RADIO SOCIETY

of Great Britain ——————————————————————————

PROPAGATION STUDIES COMMITTEE

Minutes of a meeting of the Propagation Studies Committee held in Leicester on Saturday 18th April 2015, commencing at 1300hrs.

1. Members Present

Steve Nichols	G0KYA	Chairman
Chris Deacon	G4IFX	Secretary
Alan Melia	G3NYK	
Ron Smith	G3SVW	
Gwyn Williams	G4FKH	
Prof Barry Chambers	G8AGN	
Sam Jewell	G4DDK	

Apologies for absence had been received from Dr John Worsnop G4BAO, John Rogers M0JAV and Graham Kimbell G3TCT.

2. Minutes of meeting held on 18th October 2014

These minutes had previously been approved via email and posted on the RSGB website.

3. Matters arising from the minutes

Section 3.1: Mark Algar would still like to see a new, more extensive, propagation book to take the existing introductory book to an extra level. Options were discussed for how to produce a more 'complete' propagation guide and it was agreed that one could possibly be pulled together over the winter with (probably) G0KYA as editor.

Action: G0KYA to consider initiating this project in autumn 2015.

Section 3.2: The Propagation Forum is now 'live' and is working well. There was extensive use during the Eclipse Experiment.

4. PSC Membership

4.1. Full Members

There has been no response yet to the advert in the April issue of RadCom for an extra member with a VHF focus.

4.2. Corresponding members

It was noted that M0JAV and G4CJC have become corresponding members and that Neil, G0CAS has asked to retire as a corresponding member. G0KYA has written to Neil thanking him for his contribution over many years.

4.3. Associates

No changes proposed for the time being.

4.4. RSGB Board Representative

John Rogers, M0JAV retires from the RSGB Board at the end of April and a new board representative to PSC is expected to be nominated in due course.

5. Topics for Discussion

5.1. Presentation for Clubs: "Understanding HF Propagation"

Steve, G0KYA has produced a presentation for use by clubs and turned it into a video including animations with a voiceover. This has been distributed by DVD and as a download and has now been sent to 56 clubs including two from the US and one from Germany. Steve has also conducted eight Q&A sessions after the video presentation, via Skype.

In the light of this success, there now seems to be potential demand for a second presentation which deals with VHF propagation.

Action: G4DDK to draft an outline of a VHF propagation presentation for clubs, using the same approach.

Action: G4IFX to send the UKSMG six metre presentation to KYA and discuss turning it into a video in the same way. This presentation is not exclusively about propagation but has a lot of propagation-related content.

5.2. HF Propagation Predictions: Graphical Interface for ITURHFPROP

ITURHFPROP is a new propagation prediction model which has been published by the ITU and it seems to give more accurate results than previous models, but the user interface is poor.

A graphical interface similar to VOAProp would improve its usefulness enormously. Attempts via the RSGB Youth Committee to find someone with the right skills to develop such an interface have failed so far.

Action: G4FKH to put an advert in RadCom for someone to help

Action: G0KYA/G4FKH: if no volunteer comes forward, consider making a proposal to RSGB for funding a professional developer to do the work.

6. Projects and Potential Projects

6.1. 20th March Eclipse Experiment (G0KYA)

The original idea of this project was to promote a public involvement opportunity for schools etc using medium wave monitoring, as part of British Science Week. But the scope of the event grew enormously once the idea began circulating and a range of other amateur radio-based experiments were added.

From an amateur radio point of view the event was very successful, including WSPR and RBN reporting plus a lot of responses for MW monitoring, with 60-70 operators involved. LF phase measurements were coordinated by G3NYK and the results suggest a change in effective reflection height of about 6.5km – see his report, appended to these minutes.

Large volumes of data from wide-band SDR measurements will be retained, awaiting possible future analysis. Considerable interest was also shown in the project by Ruth Bamford at RAL, particularly given the wide range of techniques now available to amateurs.

Unfortunately, the response from the public was disappointing, with only two UK schools being involved plus one in Germany. It is believed that the public publicity, which was entirely focused around social media, was probably not adequate.

