

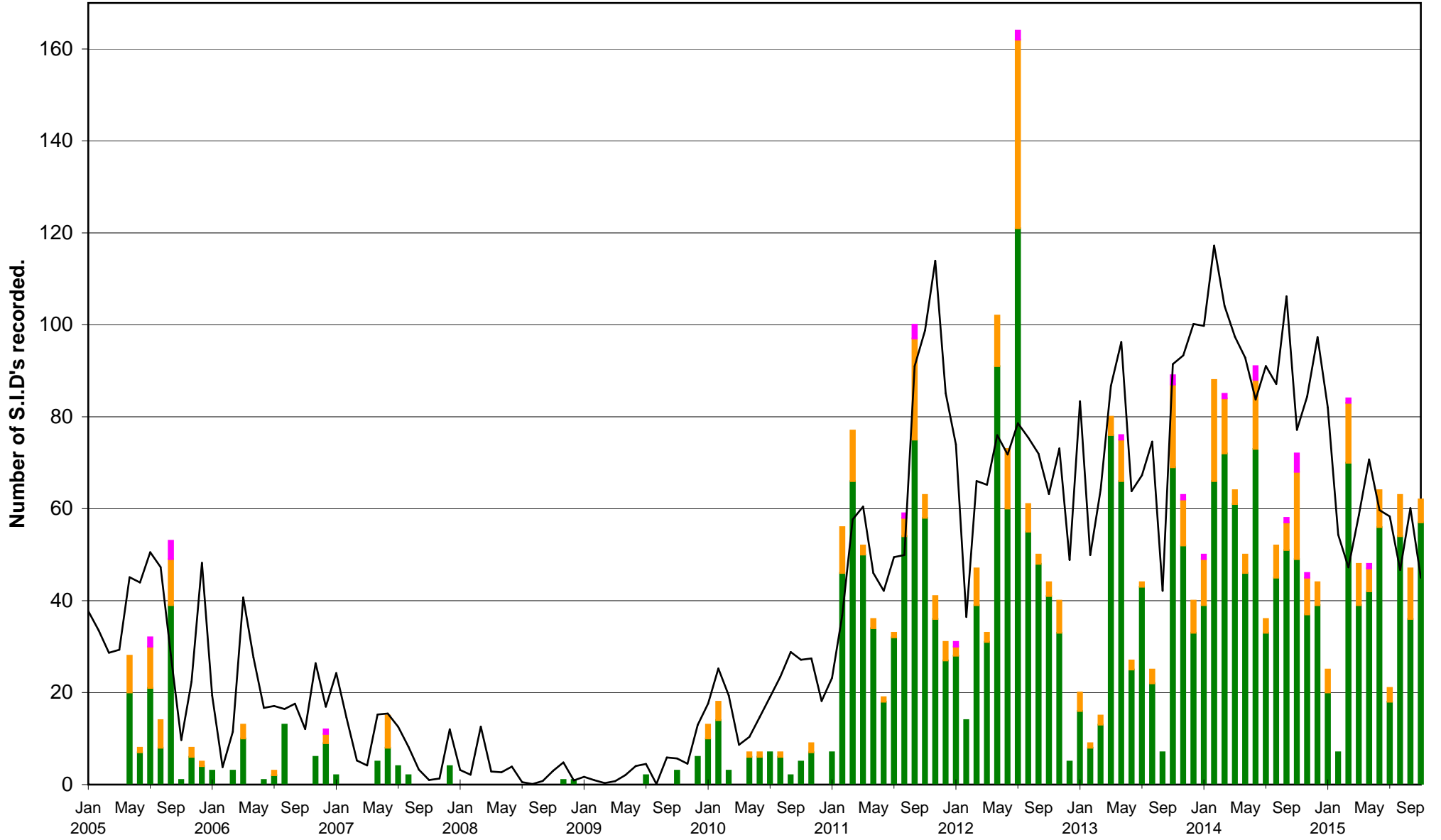
BAA Radio Astronomy Group.

