Murmur Visual-Manual

I0NAA

mario.natali@gmail.com

November 2024

Murmur

General information

- ✓ **Murmur is developped with Embarcadero® C++Builder 10.2 (community edition) and Epina GmbH SDL Component Suite.**
- ✓ **Murmur is distributed with «Inno Setup» Windows installer.**
- ✓ **Starting from version 9.0.0 the installation process creates a main folder C:\Murmur and a subfolder named C:\Murmur\Murmur .**
- ✓ **The program uses the subfolder to store all the support files (.txt and .csv) and the ATNF.csv that stores the list and main Pulsars parameters obtained from ATNF catalogue.**
- ✓ **To fully remove the program from the PC please run the uninstaller and remove manually the folders.**
- ✓ **The program was scanned with latest Kaspersky anti-virus system (at the time of the publication) before publishing.**
- ✓ **Added, in the download page of the web site, the zipped file checksum information to guarantee original package integrity.**

Murmur

Revison history

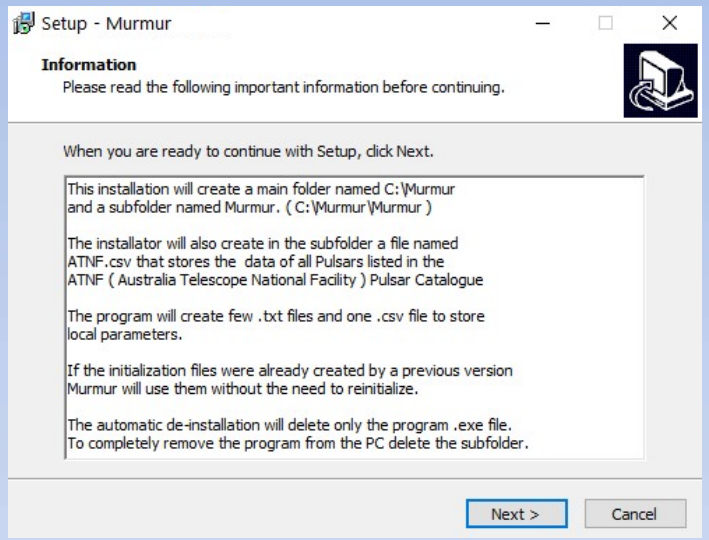
Revision History

Date	Change
5 November 2024	Release 18.3.0
5 November 2024	Updated ATNF Catalogue (ATNF.csv) to Rev. 2.5.1
5 November 2024	Corrected a bug in <Select object to track> function . Thanks Keith G0JLO for highlighting the problem
5 November 2024	Release 18.2.0
26 September 2024	Updated ATNF Catalogue (ATNF.csv) to Rev. 2.4.0
26 September 2024	Corrected a bug that masked up to 11 pulsars from the detection analysis. Thanks Keith G0JLO for highlighting the problem
28 March 2024	Release 18.1.0
28 March2024	Updated ATNF Catalogue (ATNF.csv) to Rev. 2.1.1
28 March 2024	Corrected bug in Sun Flux calculations that was showing incorrect SFU when value was above 1000000 Jy.
20 February 2024	Release 18.0.0
20 February 2024	Updated ATNF Catalogue (ATNF.csv) to Rev. 2.0.0
20 February 2024	Updated routine to read ATNF version number to align with new ATNF nomenclature.
20 February 2024	Corrected a bug in <CALCULATE Noise Y-Factor> that was generating error when Murmur was not installed in the root directory. Thanks to Roger W3SZ for addressing the problem and helping in debug.
20 February 2024	Corrected a bug in <CALCULATE Noise Y-Factor> that was generating an error when trying to delete a row in the database without specifying row number. Thanks to Roger W3SZ for addressing the problem and helping in debug.
15 June 2023	Release 17.3.0
15 June 2023	Updated ATNF Catalogue (ATNF.csv) to Rev. 1.70
15 June 2023	Added SGR 1935+2154 Fast Radio Burst-emitting Magnetar to <Noise Source tracking> widget. This Magnetar is not reported in MURMUR internal data base as no S400 and S1400 were published. To find detailed parameters please access ATNF catalogue at https://www.atnf.csiro.au/research/pulsar/psrcat/
22 October 2022	Release 17.2.0
22 October 2022	Updated ATNF Catalogue (ATNF.csv) to Rev. 1.68
22 October 2022	Added FRB 20220912A and removed Magnetar J1809-1943. Thanks to Keith G0JLO for help in checking RA and DEC.
24 May 2022	Release 17.1.0
24 May 2022	Added (in the the web site) the Checksum information for the zipped package in order to help checking original package integrity
24 May 2022	Corrected bug that was generating wrong Az for FRB in <Plan observation> mode. Thanks to Keith G0JLO for help in debugging

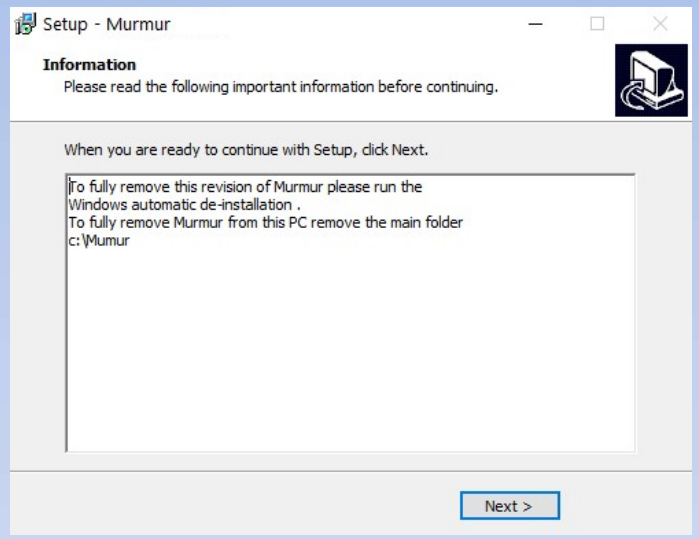
Murmur

Installation

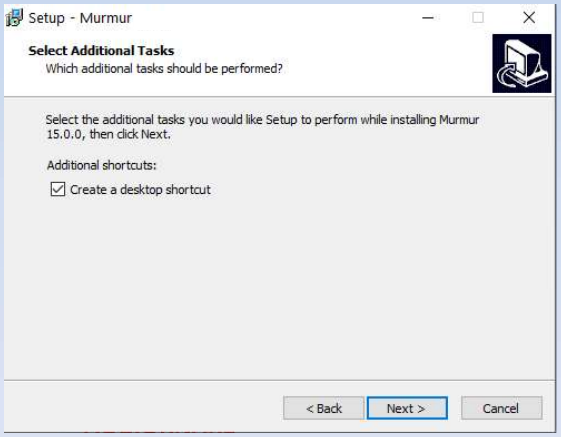
The first screen informs that the installation process will create the main folder and a subfolder.



The last screen explains how to fully remove Murmur from the PC.



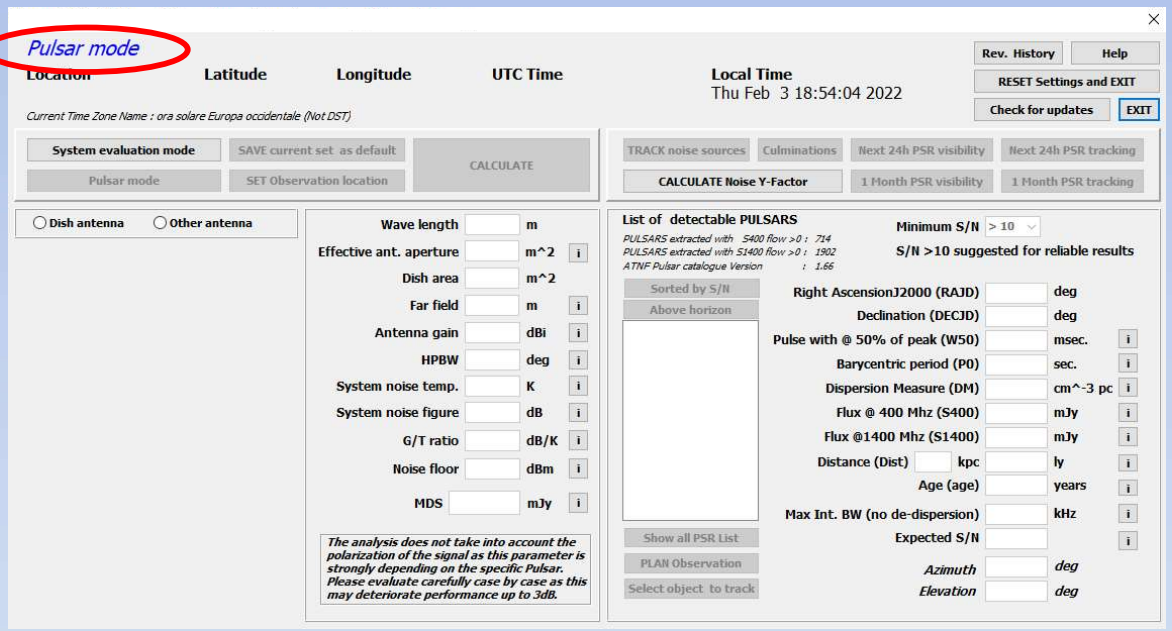
The next screen asks for permission to create a shortcut to launch Murmur.

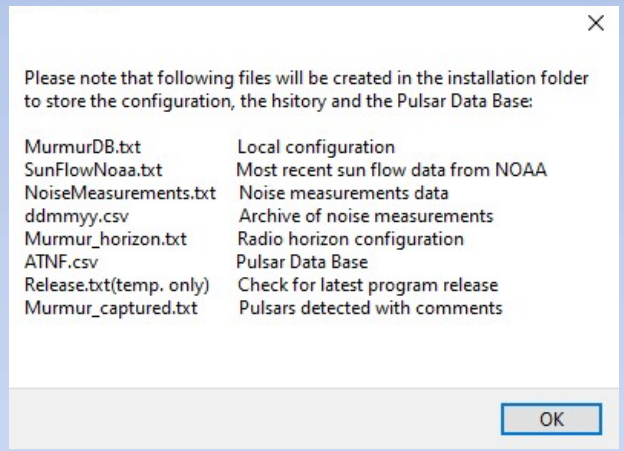


Murmur

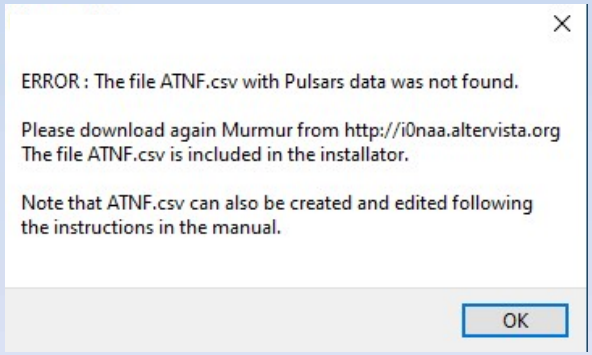
Initial setup of the program

When «Murmur» is launched for the first time, the program starts in «Pulsar mode» and a message visualizes the list of all support files needed that will be created





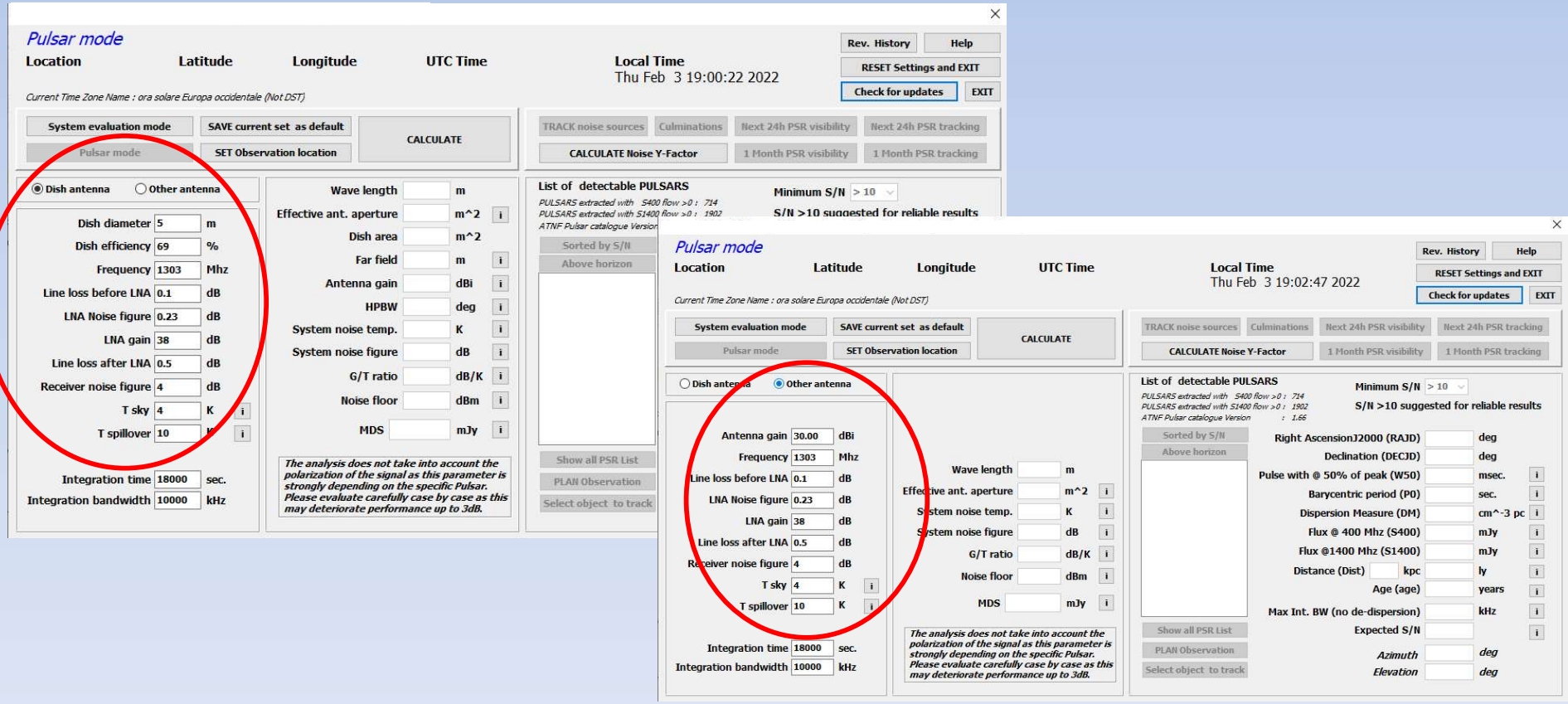
In case that the file ATNF.csv will not be available the program will stop showing the message reported on the right. To fix this problem you can download again Murmur as the installer includes this file or you can create yourself the file as described at the end of this visual-manual.



