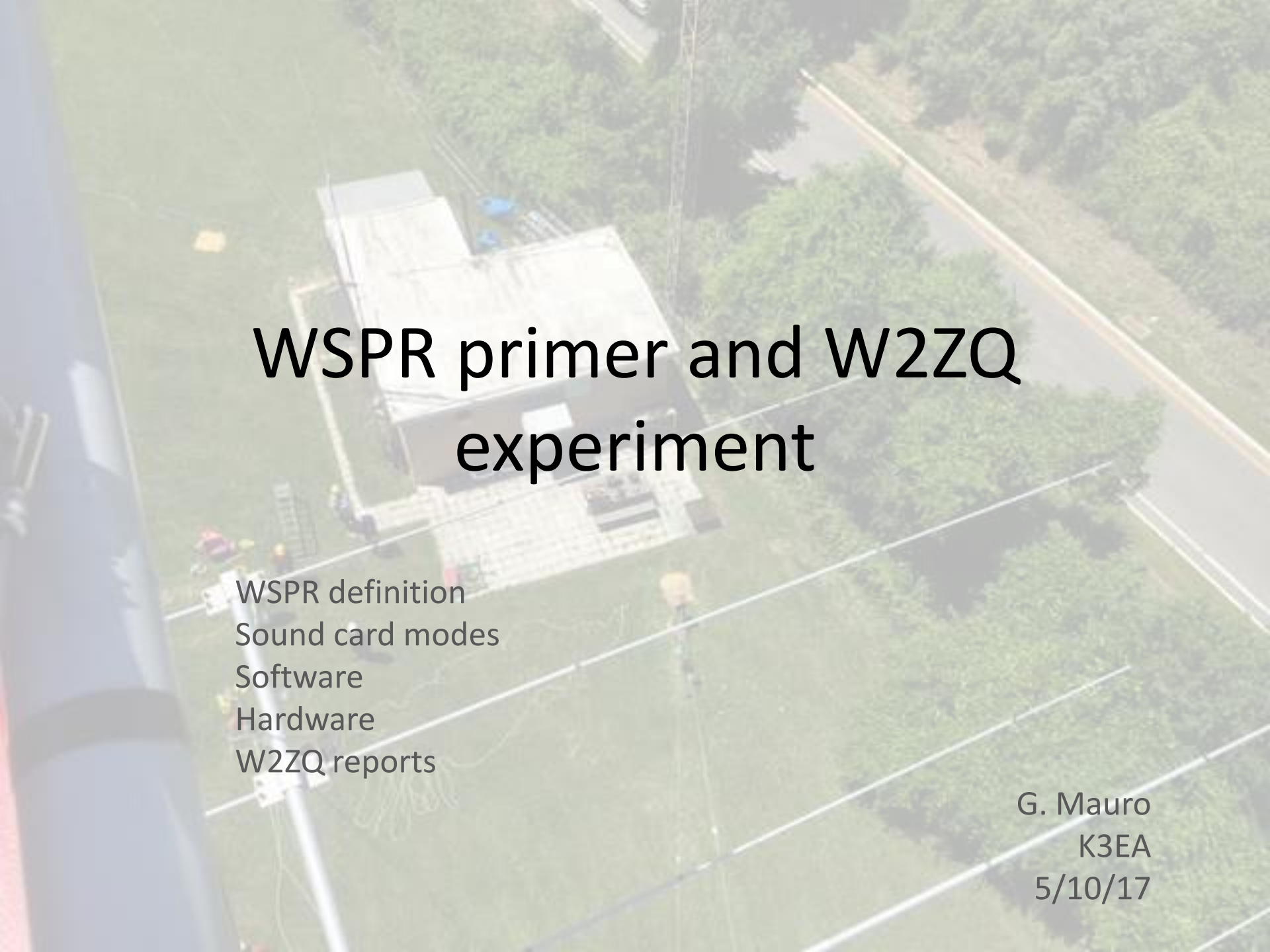

WSPR primer and W2ZQ experiment

WSPR definition
Sound card modes
Software
Hardware
W2ZQ reports

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5/10/17

WSPR basics

- WSPR in an acronym for Weak Signal Propagation Reporter.
- WSPR is a digital beacon mode (not a “QSO” mode) used primarily on the HF bands to track propagation.
  - WSPR will run on a station that is currently set up for digital modes
- A typical transmitting station uses ~ 1W (30dbm), or less
- A typical station transmits part time, duty cycle is selectable, and otherwise receives and decodes WSPR signals
- Transmitted data is:
  - Power
  - Location (grid square)
  - Call sign
- Transmissions are two minutes long, < 10hz BW (4-FSK) and sounds like a CW tone with a slight warble.
- Receiving stations can record and report the transmitted data plus frequency, time and SNR to the WSPRnet.org website.

