Using WSPR

Direct Observation of Propagation Analysis for Multiple HF Modes

WSPRliTE

for

DXplorer

from www.sotabeams.co.uk

A brief introduction…

What is WSPR?

- **W**eak **S**ignal **P**ropagation **R**eporter "**WSPR**" is a digital mode used for beacon transmissions

- It was invented by Professor Joe Taylor, K1JT a Nobel prize winning physicist (photo)

- It's not a communications mode

- It excels at being receivable below the noise

- Transmission and reception is largely automatic

- Results appear in real-time on the internet

Finding out about WSPR

- A good place to start is WSPRnet.org

WSPR is hugely popular – this is the activity in a single 10 minute period!

What can you use it for?

⚛ Learning about HF propagation

⚛ Seeing how far your radio system will reach

⚛ Testing antennas

⚛ Comparing antennas with other people

Because it's largely automatic you can run WSPR while you are not in the shack...

...basically it's a lot of fun!

Relative Sensitivity of Communication Modes

Mode	S/N Ratio Threshold	Power Equivalence
WSPR	-27 dB	0.2 W
FT8	-21 dB	0.8 W
Olivia	-17 dB	2 W
PSK31	-7 dB	20 W
CW	-1 dB	80 W
RTTY	+5 dB	320 W
SSB	+10 dB	1000 W

Relative Sensitivity of Communication Modes in a 2500 Hz Bandwidth

Setting up a beacon

Lots of wire, lots of settings, lots to go wrong.

- Download WSJT-X software

- Configure the software

- Radio/computer interface such as SignalLink

- Get your interface to work properly with the software and the radio

- Adjust audio and RF levels

- Leave your computer and radio on running WSPR

This process can be tricky to do. It's not very portable. It also ties up your shack computer and main radio.

Setting Up WSPR with Sound Card

- WSPR is subset of WSJT-X program

- If you are set up to do PSK31, RTTY, or FT8, you can pretty much do WSPR

- See your data on www.dxplorer.net or www.wsprnet.org

- WSPR frequencies are programmed into WSJT

- Be sure to check 60 meter frequencies if you use WSPR on 60 meters, to avoid out of band transmissions

