

BAA Radio Astronomy Group.

2016 APRIL

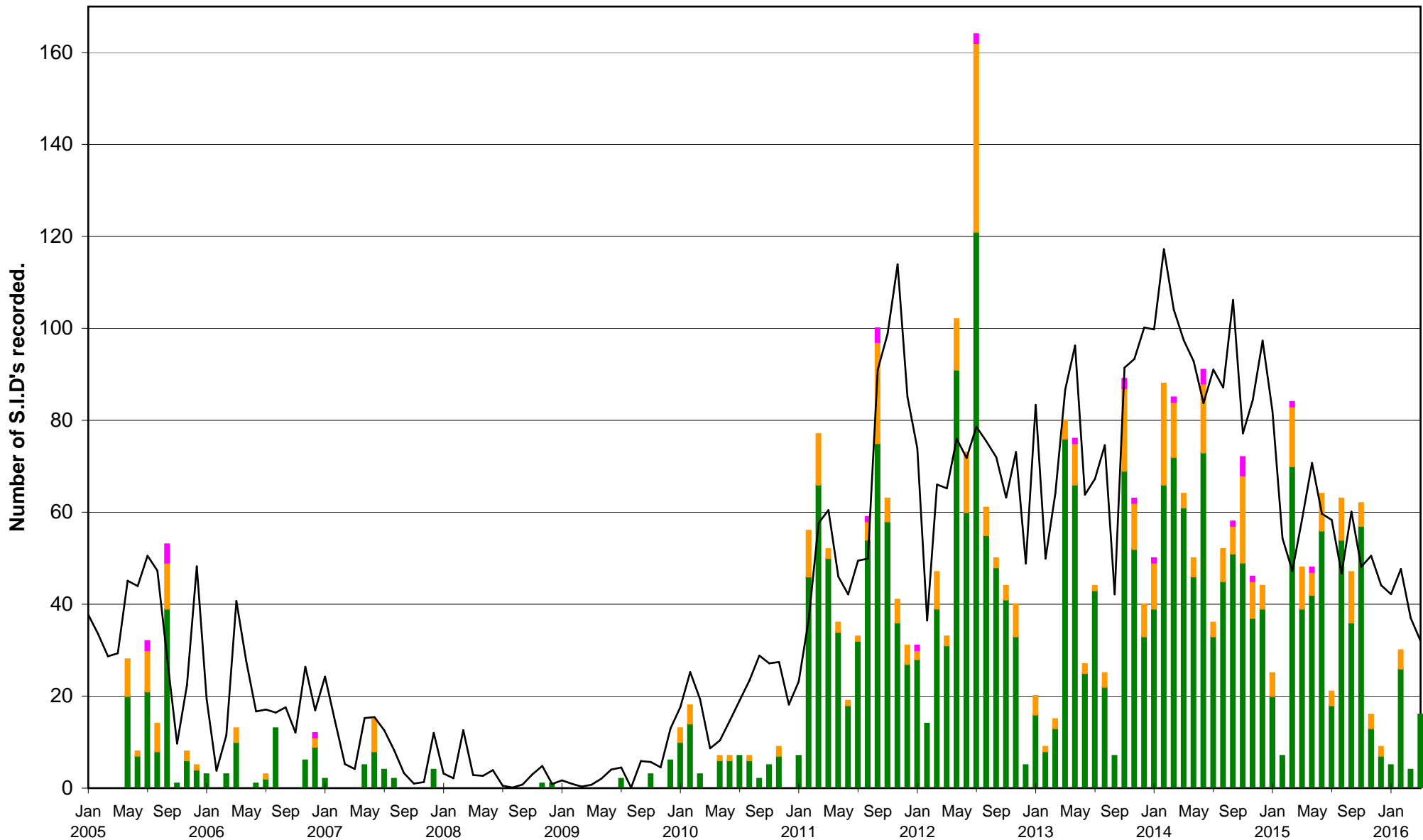
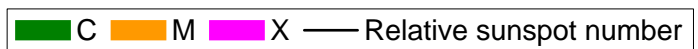
DAY	Xray class	Observers	John Cook (23.4kHz/22.1kHz)	Roberto Battaiola (18.3kHz)	Paul Hyde (22.1/23.4kHz)	Mark Edwards (20.27/24.0/18.3kHz)	Colin Clements (23.4kHz/22.1kHz)													
			Tuned radio frequency receiver, 0.58m frame aerial.		Modified AAVSO receiver.		Tuned radio frequency receiver, 0.96m frame aerial.		Spectrum Lab / PC 2m loop aerial.		AAVSO receiver, 0.76m screened loop aerial.									
			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)			
6	C1.1	4	10:00	10:11	10:41	2	09:57	10:09	10:38	2				09:58	10:12	10:20	1			
6	C1.4	2	16:41	16:47	17:07	1+								16:38	16:49	17:05	1+			
7	C1.4	1					05:51	05:54	06:00	1-										
7	B8.6	1					09:47	09:50	09:53	1-										
7	C1.9	4	11:08	11:14	12:03	2+	11:05	11:15	11:42	2				10:42	11:16	12:10	3			
7	B7.7	4	13:33	13:38	13:45	1-	13:32	13:36	13:48	1-				13:32	13:38	13:57	1			
8	B6.1	1	16:13	16:16	16:20	1-														
8	C1.1	1	16:35	16:39	16:52	1-														
9	C2.8	4	12:57	13:27	14:18	2+	12:18	13:24	14:05	3				12:36	13:31	15:41	3+			
9	C1.7	1					16:12	16:13	16:17	1-										
10	*	2												10:47	10:50	11:00	1-			
10	*	1												11:22	11:29	11:34	1-			
10	*	1												12:22	12:28	12:41	1			
11	B8.1	1												13:12	13:24	13:44	1+			
12	C1.8	2	07:47	07:54	08:01	1-														
14	C1.8	6	13:25	13:31	14:15	2+	13:21	13:32	14:02	2			13:24	13:33	14:07	2	13:23	13:34	15:15	3
14	C1.3	1											18:04	18:08	18:16	1-				
15	B7.7	2											12:42	12:45	12:52	1-	12:39	12:43	13:28	2+
15	C4.1	6	14:24	14:31	15:24	2+	14:23	14:32	14:57	2			14:23	14:31	15:04	2	14:19	14:33	16:00	3
15	*	1											15:53	16:00	16:10	1-				
16	?	2											13:55	13:59	14:05	1-	13:44	13:57	14:30	2+
16	C1.0	5	14:34	14:28	14:47	1-	14:30	14:41	14:56	1+			14:34	14:40	14:59	1	14:30	14:40	15:16	2+
16	?	1											15:41	15:46	15:50	1-				
17	?	2											12:46	12:51	12:55	1-	12:44	12:50	13:20	2
17	?	1											16:51	16:54	16:56	1-				
17	B8.4	1											17:00	17:06	17:08	1-				
17	C2.4	3											17:20	17:30	17:47	1+	17:18	17:31	17:56	2
19	B5.4	1											12:35	12:37	12:40	1-				
19	B6.6	1											12:56	13:01	13:08	1-				
26	B7.6	1											13:31	13:33	13:43	1-				
28	C1.8	1											06:01	06:03	06:07	1-				
28	C1.7	3	08:49	08:52	08:58	1-							08:51	08:53	09:15	1				
28	C1.9	4	12:50	12:52	13:02	1-							12:50	12:52	13:09	1	12:48	12:54	13:36	2+
30	C1.2	2	10:42	10:48	10:57	1-							10:46	10:51	10:59	1-				

