

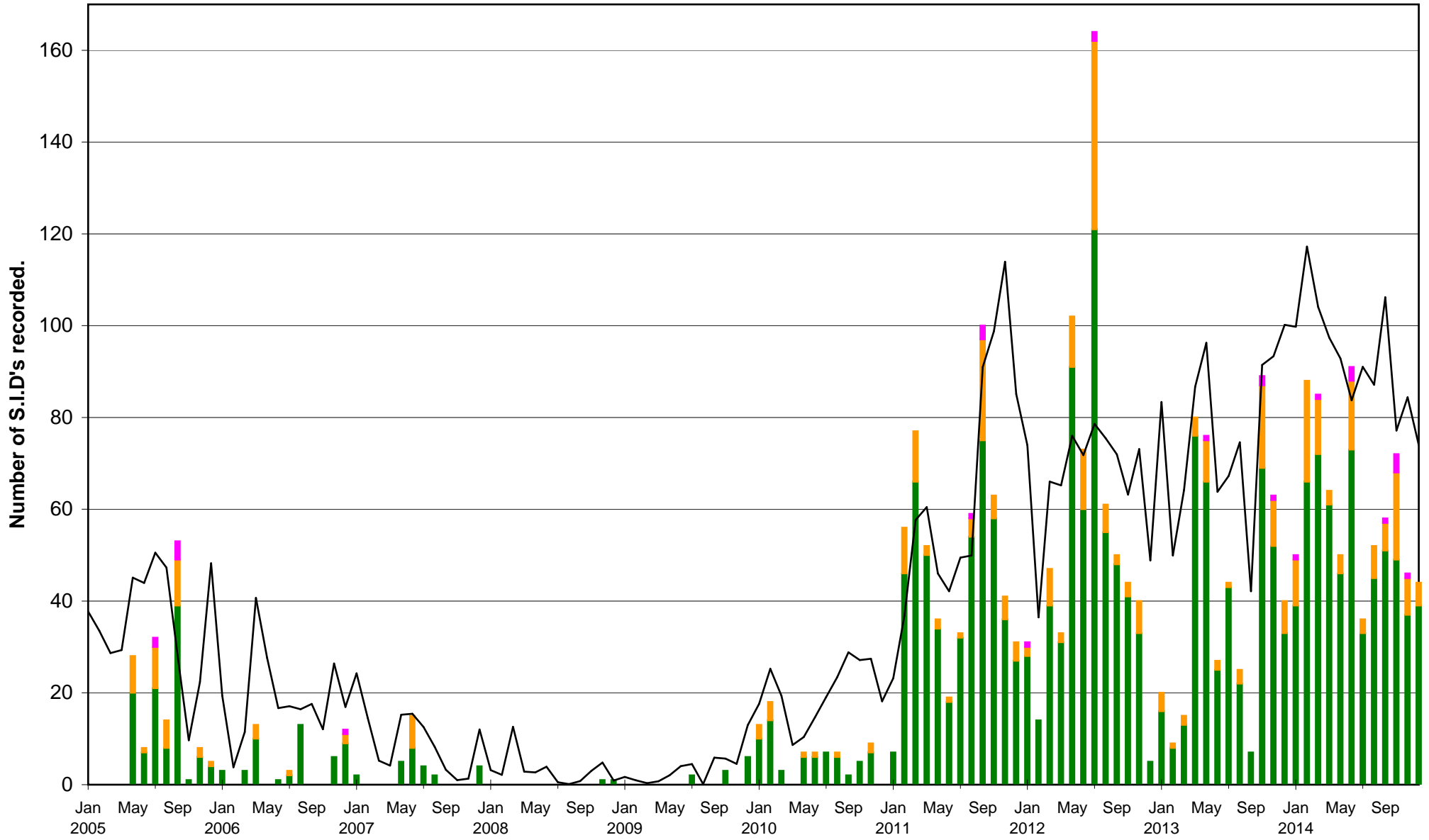
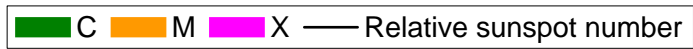
BAA Radio Astronomy Group.