WSJT Menu for WSPR
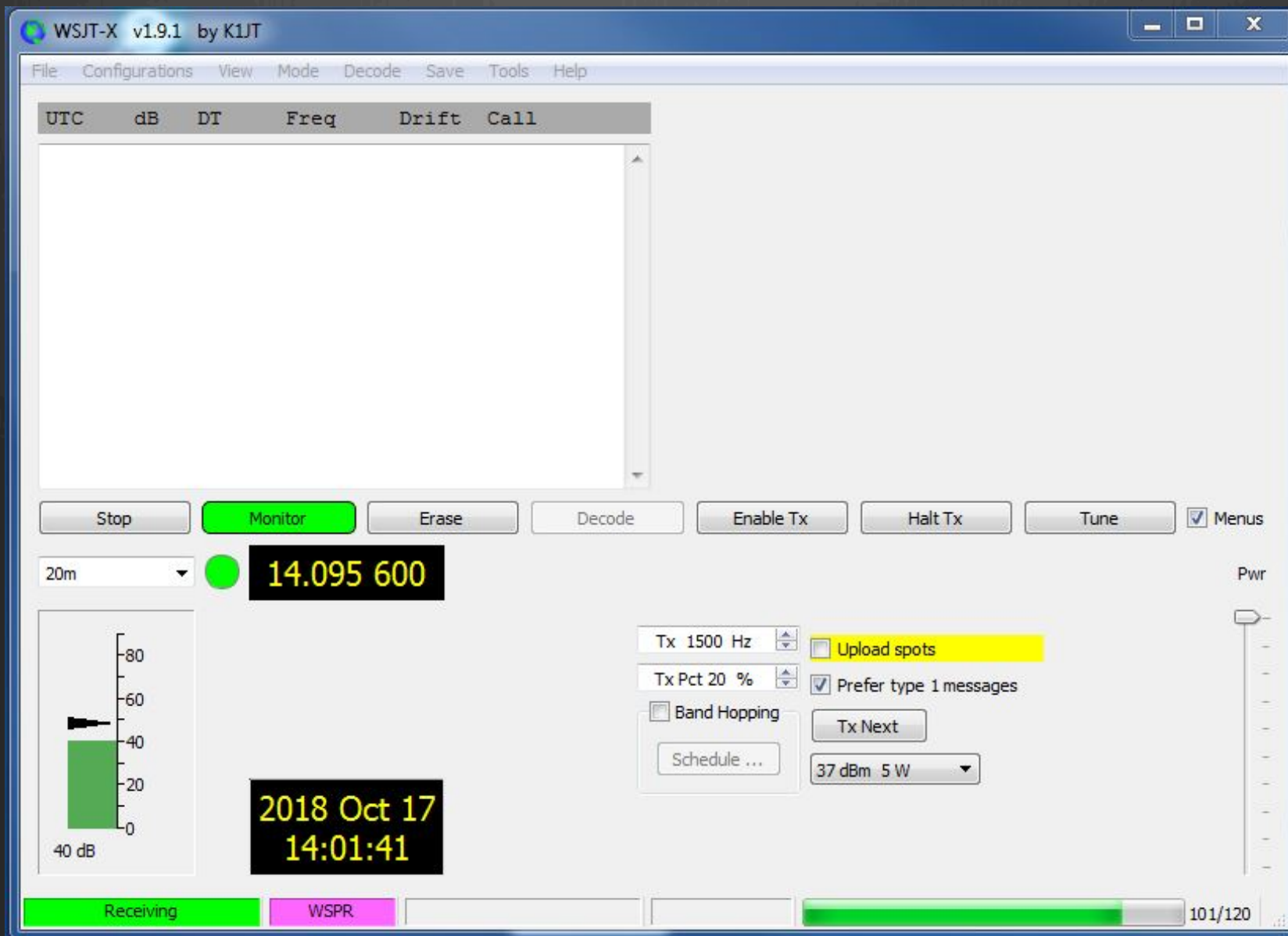
The easy way...

- Get a WSPRlite

- Configure it using the easy configuration app

- Connect it to your antenna

- Relax and wait for results

WSPRlite settings - v1.0.8

Select serial port to use:

COM47 (SOTAbeams WSPRlite)   Connect

Firmware version: v1.0.5-20170119
Status: WSPR mode, waiting to start

Update firmware   Save WSPR settings

WSPR settings

WSPR ident: G3CWI

CW callsign: ☐ unsupported - firmware update needed

Locator: IO83

Note: the WSPR protocol limits the locator to 4 characters (e.g. JN29)

Find my locator

Band: 20m / 14 MHz

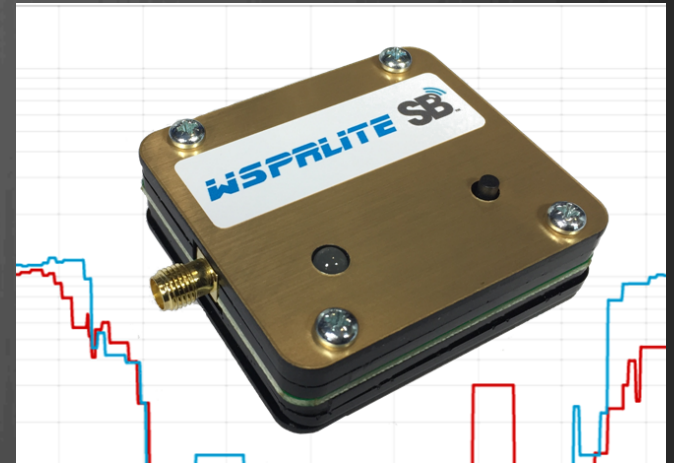Transmit frequency: 14097133Hz (picked randomly within band)

