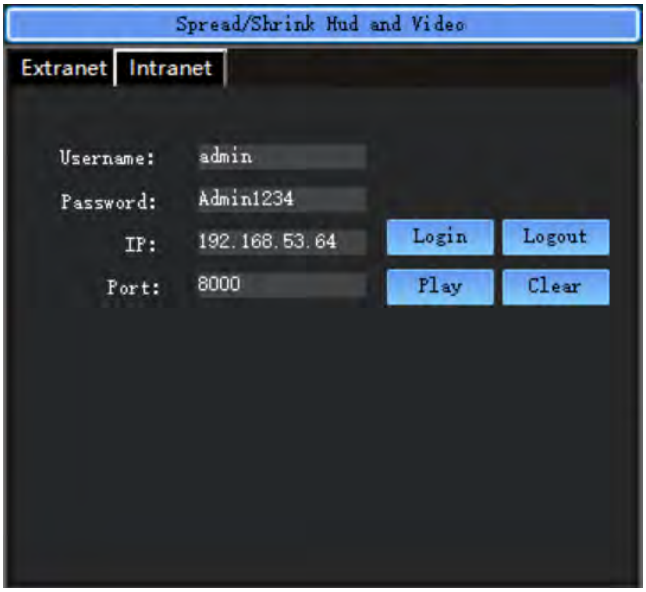
If you are using a bridge connection, you need to change your computer's IP address to the 53 subnet. However, you cannot use the following IP addresses: 192.168.53.254, 192.168.53.64, 192.168.53.20, 192.168.53.19 as they are already being used.

After the connection is established, you can find the current basic information in the bottom right corner of the homepage. It includes the longitude, latitude, altitude, GPS status, number of satellites, speed, status of battery 1, and status of battery 2. The current signal status is displayed in the top left corner.

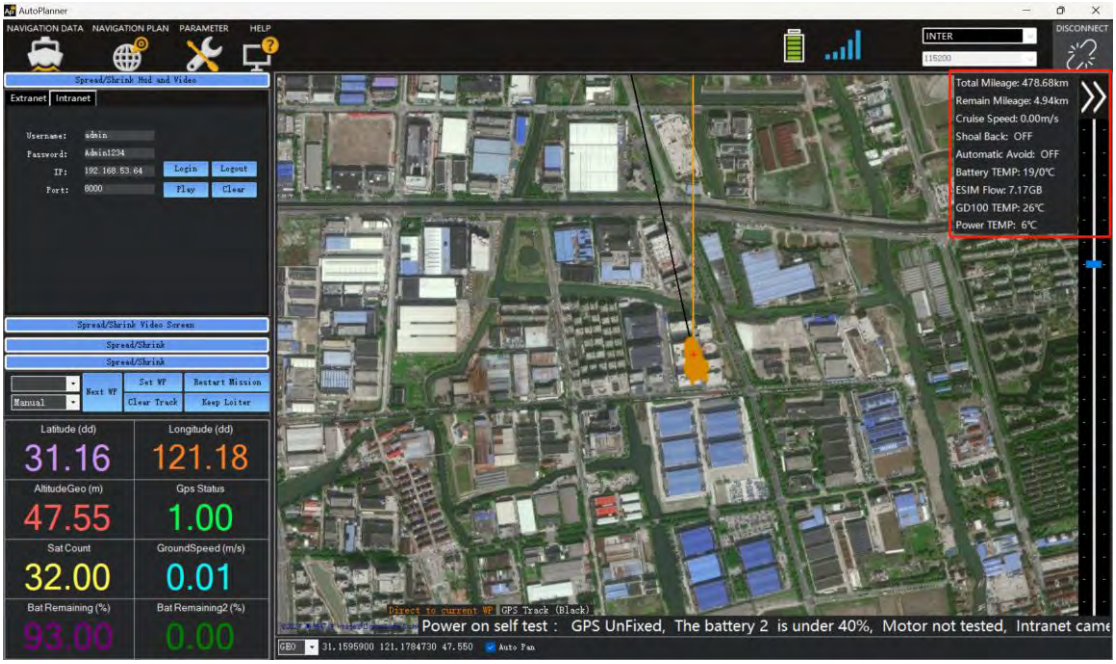
5.1.2 Login Camera

Under 4G connection status (external network): Click on the Expand/Hide Attitude Display and Video in the upper left corner of the page, click on Intranet Network, enter the Username is admin, password is Admin1234, port is 8000, and the IP is 192.168.0.254 and then click on Start - Play to open the camera.

Under TCP connection status (internal network): Username is admin, password is Admin1234, port is 8000, and the IP is 192.168.53.64.



5.1.3 Parameters Display



[Expand/Collapse Attitude Display and Video] Displays the vessel's attitude, expand to show the camera;

[Expand/Collapse Remote Control] Check button control, control the unmanned vessel using WASD, control the camera using up, down, left, and right; [Open/Close Auto Button] After setting the route and sending it to GD100, open the automatic mode, and the unmanned vessel will start operating on the preset route.

[Expand/Collapse Settings] [Set Waypoint] Sets the initial waypoint of the unmanned vessel, which is the first point when the unmanned vessel is in automatic mode; [Next Waypoint] The next waypoint of the unmanned vessel in automatic mode; [Clear Track] Clears the current planned route on the base map; [Auto/Manual/Standby/Return/Guide] Switches the current working mode of the unmanned vessel; [One-Click Hover] Select the corresponding waypoint to switch between manual mode, automatic return, and hover;

Parameter information column, the display area for regular parameters, double-click to switch to the corresponding real-time display parameters;

[Switch Map] Switches to different maps, such as Amap, Google Maps, Bing Maps, etc. Different image maps may have deviations in accuracy, choose the most suitable image map based on the field conditions. If the network is poor in the field measurement area, you can preload the satellite image indoors;

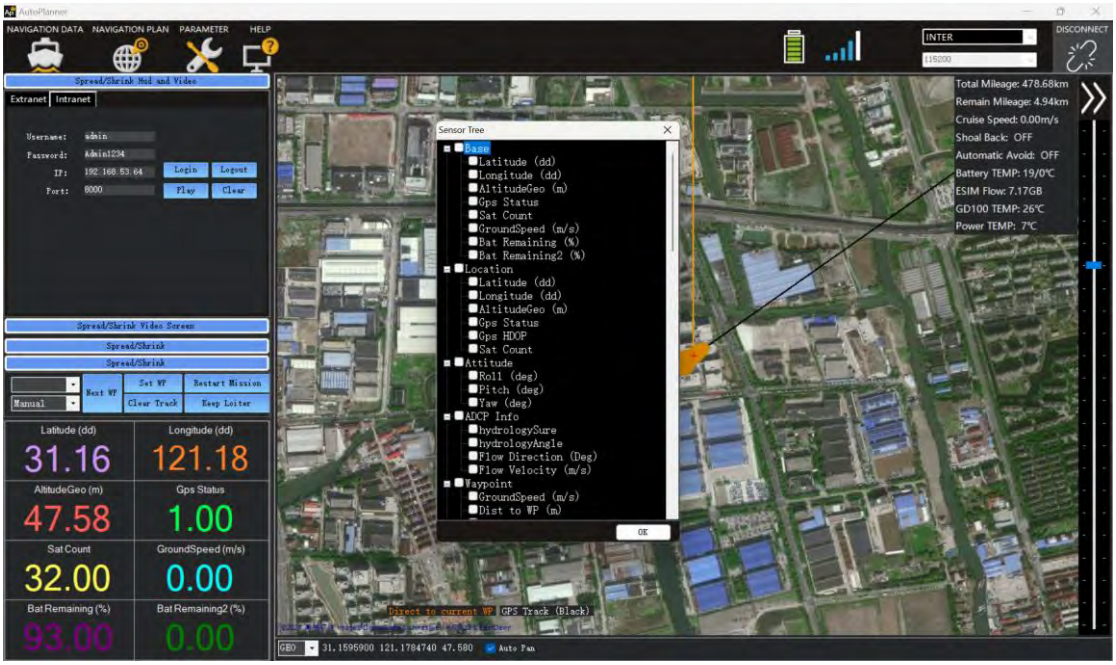
[Auto Pan] When selected, the vessel remains centered;

[Battery and Signal Strength Display] Displays the current battery level and network signal strength;

[Hide] Shows or hides the current status information of the unmanned vessel;

[Status Information Column] Displays the current status information of the unmanned vessel;

[Zoom] Zooms the map display, scroll up to zoom in and scroll down to zoom out using the mouse wheel.



5.1.4 Navigation Plan

5.1.4.1 Page Status Display

① [GEO, UTM, MGRS] are different coordinate systems, which are respectively the geodetic coordinate system, the unified transverse Mercator projection system, and the UTM-based military grid reference system (MGRS) latitude and longitude system. Generally, the default is latitude and longitude coordinates.

② Check [Grid] to display grid lines.

③ [Switch Map] to switch to different maps, such as Amap, Google Maps, Bing Maps, etc. Different imagery maps may have deviations in accuracy. Choose the most suitable imagery map based on the field conditions. If the field survey area has poor network connectivity, pre-load satellite imagery indoors.

④ [Load Task Point File] to load previously saved task point files.

[Save Task Point File] to save the currently planned flight route.

[Read Task Point] to read the current task waypoints from the controller.

[Write Task Point] to transfer the planned waypoint data to the controller.

Note:

The file import does not support a large number of waypoints, with a maximum limit of 300.

⑤ [Starting Position Coordinates] Displays the coordinate information of the initial position;

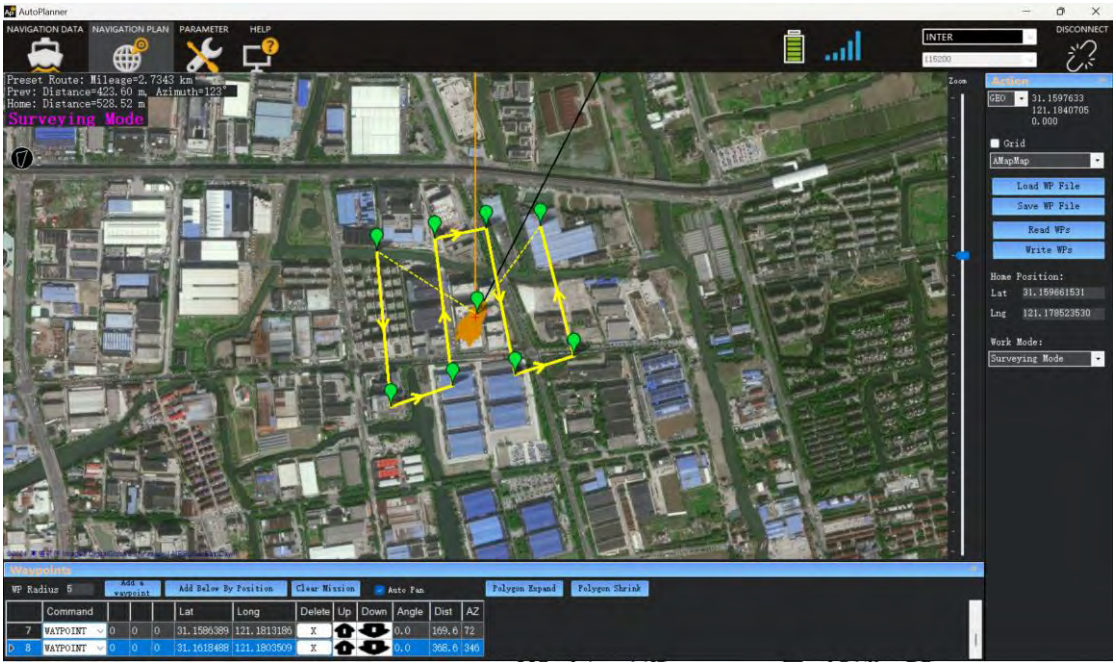
⑥ [Operating Mode] Includes four modes: surveying, hydrological, fully automatic, and semi-automatic. (Only unmanned boats equipped with millimeter wave obstacle avoidance radar can use the fully automatic and semi-automatic functions, and the obstacle recognition angle needs to be >45°)

⑦ [Pre-set Route] The top left corner displays the route mileage, bearing information from the previous point, and distance from home;

⑧ [Waypoint List] Allows modification of point coordinates, deletion, and sorting;

⑨ [Mark Waypoint at Boat's Location] Adds a waypoint at the boat's current location; [Clear Mission] Clears all waypoints added on the current interface; [Auto Pan] When selected, the boat remains centered; [Polygon Expansion/Contraction] Expands or contracts the polygon, clicking once expands internally or contracts externally by 0.5m;

⑩ [Waypoint] Left-click on the map to add waypoints, right-click on a selected waypoint to delete;

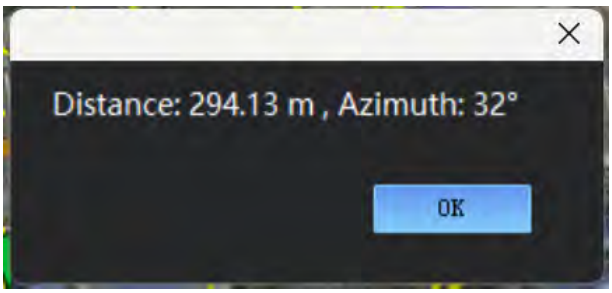


5.1.4.2 Right-Click Menu Bar Function

Insert/Delete Waypoints: Select the desired location to add a waypoint, and click the left mouse button to add the waypoint. To delete a selected waypoint, right-click on it.
Hover: Control the unmanned vessel to hover at a specific location.
Jump: After the unmanned vessel completes the preset route operation, it will continue to operate based on the preset jump points and repetition count. For example, if the operation includes waypoints 1-5 and the jump point is set to waypoint 2 with a repetition count of 3, the unmanned vessel will navigate from waypoint 5 to waypoint 2 after completing the normal preset route operation. It will then continue from waypoint 2 to waypoint 5. This process will repeat 3 times, and after that, the operation will end and the unmanned vessel will return to its home position.
Return: After the operation is complete, the unmanned vessel will return to its home position. To specify the return route, select the desired waypoint as the return point and right-click to add the return path that passes through this point.

【Points of Interest】Add points of interest and name them, which can display the latitude and longitude information of the point.

[Measure Distance Between Two Points] Right-click on a selected location to measure the distance between two points. Right-click on the target location to measure the distance between two points and display the distance and bearing between the two points.
[Reverse Task Points] Reverse the sequence of the starting point and the ending point,



i.e., reverse the trajectory of the route.

[Loading/Overlaying KML] Right-click with the mouse to load KML. Select an existing KML or KMZ file to open and check the survey lines. Adjust them as needed and write them into the task points.

Swap Docking Menu Bar: Switch the task point information display bar below to the right side of the software.

Set Home Here: Set the position of home in a safe location to ensure the safe return of the unmanned vessel in case of disconnection.

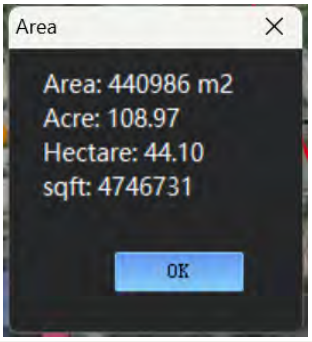
Polygon - Navigation Path Planning: Automatically plan the route based on the size of the polygon range.

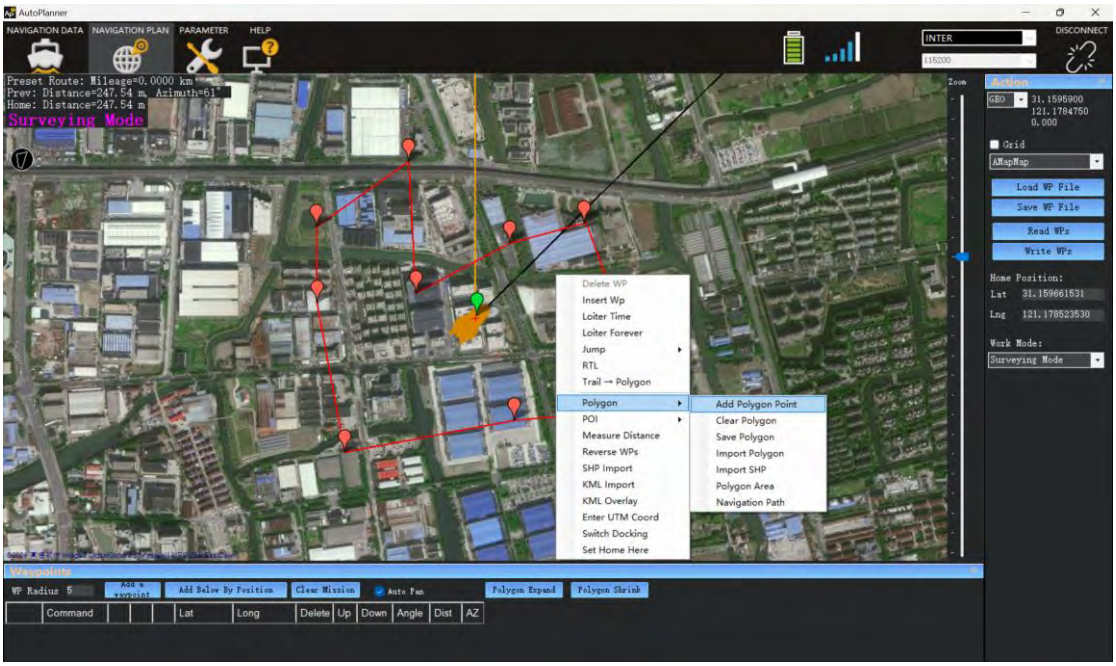
Polygon - Save Polygon: Save the current planned polygon to the computer.

Polygon - Import Polygon: Add a polygon from the computer to the base map.

Polygon - From SHP: Add an SHP file from the computer and automatically identify the polygon.

Polygon - Area: Calculate the area, acres, and other information of the current polygon.





【Polygon】 - 【Navigation Path Planning】:

【Add Polygon】: Add a polygon based on the survey area overview.

【Home Green Point】: Set the position of the home before each measurement to prevent the unmanned boat from losing connection.

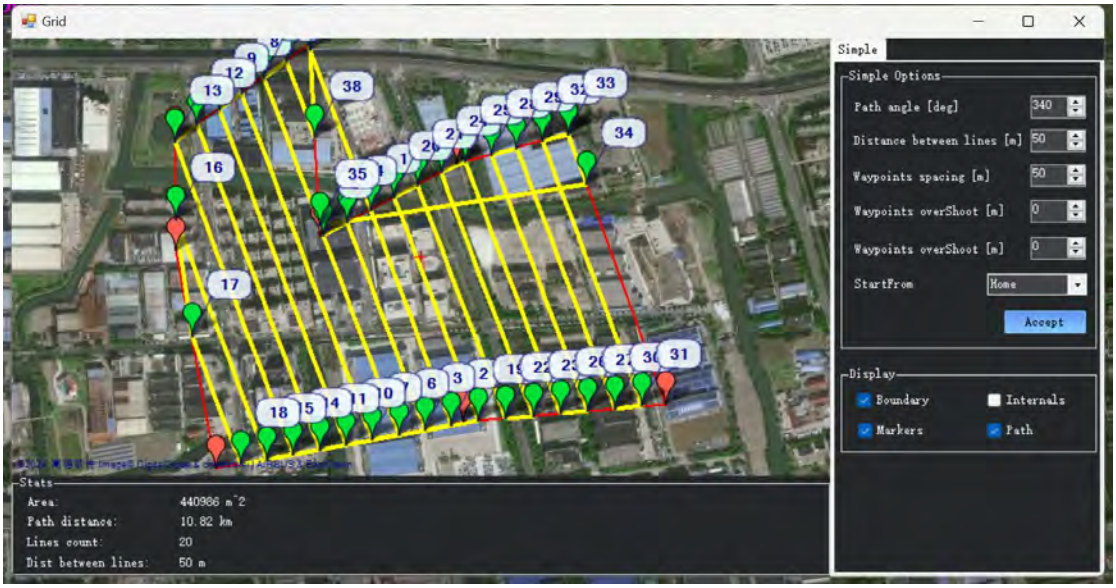
【Navigation Path Parameters Setting】: Adjust the heading angle, track line spacing, waypoint spacing, starting point, and fine-tune the left and right waypoint positions during the navigation process.

【Navigation Path Display Setting】: Select the content to display during the navigation process, including whether to show borders, internal waypoints, markers, and track lines.

Note:

Satellite imagery is not updated in real-time, so when planning work areas, pay attention to the safety of the area. The role of the home point: (1) The home point seves as the

return point. (2) The logic for generation automatic flight routes is to generate waypoint 1 near the home point, and the rest of the waypoints are generated in sequence

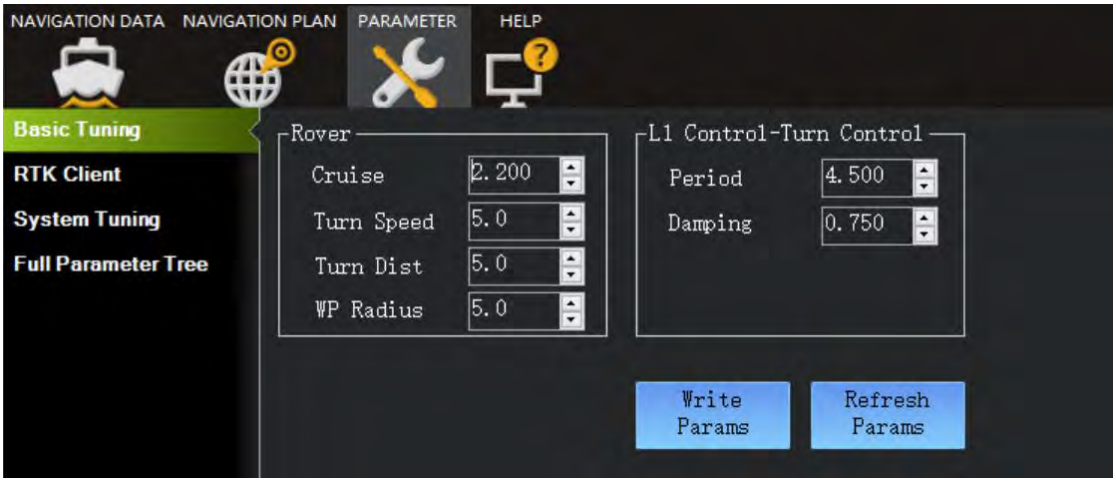


5.2 Parameter

5.2.1 Basic Parameters

The parameters automatically configured by the AP software after connecting to the unmanned boat cannot be modified;

[Cruise Speed] should be written into the parameters according to the actual situation and can be modified in real-time;



5.2.2 RTK Settings

[CORS Login] The new version of the AP software allows logging into the CORS account in the RTK settings.

5.2.3 System Setting

Shallow : The unmanned boat will automatically reverse when the water depth at its current location is lower than the set depth.

Automatic Obstacle Avoidance: When the unmanned boat approaches a preset distance from an obstacle, it will automatically avoid the obstacle and continue along the preset path after bypassing it.

Low Battery Return: When the battery level is below a certain threshold, the unmanned boat will stop operations and return automatically.

