

Hello Everyone. Thank you for your interest in the TDOA experiment. Here is an updated checklist of important details. The main objective is to create plots of TDOA data vs. Time from a minimum of 1600z to 2100z on April 8, 2024. Data from all locations whether on the path of totality or not are welcome. An example plot from the October 2023 annular eclipse is shown below.

For those wishing to copy my transmissions, I am going to transmit the TDOA waveform every 10 minutes from 1200z to 2000z on 40 (around 7260), 60 (Ch 1 or 2), and 20 meters (start around 14.280 and move as required). I am located near San Antonio, TX. I will try my best to start right on UTC top of minute at 0, 10, 20, 30, 40, and 50 minutes past the hour. Transmissions will be preceded on phone with a verbal ID and a countdown (3, 2, 1, NOW). Paul N5DUP will supplement with additional transmissions from the Abilene TX area

The University of Scranton Zoom link will be used for coordination. The Zoom link will activate at 1600z and will be up until 2100z or as needed. The Zoom has a Chat and we will post frequency adjustments there if needed. The plan is to have W3USR and others to occupy the 40 and 20 meter frequencies with SEQP activities to hold them until it is time to send the TDOA waveform. If frequency changes are required the information will be announced and posted on the chat.

<https://scranton.zoom.us/j/286316405?pwd=QWdwMIFPbDIYeXg5ZDg1dmYzeFdCUT09>

Or go to

HamSCI.org

Press the blue Join HamSCI button

Scroll down to "HamSCI Science Telecons"

Press "**Solar Eclipse QSO Party (SEQP) Telecon:**" and follow the instructions to join.

Please keep both your audio and video muted to save bandwidth unless needed.

The requirements for receive stations are to copy and record .wav files of the transmissions. To be useful each record must be identifiable with:

1. Band or frequency.
2. Actual locations of both TX and RX stations in 6-digit grid square.
3. Time and date.

The best way to satisfy the needed documentation is to keep a detailed log and to place the required information in the filenames of each record. Example filenames:

40M-EL09nn-EM02ch-1600z.wav

40M-EL09nn-EM02ch-1610z.wav

40M-EL09nn-EM02ch-1620z.wav

40M-EL09nn-EM02ch-1630z.wav

This naming convention is Band first so all recordings can be easily sorted by band. Then TX station Grid Sq. and RX station Grid Sq. so distance can be determined by those who are analyzing the recordings. ARRL has a Grid Sq. calculator on its web site <https://contest-clubs.arrl.org/griddistancecalc.php> or you can Google 'Grid Distance Calculator', there are many out there. You will need your lat/lon coordinates obtainable from most cell phones. If operating from somewhere other than your home QTH, please use the Grid Sq. of the QTH from where the recordings are made. Record time in UTC in 24-hour format. All radio, recorder, or computer clocks should be set to UTC. Appending "z" to a time denotes the time is in zulu time, or UTC.

Local time to UTC conversions are shown below. In the example conversions 1:30pm CDT or 1830z is the time of maximum totality over my QTH in Texas. To get UTC:

- Add 4 hours to EDT, 2:30pm or 1430 EDT is 1830z
- Add 5 hours to CDT. 1:30pm or 1330 CDT is 1830z
- Add 6 hours to MDT. 12:30pm or 1230 MDT is 1830z
- Add 7 hours to PDT. 11:30am or 1130 PDT is 1830z

A TDOA Waveform Recording Log in the form of a MS Word document or a text document is extremely helpful to those who are analyzing the recordings. Example:

Rec#	Band	Frequency	Time	Filename	Notes
1	40M	7.265 MHz	1600z	40M-EL09nn-EM02ch-1200z.wav	
2	40M	7.265 MHz	1610z	40M-EL09nn-EM02ch-1200z.wav	
3	40M	7.265 MHz	1620z	40M-EL09nn-EM02ch-1200z.wav	
4	40M	7.265 MHz	1630z	40M-EL09nn-EM02ch-1200z.wav	QSB

We are plotting the data vs time to see the change caused by eclipse passage and to do this we need data at 10-15 minute intervals before, during, and after eclipse passage. If you do not have the time available for the full time period you are certainly welcome to take and analyze what data you can. Ways to analyze the data will be provided on request after the eclipse.

