BAA Radio Astronomy Group. **2012 MARCH**

			John Cook (23.4kHz/*22.1kHz*)				Roberto Battaiola (18.3kHz)				Andrew Lutley (23.4kHz)			Bob Middlefell (22.1kHz)			Mark Edwards (**22.1**/24.0/*18.3kHz*)			
	Xray class	Observers	Tuned radio frequency receiver, 0.58m frame aerial.				Modified AAVSO receiver.				Tuned radios frequency receiver, 0.5m frame aerial.			Tuned radio frequency receiver, 0.5m frame aerial.			Spectrum Lab / PC 2m loop aerial.			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	
1	C3.3	6	*15:20*	*15:26*	*15:38*	*1-*											15:20	15:29	15:52	1+
2	**M3.3**	5	*17:33*	*17:41*	*17:56*	*1*	17:28	17:34	17:40	1-							17:34	17:43	18:35	2+
4	**M2.0**	7	10:33	10:51	13:20	3+	10:28	10:36	10:41	1-							10:36	10:50	?	-
4	*	2															16:06	16:09	16:17	1-
4	C3.2	1															17:30	17:34	17:42	1-
5	C	4	09:17	09:22	?	-	08:59	09:20	09:35	2							*09:18*	*09:24*	*09:38*	*1*
5	C	2	09:38	09:41	09:49	1-											*09:39*	*09:42*	*09:54*	*1-*
5	C2.3	5	10:30	10:33	10:37	1-											*10:31*	*10:33*	*10:37*	*1-*
5	C5.8	8	12:06	12:14	?	-	12:03	12:11	12:28	1							*12:08*	*12:15*	*?*	-
5	?	2	12:32	12:35	12:44	1-											*12:32*	*12:35*	*12:48*	*1-*
5	?	2	13:16	13:20	13:26	1-														
5	C1.2	3	14:27	14:29	?	-														
5	C5.4	8	14:59	15:04	15:24	1	14:53	15:03	15:15	1							*14:59*	*15:05*	*15:26*	*1+*
5	C7.8	8	15:27	15:29	15:47	1	15:23	15:29	15:43	1							*15:26*	*15:31*	*15:59*	*2*
5	*	2	16:00	16:01	16:10	1-											**16:00**	**16:01**	**16:05**	**1-**
5	C9.8	8	16:19	16:23	16:37	1-	16:18	16:20	16:25	1-							*16:18*	*16:24*	*16:35*	*1-*
5	C4.6	2															*16:47*	*16:48*	*17:02*	*1-*
6	C5.3	4					07:31	07:37	07:44	1-							*07:42*	*07:46*	*07:50*	*1-*
6	**M1.0**	5					07:51	07:58	08:11	1							*07:55*	*07:59*	*08:08*	*1-*
6	C	6	08:44	08:48	09:13	1+	08:38	08:46	09:05	1+							08:41	08:48	09:05	1
6	?	2	10:02	10:05	10:13	1-											*10:02*	*10:07*	*10:13*	*1-*
6	?	4	10:40	10:45	10:58	1-	10:31	10:43	10:52	1							10:40	10:45	10:59	1
6	C2.8	8	11:13	11:17	11:32	1	11:10	11:17	11:29	1							11:13	11:20	11:36	1
6	**M2.1**	7	12:25	12:42	?	-	12:20	12:29	12:34	1-							12:24	12:43	13:26	2+
6	?	2	13:58	14:01	14:08	1-											13:58	14:01	14:09	1-
6	C4.2	6	16:48	16:51	?	-	16:45	16:49	16:52	1-							16:49	16:54	17:16	1+
8	C	6	08:36	08:42	08:48	1-	08:33	08:40	08:51	1-							08:40	08:42	08:52	1-
8	C1.7	6	10:23	10:25	10:31	1-	10:19	10:24	10:30	1-							10:22	10:24	10:38	1-
9	C2.7	5	10:21	10:23	10:28	1-	10:19	10:22	10:27	1-							*10:21*	*10:26*	*10:29*	*1-*
9	?	1															**11:19**	**11:22**	**11:46**	**1+**
9	?	2					11:50	11:55	12:03	1-							**11:54**	**11:57**	**12:08**	**1-**
9	C2.0	1																		
10	C	4	08:50	08:54	09:01	1-	08:48	08:53	09:02	1-							***08:49***	***08:53***	***09:06***	***1-***
10	C8.0	2															*15:39*	*15:48*	*16:07*	*1+*
10	**M8.4**	3															17:23	17:28	?	-
10		1															17:34	17:39	18:17	2
12	C	2																		
13	**M7.9**	7	*17:19*	*17:30*	*18:00*	*2*	17:11	17:19	17:24	1-							17:18	17:34	18:51	3
14	**M2.8**	8	15:14	15:34	16:41	3	15:09	15:17	16:20	2+							15:12	15:27	16:12	2+
15	**M1.8**	4	*07:43*	*07:53*	*?*	-														
15	C	2	09:40	09:43	09:50	1-														
16	C	1																		
16	C1.1	3					12:34	12:41	12:49	1-							12:38	12:42	12:50	1-
19	C1.2	2					13:43	13:48	13:53	1-										
21	B9.4	1					09:58	10:07	10:14	1-										
21	C2.9	8	12:46	12:53	13:10	1	12:43	12:52	13:15	1+							12:48	12:54	13:29	2
21	C1.2	5					13:55	13:59	14:07	1-							13:58	13:59	14:24	1+
21	C1.1	2															15:49	15:50	16:04	1-
22	C	1															***09:39***	***09:42***	***09:47***	***1-***
22	C	1															13:44	13:47	14:21	2
22	C1.1	1															17:44	17:45	17:53	1-
23	C6.5	7	16:36	16:39	17:00	1	16:32	16:39	16:52	1							16:35	16:40	17:34	2+
24	C7.2	6	08:40	09:11	10:16	3	08:34	08:58	10:11	3							*08:40*	*09:14*	*10:15*	*3*
29	C7.7	9	09:51	09:56	10:30	2	09:49	09:53	10:16	1+							09:52	09:55	10:26	2
29	C1.8	6	11:50	11:53	12:04	1-	11:47	11:52	12:01	1-							11:50	11:54	12:12	1
29	C1.1	6	12:38	12:41	12:57	1	12:37	12:41	12:47	1-							12:38	12:43	12:56	1-
29	C5.0	9	13:16	13:23	14:08	2+	13:12	13:21	13:46	2							13:16	13:23	14:20	2+
29	C1.4	3															16:41	16:43	16:47	1-

