



Please send all reports and observations to [jacook@jacook.plus.com](mailto:jacook@jacook.plus.com)

**BAA Radio Astronomy Section.**

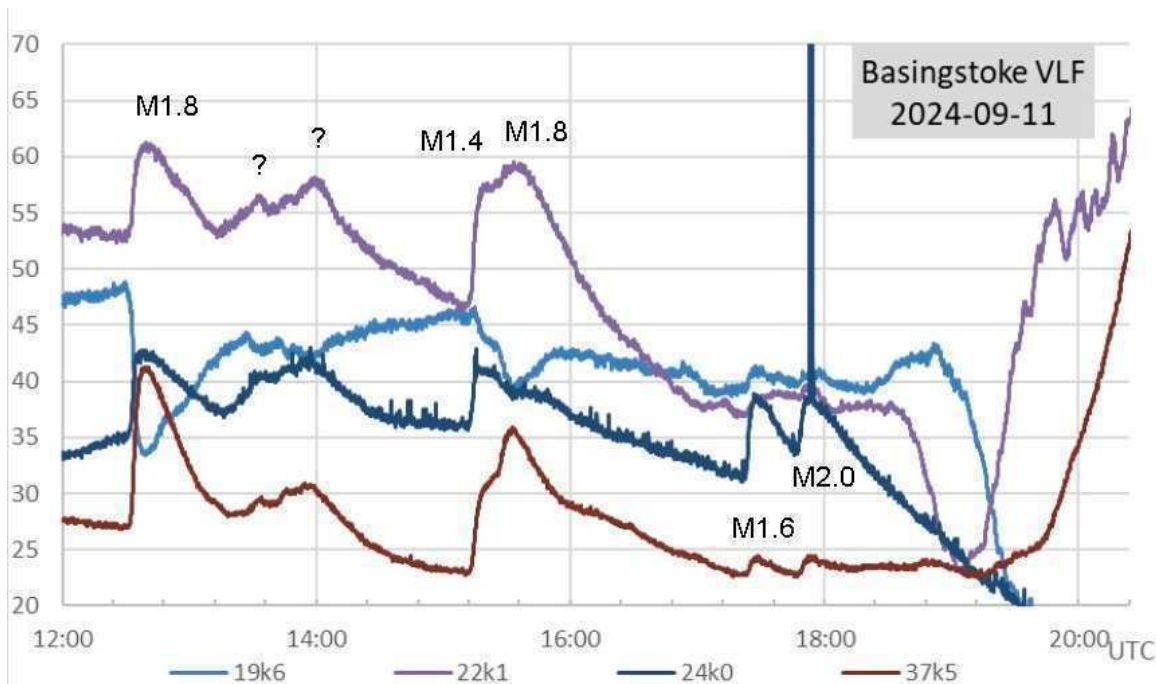
Director Paul Hearn.

## RADIO SKY NEWS

## 2024 SEPTEMBER.

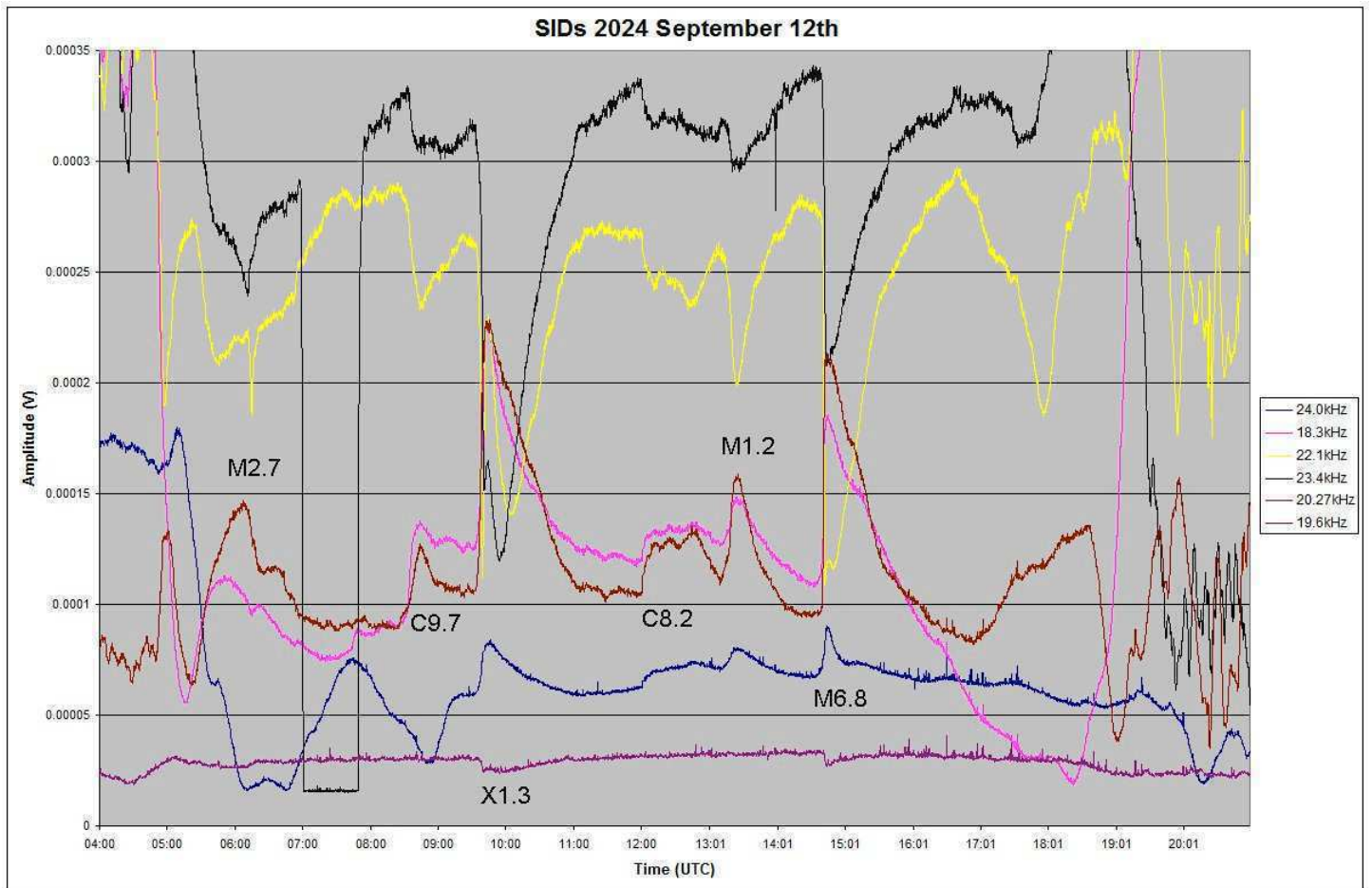
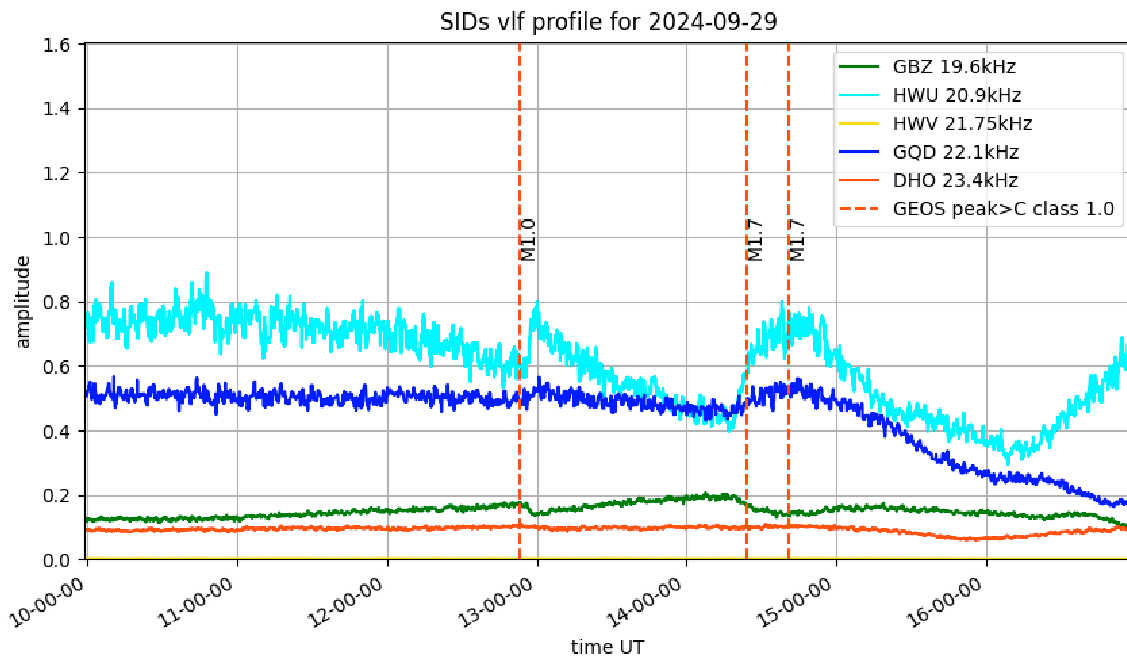
### VLF SID OBSERVATIONS.

