

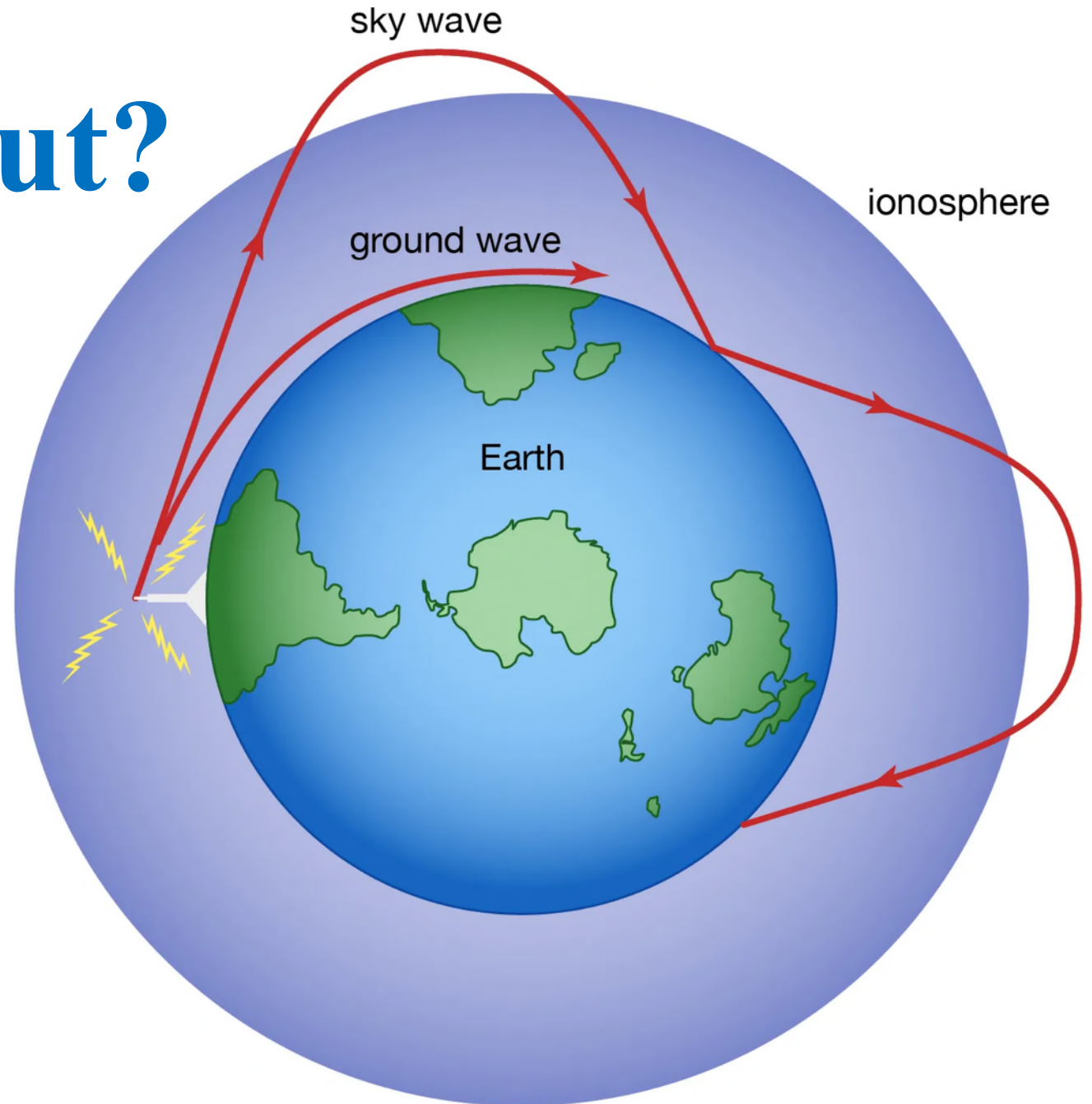
# Am I Getting Out?

Reverse Beacons,  
Skimmers, and Other  
Tools to See How Well  
Your HF Station is Working

