



## Minutes of the Propagation Studies Committee

Interim meeting by video conference

20 November 2021

### Attendees:

|                        |       |                      |
|------------------------|-------|----------------------|
| Steve Nichols          | G0KYA | Chairman             |
| Dr John Worsnop        | G4BAO | Vice Chairman        |
| Chris Deacon           | G4IFX | Secretary            |
| Alan Melia             | G3NYK |                      |
| Ron Smith              | G3SVW |                      |
| Dr Peter Duffett-Smith | G3XJE |                      |
| Prof Barry Chambers    | G8AGN |                      |
| Gwyn Griffiths         | G3ZIL | Corresponding Member |
| George Jacob           | G0HSV | Corresponding Member |

### 1. Apologies for absence

Sam Jewell, G4DDK (Corresponding Member).

### 2. Matters arising from the minutes of the meeting held on 15 May 2021

These minutes had previously been approved via email and posted on the RSGB website. Matters arising are dealt with under other agenda items.

### 3. PSC membership and roles

All the current PSC officers (Chairman G0KYA, Vice Chairman G4BAO, Secretary G4IFX) confirmed that they are happy to continue in their roles for another year.

It was noted that PSC does not currently have an allocated RSGB Board Representative.

It was also agreed that the Secretary would contact the small number of Corresponding Members who have not been heard from for some time, to enquire whether they wish to continue their membership of PSC.

**Action: G4IFX**



## 4. Topics for discussion

### 4.1. RSGB website – PSC pages

The microwave section of the PSC pages is in the process of being updated and a number of new microwave links are about to be added. Also, number of additional papers will shortly be added to the lists elsewhere on the site.

**Action: G3NYK**

### 4.2. 28/50 MHz beacon lists

Some changes have been made to the 28 MHz list this year and there are not many remaining to be done. It is expected that there will be more updates to add once the solar flux increases further and active beacon status can be confirmed. Steve has made reference to the beacon list occasionally in the GB2RS report.

**Action: G0KYA**

It is believed that Martin, G3USF is still maintaining his 50 MHz beacon list.

### 4.3. Les Barclay Award 2022

After discussion, a nomination was agreed for the 2022 Les Barclay Award. It will be forwarded to the Board in due course.

**Action: G0KYA**

### 4.4. PSC Budget 2022

It was agreed that we may be in a position to hold at least one in person meeting next year, so the relevant expenses for Leicester meetings should be left in the budget. Also, availability of the HamSCI Personal Space Weather Station has been delayed so that item should be carried over to 2022.

**Action: G0KYA**

## 5. Projects and potential projects

### 5.1. RadCom HF predictions

Gwyn, G4FKH unfortunately had a last-minute problem with his PERL software, which meant he was unable to deliver the predictions for the December RadCom. Luckily, Marcus G0IJZ, was able to step into the breach with his own Octave script. The Octave script does not produce the additional 'below the noise' letters that were introduced a year ago, but it was decided to go ahead on that basis, given the short notice.

Marcus will also produce the predictions for January 2022, but Gwyn has now fixed his software and will take over again from February 2022.



It was agreed that we will need a more robust solution for the future. A discussion took place about whether it would be better to focus on the much more flexible software tools that are now available, with superior functionality and the ability to tailor the results to suit an individual station, but for the time being it was agreed to continue with the current RadCom format in addition to the online systems.

## 5.2. Personal Space Weather Station (HamSCI)

The availability of 'production models' of the PSWS has been significantly delayed by problems including the limited availability of FPGA chips with suitable performance. PSC agreed to continue a watching brief.

## 5.3. GB3RAL beacons

No further news. That is, Mike Willis says he unable to get access to the Rutherford Appleton Laboratory's roof to retrieve the beacon hardware and antennas. After discussion, it was agreed that we now need to consider if we wish to build replacement beacons from scratch and find a new site.

### **Action: G0KYA/G4IFX**

Support was also expressed by PSC members for putting in place a replacement 28 MHz beacon, at a new location, if it turns out that there is no possibility of re-establishing the multi-frequency cluster.

## 5.4. BAA Meteor Scatter Beacon

A prototype system has been developed and tested, by Brian, G4NNS in collaboration with Andy, G4JNT. The system uses a crossed Moxon array for the vertical-fire antenna and a versatile 100 W PA.

The initial plan was to install the beacon at BT's Madley Communications Centre (Herefordshire), but the support available from site management has turned out to be very limited. G4NNS is currently investigating a more promising option, at the Mansfield and Sutton Astronomical Societies' Sherwood Observatory.

PSC will continue to provide support and/or assistance as required.

### **Action: G4IFX**

## 5.5. Other potential projects

None proposed.

## 6. Chairman's report (G0KYA)

This has been a quieter year than normal, mainly due to continuing Covid restrictions.

The YouTube "Understanding HF propagation" video has now had more than 12,000 views and the VHF Propagation presentation has had 2,316 views.



Steve's lecture for the 2021 RSGB Online Convention entitled "Solar cycle 25: the good, the bad and the downright ugly" has received 425 views in addition to the live presentation audience.

Steve also gave a talk as part of the RSGB's "Tonight at 8" series in March, entitled "Using propagation prediction tools" which looked at the whole gamut of tools available, including Pretest, Propquest and Propy. That has received 1,465 views since the live presentation.

Nothing else has been heard about the proposed Poldhu WSPR beacon and an email to Poldhu ARC has gone unanswered. Given the time already spent on this topic, it will not be followed up any further.

