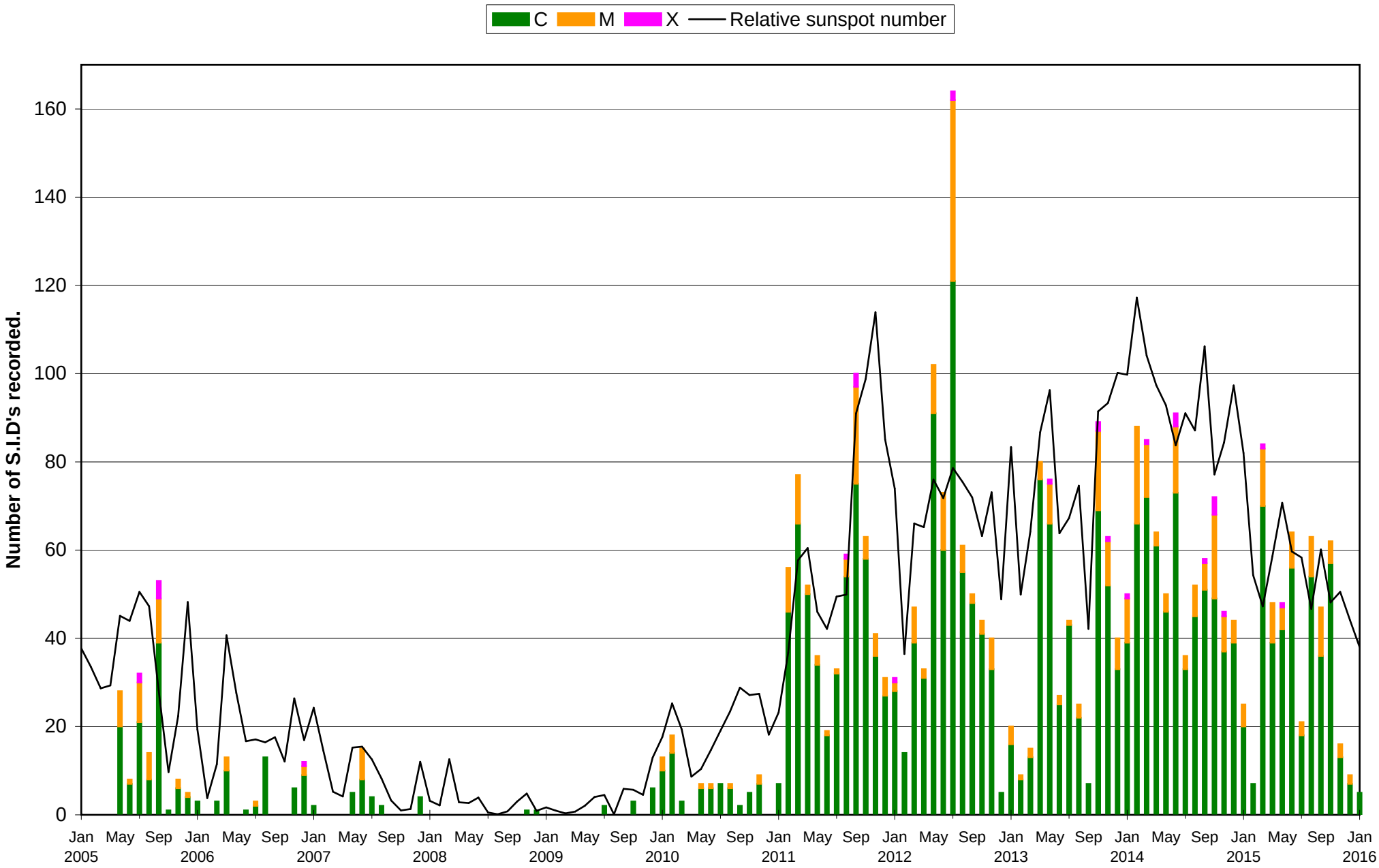
BAA Radio Astronomy Group. **2016 JANUARY**

