ARCC Pulsar Viewer

What is the Viewer?

- The viewer is a website that allows you to look through possible pulsar candidates and rank how strong of a candidate they are

- Almost 1/3 of all pulsars found in a year are found by ARCC students using this website

Setting up your account

❖ Register at: http://arcc.phys.utb.edu/viewer/index.php

❖ Once your account has been activated you are almost ready to start ranking candidates

Pulsar Viewer

Login

To review candidates login to the left.

Candidate Evaluation Tutorial

Username:

Password:

Login   Register

CGWA Pulsar Timing Group

Getting ready to view candidates

❖ When you log in this is what you see

Saved candidates in the survey

List of how many candidates have been recently uploaded to each survey

Top Ranked candidates in the survey

User Control Panel

Top Ranked | Summary | Goal | Saved Candidates | Followup | Show Known | Server Status | Log Out

Welcome ehandzo

Welcome to ARCC Explorer. If you would like to begin rating candidates click on the link labeled viewer below.

Viewer   Plotter

Summary of how many candidates have been viewed

List of known pulsars in a survey

News

Where to rank candidates

07-01-09: I have added a new way of looking at the candidates. It is only available once you have rated 2,000 candidates. If you have rated enough candidates, you should see a new link next to "Viewer" on this page called "Plotter". The new tool plots candidates from any survey according to attributes of your choosing versus other attributes of your choosing sorted on any attribute of your choosing. You can force the plot to be on a log scale for any of the attributes and also choose a minimum and maximum value. At this time, I do not recommend plotting more than 100,000 candidates at a time. It takes a long time to transfer the information for that many candidates from the ARCC server to your computer. Please feel free to play with the plotter and let me know of any bugs you find or feature requests you have. The tool is a java applet, so you must have java enabled for your browser. -Kevin

04-13-09: There has been another "survey" added named kolu. This survey is actually simulated pulsar data, it is meant to test the PALFA pipeline, the people rating the candidates, and also my simulating software. I have changed everyone's account to rate this survey, but you can change to other surveys. There are currently ~15,000 candidates in this survey and in the end there will be approximately 50,000 candidates. If you have any questions, please email me. -Kevin

10-14-08: There has been a new pulsar survey added. In order to view candidates from this survey click on your name at the top of this screen and change survey to midlat. I have also added a new member attribute called institution, please go to your user control panel(click on your name) and change this value to your institution (i.e. UTB or UWM)

Top Ranked | Summary | Goal | Saved Candidates | Followup | Show Known | Server Status | Log Out

Control Panel

- When you reach 2000 candidates you can change the search type

- Pick your survey

  - AOdrift has a lot of candidates to be viewed (and is periodically updated with new candidates)

  - GBTdrift and GBTncc drift are also good surveys

  - Kolu is not a real survey

- Make sure the Single Pulse Search Type is rrat_trap

- Make sure all the Password boxes are empty when clicking submit

User Control Panel for ehandzo

Member Id	1295
First Name	Emma
Last Name	Handzo
User Name	ehandzo
Email	ehandzo@fandm.edu
Group Name	undergrad
Candidates Rated	1401
Search Type	slow
Candidates Dismissed	0
Institution	UTB
Quick Rows	3
Quick Columns	3
Survey	aodrift
Single Pulse Search Type	rrat_trap
Candidates Marked	0
Old Password	
New Password	
New Password Again	