Sound Card modes

- WSPR software can run on a station that is currently set up for sound card digital modes
- Sound card modes typically employ a computer and an HF radio which are interfaced for sound Input/Output, radio keying and possibly frequency control.
  - Frequency control required for WSPR
- There are many ways to learn how to interface your radio to digital mode software.
  - See online articles,
  - ARRL publications,
  - enlist a knowledgeable DVRA member to assist you.

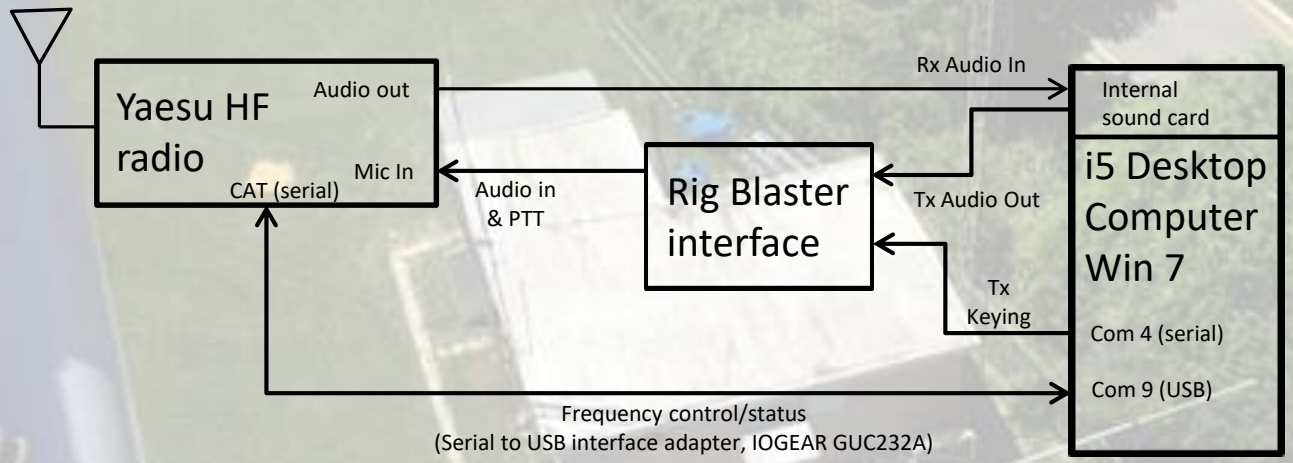
Software

- WSPR-X
  - Part of the WSJT (Weak Signal Communication by K1JT) suite of software http://physics.princeton.edu/pulsar/K1JT/wspr.html
  - Current version is WSPR-X v0.9, r4178
  - Uses “sound card” modes setup
  - Runs well on Win 7
- Other useful software
  - Radio Control (frequency and keying)
    - Com ports (Omni Rig http://www.dxatlas.com/Download.asp)
    - Virtual ports (VSP manager) http://k5fr.com/DDUtilV3wiki/index.php?title=VSP_Manager)
  - Sound interface with virtual audio (VB-CABLE http://vb-audio.pagesperso-orange.fr/Cable/#DownloadCable)
  - Time Updates
    - Need accurate timing for WSJT modes
    - Preferred software is Meinberg NTP https://www.meinbergglobal.com/english/sw/ntp.htm

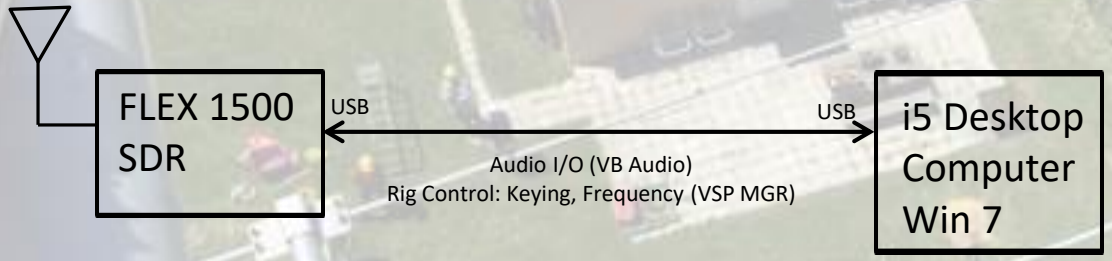
Hardware

- Computer
  - Computer with sound card
    - Hardwired or…
    - Software – Virtual audio (VB Cable)
- Radio
  - Computer interface (keying and frequency control)
    - USB or serial control port on radio
    - Hardware interface, i.e. Rigblaster
      - Software methods of interface – Omnirig, VSP manager
  - Stand alone
    - Ultimate 3S (see May 2017 QST article “WSPR Weekends” and November 2016 review)

