BAA Radio Astronomy Section. 2021 MARCH.

There was a general increase in sunspot numbers in March, with numerous small B-class flares shown in the space weather reports. There were just a couple of flares reaching C-class, the C1.6 recorded on the 9th being the strongest of the month and well timed for European observers.

This recording by Mark Edwards shows distinctive SIDs at 20.9kHz (pink trace) and 19.6kHz (brown trace). Some of the other signals show less distinct SIDs for this event. Mark also recorded ionospheric waves on the 22.1kHz and 19.6kHz signals:
These were recorded on March 10th, the two frequencies being very close mirror images. There is no obvious cause for these, but we have recorded similar effects in the past.

The B8.3 flare on the 25th shows well in this recording by Paul Hyde on the longer path at 24kHz.

MAGNETIC OBSERVATIONS.

There was also a lot of magnetic activity in March, mostly from a complex coronal hole over the Sun’s south polar region with extensions running northwards. Stuart Green’s chart shows the Month’s activity:
The south polar hole has been present for several months now, with some strong activity shown in late February on the previous rotation. Nick Quinn recorded its effects over March 1st to 3rd:

A period of strong disturbance can be seen in the evening of the 2nd with a large variation in the east–west component. Nick is located near the south coast, and so a comparison with the Mull magnetometer of Roger Blackwell, nearly 6 degrees further north, is of interest:

The By component of his 3-axis sensor matches very well the (inverted) east–west signal in Nick’s recording. The peak to peak variation in Mull is about 20nT greater than in the south.

This recording By Paul Hearn shows a more moderate disturbance on March 7th, resulting from
another coronal hole high speed wind. This was the least turbulent of the month, fading out on the 8th. The south polar hole became effective again in the afternoon of the 12th, with some strong disturbances seen on the 13th and 14th, shown here in the recording by Roger Blackwell:

A combination of minor CME’s and the high speed wind produced further disturbances towards the end of March. Roger’s recordings show some of this activity on the 20th and 21st:

Nick Quinn’s recording over the same period shows very similar disturbances, again at slightly lower magnitude. Mild activity continued on the 24th and 25th, fading out from the 26th to the end of the month.
Mark Edwards noted these magnetic disturbances on the 37.5kHz signal from Grindavik, Iceland, particularly on the 14th and 21st, shown in these charts:

Mark has overlaid his VLF recording on Roger Blackwell’s magnetometer charts. The effects are again most noticeable in the late afternoon and evening, running into the VLF sunset around 19:00UT. The recording from the 21st also shows some disturbance to the 37.5kHz signal from 06:00UT, followed by interference from 10 to 12UT. The interference was from some broadband noise around the signal frequency. This recording also covers the period of volcanic activity in Iceland, in a region just to the north of the transmitter site. Luckily there were only small local lava flows from the volcano, with no threats to Grindavik itself.

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

The Zoom meetings organised by Paul Hearn have been a great success so far, with several more programmed over the next few weeks. Full details of the programme can be found on the BAA website, along with the other BAA meetings. If you are interested in joining any of these, please follow the notes given in the listing.
## BAA Radio Astronomy Section.

### 2021 MARCH.

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<tr>
<th>DAY</th>
<th>Xray class</th>
<th>Observers</th>
<th>Description</th>
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### Xray Observations

- **John Cook (23.4kHz/22.1kHz)**: Tuned radio frequency receiver, 0.58m frame aerial.
- **Roberto Battaiola (20.9kHz)**: Modified AAVSO receiver.
- **Paul Hyde (22.1kHz/24kHz)**: Spectrum Lab / PC 1.5m frame aerial.
- **Mark Edwards (24.0kHz)**: Spectrum Lab / PC 2m loop aerial.
- **Colin Clements (23.4kHz/18.3kHz)**: Tuned Radio Frequency receivers, 0.76m screened loop aerial.

### Day-by-Day Observations

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### Equipment Details

- **Steve Parkinson (Various)**: Tuned radio frequency receiver, frame aerials.
- **Andrew Thomas (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **Phil Rourke (23.4kHz)**: Spectrum Lab, 0.6m frame aerial.
- **John Wardle** (Spectrum Lab/Starbase, Active mini-whip aerial).
- **Christopher Bailey** (Spectrum Lab).

### Additional Observations

- **Andrew Thomas (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **Phil Rourke (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **Steve Parkinson (Various)**: Tuned radio frequency receiver, frame aerials.
- **John Wardle** (Spectrum Lab/PC, 1.2m frame aerial).
- **Colin Briden (22.1kHz)**: Spectrum Lab / PC, 1.2m frame aerial.
- **Andrew Lutley (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **Peter Meadows (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **John Elliott (18.3kHz)**: Tuned radio frequency receiver, 0.5m frame aerial.
- **Mark Prescott** (Spectrum Lab / PC, 1.5m frame aerial).
- **Colin Briden (22.1kHz)**: Spectrum Lab / PC, 1.2m frame aerial.

### Xray Observations

- **John Elliott (18.3kHz)**: Tuned radio frequency receiver, 0.5m frame aerial.
- **Andrew Thomas (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
- **Phil Rourke (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
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- **John Elliott (18.3kHz)**: Tuned radio frequency receiver, 0.5m frame aerial.
- **Mark Prescott** (Spectrum Lab / PC, 1.5m frame aerial).

### Additional Observations

- **Andrew Lutley (23.4kHz)**: Tuned radio frequency receiver, 0.6m frame aerial.
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<th>ACTION</th>
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<th>ACTIVE</th>
<th>SFE</th>
<th>B, C, M, X - FLARE MAGNITUDE</th>
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**BARTELS DIAGRAM**

**NOTATION**
- B: B-class flare
- C: C-class flare
- M: M-class flare
- X: X-class flare

**KEY**
- FLARE MAGNITUDE:
  - B, C, M, X

**SYMBOLS**
- Carrington rotation start (synodic rotation start)
- Active Flare
- Disturbed

**ACTIVEDISTURBED**

**2019 January**
- 26: B
- 20: C
- 24: B

**2019 February**
- 22: C
- 24: B
- 28: C
- 29: B

**2019 March**
- 18: B
- 20: C
- 19: B
- 21: C

**2019 April**
- 15: B
- 16: C

**2019 May**
- 13: B
- 14: C

**2019 June**
- 10: B

**2019 July**
- 6: B

**2019 August**
- 3: B

**2019 September**
- 10: B

**2019 October**
- 7: B

**2019 November**
- 4: B

**2019 December**
- 1: B

**2020 January**
- 12: B

**2020 February**
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- 9: B

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