Submit
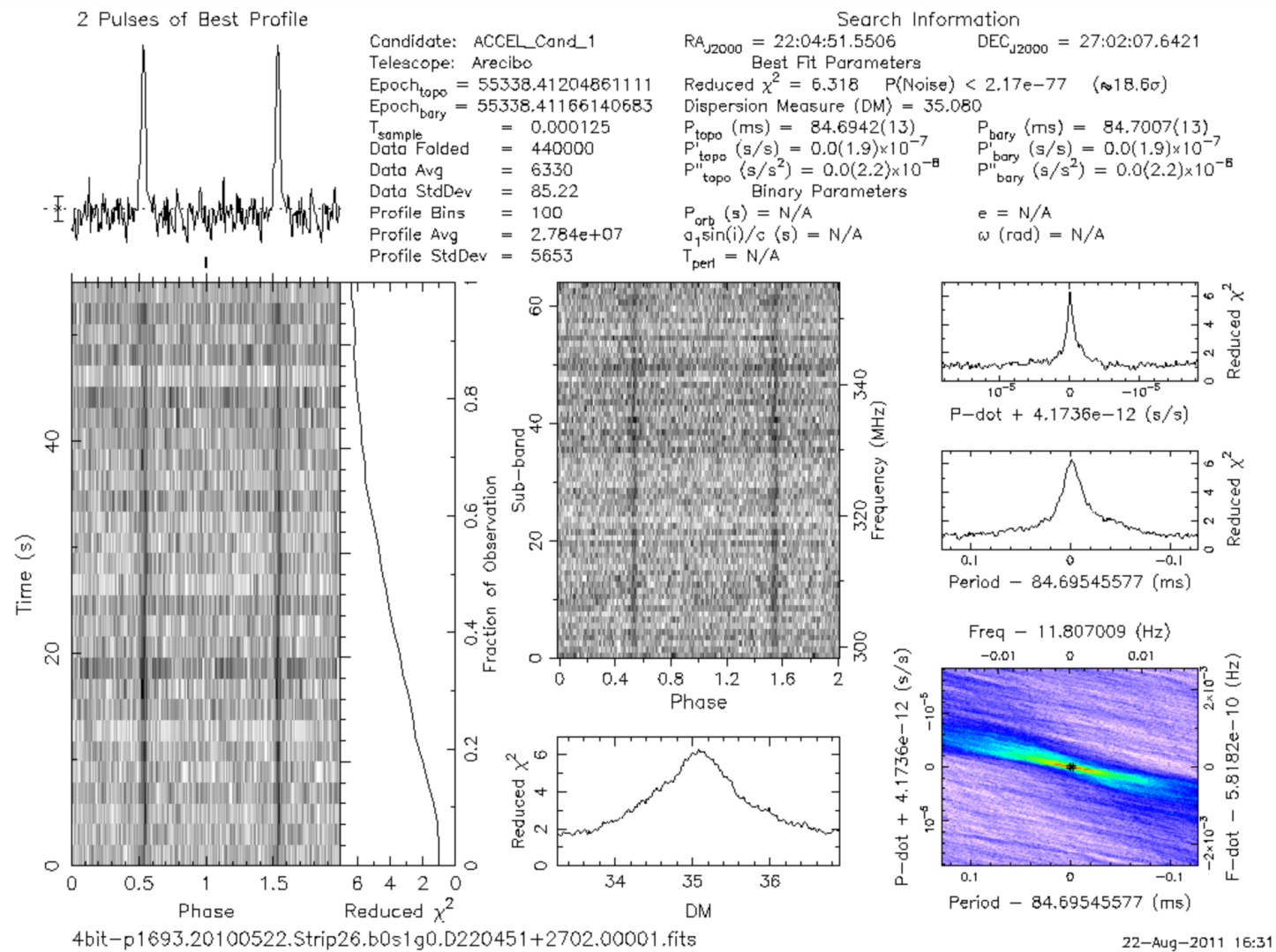
Ranking Candidates

Most of the profiles are plotted twice. This is due to the fact that the signal would most likely exist at the edge of a single profile and not be recognized as a pulsar.

First Look: The Viewer

Welcome ehandzo ... You are viewing the aodrift survey. You have rated 1401 candidates in total, dismissed 0 candidates and marked 0 candidates, you are 469 behind the leader on this survey. You have rated 0 this week.

Viewer | Top Ranked | Goal | Summary | Saved Candidates | Plotter | Followup | Show Known | Server Status | Log Out

Current candidate 6618194:4bit-p1693.20140220.Strip933.b1s1g0.00500.D063640+1033_0001_DM36.64_Z0_ACCEL_Cand_1.pfd.png

Candidate Parameters:

Period(ms)	Frequency(Hz)	dm	SNR
12.6135	79.2799	36.64	20.39
RA	**Dec**	**Presto Sigma**	**quality_png**
63640.6	103324	6.81	-7.12287
SNR_png	**pulse_width_png**	**persistence_png**	**bandwidth_png**
4.79864	18.1%	48.2%	37.0%

Known pulsars within 4°:

Name	RA (J2000)	DEC (J2000)	Period (s)	DM	Distance (°)	Flux(mJy)
J0621+1002	06:21:22.11108	+10:02:38.741	0.028853860730049	36.6010	3.80005182147	1.9	2.28770124558
J0625+10	06:25:45	+10:16	0.498397	78	2.70228344206	*	39.5158016587
J0628+0909	06:28:36.183	+09:09:13.9	1.241421391299	88.3	2.43356569397	0.058	98.4270801658
J0631+1036	06:31:27.524	+10:37:02.5	0.287800021959	125.36	1.28371176646	0.8	22.8184531309
J0646+0905	06:46:30.995	+09:05:49.3	0.9039132	149.0	2.8293812904	3.6	71.6674753818
J0647+0913	06:47:15.68	+09:13:59.5	1.23485362778	154.7	2.92346350382	0.18	97.9063498232

Profile Quality:

Weak ○○○○○ Strong

Artificial ○○○○○ Natural

Broad ○○○○○ Narrow

Dispersion Measure:

Suspicious ○○○○○ Trusted

Persistence:

Patchy ○○○○○ Steady

Bandwidth:

Narrow ○○○○○ Wide

List of Known Pulsars : Sorted by Period : Sorted by RA : PALFA : DMB   Nope. ○○○○○   Pulsar!   ☐ Save This Candidate
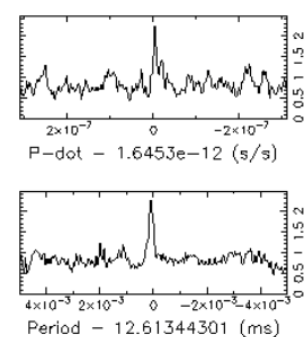
Known Pulsar Name: [_____] Submit   NEW PULSAR!!!   BROKEN

Candidate: ACCEL_Cand_1
Telescope: Arecibo
$Epoch_{topo}$ = 56709.03062500000
$Epoch_{bary}$ = 56709.03474087013
T_{sample} = 0.000125
Data Folded = 504000
Data Avg = 8.973e+04
Data StdDev = 825.4
Profile Bins = 50
Profile Avg = 9.043e+08
Profile StdDev = 8.287e+04