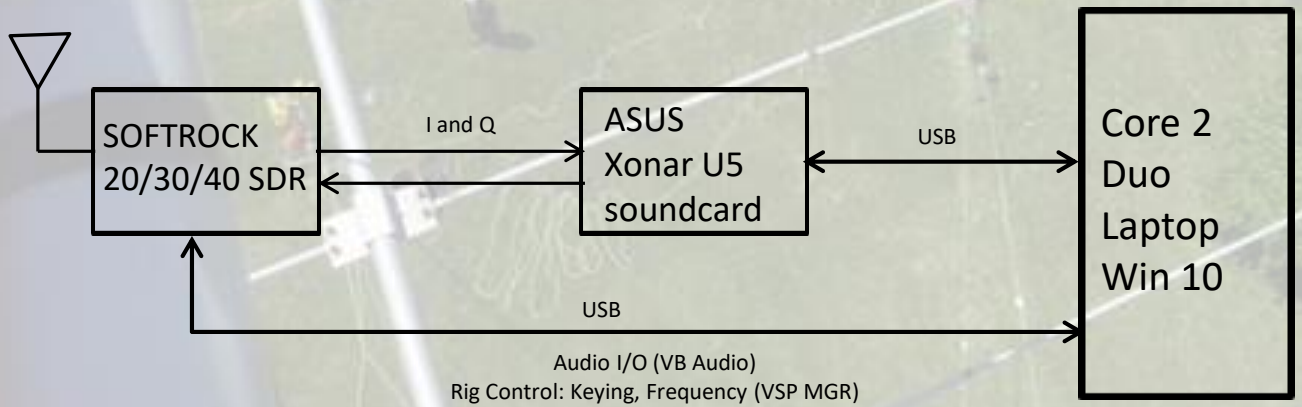
Example digital stations



Typical hardwired base station - HF rig with interface

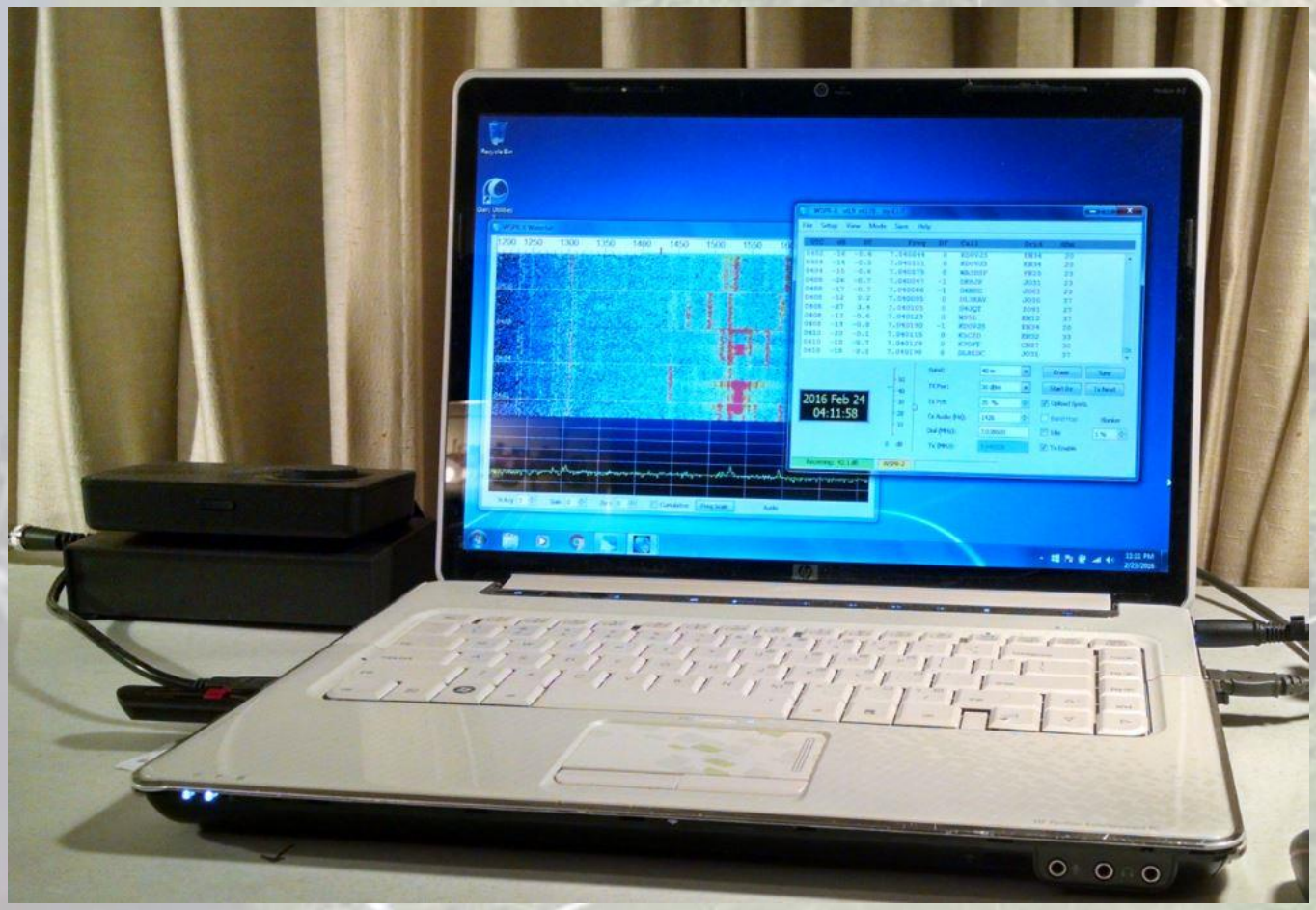


SDR radio with computer – all interfaces by USB



Portable station – SDR/laptop used at W2ZQ

WSPR setup used at W2ZQ



WSPR's windows:

- Rx Waterfall
- Control panel and rx log

- Station was operated using the W2ZQ call
- 1W output was used into the 40 meter beam
- 50% duty was selected – TX 2minutes, RX 2 minutes
  - Received spots can be sent to WSPRnet . This option was not selected.