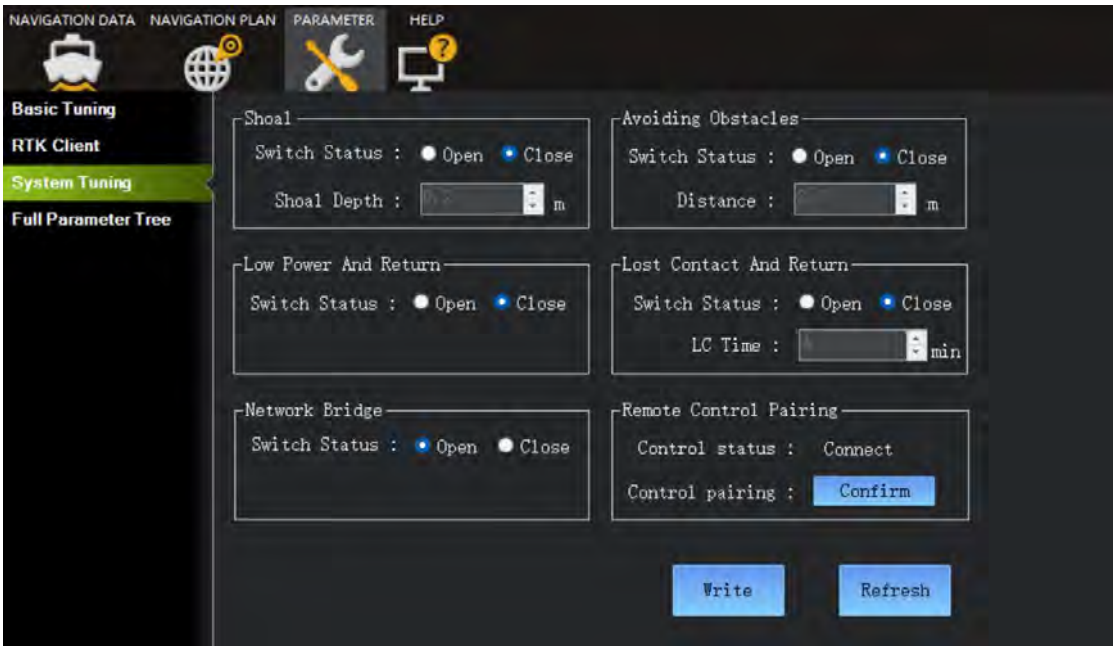
Lost Connection Return: If both the remote control and the AP software lose connection with the unmanned boat for a certain period of time, the boat will automatically return.

Bridge: Enabled by default.

Remote Controller: The default matched remote controller will automatically connect to the unmanned boat after it is turned on. If it is not the matched remote controller, first connect the AP software with the unmanned boat, then click "Enable Matching" and turn on the remote controller. Once you hear the boat's prompt sound, it means the matching is successful. Write/Refresh Parameters: After modifying the parameters, click "Write" and then refresh to apply the changes.

Note:

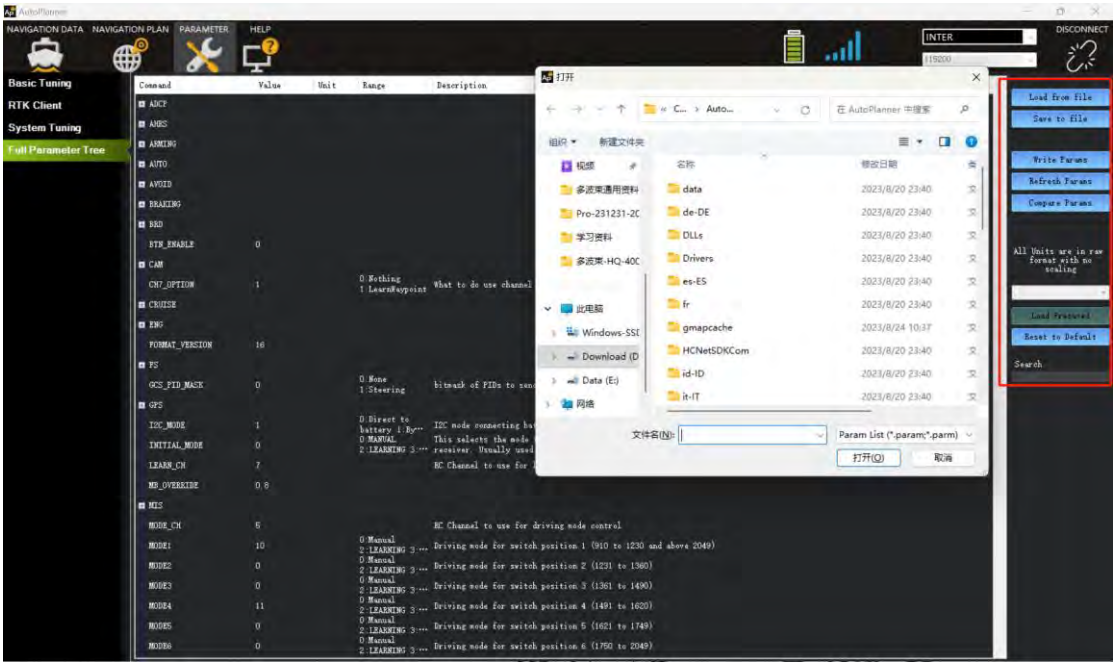
Shoal must be done under the condition that the depth sounder is working properly.



5.2.4 Full Parameters

[Loading] In case of abnormal attitude of the hull, the corresponding hull parameters can be loaded to restore the factory parameter configuration. The parameter name is GD100-ship type, with a suffix of .param. The default storage path for parameters is in the main installation directory of the AP software. The parameter name for the new A3, A4 unmanned boats is GD100-ship type (V1.1).

[Saving] Save the current parameters to the computer.



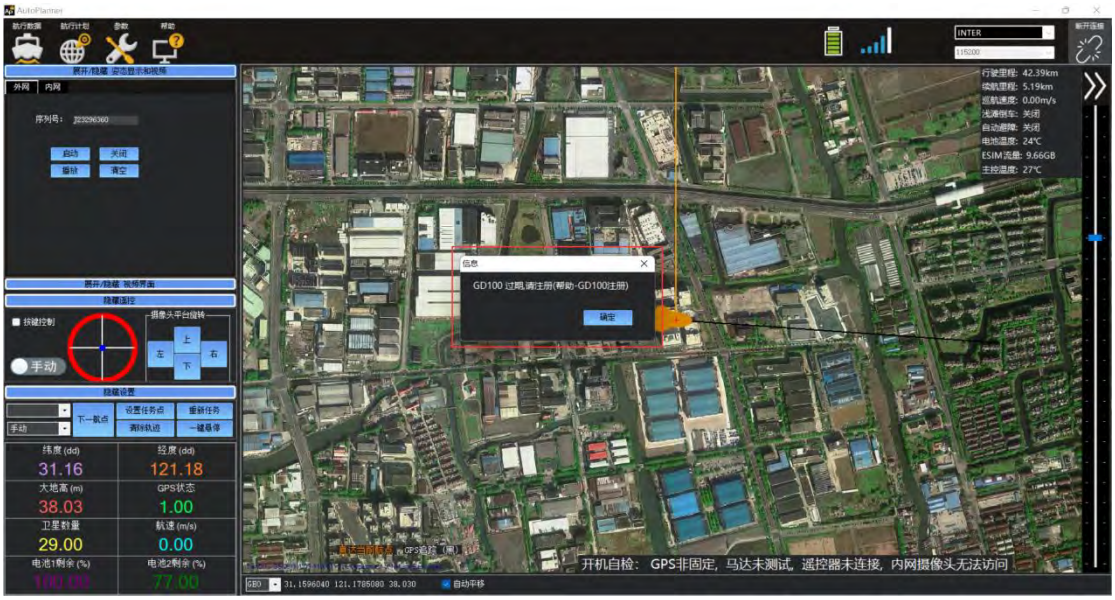
5.3 Help

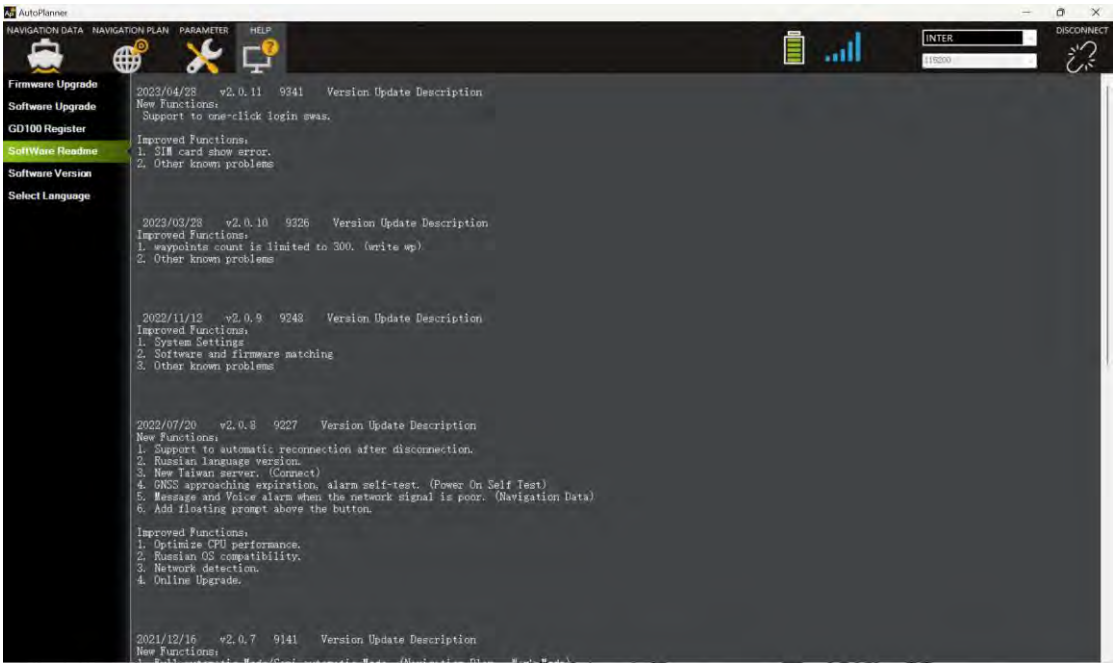
5.3.1 GD100 Registration

If the GD100 registration has expired (as shown in the image), please provide the machine code to the salesperson to complete the GD100 registration using the registration code. You can find the registration code by going to "Help" > "GD100 Registration" to view the machine code and registration code.

Software update information

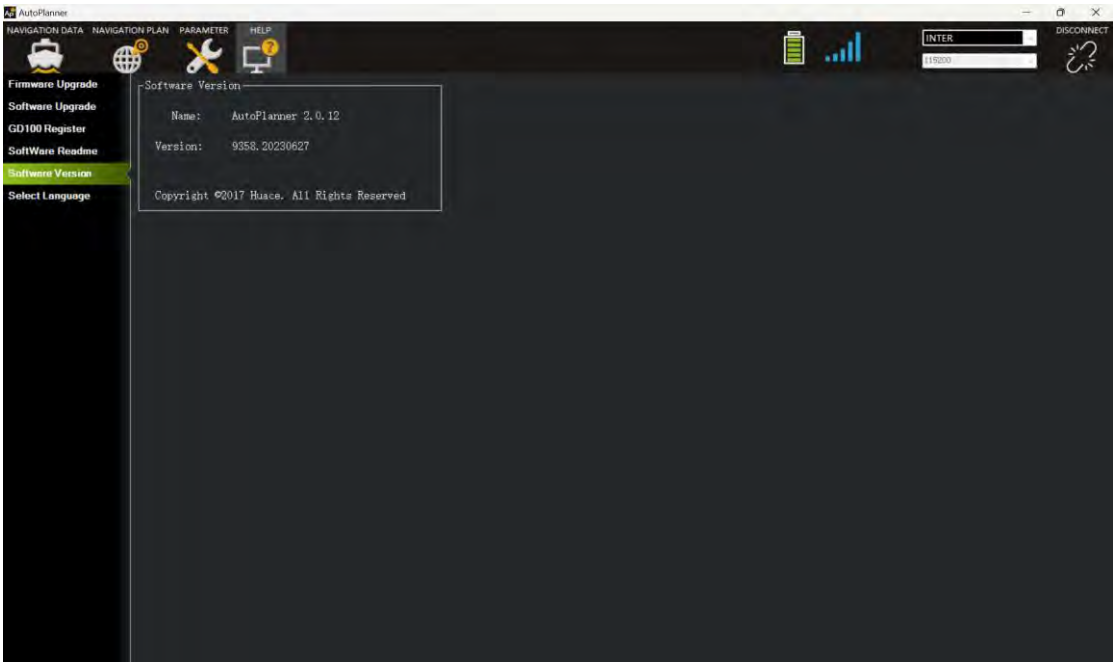
Each version update will have a corresponding update log to explain the changes made.





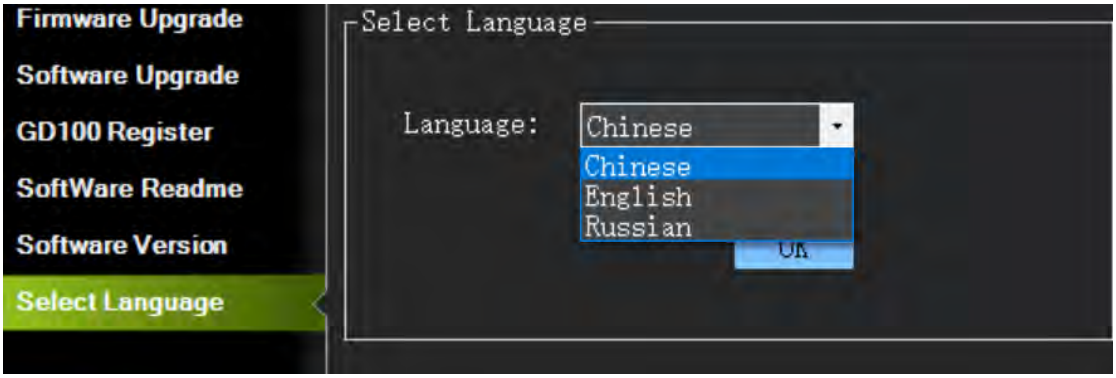
Software version information

Display the current version number of the AP software. If there are any issues with the software, please provide the corresponding version number for targeted troubleshooting.



5.3.2 Language

The current version supports Chinese/English/Russian languages. After switching, restarting the software will take effect



6. USV Web Management System

After establishing a connection with the unmanned vessel, you can access the USV web management system to view its status and control data output. There are two types of access methods:

Method 1: After connecting to AutoPlanner software through 4G (INTER), open a browser and enter 192.168.0.254 in the address bar to access it.

Method 2: Through TCP, the mobile device connects to the GD100 LAN1 network port or WIFI through a network cable, opens a browser, and enters 192.168.53.254 or 192.168.144.254 in the address bar to access it.

Note:

To connect via TCP, it is necessary to modify the device network segment to be consistent with GD100.

User name (default)：admin

Password (default)：Admin1234

6.1 USV Status

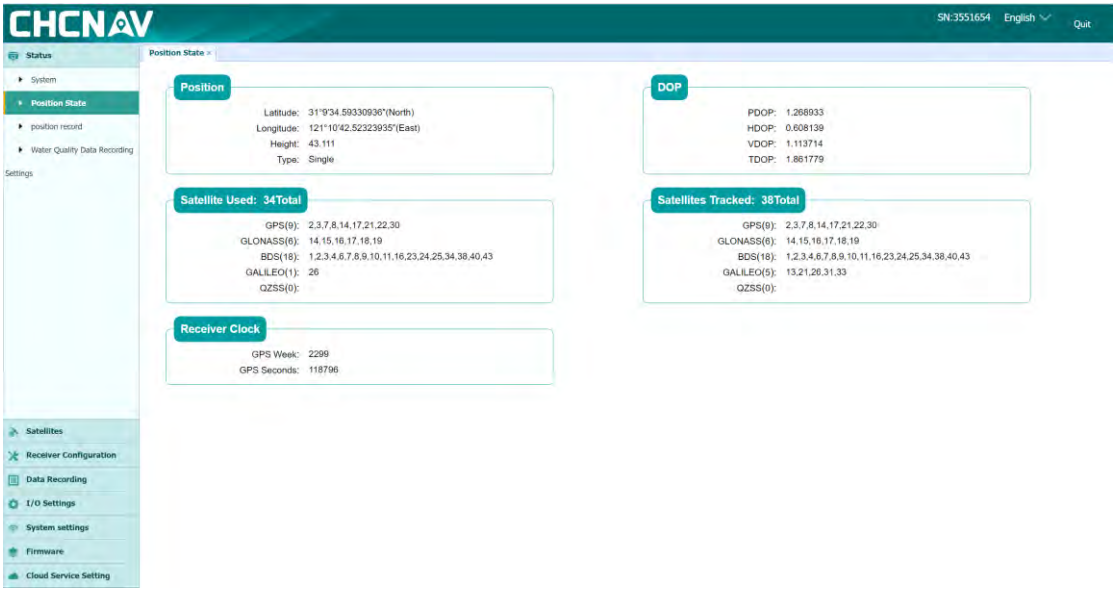
6.1.1 System State

In the system status bar, you can check network status, GNSS information, battery status, activity status, control status, depth sounder status, and other information.

4G connection requires checking the network status bar, network signal strength, dialing status, and remaining ESIM traffic.

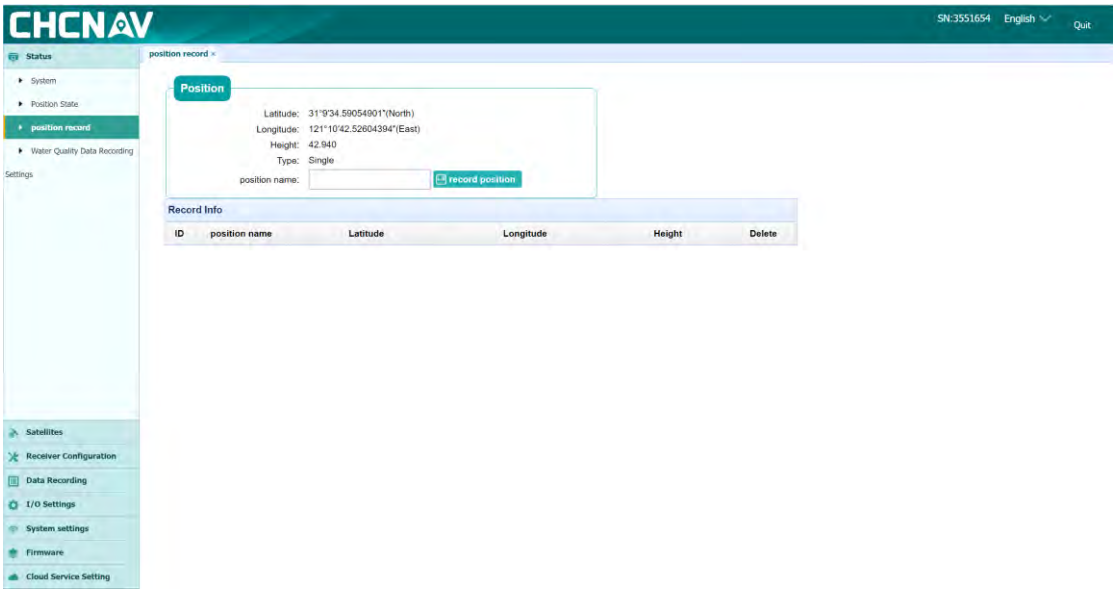
6.1.2 Position Status

This interface is used to view relevant information such as the position of the antenna behind the USV GNSS.



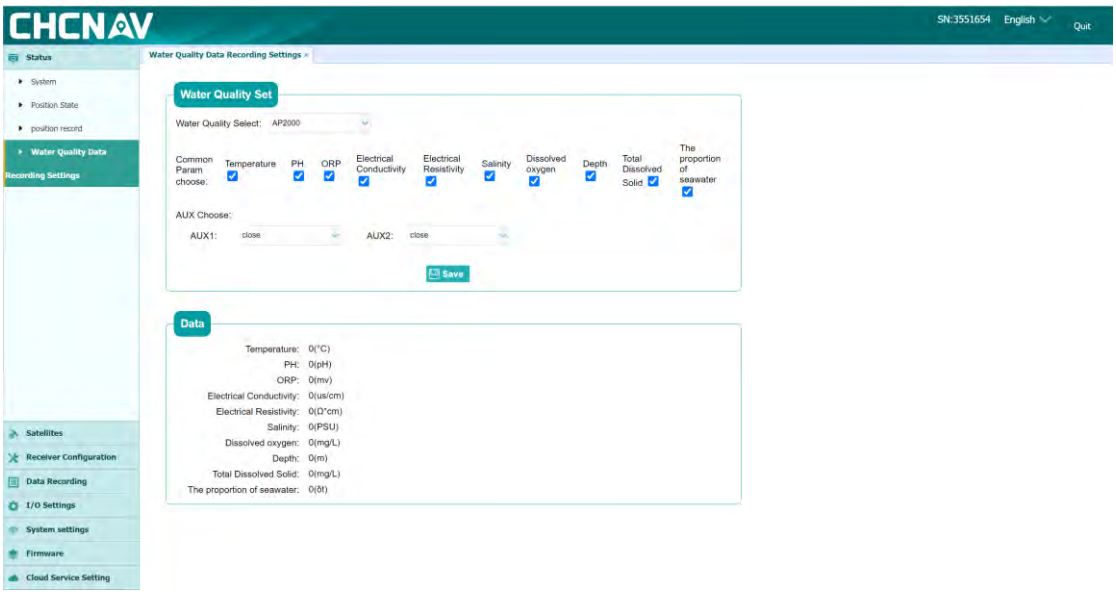
6.1.3 Position Record

Enter the name and click on the measurement point to record the current position.



6.1.4 Water Quality Data

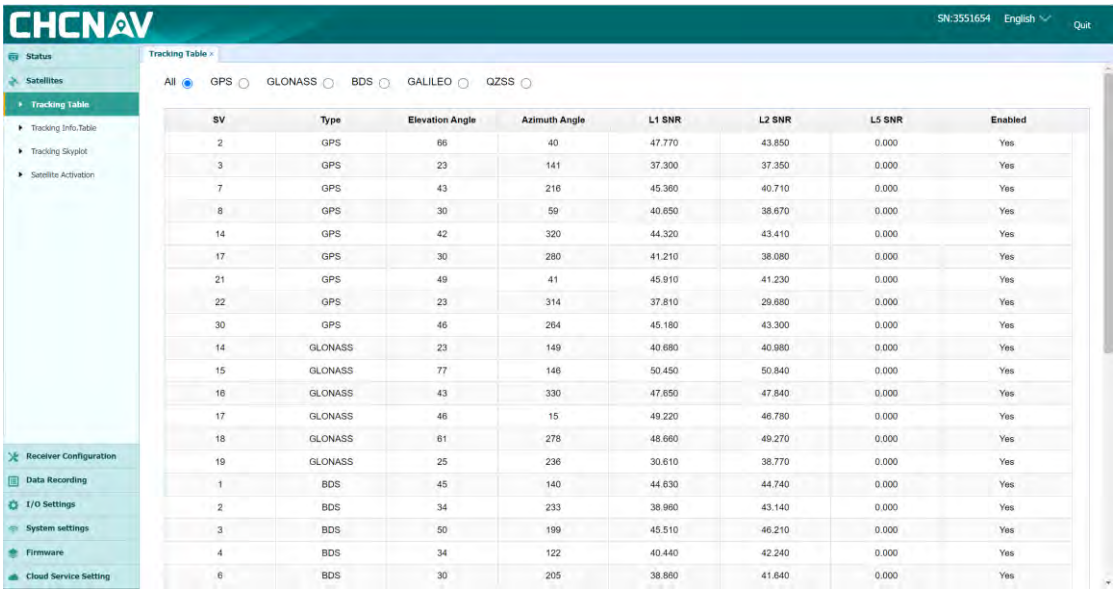
This interface is used for data transmission of water quality meters. Currently, water quality meter models support(AP2000, AP5000, AP7000, Y4000). Select the corresponding parameter output based on the hardware sensor of the water quality meter.