Solar activity in September started strongly, but faded away mid-month. We recorded 132 classified flares compared with 305 in August. This lower level was last recorded in February, with a count of 134. Many of the flares were fairly strong, with 34 M-class and two X-class. There were also plenty of multiple peaked flares, some of which merged to give a single SID depending on the frequency monitored.



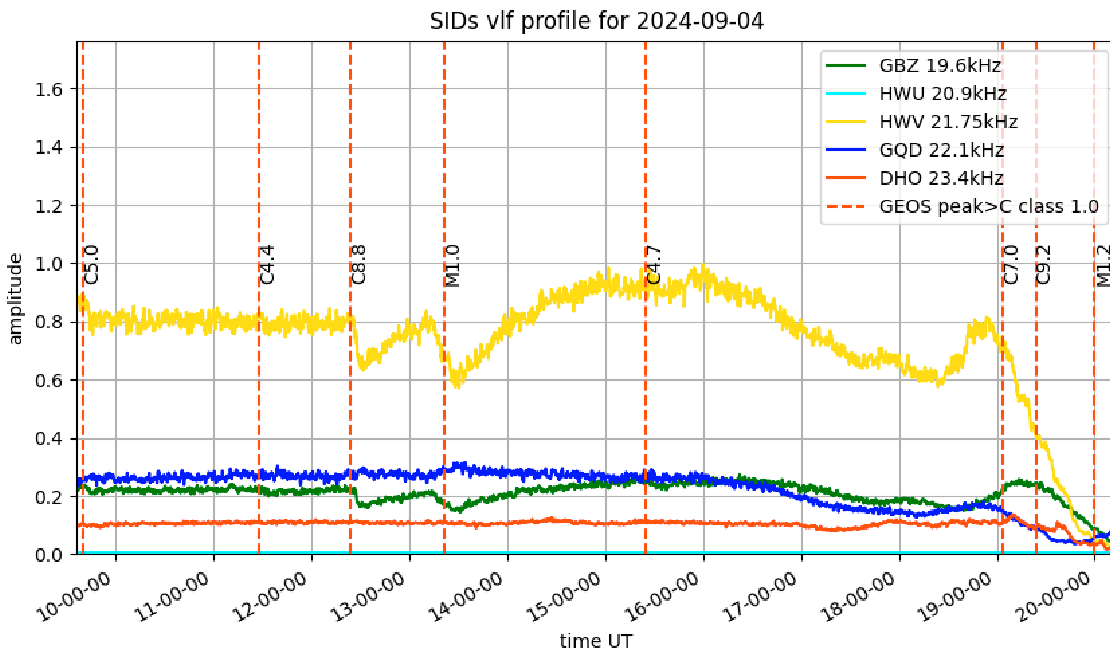
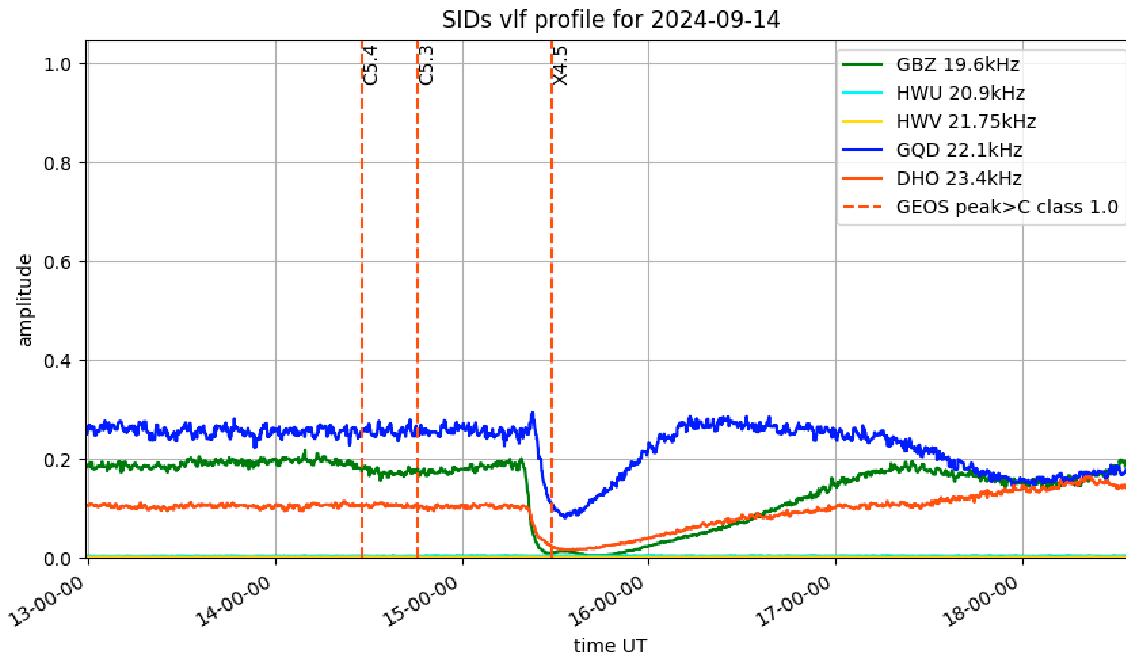
Paul Hyde's recording from the 11<sup>th</sup> shows the merging of the M1.4 and M1.8 flares, giving a double peaked SID. The SWPC satellite bulletin lists these as being from AR 13811, with peaks just 12 minutes apart. The recording also shows a pair of unlisted events earlier in the afternoon. The M1.6 and M2.0 flares later in the afternoon have produced smaller SIDs, although the 24kHz Atlantic path are much stronger. This was just 10 days before the autumnal equinox, the days getting noticeably shorter and the sunset effect clearly seen at 19.6kHz and 22.1kHz.

There was a similar pair of merging flares on the 29<sup>th</sup>. The SWPC bulletin lists two M1.7 flares from AR13842 just 17 minutes apart. They were immediately followed by an unclassified flare lasting until 15:11. A single SID is shown in the recording by Mark Prescott, with just a hint of a second peak at 19.6kHz.



