



# Top Band

## 160 Meters

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WHY DO FEW HAMS USE  
IT?

HINT: 160M = 524 FEET

# History of 160M Band

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1. Amateurs had an allocation from 150 meters to 200 meters in wavelength (that's 2 MHz down to 1.5 MHz). Due to AM broadcast stations and other services, the 160m band was eventually narrowed up to 1.8 to 2.0 MHz.



2. Because of LORAN issues (LORAN is a radio navigation service), there have been power and frequency restrictions in the past (ex. 1942 to 1984 - 1.8 to 1.825 MHz, 200W day & 50W night). GPS replaced LORAN



3. Nowadays those of us in the US can operate anywhere from 1.8 to 2.0 MHz at up to 1500 W PEP output.

# 160M BAND PLAN

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1.800 - 2.000	CW
1.800 - 1.810	Digital Modes
1.810	CW QRP
1.843-2.000 FT8 = 1.840	SSB, SSTV and other wideband modes
1.910	SSB QRP
1.995 - 2.000	Experimental
1.999 - 2.000	Beacons

## What kind of activity will I find on 160M?

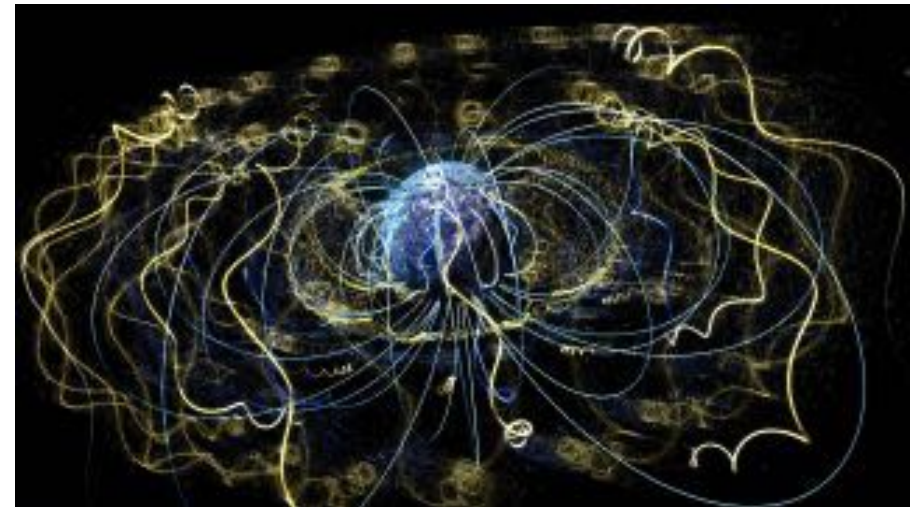
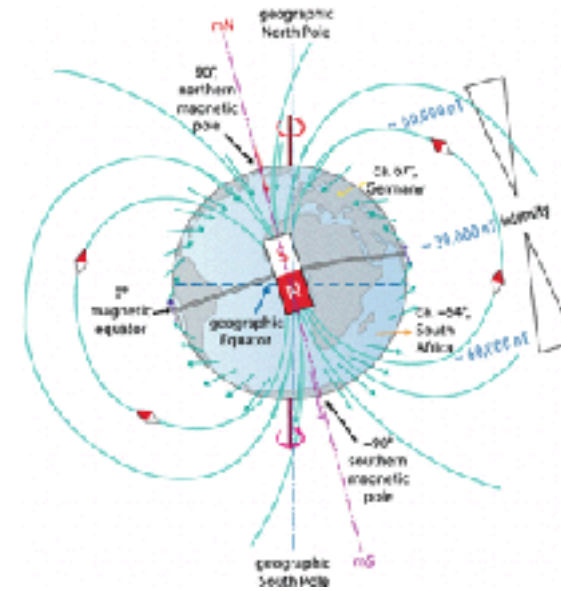
- Rag chewing SSB and CW
- DXing
- Experimenting
- Digital Modes – especially FT8
- Various Nets – Every Night net – 1.895

## What is propagation like?

- Quirky – mostly night-time band – effected by normal ionosphere changes **and** earth's magnetic field changes
- Best DX ~2hrs before sun-down and ~2hrs after sun-up – Grayline propagation
- Best during winter – peaks in Dec. – QRN in summer