2014 DECEMBER

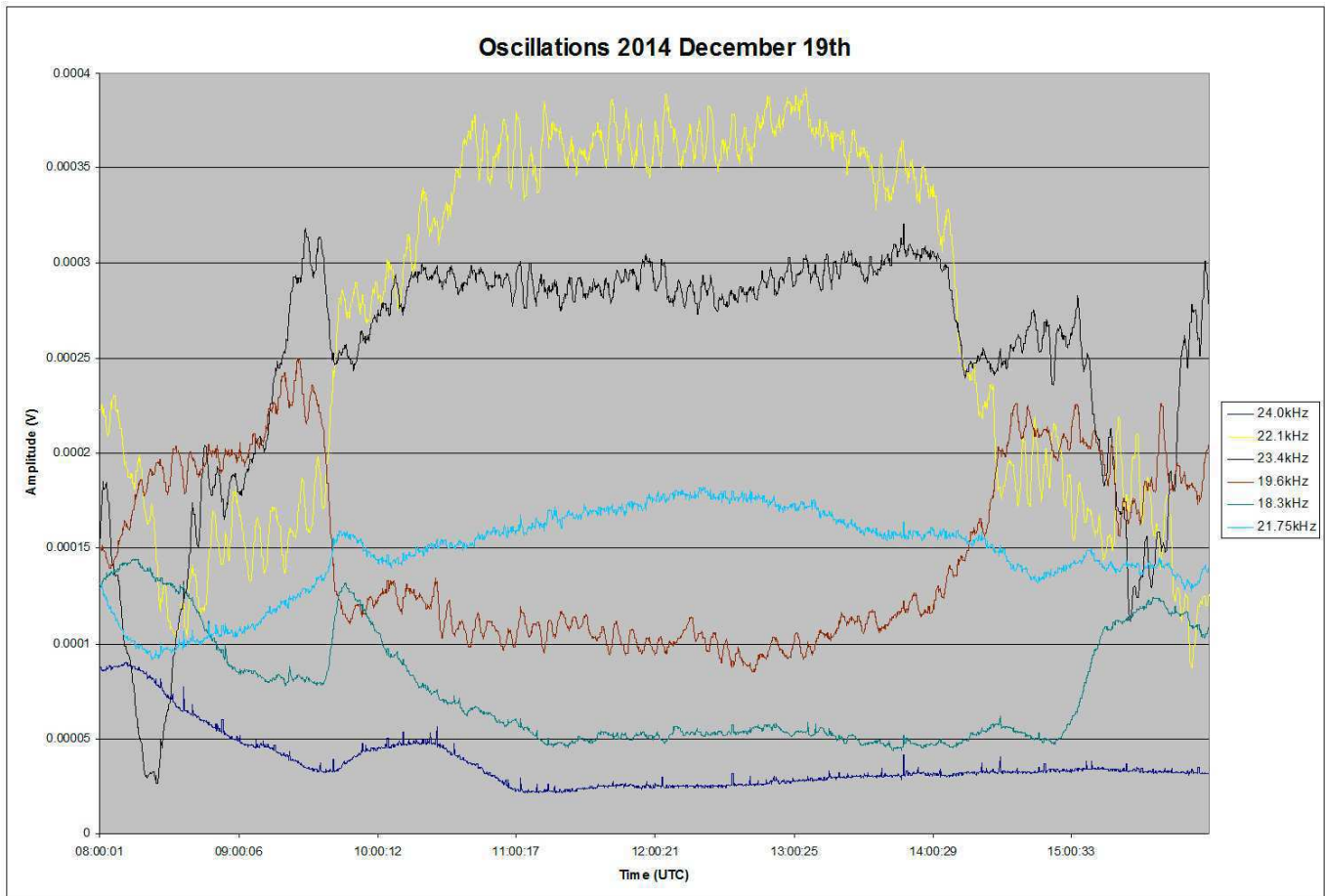
DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (18.3kHz)	Paul Hyde (22.1/23.4kHz)	Bob Middlefell (22.1kHz)	Mark Edwards (20.27/24.0/18.3kHz)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Tuned radio frequency receiver, 0.96m frame aerial.	Tuned 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	C5.2	1					08:00 08:04 08:09 1-
2	*	1					11:57 12:23 ? -
2	*	1					13:05 13:06 13:32 1+
2	C4.1	1					13:43 13:54 14:08 1
2	?	1					14:25 14:28 14:36 1-
2	C6.5	1					15:42 15:56 16:29 2+
3	C1.5	1	08:11 08:14 08:23 1-				
3	?	1	09:14 09:17 ? -				
3	C3.1	1	09:28 09:32 09:41 1-				
3	C2.7	2					13:07 13:11 13:19 1-
3	C3.8	4	13:24 13:27 13:37 1-		13:25 13:27 13:39 1-		13:25 13:28 13:36 1-
4	M1.3	2			08:03 08:09 09:15 2+		08:02 08:12 08:34 1+
4	C5.4	1					08:47 08:57 09:14 1+
4	M6.1	1					18:09 18:23 18:32 1
5	C1.3	1		07:05 07:15 07:25 1			
5	C1.6	1		10:17 10:25 10:35 1-			
5	M1.5	7	12:05 12:25 12:46 2	11:51 12:25 13:23 3	12:05 12:26 12:39 2		12:08 12:25 12:35 1+
6	?	1					13:40 13:41 ? -
6	C3.7	1					13:44 13:54 14:02 1-
9	C8.1	1					08:25 08:32 08:38 1-
9	?	1					10:03 10:11 ? -
9	C8.6	4	10:22 10:26 10:30 1-		10:22 10:26 10:40 1-		10:17 10:26 10:33 1-
9	C5.4	6	12:31 12:34 12:50 1	12:28 12:33 12:59 1+	12:31 12:36 12:57 1+		12:32 12:33 12:48 1-
9	C4.5	2					13:46 13:51 14:00 1-
9	C6.2	2		15:17 15:22 15:27 1-			15:25 15:29 15:48 1
11	C1.4	1		11:51 11:55 12:05 1-			
12	C4.2	1					14:39 14:42 14:46 1-
13	C6.0	2	08:43 08:46 08:55 1-				08:45 08:48 08:51 1-
13	C4.0	5	10:07 10:11 10:20 1-	10:03 10:10 10:18 1-	10:08 10:11 10:23 1-		10:06 10:12 10:19 1-
13	C3.8	4	10:49 10:55 11:05 1-	10:48 10:53 11:07 1	10:52 10:55 10:59 1-		10:52 10:57 11:18 1+
13	*	5	13:05 13:07 13:17 1-	13:03 13:07 13:24 1	13:05 13:07 13:28 1		13:05 13:08 13:22 1-
13	*	1					14:43 14:46 14:55 1-
13	?	1					15:07 15:08 15:18 1-
14	*	1		08:04 08:07 08:08 1-			
14	C3.1	2		08:26 08:29 08:37 1-			08:29 08:34 08:46 1-
14	C2.3	1					13:37 13:40 13:48 1-
16	C4.1	4	10:11 10:17 10:30 1	10:09 10:18 10:35 1+	10:12 10:16 10:27 1-		10:12 10:17 10:35 1
16	C2.1	1		11:07 11:11 11:14 1-			
16	C5.6	7	11:38 11:41 11:55 1-	11:35 11:40 12:04 1+	11:38 11:41 11:54 1-		11:38 11:41 11:49 1-
17	C9.8	3	14:59 15:02 15:14 1-	14:57 15:01 15:06 1-			14:59 15:04 15:41 2
17	C6.7	1					15:56 16:03 16:24 1+
18	C5.6	1		08:53 09:08 09:16 1			
18	?	1					09:31 09:38 09:51 1
18	*	1	12:08 12:12 12:20 1-				
18	C7.2	5	12:45 12:49 13:04 1		12:46 12:53 13:37 2+		12:46 12:51 13:08 1
18	C5.3	1					15:45 15:49 16:14 1+
19	M1.3	5	09:35 09:45 10:10 2	09:32 09:44 10:25 2+	09:39 09:49 10:08 1+		09:36 09:48 10:16 2
19	C5.3	1					16:27 16:30 16:35 1-
20	C2.9	1					15:05 15:07 15:11 1-
21	?	1					11:27 11:47 ? -
21	M1.0	5	11:32 12:06 13:10 3	11:23 12:13 13:02 3	11:27 11:53 14:10 3+		11:54 12:18 ? -
21	*	1					13:14 13:21 14:15 2+
22	C7.0	7	11:00 11:09 11:30 1+	10:56 11:09 11:52 2+	11:01 11:06 11:45 2		11:00 11:13 ? -
22	?	1					11:19 11:21 11:48 1+
25	C4.3	1		11:57 12:08 12:25 1+			
26	C3.7	2	15:05 15:15 15:21 1-				15:16 15:17 15:21 1-
28	C2.3	1			13:33 13:41 13:52 1		
29	C2.6	1					10:51 10:53 10:56 1-
31	C1.4	1					12:34 12:37 12:41 1-