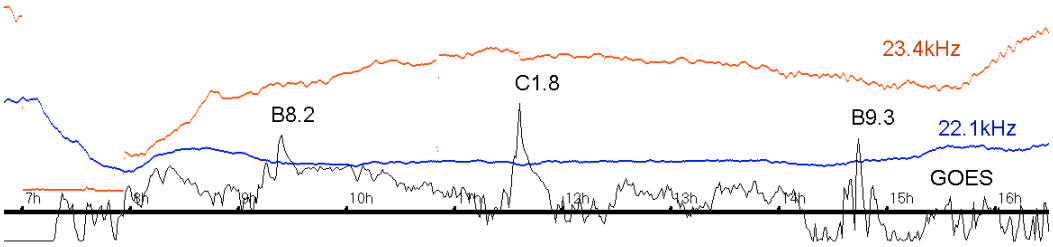
	Xray class	Observers	John Cook (23.4kHz/*22.1kHz*)				Roberto Battaiola (20.9kHz)				Paul Hyde (22.1/23.4kHz)				Mark Edwards (**20.9**/24.0/*18.3kHz*)				Colin Clements (23.4kHz/*22.1kHz*)			
			Tuned radio frequency receiver, 0.58m frame aerial.				Modified AAVSO receiver.				Tuned radio frequency receiver, 0.96m frame aerial.				Spectrum Lab / PC 2m loop aerial.				AAVSO receiver, 0.76m screened loop aerial.			
DAY			START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)		START	PEAK	END (UT)	
6	C1.8	2	11:36	11:38	11:47	1-									**11:36**	**11:39**	**11:49**	**1-**				
15	C1.7	1													15:21	15:26	15:31	1-				
27	C1.0	3									13:29	13:31	13:58	1+	13:29	13:32	13:36	1-	13:19	13:28	13:30	1-
28	C9.6	7	11:55	12:02	12:23	1+					11:55	12:03	12:33	2	11:57	12:03	12:25	1+	11:56	12:01	12:16	1
29	C3.5	1	08:13	08:17	08:28	1-																

			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)	
6	C1.8																					
15	C1.7																					
27	C1.0																					
28	C9.6		11:56	12:02	12:21	1	11:56	12:03	12:20	1									12:00	12:10	12:30	1+
29	C3.5																					


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

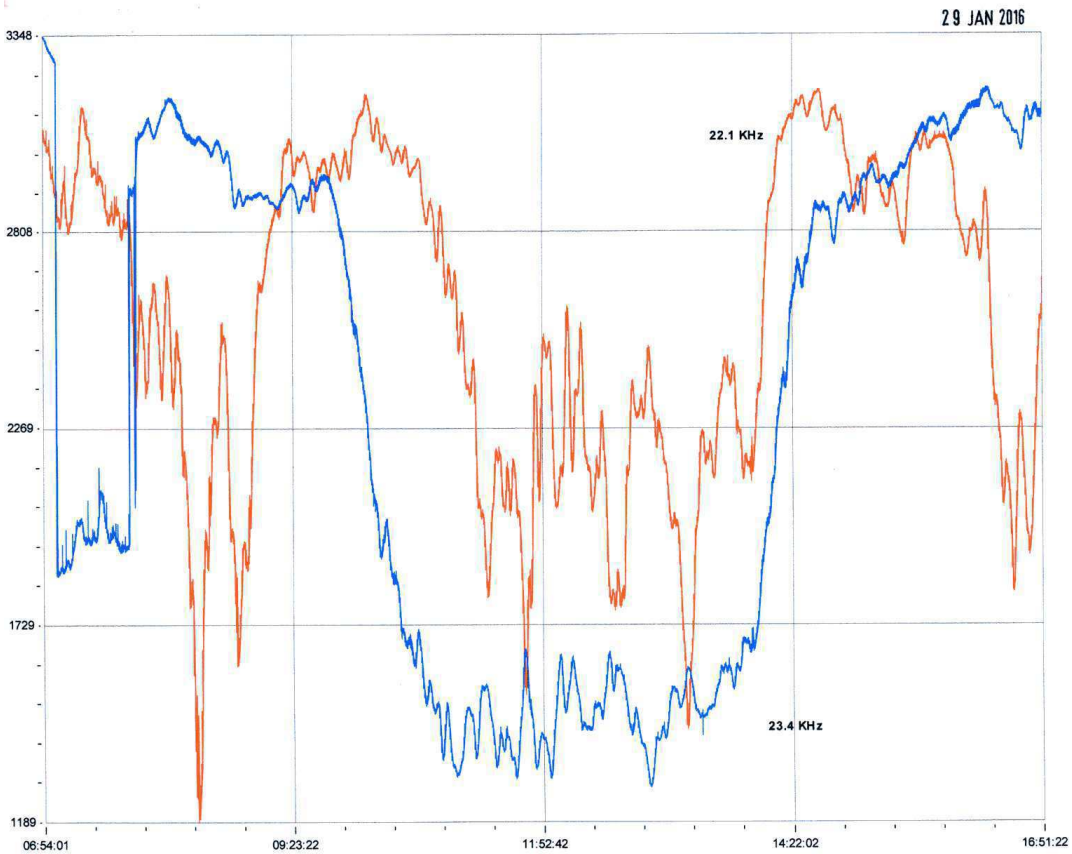
BAA Radio Astronomy Group. **2016 JANUARY.**