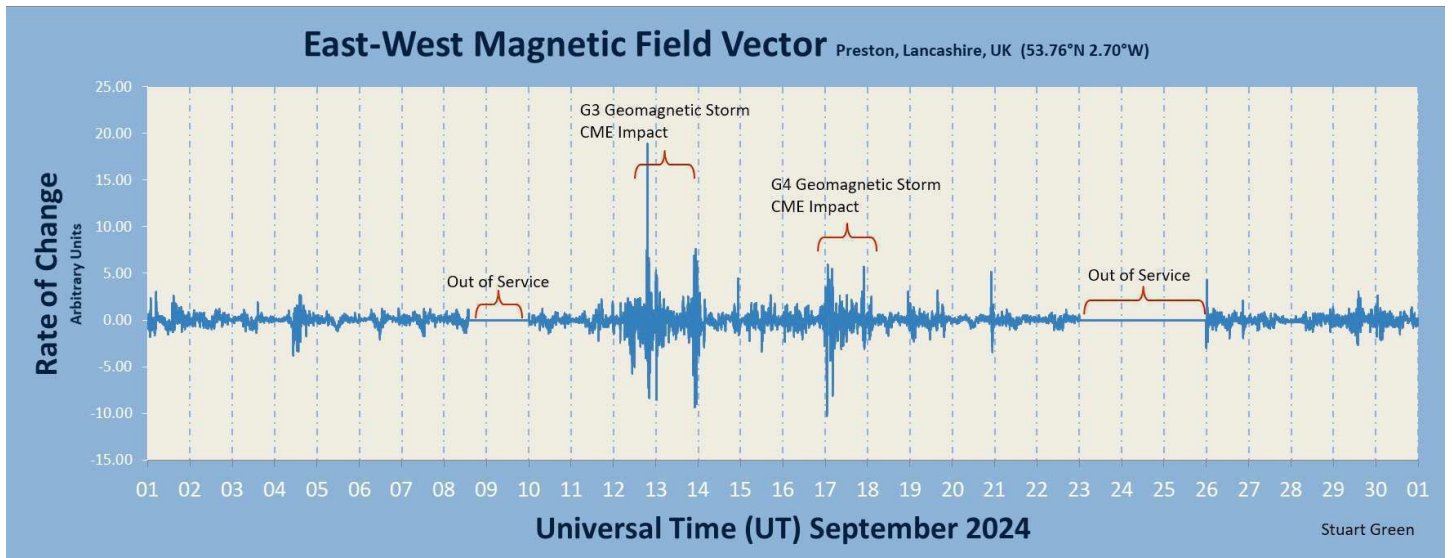
The first of the X-flares was recorded on the 12<sup>th</sup>, shown in Mark Edwards' recording along with the rest of the day's activity. I have labelled the strongest of the SIDs, but there were also several unclassified flares appearing as more multiple peaked SIDs. The southern path at 20.27kHz has only been weakly effected by the activity, while 19.6kHz and 22.1kHz show a much greater response to the flares.

The X4.5 flare on the 14<sup>th</sup> was towards the end of the strong activity, with just two other flares shown in the SWPC satellite data for the 14th. Mark Prescott's recording (below) shows a pair of similar SIDs at 19.6kHz and 23.4kHz, with what appears to be a much shorter SID at 22.1kHz. This is really a spike and wave SID with just a very small spike at the start of the flare that is followed by a very long recovery period. Mark Edwards reported a spread of over 90 minutes in the end timing of this event over the seven signals monitored.



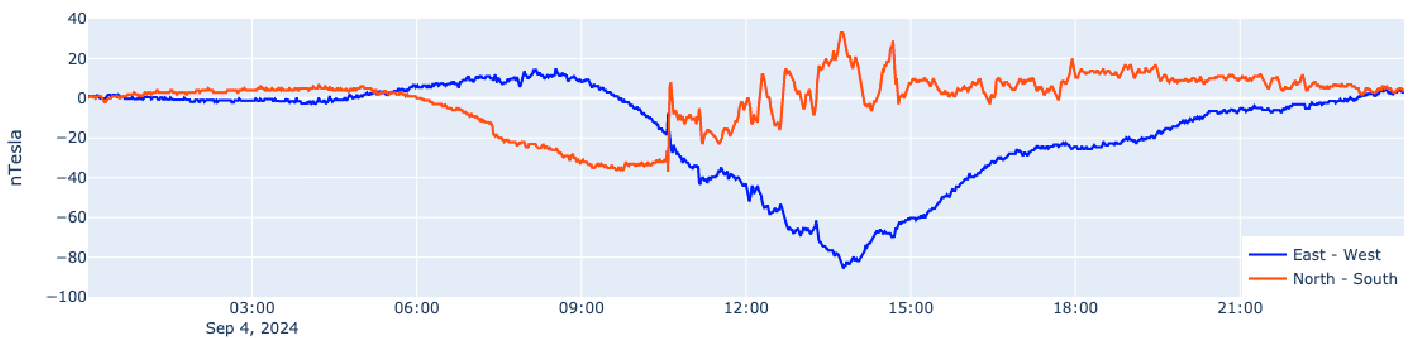
Mark Prescott's recording on the 4<sup>th</sup> shows a series of SIDs at 21.75kHz, much clearer than the other signals. 23.4kHz has not responded at all, while 19.6 and 22.1kHz just give some weak SIDs. The smaller C-flares are not so clear, but the high background X-ray flux level meant that the C-flares gave only a very small increase in flux. The reduced activity later in the month resulted in a lower background level, and so more C-flares were recorded.

## MAGNETIC OBSERVATIONS.

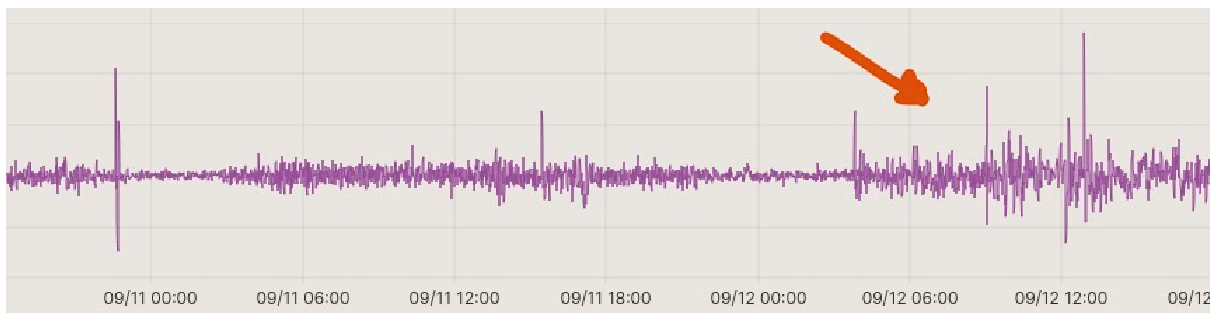


Stuart Green's summary of the month's magnetic activity shows just a couple of strong storms around mid-month. There are also two short periods where the sensor was not operating.

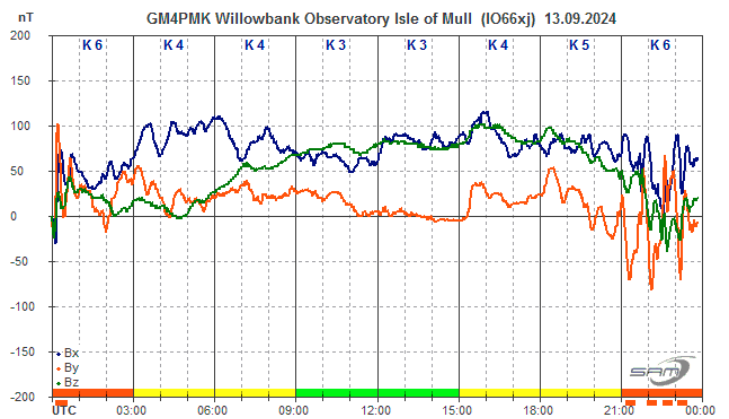
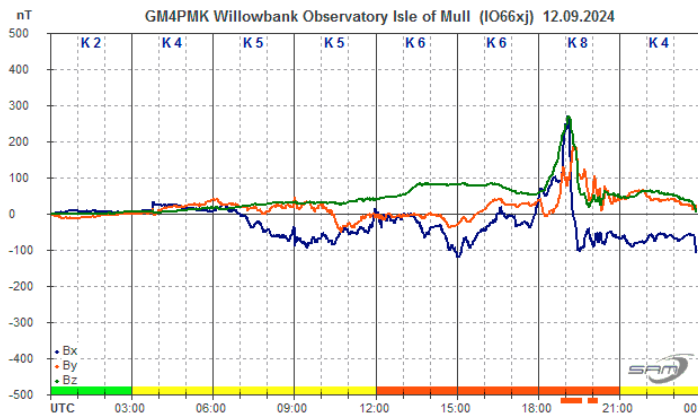
Steining Magnetometer (50.8 North, 0.3 West)



There was a strong sudden impact on the 4<sup>th</sup>, shown in Nick Quinn's recording. My own recording gives a time of 10:32UT. The source of the SI is not clear, the STCE bulletin suggesting a CME from September 1<sup>st</sup>. This however was from the back of the sun, and was not expected to have any effect. The subsequent disturbance was rather mild, and only lasted through the afternoon. There had been some mild disturbance over the previous days, probably from a turbulent solar wind.