RA_{J2000} = 06:36:40.5859 DEC_{J2000} = 10:33:23.8158
Best Fit Parameters
Reduced χ^2 = 2.254   P(Noise) < 1.23e-06 (≈4.7σ)
Dispersion Measure (DM; pc/cm^3) = 36.640
P_{topo} (ms) = 12.613542(41) P_{bary} (ms) = 12.612568(41)
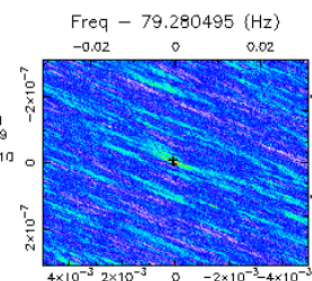P'_{topo} (s/s) = −3.1(5.1)×10^{-9} P'_{bary} (s/s) = −3.1(5.1)×10^{-9}
P''_{topo} (s/s^2) = 0.0(5.2)×10^{-10} P''_{bary} (s/s^2) = 0.0(5.2)×10^{-10}
Binary Parameters
P_{orb} (s) = N/A   e = N/A
$a_1 sin(i)/c$ (s) = N/A   ω (rad) = N/A
T_{peri} = N/A

Freq − 79.280495 (Hz)

P-dot − 1.6453e−12 (s/s)

Period − 12.61344301 (ms)

Viewer | Top Ranked | Goal | Summary | Saved Candidates | Plotter | Followup | Show Known | Server Status | Log Out

Candidate Information

Candidate Parameters:

Period(ms)	Frequency(Hz)	dm	SNR
12.6135	79.2799	36.64	20.39
RA	**Dec**	**Presto Sigma**	**quality_png**
63640.6	103324	6.81	-7.12287
SNR_png	**pulse_width_png**	**persistence_png**	**bandwidth_png**
4.79864	18.1%	48.2%	37.0%

❖ A list of the candidate parameters

❖ If there is a known pulsar highlighted in red then that means the profile you are looking at is of that pulsar

Known pulsars within 4°:

Name	RA (J2000)	DEC (J2000)	Period (s)	DM	Distance (°)	Flux(mJy)	
J0621+1002	06:21:22.11108	+10:02:38.741	0.028853860730049	36.6010	3.80005182147	1.9	2.28770124558
J0625+10	06:25:45	+10:16	0.498397	78	2.70228344206	*	39.5158016587
J0628+0909	06:28:36.183	+09:09:13.9	1.241421391299	88.3	2.43356569397	0.058	98.4270801658
J0631+1036	06:31:27.524	+10:37:02.5	0.287800021959	125.36	1.28371176646	0.8	22.8184531309
J0646+0905	06:46:30.995	+09:05:49.3	0.9039132	149.0	2.8293812904	3.6	71.6674753818
J0647+0913	06:47:15.68	+09:13:59.5	1.23485362778	154.7	2.92346350382	0.18	97.9063498232

