



HyScan software

Version 5.x

Operator manual

IVYUT.00221-01 34 01

Revision 3

Contents

Annotation.....	5
1. Program purposes.....	8
2. Execution conditions.....	8
2.1 Personnel requirements.....	9
3. Main features.....	11
4. Install and licensing software.....	13
5. Network connection settings.....	14
6. Drivers install.....	15
7. Run software.....	15
8. Where to start?.....	17
9. Operator's interface.....	18
9.1 Interface elements.....	18
9.2 Control with keyboard and mouse.....	22
9.3 Main window.....	24
9.3.1. Main menu.....	26
9.3.2. Tracks field.....	27
9.3.3. Marks field.....	29
9.3.4. Worksheet area.....	31
9.3.4.1. Worksheet tools.....	35
9.3.4.2. Layers control.....	36
9.3.4.3. Measurement mode.....	36
9.3.4.4. Temporary geomarks (pins) control.....	37
9.3.4.5. Geomarks control.....	39
9.3.5. SSS area.....	40
9.3.5.1. SSS area management tools.....	42
9.4 Managing SSS area layers.....	43
9.4.1.1. Measurements for SSS.....	43
9.4.1.2. Managing acoustic marks.....	45
9.4.2. Echosounder (ES) area.....	46
9.4.2.1. ES area management tools.....	47
9.4.2.2. ES area layers management.....	47
9.4.2.3. Measurements for ES area.....	47
9.4.2.4. ES acoustic marks control.....	47
9.4.3. Sub bottom profiler (PF) area.....	48
9.4.3.1. PF area control tools.....	49
9.4.3.2. PF layer management.....	52
9.4.3.3. PF measurements.....	52
9.4.3.4. Managing AI PF marks.....	52
9.4.4. Sonars management tools.....	52
9.4.5. Status bar.....	53
9.5 Project manager window.....	54

9.6 Startup window.....	56
10. Using software.....	57
10.1 Workflow.....	58
10.1.1. Statement of the problem and the types of survey.....	58
10.1.2. Planning.....	59
10.1.3. Survey (data collection).....	59
10.1.4. Postprocessing.....	60
10.1.5. Reporting.....	60
11. Projects.....	60
11.1 Working with the project.....	61
11.2 Creating project.....	62
11.3 Updating projects to work with the new version of the program.....	63
12. Folders and files.....	66
13. Software settings.....	67
13.1 Switching of units of measurement.....	67
14. Planning.....	68
14.1 Mission planning.....	68
14.1.1. Reference point.....	68
14.1.2. The boundary of the polygon.....	69
14.1.3. Tack plan.....	70
14.1.4. The creation of a parallel tacks.....	71
14.1.5. Selecting and editing a group of tacks.....	72
14.1.6. The panel of the planned tacks.....	73
14.1.7. Export and import.....	74
15. Survey.....	76
15.1 Sonar connection.....	76
15.2 Connecting external sensors.....	76
15.3 Sonar control.....	77
15.3.1. SSS control.....	77
15.3.2. ES control.....	78
15.3.3. SSSE control.....	78
15.3.4. PF control.....	78
15.4 Record.....	81
15.5 Track changing.....	81
16. Viewing data (playing).....	85
17. Marks management.....	85
17.1 Acoustic marks.....	85
17.2 Geomarks.....	86
17.3 Temporary geomarks (pins).....	86
18. Maps management.....	87
18.1 Configuring connections to GIS servers.....	88
18.2 Maps caching.....	88
19. Worksheet.....	88
20. Jumps.....	90

21. Logs.....	91
21.1 Tacks log.....	91
21.2 Marks log.....	91
22. Measurements.....	91
22.1 Coordinates of vessel.....	92
22.2 Speed of vessel.....	92
22.3 Depth measurement.....	92
22.4 Measurement of the coordinates of the objects.....	92
22.5 Measure distances.....	93
23. Clipboard.....	93
24. Exit the program.....	95
25. Update software.....	95
26. Uninstall software.....	96
27. Users support.....	97
28. Possible faults and ways of their elimination.....	98
29. Developer information.....	99
Appendix A . List of abbreviations.....	100
Appendix B . Setting up a network connection.....	102
Appendix C . Hot keys and mouse control.....	103
Appendix D . Folders and files.....	105
Appendix E . Data formats.....	106

Annotation

This operator's manual (hereinafter referred to as OM) applies to the HyScan software IVYUT.00221-01, version 5.x (hereinafter program). Program is included with the software Hydra[™] sonar systems (hereinafter sonar).

The OM provides information on the installation, configuration of the program, managing the sonars, survey, playback of data obtained during the survey, performing various measurements, working with marks and logs, reporting, import and export data, testing and maintenance of the sonars.

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List of abbreviations and symbols — see Appendix A.

Contact information about the Developer — see 29.

Revision history:

Revision 1 (r1) — initial version (jun 2019)

Revision 2 (r2) — editorial change (jul 2019)

1. Program purposes

The program is designed to automate the processes of work with sonar in terms of reception, visualization, processing, analysis and archiving of the obtained sonar and parametric information for its further processing and documentation.

The program provides (with the appropriate sonar used) the execution of works on the search, detection and investigation of various objects located in the water column and on the bottom surface, the implementation of measurement and mapping, engineering and environmental monitoring.

The program allows you to perform all basic operations when working with sonar and when working with survey data:

- planning (preparation for survey)
- survey (data collection)
- play (view) data
- creating primary reports
- data import/export

These operations are described in more detail in the relevant chapters.

The program provides the Operator with the following functionality:

- sonar operation control
- maintenance of sonar
- displaying information in different ways
- recording data
- pre-processing of received data
- perform measurements
- playback of recorded information
- data editing
- configuring the program for a specific Operator

2. Execution conditions

The program functions in a computer with a specific hardware and software environment.

Computer requirements differ depending on the operating modes of the program — see 3.

The program does not use the mechanisms of displaying graphic information using the capabilities of the graphics accelerator of the computer video card (hardware graphics). This allows you to run the program on computers that do not have hardware graphics support. Without using the capabilities of the graphics accelerator of the computer video card, the entire display calculation is carried out by the processor, which can lead to a slowdown in the program.

NOTE. The appearance of the program interface and graphical controls may differ from that shown in the figures in this OM. It depends on the OS version and its settings.

To connect the sonar to the computer on which the program will operate, you need to configure network connections in the OS (see Appendix B). If the program is not to be used for survey, the network configuration is not required.

For convenience, the monitor screen must be matte or anti-glare, diagonal of at least 14” (resolution of at least 1024x768).

When placing the computer outside (deck boat) may require the protected computer. These conditions are usually met by special protected Notebook, tablet or industrial computers.

When using additional sensors during survey, you may need to use special adapters or a computer in a non-standard configuration.

2.1 Personnel requirements

Installing the program and maintaining its efficiency imposes certain requirements for the qualification of personnel. Before you start using the program, you must perform a number of operations related to the OS and computer. These include:

- installing the OS on your computer (if the OS is not installed)
- check whether external devices can be connected
- configure network connections to connect to sonar

- installing drivers for the additional hardware you are using

The end User of the program (Operator) must have practical skills of working with the OS user interface.

3. Main features

Below are the main characteristics of the program (see table 1 - 10).

Table 1 - Hardware & runtime features	
Parameter	Value
Computer	IBM PC compatible
Computer configuration	Processor – P4 2 GHz or more RAM – at least 512 Mb Video RAM – at least 256 Mb Screen resolution – at least 1024x768 Ethernet 100 Mb – 1 port (for sonar connection) RS-232 or USB 2.0 ports – for external sensor connection
Graphics	Software graphics (without using the graphics accelerator)
Input device	Keyboard and mouse (2-button)
Runtime (operating system)	Windows 7/8/10 (32 or 64 bits)
Free disk space for program installation	At least 100 Mb

Table 2 - Main features	
Parameter	Value
Interface languages	English, russian
Screen mode	Fullscreen/window mode
Supported tasks	Preparing (planning), survey (data collection), postprocessing, final products
Clipboard functions	Copy the geographical coordinates to the clipboard

Table 3 - Visualisation	
Parameter	Value
Graphical user interface color depth, bit	32
Types of acoustic data displayed	Side scan (waterflow) - SSS Echosounder - ES Profiler -PF Forward looking sonar - FLS
Display control functions	Zoom, shift, scroll, contrast, dynamic range, palette
Palettes used	Choose a palette from the set
Pleer	run/stop, pause

Table 4 - Preparing, planning features	
Parameter	Value
Survey planning	Create, edit survey zones Create, edit tracs plane Plane statistics
Import	Import plane from other projects
Export	Export plane to file

Table 5 - Survey, data collection features	
Parameter	Value
Supported sonars	ES, SSS, SSSE, DSSS, PF, FLS Hydra™ series
Supported external sensors	Navigation receiver (NMEA format) Heading (NMEA format)
Connecting external sensors	Computer COM port (physical or virtual)
Number of simultaneously used COM ports of the computer for receiving data from external sensors	1
Navigation	Navigation assistant

Table 6 - Geoinformation, maps	
Parameter	Value
Coordinate system	WGS-84
Download maps	Internet
Map cache	Yes

Table 7 - Measurements	
Parameter	Value
Measurement function	Depth calculating Geographic coordinates of the selected point The distance between the selected points (measuring object dimensions)

Table 8 - Logs, marks	
Parameter	Value
Log types	Track log Marks log
Marks types	Acoustic marks Geomarks Temporary geomarks (pins)
Marks functionality	Setting, delete, editing, filtering

Table 9 - Import	
Parameter	Value

Table 10 - Export	
Parameter	Value

4. Install and licensing software

Installation of the program on the computer is carried out:

- in online mode via the Internet
- in offline mode using the installation file (from distributive)
- in offline mode using the program archive file

To install in online mode via the Internet, you must:

- go to the developer's website in the software section

- download and run the installer
- follow the installer's instructions

To install using the distributive, you must:

- download the distributive from the developer's website or copy it from the delivery disk
- run the distribution program
- follow the installer's instructions

To install via an archive file, you must:

- download the archive file from the developer's website or copy it from the delivery disk
- copy the contents of the archive according to the readme file.txt
- create shortcut to start the program

If you have an older version of the program on your computer, you must install the new version of the program in a separate folder or delete the old version of the program.

You may need administrator rights to install the program on your computer. If you cannot install the program, contact Your system administrator to install the program.

The latest version of the program is available on the developer's website.

The developer of the program (hereinafter the Licensor), being the owner of the exclusive right to use the program, grants the Licensee the right to use a copy of the program in accordance with the license agreement. The license agreement is available when you install the program on your computer, located on the delivery disk (see the readme file.txt) and the latest version of the agreement is posted on the developer's website.

BEFORE INSTALLING AND USING THIS SOFTWARE, CAREFULLY READ THE LICENSE AGREEMENT.

5. Network connection settings

Sonar with Ethernet interface connects to the computer shooting through one Ethernet port 10/100/1000. Sonar has its own IP address, which is indicated in the passport and the sticker on the case.

To access the sonar, you must configure network connections in the OS on the computer that will be used when working with the sonar. Network connection settings for different versions of Windows — see Appendix B.

6. Drivers install

If you are using a navigation receiver, Ethernet/USB adapter, or other hardware that is connected to your computer and used during shooting, you may need to install the appropriate drivers.

Installation of drivers is also possible using the installation file (distribution), which can be downloaded from the website of the supplier or developer of the equipment.

The drivers must be installed before the program starts.

Driver installation is only necessary when using the appropriate shooting equipment. If you are not using the hardware, you do not need to install the drivers.

You may need to be an OS administrator to install the drivers on your computer. If you cannot install the drivers yourself, contact your system administrator.

7. Run software

The program is started:

- using the desktop shortcut (if it was created when you installed the program)
- from the Start menu of OS
- by running the launcher executable file launcher.exe

Operator settings are tied to the user account of the OS under which the program runs. If the program is run under different accounts, the operator settings may be different.

When the program is started for the first time, the operator settings are set to the default values.

When you first start, you must also specify the path to the project folder.

On further launches, the path to the project folder is remembered and used as the current one.

After entering the program, most actions are possible only when the project is open. You need to create a new or open an existing project, then you can make project settings, perform shooting, viewing and other operations.

8. Where to start?

To work with the program, you must:

- install the program (see 4)
- learn the basics of working with the program
- learn the interface of the program (see 9)
- run the program (see 7)
- to specify the path to the projects folder (see 12)
- updating projects to work with the new version of the program if necessary (see 11.3)

To survey, you must:

- in OS to configure network connections — see 5
- connect sonar and necessary additional equipment, sensors to the computer
- install the necessary additional hardware drivers (for example, the USB navigation receiver driver) — see 6
- run the program
- run program settings to work with the used equipment
- create a new survey project or open an existing project
- make a survey

To view the survey data, you must:

- copy the survey project data to the computer where you want to view it in the project working folder
- run the program
- open project

9. Operator's interface

The program provides the operator with a user graphical window interface (hereinafter referred to as the user interface), the program is controlled by means of input devices – keyboard, mouse (trackball or touchpad touchpad).

User interface – a set of different graphical interface elements (primitives), which are used to display various information on the screen to the Operator, the interaction of the program with the Operator through input devices. The workspace is the main window of the program and additional dialogs (Windows).

The program allows you to work with the interface with the mouse and keyboard.

All functions of the program are available in a unified interface. They can be run either from the toolbars or through hot keys. The tools are grouped in separate panels into groups by basic functions. If you hold the mouse cursor over the tool field, the text with the description of the tool function appears. Toolbars allow you to quickly access various functions of the program.

Functionality and tools are active depending on the installed configuration and the current mode of the program.

The program supports personal interface settings for each Operator. When you exit the program, the current settings are saved for the current Operator and restored the next time the Operator enters the program.

Most windows can be resized by simply dragging the corners of the window, pressing and holding the left mouse button. Windows that cannot be resized have a maximize button that is either inactive or not at all.

A large number of settings are selected in different ways, for example, you can use the right-click menu, the toolbar, or use the icons in the window area. In this OM is used only one way to choice, but You can use any of these.

9.1 Interface elements

The following is a description of the user interface elements used in the program.

There are the following main types of interface elements:

- dialogs (windows)
- toolbars
- tools
- dialog elements

Dialogs (windows) include:

- main window
- Modal dialogue - a separate window with user interface elements that provides access only to the elements of this dialog, to access other elements, you must close this dialog (window).
- Modeless dialogue - similar to a modal dialog, but you do not need to close this dialog (window) to access other interface elements.
- Dockable window - a window that can be either a part of the main program window or a separate window. In both cases, it has its own title, for which it can be moved. In the case where the dockable window is part of the main window, you can move it from one area of the dockable Windows to another. In the case where the window is not attached to the main window, it is a separate floating window and can be placed in any area of the desktop.

Toolbar - a graphical menu in which items are presented as tools.

Type of tools:

Button (key) - contains an image (icon), when you click on the button icon is performed any action. Can be active (available to operator) or inactive (not available to operator). The inactive button is grayed out.

Toggle button - similar to the button, but has two fixed states - pressed and pressed.

Button-list - displays the current value and has an additional field on the right, clicking on which displays a drop-down list of available actions without the ability to enter data (only the selection of certain values).

Button-list with editing - similar to the list button, but the Operator has the additional ability to enter a direct value in the display field.

Menu button - similar to the button, but has an additional field on the right, clicking on which displays the context menu with the choice of one of the items. Clicking on the icon allows you to perform any action (for example - button-menu of the "Open project" tool). The menu button with multiple selection is similar to the menu button, but the operator can select one or more menu items at once.

Button-slider - has a button and a display/edit box. When you press the button, a vertical or horizontal regulator (engine) appears. Control of the engine is carried out with the mouse or keyboard (up, down - for the vertical engine; left, right - for the horizontal engine, coarse adjustment - using the PgUp and PgDown buttons). When you double-click in the display field, you can enter the desired value, when you press Enter or Esc, the input is completed and the edit field becomes the display field again.

Control button - it has a display/edit field and two control buttons: increment up and increment down. When you click in the input field, You can enter the desired value using the keyboard. When you click on the regulator up the current value increases, when you click on the regulator down - the current value decreases.

Slider - vertical or horizontal regulator (engine). When you double-click in the display field, you can enter the desired value, when you press Enter or Esc, the input is completed and the edit field becomes the display field again.

The elements of the dialog (window) include:

Window title - an element that is a thin strip that runs along the top edge inside the window frame. The window title contains information about what is shown in the window, and allows the user to perform a number of operations with the window (move the window, change its size), serves as a place to place

the collapse, expand and restore buttons, as well as the close button of the window.

Status bar - the status bar is located at the bottom of the window. Its purpose is to inform the Operator about the status of certain attributes or parameters.

Picture - it is a rectangular area with an image.

Static text - it is a string (or several lines) of text. Typically used as a signature to other controls.

Push button - represent a rectangle, within which is the text. When pressed, the button image returns to its original state. Pressed control buttons are mainly used to start an immediate action without saving any indication of the "on/off" button type.

Edit box - is a rectangle (with or without a frame of various types), inside which you can enter text. The edit field can be either single or multiline.

List box - it is a rectangle with a small square window (usually on the right) inside which there is an image of an arrow. When you click on this square arrow window, a single-column or multi-column list appears with a vertical (for single-column lists) and horizontal (for multi-column lists) view bar. The list can be either single-choice or multiple-choice. The latter allows the user to select more than one item in the list.

Combobox - a combo box is a combination of a list box and a single-line editor. Allows you to make a selection from the list, and enter text in the edit field.

Check box - is a small square window with text placed next to it. Act as two-way switches: one click causes a check mark to appear (the state is "on"); another click causes the mark to disappear (the state is "off").

Radio button - similar to the control switch, but round shape. A bold dot inside the check box indicates that the switch is checked. From the group of switches, only one (at a given time) can be checked.

Scroll bar - it is a horizontal or vertical orientation window with buttons at the ends and a pointer that can move between these buttons. Used to "scroll" the image in the window with which it is associated.

Trackbar - it consists of a pointer moving along the scale. Used to select values (or any object) from a given series.

Up-down control - a special kind of scroll bar. It consists of arrow buttons, but these buttons are located close to each other and do not have a slider between them.

Spin control - the combination of the edit and scroll fields, which is located nearby. Data can be entered either manually in the edit box or by scrolling.

Progress bar - a window that is used to indicate the process of performing some long operation. It is a rectangular window, which, as the operation is performed, is painted with a different color.

Tab control, tab - this element simulates a normal bookmark in a notebook. When you select a bookmark, the corresponding «page" pops up, which is a separate window or dialog.

Tree view - used to view tree information structures.

Tooltip is a small window that appears when you hover over a specific object (usually a control). Contains text that explains the purpose of this object.

Split - an element that is a thin strip separating, usually, child Windows (sometimes other controls). When you change the position of the separator, the position and maybe the size of the shared elements change.

9.2 Control with keyboard and mouse

The program is controlled using the keyboard and mouse (built-in trackball or touchpad touch field on the laptop).

The keyboard is used to enter text data, hot keys can be used to access the most frequently used functions (tools) of the program.

Working with the program in most cases is most convenient only with the mouse.

To work, you need to use a two-button mouse.

Click - a short press of the mouse button.

Double-click - double-click the mouse button.

When you hover the mouse cursor over interface elements, a context-sensitive tooltip can be displayed next to the mouse cursor.

Commands used to control the mouse — see Appendix C.