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			Colin Clements (23.4kHz/*37.5kHz*)				Peter Meadows (23.4kHz)			Mike King (20.9kHz)			John Wardle (19.6/23.4kHz)				Peter King (18.3kHz)		
			AAVSO receiver, 0.76m screened loop aerial.				Tuned radio frequency receiver, 0.58m frame aerial.			AAVSO receiver. Tuned loop aerial.			PC soundcard, long wire aerial.				Own designed receiver, 1.4m loop aerial.		
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)		START	PEAK	END (UT)
1	C3.3		15:22	15:27	15:43	1													
2	**M3.3**																		
4	**M2.0**																		
4	*																		
4	C3.2																		
5	C																		
5	C																		
5	C2.3												10:21	10:25	10:28	1-			
5	C5.8												12:05	12:15	12:44	2			
5	?																		
5	?																		
5	C1.2																		
5	C5.4												14:58	15:05	15:21	1			
5	C7.8												15:26	15:31	15:50	1			
5	*																		
5	C9.8												16:18	16:23	16:32	1-			
5	C4.6																		
6	C5.3												07:42	07:47	07:51	1-			
6	**M1.0**												07:53	07:58	08:06	1-			
6	C																		
6	?																		
6	?																		
6	C2.8												11:12	11:20	11:34	1			
6	**M2.1**												12:25	12:42	13:29	2+			
6	?																		
6	C4.2												16:46	16:51	17:02	1-			
8	C												08:35	08:43	09:04	1+			
8	C1.7																		
9	C2.7																		
9	?																		
9	?																		
9	C2.0												16:16	16:21	16:26	1-			
10	C																		
10	C8.0												15:38	15:48	16:09	1+			
10	**M8.4**												17:18	17:50	18:04	2+			
10																			
12	C																		
13	**M7.9**												17:21	17:31	18:07	2+			
14	**M2.8**												15:11	15:27	16:21	2+			
15	**M1.8**												07:45	07:56	08:18	2			
15	C																		
16	C																		
16	C1.1												13:56	14:10	14:17	1			
19	C1.2												13:42	13:51	13:54	1-			
21	B9.4																		
21	C2.9												12:46	12:55	13:19	2			
21	C1.2												13:55	14:01	14:08	1-			
21	C1.1																		
22	C																		
22	C																		
22	C1.1																		
23	C6.5												16:35	16:42	16:58	1			
24	C7.2												08:39	09:10	10:16	3			
29	C7.7												09:51	09:55	10:26	2			
29	C1.8																		
29	C1.1																		
29	C5.0												13:14	13:24	14:00	2+			
29	C1.4																		