## Do I have to have an Amp ?

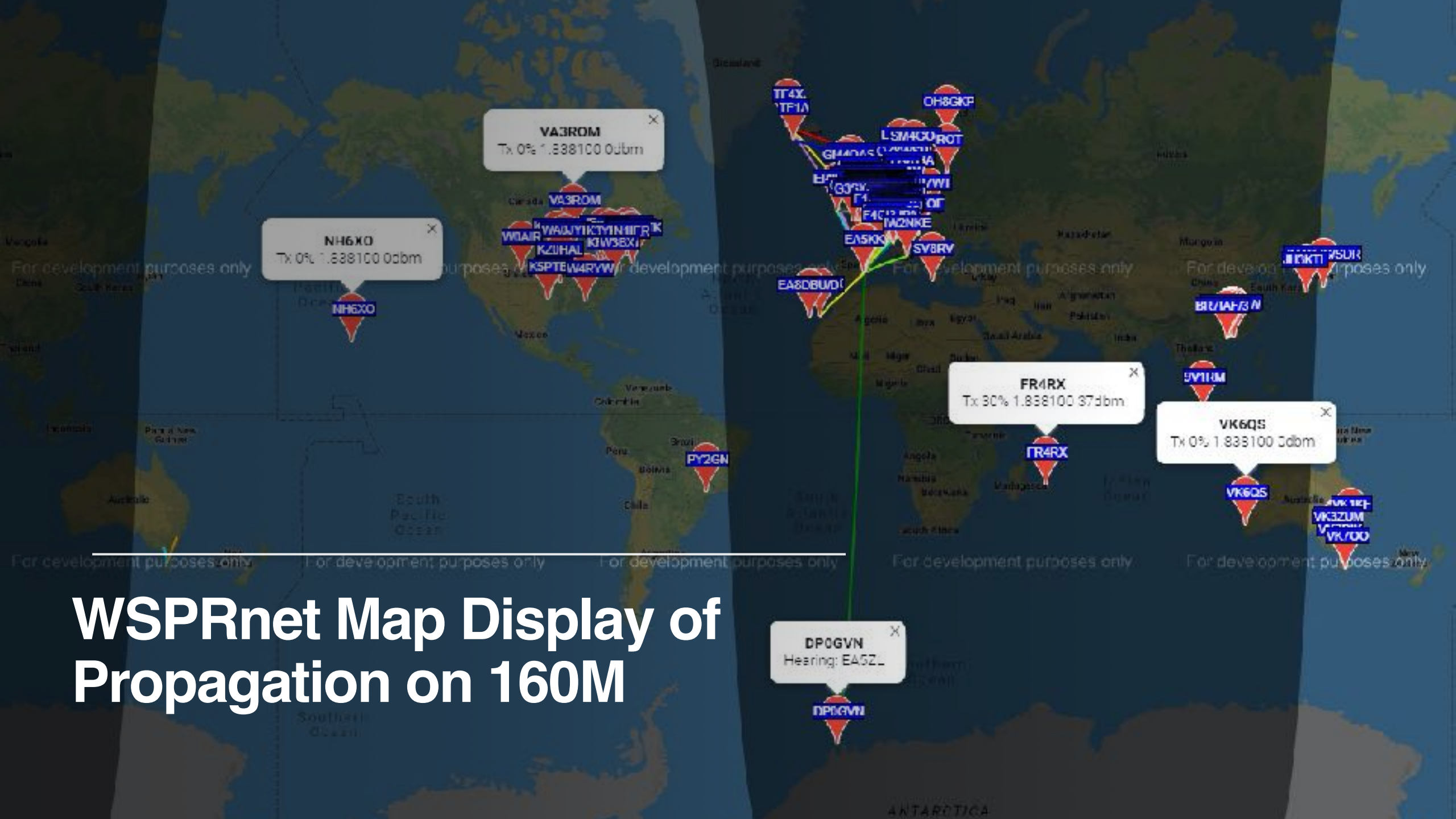
- No & Yes
- FT-8 changes the old rules
- Amp improves capability for all modes



What the magnetic flux lines really looks like!



# WSPRnet Map Display of Propagation on 160M



# What kind of antenna do I need?

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Vertical type antennas rule

But

Any antenna is better than no antenna

## 160-Meter Antennas

<i>Antenna Type</i>	<i>Total Group</i>	<i>Top group</i>
Vertical Antenna	26 %	33 %
Inverted-L/T	24 %	18 %
Shunt-Fed Tower	15 %	16 %
Dipole/Inv V	24 %	14 %
Long Wire	2 %	2 %
Vertical Array	9 %	16 %
¼-Wave Sloper	9 %	7 %
Delta Loop	2 %	0 %
Other	4 %	6 %

Notes: Top Group means stations who have worked at least 225 DXCC countries. Verticals in all shapes and forms (dedicated verticals, inverted Ls, Ts and shunt-fed towers) make up 66% of Top-Band antennas.

## Special Receiving Antennas Used on 160 Meters

<i>Antenna Type</i>	<i>Total Group</i>	<i>Top Group</i>
None	25 %	14 %
Beverages	52 %	68 %
Flags	14 %	15 %
Magnetic loops	9 %	4 %
Low dipoles	6 %	7 %
Array vert. short ele.	2 %	4 %
Other	2 %	2 %