Pulse Quality

❖ Want to see two peaks rising above the noise floor

2 Pulses of Best Profile
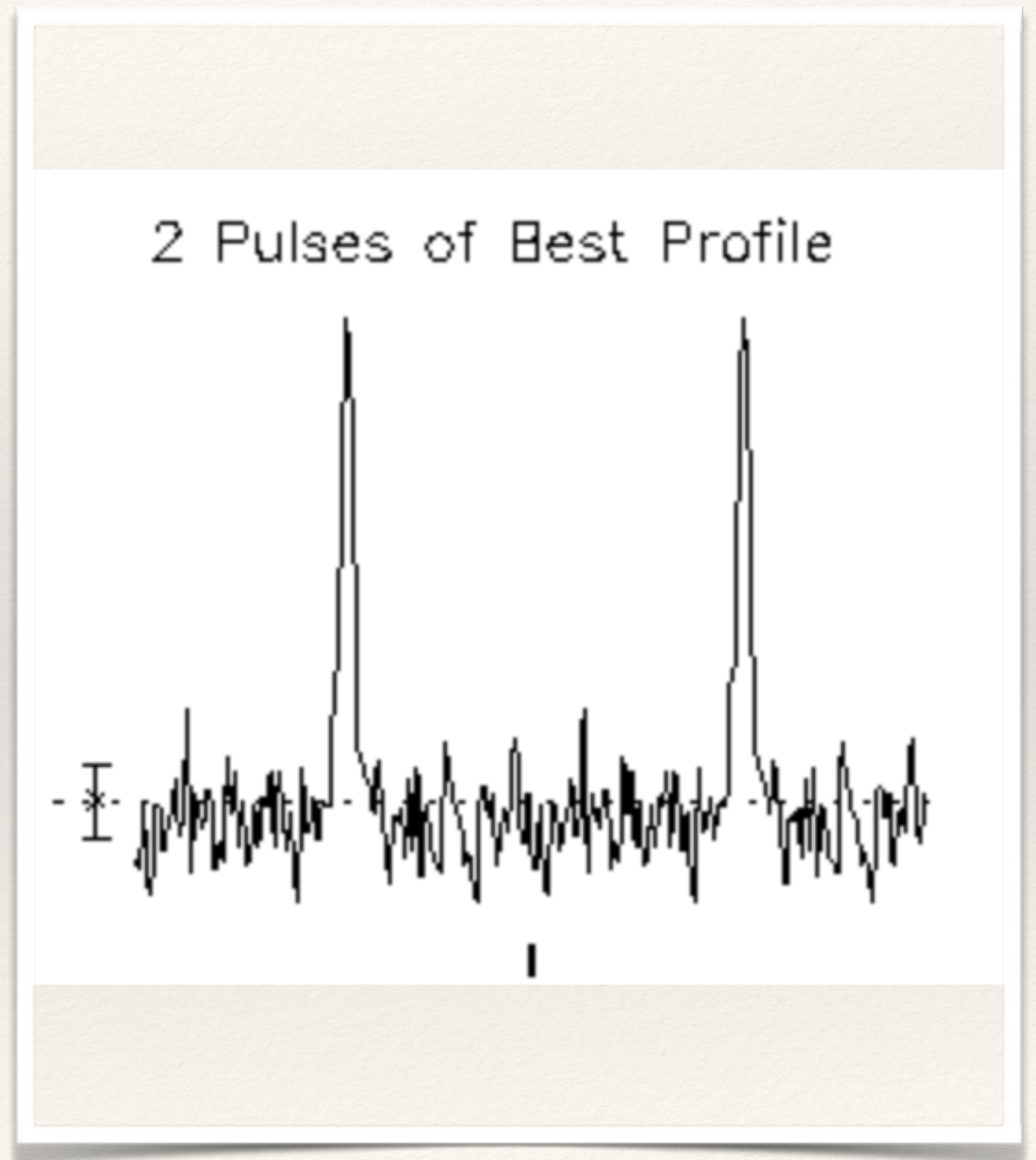
Pulse Quality

- **Weak-Strong**
  - How high the peaks rise above the noise floor
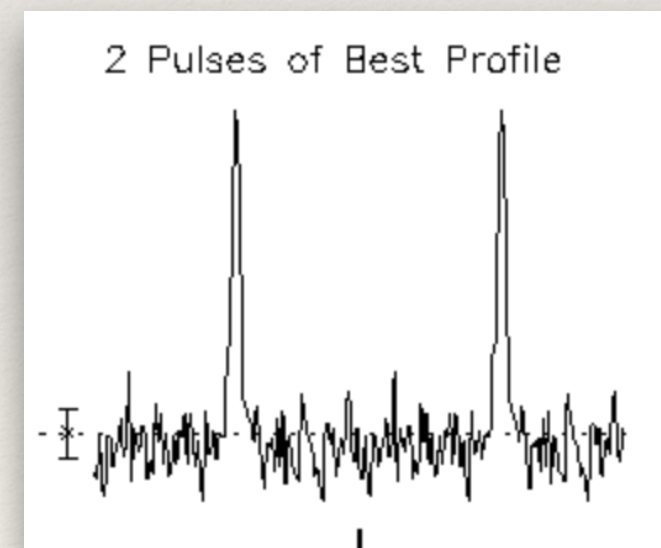 - Use the line to the left of the plot to determine how large the noise is
- **Artificial-Natural**
  - Want to see two peaks
  - Artificial looks more like a sinusoidal wave, not random with peaks
- **Broad-Narrow**
 - How wide the peaks are
  - Want to have them narrow
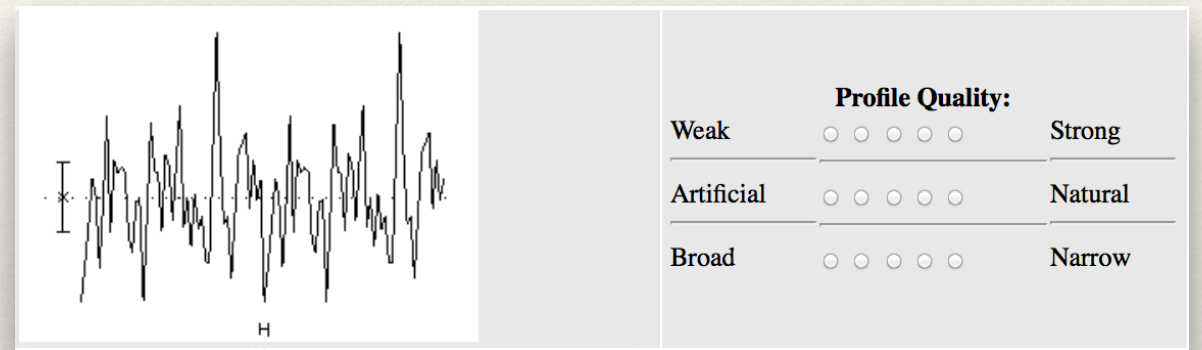
2 Pulses of Best Profile

Dispersion Measure

- Dispersion measure (DM) depends on how much 'stuff' is between Earth and the pulsar

- If the pulsar is in the plane of the galaxy, the signal has to travel through a lot of 'stuff' to get to Earth. Vice versa, if its outside the plane, the signal has to travel through less 'stuff' to get to Earth
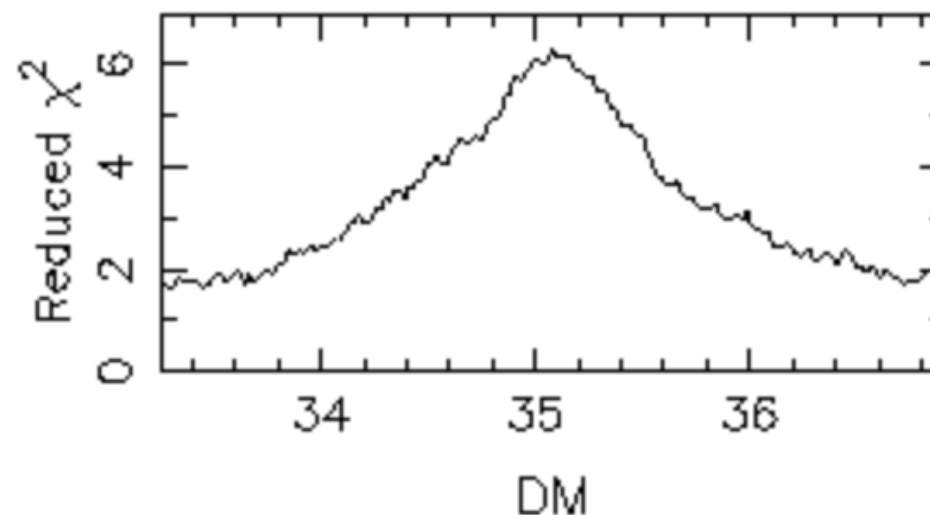
Dispersion Measure