The decline in solar activity at the end of 2015 has continued into the new year, with just five flares recorded as SIDs. None were of M- or X-class, although the GOES data does show a single M2.3 flare at 00:11UT on the 1st. From then until the 12th there were a total of just 23 flares, mostly of B-class. A single C1.8 flare was well timed near midday on the 6th, but general ionospheric instability made the SID very difficult to record.

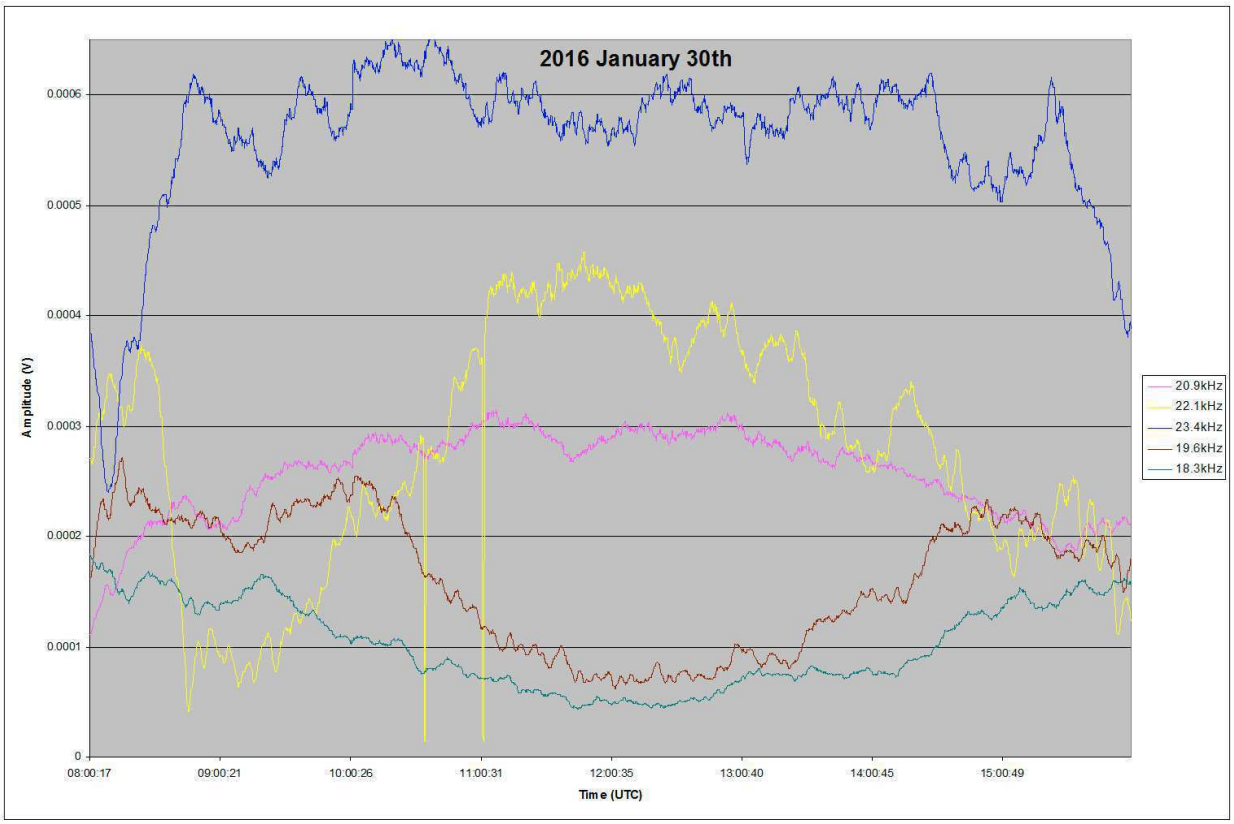