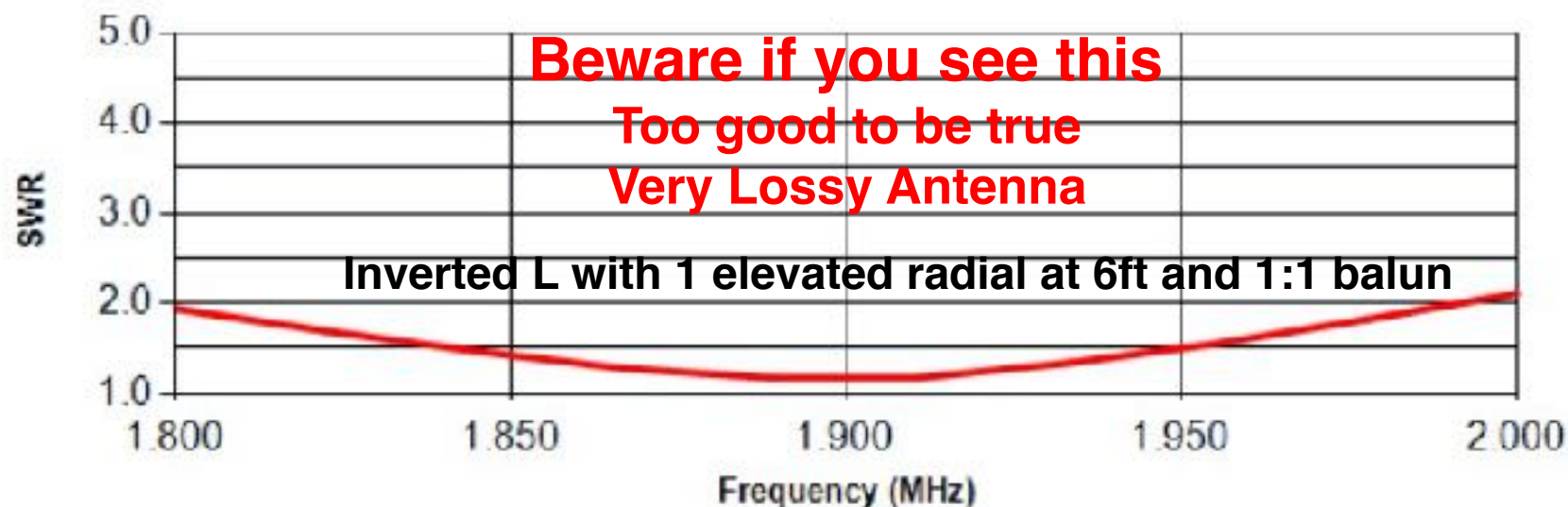
Notes: The category Flags include EWEs, Flags, Pennants, K9AY array, etc. It's obvious that Beverages are the secrets to success for most 80 and 160-meter

## Key TX Antenna Considerations for 160M

- Height – Dipoles should be very high - >120 ft or they are a cloud warmer - low noise – high take off angle not best for DX
- Full size loops are also cloud warmers – low noise
- $\frac{1}{4}$  wave Verticals = 130 ft – shorten some how – coils (narrow BW) or modify (inv L or T config)
- Verticals are noisy and need radials or counterpoise to counter ground losses
- Radials – min of 16 – ideal 32 - longer is better, but not longer than height of vertical– don't have to be tuned if on or in the ground – use lots of short ones if no room
- Elevated radials must be up >16 ft to be effective – only need two - must be tuned ~130 ft long – should be symmetrical
- A wide band tuner may be needed, especially with multiband antennas
- SWR can be misleading if antenna is lossy
- Any antenna is better than none!

## 160m SWR Plot

September 16, 2020



Plot 1 Plot 2 Plot 3 Plot 4 Plot 5

1.800 MHz = 1.94:1  
1.822 MHz = 1.69:1  
1.844 MHz = 1.47:1  
1.867 MHz = 1.27:1  
1.889 MHz = 1.17:1  
1.911 MHz = 1.17:1  
1.933 MHz = 1.34:1  
1.956 MHz = 1.55:1  
1.978 MHz = 1.82:1  
2.000 MHz = 2.10:1

BUT, it made contacts

160m

80m

40m

30m

20m

17m

15m

12m

10m

6m

4m

Starting  
Frequency

1.800 MHz

Ending  
Frequency

2.000 MHz

Start  
Analysis  
(Plot #1)

Start  
Analysis  
(Plot #2)

Start  
Analysis  
(Plot #3)

Start  
Analysis  
(Plot #4)

Start  
Analysis  
(Plot #5)