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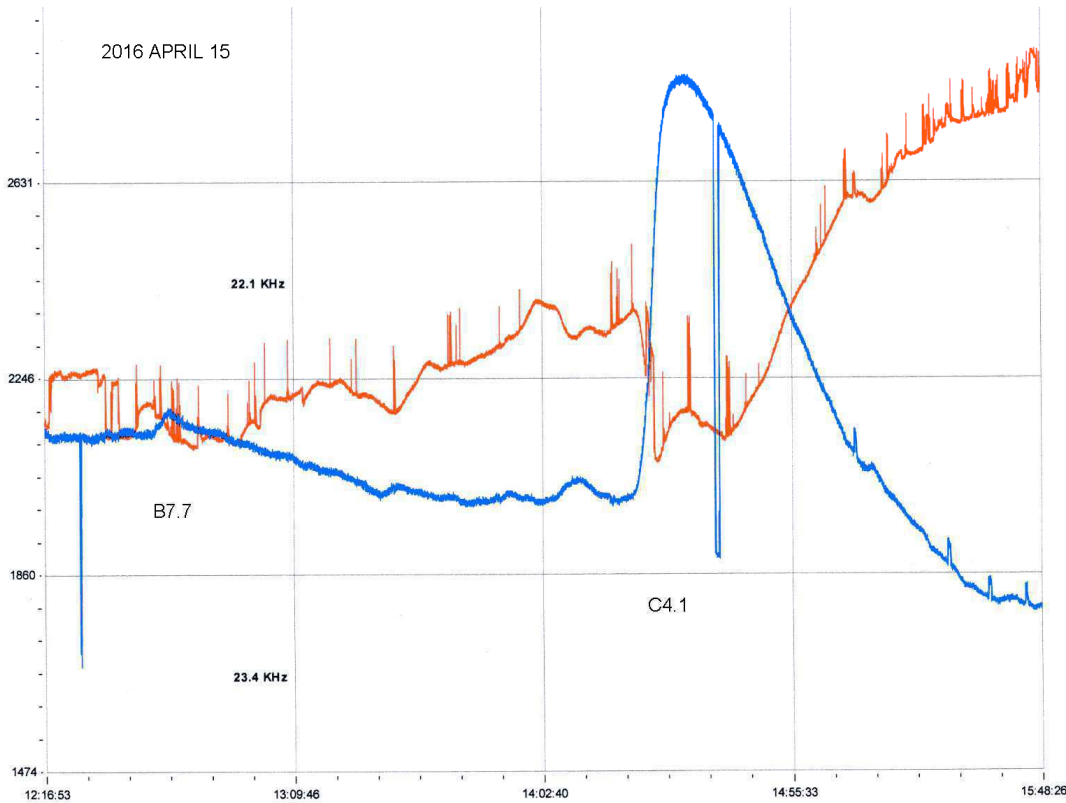
2016 APRIL