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			Paul Hyde (22.1kHz)				Gordon Fiander (18.3kHz/*19.6kHz*)				John Elliott (18.3kHz)				Martyn Kinder (19.6kHz/*22.1khz*)				Mark Horn (23.4kHz)		
			Tuned radio frequency receiver, 0.96m frame 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.		
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)
1	C3.3		15:21	15:27	15:40	1									15:11	15:26	15:45	2			
2	**M3.3**		17:34	17:43	18:05	1+									17:34	17:42	17:55	1			
4	**M2.0**		10:32	10:47	13:41	3+					10:38	10:40	10:43	1-	10:32	10:40	10:49	1-			
4	*		09:16	09:23	09:37	1															
4	C3.2																				
5	C														09:18	09:22	09:38	1			
5	C																				
5	C2.3		10:31	10:34	10:38	1-									10:29	10:33	10:40	1-			
5	C5.8		12:08	12:14	12:32	1	*12:05*	*12:15*	*12:30*	*1*					12:08	12:13	12:32	1			
5	?																				
5	?		13:17	13:19	13:27	1-															
5	C1.2		14:28	14:30	14:43	1-									14:27	14:29	14:34	1-			
5	C5.4		14:59	15:05	15:26	1+	15:05	15:12	15:25	1					14:56	15:05	15:14	1-			
5	C7.8		15:26	15:31	15:51	1	15:31	15:39	15:45	1-					15:26	15:31	15:40	1-			
5	*																				
5	C9.8		16:19	16:24	16:46	1+	16:16	16:23	16:28	1-					16:20	16:23	16:28	1-			
5	C4.6														*16:46*	*16:51*	*16:55*	*1-*			
6	C5.3		07:54	07:57	08:14	1															
6	**M1.0**														*07:54*	*07:59*	*08:12*	*1-*			
6	C		08:41	08:48	09:13	1+					08:45	08:48	09:01	1-							
6	?																				
6	?																				
6	C2.8		11:13	11:18	11:34	1					11:16	11:20	11:38	1	11:12	11:18	11:32	1			
6	**M2.1**										12:29	12:32	12:38	1-	12:24	12:43	13:01	2			
6	?																				
6	C4.2		16:48	16:50	?	-									16:48	16:52	16:59	1-			
8	C		08:36	08:42	08:54	1-															
8	C1.7		10:22	10:25	10:35	1-									*10:22*	*10:25*	*10:30*	*1-*			
9	C2.7		10:22	10:24	10:35	1-									10:22	10:24	10:33	1-			
9	?																				
9	?																				
9	C2.0																				
10	C		08:51	08:54	09:06	1-															
10	C8.0																				
10	**M8.4**		17:21	17:27	17:59	2															
10																					
12	C		09:15	09:17	09:21	1-									09:15	09:17	09:22	1-			
13	**M7.9**		17:14	17:34	18:35	2+									17:12	17:32	17:59	2+			
14	**M2.8**		15:10	15:24	16:36	3	15:12	15:24	16:11	2+					15:11	15:26	15:39	1+			
15	**M1.8**		07:44	07:56	08:44	2+									?	07:53	08:13	-			
15	C														09:41	09:44	09:50	1-			
16	C		09:40	09:44	09:57	1-															
16	C1.1																				
19	C1.2																				
21	B9.4																				
21	C2.9		12:45	12:54	13:27	2					12:49	12:52	13:13	1	*12:42*	*12:53*	*13:08*	*1+*			
21	C1.2		13:57	14:01	14:16	1															
21	C1.1		15:46	15:51	16:13	1+															
22	C																				
22	C																				
22	C1.1																				
23	C6.5		16:35	16:41	17:04	1+									*16:34*	*16:39*	*17:00*	*1+*			
24	C7.2		08:38	09:12	10:13	3															
29	C7.7		09:52	09:54	10:42	2+	09:51	09:55	10:15	1	09:53	09:54	10:34	2	09:52	09:54	10:18	1+			
29	C1.8		11:49	11:53	12:13	1									11:47	11:53	12:00	1-			
29	C1.1		12:38	12:43	12:58	1									12:38	12:42	12:49	1-			
29	C5.0		13:15	13:23	14:14	2+	13:17	13:21	13:41	1	13:18	13:22	13:47	1+	13:13	13:22	13:46	2			
29	C1.4		16:39	16:42	?	-									16:39	16:42	16:44	1-			

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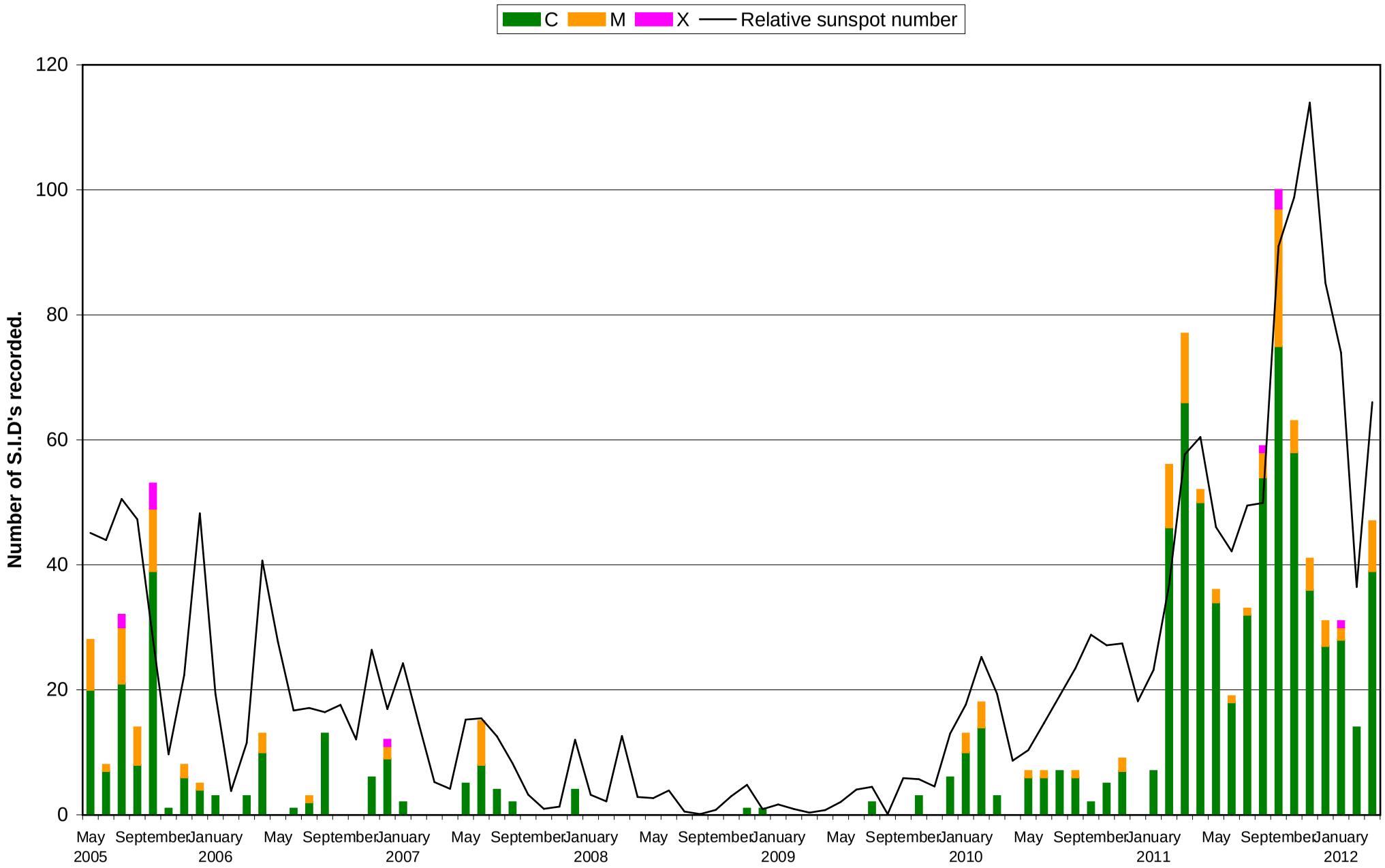
			Steve Parkinson (23.4/22.1/19.6kHz				Simon Dawes (various)			Gonzalo Vargas (Various)							
			Tuned radio frequency receiver, 0.58m frame aerial.				PC soundcard and TRF receiver with 1m loop aerial.			Spectrum Lab.							
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)
1	C3.3		15:22	15:26	15:40	1-												
2	**M3.3**																	
4	**M2.0**		10:35	11:23	13:20	3+												
4	*																	
4	C3.2																	
5	C																	
5	C																	
5	C2.3																	
5	C5.8		12:08	12:15	12:43	2												
5	?																	
5	?																	
5	C1.2																	
5	C5.4		14:59	15:04	15:26	1+												
5	C7.8		15:26	15:31	15:45	1												
5	*																	
5	C9.8		16:20	16:23	16:40	1												
5	C4.6																	
6	C5.3																	
6	**M1.0**		07:55	07:58	08:07	1-												
6	C		08:43	08:48	09:07	1												
6	?																	
6	?		10:40	10:44	11:00	1												
6	C2.8		11:13	11:18	11:35	1												
6	**M2.1**		12:25	12:43	13:30	2+												
6	?																	
6	C4.2																	
8	C		08:37	08:42	09:00	1												
8	C1.7		10:23	10:25	10:34	1-												
9	C2.7																	
9	?																	
9	?																	
9	C2.0																	
10	C																	
10	C8.0																	
10	**M8.4**																	
10																		
12	C																	
13	**M7.9**		17:21	17:34	18:40	2+												
14	**M2.8**		15:12	15:27	16:20	2+												
15	**M1.8**																	
15	C																	
16	C																	
16	C1.1																	
19	C1.2																	
21	B9.4																	
21	C2.9		12:47	12:54	13:21	2												
21	C1.2		13:58	14:00	14:09	1-												
21	C1.1																	
22	C																	
22	C																	
22	C1.1																	
23	C6.5		16:37	16:42	17:00	1												
24	C7.2		08:41	09:11	10:15	3												
29	C7.7		09:51	09:55	10:40	2+												
29	C1.8		11:50	11:54	12:08	1-												
29	C1.1		12:38	12:43	12:57	1												
29	C5.0		13:16	13:22	13:59	2												
29	C1.4																	


