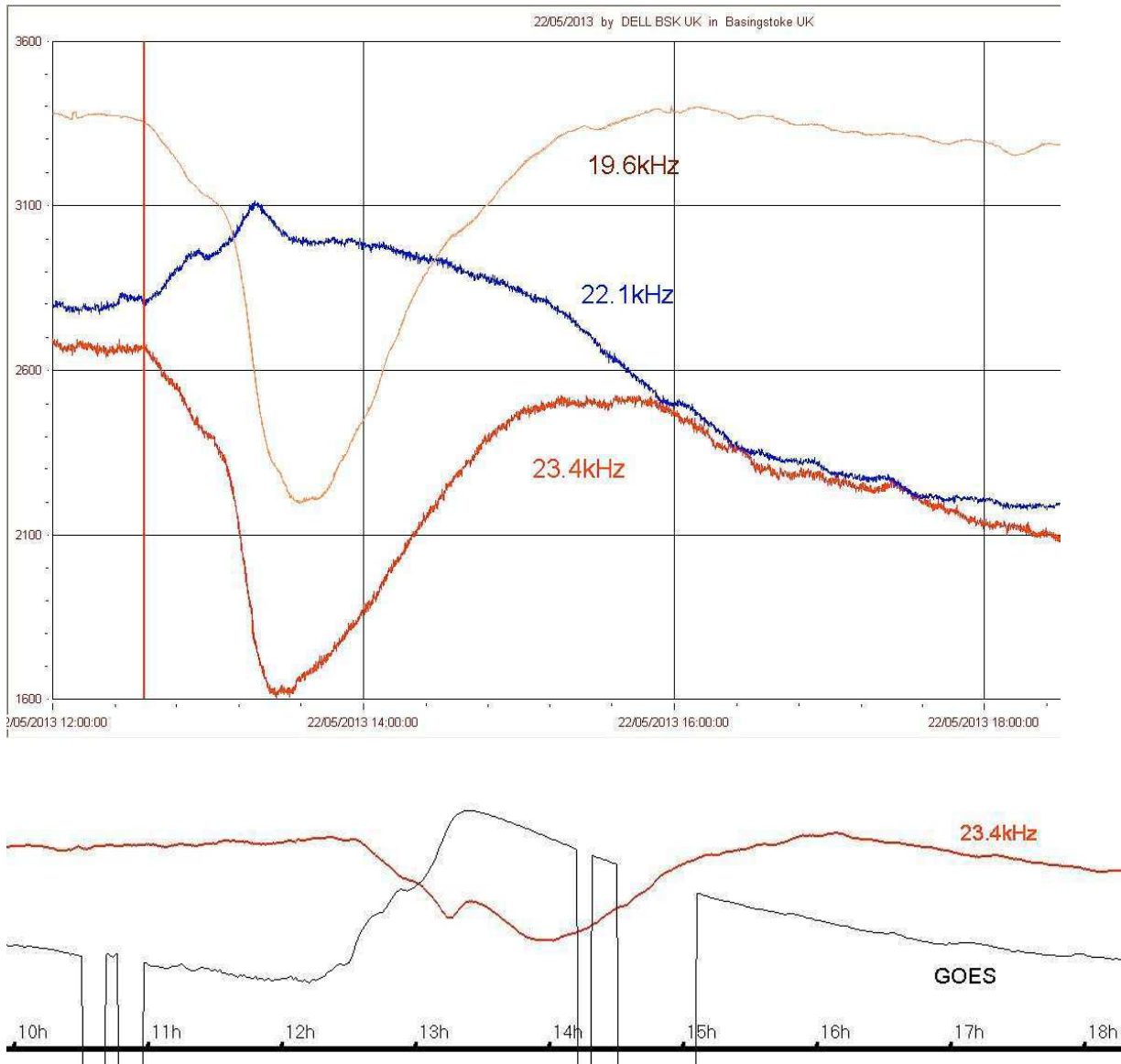




The highlight this month was the first SID recorded from an X-class flare since 2012 July. The two charts above show this SID at the end of quite a busy day on the 13th. The first is from John Wardle in Bridlington, and the second is from Roberto Battaiola in Milan. The SWPC lists a total of four X-class flares