6.2 Satellite

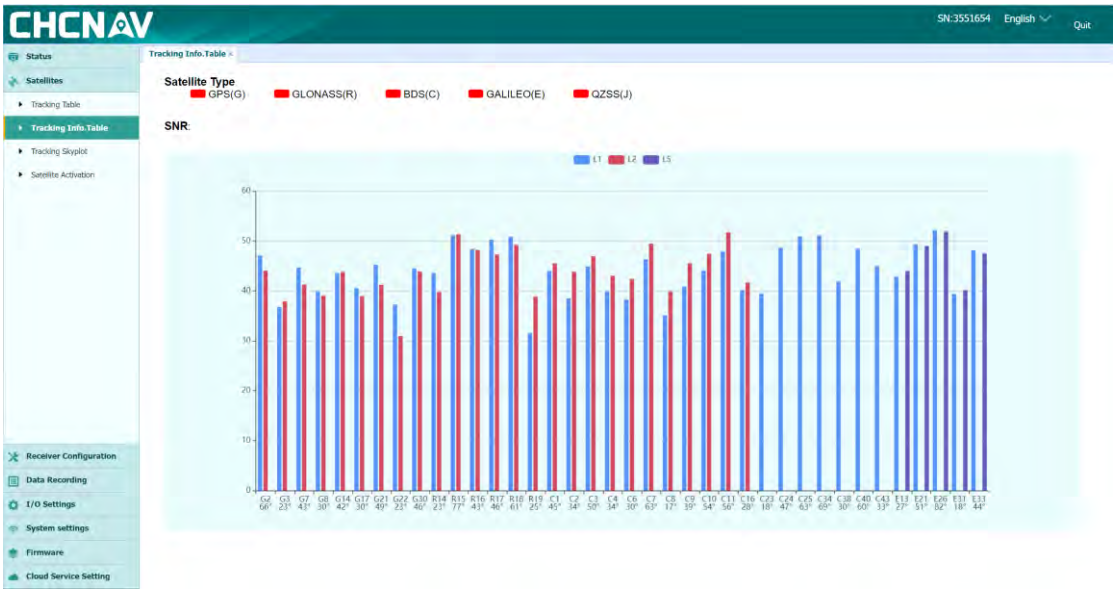
6.2.1 Tracking Table

Satellite tracking map: This interface displays the information of the currently tracked satellites in the form of a table.



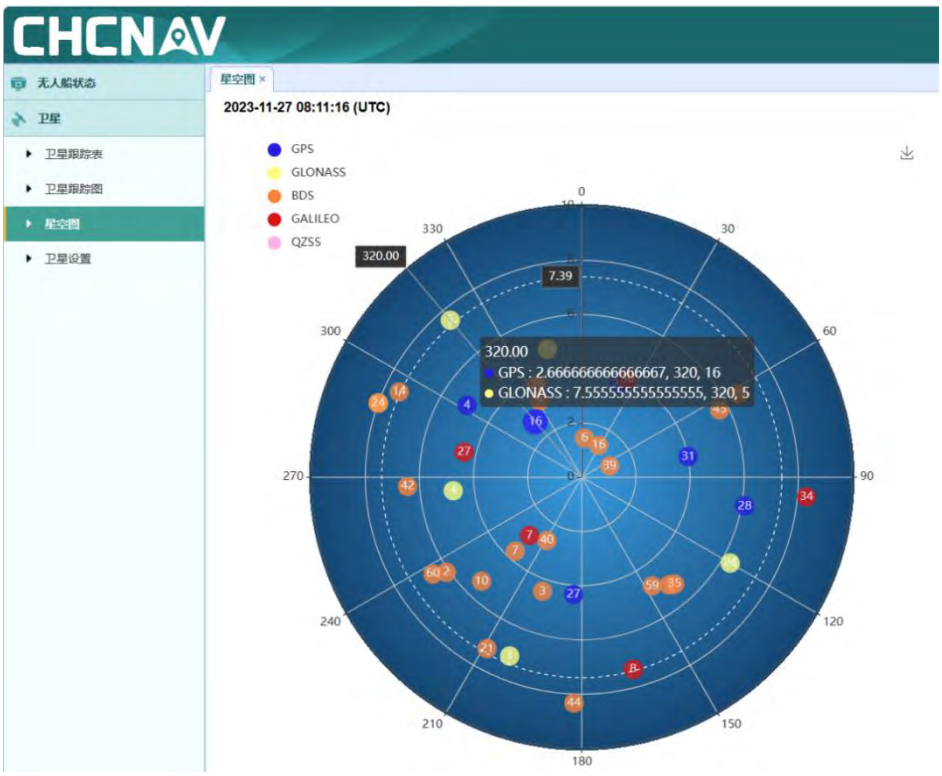
6.2.2 Tracking Info. Table

This interface displays the information of the currently tracked satellites in the form of a histogram.



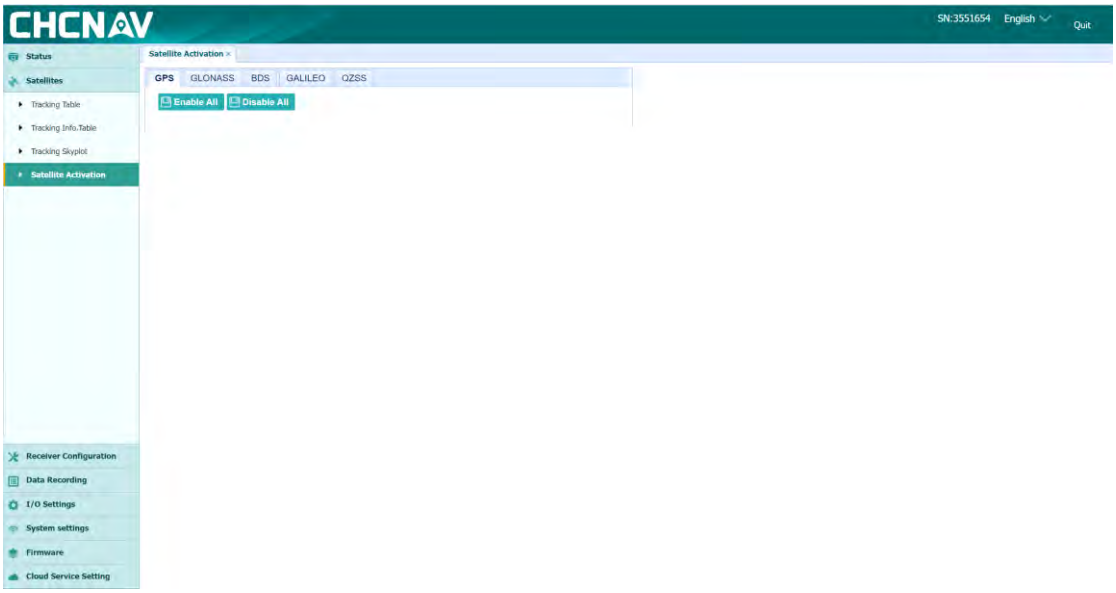
6.2.3 Tracking Skyplot

This interface displays the satellite zenith map.



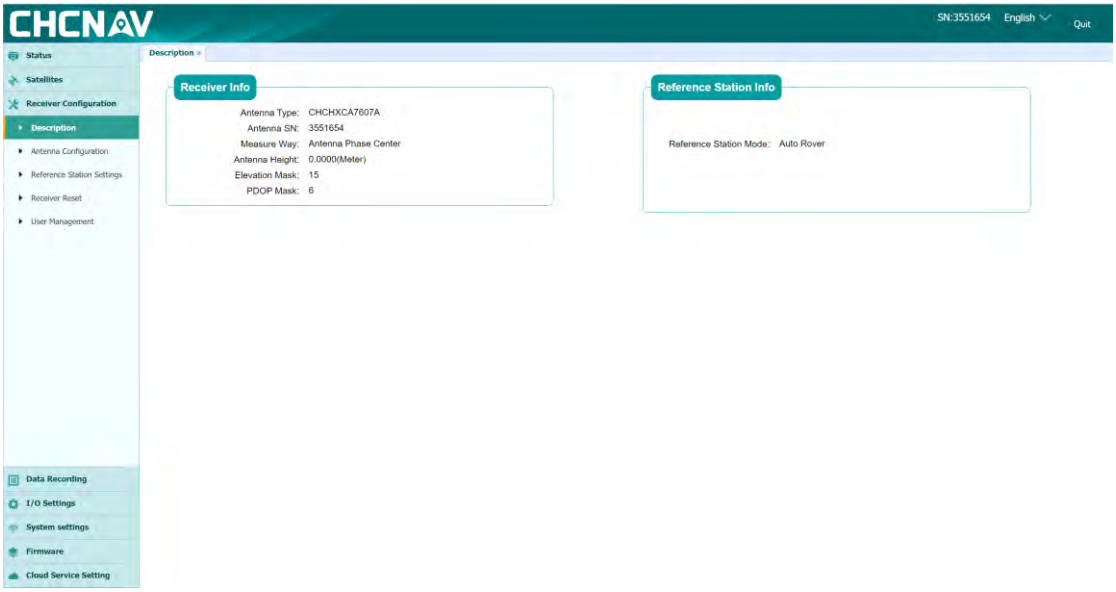
6.2.4 Satellite Activation

This interface can disable or enable tracked satellites.



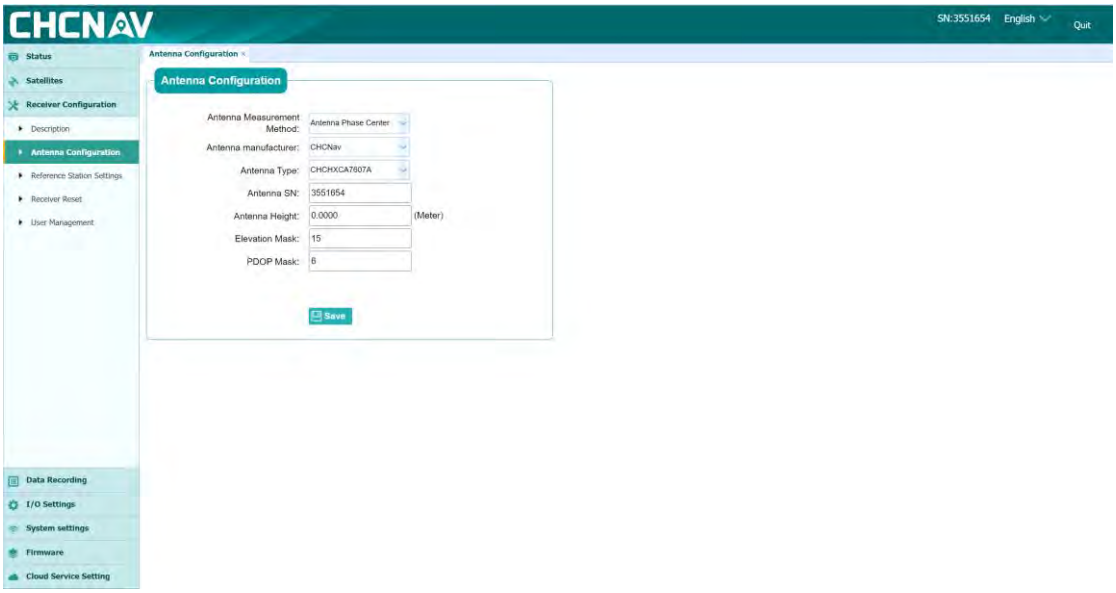
6.3 Receiver Configuration

6.3.1 Description



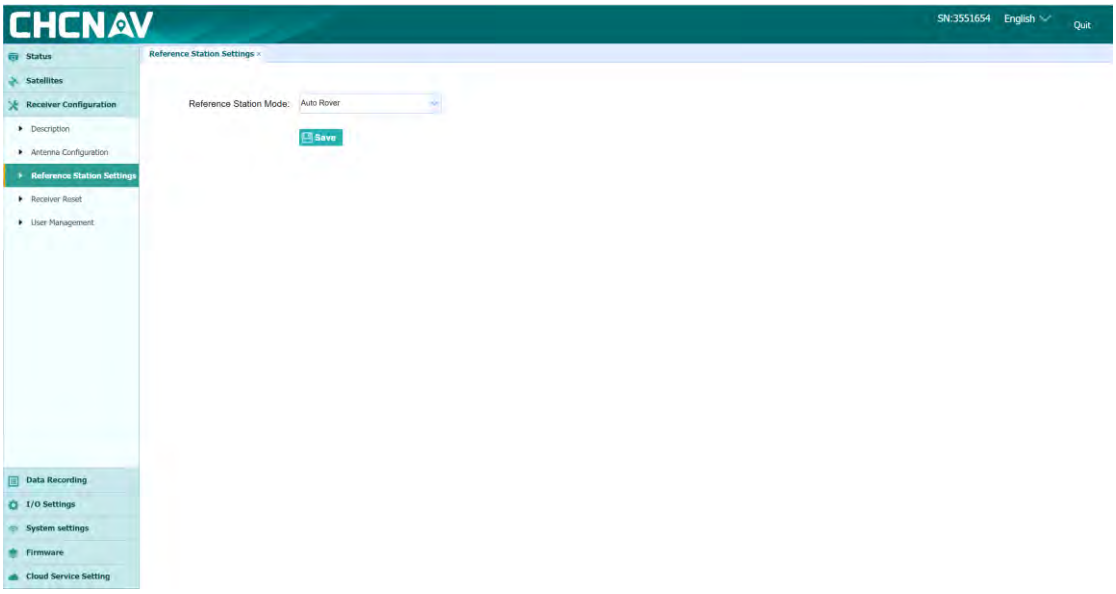
6.3.2 Antenna Configuration

This interface is used for antenna parameter settings, measurement method (phase center/vertical height/oblique height), antenna manufacturer (supporting mainstream domestic and international), antenna type (adapted according to antenna manufacturer, if not available, can be customized), antenna number (default GD100 SN, do not modify)



6.3.3 Reference Station Settings

The reference station mode only supports [self starting mobile station]

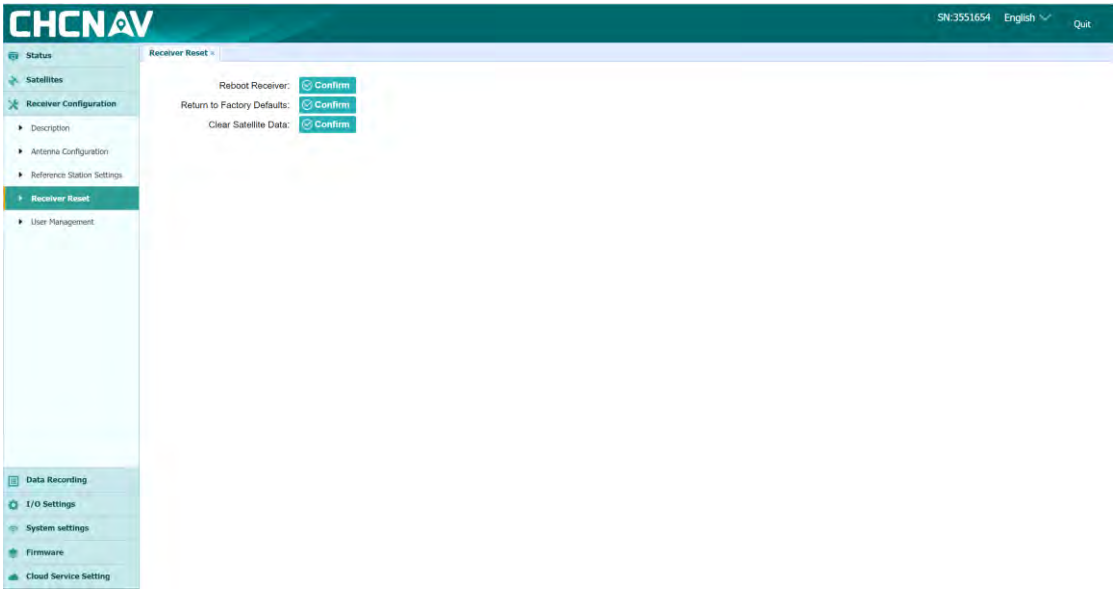


6.3.4 Receiver Reset

Restart receiver: Restart GD100

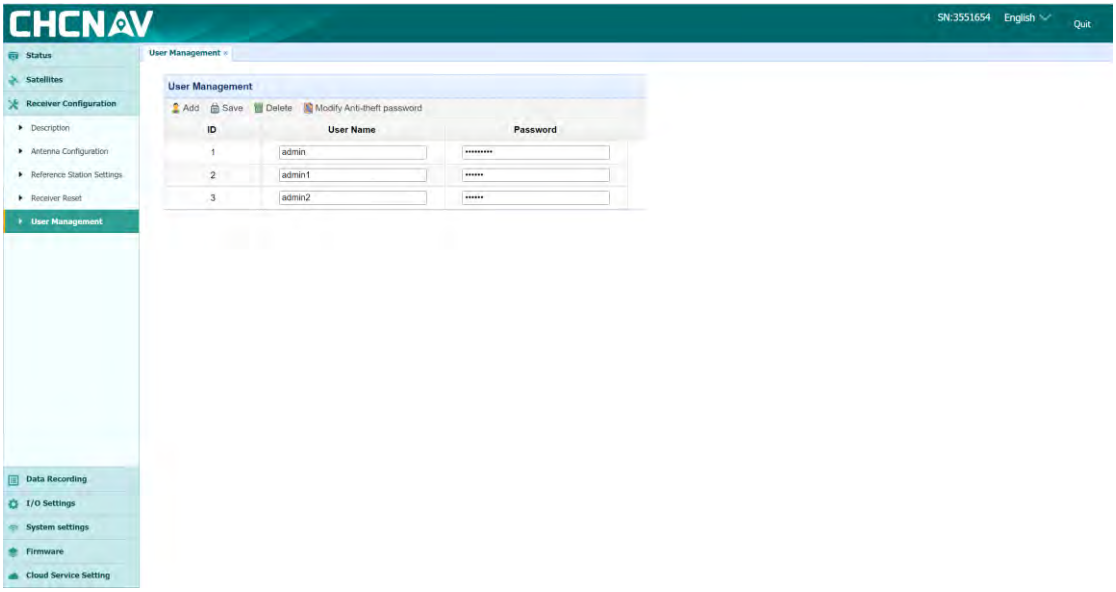
Restore factory settings: Restore the configuration parameters of GD100 to the default state

Clear satellite data: Clear board ephemeris data



6.3.5 Account Management

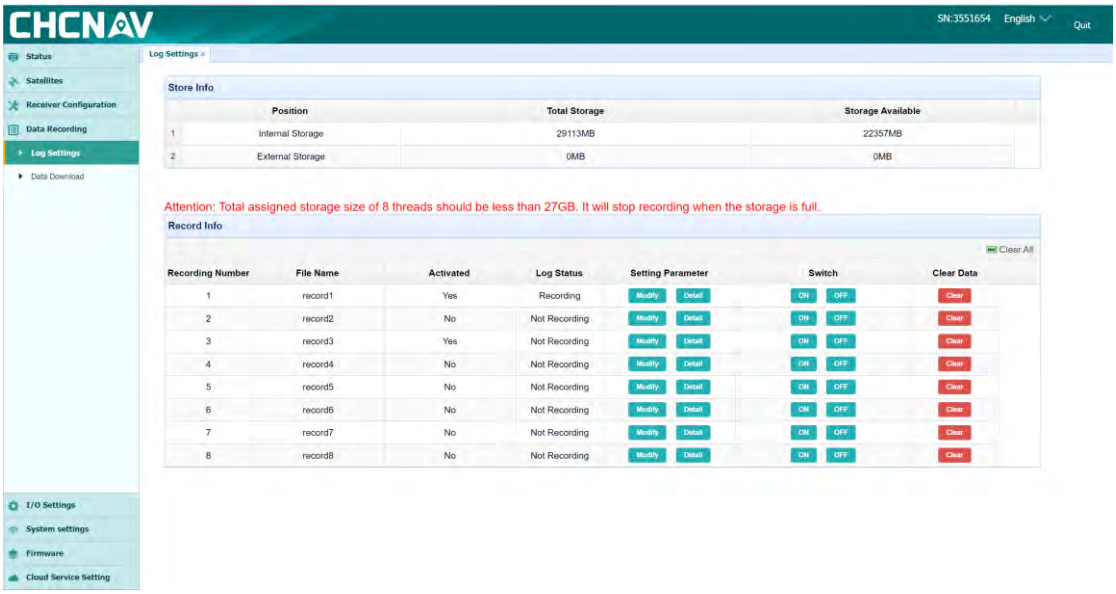
No modification required by default



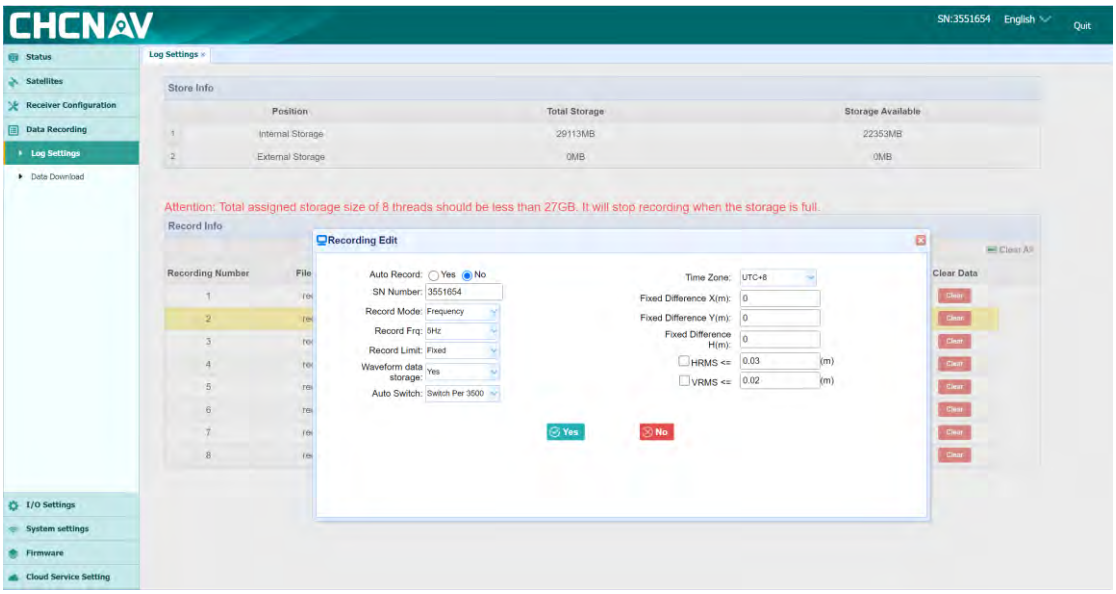
6.4 Data Recording

6.4.1 Log Settings

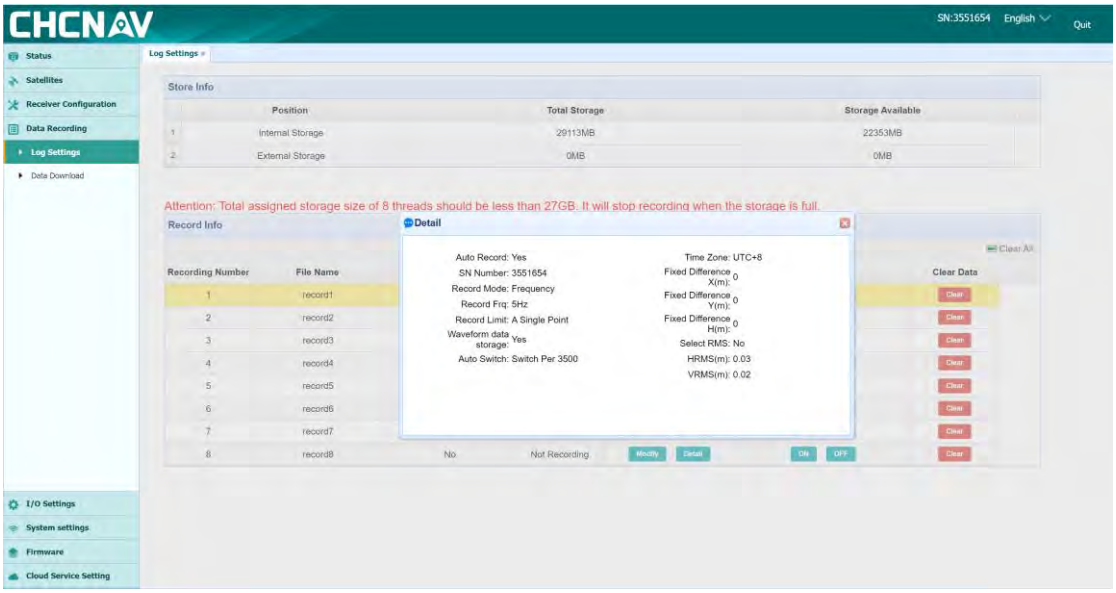
The default internal storage space of the USV GD100 is 28GB, divided into 8 record storage folders, record1 folder, which automatically records data when powered on by default, and record2 folder synchronizes with HydroSurvey and EasySave software for data recording.