VLF flare activity 2005/12.
C
M
X
Relative sunspot number
Number of S.I.D's recorded.
120
100
80
60
40
20
0
May 2005
September
January 2006
May
September
January 2007
May
September
January 2008
May
September
January 2009
May
September
January 2010
May
September
January 2011
May
September
January 2012

2012 MARCH

After the low level last month, activity has risen again in March. Much of the flare activity was from active region 1429 which was visually a complex spot group, developing quickly through the first half of the month. Although we have not recorded any X-class flares, there were three this month, all of which were during European night time: 5th X1.1 04:09UT, 7th X5.4 00:24UT and X1.3 01:14UT. Adding to the complexity, the X-ray flux record is incomplete due to eclipses of GOES 15. This has affected several of our observations; some SIDs recorded in the morning cannot be linked to GOES flares as the data is missing. From the reports received, these all seem to be from C-class flares, and so I have just indicated 'C' in the X-ray class column.

March 5th. was particularly busy with SIDs, 12 being recorded in total. I have received several charts for the 5th, making an interesting comparison among observers.

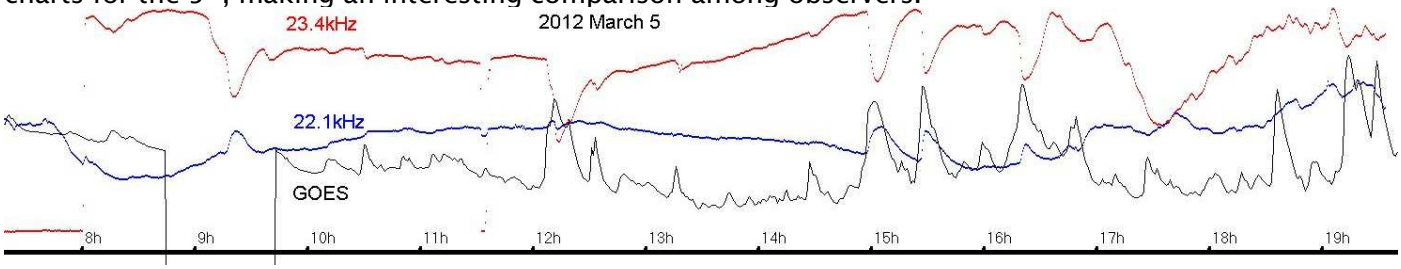


Chart above by John Cook. Note GOES data missing around 09:00UT.