		Colin Clements (23.4kHz/22.1kHz)	Steve Parkinson (Various)	John Elliott (18.3kHz)	John Wardle (19.6/23.4kHz)	Richard Kaye (Various)
		AAVSO receiver, 0.76m screened loop aerial.	Tuned radio frequency receiver, frame aeriels.	Tuned radio frequency receiver, 0.5m frame aerial.	PC soundcard, 0.7m frame aerial. Pre-amplifier + PC software receiver.	
DAY		START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
2	C5.2					
2	*					
2	*					
2	C4.1					
2	?					
2	C6.5					
3	C1.5					
3	?					
3	C3.1					
3	C2.7	13:02 13:08 13:21 1				
3	C3.8	13:21 13:27 13:59 2				
4	M1.3					
4	C5.4					
4	M6.1					
5	C1.3					
5	C1.6					
5	M1.5	12:02 12:24 12:47 2	12:07 12:25 12:54 2+	12:05 12:28 12:45 2		
6	?					
6	C3.7					
9	C8.1					
9	?					
9	C8.6		10:21 10:25 10:35 1-			
9	C5.4	12:31 12:33 12:40 1-	12:31 12:35 12:47 1-			
9	C4.5		13:46 13:50 13:56 1-			
9	C6.2					
11	C1.4					
12	C4.2					
13	C6.0		10:07 10:12 10:20 1-			
13	C4.0					
13	C3.8		13:05 13:10 13:30 1			
13	*					
13	*					
13	?					
14	*					
14	C3.1					
14	C2.3					
16	C4.1					
16	C2.1					
16	C5.6	11:37 11:42 11:57 1	11:38 11:41 11:50 1-	11:40 11:44 12:00 1		
17	C9.8					
17	C6.7					
18	C5.6					
18	?					
18	*					
18	C7.2	12:44 12:53 13:01 1-	12:46 12:53 13:17 1+			
18	C5.3					
19	M1.3		09:34 09:37 09:49 1-			
19	C5.3					
20	C2.9					
21	?					
21	M1.0		11:34 12:09 12:46 2+			
21	*					
22	C7.0	10:59 11:09 12:51 3	11:01 11:10 11:30 1+	11:00 11:14 11:45 2		
22	?					
25	C4.3					
26	C3.7					
28	C2.3					
29	C2.6					
31	C1.4					