9.3 Main window

The main window of the program (hereinafter the main window) contains the following main elements (see fig.1):

- window title (1)
- toolbar panel (2)
- left area (3)
- main area (4)
- right area (5)
- status bar (6)

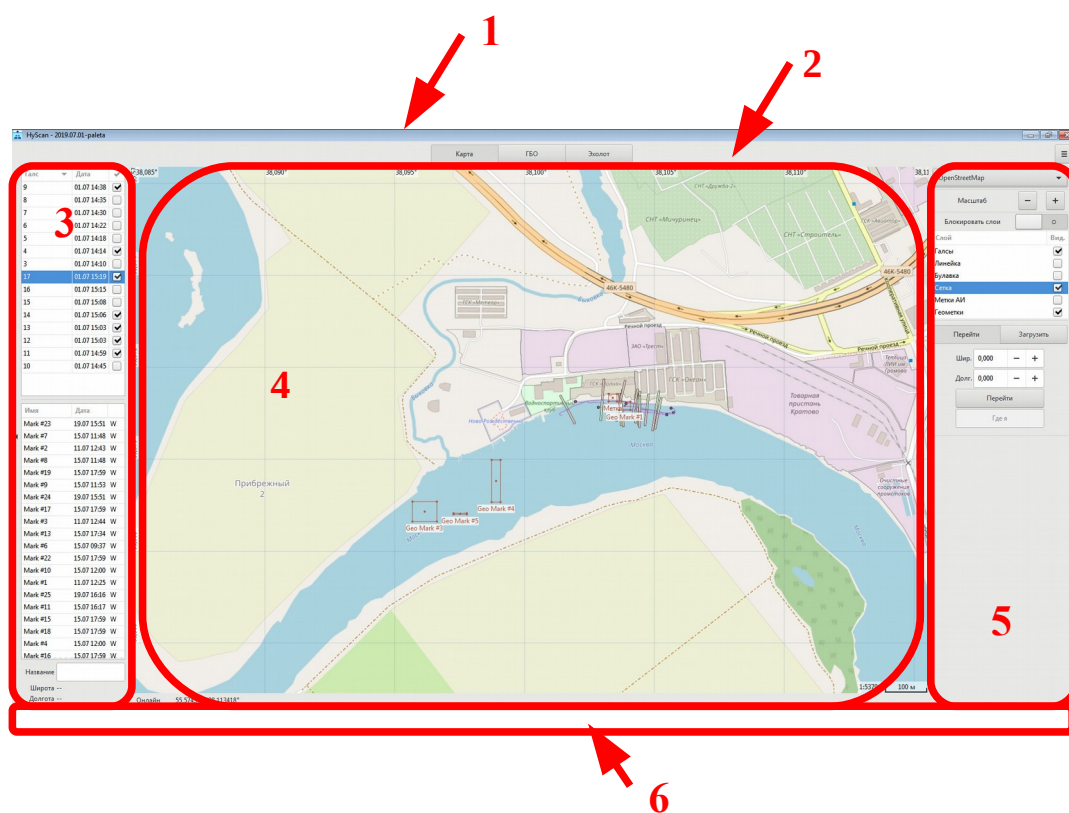


Fig.1. Main window

In window title displays:

- program name and version
- project name

NOTE. The window title is displayed only in the window mode of the program.

On the toolbar (see fig.2) contains the main tools of program management:

- Map key - activating the Worksheet area in main area
- SideScan key - activating the SSS area in main area
- Echosounder key - activating the ES area in main area
- Profiler key - activating the PF area in main area

- FLS key - activating the FLS area in main area
- Main menu - activating the main menu

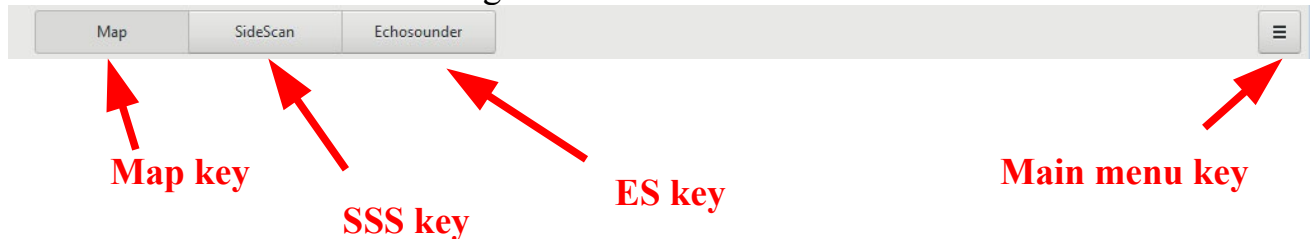


Fig.2. Example of Toolbar panel

The Map and Main menu keys are always available.

Other keys are available:

- during shooting when connected to the appropriate sonar
- while browsing when you activate a tack containing the relevant data.

Left field contains:

- tracks field
- marks field

The left margin area can be hidden or expanded by left clicking on the triangle on the left side of the field.

The main field is used to display the sonar and worksheet data. Only one of the following areas (data types) can be displayed at a time:

- «Map» - worksheet display
- «SideScan» - display of acoustic image of SSS (active track) and additional layers to work with AI SSS
- «Echosounder» - display of acoustic image of ES (active track) and additional layers to work with AI ES
- «Profiler» - display of acoustic image of PF (active track) and additional layers to work with AI PF
- «FLS» - display of acoustic image of FLS (active track) and additional layers to work with AI FLS

In the field of AI, data from the corresponding sonar are output. In this case, the area can be occupied by one data type or used to display several types together.

Simultaneously with the choice of the type of display is selected to control the sonar when survey.

The right field contains a set of tools for working with the main area. Depending on the selected active area, the Toolbox changes automatically. You can

hide or expand the right margin area by left-clicking the triangle on the right side of the field.

NOTE. If you hide the left or right field, the main field is automatically expanded in the appropriate direction, when you expand it, it is compressed. The ability to hide the left and right margins is used to maximize the area of the main margin when working.

The status bar is used to display current equipment status, parameter data, and other information (see 9.4.5).

9.3.1. Main menu

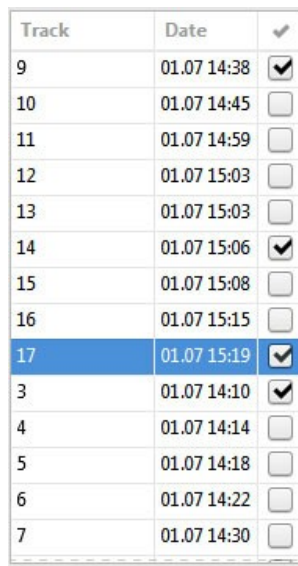
Used to access the functionality of the program.

Contains the following items:

- Project manager — opens the Project manager window (see 9.5).
- Online Map — enables/disables downloading maps via Internet. If the checkbox is selected and Internet connection is available, the currently selected map will be downloaded from the corresponding server. If the checkbox is deselected, maps are not loaded and the current cache of previously downloaded maps is used. By default — download is disabled.
- Exit — exit the program

9.3.2. Tracks field

Contains a list of tracks of the working project and a summary of tracks in the form of a table (see fig.3). Track field functionality — see table 11.



Track	Date	<input type="checkbox"/>
9	01.07 14:38	<input checked="" type="checkbox"/>
10	01.07 14:45	<input type="checkbox"/>
11	01.07 14:59	<input type="checkbox"/>
12	01.07 15:03	<input type="checkbox"/>
13	01.07 15:03	<input type="checkbox"/>
14	01.07 15:06	<input checked="" type="checkbox"/>
15	01.07 15:08	<input type="checkbox"/>
16	01.07 15:15	<input type="checkbox"/>
17	01.07 15:19	<input checked="" type="checkbox"/>
3	01.07 14:10	<input checked="" type="checkbox"/>
4	01.07 14:14	<input type="checkbox"/>
5	01.07 14:18	<input type="checkbox"/>
6	01.07 14:22	<input type="checkbox"/>
7	01.07 14:30	<input type="checkbox"/>

Fig.3. Example of Tracks list

The current (active) track is highlighted in the list with a contrasting color.

The table contains the following columns (from left to right):

- «Track» - is always displayed
- «Date» - is always displayed
- Track selector - only appears when the Worksheet area is activated

The track column displays the name of the tracks. If sorting by track name is applied, the sorting view icon is displayed in the column header.

The date column displays the date and time when the tracks began. If sorting by track date is applied, the sorting view icon is displayed in the column header.

The track selection column is used to select the tacks to display on the tablet.

Table 11 - Track field functionality	
Functionality	Action
Selection (activation) of track to display in the active region of the AI	<p>1) Left click or right click on the line with the corresponding track</p> <p>Selecting a different track from the list will automatically change the track displayed when the AI area is active.</p> <p>During survey, the recorded track is automatically selected for display and the track selection is automatically blocked.</p>
Select (activate) the tracks to display when the Worksheet area is active	<p>1) Left click or double left click on the line with the corresponding track</p> <p>When you double-click the map area is shifted so that the selected track is in the center of the map.</p>
Select which tracks on a Worksheet	When the Worksheet area is active, the displayed tracks are selected using the corresponding check box in the right column. To reset/select all tracks, click on the header of the right column.
Tracks sorting by name	1) Left click on on the "Track" column header.
Tracks sorting by date & time	1) Left click on on the "Date" column header.
Call the context menu for the track when the Worksheet area is active	<p>1) Right click on the line with the corresponding track</p> <p>Menu items:</p> <ul style="list-style-type: none"> ○ «Find track on the map» - moves the map area so that the selected track is in the center of the map ○ «Track settings» - opens the "Track settings" modal window.

9.3.3. Marks field

Contains a list of work project marks and a summary of the marks in a table (see fig.4). Marks field functionality — see table 12.

Name	Date	
Mark #2	11.07 12:43	W
Mark #18	15.07 17:59	W
Mark #14	15.07 17:59	W
Mark #7	15.07 11:48	W
Mark #28	26.07 14:10	W
Mark #8	15.07 11:48	W
Mark #29	26.07 12:37	W
Mark #33	30.07 17:10	W
Mark #13	15.07 17:34	W
Mark #17	15.07 17:59	W
Mark #3	11.07 12:44	W
Mark #11	15.07 16:17	W
Mark #23	19.07 15:51	W
Mark #30	26.07 12:25	W
Mark #12	15.07 16:25	W
Mark #24	19.07 15:51	W
Mark #25	19.07 16:16	W

Title Mark #29
Latitude 55,571205°
Longitude 38,104606°

Fig.4. Example of Marks field

The current (active) mark is highlighted in the list with a contrasting color.

The table contains the following columns (from left to right):

- «Name» - is always displayed
- «Date»- is always displayed
- Marks type — only appears when the Worksheet area is activated

The Name column displays the name of the Mark. When sorting by Mark name is applied, the sort view icon is displayed in the column header.

The Date column displays the date and time the mark was set. When sorting by date is applied, a sort view icon is displayed in the column header.

The Marks type column displays the mark type:

- “G” - geomarks
- “W” - acoustic mark

When sorting by mark type is applied, a sort view icon is displayed in the column header.

When the AI area is active, only type W marks are displayed in the list and the right column is hidden.

When a mark is activated, its name and geographic coordinates in the current project coordinate system are displayed below the list.

NOTE. For W-type marks, the coordinates of the mark will be displayed only when navigation data is available.

You can set, delete, and move marks in the main field.

Functionality	Action
Select (activate) a mark	1) Left click or double left click on the line with the corresponding mark Double-clicking moves the map area so that the selected mark is in the center of the map.
Sorting by name	1) Left click on the Name column header
Sorting by date and time	1) Left click on the Date column header
Sorting by type with the active area of the Worksheet	1) Left click on the right column header
Editing the mark name	1) Select the desired mark 2) in the Title field, enter a label name The mark name will automatically change to the one entered in the marks list.
Displaying a mark in the center of the map	1) Double left click on the line with the corresponding mark

9.3.4. Worksheet area

Displays the Worksheet as different layers to bind information from different sources to the terrain (survey polygon). The Worksheet is displayed as a rectangular area of the map at the selected scale.

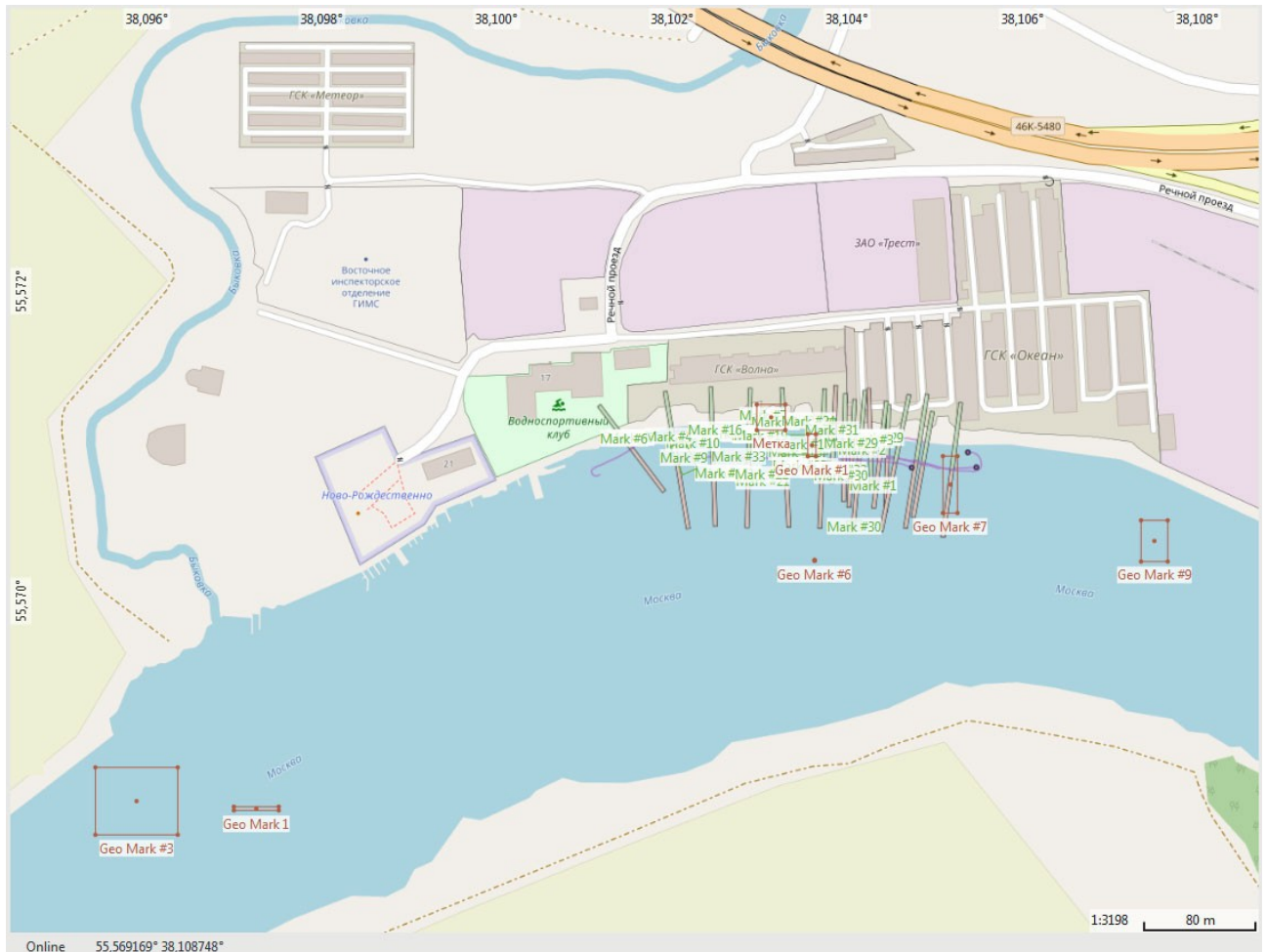


Fig.5. Example of Worksheet area

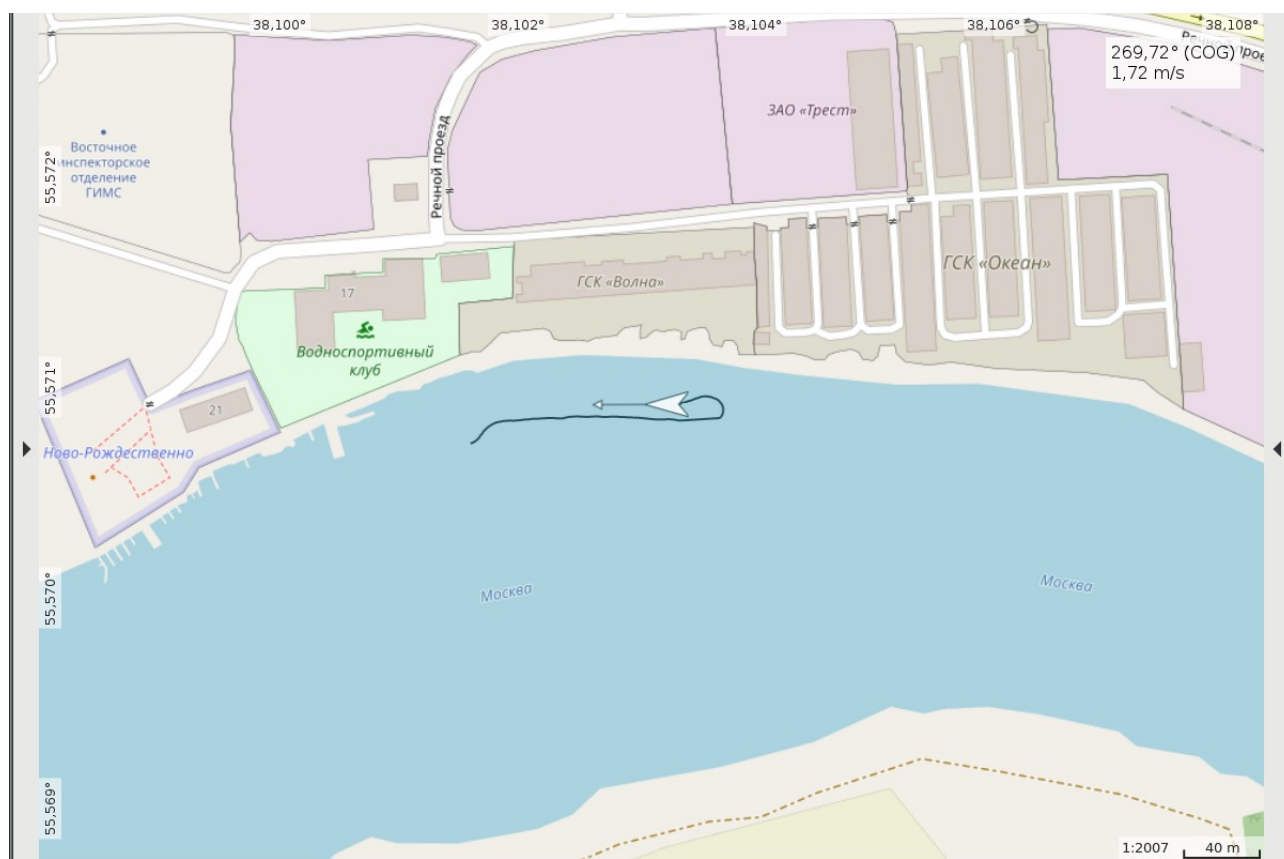


Fig.6. Example of Worksheet area when displaying the Navigation layer

Worksheet functionality — see 19, table 13.

When working with the Worksheet, the appropriate tools are used (see 9.3.4.1), Track field (see 9.3.2) and Marks field (see 9.3.3).

Layers can be turned on (visible) or off (invisible). Some of the layers can be activated to switch Worksheet operation modes (see 9.3.4.2).

The underlayer is always on and displays the current map. If the map is not available for the currently displayed area of the tablet, a background color is displayed.

The Track layer displays various information for the selected tracks from the list of tracks:

- track
- coverage etc.

The Ruler layer displays the current rulers. When the layer is activated, the measurement mode is activated using rulers.

The Pin layer displays the current temporary geomarks. When you activate a layer, the pin mode is enabled.

The Grid layer displays the coordinate grid. When you turn on a layer, the coordinate grid and coordinate labels are displayed, and when you turn off — only labels are displayed.

The Waterfall Marks layer displays all of the labels And list labels.

The Geo Marks layer displays geomarks from the list tags.

The Navigation layer displays the current position of the vessel, the vector of the direction of movement of the vessel and the last 10 minutes of the track while survey.