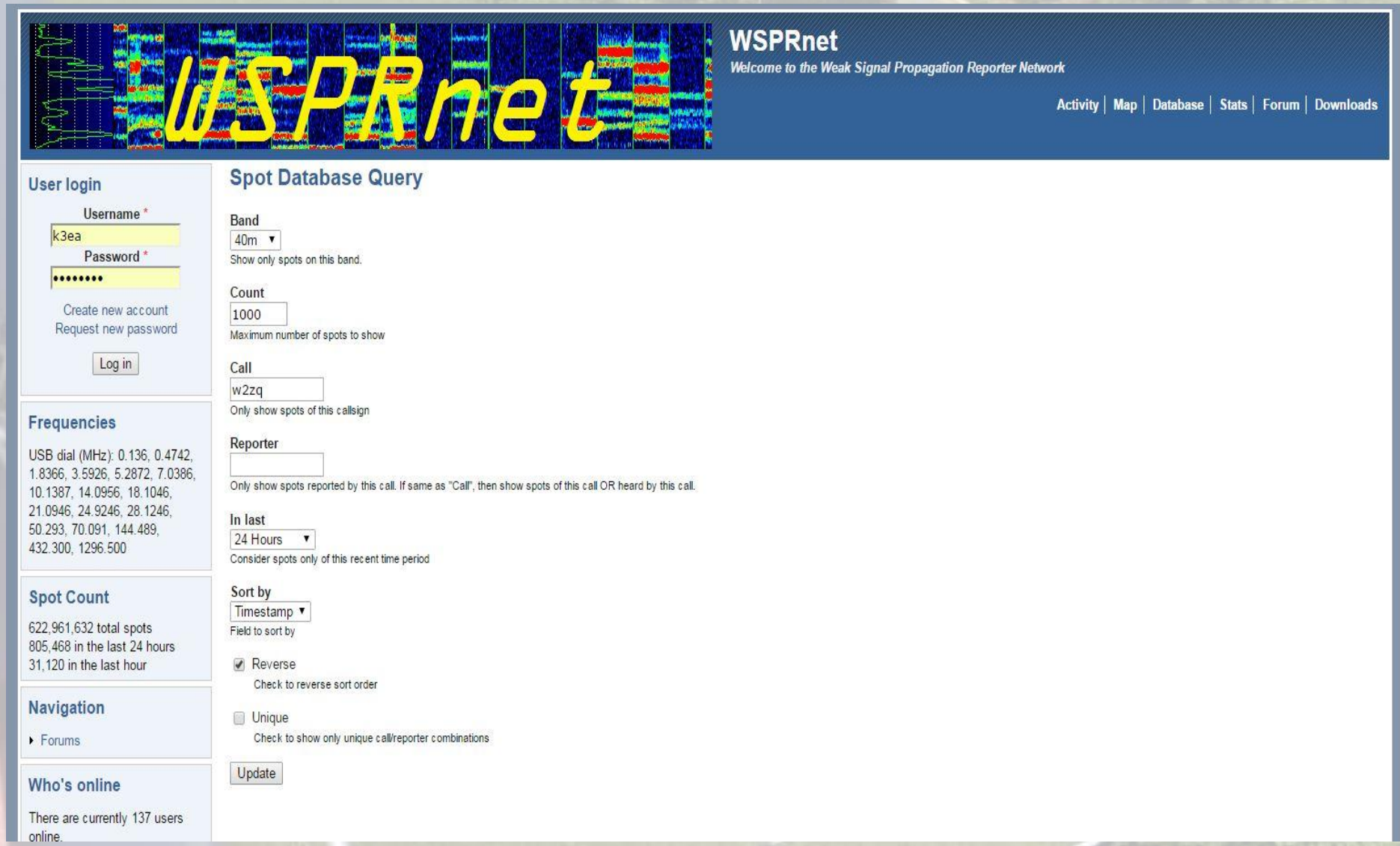
W2ZQ WSPR Results

- WSPR Station was operated at the W2ZQ guest station
  - 12V power and all of W2ZQ antennas are available
  - Interface requirements are a power cord (preferably PowerPole) and ability to interface to a PL259
- The idea was to use an antenna and band that would yield the best results.
  - 40 meters was chosen with the W2ZQ 40 meter beam
- The beam was pointed to the middle of the Pacific, halfway between Australia and Japan
- The goal was to try to get “spots” from Japan, other Asian countries or Pacific islands
- We successfully got spots from Australia, Reunion Island (Indian Ocean), New Zealand and Hawaii.
  - The furthest spot was 18,704km (VK6XT) in Western Australia

