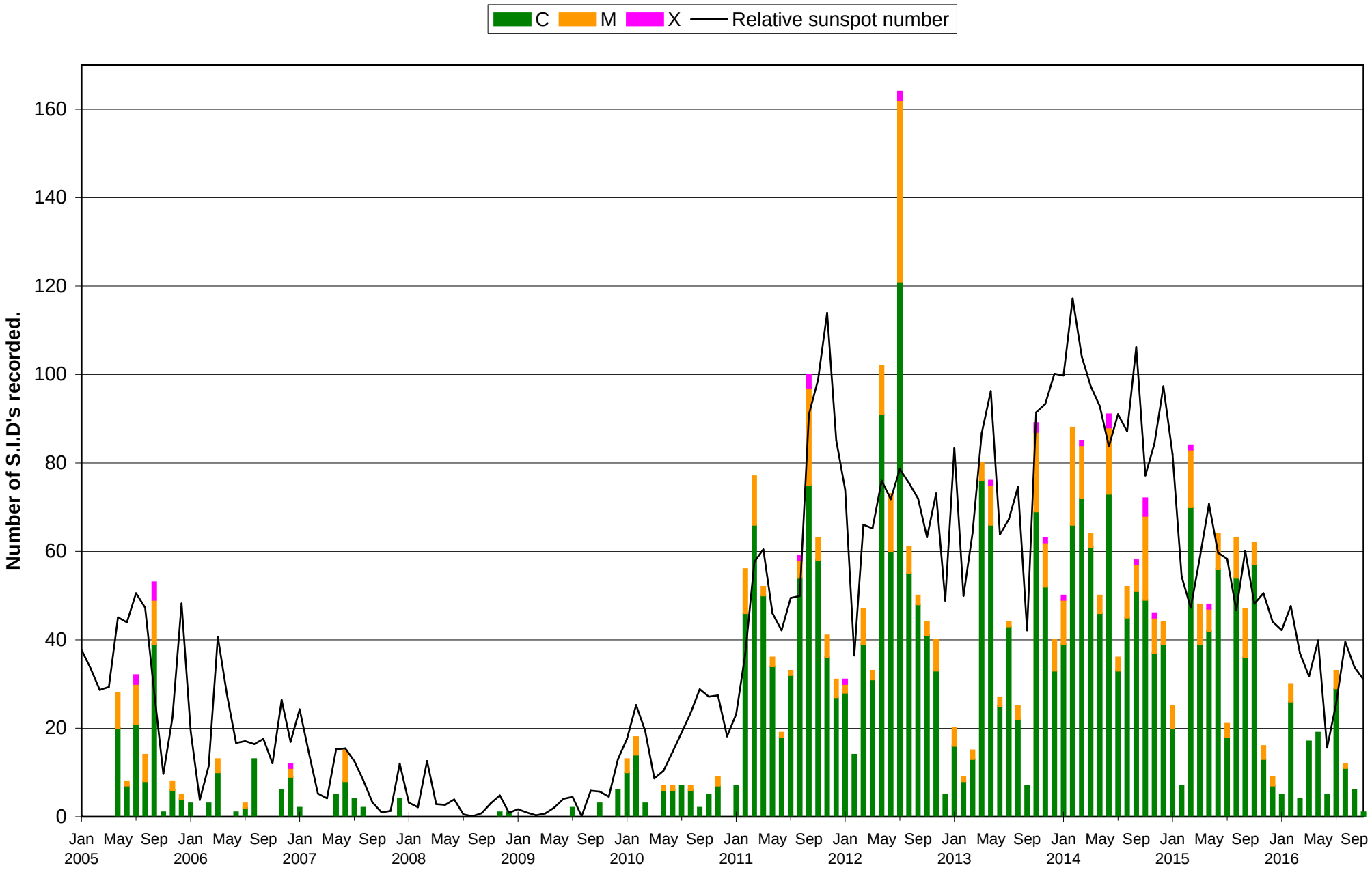
BAA Radio Astronomy Group. **2016 OCTOBER**