I have added the GOES X-ray flux to my own recording, above, to show just how insignificant this SID was.

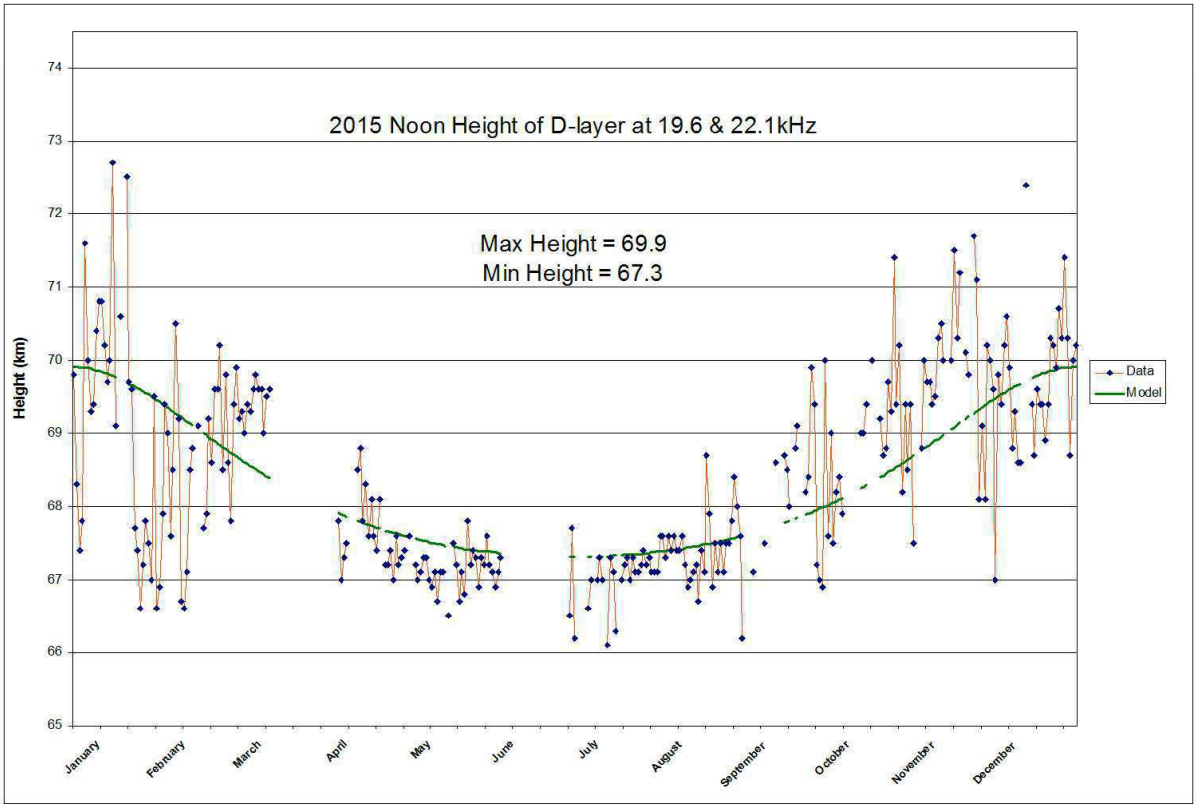
Noise from ionospheric instability has been a major feature through January. Colin Clements reported that it seemed to increase in magnitude through the month, an effect that I also noticed along with a general increase in signal level at 23.4kHz. On several occasions my receiver was saturated during the day, with much lower signal levels at night. Colin's recording from the 29th is shown below:



22.1kHz is in red, and shows some very strong disturbances from about 11 to 14:00UT. Mark Edwards also noted these oscillations on the 29th, and particularly on the 30th shown on the next page:



Much of the UK was battered by strong storms at the end of January, and some of this ionospheric instability may well be linked to these weather systems. Modelling the D-region height, Mark noted a significant rise from 69.4km on the 29th to 71.2km on the 30th. Mark has also produced his usual chart of D-region height in 2015, based on observations at 19.6kHz and 22.1kHz:

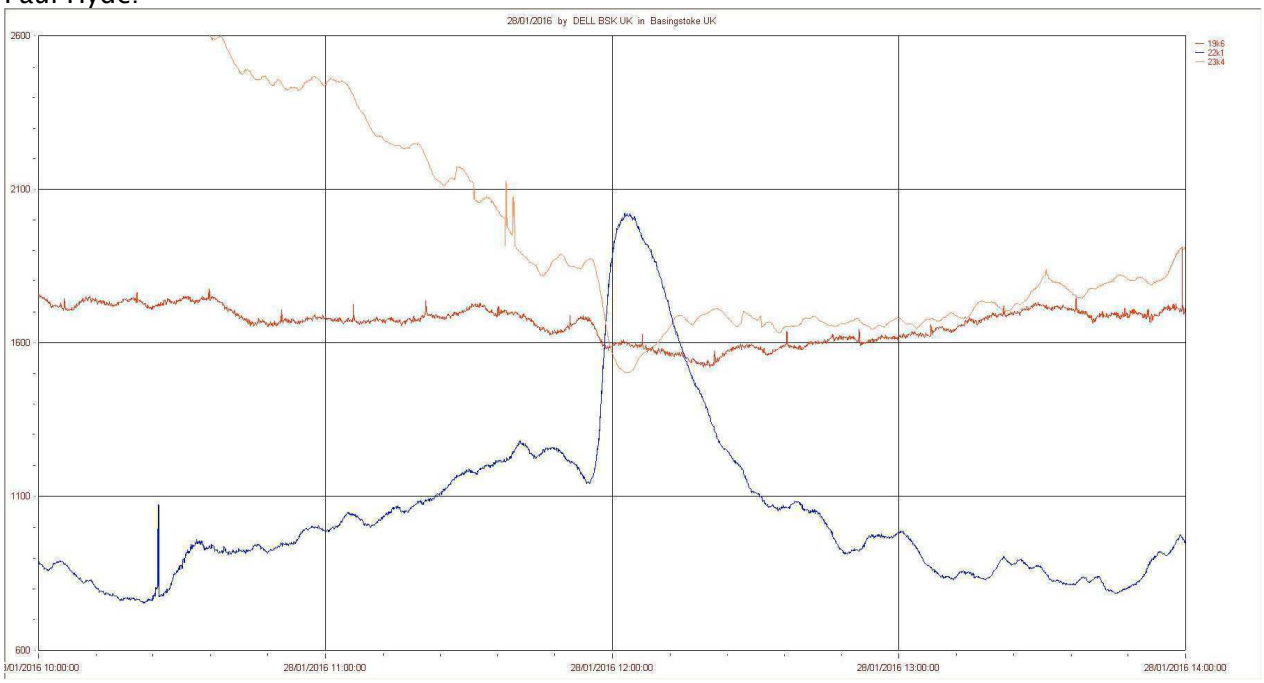


Red is the actual data, green is the model output. Note the large variations in actual height through the winter months compared to summer.