When the corresponding record folder is closed, you can click the modify button in the parameter settings bar to modify the settings of the corresponding record folder.



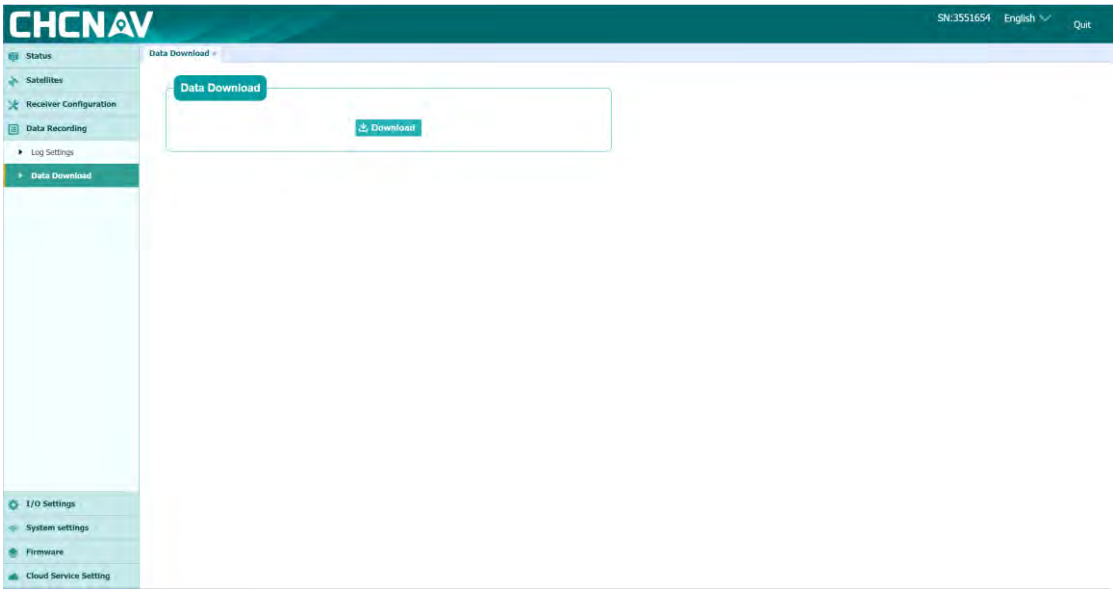
In the parameter settings column, click the details button to view the settings of the corresponding record folder.



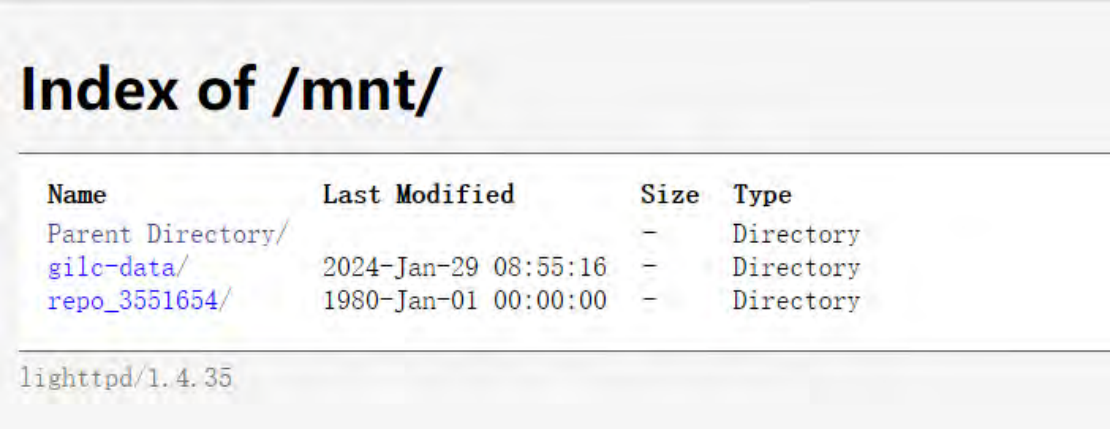
Click the clear button to clear the data in the current folder. Click clear all recorded data to clear the data.

6.4.2 Data Download

The USV GD100 stores data internally to avoid data loss.



After clicking the download button, the browser will automatically open and enter this interface.



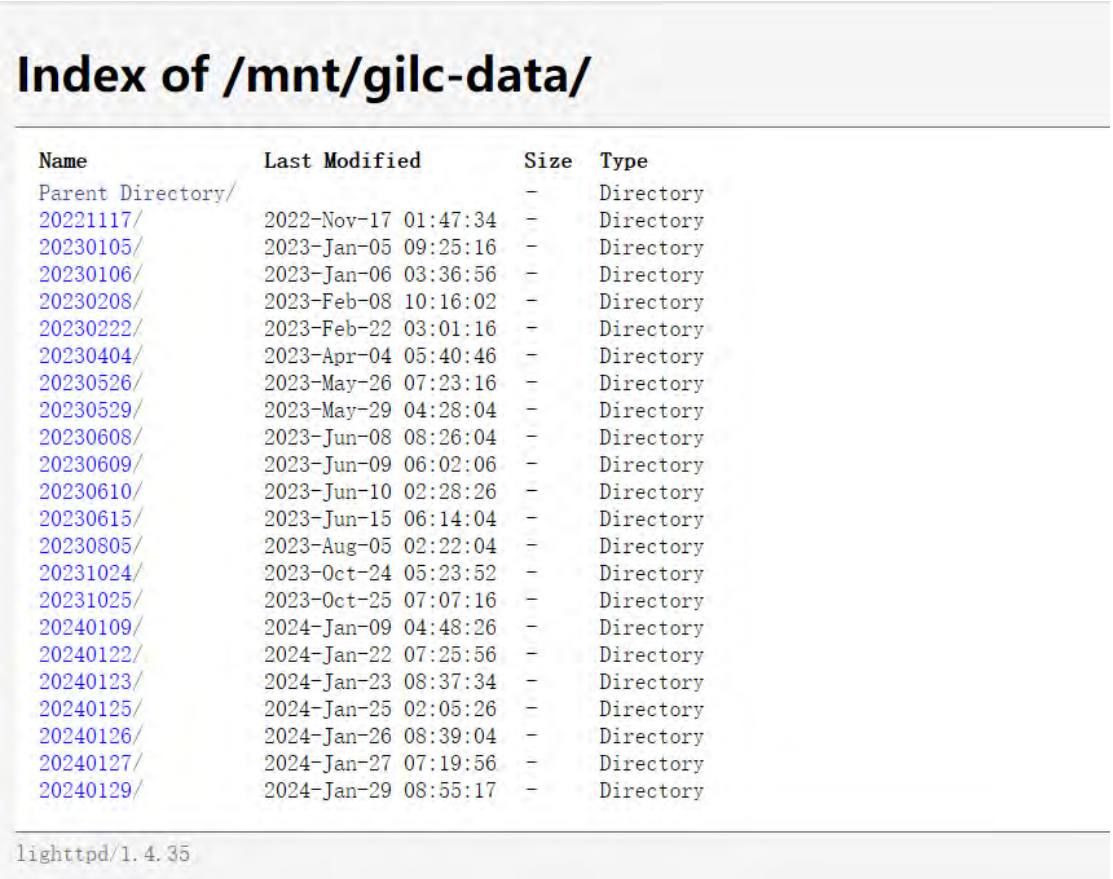
Index of /mnt/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
gilc-data/	2024-Jan-29 08:55:16	-	Directory
repo_3551654/	1980-Jan-01 00:00:00	-	Directory

lighttpd/1.4.35

After clicking on the Parent Directory, return to the directory one level above the current directory.

Click on gilc data to enter the following interface.



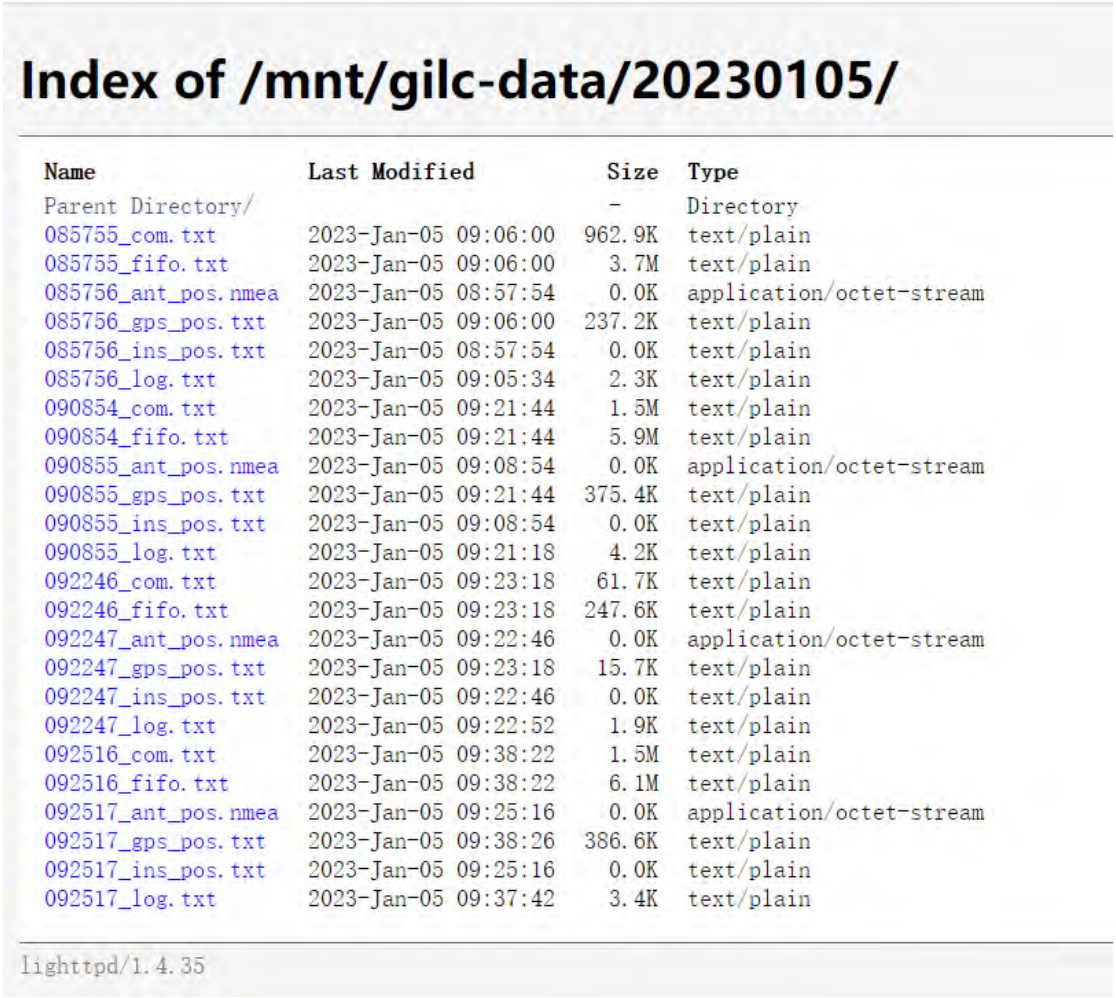
Index of /mnt/gilc-data/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
20221117/	2022-Nov-17 01:47:34	-	Directory
20230105/	2023-Jan-05 09:25:16	-	Directory
20230106/	2023-Jan-06 03:36:56	-	Directory
20230208/	2023-Feb-08 10:16:02	-	Directory
20230222/	2023-Feb-22 03:01:16	-	Directory
20230404/	2023-Apr-04 05:40:46	-	Directory
20230526/	2023-May-26 07:23:16	-	Directory
20230529/	2023-May-29 04:28:04	-	Directory
20230608/	2023-Jun-08 08:26:04	-	Directory
20230609/	2023-Jun-09 06:02:06	-	Directory
20230610/	2023-Jun-10 02:28:26	-	Directory
20230615/	2023-Jun-15 06:14:04	-	Directory
20230805/	2023-Aug-05 02:22:04	-	Directory
20231024/	2023-Oct-24 05:23:52	-	Directory
20231025/	2023-Oct-25 07:07:16	-	Directory
20240109/	2024-Jan-09 04:48:26	-	Directory
20240122/	2024-Jan-22 07:25:56	-	Directory
20240123/	2024-Jan-23 08:37:34	-	Directory
20240125/	2024-Jan-25 02:05:26	-	Directory
20240126/	2024-Jan-26 08:39:04	-	Directory
20240127/	2024-Jan-27 07:19:56	-	Directory
20240129/	2024-Jan-29 08:55:17	-	Directory

lighttpd/1.4.35

Click on any folder, taking the 20230105 folder as an example.

The following file is the data processed by the combination navigation algorithm, used by the R&D personnel to analyze the problem.

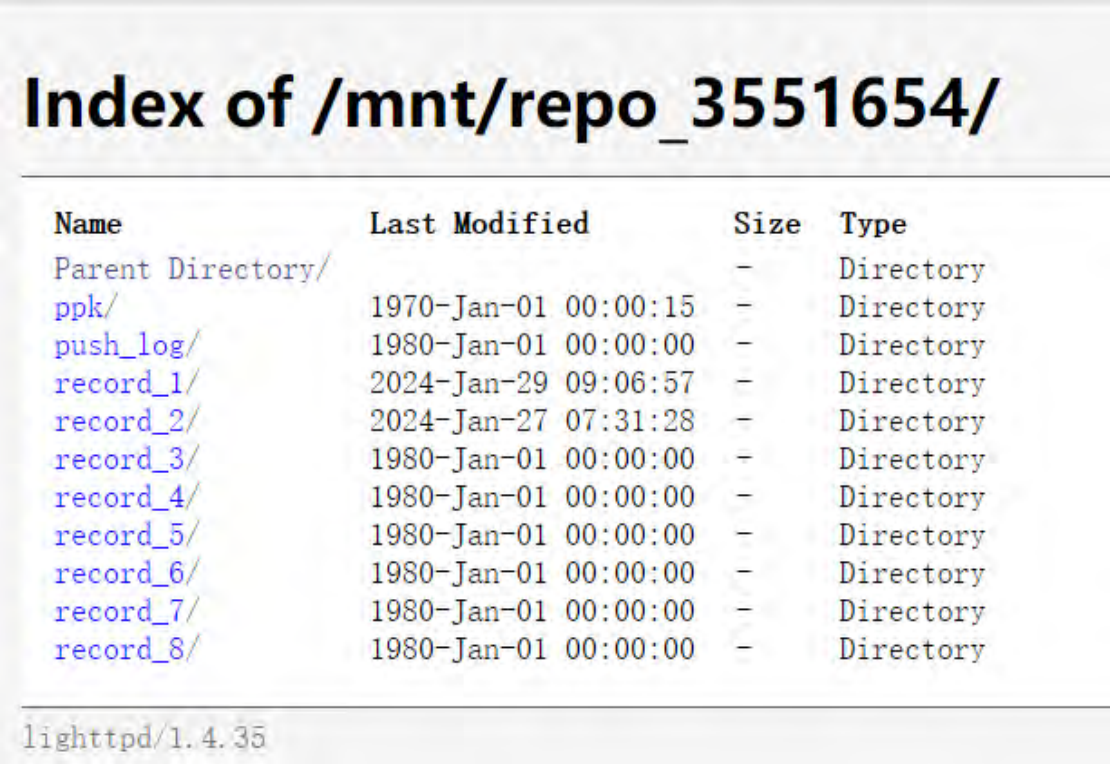


Index of /mnt/gilc-data/20230105/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
085755_com.txt	2023-Jan-05 09:06:00	962.9K	text/plain
085755_fifo.txt	2023-Jan-05 09:06:00	3.7M	text/plain
085756_ant_pos.nmea	2023-Jan-05 08:57:54	0.0K	application/octet-stream
085756_gps_pos.txt	2023-Jan-05 09:06:00	237.2K	text/plain
085756_ins_pos.txt	2023-Jan-05 08:57:54	0.0K	text/plain
085756_log.txt	2023-Jan-05 09:05:34	2.3K	text/plain
090854_com.txt	2023-Jan-05 09:21:44	1.5M	text/plain
090854_fifo.txt	2023-Jan-05 09:21:44	5.9M	text/plain
090855_ant_pos.nmea	2023-Jan-05 09:08:54	0.0K	application/octet-stream
090855_gps_pos.txt	2023-Jan-05 09:21:44	375.4K	text/plain
090855_ins_pos.txt	2023-Jan-05 09:08:54	0.0K	text/plain
090855_log.txt	2023-Jan-05 09:21:18	4.2K	text/plain
092246_com.txt	2023-Jan-05 09:23:18	61.7K	text/plain
092246_fifo.txt	2023-Jan-05 09:23:18	247.6K	text/plain
092247_ant_pos.nmea	2023-Jan-05 09:22:46	0.0K	application/octet-stream
092247_gps_pos.txt	2023-Jan-05 09:23:18	15.7K	text/plain
092247_ins_pos.txt	2023-Jan-05 09:22:46	0.0K	text/plain
092247_log.txt	2023-Jan-05 09:22:52	1.9K	text/plain
092516_com.txt	2023-Jan-05 09:38:22	1.5M	text/plain
092516_fifo.txt	2023-Jan-05 09:38:22	6.1M	text/plain
092517_ant_pos.nmea	2023-Jan-05 09:25:16	0.0K	application/octet-stream
092517_gps_pos.txt	2023-Jan-05 09:38:26	386.6K	text/plain
092517_ins_pos.txt	2023-Jan-05 09:25:16	0.0K	text/plain
092517_log.txt	2023-Jan-05 09:37:42	3.4K	text/plain

lighttpd/1.4.35

Click repo ******** to enter the following interface



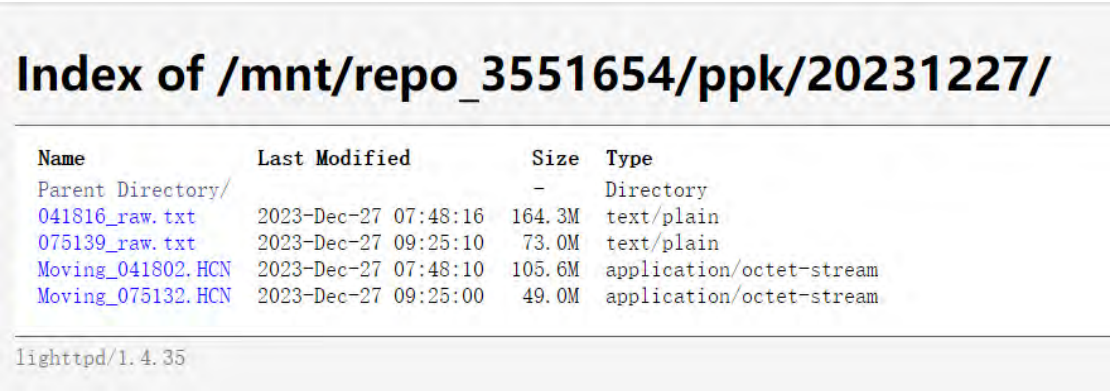
Index of /mnt/repo_3551654/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
ppk/	1970-Jan-01 00:00:15	-	Directory
push_log/	1980-Jan-01 00:00:00	-	Directory
record_1/	2024-Jan-29 09:06:57	-	Directory
record_2/	2024-Jan-27 07:31:28	-	Directory
record_3/	1980-Jan-01 00:00:00	-	Directory
record_4/	1980-Jan-01 00:00:00	-	Directory
record_5/	1980-Jan-01 00:00:00	-	Directory
record_6/	1980-Jan-01 00:00:00	-	Directory
record_7/	1980-Jan-01 00:00:00	-	Directory
record_8/	1980-Jan-01 00:00:00	-	Directory

lighttpd/1.4.35

Data stored in ppk folder

Each date named file contains both raw and HCN files.



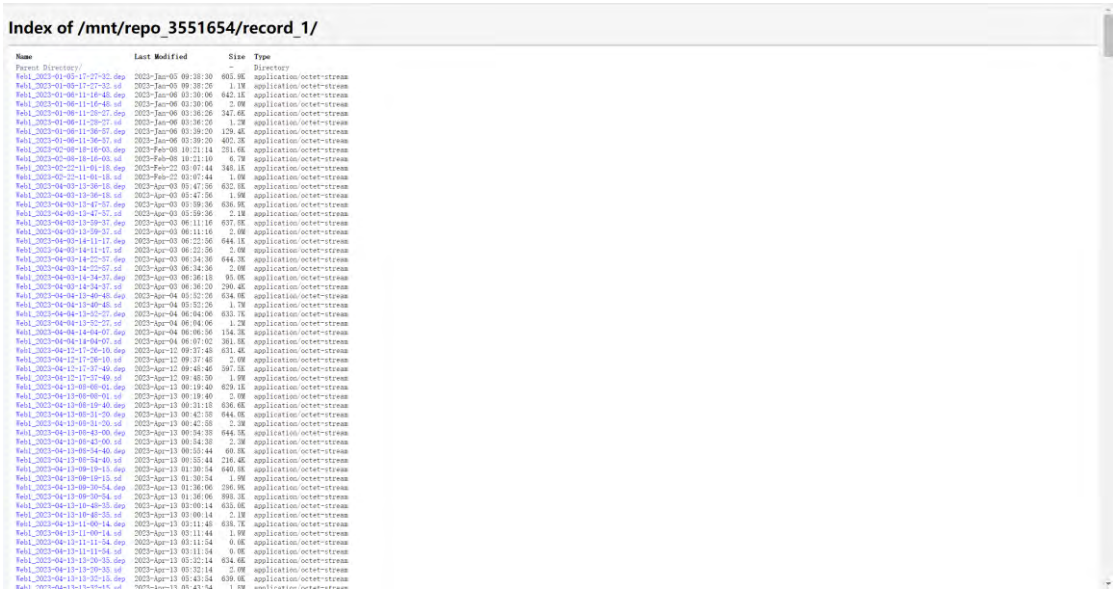
Index of /mnt/repo_3551654/ppk/20231227/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
041816_raw.txt	2023-Dec-27 07:48:16	164.3M	text/plain
075139_raw.txt	2023-Dec-27 09:25:10	73.0M	text/plain
Moving_041802.HCN	2023-Dec-27 07:48:10	105.6M	application/octet-stream
Moving_075132.HCN	2023-Dec-27 09:25:00	49.0M	application/octet-stream

lighttpd/1.4.35

Redord_* The folder, where record1 and record2 are commonly used,

Taking record1 as an example, the folder contains. dep and. sd files, the dep file records coordinates and water depth information, and the sd file records waveform information.