2015 OCTOBER

DAY		Steve Parkinson (Various)				John Wardle (19.6/23.4kHz)				Phil Rourke (23.4kHz)				Jim Barber			John Elliott (23.4kHz)				
		Tuned radio frequency receiver, frame aeriels.				PC soundcard, 0.7m frame aerial.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.			Tuned radio frequency receiver, 0.5m frame aerial.				
		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
1	C3.5					08:35	08:38	08:43	1-	08:34	08:37	08:53	1								
1	C7.7	09:22	09:34	10:15	2+	09:25	09:38	10:10	2	09:22	09:37	10:43	2+								
1	M4.5	13:07	13:12	14:10	2+	13:07	13:13	13:50	2	13:07	13:10	14:15	2+					13:10	13:15	14:00	2+
2	C5.8					07:44	07:52	08:02	1-												
2	C4.8					08:33	08:36	08:43	1-	08:34	08:44	09:41	2+								
2	C7.6																				
2	C3.0																				
2	C3.0	11:40	11:45	12:10	1+	11:40	11:47	11:54	1-	11:40	11:48	?	-								
2	M1.0	12:23	12:29	13:25	2+	12:22	12:29	13:00	2	?	12:30	13:30	-								
2	C7.2	13:34	13:40	14:22	2+	13:32	13:43	14:07	2	13:34	13:41	14:52	2+								
2	C8.8	15:30	15:34	16:30	2+	15:27	15:33	15:52	1	15:31	15:37	15:59	1+								
2	M1.0																				
2	C8.1																				
3	C1.7	10:30	10:34	10:44	1-	10:29	10:37	10:54	1	10:30	10:36	11:19	2+								
3	C2.7	11:35	11:40	12:00	1	11:35	11:42	12:05	1+	11:34	11:40	12:03	1+								
3	?																				
3	C2.1	13:07	13:11	13:35	1+	13:05	13:11	13:27	1	13:05	13:10	13:43	2								
3	C1.1																				
3	C2.7																				
13	C9.5	14:09	14:13	15:12	2+	14:08	14:13	14:55	2+												
13	C3.3																				
14	C1.8																				
14	C1.8					13:24	13:41	13:50	1+												
15	C2.7	10:46	10:50	11:16	1+	10:45	10:50	11:04	1	10:45	10:50	11:48	2+								
15	C1.1	12:26	12:29	12:45	1	12:25	12:30	12:38	1-												
15	C1.1					13:18	13:31	13:36	1-												
15	C3.6	13:46	13:49	14:10	1	13:46	13:50	14:00	1-	13:47	13:53	14:06	1								
15	C2.2					16:11	16:19	16:27	1-												
16	M1.1					06:13	06:20	06:27	1-												
16	C3.4	09:01	09:04	09:13	1-	09:00	09:04	09:15	1-	09:00	09:04	09:27	1+								
16	C3.1	10:17	10:21	10:32	1-	10:16	10:22	10:43	1+	10:16	10:21	10:36	1								
16	C3.8	13:00	13:06	?	-	12:58	13:06	13:23	1	13:00	13:02	?	-								
16	C4.3					13:24	13:26	13:33	1-												
16	C4.2	13:40	13:44	14:07	1+	13:39	13:44	13:53	1-	13:40	13:43	13:55	1-								
17	?																				
17	?																				
17	C4.5	12:33	12:37	13:09	2	12:32	12:37	12:48	1-	12:33	13:40	?	-								
17	C2.3					12:48	12:51	12:57	1-	?	12:50	?	-								
17	*																				
17	C1.8					14:24	14:29	14:33	1-	14:24	14:27	14:41	1-								
17	C1.5																				
17	C1.0					16:54	16:57	17:00	1-												
19	C1.2									09:35	09:40	09:47	1-								
19	?									09:50	09:53	10:03	1-								
19	C1.9	13:40	13:44	14:00	1	13:40	13:44	14:02	1	13:39	13:44	14:05	1+								
19	C3.9																				
20	C1.1																				
21	C2.6	11:55	12:01	12:20	1	11:55	12:02	12:15	1	11:54	12:01	12:43	2+								
21	C1.7					13:54	14:00	14:04	1-												
21	C1.1																				
26	C2.1					10:25	10:30	10:41	1-	10:25	10:31	10:42	1-								
26	?																				
28	C1.9	09:34	09:37	09:45	1-					09:33	09:37	09:45	1-								
29	C1.3									10:33	10:38	10:53	1								
29	C1.1																				
30	C4.2					07:09	07:16	07:26	1-												
30	?																				
30	C5.5					08:34	08:41	09:03	1+	08:35	08:40	08:59	1								
30	C4.6	09:57	10:06	10:23	1+	09:58	10:06	10:25	1+	09:53	10:05	?	-								
30	?									?	10:18	?	-								
30	?									?	10:31	10:52	-								
30	C2.4					11:43	11:52	12:05	1	11:41	11:49	12:11	1+								
30	C3.1					12:57	13:03	13:14	1-	12:57	13:02	13:13	1-								
30	?									13:16	13:26	13:40	1								
30	C5.9	14:17	14:22	14:32	1-	14:16	14:24	14:44	1+	14:17	14:23	?	-								
30	C5.9					15:33	15:37	15:39	1-												
30	C5.2					16:18	16:25	16:33	1-												
31	C1.5					10:05	10:24	10:28	1												
31	C1.4					12:58	13:04	13:10	1-												
31	?																				
31	C5.2	15:01	15:02	15:09	1-	15:00	15:03	15:18	1-	15:01	15:03	15:14	1-								
31	C1.9																				
31	M1.0																				