It is also interesting to see how the maximum and minimum heights have changed over the last five years:

	Maximum	Minimum	Range
2011	71.6km	67.0km	4.6km
2012	71.8km	66.8km	5.0km
2013	71.4km	66.8km	4.6km
2014	71.0km	67.2km	3.8km
2015	69.9km	67.3km	2.6km

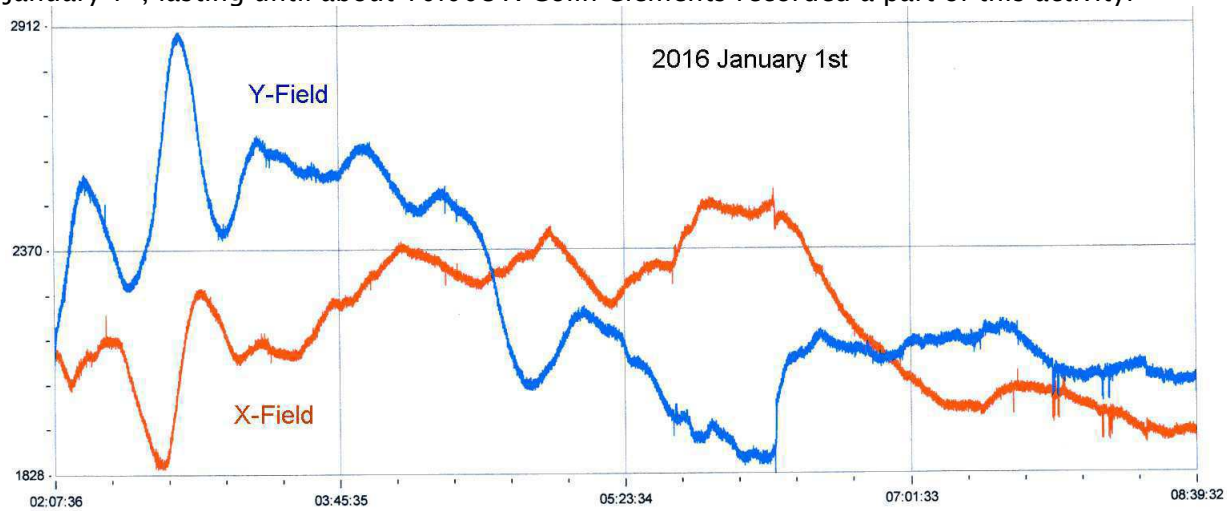
The C9.6 flare on the 28th produced the best recorded SID of the month, well shown in the chart by Paul Hyde:



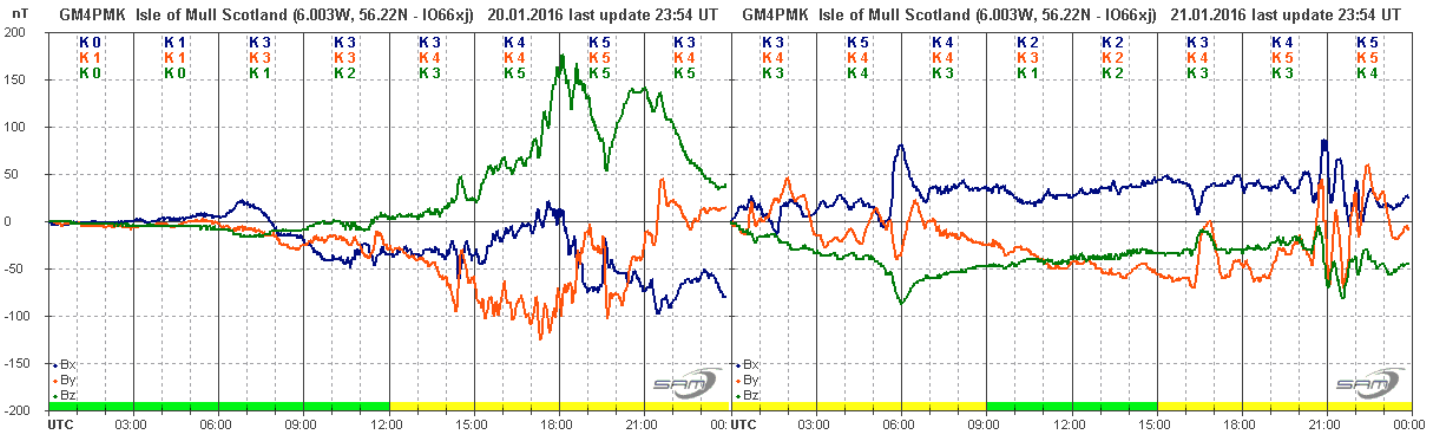
The blue trace (22.1kHz) shows a very strong SID, with a rather smaller SID at 23.4kHz (yellow). Strangely, it has hardly recorded any SID at 19.6kHz (red), despite the very similar path to that at 22.1kHz.

MAGNETIC OBSERVATIONS.

In the December summary I noted a strong magnetic disturbance on December 31st. This continued on January 1st, lasting until about 10:00UT. Colin Clements recorded a part of this activity:



The only strong CME in January originated with a filament eruption in the solar southern hemisphere on the 14th. ACE satellite data shows a magnetic shock at 20:56 on the 18th, but I have no SSC recorded for this event. There followed a very mild magnetic disturbance on the 19th, but its real effect was not seen until the 20th and 21st. CHHSS effects added to the CME in the afternoon of the 21st, increasing the strength of the disturbance. I have combined two of Roger Blackwell's charts to show the activity. Note that the magnetometer is reset at local midnight, producing a discontinuity.



There was a very mild disturbance overnight on the 6th/7th of January, measuring about 28nT on my single-axis magnetometer. This was from a recurrent coronal hole high speed stream. CHHSS effects were also responsible for a longer period of disturbance from the 10th to 13th, measuring about 50nT maximum.

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

BAA Radio Astronomy Group

BARTELS DIAGRAM

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

2454

	2138																				2013 July					
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
F BC									CC	CCC	CC	C	M	CCCC	B	C	CBC	C		CCCC	CC	CC	MCCC	CCCC	CCCC	

2455

2139																							2013 August	
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
F CB		C	C	CC	C	C	C	CC	C	C	CC			CC						C	CCCC	C				

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
F								CCC	M	CCCC	CCC	CC	CC	CMM	C	C	C	CC	C							

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
F	C	C		BC	C																CCCC					

2458

		2142			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
F										C	C		C	CCCC	MCCC	CCC	C	C	CMCC	CCC	CCM	CCCC	CCC	CC		CCCM

2459

		2143							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
F CCCC	CMMC	XMXM	MMMM	CCMC	MMMM	CCCC	C	MCC	C	CCC	C	CCC	MCCM	CCCM	CCMC	M	CC	CCC	CMC	CC	CCCM	CCC	C	MCC	CCC	CCC

2460

		2144										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
F X	CC	M	C	CCM	CC							C	C			C	C		C	CCC		CC	C		CC	CC

2461

		2145															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
F C			C	CMCC	C	MMMM	M		C		CC	CC	MCCC	C	C	C	C	CCMC	CCMC	C	C	CMCX	CCCC			CCC

2462

		2146																			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
F	CC	C		C	CCCC	CC								C	C	MMMM	CCC	MCC	CM	CCCC	MMMM	CCCC	MCCM	CCCM	CCC	CCMC