Murmur

Initial setup of the program

The first thing to define is the type of the antenna .
The program allows to enter «dish antenna» or «other antenna». In the case of «dish antenna» the program will calculate automatically the gain based on the dish diameter, while entering « other antenna» you will need to enter the antenna gain.

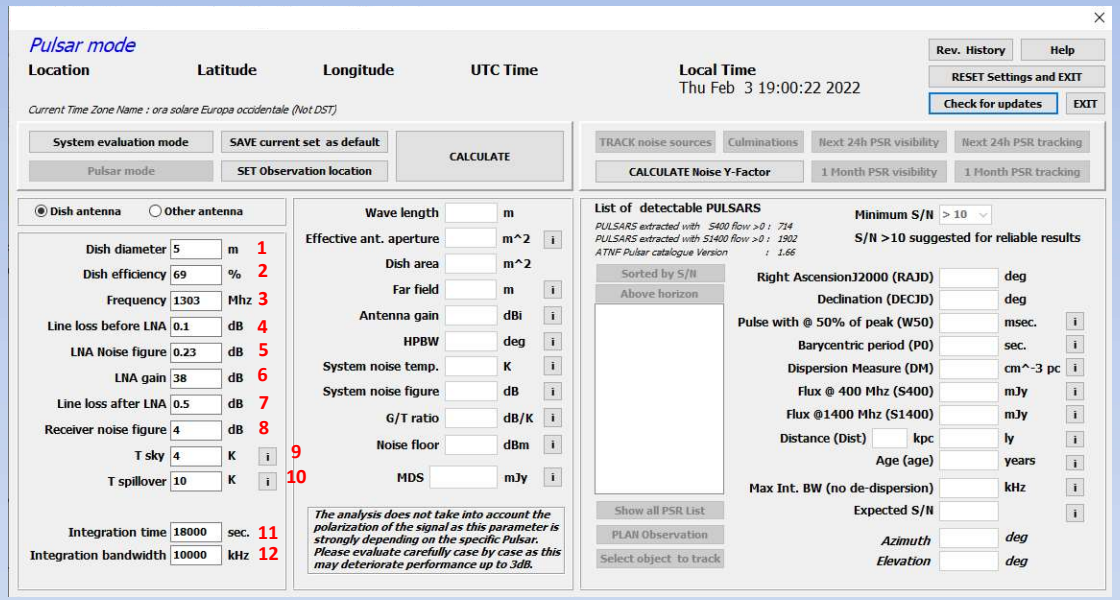


Murmur

Initial setup of the program

By clicking on «dish antenna» the program will load some default parameter that you can modify to reflect your specific station.

1. **Enter Dish diamter in meters.**
2. **You can modify dish efficiency, reasonable numbers for amateur station runs from 45% to 70%. The higher the better.**
3. **Enter the frequency at which you want to make the simulation. Please note the only two frequency intervals are available in Pulsar mode : 390Mhz-500Mhz and 1,000Mhz-1,500Mhz.**
4. **Enter the line loss before LNA (the preamplifier). This value is usually very low and 0.1 dB should be ok.**
5. **Enter the noise figure of your pre-amplifier.**
6. **Enter the gain of your preamplifier.**
7. **Enter the loss of the line after the preamplifier. Please note that this value has a very low impact on overall system performance.**
8. **Enter the receiver Noise Figure. Please note that this value has a very low impact on overall system performance.**
9. **Enter T Sky. This value is strictly depending on frequency in use.**
   Click i button for guidelines.



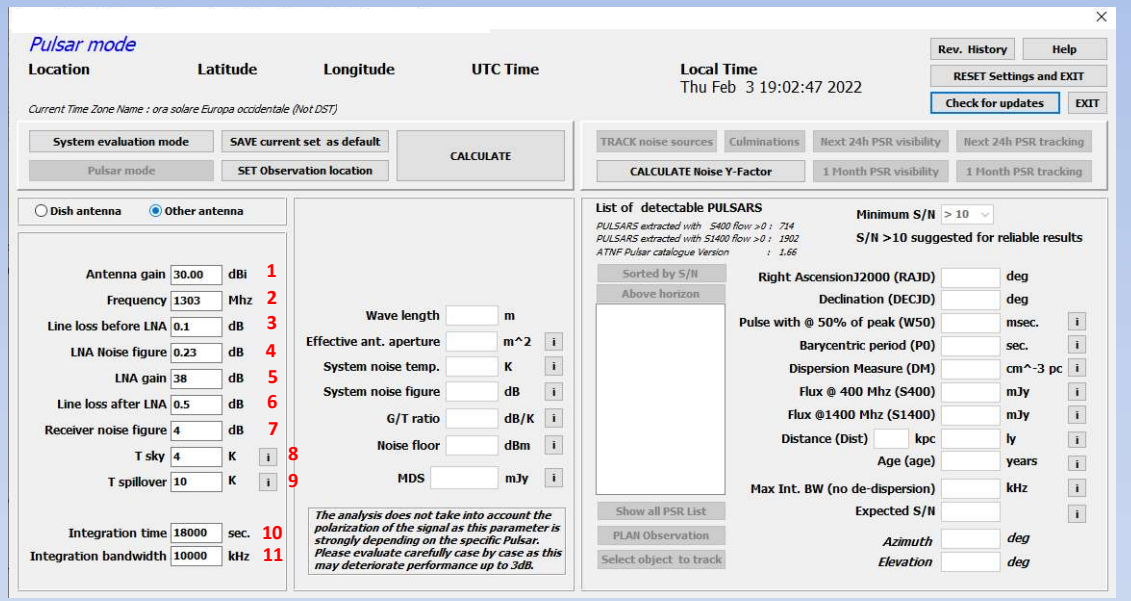
10. **Enter T Spillover. This is the contribution to overall noise of the ground and of surroundings of the dish. This is usually < 10.**
11. **Enter Integration time. This parameter defines the total time of observation in seconds . Usually this is between 1 and 7 hours.**
12. **Enter integration bandwidth. This is strictly depending on your receiving system.**

Murmur

Initial setup of the program

By clicking on «other antenna» the program will load some default parameter that you can modify to reflect your specific station.

1. **Enter Antenna gain in dBi**
2. **Enter the frequency at which you want to make the simulation. Please note the only two frequency intervals are available in Pulsar mode : 390Mhz-500Mhz and 1,000Mhz-1,500Mhz.**
3. **Enter line loss before LNA (the preamplifier). This value is usually very low and 0.1 dB should be ok.**
4. **Enter the noise figure of your pre-amplifier.**
5. **Enter the gain of your preamplifier.**
6. **Enter the loss of the line after the preamplifier. Please note that this value have a very low impact on overall system performance.**
7. **Enter the receiver Noise Figure. Please note that this value has a very low impact on overall system performance.**
8. **Enter T Sky. This value is strictly depending of frequency in use. Click i button for guidelines.**



9. **Enter T Spillover. This is the contribution to overall noise of the ground and of surroundings of the dish. This is strictly depending on the type of antenna**
10. **Enter Integration time. This parameter define the total time of observation in seconds . Usually this is between 1 and 7 hours.**
11. **Enter integration bandwidth. This is strictly depending on your receiving system.**

Murmur

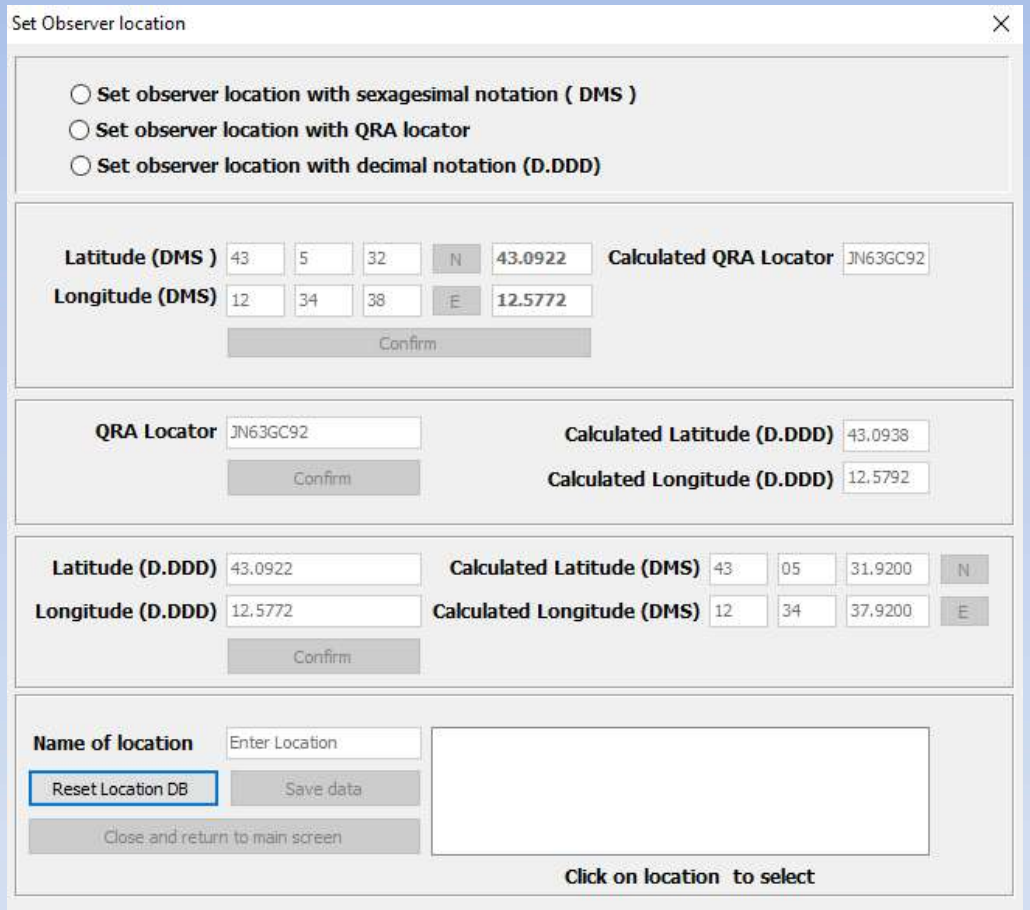
Initial setup of the program

Next the location coordinates must be entered

1. Click either on
   1. Set observer location with sexagesimal notations (DMS).
   2. Set observer location with QRA locator.
   3. Set observer location with decimal notation (D.DDD).
2. Enter data accordingly to your choice
3. Click confirm
4. Enter Name of location
5. Click Save data

   You can add multiple locations or reset everything by clicking «Reset Location DB».
   Once you decided the location to use that is listed in the table, activate the location by clicking .

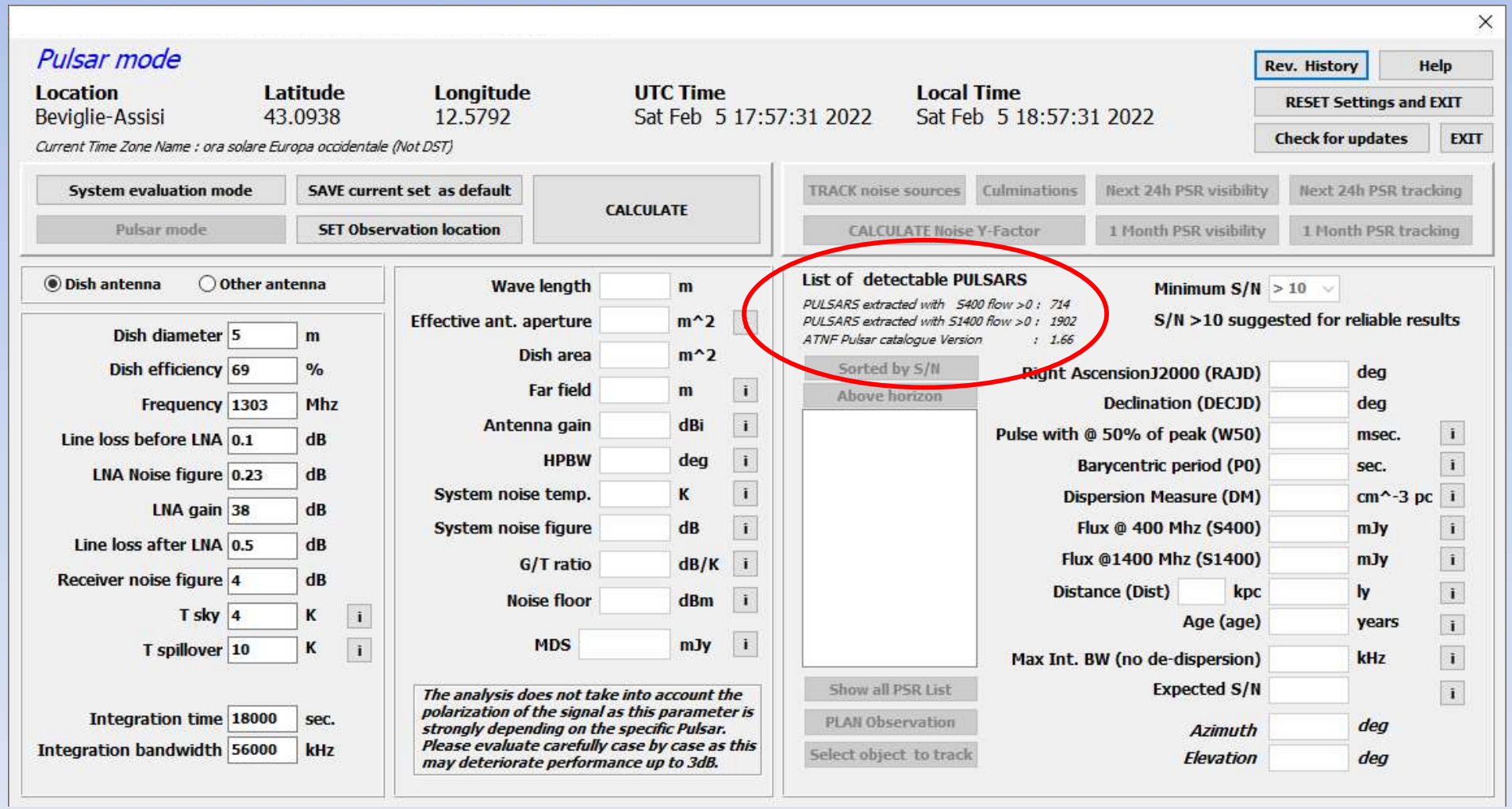
6. Close the form by clicking «Close and return to main screen».



