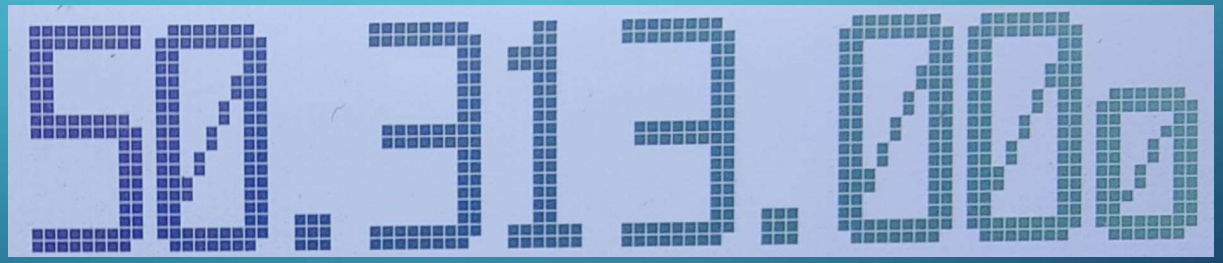
# SIX METERS

## THE "MAGIC BAND"




Presented By: Ray Dabkowski, W8RD

# UNITED STATES FREQUENCY ALLOCATIONS

## THE RADIO SPECTRUM

RADIO SERVICES COLOR LEGEND

- AERONAUTICAL MOBILE
- AERONAUTICAL MOBILE SATELLITE
- AERONAUTICAL RADIONAVIGATION
- AMATEUR
- AMATEUR SATELLITE
- BROADCASTING
- BROADCASTING SATELLITE
- EARTH EXPLORATION SATELLITE
- FIXED
- FIXED SATELLITE
- INTER-SATELLITE
- LAND MOBILE
- LAND MOBILE SATELLITE
- MARITIME MOBILE
- MARITIME MOBILE SATELLITE
- MARITIME RADIONAVIGATION
- METEOROLOGICAL AIDS
- METEOROLOGICAL SATELLITE
- MOBILE
- MOBILE SATELLITE
- RADIO ASTRONOMY
- RADIODETERMINATION SATELLITE
- RADIOLOCATION
- RADIOLOCATION SATELLITE
- RADIONAVIGATION
- RADIONAVIGATION SATELLITE
- SPACE OPERATION
- SPACE RESEARCH
- STANDARD FREQUENCY AND TIME SIGNAL
- STANDARD FREQUENCY AND TIME SIGNAL SATELLITE

ACTIVITY CODE

- GOVERNMENT EXCLUSIVE
- GOVERNMENT/NON-GOVERNMENT SHARED
- NON-GOVERNMENT EXCLUSIVE

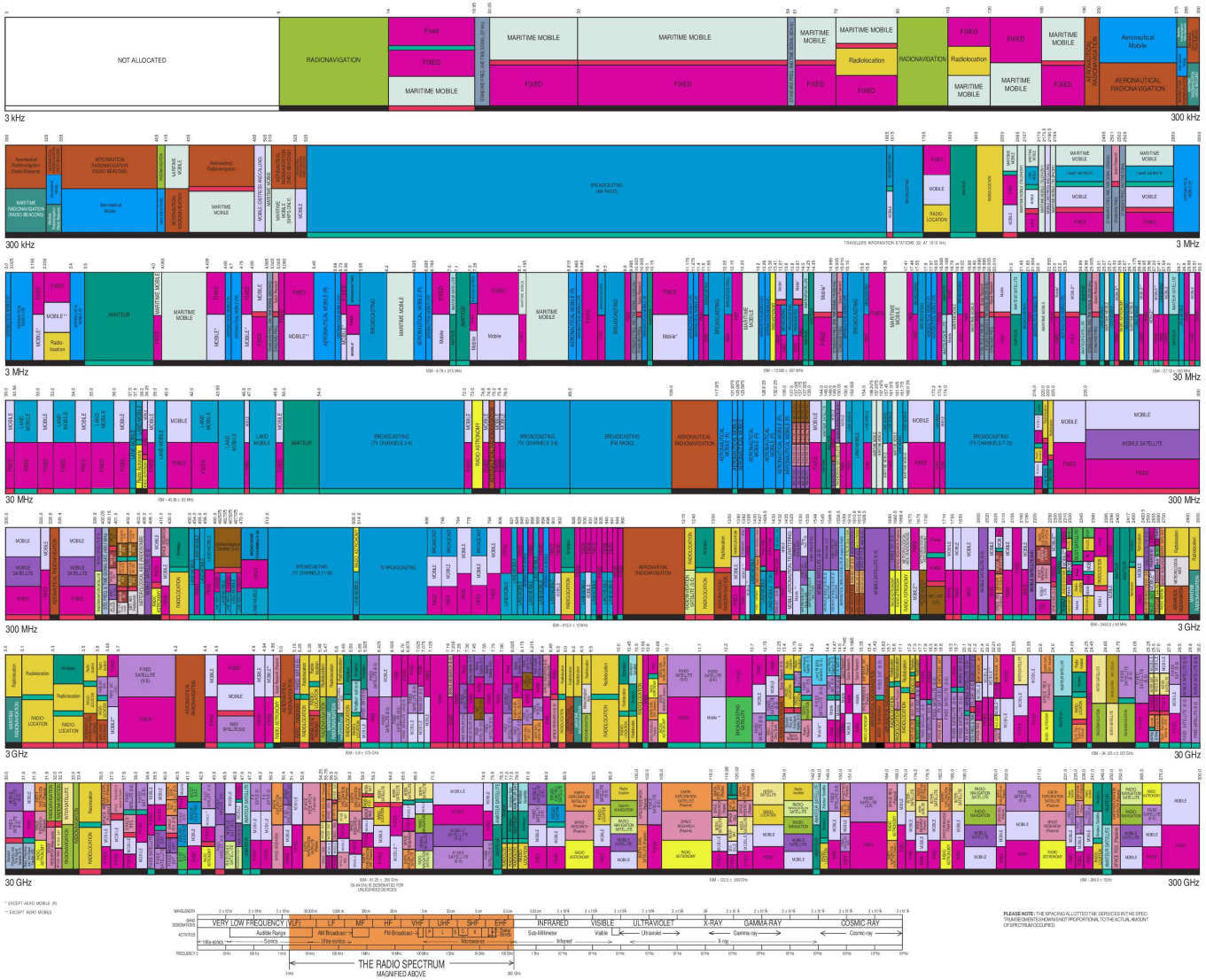
ALLOCATION USAGE DESIGNATION

| SERVICE | EXAMPLE | DESCRIPTION |
|---|---|---|
| Primary | FIXED | Capital Letters |
| Secondary | Mobile | 1st Capital with lower case letters |

This chart is a graphic single-point-in-time portrayal of the Table of Frequency Allocations used by the FCC and NTIA. As such, it does not completely reflect all aspects, i.e., footnotes and recent changes made to the Table of Frequency Allocations. Therefore, for complete information, users should consult the Table to determine the current status of U.S. allocations.

U.S. DEPARTMENT OF COMMERCE
National Telecommunications and Information Administration
Office of Spectrum Management

October 2003




* EXCEPT AERO MOBILE (R)

** EXCEPT AERO MOBILE

PLEASE NOTE: THE SPACING ALLOTTED THE SERVICES IN THIS SPECTRUM SEGMENT IS NOW IN EXACT PROPORTIONAL TO THE ACTUAL AMOUNT OF SPECTRUM OCCUPIED.

30.0
30.56
32.0
33.0
34.0
35.0
36.0
37.0
37.5
38.0
38.25
39.0
40.0
42.0
43.69
46.6
47.0
49.6
50.0
54.0
72.0
MOBILE
LAND MOBILE
FIXED
Radio Astronomy
RADIO ASTRONOMY
AMATEUR
BROADCASTING
(TV CHANNELS 2-4)
30 MHz
ISM – 40.68 ± .02 MHz

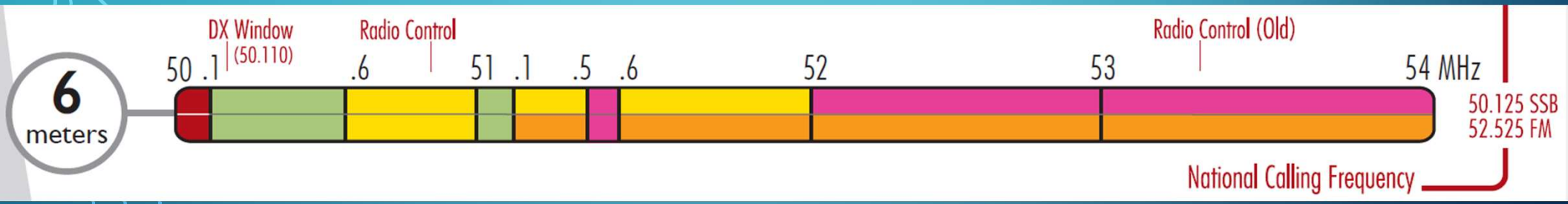
# HISTORY

## Whatever happened to TV Channel 1?

| Year | | 6 Meter Band | FM | TV 1 | TV 2 |
|---|---|---|---|---|---|
| 1924 | US action | 56-64 MHz | | | |
| 1927 | International action | 56-60 MHz | | | |
| 1934 | FCC established | | | | |
| 1937-1938 | 6 MHz TV channels | 56-60 MHz | | 44-50 MHz | 50-56 MHz |
| 1940 | FCC action | 56-60 MHz | 42-50MHz | 50-56 MHz | 60-66 MHz |
| 1941 | World War II | | | | |
| 1946 | FCC action | 50-54 MHz | 88-108 MHz | 44-50 MHz | 54-60 MHz |
| 1948 | TV 1 removed | | | | |

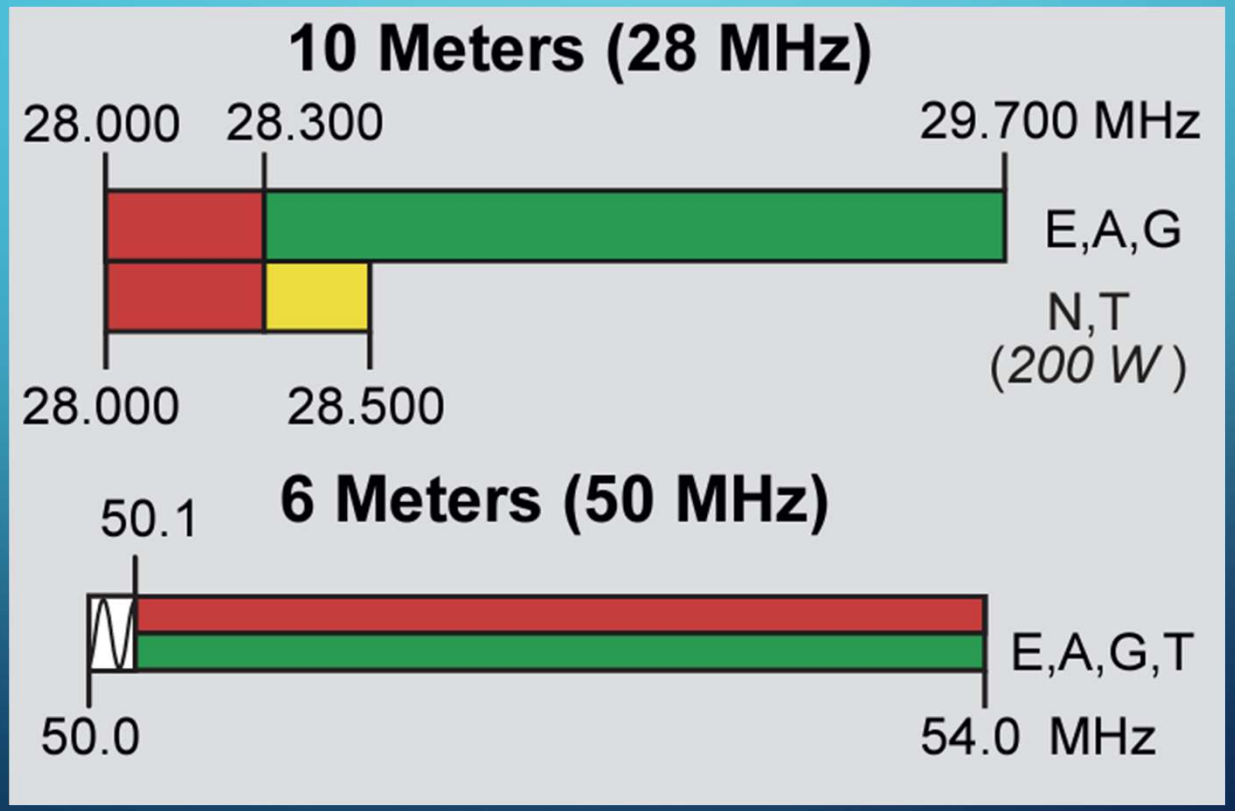
## And what is TVI?