2463

				2147																			2014 March				
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	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

				2148																				2014 April	
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
F		CCMM	CCCM	CMCC	CMC	CCM	C	CCC	CC	CCC	C	CCCC	CC	C	MCC	CC	CC		CC		CM	CCCX	M	MC		CCM

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
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

	2014 May				2150																					
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
F B		CCC	CCCC	CCCC	C	MCC	CMC	M	CCCC	CCC	CCCC		C	CCC	C	CCC				B	C	C		M	C	CCC

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
F C				B	C	M	CCM				CC	CC	CCC	CCXX	MMXC	MMMM	MCCC	CCM	CMCC	CCCC	CBCC	CC	C	CC	C	B

2468

					2152			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
F	BBB				CCCC	CCCC	CC	CCCM	C		C		CC	CC	CM	C	CC		CCC	CCCC						

2469

					2153								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
F	B				C	CCCB	CC		CC	CC	CMCC	CMM	CC	C		CCC			CCCC	C						CC

2470

						2154															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
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

						2155															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
F CCCC	CC			CC		CMC	C	CC	CCC			CC	C	CCC	M	CCMM	C			MM	CCC					C

2472

							2156																		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
F MCCC							CCM	CC	MCCC	CCCC	MCMM	CCCM	CCXM	MCC	MCC	CCCX	XCCM	CCMX	CCM	MMMM	CCCC		CCCC		M	MM

2473

							2157																					
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
F MC	C	MCCX		CCM	CC	C	C	C	CC	M	CCCM	C					C	C	C			CCC	C	CCCC	CC	

2474

2014 December							2158																			
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
F CCC	CCCC	MCM	CCM	C			CCCC		C	C	CCC	CC		CCC	CC	CCC	MC	C	M	C			C	C		C

2475

		2015 January					2159																			
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
F C		C			M	M	C	C	CC	C	C	C		CC	C	CM	CC						CCC		CC	

2476

							2015 February																			
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
F		CC	C	MC	M		C		CC	C																C

2477

								2015 March																		
21	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
F							CC	C	CMCCM	CC	CC	CM	MCCC		C	CCMC	CCCC	MMCX	CMMM	C	CCCC	MCCC	CCMC		CCCC	C

2478

									2162				2015 April													
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
F			C		CC	CC	CCC	CC	CCCC	CC									M	CCCC	CCCC	C	CMCC	CCC		C

2479

									2163							2015 May										
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
F CCCC	C	CCC			MMMM	CCMC	CMCC	C	C	C							C	CCC	MMMX	CCMC	CCCC	CC	CC	CCC		CC

2480

									2164												2015June					
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
F CCCC	CCCC			B		C	C			CC										C		CC	CC		CC	

2481

									2165															2015 July		
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
F	CCC	CMCC	CC	MCCC	C	CC	CC	CC	CCM	CCCC	MC	MCCM	CCCM	C	C	M			C	CCCC	C		C	CCCM		

2482

									2166																	
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
F MCCM	C			C				C				C						CC		C						C

2483

2015 August										2167																
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
F				C	CBCC	CC	C						C					CC	MCM	MCCM	CCCC	MCCM	CCCC	CC	M	CMCM

2484

	2015 September								2168																	
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
F CCC	CC				C													CC	CMCC	C	C	CCM			CCC	

2485

						2015 October			2169																	
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
F	C	CMCC	MCMM	MMCM	CMCM	CCM	CCMM	CCCC										CC	CC	CCCC	MCCC	CCCC		CCC	C	CCC

2486

										2015 November																
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
F				C		C	CC	CCCC	CCCM	CCCC	CCCC		CMM					M	CC							

2487

										2171			2015 December													
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
F			C														C					C		CC		

2488

										2172							2016 January									
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
F						M	C						M	C								C				

2489

											2173										2016 February					
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
F				C												C	C	C								