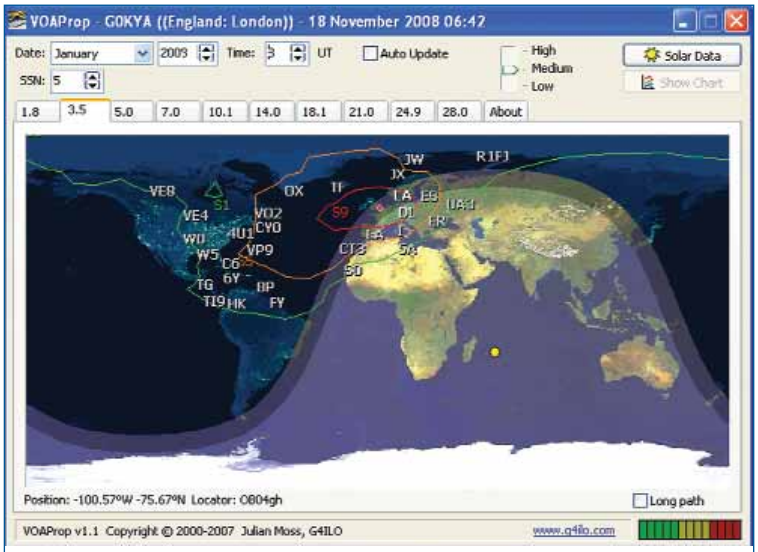
Understanding Propagation

Try out 80m during January and see what you can work.

THE THEORY. Last month we looked at Top Band (160m or 1.8MHz). As it is still mid winter, a lot of what I said then can be applied equally to this month's band 80m (3.5MHz), although we should be careful not to suggest that propagation on both bands is identical.

Eighty metres (3.5MHz) is almost twice the frequency of Top Band, so it is well away from the electron gyro frequency (as talked about last month) that can cause absorption on 1.8MHz.

During the daylight hours, the sun's UV and soft X-ray radiation ionises the lowest D region of our ionosphere, but as absorption is related to the inverse square of the frequency, it is only roughly a quarter as bad on 80m as it is on Top Band. This solar radiation also illuminates the E and F layers too and, during the early morning and late afternoon in winter, the low sun grazing angles means that 80m may support DX even in daylight. Putting these two factors together means that you stand more chance of working DX on 80m than Top Band.



The illustration shows VOAProp predicting 80m propagation to the USA at sunrise in January.

IN PRACTICE. Staying with the daylight theme, you will find 80m an excellent band for inter-G contacts. Expect to be able to make ground wave contacts out to around 50 miles or so and sky-wave contacts too, as long as the critical frequency stays high enough. The critical frequency is that which will just return signals back to earth if they are directed straight up. Many contacts around the UK are the result of NVIS or near vertical incidence sky-wave signals.

If there is sufficient ionisation, the critical frequency will stay above 3.8MHz and the signals will return. If there isn't, the signals will continue to go on into outer space. You can check the real-time critical frequency at www.ukssdc.ac.uk/ionosondes/view_latest.html, but you have to register first. These graphs show you the F_0F_2 (F2 layer) and F_0E (E layer) frequencies as measured by an Ionosonde at Chilton. The "F_0" denotes a signal going up vertically.

If the critical frequency falls below 3.8MHz in early morning and late afternoon you may find that it is hard to work close-in UK stations, but signals from Europe are still loud. This is due to the lower skip angles that the signals are taking to reach the UK from Europe. For the same reason you may find that you can work stations in Scotland or Cornwall from the Midlands, but nothing closer.

If the F_0F_2 (critical frequency) is higher than 3.8MHz you will no doubt get good 80m coverage around the UK at all distances. As I am writing this, the latest ionogram at Chilton is showing $F0F_2$ as 5.054MHz and UK signals on 80m are romping in at 59+. In all cases you may find that signals are weaker around local noon when D layer absorption is at its highest.

Start to look for DX on 80m to the east during the late afternoon and to the west up to and past sunrise. The best place to look for SSB DX on 80m is in the top 5 – 10kHz of the band where there are often nets in progress. Many amateurs have worked their first US and Canadian stations on the band in this way.

80m really starts to shine as a DX band after sunset. At this point D layer absorption is declining rapidly, while the F layer(s) will still support long-distance DX.

We have a double whammy at the moment as not only is it winter, with long hours of darkness, but it is also sunspot minimum with few solar disturbances. The lack of solar flares and coronal mass ejections means that fewer charges particles get funnelled towards to the earth's magnetic poles, resulting in increased absorption and fluttery signals that have to cross the polar regions.

MORE THEORY. While we are on the subject, people often get confused between the A and K indices. In fact, they are pretty much a measure of the same thing – both measure the impact of fast-moving charged particles from the sun on the earth's magnetic field. The difference is that the K index is logarithmic. It is a whole number in the range 0 – 9 and measures the disturbance over the last three hours. The A index is linear and is an average of the disturbance over the last 24 hours.

The logarithmic nature of the K index can be deceiving as a jump from a K index of 1 to 5 is roughly equivalent to a jump in the A index from about 3 to 48. So if you are looking for a near real-time measure of the disturbance, the K index is more accurate. The A index tells you how conditions have been over the past day.

As long as the K and A indices remain low, night-time DX conditions on 80m can be good, so keep an eye on these figures, either via www.solarcycle24.com or one of the other propagation sites such as http://dx.qsl.net/propagation/.

For the best DX on 80m, you need a dark (night-time) path between you and the other station. To make this easier to visualise you can use a computer program, such as Sunclock, or perhaps one of the propagation programs like W6ELProp, ACE-HF or VOAProp. There are various internet sites that will also show you the same information – just search Google for 'sunclock'.

Look out for sunrise enhancements too – start to look around 60 minutes before the sun shows its face and keep going until around 60 minutes after sunrise.

In general, the best conditions will occur in the early hours of the morning with DX being workable as far afield as the mid-western USA, the Middle East and Asia, depending upon the quality of your antenna. On the whole paths to the southern hemisphere will be very difficult as it is mid summer down there and absorption will prevent good openings. As always, a good propagation program will show this.