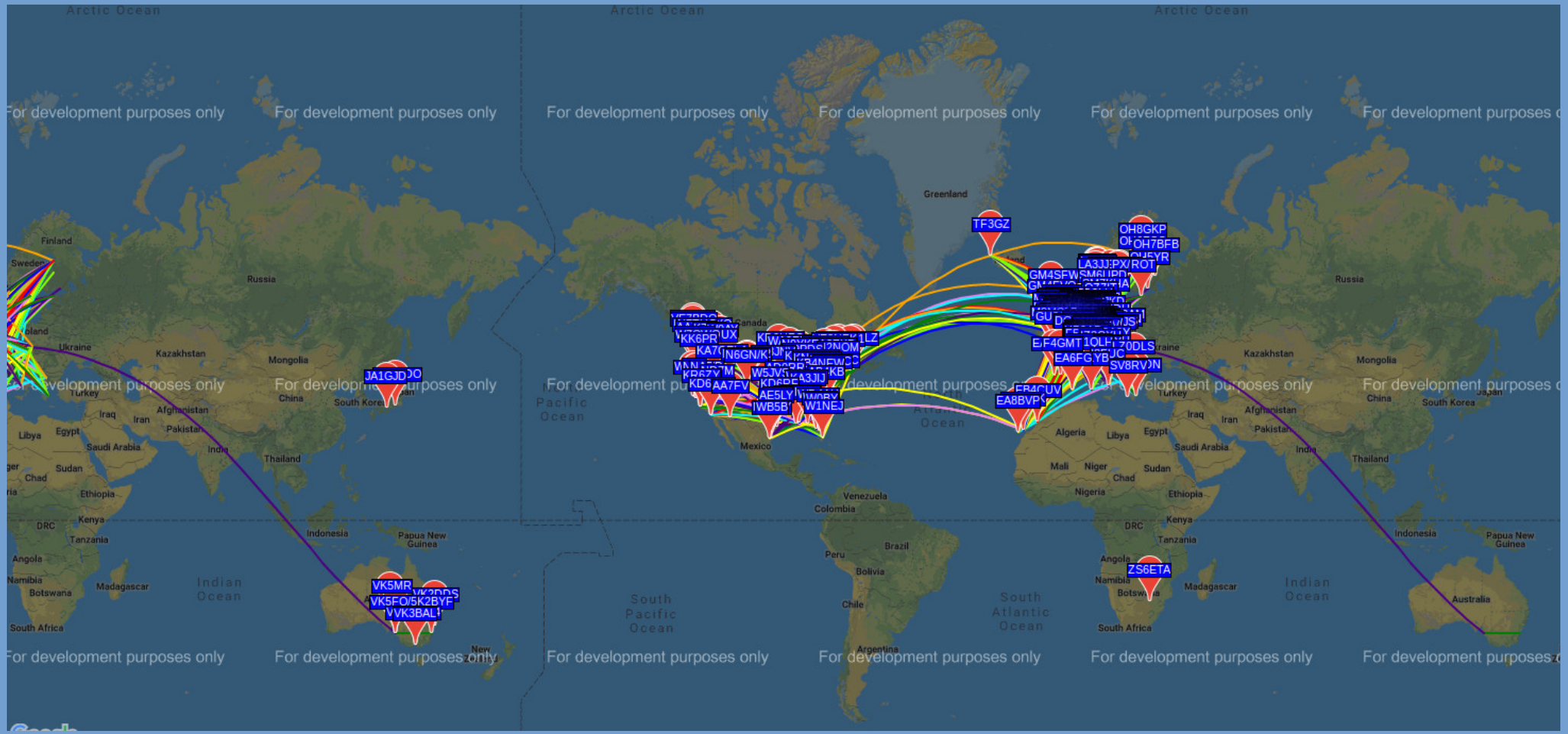
WSPR – Weak Signal Propagation Reporter



Professor Joe Taylor - K1JT

- WSPR designed by K1JT
- Nobel Prize - Physics
- Developer of WSJT & JT65.
- Arecibo Moonbounce Expedition

http://physics.princeton.edu/pulsar/K1JT/

QRP Signal Propagation

- Primarily a propagation measurement tool
- QSO claimed possible but nothing like PSK
- Primarily HF/MF, but VHF/UHF capable
- Similar to JT65 & FT8
- Low power (10W maximum)
- Low bit rate & small payload

Slow and Steady

- Transmits 1 second into even minutes
- Transmission lasts approximately 110 Seconds
- Effective rate is 1.5 baud
- Total payload is 50 bits
- Bandwidth approximately 200Hz
- Minimum S/N is -28db
- F1D Emission (Frequency Shift Keying)