WSPRlite output power: 200 mW

Reported transmit power: WSPRlite output power (no external amplifier)

Repeat rate (%): 20

Max run time (days): 3

Statistics: http://dxplorer.net/wspr/tx/?(Open in browser

WSPRlite
from **www.SOTABEAMS.co.uk**

- USB powered (does not need a computer to run)

- 200 mW output

- Super portable – can even be run from a USB power pack

- Built in accurate power levels for antenna comparisons

- Runs on 20m or 30m out of the box

- 160m-80m-40m easily added with external filters

- Gives Premium Access to DXplorer.net analysis tools

Looking at the results on DXplorer

How far will you get?

SPOT DX OPENINGS
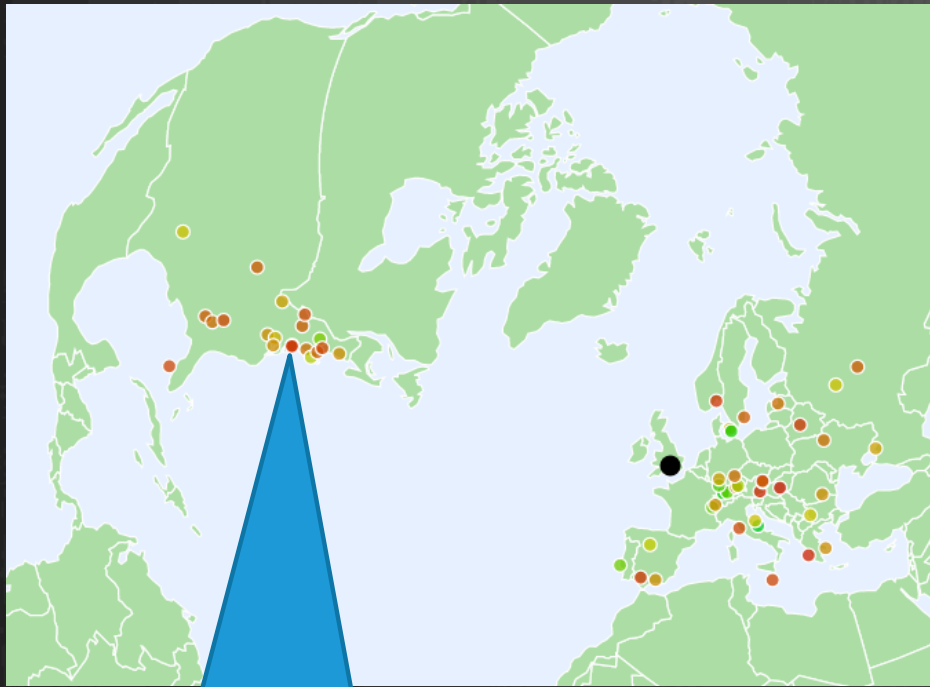
COLOUR CODED SPOTS SHOW WHERE YOU REACH AND HOW STRONG YOU WERE

DX10: G0MJW - 14 MHz - 200mW

Distance (km)	Call	Spots count	Last seen
15883	VK5MR	1	2017-03-27 16:48
11103	LW5DW	3	2017-03-27 21:32 to 22:16
9776	FR5ZX	6	2017-03-27 15:48 to 17:00
9488	PY2GN	1	2017-03-28 09:16
7595	K5XL	1	2017-03-27 16:32
7181	W4MO	1	2017-03-27 16:00
6862	W4HOD	19	2017-03-27 12:00 to 19:32
6745	K4COD	15	2017-03-27 12:32 to 18:32
6601	KA3JIJ	1	2017-03-27 14:16
6440	K9AN	2	2017-03-27 12:16 to 13:00

