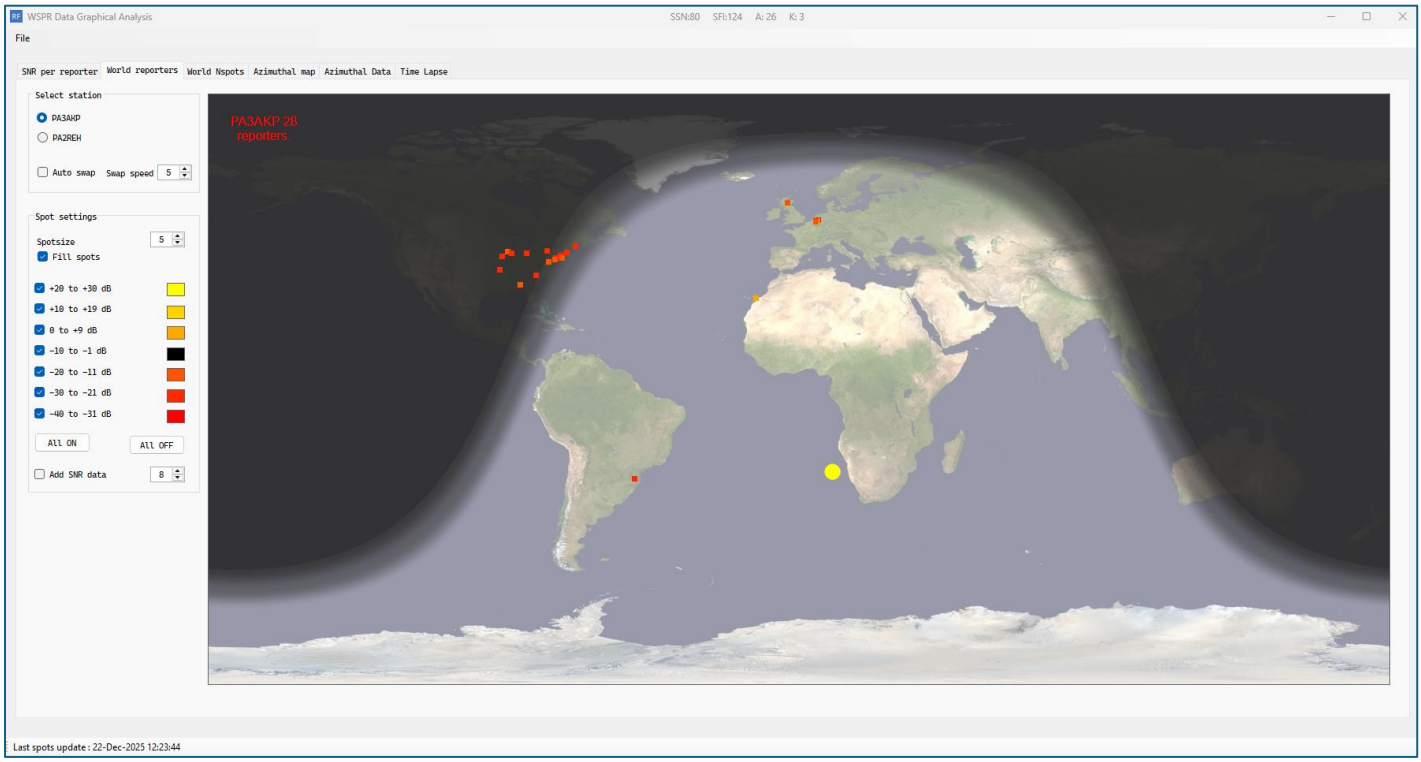
PA3AKP
WSPR Analyzer
User Manual



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Software version:	1.9.0.0 plus incremental updates for versions 1.9.x.x
Document date:	31 January 2026
Website:	https://rfcalculator.com/WSPR/

1 Contents

2 Updates overview

Version	Released
1.9.1.1	26 Feb 2026

2.1 Update policy

When a software update is available you must download and install the latest version. The old version installed on your device does not start anymore.

3 Preface

Thanks to PA2REH for allowing me to use his WSPR propagation data this manual to explain the comparison mode functionality inside the program. My own station, PA3AKP and PA2REH are more or less co-located with a distance of about 4km.

4 WSPR spots data used in this manual

All the data presentations in the form of tables and graphs are all based on two queries (MAIN and COMPARE call signs) with the following parameters

Main station		**Compare station**
Call sign	PA2REH	PA3AKP
Min. spot distance	30 km	30 km
Date	24 December 2025	24 December 2025
Band	28 MHz	28 MHz
Time frame	00:00 to 23:59	00:00 to 23:59
SNR filter	Off	Off

5 Introduction to the program

After the construction of a new Magnetic Loop antenna, the requirement came up to test the antenna with respect to its performance and preferably compare the performance with another nearby station.

There are more roads leading to Rome and the decision was made that the best way to test the antenna on a 24 hours per day basis is making use of the WSPR (Weak Signal Propagation Reporter) transmission mode. This very low power transmission method with transmit powers in the milli-Watt range and receivers with software listening in a 6 Hz bandwidth makes WSPR a very nice and simple solution to perform the tests.

Looking at various websites showing the results, the idea came up to design a brand-new software package to provide a good insight in antenna performance, propagation and solar data making as much as possible use of visual presentations instead of long lists with numbers that are difficult to understand.

6 Versions of the software

There are two versions of the software available. A free downloadable demonstration version to get acquainted with the package, but having limitations with respect to the functionality and date settings up to 31 December 2025 maximum.

If there is an interest in a full blown operational package, you can order your personal user license which is bound to the device on which the software has been installed. The first published version is V1.9.1.0 and will be made available online on January 31st 2026 latest.

7 Installation

Installation is quite straightforward. Download the installer from the rfcalculator.com website and run the installer. In case you are worried to run a downloaded executable your can check the digital signature of the installer taking the following steps:

- Download the installer from https://rfcalculator.com/WSPR/
- Click right on the WSPR_Analyser_installer.exe, and select ‘properties’
- This will open the properties window

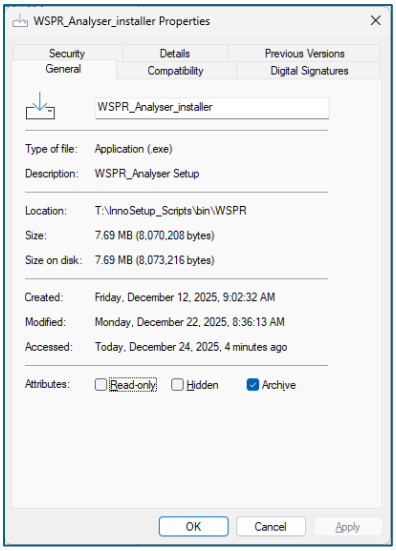


Figure 1 WSPR analyzer installer properties

- Select the Digital Signatures tab. In the top box 'Embedded signatures' click on the signer and then click details. This opens the digital signatures window. After clicking on certificate you can read the certificate information.

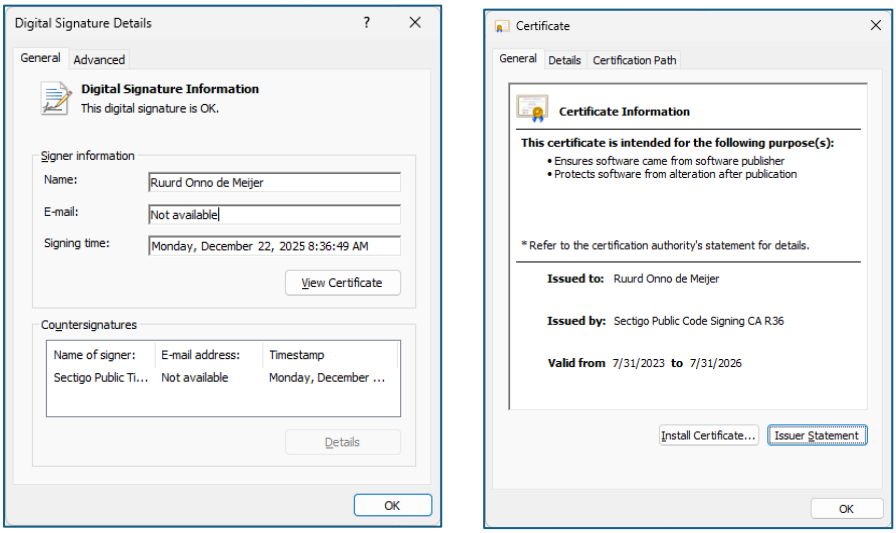


Figure 2 Digital signature and certificate details

- When you agree just run the installer and run the program after the installation process has been finalized.

8 First start after installation

When the program is started for the first time (or after a programmatic config.ini file reset) after installation, the following message appears:

Figure 3 config.ini file missing after installation or reset

This message 'Reset Ini File' is shown after a first start, but also when the .ini file is reset through the menu in the main form. The next message, after installation, that appears ion the screen is the unlicensed version message. This means that the software is running in a free demo mode with limitations.

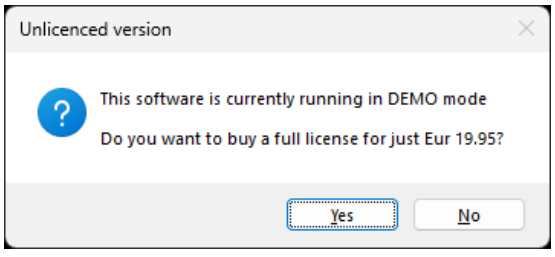


Figure 4 demo mode message

The following limitations apply when you are running in demonstration mode:

- Date setting 31-Dec-2025 and earlier
- Time settings: start time 07:00, end time 19:00
- The Date – time short cuts are disabled
- Call sign check selection (Main and Compare) disabled. When you enter your call signal as Main Call, an online check will be done and your QRA locator retrieved.
- The SNR range is disabled

After a first start, (or config.ini file reset), the Updates windows pops up. Here you can read the latest changes and updates applied to the program. Checking the box on the lower left hand side prevents this window from popping up each time you start the program.

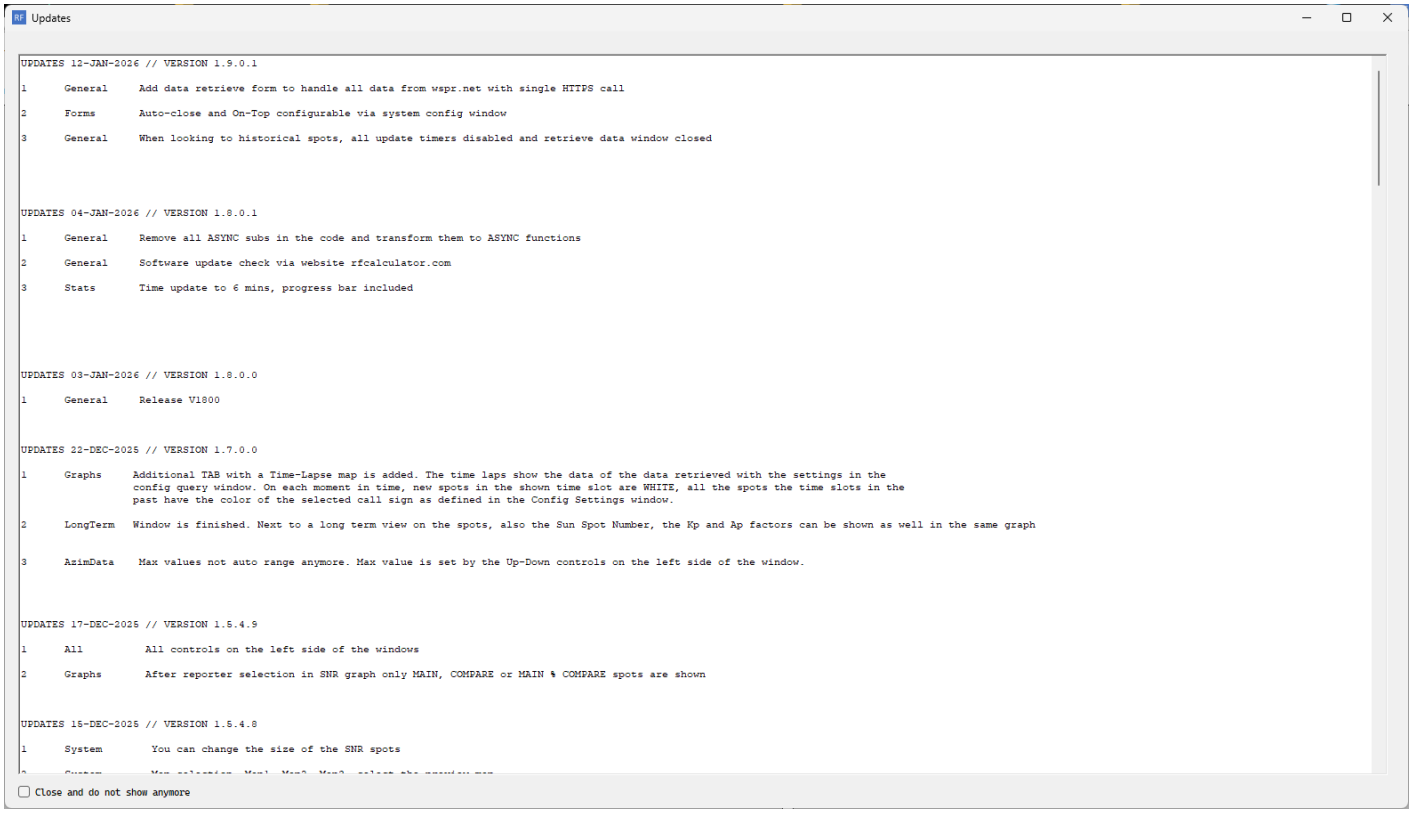


Figure 5 the updates window

After closing the updates window, the main window and the query configuration window are visible. In the query configuration window you define what information you want to see and analyze. The data is retrieved from the wspr online database at wspr.net

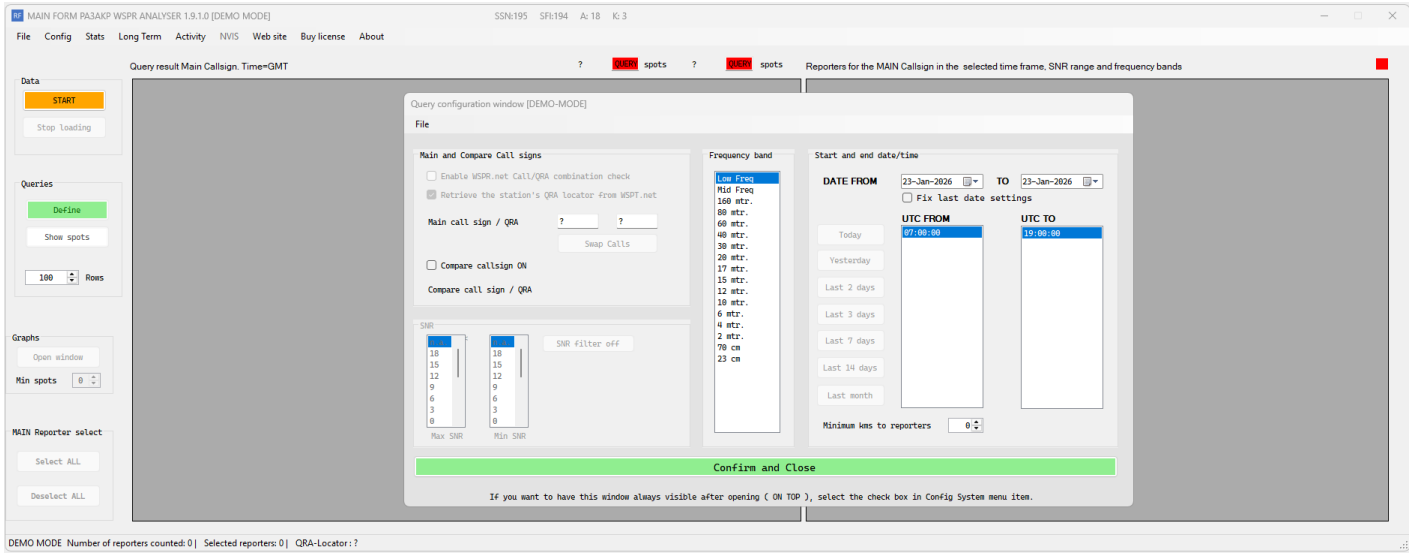


Figure 6 the query configuration window in demo mode

9 Configuration and walkthrough the various windows

After a first start, you see the updates window in which all the software updates and changes are described. Close the screen to proceed, or click on 'do not show anymore' the have a one-time read and close it.
After closing the updates screen, two windows are open:

- The main window, named MAIN FORM PA3AKP WSPR ANALYSER x.x.x.x, where the x's are the version number of the software you have installed.
- The Query configuration window, which is always starts on top and above the main window.

The data you wish to analyze is retrieved directly from the online WSPR database. To get the data you wish it requires at first the configuration of the queries that request the data from the database.

WSPR analyzer can retrieve the data from the database for two Call Signs simultaneously. The two Call signs are known in the program as:

1. The MAIN call sign, which is often your own call sign.

2. The COMP(are) call sign. This can be a station close to you and can be used to make comparisons between the MAIN and COMP station.

Another application that you can think about is when a new antenna on your own location must be tested against the existing one. In that case you need two call signs for the WSPR transmissions in order to see who-is-who.

The WSPR TX format allows to have more than six digits in the call sign to be transmitted. This falls outside the scope of this manual and we refer to the basic WSPR specifications.

9.1 The Query Configuration Window (licensed version)

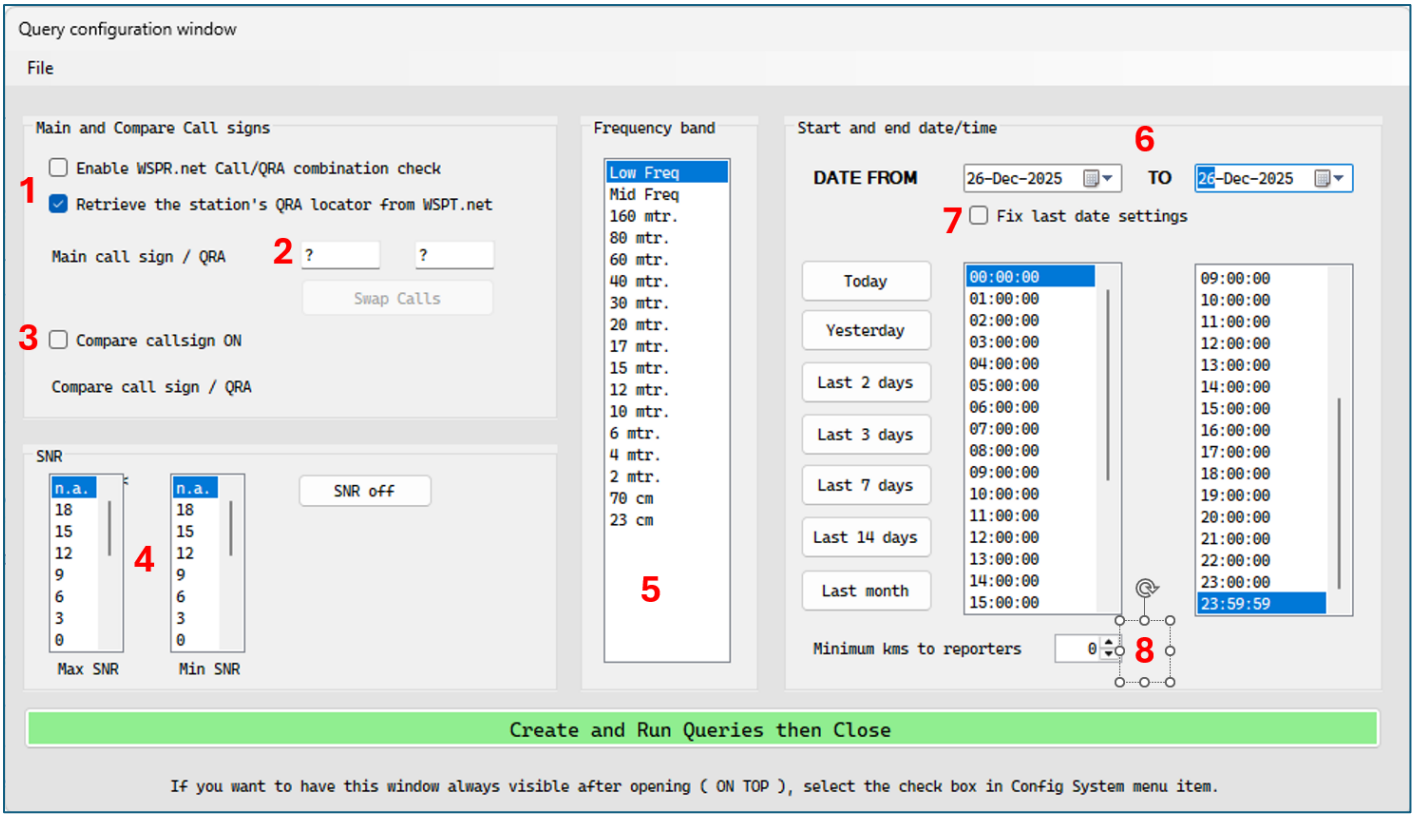


Figure 7, Query Configuration Window

9.1.1 Controls Navigation Query Configuration window

1. Select the call sign // QRA locator combinations.
2. MAIN call sign and QRA locator entries
3. Select here if a COMPare call sign is required
4. Filter on the SNR range of the reported spots
5. Selection of the frequency band
6. Start and end date settings
7. Fix the start and end date when selected
8. Set a minimum distance between the (MAIN & COMPare) stations to reduce spots clutter of nearby stations

9.1.2 *Defining the MAIN station*

First select one of the two entry methods (see 1 in the picture above 'Enable WSPR.net Call/Qra .....'). With the option selected in the picture you enter the MAIN call sign, followed by a 6 digit QRA locator in the field that becomes visible after the MAIN call sign has been entered.

When the entered Call sign / QRA combination corresponds to the combination known in the WSPR database the following message appears to confirm the entered MAIN call / MAIN QRA are matching.

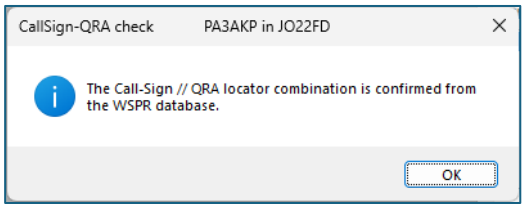


Figure 8, Call sign – QRA combination check

When you select the other option, "Retrieve the station's .... " then after entry of the MAIN call sign, the MAIN QRA is retrieved from the WSPR database and automatically entered into the MAIN QRA field in the window.
In both cases MAIN Call sign and MAIN QRA are saved into the config.ini file which you can fin the folder : C:\Users\Public\Documents\WSPR\System.

9.1.3 *Defining the COMP(are) station*

In case you wish to define a station with which you want to compare the WSPR results check the box left of 'Compare callsign ON' After the checkbox has been selected the following controls become visible:

- A search compare button
- Two fields for the Compare station's call sign and QRA-locator.

See the picture below.

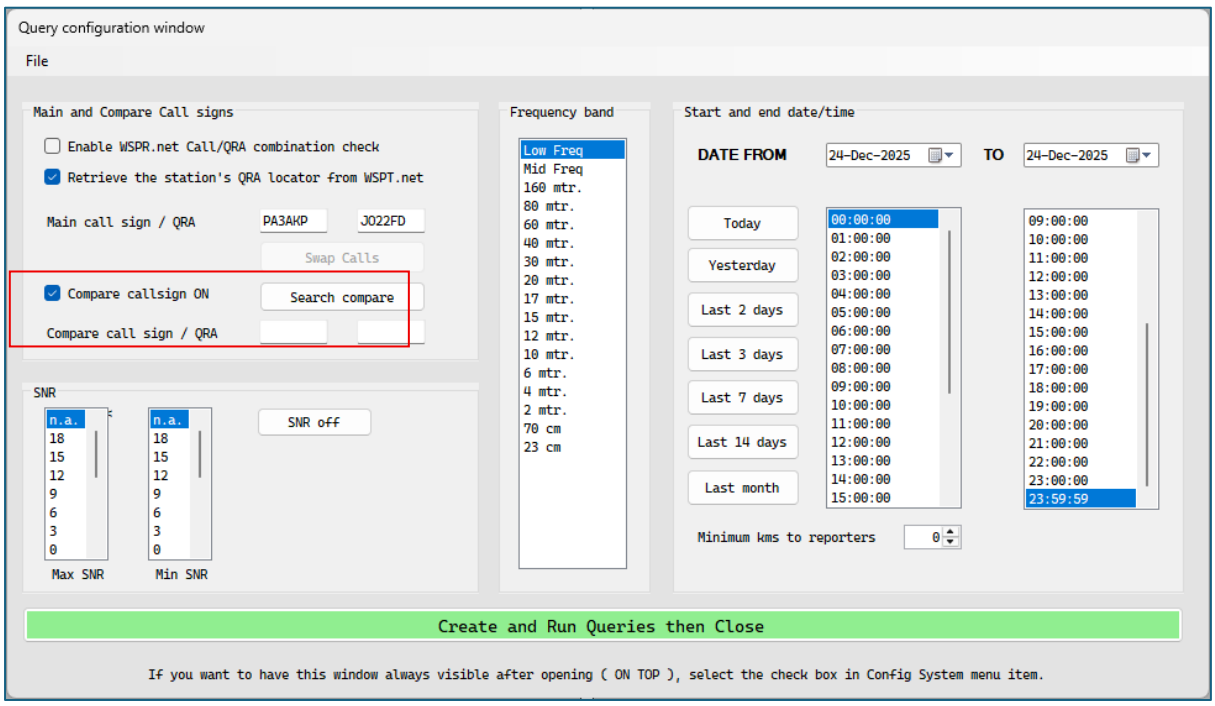


Figure 9 Query Configuration Window, COMPARE station entry

Now we have three(3) methods of entering the correct data for the compare station's call sign and QRA-locator.