Murmur

Pulsar mode

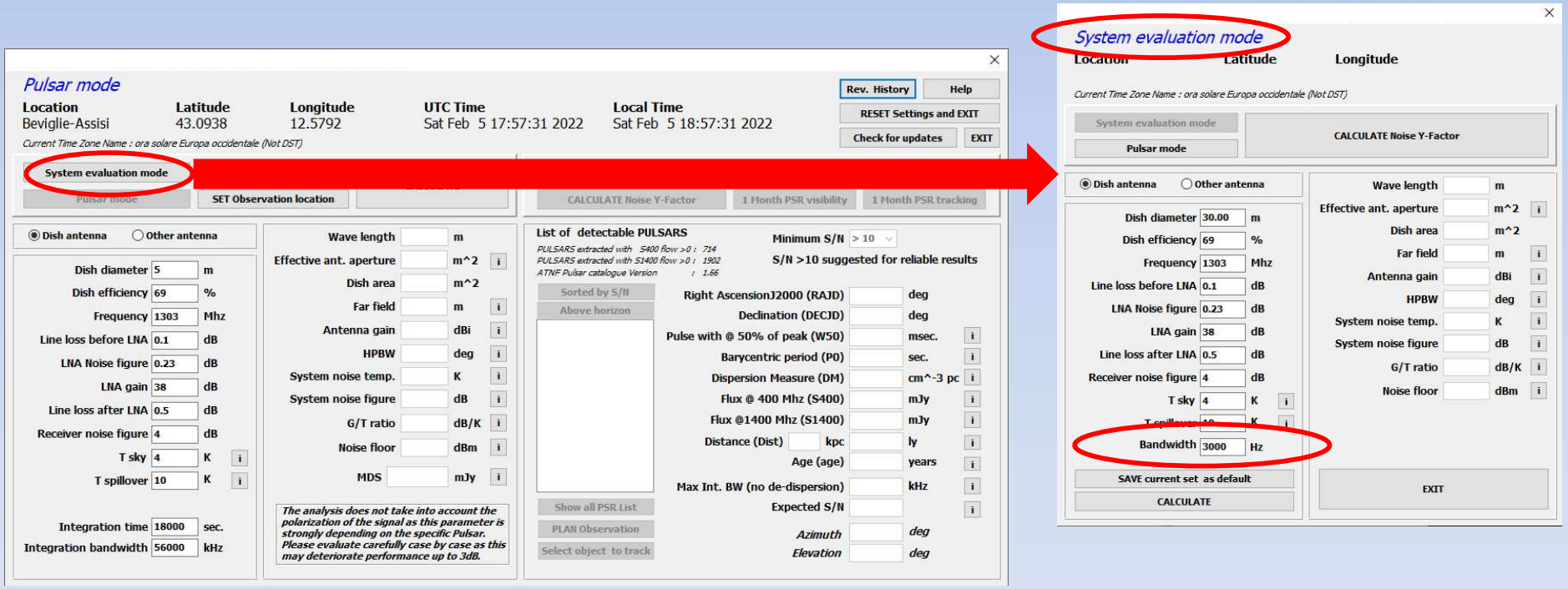
The initialization is now completed and the following screen should be displayed. Murmur will show the ATNF Pulsar catalogue version and the number of Pulsars extracted from ATNF.csv file.



Murmur

System evaluation mode

«System evaluation mode» allows the analysis of station parameters without frequency limitations and the visualization of Y-factor noise of the sun and of the most powerful and interesting cosmic radio sources in the entire frequency range of NOAA RSTN (Radio Solar Telescope Network) : 245Mhz-15400Mhz.
Pls note that in «System evaluation mode» «bandwidth» replaces «Integration bandwidth» of «Pulsar mode».

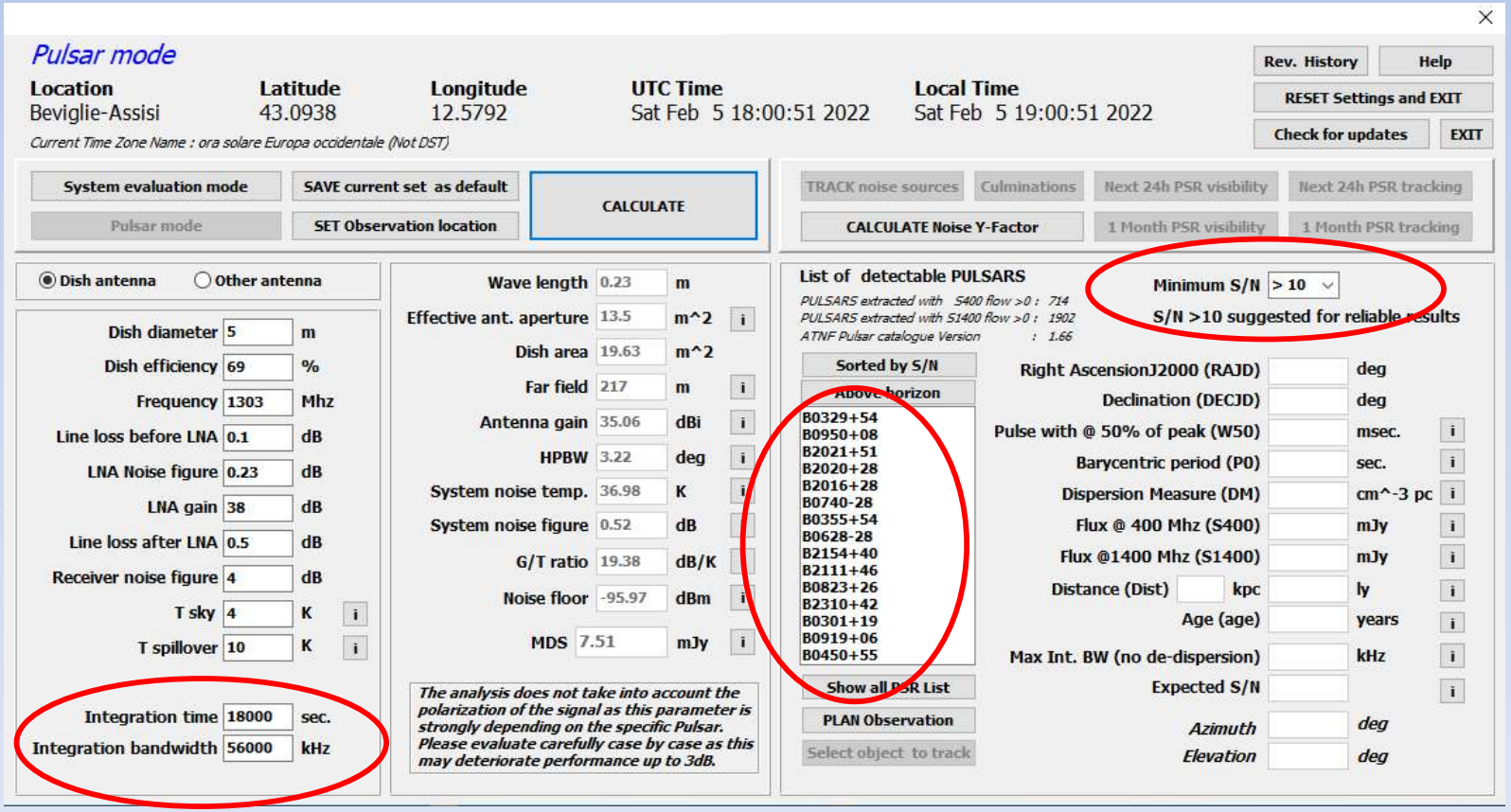


Murmur

Pulsar mode

Click on «CALCULATE» to show Pulsars that are theoretically detectable.

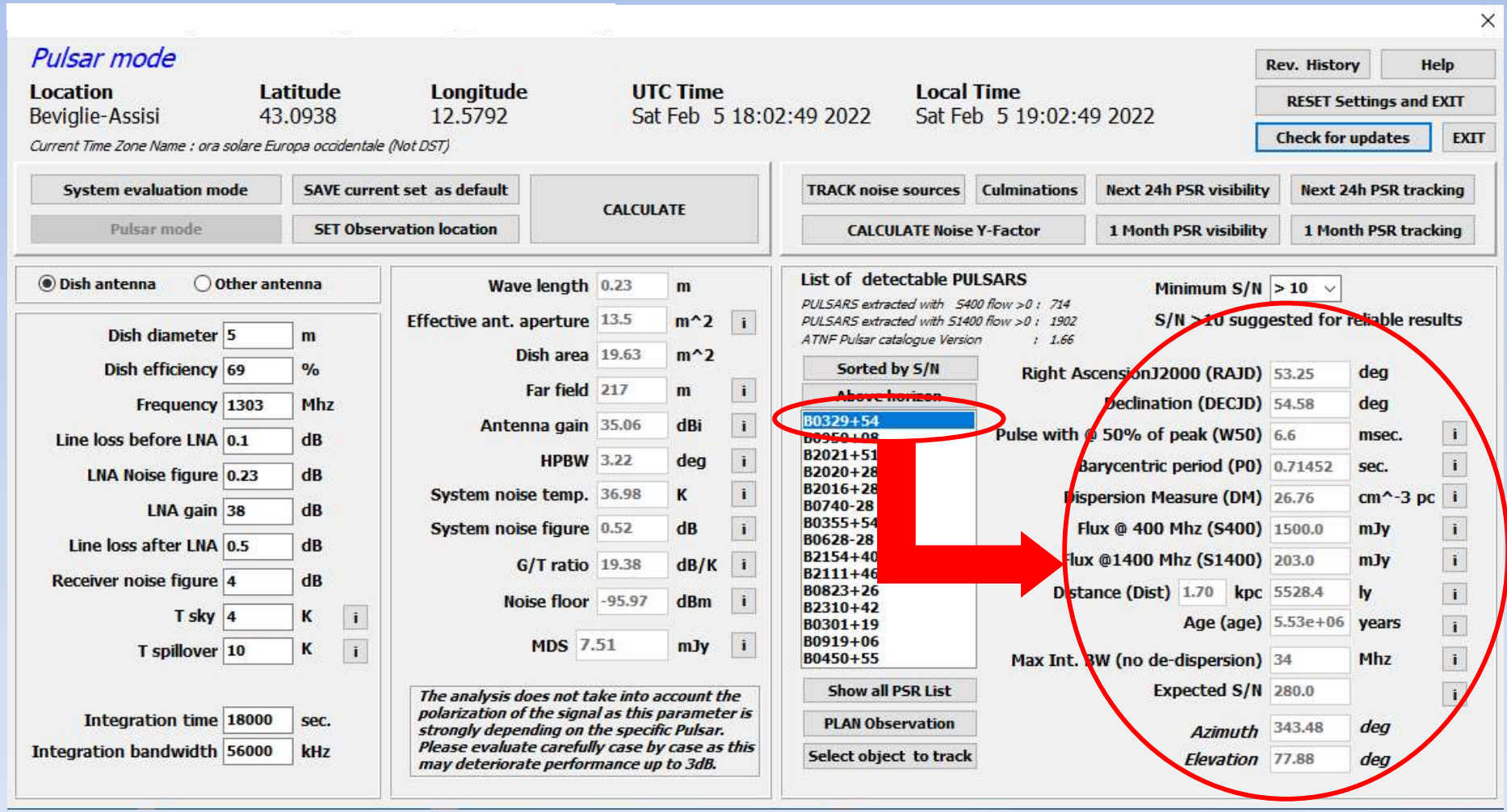
- ✓ **If you do not see any PULSAR listed on the box you can try to click on «Above Horizon» button to see also PSR below horizon.**
- ✓ **It is also possible to modify the S/N by clicking the «Minimum S/N» button. Please bear in mind that values below 10 make the PSR detection much more difficult !**
- ✓ **If you cannot still see any PSR you can try to increase «Integration time» and «Integration bandwidth ».**



Murmur

Pulsar mode

Click on any of the PSR listed to show PSR parameters to visualize the expected S/N and the real time Azimuth and Elevation based on your location.



Murmur

Pulsar mode

By clicking on «Track noise sources» the following screen will be displayed with the real time position (Azimuth and Elevation) of the selected PSR and of the strongest cosmic noise sources.
The screen will also show the strongest Quasar (3C273), the FRB 20220912A [1], the FRB 20201124A a repeating Fast Radio Burst in a globular cluster [2] [3] and the FRB Fast Radio Burst-emitting Magnetar SGR 1935+2154 [4] .