Steve and the team's weekly contribution to the GB2RS script continues, although little feedback is received. One member comment was recently passed on, asking why the team don't use Met Office space weather data instead of NOAA's. The answer was that the Met Office has confirmed that it isn't able to supply the data required, specifically the thirty-day sunspot and geomagnetic activity predictions.

## **7. PSC member activity**

### **7.1. Chris, G4IFX**

As part of his sporadic-E research, Chris is working on a short paper, targeting the online journal Radio Science Letters, to demonstrate the validity of using amateur radio data to demonstrate the presence of sporadic-E. This is important because although ionosondes are undoubtedly the definitive ground-based way of detecting Es, they give only limited geographical coverage because less than a dozen of them are currently operating 24x7 in Western Europe. This limited coverage, combined with the spatially limited and transient nature of sporadic-E, means that there are many events which are not within range of an ionosonde. Other effective methods for detecting Es, such as satellite radio occultation measurements, are intermittent and rarely coincide with the desired location and time.

The approach to be adopted in the paper is to map signal reports from DXMaps.com along with ionosonde Es data, to demonstrate that (a) where there is an ionosonde in the right place, results are broadly consistent between the two approaches, and (b) there are a significant number of Es events where there is no ionosonde within range.

The paper will be based on a case study using data from a four-hour period on 18th August 2018. Chris showed a number of 'work in progress' plots to demonstrate the approach.

### **7.2. Peter, G3XJE**

Peter's main activity has been as Editor of "RadCom Plus". There will be two propagation-related articles in the next edition: firstly, part 1 of an article from Barry, G8AGN about building a 30 THz receiver to investigate propagation at long-wavelength infrared; and secondly an article from Alan Goodacre, VE3HX about long delay echoes. Peter said he would be grateful for further propagation-related articles and reminded the committee that RSGB pay by the page!

### 7.3. Barry, G8AGN

As Barry described at the last PSC meeting, handheld infrared thermometers have long-IR detectors and a group in Australia suggested using the sensors for 30 THz work. Barry has built two receivers and a transmitter, using searchlight mirrors.

Operation at 30THz is much easier in the winter than in the summer, because in the summer 'everything' radiates long-IR. To overcome this problem, Barry has developed a new approach using 30 THz radiation from the Sun as a signal source, moving a mirror to redirect the radiation (like a long-IR heliograph/heliostat) with real time tracking in azimuth and elevation. The system is Arduino-based, one being used for modulation and another for tracking. The sensors have filters which block short-IR and visible wavelengths.

Part 2 of Barry's RadCom Plus article will be much longer than part 1 and will deal with the construction of modulated signal sources. He has also had an article accepted for QEX, plus he has created five or six YouTube videos demonstrating the tests that he's done over the past year. The greatest distance covered so far is 130 m, but that was limited only by the restrictions of the site. Clearly, with a sun-based source, it is essential to avoid locations where there is a chance of the visible light reflected by the mirror dazzling drivers on adjacent roads.

Some interesting propagation effects have been observed, but data on propagation loss etc is not easily available - although this is an area of significant activity in the defence sector. The equipment will detect the heat from the full moon (the sun can heat the surface of the moon to over 100 C). The sensors are uncooled. The limits are not clear yet, but signals are still strong at 150 m and there is a reasonably low attenuation atmospheric window at 30THz, so a considerably greater distance may be possible. The real 'transmitted' power is probably of the order of milliwatts. The data rate is limited by mechanical constraints and thermal inertia, because of which only slow morse has been possible so far.

### 7.4. John, G4BAO

John produces the VHF commentary for GB2RS, and the RadCom 'GHz' column every month. He also operates 10 GHz EME and generally seeks to popularise propagation interest.

### 7.5. Ron, G3SVW

Ron has been running tests in a search for LDEs (Long Delay Echoes). He has been putting out signals on the five upper HF bands 28, 24, 21, 18 and 14 MHz and listening for returns. He has had no success so far, but the tests have raised a lot of interest locally.

His thoughts on the mechanism of LDEs is that the magnetosphere may be involved when very high solar winds arise, as proposed by LA3ZA. Such winds push the tail of the magnetosphere out to great distances and Ron is wondering if signals can break out of our ionosphere and take a trip round the extended magnetosphere.

Ron's test transmissions have been CW on different bands at a time close to solar midnight. At solar midnight the tail of the magnetosphere is due South of us and that may be the best time for signals to escape and get injected into the magnetosphere. Timing of transmissions is fairly close tolerance, a few fractions of a second to help listening stations



identify a received signal as direct reception or as an LDE. There's a lot of optimism in these tests, but it has raised much interest in club members and local stations.

### **7.6. Gwyn, G3ZIL**

Gwyn's interests are focused on the analysis of WSPR data, with an interest in visualisation approaches. He reported on two specific topics:

1. A report from a colleague in Colorado shows a correlation between magnetic disturbance and a reduction in 40m noise, accompanied by a reduction in most signals (except for signals from Australia) for a very discrete period.
2. Observations of 40 m noise by a station in Austria clearly show a peak in the evening period, appearing to corroborate the greyline analysis by Sam Lo, M0IDJ, showing that the lower number of reports between G and ZL in the evening is probably caused by the increased noise level.

### **7.7. George, G0HSV**

Although his free time is very limited at the moment, George is developing an interest in greyline propagation. During the discussion, Steve G0KYA commented that his view of greyline is that the phenomenon is frequently associated with high angle propagation across the terminator, rather than along the terminator.

## **8. Any other business**

None

## **9. Date of next meeting**

Provisionally Saturday 30 April 2022.

**Chris Deacon G4IFX**  
**PSC Secretary**