# BANDPLAN




## 50.313 FT8

# ALL AMATEURS HAVE SAME PRIVILEGES

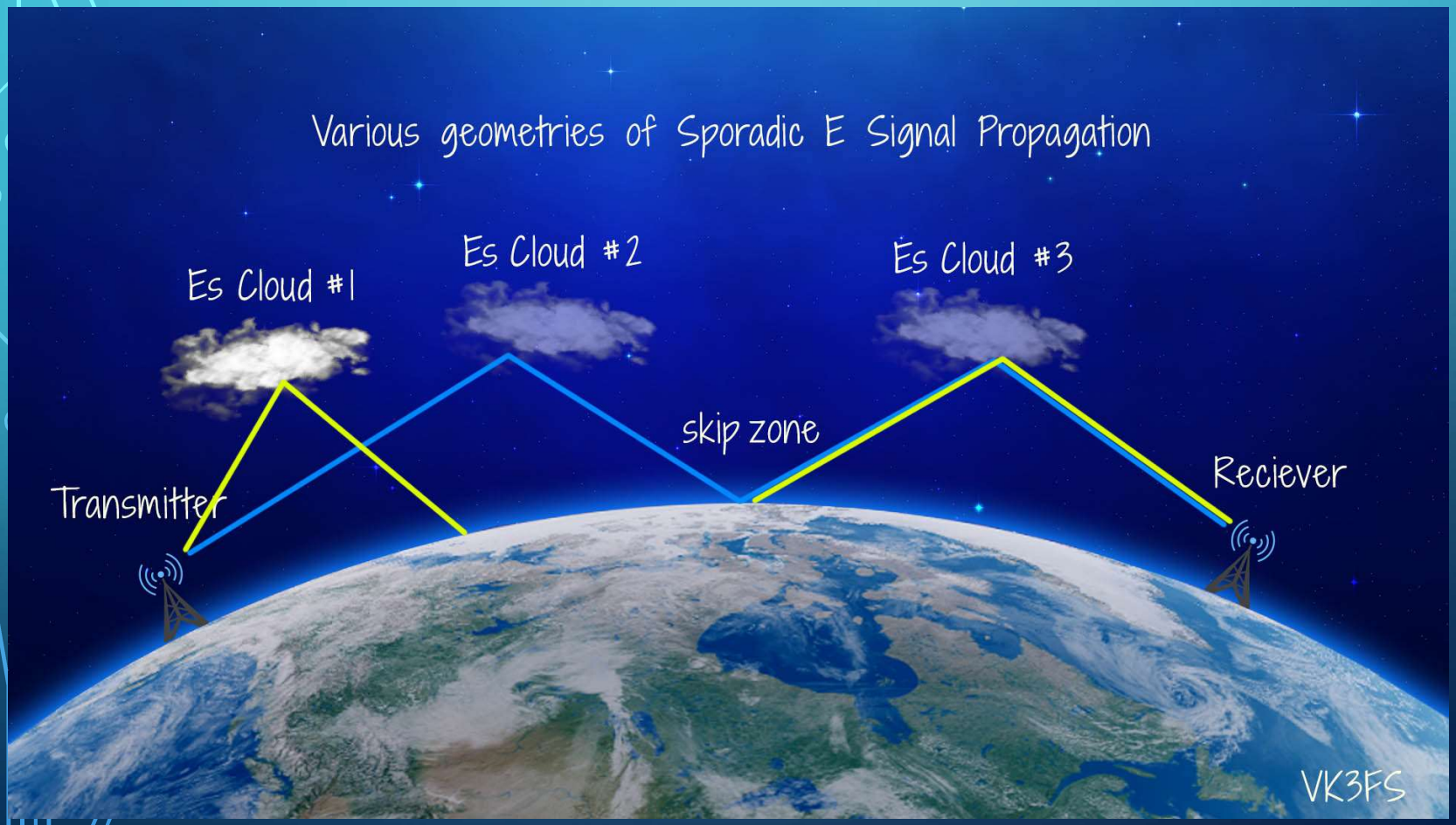


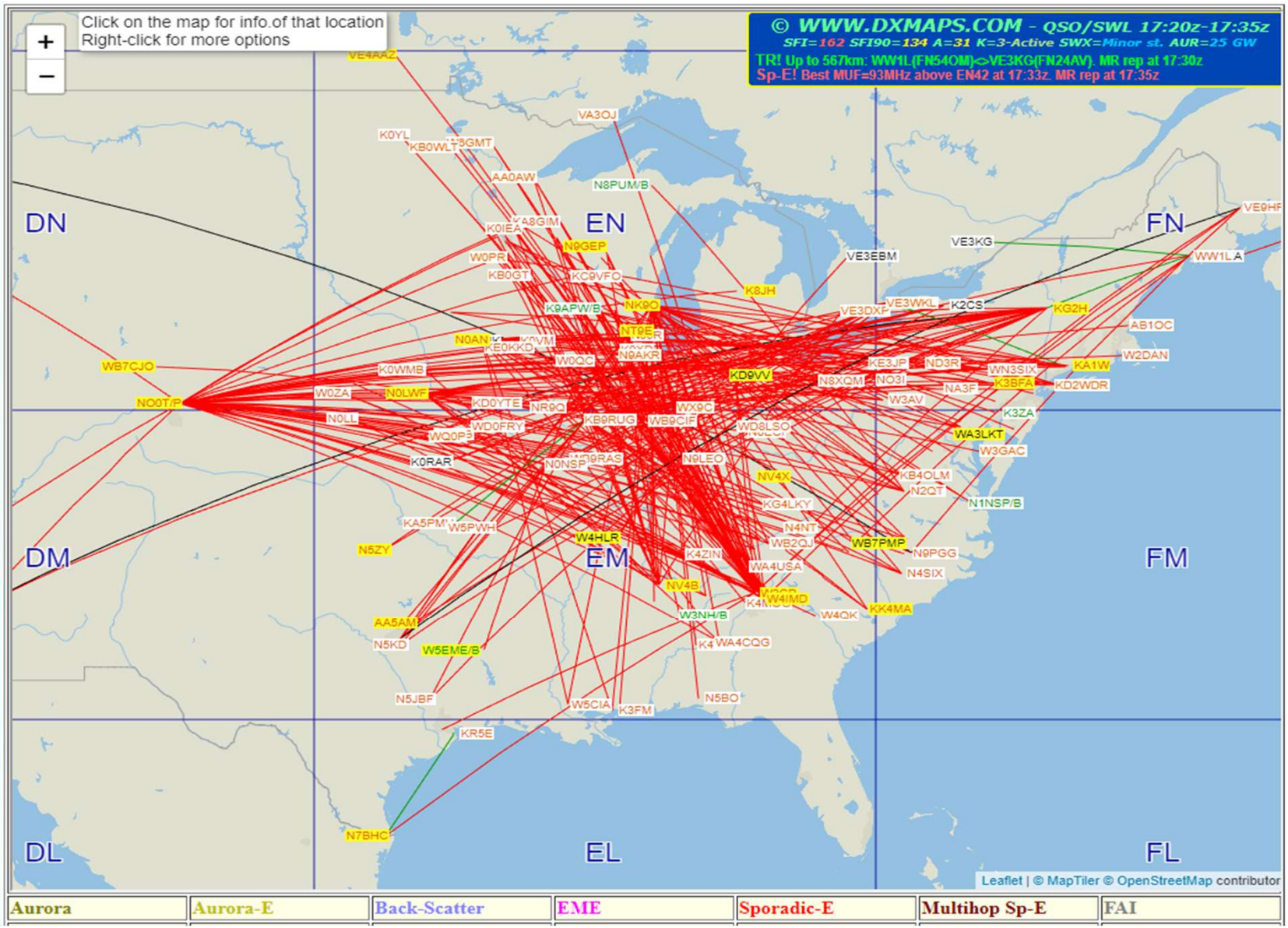

What Makes
It So Magic?
PROPAGATION

# Sporadic E (Es)

- Seasonal
  - May – July (Northern Hemisphere)
  - Smaller peak in mid-winter
- Unpredictable
  - Es Clouds vary greatly in size
  - They move
- Their method of creation is unknown
  - Several theories – wind shear
- Signals can double hop

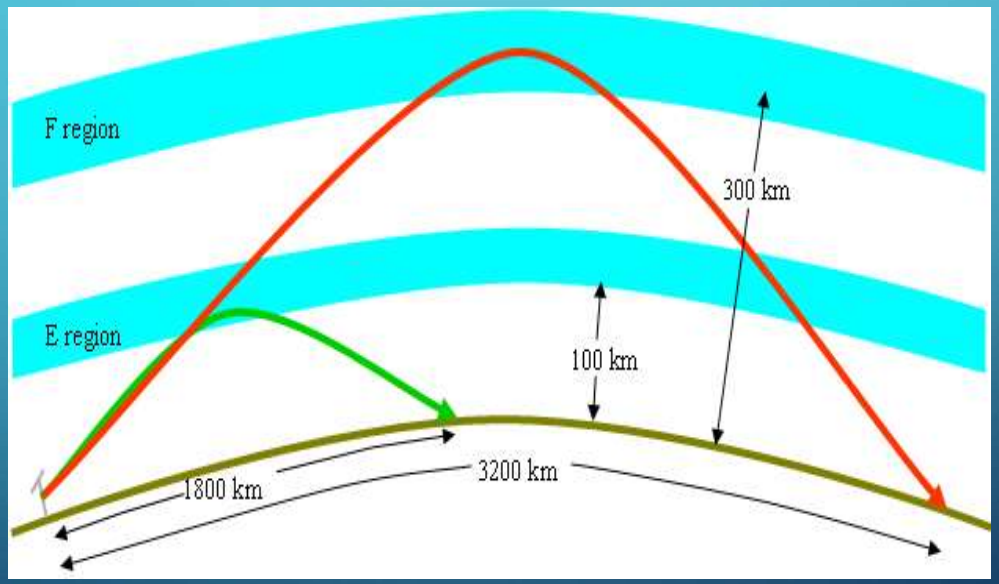
# SPORADIC E (Es)




