Understanding Propagation

On our monthly journey through the HF bands we now only have three left – 15 metres (21MHz), 12m (24MHz) and 10m (28MHz).

A LOT TO OFFER. This month we are going to look at 15 metres, leaving the other two for when Sporadic-E conditions bring the bands alive over the next couple of months.

Fifteen metres is a band that can offer a lot – antennas are smaller than those used on 20m and you have a full 450kHz to play with. D layer absorption, which you may recall is related to the inverse square of the frequency, is also less than the lower bands. Noise levels tend to be lower too, which means you can work stations even if they are only S1 or S2 – try doing that on 80m! I can recall working stations solidly on the higher bands when the signals didn't even move the meter.

So far, so good – so what's the catch? The problem with 15m metres at the moment is that it really needs a fairly high solar flux to come alive and, at the time of writing, we are still waiting for solar Cycle 24 to really get into its stride. That isn't to say that there aren't good openings on 15m with low solar flux levels, but they may often be fleeting, weak, short or non-existent.

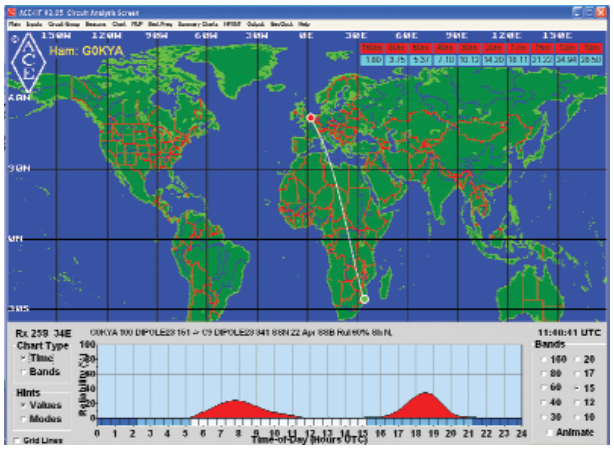
So what can we expect on 15m in April? If you don't have a propagation prediction program use the HF charts in *RadCom*, prepared by Gwyn, G4FKH.

Using a VOACAP-based propagation prediction program like VOAProp or Ace-HF and a sunspot number of 22, we see that there is virtually zero probability of 15m being open at night from the UK. Once the sun has set, the level of ionisation in the F1/F2 layers drops quite quickly and cannot support propagation on the higher bands.

There are always exceptions to the rule, especially if there are solar disturbances. If the A and K indices go up dramatically and the Bz goes south (see www.solarcycle24.com), showing that the interplanetary magnetic field is coupling with the earth's magnetic field, you can get Auroral E enhancements at night that can give relatively short distance contacts into Europe, but these are relatively rare. At this point in the solar cycle, geomagnetic disturbances due to solar flares or coronal mass ejections, which both pump out massive clouds of hot, ionised gases, are not so prevalent as they will be near the solar maximum.

Once the cycle really gets under way in a couple of years time, we can expect more disturbances, which is generally not good news for HF propagation overall.

WHAT WILL YOU HEAR? With a guesstimated sunspot number of 22 for April, we find that 15m is slow to open in the morning, with weak propagation first appearing to North Africa and Central Europe around 8am. By noon, although still quite weak, much of Central and West Africa is now possible.



ACE-HF shows that the path to April's C91FC DXpedition to Mozambique is predicted to be quite weak on 15m with a maximum probability of about 35% (100W SSB dipole to dipole). For CW it is about 75 – 80%.

Propagation builds during the day towards Southern Africa too, swinging towards South America before sunset. Again, at sunset expect 15m to begin to close quite rapidly.

Because of the low levels of ionisation, you may also find another apparent anomaly. The F layer(s) may not be able to return relatively high angle signals on 15m. This means that you may be able to hear DX signals (which typically arrive at your antenna at angles less than 10 degrees), but can't hear mainland Europe, such as Germany or Italy.

As Solar Cycle 24 progresses and the sunspot number/solar flux increases, we can expect to see 15m become far more reliable. Predictions using a sunspot number of 50 show reliable propagation to most of Africa in April – even Antarctica is possible in late afternoon.

With a high solar flux and a decent antenna, such as a Yagi at 30 – 40ft or more, long-path openings to the Pacific may be possible after sunrise and again in the late afternoon.

You will definitely find that a good antenna will help – long wires, G5RVs and 80m Windoms (OCF dipoles) are not at their best on 15m and will likely be beaten by even a half-wave dipole at 25 – 35ft.

You may wonder why I haven't mentioned propagation on 15m to the USA. This is because the equinox months (late March/early April and late September/early October) tend to favour north/south paths, where ionisation north and south of the equator tends to be similar. If you want to work 'across the pond' in April, 20m (14MHz) is a much better bet. Working the USA on 15m is more reliable in late October/November or December/January when the sun is in the southern hemisphere. Again, a good propagation program will help illustrate this.

Now that you begin to understand propagation on the band, it starts to make sense. The MUF (maximum usable frequency) on a given path from the UK may hover around the 21MHz mark. For much of the time you may hear nothing, but then signals may pop out of the noise, only to disappear again a few minutes later.

A cursory glance at the band might lead you to believe that it was totally dead, but you might be wrong. A tip is to check propagation on 17m (18MHz too). A DX opening there might suggest that one is on its way on 15m too. Also check the International Beacon Project chain on 21.150MHz.

These are the only beacons operating on 15m, which is a shame really. If your CW is rusty or non-existent, both VOAProp and ACE-HF can be configured to show you which beacon is currently transmitting, just make sure that your computer clock is accurate to the nearest second. For more details of the IBP project http://www.ncdxf.org/beacons.html.