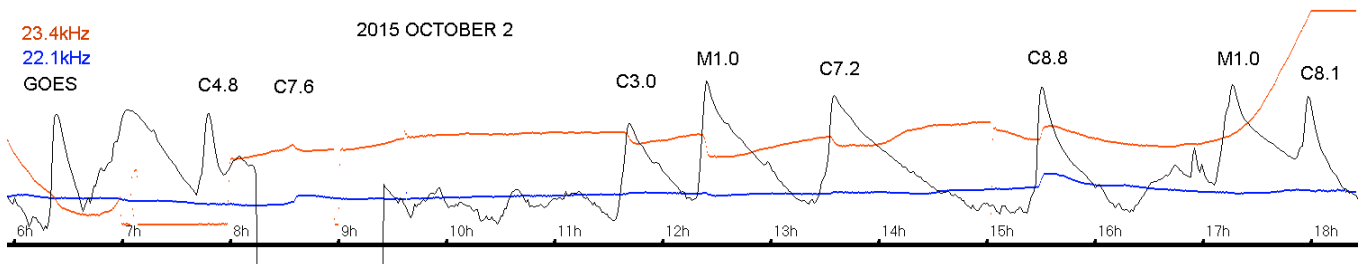
VLF flare activity 2005/15.

C M X — Relative sunspot number

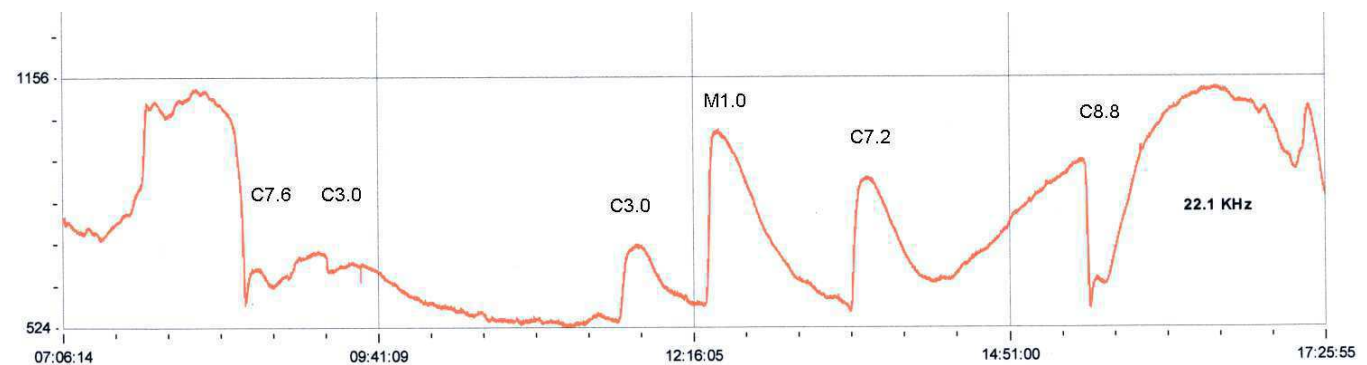


The strong activity at the end of September continued for the first three days of October, with the most energetic flare of the month on the 2nd. This was an M5.5 flare, but at 00:13UT we were unable to record it as a SID. We did catch the M4.5 flare at 13:13UT on the 1st, which was well timed for European observers. Activity then decayed rapidly, the period from the 6th to 11th producing just nine B-class flares and a single C-class. Activity picked up again from the 13th, with a total of 12 SIDs being recorded on the 30th. There are no X-class flares in the GOES record for October.

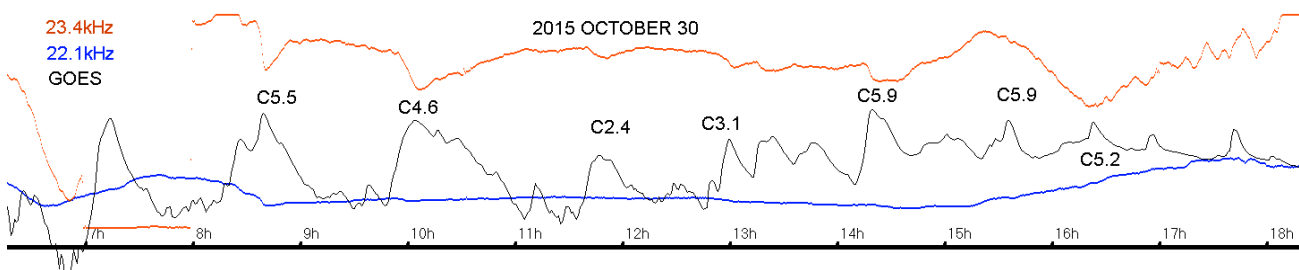
A total of ten SIDs were recorded on the 2nd, some of which are shown in my own recording:



An eclipse of GOES-15 has resulted in a gap in the X-ray data between 08:15 and 09:25, so that the C7.6 flare has been lost. A SID at 22.1kHz is quite clear though. The peak of the first C3.0 flare (09:20) has also been lost, and strangely I have no SID recorded either. The M1.0 and C8.1 are too late for these signals, but were caught on the trans-Atlantic path at 24.0kHz. All of this activity was from active region AR12422, a large complex group very close to the western limb of the sun. It had rotated out of view by the 4th.