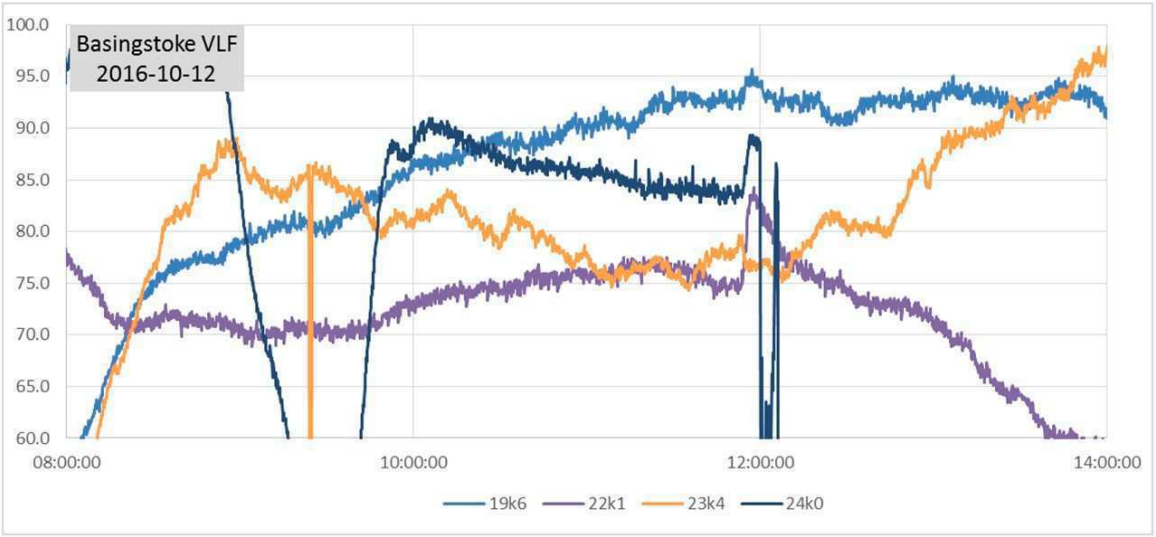
	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*)	Roberto Battaiola (21.75kHz)	Paul Hyde (22.1kHz)	Mark Edwards (18.3kHz)	Colin Clements (23.4kHz/*22.1kHz*)
			Tuned radio frequency receiver, 0.58m frame aerial.	Modified AAVSO receiver.	Spectrum Lab / PC 1.5m frame aerial.	Spectrum Lab / PC 2m loop aerial.	AAVSO receiver, 0.76m screened loop aerial.
DAY			START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)
12	C1.1	5	11:53 11:54 12:19 1+		11:53 11:58 12:34 2	11:54 11:58 12:35 2	11:50 11:57 12:06 1-
14	B9.4	1				11:22 11:27 11:34 1-	
16	B7.5	1				11:26 11:36 11:44 1-	

	Xray class		Steve Parkinson (Various)	John Wardle (19.6/23.4kHz)	Phil Rourke (23.4kHz)	Jim Barber	John Elliott (18.3kHz)
			Tuned radio frequency receiver, frame aerials.	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)
12	C1.1		11:53 11:57 12:15 1				
14	B9.4						
16	B7.5						