At the bottom of the area, you can see supporting information:

- Map download mode:
 - «online» - downloading maps from the Internet
 - «offline» - offline work with maps
- Current cursor coordinates (latitude, longitude)
- Current scale (lower right corner)

Table 13 - Worksheet functionality	
Functionality	Action
Worksheet area activate	1) Left click on the activation button of the Map area (see 9.3).
Layer visibility control	Using the Layers tool (see 9.3.4.1).
Layer activation	Using the Layers tool (cm. 9.3.4.1).
The choice of tracks to display	Tracks list (cm. 9.3.2)
Measurement mode	See 9.3.4.3
Pins management	See 9.3.4.4
Geomarks management	See 9.3.4.5
Maps download	See 9.3.4.1, 18
Setting the map download mode	See 9.3.1
Setting the current scale	1) Mouse whell or Scale tool (see 9.3.4.1)
Shift, scroll	Press the left button and move the mouse cursor

The positioning at the specified coordinates	GoTo tool (see 9.3.4.1)
Positioning to the current point when shooting	My location tool (cm. 9.3.4.1)
Vessel track display	If you have navigation data during survey

9.3.4.1. Worksheet tools

The following tools are used to control the Worksheet area (see fig.7, table 14):

- Maps list
- Scale
- Lock layers
- Layers control (см. 9.3.4.2)
- Go to tab
- Download tab

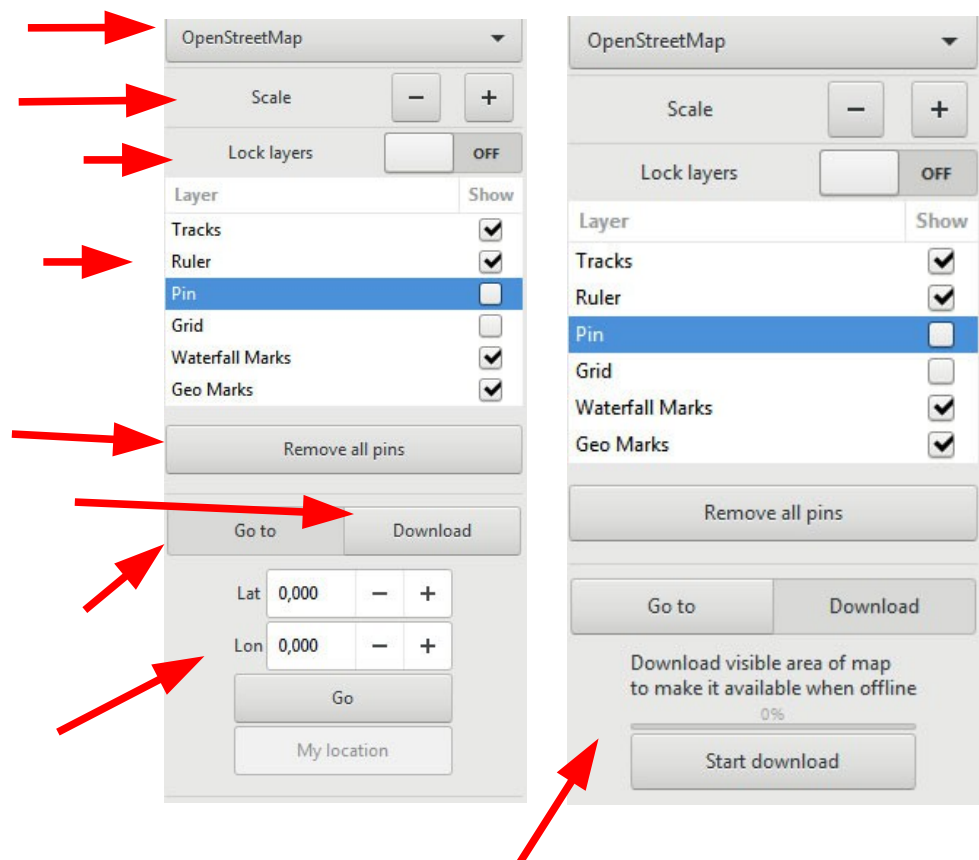


Fig.7. Tools for Worksheet area control

When you activate the Ruler layer further appears the button to delete the rules.

When you activate the Pin layer further appears the button to delete all rules.

The "Go to" tab is used to move to the specified point of the map with the entered coordinates.

The "Download" tab is used to load the visible map area in online mode.

Tool	Action
Map list	Select the currently displayed map (maps to download). <i>NOTE. By default, the program only comes with an OSM access templat.</i>
Scale	Scale set. Key «+» - zoom in, key «-» - zoom out.
Layers lock	Off — editing layers is allowed On — editing layers is not allowed
Layers control	Select and management of layers. See 9.3.4.2
Go to	Set the coordinates of the point and go to the specified point when you click "Go".
Download	Load all available scales of the current map for the visible area

9.3.4.2. Layers control

To show/hide a layer, select/deselect the corresponding check box in the Show column (see 6).

Current (active) layer подсвечивается в списке контрастным цветом.

When you activate the Ruler layer, the measurement mode is enabled (see 9.3.4.3).

When you activate the Pin layer, the management of pins is enabled (see 9.3.4.4).

When you activate the Geomarks layer, the management of geomarks is enabled (see 9.3.4.5).

9.3.4.3. Measurement mode

Used for linear measurements on the map with a ruler.

The mode is turned on/off when the Ruler layer is activated/deactivated (see 9.3.4.2).

Rule — a set of nodes (points) on the map connected by straight lines. The number of nodes is not limited. The total length of the lines is displayed next to the ruler.

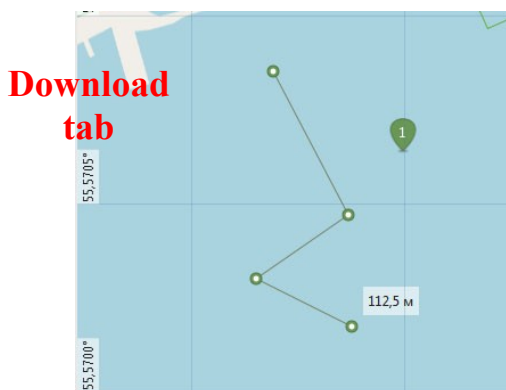


Fig.8. Examples of rule

Table 15 - The functionality of the measurement (with the active Ruler layer)	
Functionality	Action
Set node	1) Left click in the Worksheet area — the node is displayed as a circle
Move node	1) Left click on the node 2) the movement of the node 3) Left click
Delete node	1) Left click on the node 2) press Del
Delete ruler	Press the "Remove ruler" button (see 9.3.4.1)

9.3.4.4. Temporary geomarks (pins) control

Used to set one or more temporary geomarks (pins) on the Worksheet. Control is turned on/off when the Pin layer is activated/deactivated (see 9.3.4.2).

The number of installed pins is not limited. The first 9 pins are numbered, the next — no.



Fig.9. Examples of pins

Table 16 - Pins functionality (when Pin layer activated)	
Functionality	Action
Set pin	1) Left click in the Worksheet area The numbering of the pins is automatically generated
Move pin	1) Left click on the pin 2) Moving pin 1) Left click
Delete pin	1) Left click on the pin 2) Press Del key
Delete all pins	Press the "Remove all pins" button (see 9.3.4.1)

9.3.4.5. Geomarks control

Used to install one or more geomarks on a Worksheet.

Control is turned on/off when the Geo marks layer is activated/deactivated (see 9.3.4.2).

Functionality	Action
Set geomark	<ol style="list-style-type: none">1) Left click in the Worksheet area2) Move the cursor to set the desired size of the mark frame1) Left click — mark fixed
Move geomark	<ol style="list-style-type: none">1) Left click in the center of the frame2) Moving a mark to a new location1) Left click — mark fixed
Changing the frame size	<ol style="list-style-type: none">1) Move the cursor to any corner of the frame; a circle is displayed when capturing a corner2) Left click on corner capture — frame capture3) Move the cursor to set the desired frame size vertically and horizontally1) Left click — mark fixed
Delete geomark	<ol style="list-style-type: none">1) Left click in the center or corner of the geomark frame2) Press Del key

9.3.5. SSS area

Displays AI one or two sides of SSS in waterfall mode and additional layers for working with AI SSS.

The SSS area displays sonar data in the "waterfall" mode for the left and right sides of SSS. In this mode, the image is formed based on the assumption of uniform, rectilinear motion of the SSS carrier.

A coordinate grid is automatically formed on the AI, which displays the distance traveled and the viewing strip in the inclined range. Information with coordinates is generated for the mouse pointer.

For the SSS area available modes control the display, the marks management and the measurement mode.

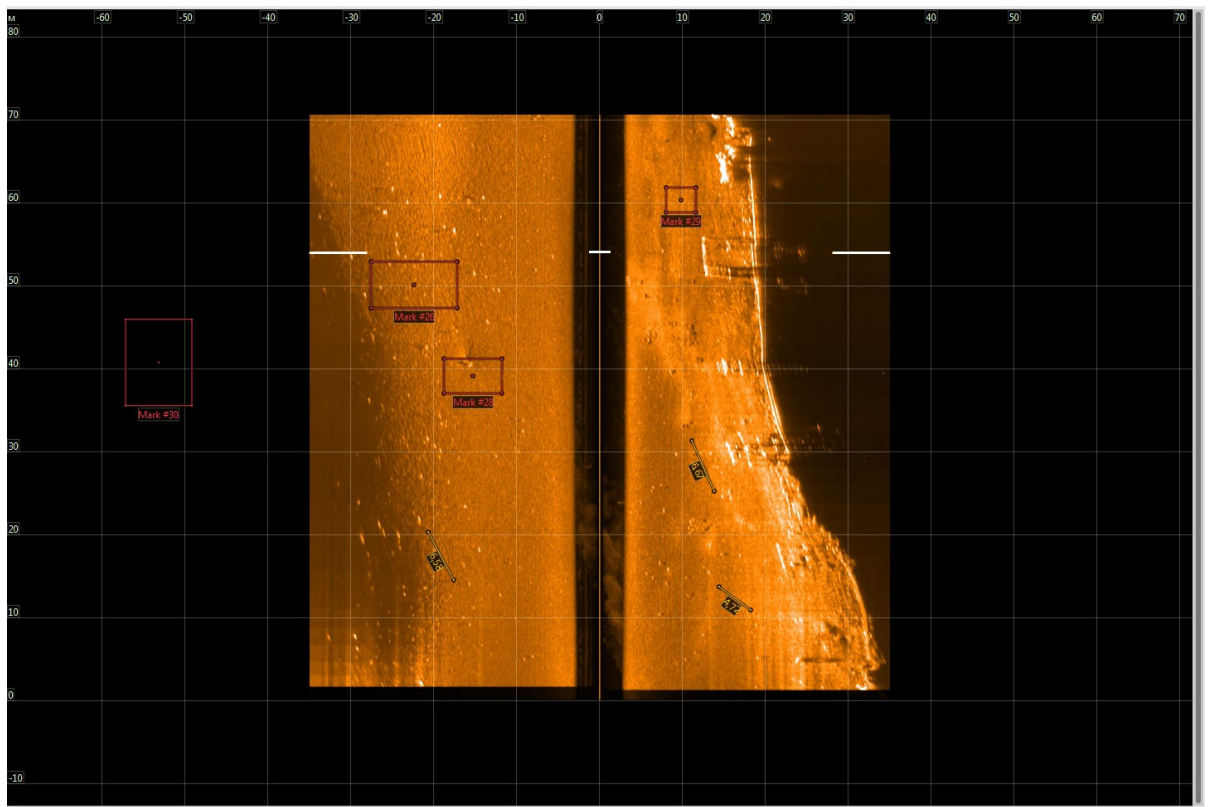


Fig.10. Example of SSS area

At the top of the scale is displayed slant range.

The top right corner shows the current cursor position by distance.

The distance scale is displayed on the left.

At the bottom and right of the scroll bar (shift) images are displayed.

The following layers are used:

- Acoustic image (AI)
- Grid
- Marks
- Measurements

The AI layer is always active and displays the AI of the active track.

Grid layer displays the coordinate grid.

The Marks layer displays the active AI marks from the Marks list. When the layer is activated, the mode of working with marks is activated.

The Measurements layer displays the elements to perform the measurements. When the layer is activated, the measurement mode is activated (see 9.4.1.1).

Activating layers and layer visibility control — using the Layers tool (see 9.3.4.1).

9.3.5.1. SSS area management tools

The following tools are used to manage the SSS area:

- Contrast
- Range
- Scale
- Palette
- Autoscroll
- Ploor
- Layer control

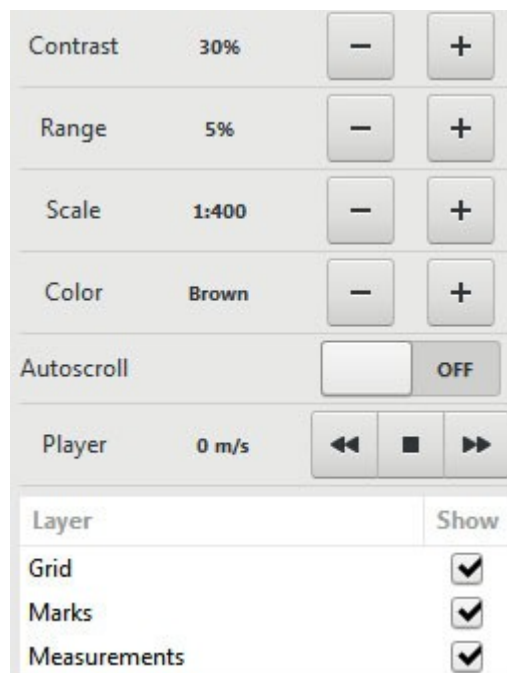


Fig.11. SSS area management tools

Table 18 - SSS area management tools	
Tool	Function
Contrast	Contrast adjustment is carried out in the range from 0 to 100%. As the value decreases, the contrast decreases, else - increases.
Range	The range is adjustable from -100 to 100%. When the value is increased, the range of high brightness (light) is stretched, while the range of low brightness (shadow) is reduced.
Scale	Sets the current scale. Button "+" - zoom in, button "-" - zoom out.
Palette	Sets the current display palette. Buttons "+", "-" - select a palette from a set of available palettes.
Autoscroll	
Pleer	Playback of track data at a specified speed (if the current scale does not allow the whole track to be displayed).
Layers	Layers control (see 9.4).

9.4 Managing SSS area layers

To show/hide a layer, select/deselect the appropriate check box in the Show column.

The current (active) layer is highlighted in the list with a contrasting color.

When you activate/deactivate the Marks layer, the Marks Management mode is turned on/off (see 9.4.1.2).

When the "Measurements" layer is activated/deactivated, the AI measurement mode is turned on/off (see 9.4.1.1).

9.4.1.1. Measurements for SSS

Used for linear measurements of AI SSS with one or more rulers.

Ruler — two nodes (points) in the SSS area connected by a straight line. The line length is displayed next to the line (see fig.12). The user can create any number of "rulers" for the measurement.

Measurement mode is turned on/off when the Measurement layer is activated/deactivated (see 9.3.4.2). Measurements functionality — see table 19.

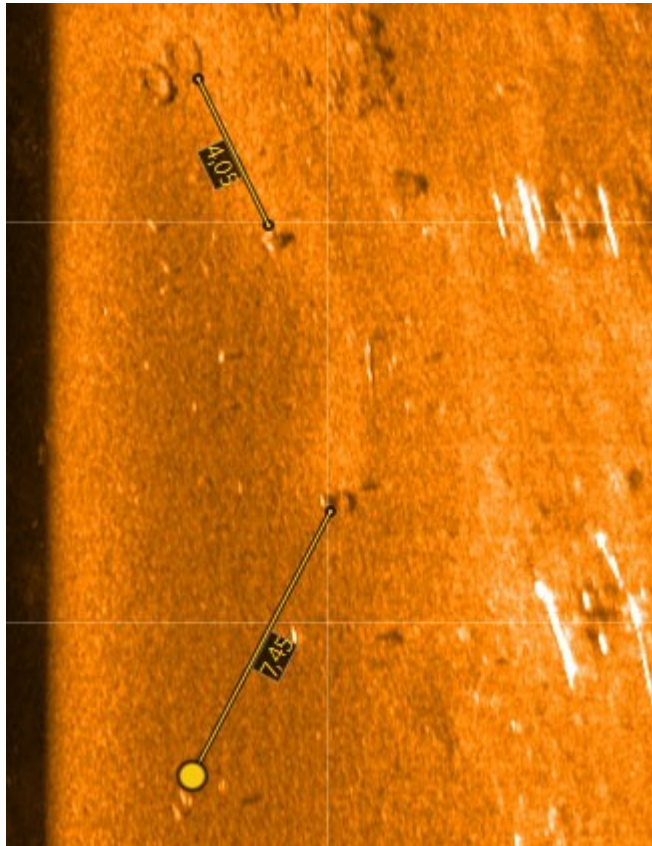


Fig.12. Example of rules in SSS area

Table 19 - SSS measurements functionality	
Functionality	Action
Set node of the ruler	<ol style="list-style-type: none"> 1) Move the cursor to the desired point 2) Left click — set the start node (displayed as a circle) 3) When you move the cursor further, the end node and the distance between the start node and the current cursor position (end node) 4) Left mouse click — set the end node (displayed as a circle)
Move ruler	<ol style="list-style-type: none"> 1) Move the cursor to the desired node; when capturing a node, a larger circle is displayed 2) Left click on node — capture node 3) Moving a node to a new location 4) left click — lock the node to a new location
Delete ruler	<ol style="list-style-type: none"> 1) Move the cursor to any of the nodes; a larger circle will be displayed when the node is captured 2) Press Del key — ruler deleted

9.4.1.2. Managing acoustic marks

Used to set one or more acoustic mark in the SSS area (see fig.13). The user can create an arbitrary number of marks.

Control is turned on/off when the Marks layer is activated/deactivated (see 9.4). SSS marks functionality — see table 20.

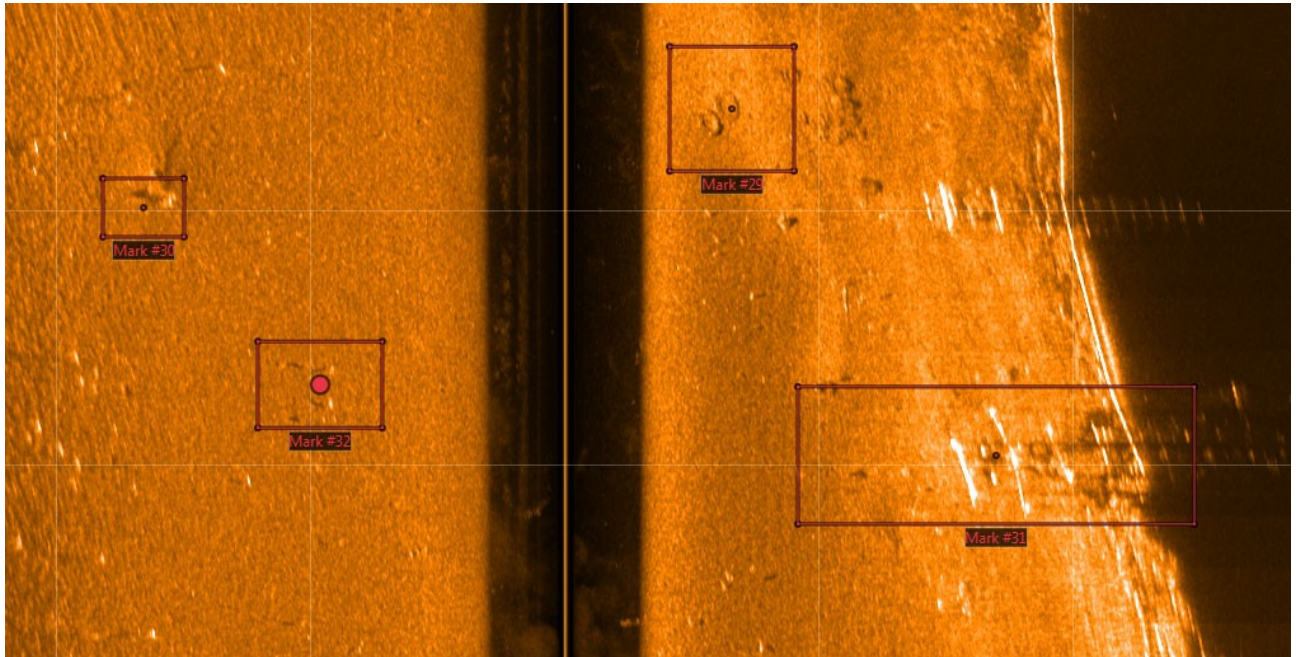


Fig.13. Example of Acoustic marks for SSS area

Table 20 - SSS marks functionality	
Functional	Action
Set mark	<ol style="list-style-type: none"> 1) Move the cursor to the desired point in the SSS area 2) left click — sets the center point (coordinate) of the mark; the center point is displayed as a circle 3) move the cursor to set the desired size of the mark frame vertically and horizontally 4) left click — fixing the size and setting the mark <p>After the mark is set, it appears in the Marks list, the mark name is generated automatically (see 9.3.3).</p>
Move mark	<ol style="list-style-type: none"> 1) Move the cursor to the center point of the mark 2) Left click on the center point of the mark — frame capture 3) Moving a mark to a new location 4) left click — fix mark on new location
Border changing size	<ol style="list-style-type: none"> 1) Move the cursor to any corner of the frame; a circle is displayed when capturing a corner

		<ol style="list-style-type: none"> 2) left click on corner capture — frame capture 3) move the cursor to set the desired frame size vertically and horizontally 4) left click— fixing the size
Mark editing	name	See 9.3.3
Delete mark		<ol style="list-style-type: none"> 1) Move the cursor to the center of the frame or any of the corners of the frame; a circle will be displayed when capturing 2) left click on capture — activate mark 3) Press Del key– the mark will be removed <p>After the mark is removed, it is removed from the Marks list (see 9.3.3).</p>

9.4.2. Echosounder (ES) area

Displays information of one channel echosounder in the form of AI in the coordinate system of the "distance-depth" and additional layers.