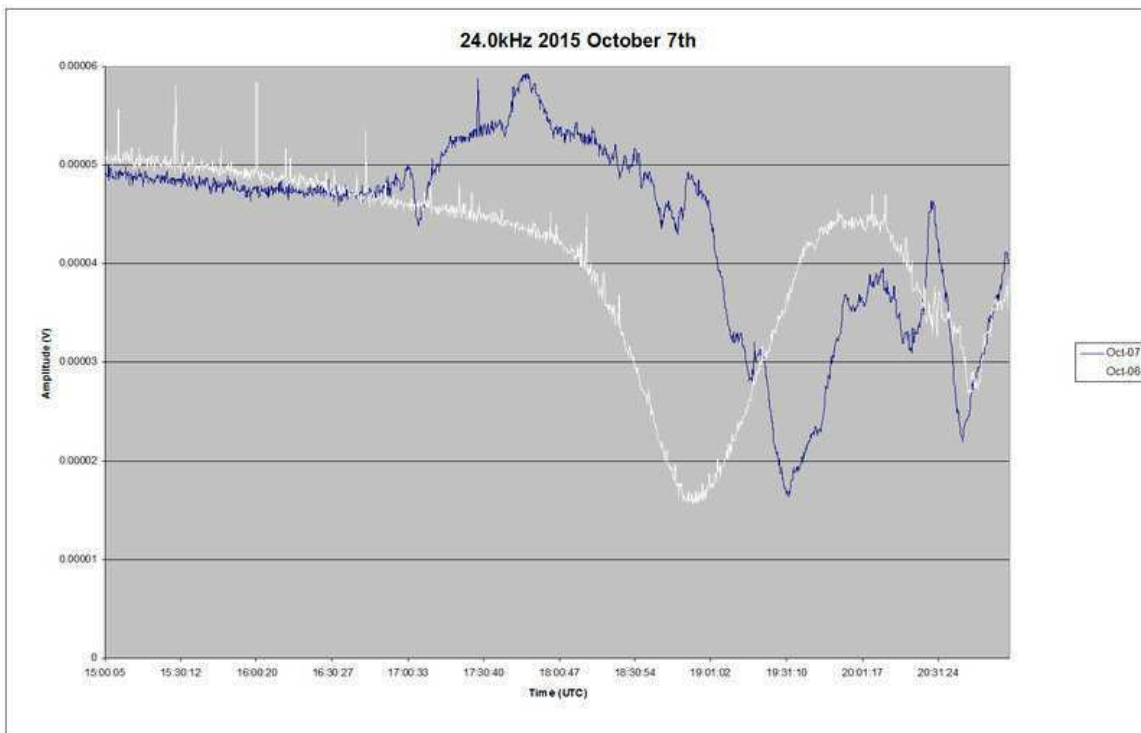


This recording by Colin Clements also shows 22.1kHz activity on the 2nd, and includes SIDs from both of the C3.0 flares. The early C7.6 flare and later C8.8 flare are both inverted, having been caught in the sunrise/sunset periods. They also both show a spike and wave style SID, compared to the shark-fin shape of the others. Colin did