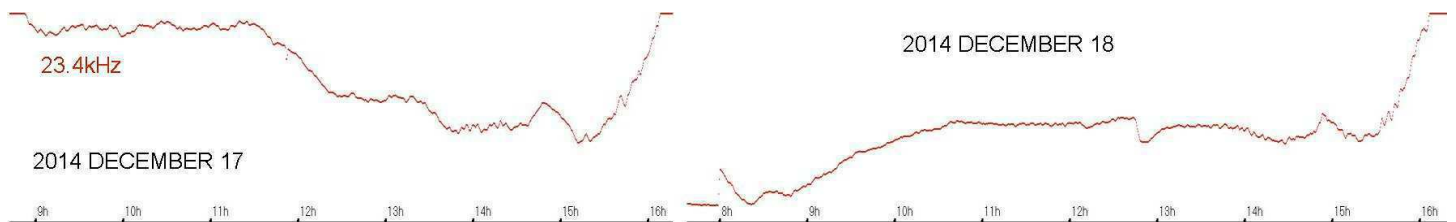
VLF flare activity 2005/14.



Strong oscillations were once again a feature this month. My own 23.4kHz recordings were disturbed on most days, particularly in the last two weeks. Mark Edwards reported similar effects at 22.1 and 19.6kHz, with 23.4kHz also affected at times. The normal diurnal curve was badly distorted on several occasions, altogether making SIDs quite difficult to find and measure. The SID count is down again on the October peak. Although old active region AR 12192/12209 did reappear in December, it was much smaller and decayed rapidly without much further flare activity.

