K1SIX SIX METER TRANSATLANTIC Es SEASON BEST FIVE DAYS

And

Data Collection Methodology[1]

To date, using the objective accumulated data point method described below, the best five UTC days of the present 6M transatlantic Es season were (**values in ( ) are the data point scores**):

29 May 2023 (**169**) ***The 1st place best 'data point day' in all records was 4 June 2021 (675).***[2]

27 May 2023 (**86**) ***The 2nd place best 'data point day' in all records was 17 June 2021 (632).***[2]

3 June 2023 (**32**) ***The 3rd place best 'data point day' in all records was 19 May 2021 (611).***[2]

25 May 2023 (**30**) ***The 4th place best 'data point day' in all records was 9 July 2022 (438).***[2]

26 May 2023 (**25**) ***The 5th place best 'data point day' in all records was 6 July 2022.*** **(402).**[2]

And the diurnal maximum peaks were at: **XX:XX** UTC for the AM Peak (**TBD**) and **XX:XX** UTC for the PM Peak (**TBD**) with a null during the high activity period at **XX:XX** UTC (**TBD**). **Note correlation**. ***The highest accumulated annual data point count since 1982 was for the record 2021 summer season*** (**6,623**).[2]

Data Collection Methodology (Updated 3 June 2023)

Data Points Defined (Thresholds)

A data point is defined as follows: For CW or SSB- a signal strong enough to accurately determine the full call sign. For WSJT (JT65 and FT8 effective 17 June 2017) - A signal equal to or greater than -10 dB with an accurate call sign decode. Note that -10 dB signal levels are weakly audible by ear here in the 3 kHz wide IF WSJT bandwidth utilized and should be detectable on CW (not SSB) when the IF bandwidth is narrowed down to 500 Hz or even 250 Hz or less. In addition, -10 dB is an easy number to remember.

Note that it was essential to account for the popularity of FT8 in the entire history of data collection so that some correlation to past history could be determined. It had to be done. Some have argued the point but this is what I have adopted as a standard going forward and I have high confidence in this methodology.

Data Points are accumulated in one hour time bins

The overall data points accumulated are parsed to ensure they all meet the minimum signal levels required and represent ***mostly*** 3 hop paths across mostly 3-hop+ ranges across ***mostly*** mid-latitude transatlantic paths. Some Arctic paths like OH and TF are maintained as are the Azores which could be 2x Es at times from here. OX is removed as are more southern end-points in southern Africa to avoid equatorial zone contribution which would greatly over-complicate a generally temperate zone goal.

After the initial parsing, the time stamped data are placed into one of 24 one hour UTC time bins for the particular UTC date then parsed again. This time to remove any dupes. No duplicate call signs are allowed within any one hour time bin to ensure that the total data point count for each individual hour represents unique stations. The data counts for each individual hour are then placed in a master spreadsheet.

This process continues until all hours for a day's run are completed. Daily dupes are allowed in different hourly bins but never within a unique hourly bin. Once entered into the master spreadsheet, hourly data point counts are summed with all previous years' hourly counts to produce a diurnal plot such as **this**. Diurnal plots for transatlantic and **far east paths** are updated annually along with the models from contributors in the Es_Predict.xls spreadsheet on my website at **https://www.k1six.com/**.

The file ALL.txt within the WSJT-X application is the source for all WSJT data collected. I hit STOP then Open Log Directory, choose ALL.txt then File Save As to a transport thumb drive during a "run" renaming the exported file to something like "ALL062521 12Z" and compile on a separate workstation. The compilation run can be as small as 1 hour, batches of several hours or several days. Once I ensure I have a good file transport, I hit Erase ALL.txt, hit MONITOR and start all over again. Usually at the top of the hour. Each "Time Bin" starts at the top of the UTC hour and runs through 59 minutes, 59 seconds after that hour. They are plotted at half past the hour for best resolution and to avoid confusion. Thus, a "time bin" starting at 12:00 UTC would have the results plotted at 12:30 UTC. **CLICK HERE FOR A 4 JULY 2021 JA OPENING EXAMPLE OF MANUALLY PARSED HOURLY SUMMARY DATA PREPARED FOR IMPORT.**

The parsing process is manual at this time and can be time consuming after a busy day, taking up to three days to catch up. But it's a learning process as I develop an outline for an automated import/parsing utility to be embedded within the master MS Excel spreadsheet.

Daily data point counts and compilation

The final step in the process of compilation is to take the sum of all accumulated data points for a given UTC day and place them in the daily database portion of the master spreadsheet for a unique date (MM/DD). These are recorded for each year then summed to estimate some statistical assessments of things like **summer Es season 3x Es seasonal probabilities** (from which **single hop probabilities** can be statistically derived from which any number of hop probabilities can be statistically derived), **a season report card** to compare against previous seasons with a projection, estimated quality, etc., etc. Please note that I am presently using 3 past year moving average projections which is subject to change. 4 of these will fit into the span between solar maximums. Past moving average projections account for the dynamics of change from the influences of ***modern*** history. And there have been many influences over the past 10 years! WSJT-X is certainly one of them.

Operational Planning using Statistical Modeling (use fractions)

The best dates and times to operate can be estimated to a reasonable degree of accuracy by using the following formula where **X** equals the % chance of probability for a desired path:

X = DIURNAL Prob. % (A) x UNIQUE or BLENDED SEASONAL Prob. % (B) x CHAOS Prob. % (C)

Chaos cannot be modeled with statistics. It is a real time issue. An example of chaos is when a similarly capable neighbor only 7 miles away is working stations you can't even hear. This is caused by ray focusing, particularly during multi-hop events, from cloud alignment and differing values of FoEs.