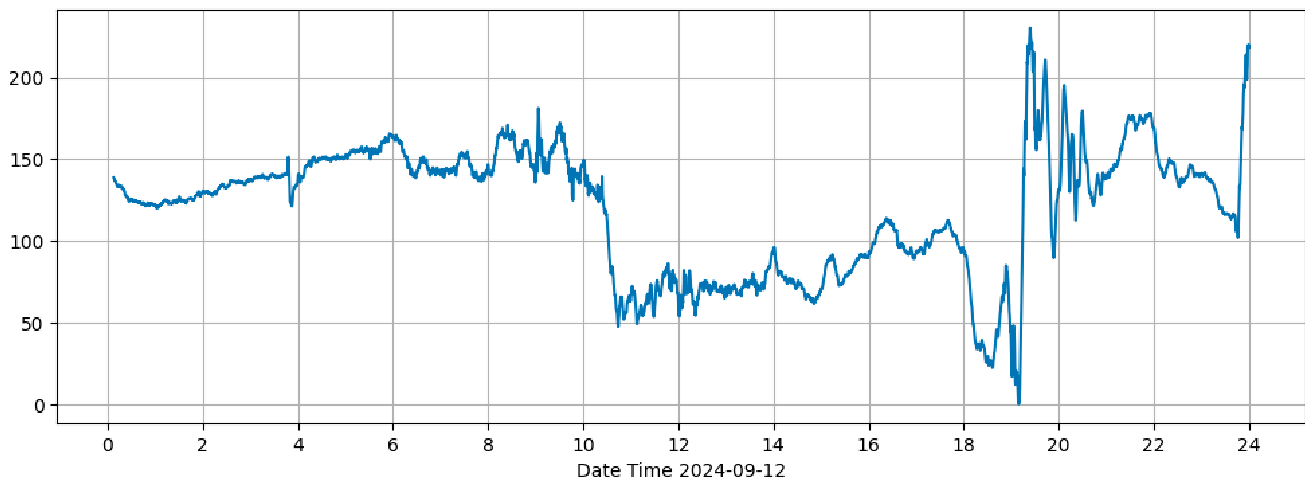


There were some short periods of mild disturbance over the following week, but the first strong activity started on the 12<sup>th</sup>, shown in this chart from Thomas Mazzi in Italy. The activity continued into the 13<sup>th</sup>, shown in Roger Blackwell's recording:



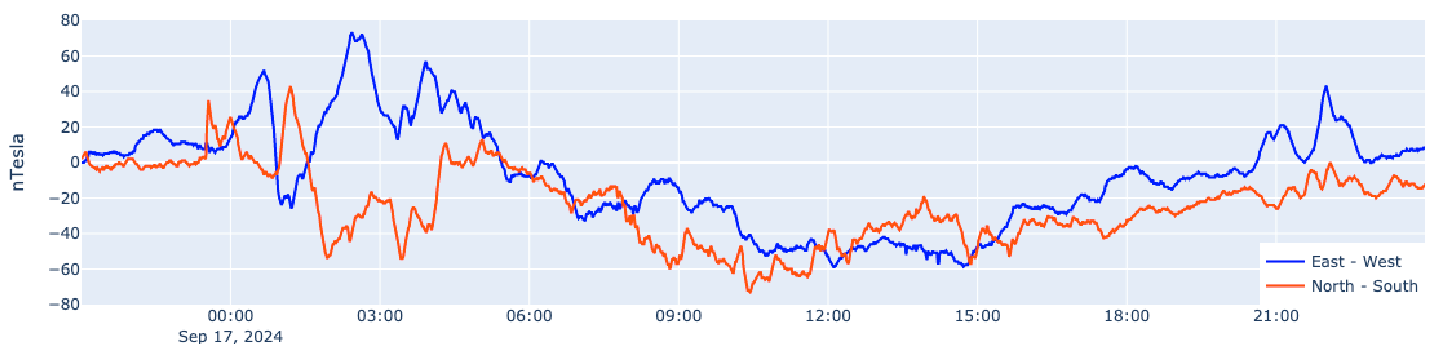
The vertical scale changes between the two charts, the strongest peak being around 18–20UT on the 12<sup>th</sup>. There is a small impact spike at about 03:45, also seen in Callum Potter’s recording:

Wasbister Magnetometer (59.17N,3.06W)



The STCE bulletin lists a CME from the 10<sup>th</sup> as being the source of the disturbance. Mild disturbance continued through the 14<sup>th</sup> to 16<sup>th</sup>, increasing again just before midnight on the 16<sup>th</sup>. Nick Quinn’s recording shows another impact just before midnight on the 16<sup>th</sup>, with a more active period in the morning of the 17<sup>th</sup>.

Steying Magnetometer (50.8 North, 0.3 West)



The STCE bulletin gives the source as a CME from the 14<sup>th</sup>. This activity continued through the 18<sup>th</sup> to 24<sup>th</sup>, before another more active period on the 25<sup>th</sup>. Callum Potter’s recording shows magnetic turbulence all day on the 25<sup>th</sup>:

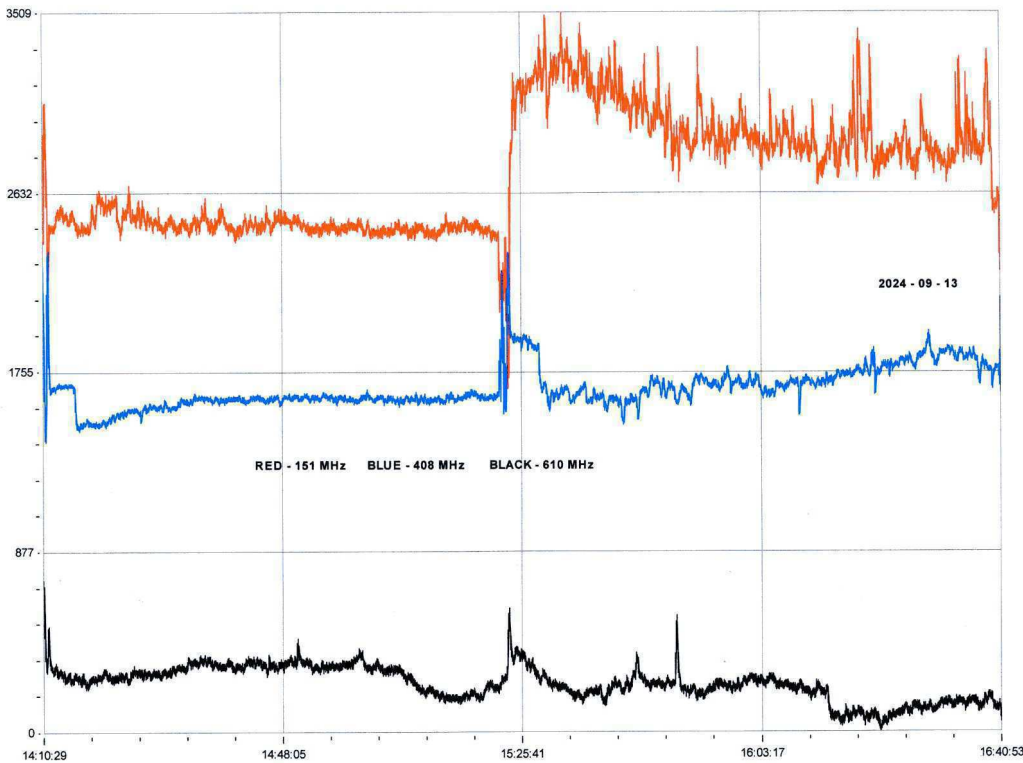
Wasbister Magnetometer (59.17N,3.06W)



It was much quieter after this, with just a few minor disturbances on the 29<sup>th</sup> and 30<sup>th</sup>.