not record any 151MHz noise bursts associated with these flares.

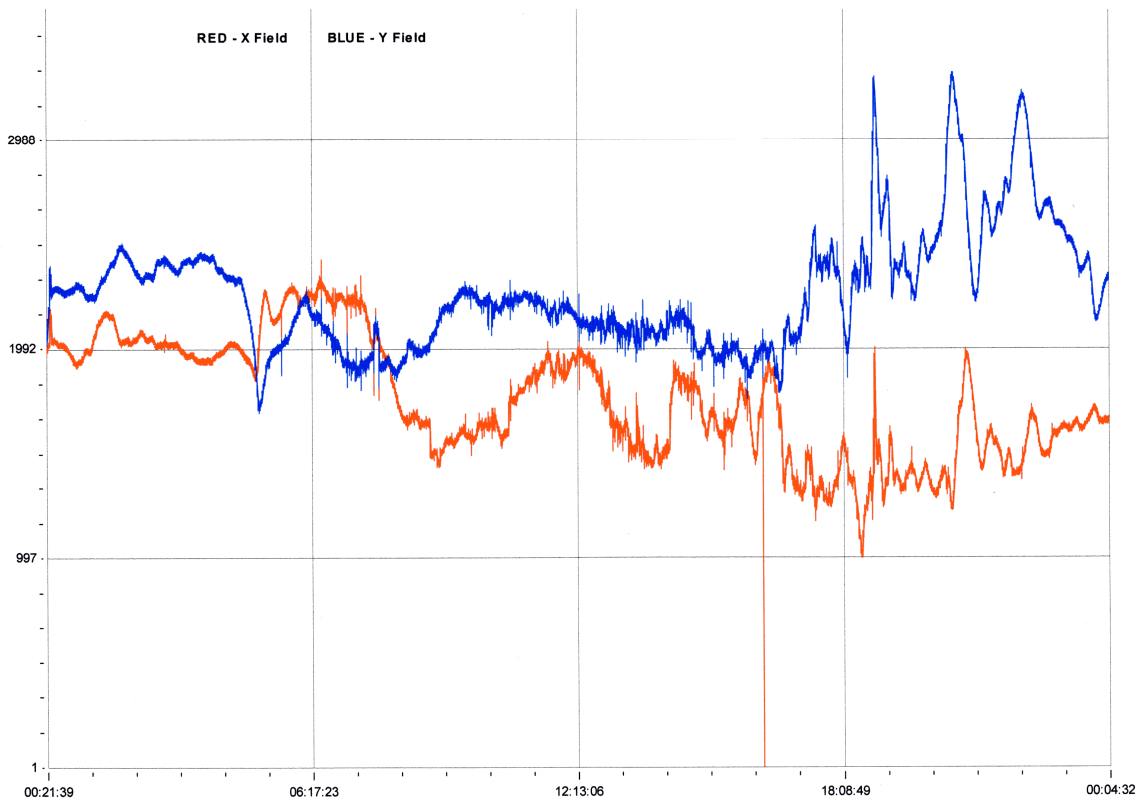


This recording shows activity at the end of the month. The general background X-ray flux can be seen rising well over the C2.0 level by mid afternoon. Just a few days earlier it had been at the B2 level. Multiple peaks can be seen associated with the C5.5 and C4.6 flares.