		Steve Parkinson (Various)	John Wardle (19.6/23.4kHz)	Phil Rourke (23.4kHz)	Jim Barber	John Elliott (18.3kHz)
		Tuned radio frequency receiver, frame aeralis.	PC soundcard, 0.7m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	Tuned radio frequency receiver, 0.5m frame aerial.
DAY		START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
6	C1.1	10:01 10:11 10:36 2				
6	C1.4					
7	C1.4					
7	B8.6					
7	C1.9	11:08 11:15 11:53 2				
7	B7.7	13:34 13:38 13:51 1-				
8	B6.1					
8	C1.1					
9	C2.8	12:41 13:30 14:20 3				
9	C1.7					
10	*	10:48 10:51 10:55 1-				
10	*					
10	*					
11	B8.1					
12	C1.8	07:45 07:56 08:11 1+				
14	C1.8	13:25 13:32 13:56 1+				13:28 13:32 14:00 1+
14	C1.3					
15	B7.7					
15	C4.1	14:23 14:32 15:10 2+				14:28 14:33 15:05 2
15	*					
16	?					
16	C1.0	14:33 14:39 15:04 1+				
16	?					
17	?					
17	?					
17	B8.4					
17	C2.4	17:22 17:30 17:45 1				
19	B5.4					
19	B6.6					
26	B7.6					
28	C1.8					
28	C1.7	08:49 08:53 09:12 1				
28	C1.9	12:50 12:53 13:20 1+				
30	C1.2					

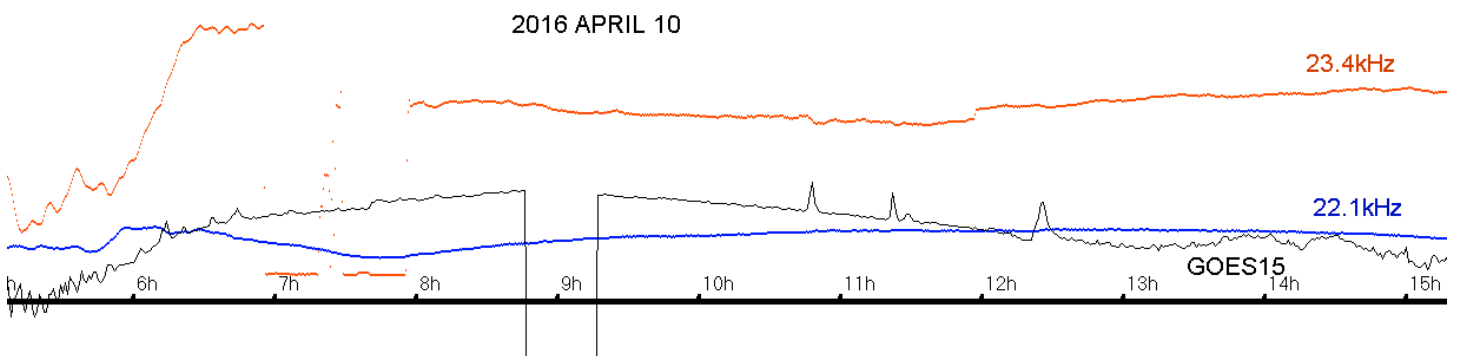
VLF flare activity 2005/16.