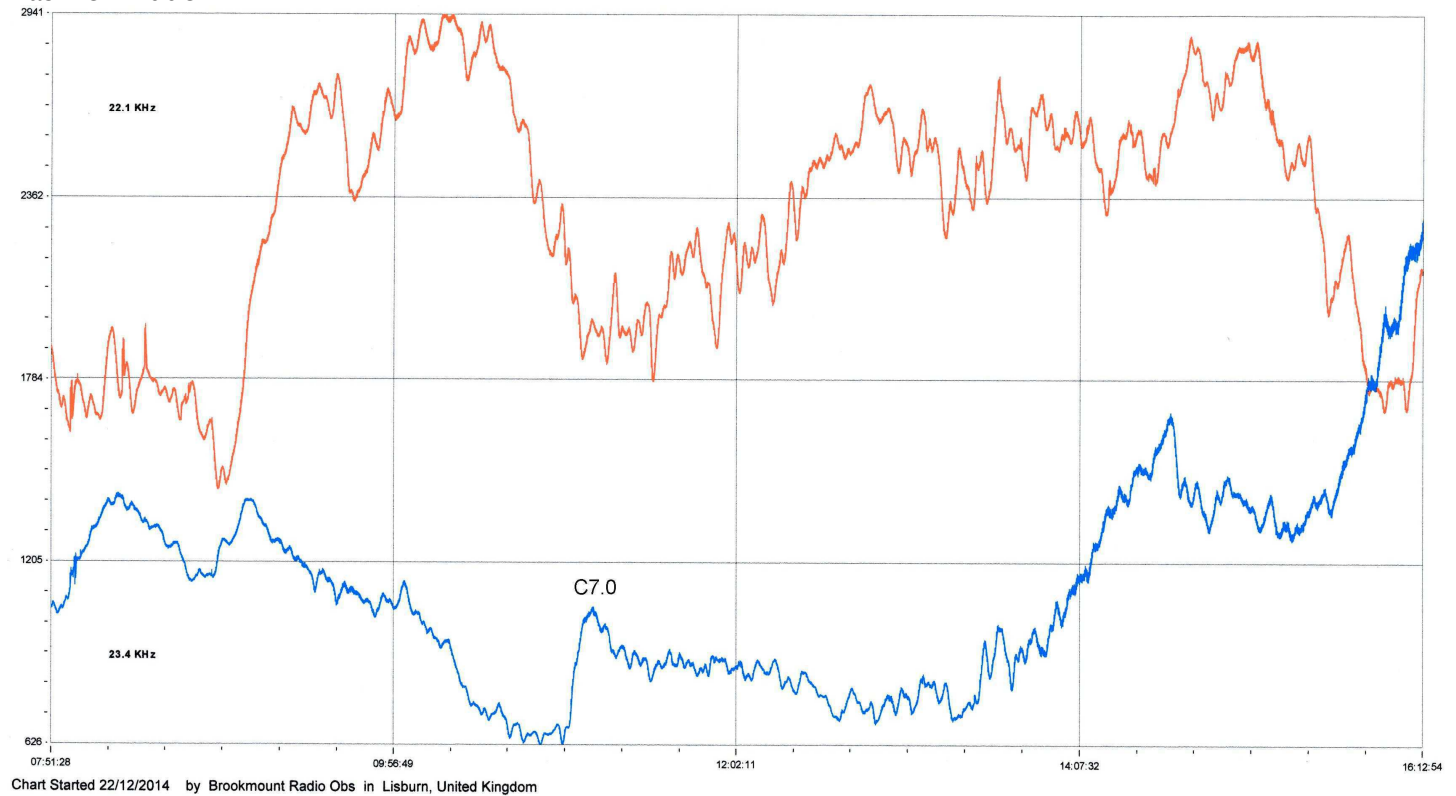


This chart from Mark Edwards in Coventry shows oscillations all day on the 19th. The M1.3 flare is only really clear at 18.3 and 21.75kHz.