In this manual the compare station is PA2REH. This station is located about 5km from the location of PA3AKP and both PA3AKP and PA2REH use the same time slots for the WSPR transmissions at 00, 06, 12 18 minutes each hour to have the best possible comparison.

Like for the MAIN call signs, if 'Enable WSPT.net .....' is selected, after entry of callsign and QRA-locator the data is checked in the WSPR database and when correct the foll message appears.

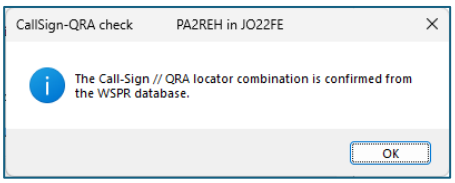


Figure 10 Confirmation of the COMPare station being correct.

In case 'Retrieve the station's.....' is selected the QRA locator is retrieved from the WSPR.net database and the QRA is entered into the corresponding field in the form.

A third method allows you to select calls from a list of active stations on the band you have selected (see 5). The activity of the list of stations is within the Start-date and Start-time as defined in the Query Config window. (see 6 in fig. 1)

For this option you can click on the 'Search Compare' button.
In case other stations are active within the defined time-span you get the window (fig 5) on the right. In the window the stations are listed which are active on 28 MHz with a TX power level between 5 and 20 dBm.

The upper and lower power limits for this list can de varied to narrow the selection. See the lower side of the window'

Double click on the station you wish to be your compare station. This enters the Compare station data in the query configuration window and closes this form.

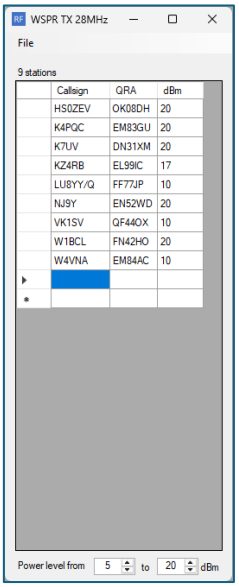


Figure 11 WSPR TX station on 28 MHz for Compare selection

After defining all your choices of the parameters (see 1 to 7 in fig.1) the next step you can take is click on the large green button named 'Create and Run Queries then close'. When spots are available then the main form will be loaded with the spots data of the MAIN call sign.

9.2 The main form Window items

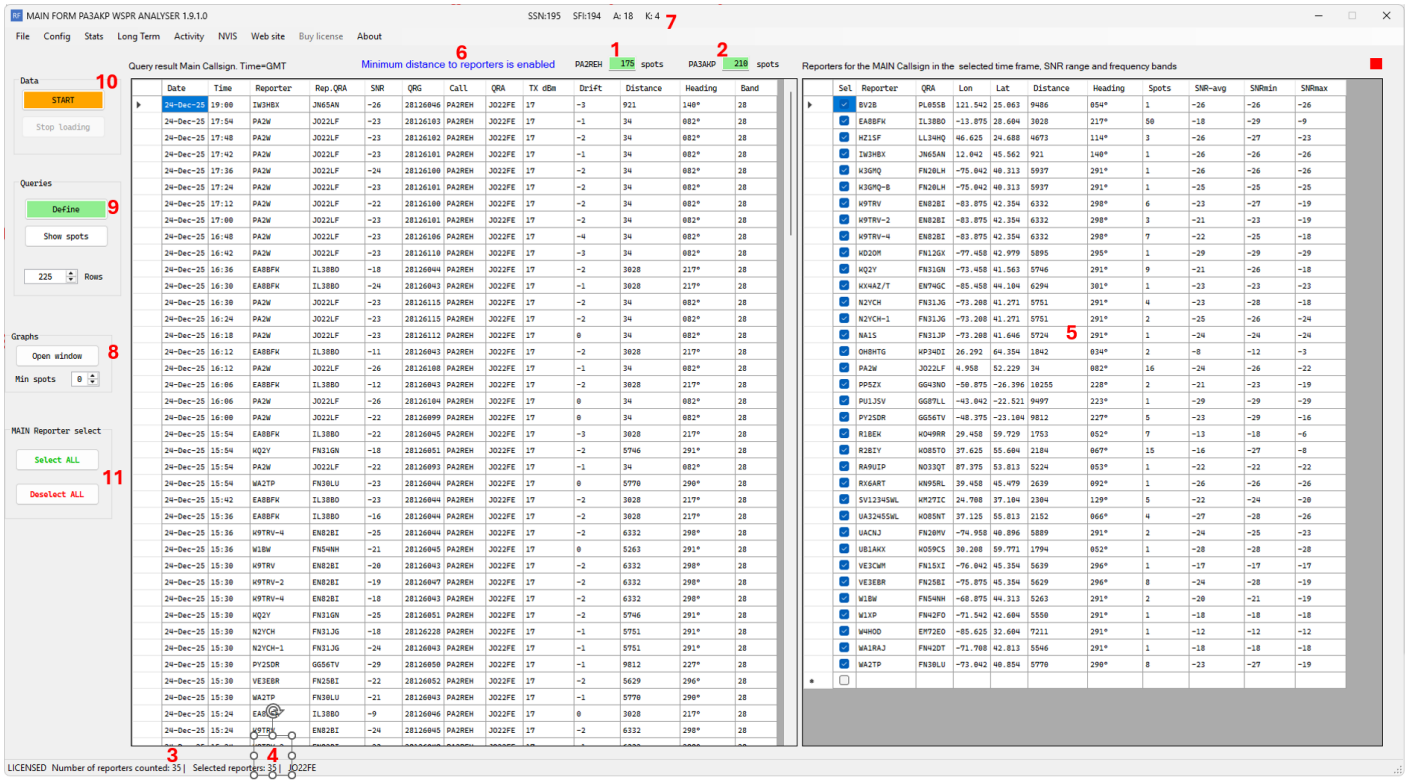


Figure 12 Main form

9.2.1 Controls Navigation MAIN window

1. Number of spots reported for PA2REH
2. Number of spots reported for PA3AKP
3. The number of reporting stations receiving the MAIN call PA2REH
4. The number of selected (see the left column in 'Sel' in 5) reporters
5. The MAIN call sign reporters list, showing location, distance, number of times where PA2REH is spotted, and the SNR values as minimum, average and maximum.

Reporters for the MAIN Callsign in the selected time frame, SNR range and frequency bands

	Sel	New	Reporter	QRA	Lon	Lat	Distance	Heading	Spots	SNR-avg	SNRmin	SNRmax
▶	☑	☐	BV2B	PL05SB	121.542	25.062	9486	054°	1	-26	-26	-26

6. Message that the minimum distance between PA2REH and the spotters is set (to 30 kms)
7. Solar data. Sunspot number, A and K factors.
8. Open the graphs window.
9. Open the query configuration window
10. Execute the query as defined in the query configuration window
11. Select / Deselect ALL reporters of the right hand table

9.2.2 *Defining an SNR range to filter received spots*

In case you want the define a range of SNR values reporter in which receive stations are receiving your WSPR transmissions, you can set an upper and lower value with the SNR range controls, see 4 in fig. 1.

9.2.3 *Defining the time span*

The time span (see 6 in fig1) for the analysis in which you transmissions are observed is defined in the Start and End date group. You can freely select dates with the two date controls on the upper part of the group, and hours in a 24 hour span in 1 hour steps.
Seven short-cut buttons allow to quickly to select the current day, yesterday the last 2,3,7,14 days and the last month.

9.2.4 *Min distance to the reporter*

To prevent a lot of data clutter from nearby reporters than continuously receive your transmission, which in most cases are local stations, you can de fine a minimum distance (see 7 in fig 1) between your station and the reporter as an addition filter. In the two figures below you can see the effect.

In Figure 13 you see that PE2BZ, 30 kms from PA2REH, is creating a spot every 6 minutes which is the TX period set by PA2REH. The same applies to PE1PDC at 5kms.

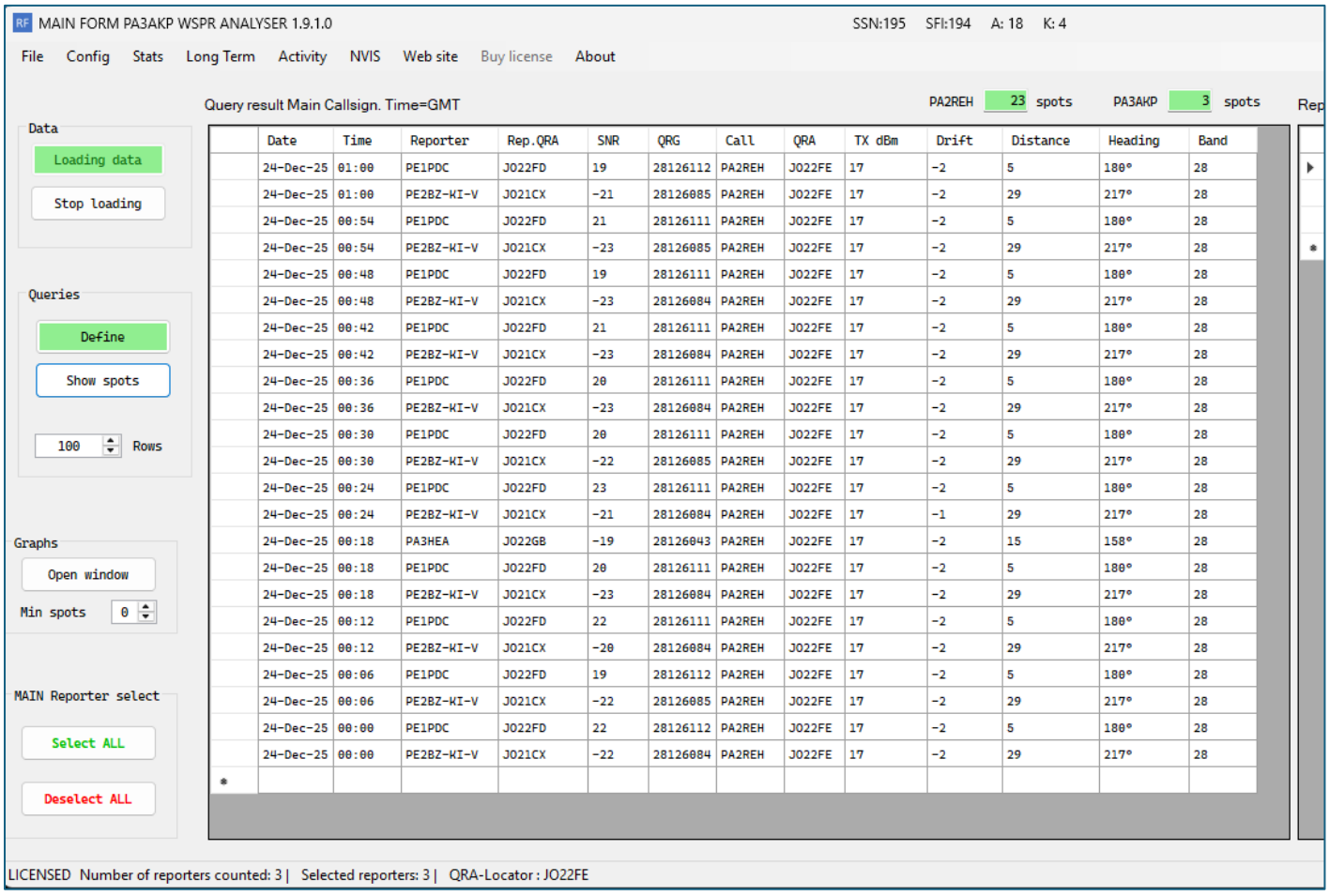


Figure 13 Min. km filter set at 0km

After setting the minimum kms filter in the Query definition window to 30, all local clutter is removed from the Query output.

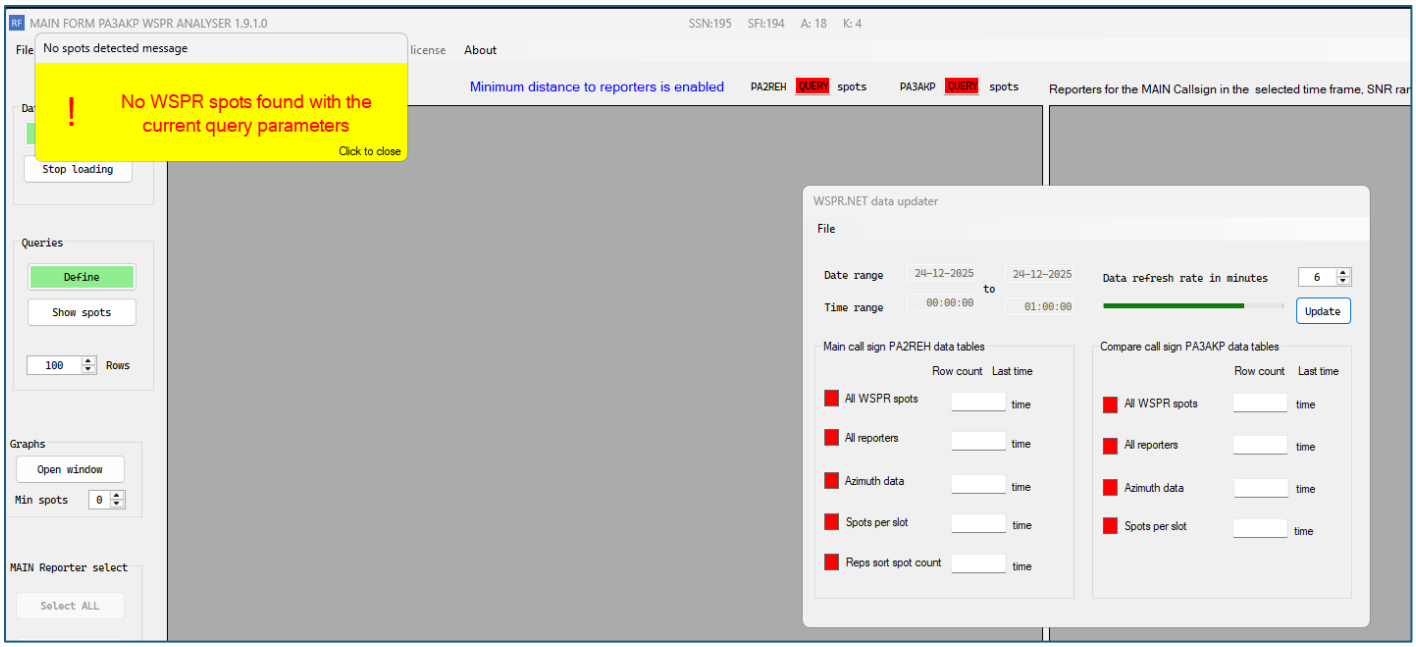


Figure 14 Min. km filter set at 30 km

9.2.5 *After the data is retrieved and ready, what can be the next steps?*

The data is now available in one or two data tables for respectively the MAIN and COMPare call signs. With this data being available the next step is the question how we are going to look at this data?

Clicking on 'Open window' in the Graphs group (see 10 in Figure 12) will open the Graph Analysis window. In this window more insight is graphically available.

9.3 The data retrieve window

This window with its own timer (minimum set to 6 minutes) requests all the required data from WSPR.net. The window has an auto-minimize function to remove this window from the display and keeps running while minimised. The minimize functionality can be set on/off via the system-config window.

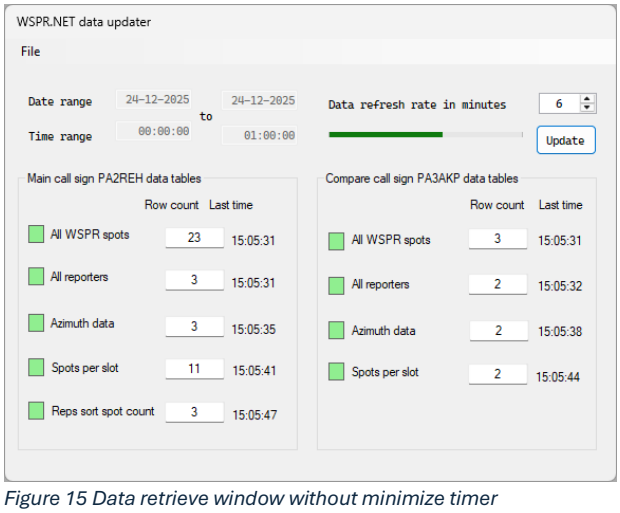


Figure 15 Data retrieve window without minimize timer

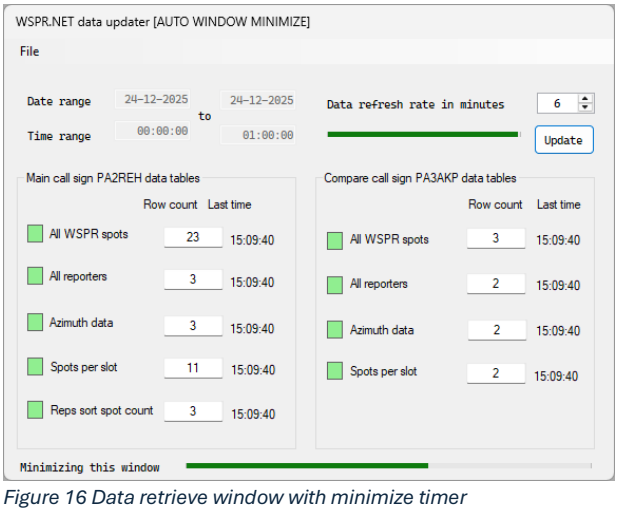


Figure 16 Data retrieve window with minimize timer

When the queries are in the past to review historical data, the 'Activity' and 'NVIS' menu items are disabled. Opening these windows only makes sense when looking at current propagation data.

10 The Config System window

In this window a number of presets/settings can be made for various functions of the software.

10.1.1 Controls Navigation on the Config System window

1. Select the rectangular map for the Graphs window.
2. Select the SNR value to be plotted on the SNR graph.
3. Add a grayline to the rectangular maps and/or add the sun position to the rectangular maps.
4. Apply a colour range to the SNR column in the spots list
5. Show the best DX by filling the best DX value cell.
6. Select the voice for the Alarms Window.
7. Set colours and spot size for the SNR graph spots.
8. Provide angular spots showing the heading of the reporter.
9. Make the WSPR data retrieve window Auto-Minimise
10. Config query window is always on top.
11. Settings for the NVIS window
12. Time period for the world wide WSPR activity window
13. The text colour for SNR labels next the spots on the maps
14. Save the settings and close the window

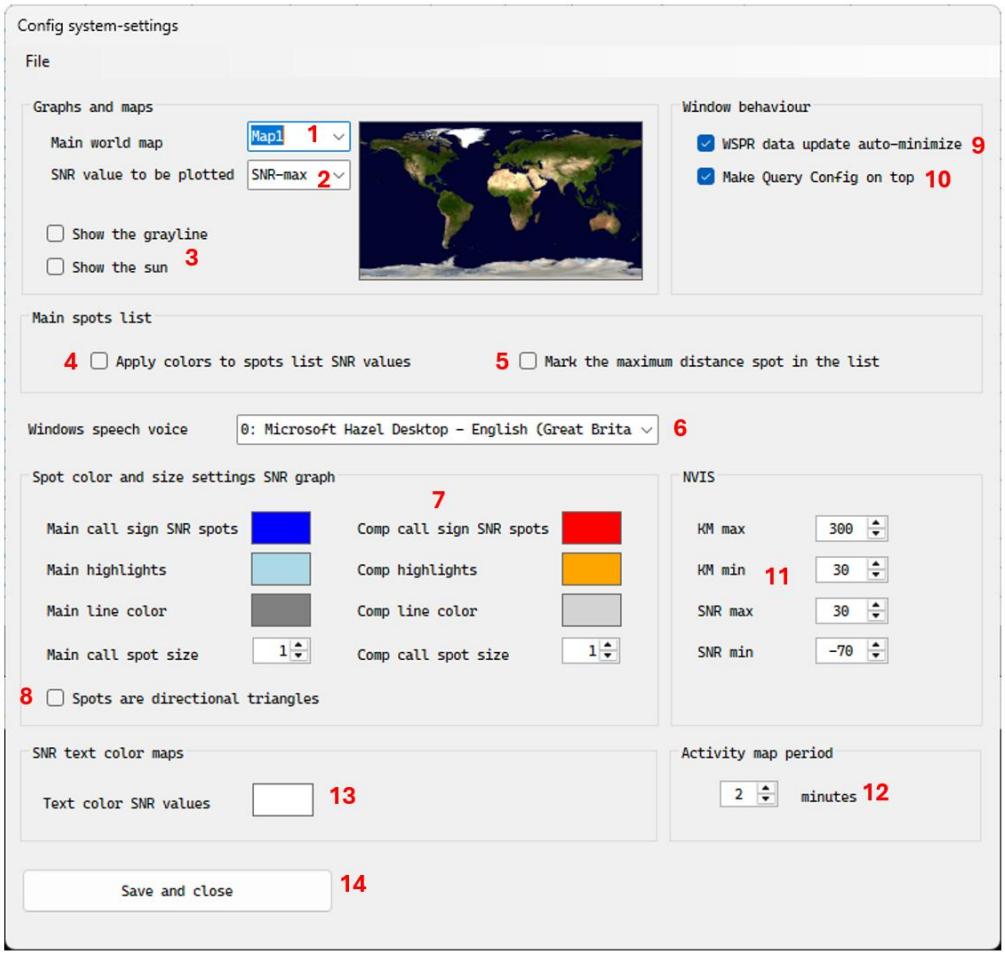


Figure 17 Config System window

10.2 Map selections

In the screenshots below you can see the current available *equidistant* rectangular maps.

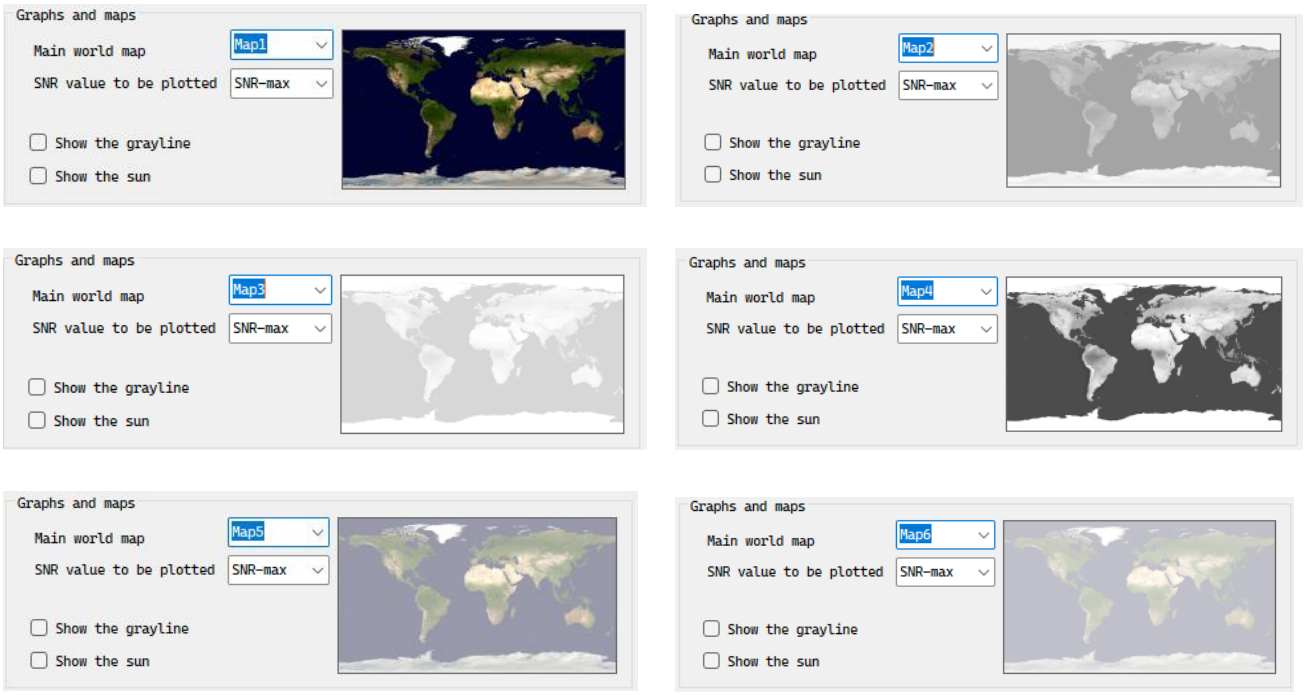


Figure 18 An overview of all possible maps

10.3 Colours for SNR values and best DX

Both checkboxes in 'Main spots list' group are selected to provide coloured cells in the spots table.