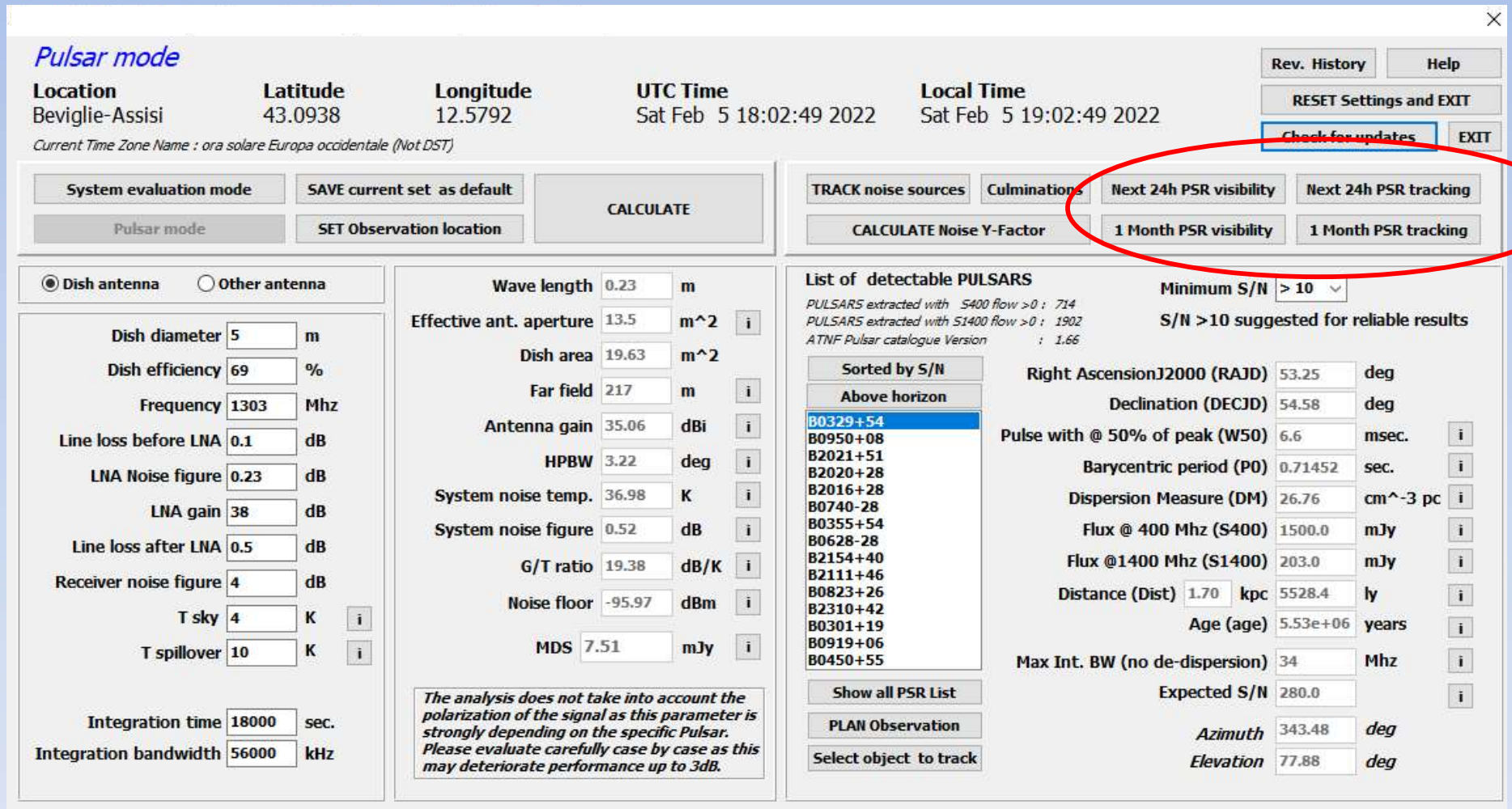
Please note that SGR 1935+2154 is not reported in MURMUR internal Pulsar data base as no S400 and S1400 were published.
To find details of this Magnetar visit :
https://www.atnf.csiro.au/people/pulsar/psrcat/

[1] ATEL #15691
[2] L. Piro, G. Bruni, E. Troja[2], B. O'Connor, F. Panessa, R. Ricci et al.: « The Fast Radio Burst FRB 20201124A in a star forming region: constraints to the progenitor and multiwavelength counterparts», A&A Volume 656, December 2021
[3] https://astropeiler.de/frb20201124a?msclkid=23a40c3faffa11ec88308a9f01282ad1
[4] Starr, Michelle (16 November 2020). "It's Official: The Fast Radio Burst Coming From Within Our Galaxy Is Repeating". ScienceAlert. Retrieved 17 November 2020.

Murmur

Pulsar mode

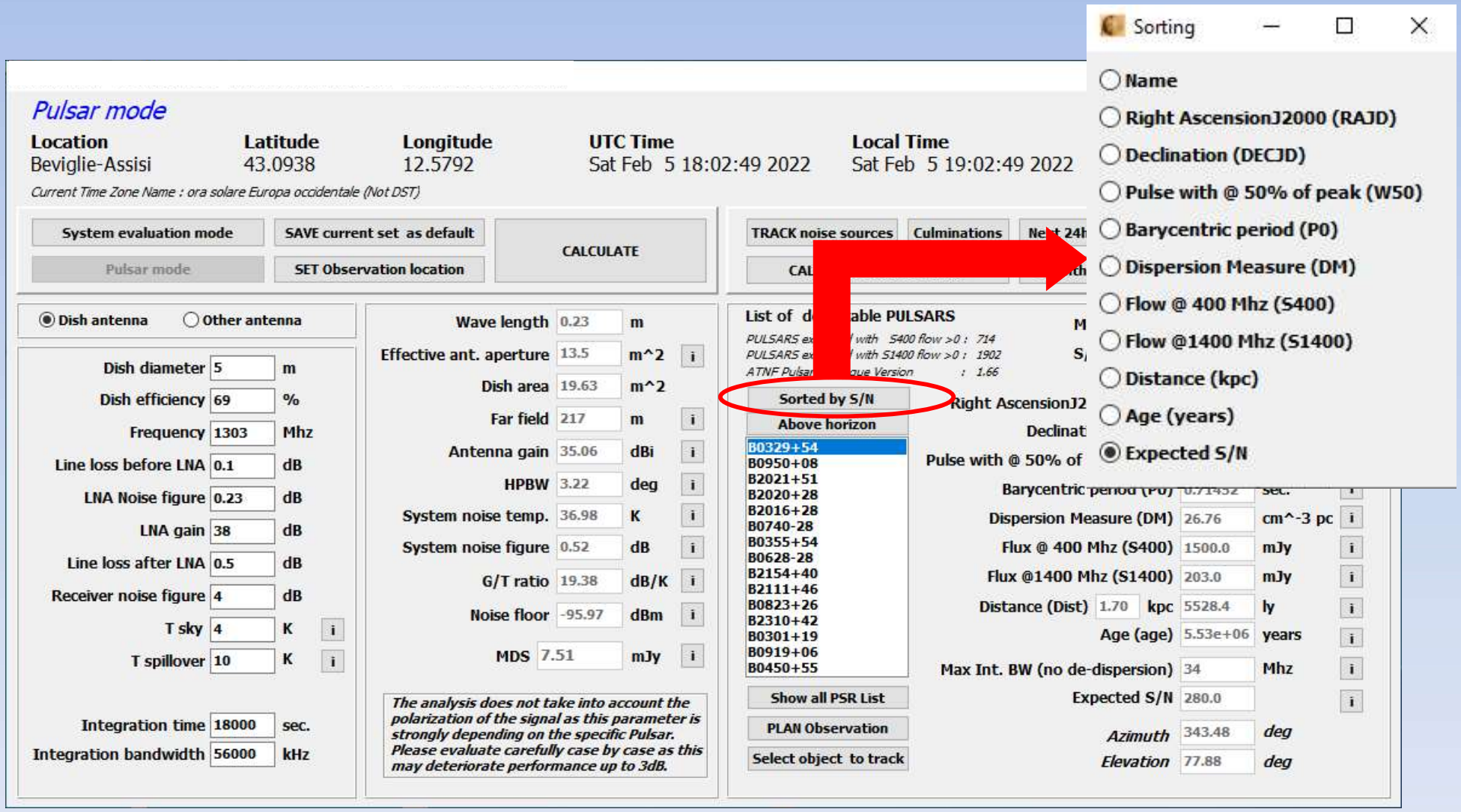
The four buttons on the right side allow to predict visibility (above the horizon) or full tracking of the selected PSR for the next 24 hours or for tyhe full month.



Murmur

Pulsar mode

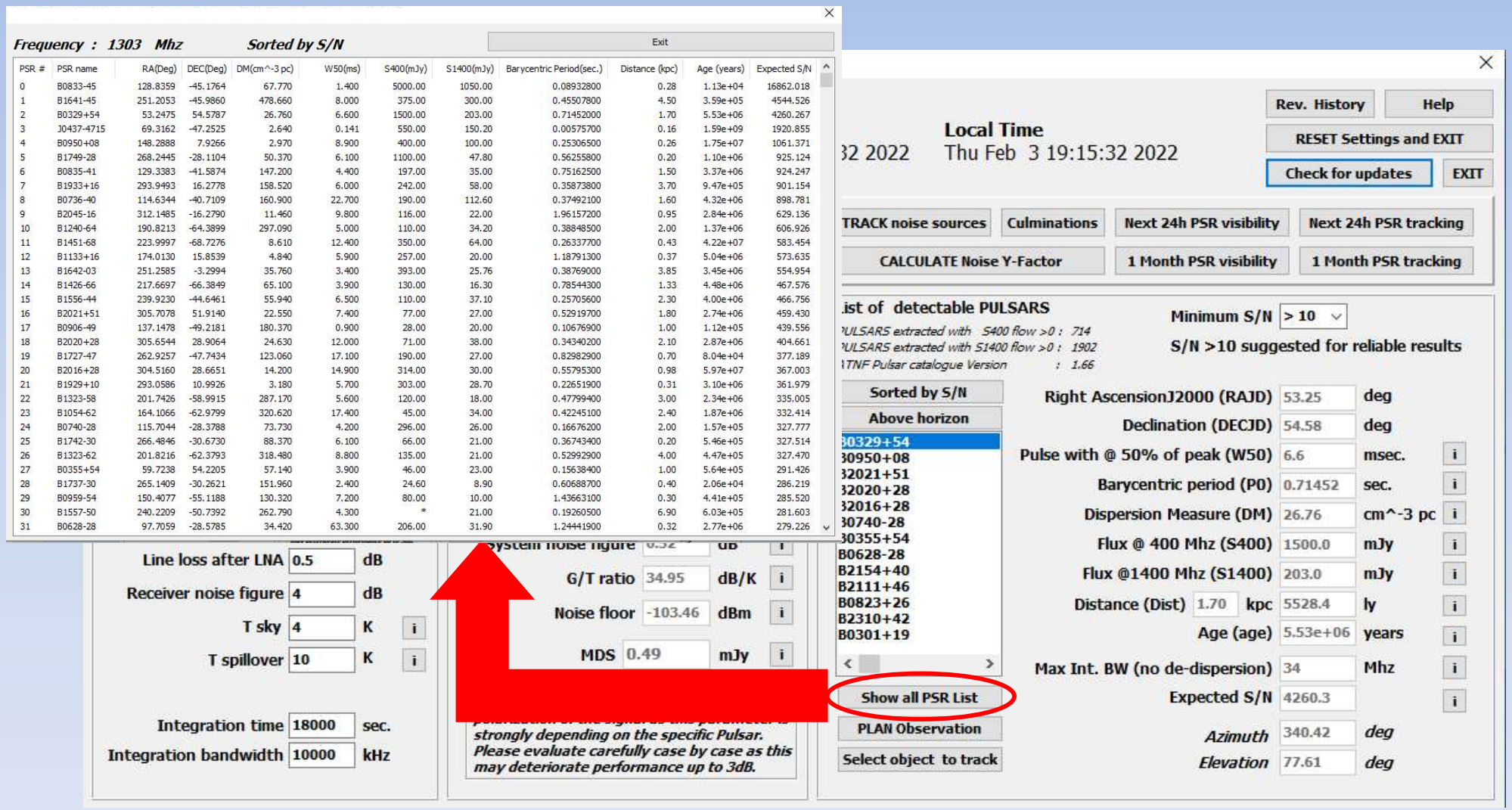
The «Sorted by S/N» button triggers a procedure that allows the sorting of the Data Base by any Pulsar parameter.



Murmur

Pulsar mode

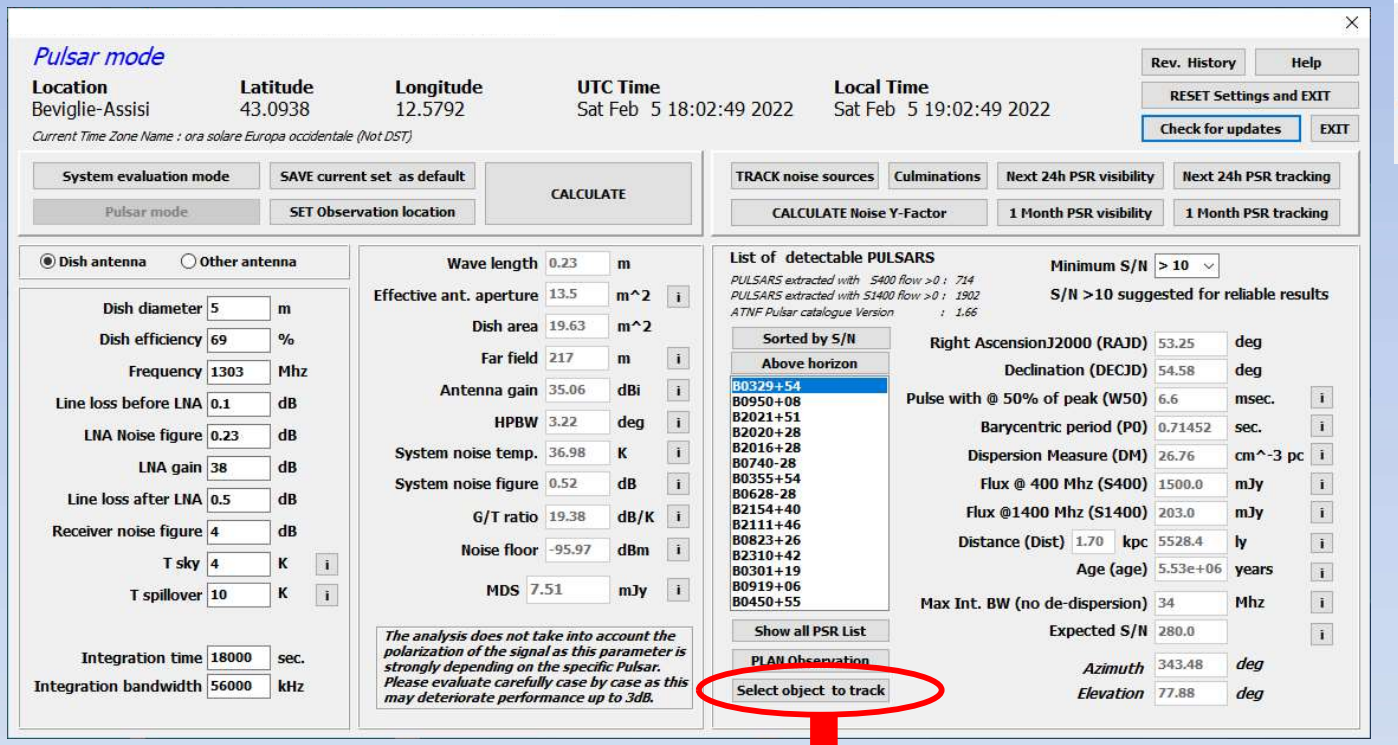
By clicking the «Show all PSR List» Murmur will show the list of all Pulsars extracted from ATNF.csv file sorted as specified.