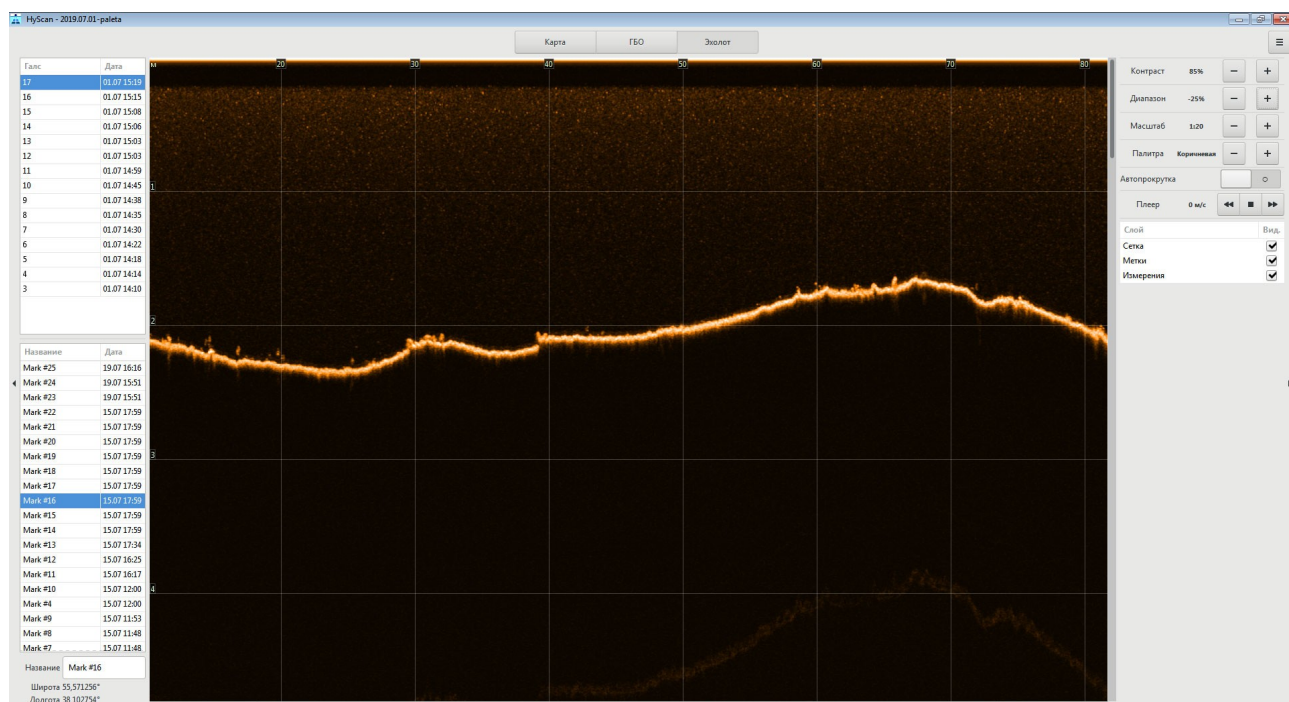


Fig.14. Example of ES area

At the top of the scale displays the distance traveled.

The depth scale is displayed on the left.

The top right corner shows the current cursor position by distance and depth.

At the bottom and right of the scroll bar (shift) images are displayed.

Layers similar to the SSS area layers are used (see 9.3.5). Working with ES layers is similar to working with SSS layers (see 9.4).

9.4.2.1. ES area management tools

The functionality of the tools for working with the ES area is similar to the functionality of the SSS area tools (see 9.3.5.1).

9.4.2.2. ES area layers management

Working with ES layers is similar to working with SSS layers (see 9.4).

9.4.2.3. Measurements for ES area

The functionality of the ES area measurement is similar to the functional measurements in the SSS area (see 9.4.1.1).

9.4.2.4. ES acoustic marks control

Working with acoustic marks in ES area is similar to working with marks in SSS area (see 9.4.1.2).

9.4.3. Sub bottom profiler (PF) area

Displays information of the LF channel of the PF in the form of AI in the coordinate system of the "distance-depth" and additional layers.

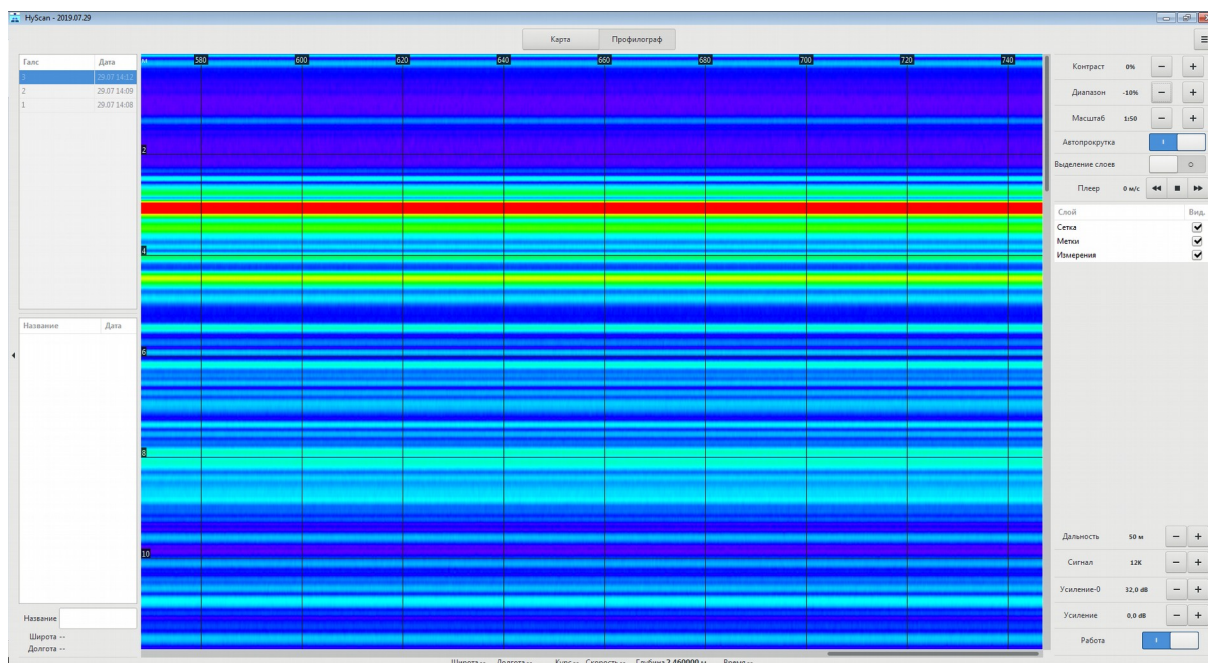


Fig.15. PF area

At the top of the scale displays the distance traveled.

The depth scale is displayed on the left. The top right corner shows the current cursor position by distance and depth. At the bottom and right of the scroll bar (shift) images are displayed.

Layers similar to the SSS area layers are used (see 9.3.5). Working with PF area layers is similar to working with SSS layers (see 9.4).

The LF channel data is displayed in the RGB palette: the minimum signal is displayed in blue, the maximum signal is displayed in red (see fig.16).



Fig.16. Palette for PF data

The following functionality is used to control PF:

- Distance
- Signal – the higher the value, the higher the frequency generated

- Gain-0 - Initial gain setting (at zero distance)
- Gain - Setting the gain change rate per line
- Select transitions
- Work - PF operation on/off

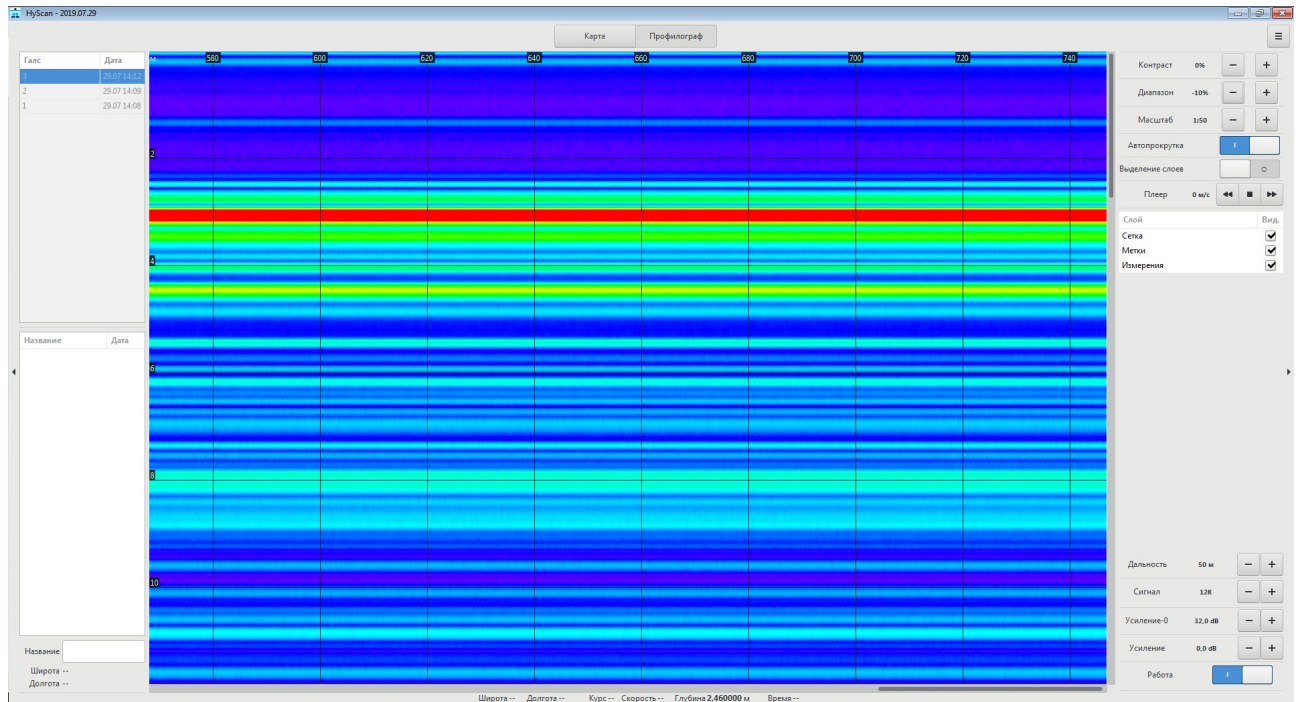


Fig.17. Example of PF area (select transitions = off)

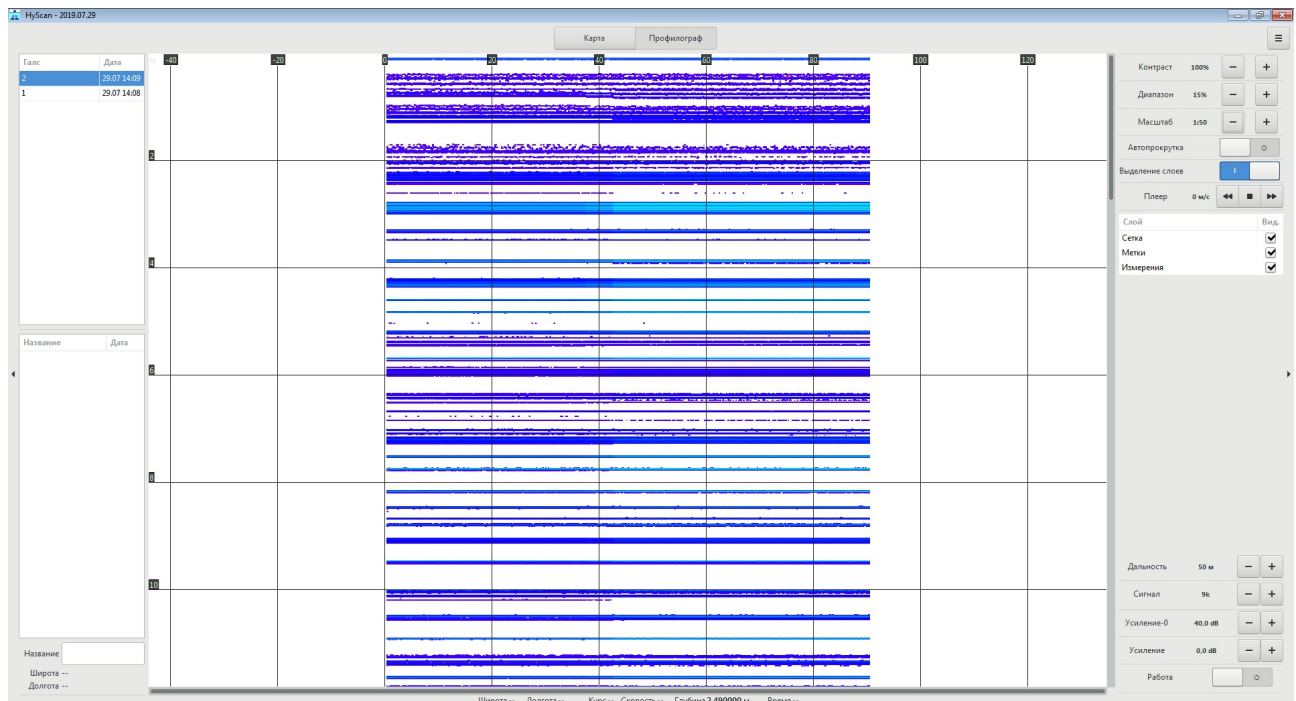


Fig.18. Example of PF area (select transitions = on)

9.4.3.1. PF area control tools

The following display management tools are used to manage the PF area (see fig.19, table 21):

- Contrast
- Range
- Scale
- Autoscroll
- Transitions
- Pleeer
- Layers control

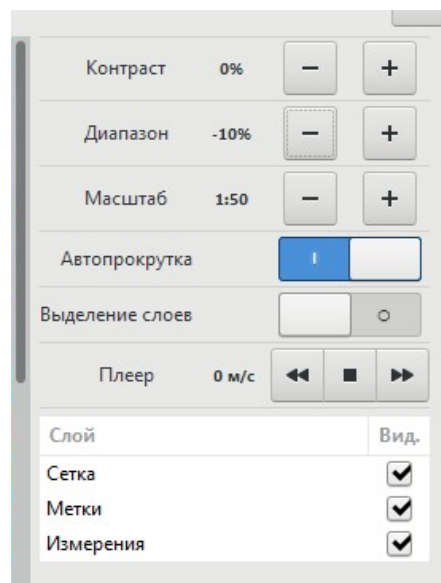


Fig.19. Display management tools for PF area

When survey to control the PF uses the following management tools (see fig.20, table 21):

- Distance
- Signal
- Gain-0
- Gain
- Work

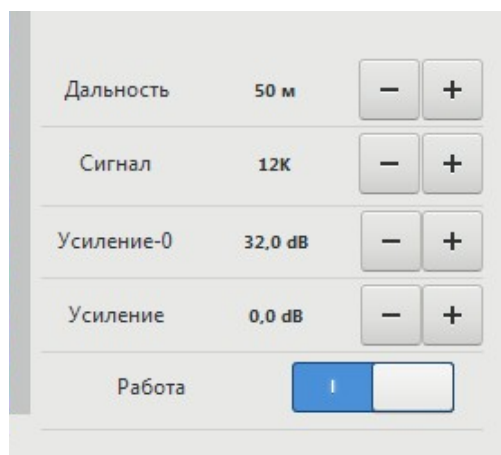


Fig.20. Tools for PF control

Table 21 - PF area and PF sonar managements tools	
Tool	Action
Contrast	Contrast adjustment is carried out in the range from 0 to 100%. As the value decreases, the contrast decreases and versa.
Range	The range is adjustable from -100 to 100%. When the value is increased, the range of high brightness (light) is stretched, while the range of low brightness (shadow) is reduced.
Scale	Sets the current scale. Button "+" - zoom in, button "-" - zoom out.
Autoscroll	
Transitions	Enable/disable transitions mode. See PF description.
Pleer	Playback of track data at a specified speed (if the current scale does not allow the whole track to be displayed).
Layers control	Layers control (see 9.4).
Distance	Setting the current range of PF. Button "+" - increase range, button "-" - decrease. Can be adjusted during operation. Changing the range does not lead to a change of track.
Signal	The choice of a signal emitted by the work of PF (of the available). Button "+" - increase the signal frequency, button "-" - decrease. Can be adjusted during operation. Changing the signal does not change the track.
Gain-0	Adjustment of the initial gain (gain at the beginning of the distance) in DB. As the value decreases, the gain decreases and increases. Can be adjusted during operation. Changing the gain does not change the track.
Gain	Adjusting the speed of the gain changes along the distance in dB/100m. A value of 0 — the gain is not changed and is equal to the initial, >0 – increase the gain at a given rate, <0 - the gain is reduced at a specified rate. Can be adjusted during operation. Changing the gain does not change the track.

Work	Turn on/off the PF. When you turn on — starts the PF with the specified parameters (PF goes into operation mode), when you turn off — stops the PF (PF goes into Stop mode).
------	--

9.4.3.2. PF layer management

Working with layers PF the same work with SSS layers (see 9.4).

9.4.3.3. PF measurements

The functionality of the measurements of the PF area is similar to the functional measurements in the SSS area (see 9.4.1.1).

9.4.3.4. Managing AI PF marks

Work with acoustics marks in the PF area is similar to work with acoustic marks in the SSS area (see 9.4.1.2).

9.4.4. Sonars management tools

Used to control sonar during survey. Depending on the type of sonar, the instruments may vary. The tools are located in the right field of the main window.

SSS management tools - see 9.3.5.1.

ES management tools - see 9.4.2.1.

PF management tools - see 9.4.3.1.

9.4.5. Status bar

Used to display current sonar state data, parametric data, and other information.

The following information is displayed during survey:

- coordinates (latitude, longitude) — if navigation data is available
- course — if navigation data is available
- velocity — if navigation data is available
- depth — if depth data is available
- time – computer time

9.5 Project manager window

Used for project management. The window contains (see fig.21):

- Projects list - displays a list of available projects in the projects folder.
- Tracks list - displays the tracks of the selected project.
- New project key - opens a window for entering the project name.
- Open project key - opens the selected project.
- Delete project key - deletes the selected project.
- Delete track - deletes the selected track.