Average distance: 8767 km

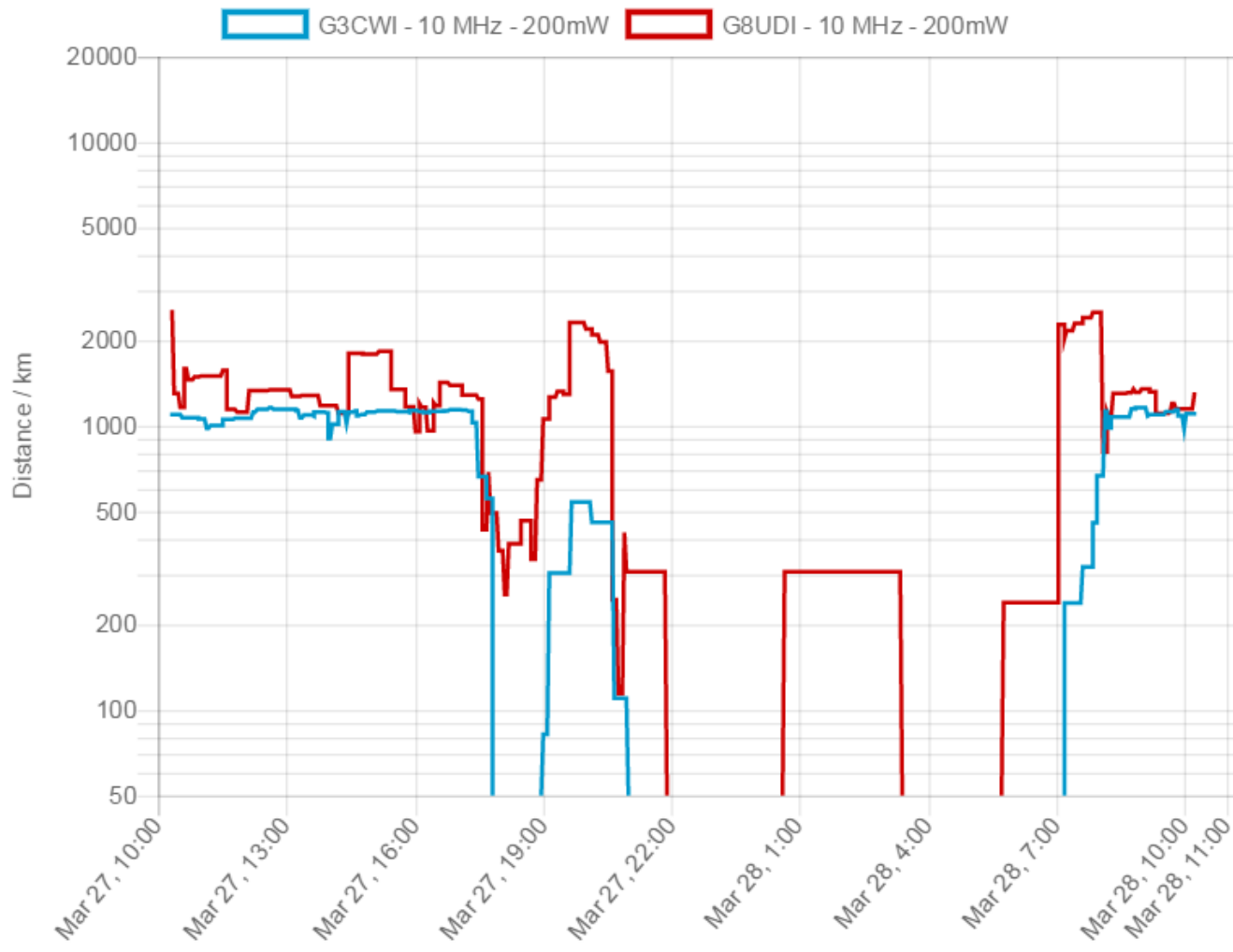Your best DX spots in order of distance

Learning about propagation

See how your DX performance varies with time.
See when the best times for DX are!