Click on the map for info.of that location
Right-click for more options
© WWW.DXMAPS.COM - QSO/SWL 17:20z-17:35z
SFI=162 SFI90=134 A=31 K=3-Active SWX=Minor st. AUR=25 GW
TR! Up to 567km: WW1L(FN54OM)<>VE3KG(FN24AV). MR rep at 17:30z
Sp-E! Best MUF=93MHz above EN42 at 17:33z. MR rep at 17:35z
DN
EN
FN
DM
EM
FM
DL
EL
FL
VE4AAZ
VA3OJ
K0YL
KB0WLT
AA0AW
N8PUM/B
K0IEA
N9GEP
W0PR
KB0GT
KC9VFC
K8JH
K9APW/B
NK9O
NT9E
N0AN
KE0KKD
N9AKR
W0QC
WB7CJO
K0WMB
W0ZA
N0LWF
NO0T/P
KD0YTE
NR9Q
N0LL
WD0FRY
WQ0P
KB9RUG
WB9CIF
K0RAR
N0NSP
N9LEO
NV4X
KG4LKY
KA5PM
W5PWH
N5ZY
W4HLR
K4ZIN
WA4USA
NV4B
W4IMD
AA5AM
N5KD
W5EME/B
W3NH/B
W4QK
KK4MA
WA4CQG
N5JBF
W5CIA
K3FM
N5BO
KR5E
N7BHC
VE3KG
VE3EBM
VE3DXP
VE3WKL
K2CS
KG2H
WW1L/A
VE9HP
AB1OC
W2DAN
KA1W
WN3SIX
KE3JP
ND3R
N8XQM
NO3I
NA3F
K3BFA
KD2WDR
W3AV
K3ZA
WA3LKT
W3GAC
KB4OLM
N2QT
N1NSP/B
N4NT
WB2QJ
WB7PMP
N9PGG
N4SIX
Leaflet | © MapTiler © OpenStreetMap contributor
Aurora
Aurora-E
Back-Scatter
EME
Sporadic-E
Multihop Sp-E
FAI