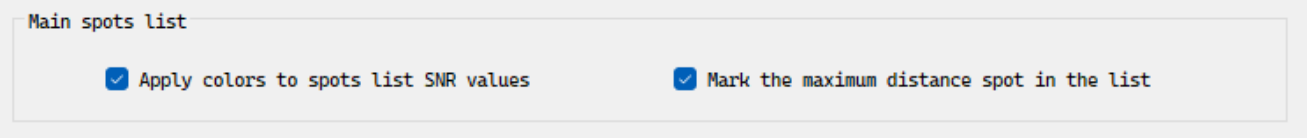


Figure 19 Select colours in the mains spots list

Now the SNR column in the spots data grid is coloured as function of the SNR value and the best DX spot is having a green cell colour. Blue is lowest SNR, red is the best.

Query result Main Callsign. Time=GMT PA2REH 23 spots PA3AKP 3 spots

Date	Time	Reporter	Rep.QRA	SNR	QRG	Call	QRA	TX dBm	Drift	Distance	Heading	Band
24-Dec-25	01:00	PE1PDC	JO22FD	19	28126112	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	01:00	PE2BZ-KI-V	JO21CX	-21	28126085	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:54	PE1PDC	JO22FD	21	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:54	PE2BZ-KI-V	JO21CX	-23	28126085	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:48	PE1PDC	JO22FD	19	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:48	PE2BZ-KI-V	JO21CX	-23	28126084	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:42	PE1PDC	JO22FD	21	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:42	PE2BZ-KI-V	JO21CX	-23	28126084	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:36	PE1PDC	JO22FD	20	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:36	PE2BZ-KI-V	JO21CX	-23	28126084	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:30	PE1PDC	JO22FD	20	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:30	PE2BZ-KI-V	JO21CX	-22	28126085	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:24	PE1PDC	JO22FD	23	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:24	PE2BZ-KI-V	JO21CX	-21	28126084	PA2REH	JO22FE	17	-1	29	217°	28
24-Dec-25	00:18	PA3HEA	JO22GB	-19	28126043	PA2REH	JO22FE	17	-2	15	158°	28
24-Dec-25	00:18	PE1PDC	JO22FD	20	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:18	PE2BZ-KI-V	JO21CX	-23	28126084	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:12	PE1PDC	JO22FD	22	28126111	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:12	PE2BZ-KI-V	JO21CX	-20	28126084	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:06	PE1PDC	JO22FD	19	28126112	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:06	PE2BZ-KI-V	JO21CX	-22	28126085	PA2REH	JO22FE	17	-2	29	217°	28
24-Dec-25	00:00	PE1PDC	JO22FD	22	28126112	PA2REH	JO22FE	17	-2	5	180°	28
24-Dec-25	00:00	PE2BZ-KI-V	JO21CX	-22	28126084	PA2REH	JO22FE	17	-2	29	217°	28

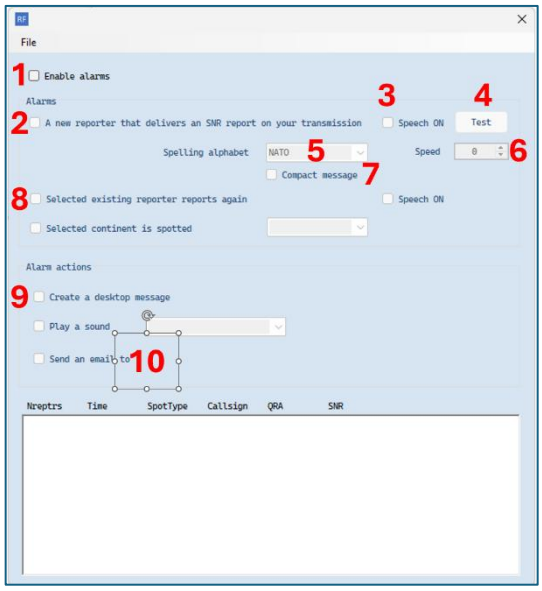
Figure 20 Coloured cells in the MAIN call sign spots list

10.4 Select Windows speech announcements

This alarm window , see 10.4.1, allows you to generate spoken messages from the program in case a new reporter is listed, or when a selected reporter reports another spot while being known by the software.

This function can be very handy for operators with a reduced visibility. Next to that, having this running in the background allows you to do other things while being warned by a speech message when a new or existing reporter is added to the spots list.

10.4.1 Controls Navigation Alarms window



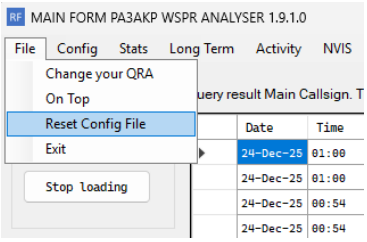
1. When selected, the alarm is working. Always keep the window open. After this checkbox is selected, the Auto Query on the Main Form is enabled. This allows new reporters to be listed.
2. When selected, a new reporter is announced
3. When the Speech On is selected, the message can be heard
4. To check if the audio can be heard, run a test message
5. Three types of Alphabet can be chosen

6. The speed of speech
7. Make the message short
8. This is the second option for audio warnings. When checked, and a callsign from the existing reporter list is selected, a message is spoken that the reporter receives you again.
9. Desktop message On or Off
10. Send an email to your selected e-mail address. Once entered you can not change the e-mail address anymore. The only way to do this is by deleting the config.ini file in the folder:

C:\Users\Public\Documents\WSPR\System

or

use the reset config file function on the main form.



11 TAB1 of the WSPR Data Graphical Analysis window, 'SNR per reporter'

The window shown below in Figure 21 is displayed on the screen after you have clicked the Open Window button in the Graphs group on the main window.

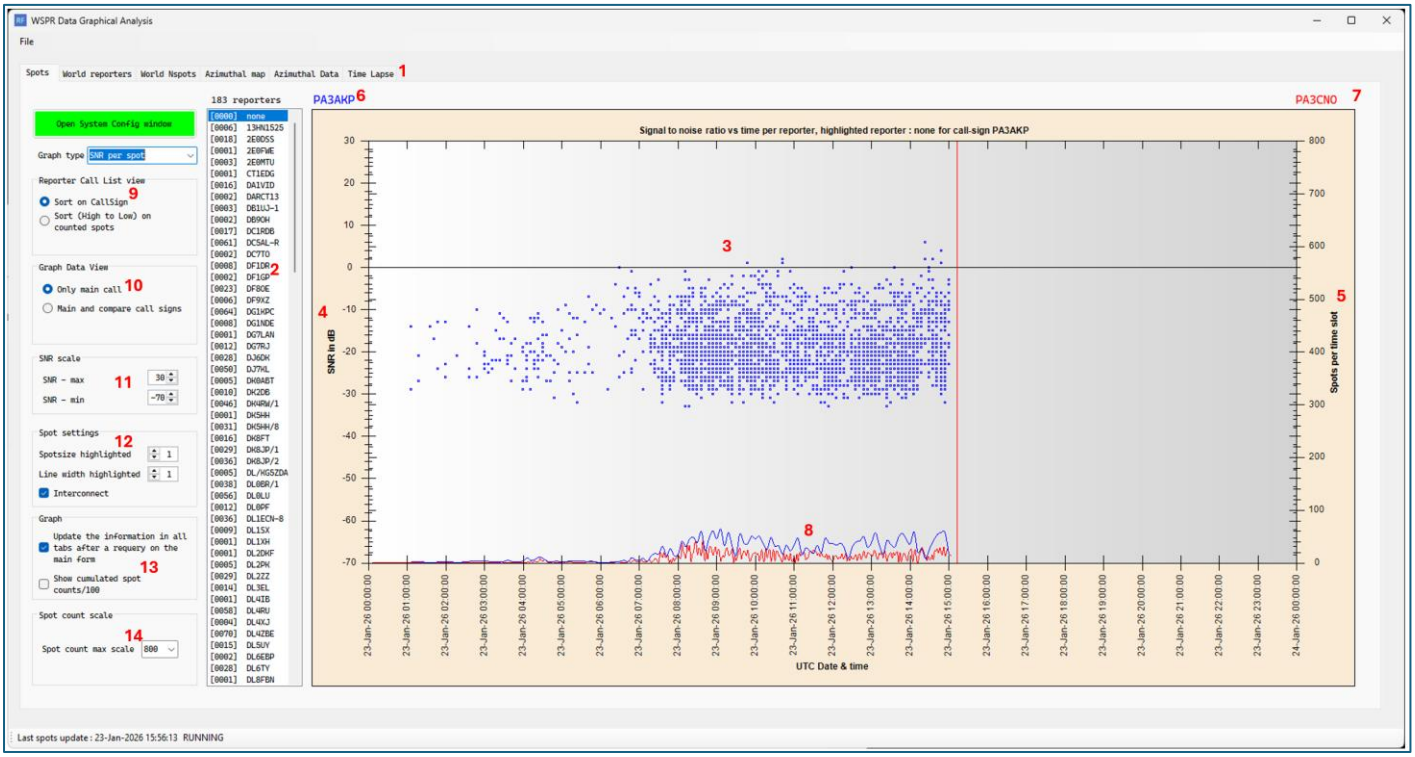


Figure 21 Graphical Analysis window

Explanation of the main items in the Graphical Analysis window

The red labels on the screenshot above in fig 9 refer to the following in this tab of the window:

1. There are six tabs in this window with different views and data layouts.
2. The list of reporters receiving the WSPR transmissions generated by the query/queries defined in the Config Queries window.
3. The spots from the reporters positioned on the graph with X-axis = spot time and Y-axis = SNR value.
4. The primary Y-axis for the SNR values. Starts default with SNR_{max} =30dB and SNR_{min} = -70dB, see below in fig. and fig. for the effects
5. The secondary Y-axis with the spot rate per time slot of 6 minutes
6. The MAIN call, colour of the text is defined in the System Config window
7. The COMPare call, colour of the text is defined in the System Config window
8. The spot rate per time slot of 2 minutes shown as line graphs
9. The sorting of the list with reporters. The sorting can be on Callsign or on number of received spots. See fig. 10 below
10. What is shown as data. You can select MAIN, COMPare and both. The colours of the plotted spots are the same as the colours of the text with the respective call signs. (see 6 and 7)
11. Here is primary Y-axis can be set for the range of displayed SNR values.
12. Here you can change the size of the spots and line-width in the graph. A line graph is displayed when one of the reporters in the list (2) is clicked. Depending on station selection(10) you will see 1 or 2 line graphs.
13. Graph general: update the graphs automatically when the auto-query on the main form is on, show the cumulation of the spots counts
14. Set the scale of the secondary Y-axis, the number of spots per time slot of 6 minutes.
15. The vertical red line is the Current UTC time and is updated with the pace of the data retrieval form

11.1.1 Graphical Analysis opens as default with SNR per reporter, see Figure 22

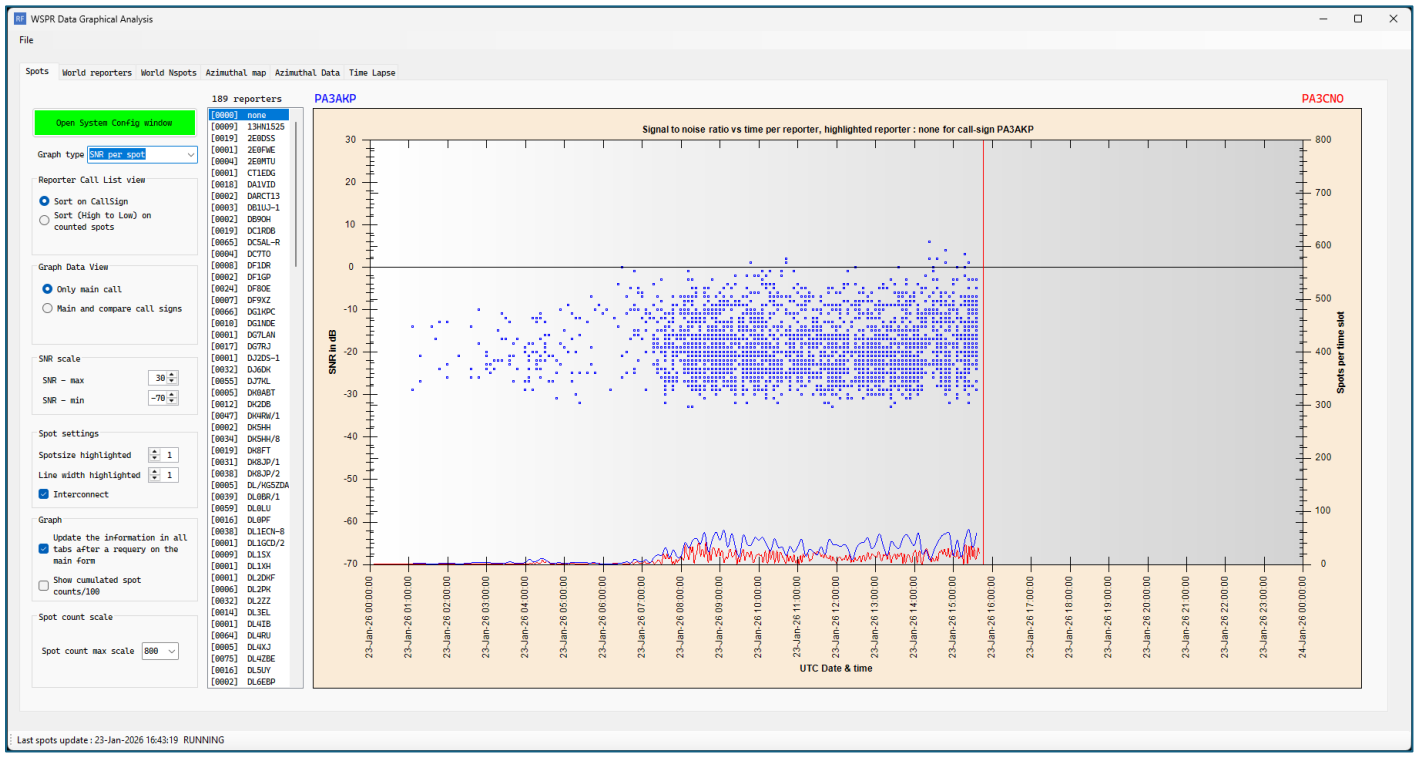


Figure 22 Default opening of the Graphical Analysis window

11.1.2 The SNR value range changed to -45dB to +10dB

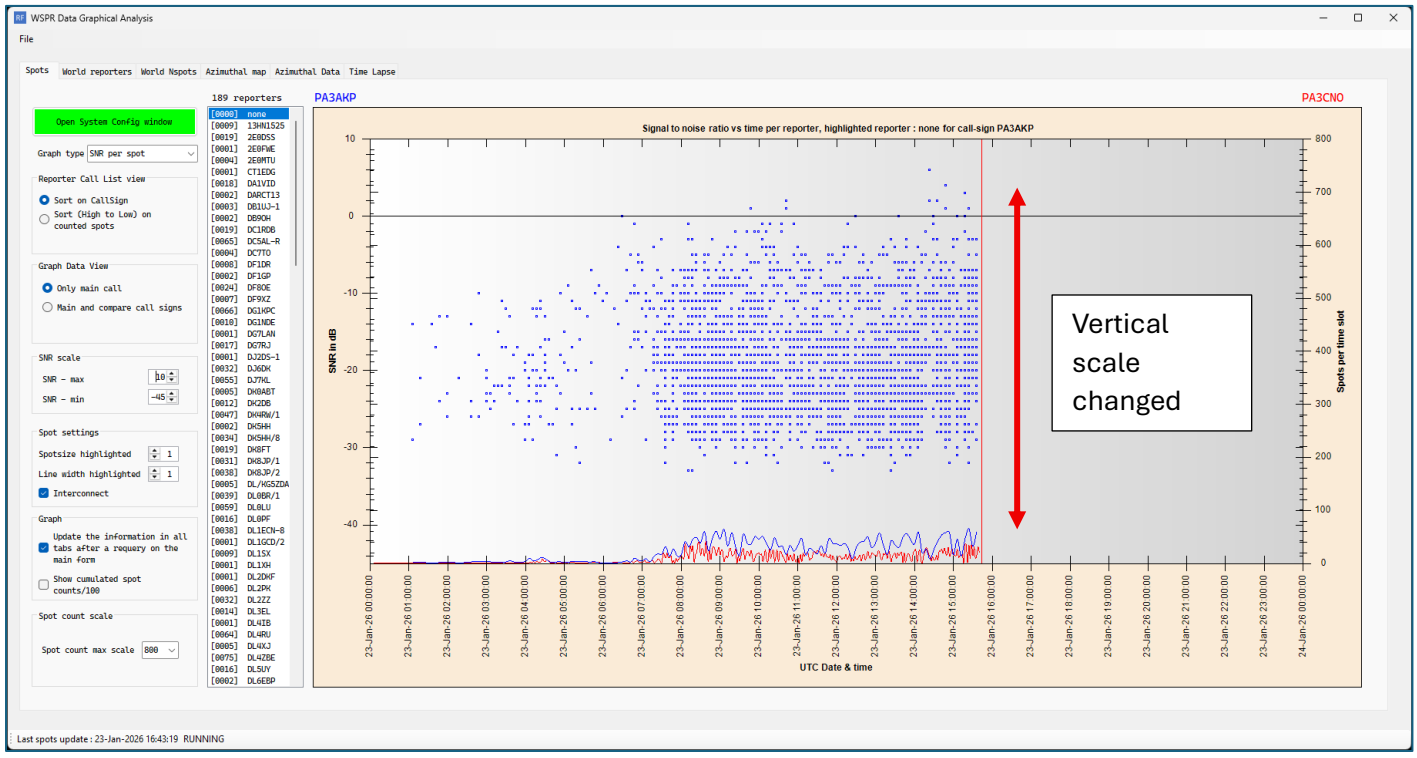


Figure 23 After modification of the (primary) SNR axis

In Figure 23 After modification of the (primary) SNR axis the spots are vertically more vertically spread over the graph area.

11.1.3 Sorting of the reporters list on callsign and number of reported spots

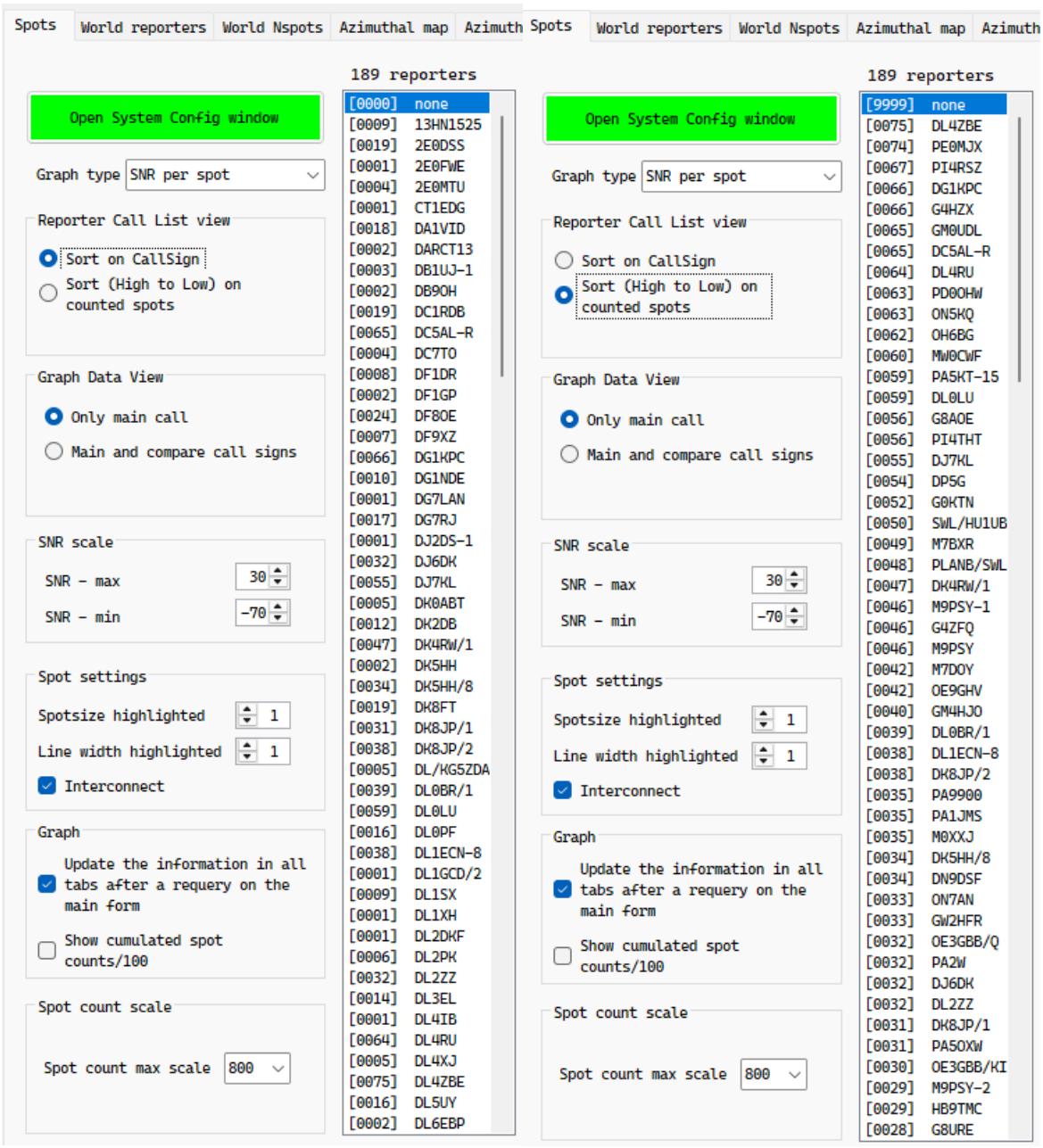


Figure 24 Default sorting, alphabetic on Callsign (left) and sorted on High to Low spots count (right)

11.1.4 Select the spots received from one of the reporter stations in the list.

After a click on reporter DL4ZBE in the list, only the spots for this reporter station are shown and as the interconnect checkbox is selected a line connects the spots. When the interconnect is deselected the graph will look as follows, see Figure 28