Following on from March, there have been many more B-class flares recorded this month. Among those unclassified in the SWPC bulletin, the 13:59 SID on the 16th was produced by a B5.2 flare according to the GOES15 data file. There were no M or X-class flares during April. The strongest flare recorded as a SID this month does not break any records at C4.1, but does show well in this chart by Colin Clements:



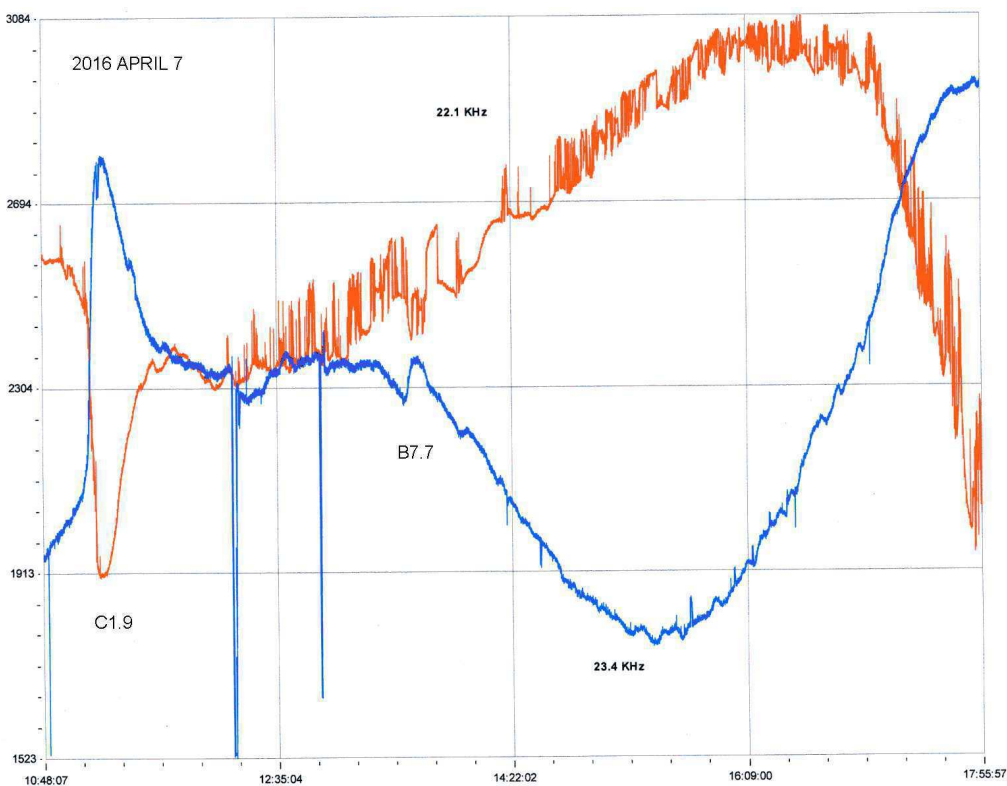
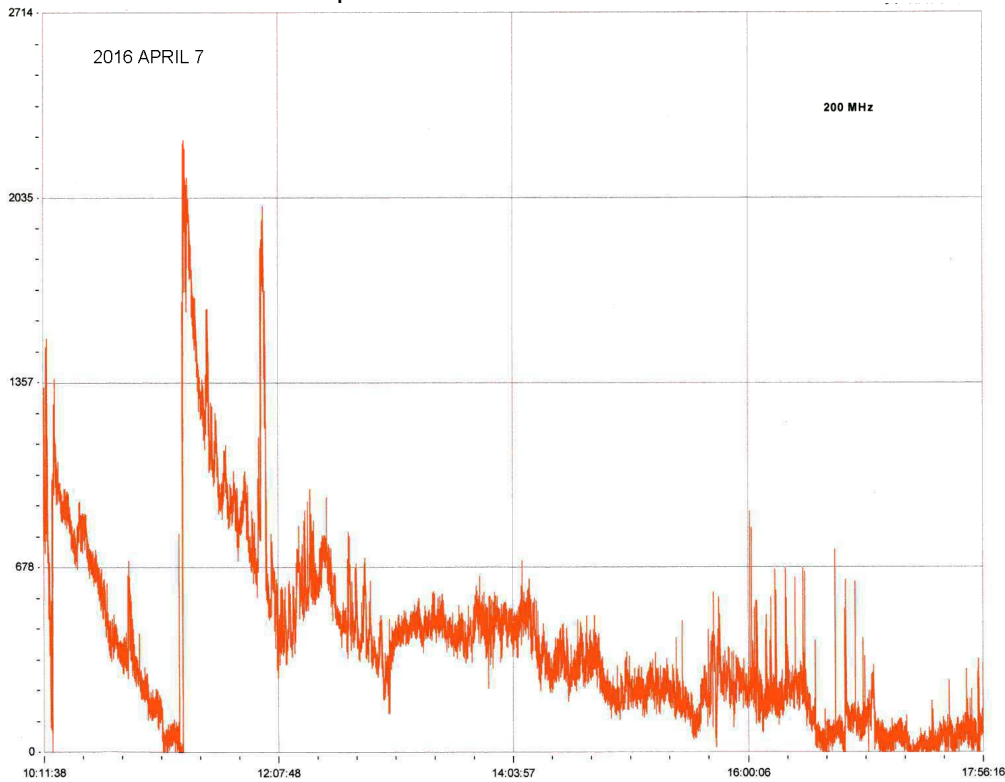
Recorded on the 15th, it was preceded by a B7.7 flare peaking at 12:43UT, both being clearly seen at 23.4kHz (blue trace). The 22.1kHz (red) signal shows some instability and has not responded to the weaker flare.