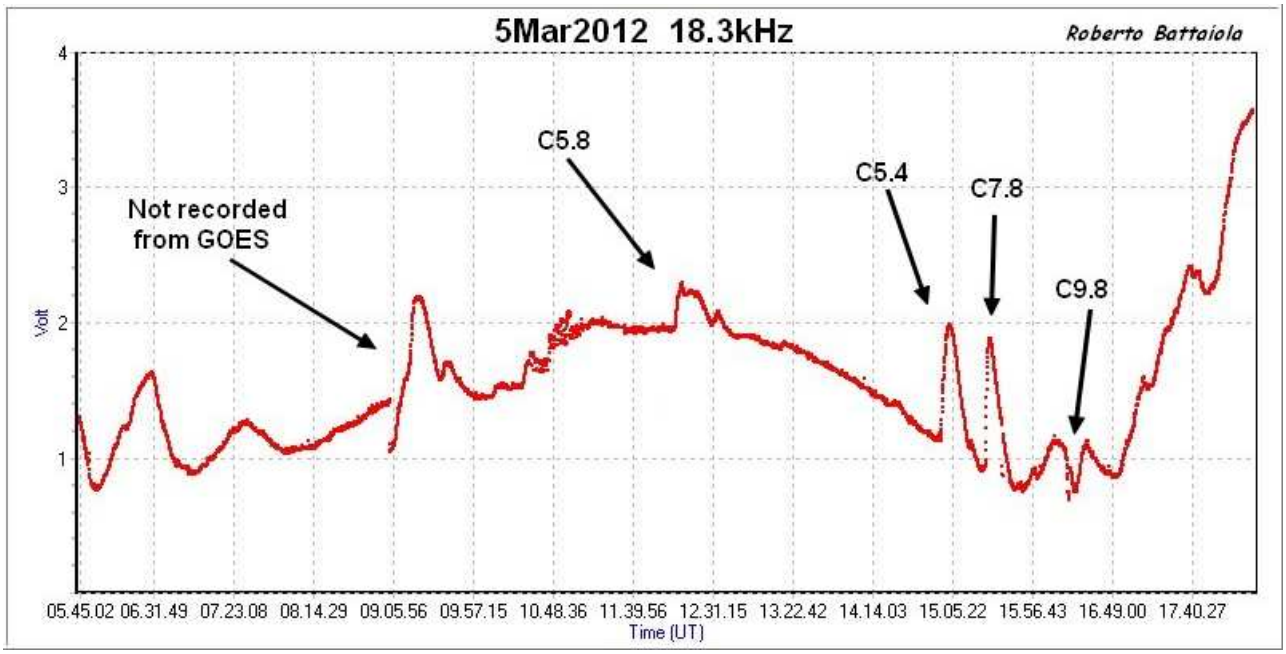
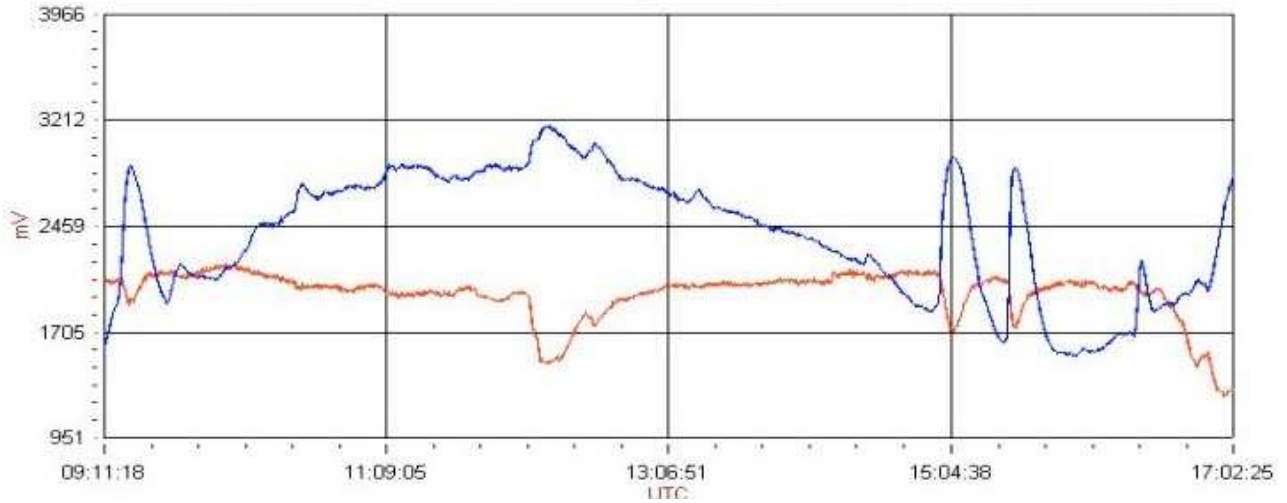
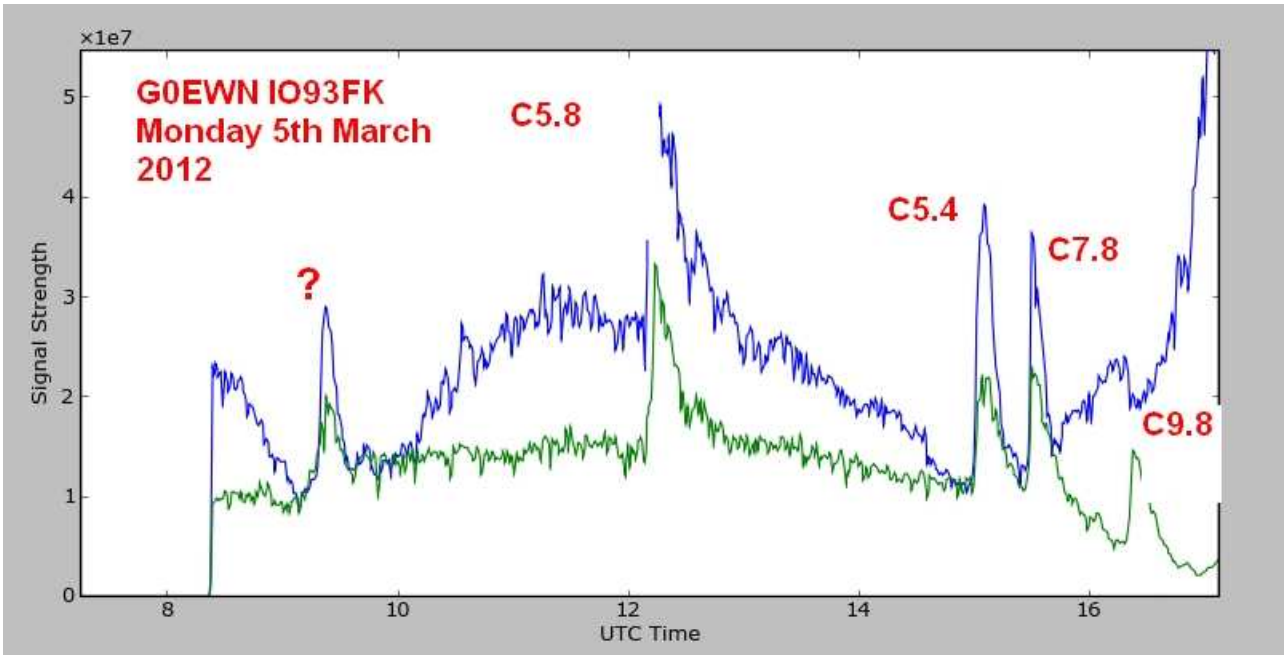