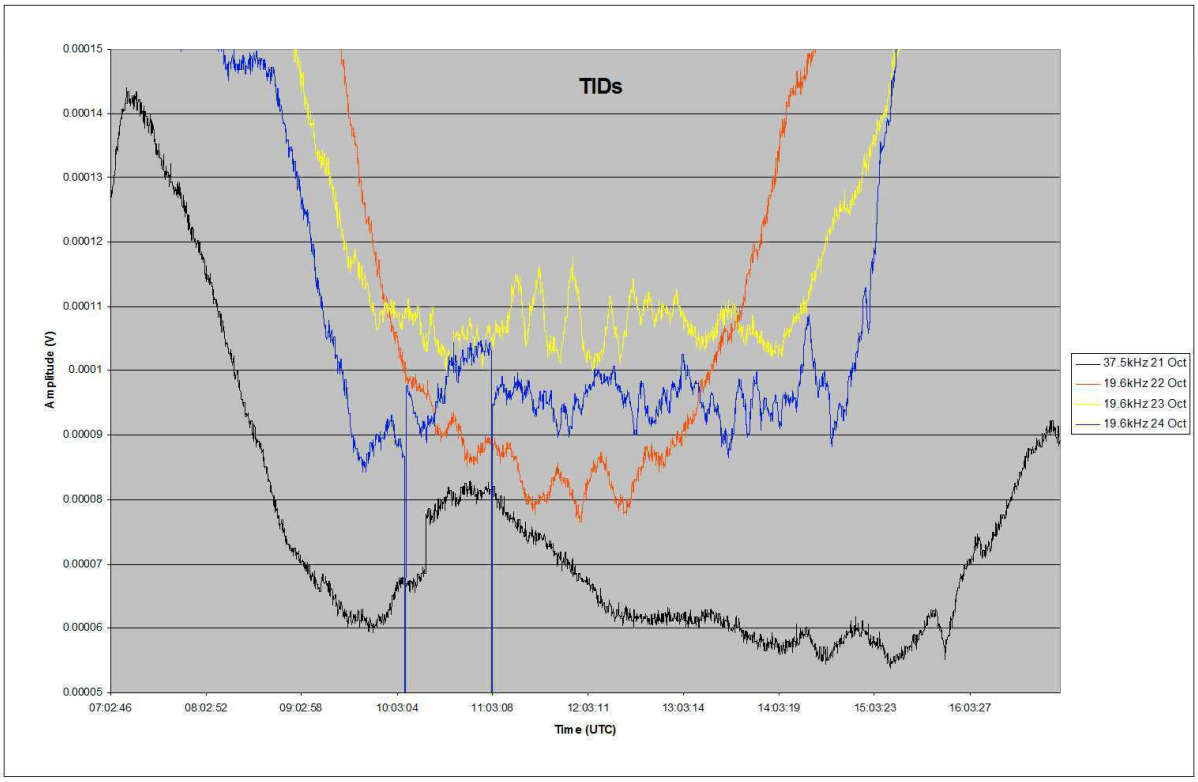

VLF flare activity 2005/16.
C
M
X
Relative sunspot number
Number of S.I.D's recorded.
0
20
40
60
80
100
120
140
160
Jan 2005
May
Sep
Jan 2006
May
Sep
Jan 2007
May
Sep
Jan 2008
May
Sep
Jan 2009
May
Sep
Jan 2010
May
Sep
Jan 2011
May
Sep
Jan 2012
May
Sep
Jan 2013
May
Sep
Jan 2014
May
Sep
Jan 2015
May
Sep
Jan 2016
May
Sep

BAA Radio Astronomy Group. **2016 OCTOBER.**

2016 October recorded the lowest number of SIDs since 2010 December, with just a single small C-class flare and two B-class. The X-ray background flux started the month at about B2 levels, dropping below B1 on the 17th and remaining at A8 to A9 for the rest of the month. The strongest flare in the GOES record was C4.2 at 00:38UT on the 17th.



The C1.1 flare shows well at 22.1kHz in this recording by Paul Hyde. Its start is also clear at 24kHz, but the signal then abruptly turns off.