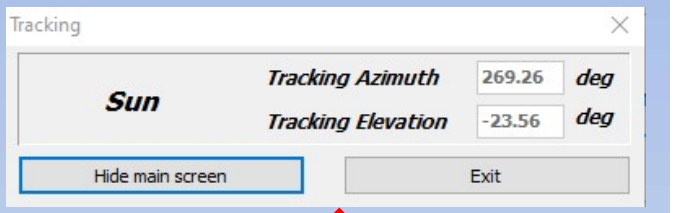


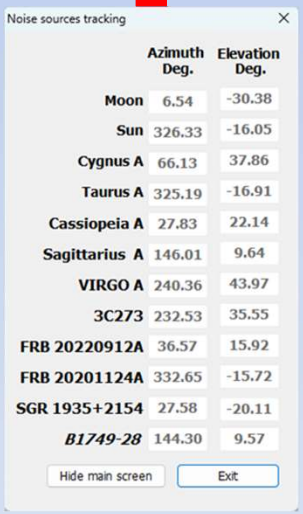
Murmur

Pulsar mode

By clicking the «Select object to track » Murmur will allow to select on object and the tracking data will be shown in a separate Form.





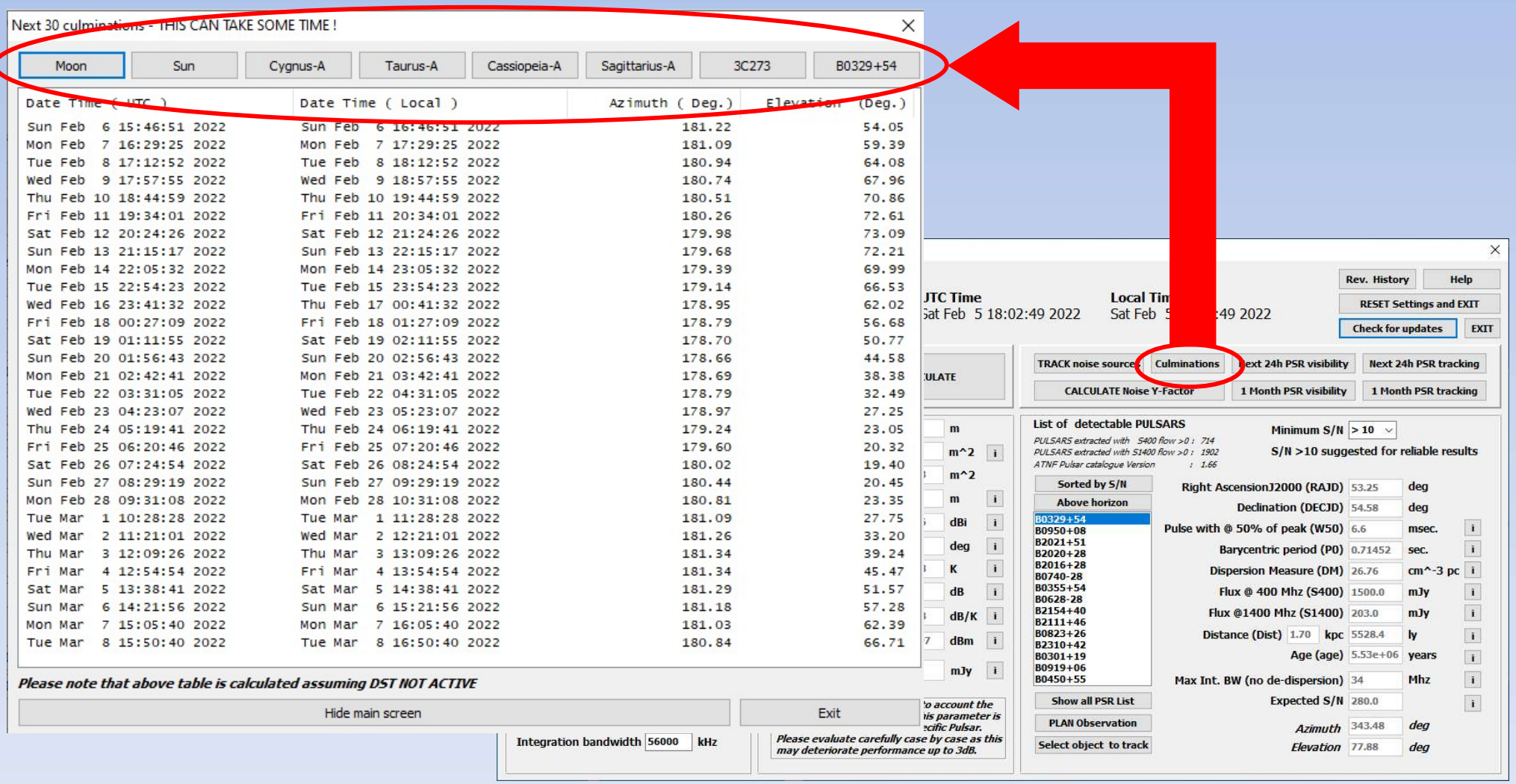


When this feature is active Murmur will work in conjunction with the program «PstRotator» from Codrut YO3DMU https://www.qsl.net/yo3dmu/index_Page346.htm allowing direct control of antenna rotators.

Murmur

Pulsar mode

By selecting «Culminations» Murmur will calculate the culmination of the objects shown in the upper side of the screen . Please note that this calculation may take long time .

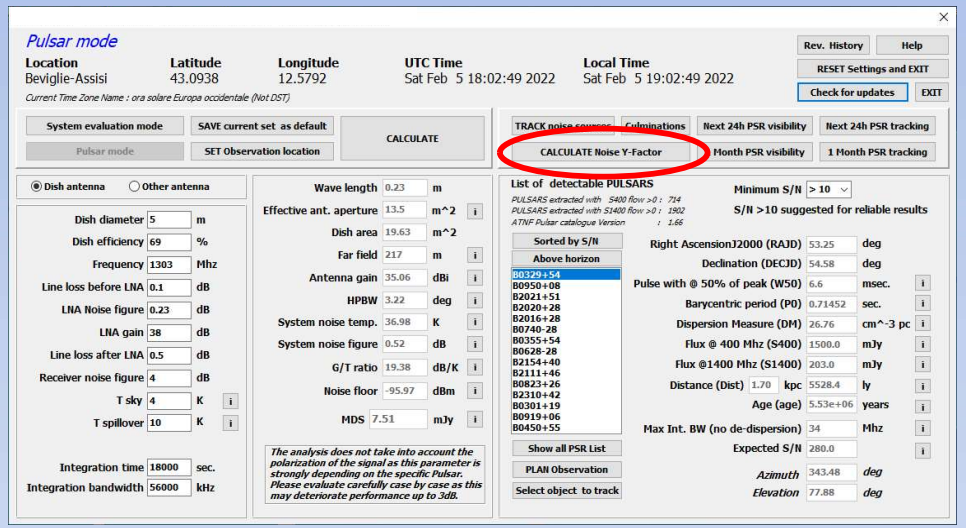


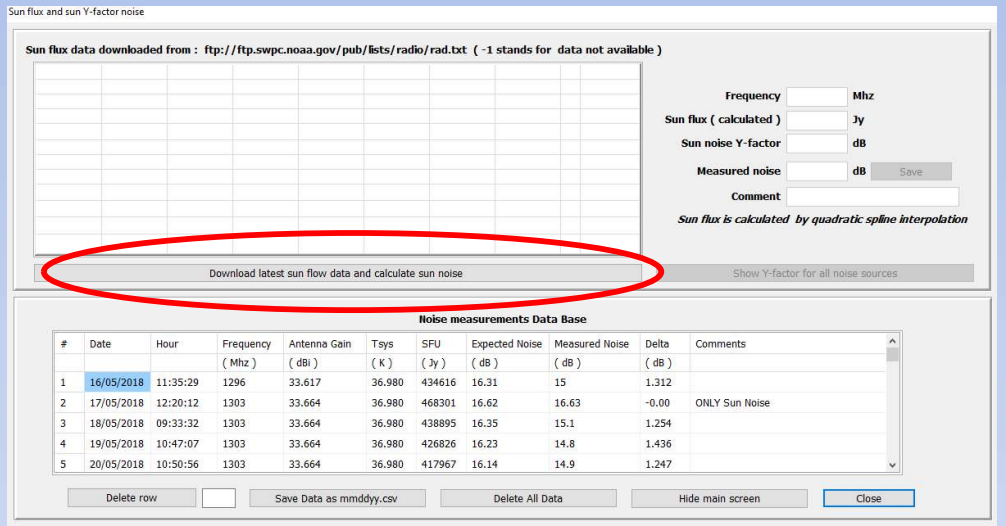
Murmur

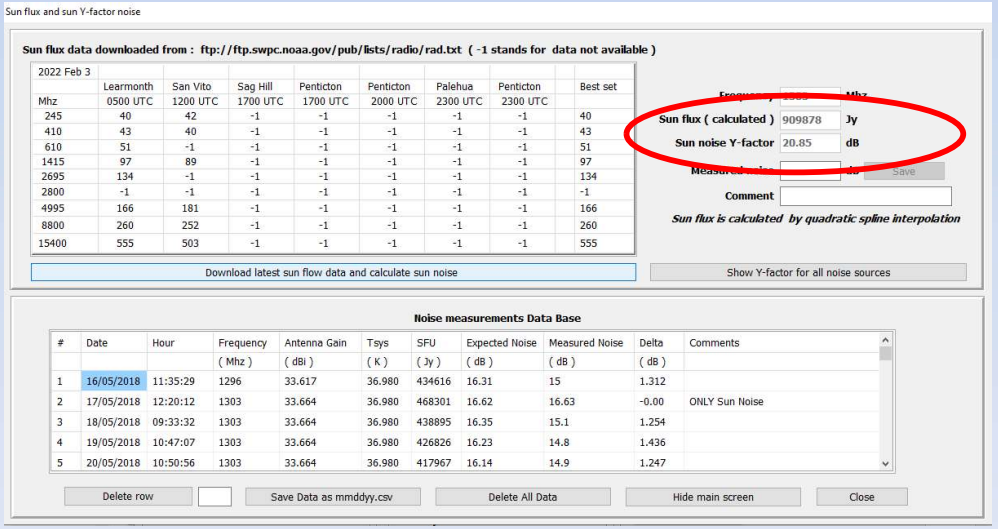
Pulsar mode and System evaluation mode

By selecting «CALCULATE Noise Y-Factor» Murmur will allow Noise calculations.

- ✓ **Click on «Download latest flow data» to download latest data from the NOAA ftp site https://www.swpc.noaa.gov/**





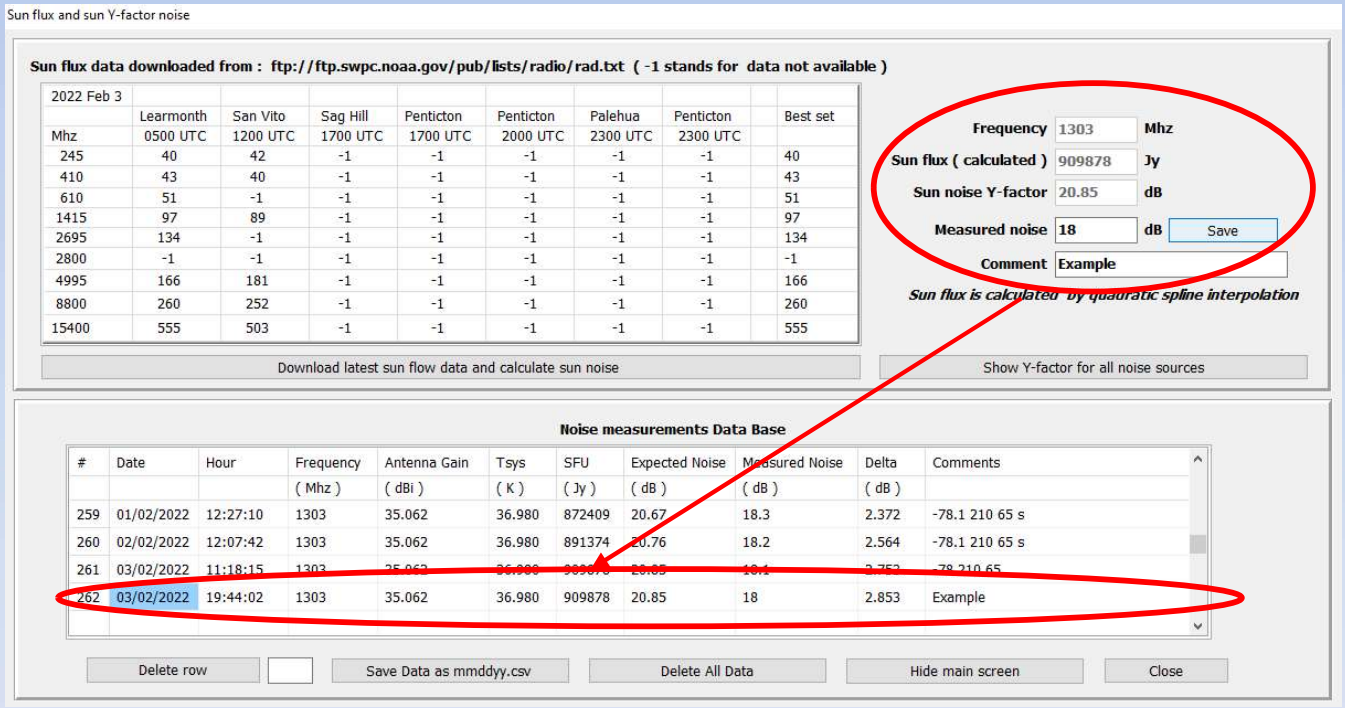


When the download from the observatory site will be completed the Sun flux and the Y-factor noise at the required frequency will be displayed.