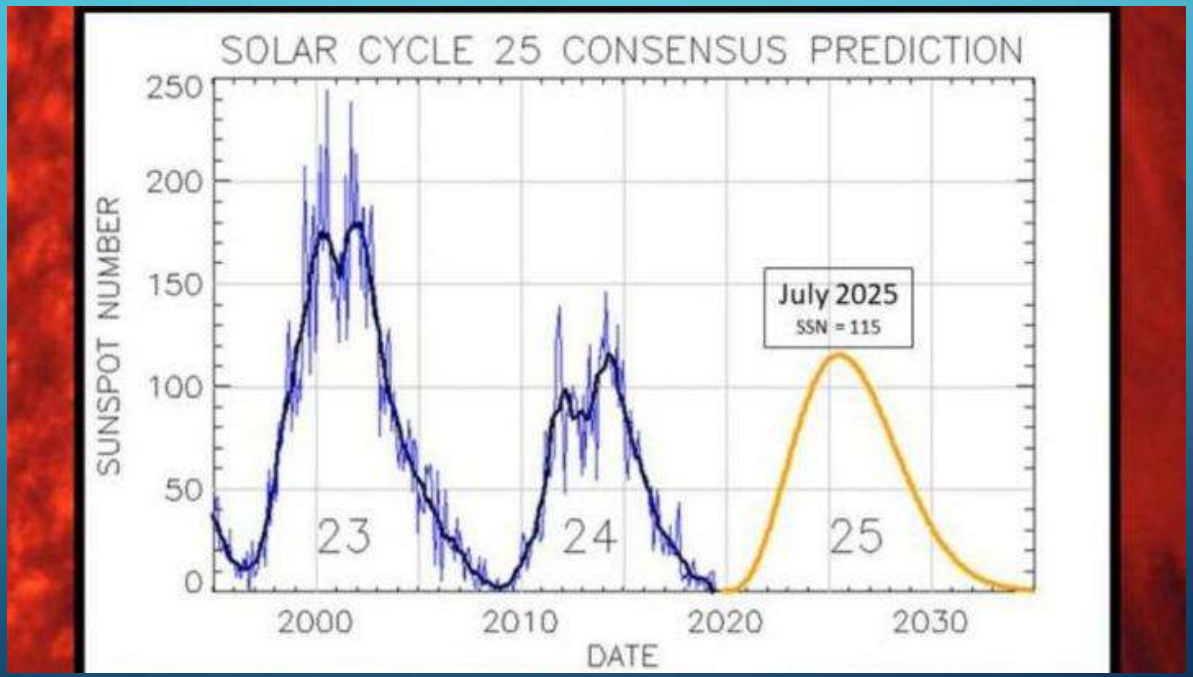
# F Layer

Occurs only when solar flux is high

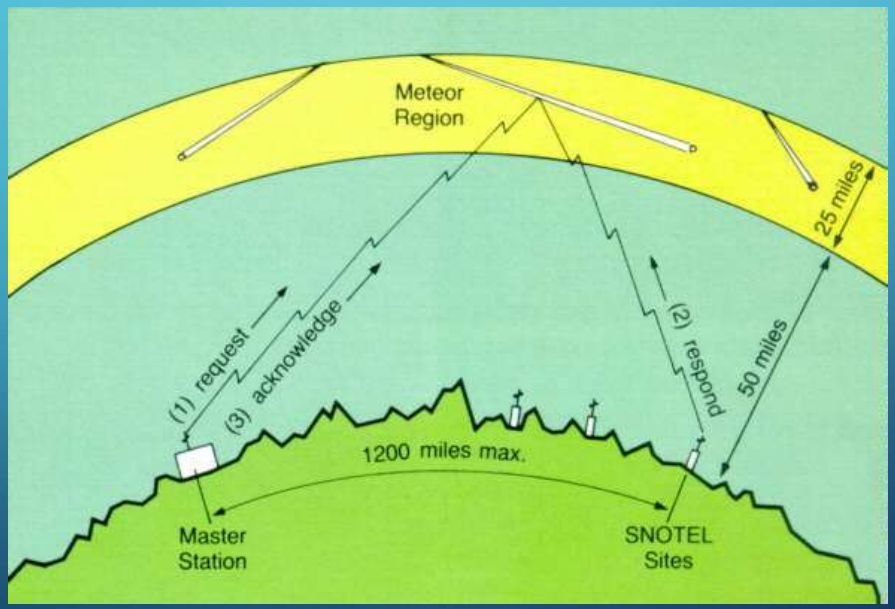


# F Layer

Occurs only when solar flux is high

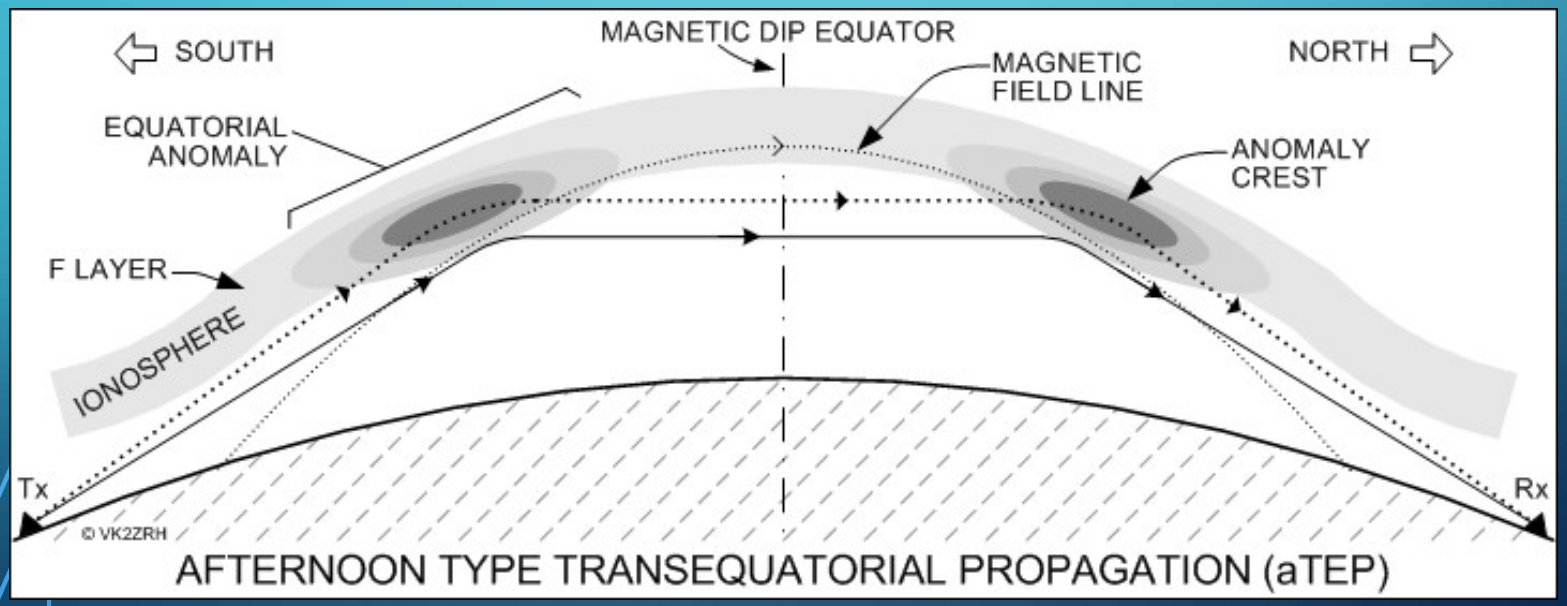


# Meteor Scatter
# Ionoscatter

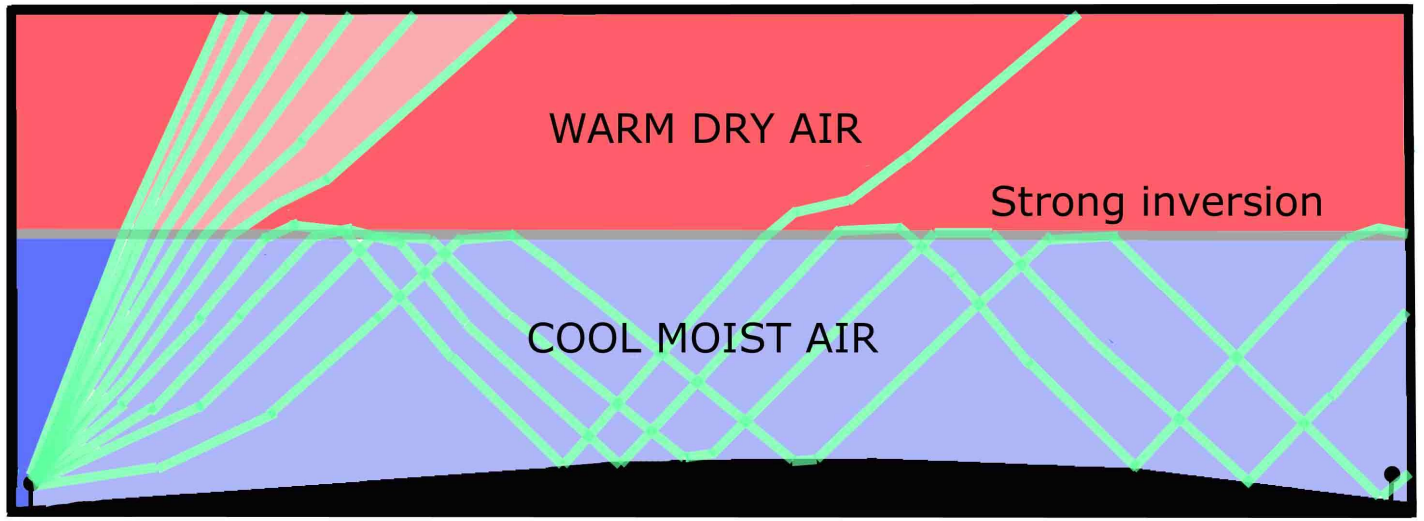


# TEP

## Trans-Equatorial Propagation



# Tropospheric Ducting

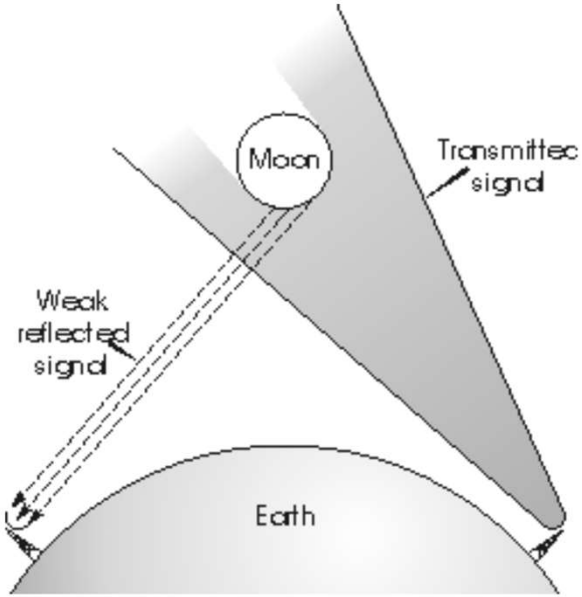



**DUCTING**

Signals bend down and reflect off the ground.
RX receives signal from TX. Radar shows strong ground clutter.