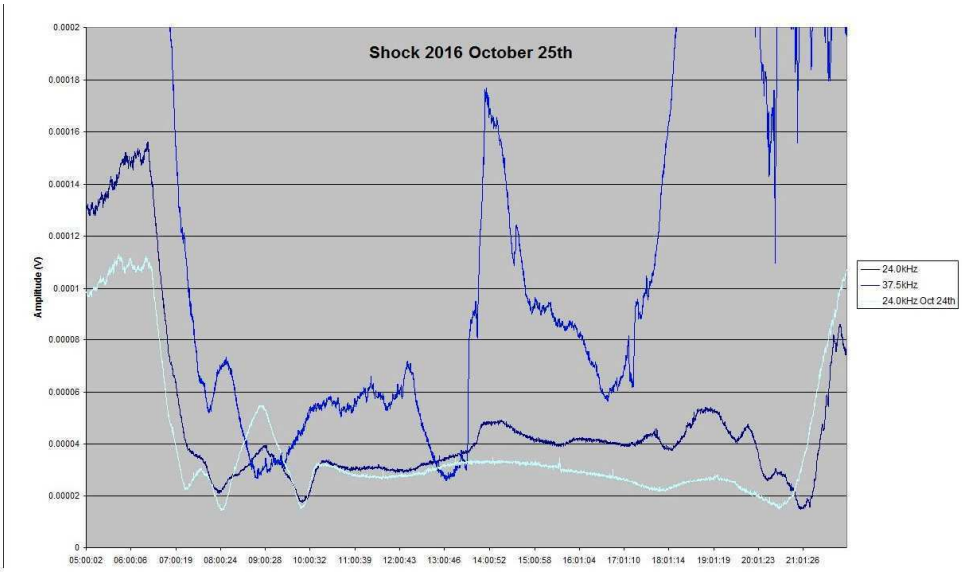


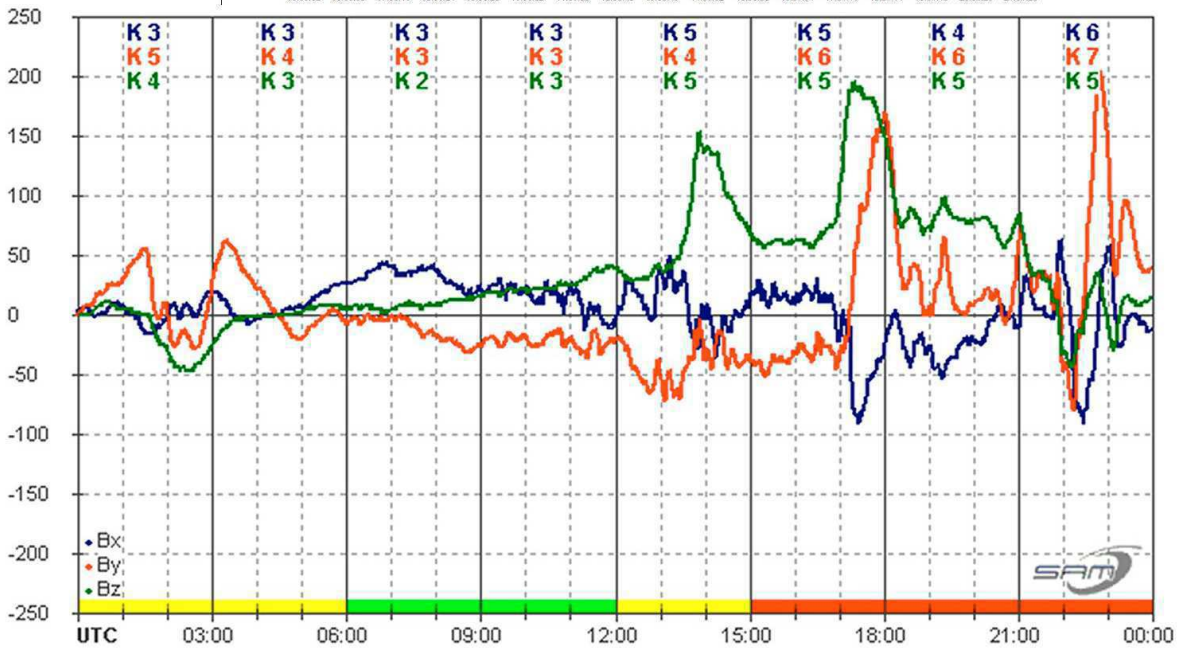
In the September summary I noted that there had not been any oscillations despite the low solar activity. In contrast, there have been some significant oscillations this month, shown well in the above chart by Mark Edwards covering activity over four days. Black is the 21st (37.5kHz), red is the 22nd, yellow is the 23rd and blue is the 24th (all 19.6kHz).

The disturbance on 37.5kHz in the afternoon of the 21st was not seen at 19.6kHz or 22.1kHz. From the 22nd to 24th 22.1kHz mirrored the 19.6kHz activity, although it did not show on the Iceland path at 37.5kHz. My own recordings showed some minor disturbance at 23.4kHz over this period, while Colin Clements notes that his recordings (22.1 and 23.4kHz) were completely smooth all month.

MAGNETIC OBSERVATIONS

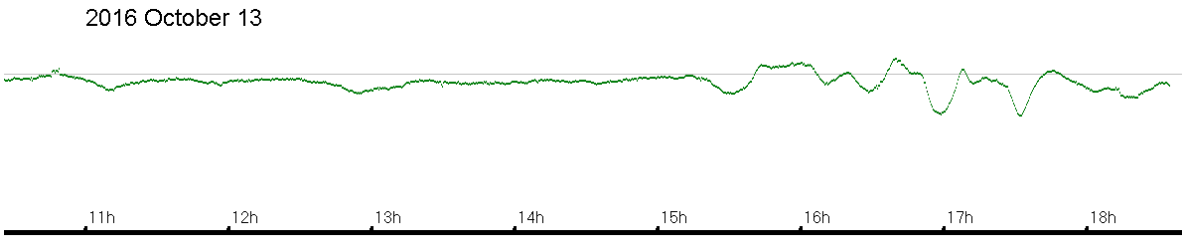
The oscillations shown above were replaced on the 25th by some magnetically induced disturbances.