Chart above by Roberto Battaiola, Milan.

The top chart on the next page is by Martyn Kinder, showing signals at 19.6kHz and 22.1kHz.

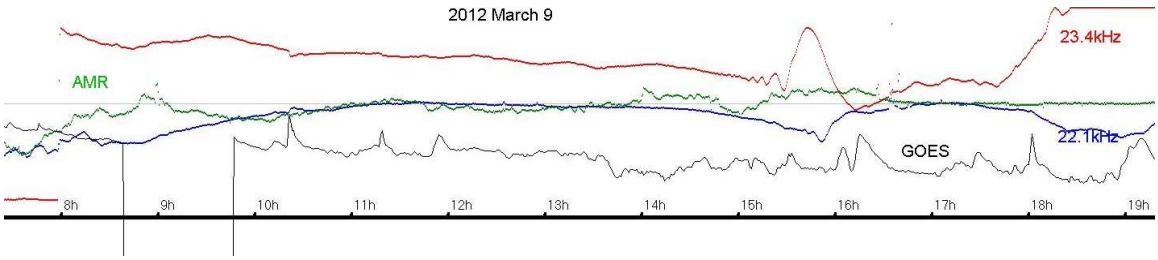




The chart above is by Gordon Fiander, showing 18.3kHz and 19.6kHz.
Notable in these recordings is the different responses to the C5.8 flare near midday.

This high level of activity continued on the 6th, with another 9 SIDs recorded. X-class flares early on the morning of the 7th from AR1429 and AR1430 brought the activity to a brief halt. They were accompanied by a sudden increase in high-energy solar protons that took over four days to return to normal levels. The resulting higher D-region ionisation caused increased signal absorption over most of the following day, the effect on our received signals depending on the signal path length involved.

Although March 9th produced just four small C-class flares, a number of observers reported some odd behaviour in the late afternoon. I recorded a pulse of increased signal strength lasting from about 15:00 to 16:15UT. It does not look like a SID, and has no counterpart in the GOES flare listing. Martyn Kinder has a similar response but with the pulse inverted.



My own chart, above, also showing some of the magnetic activity.