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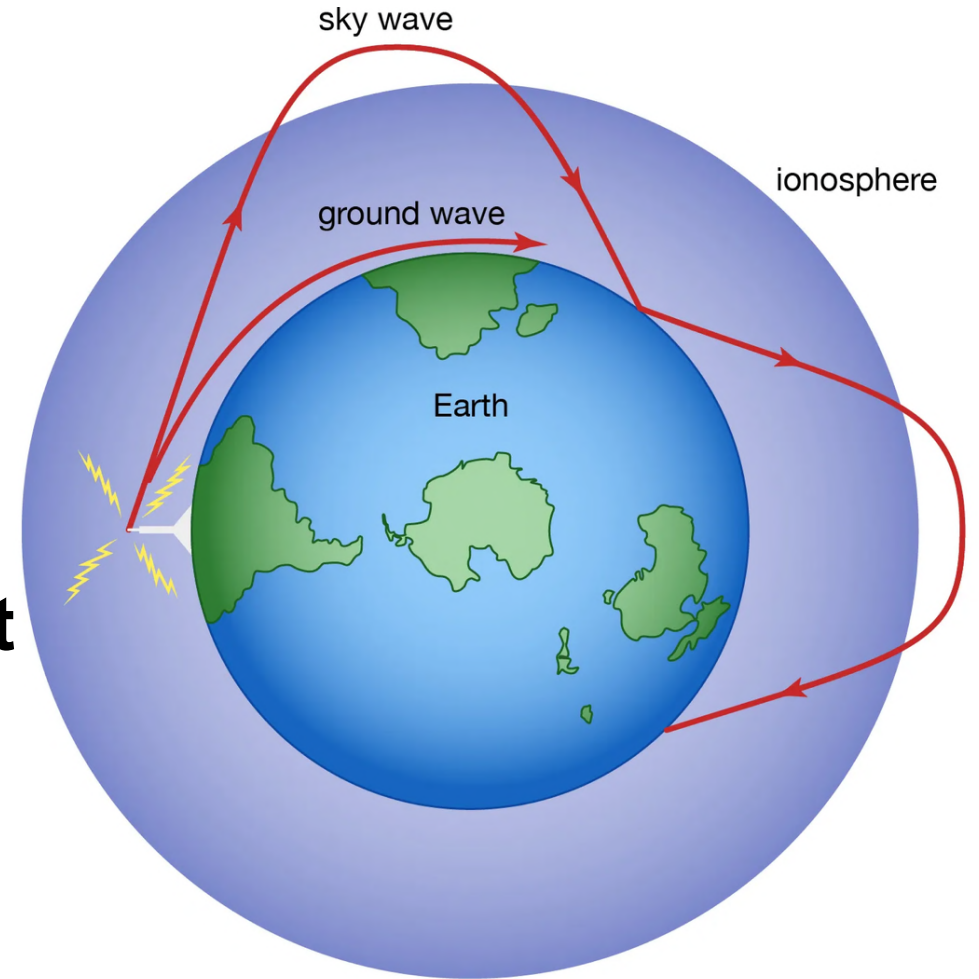
[HTTPS://na6o.com](https://na6o.com)



# I've got my HF station on the air, but how do I know if I'm getting out or hearing well?

Here are some tools that can help:

- Beacons
- Reverse Beacon network
- DX Cluster spotting network
- PSK Reporter for digital modes
- WSPR for precision measurement



**Tip: Before doing all this technical stuff...**

**Turn on your radio and CALL CQ!!!**



# Beacons

- A beacon transmits repeatedly, on a known frequency
- You tune around until you hear it
- Tells you if the band is open, and your rcvr is working
- In the HF bands, there is the NCDXF/IARU International Beacon Project

<https://www.ncdxf.org/beacon/>

- There are also many 6m and VHF beacons

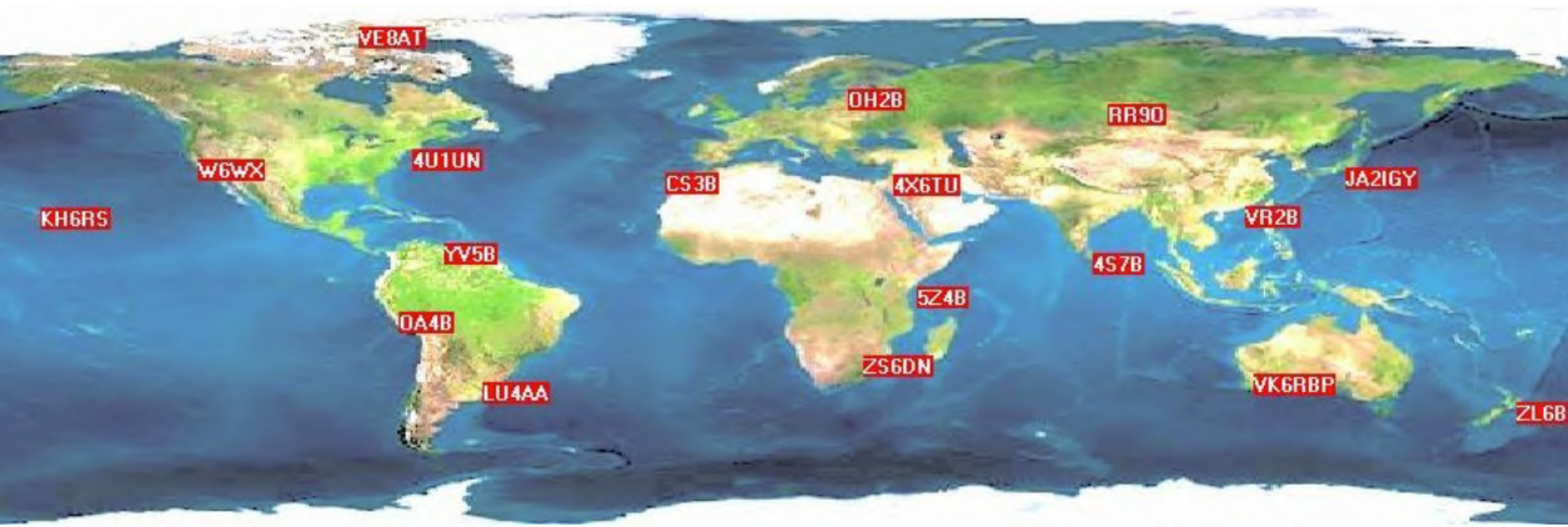
<https://www.newsvhf.com/beacons2.html>



# NCDXF has 18 stations worldwide



- Five frequencies: 14.100, 18.110, 21.150, 24.930, 28.200 MHz in a 3 minute cycle so that no two beacons transmit at the same time on the same frequency. Power steps: 100W, 10W, 1W, 0.1W