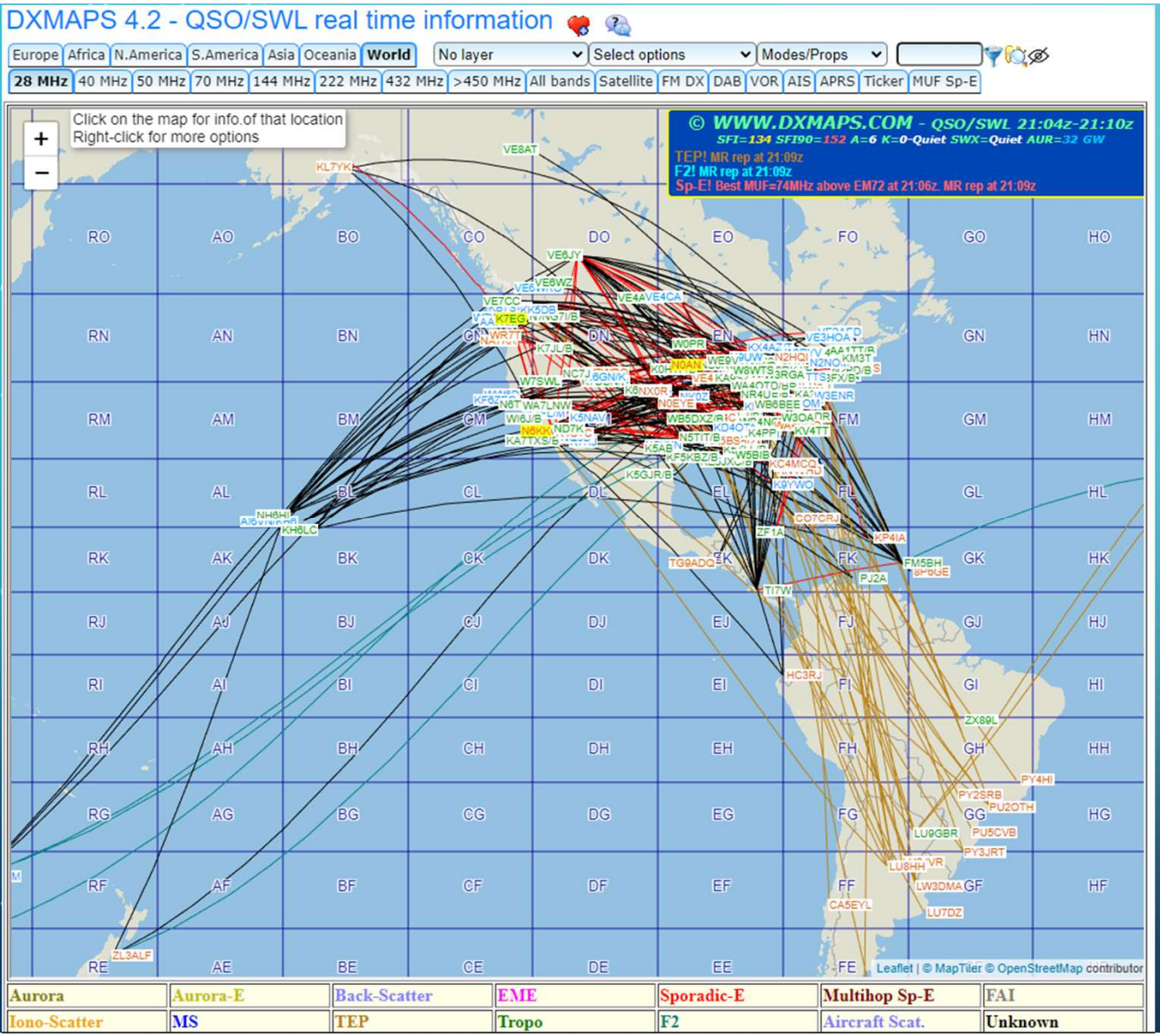
**W. HEPBURN**

# EME

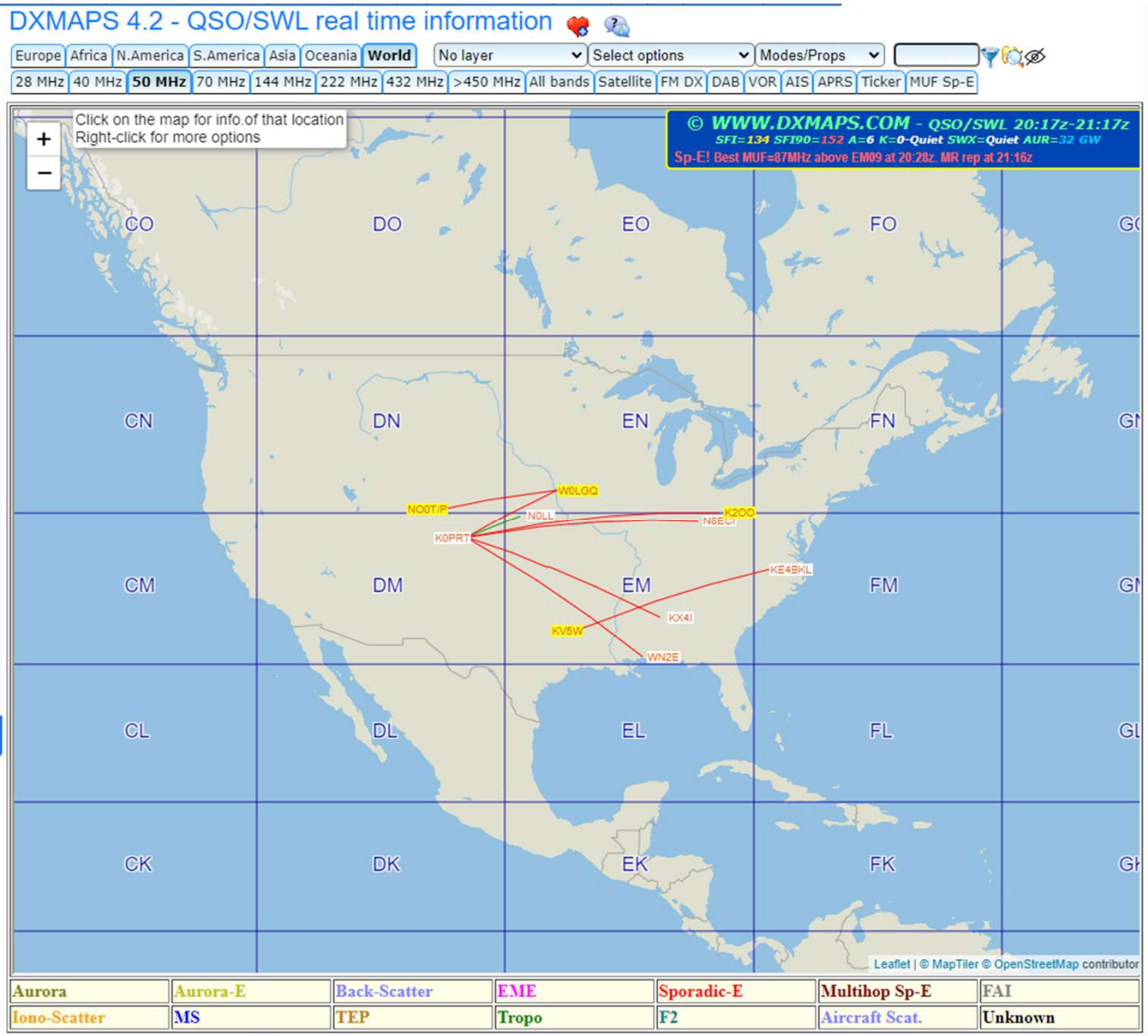



**Concept of Moonbounce EME propagation**

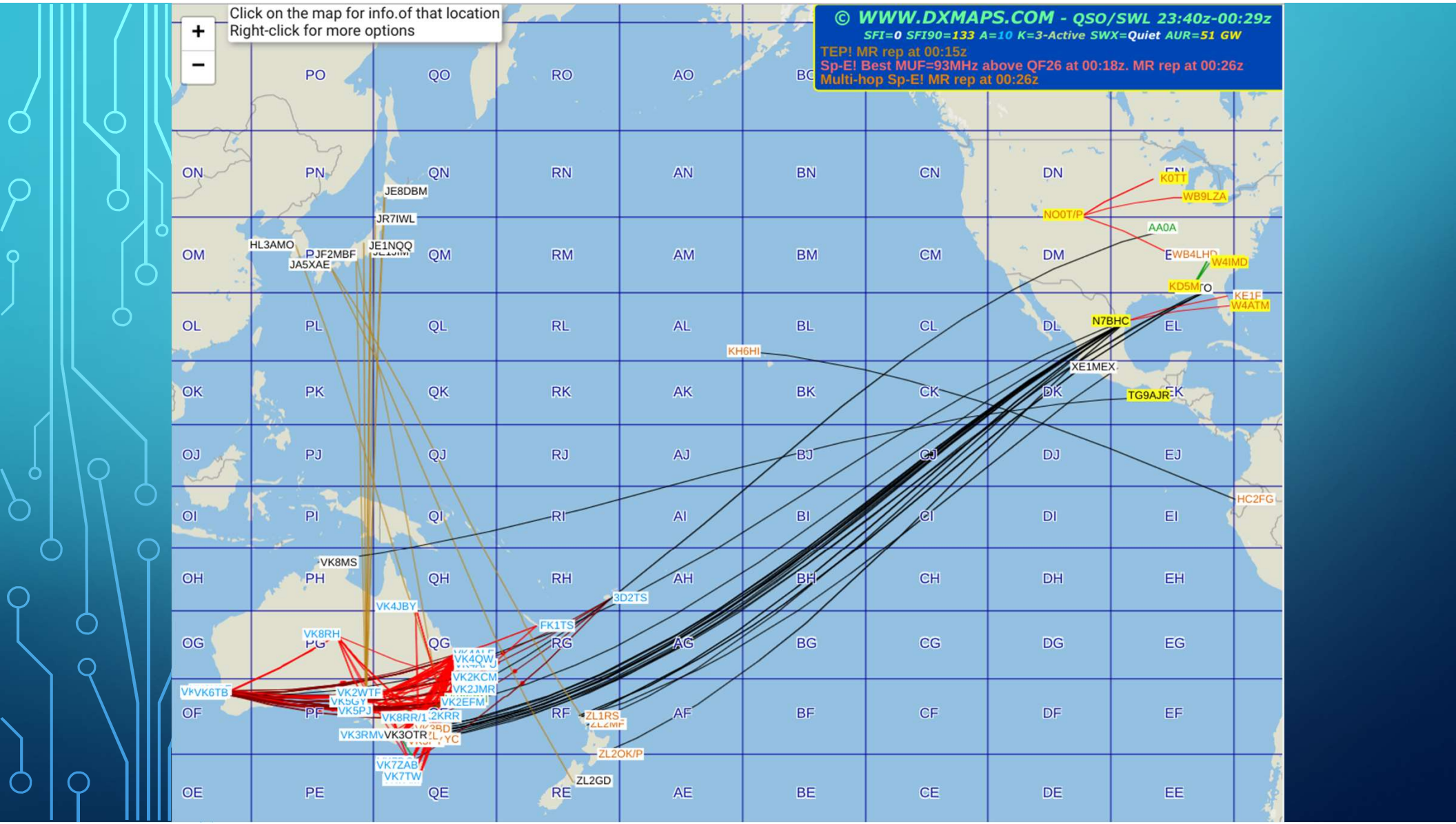
# SOFTWARE


DXMAPS 4.2 - QSO/SWL real time information
Europe Africa N.America S.America Asia Oceania World
No layer
Select options
Modes/Props
28 MHz 40 MHz 50 MHz 70 MHz 144 MHz 222 MHz 432 MHz >450 MHz All bands Satellite FM DX DAB VOR AIS APRS Ticker MUF Sp-E
Click on the map for info.of that location
Right-click for more options
© WWW.DXMAPS.COM - QSO/SWL 21:04z-21:10z
SFI=134 SFI90=152 A=6 K=0-Quiet SWX=Quiet AUR=32 GW
TEP! MR rep at 21:09z
F2! MR rep at 21:09z
Sp-E! Best MUF=74MHz above EM72 at 21:06z. MR rep at 21:09z
Leaflet | © MapTiler © OpenStreetMap contributor
Aurora
Aurora-E
Back-Scatter
EME
Sporadic-E
Multihop Sp-E
FAI
Iono-Scatter
MS
TEP
Tropo
F2
Aircraft Scat.
Unknown

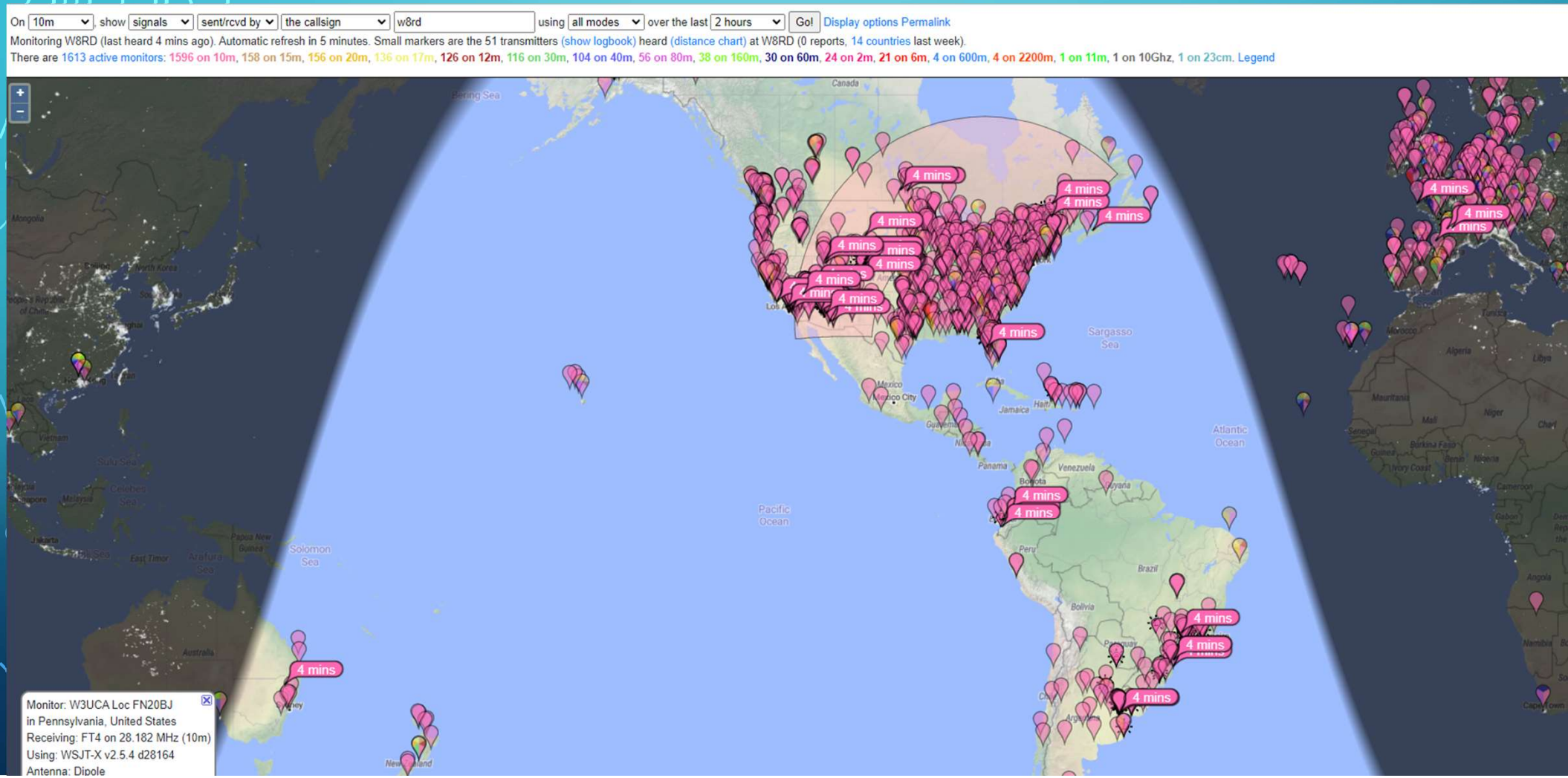
# DXMaps.com

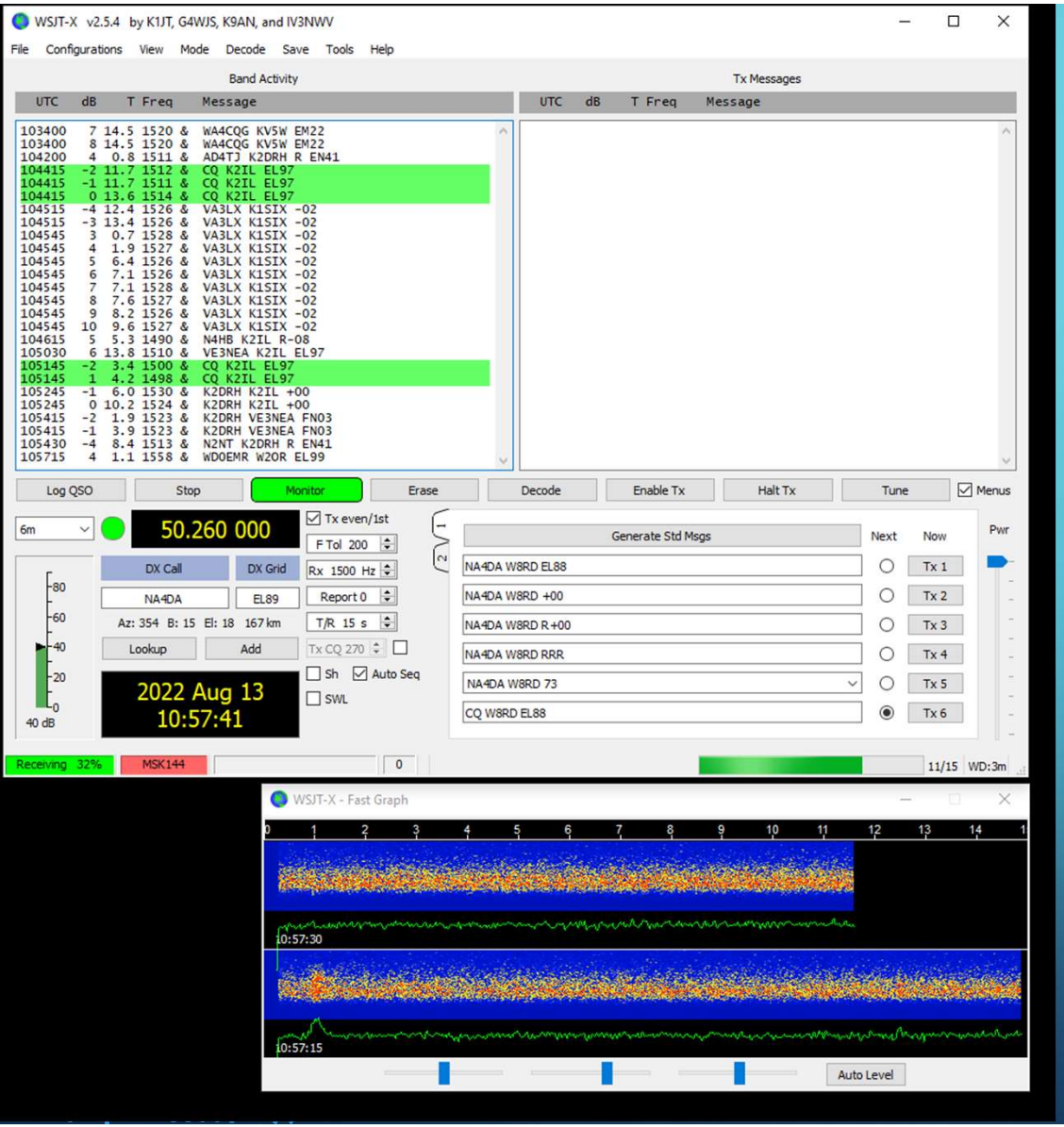

DXMAPS 4.2 - QSO/SWL real time information
Europe Africa N.America S.America Asia Oceania World
No layer
Select options
Modes/Props
28 MHz 40 MHz 50 MHz 70 MHz 144 MHz 222 MHz 432 MHz >450 MHz All bands Satellite FM DX DAB VOR AIS APRS Ticker MUF Sp-E
Click on the map for info.of that location
Right-click for more options
© WWW.DXMAPS.COM - QSO/SWL 20:17z-21:17z
SFI=134 SFI90=152 A=6 K=0-Quiet SWX=Quiet AUR=32 GW
Sp-E! Best MUF=87MHz above EM09 at 20:28z. MR rep at 21:16z
CO DO EO FO
CN DN EN FN
CM DM EM FM
CL DL EL FL
CK DK EK FK
W0LGQ
NO0T/P
N0LL
K2OO
N8ECI
K0PRT
KE4BKL
KX4I
KV5W
WN2E
Leaflet | © MapTiler © OpenStreetMap contributor
Aurora Aurora-E Back-Scatter EME Sporadic-E Multihop Sp-E FAI
Iono-Scatter MS TEP Tropo F2 Aircraft Scat. Unknown