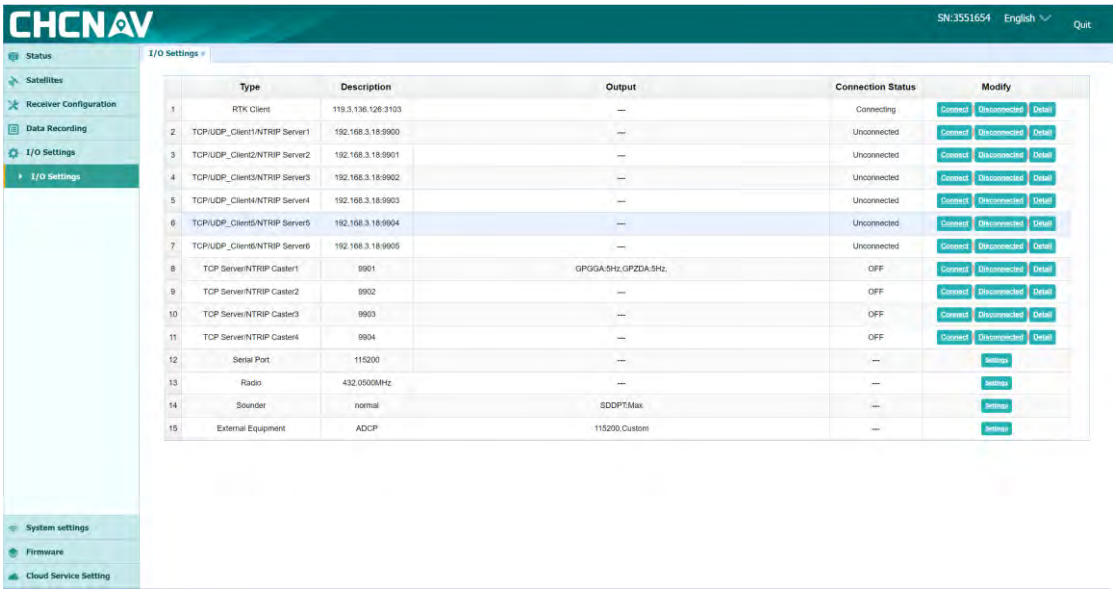


Index of /mnt/repo_3551654/record_1/

Name	Last Modified	Size	Type
Parent Directory/		-	Directory
Web1_2023-01-05-17-27-32.deg	2023-Jan-05 09:38:30	605.9K	application/octet-stream
Web1_2023-01-05-17-27-32.sd	2023-Jan-05 09:38:26	1.1M	application/octet-stream
Web1_2023-01-06-11-16-48.deg	2023-Jan-06 03:30:06	642.1K	application/octet-stream
Web1_2023-01-06-11-16-48.sd	2023-Jan-06 03:30:06	2.0M	application/octet-stream
Web1_2023-01-06-11-29-27.deg	2023-Jan-06 03:36:26	347.6K	application/octet-stream
Web1_2023-01-06-11-29-27.sd	2023-Jan-06 03:36:20	1.2M	application/octet-stream
Web1_2023-01-06-11-36-57.deg	2023-Jan-06 03:39:20	129.4K	application/octet-stream
Web1_2023-01-06-11-36-57.sd	2023-Jan-06 03:39:20	402.2K	application/octet-stream
Web1_2023-02-08-18-16-03.deg	2023-Feb-08 10:21:14	291.6K	application/octet-stream
Web1_2023-02-08-18-16-03.sd	2023-Feb-08 10:21:10	6.7M	application/octet-stream
Web1_2023-02-22-11-01-18.deg	2023-Feb-22 03:07:44	348.1K	application/octet-stream
Web1_2023-02-22-11-01-18.sd	2023-Feb-22 03:07:44	1.0M	application/octet-stream
Web1_2023-04-03-13-36-18.deg	2023-Apr-03 05:47:56	632.8K	application/octet-stream
Web1_2023-04-03-13-36-18.sd	2023-Apr-03 05:47:56	1.9M	application/octet-stream
Web1_2023-04-03-13-47-57.deg	2023-Apr-03 05:59:36	636.9K	application/octet-stream
Web1_2023-04-03-13-47-57.sd	2023-Apr-03 05:59:36	2.1M	application/octet-stream
Web1_2023-04-03-13-59-37.deg	2023-Apr-03 06:11:16	637.0K	application/octet-stream
Web1_2023-04-03-13-59-37.sd	2023-Apr-03 06:11:16	2.0M	application/octet-stream
Web1_2023-04-03-14-11-17.deg	2023-Apr-03 06:22:36	644.1K	application/octet-stream
Web1_2023-04-03-14-11-17.sd	2023-Apr-03 06:22:36	2.0M	application/octet-stream
Web1_2023-04-03-14-22-57.deg	2023-Apr-03 06:34:36	644.2K	application/octet-stream
Web1_2023-04-03-14-22-57.sd	2023-Apr-03 06:34:36	2.0M	application/octet-stream
Web1_2023-04-03-14-34-37.deg	2023-Apr-03 06:36:18	90.0K	application/octet-stream
Web1_2023-04-03-14-34-37.sd	2023-Apr-03 06:36:20	290.4K	application/octet-stream
Web1_2023-04-04-13-40-48.deg	2023-Apr-04 05:52:26	634.0K	application/octet-stream
Web1_2023-04-04-13-40-48.sd	2023-Apr-04 05:52:26	1.7M	application/octet-stream
Web1_2023-04-04-13-52-27.deg	2023-Apr-04 06:04:06	633.7K	application/octet-stream
Web1_2023-04-04-13-52-27.sd	2023-Apr-04 06:04:06	1.2M	application/octet-stream
Web1_2023-04-04-14-04-07.deg	2023-Apr-04 06:06:36	154.3K	application/octet-stream
Web1_2023-04-04-14-04-07.sd	2023-Apr-04 06:07:02	361.6K	application/octet-stream
Web1_2023-04-12-17-26-10.deg	2023-Apr-12 09:37:48	631.4K	application/octet-stream
Web1_2023-04-12-17-26-10.sd	2023-Apr-12 09:37:48	2.0M	application/octet-stream
Web1_2023-04-12-17-37-49.deg	2023-Apr-12 09:48:46	597.5K	application/octet-stream
Web1_2023-04-12-17-37-49.sd	2023-Apr-12 09:48:36	1.9M	application/octet-stream
Web1_2023-04-13-00-00-01.deg	2023-Apr-13 00:19:40	629.1K	application/octet-stream
Web1_2023-04-13-00-00-01.sd	2023-Apr-13 00:19:40	2.0M	application/octet-stream
Web1_2023-04-13-00-19-40.deg	2023-Apr-13 00:31:18	636.6K	application/octet-stream
Web1_2023-04-13-00-19-40.sd	2023-Apr-13 00:31:18	2.0M	application/octet-stream
Web1_2023-04-13-00-31-20.deg	2023-Apr-13 00:42:58	644.0K	application/octet-stream
Web1_2023-04-13-00-31-20.sd	2023-Apr-13 00:42:58	2.1M	application/octet-stream
Web1_2023-04-13-00-43-00.deg	2023-Apr-13 00:54:38	644.5K	application/octet-stream
Web1_2023-04-13-00-43-00.sd	2023-Apr-13 00:54:38	2.2M	application/octet-stream
Web1_2023-04-13-00-54-40.deg	2023-Apr-13 00:55:44	60.8K	application/octet-stream
Web1_2023-04-13-00-54-40.sd	2023-Apr-13 00:55:44	216.4K	application/octet-stream
Web1_2023-04-13-09-19-15.deg	2023-Apr-13 01:30:54	640.9K	application/octet-stream
Web1_2023-04-13-09-19-15.sd	2023-Apr-13 01:30:54	1.9M	application/octet-stream
Web1_2023-04-13-09-30-54.deg	2023-Apr-13 01:36:06	286.9K	application/octet-stream
Web1_2023-04-13-09-30-54.sd	2023-Apr-13 01:36:06	895.3K	application/octet-stream
Web1_2023-04-13-10-40-35.deg	2023-Apr-13 02:00:14	635.6K	application/octet-stream
Web1_2023-04-13-10-40-35.sd	2023-Apr-13 02:00:14	2.1M	application/octet-stream
Web1_2023-04-13-11-00-14.deg	2023-Apr-13 03:11:48	638.7K	application/octet-stream
Web1_2023-04-13-11-00-14.sd	2023-Apr-13 03:11:44	1.9M	application/octet-stream
Web1_2023-04-13-11-11-54.deg	2023-Apr-13 03:11:54	0.6K	application/octet-stream
Web1_2023-04-13-11-11-54.sd	2023-Apr-13 03:11:54	0.0K	application/octet-stream
Web1_2023-04-13-13-20-35.deg	2023-Apr-13 05:32:14	634.6K	application/octet-stream
Web1_2023-04-13-13-20-35.sd	2023-Apr-13 05:32:14	2.0M	application/octet-stream
Web1_2023-04-13-13-32-15.deg	2023-Apr-13 05:43:54	639.0K	application/octet-stream

6.5 I/O Settings

This interface is used for receiving and outputting data.

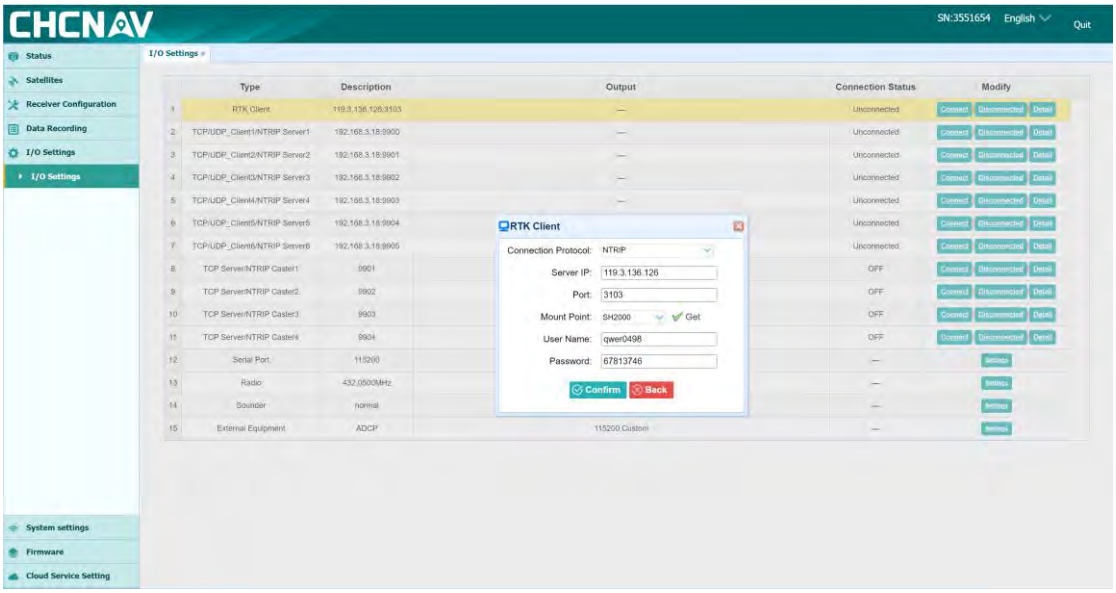


6.5.1 RTK Client (CORS Login)

This item column can be used for CORS login.

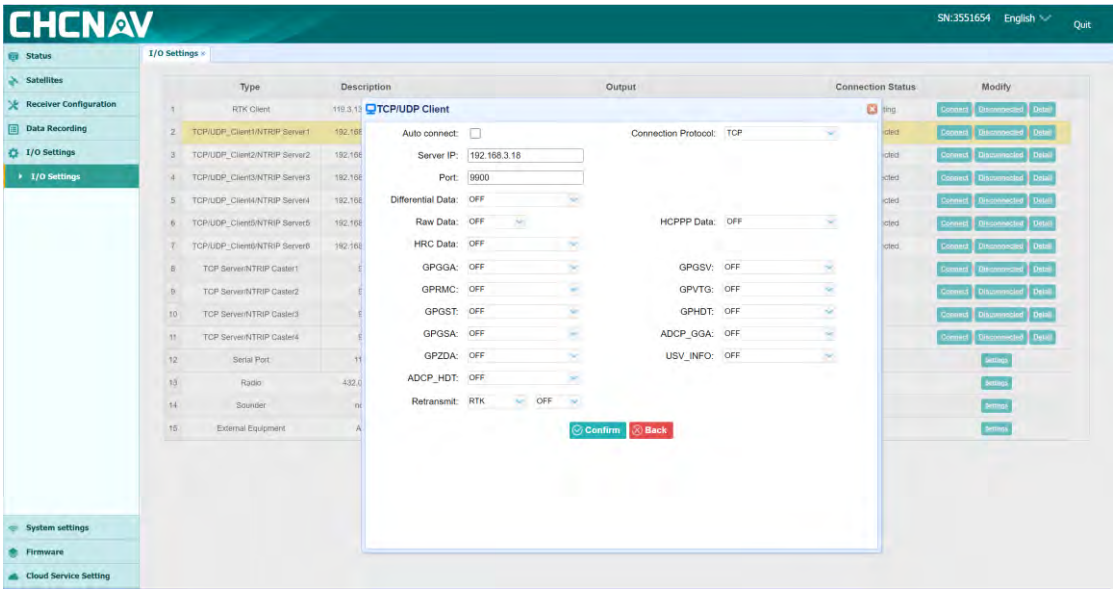
The connection protocol includes ntrip (CORS mode), APIs_ Rover (network 1+1), TCP and SWAs modes.

SWAs is a one button fixed account exclusively owned by chinatest, which can only be used by USVs bound with chinatest SWAs account.



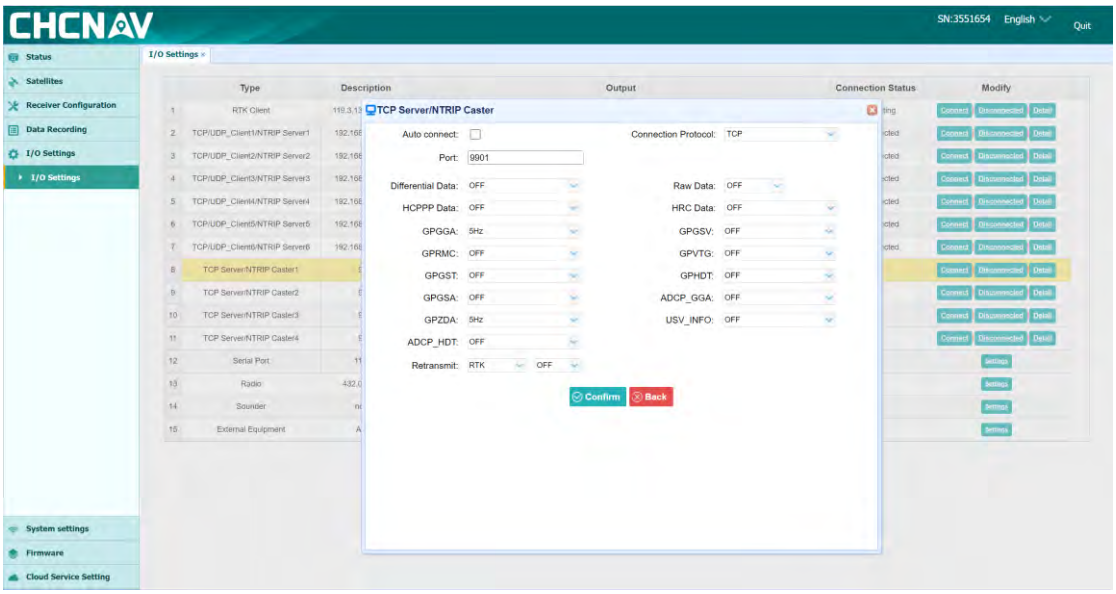
6.5.2 Tcp/Udp_Client/Ntrip Server

This interface is used to set the TCP client to forward NMEA data, differential data, positioning data, water depth data, etc. of the USV to the server.



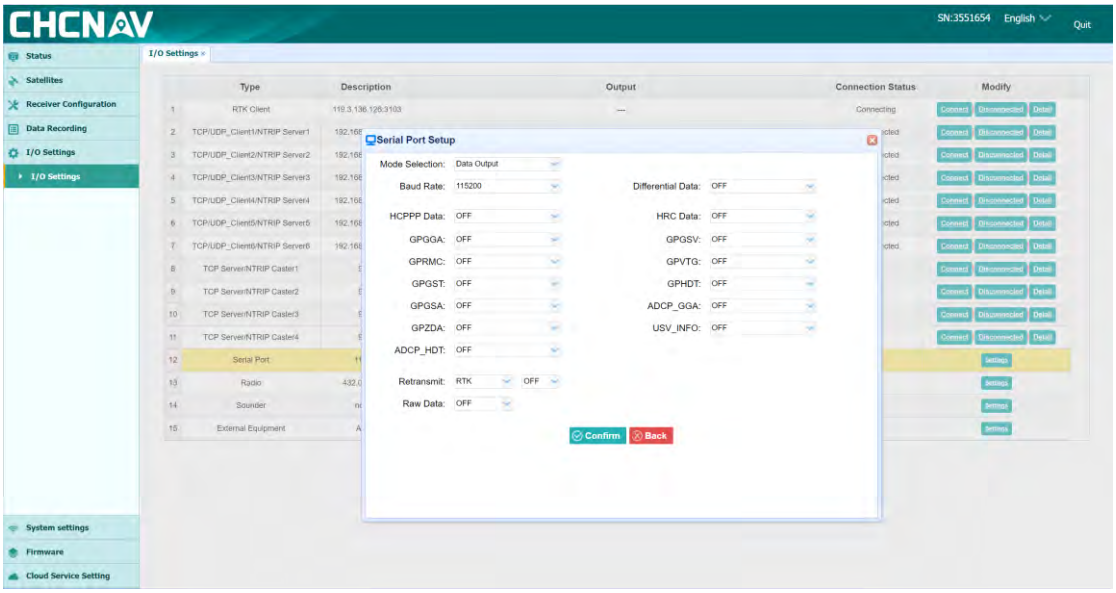
6.5.3 Tcp Server/Ntrip Caster

This interface is used to open a server to broadcast NMEA data, differential data, positioning data, water depth data, etc. of the USV for user client connection.



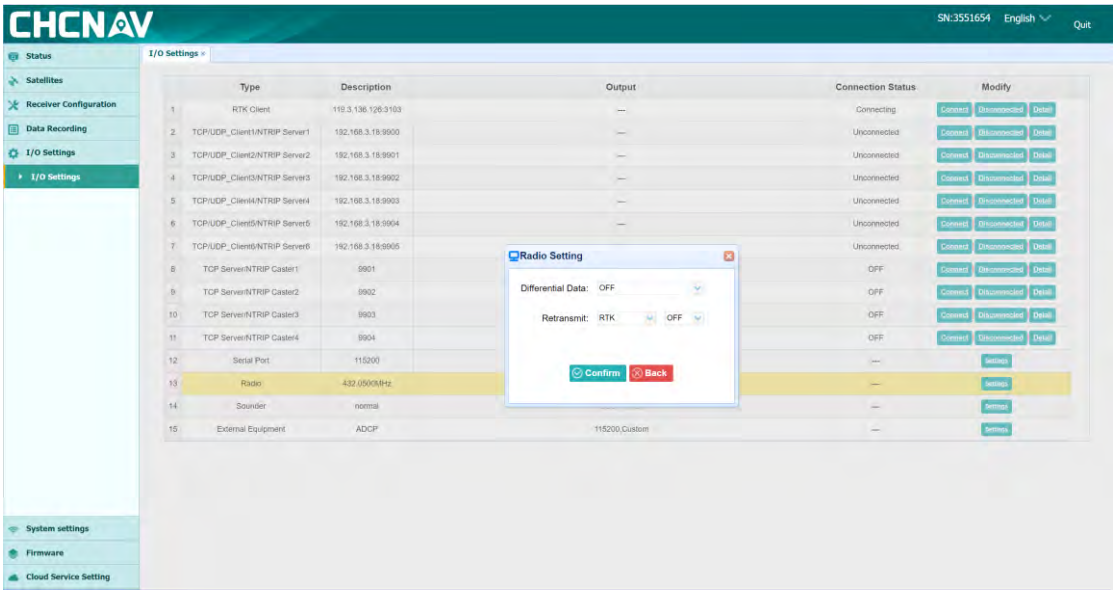
6.5.4 Serial Port

This interface is used to set gd100 debug serial port to forward NMEA data, differential data, positioning data, water depth data, etc.