# **Reverse Beacons** listen for *your* signal

- **Principle:**
  - Hundreds of receivers, all over the world
  - Each receiver runs *skimmer* software to detect call signs
  - All detections are reported to a central server on the internet
- **Viewers let you filter activity by call sign, band, etc.**
- **Works only on CW and RTTY**
- **Main website: <http://reversebeacon.net/>**

# Background:

## What's is a *skimmer* system?

- Wideband SDR receiver(s) and antenna(s)
- Skimmer software digitizes and analyzes a wide bandwidth
- Detects a nearly unlimited number of signals
- Decodes each signal and extracts call signs
- Normally looks for **CQ callsign** or **TEST callsign**
- Each call sign and freq are posted to the reverse beacon net
- QSY by >500 Hz to get picked up again

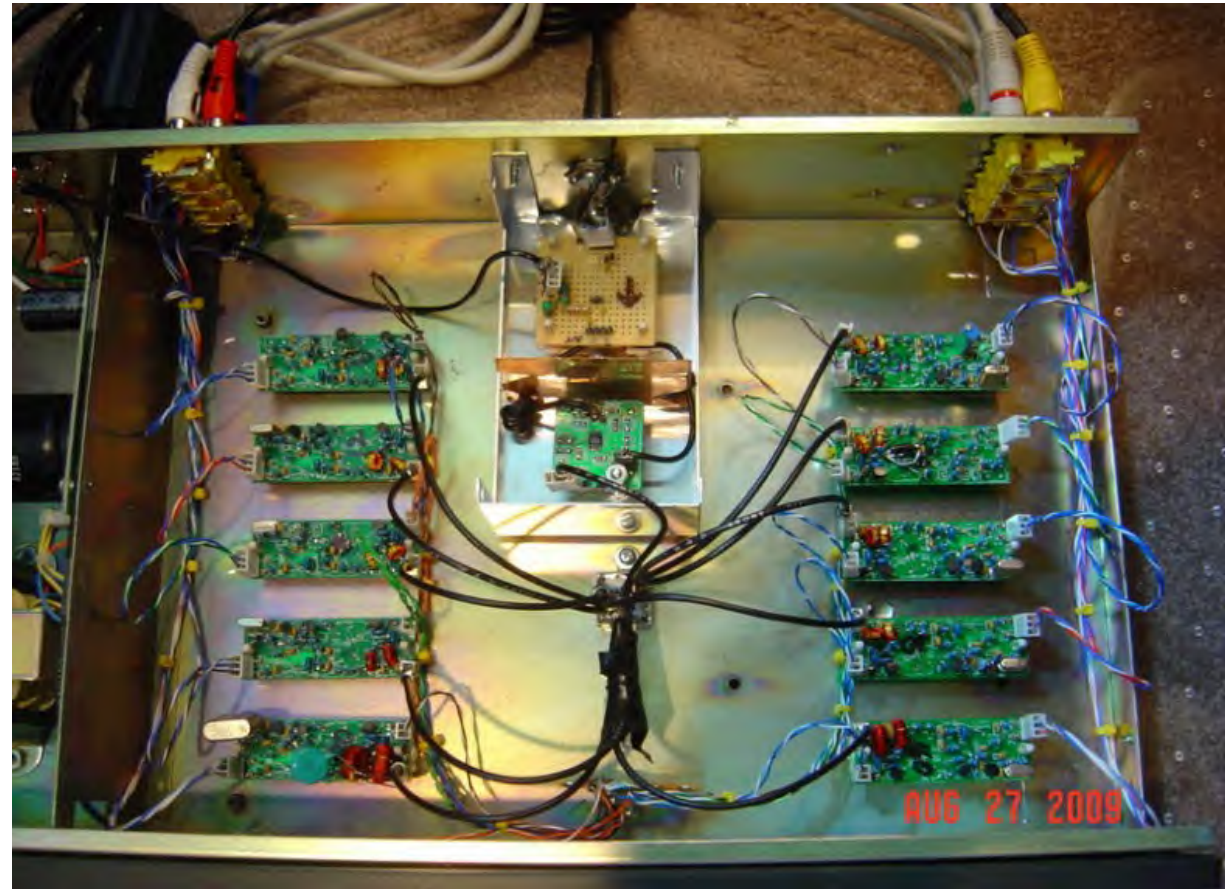


# Some guys put a lot of work into their multi-band skimmer systems

K3LR: 6 Perseus SDRs



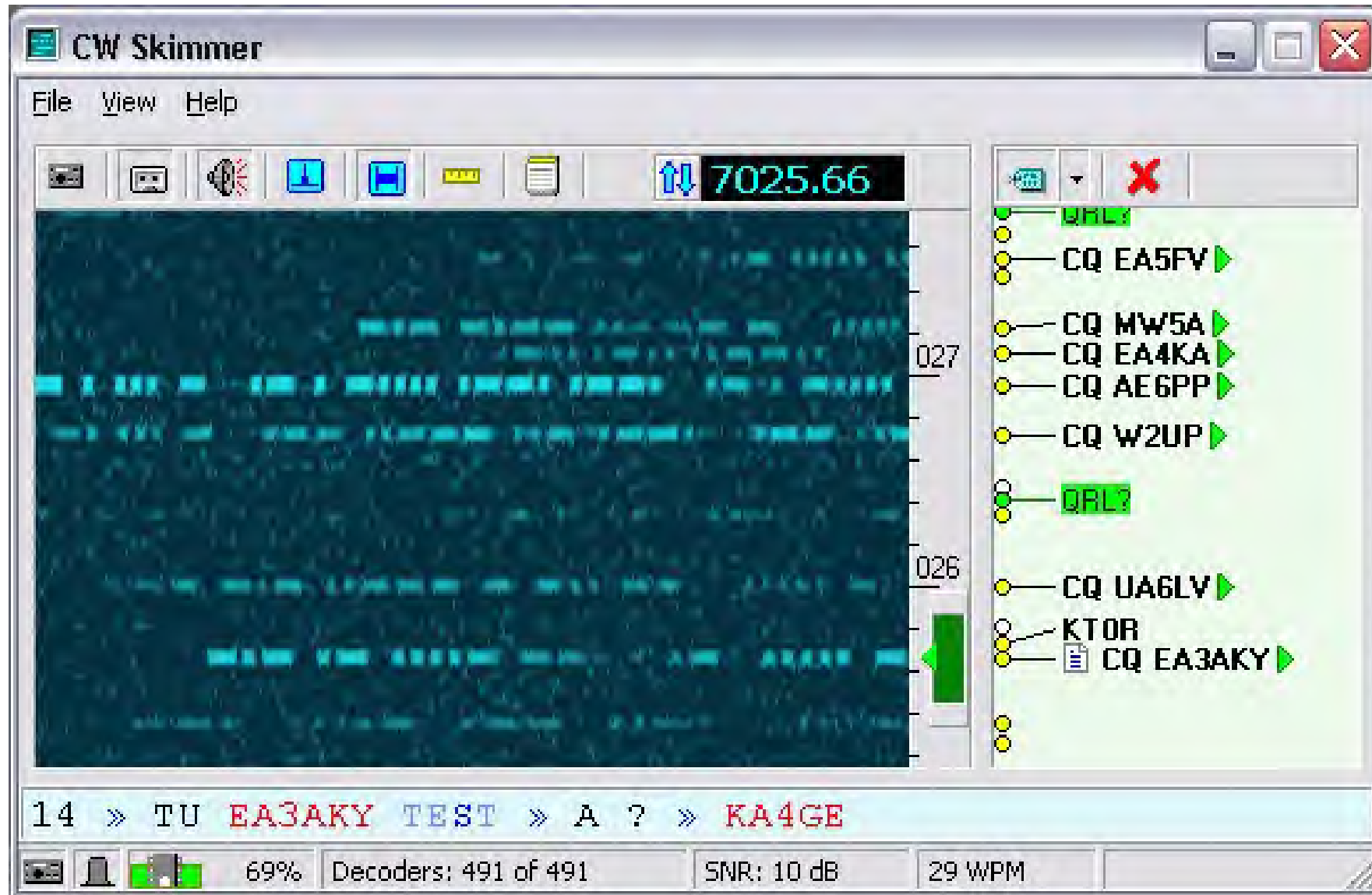
ACOC: Runs 10 SoftRock SDRs





# CW Skimmer in action

<http://www.dxatlas.com/cwskimmer/>



There is also a version for RTTY



# **DX Cluster** aggregates manual and optionally automatic reports (spots)

- Also called *packet reporter*, because data was originally distributed by amateur packet radio. Now it's internet.
- Anyone can manually add a spot, with comments
  - Option: Include reverse beacon (skimmer) spots
- You connect to an aggregator node, and optionally filter what you want
- Read via websites like: [dxsummit.fi](http://dxsummit.fi) [dxwatch](http://dxwatch) [eham](http://eham)
- Also integrated into all logging software, and on some radio waterfall displays, e.g., FlexRadio

# Enter a manual spot via a web page or your logger application

The screenshot shows the MY DX SUMMIT website interface. At the top, there's a navigation bar with 'Spots', 'Spot Search', 'Daily DX', 'News', 'Radio Arcala', 'Visit Azores', 'Feedback', and 'Tutorials'. Below this is a search bar with 'Filters', 'dx', and 'inc' options, and a search input field. The main content area features a table of spots and a 'Share a spot' form on the right.