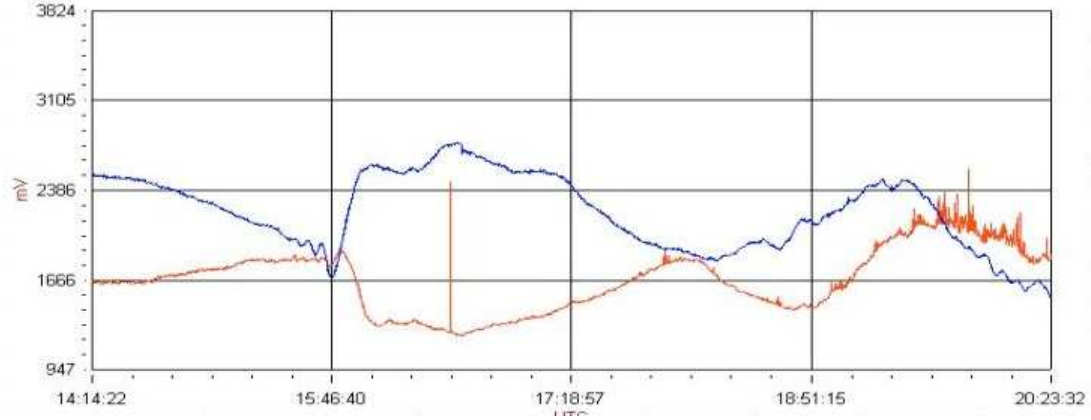
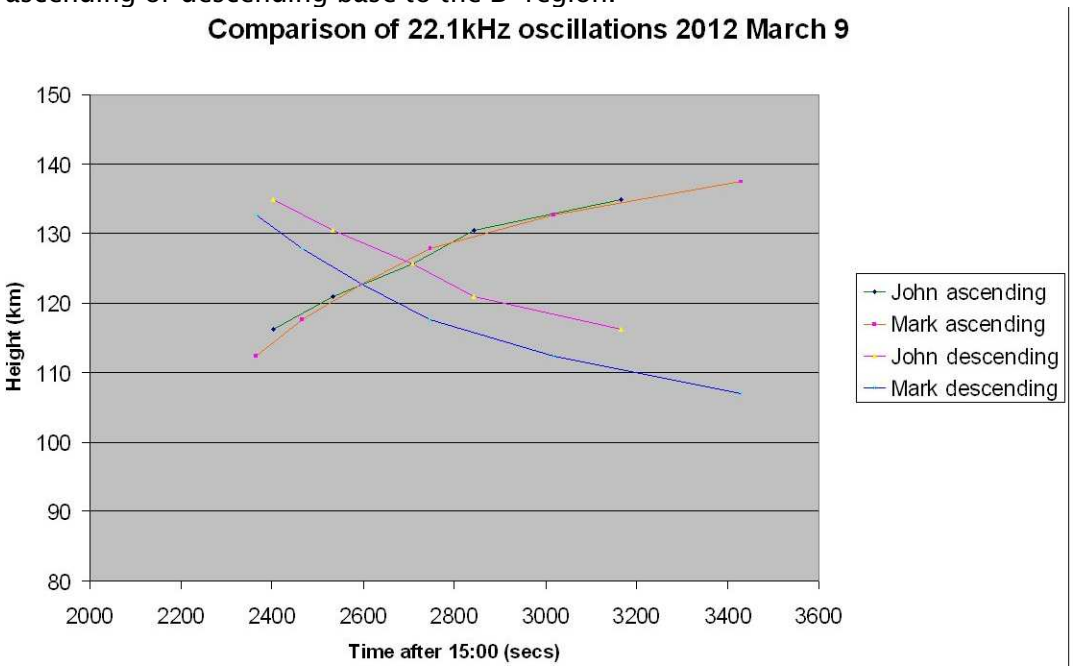


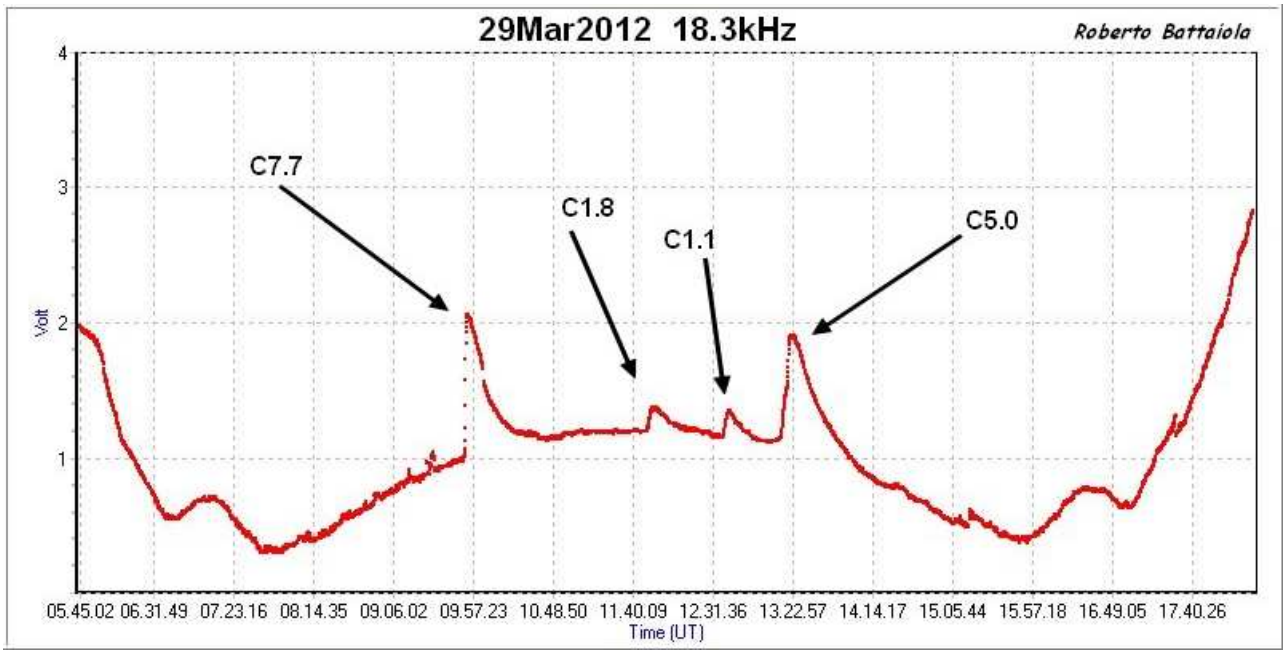
Chart recorded by Martyn Kinder at 22.1kHz and 19.6kHz.

Mark Edwards has done some modeling of this, comparing my data with his own. His results shown in the graph below indicate the correlation between our sets of data assuming either an ascending or descending base to the D-region.



This shows the best match for the ascending D-region, as expected in the afternoon. However, the best match for data at 23.4kHz is for a descending D-region. The cause of this unusual effect remains unknown at the moment.

A series of three M-class flares on the 13th, 14th and 15th produced some good SIDs, although that on the 15th started while 23.4kHz was off the air. A series of five SIDs on the 29th completed the month.