Stop  
Analysis

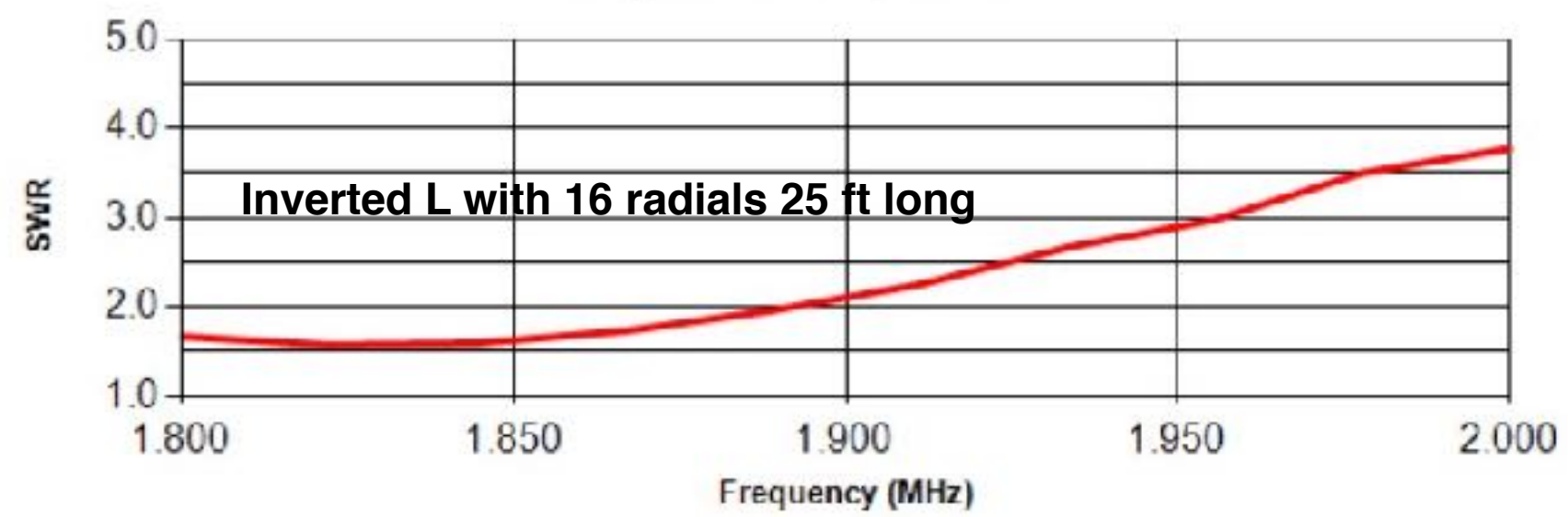
Save  
Results

Clear  
Results



# 160m SWR Plot

September 24, 2020



Plot 1	Plot 2	Plot 3	Plot 4	Plot 5
1.800 MHz = 1.67:1				
1.822 MHz = 1.57:1				
1.844 MHz = 1.59:1				
1.867 MHz = 1.73:1				
1.889 MHz = 1.96:1				
1.911 MHz = 2.25:1				
1.933 MHz = 2.66:1				
1.956 MHz = 2.97:1				
1.978 MHz = 3.50:1				
2.000 MHz = 3.77:1				

Ideal Vertical Zin should be 36 ohms  
SWR ~ 1.5 to 1

160m 80m 40m 30m 20m 17m 15m 12m 10m 6m 4m Starting Frequency 1.800 MHz Ending Frequency 2.000 MHz

Start Analysis (Plot #1) Start Analysis (Plot #2) Start Analysis (Plot #3) Start Analysis (Plot #4) Start Analysis (Plot #5) Stop Analysis Save Results Clear Results

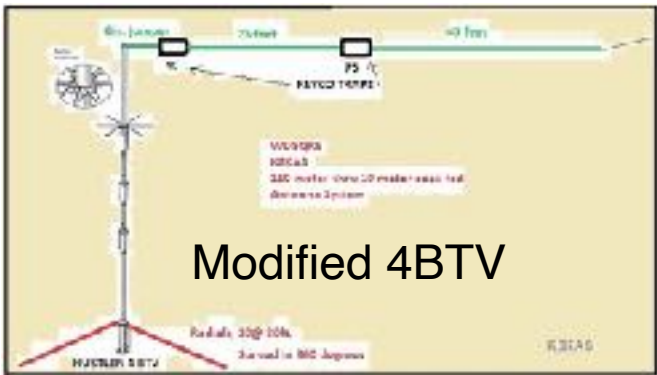
# 160M Antenna Designs



End-Fed w/Balun



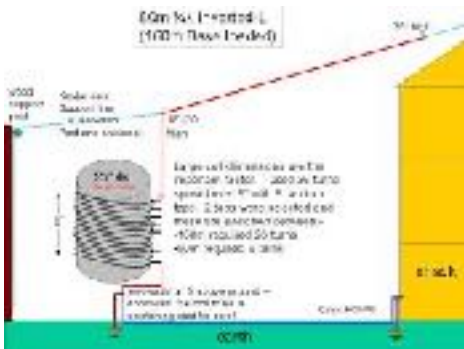
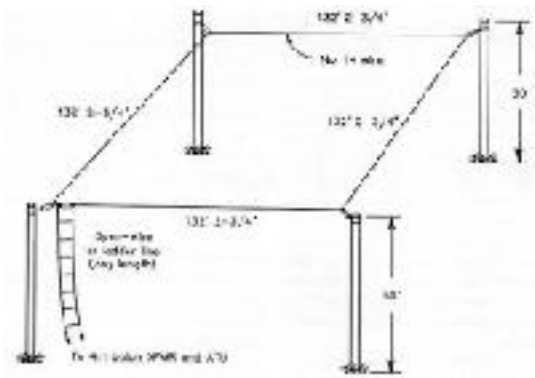
43 Vertical w/ 4:1 UNUN