Not A QSO Protocol

- 50 bit payload
- 28 bit callsign, 15 bit maidenhead, 7 bit power (dbm)
- Simple Forward Error Correction
- V2.0 allows multi-packet - more discrete maidenhead
- Experimental QSO & GPS “hacks”
- WSPR QSO contacts qualify for DXCC (100 countries)

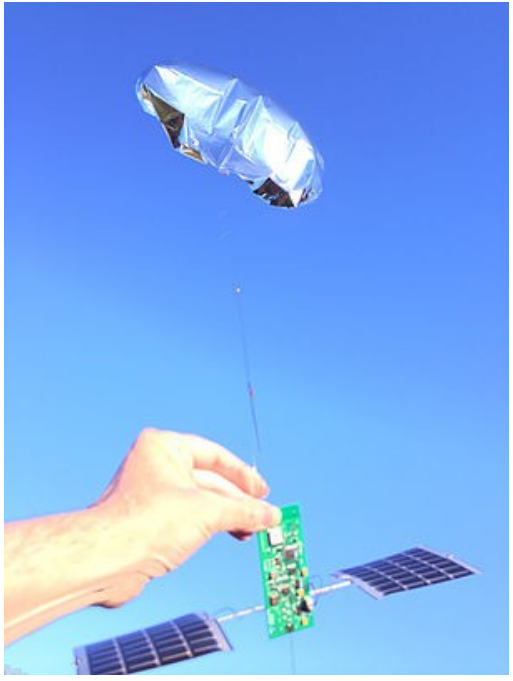
Hacks / Mods

- APRS-WSPR
  - Operation on other frequencies
  - Redefine payload for better position resolution
  - Send any of 43 ARRL Standard Radiograms
  - Send any of the 14 Maritime Emergency Codes

http://aprs.org/aprs-wspr.html

Hacks / Mods

- QSO mode – 50 bit message size limit!
- Pico Balloons (small balloons w/light payload)
  - Solar powered transmitters
  - VHF APRS / HF WSPR
  - Around-the-world possible
  - W8ELK “Skytracker” 20 Meter WSPR
  - http://gmigliarini.wixsite.com/wb8elk



Standard Frequencies

- Like APRS, frequency standardization is critical

Band	Dial freq (MHz)	Tx freq (MHz)
160m	1.836600	1.838000 - 1.838200
80m	3.592600	3.594000 - 3.594200
60m	5.287200	5.288600 - 5.288800
40m	7.038600	7.040000 - 7.040200
30m	10.138700	10.140100 - 10.140300
20m	14.095600	14.097000 - 14.097200
17m	18.104600	18.106000 - 18.106200
15m	21.094600	21.096000 - 21.096200
12m	24.924600	24.926000 - 24.926200
10m	28.124600	28.126000 - 28.126200
6m	50.293000	50.294400 - 50.294600
2m	144.488500	144.489900 - 144.490100

Why?

- Provides real-time propagation information
- Good propagation with low power
- Antenna testing – low power requires efficiency
- Low power allows operation from Solar energy
- QRP equipment is ideal for implementation
- It’s something to play with!

Software

- WSPR by K1JT, Professor Joe Taylor
  - Original WSPR Software
  - Production version: 2.11/2.12 (Linux/Windows)
  - SDR compatible
  - Many functions are command line
  - WSPR specific
  - Beta version 4 available
    http://physics.princeton.edu/pulsar/K1JT/wspr.html

Software

- WSJT-X by K1JT, Professor Joe Taylor
  - 2nd Generation software
  - Production version: 1.9.1 (Linux/Windows)
  - Multi-mode: FT8, JT4, JT9, JT65, QRA64, ISCAT, MSK144, **WSPR**
  - Interfaced, can perform frequency hopping
  - Receive-only stations are very valuable as well
  - Sound card interfaced, no TNC needed