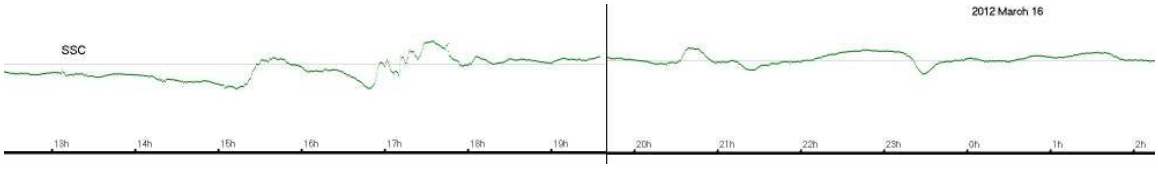
This chart from Roberto Battaiola shows four of them, the last one being lost at sunset.

MAGNETIC DATA

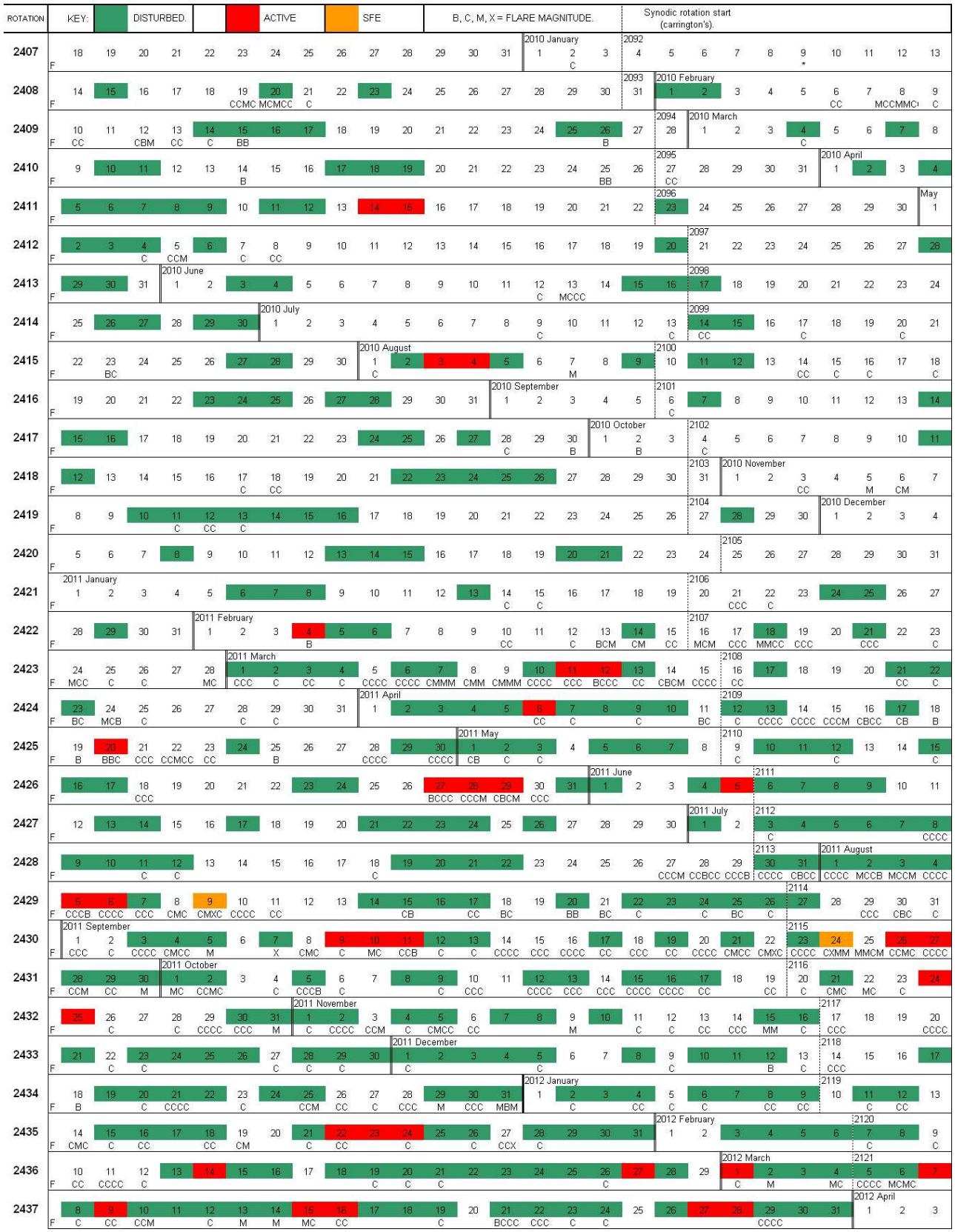
March was a very busy month for magnetic activity, with most days showing some disturbance. Most of this was from Coronal High Speed Streams, but the stronger flares also had associated CMEs. Four of these produced Sudden Storm Commencements (SSCs) that are recorded in our observations. The following SSC & transit time data is from Paul Hyde:

CME (SWPC data)	SSC	Transit time.
1. 5th X1.1 04:09UT	7th 04:21UT	48h 12m
2. 7th X5.4 00:24UT	8th 11:05UT	34h 41m
3. 10th M8.4 17:21UT	12th 09:15UT	39h 54m
4. Unspecified	15th 13:06UT	

The SWPC does not list the flare associated with the SSC on the 15th. My own recording of this event shows it to be the most active of the four SSCs listed.



While the initial SSC produced a very minor disturbance of about 12nT, the following activity reached 170nT, about K=6, between 15 and 18h UT. The disturbance continued through to the early hours of the 18th.



Data supplied by Gonzalo Vargas, Colin Clements, John Cook and Paul Hyde.