Further Investigation Required!

Late Night 6M NA to Far East Es (SSSP) Paths

By Bob Mobile, K1SIX (18 October 2024 Under Construction)

Introduction

This document addresses a possibly long overlooked long haul 50 MHz Summer Es path potential between eastern North America and the Far East that I believe requires further investigation. Links to supporting material are underlined and in bold blue. Try **this link** for starters. This is my website. ***This story may reveal a few surprises!***

Statistical Significance

Here is a link to my personal summer diurnal distribution for mid-latitude mostly 3x hop 6 meter paths to my east. Note the ***double hump*** (am (Early) and pm (Late) peaks) and ***pay close attention to the sample size***. Size matters. Simply stated: the larger the size of the number of samples, the higher the confidence that the outcome of a specific number of trial or test samples will provide a specific percentage of a match between a model and that minimum number of test samples required to prove the model. Please refer to **Estimate of Proportions** for more detailed information. I consider myself to be very fortunate to be within 3-4 hop Es range of such a densely populated area with high interest level in operating on six meters.

Several have requested that I supply a confidence % for the diurnal plots that I supply. I can't, in good conscience do so as the population in indeterminate (there are workarounds). So, if someone asks me how good my Transatlantic data is, the response will simply be: "It's pretty good!" However, a 20 point hourly comparison, with ***4 hours of "outliers" discarded***, against an annually updated model is recorded and published as a "fit score %" shown as Chart 1 in **this document** for each summer Es season. This is a simplified form of **CURVE FITTING**. ***Note the trial or test sample sizes*** that are also plotted. Bigger is better! This is my preferred method to convey a confidence interval. Things should improve as the number of trials increases if the baseline model is reasonably accurate. If improvement is not realized, it implies either model inaccuracy or some external influence causing the deviation.

Late Night 6M NA to Far East Es (SSSP) Paths

Thanks to the efforts of Han, JE1BMJ and the very dedicated team of avid six meter dxers throughout the Far East, many North Americans have been able to make their first six meter contacts into that area. **CLICK HERE TO SEE HAN'S ARTICLE ON SSSP**. For some of us, these represent extremely long distances. My personal best so far is BH4SCF at 7,204 mi. (11,594 km). I have also worked the Republic of Korea via six meter non-F2 propagation. **These** are my non-F2 propagation mode six meter results as of 2024 in terms of detected non-F2 days and not actual QSOs. My first JA 6M QSOs were all on CW. It can be seen that six meter openings to JA are quite rare here (peaking at ~ 9% max. for the peak days of a season) and sometimes after local sunset.

Early Morning Unusual Conditions Being Reported

I usually rise early, Keurig my cup of coffee and head for the shack. I then turn on the radios and check into the **pskreporter site** to see what others around me may be realizing for conditions. Choose the call of a station known to be active and successful on the six meter band and select ***FT8*** from the pull down menu for modes and ***12 hours***. For me, Lefty (K1TOL) and Tim (WW1L) are my best indicators. My next step is to click on ***(show logbook)*** then click on the ***Distance*** header twice to sort in descending order. This will sort the greatest distances to be listed first.

On the morning of June 5th, 2024 I rose and followed the above procedure using Tim's call and noticed a JA in his logbook. Then, on the following morning of June 6th it happened again! This time, JN1JFC was in Tim's log. Both JA stations were logged around 0600-0800 UTC as I recall.

Researching the Path Using the Es_Predict MS Excel Utility

Needless to say, the above events triggered a need for further investigation as the times of these events were somewhat unusual. **CLICK THIS LINK** to view my personal results for the times I have experienced non-F2 six meter propagation to the Far East during Northern Hemisphere summer. ***Note the peak time for maximum probability is 2200-2259 UTC. Also note that I always indicate the test sample size to convey statistical significance.***

The next step is to view the results from the MS Excel Es_Predict Utility, hereafter referred to as The Utility, for the path between WW1L (FN54om) and JN1JFC (QM06ad). This macro driven utility is available for free download on my website. **CLICK HERE TO VIEW THE RESULT**. I chose a date of 7 July to maximize the probability values. ***Note the classic double hump (am (Early) and pm (Late) peaks) and an exact match for maximum probability at 2200-2259 UTC***.