- ❖ We want to see a nice peak at the center of a DM plot, no sudden increases or dropouts occurring

- ❖ A DM peak at 0 means that the signal is most likely coming from Earth

- ❖ Suspicious-Trusted
  - ❖ Suspicious usually is when the peak is nonexistent or there are sudden drops or increases
 - ❖ Trusted is a smooth peak, peaking around the center of the plot
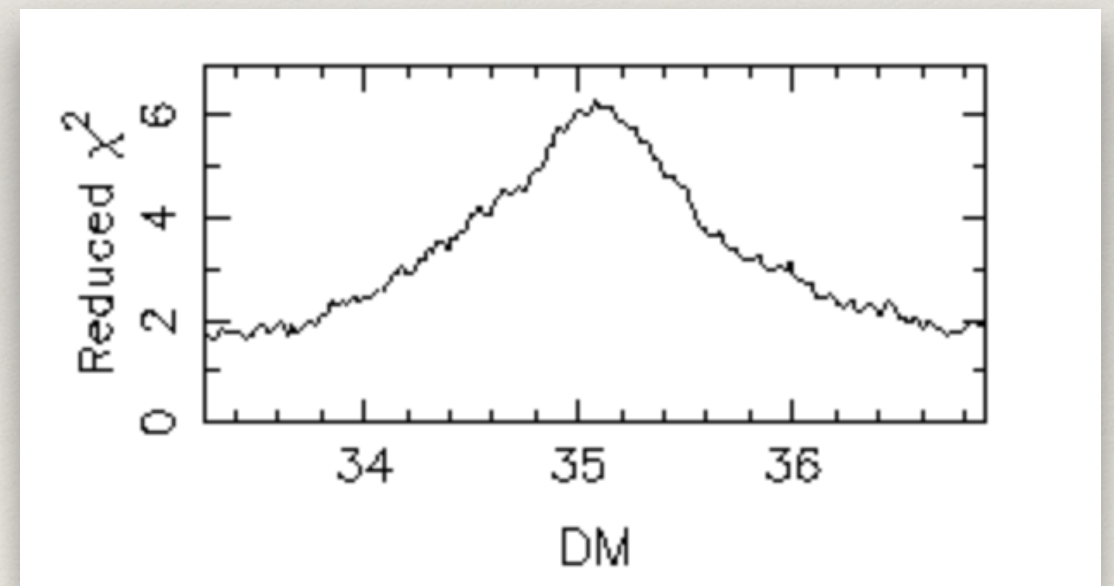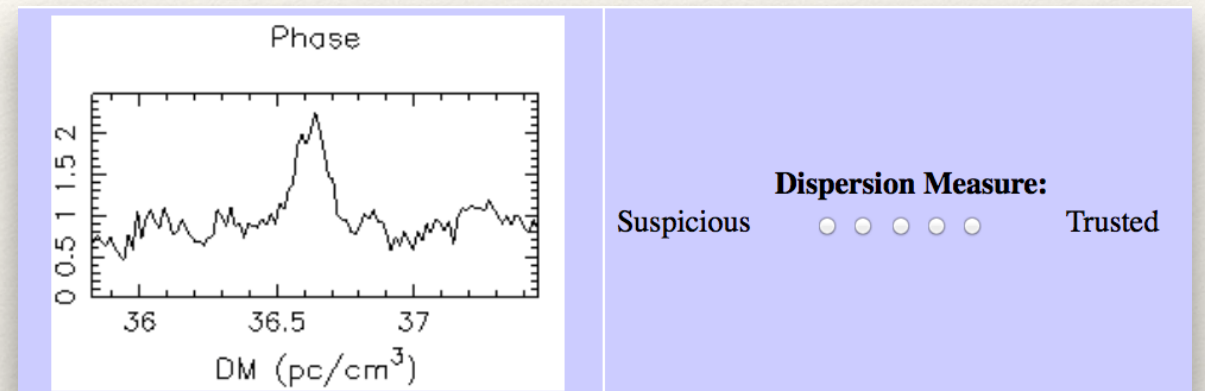
Reduced Chi-Squared

- The reduce chi-squared value is a measurement of how well the data fits a particular model