Compare antennas or sites in real time

Range:
G3CWI: mean 2.4%, max 5.8%
G8UDI: mean 4.2%, max 12.6%

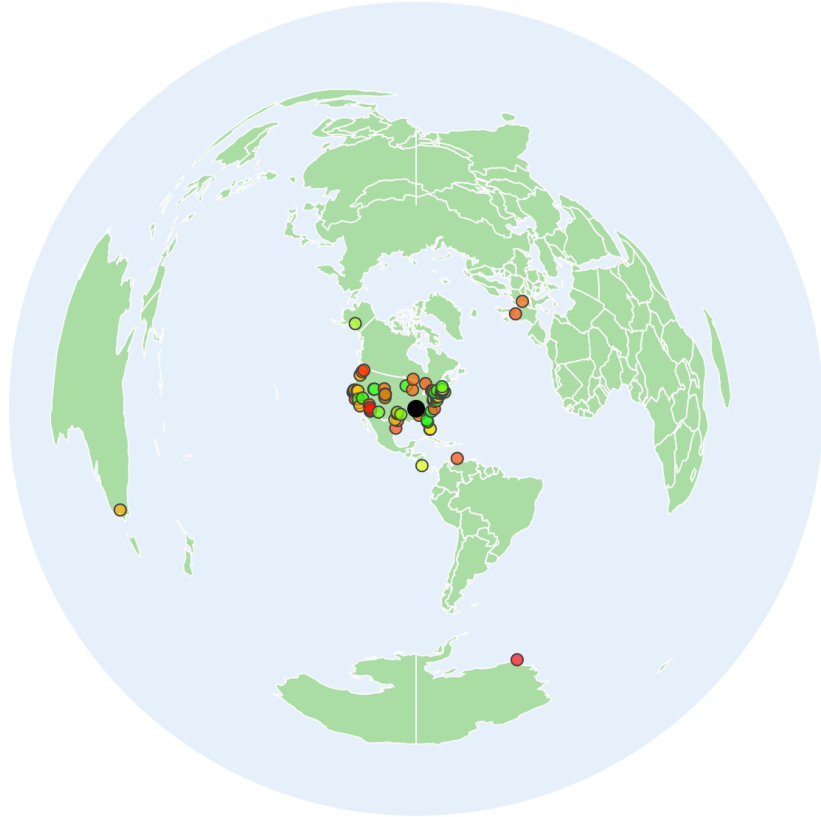G3CWI - 10 MHz - 200mW   G8UDI - 10 MHz - 200mW

DXplorer makes it easy to see who has the best station!