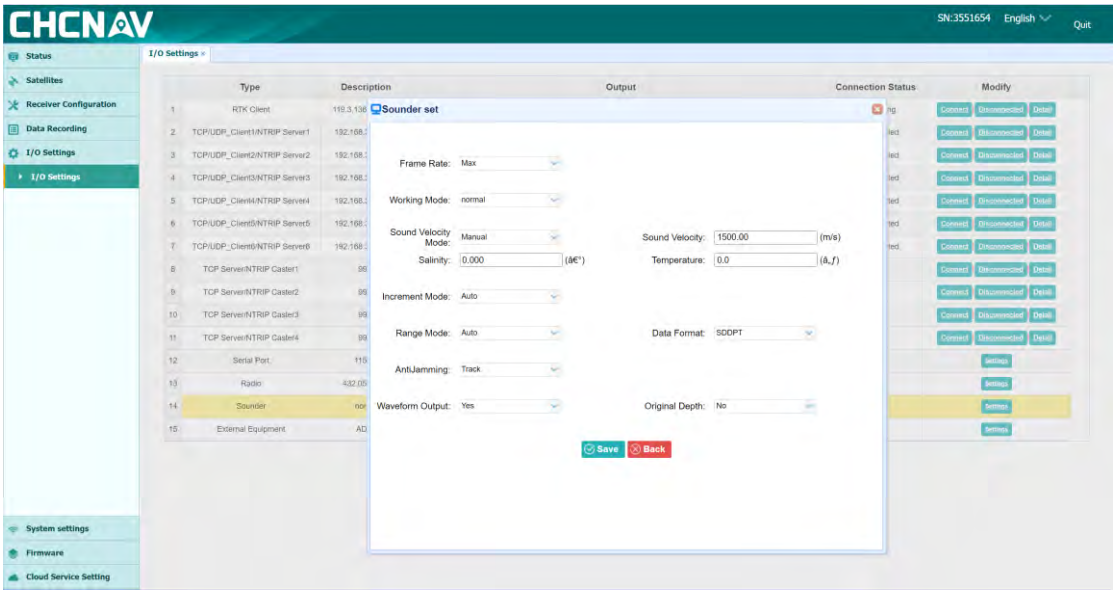
6.5.5 Radio Station

This interface is used to configure the receiving station differential data



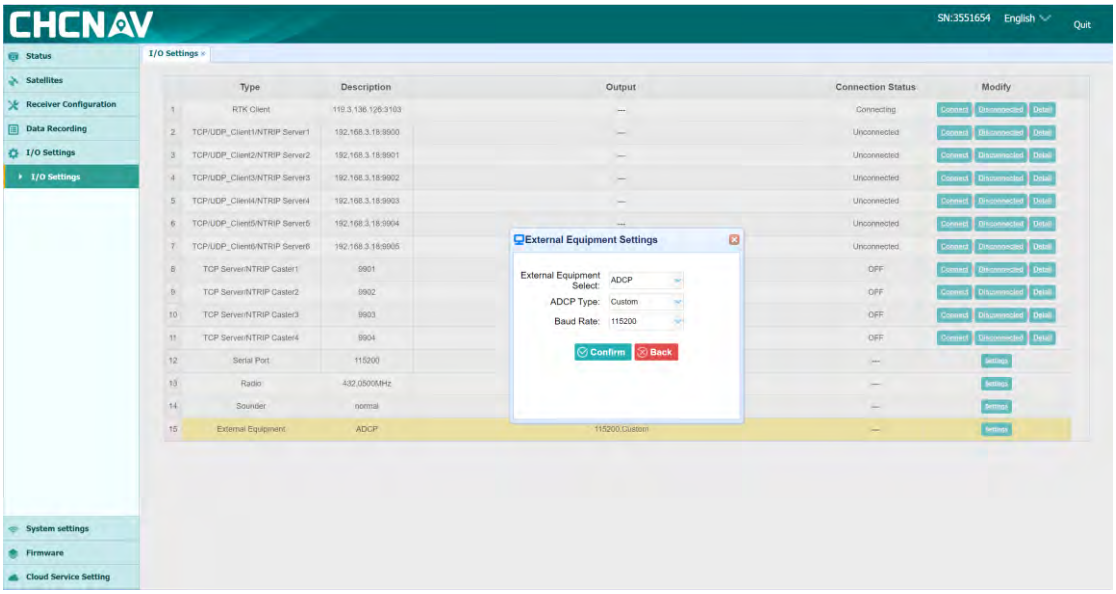
6.5.6 Sounder

This interface is used to set the parameters of the depth sounder.



6.5.7 External Devices

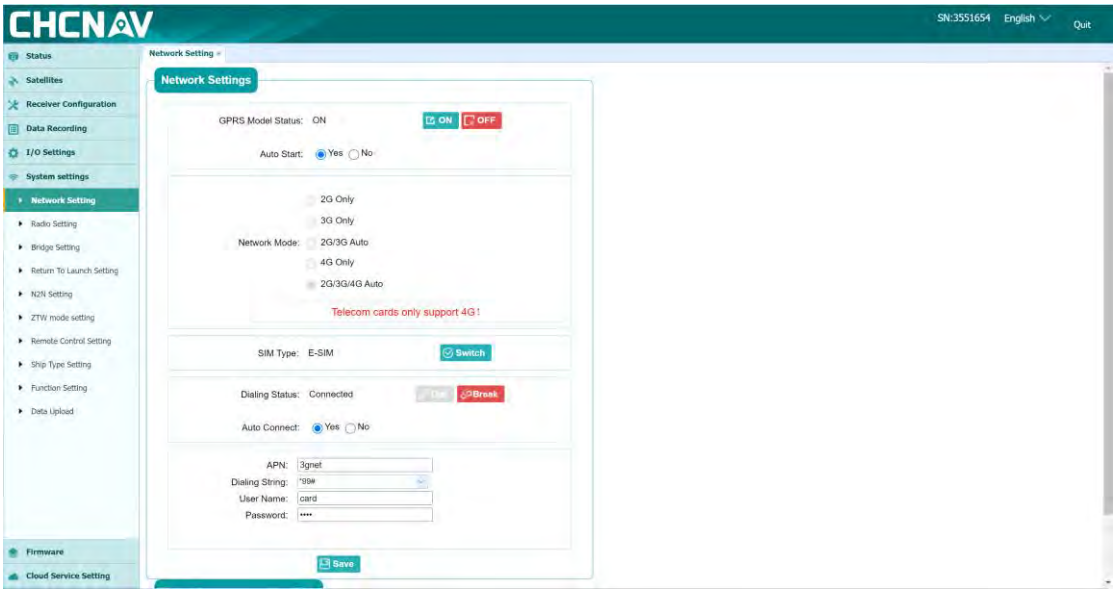
At present, external devices only support ADCP/water quality indicators. After connecting the external devices to the R232 serial port of the USV, the corresponding device type can be selected here.



6.6 System Settings

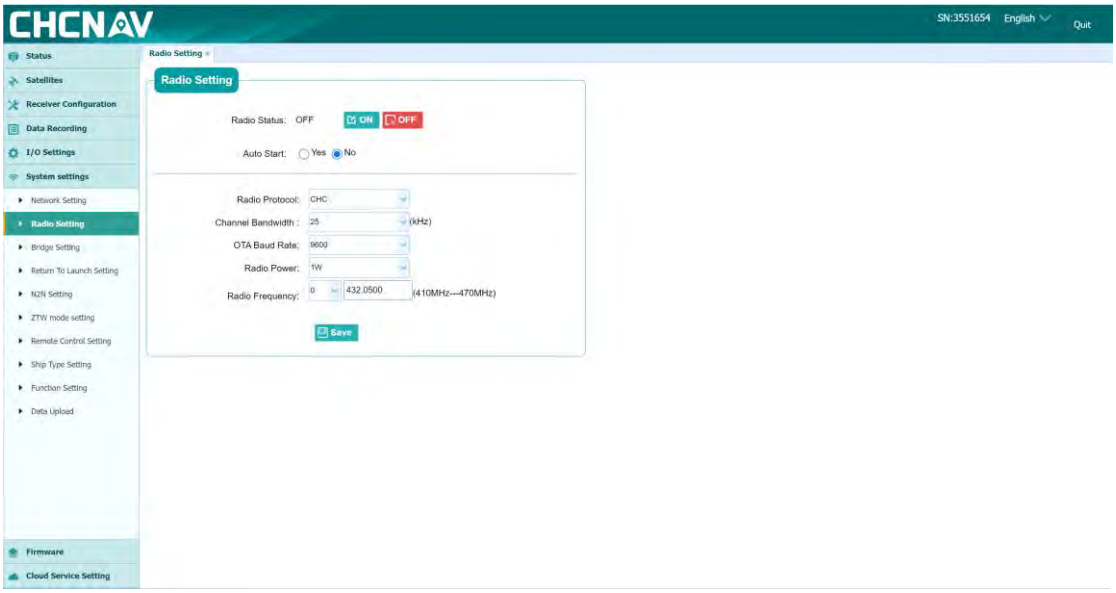
6.6.1 Network Settings

After inserting their SIM card into the GD100 card slot, the user needs to log in to the interface, switch the card type to SIM, and dial successfully. The USV defaults to using the E-SIM card. Other parameters remain unchanged by default.



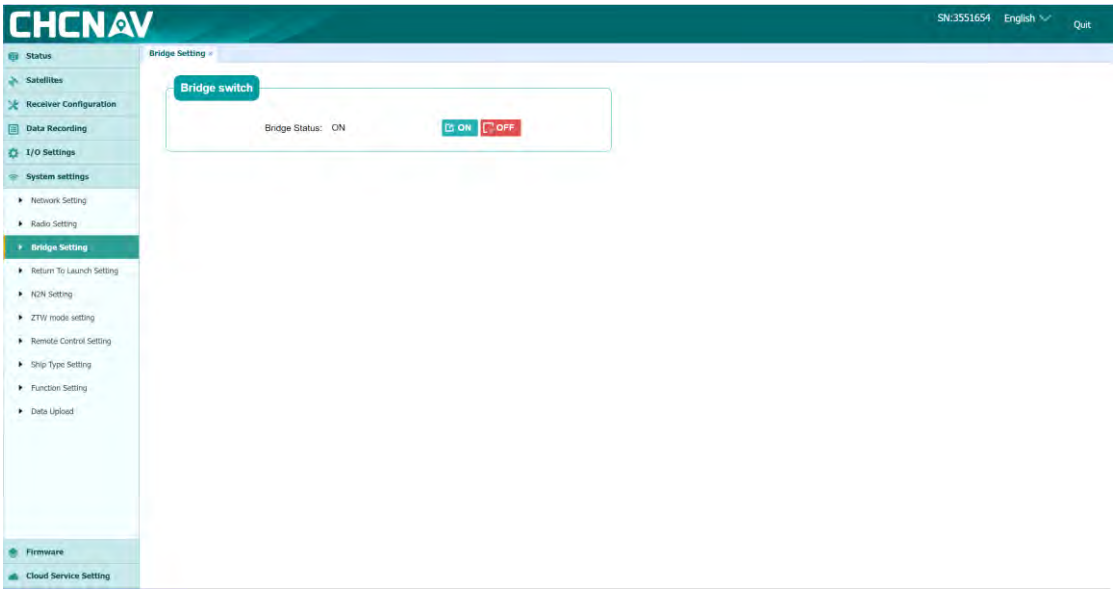
6.6.2 Radio Settings

When using radio mode, the USV needs to connect an external radio antenna, turn on the switch, set the corresponding radio protocol, baud rate, and radio channel, and wait for the differential signal light of the USV to remain green to start operation.



6.6.3 Network Bridge Settings

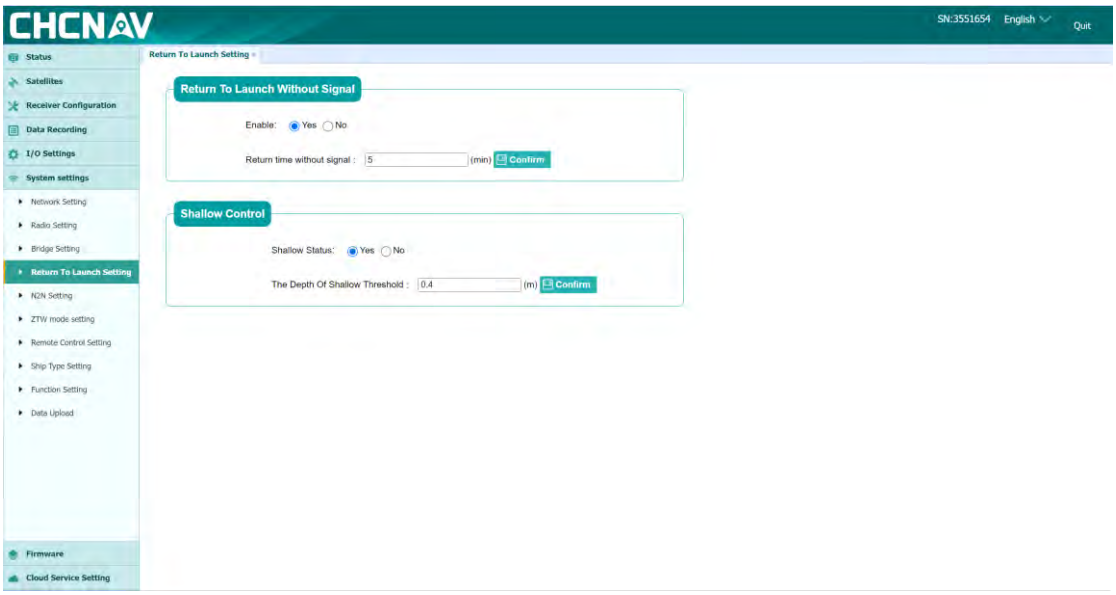
No modification is required by default. Before closing the bridge, ensure that the 4G network is normal, otherwise it cannot be closed.



6.6.4 Return To Launch Setting

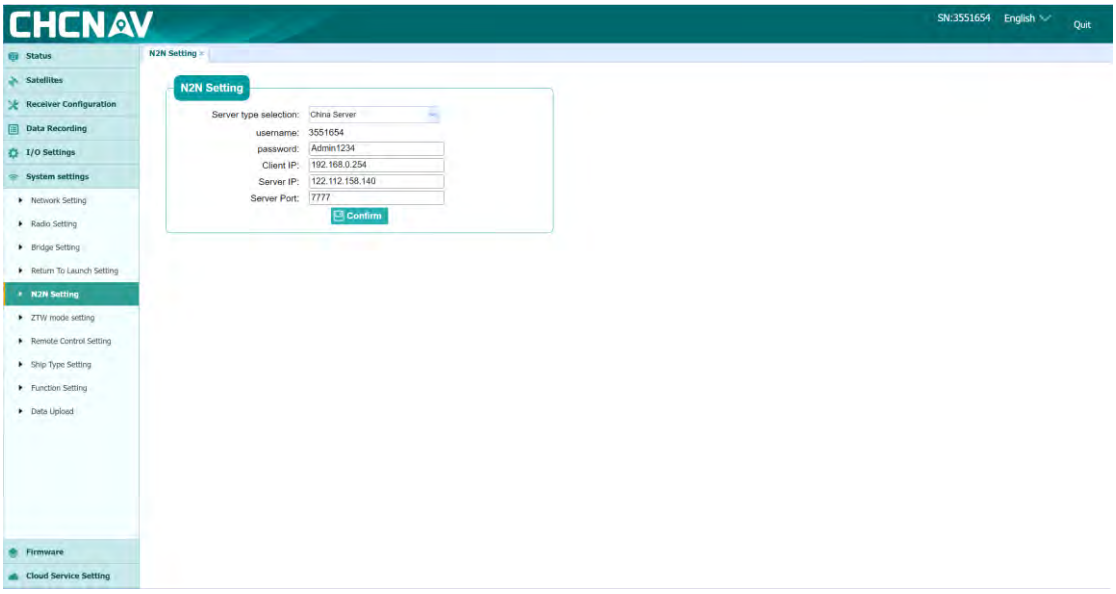
No signal return: When the remote control and hull control software (AutoPlanner or EasySail) of the USV are disconnected for a preset time, the USV will automatically return to the Home point.

Shallow control: Under normal working conditions of the depth sounder, when the measured water depth is lower than the preset shallow depth, it will reverse by 3 seconds, with a default shallow depth of 0.5m.



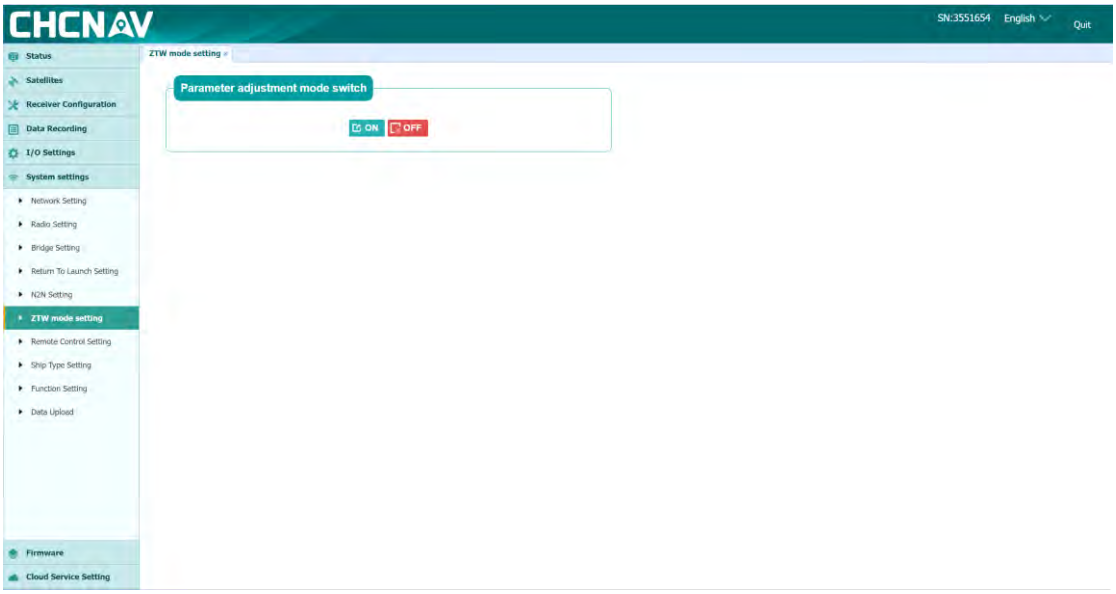
6.6.5 N2N Settings

No modification is required by default, as the server types are different both domestically and internationally.

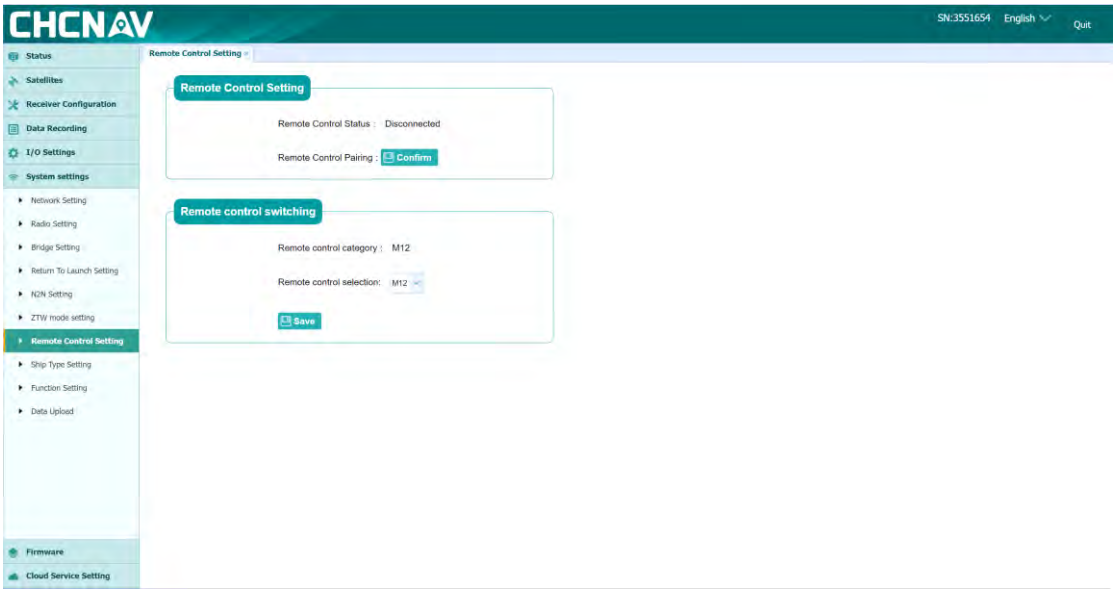


6.6.6 Ztw Mode Setting

By default, there is no need to modify the configuration of the power box for USVs. If you need to adjust the electrical adjustment parameters, turn on this switch first, modify the electrical adjustment parameters, and restart the USV.

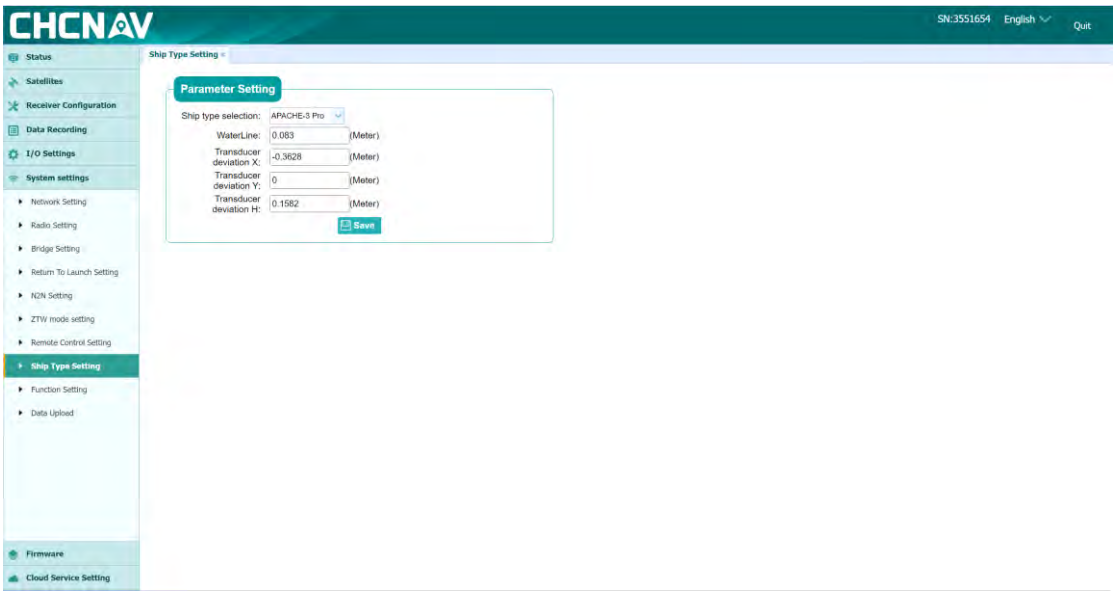


6.6.7 Remote Control Settings



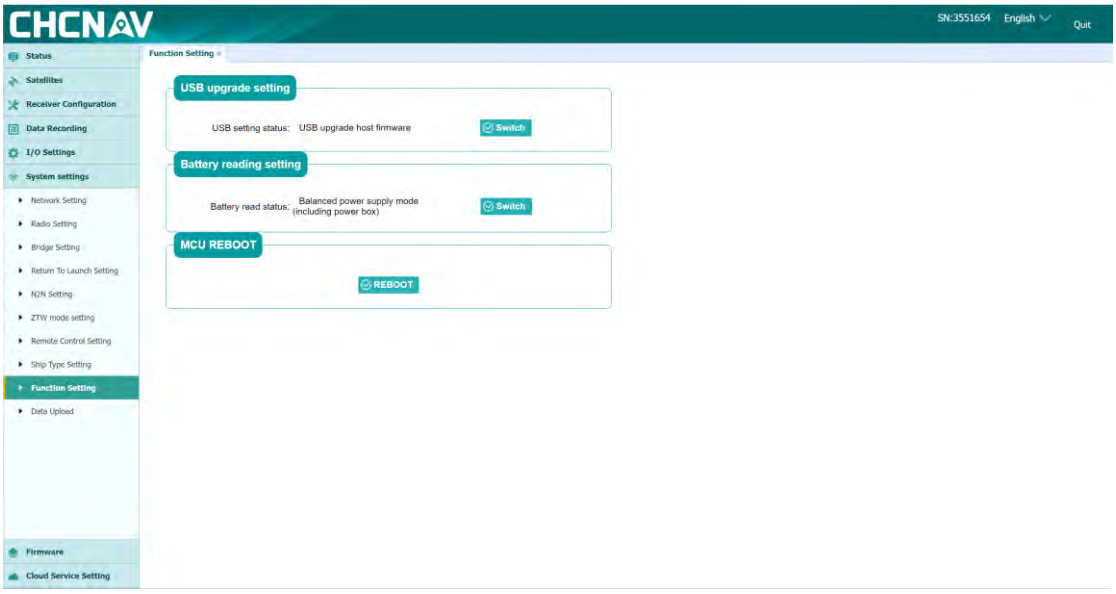
6.6.8 Ship Type Setting

After the USV starts up and self checks, it will automatically recognize the current USV model and apply relative deviation in open and unobstructed conditions. If the ship type recognition is incorrect, the ship type can be manually selected.