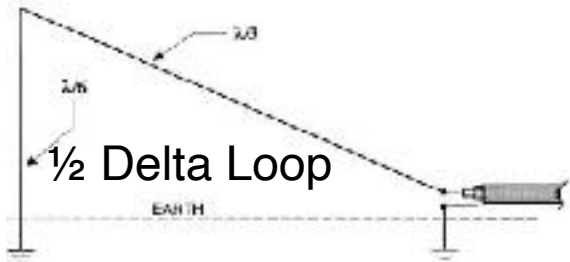
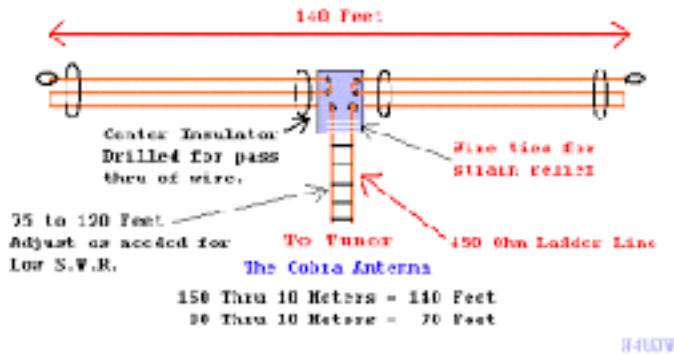
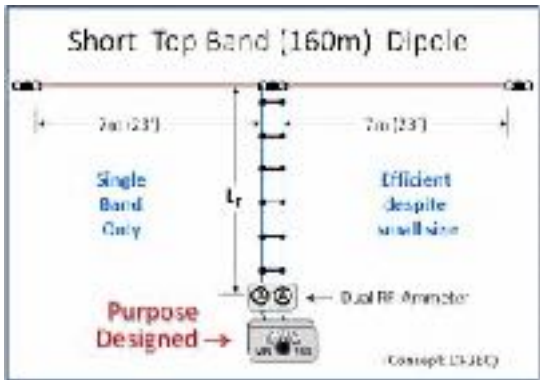
Modified 4BTV



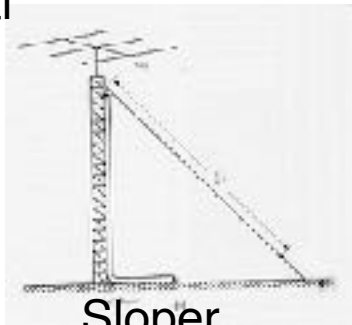
OCF Dipole



Loaded Vertical



1/2 Delta Loop



Sloper



Loop

The higher the better! Yard size limits type. HOA limits type! Verticals rule!

# THE UNUN:

## One Solution for verticals or T or Inv L

Recommended Wire Lengths for 9:1 ratio (in feet) for Coverage of 160m through 10m 53' 59' 72' 88.5' 98.5' **124.5'** 146' 162' 175'

Alternative Lengths (in feet) for Coverage of 160m through 10m 58' 71' 84' 107' 119' 148' 203'

Usually any wire length that is non resonant, like those shown above, will work with the 4:1 ratio.

Still need radials or counterpoise . May need tuner for multiband ops.



Model 4932sw





+RX  
+TNF  
Band  
ANT  
Display  
DAX

RX ANT: ANT1

RF Gain:

WNB

ANT1 ANT1 3.3K SPLIT TX A  
NB NR ANT QSK  
1.9 10.002  
-63 dBm  
DSP LSB X/RIT DAX

Inverted L with 16 radials  
Notice noise level

1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 LIVE

S B

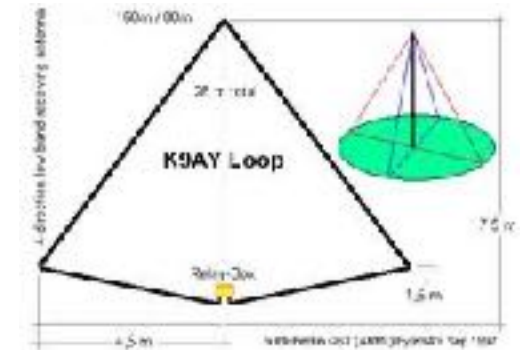
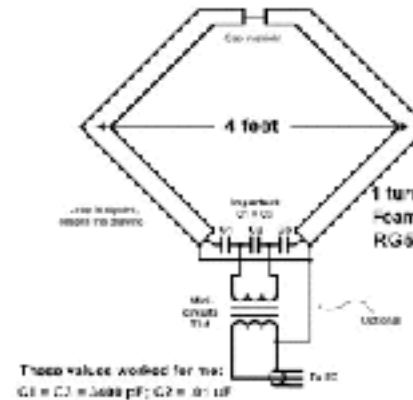
TNF CWX FDX

STATION: DESKTOP-FBCQUCJ

Petes6400  
v3.1.12TX  
Ready09/23/20  
23:17:53Z

## RX antenna considerations – not necessary but help

- Beverage antenna on 160M is 1 to 3 wavelengths – really long but very effective – low noise
- Active Loop antennas can be small – 1 meter diameter – low noise
- Various array type antennas are fairly large on 160M – low noise
- Use other band dipole for 160M receive – cut down noise
- RX antennas are usually directive
- Use TX antenna if that's all you have
- Any antenna is better than no antenna!