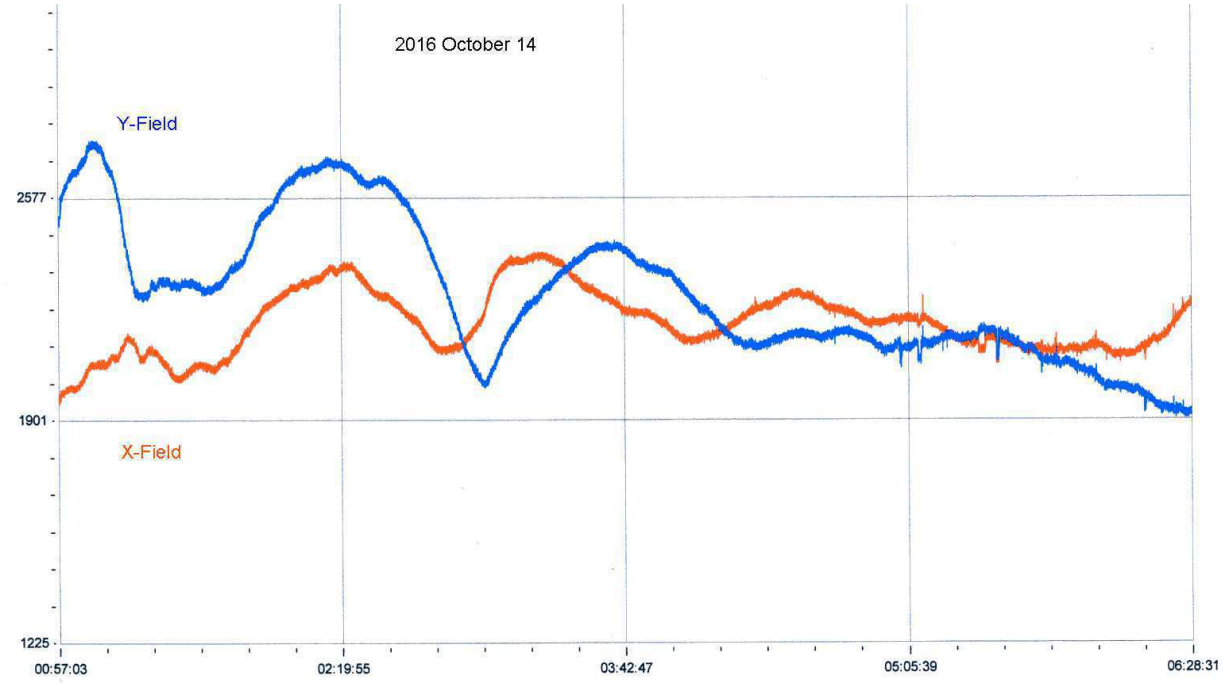




The lower panel is Roger Blackwell's Mull magnetometer recording for the 25th, showing some very strong pulses around 13:30 and 17:00UT. Above this is Mark Edwards' VLF recording showing a pair of very strong pulses at 37.5kHz (blue). The dark blue trace is 24kHz, showing smaller but similarly timed pulses. The light-blue trace at the bottom of the chart is 24kHz on the 24th, showing a quiet signal. Gonzalo Vargas (Bolivia) noted a moderate to active period on the 25th, while Colin Clements also recorded strong activity. My own single-axis magnetometer showed disturbances of about 80 and 160nT coincident with these pulses. The Bartels diagram shows that this disturbance was from the large recurrent coronal hole mentioned in last month's summary. It was even larger this time, covering over 50% of the visible hemisphere.

A small filament eruption late on October 8th caused a CME detected by satellites on the 9th. Initially thought not to be Earth-directed, it did create some substantial magnetic disturbance, recorded on the 13th and 14th. My recording from the 13th is shown below:





The field was quiet again after 20UT on the 13th, becoming more active from 01:00 on the 14th as shown in Colin Clements' chart, above. Roger Blackwell recorded some very rapid magnetic turbulence over this period, and Mark Edwards again recorded some VLF oscillations at 24kHz during the sunset period on the 13th, from 17UT until about 19:30.

A filament eruption on October 1st created a small CME that added to the fading effects of the CHHSS from the end of September, giving some short periods of magnetic activity through the first few days of October. The month ended with further CHHSS induced disturbances, particularly overnight on the 28th/29th, fading early on the 31st.

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

BAA Radio Astronomy Group

BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).