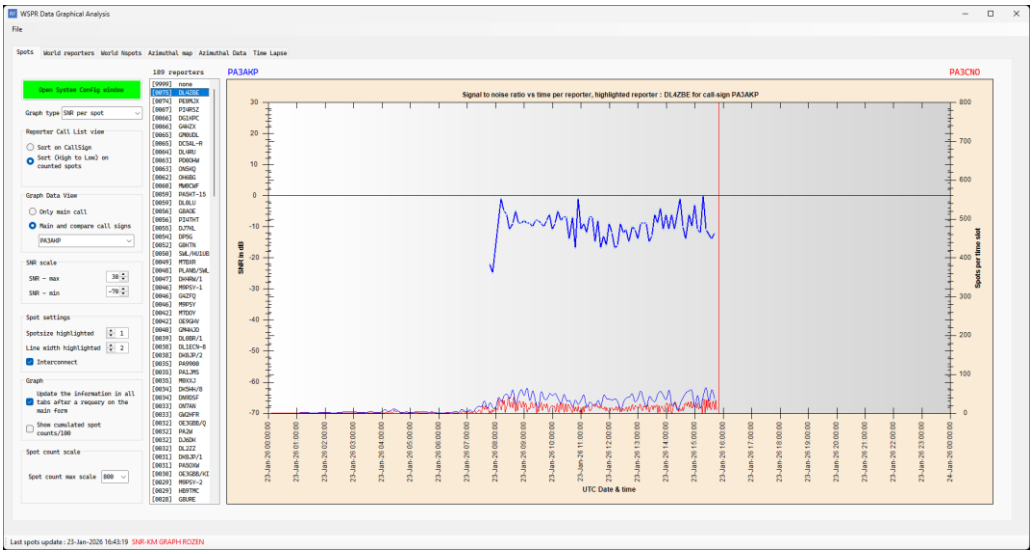


Figure 25 Main Call Spots reported by DL4ZBE

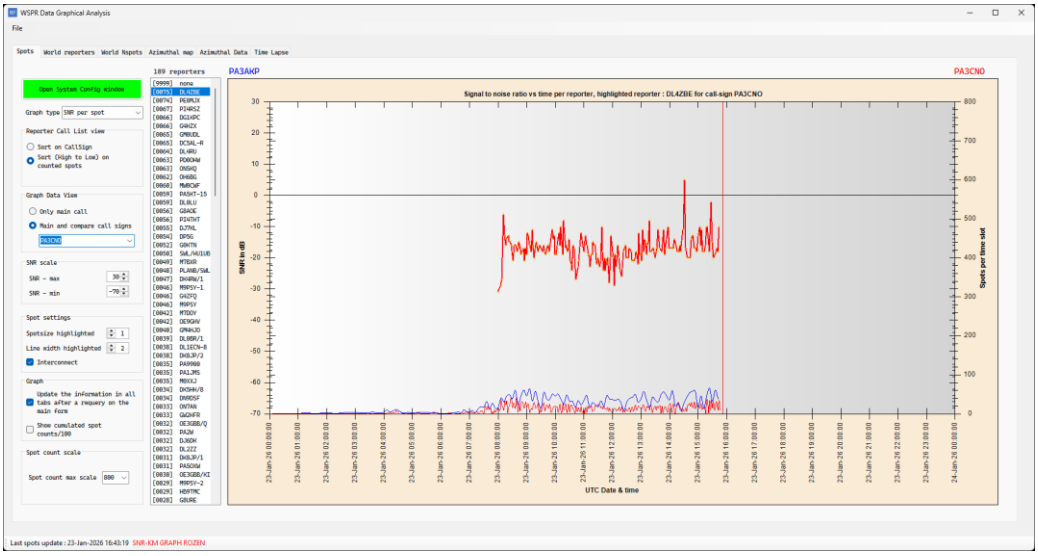


Figure 26 Compare Call Spots reported by DL4ZBE

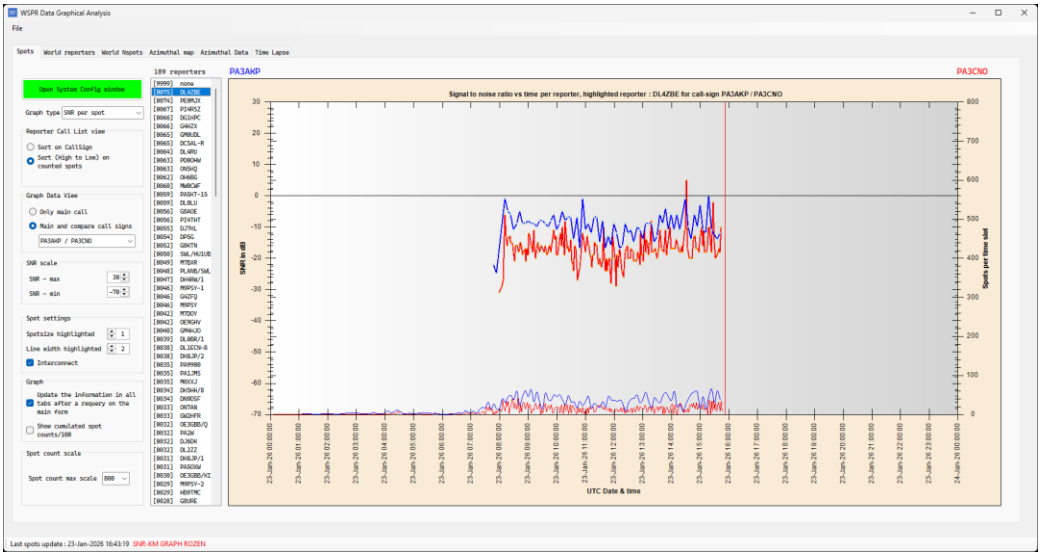


Figure 27 Main and Compare Call Spots reported by DL4ZBE

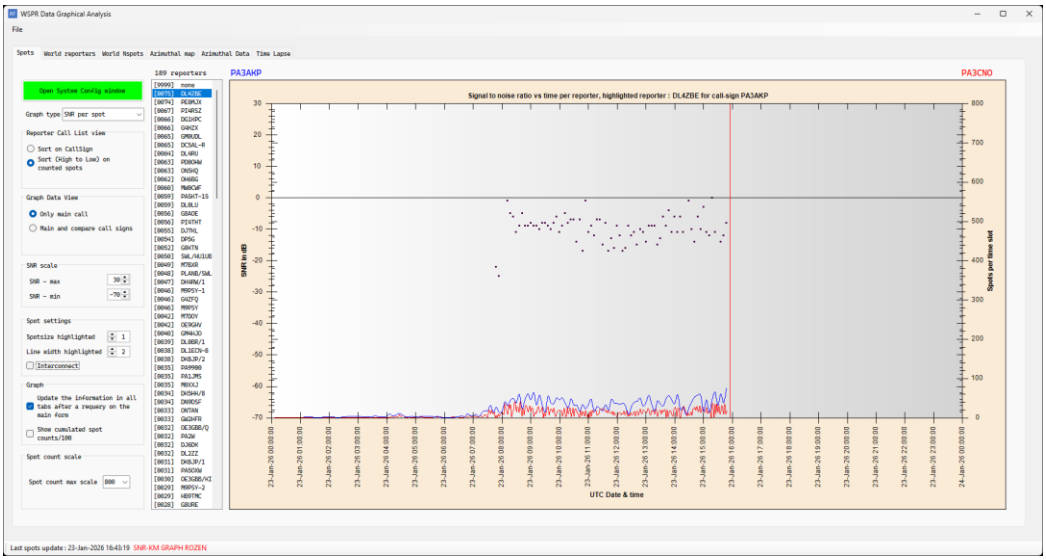


Figure 28 Interconnect is deselected for the MAIN call sign

The size of the spots in the graphs can be changed with respect to size and colour in the System Config window.

A shortcut to this window is the green button on the top left of the window. Otherwise in the main window you find this in the menu of the Main form under ‘config’.

11.1.5 Changing the parameters of the spots on the SNR graph

In the Config System settings window the behaviour of the MAIN and COMPare spots are defined with respect to size and colour. In the graph above the spot settings are shown on the right hand screen shot, fig. 15.

On the left (1) the size and colour settings for the MAIN call sign, on the right (2) for the COMPare callsign. colours can be changed with a click on the colour box, the size of the spots with the Up-Down controls.

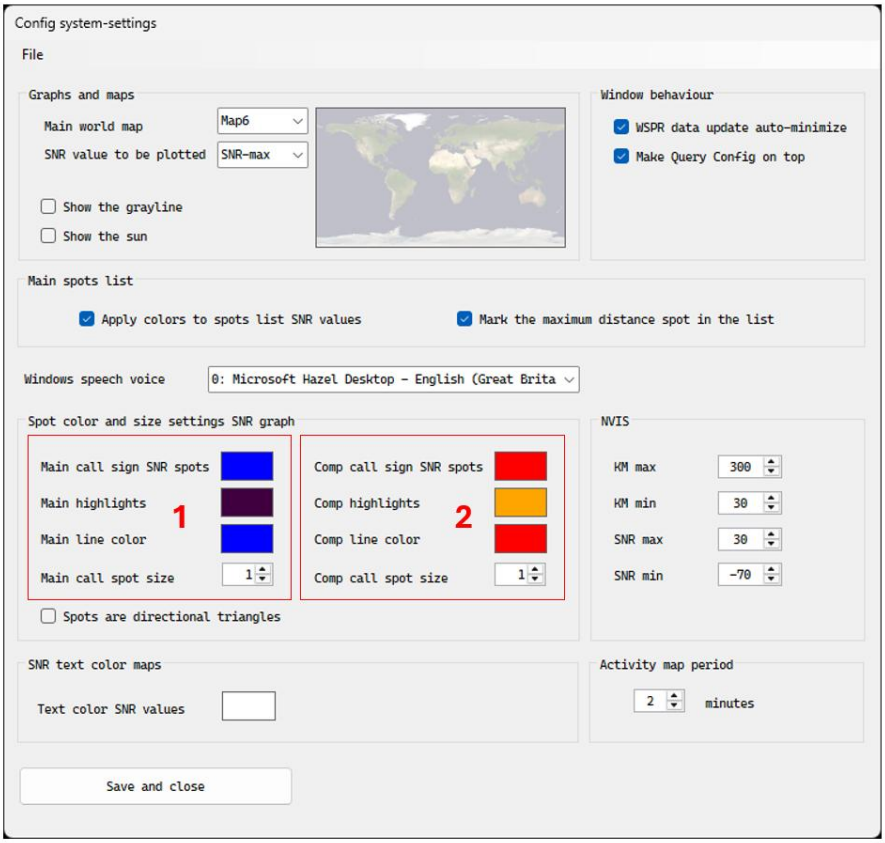


Figure 29 The Config-System window

To see the effect the following colour changes are implemented for the MAIN call sign, Figure 30

Normal spots colour:	orange
Selected reporter spot	blue
Interconnect line	light green

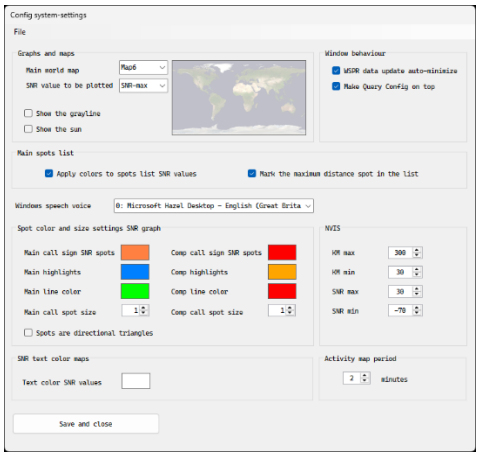


Figure 30 MAIN call sign spot colour changed to orange

This changes the SNR graph as follows with the MAIN call sign PA3AKP text and spots on the graph are orange open squares now.

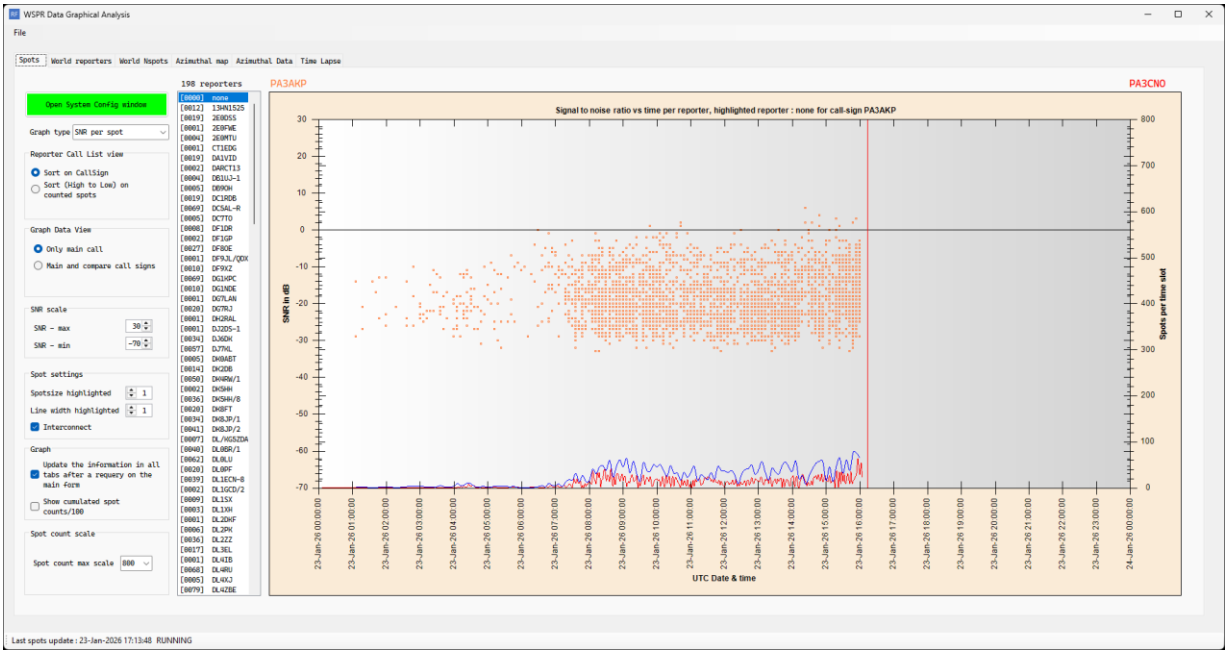


Figure 31 All spots for the MAIN callsign

Click on DL4ZBE

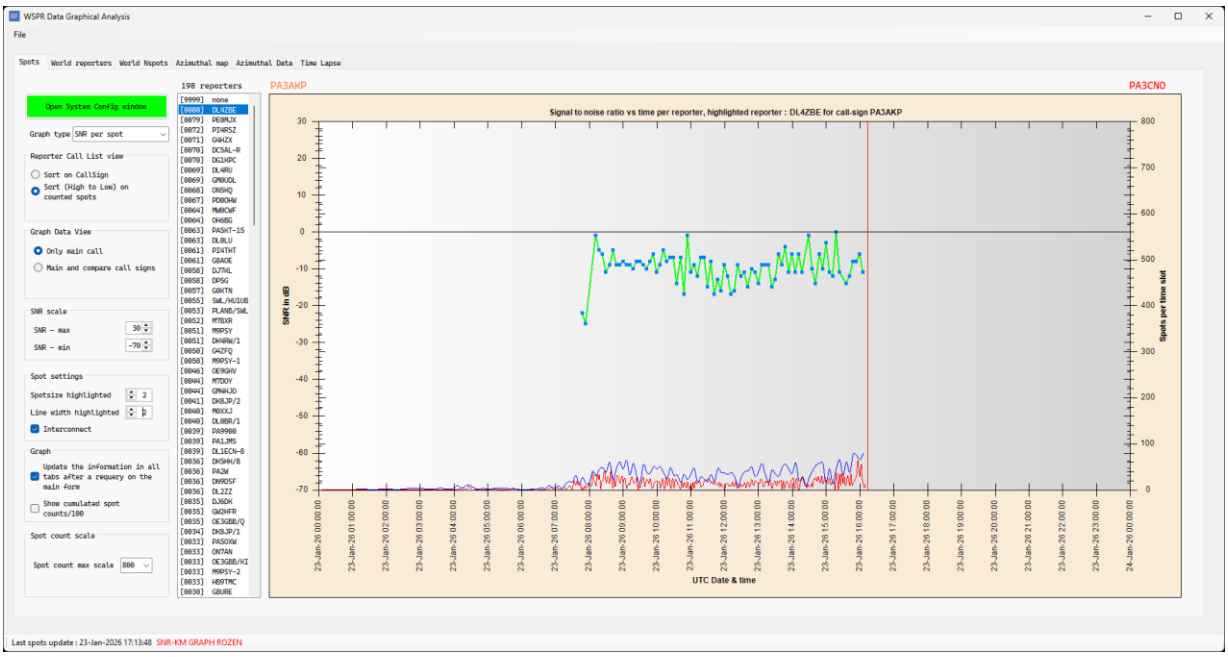


Figure 32 Spots from DL4ZBE

The size of the spots are now larger by making the setting of ‘Spotsize highlighted’ = 4 in the spot settings group. And the interconnect lines are now the green colour.

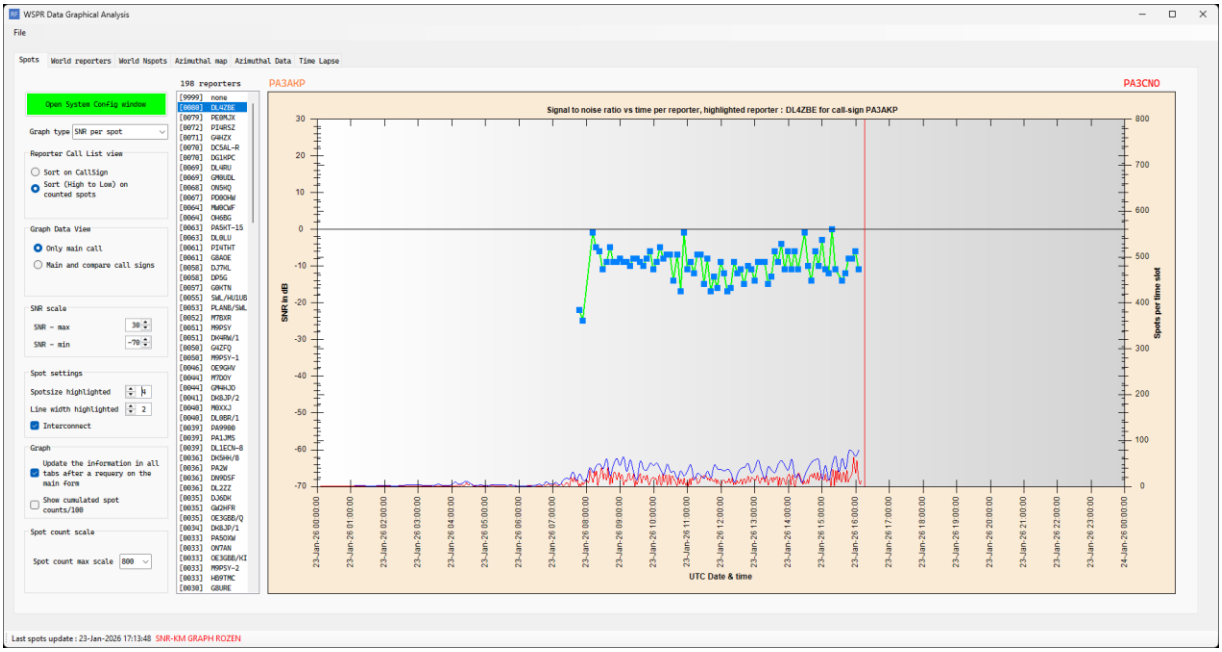


Figure 33 SNR graph with enlarged spots and thicker lines

So far we have been looking only to the MAIN call. When a COMPare call is also defined, a comparative view between the two stations is generated. In the group ’Graph Data View’ the following selection can be made:

- View only the MAIN call
- View the MAIN, COMPare and MAIN/COMPare calls

11.1.6 ’Graph Data View’ group selections

In case two call signs are defined, you can select as follows from left to right, see Figure 34.

1. Only the MAIN callsign data
2. MAIN and COMPare only PA2REH
3. MAIN and COMPare only PA3AKP
4. MAIN and COMPare both PA2REH and PA3AKP

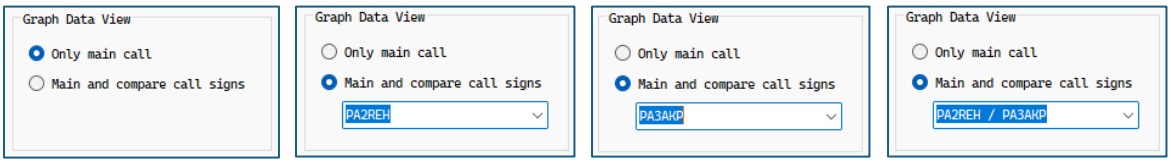
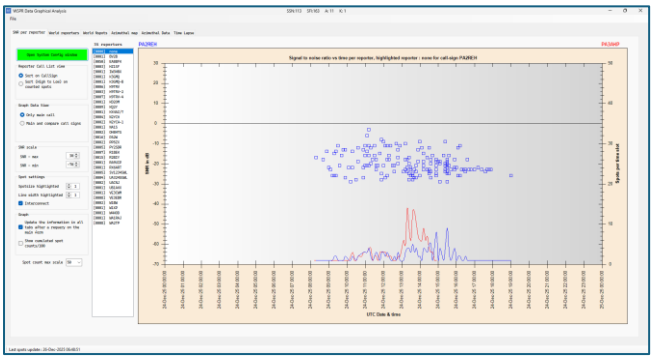


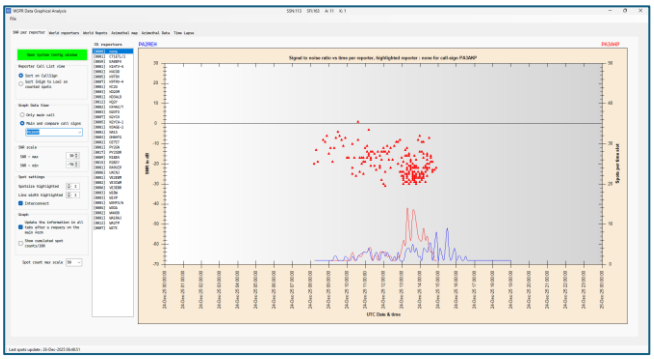
Figure 34 All possible combinations for the Graph Date view group

11.1.7 Graphical SNR results, see 11.1.6

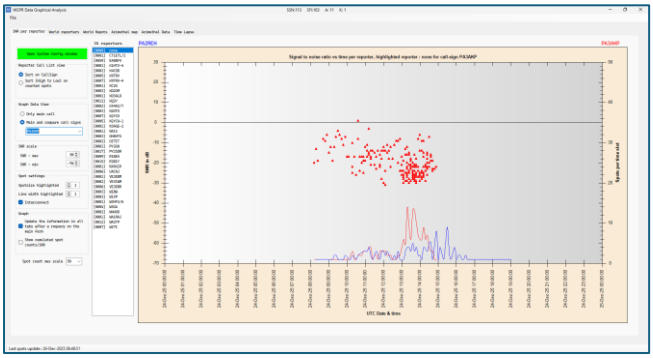
MAIN call sign



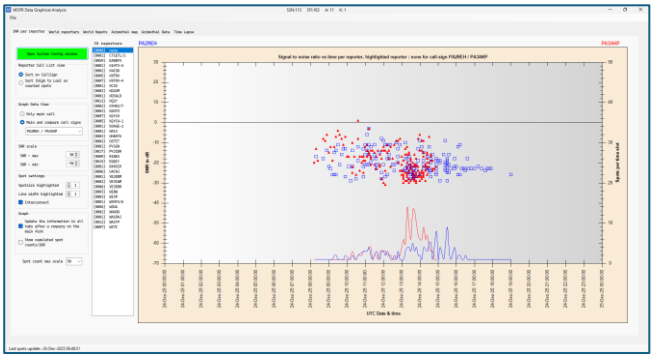
PA2REH



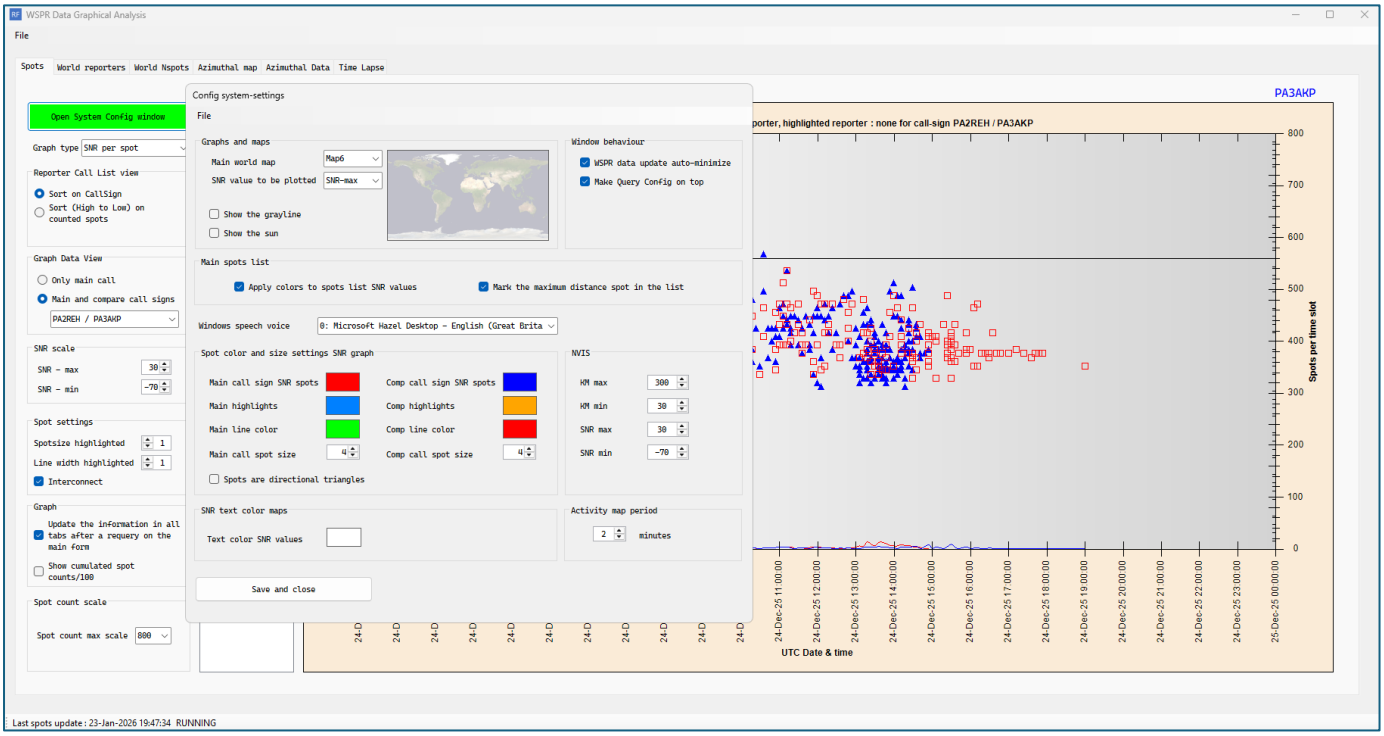
PA3AKP



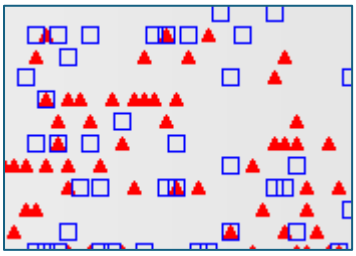
PA2REH & PA3AKP



After changing the spot sizes to 4 with the following settings in the Config System window as follows:



When the MAIN call spot size (Blue square) is one point larger than the COMPare call spot size (Red triangle) , then the spots are co-located and the red triangle falls nicely inside the blue square showing a common spot position.