The prediction was run using a model (#3) that I created from the logs supplied by Bob, K6QXY. Thank you Bob! **CLICK HERE TO VIEW THE FOUNDATION FOR THIS MODEL** ***which includes sample size***. This represents about 3 hops to Bob's west. If one were to overlay Bob's results with my 3 hop results to my east and use the path mid-point local solar time for the X-axis, **THIS WOULD BE THE RESULT**. This is how the Utility can use a distant model and apply it to different paths. I refer to this as "***research mode***". However, to reduce error, it's always best to select the closest model available that applies to the path of interest.

To see an example of using a distant model in The Utility: I used my Diurnal Model for transatlantic paths (Model #2) in research mode and applied it to a path between JE1BMJ and AP2HA on the exact date (MM/DD) of June 8th. The result showed 3 hops with an overall probability of 20.3% for the date which is pulled from a Northern Hemisphere Composite Seasonal probability model. The predicted UTC times vs. the % probability (of that entire 20.3% probability) showed a classic double humped result with peaks at 0200-0259 UTC and 1100-1159 UTC as shown in **THIS PLOT**. ***Keep this result in mind as this date and time will resurface later. The plot is nothing more than a clone of my NA-Eu model (Model #2) shifted by the path midpoint local solar time and therein lies a potential problem for extremely long paths.***

WHAT REQUIRES FURTHER INVESTIGATION?

IF you believe in the classic double hump diurnal distribution shape with Early and Late peaks that we see over and over again and is supported in scientific literature AND if you have any confidence at all in what The Utility is telling us THEN the time period after the predicted null at 0230 UTC requires further investigation. To be more precise: 0300-0800 UTC.

The Far East to Eastern North America path spans at least 13 time zones and unlike paths to Europe, creates the problem of mutual availability. 0600 UTC equates to 0200 LOCAL here in summer but in Tokyo it would be 1500 LOCAL. So the JA end of the path is wide awake while we are sleeping and potentially missing out on exciting propagation. ***Mutual availability is not the only problem*** but surely this **"Melatonin Factor"** must be accounted for.

So before going through the pain and suffering associated with getting up at 3:00 am every morning from May until August, let's try to comfortably prove that this path may potentially exist.

Later, I will provide a method that will allow researching the potential of such a path while one sleeps.

THEN SUDDENLY AND WITHOUT WARNING

On the morning of June 8, 2024 I arose as usual and went to the shack following my usual routine and began listening for Europe with the antenna northeast on 50.313 FT8 mode. After a short while, the following came across my screen (sorry for breaking etiquette):

240608_110945 50.313 Rx FT8 -19 2.9 1726 AP2HA JE1BMJ -24

I quickly opened the ALL.txt file, captured and saved the above under another filename.txt, turned the beam on Han, gave him a few calls, then proceeded to call about 6x CQ JA with no response. Wow! I said to myself. This is the first time anyone has seen that second hump (PM or Late) diurnal peak to the Far East and I have it recorded. I looked at that decode again and then it hit me: I had been "had"!

BEYOND a REASONABLE DOUBT

OK so I missed it at first. That 2.9 second DT is an obvious part of evidence indicating EME. But let's take it a step further by providing four (4) additional evidentiary proofs making a total of five (5) supporting facts. Two of these will come from each individual: Both Azimuth and Elevation (antenna beamwidth) must "see" the moon at 11:09:45 on 8 June. My tool of choice for this endeavor was **GJTRACKER** by W7GJ available free on Lance's website. Thank you Lance!

For each individual, I provided a 5 minute printout every 1 minute with the time 1109 UTC centered and highlighted as minute #3.