This is my own recording from April 10th, showing a very long duration C1.5 flare. The timings reported by SWPC are start: 05:49, peak: 09:34, End: 13:04. Unfortunately there is a badly timed drop-out in the GOES15 data (black trace). Neither signal has responded with a SID. Superimposed are three distinct peaks in the X-ray data that were recorded by Colin at 10:50 (C1.9), 11:29 (C1.4) and 12:28 (C1.5). There are some small effects seen at 23.4kHz in my recording, but insufficient to measure with any accuracy.

All of the activity from the 6th to 19th was from AR12529, a very large sunspot region close to the meridian on April 13th.

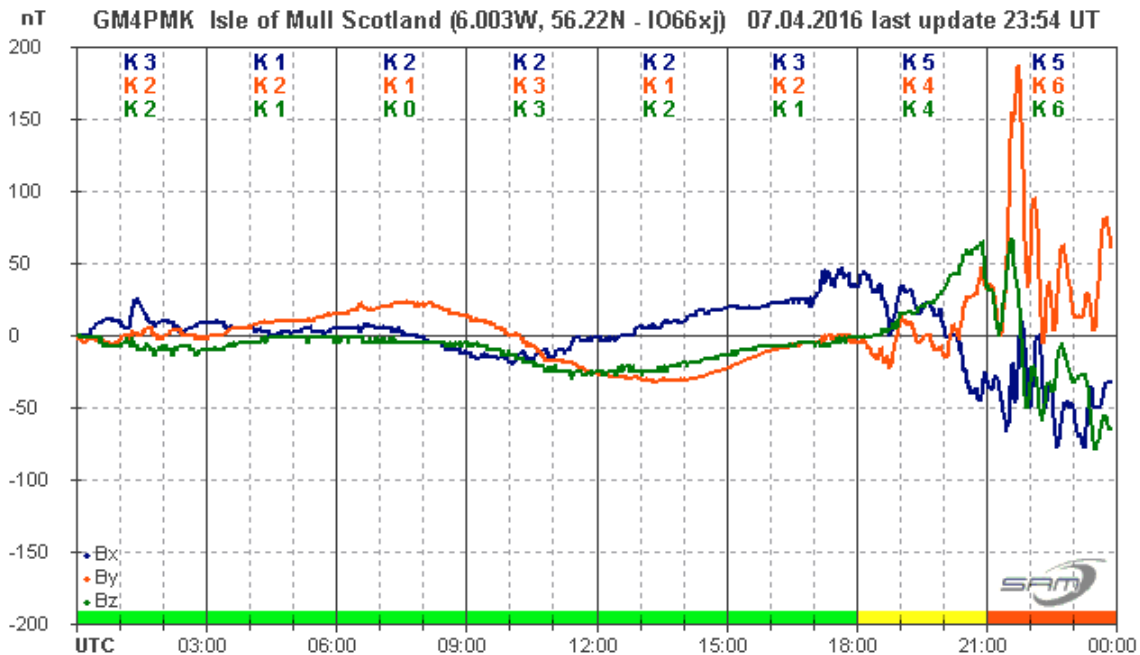
Colin has also started an experimental 200MHz receiver in addition to his 151MHz receiver. It recorded some VHF emissions on April 7th:



There is a substantial rise in the 200MHz emission at 11:10UT, just a few minutes before the peak SID response from the C1.9 flare. Another B7.7 flare shows as a SID, but has not had much effect at 200MHz. This system is still on trial, as 200MHz may be susceptible to local interference. It probes into a lower level of the Solar atmosphere compared with 151MHz, and so comparisons will be of interest.