MAGNETIC OBSERVATIONS.

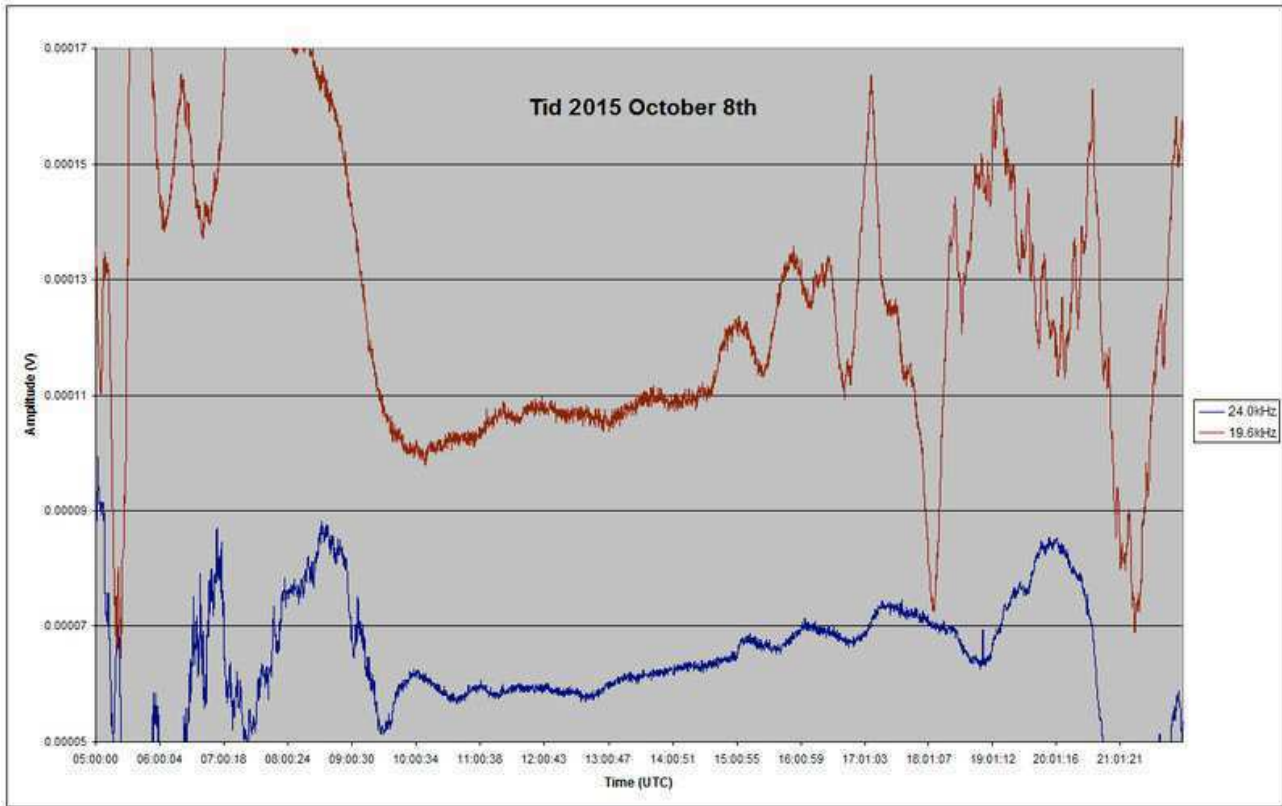


This chart from Mark Edwards shows 24kHz on the 6th in white, and on the 7th in blue. A smooth change to sunset conditions is seen on the 6th, while the 7th has been disturbed by a pair of SID-like features. The first is at 16:50 UT, and matches well with a dramatic increase in solar wind speed measured by the ACE satellite. Solar wind speed increased from 400km/s to nearly 800km/s during the afternoon, peaking around this time. It remained high throughout the 8th.