# DXMaps.com


Click on the map for info.of that location
Right-click for more options
© WWW.DXMAPS.COM - QSO/SWL 23:40z-00:29z
SFI=0 SFI90=133 A=10 K=3-Active SWX=Quiet AUR=51 GW
TEP! MR rep at 00:15z
Sp-E! Best MUF=93MHz above QF26 at 00:18z. MR rep at 00:26z
Multi-hop Sp-E! MR rep at 00:26z
PO QO RO AO BO
ON PN QN RN AN BN CN DN EN
OM PM QM RM AM BM CM DM EM
OL PL QL RL AL BL CL DL EL
OK PK QK RK AK BK CK DK EK
OJ PJ QJ RJ AJ BJ CJ DJ EJ
OI PI QI RI AI BI CI DI EI
OH PH QH RH AH BH CH DH EH
OG PG QG RG AG BG CG DG EG
OF PF QF RF AF BF CF DF EF
OE PE QE RE AE BE CE DE EE
JE8DBM
JR7IWL
HL3AMO
JE1NQQ
JA5XAE
PJF2MBF
K0TT
WB9LZA
NO0T/P
AA0A
W4IMD
KD5MRO
KE1F
W4ATM
N7BHC
KH6HI
XE1MEX
TG9AJR
HC2FG
VK8MS
3D2TS
VK4JBY
FK1TS
VK8RH
VK4QW
VK2KCM
VK2JMR
VK2EFM
VK2WTF
VK5PJ
VK8RR/1
VK3RMV
VK3OTR
ZL1RS
ZL2OK/P
VK7ZAB
VK7TW
ZL2GD

# PSK Reporter






# Meteor Scatter MSK144

| Shower | Activity Period |
|---|---|
| | |
| Quadrantids (QUA) | Dec 26-Jan 16 |
| Lyrids (LYR) | Apr 15-Apr 29 |
| eta Aquarids (ETA) | Apr 15-May 27 |
| Southern delta Aquarids (SDA) | Jul 18-Aug 21 |
| Perseids (PER) | Jul 14-Sep 01 |
| Orionids (ORI) | Sep 26-Nov 22 |
| Leonids (LEO) | Nov 03-Dec 02 |
| Geminids (GEM) | Nov 19-Dec 24 |
| Ursids (URS) | Dec 13-Dec 24 |

# Ping Jockey Central.


| Relief page | Skeds in-progress | CQ Announcements | splat-65 Link |
|---|---|---|---|
| Refresh | Look back | Distance/Bearing Locator | Who's Earwigging? |
| Update User details | AA1YN Callsign database | Ray, W8RD FL EL88oa | Refreshed 13Aug 11:20 |

This page is to be used only for the purposes of discussing matters related to amateur radio meteor scatter communications.**Any** non-meteor scatter use is strictly prohibited.

That means **DO NOT USE THIS PAGE TO WORK splat-65 or for General chit-chat.**

Remember, in North America, 50.260MHz and 144.140MHz are calling not operating frequencies.

Exchanging any contact details on here before you're complete, invalidates the contact, and, if it's not HIGH-SPEED METEOR SCATTER, it doesn't belong here!

---

Enter your message here Go!

DDMMM UTC
13Aug 11:20 N5BO Justin, calling you from EM40 (W5ADD/6M Parker LA EM40wl )
13Aug 11:19 KC9ELU - Answering on 2 Mike (WA2FZW/6M/2M John NJ FN20tp )
13Aug 11:19 N1SV - tnx 2m q - ur best +13 (KC9ELU Mike IN EM79hj )
13Aug 11:18 Tnx new grid (N1SV Les MA FN42ep )
13Aug 11:18 111800 8 7.6 1599 & N1SV KC9ELU 73 (N1SV Les MA FN42ep )
13Aug 11:18 wow your killing it andy (K0TPP/2/6/222 Larry mo EM48rk )
13Aug 11:17 and another! (N1SV Les MA FN42ep )
13Aug 11:17 111700 5 11.4 1437 & WA2FZW K2DRH RRR - Thanks again Bob - Best ~Plus~14 - Looks like 2M Es! (WA2FZW/6M/2M John NJ FN20tp )
13Aug 11:17 full frame burn on 2m here (N1SV Les MA FN42ep )
13Aug 11:16 N2NT Andy, nice rocks on 222 on you (K0TPP/2/6/222 Larry mo EM48rk )
13Aug 11:16 N2NT loud here on 222 Andy (N0AKC Charlie WI EN44gu )
13Aug 11:15 NX3B Tom are you here? (WQ5S/6/2 Brad TX EM13ci )
13Aug 11:15 N4QWZ running 222085 (N2NT/6M2M/KW Andy NJ FN20si )
13Aug 11:13 N2NT calling 222.085 QWZ 1st running now (N4QWZ/6/2/222 Todd TN EM66ok )
13Aug 11:13 222085 (N2NT/6M2M/KW Andy NJ FN20si )
13Aug 11:12 watching (K0TPP/2/6/222 Larry mo EM48rk )
13Aug 11:12 wq0p tnx (N2NT/6M2M/KW Andy NJ FN20si )
13Aug 11:12 N2NT Andy, wathing too on 222 (K0TPP/2/6/222 Larry mo EM48rk )
13Aug 11:12 111115 20 0.5 1517 & WQ0P N2NT RRR thanks for the contact!!! (WQ0P/6/2/222 Greg KS EM19wf )
13Aug 11:11 N2NT, will be listening in on 222.085 as well (W0PN/2/222 Dan MO EM39rk )
13Aug 11:10 stop cq (K7ULS/6N2 Mike UT DN41bh )

# ANTENNAS

Small size due to short wavelength

Easy to build and erect

Clever designs

Polarization becomes a factor

# AMATEUR RADIO ANTENNA LENGTH CHART

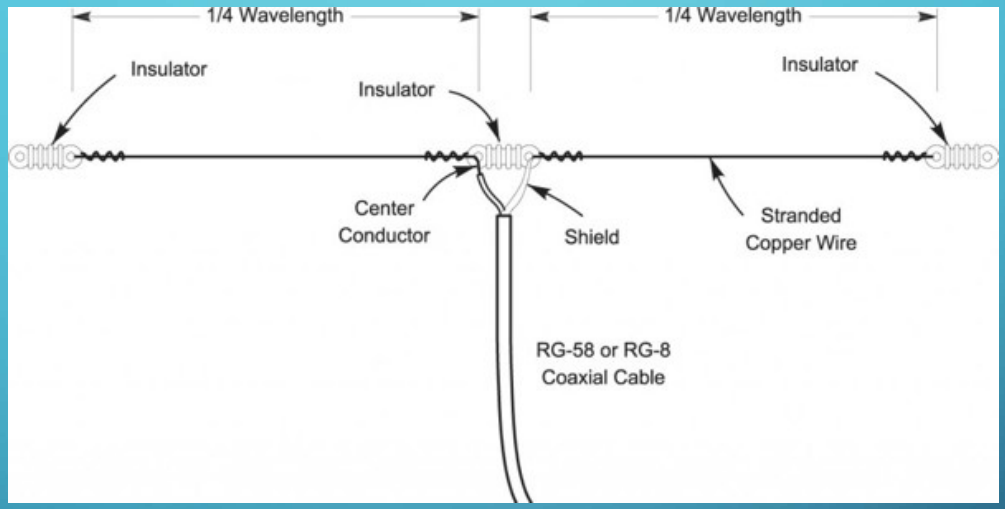
| | FREQUENCY (Mhz) | 1/4λ (Feet) | 1/2λ (Feet) | 1λ (Feet) | 1/2λ Inv Vee 90° (Feet) |
|---|---|---|---|---|---|
| | **1.800** | **130' 0"** | **260' 0"** | **558' 4"** | **257' 5"** |
| | 1.850 | 126' 6" | 253' 0" | 543' 3" | 250' 5" |
| 160 METERS | 1.900 | 123' 2" | 246' 4" | 528' 11" | 243' 10" |
| | **2.000** | **117' 0"** | **234' 0"** | **502' 6"** | **231' 8"** |
| | **3.500** | **66' 10"** | **133' 9"** | **287' 2"** | **132' 5"** |
| | 3.750 | 62' 5" | 124' 10" | 268' 0" | 123' 7" |
| 80 METERS | 3.900 | 60' 0" | 120' 0" | 257' 8" | 118' 10" |
| | **4.000** | **58' 6"** | **117' 0"** | **251' 3"** | **115' 10"** |
| | **7.000** | **33' 5"** | **66' 10"** | **143' 7"** | **66' 2"** |
| 40 METERS | 7.150 | 32' 9" | 65' 5" | 140' 7" | 64' 10" |
| | **7.300** | **32' 1"** | **64' 1"** | **137' 8"** | **63' 6"** |
| 30 METERS | **10.100** | **23' 2"** | **46' 4"** | **99' 6"** | **45' 10"** |
| | **10.150** | **23' 1"** | **46' 1"** | **99' 0"** | **45' 8"** |
| | **14.000** | **16' 9"** | **33' 5"** | **71' 9"** | **33' 1"** |
| | 14.150 | 16' 6" | 33' 1" | 71' 0" | 32' 9" |
| 20 METERS | 14.300 | 16' 4" | 32' 9" | 70' 3" | 32' 5" |
| | **14.350** | **16' 4"** | **32' 7"** | **70' 0"** | **32' 3"** |
| 17 METERS | **18.068** | **12' 11"** | **25' 11"** | **55' 7"** | **25' 8"** |
| | **18.168** | **12' 11"** | **25' 9"** | **55' 4"** | **25' 6"** |
| | **21.000** | **11' 2"** | **22' 3"** | **47' 10"** | **22' 1"** |
| 15 METERS | 21.200 | 11' 0" | 22' 1" | 47' 5" | 21' 10" |
| | **21.450** | **10' 11"** | **21' 10"** | **46' 10"** | **21' 7"** |
| 12 METERS | **24.890** | **9' 5"** | **18' 10"** | **40' 5"** | **18' 7"** |
| | **24.990** | **9' 4"** | **18' 9"** | **40' 3"** | **18' 6"** |
| | **28.000** | **8' 4"** | **16' 9"** | **35' 11"** | **16' 7"** |
| 10 METERS | 28.500 | 8' 3" | 16' 5" | 35' 3" | 16' 3' |
| | **29.700** | **7' 11"** | **15' 9"** | **33' 10"** | **15' 7"** |
| 6 METERS | **50.000** | **4' 8"** | **9' 4"** | **20' 1'** | **9' 3"** |
| | **54.000** | **4' 4"** | **8' 8"** | **18' 7"** | **8' 7"** |
| 2 METERS | **144.000** | **1' 8"** | **3' 3"** | **7' 0"** | **3' 3"** |
| | **148.000** | **1' 7"** | **3' 2"** | **6' 9"** | **3' 2"** |

**Antenna length calculations are based on the following formulas:**
1/2 wave dipole (feet) = 468/frequency in Mhz
Full wave loop (feet) = 1005/frequency in Mhz
Inverted Vee with 90 degree included angle is 95% the length of 1/2 wave dipole

**Note:**
Cut wire slightly longer to allow for connecting insulators and pruning.
Height above ground, nearby wires, trees, etc. will change tuning slightly.