6.6.9 Function Settings

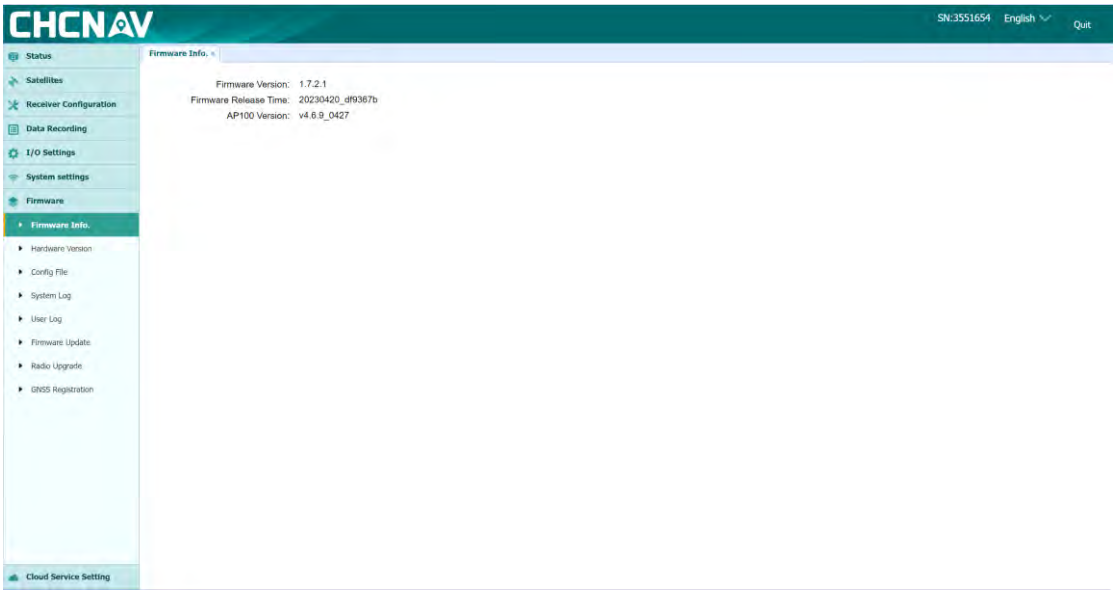
No modification is required by default, and can be used by R&D personnel for debugging.



6.7 Firmware

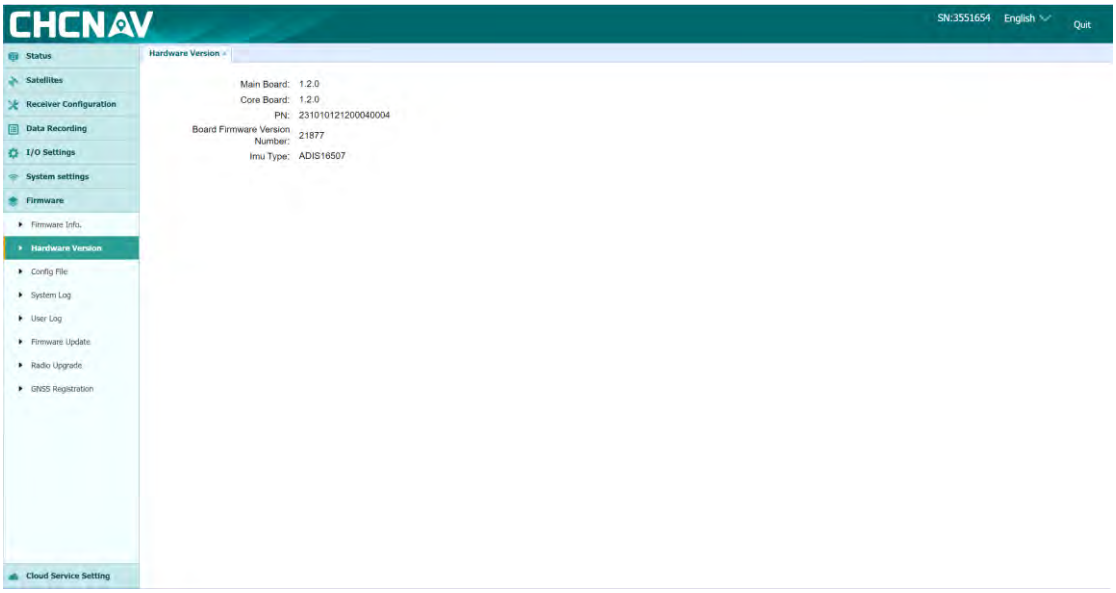
6.7.1 Firmware Information

This interface allows you to view firmware version information.



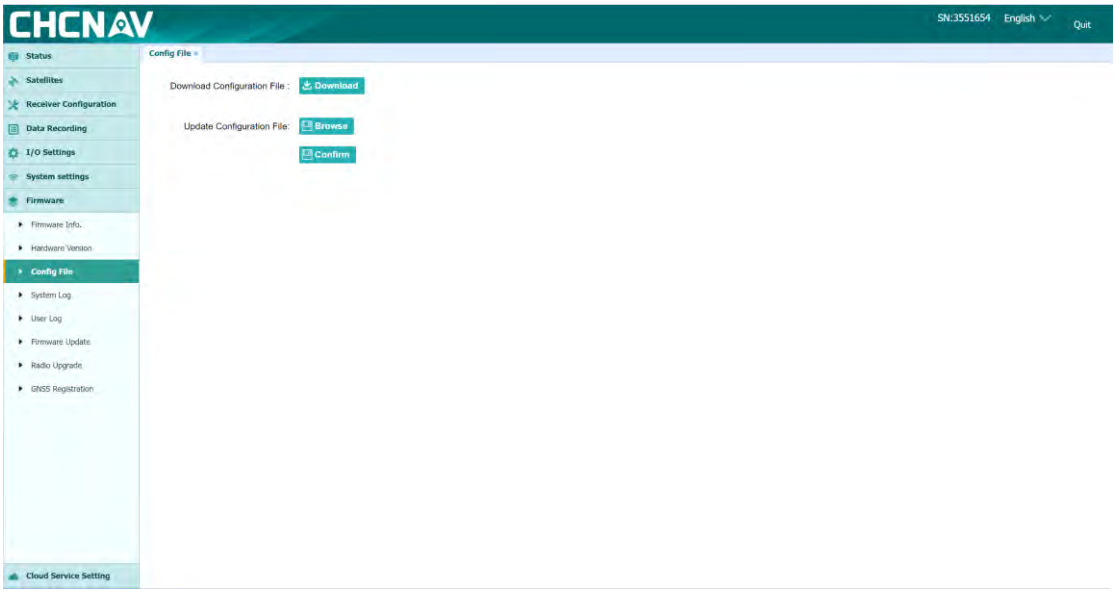
6.7.2 Hardware Version

This interface allows you to view hardware version information.



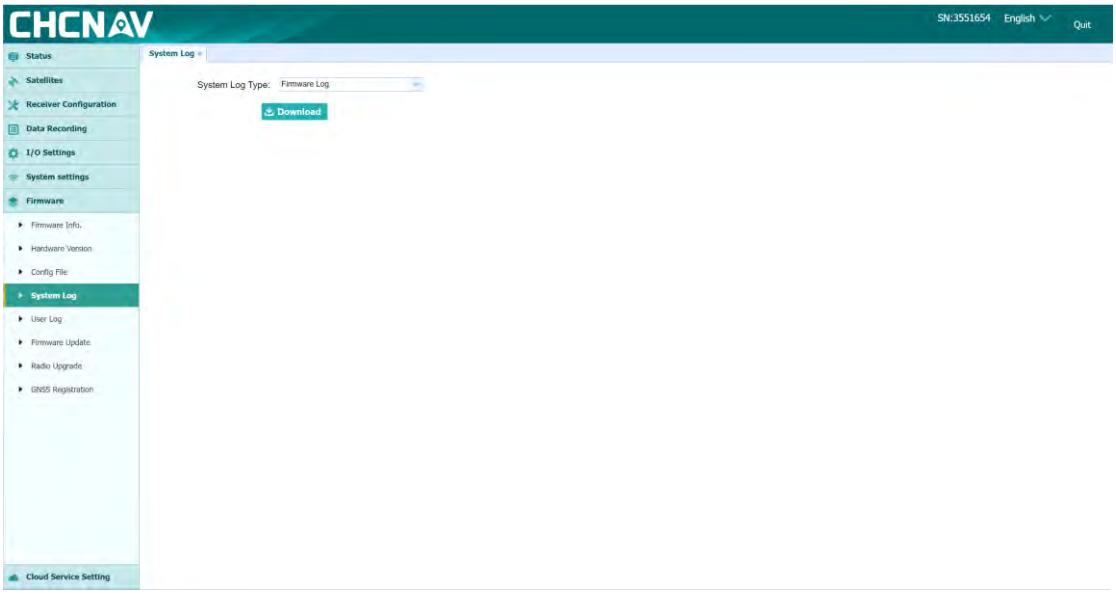
6.7.3 Config File

This interface is used for downloading and updating configuration files, and no modification is required by default.



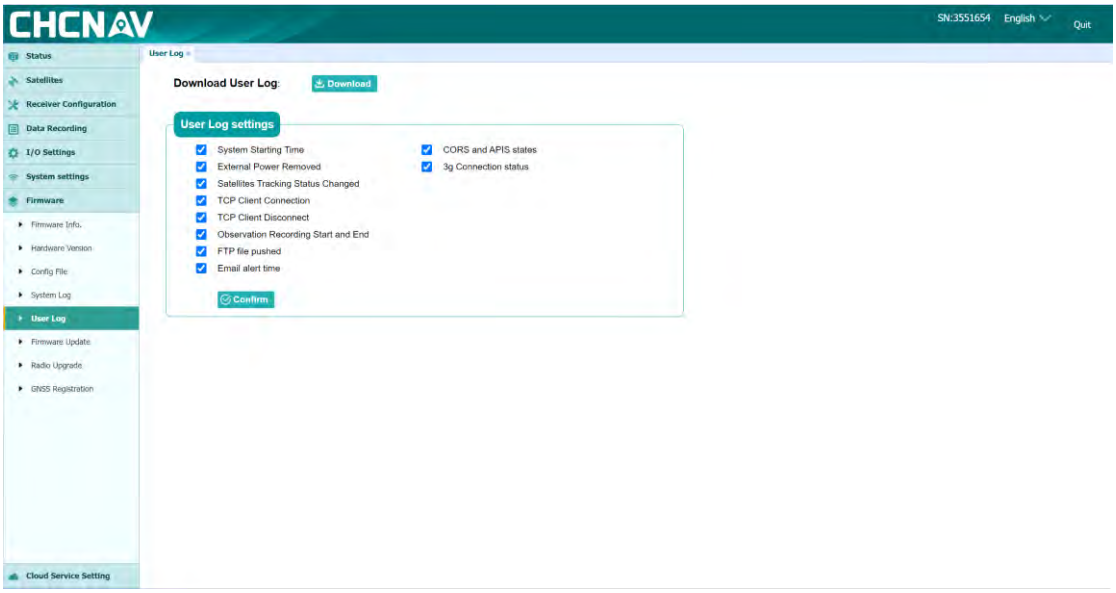
6.7.4 System Log

This interface is used to download system logs for analysis by R&D personnel.



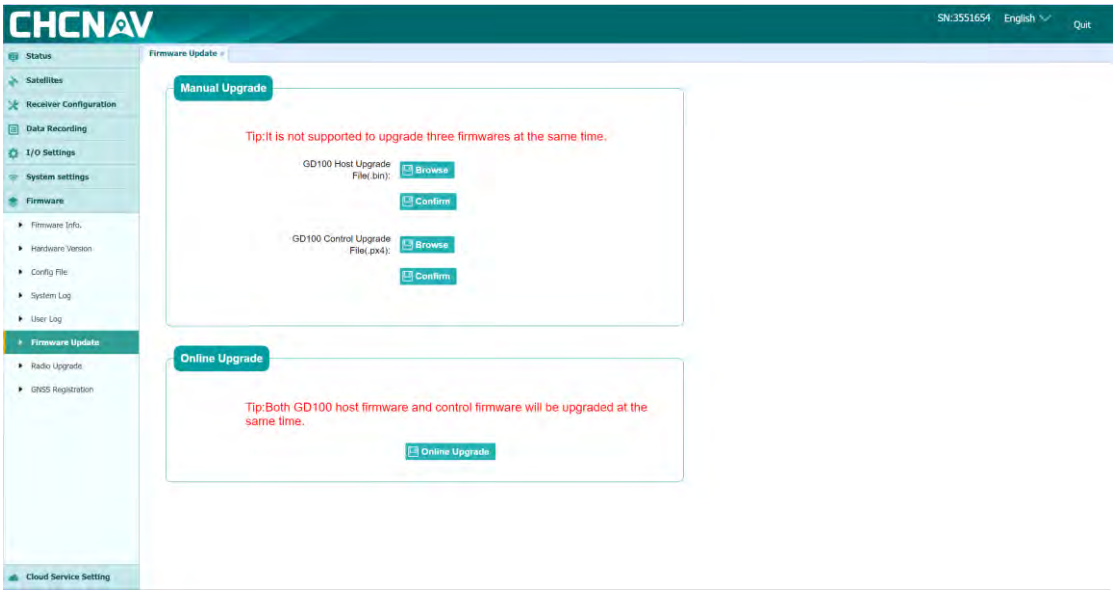
6.7.5 User Log

This interface is used to download user logs for analysis by R&D personnel.



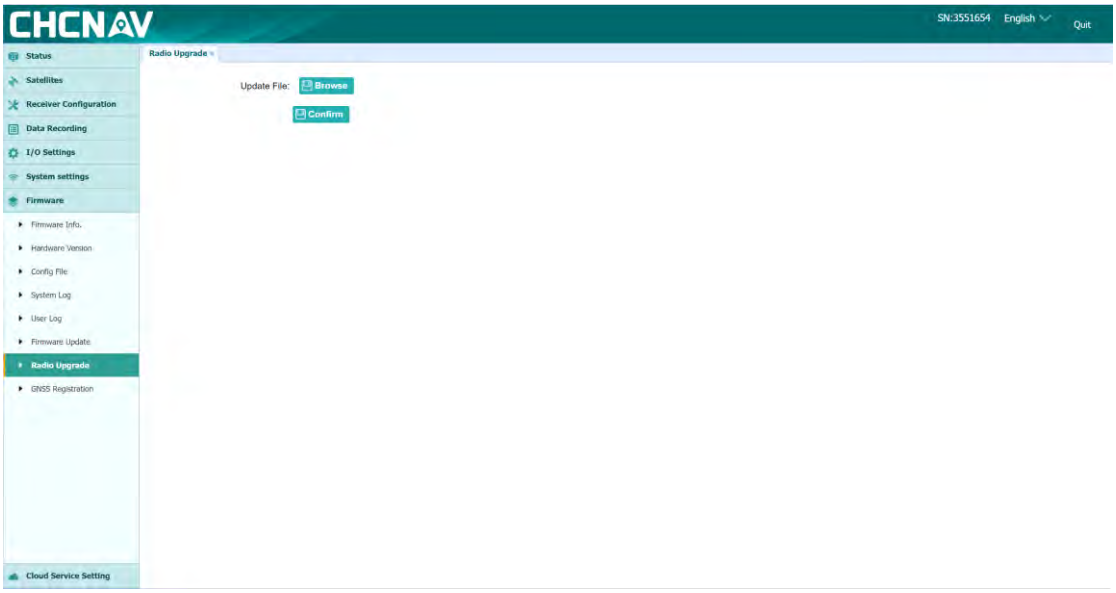
6.7.6 Firmware Upgrade

This interface is used for firmware upgrade. Please refer to the appendix for details of firmware upgrade operations.



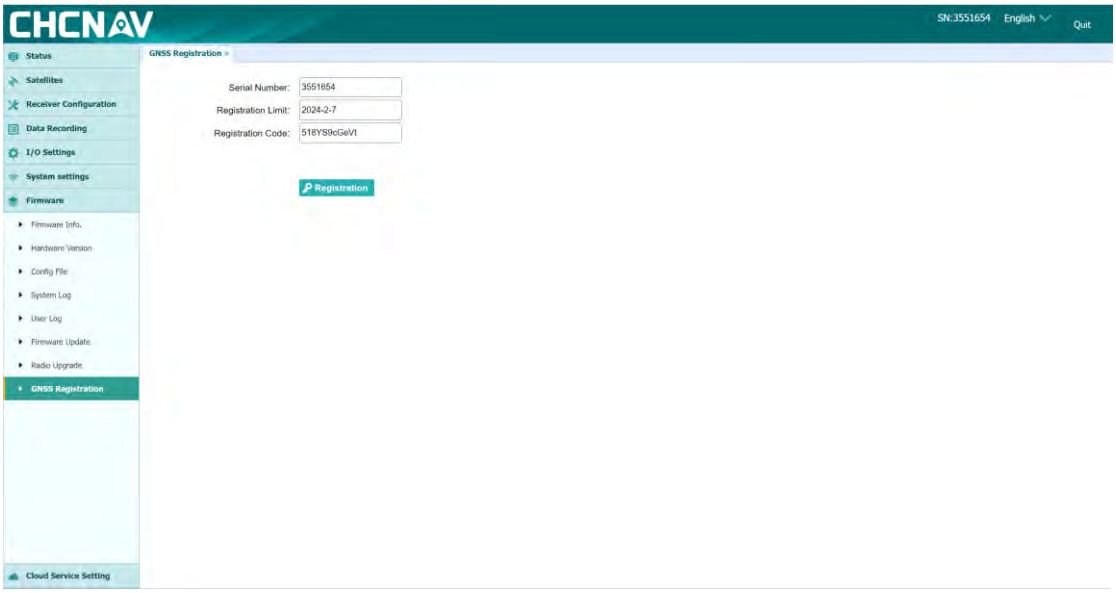
6.7.7 Radio Upgrade

This interface is used for radio station upgrades and does not require modification by default.



6.7.8 Receiver Registration

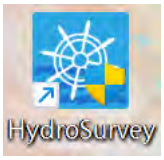
This interface is used for receiver registration. If the receiver expires and the device cannot be used normally, please contact Huace after-sales service to obtain the registration code.



7. HydroSurvey Software

Provide a detailed introduction to the features of HydroSurvey software

his software is used for Huawei series USVs and depth sounders, for single beam data recording and post-processing, and also has positioning and navigation functions.

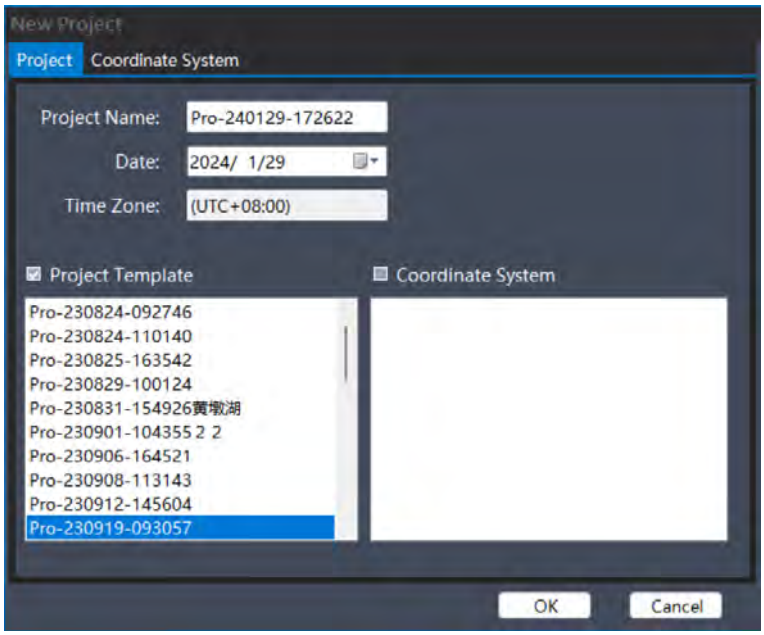


7.1 Quick-access

7.1.1 New project

Click "project - new project" in the navigation bar, or click the "new project" icon in the shortcut bar to create a new project.

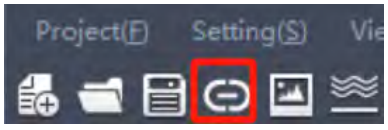
Enter the project information and set the coordinate system parameters. Click OK after checking to complete the new project.



7.1.2 Device connection

7.1.2.1 APACHE Series USV

After successfully connecting the USV using the autoplaner software, click the "one click connection" icon of the Hydrosurvey software.

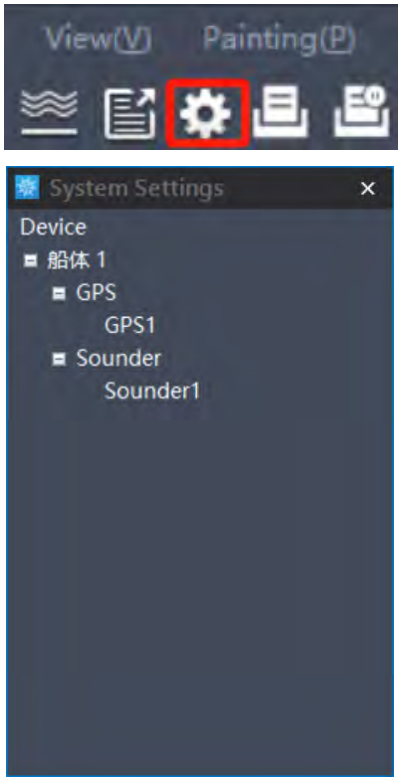


After the connection is successful, the real-time status of positioning data and water depth data is displayed.

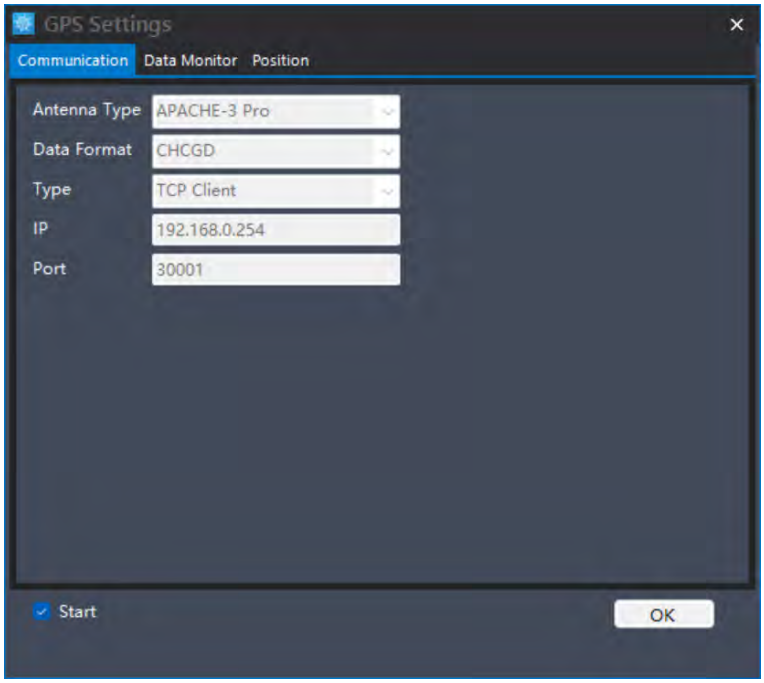
7.1.2.2 Depth Sounder And Construction Vessel

When a single beam bathymeter or construction ship uses the Hydrosurvey software, it is necessary to manually set parameters for communication connection.