Murmur

Pulsar mode and System evaluation mode

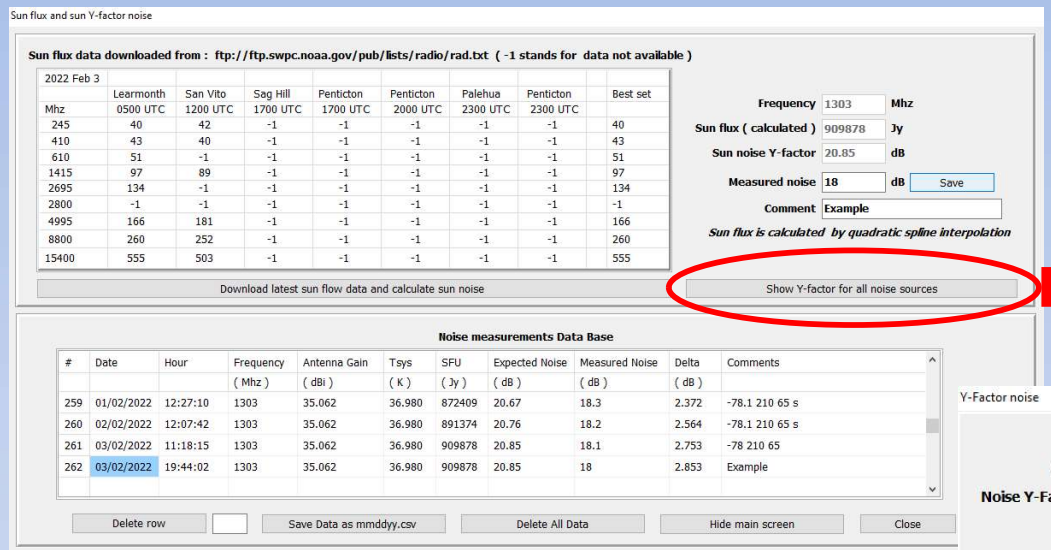
After calculating the Sun noise Y-factor it is possible to enter and save the measurements taken together with some comment. The program will also allow the edit of the saved data and the export in .csv format for further analysis.
Please note that Noise Y-factor in «Pulsar mode» is calculated only in two frequency windows (400 Mhz and 1300 Mhz) while when in «system evaluation mode » the calculations are performed for extended frequency range .

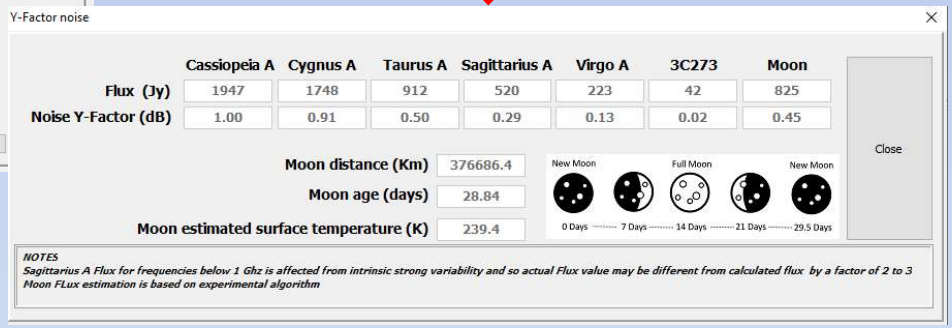


Murmur

Pulsar mode and System evaluation mode

By activating «Show Y-Factor for all noise sources» Murmur calculates the expected Noise Y-factor of the major noise sources.





- **3C273 flux value is calculated by interpolation of data reported in :**

  M. Türler, S. Paltani, T.J.-L. Courvoisier, et al., « 30 years of multi-wavelenght observations of 3C273 », Astronomy & Astrophysics supplement series, 1999

- **Cassiopeia A, Cygnus A, Taurus A, Virgo A flux values are calculated by interpolation of data reported in :**

  J.W.M. Baars, P.G. Mezger, H.Wendker « The flux density values of standard sources used for antenna calibration », NRAO,Green Bank, West Virginia, 1964
  J.W.M. Baars et.al, Astron. & Astrophys. 61, 99-106, 1977
  W. Herrmann, https://astropeiler.de/sites/default/files/Astropeiler_Story_2.pdf

- **Moon flux value is calculated with a dedicated algoritm based on :**

  a) J. Köppen , « Observation of the Moon» , https://portia.astrophysik.uni-kiel.de/~koeppen/10GHz/moon.html
  b) D.Morabito, W.Imbriale, S.Keihm « Observing the moon at microwave frequencies using a large-diameter deep space network antenna », IEEE Transactions on antennas and propagation , 2008

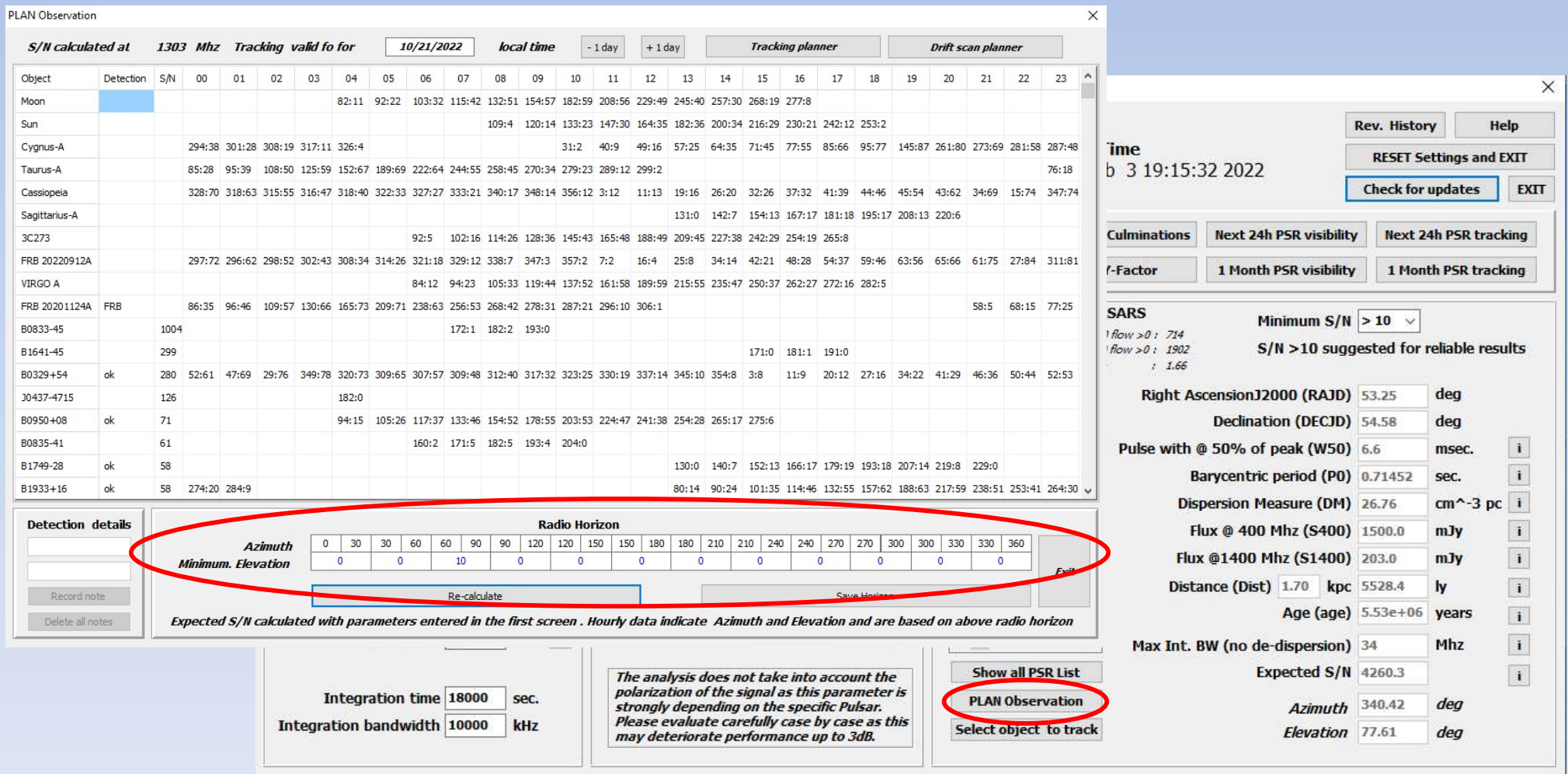
- **Sagittarius A flux values are calculated by interpolation of data reported in :**

  S. Roy, P. Rao « Sgr A* at low radio frequencies: Giant Metrewave Radio Telescope observations», Monthly Notices of the Royal Astronomical Society, 349, L25–L29, 1964
  G. C. Bower,S. Markoff et al. « Radio and Millimeter Monitoring of Sgr A*: Spectrum, Variability, and Constraints on the G2 Encounter», The astronomical journal , Feb 2015

Murmur

Pulsar mode

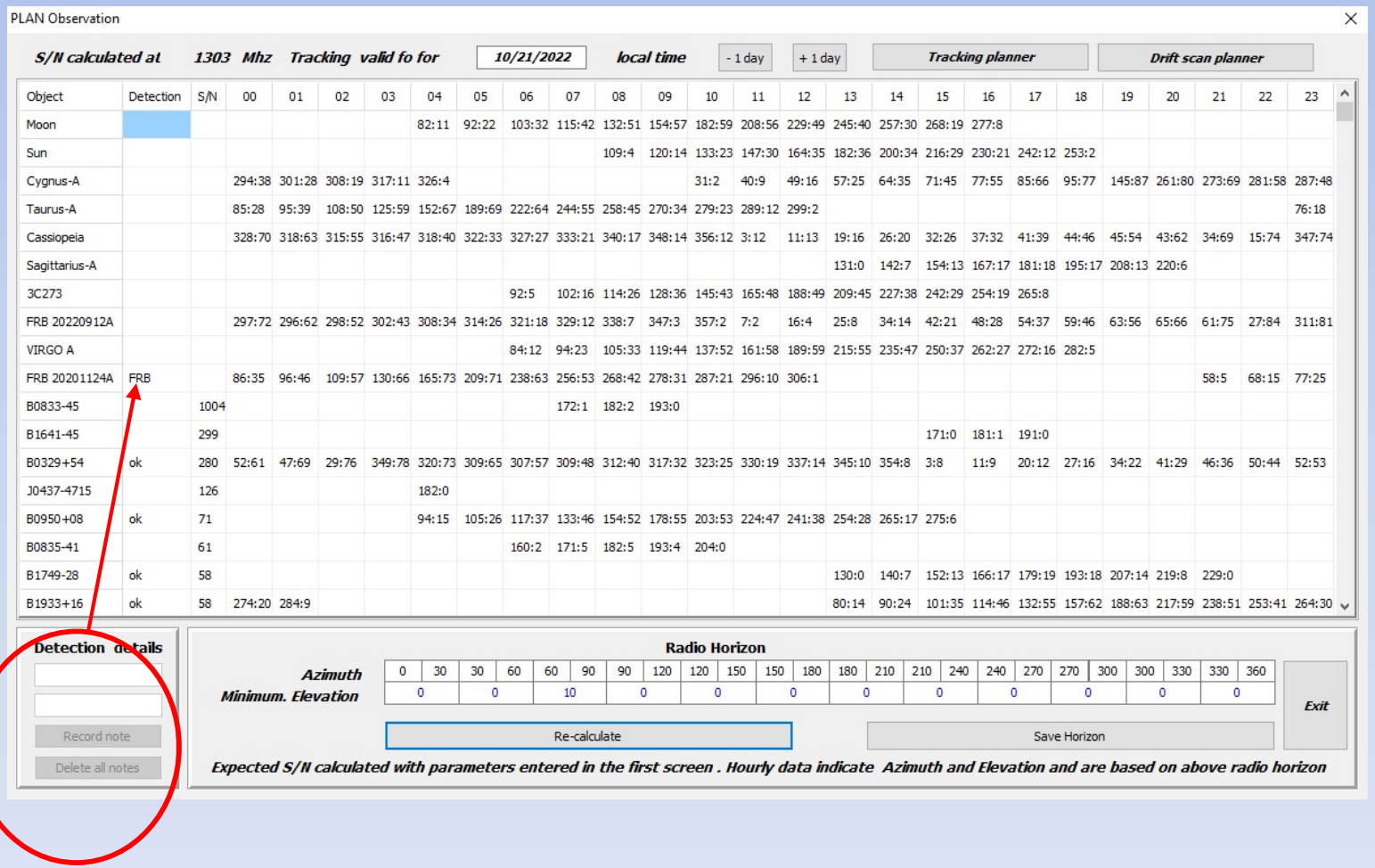
«PLAN Observation» visualizes all objects in the current internal data base with respective Azimuth/Elevation for the 24 hours (from 00 to 23).
For all the PSR the expected S/N will be listed . On the «Radio Horizon» sub-screen will be possible to set local radio horizon defining the minimum elevation in 30° steps



Murmur

Pulsar mode

By positioning the cursor on any row under the «Detection» column it is possible to enter a 9 characters comment.