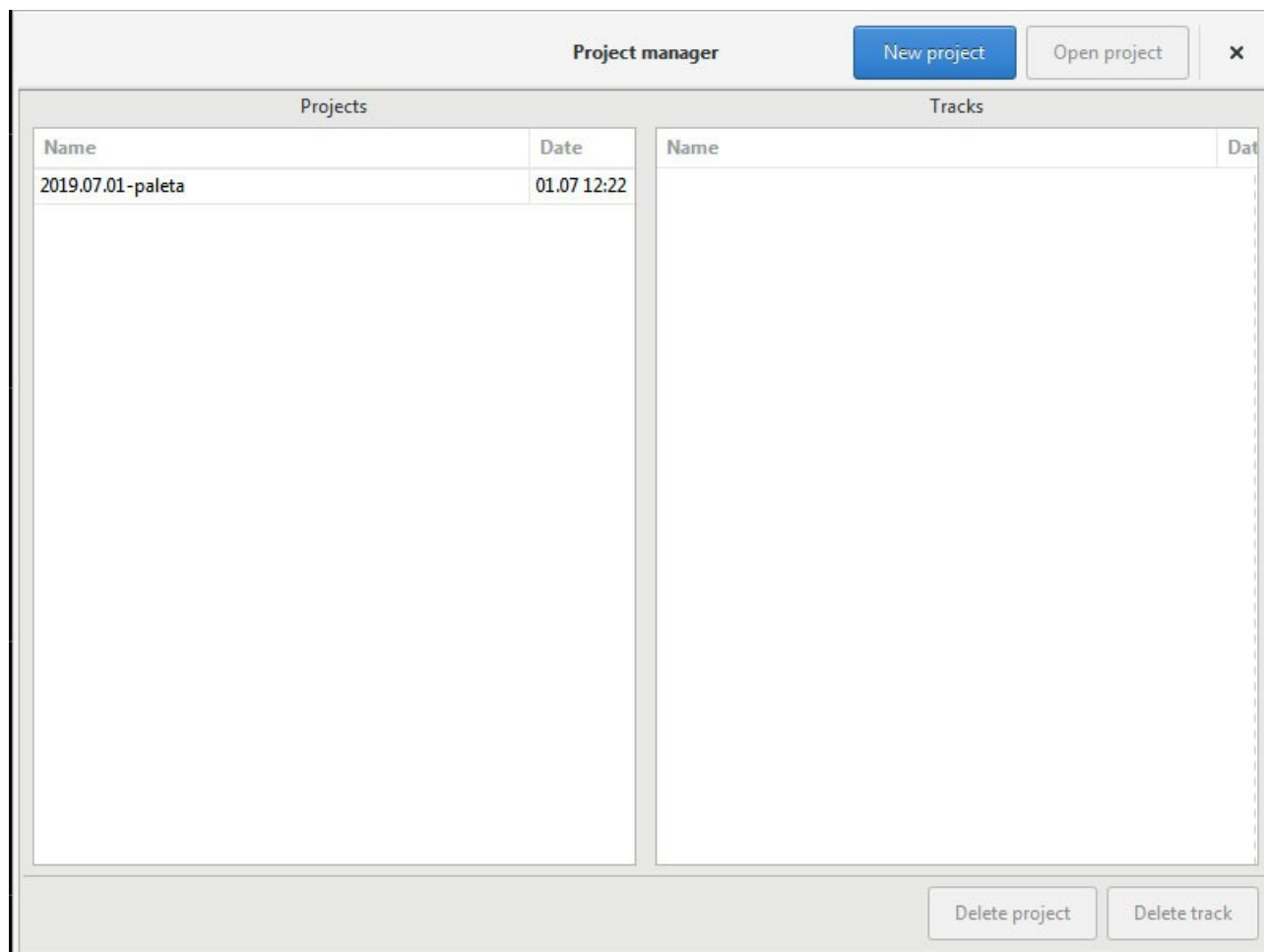


Fig.21. Example of Project manager window

Table 22 - The functionality of management of projects	
Functionality	Action
Choice project	1) Select a project in the Projects list The selected project is highlighted in the list with a contrasting color. After selecting a project, the buttons for possible actions with the project and in the field are activated.
Open project	1) Select a project in the Projects list

	2) Press “Open project” key
Delete project	1) Select a project in the Projects list 2) Press “Delete project” key
View track list	1) Select a project in the Projects list The Tracks list displays the tracks of the selected project
Delete track	1) Select a project in the Projects list 2) The Tracks list displays the tracks of the selected project 3) Select track in the track list 4) Press “Delete track” key

9.6 Startup window

Used to select the program mode at startup.

The window contains the following pages:

- «Intro» - selection of the key actions when the program is run. Opens automatically when the program starts.
- «Hardware» - hardware setup.
- «Connection» - connect to equipment

Intro page contains:

- «Cancel» key — close a window
- «Project manager» key - opens the project Manager window
- «Next» key - go to the next page
- «Project:» string - displays the project selected for the job.
- «Hardware:» string - displays the selected hardware template.
- «View» - start the program in the selected project View mode.
- «Scan» - start the program in the selected project Survey mode.

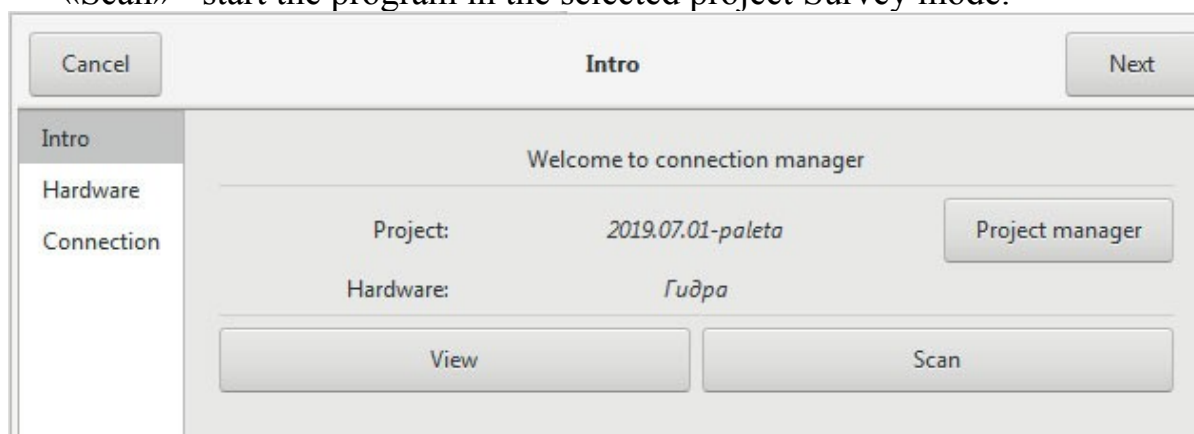


Fig.22. Example of Startup window, Intro page

Table 23 - Startup functionality	
Functional	Action
Select an existing project, create a new project, delete a project, edit a project	1) Press «Project manager» key on the Intro page
Hardware setup	1) Click the Next button on the Intro page 2) Choose a template equipment
Running the program in View mode	1) To select a project to view 1) Press «View» key
Running the program in Survey mode	1) Select a project to view or create a new project 2) Choose a template equipment 1) Press «Survey» key

10. Using software

After starting the program a window opens the initial launch of the program (see 9.6).

You must complete the following steps:

- select an existing project or create a new project
- o select the mode of operation of the program: View or Survey

When you select the View mode, the program provides work with the previously recorded project, the connection of equipment is not required.

When you select the Survey mode, the program allows you to continue working with the previously recorded project or newly created in the survey mode, with the connection of the necessary equipment. If the hardware fails to connect, the program goes into View mode.

In the view mode, all the functionality of the program is available except for hardware management and data recording.

The basis of any work in the program is working with project data (see 11).

The following definitions are used in the job description:

Working project — a project that is open in the program.

Active layer - a layer selected by the Operator or automatically to which certain actions can be applied. Example: activation of the layer Rules in the Worksheet area involves measurement mode.

Active (current) track - track selected by the Operator or automatically to which certain actions can be applied. For example: track activation when survey.

Selected tracks — one or more tracks selected by the Operator or automatically tracks to which certain actions can be applied. For example: when the Worksheet area is active, the selected tracks are displayed (when the Tracks layer is enabled).

Selected marks — one or more operator-selected or automatically selected marks to which specific actions can be applied.

10.1 Workflow

There are the following main stages of work with sonar (see fig.23):

- planning (preparing)
- survey (data collection)
- postprocessing

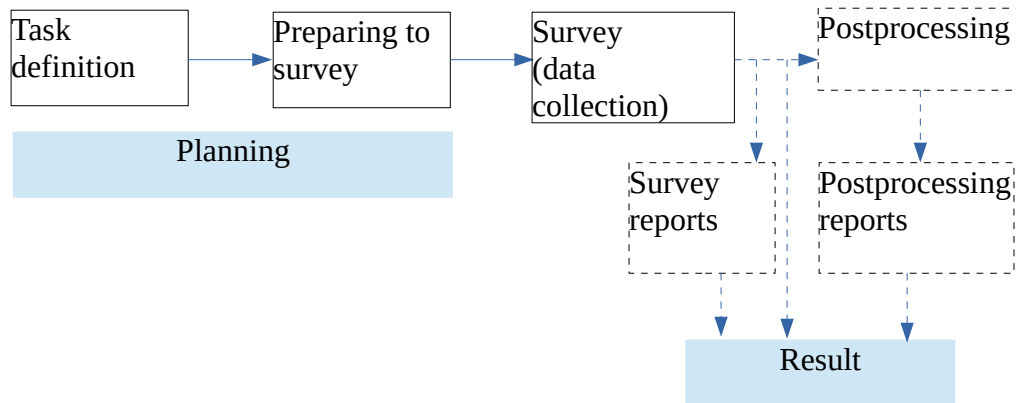


Fig.23. Workflow

During the planning phase, the program allows (in View mode):

- to prepare the map
- create a project
- to configure the project
- create a plane
- create required reports

During the survey phase, the program allows:

- open a project or create a new one
- to configure the project
- connect to the equipment used for survey
- to operate the equipment during survey
- recording data
- to view the data
- perform various measurements
- to evaluate the quality of the survey
- create required reports

During the postprocessing phase, the program allows (in View mode):

- to view the data
- perform various measurements
- to evaluate the quality of the survey
- create required reports

10.1.1. Statement of the problem and the types of survey

In the formulation of the problem determine:

- survey type
- date and place, survey polygon
- vessel used
- features of the polygon, places of approaches, etc.
- presentation of results (form and composition of the report)

Depending on the goal and the solution of a specific problem, there are the following types of survey:

- search
- profiling
- echosounder measurement

It is possible to combine several types of survey in one.

Search survey is designed to search for various objects on the bottom and in the water column.

Profiling is designed to study the thickness of the soil and determine its properties.

Echosounder measurement is designed to build a bathymetric map.

Regardless of the type of survey can be divided into three stages - the preparation (planning) , data collection and postprocessing of data.

10.1.2. Planning

At the stage of preparation, all the necessary measures are carried out to ensure the quality of the survey.

From a technical point of view, the preparation phase includes:

- the formation of the source data (target setting)
- tracks planning, selecting the width (step) of tracks
- предварительное определение режимов съемки
- preparation of vessel
- equipment preparation

10.1.3. Survey (data collection)

When collecting data, direct sonar survey with recording of the received data is carried out, visual interpretation of the data and their initial analysis takes place.

During data collection is carried out:

- operational adjustment of survey parameters

- logging of marks, tracks;
- recording data
- operational control

10.1.4. Postprocessing

The need for postprocessing is determined by the initial requirements. Postprocessing is performed at the end of survey (not in real time) with the help post processing software.

10.1.5. Reporting

The need for reporting is determined by the initial requirements. Usually, reports are made on the results of the survey and postprocessing. It is also possible to create a final report on the results of the work done. The report form can be a text file with the necessary explanations and illustrations. Optionally, you can attach video, screenshots, results of postprocessing in different formats, etc.

11. Projects

The program allows you to store survey data in the form of projects.

The project is intended for separate storage of data related to the performance of any work (survey). Projects created while working with the program are basically similar to projects used in various software packages running on the computer. The project contains a set of data of various types and a description of the links between them, various settings, allows you to automate the process of data processing, storage and transmission. The main purpose of the project – the convenience of the Operator, reducing the implementation of repetitive operations, additional data protection. To work with the project, special functions of the program are used, which provide project management and management.

Data from multiple projects can be combined into a single project. Data from one project can be divided into several projects.

Project management — with the help of project Manager (see 9.5).

Projects are created using the selected template, which already contains some presets.

All project files are stored in one folder — the project folder. The necessary subfolders can be created inside the project folder.

All projects are stored in the project working folder. The path to the project folder is set by the Operator.

When you create a new project, the program automatically creates a new project folder inside the project working folder.

The reliability of the project settings is provided by the Operator.

11.1 Working with the project

When working with a project, you can highlight the following basic operations:

- create a project
- open a project
- recording project data
- editing project data
- close a project
- importing data into a project
- export project data
- project data control
- project archiving
- deleting a project
- the division of the project
- merging projects
- create project reports
- logging project actions

Table 24 - Functionality of the project	
Functional	Action
Create a project	Project manager
Open a project	Project manager
Setting up the project	Project manager
Close a project	Project manager Exit the program
Copy a project	Copying a project folder with OS tools
Export project data	Project manager
Import project data	Project manager
Deleting a project	Deleting a project folder with OS tools

Project data monitoring	Project manager
Converting data from old projects to the new version	See 11.3

11.2 Creating project

The creation of the project is carried out by the Operator in advance or immediately before the execution of the work. In this case, the necessary settings are set, describing the used hardware configuration, sensor settings, the planned grid of tacks, etc. the Project can be created by any Operator in several ways:

- based on the default template, then editing the required data or importing the required data from other projects
- save one of the projects under a different name, then open a new project and edit the required data

To create a project, use the project Manager (see 9.5).

When you create a project, you must specify a project name. When you create a project, a project folder is automatically created in the project working folder.

After you create a project, you must set up the project settings.

NOTE. Recommendations for choosing a project name are given in the description of the project Manager.

Just before creating a survey project, it is recommended to check and set (if necessary) the system date and time on the computer used for the survey, so that the project time coincides with the real time and the shooting date (when creating project files, the system date and time are used).

If the disk on which the project is stored uses the NTFS file system, it is necessary to correctly set the summer/winter time in the OS. Otherwise, when you view the project on another computer, the project file creation time may be shifted by one hour.

11.3 Updating projects to work with the new version of the program

When program gets new features, it is sometimes necessary to change the way data is stored inside projects. That's why after upgrading your program installation you may need to modify already stored data. HyScan DB Fix solves this exact task. It is a wizard which takes you through all the steps, needed to update projects.

When you launch HyScan DB fix you see welcome page (see fig.24) with brief info about this tool. You can hit Cancel or Esc button to exit it.

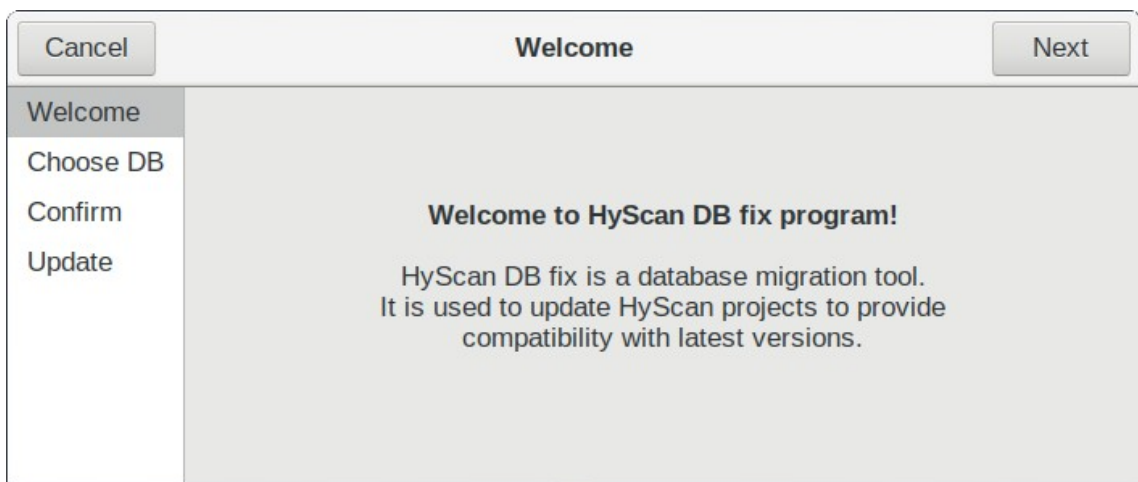


Fig.24. DB Fix welcome page

Click Next to go to database selection page (see fig.25). It contains a list of all known databases.

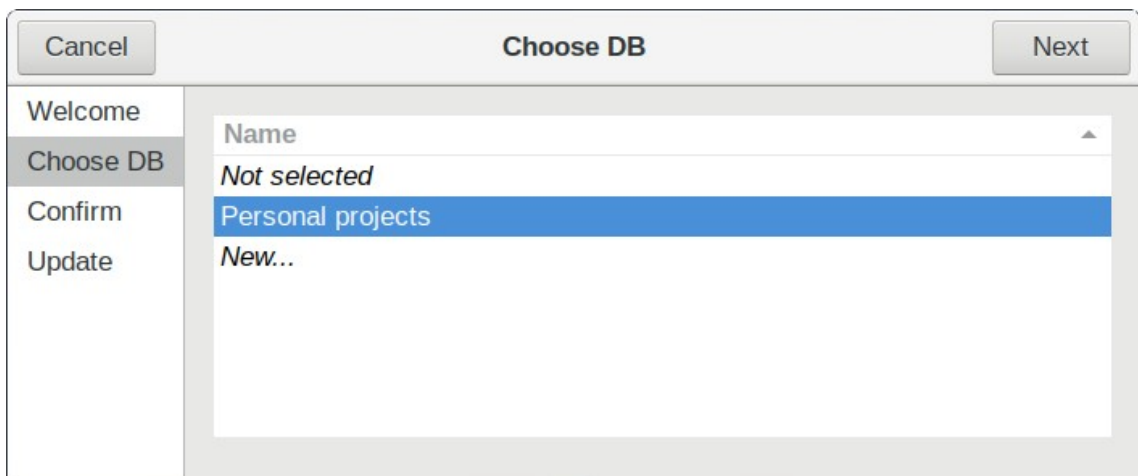


Fig.25. Selecting database to update

Select database to update and click Next to go to confirmation page (see fig.26).

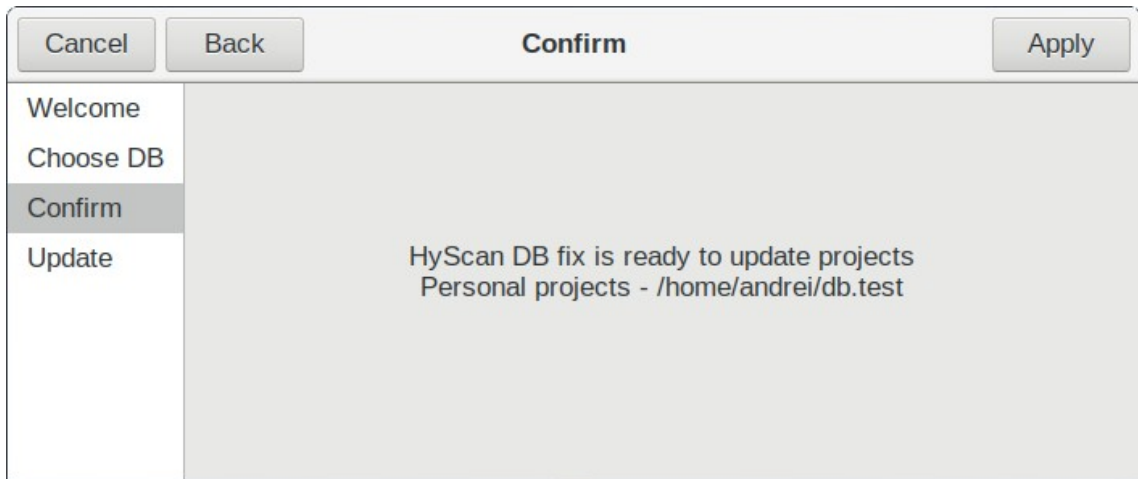


Fig.26. Reviewing your choice

Review your choice (selected database and where it is stored) and confirm with corresponding button. After that, the program will start to update database and all of its projects. (see fig.27).

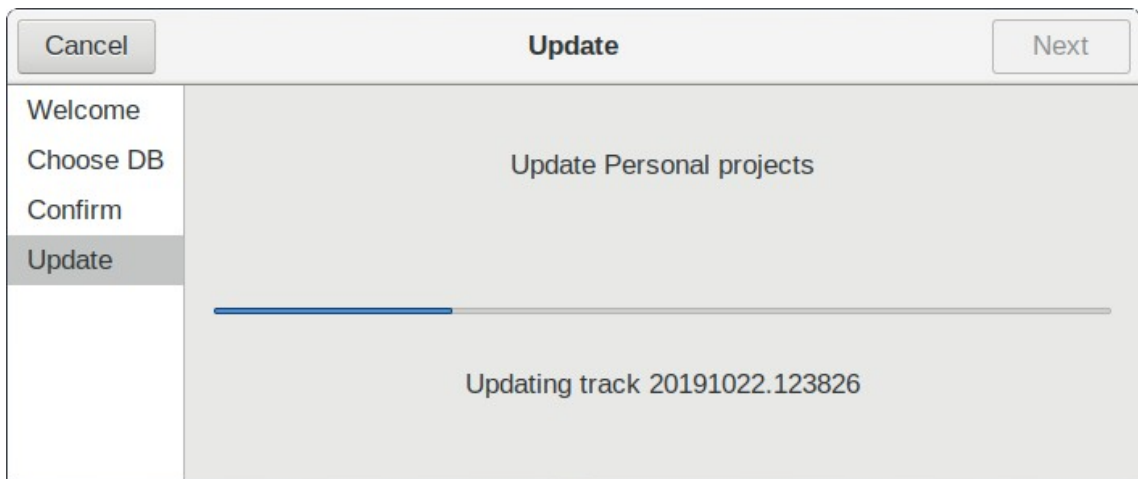


Fig.27. Updating database

You can track overall process on this page. When the process is done, Next button becomes sensitive (see fig.28). Press it to finish updating this database.