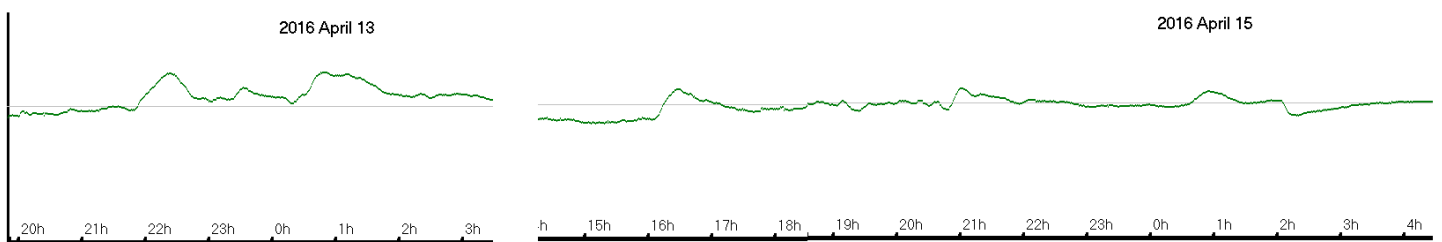
MAGNETIC OBSERVATIONS.

Most of the magnetic activity this month was again due to CHSS effects. Overnight on the 2nd and 3rd the Earth passed through a co-rotating interaction region in the solar magnetic field, followed by an increase in wind speed from a coronal hole. Late afternoon on the 7th a solar sector boundary crossing changed the Interplanetary Magnetic Field (IMF) Bz component from inward pointing to outward pointing. The effect on the Earth's magnetic field is shown in Roger Blackwell's recording:



The initial SSC can be seen just after 17:00UT, followed by active conditions through the evening. The disturbance lasted until about 03UT on the 8th.

A large coronal hole stretched from the sun's south pole to a latitude of 15degrees north, facing the Earth on the 9th and 10th. Its high speed wind was first recorded on the 13th, with a disturbance lasting into the early hours of the 15th. My own recording shows the best of the activity:



Short disturbances of about 2 hours each were recorded on the 22nd and 23rd, again from coronal hole effects. Looking at SDO images shows just how frequent these coronal holes are becoming, particularly the larger holes covering areas from the pole to near the solar equator. These allow the high speed wind direct access to the Earth's environment, causing turbulence in the Magnetosphere.

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

BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2454	10 BC	11 12 13 14 15 16 17 18 19	20 21 22 23 24 25 26	27 28 29 30	2013 July	1 2 3 4 5 6
2455	7 CB	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	1 2
2456	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	2013 September	
2457	30 31 C	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 October			
2458	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 November			
2459	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 December			
2460	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	2014 January			
2461	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 February			
2462	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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 March			
2463	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 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	2014 April			
2464	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 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 30 31	2014 May			
2465	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	30 31	2014 June			
2466	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 26	2014 July			
2467	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 August			
2468	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 September			
2469	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 October			
2470	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 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 November			
2471	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 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2014 December			
2472	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 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	2015 January			
2473	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	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 28 29 30 31	2015 February			
2474	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	29 30 31	2015 March			
2475	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 April			
2476	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 May			
2477	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 20 21 22 23 24 25 26 27 28 29 30 31	2015 June			
2478	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 July			
2479	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 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2015 August			
2480	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 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2015 September			
2481	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 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	2015 October			
2482	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 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 29 30 31	2015 November			
2483	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	29 30 31	2015 December			
2484	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	2016 January			
2485	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 21 22 23 24 25 26 27 28 29 30	2016 February			
2486	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 20 21 22 23 24 25 26 27 28 29 30 31	2016 March			
2487	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 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2016 April			
2488	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 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2016 May			
2489	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 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	2016 June			
2490	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	2016 July			
2491	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	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 28 29 30 31	2016 August			
2492	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	28 29 30	2016 September			
2493	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 23 24	2016 October			