- A large reduced chi-squared is good

- A chi-squared value close to 1, means that the signal is mostly noise
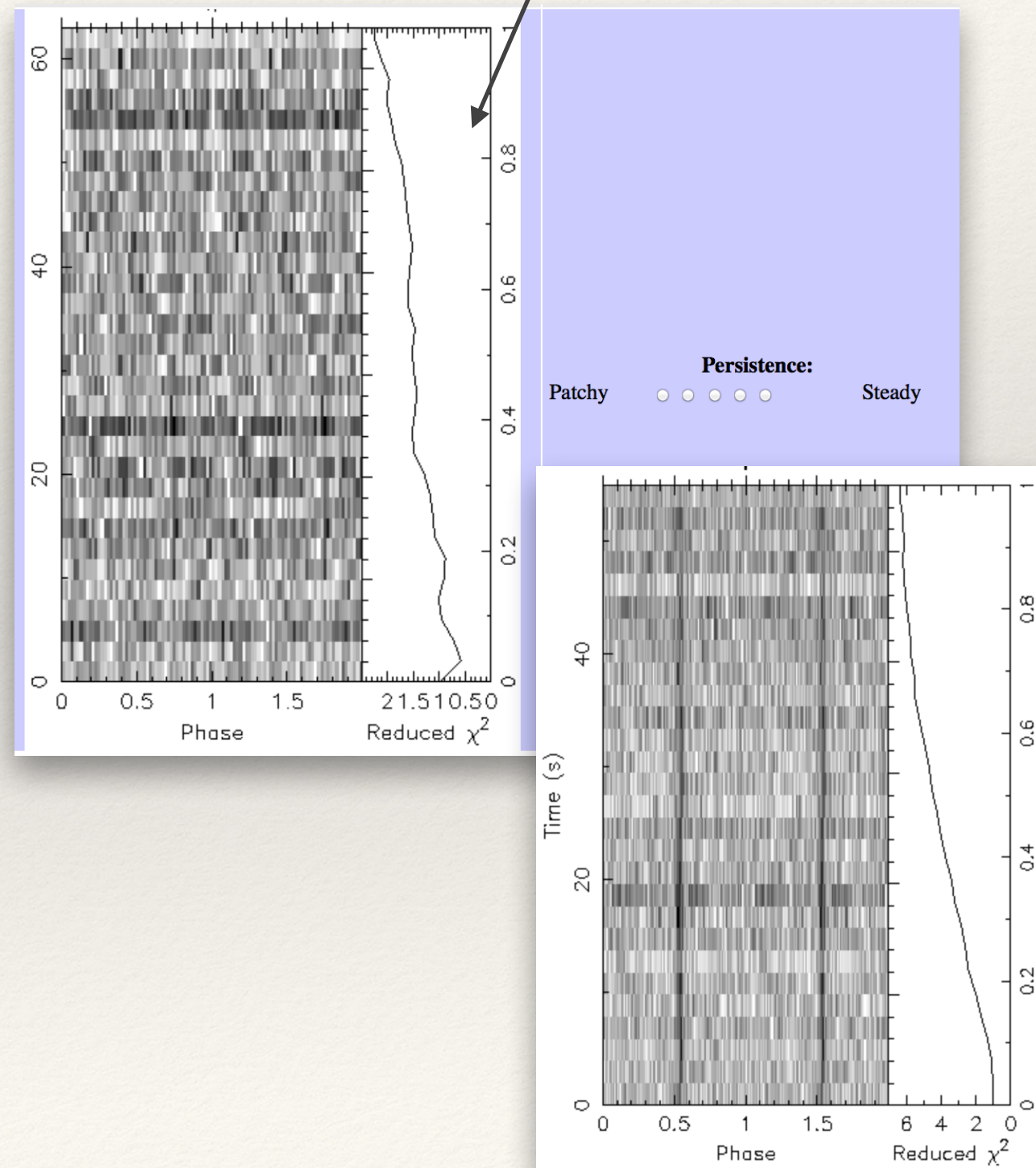
Time Domain

- ❖ Shows the strength of the signal over the observation

- ❖ The darker the square (bin), the stronger the signal

- ❖ The sum of this power is what produces the pulse profile plots

- ❖ Patchy-Steady
  - ❖ We want to see a steady line of dark bins, which indicates power received at a constant part of the phase
  - ❖ The persistence is patchy if there is not a steady line up the graph

Persistence

Persistence:

Patchy ○ ○ ○ ○ ○ Steady
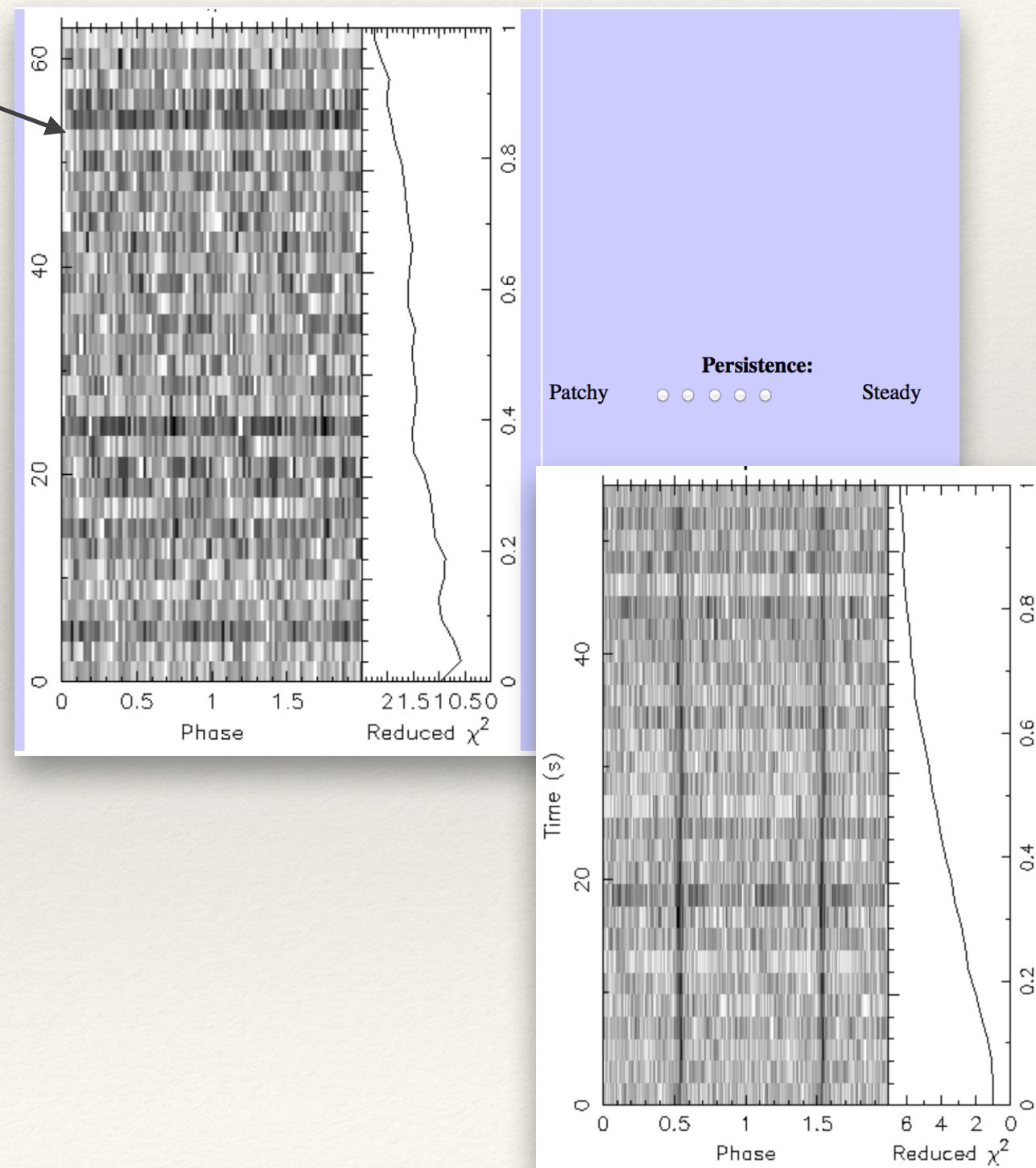
Bandwidth

❖ Pulsars emit as signal over a wide range of frequencies, not at a single frequency

❖ We want to see a nice band of power over a range of frequencies in the bandwidth plot
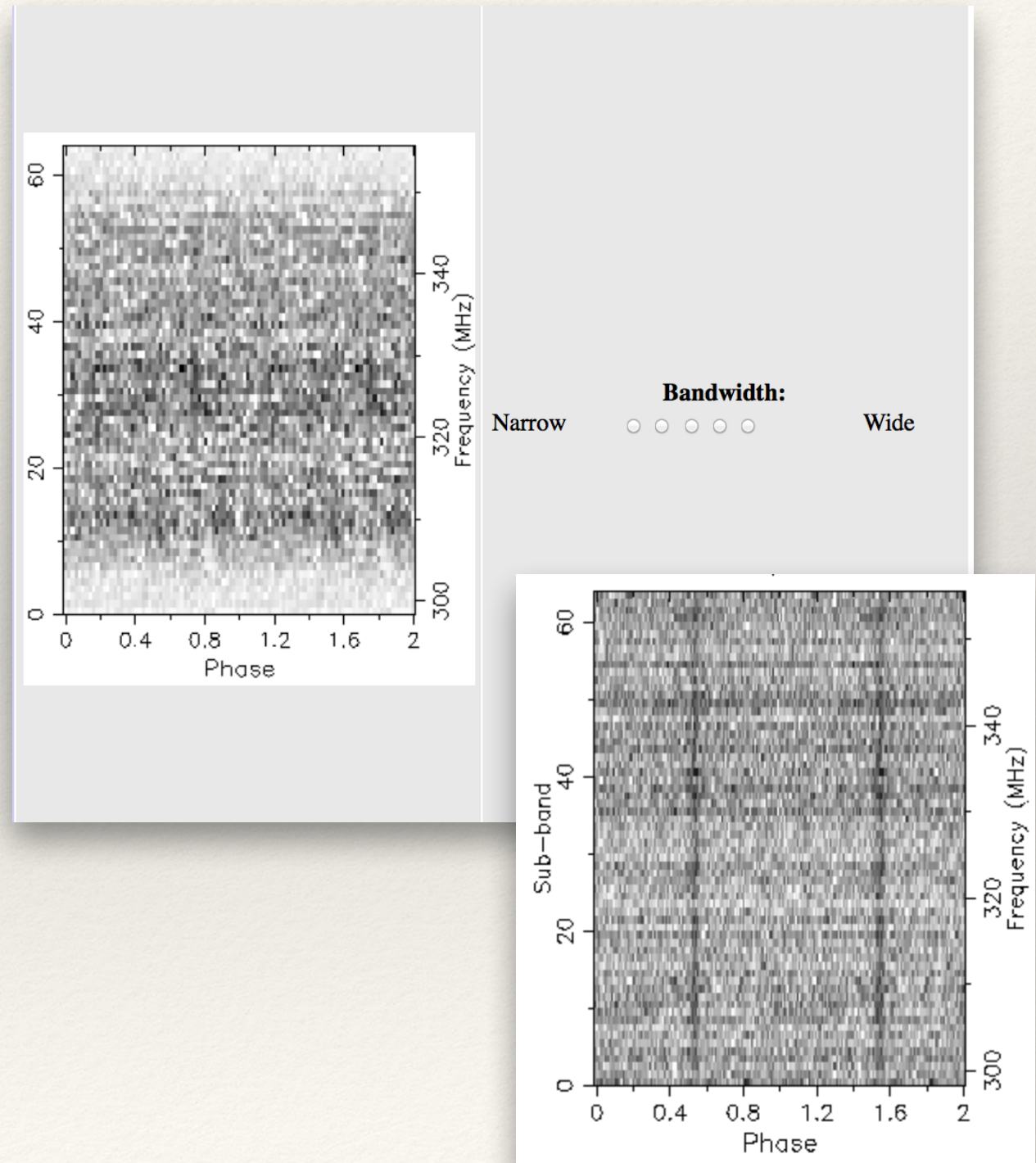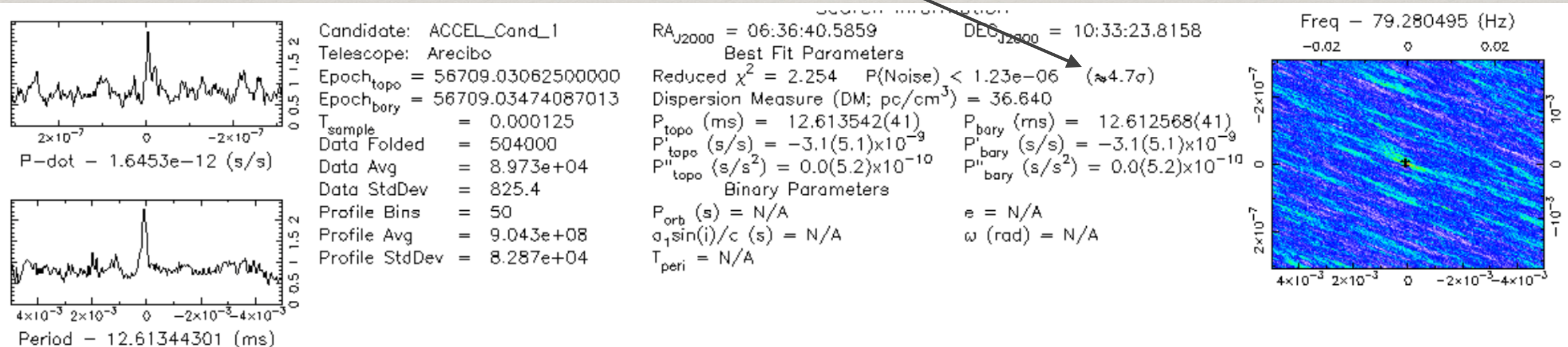
Final Glances