JE1BMJ Han was calling AP2HA (MM63kp) on 3x Es. His bearing was assumed to be **294.5°** True

JUN 8,2024 35 ° 43' 45" N MOON POSITION RANGE: 231,044 MI

SATURDAY 140° 7 ' 30" E (PREPARED BY GJTRACKER) P +6 DAYS 15.52'SD

(JE1BMJ in QM05br) APPROX 50 MHZ DB

UTC	NOTES	W AZIMUTH	ELEV	GHA	DEC	RT ASCN	SKY °K	DEGRADATION
1107		298.4	7.5	319.0	27.3	6H 56M	6505	4.6
1108		298.5	7.4	319.3	27.3	6H 56M	6505	4.6
1109	**Hrd**	**298.6**	**7.2**	**319.5**	**27.3**	**6H 56M**	**6505**	**4.6**
1110		298.8	7.0	319.8	27.3	6H 56M	6505	4.6
1111		298.9	6.8	320.0	27.3	6H 56M	6505	4.6

K1SIX Bob was monitoring 50.313 with the antenna pointed at approximately **55°** True

JUN 8,2024 43 ° 8 ' 45" N MOON POSITION RANGE: 231,044 MI

SATURDAY 71 ° 57' 30" W (PREPARED BY GJTRACKER) P +6 DAYS 15.52'SD

JD: 2460469.5

(K1SIX in FN43ad) APPROX 50 MHZ DB

UTC	NOTES	W AZIMUTH	ELEV	GHA	DEC	RT ASCN	SKY °K	DEGRADATION
1107		55.3	3.6	319.0	27.3	6H 56M	6505	4.6
1108		55.5	3.7	319.3	27.3	6H 56M	6505	4.6
1109	**Hrd**	**55.6**	**3.8**	**319.5**	**27.3**	**6H 56M**	**6505**	**4.6**
1110		55.8	4.0	319.8	27.3	6H 56M	6505	4.6
1111		55.9	4.1	320.0	27.3	6H 56M	6505	4.6

With five (5) matching evidentiary proofs, I believe it is safe to conclude that decode of Han's FT8 signal that morning was via EME. This was a personal first for me and I can only assume that two well equipped stations could complete a six meter FT8 EME QSO if this hasn't already been accomplished!

USING the Utility for EXTREMELY LONG HAUL PATHS

The best way I can think of to begin this section is to simply state the obvious: **ONE SIZE DOES NOT FIT ALL** and if I could think of a single word to best describe The Utility in its present form, it would be: ***Obsolete*****.** However, I believe it still has value and the learning process and technology changes that have occurred since the initial release in 2002 have created a list of upgrades in my mind that could make such a utility extremely valuable, on a global basis, in the future.

So, consider this as a version of **Shark Tank**. I am looking for talented investors as this is well beyond my personal capability. The investment is time. I'm looking to build a team with similar interests. A team of experts in the fields of programming, plasma physics, propagation and understanding how people may interact with software- all with people skills. A perfect example of a team effort is the WSJT-X application itself. The return on investment in such an endeavor is anticipated to be $0. However, the reward could benefit the entire 6m dx community and that could impact you. Please read on as I describe the shortcomings of the present Utility along with potential solutions.

THE APPLICATION

Using MS Excel for just about anything is "a natural" for me. I am formally trained on this product (and others) by classroom attendance at courses offered directly by Microsoft. This means that I can quickly and efficiently develop a Macro driven application. Over time, I have developed Macro driven Excel "apps" for business, finance and engineering which is my background. Often, these "apps" would "massage" the data and export a CSV or .txt file to another application for further processing. So maybe I could be called an Excel "guru" but…

MS Excel is not the platform to distribute a product to a wide audience if that product could potentially realize widespread use. A compiled high level programming language, distributed as a .exe file is clearly the solution. In addition, in these modern times, such an "app" should be compatible with a minimum of the most commonly used smartphone operating systems (Apple iOS and Android). Note: I pulled the "stats" from my web hosting server and they reveal a maximum of 361 Es_Predict.xls downloads in 2021. For 2023 it shows 181. I support and envision "freeware" and Open Source to promote further personal investigations of propagation on "The Magic Band" that will, hopefully, see the results passed on to others over time.