Spotter	Freq.	DX	Time	Info	Country
M5DZH-@	7170.0	G000Q	17:34 17 Aug	Sean CQ CQ	England
F8ASG	21002.2	8H77D	17:34 17 Aug		Indonesia
YO8SSB-@	3573.0	SN200W	17:34 17 Aug	FT8	Poland
SP5MXG	14080.0	S79VU	17:34 17 Aug	FT4 -06dB from LI75 1964Hz	Seychelles
F5IYC	21002.2	8H77D	17:34 17 Aug	tu 73	Indonesia
F4HRS	21229.0	J20EE	17:33 17 Aug	Merci 73 !	Djibouti
IZ7QEN	14216.0	VU2DGR	17:33 17 Aug	VERY GOOD COPY CIAO	India
XE2WK	50313.0	WA0JYF	17:33 17 Aug	EL03KR<->EN42EB	United States
DH1KCO @	21022.4	ZD7DC	17:33 17 Aug	mi toy qso	St. Helena

**Share a spot**

My call: NA6O  
DX: J20EE  
kHz: 21229  
Info: Inx QSO  
Share

Manual spots help others see who is on the air

<http://dxsummit.fi>

Here you can also search for particular calls

Comments optional (sometimes funny...)

# Cluster interface in Log4OM Logger

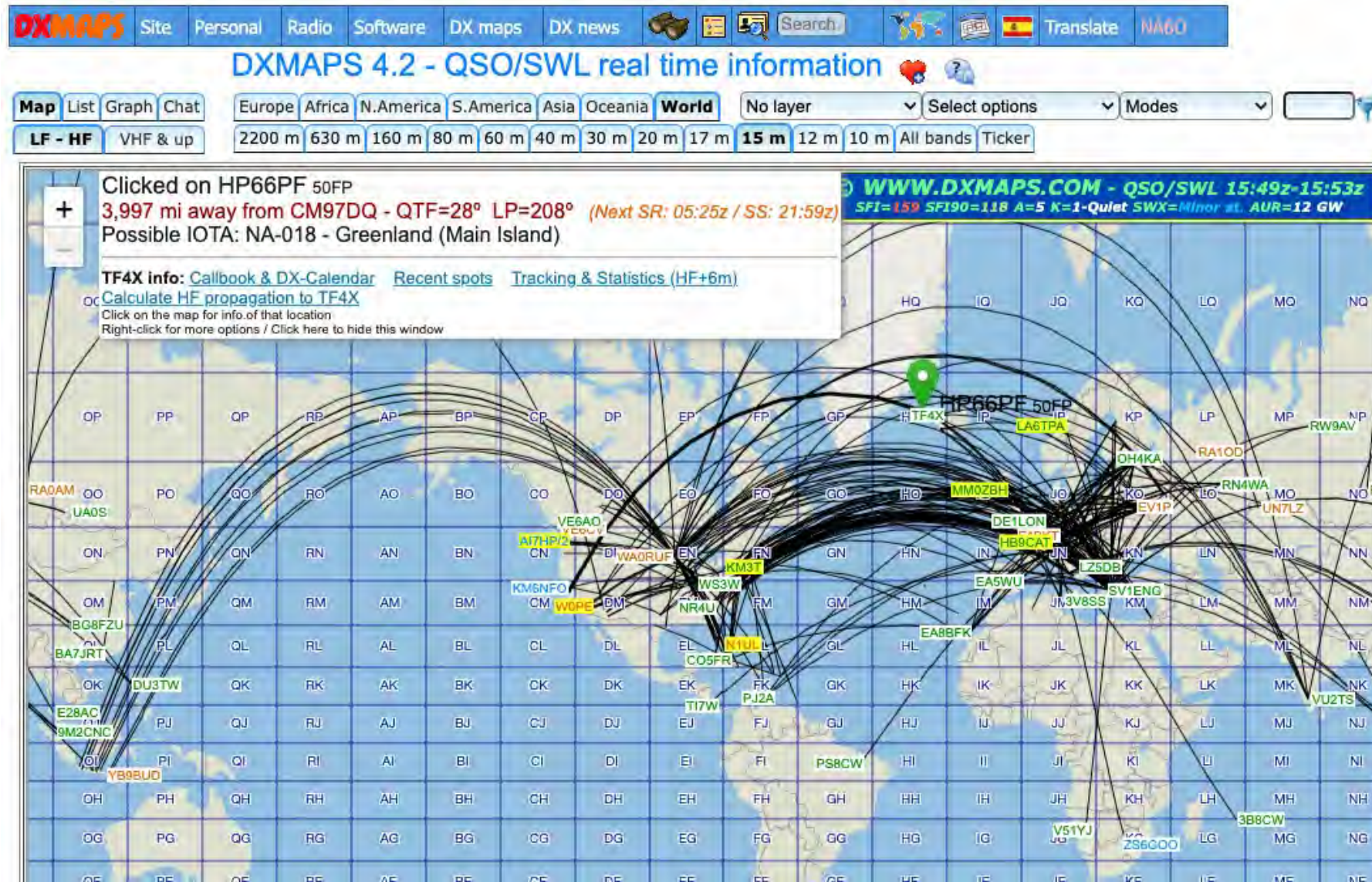
Main (F6) Recent QSO's (F7) Cluster (F8) Propagation (F9) Worked before (F10)