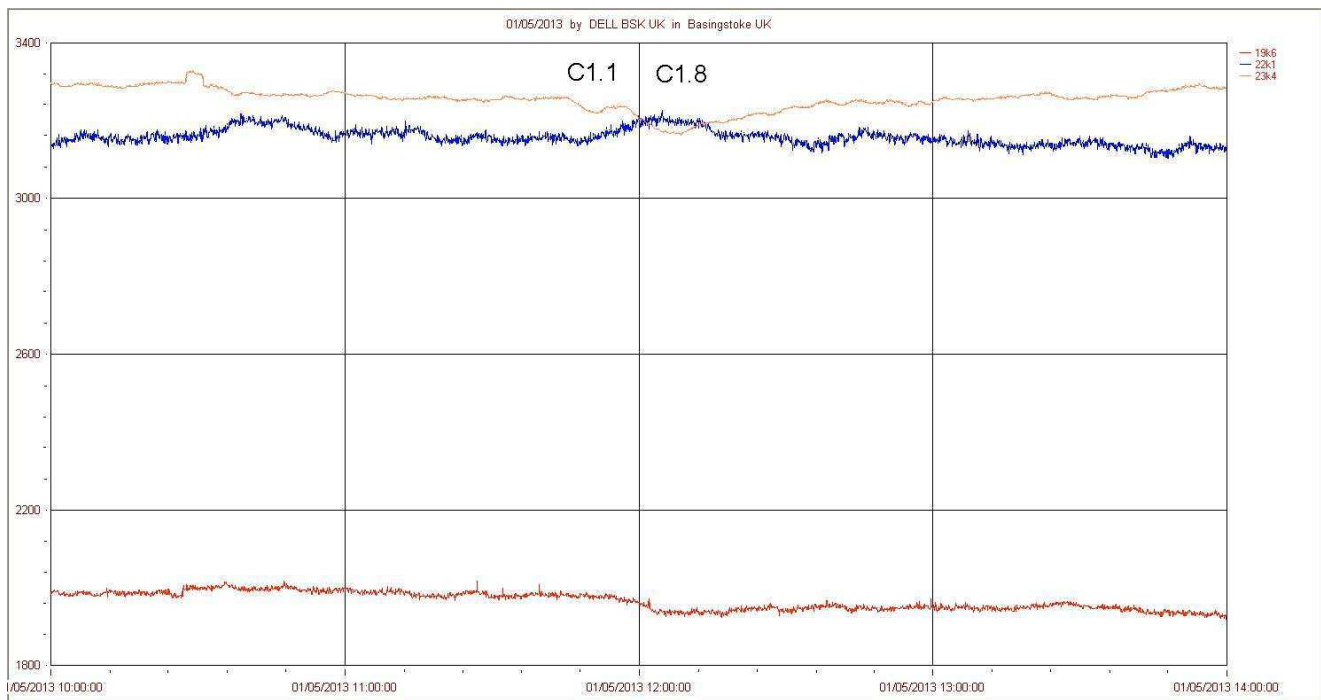
during the month, an X3.2 peaking at 01:11UT on the 14th being the most energetic. They were all produced by AR1748, a large complex group close to the NE limb of the Sun.

In contrast, AR1745 was a small group of just three spots close to the NW limb when it produced a very slow M5.0 flare peaking at 13:30UT on the 22nd. The SID extended over three to four hours, and is well shown in this recording from Paul Hyde:



I have added the GOES X-ray data to my own recording, above, to show just how long the flare lasted. Note the small phase reversal at the peak of the 23.4kHz SID. Also note the two small steps as the X-ray flux rises. The SWPC lists the M5 flare as starting at 13:08UT, but also shows two unclassified flares starting at 12:35 and 12:53UT. Our timings show one or other of these as starting times, with the peak being at the peak of the M5 flare.

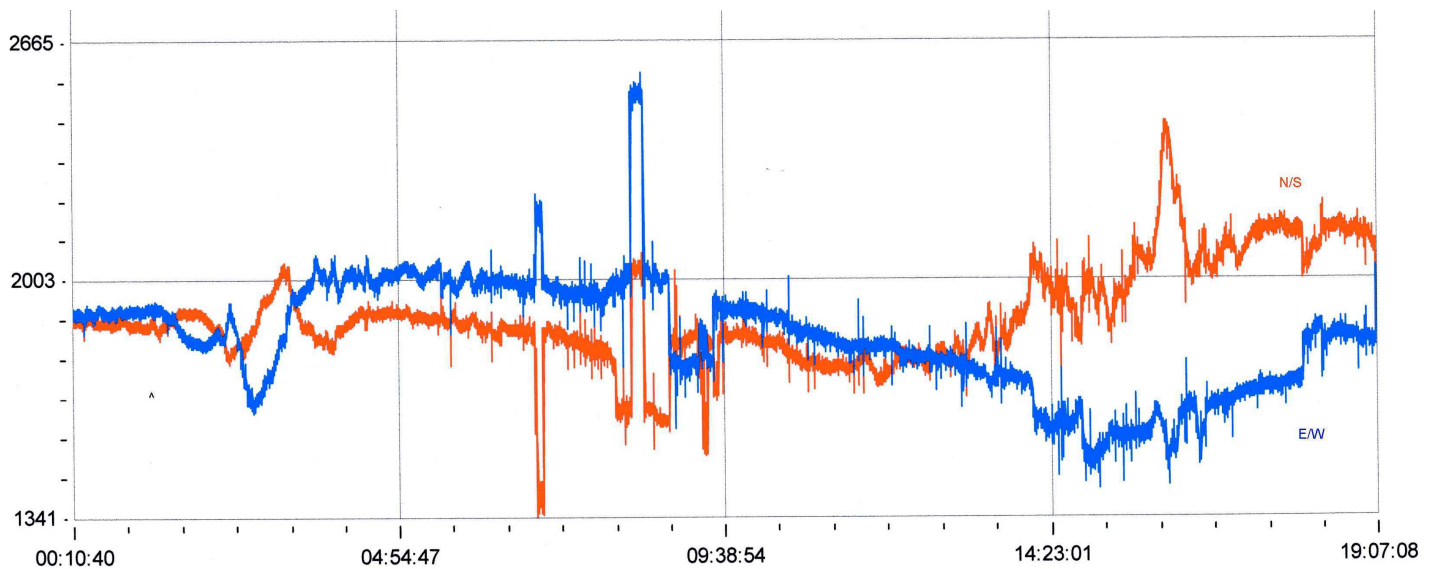
The C1.1 and C1.8 flares on the 1st also occurred in quick succession, producing a single SID for some observers and two for others. Similarly on the 5th, the C3.2 and C3.8 flares also merged into a single SID for some observers. Paul Hyde's recording from the 1st shows the effect:



Blue is 22.1kHz showing a single SID, while 23.4kHz (brown) shows two distinct SIDs.

MAGNETIC OBSERVATIONS.

Although all four of the X-class flares were fast, none appear to have produced an SFE. There were a number of CMEs though, with some sustained magnetic disturbances. The first of these produced a distinct Sudden Storm Commencement early in the morning of the 18th. The following recording by Colin Clements shows it quite well:

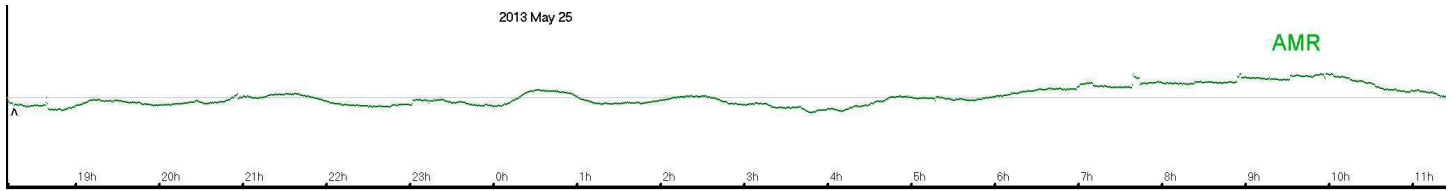


The SSC occurs at about 01:20UT in Colin's chart, and was caused by a CME associated with the X1.2 flare at 01:48UT on the 15th. On my own recording the SSC occurs at 01:10UT with the subsequent disturbance measuring about 80nT. The CME transit time was about 71..72 hours.

The second CME was associated with the M3.2 flare that was well recorded peaking at 09:00 on the 17th. I recorded an SSC at 23:08UT on the 19th marking the CME arrival. Although the SSC was clear, there was

very little subsequent disturbance in my recording. From my own measurements this was a slightly faster CME, with a transit time of 63 hours.

The long duration M5.0 flare from the 22nd also produced a strong CME.



My recording (above) shows the SSC at 18:10UT on the 24th, with effects lasting until midday on the 25th. I timed the peak of the SID at 13:26, giving a transit time of 52h 44m. Gonzalo Vargas also reported active conditions in Bolivia over this period.

Although a CME is reported by the SWPC on the 27th, no source is given. The BGS also report an SSC at 16:17UT on the 31st, but this is not clear in our recordings. A CHSS was effective on the 31st, and did lead to some minor disturbance recorded by Colin Clements.

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

Reports and observations to jacook@jacook.plus.com

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2407						2010 January 1 2 3 C
2408						2092 2093 2010 February 1 2 3 4 5 6 7 8 9 C CC MCCMCC
2409						2094 2010 March 1 2 3 4 5 6 7 8 C
2410						2095 2010 April 1 2 3 4 C
2411						2096 May 1
2412						2097 2098 2010 June 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 C CCM C CC
2413						2099 2010 July 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 C MCCC
2414						2099 2010 August 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 C C CC C
2415						2100 2010 September 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 C M CC C C C
2416						2101 2010 October 1 2 3 4 5 6 7 8 9 10 11 12 13 14 C C B
2417						2102 2010 November 1 2 3 4 5 6 7 8 9 10 11 C CC M CM
2418						2103 2010 December 1 2 3 4 C CC C
2419						2104 2010 December 1 2 3 4 C CC C
2420						2105 2010 December 1 2 3 4 C CC C