There will be a four-page feature on the project in the June RadCom.

6.2. Noise Measurement Projects (G4FKH)

Unfortunately no student has yet been found to carry out the proposed Leicester University project, but they are still looking.

Meanwhile, the PSC-sponsored automated noise measurement project continues and has 3.5 years funding remaining. No change in noise levels greater than 1dB has been observed over the two-year timescale of the project so far.

Concern was expressed that the spec of the CCW antenna has changed and there is the inevitable possibility of drift in receiver performance, but there is currently no plan for recalibration.

Action: G4FKH to review the need for calibration, using his own station as the test case.

6.3. Transatlantic 2m Beacons GB3SSS/GB3WGI (G0KYA/G4BAO)

GB3SSS is apparently still on the air but no further information has been received.

A more viable long-term approach may be to install an online receiver, possibly at Goonhilly Down

Action: G0KYA to follow up.

6.4. IARU 50MHz Synchronised Beacons (G4IFX)

UKSMG has offered to fund the Mid-Cornwall Repeater Group to make the 50MHz GB3MCB beacon the first (potentially the only) UK beacon in the chain but that is dependent on confirmation from the repeater group and, more to the point, agreement on technical standards. UKSMG is in touch with the OZ group developing the PI4 standard but this would need to be modified to support shared-frequency operation.

No further progress has been reported from the Spectrum Forum on the synchronised beacon project, or indeed on a programme to move the existing UK 50MHz beacons to the new allocation above 50.400MHz.

6.5. 2014 European 50MHz Sporadic-E Study (G0KYA)

A database of every RBN spot for six metre beacons between 1st May and 1st September 2014 has been built and the results of the subsequent analysis will be reported in the June RadCom. Jim Bacon has contributed some further analysis of correlation of Es with 300mb winds and will be using the results to help improve his upcoming Es forecasts.

The results show no particular evidence of periodicity. A lot of manual intervention is required to collect the data so the exercise is unlikely to be repeated in the near future.

7. Reports

7.1. Chairman's Report incl Leadership Meeting (G0KYA)

Following the retirement of G0CAS and G3USF from producing the GB2RS propagation report, it has been agreed that the reports will continue but with a re-balancing to de-emphasise solar information and emphasise content directly related to propagation. G0KYA is now preparing the HF material and G4BAO/G3YLA the VHF content. Initial feedback for the new format from the wider audience is good.

The chairman also expressed the view that PSC's 'stock' with the RSGB Board is high at the moment (see Board Report, below) and we should be considering potential expansion to our activities.

Action: All to propose potential additional activities.

Gwyn, G4FKH suggested that one possible topic for future investigation could be the reported lack of reciprocity on some HF paths. Chris, G4IFX suggested that WPSR data could be used for such an investigation.

Action: G0KYA to investigate.

7.2. RSGB Board Report (M0JAV)

John Rogers, M0JAV had sent the following report by email:

"Please record the thanks of the board and my personal congratulations for the great work which continues to be done by PSC. The work done by the group makes a real contribution to advancing communication knowledge aspect of the society. The work of the regular 'predictors' for the RSGB news, RadCom and the Convention keeps members up to date on these matters. The two major projects, the sporadic-E Reverse Beacon Network analysis and the Eclipse Experiment are great pieces of work. I am pleased that the technical expertise continues to broaden as more members are attracted to committee and helps others to better understand the science of propagation. My own particular favourite in the excellent work this year is the video prepared for remote presentation to clubs, supplemented by Skype Q & A's and the excellent forum on the RSGB website. This together with live presentations to clubs provides a service which enhances member benefits which is the raison d'être for the society. It also laid down the gauntlet for other committees to follow and I know AROS and EMCC are preparing similar presentations to highlight the benefit to members of the excellent work done by committees. You should all be very proud of the results of your efforts."