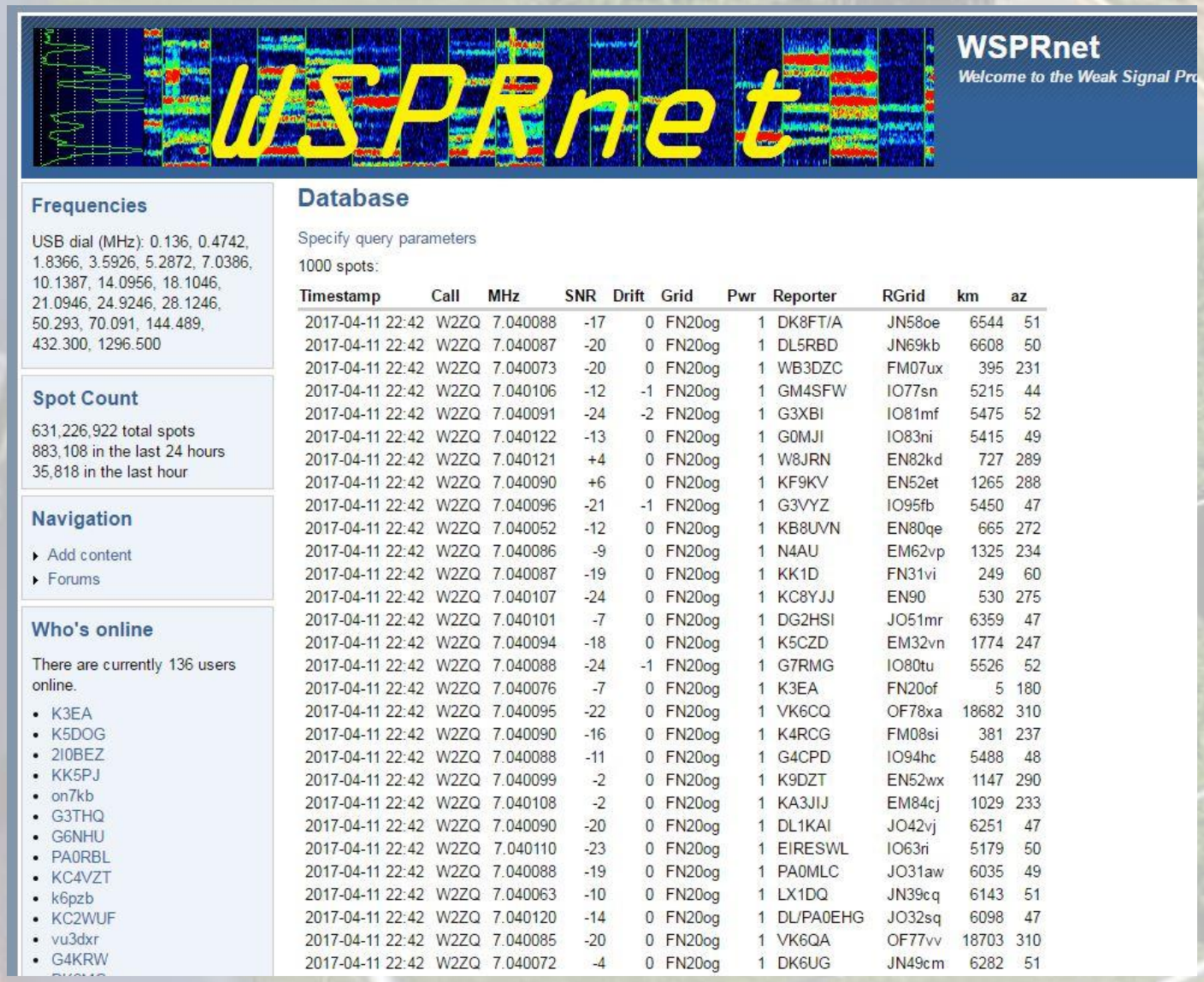
WSPR reports

- WSPR interface
  - Wsprnet.org for reports
  - Many stations also report their operating conditions
- Typical reports generated on WSPRnet
  - Distance, Time, Band
  - Graphical Display on a map
- W2ZQ experiment
  - 40m beam aimed at 300 degrees azimuth
    - Pointed to middle of Pacific in an attempt to get “hits” from Asia.