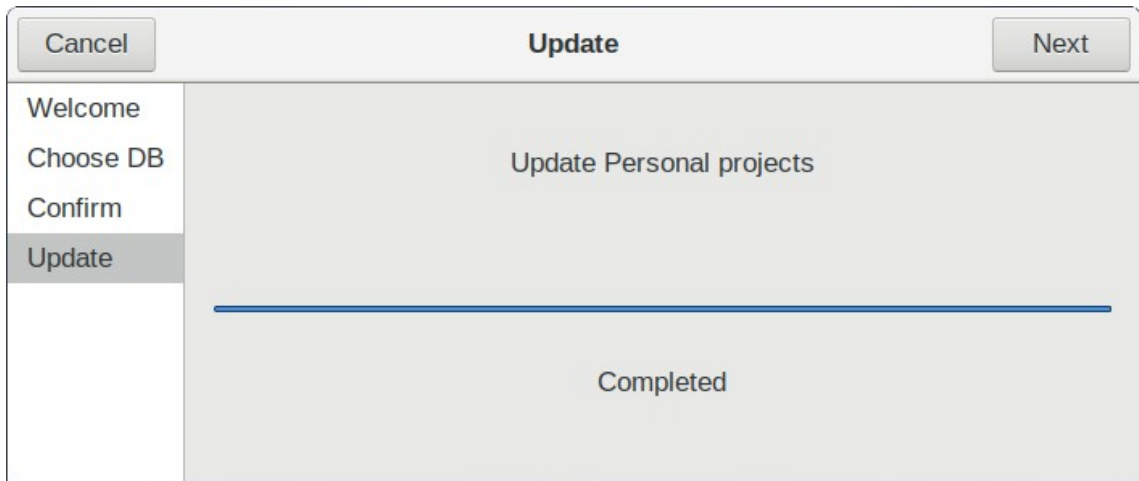


Fig.28. Database succesfully updated

On the next screen (see fig.29) you may update another database if necessary, or close the program.

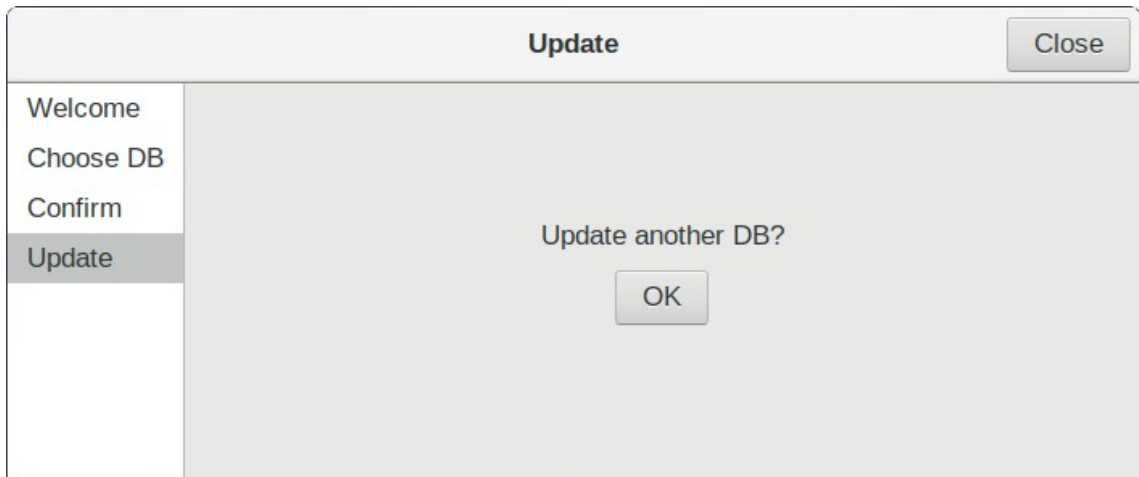


Fig.29. Database updated

12. Folders and files

The program uses the following working folders and files:

- program working folder - the folder where the program was installed (for example: C:\HyScan5\)
- operator settings folder - contains settings data for the operator account
C:/Users/<ПОЛЬЗОВАТЕЛЬ>/AppData/Local/hyscan/map-profiles
- GIS server access files folder - contains configuration files that are used to access GIS servers when maps are downloaded over the Internet
C:/Users/<ПОЛЬЗОВАТЕЛЬ>/AppData/Local/hyscan/map-profiles
- Project working folder - contains project folders (for example: D:\Hydra\Projects\). It can be located on an internal, external (removable), or network drive. One or more projects can be stored in the working folder.
- Project folder - contains all project files, located in the project working folder (for example: D:\Hydra\Projects\Prj1).
- Project files - store project data, located in the project folder

An example of folders and files placement — see Appendix D.

13. Software settings

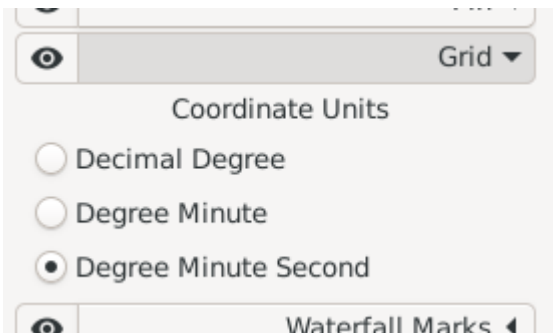
Setting up the program is:

- setting the project working folder (see 9.5)

13.1 Switching of units of measurement

The program uses the geographical coordinates of WGS-84. To change the format for displaying latitude and longitude coordinates, open the grid settings (Grid) and select one of the available formats (see Appendix E):

- Decimal Degrees - degrees with tenths,
- Degree Minute - degrees and minutes,
- Degree Minute Seconds - degrees, minutes, and seconds.



14. Planning

In preparation for the survey are determined by the purpose of survey, polygons, the volume of work, planned grid tracks.

Before survey:

- define the goals and objectives of the survey
- examine the survey area, determine the survey area and the range of depths surveyed
- prepare for use the vessel, mount, sonar and other equipment used

In the preparation phase, run:

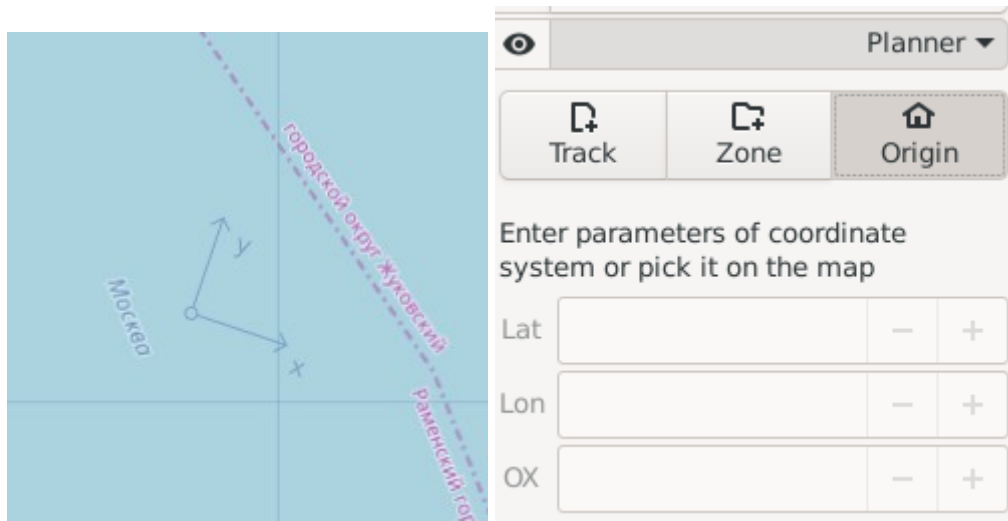
- download maps (see 18)
- create a project (see 11.2)
- plan a mission (see 14.1)

14.1 Mission planning

Before going to a water area, the operator can map the tacks of the upcoming mission using the planning tools available within the program. The mission plan represents the boundaries of the research area and the plan-diagram of tacks within this zone, at which the ship will move during the mission. Point coordinates can be represented in two coordinate systems: the global WGS-84 or the local Cartesian coordinate system.

14.1.1. Reference point

To set the reference point of the local coordinate system, open the planning settings and select the "Origin" mode. Then click on the map to set the reference point and the direction of the OX axis. Later, you can change these parameters in the input fields below (Lat, Lon, OX).

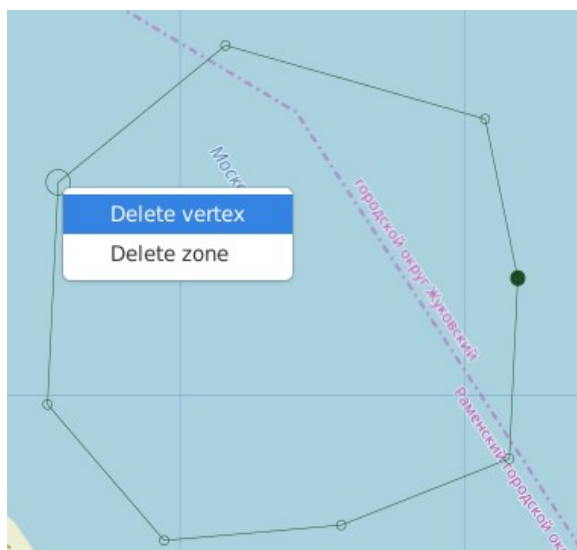


14.1.2. The boundary of the polygon

To set the boundaries of a polygon zone, select *Zone* mode and left-click on the map to specify the location of the polygon's vertices. To finish the entering of points, click the right mouse button. Multiple zones can be set within a single plan.

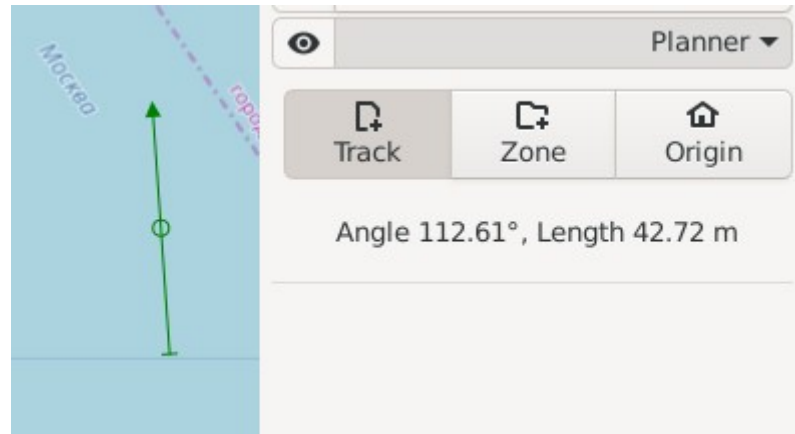
To change the location of a vertex, grab it with the mouse and drag it to a new location (drag and drop). To add an additional vertex, hover over the polygon edge and drag the point that appears.

To remove a vertex or area as a whole is possible through the context menu opened by clicking the right button of the mouse on the vertex.



14.1.3. Tack plan

To add a tack plan directly, select Track mode and set the start and the end points of the movement with two consecutive clicks on the map.



By moving the start and the end points of the tack, you can change the length of the tack and the direction of movement. You can also edit individual components:

- when the Shift key is held down, only the tack length is changed while maintaining the current course of movement;
- when the Ctrl key is held down, only the direction is changed while maintaining the current length.

Midpoint capture allows you to move the entire tack plan to a new point and move the tack from one zone to another. When the Ctrl key is held down, the tack turns around the center point.

The tack plan can be located inside one previously defined polygon zone, or it can be a free tack, i.e. it does not belong to any of the zones.

The following items are available in the tack context menu:

Navigate - selects the tack for navigation,

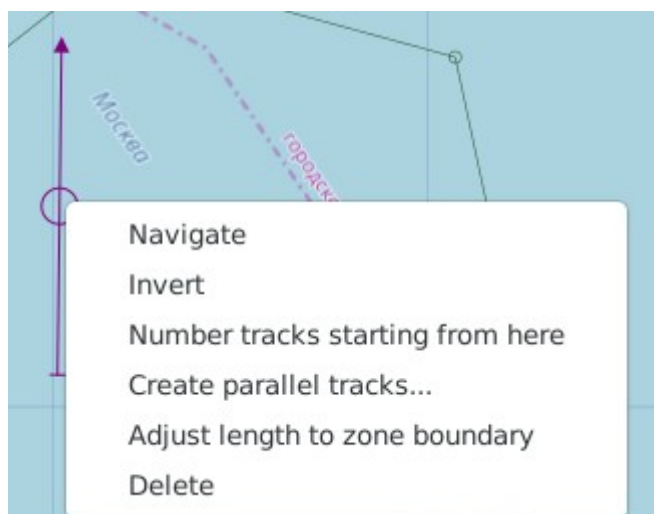
Invert - changes the direction of the tack to the opposite,

Number tracks starting from here - automatically sets the order of passing tack plans within the current zone,

Create parallel tracks... - opens the menu for creating parallel tacks,

Adjust length to zone boundary - changes the length of the tack plan so that its beginning and the end are on the polygon border,

Delete - removes the tack plan from the diagram.

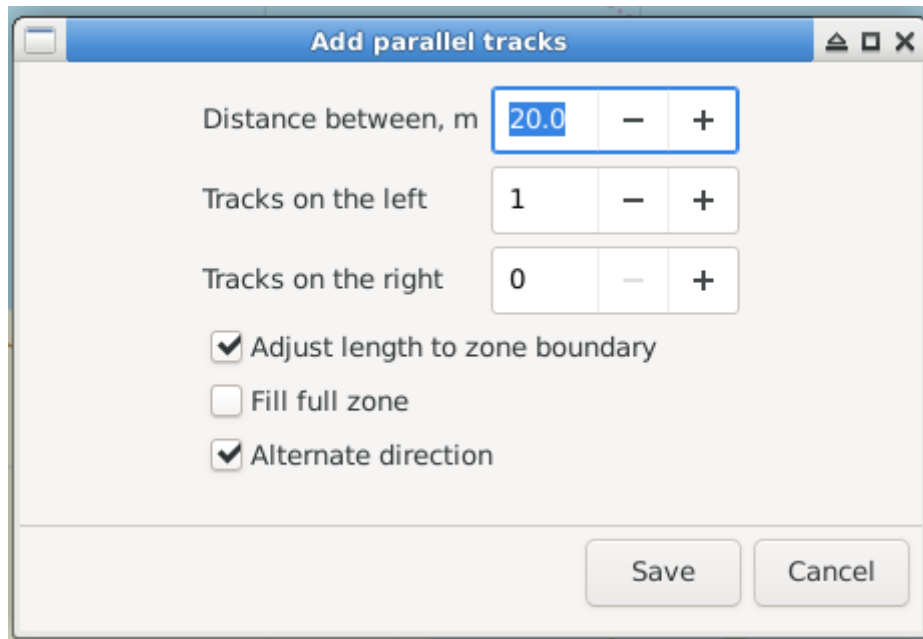


14.1.4. The creation of a parallel tacks

Most often, survey of a water area is reduced to passing several parallel tacks covering the area of interest. For this purpose, the planning mode provides a tool for creating parallel tacks.

To create a group of parallel tacks, follow these steps:

- 1) Create a single reference tack in the usual way.
- 2) Open the context menu of the reference tack and select 'Create parallel tracks...'
- 3) In the window that opens set the distance between tacks.
- 4) You can either specify the number of tacks manually, using the 'Tracks on the left' and 'Tracks on the right' fields, or use automatic fill-in of the entire zone ('Fill full zone')
- 5) If the 'Adjust length to zone boundary' checkmark is set, the length of the created tacks will be adjusted to the polygon size. Otherwise, the new tacks will have the same length as the reference tack.
- 6) If the 'Alternate direction' checkmark is set, the neighboring tacks will have the opposite direction of movement. Otherwise, all tacks will be directed the same way as the reference tack.



14.1.5. Selecting and editing a group of tacks

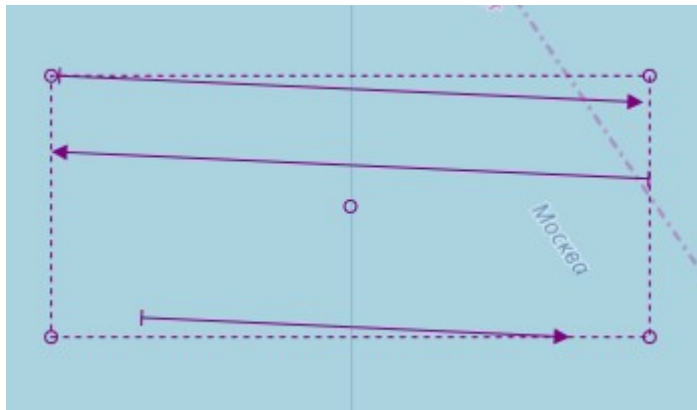
There are a number of ways to select multiple tack plans on the map:

- hold down the 'Ctrl' key and use the mouse to select the area on the map that contains the plans you are interested in;
- click the mouse on the start, middle, or end point of the tack to select a particular tack;
- additionally, hold down the Shift key to add the selected area (or a separate tack) to the current selection, otherwise the current selection will be replaced.

The selected tacks will be highlighted in color and outlined with a dotted rectangle. You can perform the following actions on the selected tacks:




- drag the center selection point to move the group to a different location,
- pull the corner point to change the size of the group,
- hold down 'Ctrl' and pull the corner point to rotate the group around the center,

- right-click on one of the points to open the group's context menu.



14.1.6. The panel of the planned tacks

In the lower part of the tab, information about the project plan is available in a table view. All created tack plans are grouped by the zones within which they are located, and plans without a zone are in the 'Free tracks' group.

-  - selecting table columns. You can change the order of columns by dragging the columns inside the table itself.
-  - uncover all the elements of the list.
-  - collapse all the elements of the list.

Title	Done	L	Time	Vel	Trk, °
▼ Zone	0%	193	03:12	1.00	
Plan 1	0%	76	01:15	1.00	180.7
Plan 2	0%	89	01:28	1.00	0.7
▼ Free tracks	0%	596	09:55	1.00	
Plan 1	0%	98	01:38	1.00	88.4
Plan 2	0%	98	01:38	1.00	268.4
Plan 3	0%	98	01:38	1.00	88.4
Plan 4	0%	98	01:38	1.00	268.4
Plan 5	0%	98	01:38	1.00	88.4

1 track selected

Speed: 1.00 [- +]

Length: 98.39 [- +]

Geo Topo

Course: 88.42 [- +]

Start Lat: 55.546805 [- +]

Start Lon: 38.144839 [- +]

End Lat: 55.546829 [- +]

End Lon: 38.146397 [- +]

Planned tracks

To edit tack plans, select one or more lines and enter new values in the fields on the right side of the panel. Uncheck the mark next to the field to leave its value unchanged if you are editing multiple plans at once.

The tack plan pass queue is defined by the number in the plan name. To change the order of passing tacks, set the sorting by field 'Title' (click on the column name) and drag the tacks in the desired order inside your zone.

To edit the coordinates of the zone's vertices, select the zone in the list, and double-click the field to edit it on the right side of the panel. Right-click on a vertex will open a context menu, that allows you to duplicate the vertex ('Ctrl + D') or delete it ('Delete').

To switch between local and global coordinate systems, use the 'Topo coordinates (x, y)' checkmark at the top of the table.