When in the Config System window the option ‘Spots are directional triangles’ is selected

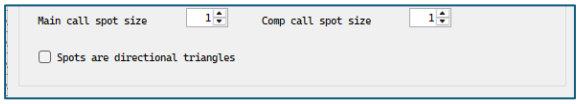


Figure 35 Location of the directional triangles option.

the following effect is seen in the SNR per reporter graph. Each spot is changed from a square blue spot to an arrow which is pointing into the direction where the reporter is located.

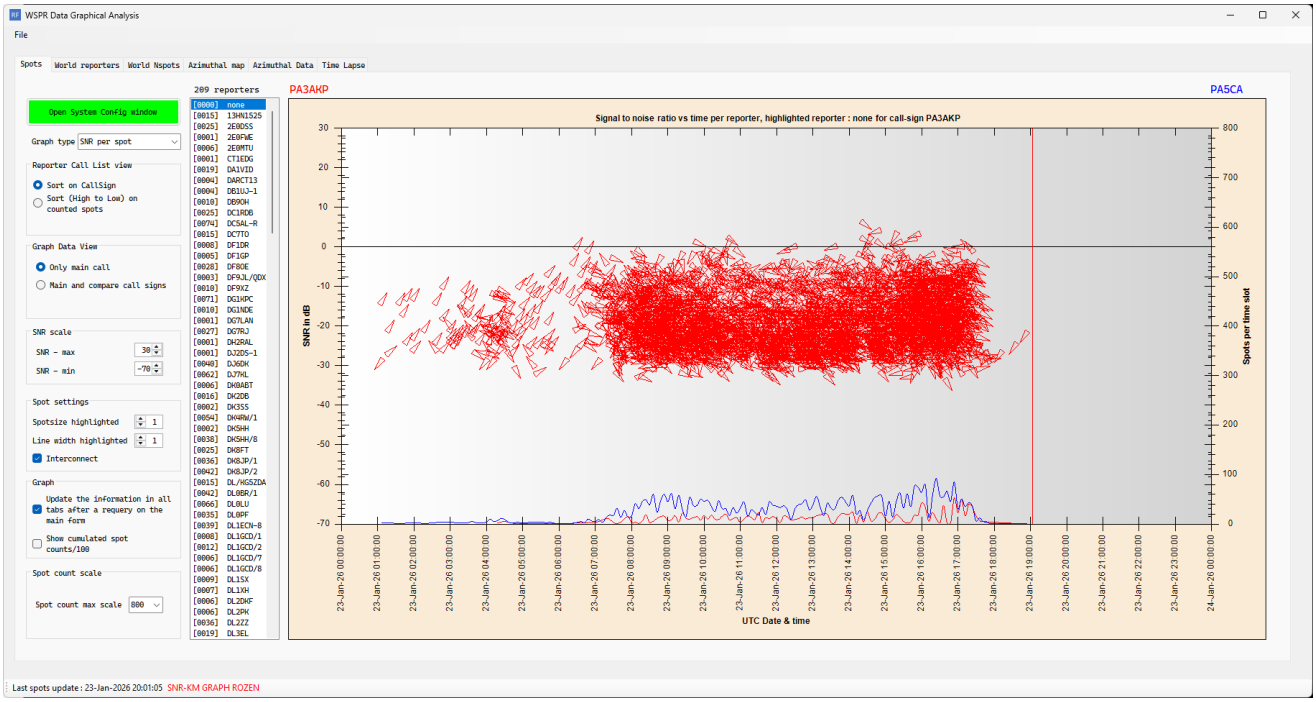


Figure 36 Directional spots for the MAIN call sign

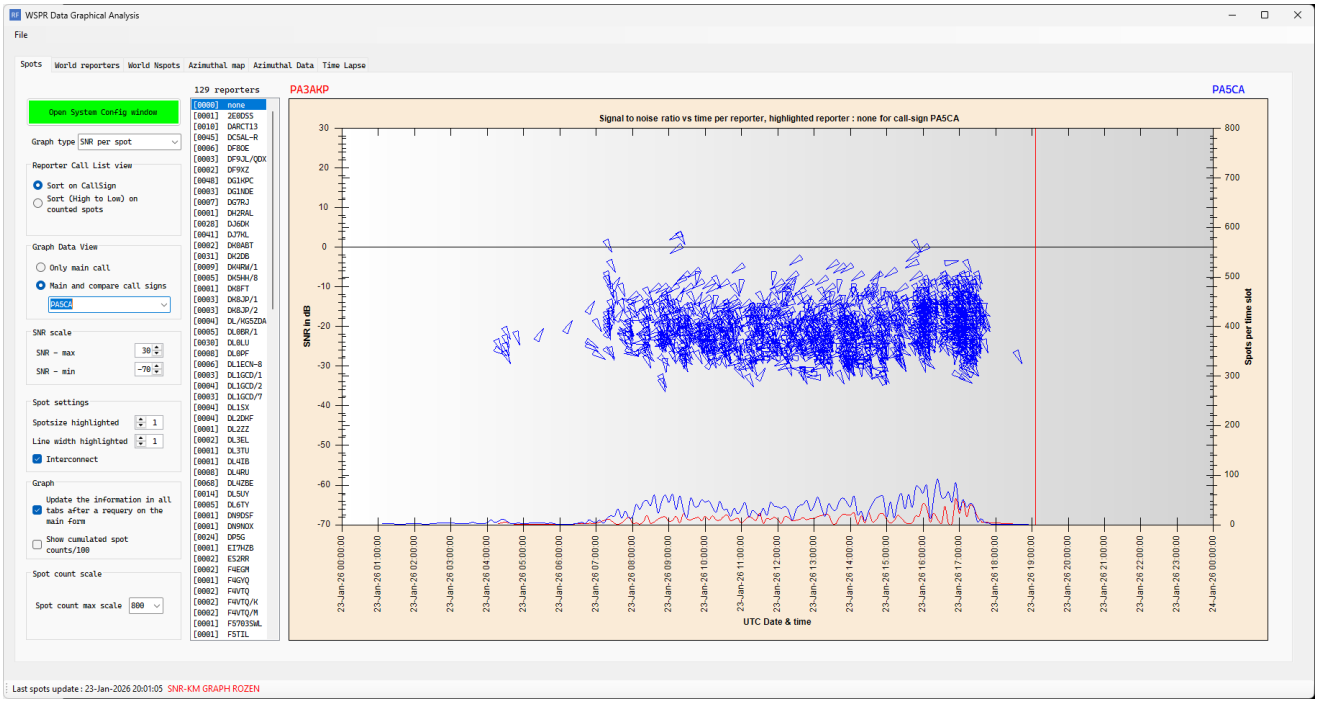


Figure 37 Directional spots for the COMPARE call sign

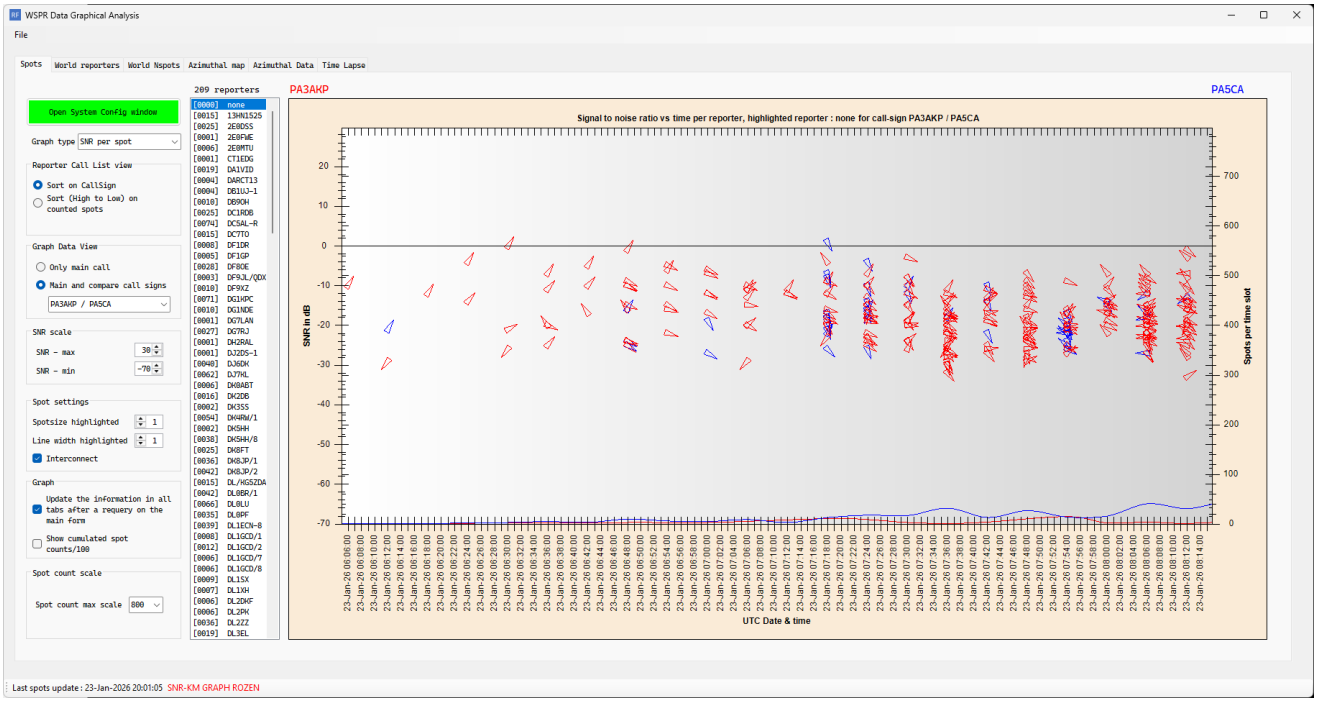
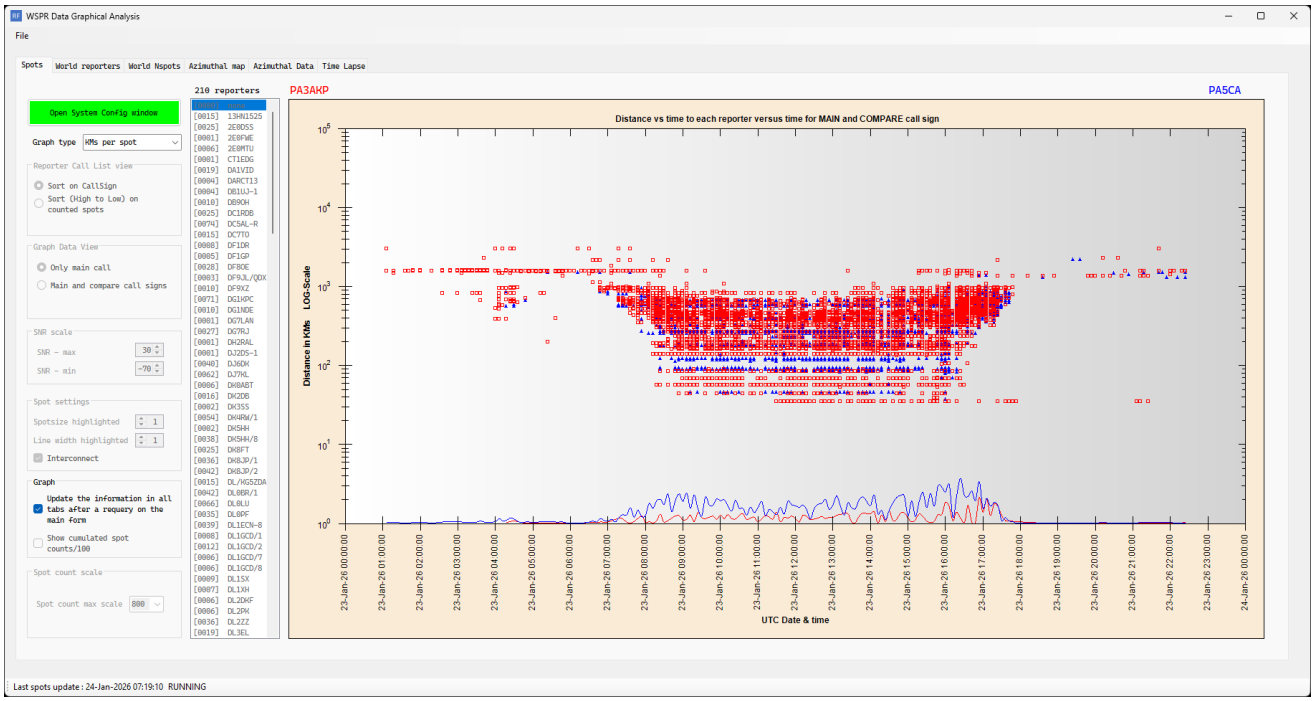


Figure 38 Directional spots for the MAIN & COMPare call signs. The SNR scale is changed

12 How are the conditions evolving on the lower frequency bands.

12.1 Views per time line

To monitor how the conditions are evolving, a different view of the collection of spots makes this possible. Instead of looking at the spots plotted versus the SNR and time scale, you can also look at the spots plotted with distance in kilometres against time. And this produces an interesting view.



The left hand vertical Y-scale is now kilometres logarithmic. The x-axis did not change and is still the time axis for the chosen period. The frequency band is 40 meters. The views below (40 meters) show:

- the spot distance versus time
- the SNR and Ak index versus time
- the SNR of both MAIN and COMPARE stations

in the period 16 to 24 january 2026. In this week a very large CME (Corobal Mass Ejection) came from the sun towards the earth and created an intense Aurora Borealis over Europe on 19 January 2026. The yellow arrow points to a period of HF propagation blackout the night after the arrival of the CME.

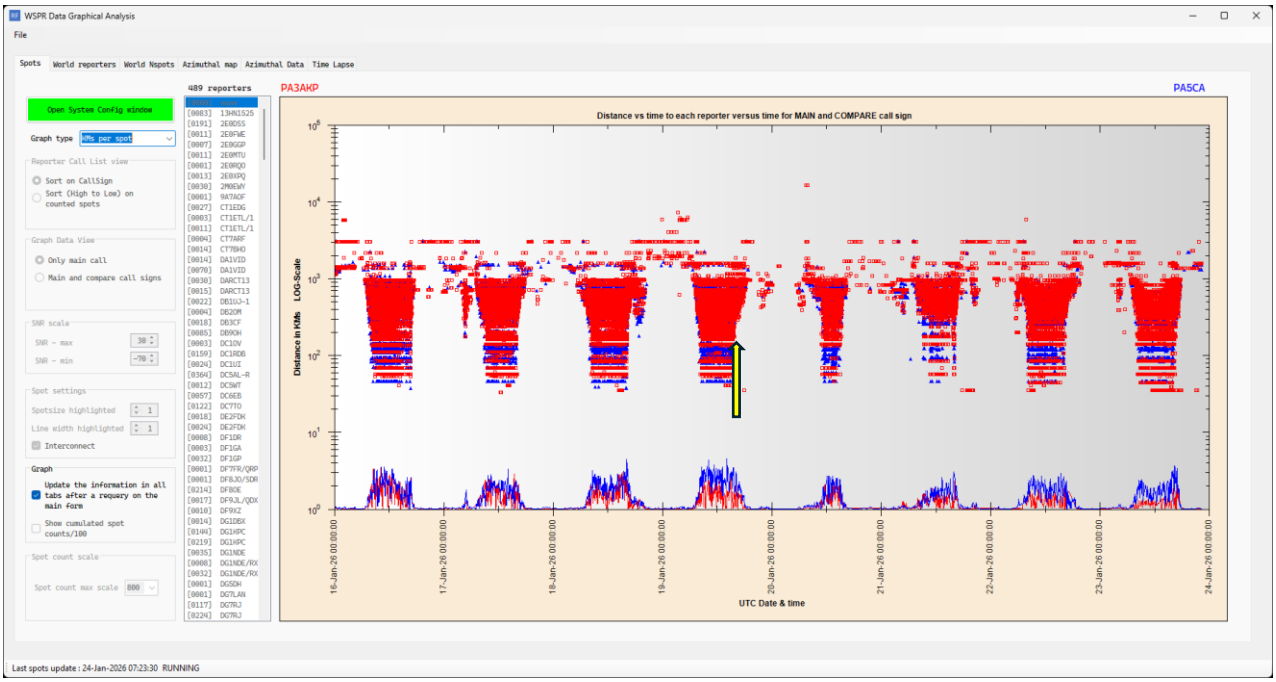


Figure 39 Kilometer per spot and spots per time frame

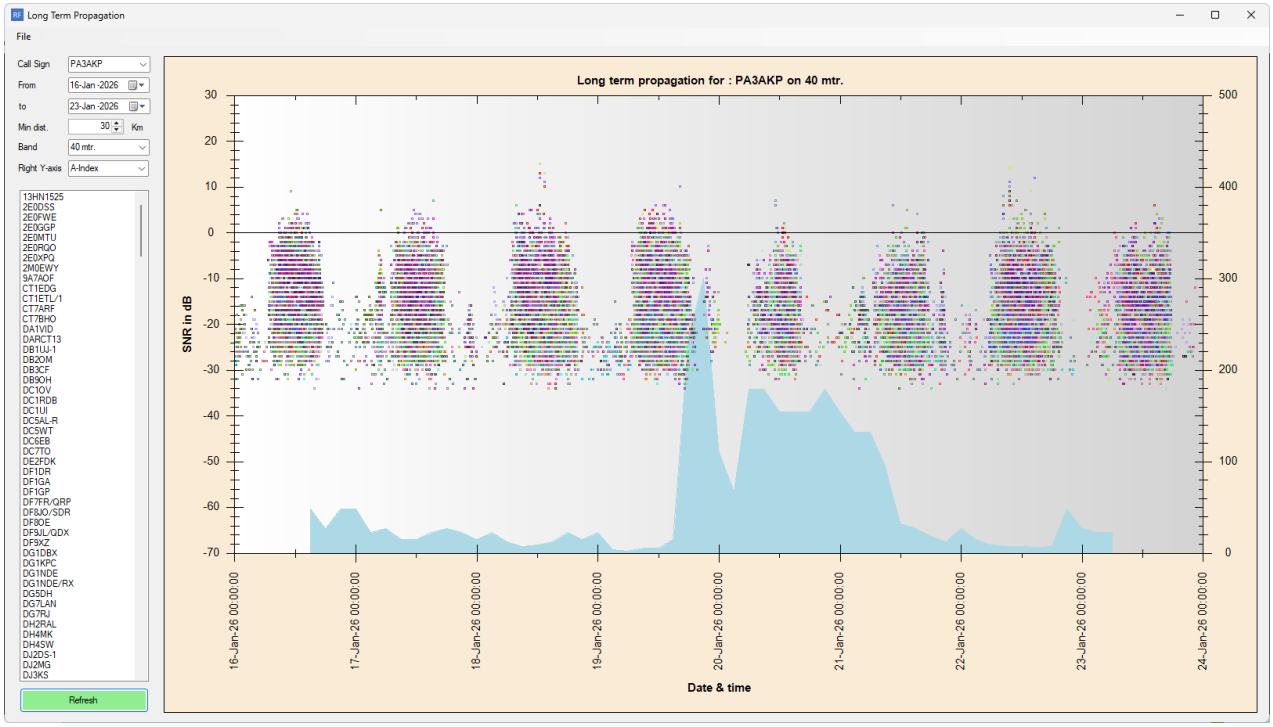


Figure 40 SNR per spot and the Ak index in blue(filled)

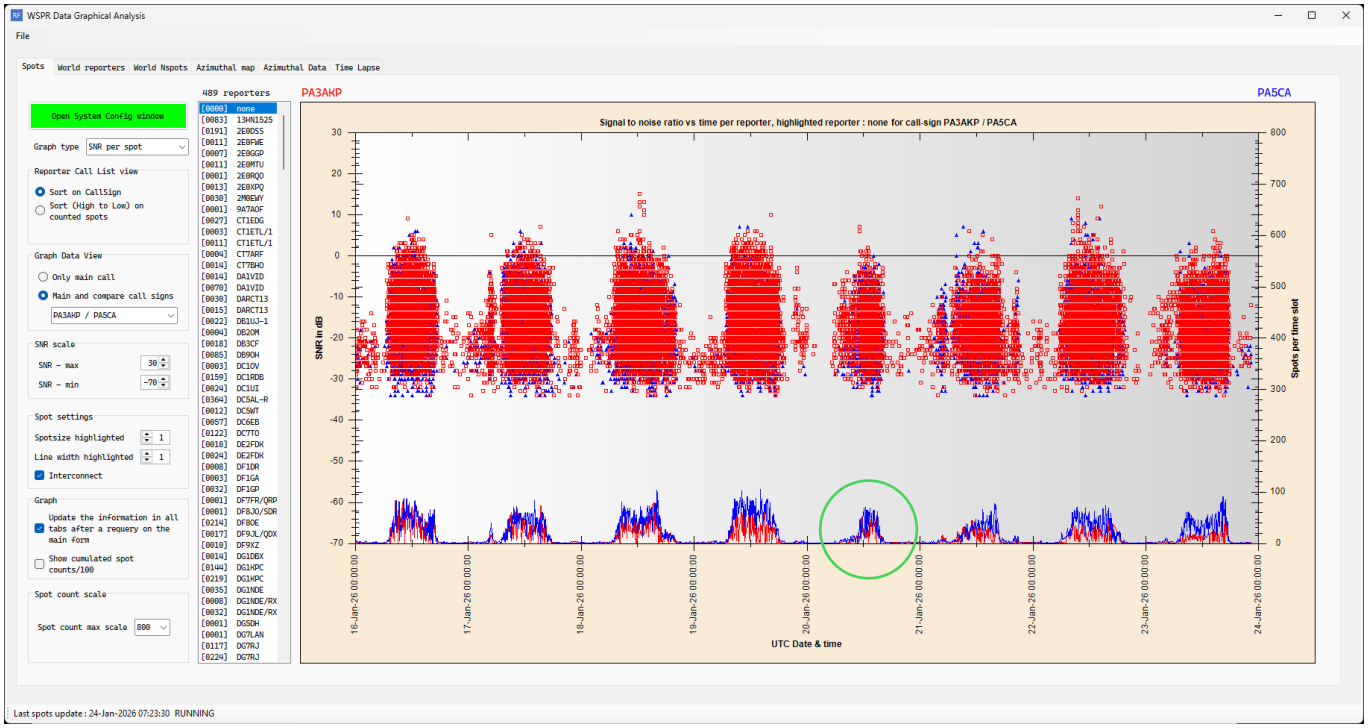


Figure 41 SNR, spots per time frame for MAIN and COMPARE call sign

12.2 NVIS

The NIVIS window provides a clear insight how NVIS (Near Vertical Incident Skywave) propagation is evolving. The default settings of the NVIS window are SNR vertical scale -70dB to +30dB and horizontal cale 30km to 300km. These values can be changed according your requirement in the Config System window.