2460

19	20	2144 21	22	23	24	25	26	27	28	29	30	2013 December 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F X	CC	M	C	CCM	CC							C	C			C	C			C	CCC		CC	C	CC	CC

2461

16	17	18	2145 19	20	21	22	23	24	25	26	27	28	29	30	31	2014 January 1	2	3	4	5	6	7	8	9	10	11
F C			C	CMCC	C	MMMM	M		C		CC	CC	MCCC	C	C	C	C	CCMC	CCMC	C	C	CMCX	CCCC			CCC

2462

12	13	14	2146 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2014 February 1	2	3	4	5	6	7
F	CC	C		C	CCCC	CC								C	C	MMMM	CCC	MCC	CM	CCCC	MMMM	CCCC	MCCM	CCCM	CCC	CCMC

2463

8	9	10	11	2147 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	2014 March 1	2	3	4	5	6
F CCC	M	CC	CM	CM	MCCM	CMMM		MCC	CCC	CC	C	M	CC	C	CC	MMC	C	CCM	CCCC	CCC	MC	CCC	CCCM	CCCC	C	

2464

7	8	9	10	2148 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2014 April 1	2
F		CCMM	CCCM	CMCC	CMC	CCM	C	CCC	CC	CCC	C	CCCC	CC	C	MCC	CC	CC		CC		CM	CCCX	M	MC		CCM

2465

3	4	5	6	2149 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
F CC	CCC	CCC		CC			C	CCC	C	C	CCCC	CCCC	CCCM	CC	CM	CCCC	CCCC	C	CCCC	CCCC	C	CC	C		BC	B

2466

30	2014 May 1	2	3	4	2150 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
F B		CCC	CCCC	CCCC	C	MCC	CMC	M	CCCC	CCC	CCCC		C	CCC	C	CCC				B	C	C		M	C	CCC

2467

27	28	29	30	31	2014 June 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
F C				B	C	M	CCM				CC	CC	CCC	CCXX	MMXC	MMMM	MCCC	CCM	CMCC	CCCC	CBCC	CC	C	CC	C	B

2468

23	24	25	26	27	2152 28	29	30	2014 July 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
F	BBB				CCCC	CCCC	CC	CCCM	C		C		CC	CC	CM	C	CC		CCC	CCCC						

2469

20	21	22	23	24	2153 25	26	27	28	29	30	31	2014 August 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F	B				C	CCCB	CC		CC	CC	CMCC	CMM	CC	C		CCC			CCCC	C						CC

2470

16	17	18	19	20	21	2154 22	23	24	25	26	27	28	29	30	31	2014 September 1	2	3	4	5	6	7	8	9	10	11
F C		C		CCCC	CMCC	MCCC	CCCC	CMC	MM	C		CB	C	CCB	CCCC	CC	CC	CCM	CCCC	CC	CCMC	CCC	C	C	CCX	CCM

2471

12	13	14	15	16	17	2155 18	19	20	21	22	23	24	25	26	27	28	29	30	2014 October 1	2	3	4	5	6	7	8
F CCCC	CC			CC		CMC	C	CC	CCC			CC	C	CCC	M	CCMM	C			MM	CCC					C

2472

9	10	11	12	13	14	2156 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	2014 November 1	2	3	4
F MCCC							CCM	CC	MCCC	CCCC	MCMM	CCCM	CCXM	MCC	MCC	CCCX	XCCM	CCMX	CCM	MMMM	CCCC		CCCC		M	MM

2473

5	6	7	8	9	10	2157 11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	1
F MC	C	MCCX		CCM	CC	C	C	C	CC	M	CCCM	C					C	C	C			CCC	C	CCCC	CC	

2474

2014 December 2	3	4	5	6	7	8	2158 9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
F CCC	CCCC	MCM	CCM	C			CCCC		C	C	CCC	CC		CCC	CC	CCC	MC	C	M	C			C	C		C

2475

29	30	31	2015 January 1	2	3	4	2159 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F C		C			M	M	C	C	CC	C	C	C		CC	C	CM	CC						CCC		CC	

2476

25	26	27	28	29	30	31	2015 February 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
F		CC	C	MC	M		C		CC	C																C

2477

21	22	23	24	25	26	27	28	2015 March 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
F							CC	C	CMCCM	CC	CC	CM	MCCC		C	CCMC	CCCC	MMCX	CMMM	C	CCCC	MCCC	CCMC		CCCC	C