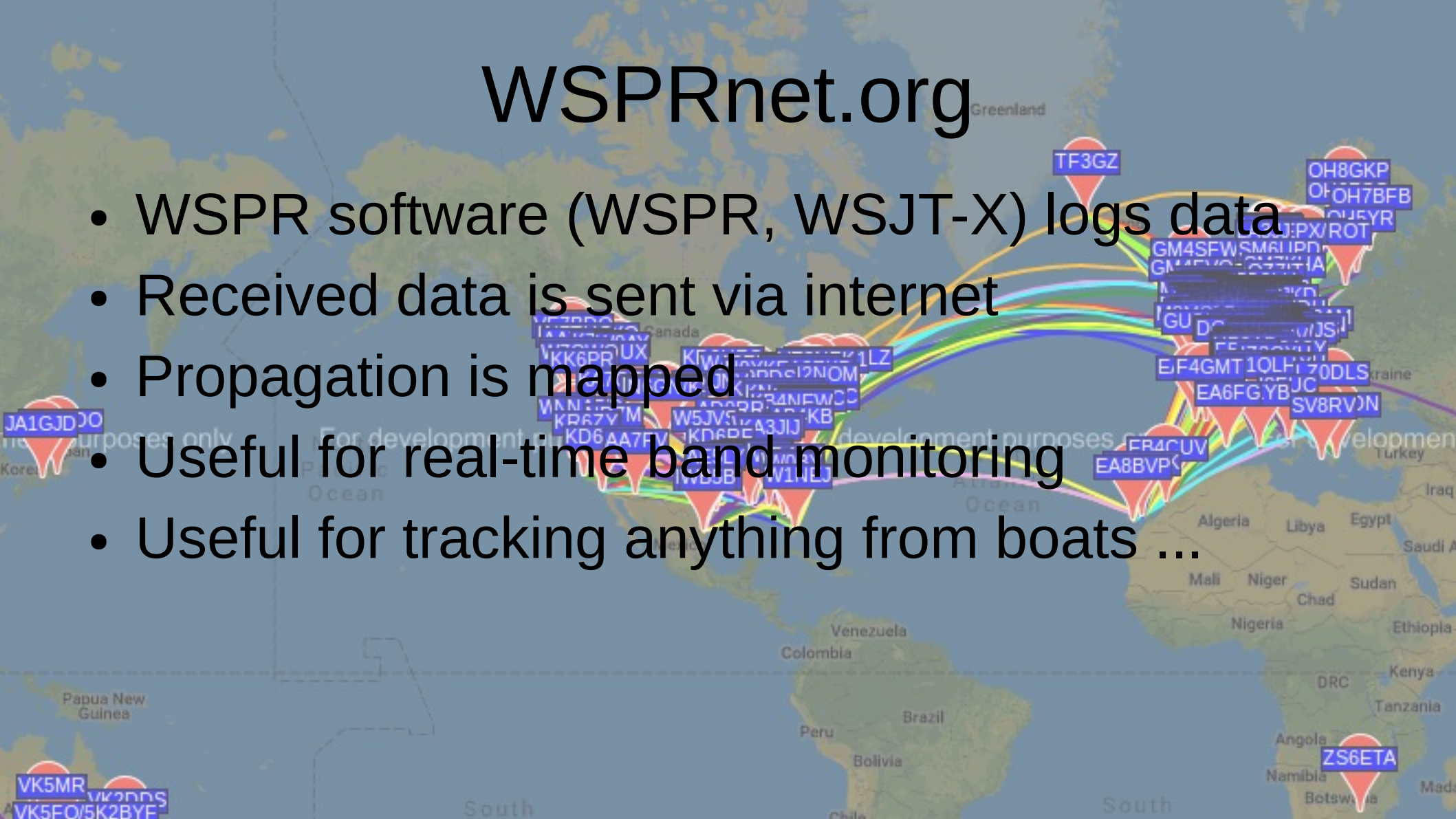
    http://physics.princeton.edu/pulsar/K1JT/wsjtx.html

Software - Variants

- WSPR
- WSJT-X
- Arduino with Si5351, Beacon - very low power.
- SDR 8 Channel Receiver.
- Raspberry pi based beacon – very low power.

WSPRnet.org

- WSPR software (WSPR, WSJT-X) logs data
- Received data is sent via internet
- Propagation is mapped
- Useful for real-time band monitoring
- Useful for tracking anything from boats ...



WSPRnet.org

- WSPR software (WSPR, WSJT-X) logs data
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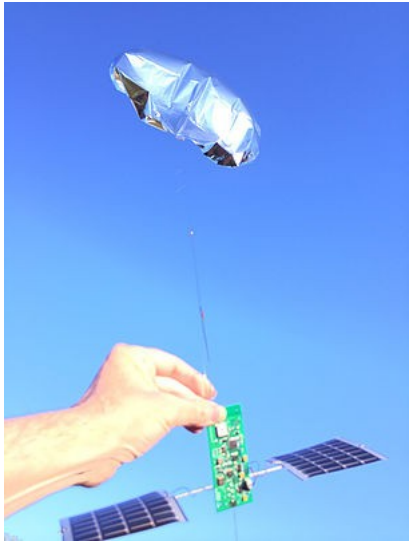
- Long Range Pico Balloons



Pico Balloon Launch

- Early 2019 – possibly January
- Receiving stations would be useful
- Investigating use of Skytracker APRS/WSPR
- WX4BK/N4BWR joint effort