8. Any Other Business

8.1. Sam, G4DDK reported that PI4 is gaining a lot of interest as the future MGM beacon mode of choice, specifically for the GI 4m beacon GB3CFG and for GB3NGI. The Martlesham beacons are also potentially moving to PI4 soon.

It was noted that no reports have been received on HF or VHF beacons recently.

Action: G0KYA to mail G3USF for an update on HF beacons.

8.2. Alan, G3NYK reported that he has responded with LF input to Mike Dennison's request for input to the propagation section of the next edition of the RSGB Amateur Radio Operating Manual.

8.3. Ron, G3SVW reported that he has been building a small local group who have been getting involved in propagation matters, including the Eclipse Experiment and other activities.

8.4. Chris, G4IFX reported some early results from his investigation of polarisation effects on 50MHz ionospheric signals. The next step is to acquire an SDR receiver to allow true diversity reception.

8.5. Steve, G0KYA made a request for ideas for input to the new RadCom Plus technical magazine.

9. Date of Next Meeting

The meeting closed at 16.20 hrs. The date of the next meeting was provisionally agreed to be Saturday 31st October 2015.

Chris Deacon G4IFX
PSC Secretary

APPENDIX:

Some calculations based on VLF observations during the 2015 Total Eclipse

Alan Melia, G3NYK

Several stations monitored the Icelandic Military transmitter call-sign NRK at Grindavik in south west Iceland on a frequency of 37.5 kHz during the eclipse. Many of these were amateur radio astronomers who monitor VLF station signal amplitude as a method of detecting solar flares via Sudden Ionospheric Disturbance events (SID). Stations monitored included paths which did not pass through the area of totality. I have acquired data from two stations who have slightly more sophisticated equipment and are able to monitor the received signal phase. Whilst changes in the ionosphere, in particular the D-region, will cause changes in the amplitude of the received signal the effect is complicated by changes in absorption as well as changes in path length. Changes in absorption below the apparent reflection height cause changes in the strength of the ionospheric wave component. The resultant amplitude seen by the receiver is due to the addition of signals over the two paths, where the phase of the ionospheric wave may cause it to reinforce or to partially cancel that due to the ground-wave. The observation of the received phase is independent of any absorption effects and provides a direct measure of changes in the ionospheric path length.

I have then used simple geometry to derive a rather naïve estimate of the change in apparent reflection height during the totality. I estimate that the “refection point” from the two stations I used would have just inside the path of totality at the altitude of the D-region. The actual position is difficult to calculate but the sun is to the South West and at an elevation of around 30 degrees at that time of year. Thus the interesting area is to the south west of the ground shadow, and the time of maximum effect should be ahead of the time of the ground shadow crossing the path.

Using Jim Tonne's program “Pizza” I calculated the Great Circle path length. Then using some simple trigonometry and the simplified assumption that the ionospheric wave is reflected mirror-like from an ionospheric “shell” concentric with a spherical Earth, I estimated the change in this “apparent reflection height” that would yield the observed phase change during the event.

The best data is from Paul Nicholson located in Todmorden. Paul has set up a network of VLF stations in Europe and the Eastern seaboard of the USA which monitors Whistler events and by time-of-flight determines the position of the lightning strike that launched them. Thus Paul's data is of very high quality. Paul published a phase plot for NRK which showed a smooth change in phase of 80 degrees peaking at 09:32:30. The Great Circle path to Grindavik is calculated as 1673km. It is not possible with a single path to calculate a unique “apparent reflection height” because the phase change equates to an increase in path length of 1.778km. The wavelength of the NRK signal is nominally 8,000m. If we assume a normal daytime “apparent reflection height” of 55km it would require that this would need to rise by around 6.5km during the totality produce the observed phase shift. This would seem to be close to the rise observed at sunset.

It was hoped that accurate timing of the signal would yield some information on the ionisation decay times and time to re-ionise, but there is some discussion on the accuracy of the data time-stamps from some stations which has not yet been resolved.

I am greatly indebted to Paul Nicholson and Terry Jeacock GW0EZY for their kind release of their observations, and other data, to make this exercise possible.