MILLENNIA ARTS

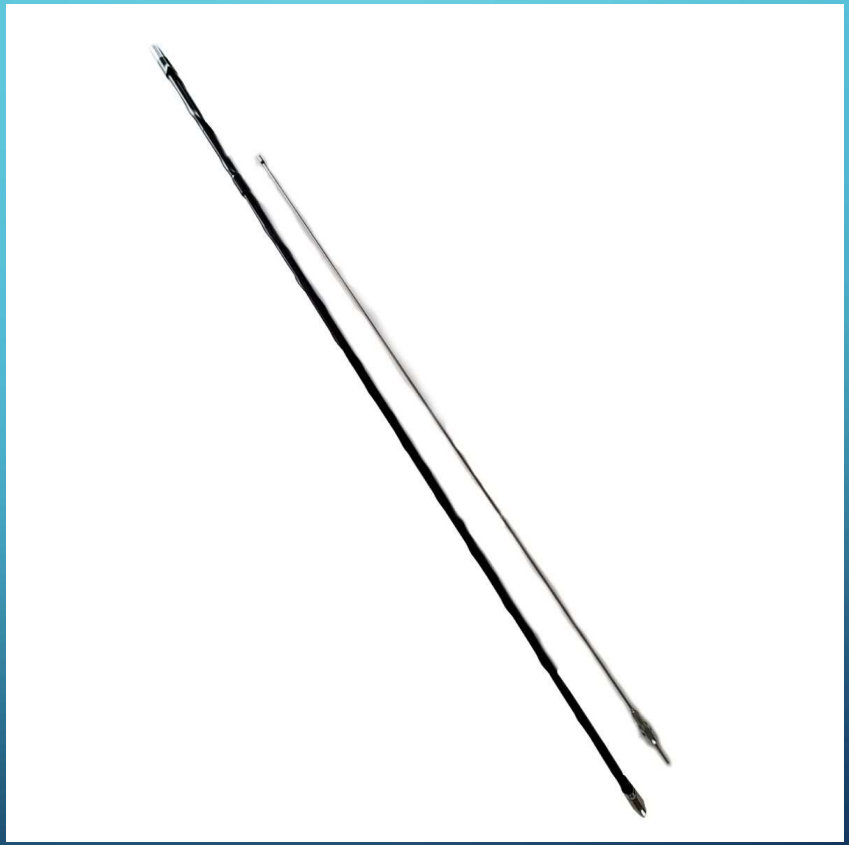
# Simple Dipole




$$L = \frac{468}{f}$$

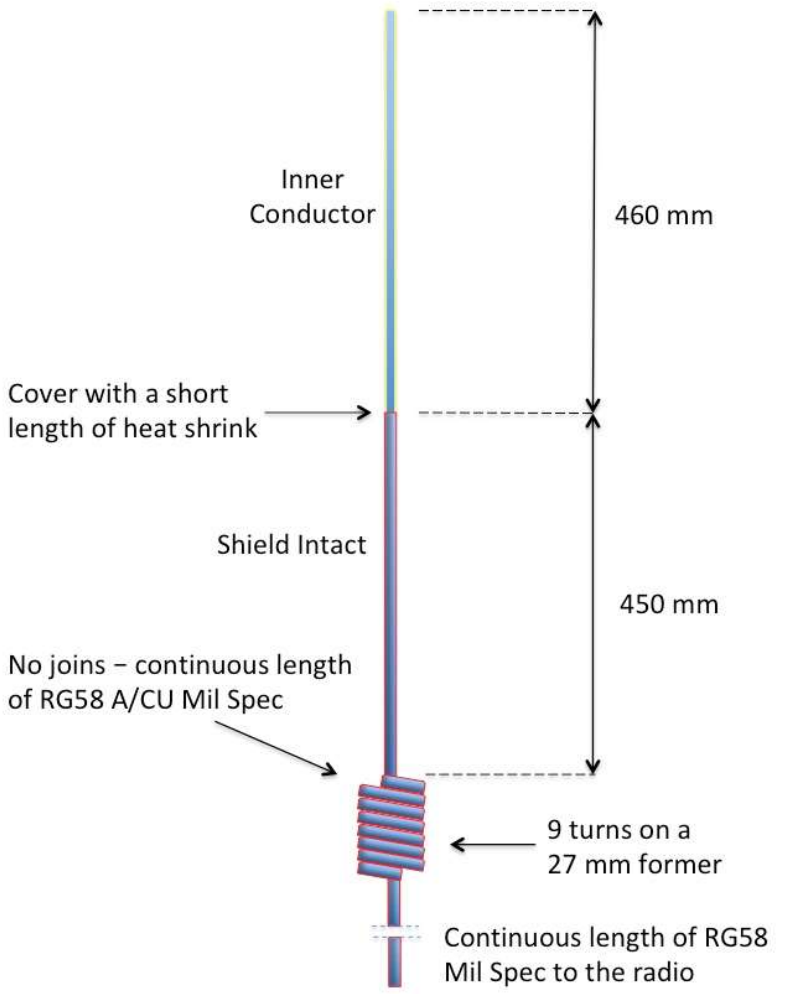
468 / 50.313 = 9.3 ft

# Hamstick



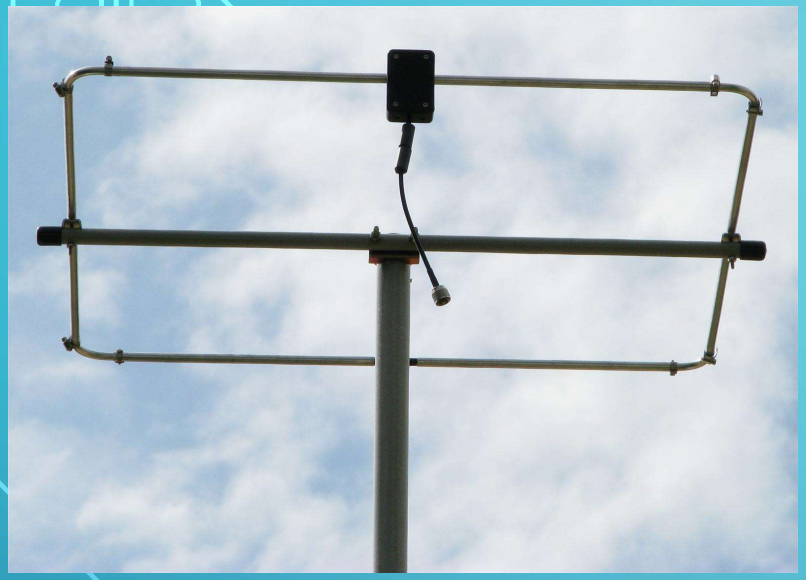
# FlowerPot

## "Coaxial Antenna"

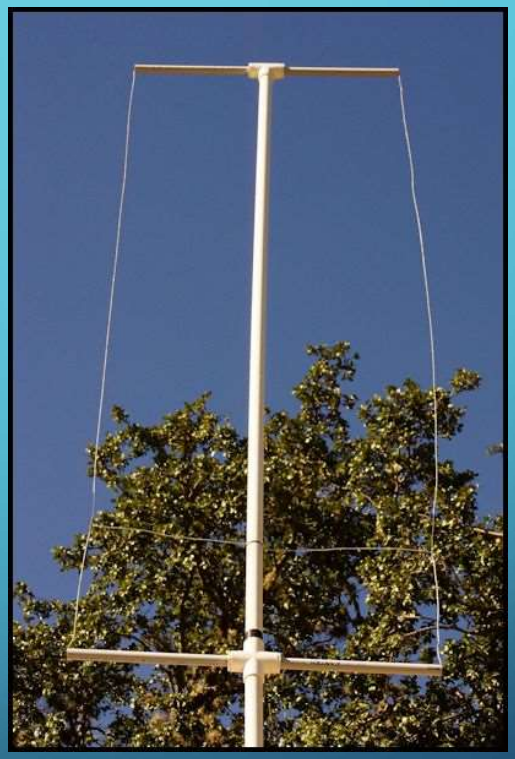


# Moxon

# Yagi




PORTABLE
6 METER
HEXBEAM




Hentenna
dual band
145/245mhz.
145/430mhz
max 250 watts.
gain 11.25 dbi
DC ground
vswr >1.5:1
vertical
clubstation