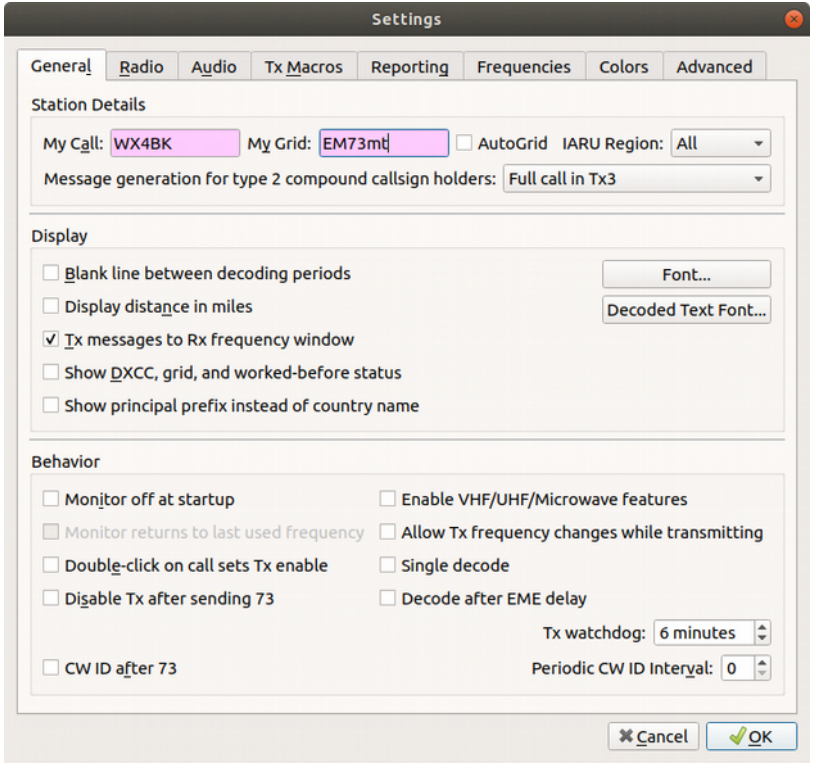
Installing WSJT-X

- Debian Linux Download/Install: Click Here
- Redhat Linux Download/Install: Click Here
- Raspberry Linux Download/Install: Click Here
- Windows Download/Install: Click Here

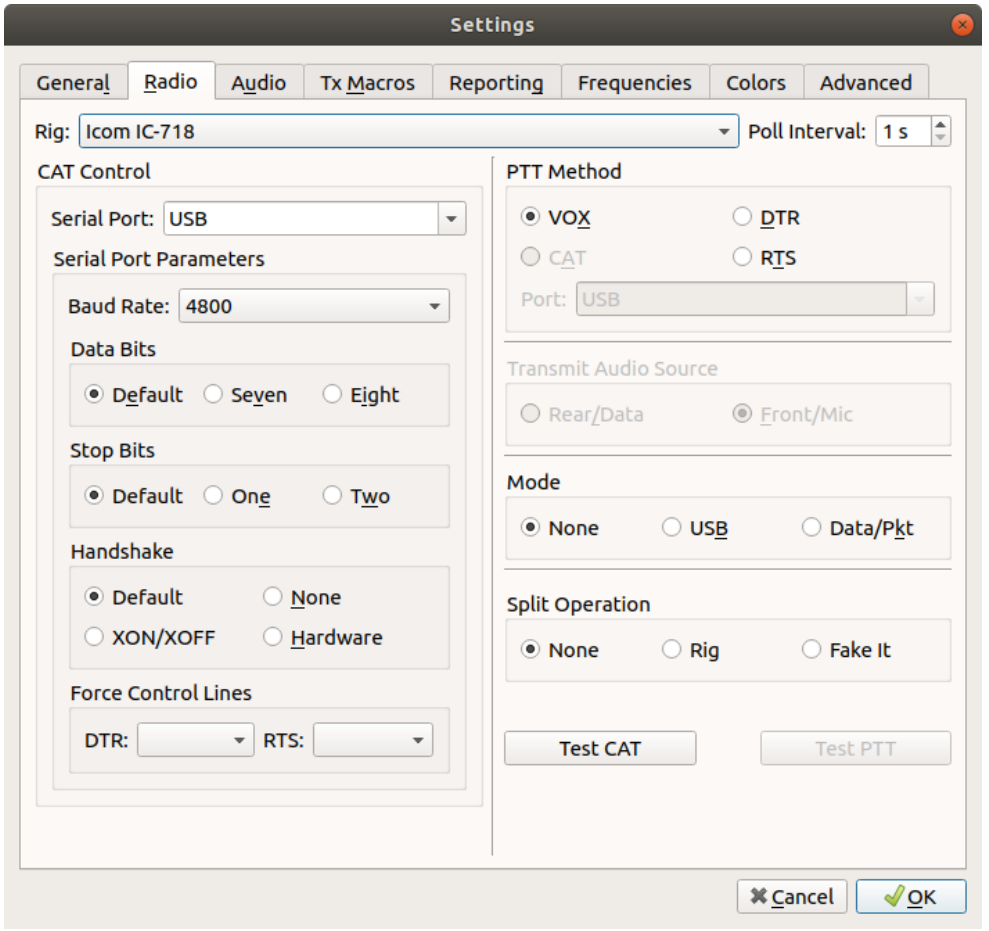
Debian (Ubuntu) Installed using the Debian Package Installer when opened, seamlessly.