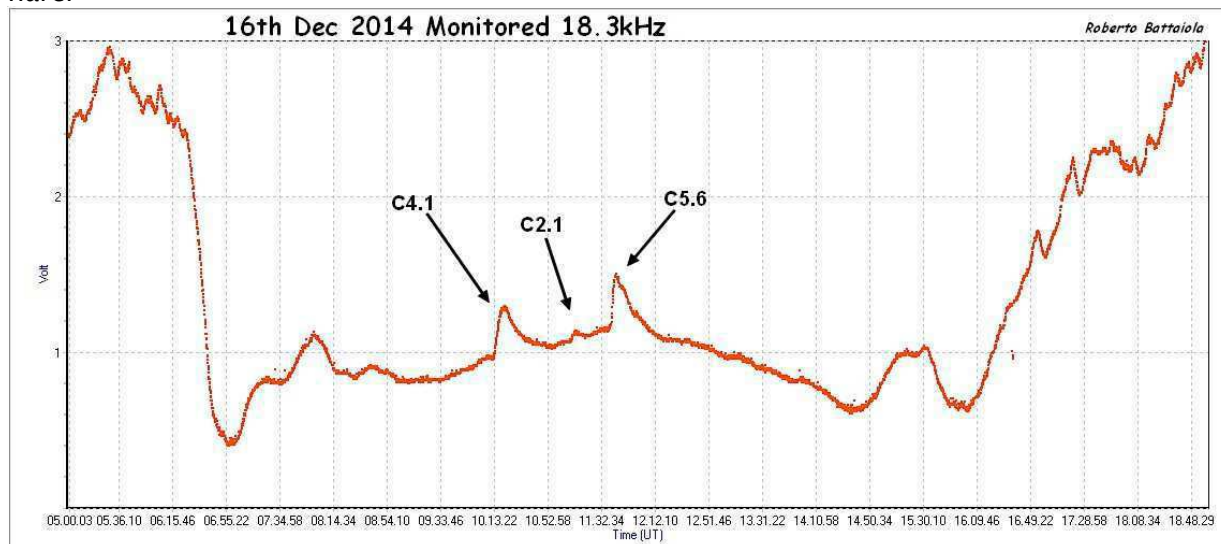


This is my own recording from 17th & 18th December showing a marked distortion of the normal diurnal curve. Starting at a very high level the signal strength faded away after 11UT, only rising again at sunset. On the 18th the signal emerged from its morning break at a very low level, rising through the morning. It remained steady after 10:30UT, interrupted by the C7.2 flare at 12:50. There does not seem to be any reason for this in the X-ray data.

Oscillations were so strong with Colin Clements on the 22nd that the SID from the C7.0 flare at 11:09 was well hidden:



22.1kHz is red, 23.4kHz is blue. The sharp rise starting at 10:59 marks the SID. Roberto Battaiola in Milan suffers much less from these disturbances, and has a nice clean recording from the 16th, including a C2.1 flare:

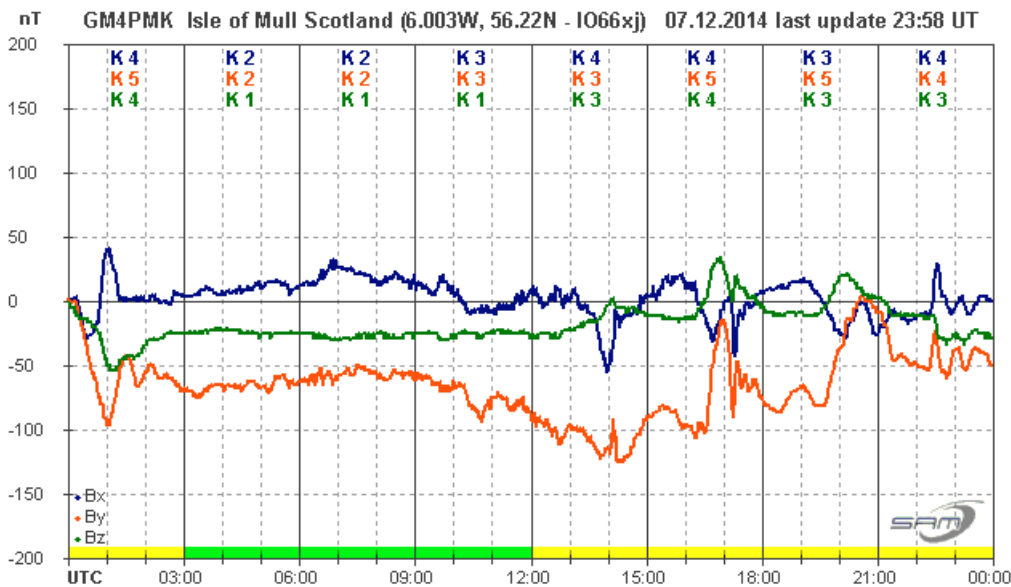


The signal path at 18.3kHz is to the north east from Milan, with a mid point in south eastern France.