Topo coordinates (x, y)

N	Latitude	Longitude
1	55.548666	38.144159
2	55.548526	38.145073
3	55.548333	38.145188
4	55.548158	38.145158
5	55.548000	38.144567
6	55.547724	38.143944
7	55.547983	38.143533
8	55.548405	38.143571

Duplicate
Delete

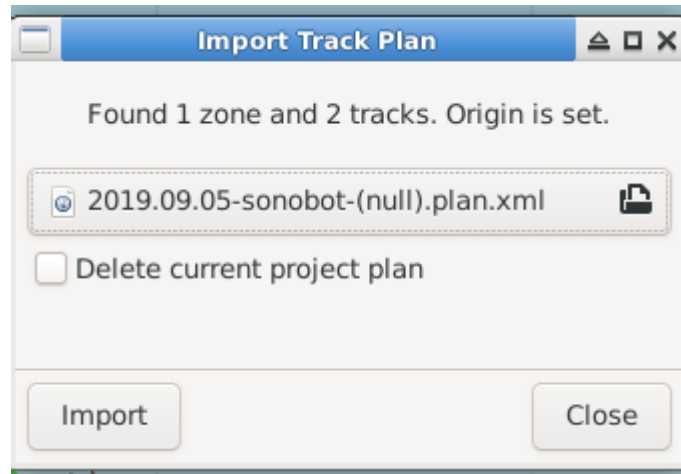
14.1.7. Export and import

In the main menu of the program (Menu → Export), you can export and import the tack plan in the following formats:

- XML - export and import, can be used to transfer the plan between projects;
- KML - only export to other programs.

When you select import, a window opens where you need to select the file to import. After selecting a file, general information about the file content will be displayed.

Check the 'Delete current project plan' mark to replace the current project plan. Otherwise, the plan from the file will be added to the existing plan. To import data, click 'Import'.



15. Survey

Survey - the process of obtaining data from the sonar and parametric data (survey data) when performing tracks.

All the data obtained during survey are combined into a survey project.

The purpose of the survey is to obtain data that can then be used for post processing, reporting, etc.

The survey process consists of the following steps:

- 1) data collection (track execution)
- 2) quality assessment
- 3) execution of additional tracks (if necessary)

15.1 Sonar connection

The connection to the sonar is made according to the current connection settings when the program is started in the Survey mode.

If the connection to the sonar is successful, the corresponding buttons for switching the sonar display and control areas will be displayed in the toolbar.

15.2 Connecting external sensors

The program provides data reception from external sensors connected via serial communication lines RS-232, RS-485 (COM port). Sensors that provide data exchange in the NMEA-0183 format are supported.

The program uses the concept of "port to connect the sensor." In the current version of the program, one port is defined for connecting the sensor via the COM port.

Data may come from:

- an outside party (e.g., navigation receiver) via the hardware or the virtual COM port of the computer
- an application running on the same computer as the program (via a virtual COM port)
- an application running on another computer (via the computer's hardware or virtual COM port)

By default, automatic search and connection of the sensor connected to the COM port of the shooting computer is used.

A physical or virtual COM port available in the OS can be used as a COM port. The number of com ports used, the type of sensors connected and the connection parameters are given in the characteristics of the program.

The port used for com operation is engaged in the program and is not available to other programs. The port is engaged after the project is opened until the project is closed in the program.

15.3 Sonar control

The program supports the management of the following types of sonars when survey:

- SSS
- ES
- SSS+ES (SSSE)
- PF
- Forward looking sonar (FLS)
- SSS+FLS

15.3.1. SSS control

The following functionality is used to SSS control:

- Setting the slant range
- Setting the signal (pulse probing)
- Setting the gain (TVG)
- Work On/off

SSS control is carried out using the appropriate tools of the right field of the main window with the active SSS area. Description of tools for the SSS management — see 9.3.5.1.

At initial inclusion of SSS it is necessary:

- Set the slant range exceeding the depth of not less than 1.5..2 times
- Select signal
- To set the minimum contrast
- Set the scale so that the desired range area is visible
- work on

After switching on the work:

- To adjust the contrast (if necessary)

At work:

- Adjust the range (if necessary)
- Adjust the contrast (if necessary)

- Change signal (if necessary)
- To change track (see 15.5)
- Enable/disable recording
- To put marks

To turn off, you must:

- Work off

15.3.2. ES control

Es management is similar to SSS management (see 15.3.1):

15.3.3. SSSE control

SSSE management includes SSS and ES management with the following features:

- When setting the range for SSS (D_{sss}), the range of ES (D_{es}) is set to half the range of SSS: $D_{es} = D_{sss}/2$ (for example: when setting the range of 100m for SSS, the range of ES =50 m)
- When the SSS range is set, the range for the ES can be changed to a maximum value of $D_{sss}/2$

15.3.4. PF control

The following functionality is used to SSS control: (see fig.30):

- Setting the distance
- Signal selection – the higher the value, the higher the frequency generated
- Initial (start) gain setting (Gain-0)
- Setting the gain change rate per line
- Transitions selection
- Work on/off

Description of tools for the PF management — see 9.4.3.1.

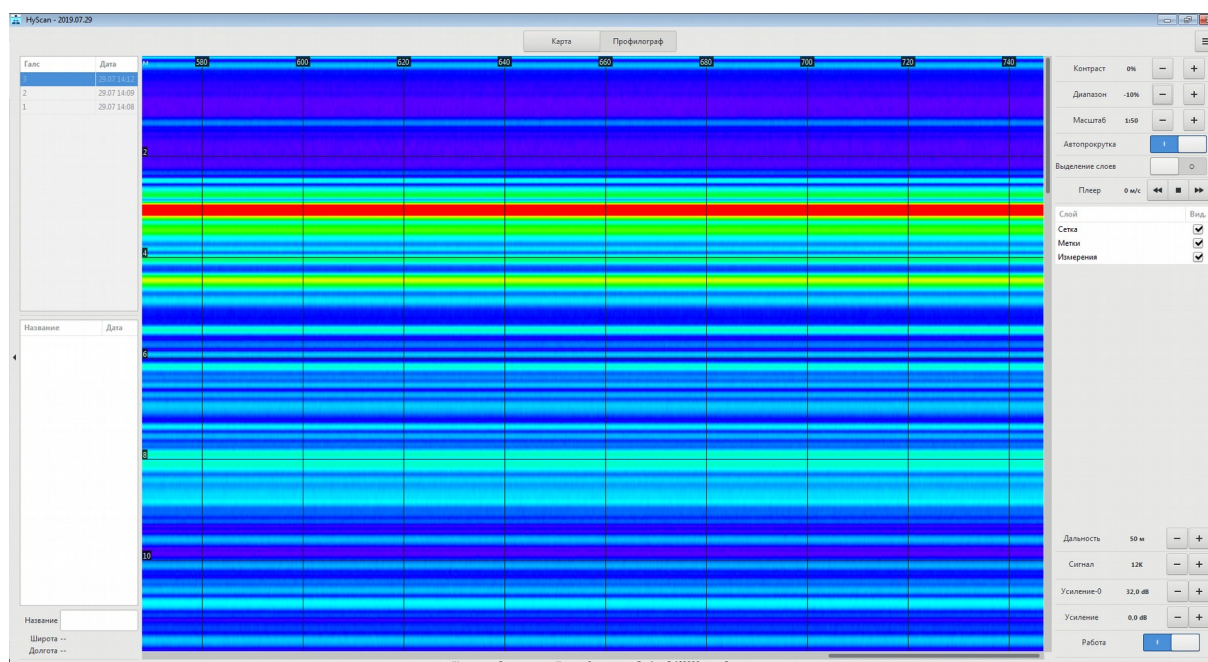


Fig.30. Example of PF area when survey (transition selection = off)

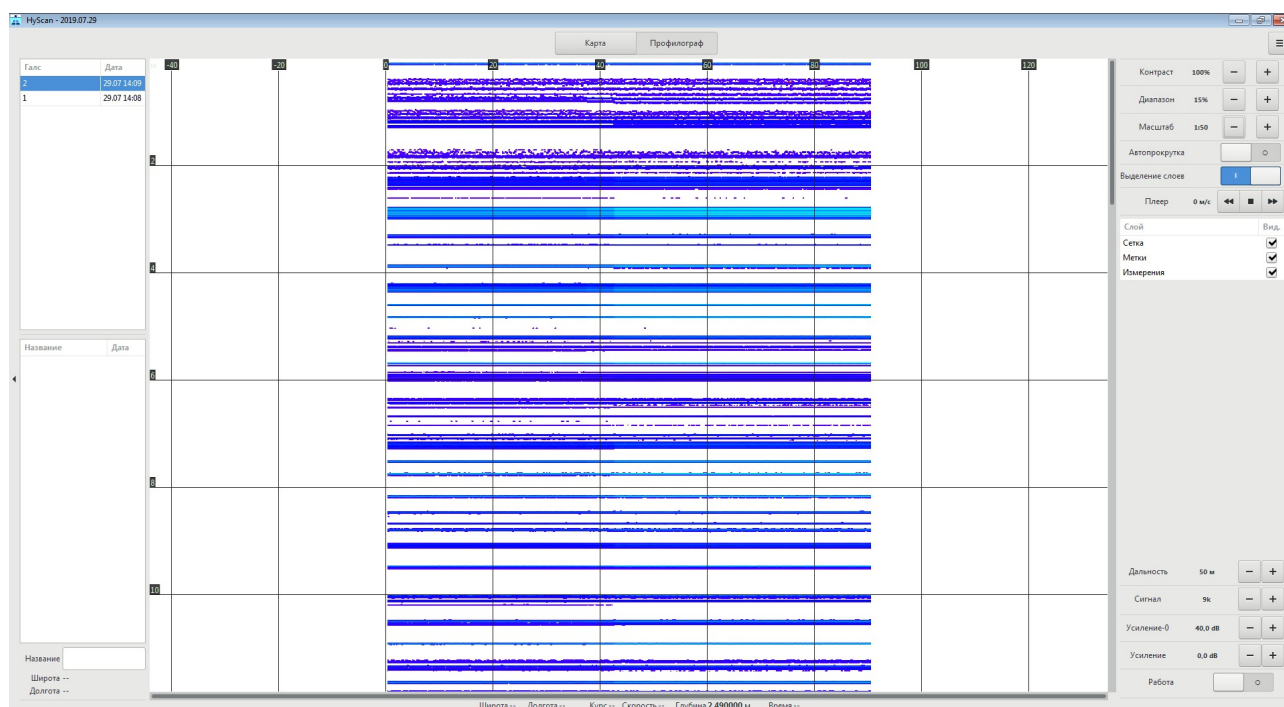


Fig.31. Example of PF area when survey (transition selection = on)

При начальном включении ПФ необходимо:

- Set the distance exceeding the depth of not less than 3..4 times
- Select the signal
- To set the minimum contrast
- Transitions = off
- Gain-0 = minimal
- Gain = 0
- Set the scale so that the desired range area is visible

- Work on

After switching on the work:

Set the initial gain so that the bottom line and the layer are visible, but the signal in the water column is weak and the bottom line itself does not go to the limit. If the thickness of the observed layers below the bottom line is small, it is necessary to:

- Adjust the gain rate >0 to increase the gain at the end of the distance or
- To set the signal to lower frequency

At work:

- Adjust the range (if necessary)
- Adjust the contrast (if necessary)
- Change signal (if necessary)
- Change gain (if necessary)
- To change track (see 15.5)
- Enable/disable recording
- To put marks

To turn off, you must:

- Work off

15.4 Record

Sonar data recording is turned on/off automatically when sonar operation is turned on/off (The "Operation" tool on the right field).

15.5 Track changing

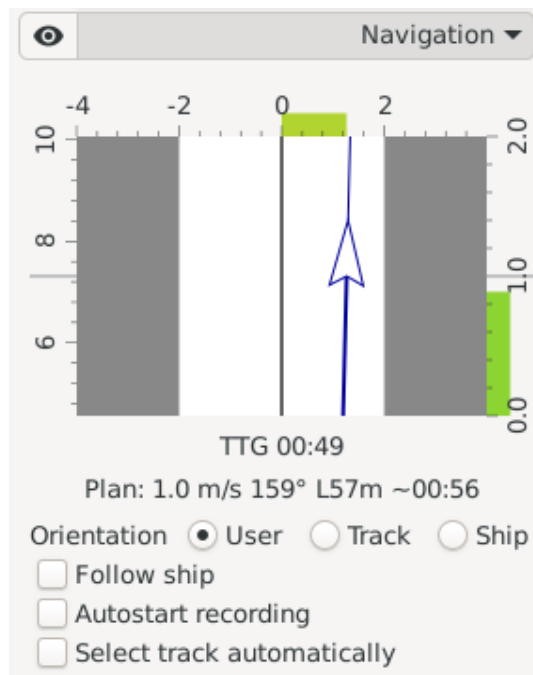
Changing the track when shooting is done automatically when you turn on the sonar. Each shutdown/shutdown automatically opens a new track.

15.6 Navigation

15.6.1. Navigation assistant

To navigate through the tack plan follow these steps:

- 1) Run the program in the shooting mode ('Scan').
- 2) Right-click to open the context menu of the tack plan that will be used for navigation, and select 'Navigate'.
- 3) In the right part of the window, open the navigation panel ('Navigation').
- 4) The navigation assistant will be displayed with the following information.



Mini-map with the image of the ship and the tack plan line in the center:

- The area of acceptable deviation from the plan (highlighted in white). You can change the size of the area by dragging its border.
- The left coordinate axis shows the position of the ship along the line of the tack plan, (in meters). The current position is marked by a line in the center.
- The upper coordinate axis shows the ship's deviation from the planned tack line, (in meters). The current deviation is marked with a color that changes from green to red as the deviation value increases.
- The right coordinate axis shows the speed of the vessel, m/s. The Central mark corresponds to the planned speed value. The current deviation is marked with a color that changes from green to red as the deviation value increases.

TTG (Time-To-Go) - estimation of the time remaining until the end of the tack plan.

Plan - parameters of the tack plan: speed, length, course, and time estimate.

15.6.2. Map orientation and position

Use the following buttons to manage the map during navigation:

- **Orientation** - sets the map orientation:
 - **User** - the map orientation is set manually by scrolling the mouse wheel on the map while holding the **'Shift'** key;
 - **Track** - the map is oriented according to the course of the tack plan;
 - **Ship** - the map is oriented according to the ship's course.
 - **Follow ship** - sets the movement of the visible area following the vessel. Set checkmark so that the vessel is always in the visible part of the map.

15.6.3. Automatic start of the locator and selection of the next plan

For automatic activation of the sonar and recording of the tack, select the 'Autostart recording' checkmark. In this case, the recording will be enabled

automatically when the vessel will approach the tack plan and disabled as soon as the vessel will leave the tack plan.

Set checkmark ‘**Select track automatically**’ to switch navigation to the tack plan that is closest to the vessel automatically.

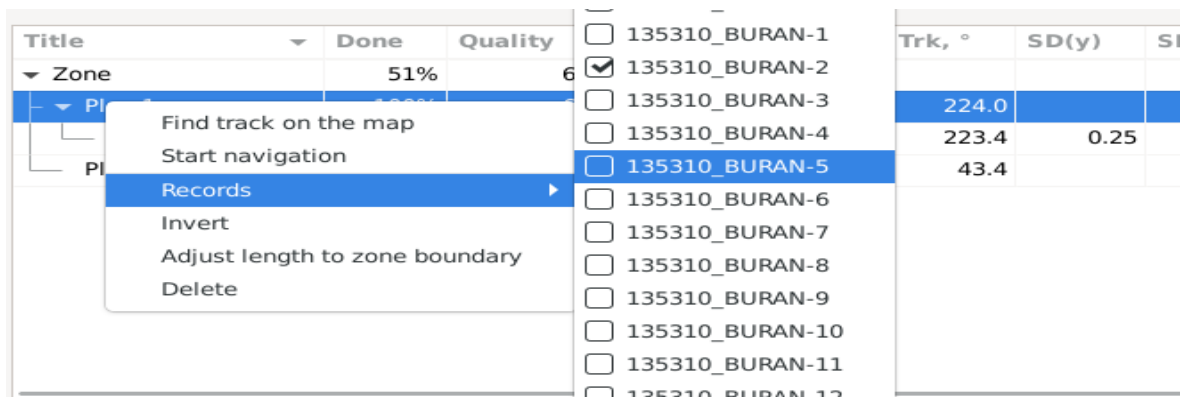
15.6.4. Status and statistics of plan completion

The tack recorded accordingly to the plan is displayed in the planning panel inside its plan.

Title	Done	L	Time	Vel	Trk, °	SD(y)	SD(Vel)	SD(Trk)
▼ Zone	46%	132	02:12	1.00				
▼ Plan 1	92%	53	00:53	1.00	223.4			
135310_BURAN-2	92%	49	00:49	1.00	223.0	0.11	0.01	2.35
Plan 2	0%	53	00:53	1.00	43.4			


The tack line displays traffic statistics in accordance with the plan. When calculating this statistic, only the part of the tack that was between the beginning and the end of the tack plan is used. Data recorded on the tack before entering the planned tack and after exiting it is ignored.

- **Title** - title of the tack;
- **Done** - part of the length of the plan that was covered by the tack in length, as a percentage;
- **Len** - the distance that the ship passed while on the planned tack, m;
- **Time** - time during which the ship was on the planned tack, mm: sec;
- **Vel** - average speed, m/s;
- **Trk** - the direction of movement, degrees;
- **SD(y)** - standard deviation (rms) from straight-line movement at the planned course, m;
- **SD(Vel)** - standard deviation (rms) of the speed, m / s;
- **SD(Trk)** - standard deviation (rms) of the course, degrees;
- **Quality** - an average estimation of the quality of movement according to the plan, based on deviations in speed and course, units from 0 to 100.



If a tack was not recorded according to the plan, then, to get statistics on it, you must link this tack to the plan. For this :

- 1) select a tack plan and create a new plan that matches the recorded tack,
- 2) by right click of the mouse open the context menu of the tack plan,
- 3) in the 'Records' item, select the tack fitting to the plan.

If the tack was recorded on one plan and later linked to another plan, the tack will be marked with an icon .

The '**Done**' and '**Quality**' columns for the tack plan show the total statistics on the status of its coverage along the length of all associated tacks.

The corresponding columns for the polygon zone show the total statistics on the coverage status of all tack plans in this zone.

16. Viewing data (playing)

The data recorded during shooting can be viewed (played).

The operation of the program in the viewing mode is similar to the operation of the program in the survey mode, except that you do not need to connect to the sonar and the data does not come from the sonar, but from the recorded files of the project. Data display is carried out on the tracks.

As data for viewing are available:

- vessel tracks (in Worksheet area)
- SSS coverage (in Worksheet area)
- AI marks (in Worksheet area and in AI area)
- Geomarks (in Worksheet area)
- AI(in AI area)

To view the recorded data, you must:

- to open a project in View mode (see 9.5)
- to activate the required area
- select track

View acoustic data of track — using the tools in the AI area.

You can use the Player tool in the AI area to automatically play long tracks. The player allows:

- start track playback at different speeds
- stop playback

17. Marks management

The following marks types are supported:

- Acoustic marks
- Geomarks
- Temporary geomarks (pins)

17.1 Acoustic marks

Used to mark (fix) the point of interest and its surroundings in the sonar area.

Acoustic marks:

- are one of the program mark types (W type)
- используются только в области ГАС
- attached to the tracks
- have a name
- saved when you exit the program

Acoustic marks management — see 9.4.1.2.

17.2 Geomarks

Used to mark (fix) the point of interest and its surroundings in the area of the Worksheet. Geomarks:

- are one of the program mark types (G type)
- used only in the Worksheet area
- have a name
- saved when you exit the program

Geomarks management — see 9.3.4.5.

17.3 Temporary geomarks (pins)

Used to mark (fix) the point of interest of the Worksheet area. Pins:

- used only in the Worksheet area
- have numbering
- not saved when you exit the program

Pins management — see 9.3.4.4.

18. Maps management

The map is the element of the worksheet and used in the form of geopoly (underlay) for geolocated data of the project.

Working with maps is possible at all stages of the project and is carried out in the Map area of the main window (see 9.3.4).

The program allows you to work with maps in two modes:

- online
- offline

On-line downloading of map data from GIS servers and caching of this data on the computer is provided. Internet access is required to download.

In offline mode, the program uses the card data from the card cache and does not require an Internet connection. In this case, only maps that were previously downloaded or copied will be available.

Functional work with maps — see table 25.

Table 25 - Maps management

Function	Action
Configuring connections to GIS servers	See 18.1
Maps loading	<ol style="list-style-type: none">1) set check box «Online Map» in Main menu2) Open Map area3) Select a map source from the list of available4) Load required map areas (see 9.3.4.1)5) Repeat for all maps used
Online/offline maps mode setting	<ol style="list-style-type: none">1) For online mode set check box «Online Map» in Main menu1) For offline mode clear check box «Online Map» in Main menu

18.1 Configuring connections to GIS servers

Special configuration files are used to connect to GIS map sources servers. Each file stores settings for one server. The program uses these files to access servers when you are connected to the Internet. The files are stored in a separate map configuration folder:

C:/Users/<UserName>/AppData/Local/hyscan/map-profiles

NOTE. Each operating system user account has its own folder.