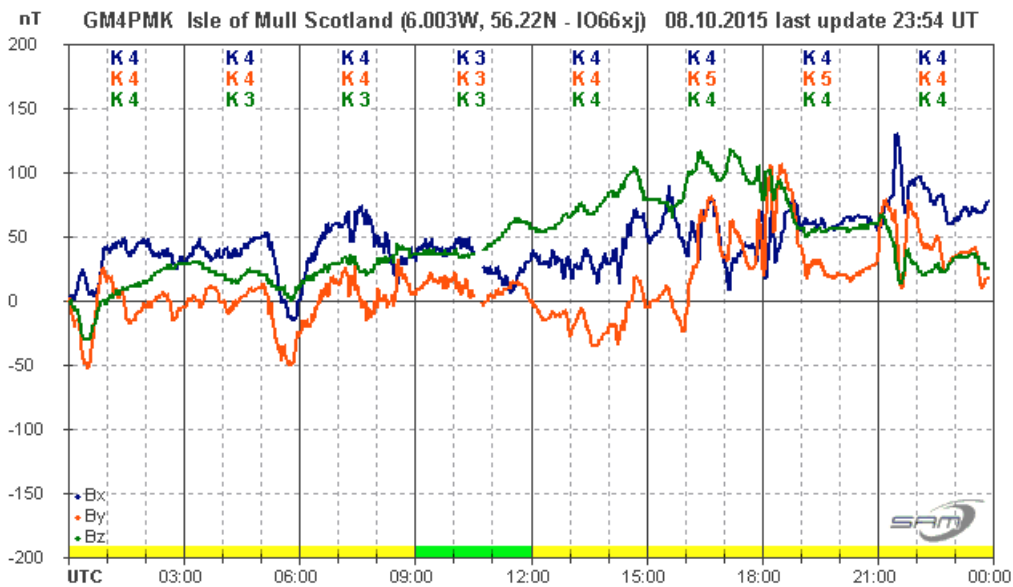


This chart shows the magnetic disturbance recorded by Colin Clements on the 7th.

The jump in solar wind speed has produced a very active period starting just before 17:00, and so may well be linked to the VLF disturbance recorded by Mark. Throughout most of October there was a background of coronal holes, some of which were quite large, resulting in magnetic disturbances and some good aurora for those with darker skies.