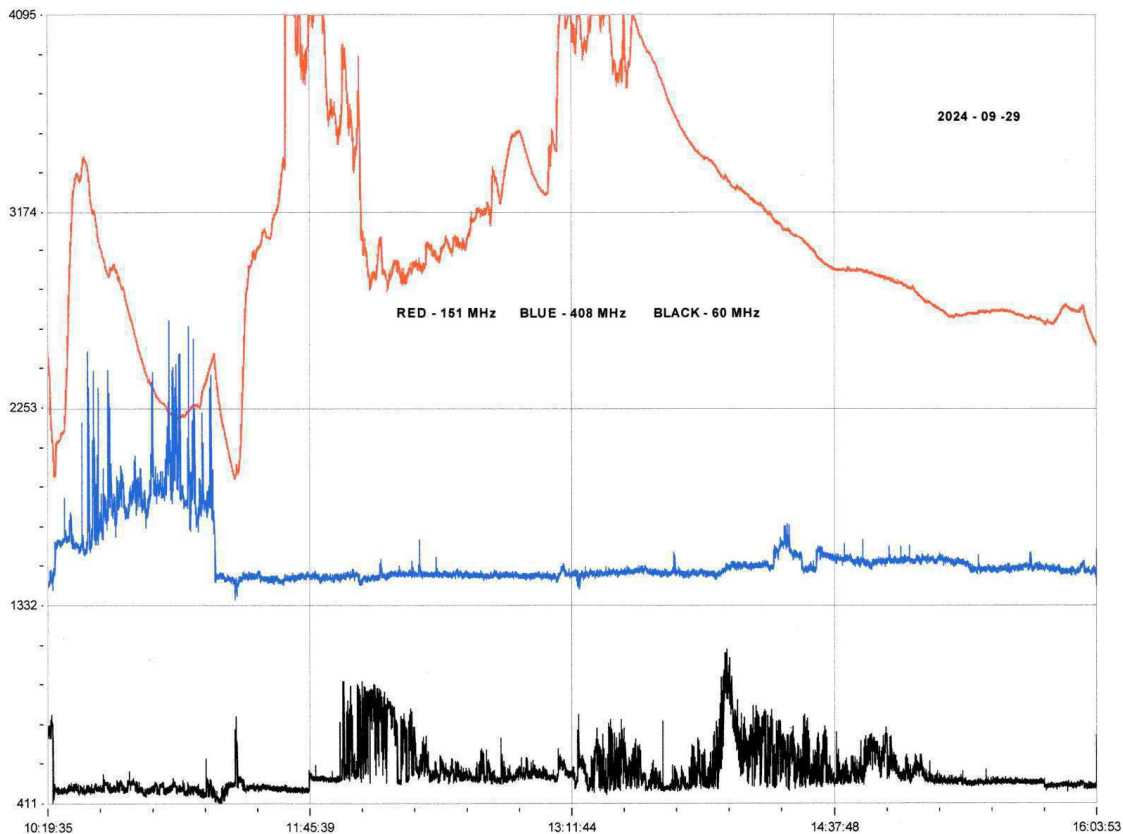
Magnetic observations received from Roger Blackwell, Thomas Mazzi, Callum Potter, Nick Quinn and John Cook.

### SOLAR EMISSIONS



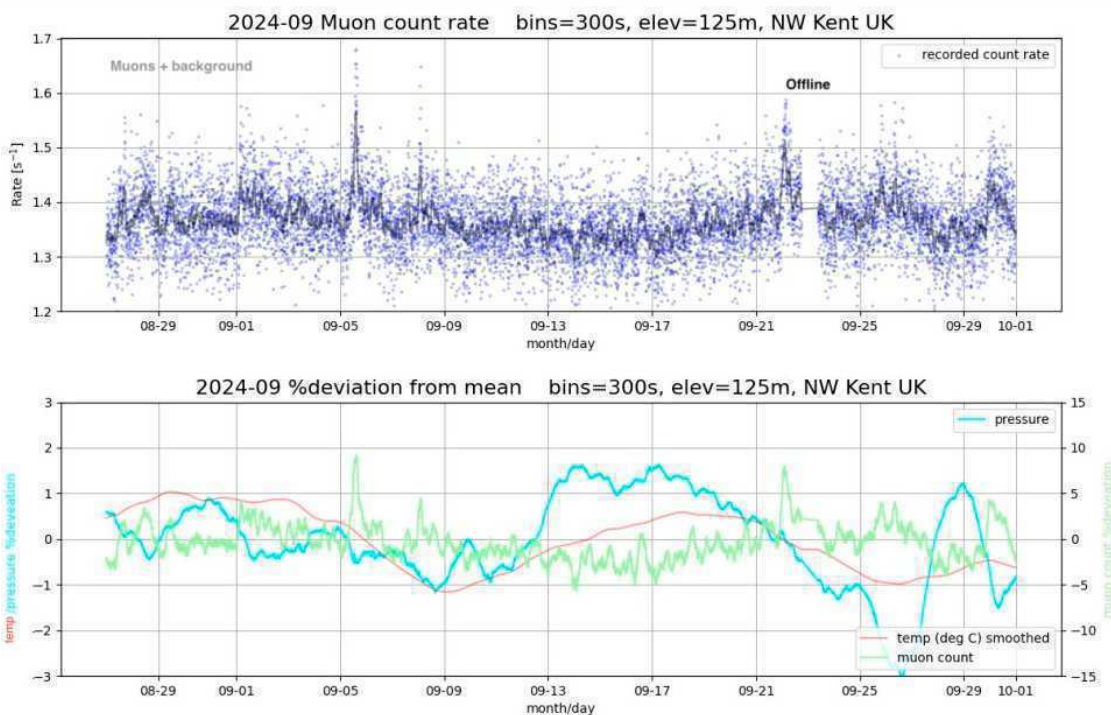
Colin Clements' recording from the 13<sup>th</sup> shows a strong 151MHz emission starting at 15:05UT, matching the M1.2 flare. The flare lasted for over an hour based on our SID timings, the 151MHz noise lasting rather longer. Much shorter noise bursts were recorded at 408MHz and 610MHz.