2478

20	21	22	23	24	25	26	27	2162 28	29	30	31	2015 April 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F			C		CC	CC	CCC	CC	CCCC	CC									M	CCCC	CCCC	C	CMCC	CCC		C

2479

16	17	18	19	20	21	22	23	2163 24	25	26	27	28	29	30	2015 May 1	2	3	4	5	6	7	8	9	10	11	12
F CCCC	C	CCC			MMMM	CCMC	CMCC	C	C	C							C	CCC	MMMX	CCMC	CCCC	CC	CC	CCC		CC

2480

13	14	15	16	17	18	19	20	21	2164 22	23	24	25	26	27	28	29	30	31	2015June 1	2	3	4	5	6	7	8
F CCCC	CCCC			B		C	C			CC										C		CC	CC		CC	

2481

9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	2015 July 1	2	3	4	5
F	CCC	CMCC	CC	MCCC	C	CC	CC	CC	CCM	CCCC	MC	MCCM	CCCM	C	C	M			C	CCCC	C		C	CCCM		

2482

6	7	8	9	10	11	12	13	14	2166 15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1
F MCCM	C			C				C				C						CC		C						C

2483

2015 August 2	3	4	5	6	7	8	9	10	11	2167 12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
F				C	CBCC	CC	C						C						CC	MCM	MCCM	CCCC	MCCM	CCCC	CC	M	CMCM

2484

29	30	31	2015 September 1	2	3	4	5	6	2168 7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F CCC	CC				C													CC	CMCC	C	C	CCM			CCC	

2485

25	26	27	28	29	30	2015 October 1	2	3	2169 4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
F	C	CMCC	MCMM	MMCM	CMCM	CCM	CCMM	CCCC										CC	CC	CCCC	MCCC	CCCC		CCC	C	CCC

2486

22	23	24	25	26	27	28	29	30	31	2015 November 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
F				C		C	CC	CCCC	CCCM	CCCC	CCCC		CMM					M	CC								

2487

18	19	20	21	22	23	24	25	26	27	2171 28	29	30	2015 December 1	2	3	4	5	6	7	8	9	10	11	12	13	14
F			C														C					C		CC		

2488

15	16	17	18	19	20	21	22	23	24	2172 25	26	27	28	29	30	31	2016 January 1	2	3	4	5	6	7	8	9	10
F						M	C						M	C								C				

2489

11	12	13	14	15	16	17	18	19	20	21	2173 22	23	24	25	26	27	28	29	30	31	2016 February 1	2	3	4	5	6
F				C												C	C	C				C	CC	CCC		

2490

7	8	9	10	11	12	13	14	15	16	17	2174 18	19	20	21	22	23	24	25	26	27	28	29	2016 March 1	2	3	4
F	C		C		MC	CMCM		CMCC	CC	CCCC		C					C	C								

2491

5	6	7	8	9	10	11	12	13	14	15	2175 16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
F			CB	C						CC										B		BB				

2492

2016 April 1	2	3	4	5	6	7	8	9	10	11	12	2176 13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
F					CC	CBCB	BC	CC		B	C		CC	BC	C	BC		BB							BC	

2493

28	29	30	2016 May 1	2	3	4	5	6	7	8	9	2177 10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F CCC		C	C	C		C			C							CCCB	CCBC	C					BC	B		BBC

2494

25	26	27	28	29	30	31	2016 June 1	2	3	4	5	2178 6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
F	CC	CC													BCC		B	C	C						C	

2495

21	22	23	24	25	26	27	28	29	30	2016 July 1	2	2179 3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
F																C		C						C	CCCB	C

2496

18	19	20	21	22	23	24	25	26	27	28	29	30	2180 31	2016 August 1	2	3	4	5	6	7	8	9	10	11	12	13
F C	C		CBCB	CCC	MMCC	MBCM	C	BB										C		CCMC	CCCC	C	B	C		

2497

14	15	16	17	18	19	20	21	22	23	24	25	26	2181 27	28	29	30	31	2016 September 1	2	3	4	5	6	7	8	9
F C																								B		

2498

10	11	12	13	14	15	16	17	18	19	20	21	22	2182 23	24	25	26	27	28	29	30	2016 October 1	2	3	4	5	6
F											CCB	CCCC														

2499

7	8	9	10	11	12	13	14	15	16	17	18	19	2183 20	21	22	23	24	25	26	27	28	29	30	31	2016 November 1	2
F					C		B		B																	