Stations are also encouraged to set up your own TDOA experiment. Experience has shown the TDOA method works best on paths less than 500 km (~300 miles) using 60 or 40 meters. The same general rules apply regarding sample rate (6-10 transmissions per hour from 1600z-2000z). The waveform is available at

https://github.com/jtm5/HamSCI_TDOA_SigGen

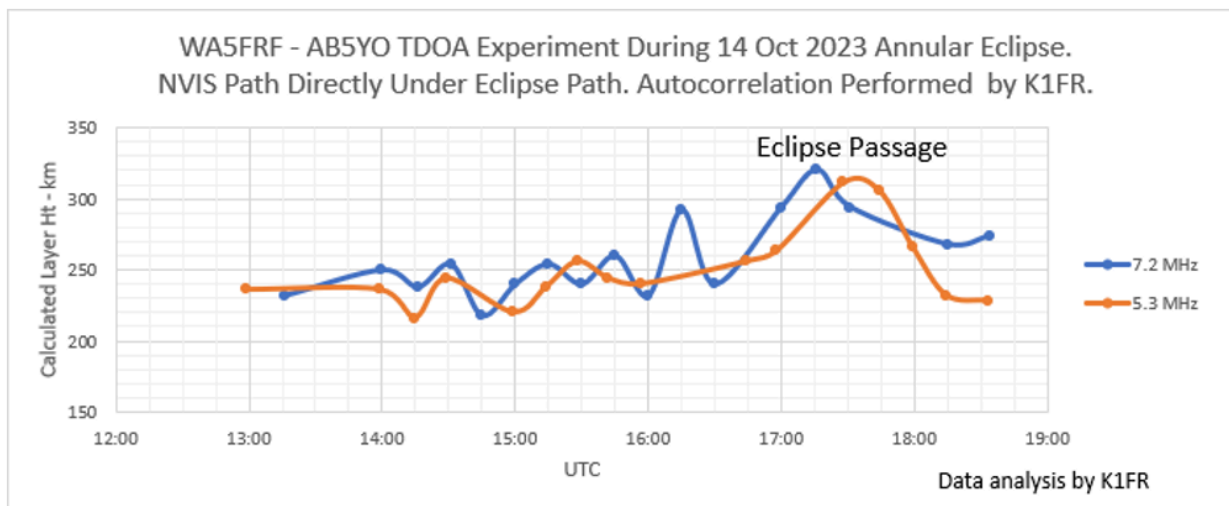
You enter your call sign and 6 digit grid square and the program will make a personalized and downloadable waveform with your call sign and grid square in the CW preamble. Note: Windows 11 media player has trouble playing it because it uses 32-bit float, but .wav programs like Audacity and Mac computers have no trouble. Stations planning their own experiment should get on the air beforehand to find out what band(s) work over the 1600-2000z time span. 40 and 60 meters worked for the NVIS path (9 km station separation) and 317 km regional path during the annular eclipse. 20 or maybe even 15 meters might be required for long paths (>1000 km). In general it is recommended to use regional distances and the lowest frequency that works through the afternoon for the best chance of getting recognizable 1 and 2 hop

propagation. Remember this is HF and there is a LOT of short term and long term variability. There are 10 chirps in the waveform and I have seen the multipath beat notes go from excellent to zero in the span of seconds. So don't expect good results on every transmission.

Summary of receiver requirements:

1. Noise free interface between receiver and sound card.
2. Mode is SSB using normal band conventions: LSB below 7.3 MHz and USB everywhere else and in the CW bands (this is like what you do with digital modes). Set receiver for widest possible audio and IF bandwidth. e.g., 100-2900 Hz
3. Do not use noise reducing filters of any kind (e.g., No Digital Noise Reduction, Noise Blanker, or Notch Filter). Use no or a flat response equalizer.
4. SLOW AGC.
5. Set receiver and computer time and date to UTC so time stamps are accurate.
6. Record with 8000 SPS minimum (44100 preferred) and either 16 bit signed or 32 bit float bit format.
7. Each record must be identifiable with band, maidenhead grid squares for both the transmitting and receiving stations, UTC date and time.
8. It is not necessary to use a GPSDO. If your receiver is tuned to frequency so that SSB speech sounds normal that is good enough.

Here is a plot of the data from the October annular eclipse. The plot shows a well-defined rise in the layer height when the eclipse came over the paths we had in TX. Interestingly, the time of maximum peaking was different for 40 and 60 meters. It will be interesting to see if this pattern repeats and what the difference might be between the annular and total eclipses.



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