WSPR Database Query Screen

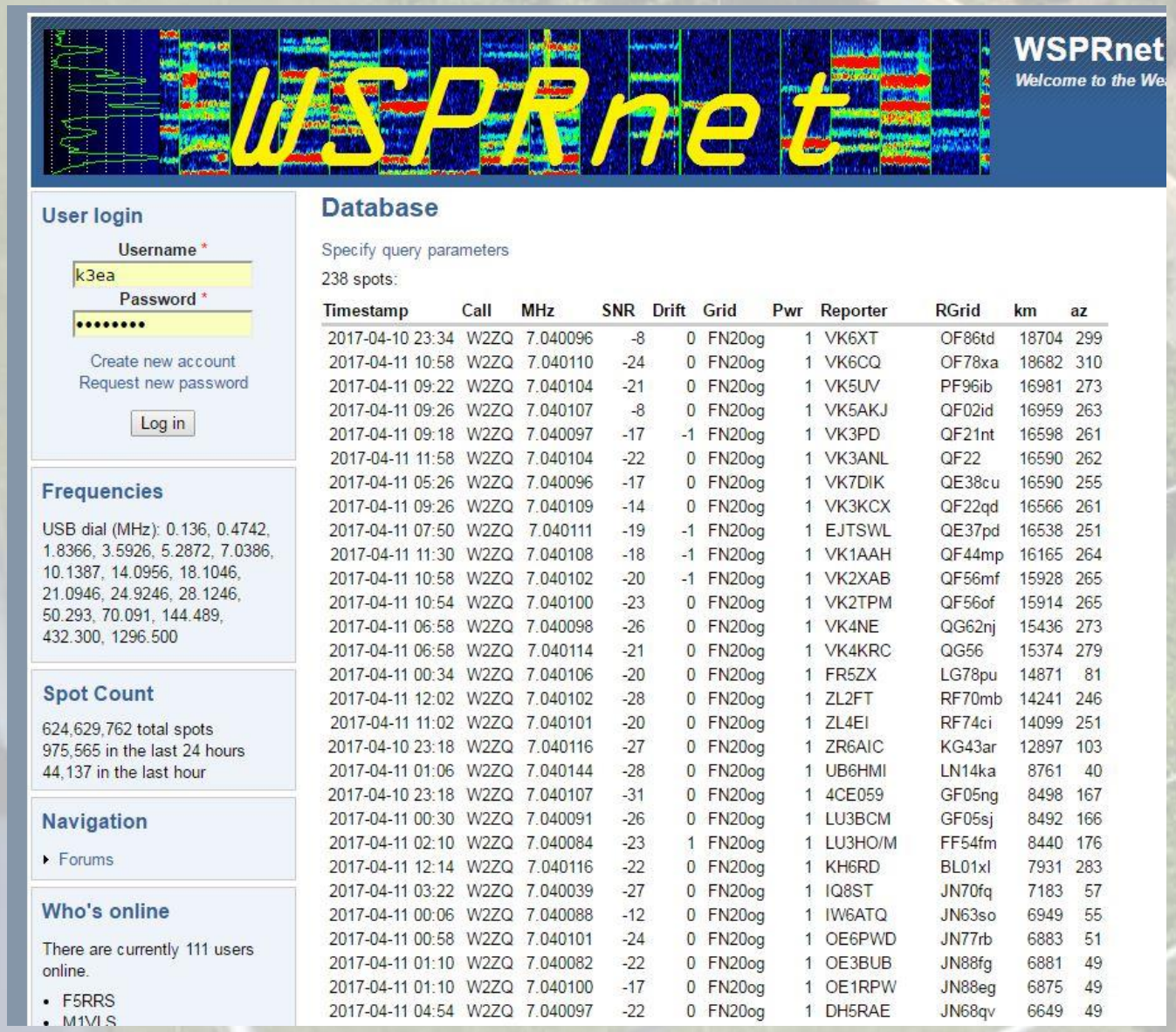


W2ZQ query by time