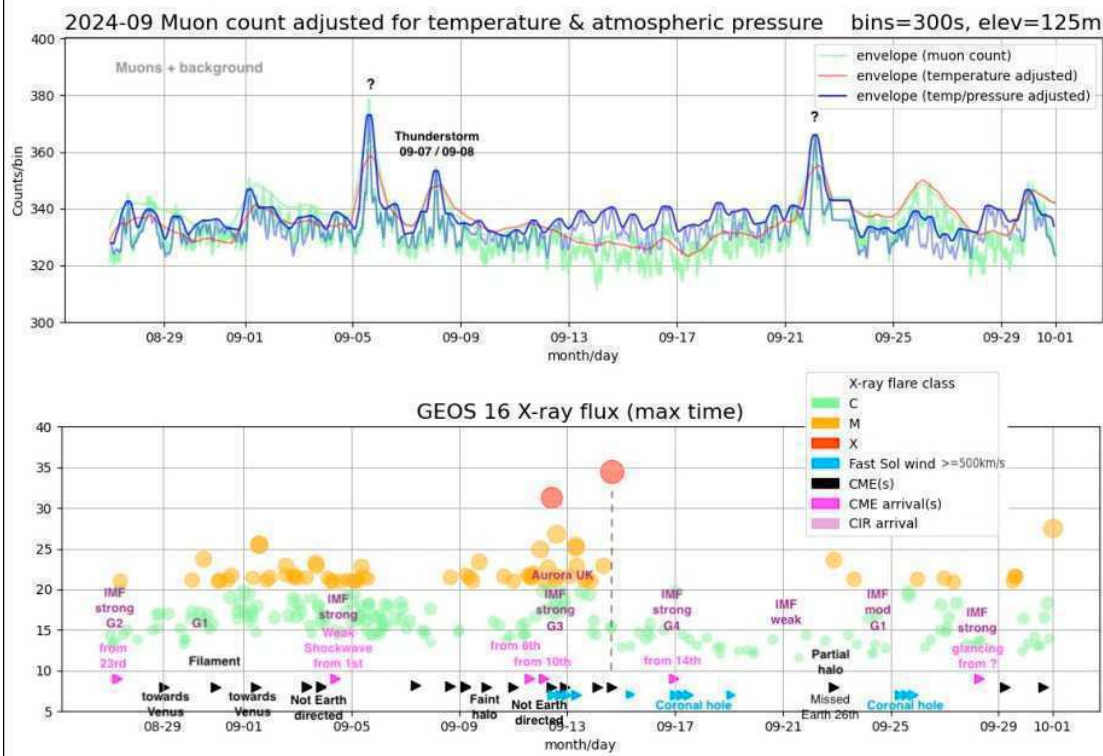




Colin's recording from the 29<sup>th</sup> shows a lot of 151MHz activity. The strong peak around 13:00 matches the M1.0 flare, possibly with a contribution from the first of the M1.7 flares at 14:21. The SWPC bulletin includes an unclassified flare at 11:07 which may be linked with the earlier 151MHz and 408MHz activity . Colin has also recently installed a 60MHz antenna in the loft, aimed to catch the Autumn / Winter activity. This has shown activity for nearly three hours from midday, covering the M1.0 and both of the M1.7 flares.

### MUONS





Mark Prescott's Muon charts show three very pronounced peaks. One of these was due to a local thunderstorm, and is a common effect, the other two do not appear to match any significant solar activity. There had been multiple minor CMEs early in September, but no significant magnetic disturbances was recorded on the 5<sup>th</sup> or 22<sup>nd</sup>. The weather here in the UK has been fairly turbulent with a large variation in air pressure, but the peaks remain after the raw data has been corrected for temperature and pressure.

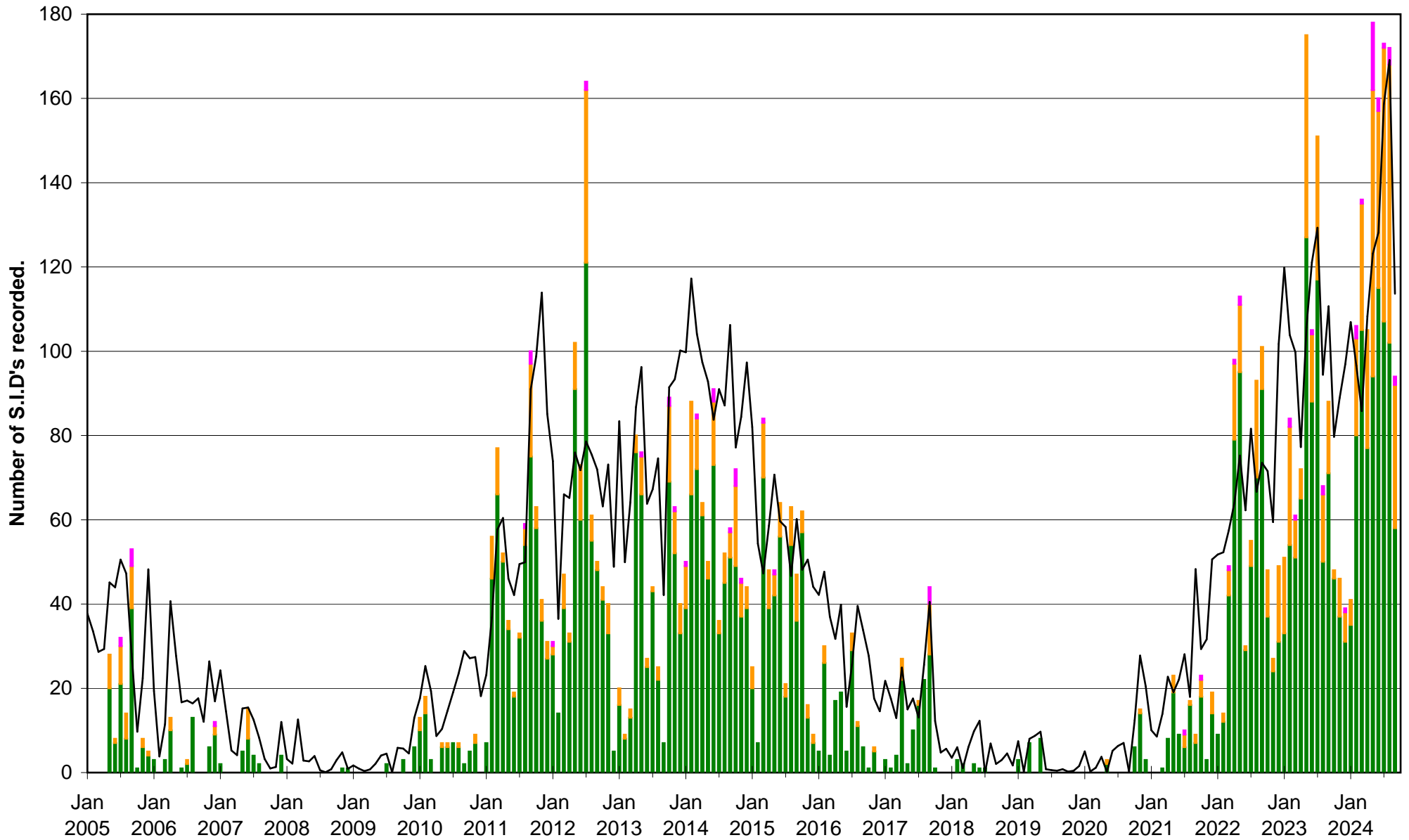
The August BAA journal included an interesting item describing the construction of a Muon detector. One of the members of our local library astronomy group has built a version of this design, bringing it along to a recent meeting. The results were quite interesting, with several captures during the short period that it was operating. It is essentially a miniature cloud chamber, so events are seen visually rather than being logged and counted. To demonstrate its operation we had a small web camera aimed into the chamber, with the activity seen on a monitor screen.

Section webinars continue, with a talk on the development of a global network for cosmic ray Muon detection on Friday December 6<sup>th</sup>. If you are not on the mailing list for the webinars, then do contact Paul Hearn for details.