Oops! Did someone say Open Source? Are we talking about ***control*** over **Intellectual Property Rights** here? Please understand that Open Source implies that your source code is available to anyone to use and that they will be able to develop "spinoff" applications from it. One example is the WSJT-Z program. So a developer with good intentions must consider risk and protect themselves.

The Solution: We may need a ***free lawyer*** as a consultant on "the team". This just keeps getting better! At this point, I predict that most readers of this document will start **dropping off like flies**.

THE MODELS and DATA COLLECTION (GENERAL)

In the following sections I will elaborate on how the first models were developed along with their goals and the intended audience ***at that time***. That was then and this is now. Things have changed! I will also offer suggestions related to modern model development and improvements. I will also address the potential failures associated with extremely long-haul paths and include links to useful reference material.

All models within The Utility are non-theoretical. They are obtained from the ***actual field logs of contributors*** and compiled annually into the associated database within The Utility. The theory here is that over time, the statistical significance will grow because of the increasing number of samples and that the blending of theoretical models may not necessarily fit the needs of the amateur community. Early versions of The Utility allowed users to download the various models of choice from my website. Later versions simply update the entire Utility with any enhancements and updated models, just prior to the start of a new Northern Hemisphere Es season. This procedure ***forces*** regular users to stay current. This is a common strategy by program developers. After over 20 years on this project, I have come to the conclusion that ***the entire data collection process must change!*** The issue is that, as expected, the handful of individuals supplying the log data that allowed me to compile the various models over the years has dropped to zero. Things change, people move on. Even though I will continue to update my own models but not for much longer, this process is actually detrimental to the Composite Seasonal Model. This is because each time I add in my data it contaminates the blend of my data averaged with other individuals creating bias. Over time, the Composite Seasonal Model could become my personal model and as I said earlier: ***One size does not fit all***. The goal of the Composite Seasonal Model is a long term operational planning tool that serves the interests of a wide range of individuals spread over a wide geographic area and not just those in close proximity to me.

Some years ago I became aware of an effort by Kevin, VE3EN. I liked it so much that I gave him a call and we briefly chatted about it. **Read about it here**. Sure, nothing is 100% but that would go away with a sufficiently robust sample. Each year, when I update my Composite Seasonal Probability Model, I also create an overlay chart: **K1SIX vs. VE3EN METHODOLOGY COMPARISON** referencing this effort. In my opinion both methodologies have their pros and cons with the largest con being restrictions. Kevin's data covers a much wider geographic area than mine. However, is an Es "season" shorter at higher geographic latitude than lower based upon solar angles, durations and perhaps geomagnetic influence? Why have any restrictions at all? What about the Southern Hemisphere?

So, for the first time, I will introduce a concept: ***"The 6M Es Model Server",*** hereafter referred to as The Model Server. And it is that very concept that I am trying to "sell" to potential investors right here on this episode of "Shark Tank". The Model Server's function is to distribute datasets to clients which will rebuild these datasets into two models: A geographic coordinate centric Seasonal model and several Diurnal models. The Model Server functionality would likely take the form of a **relational database** and either co-exist or be networked with a wide area Data Collection Point (RBN, Cluster, etc.).

In the architecture that I envision, The Model Server would strip off only qualifying data from the data collection point (stream) and place it into "bins". An example of a "bin" might be something like this: IF we believe that the 6M Es Season is shorter at higher latitudes THEN place the data (from a seasonal summary) into one of ***THREE*** bins: Low, Middle or High Latitude based upon the client's grid locator requesting a seasonal model. Other examples might be east or west bearing paths, path midpoint geomagnetic coordinates and ***range***. Extremely long-haul Es (SSSP) paths are a ***special case*** and absolutely require a special "bin". Basically, IF Range(time) > T.B.D. THEN SpecialBIN.