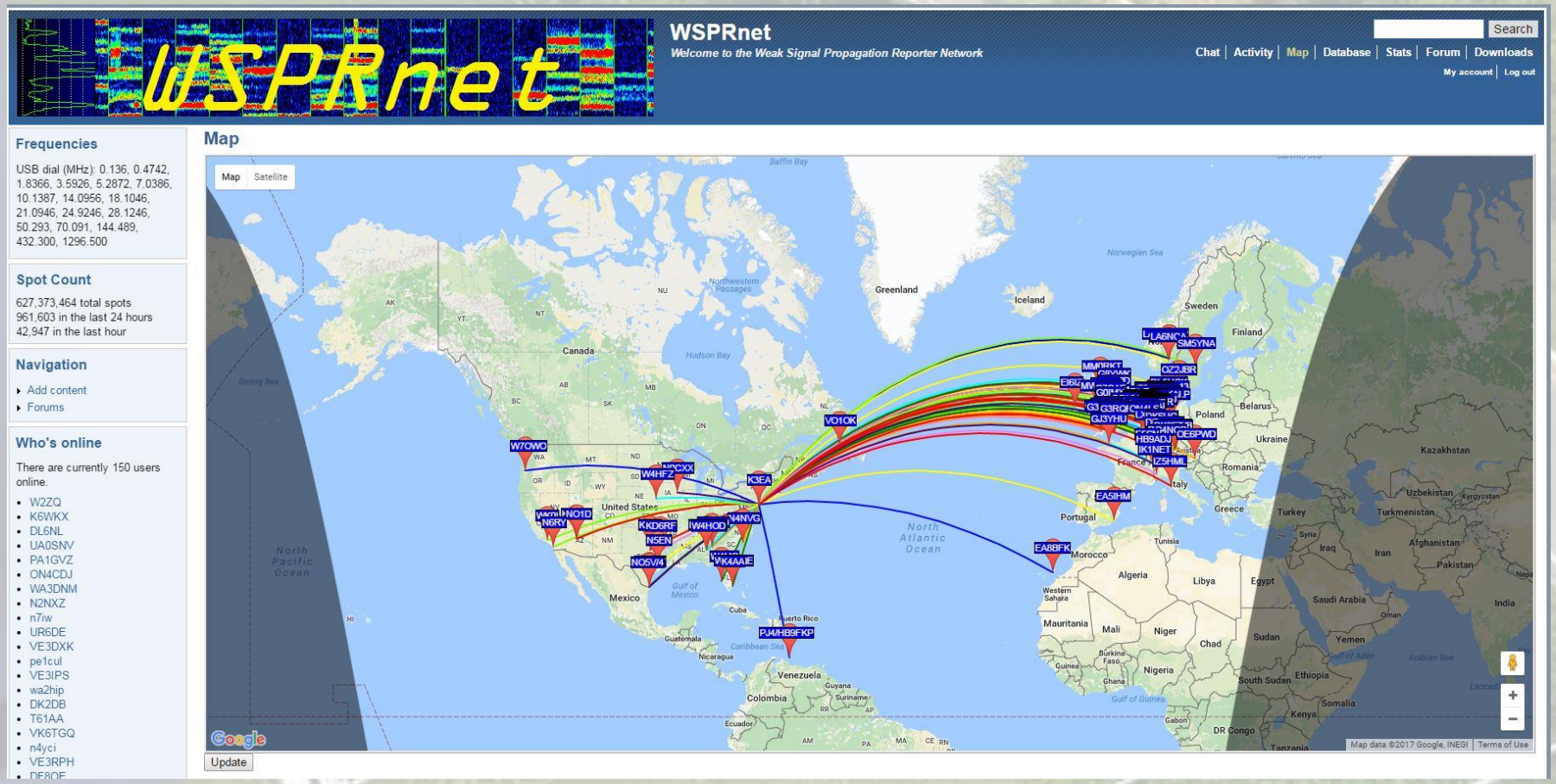
Over 25 spots in a two minute transmission period!!