Cluster Map

Time	Spot	Callsign	Frequency	Country	Note	Reporter	State
2057Z	CW	IU0PIO/7	14016.0	Italy	CW 21 dB 17 WPM CQ	AA4VV	
2057Z	CW	G00BK	14022.1	England	CW 10 dB 15 WPM CQ	VE2WU	
2057Z	CW	WB9HFK	14042.3	United States	CW 5 dB 17 WPM CQ ...	N6TV	IL
2057Z	CW	KW9E	10119.0	United States	CW 19 dB 22 WPM CQ ...	W3UA	WI
2057Z	CW	K1SEI	14031.6	United States	CW 11 dB 18 WPM CQ ...	VE7CC	CT
2057Z	CW	EA1EX	14021.0	Spain	CW 9 dB 26 WPM CQ	WE9V	
2057Z	CW	N4BP	14032.4	United States	CW 18 dB 22 WPM CQ ...	N4RLI	FL
2057Z	CW	W7SW	14040.0	United States	CW 60 dB 18 WPM CQ ...	AC0C	AZ
2056Z	CW	WA4FQN	10121.6	United States	CW 24 dB 16 WPM CQ ...	K1TTT	TN
2056Z	CW	ON7PQ	14035.5	Belgium	CW 12 dB 19 WPM CQ	W3RGA	
2056Z	CW	WABZNC	14037.6	United States	CW 14 dB 16 WPM CQ ...	W3RGA	WA
2056Z	CW	KB3FW	14042.1	United States	CW 14 dB 17 WPM CQ ...	K5TR	SC
2056Z	CW	CS3B	18110.0	Madeira Is.	CW 17 dB 23 WPM NCDXF...	KM3T	
2056Z	CW	KC3M	14033.1	United States	CW 21 dB 19 WPM CQ ...	K5TR	PA
2056Z	CW	KR2Q	14043.6	United States	CW 44 dB 18 WPM CQ ...	K9IMM	NJ

All spots are clickable for instant QSY, in the list and band map

# **DXmaps.com** displays data from the clusters on maps



Due to large increase in FT8 activity, this map is not nearly as busy as it used to be, except during contests.

# **PSKReporter.info** maps data from *all* digital modes

- Especially from WSJT-X, the software for operating FT8, FT4, JT65, and many other modern digital modes
- Every CQ signal you decode can be reported automatically
- Multiply this by the thousands of users worldwide!
- Accumulates hundreds of spots per second

**Probably the best overall resource for judging propagation on any band**

# WSJT-X interface... lots of decoded signals. All CQs get reported (uploaded)

UTC	dB	DT	Freq	Message	UTC	dB	DT	Freq	Message
210630	-9	0.1	2341	~ KF9UG K4ZH -23	210245	-14	-0.1	2146	~ CQ T47C FL11 CQ Zone 8
210630	-5	-0.3	714	~ VP8ADR KB9DFE EN53	210334	Tx		1322	~ T47C NA60 -14
210630	-8	0.1	451	~ IT9CWA KE3VV -16	210345	-13	-0.1	2147	~ N5WXY T47C RR73
210630	-15	0.1	1232	~ EA8J WA2EPI FN20	210400	Tx		1322	~ T47C NA60 -14
210630	-21	0.4	1094	~ CQ KSOFD EM18 U.S.A.	210415	-10	-0.1	2147	~ NA60 T47C R-02
210630	-12	0.1	417	~ VP8ADR W3AZT FN20	210430	Tx		1322	~ T47C NA60 RR73
				----- 17m	210445	-15	-0.1	2147	~ NA60 T47C 73
210645	-13	0.1	1401	~ DK4BP PY5ZHP -22	210515	-10	-0.1	2148	~ CQ T47C FL11 Cuba
210645	12	0.4	1619	~ K7CAR KK4WDR RR73	210515	-17	0.1	1398	~ SP6M ZV8C +00
210645	14	0.2	1513	~ D2UY WB3D FM07	210540	Tx		1322	~ ZV8C NA60 -17
210645	6	0.1	138	~ D2UY K3JRB EM45	210600	Tx		1322	~ ZV8C NA60 -17
210645	-5	0.1	488	~ CQ WA3JAT EN91 U.S.A.	210645	-13	0.1	1401	~ DK4BP PY5ZHP -22
210645	-9	0.1	1277	~ VE6YXE N5WXY EM40					
210645	-8	-0.1	598	~ 7Q7EMH K4EKD R-22					
210645	-13	-0.1	2149	~ EA3HMM T47C -21					
210645	-21	0.1	918	~ CQ KF9UG EN71 U.S.A.					
210645	-3	0.1	184	~ D2UY KI4TWY R+10					
210645	-12	0.1	1740	~ HC2AO KS4S FM04					
				----- 17m					
210700	5	0.1	694	~ VP8ADR N0JR -16					
210700	7	0.1	1565	~ IN3BJS WA2VJL -11					
210700	-4	0.1	2341	~ LW2EII K4ZH -16					
210700	-7	0.2	1228	~ EA8J KE5BR RR73					
210700	6	0.6	203	~ KI4TWY D2UY -07					
210700	-8	0.1	1689	~ VP8ADR W3AZT FN20					
210700	-10	0.2	1899	~ K2ANT CE4WT -18					
210700	2	0.1	440	~ <...> VE3IDT R-10					
210700	-10	0.1	637	~ VP8ADR K8ET -07					
210700	-22	0.2	985	~ NU1T KA0BOJ -10					
210700	-15	0.2	580	~ VP8ADR WB5AEE EM02					
210700	-4	0.1	1553	~ DF200 NE8Z -17					
210700	-13	0.2	2376	~ CQ WB4JWM EM83 U.S.A.					