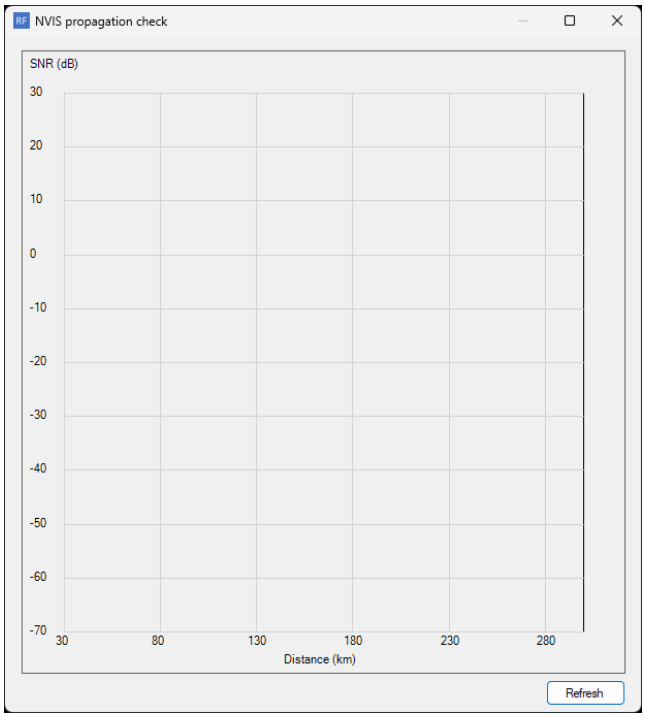


Figure 42 NVIS Window

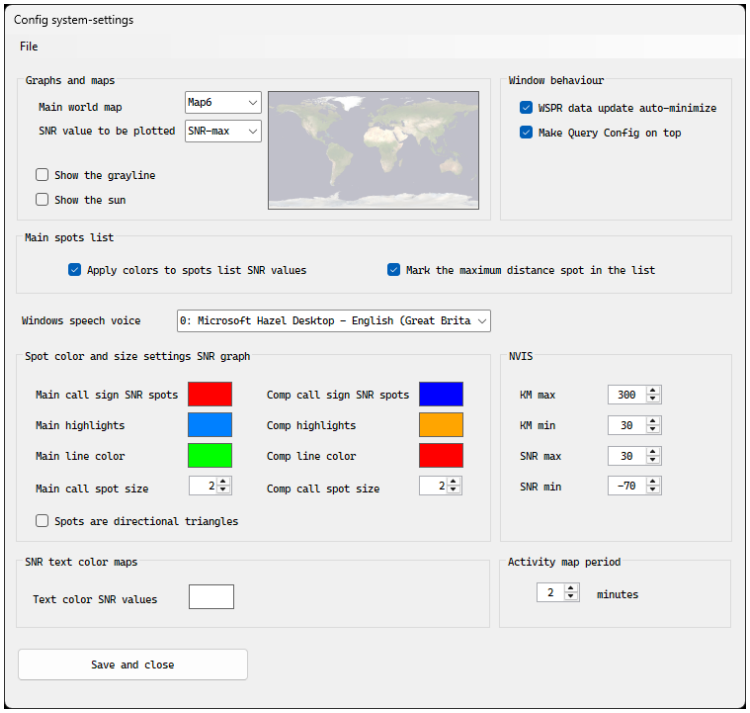


Figure 43 Config system window, set NVIS map parameters

Early in the morning on 40m the window is empty. The next three screenshots show how NVIS is changing when the sun rises and shorter skips are possible.

12.3 NVIS Evolution

Below screen shots at showing the NVIS propagation at the times noted, plus a screen shot where the grayline and sun are positioned. As the Netherlands is a small country, the distance is set to 150km maximum, and the SNR scale is changed to -40dB to +10dB.

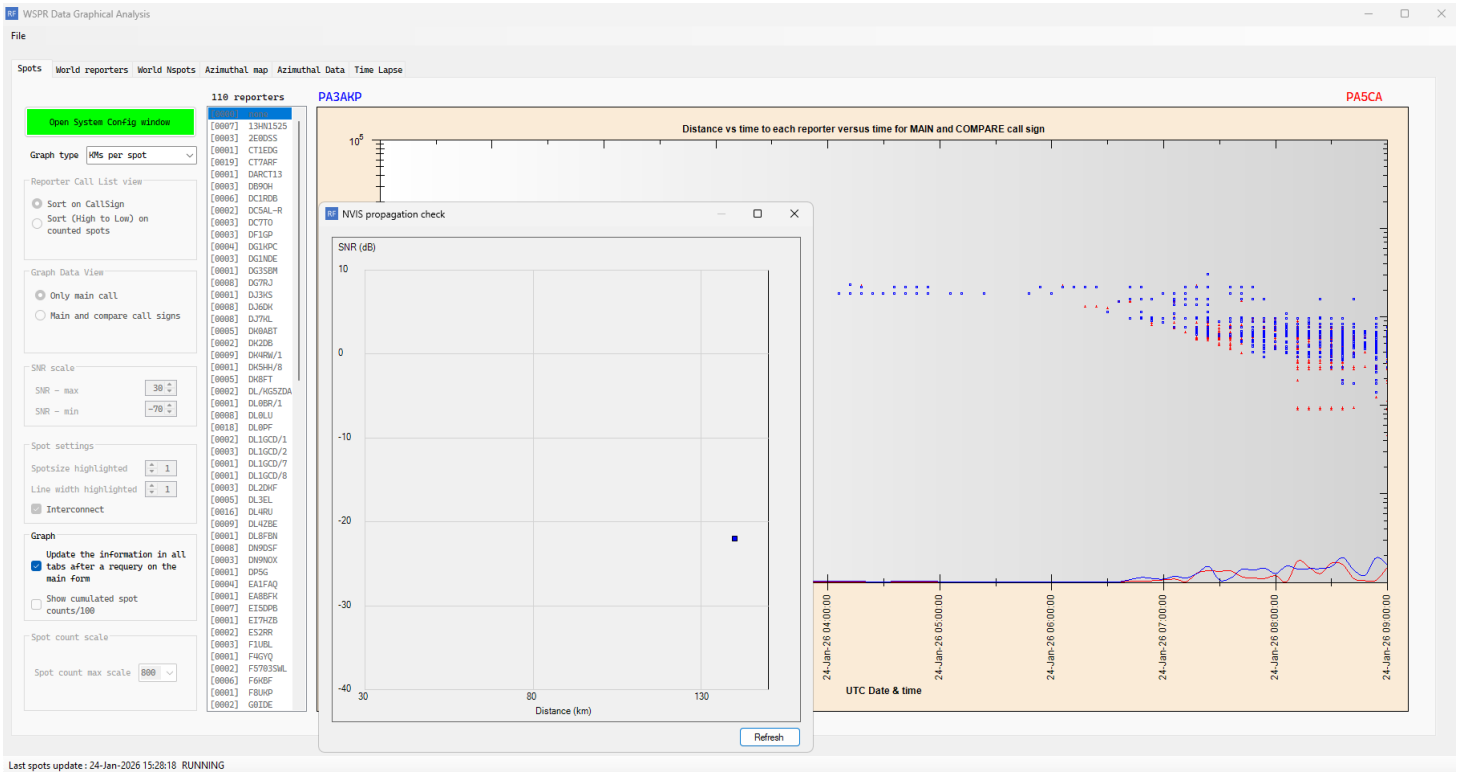


Figure 44 Spots between 00:00 and 09:00 GMT

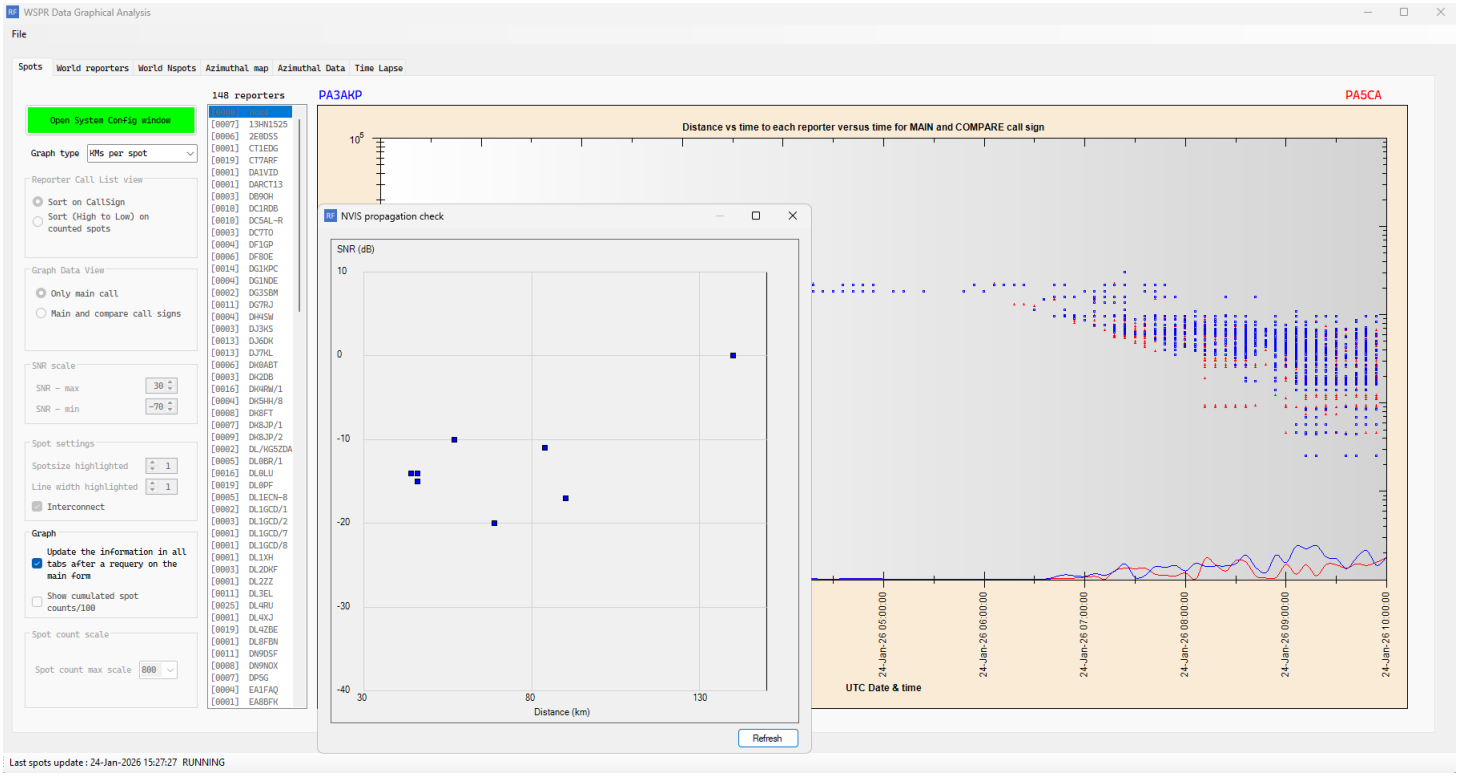


Figure 45 Spots between 00:00 and 10:00 GMT

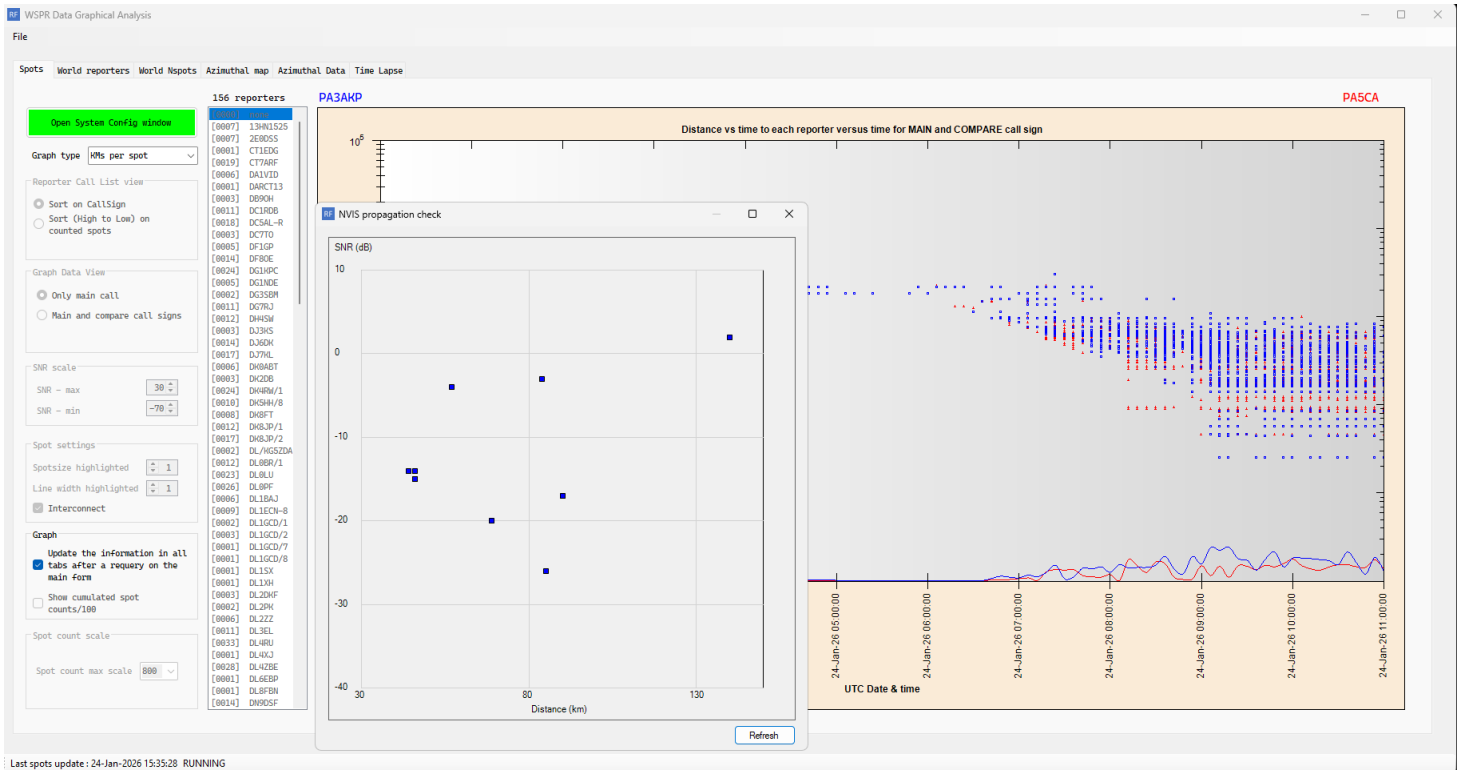


Figure 46 Spots between 00:00 and 11:00 GMT

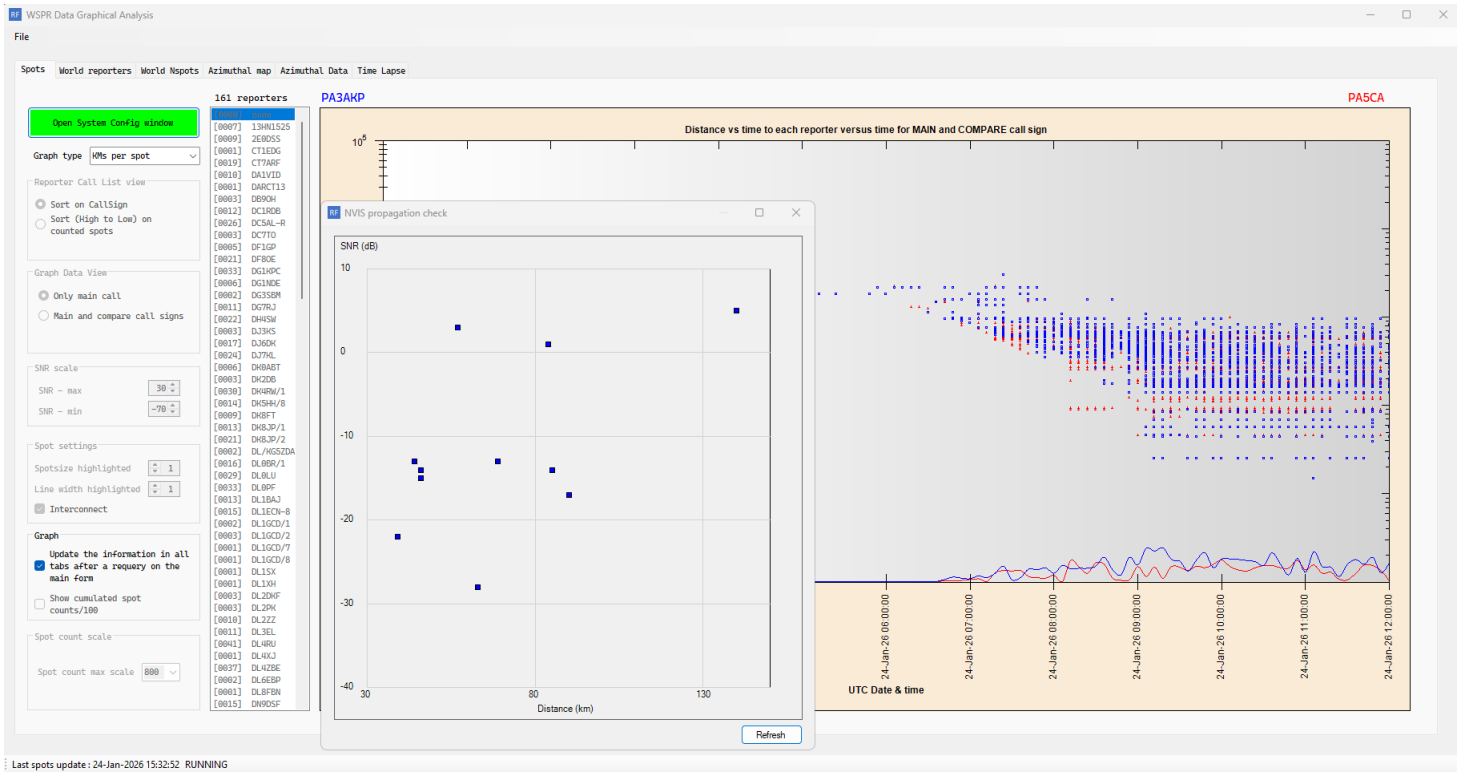


Figure 47 Spots between 00:00 and 12:00 GMT

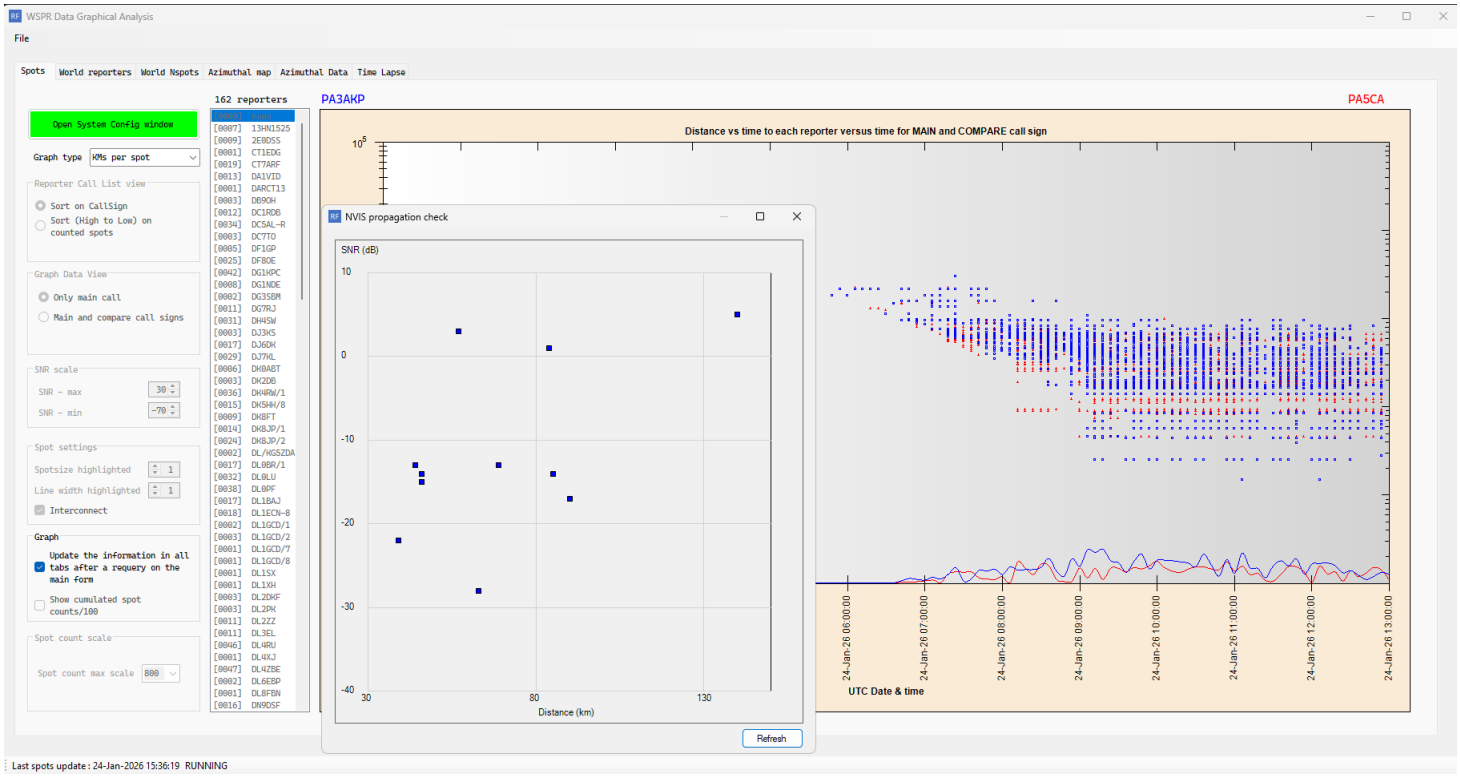


Figure 48 Spots between 00:00 and 13:00 GMT

13 TAB 2 of the WSPR Data Graphical Analysis window ‘World reporters’

A click on the second TAB labelled ‘World reporters’ provides the following view

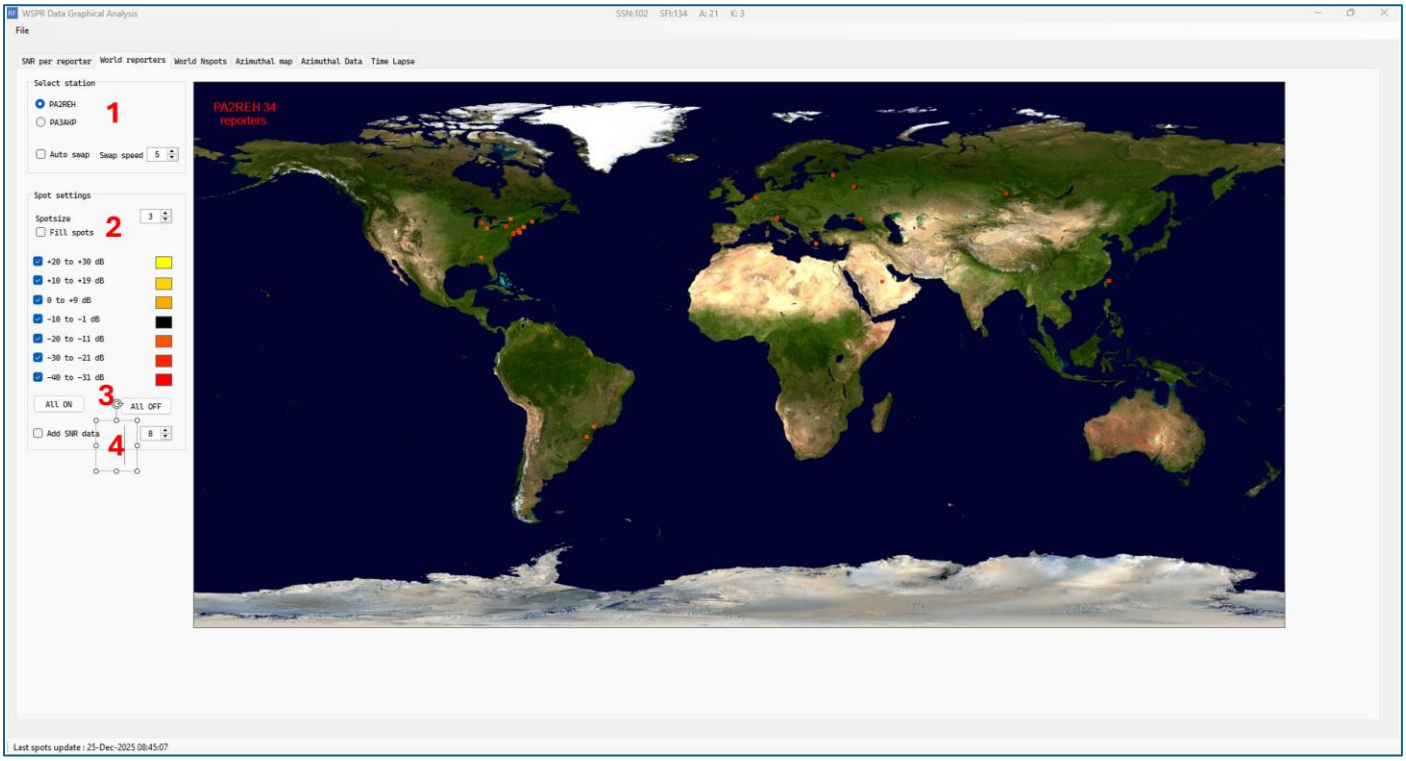


Figure 49 World reporters view for the MAIN call sign

13.1.1 Controls Navigation World Reporters:

1. Select MAIN or COMPare call sign. By default when the window opens, the MAIN callsign is selected

With the Auto swap enabled, the map automatically shows the MAIN and COMPare callsign spots swapping the data automatically. The speed of this swap function is controlled by the swap speed up-down control

2. The maximum received SNR values are spotted by making use of the colour ranges on the left.
3. With the checkboxes on the left of the SNR ranges, a range can be selected for plotting of the map. With the buttons **All On** and **All Off** these checkboxes are set or reset in one action.
4. When checked, the Maximum SNR value is plotted next to the spot.