This type of analysis is unique to DXplorer

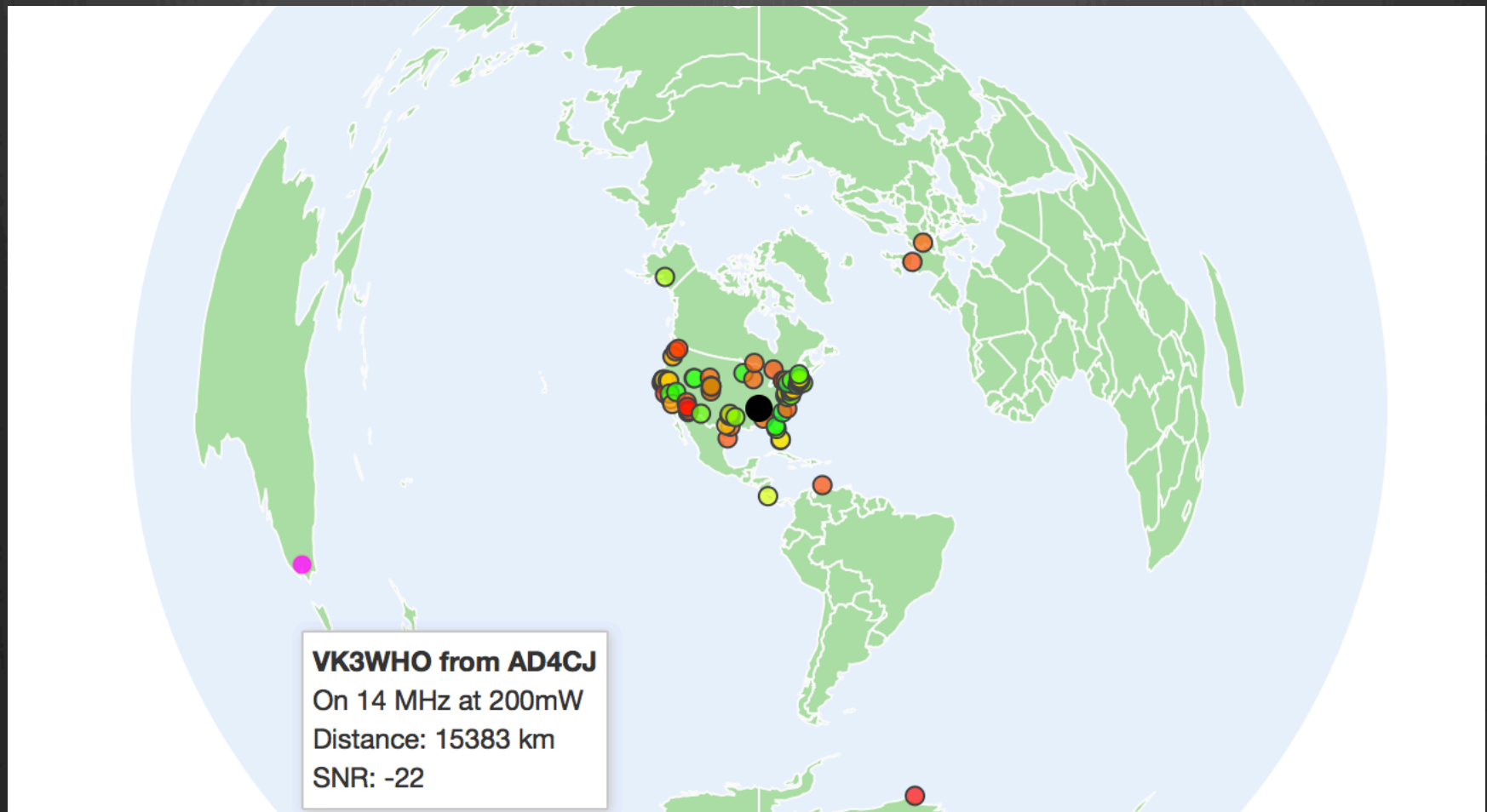# See where your antenna works best!

Spots: AD4CJ - 14 MHz - 200mW

Colour coded spots show who's station is best in any location. Great for testing directional antennas.

This type of analysis is unique to DXplorer.

Mouse Over the Spot to See Data

Calculate Relative Strength Required for QSOs via Path

⊛ From AD4CJ to VK3WHO with 0.2 W ON WSPR, my SNR received was -22 dB

⊛ I want to work VK3WHO on SSB or CW

  ⊛ SSB will require a S/N ratio of at least +10 dB

  ⊛ SSB requires at least a 32 dB stronger signal than my 0.2 W

  ⊛ CW requires at least a 21 dB stronger signal than my WSPR

⊛ SSB Power Needed is:

  ⊛ $10 \wedge 3.2 * 0.2 = 317$ W

⊛ CW Power Needed is:

  ⊛ $10 \wedge 2.1 * 0.2 = 25$ W

Conclusion

- **WSPRlite** from **www.SOTABEAMS.co.uk** is a ready made beacon transmitter

- Runs out of the box on 20m or 30m

- Easy to set up and use

- Gives access to unique analysis facilities at **DXplorer.net**

- Users say it's the most fun thing they have bought for their hobby in years!

I am happy to take questions…