Configuring

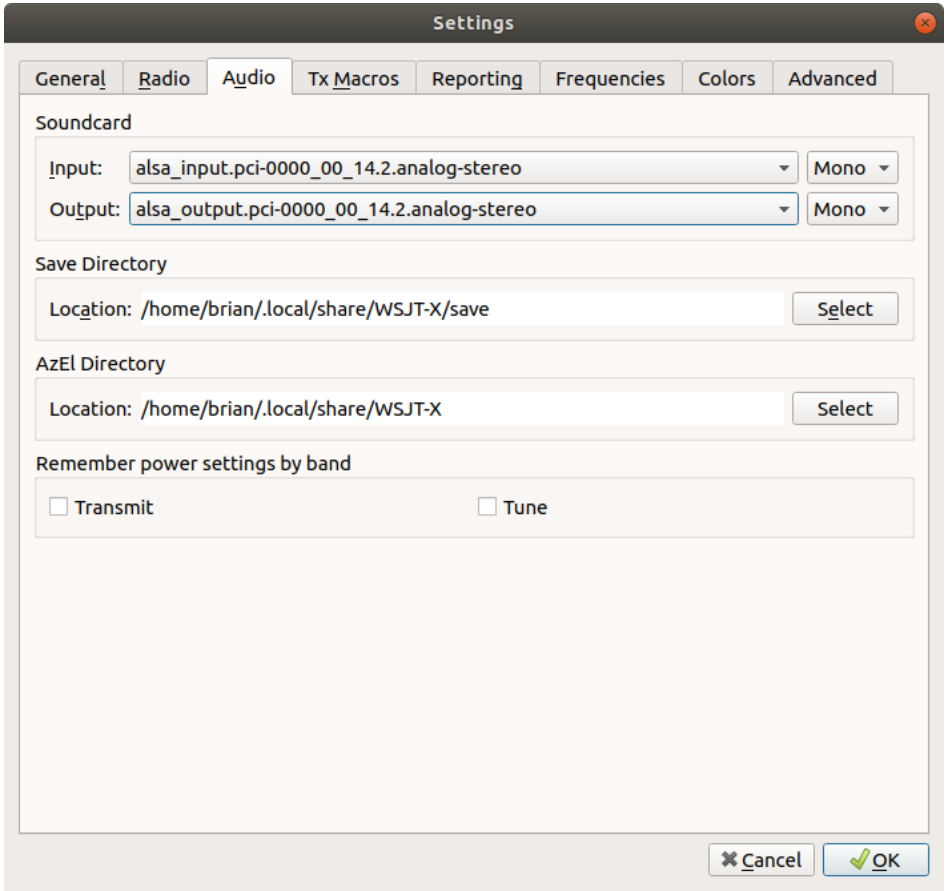
- Click File → Settings, set call/maidenhead.



