The Importance of Contest and DXpedition Logs

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Our HF propagation prediction software packages (VOACAP, W6ELProp, ASAPS, ITURHFProp, and others) use a monthly median model of the ionosphere. Thus the normal outputs – MUF (maximum useable frequency) and signal strength – are monthly median values for any month-long period. These monthly median values are kind of an average view of the ionosphere over a month's time frame, and they have distributions about them.

On any given day in the month-long period, the actual MUF could be roughly 15% higher to 25% lower than the monthly median MUF. Similarly, the actual signal strength could be roughly 1-2 S-units higher to 3 or more S-units lower than the monthly median signal strength. These upper and lower values come from the MUF variability and the excess system loss tables in the ionospheric literature (for example, C.C.I.R. Report 252-2, New Delhi, 1970).

Unfortunately, these variabilities about the median aren't the whole story. Additionally, very short-term events (which most of the time are quite unusual) can happen that aren't captured in the monthly median model. Prior to the Reverse Beacon Network (RBN), the Weak Signal Propagation Reporter (WSPRnet), the IARU/NCDXF beacon network and other such systems, logs from contest operations and DXpeditions have been instrumental in discovering and investigating these very short-term events. Some examples of interesting short-term events that I've discovered in logs follow.

Traveling Ionospheric Disturbances at YK9A – Some of my QSOs with North America on 10-Meters from Syria in February 2001 showed a cyclic nature that suggests the MUF (maximum useable frequency) was going up and down due to traveling ionospheric disturbances (TIDs). Rome ionosonde data (unfortunately the only ionosonde in the general area that was taking data at 5-minute intervals) suggests that TIDs might have been occurring along the YK9A path to North America, and were the cause of the MUF to vary up and down.

K3LR Skewed Path to JA – In the ARRL DX CW contest in February 2012, the 10m operators at K3LR reported poor propagation to Japan on Friday evening. On Saturday evening, a skewed path to Japan to the southwest initially occurred for a short time until the true great circle path to the northwest took over later in the evening. The cause of these different openings was geomagnetic field activity, and the true great circle path was confirmed by high-latitude ionosonde data and beam headings. Unfortunately, no ionosonde data was available for the skewed path to the southwest (all I had was beam headings from the operators).

Solar Flares at ZF2RR – During the 2000 CQ WW DX CW contest, N9XX operated from the Cayman Islands as a single-op single-band 10m entry. His log showed four hour-long periods of reduced QSO rates during the daytime on the two days of the contest. Two of these periods were tied to an X1.9 and an X4.0 solar flare that increased ionospheric absorption. The other two periods were when N9XX was hunting for multipliers (countries and zones) instead of concentrating on rate (making many QSOs). Reviewing his log and being able to talk to N9XX after-the-fact was an invaluable supplement to the log data.

Non-Great Circle Paths to FT5ZM – The January/February 2014 FT5ZM DXpedition to Amsterdam Island in the southern Indian Ocean gave many DXers a new DXCC country. Several North Americans in Florida reported working FT5ZM on 10-Meters not via the true great circle short path to the southeast, but rather along a skewed path on headings between 60 and 75 degrees (essentially to the northeast). Perusing the FT5ZM log, discussing beam headings with the operators, looking at NM7M's great circle path maps and looking at worldwide F2 region MUF maps for the appropriate times revealed that the great circle short path was not available due to MUFs being too low. The beam headings suggested that the actual path consisted of two great circle paths that intersected over northern Africa (the equatorial ionosphere) that did have sufficiently high MUFs along the paths and an area (skew point) that had sufficiently high MUFs to refract signals off of one great circle path and onto the other great circle path.

In summary, the RBN, WSPRnet, IARU/NCDXF beacons, etc systems provide lots of great data to study the ionosphere. But they lack the human element that could possibly allow a deeper understanding of what can happen sometimes. Contest and DXpedition logs can still be very important!