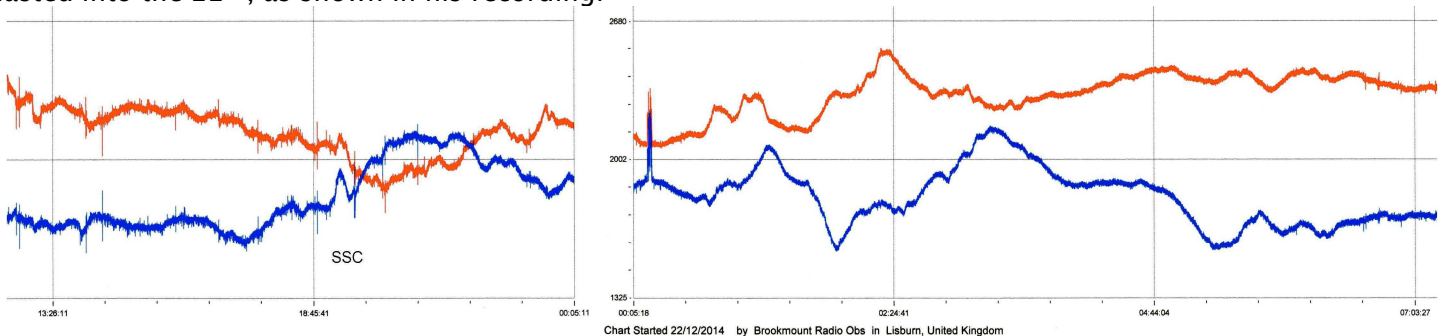
The M1.0 flare on the 21st was very slow, lasting about three hours. It also had several minor peaks leading to multiple SIDs. X-ray data for the 13th is incomplete due to a problem with GOES15 communications. The sun remained fairly quiet over the holiday period, with just a C4.3 on the 25th. There were a few small SIDs in the last week of the year, although the SWPC bulletin does show a large number of minor visual flares without X-ray magnitudes on the 29th, 30th and 31st.

MAGNETIC OBSERVATIONS.

The Bartels diagram shows a high level of magnetic activity in December. The active period on the 4th appears to be due to CHSS effects that produced some rapid variations in my magnetometer from 15:00UT lasting just over three hours. A large southern polar coronal hole caused an all-day disturbance on the 7th, shown in the recording by Roger Blackwell:



CMEs were associated with several M-class flares that occurred over 17th–20th, all timed during our night. Two distinct SSCs were recorded, the first by Colin Clements at 19:11 on the 21st. The disturbance lasted into the 22nd, as shown in his recording:



The second was timed at 11:15UT in my own recording, with a shift of about 21nT. As can be seen, there was very little subsequent disturbance on this occasion:



It is not entirely clear which CME produced which SSC, and we do not have any of the flares recorded as SIDs. Assuming an M6.9 flare at 21:58 on the 18th was responsible for the second SSC gives a transit time of just over 109 hours. This SSC was also noted by Gonzalo Vargas in Bolivia, who also recorded further disturbance until 18:10UT.

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

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.																	Synodic rotation start (carrington's).										
2439	2012 May	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	2124	2125		
2440	2012 June	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	2126	2127		
2441	2012 July	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	2128	2129		
2442	2012 August	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	2130	2131		
2443	2012 September	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	2132	2133		
2444	2012 October	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	9	2134	2135		
2445	2012 November	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	2136	2137		
2446	2012 December	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	1	2	2138	2139		
2447	2131	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	2140	2141		
2448	2013 January	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	2142	2143		
2449	2013 February	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	2144	2145		
2450	2013 March	22	23	24	25	26	27	28	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	2146	2147		
2451	2013 April	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	2148	2149		
2452	2136	17	18	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	2150	2151		
2453	2137	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	2152	2153		
2454	2138	10	11	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	2154	2155		
2455	2139	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	2156	2157		
2456	2140	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	2158	2159		
2457	2013 September	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	2160	2161		
2458	2013 October	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	2162	2163		
2459	2013 November	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	2164	2165		
2460	2013 December	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	2166	2167		
2461	2014 January	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	2168	2169		
2462	2014 February	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	2170	2171		
2463	2147	8	9	10	11	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	2172	2173
2464	2148	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	2174	2175		
2465	2149	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	2176	2177		
2466	2014 May	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	2178	2179		
2467	2014 June	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	2180	2181		
2468	2014 July	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	18	19	2182	2183		
2469	2014 August	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	2184	2185		
2470	2014 September	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	2186	2187		
2471	2014 October	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	2188	2189		
2472	2014 November	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	2190	2191		
2473	2014 December	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	1	2192	2193		
2474	2014 December	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	2194	2195		
2475	2015 January	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	2196	2197		