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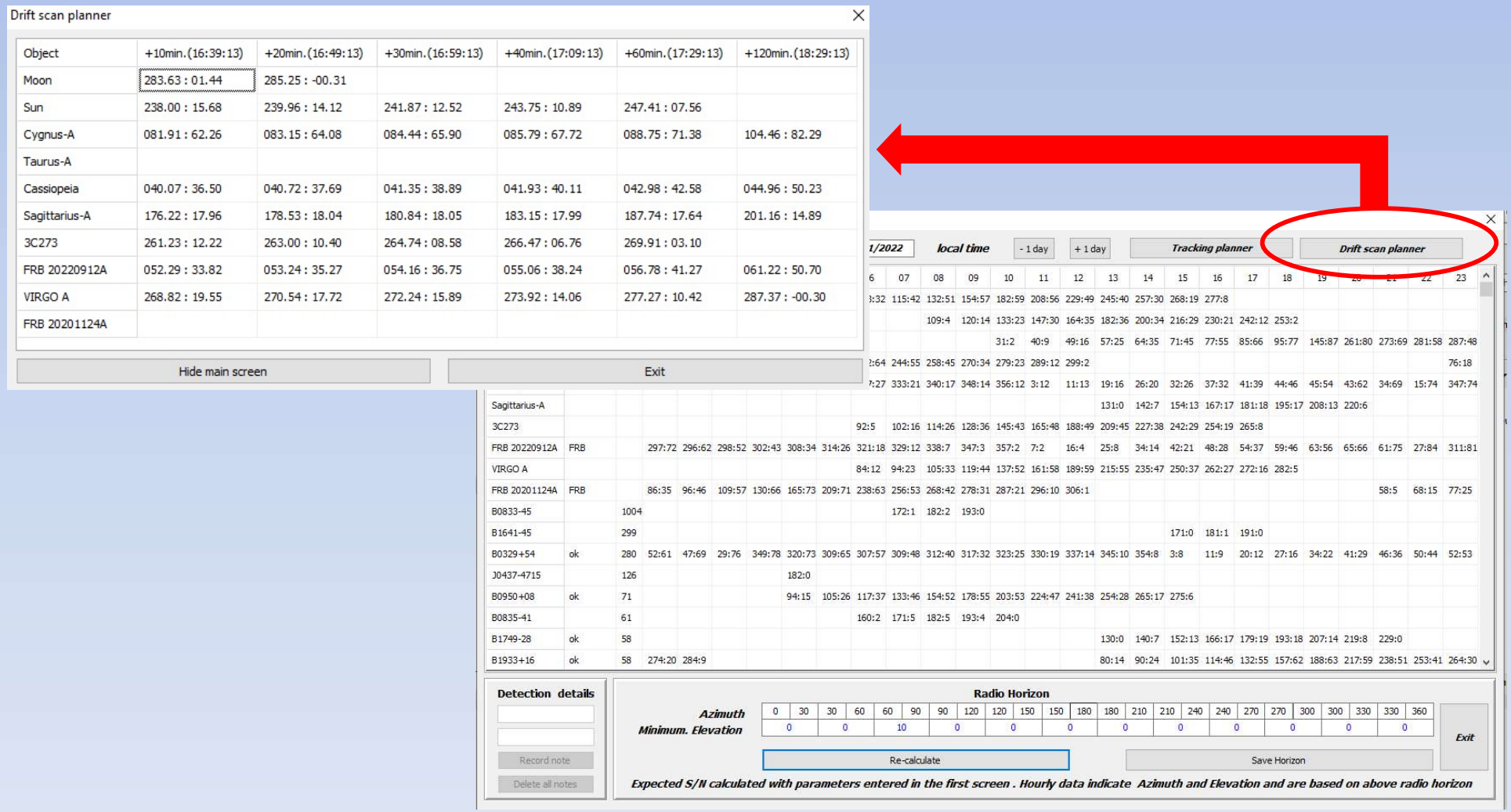
Pulsar mode

By selecting «Drift scan planner» on «Plan Observation» screen the future position (+10min., +20min., +30min., +40min., +60min. , +120min.) of objects above the horizon wil be visualized.
This function helps in positioning the antenna to perform a drift scan.



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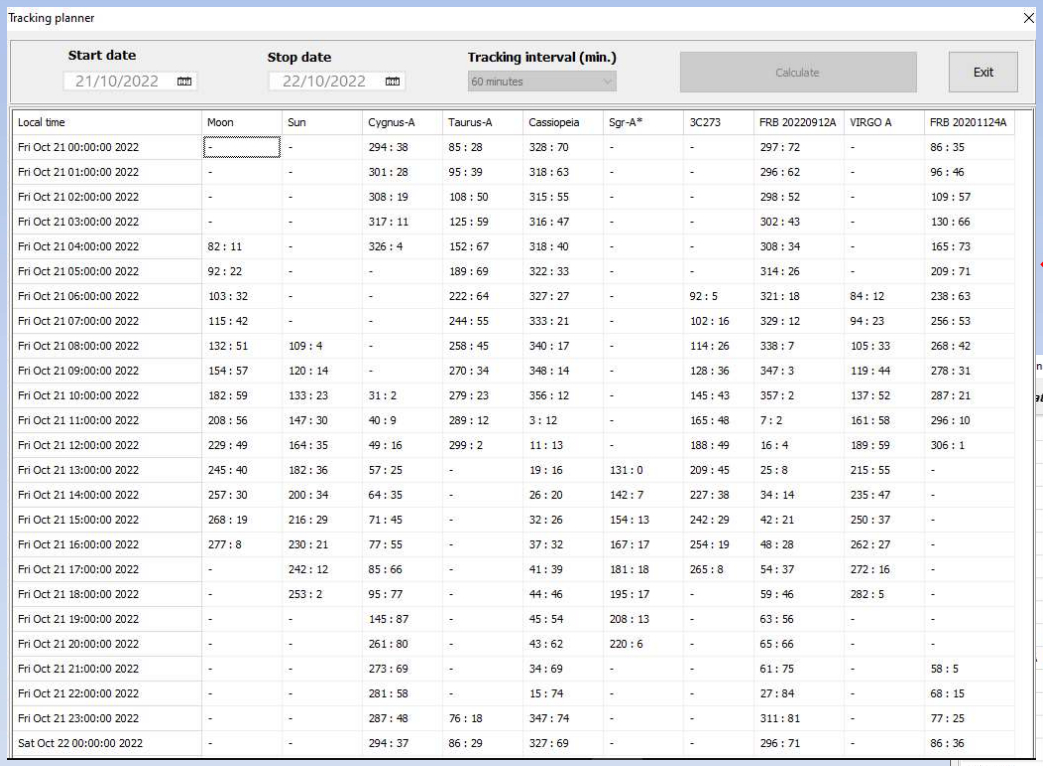
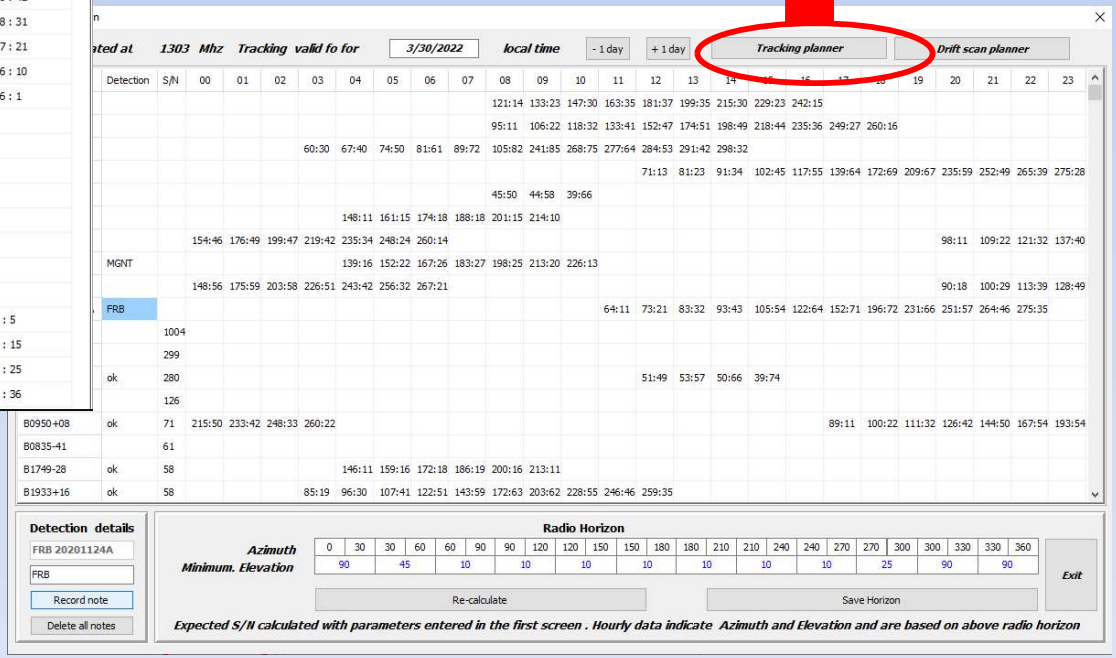
Pulsar mode

By selecting «Tracking planner» it would be possible to show tracking data for all noise sources entering desidered dates and interval.



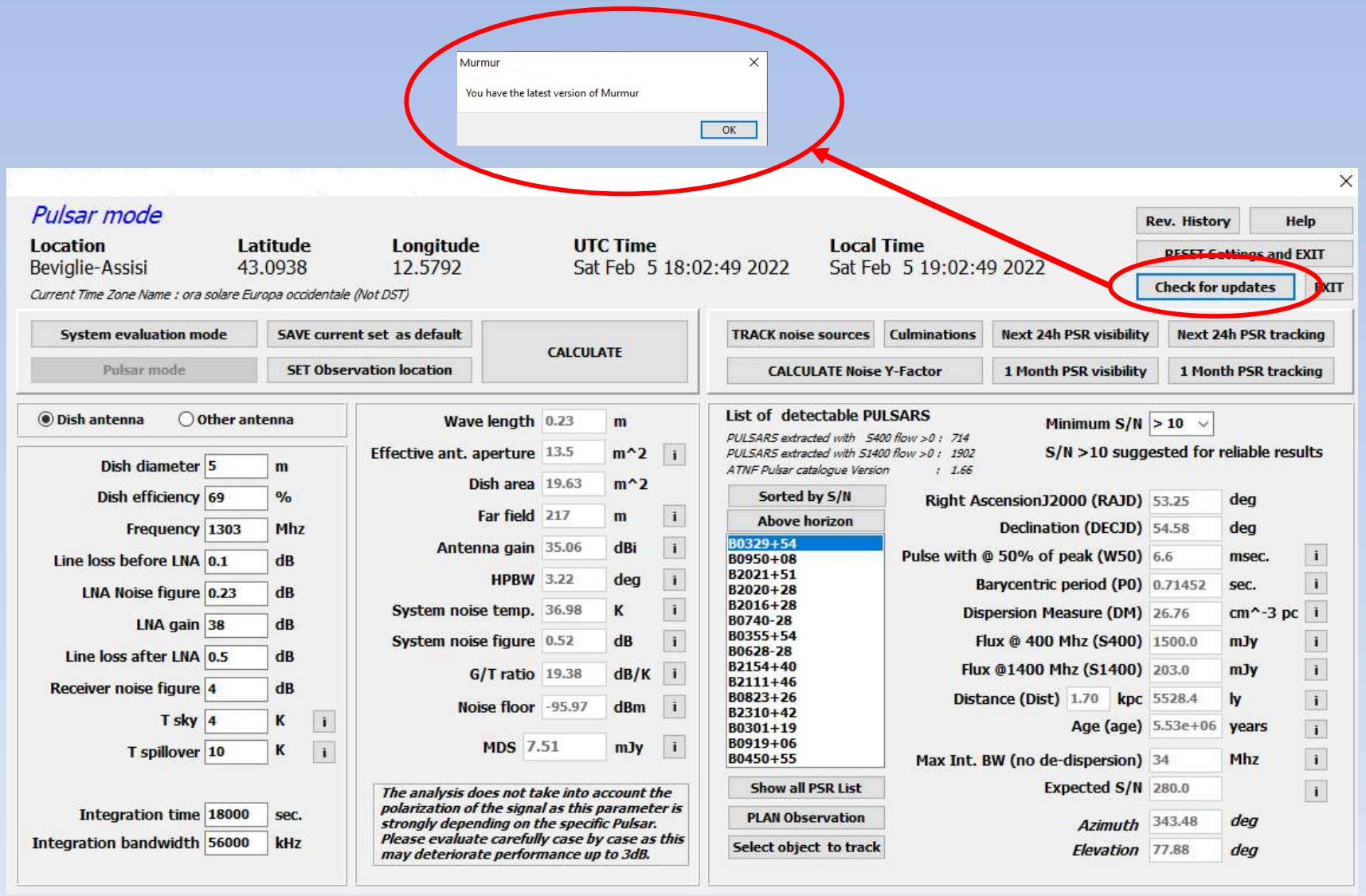
Local time	Moon	Sun	Cygnus-A	Taurus-A	Cassiopeia	Sgr-A*	3C273	FRB 20220912A	VIRGO A	FRB 20201124A
Fri Oct 21 00:00:00 2022	-	-	294 : 38	85 : 28	328 : 70	-	-	297 : 72	-	86 : 35
Fri Oct 21 01:00:00 2022	-	-	301 : 28	95 : 39	318 : 63	-	-	296 : 62	-	96 : 46
Fri Oct 21 02:00:00 2022	-	-	308 : 19	108 : 50	315 : 55	-	-	298 : 52	-	109 : 57
Fri Oct 21 03:00:00 2022	-	-	317 : 11	125 : 59	316 : 47	-	-	302 : 43	-	130 : 66
Fri Oct 21 04:00:00 2022	82 : 11	-	326 : 4	152 : 67	318 : 40	-	-	308 : 34	-	165 : 73
Fri Oct 21 05:00:00 2022	92 : 22	-	-	189 : 69	322 : 33	-	-	314 : 26	-	209 : 71
Fri Oct 21 06:00:00 2022	103 : 32	-	-	222 : 64	327 : 27	-	92 : 5	321 : 18	84 : 12	238 : 63
Fri Oct 21 07:00:00 2022	115 : 42	-	-	244 : 55	333 : 21	-	102 : 16	329 : 12	94 : 23	256 : 53
Fri Oct 21 08:00:00 2022	132 : 51	109 : 4	-	258 : 45	340 : 17	-	114 : 26	338 : 7	105 : 33	268 : 42
Fri Oct 21 09:00:00 2022	154 : 57	120 : 14	-	270 : 34	348 : 14	-	128 : 36	347 : 3	119 : 44	278 : 31
Fri Oct 21 10:00:00 2022	182 : 59	133 : 23	31 : 2	279 : 23	356 : 12	-	145 : 43	357 : 2	137 : 52	287 : 21
Fri Oct 21 11:00:00 2022	208 : 56	147 : 30	40 : 9	289 : 12	3 : 12	-	165 : 48	7 : 2	161 : 58	296 : 10
Fri Oct 21 12:00:00 2022	229 : 49	164 : 35	49 : 16	299 : 2	11 : 13	-	188 : 49	16 : 4	189 : 59	306 : 1
Fri Oct 21 13:00:00 2022	245 : 40	182 : 36	57 : 25	-	19 : 16	131 : 0	209 : 45	25 : 8	215 : 55	-
Fri Oct 21 14:00:00 2022	257 : 30	200 : 34	64 : 35	-	26 : 20	142 : 7	227 : 38	34 : 14	235 : 47	-
Fri Oct 21 15:00:00 2022	268 : 19	216 : 29	71 : 45	-	32 : 26	154 : 13	242 : 29	42 : 21	250 : 37	-
Fri Oct 21 16:00:00 2022	277 : 8	230 : 21	77 : 55	-	37 : 32	167 : 17	254 : 19	48 : 28	262 : 27	-
Fri Oct 21 17:00:00 2022	-	242 : 12	85 : 66	-	41 : 39	181 : 18	265 : 8	54 : 37	272 : 16	-
Fri Oct 21 18:00:00 2022	-	253 : 2	95 : 77	-	44 : 46	195 : 17	-	59 : 46	282 : 5	-
Fri Oct 21 19:00:00 2022	-	-	145 : 87	-	45 : 54	208 : 13	-	63 : 56	-	-
Fri Oct 21 20:00:00 2022	-	-	261 : 80	-	43 : 62	220 : 6	-	65 : 66	-	-
Fri Oct 21 21:00:00 2022	-	-	273 : 69	-	34 : 69	-	-	61 : 75	-	58 : 5
Fri Oct 21 22:00:00 2022	-	-	281 : 58	-	15 : 74	-	-	27 : 84	-	68 : 15
Fri Oct 21 23:00:00 2022	-	-	287 : 48	76 : 18	347 : 74	-	-	311 : 81	-	77 : 25
Sat Oct 22 00:00:00 2022	-	-	294 : 37	86 : 29	327 : 69	-	-	296 : 71	-	86 : 36