The more hops, the more likely this will occur. For one or two hops, a straight line can be drawn between any two end points. However, once 3rd or 4th refraction points are added into the mix, the probability of a straight-line path becomes orders of magnitude more difficult. Mathematically, this can best be described by the Y^x formula: **$PROB^{\#hops}$** Where **PROB** is the decimal fraction probability of a ***single hop***, raised to the exponent value (**#hops**) for the number of hops.

At times just waiting can bring you into the path footprint as the dynamics of multiple interrelated complex refraction points comes into play and the path footprint changes for your benefit. Be patient! All the CQing in the world won't help here – it's all pure luck! PSKREPORTER can help and is essential!

Table 1.

Previous Date of Test >	**3-Jun-23**	**Past Season Model Confidence >**	**97.84%**
Reference Model Used >**	**K1SIX 31 August 2022 Diurnal, 28,340 datapoint samples**		
Paths of Interest >**	**Transatlantic, mostly Temperate Zone, some Arctic**		
Number of samples for test >	**385**	**5 point averaged confidence** :**	**#NAME?**

REFERENCE MODEL USED**			TEST RESULT OF COMPARISONS**		
MODEL PARAMETER	COMMON UTC	MODEL %	TEST % to date[3]	Unsigned Deviation from 100% model	CALCULATED CONFIDENCE
R (ise)	09:30	1.73%	2.86%	1.13%	98.87%
AM (peak)	12:30	10.20%	7.01%	3.19%	96.81%
NULL	18:30	4.27%	1.56%	2.71%	97.29%
PM (peak)	21:30	10.79%	4.16%	6.63%	93.37%
F (all)	00:30	0.52%	0.00%	0.52%	#NAME?

The 5 Key Measurement Points Assessed against present model to compare *SHAPE* are:
R: Path UTC rising edge time where diurnal probability rises above 1.00%.
F: Path UTC falling edge time where diurnal probability falls below 1.00%.
AM: Western end sunrise diurnal peak UTC time per model.
PM: Western end sunset diurnal peak UTC time per model.
NULL: Null point UTC time between AM and PM peaks per model.
NOTE: Valid only for the unique location local area and paths of interest indicated!**

NOTES

[1] Please hit RELOAD/REFRESH for all links to ensure your browser cache receives the most recent data!

[2] Values are updated any time the main plot is updated. The Confidence Test table is at least one day behind to allow a determination of how many new samples were added between the two dates (chart – Table 1).

[3] All 5 new season data point parameter values must be non-zero for a valid overall assessment!

Table 1. is for "Variable (A)"

Table 1. Compares the distribution of data point counts, for a given path, of an ongoing Es season versus the accumulated data point counts of all prior Es seasons (***the model***). The times shown in the table are the key points of comparison. Percentages are: Hour Time Bin accumulated count ÷ Sum of all 24 hour Time Bin counts. The deviation between the model and the ongoing season percentages is considered the error and subtracted from 100%. Once a given Es season is over, the data are added in with the existing model data and the model is updated to be used for a subsequent season.

The results shown in ***Table 1.*** Indicate a very mature model based upon the very large and accumulating sample size.

PREVIOUS 2022 6M Long Haul Es Season Highlights and Summary

Heards but not worked (all on FT8 and would be new 6M DXCC):

BV??	Taiwan (heard me)
D2UY	Angola (Heard 2x Cqs then gone. Cross-checked QRZ.com and legit grid match).
JR6	Okinawa (heard me)
UK9AA	Uzbekistan (Called me but we never completed)

7 new 6M DXCC Entities Worked (all on FT8):

7Z1SJ	Saudi Arabia (confirmed via LoTW)
BH4SCF	China (confirmed via LoTW)
DS2JJV	Republic of Korea (also HL4GAV all confirmed via LoTW)
EY8MM	Tajikistan (confirmed via LoTW)
TA4/PE2M	Turkey (confirmed via LoTW)
UN3G	Kazakhstan (also UN3GX and UN9L all confirmed via LoTW)
Z66X	Republic of Kosovo (confirmed via LoTW)

2022 Summer Es Season Summary (all FT8 at K1SIX FN43ad):

This northern hemisphere summer Es season was projected to provide **75 days** of t***ransatlantic*** Es propagation in FN43ad, based upon a 3 prior year moving average. The actual qualifying ***transatlantic*** number of days open was recorded as **68 days**, 9.3% short of the projection. ~ 100 days are possible from here based upon evidence collected over many decades: from the last week of April to the first week of September. The total season 3 prior year moving average data point score was **4,161** which includes the record 2021 season total of **6,623**. This season produced a total of **4,927** qualifying data points exceeding the prior 3 year M.A. projection by 18.4%. The 2022 summer ***transatlantic*** season was the 2nd best on record in terms of accumulated data points.

The season produced two personal Es propagation related distance records here: EY8MM (10,131 km.) on my sunrise on 25 June 1311 UTC and BH4SCF (11,594 km.) on my sunset on 16 June 0006 UTC. The ~ 2.5 hour sunrise opening to Central Asia on 25 June was amazing with very strong signals. On 28 June I was able to work KL7 for the first time via multi-hop Es. All previous 6 meter KL7 QSOs were via either F_2 or Auroral E propagation modes.

High rates of 'dx efficiency' are enjoyed by everyone operating on the 50.313 bandwidth 'slice' making it easy to find the dx and QSYing to the 50.323 DX only 'slice' only when necessary. However, interference levels are rising and some 'creative' operators are placing temporary **CLICK>** **CQ BEACONS AND ROBOTS** in service. Sadly, the existing record of 2 consecutive days of 12 hours per day continuous cqing from a (***nlos***) local only 20 miles away has been eclipsed by a different strong station in May 2023! So what we enjoyed in the past may not be able to be sustained in the near future. Time will tell.

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Vy 73,

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