# VLF flare activity 2005/24

C M X — Relative sunspot number



BARTELS DIAGRAM

ROTATION	KEY:	DISTURBED.	ACTIVE	SFE	B, C, M, X = FLARE MAGNITUDE.	Synodic rotation start (carrington's).
2570	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			
2571	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				
2572	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				
2573	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				
2574	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				
2575	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				
2576	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				
2577	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				
2578	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				
2579	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				
2580	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				
2581	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				
2582	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				
2583	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				
2584	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				
2585	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				
2586	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				
2587	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				
2588	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				
2589	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 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				
2590	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				
2591	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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22				
2592	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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18				
2593	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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15				
2594	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 1 2 3 4 5 6 7 8 9 10 11 12				
2595	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 1 2 3 4 5 6 7 8 9				
2596	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				
2597	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				
2598	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 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				
2599	29 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 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				
2600	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				
2601	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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19				
2602	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 1 2				
2603	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 1 2 3 4 5 6 7 8 9 10 11 12				
2604	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 1 2 3 4 5 6 7 8				
2605	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 1 2 3 4				
2606	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	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 1				

DAY	X-ray class	Observers	John Cook (23.4kHz/22.1kHz)			Roberto Battaiola (23.4kHz)			Paul Hyde (Various)			Mark Edwards (24.0/19.6/22.1kHz)			Colin Clements (21.75/23.4kHz)			
			Tuned radio frequency receiver, 0.58m frame aerial.			Modified AAVSO receiver.			Spectrum Lab / PC 1.5m frame aerial.			Spectrum Lab / PC 2m loop aerial.			Tuned Radio Frequency receivers, 0.76m screened loop aerial.			
			START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	START	PEAK	END (UT)	
1	C6.7	1																
1	M1.4	6							07:54	08:02	08:43	2+	07:21	07:24	07:32	1-		
1	C4.7	1											07:55	08:02	08:28	2		
1	C8.0	1											10:53	11:10	?	-		
1	?	1											10:49	11:27	?	-		
1	?	1											11:40	12:29	?	-		
1	M5.5	6							11:50	12:18	17:14	3+	12:45	13:01	16:37	3+		
2	?	1											11:03	11:11	?	-		
2	C6.7	4							11:25	11:32	11:49	1	11:20	11:33	?	-		
2	?	1											11:54	12:06	12:35	2		
2	?	4	13:15	13:28	?	-			13:17	13:25	?	-	13:15	13:28	15:06	3		
2	M2.9	8	13:36	13:42	14:50	2+			13:36	13:42	14:55	2+	13:35	13:44	14:58	2+		
2	C6.6	4					15:42	15:48	15:56	1-			15:44	15:48	16:03	1		
2	C9.0	1											19:30	19:33	19:37	1-		
3	M1.4	6							07:18	07:29	08:30	2+	07:20	07:34	08:07	2+		
3	C5.5	5	09:58	10:02	10:30	1+			09:57	10:03	10:20	1	09:59	10:02	10:21	1		
3	C8.7	8	10:46	10:51	11:32	2+			10:44	10:54	11:29	2	10:47	10:55	11:26	2		
3	C4.6	4	11:44	11:46	11:59	1+			11:45	11:49	12:07	1	11:44	11:50	11:55	1		
3	*	1											13:01	13:05	13:18	1-		
3	*	2	14:02	14:04	14:27	1							14:03	14:07	14:22	1		
3	M3.3	10	15:59	16:04	17:45	3	15:57	16:03	17:08	2+			15:59	16:07	?	-		
3	?	1											16:10	16:13	16:54	2		
3	C7.5	1											17:51	18:03	18:32	2		
4	C5.0	3	09:39	09:40	09:50	1-			09:38	09:42	09:51	1-	09:40	09:44	10:05	1		
4	?	1											10:27	10:37	10:55	1+		
4	C4.4	2	11:25	11:28	11:58	2							11:26	11:31	11:36	1-		
4	C8.8	10	12:22	12:25	12:53	1+	12:21	12:25	12:47	1+	12:21	12:27	12:50	1+	12:23	12:26	12:58	2
4	M1.0	10	13:11	13:22	13:50	2	13:08	13:20	13:43	2	13:11	13:25	13:46	2	13:11	13:24	14:21	2+
4	C4.7	4					15:21	15:26	15:40	1	15:23	15:30	15:40	1-	15:22	15:29	15:56	2
5	C5.6	3	07:52	07:57	08:08	1-							07:50	08:00	08:05	1-		
5	C7.6	2							08:17	08:23	08:43	1+	08:19	08:25	08:42	1		
5	M2.8	8	08:52	08:57	?	-			08:49	08:58	?	-	08:44	09:12	?	-		
5	M1.6	6	09:34	09:44	10:20	2+			09:29	09:43	10:30	2+	09:29	09:42	10:29	2+		
5	?	1											11:39	11:42	12:06	1+		
5	C5.1	2							12:46	12:51	13:01	1-	12:50	12:51	13:02	1-		
5	C6.1	2							13:05	13:10	13:15	1-	13:06	13:09	?	-		
5	M1.3	10	13:23	13:26	?	-	13:20	13:25	13:37	1-	13:22	13:29	?	-	13:20	13:25	?	-
5	C7.8	6	14:07	14:18	14:35	1+	14:07	14:39	14:19	1-	14:09	14:24	?	-	14:09	14:20	?	-
5	C7.8	6	14:51	14:52	15:19	1+	14:47	14:57	15:15	1+	14:48	15:00	15:26	2	14:48	15:00	15:33	2
5	C4.4	2							16:06	16:11	16:28	1	16:07	16:12	16:32	1		
5	C4.2	2							17:55	18:03	18:18	1	17:56	18:02	18:15	1		
5	C6.5	1											18:39	18:41	19:00	1		
6	C7.5	4	07:56	08:00	?	-			07:58	08:02	08:30	1+	07:57	08:00	08:08	2+		
6	C6.2	6	14:02	14:05	14:45	2	13:59	14:04	14:13	1-	14:03	14:06	14:39	2	14:02	14:08	14:36	2
6	C7.0	1											16:09	16:28	16:54	2		
6	C8.0	1											19:15	19:17	19:27	1-		
7	M1.6	2	06:52	07:28	?	-							07:05	08:04	09:33	3+		
7	C4.9	1											14:11	14:20	14:29	1-		
7	C5.0	2							16:08	16:17	16:44	2	16:11	16:14	16:34	1		
7	*	1											17:20	17:22	17:32	1-		
7	C4.4	1											17:41	17:47	17:52	1-		
8	M1.5	9	15:19	15:27	16:35	2+	15:10	15:34	15:59	2+	15:14	15:32	16:55	3	15:17	15:31	16:17	2+
9	?	1											08:07	08:24	?	-		
9	M1.5	6	08:41	08:53	09:42	2+			08:41	08:53	09:54	2+	08:30	08:56	?	-		
9	?	1											09:17	09:31	?	-		
9	M1.7	7	10:08	10:27	11:09	2+			10:02	10:23	11:29	3	09:57	10:31	12:04	3+		
9	M1.0	6	12:15	12:17	12:32	1-	12:12	12:19	12:30	1-	12:12	12:18	13:05	2+	12:15	12:21	12:35	1
9	?	1											12:34	12:46	13:34	2+		
9	M3.4	9	17:03	17:04	17:32	1+	17:00	17:10	17:40	2	17:01	17:11	18:16	2+	17:02	17:12	17:31	1+
10	C5.6	9	11:03	11:13	11:55	2+	10:59	11:18	11:58	2+	11:02	11:11	12:31	3	11:03	11:24	?	-
10	?	1											11:58	12:03	12:14	1-		
10	?	2											13:14	13:27	13:35	1		
10	?	1											15:17	15:21	15:27	1-		
10	M1.6	10	15:42	15:48	16:02	1	15:37	15:47	16:51	2+	15:37	15:49	16:57	2+	15:40	15:45	16:45	2+
10	?	1											16:57	17:05	17:24	1+		
10	C3.9	1											17:59	18:03	18:12	1-		
11	C4.5	4	08:26	08:29	08:47	1							08:25	08:32	08:56	1+		
11	C4.5	1											09:36	09:48	?	-		
11	C5.9	2											09:53	10:02	10:20	1+		
11	?	1											10:33	10:38	10:48	1-		
11	C4.6	5							11:09	11:18	11:47	2	11:11	11:20	11:38	1+		
11	*	1											11:54	11:56	12:05	1-		
11	M1.8	10	12:33	12:38	13:22	2+	12:29	12:34	12:56	1+	12:31	12:39	13:14	2	12:33	12:42	?	-
11	?	1											13:18	13:32	?	-		
11	?	1											13:43	13:47	?	-		
11	?	2											13:51	13:53	14:30	2		
11	M1.4	5	15:11	15:21	?	-	15:10	15:18	15:33	1	15:14	15:22	16:33	2+	15:14	15:22	16:33	2+
11	M1.8	8	15:25	15:37	15:43	1-	15:34	15:42	16:34	2+	15:11	15:35	17:03	3	15:14	15:32	16:35	2+
11	M1.6	5	17:23	17:26	17:39	1-							17:22	17:27	?	-		
11	M2.0	2											17:47	17:52	19:00	2+		
12	M2.7	2	06:15	06:20	?	-							06:12	06:15	06:22	1-		
12	C9.7	7	08:34	08:40	09:07	2	08:27	08:39	09:00	2	08:32	08:42	?	-	08:27	08:44	09:01	2
12	*	1											08:58	09:03	09:29	1+		
12	X1.3	10	09:34	09:45	11:09	3	09:38	09:44	10:14	2	09:33	09:44	10:55	2+	09:33	09:48	11:05	3
12	*	1																