Murmur

Pulsar mode

«Check for updates» on main screen will check automatically if the installed version of Murmur is the latest one.



Murmur

Creating ATNF.csv file

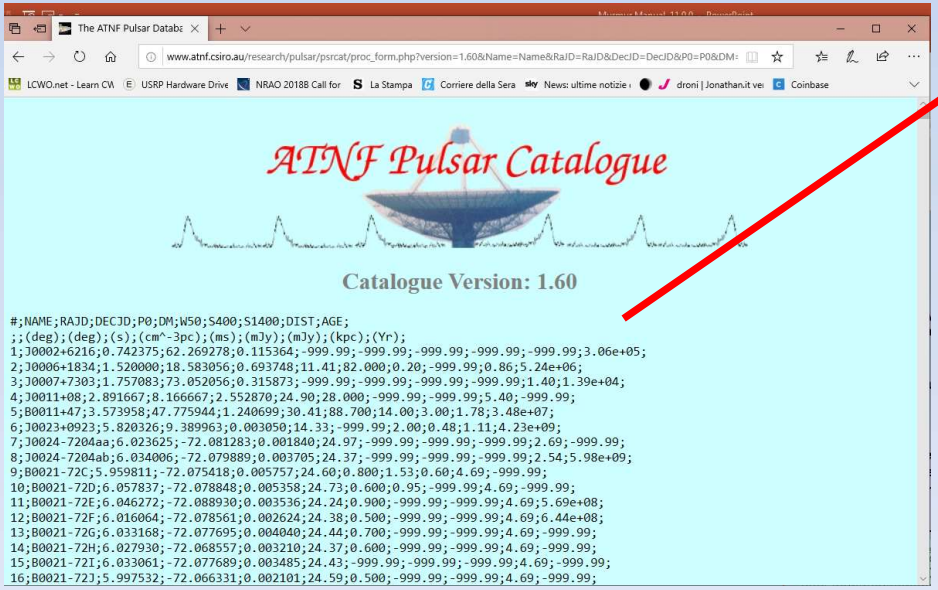
Starting from version 10.0.0 the installer of Murmur will also create in the C:\Murmur\Murmur directory the file ATNF.csv with Pulsars data downloaded from ATNF (Australia Telescope National Facility) Pulsar catalogue : http://www.atnf.csiro.au/research/pulsar/psrcat/.

The ATNF.csv file can also be created (and edited) from the user following this procedure :

Download the Pulsar data from ATNF catalogue using following http instruction (copy and paste):

http://www.atnf.csiro.au/research/pulsar/psrcat/proc_form.php?version=2.5.1&Name=Name&RaJD=RaJD&DecJD=DecJD&P0=P0&DM=DM&W50=W50&S400=S400&S1400=S1400&Dist=Dist&Age=Age&startUserDefined=true&c1_val=&c2_val=&c3_val=&c4_val=&sort_attr=jname&sort_order=asc&condition=&pulsar_names=&ephemeris=short&coords_unit=raj%2Fdecj&radius=&coords_1=&coords_2=&style=Short+csv+without+errors&no_value=-999.99&fsize=3&x_axis=&x_scale=linear&y_axis=&y_scale=linear&state=query&table_bottom.x=87&table_bottom.y=35

Be sure to put the required version !




```
#;NAME;RAJD;DECJD;P0;DM;W50;S400;S1400;DIST;AGE;
;;(deg);(deg);(s);(cm^-3pc);(ms);(mJy);(mJy);(kpc);(Yr);
1;J0002+6216;0.742375;62.269278;0.115364;-999.99;-999.99;-999.99;-999.99;-999.99;3.06e+05;
2;J0006+1834;1.520000;18.583056;0.693748;11.41;82.000;0.20;-999.99;0.86;5.24e+06;
3;J0007+7303;1.757083;73.052056;0.315873;-999.99;-999.99;-999.99;-999.99;1.40;1.39e+04;
4;J0011+08;2.891667;8.166667;2.552870;24.90;28.000;-999.99;-999.99;5.40;-999.99;
5;B0011+47;3.573958;47.775944;1.240699;30.41;88.700;14.00;3.00;1.78;3.48e+07;
6;J0023+0923;5.820326;9.389963;0.003050;14.33;-999.99;2.00;0.48;1.11;4.23e+09;
7;J0024-7204aa;6.023625;-72.081283;0.001840;24.97;-999.99;-999.99;-999.99;2.69;-999.99;
8;J0024-7204ab;6.034006;-72.079889;0.003705;24.37;-999.99;-999.99;-999.99;2.54;5.98e+09;
```

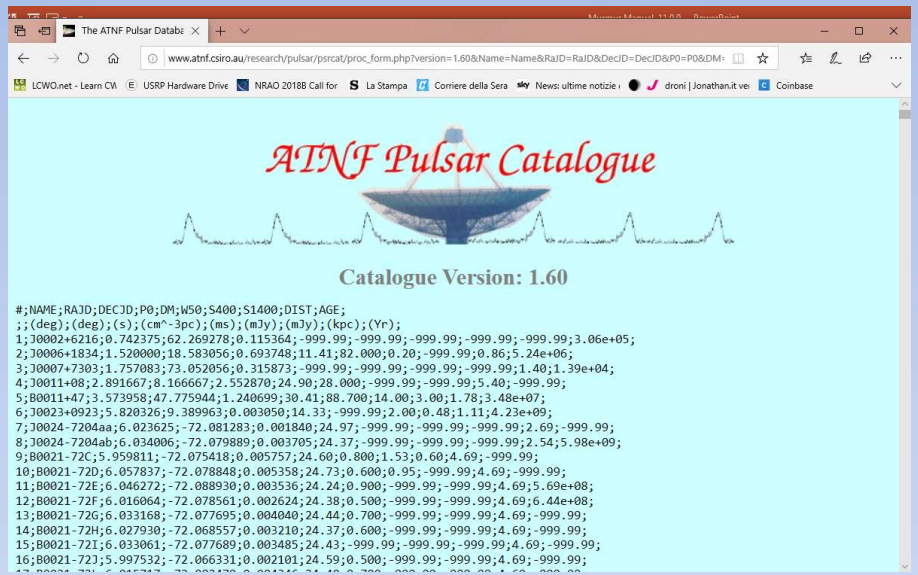
Name:	Pulsar name. The B name if exists, otherwise the J name.
RAJD:	Right ascension (J2000) (degrees)
DecJD:	Declination (J2000) (degrees)
P0:	Barycentric period of the pulsar (s)
DM:	Dispersion measure (cm-3 pc)
W50:	Width of pulse at 50% of peak (ms).
S400:	Mean flux density at 400 MHz (mJy)
S1400:	Mean flux density at 1400 MHz (mJy)
Dist:	Best estimate of the pulsar distance using the YMW16 DM-based distance as default (kpc)
Age:	Spin down age (yr)

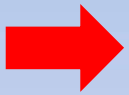
Note : The value-999.999 indicates that the data is not available

Murmur

Creating ATNF.csv file

Select all data and save : ->File -> Save as ->ATNF.txt





```
Catalogue Version: 1.60
#;NAME;RAJD;DECJD;P0;DM;W50;S400;S1400;DIST;AGE;
;;(deg);(deg);(s);(cm^-3pc);(ms);(mJy);(mJy);(kpc);(Yr);
1;J0002+6216;0.742375;62.269278;0.115364;-999.99;-999.99;-999.99;-999.99;-999.99;3.06e+05;
2;J0006+1834;1.520000;18.583056;0.693748;11.41;82.000;0.20;-999.99;0.86;5.24e+06;
3;J0007+7303;1.757083;73.052056;0.315873;-999.99;-999.99;-999.99;-999.99;1.40;1.39e+04;
4;J0011+08;2.891667;8.166667;2.552870;24.90;28.000;-999.99;-999.99;5.40;-999.99;
5;B0011+47;3.573958;47.775944;1.240699;30.41;88.700;14.00;3.00;1.78;3.48e+07;
6;J0023+0923;5.820326;9.389963;0.003050;14.33;-999.99;2.00;0.48;1.11;4.23e+09;
7;J0024-7204aa;6.023625;-72.081283;0.001840;24.97;-999.99;-999.99;-999.99;2.69;-999.99;
8;J0024-7204ab;6.034006;-72.079889;0.003705;24.37;-999.99;-999.99;-999.99;2.54;5.98e+09;
9;B0021-72C;5.959811;-72.075418;0.005757;24.60;0.800;1.53;0.60;4.69;-999.99;
10;B0021-72D;6.057837;-72.078848;0.005358;24.73;0.600;0.95;-999.99;4.69;-999.99;
11;B0021-72E;6.046272;-72.088930;0.003536;24.24;0.900;-999.99;-999.99;4.69;5.69e+08;
12;B0021-72F;6.016064;-72.078561;0.002624;24.38;0.500;-999.99;-999.99;4.69;6.44e+08;
13;B0021-72G;6.033168;-72.077695;0.004040;24.44;0.700;-999.99;-999.99;4.69;-999.99;
14;B0021-72H;6.027930;-72.068557;0.003210;24.37;0.600;-999.99;-999.99;4.69;-999.99;
15;B0021-72I;6.033061;-72.077689;0.003485;24.43;-999.99;-999.99;-999.99;4.69;-999.99;
16;B0021-72J;5.997532;-72.066331;0.002101;24.59;0.500;-999.99;-999.99;4.69;-999.99;
17;B0021-72L;6.015717;-72.082479;0.004346;24.40;0.700;-999.99;-999.99;4.69;-999.99;
18;B0021-72M;5.977041;-72.091877;0.003677;24.43;1.200;-999.99;-999.99;4.69;-999.99;
19;B0021-72N;6.038283;-72.074692;0.003054;24.57;-999.99;-999.99;-999.99;4.69;-999.99;
20;J0024-7204O;6.019386;-72.081602;0.002643;24.36;-999.99;-999.99;-999.99;4.69;1.38e+09;
21;J0024-7204P;6.083333;-72.069444;0.003643;24.29;-999.99;-999.99;-999.99;4.69;8.70e+07;
22;J0024-7204Q;6.068712;-72.073657;0.004033;24.27;-999.99;-999.99;-999.99;4.69;1.88e+09;
23;J0024-7204R;6.031605;-72.080665;0.003480;24.36;-999.99;-999.99;-999.99;4.69;3.72e+08;
24;J0024-7204S;6.016581;-72.078431;0.002830;24.38;-999.99;-999.99;-999.99;4.69;-999.99;
25;J0024-7204T;6.035621;-72.077481;0.007588;24.41;-999.99;-999.99;-999.99;4.69;4.09e+08;
26;J0024-7204U;6.040986;-72.066580;0.004343;24.34;-999.99;-999.99;-999.99;4.69;7.23e+08;
27;J0024-7204V;6.023625;-72.081283;0.004810;24.11;-999.99;-999.99;-999.99;4.69;-999.99;
```

ATNF.csv must be as per above screenshot
Note : fields must be semicolon delimited

Open Microsoft Excel (or equivalent) and import data :
-> Data -> From text -> «ATNF.txt»-> Import ->Delimited->Start import at row-> 6
(*Please be sure that row 6 cointains «Catalogue version»*)
-> Next->Tab, Semicolon->Next->General->Finish->OK

Save file : ->File->Save as -> «ATNF.csv» (with format csv (ms-dos)) -> yes

Murmur

General

Clicking on i buttons the program will show details and references on the specific parameter.

By clicking on «History» button you will be able to see all the program modifications from the first release.

The program works with «.» decimal sparators. In case of troubles with different OS settings please let me know.

Please report any problem / suggestion / correction to : mario.natali@gmail.com

«Murmur» can be downloaded from web site : http://i0naa.altervista.org

Murmur

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