Figure 50 Example how SNR values are plotted on the mao

NOTE: The SNR text colour can be set in the Config System window.

14 TAB 3 of the WSPR Data Graphical Analysis window, ‘World Nspots’

A click on the third TAB labelled ‘World N-spots’ provides the following view, with map5 selected in the Config System window.

In this window the colour of the spots is related to the number of spots of the stations according the references on the left hand side of the map.

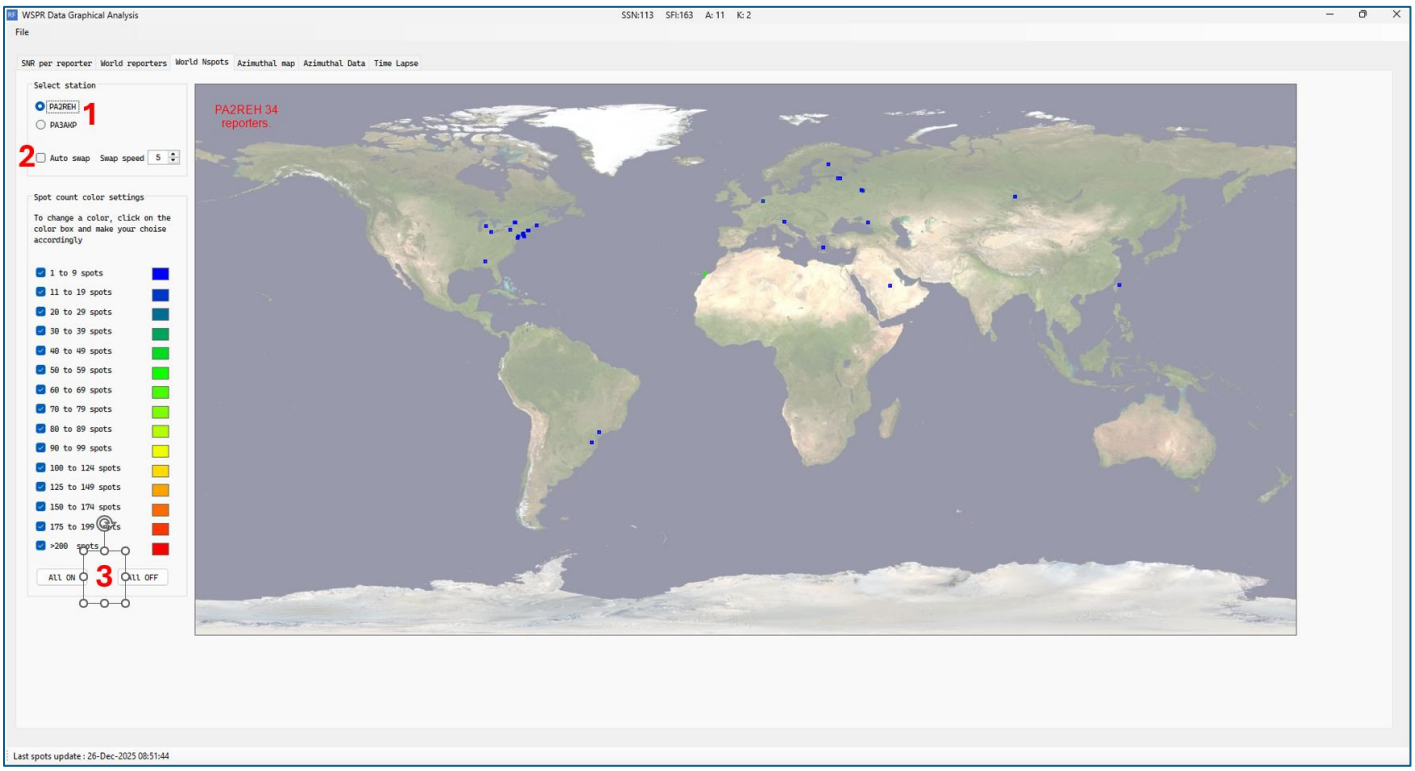


Figure 51 The N-spots graphs window

14.1.1 Controls Navigation World Nspots

In this TAB you can select the station to be viewed, MAIN or COMPARE, and enabling the auto swap option does this automatically.

15 TAB 4 of the WSPR Data Graphical Analysis window, 'Azimuthal Map'

In this TAB two azimuthal maps are generated to represent and show where the reporters are positioned on the earth with the azimuth to the reporter form the centre point of the map which is in this example JO22FE for the Main call sign PA2REH and JO22FD for the COMPARE call sign PA3AKP.

The map is always with the stations QRA in the centre of the circle, and updated when the window is opened.

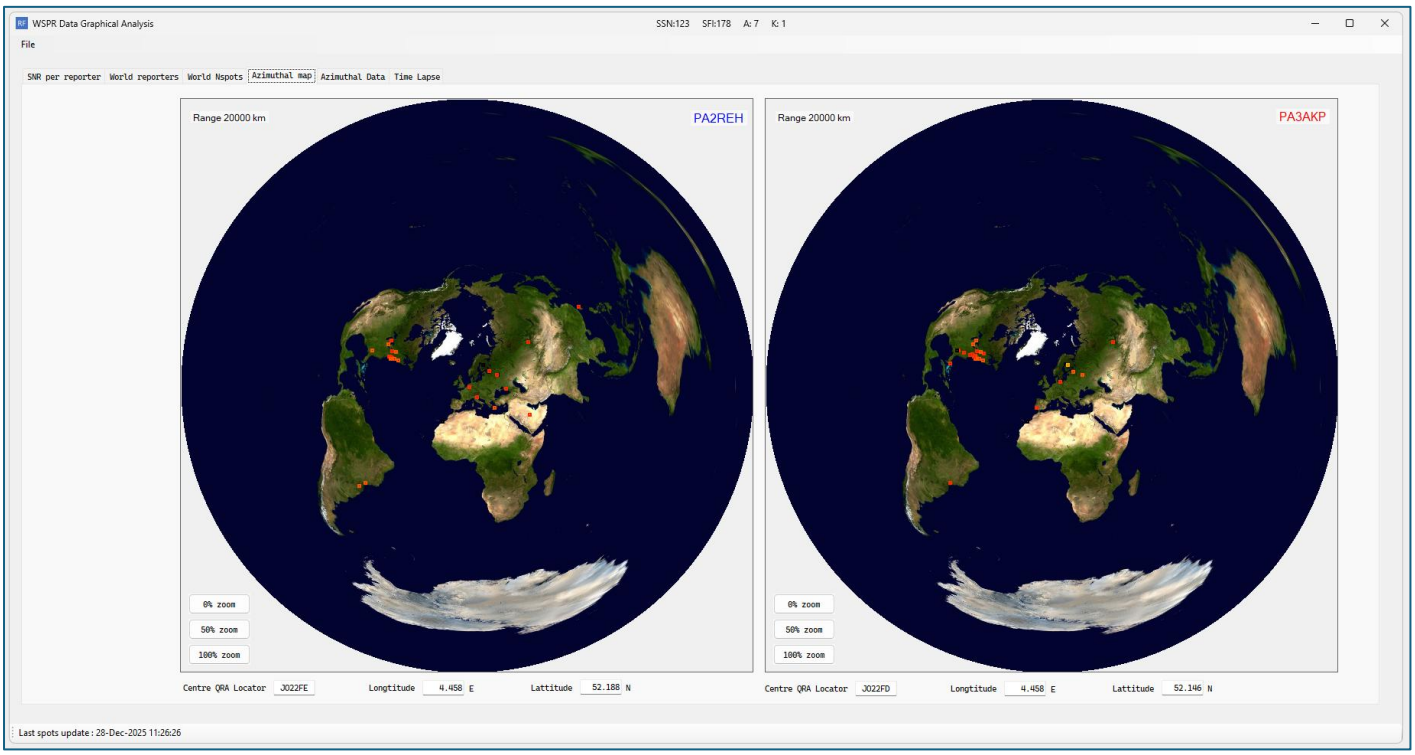


Figure 52 MAIN and COMPARE call azimuthal maps, both in the Netherlands

After changing the compare station to K9RLL located in QRA locator DM33TQ you will see that K9RRL's spots are presented on an azimuthal map with DM33TQ in the center. The transformation process from the rectangular to the azimuthal map is embedded in the program.

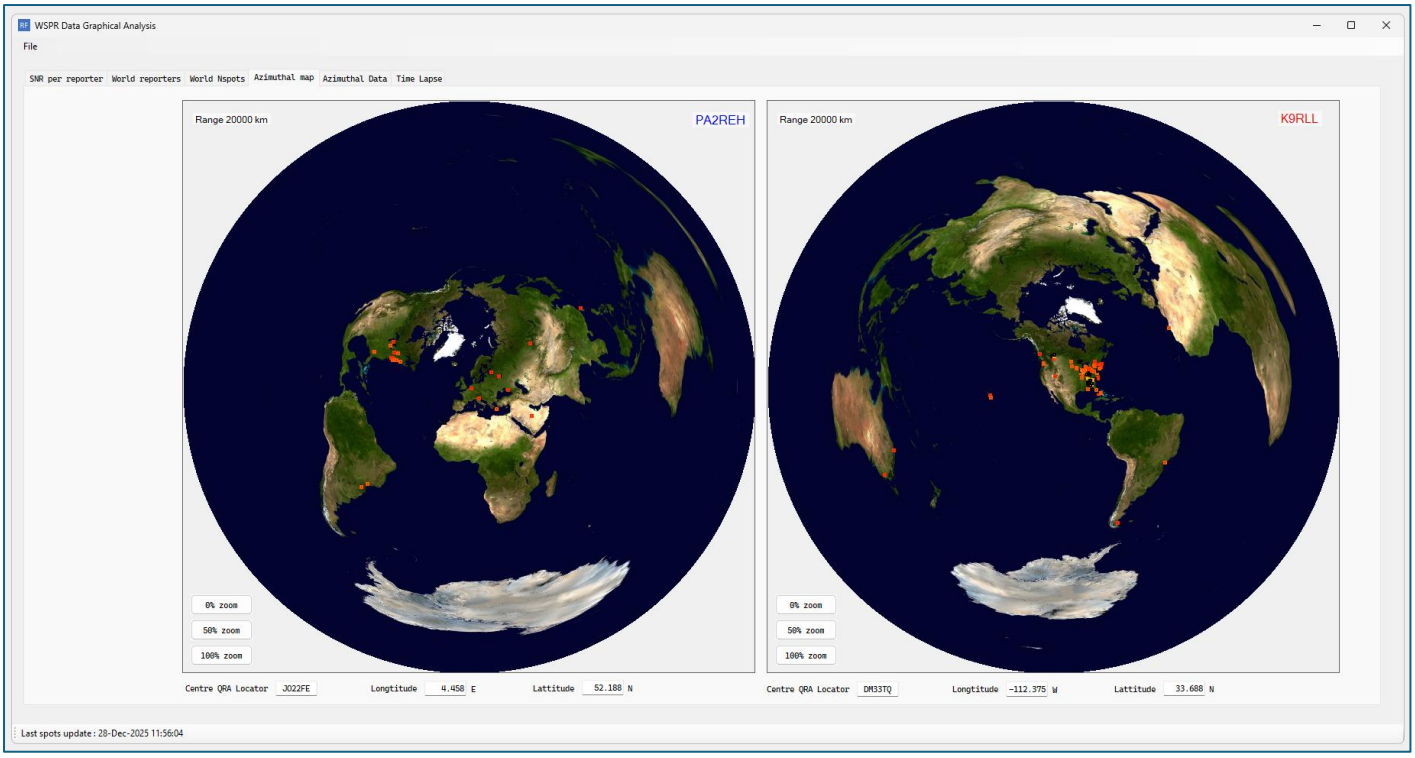


Figure 53 Left side in the Netherlands, right side in the USA

With zoom control buttons on the left lower side of each graph, the following results are obtained:

50% zoom, range 5000 km.

100% zoom, range 2000 km.

16 TAB 5 of the WSPR Data Graphical Analysis window, 'Azimuthal Data'

In the TAB 'Azimuthal data' you see an azimuthal data presentation of the MAIN call sign on the left hand side and the COMPARE call sign on the right hand side. These graphs provide a better insight in numbers as a function of the azimuth angle from you station for:

- Distance in km
- SNR in dB
- Number of spots

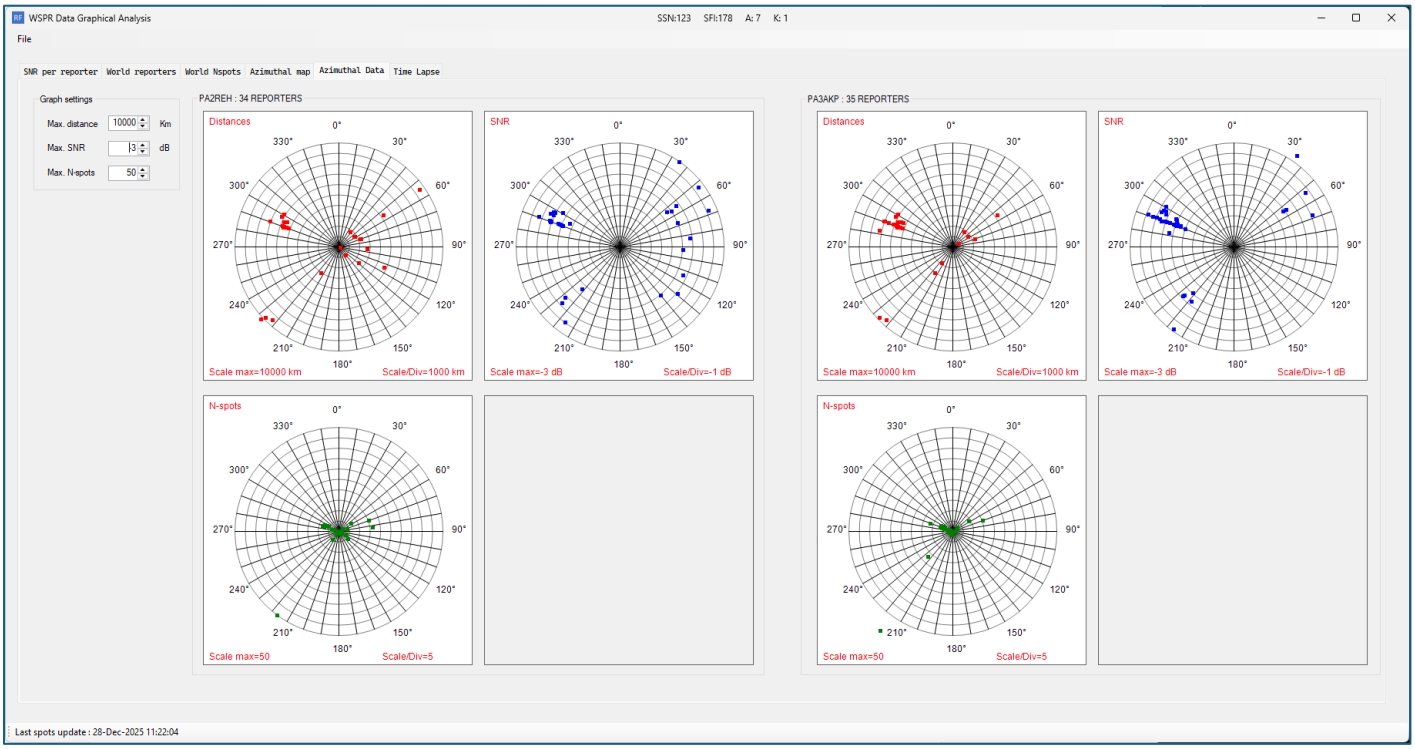


Figure 54 Azimuthal data on distances, SNR's and number of spots

On the left hand side you will find the settings for the graph max settings, i.e. the value on the outer ring of the azimuthal graphs.

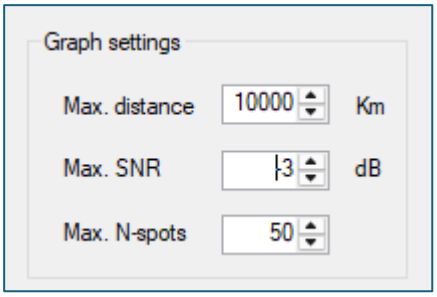
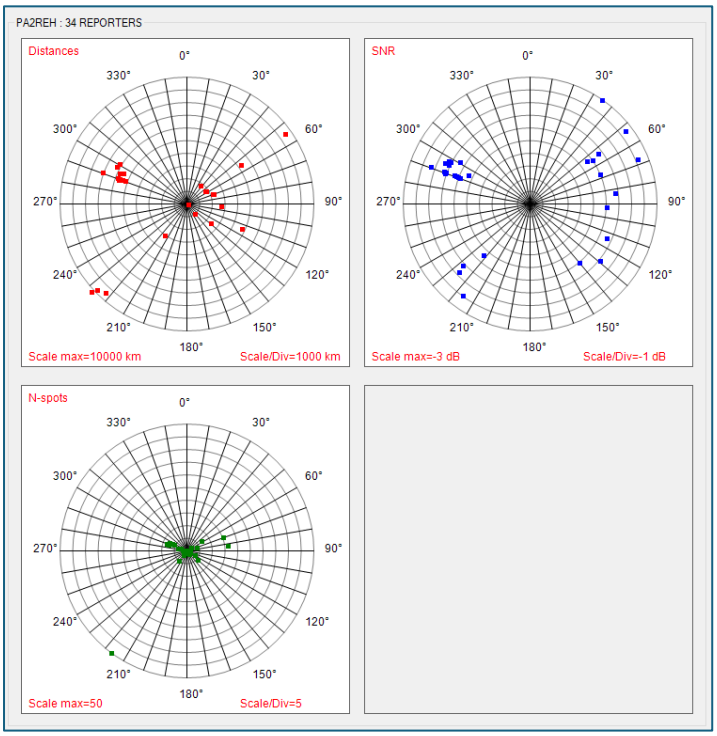
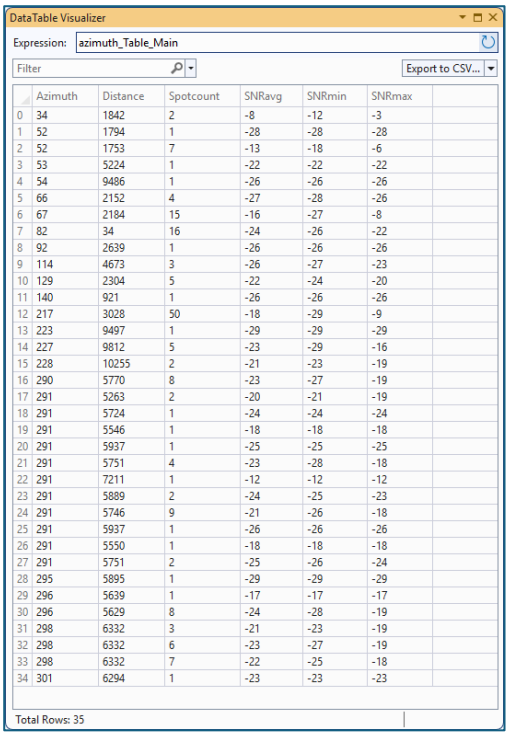


Figure 55 Graph settings controls

16.1 Data source and presentation

Focusing on the PA2REH, MAIN call sign, azimuthal graphs with the graph settings above in mind:





	Azimuth	Distance	Spotcount	SNRavg	SNRmin	SNRmax
0	34	1842	2	-8	-12	-3
1	52	1794	1	-28	-28	-28
2	52	1753	7	-13	-18	-6
3	53	5224	1	-22	-22	-22
4	54	9486	1	-26	-26	-26
5	66	2152	4	-27	-28	-26
6	67	2184	15	-16	-27	-8
7	82	34	16	-24	-26	-22
8	92	2639	1	-26	-26	-26
9	114	4673	3	-26	-27	-23
10	129	2304	5	-22	-24	-20
11	140	921	1	-26	-26	-26
12	217	3028	50	-18	-29	-9
13	223	9497	1	-29	-29	-29
14	227	9812	5	-23	-29	-16
15	228	10255	2	-21	-23	-19
16	290	5770	8	-23	-27	-19
17	291	5263	2	-20	-21	-19
18	291	5724	1	-24	-24	-24
19	291	5546	1	-18	-18	-18
20	291	5937	1	-25	-25	-25
21	291	5751	4	-23	-28	-18
22	291	7211	1	-12	-12	-12
23	291	5889	2	-24	-25	-23
24	291	5746	9	-21	-26	-18
25	291	5937	1	-26	-26	-26
26	291	5550	1	-18	-18	-18
27	291	5751	2	-25	-26	-24
28	295	5895	1	-29	-29	-29
29	296	5639	1	-17	-17	-17
30	296	5629	8	-24	-28	-19
31	298	6332	3	-21	-23	-19
32	298	6332	6	-23	-27	-19
33	298	6332	7	-22	-25	-18
34	301	6294	1	-23	-23	-23

Data below is from the Main window, see the table on the right

16.1.1 Distances graph, red spots

The maximum reported distance is 10255 km, see row 15 in the data table, on an azimuth of 228 degrees.

Reporter	QRA	Lon	Lat	Distance	Heading	Spots	SNR-avg	SNRmin	SNRmax
PY2SDR	GG56TV	-48.375	-23.104	9812	227°	5	-23	-29	-16

16.1.2 SNR graph, BLUE SPOTS

The maximum reported SNR (SNR-max) ratio is -3dB, see row 0 in the data table, on an azimuth of 34 degrees.

Reporter	QRA	Lon	Lat	Distance	Heading	Spots	SNR-avg	SNRmin	SNRmax
OH8HTG	KP34DI	26.292	64.354	1842	034°	2	-8	-12	-3

16.1.3 Number of spots graph, green spots

The maximum number of reported spots is 50, see row 12 in the data table, on an azimuth of 217 degrees.

Reporter	QRA	Lon	Lat	Distance	Heading	Spots	SNR-avg	SNRmin	SNRmax
EA8BFK	IL38BO	-13.875	28.604	3028	217°	50	-18	-29	-9

The same explanation above applies to the COMPARE station data set and COMPARE azimuthal data graphs.

17 TAB 6 of the WSPR Data Graphical Analysis window, 'Time Lapse'

The time lapse window shows how the spots in a time frame evolve as function of time, or in other words how are conditions are developing. The software runs from start to end time in steps defined by the minutes up/down control and the speed control.

When at a moment in time (T_0) new spots arrive, then they are plotted on the graph as a white spot. When the next time slot is taken, i.e. $T_0 + T_{step}$ then new spots will be plotted in white again, the older spots appear in the colour connected to the colour selection for the call sign (see Config System) of which the graph is running.

By default the Gray line is presented on this time lapse for a better feeling about developing conditions.