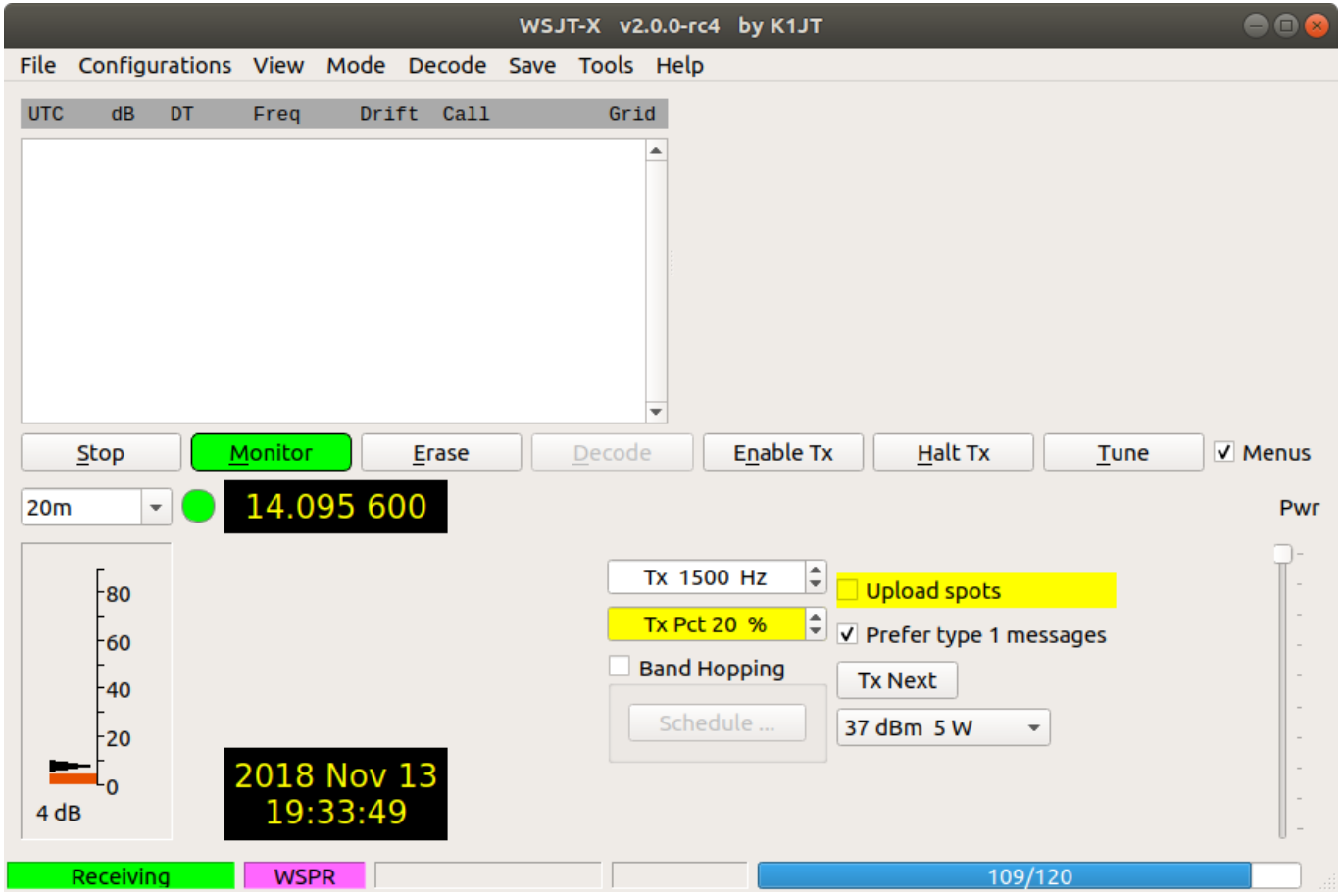
- Set your radio type if software controlling:



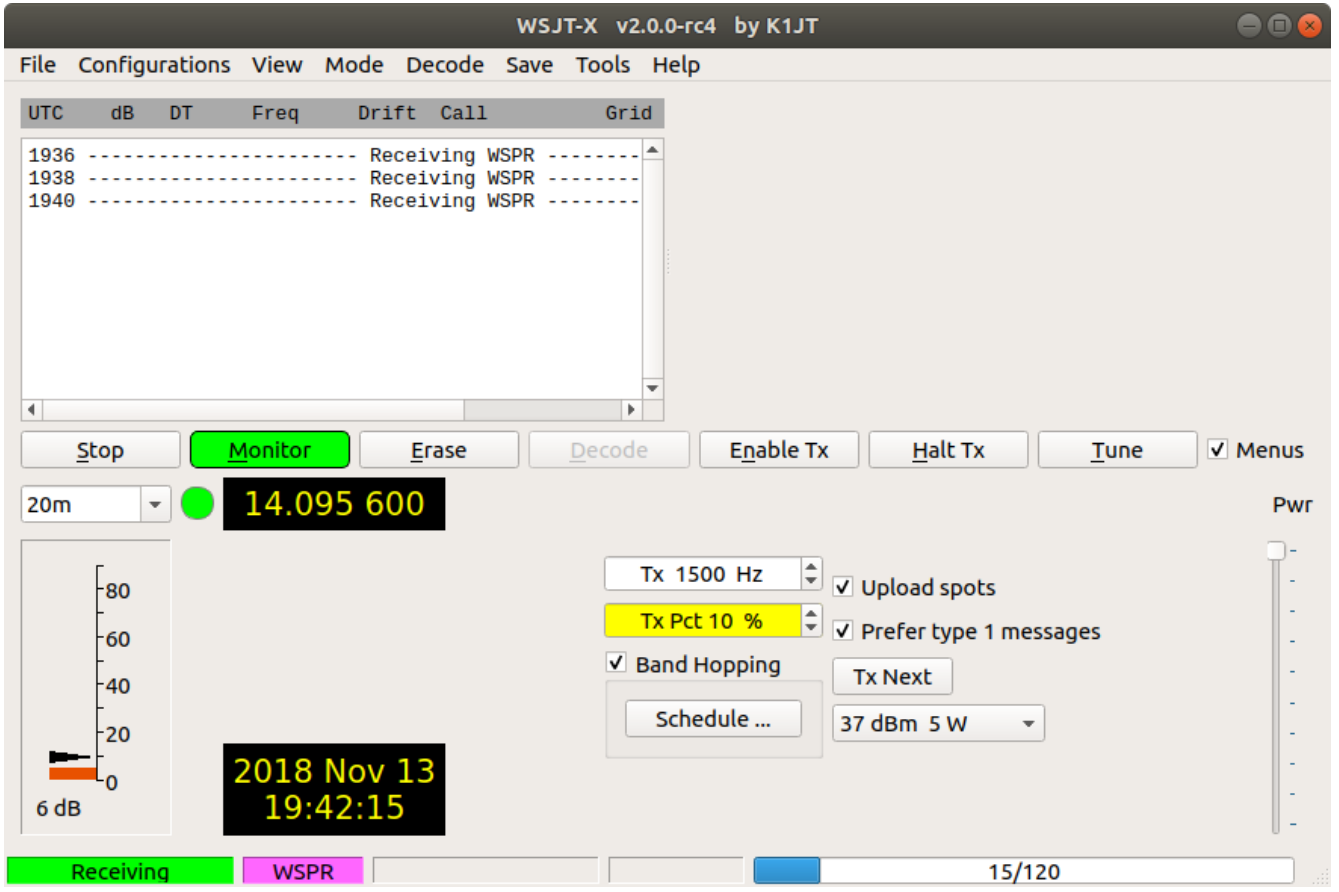
- Select your audio source. Linux names look odd, but Windows is easier:



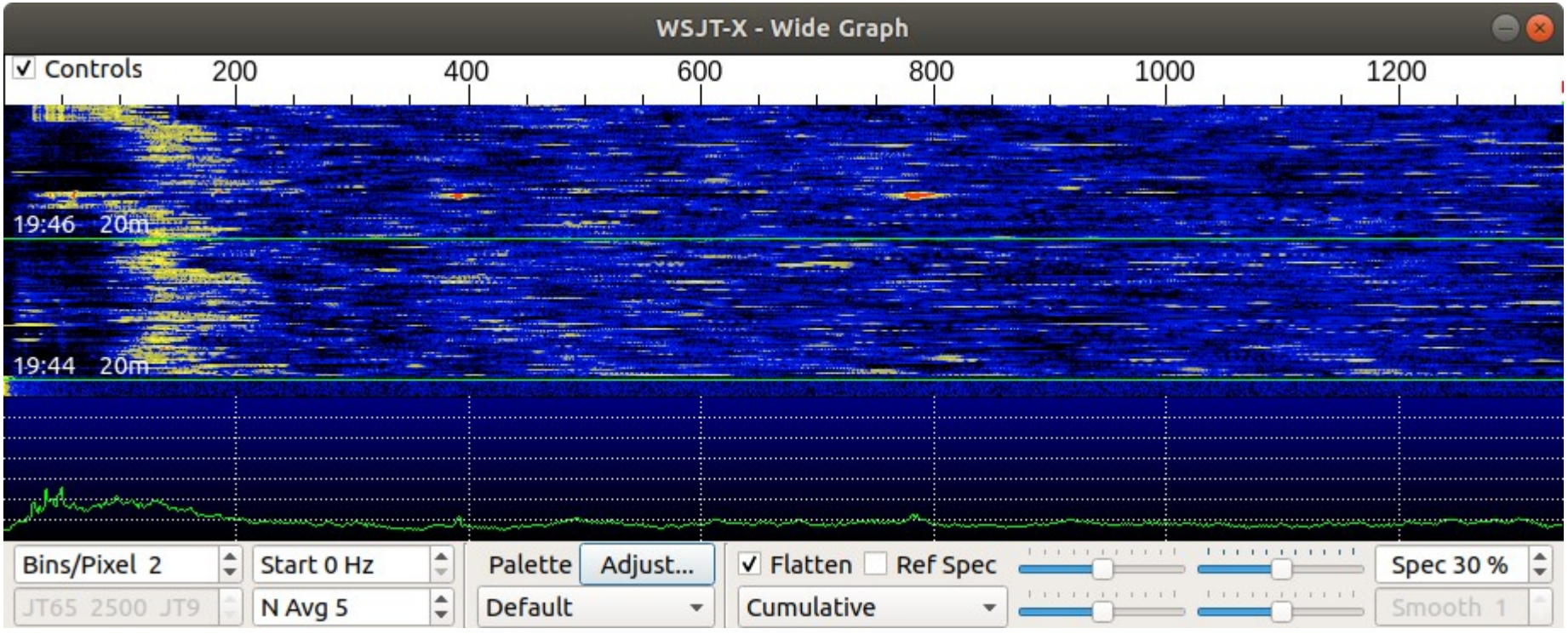
- You can pick from various modes by clicking on Mode and picking the one you want. Here, WSPR is selected:

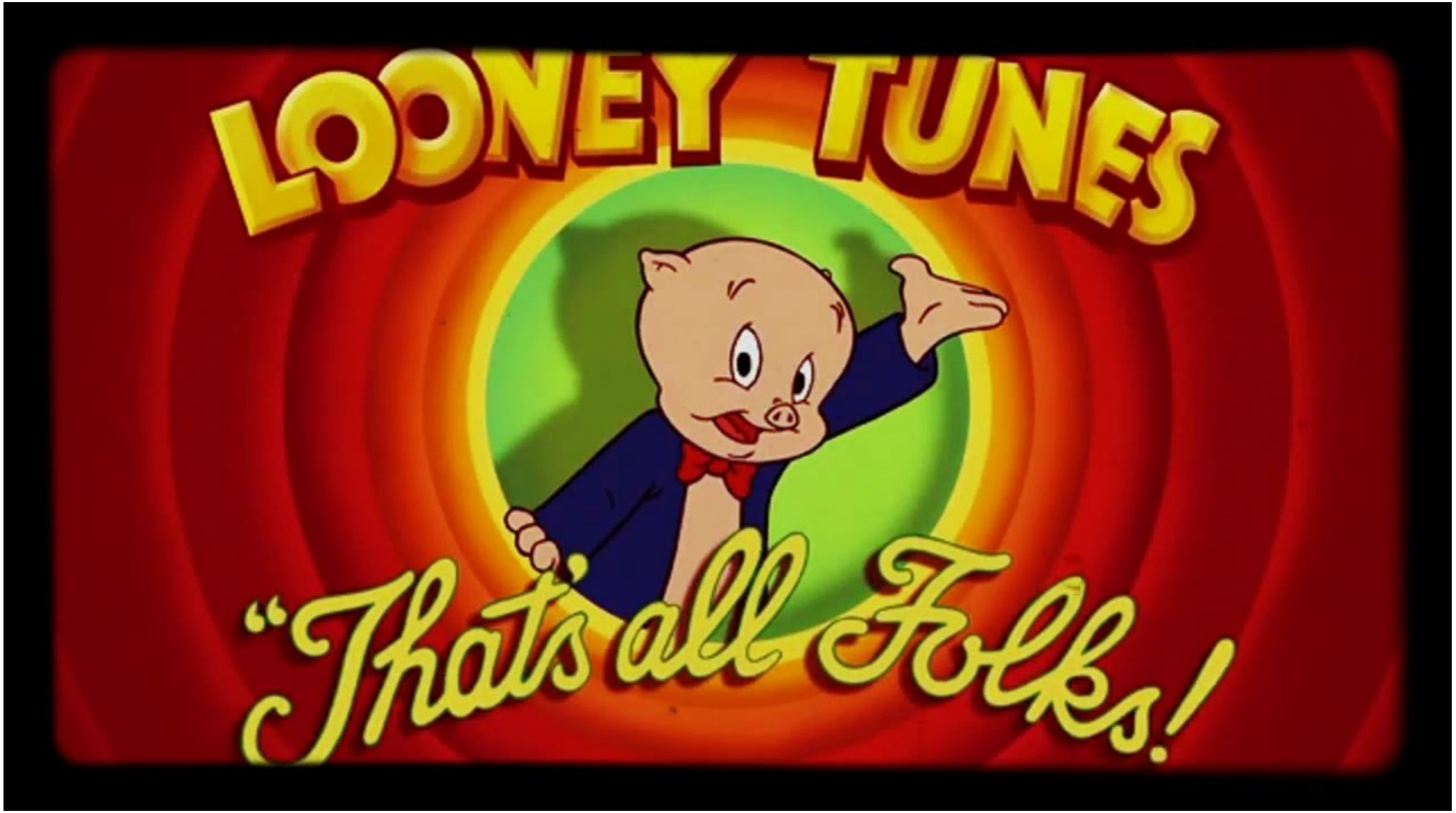


- You'll want to enable uploading spots, and maybe band hopping. If all you want to do is logged received, disable TX and just use an audio cable from your rig to the computer!



- A quick look at the waterfall:




LOONEY TUNES
"That's all Folks!