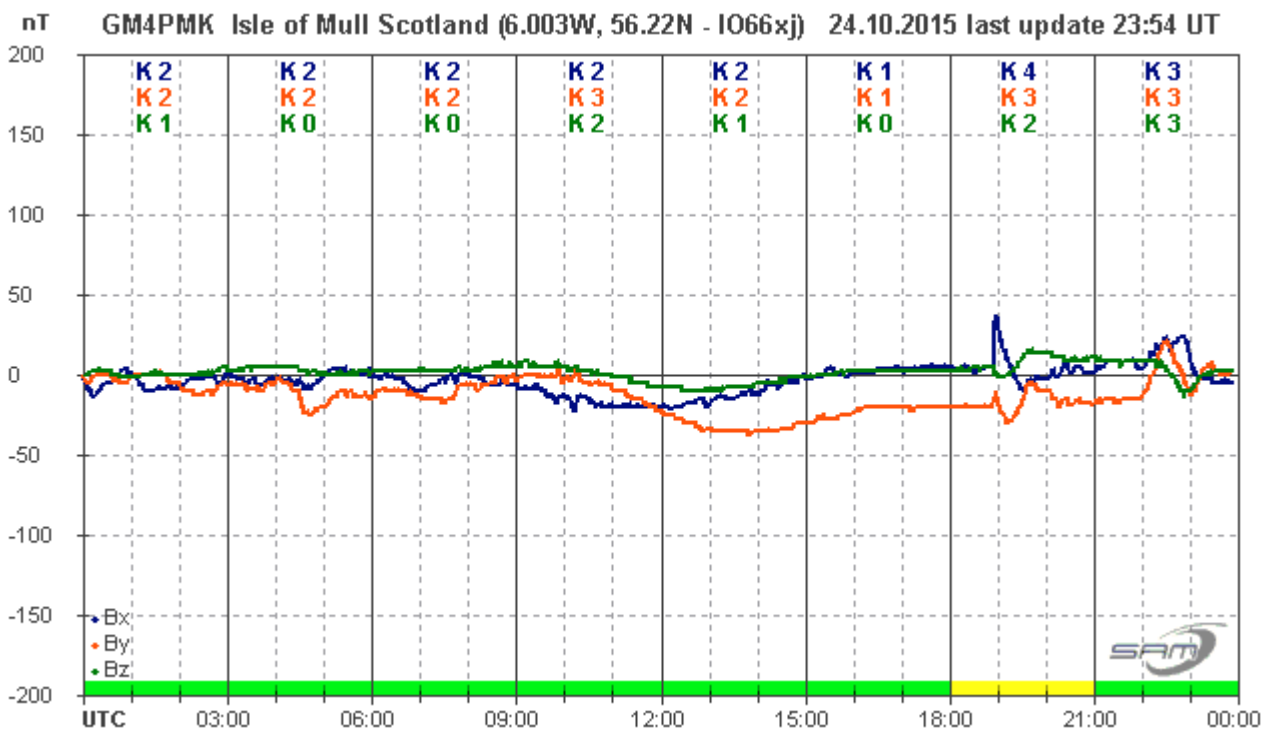


Mark recorded another VLF wave on the 8th, on both the 19.6kHz and 24kHz signals. On the north/south path at 19.6kHz, the wave starts at 14:37, while on the east/west path at 24kHz it starts at 15:01.



This magnetic recording by Roger Blackwell shows the disturbance from the 7th continuing through the 8th, with a more active period after about 14:00UT. Again, there may be a link to the ionospheric waves that Mark has recorded.

Just a single coronal mass ejection is reported to have been Earth-directed. A long duration C4.4 flare at 03:40UT on the 22nd caused a small sudden storm commencement at 18:55 on the 24th. It shows quite distinctly on Roger Blackwell's 3-axis magnetometer, but was barely detectable in my own single axis sensor. A very minor disturbance lasted until about 02:00UT the next morning.



The Bartels diagram shows that both September and October have recorded significantly more magnetic disturbances than previous months. Looking back to 2014 shows that the same was also true then. The autumn months are reputed to be good for auroral displays, especially with darker nights, and judging by the space weather reports there have indeed been some magnificent displays through Scandinavia and Iceland. The decay phase of the solar cycle also has a reputation for the best displays.

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

SOLAR ACTIVITY.

The sunspot numbers shown on the activity chart are the actual monthly figures from the Solar Section. When they are smoothed to show the general trends, two peaks become clear. The first is in 2012 January, with the second in 2014 February. The decay from this second peak has been very slow, with general activity remaining quite high. Solar minimum was in 2009 January, with cycle 23 peaks in 2001 November and 2000 June. Given the accepted average figure of 11 years per cycle, we are well overdue for the next minimum.

BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2454	F	10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30				2013 July
2455	F	7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				2013 August
2456	F	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 28 29				
2457	F	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 25				2013 September
2458	F	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 21 22				2013 October
2459	F	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 17 18				2013 November
2460	F	19 20 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				2013 December
2461	F	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 10 11				2014 January
2462	F	12 13 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				2014 February
2463	F	8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5 6				2014 March
2464	F	7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2				2014 April
2465	F	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 28 29				
2466	F	30 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				2014 May
2467	F	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 21 22				2014 June
2468	F	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 17 18 19				2014 July
2469	F	20 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				2014 August
2470	F	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 10 11				2014 September
2471	F	12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8				2014 October
2472	F	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4				2014 November
2473	F	5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				
2474	F	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 28				2014 December
2475	F	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				2015 January
2476	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				2015 February
2477	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 17 18 19				2015 March
2478	F	20 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				2015 April
2479	F	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 10 11 12				2015 May
2480	F	13 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				2015 June
2481	F	9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 2 3 4 5				2015 July
2482	F	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1				
2483	F	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 28				2015 August
2484	F	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				2015 September
2485	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 21				2015 October
2486	F	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 17				2015 November