←  
+RX  
+TNF  
Band  
ANT  
Display  
DAX

RXA ANT1 3.3K  
NIL NR ANT QSK  
SPLIT TX  
1.910.002  
-92 dBm  
DSP LSB X/RIT DAX

Wellbrook Active Loop RX Antenna  
Notice much lower noise level

800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 LIVE

S B  
+ -

TNF CWX FDX

STATION: DESKTOP-FBCQUCJ

Petes6400  
v3.1.12

TX  
Ready

09/23/20  
23:12:31Z

# Resources to help with 160M operation

1. WSPRnet – use to check propagation and antenna performance (TX and RX)

2. DX Spotters – can see frequency and mode of DX

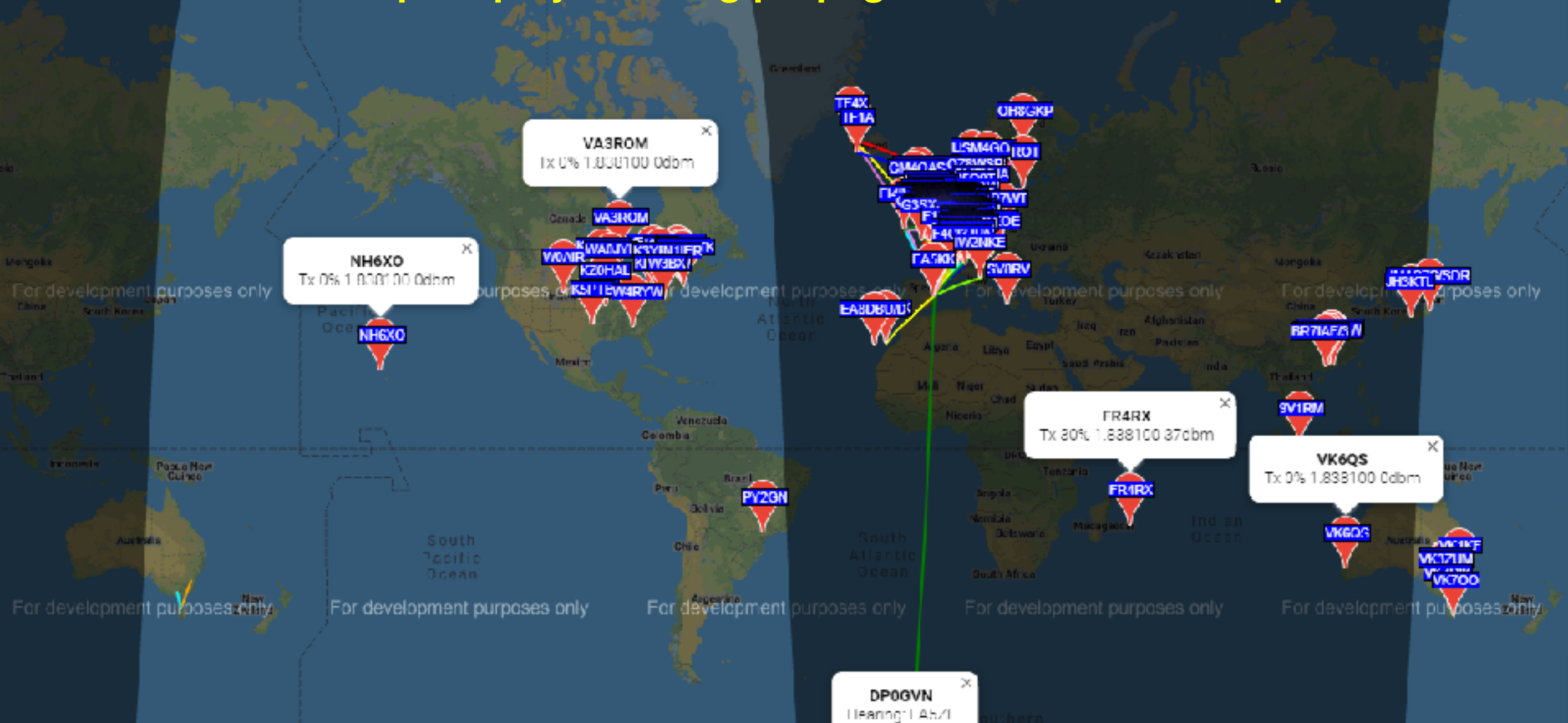
3. Listen with what you have

4. Google 160M operation or antenna design for much more information

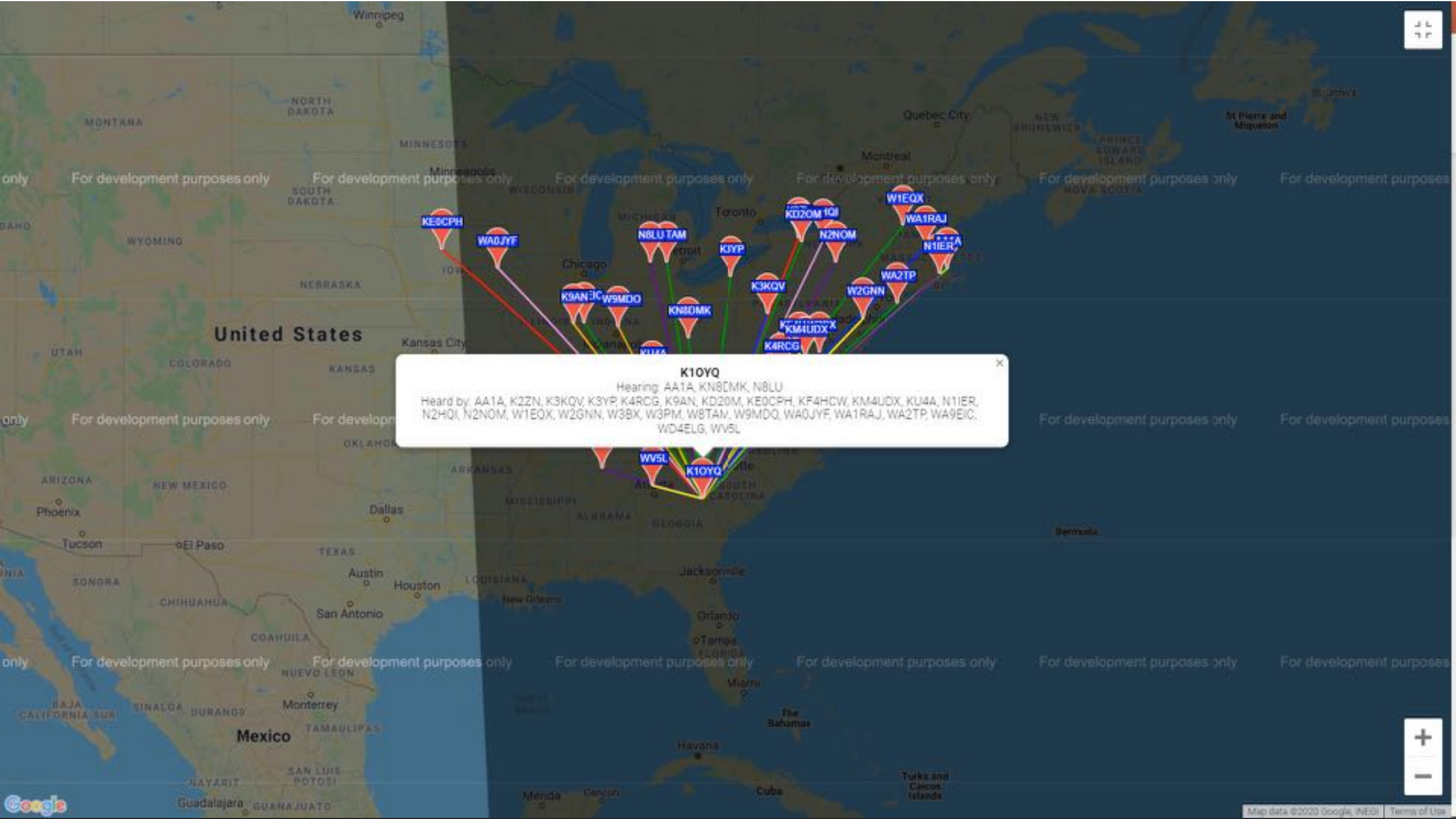
5. Put up a 160M antenna and try it out.

<http://k9yc.com/publish.htm> “Getting on 160M From a Small Lot”

# WSPRnet Map Display showing propagation over a 24-hour period







**K10YQ**

Hearing: AA1A, KN8DMK, N8LU

Heard by: AA1A, K2ZN, K3KQV, K3YP, K4RCG, K9AN, KD2OM, KE0CPH, KF4HCW, KM4UDX, KU4A, N1IER, N2H0I, N2NOM, W1EQX, W2GNN, W3BX, W3PM, W8TAM, W9MDO, WA0JYF, WA1RAJ, WA2TP, WA9EIC, WD4ELG, WV5L

My LastPass Vault

Mail - Dennis LaPierre - Outlook

factors affecting 160 meter prop...

Mp | WSPRnet

DXHeat | DXCluster & DX Resea...

dxheat.com/dxc/

★

1

ABP

K

2

★

P

⋮

Apps

Imported From IE

DXHeat | DXCluster...