W2ZQ by distance over 24hrs



Timestamp	Call	MHz	SNR	Drift	Grid	Pwr	Reporter	RGrid	km	az
2017-04-10 23:34	W2ZQ	7.040096	-8	0	FN20og	1	VK6XT	OF86td	18704	299
2017-04-11 10:58	W2ZQ	7.040110	-24	0	FN20og	1	VK6CQ	OF78xa	18682	310
2017-04-11 09:22	W2ZQ	7.040104	-21	0	FN20og	1	VK5UV	PF96ib	16981	273
2017-04-11 09:26	W2ZQ	7.040107	-8	0	FN20og	1	VK5AKJ	QF02id	16959	263
2017-04-11 09:18	W2ZQ	7.040097	-17	-1	FN20og	1	VK3PD	QF21nt	16598	261
2017-04-11 11:58	W2ZQ	7.040104	-22	0	FN20og	1	VK3ANL	QF22	16590	262
2017-04-11 05:26	W2ZQ	7.040096	-17	0	FN20og	1	VK7DIK	QE38cu	16590	255
2017-04-11 09:26	W2ZQ	7.040109	-14	0	FN20og	1	VK3KCX	QF22qd	16566	261
2017-04-11 07:50	W2ZQ	7.040111	-19	-1	FN20og	1	EJTSWL	QE37pd	16538	251
2017-04-11 11:30	W2ZQ	7.040108	-18	-1	FN20og	1	VK1AAH	QF44mp	16165	264
2017-04-11 10:58	W2ZQ	7.040102	-20	-1	FN20og	1	VK2XAB	QF56mf	15928	265
2017-04-11 10:54	W2ZQ	7.040100	-23	0	FN20og	1	VK2TPM	QF56of	15914	265
2017-04-11 06:58	W2ZQ	7.040098	-26	0	FN20og	1	VK4NE	QG62nj	15436	273
2017-04-11 06:58	W2ZQ	7.040114	-21	0	FN20og	1	VK4KRC	QG56	15374	279
2017-04-11 00:34	W2ZQ	7.040106	-20	0	FN20og	1	FR5ZX	LG78pu	14871	81
2017-04-11 12:02	W2ZQ	7.040102	-28	0	FN20og	1	ZL2FT	RF70mb	14241	246
2017-04-11 11:02	W2ZQ	7.040101	-20	0	FN20og	1	ZL4EI	RF74ci	14099	251
2017-04-10 23:18	W2ZQ	7.040116	-27	0	FN20og	1	ZR6AIC	KG43ar	12897	103
2017-04-11 01:06	W2ZQ	7.040144	-28	0	FN20og	1	UB6HMI	LN14ka	8761	40
2017-04-10 23:18	W2ZQ	7.040107	-31	0	FN20og	1	4CE059	GF05ng	8498	167
2017-04-11 00:30	W2ZQ	7.040091	-26	0	FN20og	1	LU3BCM	GF05sj	8492	166
2017-04-11 02:10	W2ZQ	7.040084	-23	1	FN20og	1	LU3HO/M	FF54fm	8440	176
2017-04-11 12:14	W2ZQ	7.040116	-22	0	FN20og	1	KH6RD	BL01xl	7931	283
2017-04-11 03:22	W2ZQ	7.040039	-27	0	FN20og	1	IQ8ST	JN70fq	7183	57
2017-04-11 00:06	W2ZQ	7.040088	-12	0	FN20og	1	IW6ATQ	JN63so	6949	55
2017-04-11 00:58	W2ZQ	7.040101	-24	0	FN20og	1	OE6PWD	JN77rb	6883	51
2017-04-11 01:10	W2ZQ	7.040082	-22	0	FN20og	1	OE3BUB	JN88fg	6881	49
2017-04-11 01:10	W2ZQ	7.040100	-17	0	FN20og	1	OE1RPW	JN88eg	6875	49
2017-04-11 04:54	W2ZQ	7.040097	-22	0	FN20og	1	DH5RAE	JN68qv	6649	49

Sample Map Report



- 20 meters, one hour of data from Eastern PA
- Online users can center the map for any location. Can be used as propagation tool for anyone!

Why Try WSPR?

- Propagation tool – WSPRnet website
  - Check the propagation before you get on 20 meters
- Method to test out the effectiveness of your equipment
  - Compare antennas, receivers, transmitters
- Being a transmit station contributes to propagation study efforts
- Low power stations with restricted antennas can effectively get on the mode and make contributions
- If you already have a digital sound mode station, its another mode to try!