A running video is available on the website. Go to https://rfcalculator.com/WSPR/

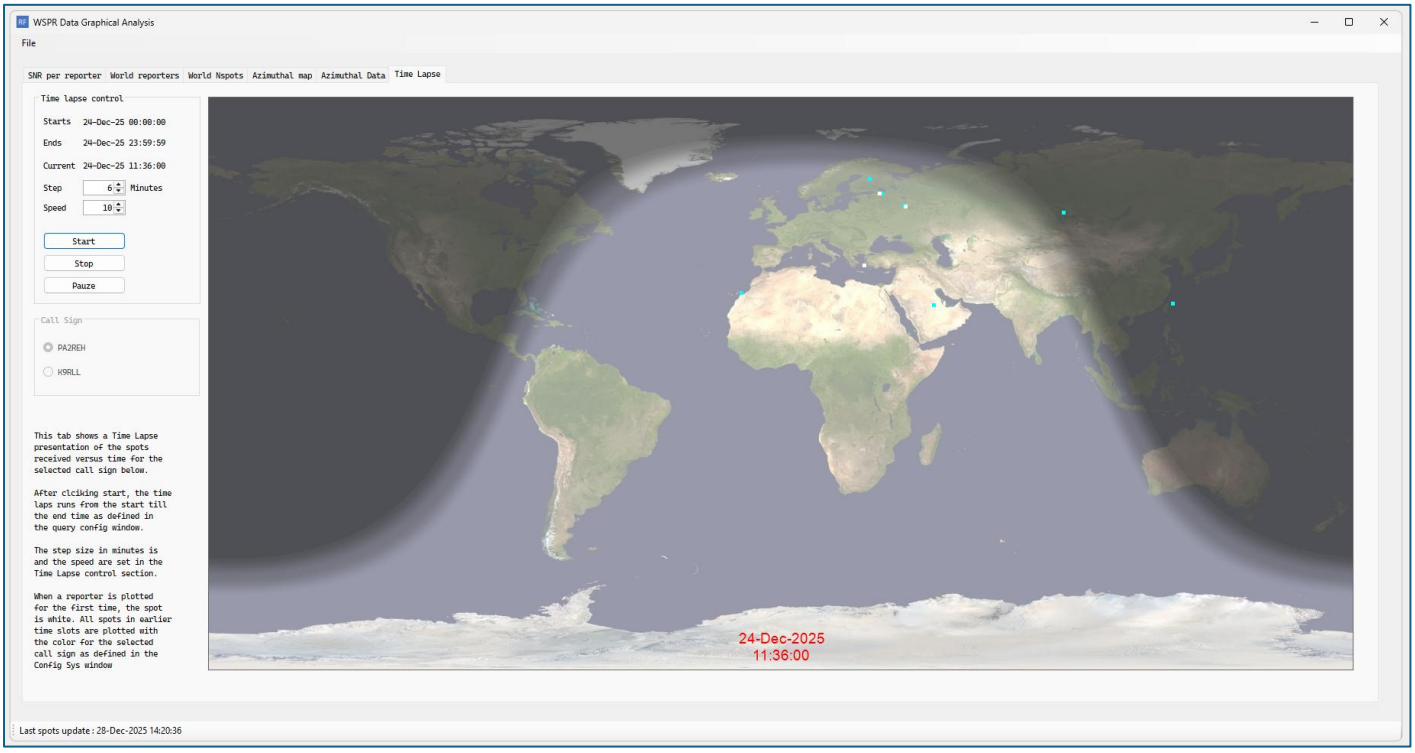


Figure 56 Time lapse window

18 Stats (statistics) window

The stats window is a small window you can keep open on your desktop when you are comparing performance between two stations.

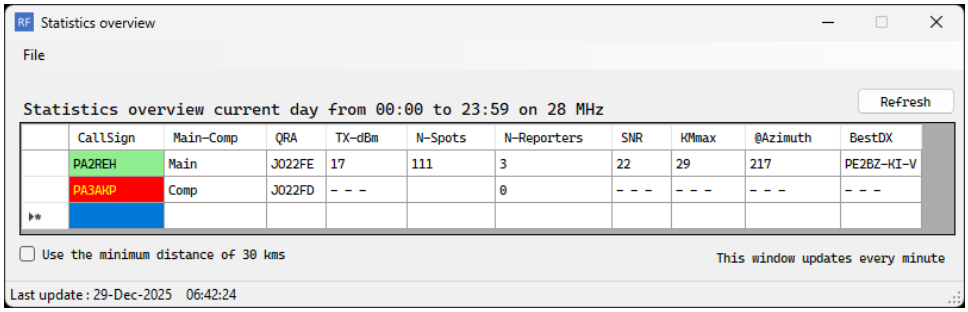


Figure 57 Stats window with the minimum Kms checkbox not selected

In the example above, the MAIN call PA2REH is green, his signal is spotted with a best DX for a local station at 29 kms distance and azimuth 217 degrees. The COMPARE station PA3AKP does not produce any spots and is red.

After selecting the minimum distance checkbox the window looks as follows:

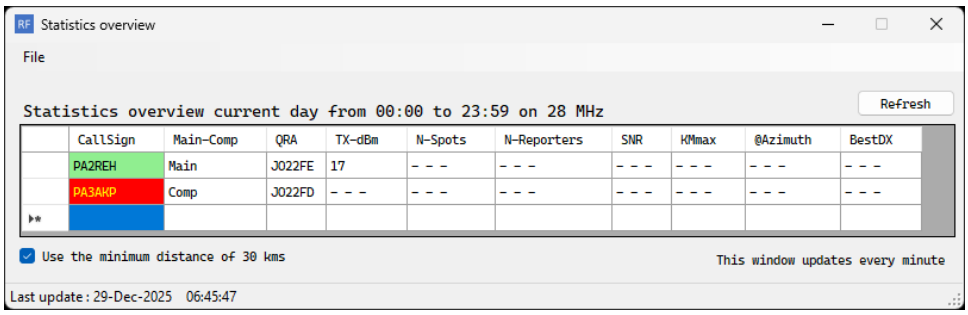


Figure 58 Stats window with the minimum Kms checkbox selected

Both stations do not produce spots with a distance larger than 30 km. The MAIN call is still noted as green. The reason for this is that the MAIN callsign PA2REH is detected on a short distance as his TX power of 17 dBm can be retrived from the database.

The window refreshes the data every minute from the wspr.net databse. With the ‘refresh’ button you can manually rerun the queries and update the window.

19 Long term window

The long term analysis window allows you to look far back and, in the same graph, show sun parameters like the sunspot number (SSN), the Kp and the Ap indices. Especially when you have long term data from your station you can see the effects of solar activity in the graphs. For example the graphs below shows 10 year 28 MHz spots of PA2REH in combination with the daily sunspot numbers.

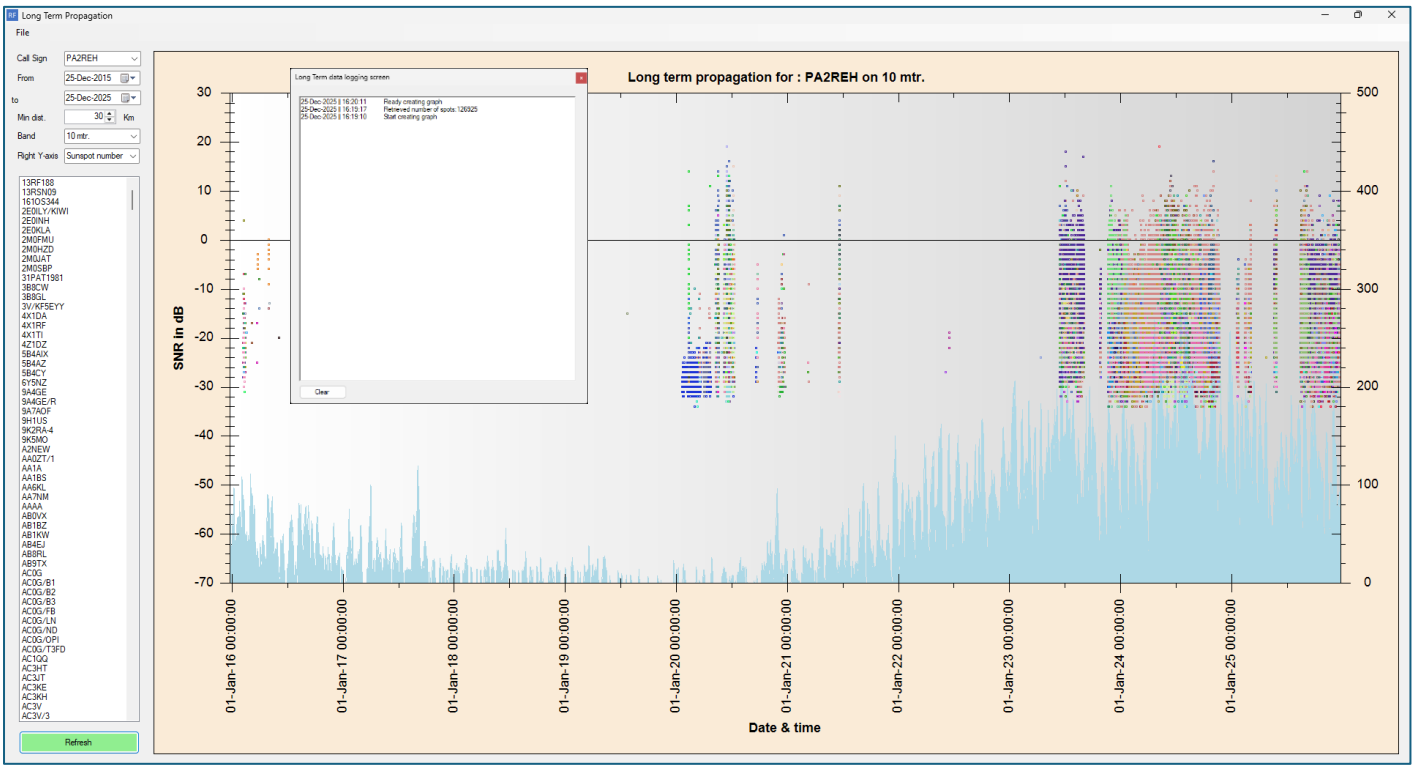


Figure 59 10 year time span PA2REH on 28 MHz with the Sun Spot data

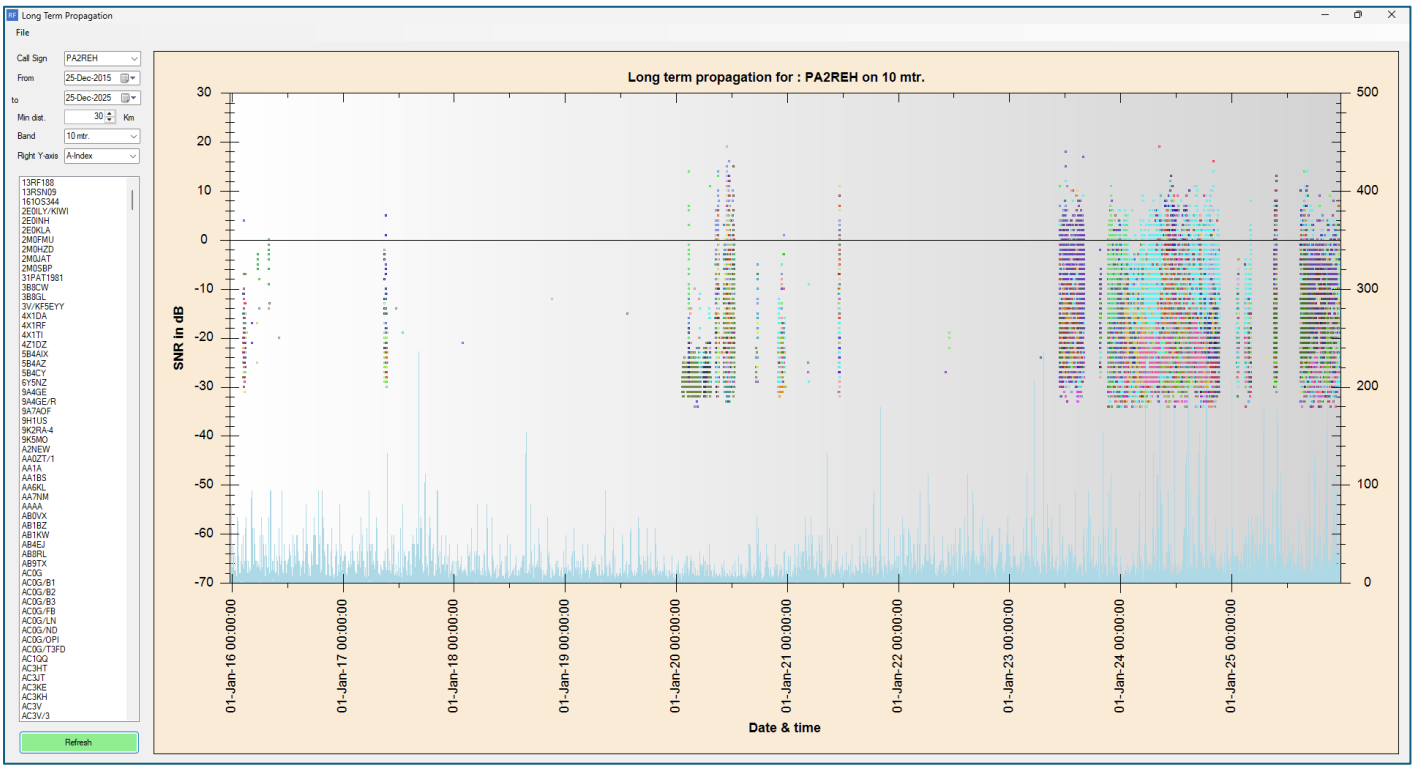


Figure 60 10 year time span PA2REH on 28 MHz with the Ap index data

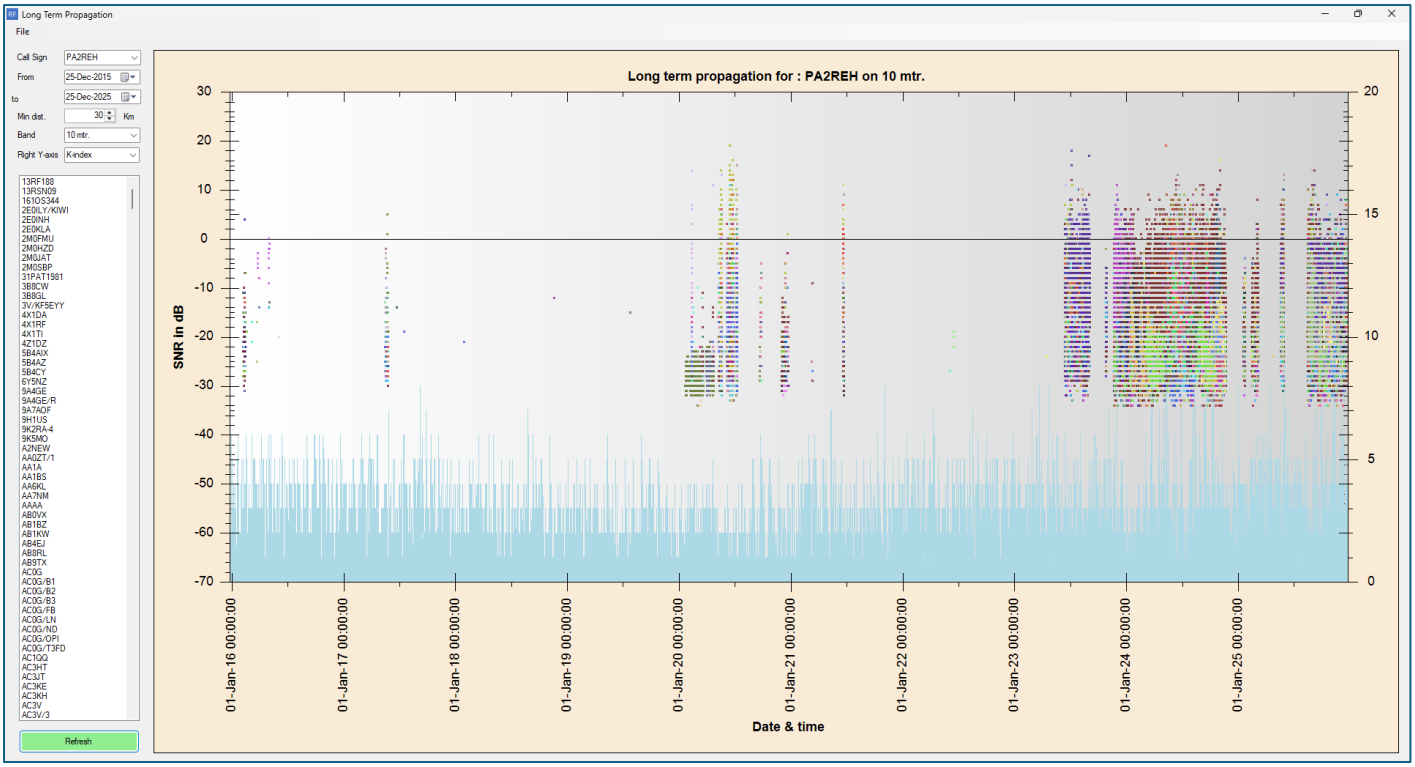


Figure 6110 year time span PA2REH on 28 MHz with the Kp index data

20 How to get your installed version licensed and fully functional?

After installation WSPR analyser runs in demonstration mode, and the message you see below pops up when you start the program.

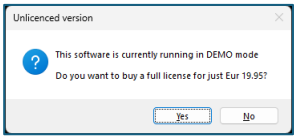


Figure 62 Demo version message

If you click 'Yes' the following window opens where you can read instructions how to proceed. Just enter your e-mail address (this will be your userID), press tab to confirm and then click on 'Request your start code'.

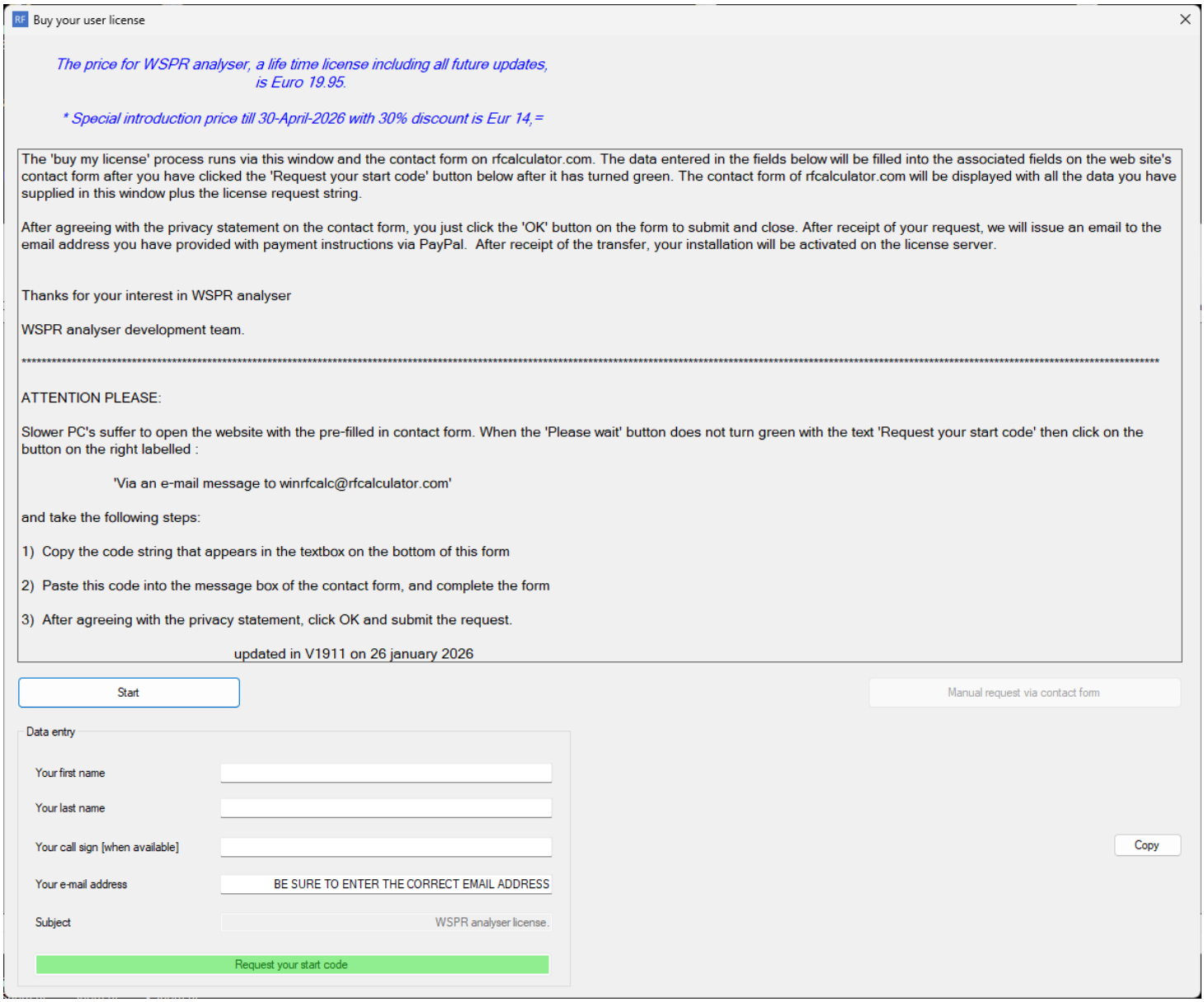


Figure 63 License request window

There is two ways to submit the license request see the next page.

20.1 Method 1

The first method asks you to fill your in user data in to the fields into the fields grouped in the box 'Data entry.' When the lower button turns green and is labelled 'Request your start code', all the information is entered into the correct fields of the contact form on www.rfcalculator.com. To finalise, just check the privacy statement and click OK to submit.

20.2 Method 2

The second method has been implemented to overcome an issue with slower devices. The contact webpage loaded in a window of the software is using underlying software of the Microsoft Edge browser. This browser has a slow down effect that prevents the form being loaded correctly.

20.2.1 How to use the second method?

- Click on the button 'Manual request via contact form'.
- After clicking the button, and a new textbox opens with the request string.
- Click on 'Copy' to make a copy of this string.
- The string is copied into the clipboard, and the contact form of the website loads into your default browser on your device
- Paste the string into the message field
- Check the privacy statement and OK to submit

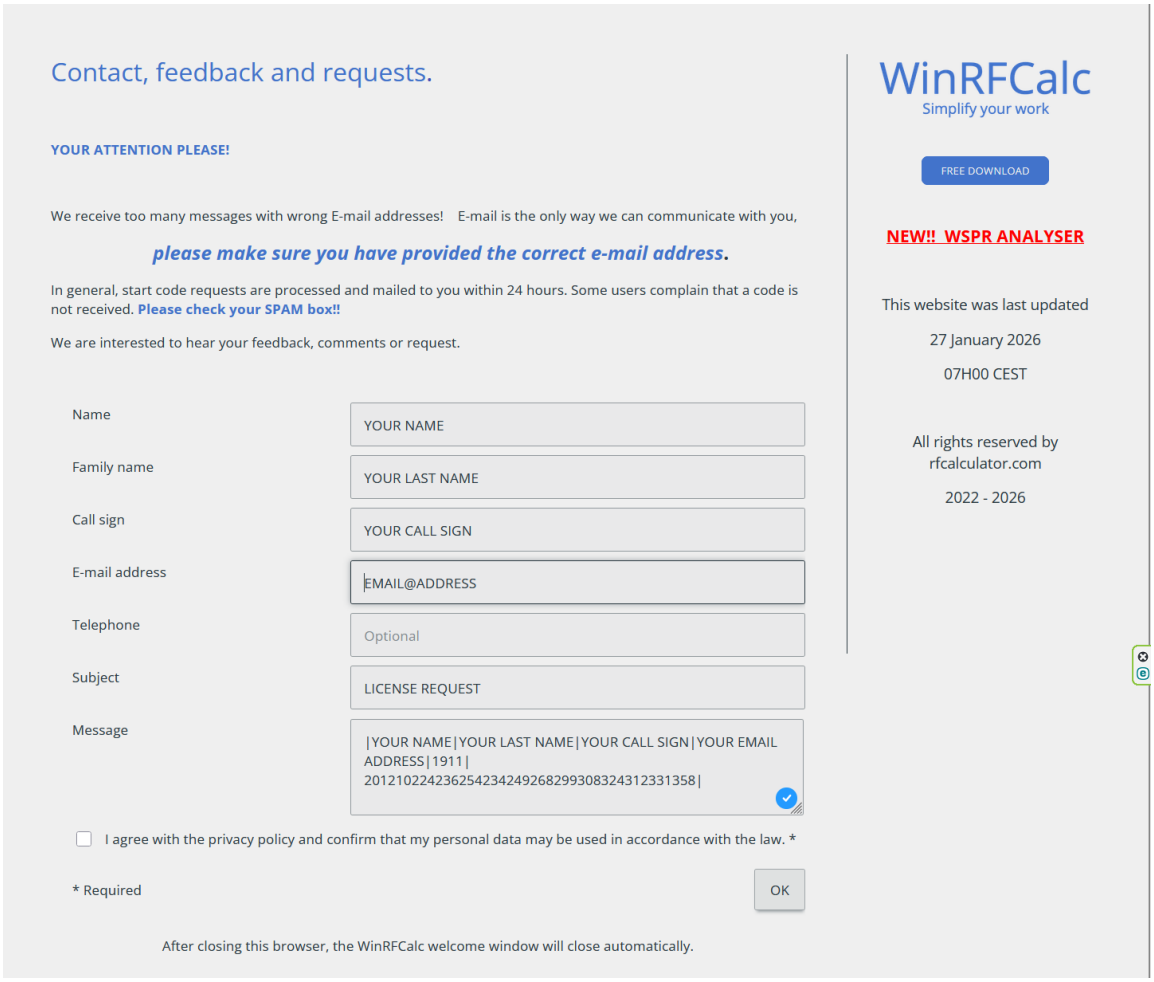


Figure 64 Contact form with filled in data on www.rfcalculartor.com

20.3 Internet connection

Just like you need a live internet connection to receive the WSPR spot updates from wspr.net, the internet connection is also required for the license check process.

END OF DOCUMENT

21 List of figures

22 Keywords