Total Connect 2.0

QRZ Now - Ham Ra...

Time.is 07:04pm

Ham Radio Site - [...]

WRDW | Augusta, G...

Wire\_Antennas\_for\_...

Dashboard

Ambient Weather

»

DX Cluster

Login/Signup

Filters

All

None

Sources

W3LPL

DXCC

VALID

OTHER

Modes

CW

PHONE

DIGI

Bands

SHF

DX de	Freq	DX	Tags	Comments	UTC	Date
W7RH	1 824,5	AL7JX	🟢@	CQ DX	12:40	23/09/20
K4TR	1 840,0	XE1KK	🟢@		11:26	23/09/20
K0LB	1 840,0	W1VT	🟢@	FM18HQ FN31	10:43	23/09/20
K0LB	1 840,0	AB0QN	🟢@	FM18HQ EM47	10:42	23/09/20
N4VN	1 820,6	AA1K	🟢	CQ DX	10:37	23/09/20
K0LB	1 840,0	WA7GYQ	🟢@	FM18HQ DN71PD	10:35	23/09/20
N4VN	1 822,7	AA1K	🟢	JON - CQ DX	09:26	23/09/20
NQ4I	1 822,7	AA1K	🟢	cq	09:23	23/09/20
VE6WZ	1 832,2	IV3PRK	🟢@	TNX Luis gud ears with QIRN	04:57	23/09/20
W7JwT	1 841,3	SM6NOC	🟢@		04:46	23/09/20
N4QS	1 828,5	V31MA	🟢	Correction	04:32	23/09/20
N4QS	1 828,5	V31WA	🔴@		04:31	23/09/20
VE6WZ	1 830,2	IK7JTF	🟢@	579	04:30	23/09/20
W7JwT	1 842,2	ZS1LS	🟢@		04:26	23/09/20
VE6WZ	1 832,2	IV3PRK	🟢@	Luis good sig CQ	04:23	23/09/20
VE6WZ	1 825,0	G4EIM		good signal	04:21	23/09/20
N4QS	1 822,5	ON7PQ			04:14	23/09/20
N4QS	1 822,5	ON7PQ			04:14	23/09/20
N4QS	1 829,5	DL8MKG	🟢@		04:08	23/09/20
VE6WZ	1 823,9	SM4DHF	🟢@		04:01	23/09/20
VE6WZ	1 829,5	DL8MKG	🟢@		03:56	23/09/20
N5DG	1 826,0	9A2G	🟢	nice sig into Tx	03:52	23/09/20
VE6WZ	1 826,0	9A2G	🟢		03:51	23/09/20