To add a new map data source, you must write the appropriate file to the specified folder. To delete a map data source, you must delete the corresponding file from the specified folder. The program generates a list of available map sources depending on the composition of the files in the map configuration folder. The list of sources is displayed in the Map area management tools (see 9.3.4.1).

18.2 Maps caching

The downloaded maps are stored in the map cache and are available offline.

Map cache files are stored in a separate map cache folder:

C:/Users/<Username>/AppData/Local/Temporary Internet Files /hyscan/

NOTE. Each OS User account has its own cache folder.

To transfer the map cache, you must copy it to the appropriate folders:

- required map configuration file (see 18.1)
- copy the required map cache folder

19. Worksheet

A worksheet is a way to display various geo-referenced data as layers.

In the program, the worksheet is displayed in the Worksheet area (see 9.3.4) as a rectangular area in the selected scale.

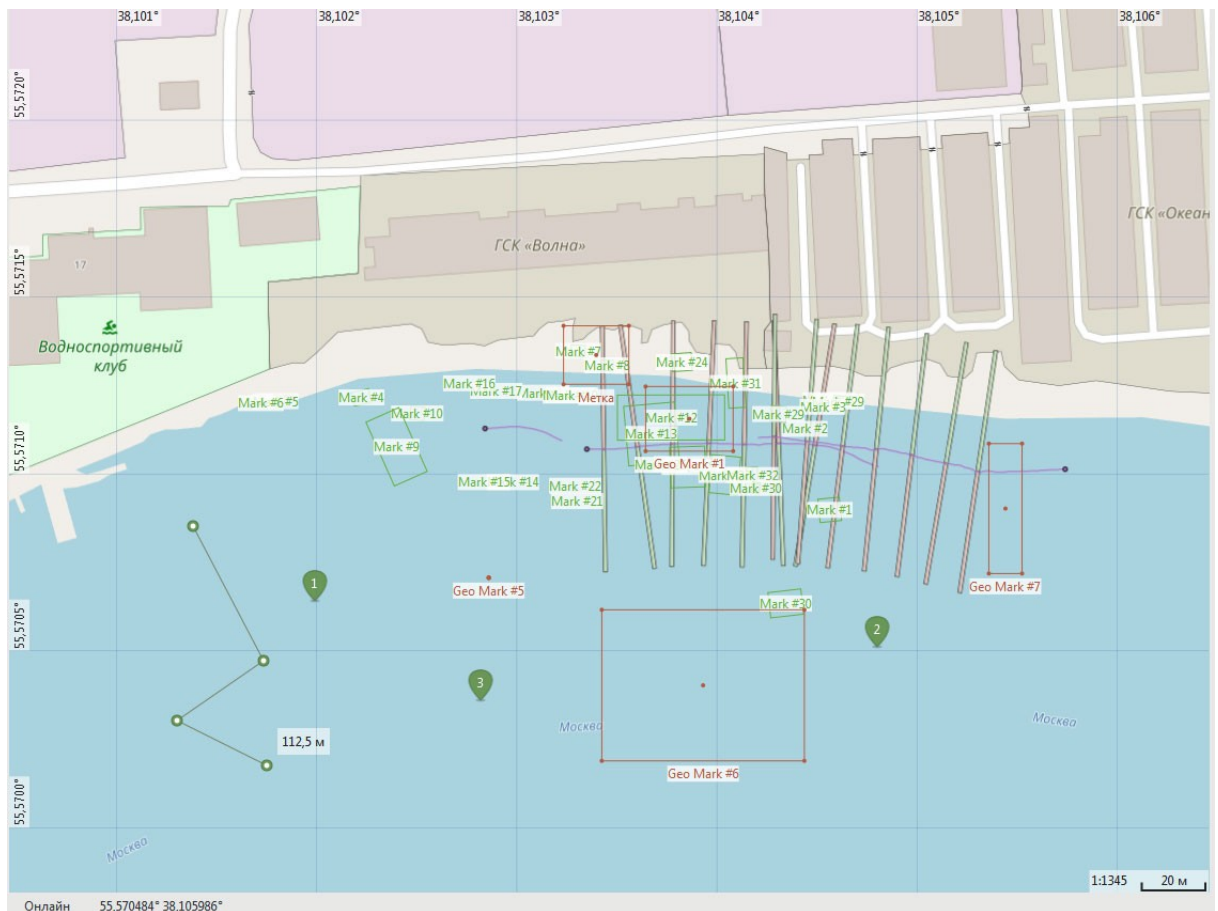


Fig.32. Examples of Worksheet

The following layers are used to display the worksheet:

- underlayer
- tracks
- ruler
- pin
- grid
- acoustic marks
- geomarks
- navigation

Layers can be turned on (visible) or off (invisible). Some of the layers can be activated to switch worksheet operation modes (see 9.3.4.2).

The underlayer is always on and displays the current map. If the map is not available for the currently displayed area of the tablet, a background color is displayed.

The Track layer displays various information for the selected tracks from the list of tracks:

- track
- coverage etc.

The Ruler layer displays the current rulers. When the layer is activated, the measurement mode is activated using rulers.

The Pin layer displays the current temporary geomarks. When you activate a layer, the pin mode is enabled.

The Grid layer displays the coordinate grid. When you turn on a layer, the coordinate grid and coordinate labels are displayed, and when you turn off — only labels are displayed.

Waterfall marks layer displays all of the AI marks from Marks list.

Geomarks layer displays all of the geomarks from Marks list.

The Navigation layer displays the current position of the carrier, the vector of the direction of movement of the carrier and the last 10 minutes of the track while survey.

At the bottom of the pane, you can see supporting information:

- map download mode
- current cursor coordinates (latitude, longitude)
- the current scale

The following measurements are available for the Worksheet (see 22, 9.3.4.3):

- coordinates
- distances

20. Jumps

To quickly navigate to the object of interest in the program uses the following functionality:

- navigate to the selected geomark from the Marks list in the Worksheet area (see 9.3.4.5)
- navigate to the selected AI mark from the Marks list in the Worksheet area (see 9.3.3)

- navigate to the specified coordinates in the Worksheet area (see 9.3.4.1)
- open the selected track from the Tracks list in the Worksheet area and in the AI area (see 9.3.2)
- transition to the beginning/end of the track in the AI area (see 9.3.5.1)

21. Logs

The program uses the following logs:

- tacks log (see 21.1)
- marks log (see 21.2)

21.1 Tacks log

In the log of tracks use Tracks list (see 9.3.2).

21.2 Marks log

In the log of marks use Marks list (see 9.3.3).

22. Measurements

The program allows you to perform various measurements in automatic or semi-automatic mode.

There are measurements performed on the data coming from the sensors parameters and measurements on AI.

Measurements are also divided into direct and indirect. Direct measurement is a measurement made on the basis of data coming from any sensor (for example, the definition of coordinates based on the data of the navigation receiver). Indirect measurement is a measurement performed using additional or pre-known data (for example, determining the speed of sound in water from water temperature data).

Measurements performed by the parameter data:

- vessel speed (Vc)
- vessel trajectory course (Cc)
- heading (Hc)
- roll (Rc)
- pitch (Pc)
- speed of sound in water (Vs)

- water temperature (Tw)

Cc - the course calculated from the navigation data without taking into account the drift angle.

Hc - the angle between the North direction and the longitudinal axis of the vessel's construction, calculated from the heading sensor.

Measurements performed according to AI:

- current depth under the vessel
- the determination of geographical coordinates of object (point) that is displayed in the AI area
- define the distance between two objects (points) displayed in AI area

22.1 Coordinates of vessel

The coordinates of the vessel are determined by the navigation data. To determine the coordinates, you must have navigation data that contains information about the coordinates.

If coordinate data is available, the current coordinates are displayed in the status bar when survey (see 9.4.5).

22.2 Speed of vessel

The speed of the carrier (vessel) is determined by the navigation data. To determine the speed, you must have navigation data that contains information about the speed, or data about the current coordinates.

If speed data is available, the current speed are displayed in the status bar when survey (см. 9.4.5).

22.3 Depth measurement

Depth is calculated by data from ES or PF.

If depth data is available, the current depth is displayed in the status bar when survey (see 9.4.5).

22.4 Measurement of the coordinates of the objects

The measurement of the coordinates of the object may in:

- Worksheet area (see 9.3.4.3)
- AI area (see 9.4.1.1)

Measurement of coordinates in the Worksheet area is possible by chipping the coordinates of the object on the map, marks. Measurements in the Worksheet area available when the Worksheet area is active (see 9.3.4.3).

Measurement of coordinates in the AI area is possible, if you have the following information:

- AI
- navigation (coordinates, course)
- depth

The coordinates of the object are calculated and displayed for the selected AI mark in Marks list (see 9.3.3).

22.5 Measure distances

Distance measurement is possible in:

- Worksheet area (see 9.3.4.3)
- AI area (see 9.4.1.1)

The Ruler tool is used to measure distances in the Worksheet area. Measurement in the Worksheet area is available when Worksheet area is active and the Ruler layer is active (see 9.3.4.3).

Measuring distances in the AI area is available, if you have the following information:

- AI
- navigation (coordinates, course)
- depth

The Ruler tool is used to measure distances in the AI area. Measurement in the AI area is available when AI area is active and the Ruler layer is active (see 9.4.1.1).

23. Clipboard

Clipboard is an intermediate data storage provided by the software and intended for transferring or copying data between applications or parts of one application

through cut, copy, paste operations. The program uses the clipboard provided by the OS. You can paste data from the clipboard as many times as you want. When you copy information to the clipboard, its previous contents are lost. The program allows you to perform the following operations with the clipboard:

- editing of input data
- copy the current coordinates of the tablet area cursor to the clipboard

24. Exit the program

To exit, you must close the program by doing one of the following:

- 1) Use the mouse to close the main window using the close window icon
- 2) Press the appropriate hotkey combination

When you finish working with the program:

- all open files are closed
- if survey was performed, it stops, the sonar is transferred to the stop mode
- if a project has been opened, it is closed

25. Update software

You can update versions of a program by using update programs (Service Pack) or by uninstalling the current version and installing a new version of the program.

Updates and the latest versions of the program are available on the developer's website.

26. Uninstall software

For uninstall programm:

- exit the program (if it was running)
- if the program was installed using the online installer, run the installer through the start menu and select uninstall a program, then follow the instructions of the installer
- if the program was installed using the offline installer, run the Uninstaller through the start menu, then follow the instructions of the installer
- if the program was installed from archive, delete the program folder

When you uninstall a program, the entire working folder of the program and all its contents are deleted. If the project working folder is stored inside the program working folder, it will also be deleted when you uninstall the program. Before you uninstall the program, copy or move the project working folder to another location.

27. Users support

For all questions about the application and development of the program and related software, please contact the Developer.

The developer of the program and guarantees users who legally purchased the program and comply with the terms of the License, the following types of technical support of the program:

- 1) free advice on the use of the program
- 2) free upgrades of this version of the program in case of errors that significantly affect the performance of the program and the transition to a new version

These warranties are valid:

- 1) with respect to free upgrades – not less than 1 year from the date of release of the version of the program or option, provided that the Developer has not announced through its website on the termination of support for this version or option;

- 2) with respect to other upgrades – during the entire time of use of the program, provided that the Developer has not announced through its website on the Internet about the termination of sales of this version or option

In case of defects in the program media, the Developer guarantees their replacement within one week (7 days) from the date of purchase, subject to the legal purchase of the program and compliance with the requirements of the License and if the performance of the media is not violated as a result of improper handling

The user is entitled to technical support of the program from the date of purchase.

Termination of warranty and technical support:

- 1) failure to comply with License requirements
- 2) improper use of the program as part of the complex

More information about the program and contact information of the Developer – on the developer's website.

28. Possible faults and ways of their elimination

29. Developer information

Software developer:

Screen co. ltd. research and production company

Zhukovsky city, Moskow region, Russia

Internet: www.hydrasonars.ru, E-mail: support@hydrasonars.ru

Appendix A . List of abbreviations

AI	Acoustic image
AUV	Autonomous unmanned vehicle
BMP	BitMaP Windows graphic file (format)
CHIRP	Line-frequency modulation
COM	Serial port of computer
ES	Echosounder
FLS	Forward looking sonar
Ethernet	Ethernet interface
GIS	Geographic information system
Hc	Depth under vessel
HF	High frequency
KML	Keyhole Markup Language
LF	Low frequency
MD	Maintenance documentation
MS	Maintenance service
OM	Operator manual
OS	Operation system
OSM	Open street map
PF	Sub bottom profiler
PNG	PNG graphic file (format)
PP	Probe pulse
RAM	Random access memory
RS-232	RS-232 interface
RS-485	RS-485 interface
SI	Sonar information
SSS	Side scan sonar
SW	Software
TVG	Time variable gain
Tw	Temperature of water
UM	User's manual
USB	USB interface
UTM	Universal Transverse Mercator projection
Vc	Speed of vessel
Vs	Speed of sound in water
WGS-84	Coordinates systemWGS-84

Wi-Fi Wi-Fi interface

Appendix B . Setting up a network connection

The sonar connects to the computer via a single 10/100 TX or 10/100/1000 TX Ethernet port. Sonar has its own IP address and UDP port number (hereinafter UDP port), which is specified in the passport for sonar. IP address has the following format:

X.X.X.X

where:

X – decimal number between 0 and 255

Example: 192.168.13.3

IP address is set in the OS network connection settings and when connected to sonar in the program. UDP port is a decimal number in the range from 1 to 65535, for example: 4444. UDP port is set only when connected to sonar in program.

To access the sonar, you must set up network connections in the OS on the computer that will be used when working with the sonar when survey.

NOTES.

- 1) If the UDP port number is not specified, it is 4444*
- 2) By default, the program uses IP address 192.168.13.3 and UDP port 4444 when connecting to the locator.*
- 3) If your computer has more than one Ethernet port, we recommend that you use a free (unoccupied) Ethernet port to connect to the sonar.*
- 4) If the computer does not have an Ethernet port, you can connect the sonar to the computer via an Ethernet-USB adapter.*
- 5) When connecting several sonars to one computer, each sonar must have a unique IP address.*
- 6) If you do not want to use your computer to take pictures (connect to sonar), you do not need to configure network connections.*
- 7) If the Ethernet port is used for several tasks, it is recommended to install the program to quickly switch the network connection settings*

Appendix C . Hot keys and mouse control

Below is a list of hotkeys and mouse commands used in the program.

Text editing hot keys		
Command	Key	Action
Delete	Del	Delete the character
Paste	Ctrl+V или Shift+Ins	Copies data from the clipboard to the current position.
Copy	Ctrl+C или Ctrl+Ins	Copies the selected data to the clipboard
Cut	Ctrl+X или Shift+Del	Cuts the selected data and places it on the clipboard

Common hot keys		
Command	Key	Action
Fullscreen/window mode	F11	Toggles the display of the program
Exit	Alt+F4	Exit the program

Sonars area hot keys		
Command	Key	Action
Zoom in	«+»	Zooms in the image
	Shft+«+»	
Zoom out	«-»	Zoom out the image
	Shft+«-»	
Scrolling	PgUp	Move to the end of the tack on ¼ of the screen
	PgDwn	Move to the start of the tack on ¼ of the screen
	Home	Go to start of tack
	End	Go to end of tack
	→	Shift right by 1 pixel
	←	Shift left by 1 pixel
	Cntrl+”→”	Shift right by 10 pixels
	Cntrl+”←”	Shift left by 10 pixels
	↑	Shift up by 1 pixel
	↓	Shift down by 1 pixel
	Cntrl+”↑”	Shift up by 10 pixels
Cntrl+”↓”	Shift down by 10 pixels	

Map area hot keys		
Command	key	Action
Copy the current coordinates under the cursor to the clipboard	Ctrl+Ins	

Mouse control

Command	Action	Description
Left key	Click	Select (activate) the tool when you hover over the tool. The transfer (activation) of a menu item, button, etc. when you hover the mouse cursor over the appropriate item . Set labels when the corresponding layer is activated.
	Click + cursor moving	Map movement (for Map area).
	Double click	
Right key	Click	Call the context menu for the interface element under the cursor (if there is a context menu for the interface element).
Whell	Rotation	Vertical movement in the list box, the table (when you are in the list box, the table). Zoom change (for Map area).

Appendix D . Folders and files

Project working folder structure (example)

Drive:\		<i>Working drive</i>
Hydra\		<i>Working folder</i>
Projects\		<i>Working folder for storing projects</i>
Project1\		<i>Folder to store the «Project1» project</i>
.....		
Project2\		<i>Folder to store the «Project2» project</i>
.....		

Appendix E . Data formats

Format	Destination	Decription
Time and date		
hh:mm:ss	Display time in hours, minutes, and seconds.	Display time («hh» field, values from 00 to 23), minutes («mm» field, values from 00 to 59), secons («ss» field, values from 00 to 59), milliseconds («ms» field, values from 000 to 999)
hh:mm:ss.ms	Display time in hours, minutes, seconds and milliseconds.	
hh:mm	Display time in hours and minutes.	
dd.mm dd/mm/ dd.mm.yyyy dd/mm/yyyy	Display date (day, mounth or day, mounth, year)	Display day of mounth («dd» field, values from 01 to 31), mounth of year («mm» field, values from 01 to 12), year («yyyy» field, represents year)
dd.mm hh:mm	Display date (day, mounth) and time (hours , minutes).	
Coordinates		
dd.dddddd°, dd.dddddd°N dd.dddddd°,dd.dddddd°S ddd.dddddd°, ddd.dddddd°E ddd.dddddd, ddd.dddddd°W	Display latitude and longitude in degrees and decimal fractions of a degree.	dd - value of integer degrees (possible values are 0..99 for latitude and 0..179 for longitude) ddd - value of decimal fractions of degrees (possible values are 0..Nine hundred ninety nine thousand nine hundred ninety nine)
dd°mm.mmmm'N dd°mm.mmmm'S ddd°mm.mmmm'E ddd°mm.mmmm'W	Displays latitude and longitude in degrees, angular minutes, and decimal minutes	mm - value of whole minutes (possible values are 0..Fifty nine) mmmm - value of decimal fractions of minutes (possible values are 0..Nine thousand nine hundred ninety nine)
dd°mm'ss.ss"N dd°mm'ss.ss"S ddd°mm'ss.ss"E ddd°mm'ss.ss"W	Displays latitude and longitude in degrees, angular minutes, angular seconds, and decimal seconds	ss.ss - value of integer and decimal fractions of seconds (possible values are 0.00..59.99) N or S - hemispheric sign for latitude (N - North, S - South) E or W - hemisphere sign for longitude (E - East, W -West) Decimal fractions are separated from

		<p>integer values by a period character.</p> <p>° - value in degrees</p> <p>'- value in minutes</p> <p>"- value in seconds</p> <p>For example, the record 54.123456°N, 134.987654°E reflects the following coordinates: 54,123456° = 54°7.4074' = 54°7'24.44" and Eastern longitude 134.987654°=134°59.2592' =54°59'15.55"</p>
--	--	--

The coordinate format is usually written as follows: DD - degrees, MM - minutes, SS - seconds.

If minutes and seconds are represented as decimal fractions, then write simply DD.DDDDD.

For example:

DD MM SS: 50° 40' 45" e 40 50' 30" North latitude. - degrees, minutes, seconds

DD MM.MM: 50° 40.75' e, 50.5 40' North latitude. degrees, decimal minutes

DD.DDDDD: 50.67916 V. D., 40.841666 S. sh. - decimal degrees

Formula for conversion from DD MM SS.SSS to dd.ddddd:

$$dd.ddddd = DD + ((MM)/60) + (S)/3600$$

Formula for conversion from DD MM.MMMM to dd.ddddd:

$$dd.ddddd = DD + ((MM.MMMM)/60)$$

Formula for conversion from dd.dd to DD MM SS:

$$D D = ZELATI(dd.ddddd)$$

$$MM = ZELATI((dd.ddddd-DD)*60)$$

$$SS = ((dd.dd-DD)*60MM)*60$$

To enter coordinate values in GIS programs, latitude and longitude values can be entered one after another through a space character, as a rule, in modern GIS, the DD format is used.DDDDD. In this case, decimal fractions can be separated by a period symbol or a comma symbol. For example: 54.123456 134.987654 (54.123456° N, 134.987654° E) or 54,123456 134,987654