Information on this particular source

If it is a pulsar candidate we would expect to see:

- A sharp peak at the period value and period derivative value in the plots, means that this value is well defined
- A sigma greater than approximately 7

Is this a pulsar?

Rate it and submit your result. If you think its a new pulsar, click on 'NEW PULSAR!!!', if you think it is known pulsar, type the name of it in the box and hit submit.

List of Known Pulsars : Sorted by Period : Sorted by RA : PALFA : DMB   Nope.   ○ ○ ○ ○ ○   Pulsar!   ☐ Save This Candidate

Known Pulsar Name: [   ] [Submit]   [NEW PULSAR!!!]   [BROKEN]

Think you found a Pulsar??

❖ Go to http://www.atnf.csiro.au/research/pulsar/psrcat/ and see if any of the pulsars listed there match yours

  ❖ Period

  ❖ Right Ascension and Declination

❖ Go to the list of known pulsars on the Viewer (found in the Known Pulsars link up top)

  ❖ A list of the known pulsars in the particular survey being viewed

❖ Save the candidate and take a snapshot of the plot

  ❖ Send it to your team leader or Kevin Stovall

There are currently 113 distinct known pulsars in the aodrift survey.

Known Pulsars			
Pulsar	Period(ms)	RA	Dec
	253.07400	100159.00	083242.10
B0301+19	1387.31000	030446.50	194452.00
B0523+11	11.43300	052003.40	103203.00
B0525+21	1872.75000	052932.50	213418.00
B0531+21	33.68660	053421.30	213424.00
B0820+02	864.96200	082308.10	020434.90
B0823+26	530.70200	082751.10	261153.00
B0834+06	1273.53000	083711.60	055934.60
B0919+06	3.15170	004056.09	004805.59
B0919+06	430.54500	092238.60	064106.50
B0940+16	1087.50000	094348.30	162749.00
B0943+10	1097.74000	094618.50	095412.50
B0950+08	253.05600	095313.90	080445.00
B1133+16	169.73000	113451.00	155358.00
B1257+12	1.75867	130629.00	114615.00
B1516+02A	1.57714	151217.00	031345.90
B1516+02B	2.40737	152425.00	024606.50
B1534+12	37.90150	153738.00	115825.00
B1726-00	385.91700	172822.00	-00134.71
B1821+05	752.83200	182432.00	061006.70
B1831-00	521.00100	183410.00	-01622.01
B1842+14	375.39100	184501.00	144341.00
B1854+00	1022.68000	185052.00	-01639.68
B1907+02	989.76100	190930.00	022828.40
B1911+13	2.97808	190552.00	144315.00
B1913+16	9.03901	191458.00	144304.00

Additional Information

❖ http://www.astro.virginia.edu/~rsl4v/PSC/intro.html