Realtime World Clock

23:14:45 UTC

Wednesday, 23. of September 2020

Q Search

Search

Default Wildcard

Submit

Submit a DX Spot

(Login required)

Propagation

Solar Activity  
SFI: 72

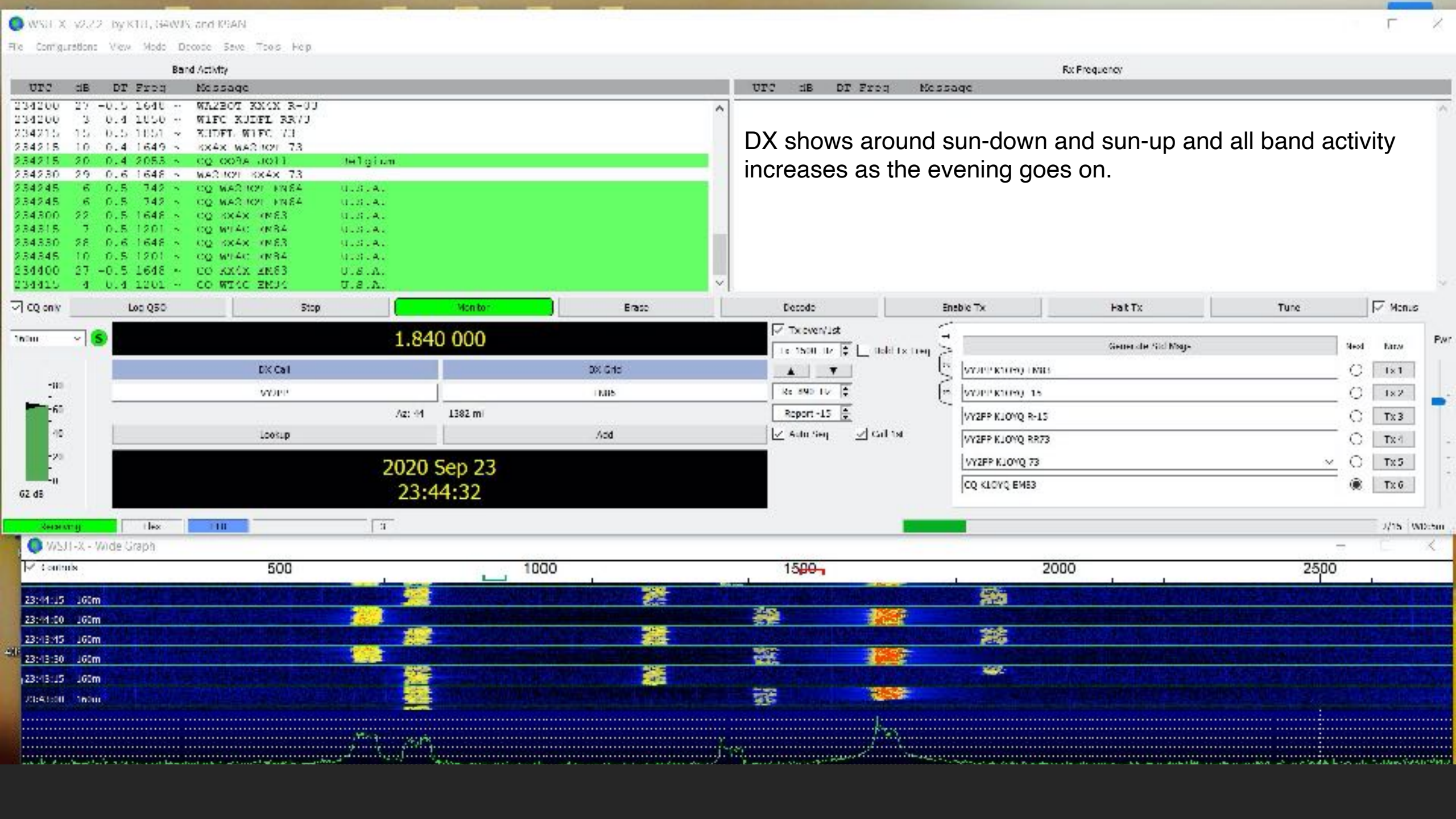
Magnetic Activity  
K: 2 A: 7

Band Activity

Chat

feedback





# Questions

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