

Please send all reports and observations to jacook@jacook.plus.com

BAA Radio Astronomy Section.

2021 NOVEMBER.

Solar activity in November was much lower than the last few months, despite the higher sunspot count. We recorded just three C-class flares as SIDs. There were also three M-class flares shown in the satellite X-ray data, but they were all during our European night time. The strongest was an M2.0 on the 9th.



This recording by Mark Prescott shows the C3.5 flare on the 4th quite well at 20.9 and 22.1kHz, despite the rather noisy day-time signal. The 20.9kHz signal also clearly shows the short observing period from 09 to 15UT available at this time of year. With the low altitude of the sun in the sky, the ionosphere is also more noticeably affected by changing weather patterns, leading to very noisy signals that hide the smaller flares. My own recording from the 4th shows the problem:



This 'noise' can become more organised in the form of distinct waves, as shown in this recording from the 22nd, by Mark Edwards. The 37.5kHz signal (blue) is very clean.



MAGNETIC OBSERVATIONS.



Magnetic activity was much higher, with most days in November showing some disturbance. This was mostly from a faster turbulent solar wind, with some coronal mass ejections. A mild disturbance from the CME at the end of October continued into November 1st, mixed with a faster flowing solar wind from a north-polar coronal hole. This was rapidly followed by a pair of CMEs from the M-class flares on the 1st and 2nd, the second catching up with the first to produce some very active conditions starting on the 3rd. The following chart from Roger Blackwell shows the activity:



The arrival shock from the first CME can be clearly seen at about 19:45UT, followed by very rapid and deep fluctuations in the magnetic field. This was repeated again in the morning of the 4th as the second CME caught up and added to the disturbance. The disturbance was also recorded on the 37.5kHz signal from Iceland:



Mark Edwards' recording shows the 3rd on the pink trace, compared with the 4th in blue. The signal break at 10UT on the 4th is unfortunate, but the general disturbance is very clear. Mild magnetic disturbances continued over the next few days, with another VLF disturbance showing on the 6th. The recording by Paul Hyde shows a very SID-like feature at 11:30 on all four signals. Mark Edwards also noted this feature. It does match the timing of a mild magnetic disturbance.



High speed solar wind from a south-polar coronal hole created a period of disturbance over the 15th and 16th, shown in this recording by Andrew Thomas:



The impulsive bursts around 12UT on the 15th appear to be a local effect, the solar wind impact being at about 20:30. The disturbance continued into the early afternoon on the 16th, with some genuine impulsive effects after 06UT.

November ended with a complex mixture of coronal hole and CME effects, starting on the 20th. Colin Clements made this recording on the 20th:



This disturbance was again from the south-polar coronal hole high speed wind, which was joined by another coronal hole over the next few days. A filament eruption detected in satellite images on the 24th produced a CME that arrived on the 27th. Its effects were very mild initially, but an increased wind speed at the end of the month led to a more active disturbance late on the 30th. This is shown in the recording by Nick Quinn:

Steyning Magnetometer (50.8 North, 0.3 West)



Magnetic observations received from Roger Blackwell, Colin Clements, Andrew Thomas, Nick Quinn and John Cook.

METEOR COUNTS.

We have not received any specific recordings from the November Leonids, but Mark Prescott has sent a chart of GRAVES echoes recorded through the year so far. This also shows the unexpected peak on October 6th

noted in last month's report. The colour background shows the counts per hour for each day, while the white graph line shows the daily mean counts. The August Perseids stand out, along with that early October peak. Meteor echoes (GRAVES radar) 2021





Mark has also been experimenting with ways of presenting meteor echo activity. The aim of this chart is to identify patterns in the periodicity (in days) of meteor echoes from the mean counts.

SOLAR RADIO BURSTS.

Colin Briden recorded just one solar radio burst in November. This chart shows a type III/1 burst recorded at 11:01UT on November 1st at 28MHz.



The black lines show the signal peaks, while the grey area is the smoothed data. This is timed nearly 10 hours after the M1.5 flare, so any link is not clear.

Colin has also been working on monitoring VLF discrete emissions, although a very low SNR is making it difficult to show them on charts. In 32 hours of day-time recording, 171 events were detected in the range 1.5 to 4.0kHz. Occasional prolonged 'chatter' was seen around 4.5kHz, with a short period of auroral chorus around 16:10UT on the 30th at 1.3kHz.

Our programme of virtual meetings and seminars continues to be very well received, and my thanks go to Paul Hearn for organising them, and all those providing material. An archive of 2021 meetings can be found at https://britastro.org/node/25798. Several meetings are already planned for 2022, the following programme to start the year:

2022 January 7th: 19:30gmt 'CHIME' Magnetars and fast radio bursts' by Alexander Josephy.

2022 January 15th 14:00gmt 'GNU II training seminar' with Marcus Leach.

2022 February 4th: 19:30gmt 'VHF meteor observations, the IMO, and correlation.' by Chris Steyaert.

My thanks to everyone for providing reports and observations for the monthly summary, and best wishes for a Happy and Healthy Christmas.

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	SS	irs	John Coo	.4kHz/22.1k	Hz)	Rob	erto Bat	taiola 20.9kHz	Paul H	-lyde (22.1	kHz/2 <i>4kH</i> z)	Mark Edv	wards (2	24.0kHz/ <i>18/</i> 3	3kHz)	Colin Clements (23.4kHz/18.3kHz						
	Xray cla	Observe	Tuned rac 0.5	lio frec 3m fra	quency rece me aerial.	iver,	Mod	ified AA	VSO receiver.	Spectru	ım Lab / F aeria	PC 1.5m frame al.	Spectrum	n Lab / F	PC 2m loop a	aerial.	Tuned Radio Frequency receivers, 0.76m screened loop aerial.					
DAY			START F	PEAK	END (UT)		START	PEAK	END (UT)	START	PEAK E	ND (UT)	START	PEAK	END (UT)		START	PEAK	END (UT)			
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	SS	Steve Parkinson (Various)	Andrew Thomas (23.4kHz)	Phil Rourke (23.4kHz)	John Wardle	Christopher Bailey				
	Xray cla	Tuned radio frequency receiver, frame aerials.	Tuned radio frequency receiver, 0.6m frame aerial.	Spectrum Lab, 0.6m frame aerial.	SpetrumLab/Starbase, Active mini-whip aerial.	Spectrum Lab				
DAY		START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)	START PEAK END (UT)				
4 4 13	C3.5 C2.9 C1.2									

	SS	Colin Briden (22.1kHz)	Andrew Lutley (23.4kHz)	Peter Meadows (23.4kHz)	John Elliott (18.3kHz)	Mark Prescott (22.1kHz)
	Xray cla	Spectrum Lab / PC, 1.2m frame aerial.	Tuned radio frequency receiver, 0.6m frame aerial.	Tuned radio frequency receiver, 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)
4 4 13	C3.5 C2.9 C1.2					10:49 10:59 11:12 1

VLF flare activity 2005/21

C M X — Relative sunspot number



BAA Radio Astronomy Section.

BARTELS DIAGRAM

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