In the above scenario, the client would request a download of models personalized for their grid square AND/OR a research model where they may be researching a path other than their own. I DO have a complex plan and outline but all of this is beyond my skill set as an individual. This requires a team effort and I can make myself available for a conference call with further details if there is interest by qualifying parties.

The "special case" for extremely long haul paths is based upon the fact that all present diurnal models within The Utility represent actual observations for paths that are mostly, but not always, sunlit. The original design goal of The Utility was as an operational planning tool to support paths between North America and Europe at a time when more and more countries were being granted 6M privileges at a very fast pace. At extreme ranges, where darkness falls upon one or more of the E-Layer refraction points, these original models will only partially apply because any dark end of the path requires some form of "compensation". Thus, the overall probability plot for SSSP-like paths, (mis)applying a 3-4 hop model, will yield results that are "about half right". The "half wrong" part is the dark side of the path in terms of sunlight. So now the question arises: If you see value in many, potentially thousands, of amateur observations to create 3-4 hop models, would it be advantageous to create ***HYBRID models*** for SSSP-like paths as a form of compensation or to go completely with a theoretical model?

Please note that when I state terms like 3 – 4 hops I really should not because we really don't know how many actual hops create a path. Each hop has unique characteristics and sometimes chordal hops are involved. The proper term is range. The Utility provides an estimate as to the number of hops and divides the entire path into equal hop segments which is probably never reality but still useful for research. The results of this estimate are displayed under the "HOPS" tab along with their six digit grid square and coordinates. The Utility also includes a KML file generator so that the file created is compatible with Google Earth Pro for mapping. I find this particularly useful for researching paths but it must be emphasized that all of this is nothing more than a guess!

When I "run" the path between JE1BMJ (QM05BR) and myself (FN43AD) using The Utility, it estimates my first hop refraction point in Han's direction to be 105 km above grid square FO01QP. This is defined as my nearest control point in Han's paper on SSSP. To determine just where that may be, I use **THIS EXCELLENT UTILITY by K7FRY**. What is the Solar Time there? Surely the view of sunset from 105 km altitude must be better than the view at ground level!

HOPS, RANGE vs. POPULATION DENSITY and CLUSTERS

Please refer to **Extreme Multi-Hop 50 MHz Es by Jim Kennedy, KH6/K6MIO**. I place all of my WSJT Digital QSOs (only) into a customized MS Excel spreadsheet that generates reports, charts and graphs, etc. Many of these are published monthly on my website if I have been active. One of the charts generated is this: **ClusterBiasExample**. The contents of this chart display actual WSJT QSOs with a "heavy" E-Layer bias, with each data point from a unique location in terms of range in miles rounded to the nearest 100 mi. To accomplish this, all pure F-Layer or east-west paths involving F-Layer, including those that are E layer – F layer links, are excluded. Everything else remains including TE, which in my case requires an E-Layer link for a low grazing angle entry. MS contacts remain with an estimated 95 km refraction altitude (Es is assumed to be ~ 105 km) and their contribution to the overall falls off rapidly beyond ~ 1,100 miles with Es mixed in at this 1xEs range. A "very few" EME QSOs are included for reference which have minimal impact on the results. The impact from E-TE links to South America is significant at ranges ~ 4,000 – 6000 miles (6,437 – 9,656 km) but Es from Europe, Middle East and Asia is "mixed in" at those ranges at a much smaller contribution level. In addition, I color code range intervals of 1,200 miles in red to conform to the ***average*** shown in Table 1 of Jim Kennedy's (KH6/K6MIO) article and finally a green marker indicating my **rounded average** range for QSO's with Europe and West Asia. As my population basis is "significant", one would think the result would reveal strong "spikes" centered near the red markers associated with the average intervals per hop. Right? Well, no that's not right. We must account for the influence of **"Clusters"** in addition to the unknown individual characteristics associated with each individual hop. Then, just for grins, toss in a chordal hop or two. The bottom line here is that my results yield Es/SSSP contacts at every (rounded) 100 mile interval all the way out to (rounded) 7,200 miles (11,600 km).