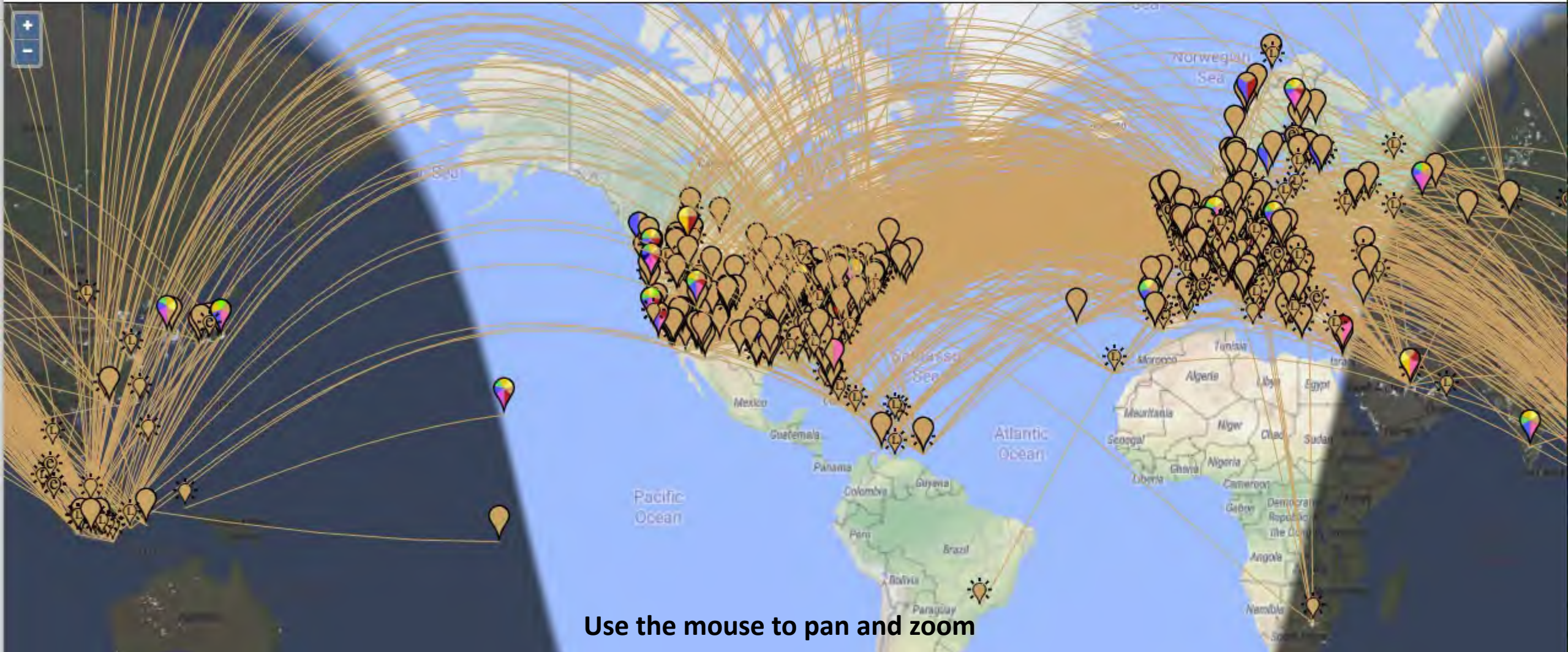


On  show  sent/rcvd by  using  over the last   [Display options](#) [Permalink](#)

Automatic refresh in 5 minutes. Large markers are monitors. [Display all reports.](#)

There are [1202 active monitors](#) on 15m. [Show all on all bands.](#) [Legend](#)

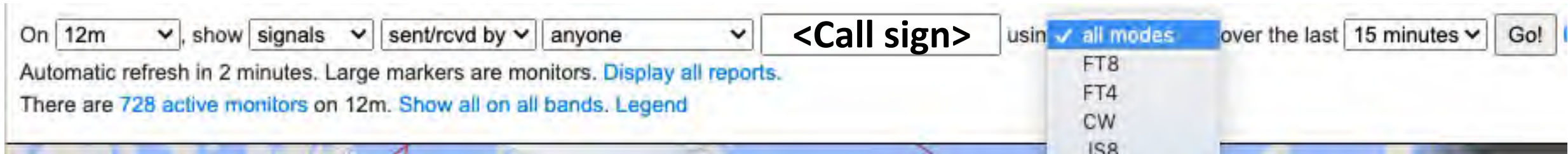
### Let's look at these filtering options...