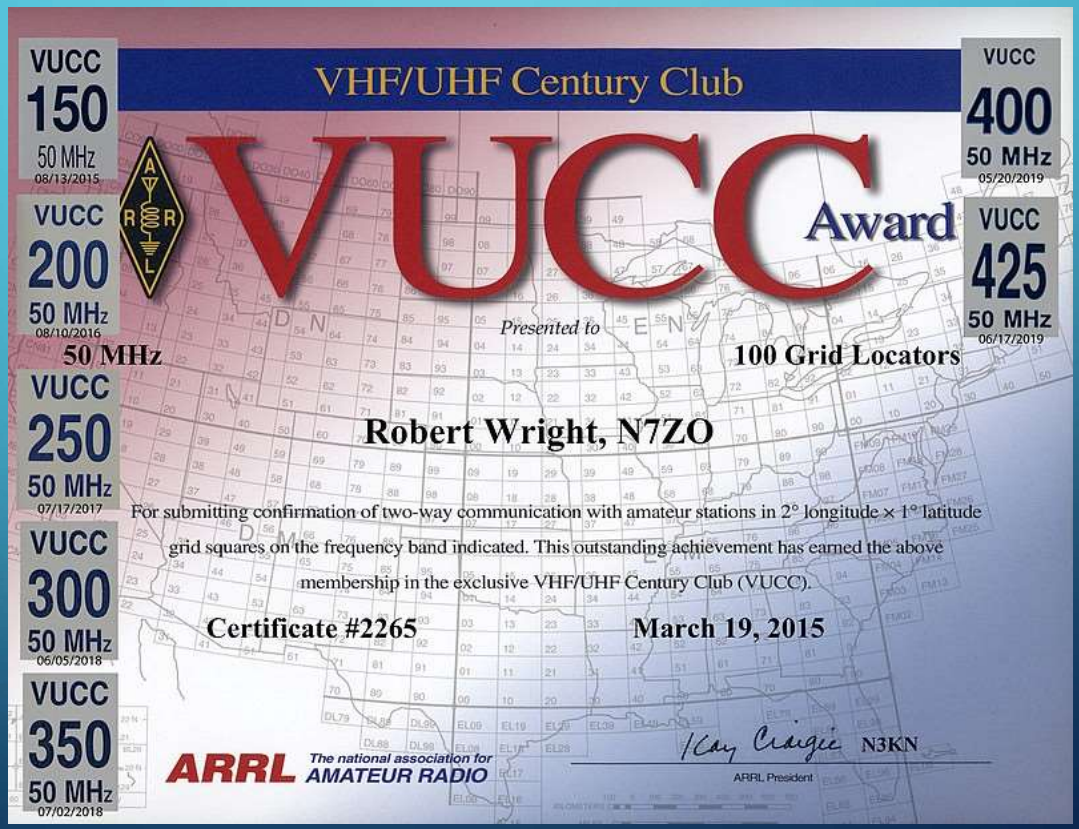
# CONTESTING AND AWARDS

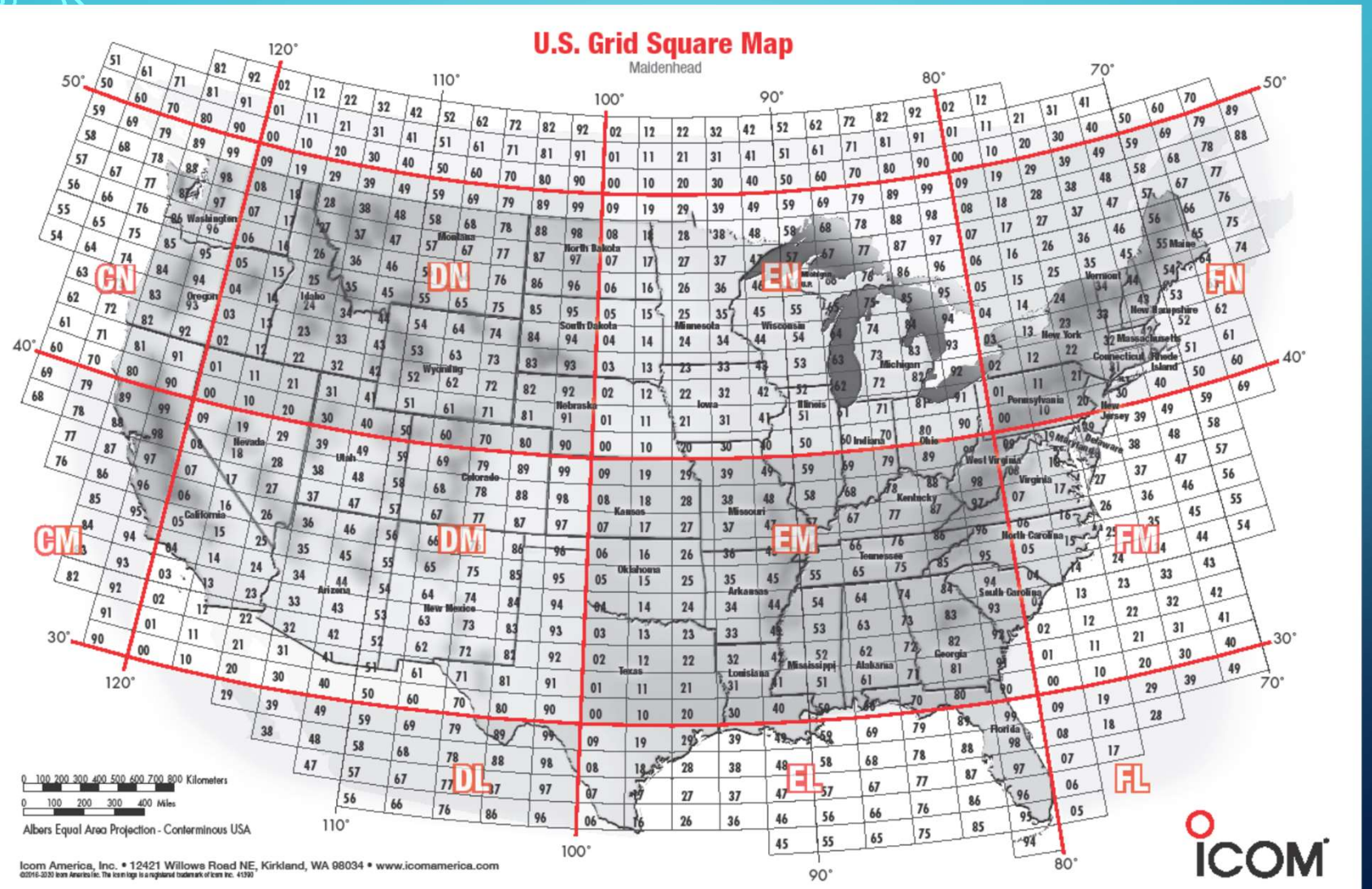
# ARRL January VHF Contest
# ARRL June VHF Contest
# CQ Worldwide VHF Contest
# ARRL September VHF Contest

All modes are allowed

CW – SSB - Digital

# Work 100 Grids

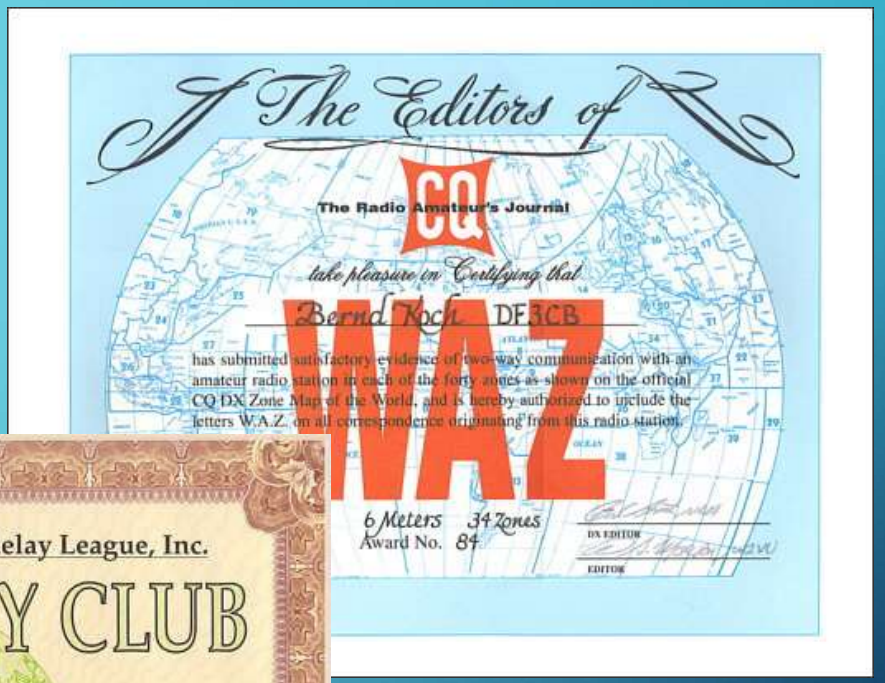


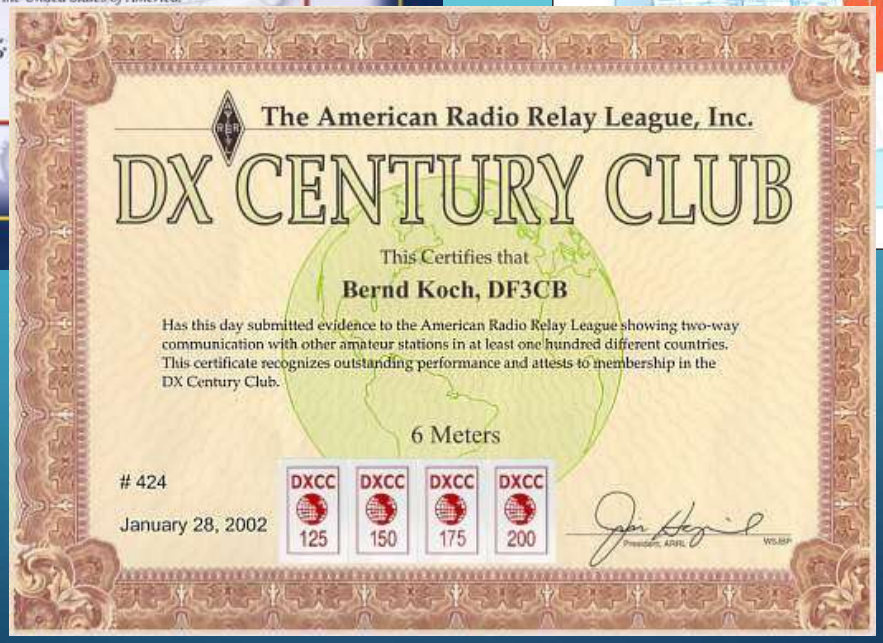

U.S. Grid Square Map
Maidenhead
120°
110°
100°
90°
80°
70°
50°
40°
30°
CN
DN
EN
FN
CM
DM
EM
FM
DL
EL
FL
Washington
Oregon
California
Nevada
Idaho
Montana
Wyoming
Utah
Arizona
Colorado
New Mexico
North Dakota
South Dakota
Nebraska
Kansas
Oklahoma
Texas
Minnesota
Iowa
Missouri
Arkansas
Louisiana
Wisconsin
Illinois
Michigan
Indiana
Ohio
Kentucky
Tennessee
Mississippi
Alabama
Georgia
Florida
South Carolina
North Carolina
Virginia
West Virginia
Pennsylvania
New York
Maine
Vermont
New Hampshire
Massachusetts
Connecticut
Rhode Island
New Jersey
Delaware
Maryland
0 100 200 300 400 500 600 700 800 Kilometers
0 100 200 300 400 Miles
Albers Equal Area Projection - Conterminous USA
Icom America, Inc. • 12421 Willows Road NE, Kirkland, WA 98034 • www.icomamerica.com
ICOM

# The Fred Fish Memorial Award

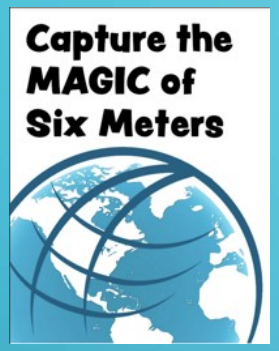
The Fred Fish Memorial Award was created in honor of Fred Fish, W5FF (SK), who was the first amateur to have worked and confirmed all 488 Maidenhead grid squares in the 48 contiguous United States on 6 Meters. The award will be given to any amateur who can duplicate W5FF's accomplishment.


The ARRL WAS
Worked All States Award
The American Radio Relay League recognizes that
Bernd Koch, DF3CB
has confirmed two-way contact with Amateur Radio stations in all 50 states of the United States of America.
ARRL The National Association for Amateur Radio
6 Meters
#1653

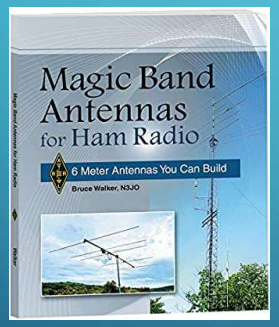

The Editors of
CQ
The Radio Amateur's Journal
take pleasure in Certifying that
Bernd Koch DF3CB
has submitted satisfactory evidence of two-way communication with an amateur radio station in each of the forty zones as shown on the official CQ DX Zone Map of the World, and is hereby authorized to include the letters W.A.Z. on all correspondence originating from this radio station.
WAZ
6 Meters 34 Zones
Award No. 84
DX EDITOR
EDITOR


The American Radio Relay League, Inc.
DX CENTURY CLUB
This Certifies that
Bernd Koch, DF3CB
Has this day submitted evidence to the American Radio Relay League showing two-way communication with other amateur stations in at least one hundred different countries. This certificate recognizes outstanding performance and attests to membership in the DX Century Club.
6 Meters
# 424
January 28, 2002
DXCC 125
DXCC 150
DXCC 175
DXCC 200
President, ARRL
W5JBP

# RESOURCES




Free eBook from K5ND
(see K5ND.net)




ARRL Book
"Magic Band Antennas"

YouTube is your friend