Attempting to correlate my results against any pattern of averaged per hop interval (the red bars in the chart) is a "crap shoot" because the population distribution surrounding me is not evenly distributed. Note the big peak at 1,700 miles in the chart. Based upon **THIS**, such a range is almost certainly 2x Es. Readily available population density statistics indicate a significantly lower population density west of the Mississippi River than here on the East Coast so it's unusual to see a large spike at 1,700 miles unless it was due to a peak of an Es footprint but this is not the case. The true reason for this unusual peak is revealed in the **K1SIX 1700 mi. RANGE MAP**. The 1,700 mile arc surrounding me does pass through population density clusters in the Midwest, Mountain States and Texas but a very large contribution is from the Caribbean. As of this writing I have a total of 45 unique contacts with KP4 grids FK68 and FK78 alone. The spike at 1,700 miles is due to the bias created from the summation of data from population density clusters and the chart cannot reliably be used to determine any correlation with Es footprints. The true peak for 2x Es is estimated to be centered ~ 2,400 miles and there is some evidence of this at the expected 1,200 mile footprint intervals but caution is advised due to population density clustering. Active six meter ham radio operators are simply viewed as a subset of the general population.

UTILITY RESULTS FOR OTHER EXTREME RANGE 6M PATHS

K6QXY to EUROPE: Over the years, Bob has submitted a significant amount of data studying the 50 MHz Es paths to Europe and North Africa. As the original design goal of The Utility was to estimate mostly sunlit paths at multi-hop ranges, let's compare the prediction against Bob's actual results.

Here is that comparison:

K6QXY PREDICTED TO EUROPE vs. **K6QXY ACTUAL RESULTS TO EUROPE and N. AFRICA**

The prediction was run to grid JN27 which represents my average range to Europe and my model to Europe (#2) was the choice of a likely best fit on a near maximum seasonal probability date of 7 July. The range between Bob and the "target" is ~ 5,690 miles (9,157 km) and spans 9 hours of ***local time*** which is not the same as local solar time. The results of this comparison indicate that K6QXY realizes the east coast solar mid-point time shifted sunlit or early "hump" in the prediction but the late predicted peak is greatly suppressed. Jay, K0GU is closer for Europe/North Africa paths at ~ 4,719 miles (7,594 km) and appears to enjoy a larger "chunk" of the late peak (hump) time predicted by The Utility. His actual results can be found **HERE**.

The bottom line is that ***for extremely long haul paths***, as described in the paper by Jim Kennedy (KH6/K6MIO), the classic double humped diurnal plot, based on the work of E.K. Smith, no longer applies and those using The Utility should be aware of this fact. Only one of the two "humps" appears to show reasonable correlation with observer reports and that hump correlates with the mostly sunlit portion of the path. The other "hump" is either greatly suppressed or essentially nonexistent depending upon range.

So, returning to the catalyst that started all of this, the late night 6M Es/SSSP JA path to the New England area, as predicted by The Utility using shorter range models, is essentially nonexistent.

EY8MM Tajikistan: As stated in the paper by Jim Kennedy (KH6/K6MIO), SSSP-like propagation is definitely a global occurrence and I have personally experienced it to my east also. On 25 June 2022 during my local morning (1311 UTC), I was able to complete a QSO with EY8MM as his local sunset was rapidly approaching. This is yet another > 10,000 km path that spans 9 local time zones and produces a misleading result from The Utility. **THIS IS THE RESULT**. The daylight or early peak seems about right and the late peak must be ignored. The shorter range models within The Utility simply do not apply for extremely long haul paths.

A SCIENTIFICALLY ACCEPTABLE APPROACH

In yet another fine article, **Summer Es Probabilities by Carl Luetzelschwab, K9LA** , Carl describes a much more sophisticated approach for multi-hop modeling than The Utility. The foundation for this approach (his ***Figure 1***) is based upon the published scientific papers cited in the article. Remember that the basis for the approach used by The Utility is limited amateur observations from which the user must make a choice, likely from a distant observation, to produce what they believe creates the most accurate model. Not great but better than nothing and actually does work for some but not all.