Use the mouse to pan and zoom

*Total reports: over 1 Million per hour!*

# PSKRporter has many programmable filters



On  , show  sent/rcvd by   using  over the last

Automatic refresh in 2 minutes. Large markers are monitors. [Display all reports.](#)  
There are [728 active monitors](#) on 12m. [Show all on all bands.](#) [Legend](#)

all modes  
FT8  
FT4  
CW  
IS8

- One band at a time (4000m thru UHF) or all bands
- Look for a particular callsign:
  - See how *you* are getting out... Call CQ and watch it light up
  - Useful when stalking a special DX
- Look for "anyone" to see all activity
- Filter by mode, or just accept all modes
- Limit to just the past 15 min, or look back up to 24 hours

# Filtering to detect only NA60, on 12m

That's much better... Just SNR reports, and relative time of last report

On  show  sent/rcvd by   using  over the last   [Display options](#) [Permalink](#)

Monitoring NA60 (last heard 1 mins ago). Automatic refresh in 4 minutes. Small markers are the 23 transmitters ([show logbook](#)) heard ([distance chart](#)) at NA60 (141 reports, 15 countries last 24 hours; 578 reports, [20 countries](#) last week).

There are [99 active monitors](#) on 12m. [Show all on all bands.](#) [Legend](#)



# **WSPR: Weak Signal Propagation Reporter**

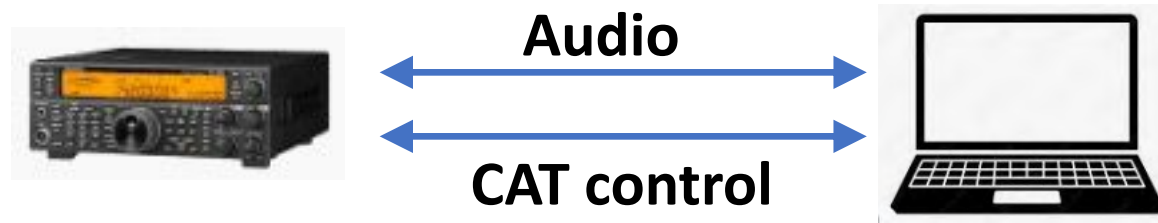
- **Uses very low-power transmitters sending very slow, narrow-bandwidth digital codes => Great sensitivity**
  - 2 min per transmission, sends call sign and grid locator
- **Excels at being receivable "below the noise floor"**
- **Not a communications mode; only for beacons**
- **Totally automatic, usually runs unattended**
- **Results appear in real-time on the internet**

**Good for testing and comparing antennas and stations, checking propagation over longer periods**

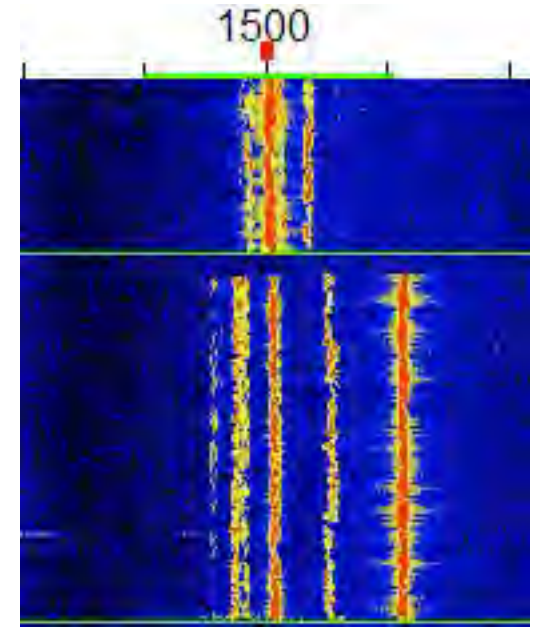
# Two WSPR station options

## 1) Transceiver and PC running WSJT-X

- Allows you to monitor *or* transmit



Waterfall display

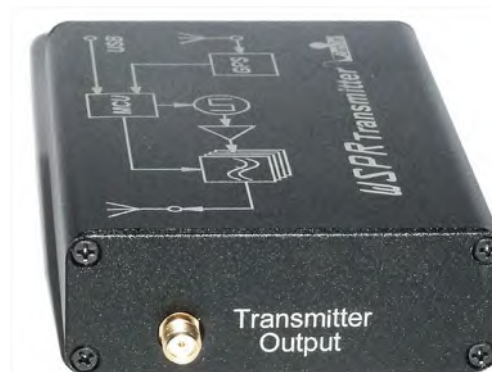


## 2) Transmit "device", connected to an antenna

- Once configured, no computer needed



WSPRlite from  
[SOTAbeams](#)



WSPR Desktop from  
[ZachTek](#) \$139

..or homebrew from Raspberry Pi



# **Summary: There are many tools to see if you're getting out...**

**...And they also tell you something about propagation**

- PSKReporter is my favorite overview, and also tells me how I'm doing on digital modes**
- Reverse Beacons find me on CW and RTTY**
- DXSummit is great when searching for a special call sign**

**If nothing else, turn on your rig and  
CALL CQ!**