DAY	X-ray class	Steve Parkinson (Various)				Andrew Thomas (19.6/18.3/22.1kHz)				Phil Rourke (23.4kHz)				Mark Prescott (19.6/20.9/22.1kHz)				John Elliott (19.6kHz/21.7kHz)			
		Tuned radio frequency receiver, frame aeriels.				Tuned radio frequency receiver, 0.6m frame aerial.				Spectrum Lab, 0.6m frame aerial.				SpectrumLab/Starbase, Active mini-whip 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	C6.7																				
1	M1.4	07:55	08:04	08:50	2+	07:55	08:04	08:58	2+								07:53	08:03	09:05	2+	
1	C4.7																				
1	C8.0																				
1	?																				
1	M5.5					11:47	13:14	16:50	3+	11:44	13:01	15:59	3+	11:48	13:21	16:14	3+				
2	?																				
2	C6.7					11:27	11:31	11:51	1												
2	?																				
2	?													13:21	13:32	?	-				
2	M2.9	13:16	13:44	14:35	2+	13:16	13:45	15:24	3+					?	13:47	14:58	-	13:15	13:45	14:40	2+
2	C6.6	15:43	15:48	16:10	1+																
2	C9.0																				
3	M1.4	07:19	07:31	08:12	2+	07:21	07:29	08:15	2+					07:25	07:36	08:05	2	07:20	07:30	08:50	3
3	C5.5	09:59	10:03	10:15	1-	09:55	10:04	10:23	1+												
3	C8.7	10:46	10:54	11:15	1+	10:45	10:51	11:42	2+	10:36	10:52	11:16	2	10:49	10:59	11:36	2+	10:45	10:52	11:25	2
3	C4.6					11:43	11:46	12:08	1												
3	*																				
3	M3.3	15:59	16:12	17:20	2+	15:59	16:14	17:20	2+	16:00	16:14	17:12	2+	16:03	16:13	17:03	2+	16:00	16:08	17:20	2+
3	?																				
3	C7.5																				
4	C5.0																				
4	?																				
4	C4.4																				
4	C8.8	12:23	12:29	12:59	2	12:22	12:26	13:11	2+	12:23	12:26	12:49	1+	12:27	12:34	?	-	12:23	12:27	13:05	2
4	M1.0	13:12	13:24	13:50	2	13:11	13:23	14:05	2+	13:11	13:24	13:39	1+	13:16	13:31	14:03	2+	13:16	13:23	14:00	2
4	C4.7	15:24	15:27	15:40	1-																
5	C6.6																				
5	C7.6																				
5	M2.8					08:50	08:58	10:48	3	08:52	08:59	?	-	08:56	09:03	?	-	08:53	08:58	?	-
5	M1.6									?	09:43	10:30	-	09:33	09:45	?	-				
5	?																				
5	C5.1																				
5	C6.1																				
5	M1.3	13:23	13:28	13:50	1+	13:21	13:30	16:04	3+	13:22	13:28	13:53	1+	13:26	13:32	13:57	1+	13:27	13:30	14:07	2
5	C7.8									14:09	14:21	14:48	2								
5	C7.8	14:50	15:00	15:25	2																
5	C4.4																				
5	C4.2																				
5	C6.5																				
6	C7.5	07:57	08:01	08:16	1																
6	C6.2					14:01	14:04	14:28	1+												
6	C7.0																				
6	C8.0																				
7	M1.6																				
7	C4.9																				
7	C5.0																				
7	*																				
7	C4.4																				
8	M1.5	15:17	15:33	16:20	2+	15:15	15:32	16:25	2+	15:18	15:31	15:55	2					15:18	15:33	16:25	2+
9	?																				
9	M1.5					08:43	08:55	09:42	2+	08:42	08:54	09:18	2								
9	?																				
9	M1.7					09:59	10:31	11:53	3	10:01	10:28	11:16	2+	10:10	10:33	11:35	2+				
9	M1.0					12:15	12:36	13:12	2+												
9	?																				
9	M3.4	17:02	17:12	18:11	2+	17:01	17:09	17:29	1+					17:07	17:16	18:01	2+	17:03	17:10	17:30	1+
10	C5.6	11:03	11:17	12:20	2+	11:03	11:14	12:40	3					11:07	11:19	12:40	3	11:03	11:13	13:00	3
10	?																				
10	?																				
10	*																				
10	M1.6	15:39	15:50	16:39	2+	15:39	15:49	16:44	2+	15:17	15:47	16:27	2+	15:45	15:53	16:28	2	15:40	15:50	16:45	2+
10	?																				
10	C3.9																				
11	C4.5	08:25	08:31	08:45	1																
11	C4.5					09:53	09:58	10:24	1+												
11	C5.9																				
11	?																				
11	C4.6	11:10	11:19	11:33	1	11:09	11:21	11:51	2												
11	*																				
11	M1.8	12:34	12:40	13:20	2+	12:31	12:41	14:38	3+	12:33	12:39	13:34	2+	12:36	12:43	13:23	2+	12:33	12:43	13:15	2
11	?																				
11	?																				
11	?																				
11	M1.4	15:13	15:19	16:15	2+					13:31	13:56	14:29	2+	15:18	15:26	?	-				
11	M1.8					15:12	15:31	16:42	3	15:15	15:32	16:34	2+	?	15:36	16:19	-				
11	M1.6					17:23	17:27	17:46	1	17:23	17:31	17:34	1-								
11	M2.0																				
12	M2.7					08:33	08:44	09:33	2+												
12	C9.7																				
12	*																				
12	X1.3	09:38	09:46	11:20	3	09:33	09:44	11:25	3	09:34	09:45	10:58	2+	09:40	09:50	11:06	3	09:38	09:47	11:10	3
12	C8.2																				
12	*																				
12	M1.2					13:15	13:23	14:06	2+	13:14	13:24	14:00	2+	13:22	13:27	14:01	2				
12	M6.8	14:41	14:45	16:00	2+	14:39	14:45	16:14	3	14:39	14:45	16:05	3	14:3	14:48	15:55	3	14:39	14:55	16:30	3
12	M1.6																				
12	*																				
12	C7.4																				
13	M5.2	06:45	07:00	08:00	2+	06:48	06:58	08:00	2+	06:43	06:59	?	-					06:47	06:55	07:35	2+
13	?																				
13	M2.9	08:18	08:38	09:35	2+	08:17	08:38	09:39	2+	08:17	08:40	09:07	2+	08:24	08:39	09:44	2+	08:18	08:40	09:30	2+
13	*																				
13	?																				
13	C9.6	12:26	12:37	13:05	2	12:27	12:36	13:03	2	12:27	12:34	12:55	1+	12:31	12:36	13:25	2+	12:25	12:35	13:10	2
13	?	14:30	14:35	14:47	1-																
13	?																				