Carl's methodology then divides an entire path into equal line segments (an assumption that has to be made) with the probability of each (assumed) refraction point calculated to provide blended probability values vs. time as shown in his ***Table 1***.

This approach eliminates the bogus double humped error realized when using The Utility for extremely long haul paths that span many hours of time. The Utility only contains observer models that range from ~2 to ~4 hops. In addition, The Utility only time shifts and references the path midpoint and disregards any intermediate hops. This improvement is shown in ***Figure 2*** of Carl's article. Now compare what The Utility plots for this same path by clicking **K9LA Figure 2**. Note that the model used is shown in the upper right hand portion of the plot and in all subsequent comparative plots.

Next, let's compare the ***Figure 3*** plot in Carl's article, a shorter path expected to reveal the classic double hump, with The Utility plot for the same path revealed by clicking **K9LA Figure 3.** Note that the probability value shown by a particular "bar" in The Utility represents a unique % related to the overall probability estimated for that entire day which is retrieved from a separate database. Generally, it is best just to focus on the shape of the plot rather than the raw values to estimate best and worst chances. However, the MAIN SCREEN in The Utility provides the user with the probability for the particular MM/DD chosen.

Finally, I compared the short range, transcon 2-hop scenario as depicted in Carl's ***Figure 4*** plot with The Utility plot for this same path revealed by clicking **K9LA Figure 4** . As I am only, on average, about 240 km northeast of the center of W2, I decided to query my WSJT QSO database so as to compare the predictions against reality at **K1SIX Actual Results to Pacific Northwest**. Sure, 35 QSOs is not a great sample size. Note the distant model that I selected for a best fit! Choosing the best fit model from a very limited group may overly burden an end user.

THE BOTTOM LINE FOR EXTREMELY LONG HAUL PATHS

The Utility was and is designed to estimate most mid latitude paths between North America and Europe/North Africa and contains observer based models that are limited to those ranges (~ 2 – 4 hops). In addition, The Utility estimates probabilities based upon solar time at the path midpoint only with no regard to the time at intermediate refraction points. This results in a misleading output at SSSP-like ranges that appears as an elevated probability (2nd hump) on the dark side of the path. It is possible that the shape of the plot may still be correct for the mostly sunlit portion of the path at these ranges. The ***total*** probability for the dark side of the path is estimated to be ~ 1% or less. The reception of Japan in New England during our sunrise, via Es/SSSP, over a dark path and actually being predicted by The Utility was a catalyst for this document. ***It ain't gonna happen!*** A more sophisticated methodology is required to serve the modern day needs of the 6M DX community and the methodology described in the K9LA article appears to contain that level of sophistication required to provide relatively accurate results across the broad ranges that we may encounter. Observer (data) based modeling remains valid because the models are based upon reality. Is the ultimate solution theoretical, observer based or a hybrid blend? You be the judge but use The Utility with informed caution. It may still have some value for you.

I owe these words of caution to existing and potential end users of the very basic tool that I developed and it is my hope that the information provided piques the interest of those parties that have the talent to help us create a better operational planning tool. This challenge will require a collaborative effort.

UNATTENDED DATA COLLECTION

Temporary placeholder describing methods/procedures and tools.

Temporary placeholders addressing errors to be expected, etc. Suggested reference material links:

Within **this document** I describe

LINKS TO SUPPORTING REFERENCE MATERIAL

SSSP: Short-path Summer Solstice Propagation by Han Higasa, JE1BMJ

Extreme Multi-Hop 50 MHz Es by Jim Kennedy, KH6/K6MIO

Summer Es Probabilities by Carl Luetzelschwab, K9LA

PLEASE BE SURE TO HIT RELOAD THE NEXT TIME YOU STOP BY as THINGS MAY HAVE CHANGED!!

STILL UNDER CONSTRUCTION- HANG IN THERE ☺