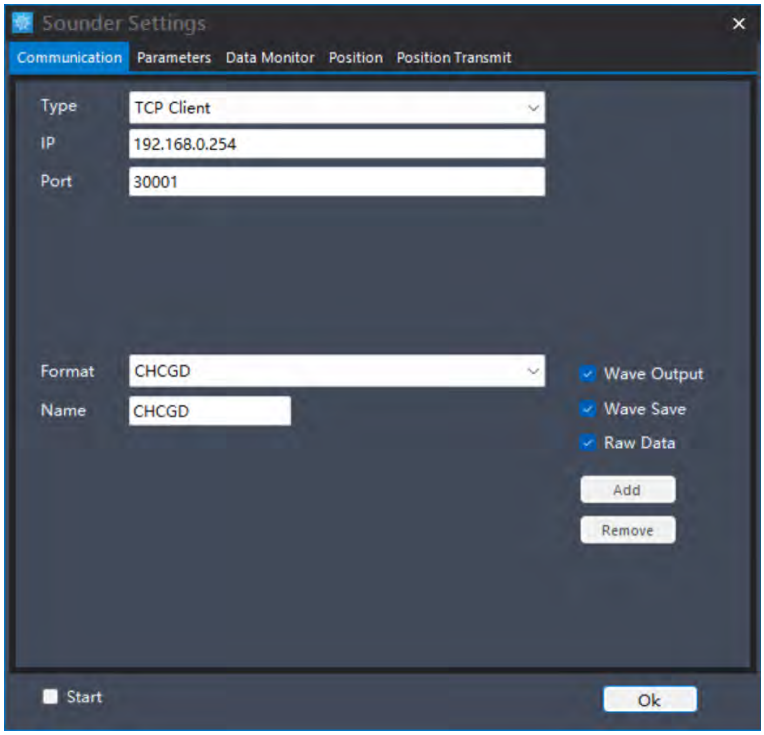
Click "Settings - system settings" (or click the "system settings" icon in the shortcut bar) to enter the system settings interface.



Double click "GPS 1" to enter the parameter setting interface of GPS device. Select the corresponding connection mode in "communication settings", enter "antenna coordinates", check "connection" in the lower left corner after setting, and click "OK" to complete GPS setting.



Double click "sounder 1" to enter the parameter setting interface of the bathymeter, select the connection mode in "communication setting" and change the draft in "parameter setting", check "connection" in the lower left corner after setting, and click "OK" in the lower right corner to complete the bathymeter setting.



7.1.3 Record control

Set data collection parameters. Click "setting - record control" to enter the record control setting interface.

(1) Recording mode

① Record by distance: record data once every few meters;

② Record by time: record data once in a few seconds;

③ Record by space: manually record data by pressing space once.

(2) Solution state limit

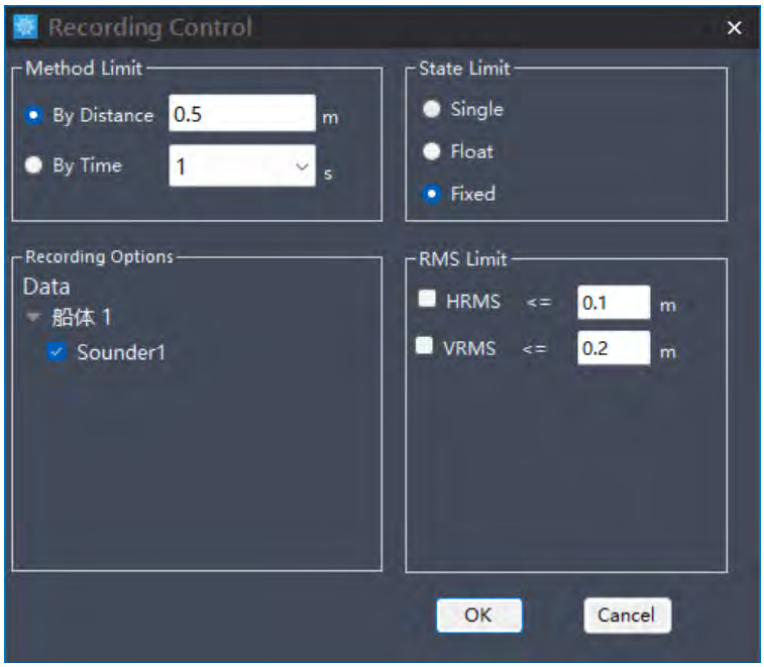
① Single point solution: record "single point solution" and higher accuracy;

② Differential resolution: record "differential resolution" and higher accuracy;

③ Fixed solution: only "fixed solution" is recorded.

(3) Record options

Select the device to record data.



7.1.4 Measure

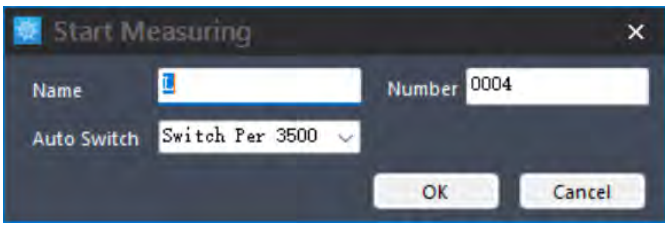
Start measurement

Click "measurement - start" (or click the "start" button in the shortcut bar ) to set the parameters. After setting the parameters, click "OK" to start recording the measurement data.

Line name: prefix of DEP line name;

Line number: dep line number, with a step of 1, automatically added;

Automatic line change: each time a certain number of point data is recorded, a new dep line will be automatically regenerated. Line change modes include: no automatic line change, 1000 point automatic line change, 2000 point automatic line change, 3000 point automatic line change, 3500 point automatic line change (default), 4000 point automatic line change, 5000 point automatic line change, 6000 point automatic line change;



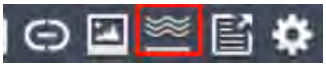
7.1.5 Pause measurement

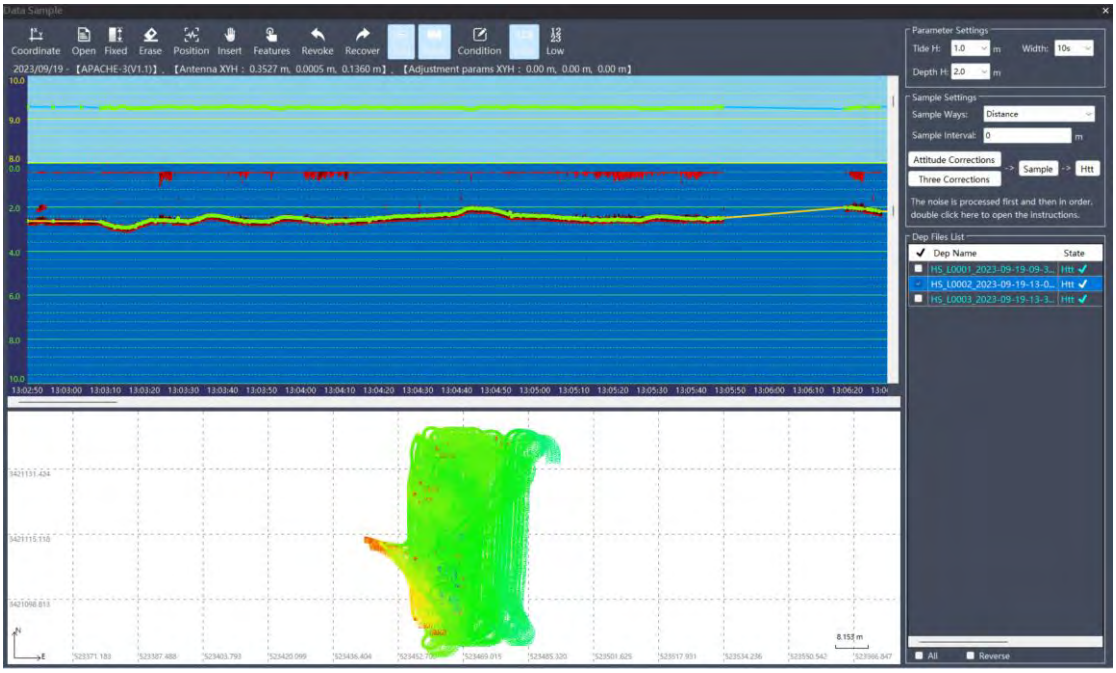
Click "measurement - pause" (or click the "pause" button in the shortcut bar ) to pause the measurement.

End measurement

Click "measurement - end" (or click the "end" button in the shortcut bar ) to end the measurement.

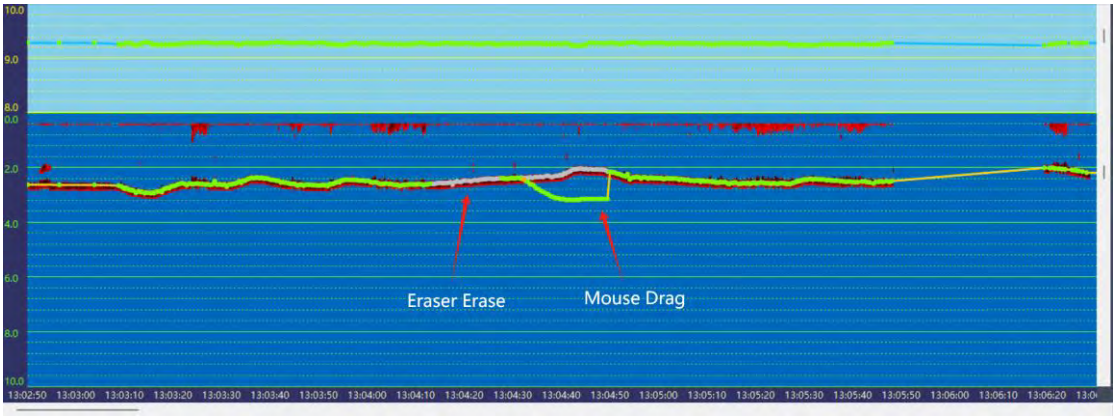
5. Data processing

Click "data processing - water depth sampling" (or click the "water depth sampling" button in the shortcut bar ) Check/correct each survey line of field survey. Double click to open the line dep file, and then display the base map, water depth, waveform and other views.



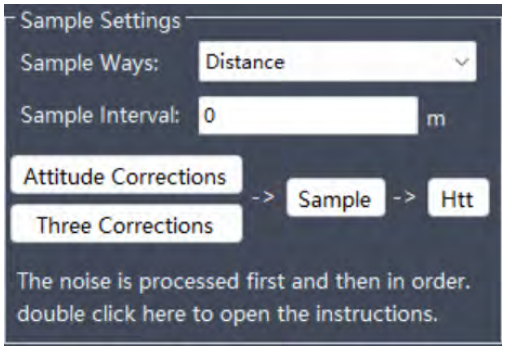
The main process of data processing (the steps in brackets are selected according to requirements): noise processing → (data interpolation) → data correction → equidistant sampling → (manual sampling) → htt generation.

Each survey line of field survey shall be inspected, de noised and thinned. According to the principle of terrain consistency, use an eraser to delete false water depth points that do not conform to the waveform, or drag the water depth points with the mouse until they are consistent with the waveform, as well as fixed interpolation operation and manual interpolation operation.



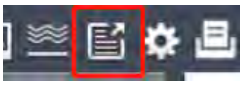
For attitude correction or three corrections, select one of the operations, and do not repeat the operation, so as to prevent the previously processed data from being overwritten. (for the three corrections, click "skip" directly for the content that does not need to be corrected.)

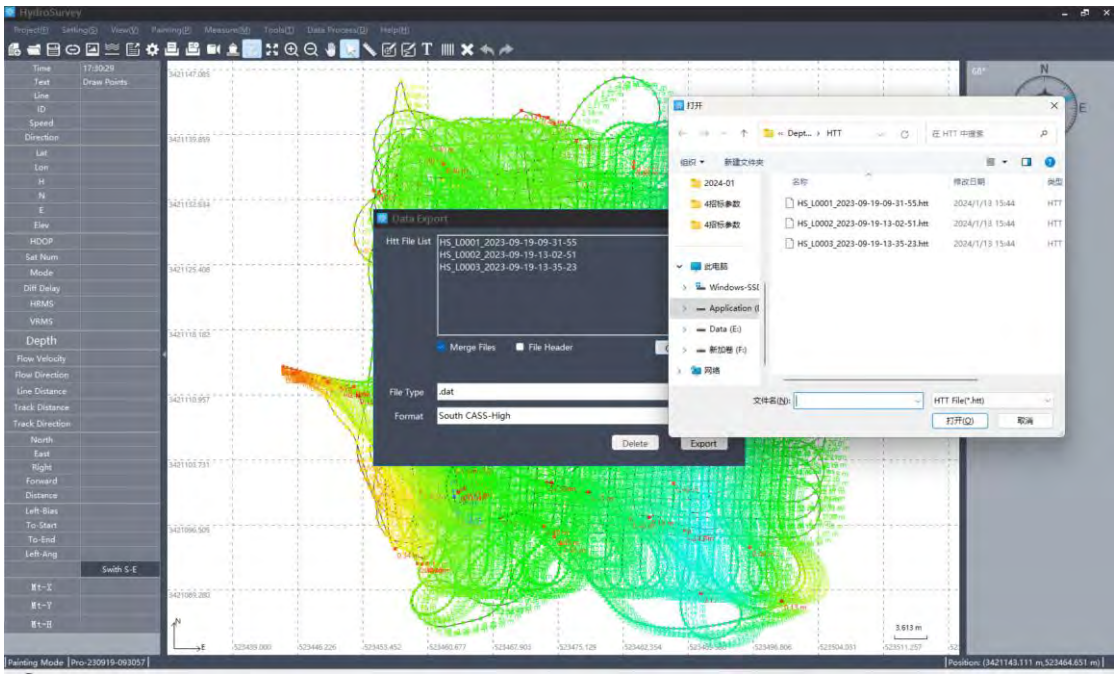
Select the sampling method and sampling interval as required, and click "equidistant sampling". If some areas are not sampled, you can click "manual sampling" to manually sample some feature points. If this function is not required, skip the manual sampling step.



Click the "generate htt" button to save to the *.htt file.

7.1.6 Data export

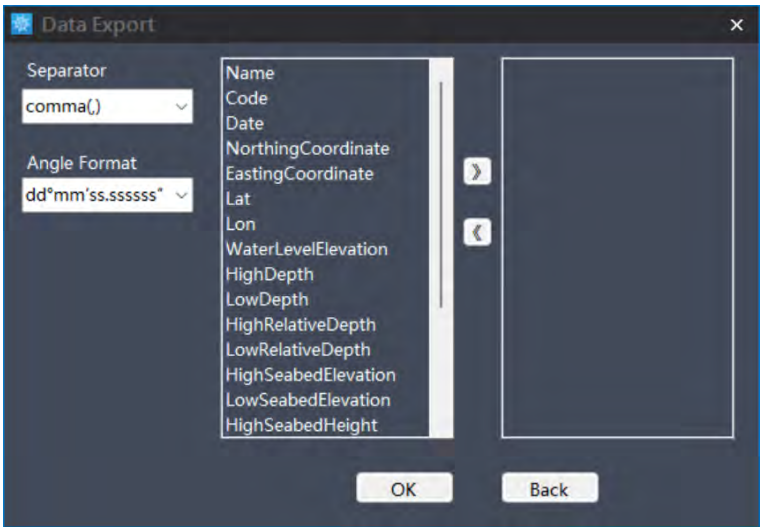
Click "data processing - Data Export" (or click "data export" in the shortcut bar  button) open the saved htt file, select the exported file type, select the format, and select the format from the drop-down list. Click "export" to export the selected format data.



The data format supports customization. At the same time, the separator and angle format can be selected for customization;

Check "file merge" to merge and export multiple htt data into one file;

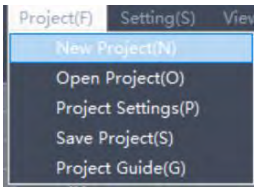
If export header is checked, the result file of data export supports header export;

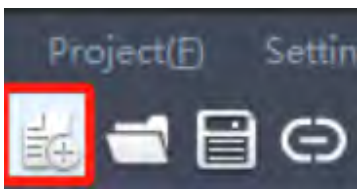


7.2 Project

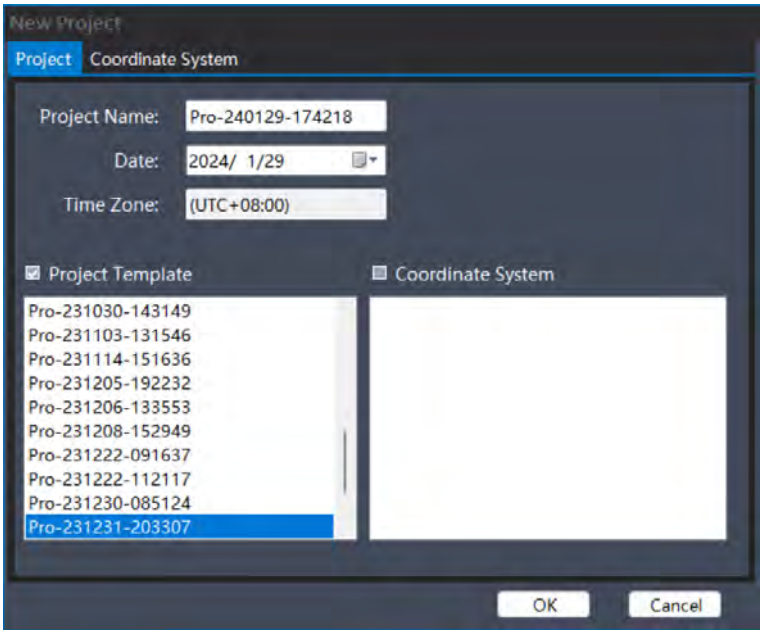
7.2.1 New project

Click "project - new project" in the navigation bar, or click the "new project" icon in the shortcut bar to create a new project.





Enter the project information and set the coordinate system parameters. Click OK after checking to complete the new project operation.



7.2.1.1 Project

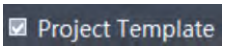
Project Name: the default is pro computer system date computer system time, which can be customized as required.

Date: the default computer system date. You can click the drop-down menu to select.

Time zone: the software automatically identifies the time zone of the current computer system.

Apply project: all settings in a project can be applied. Including coordinate system settings/gps settings/sounder settings/record control settings/coordinate library information. Check "apply project" and select the project to be applied in the project list (blue check mark) to open the "coordinate system " in the upper left 

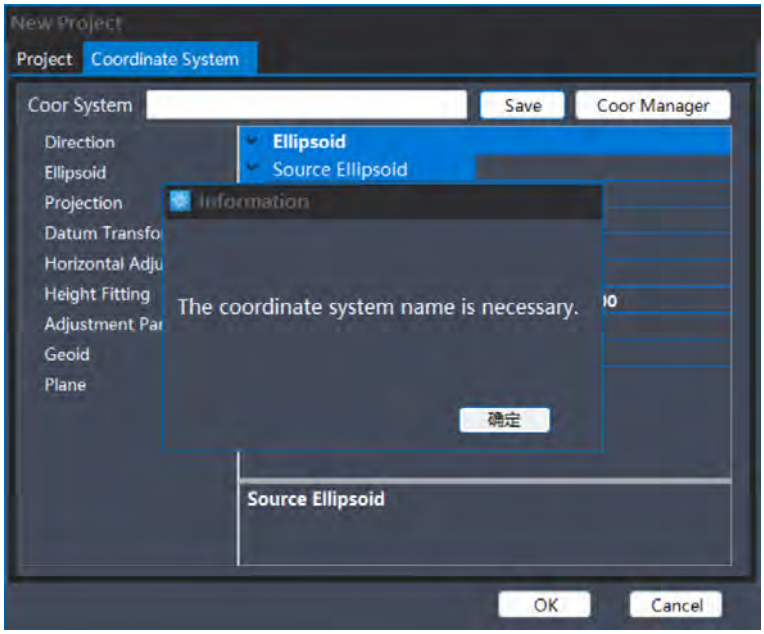
, check the applied coordinate system parameter information, and click OK.

Apply coordinate system template: you can apply the selected coordinate system parameters. Check "Project Template" 

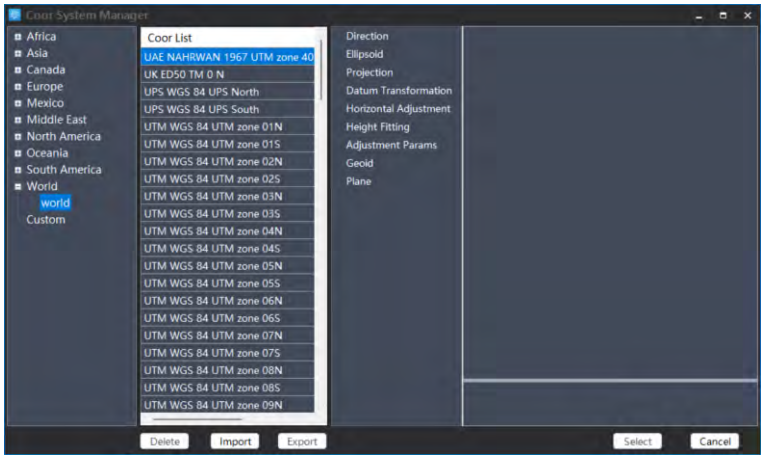
, select the template name applied in the template list, view the coordinate system parameter information in coordinate system settings, and click OK.

7.2.1.2 Coordinate System Settings

Save coordinate system: fill in the name of the coordinate system and click "save coordinate system" to save the current coordinate system parameters to the coordinate system template directory (\template), with the file suffix *.crd.



Coordinate system manager: you can select a more standardized coordinate system template in the coordinate manager, or you can customize coordinate system parameters, select and export them.



Import: externally import *.crd coordinate system parameter files, which are displayed in the user defined node list.

Export: export the selected coordinate system parameter information, the same as the "save coordinate system" function, and the export file format is *.crd.

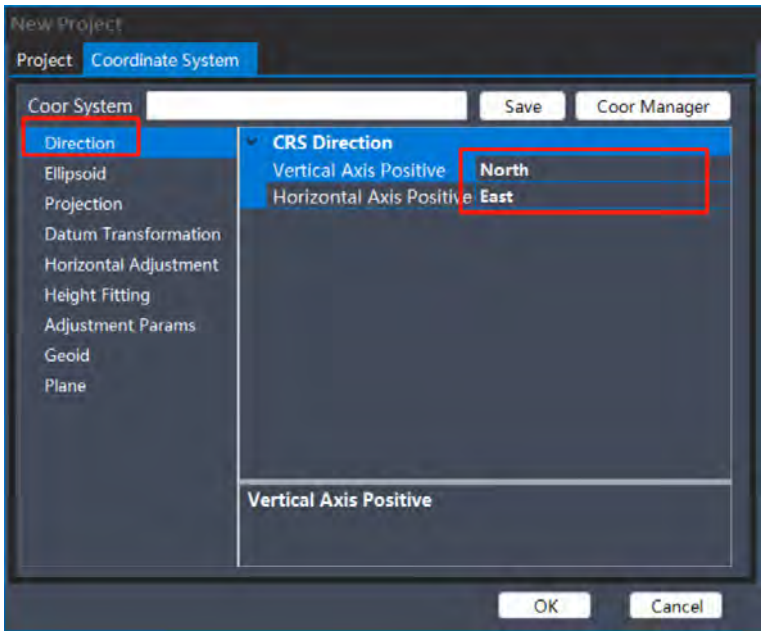
Delete: deletes the coordinate system of the custom node list.

Select: after selecting a coordinate system, click the "select" button to determine a coordinate system template for the new project.

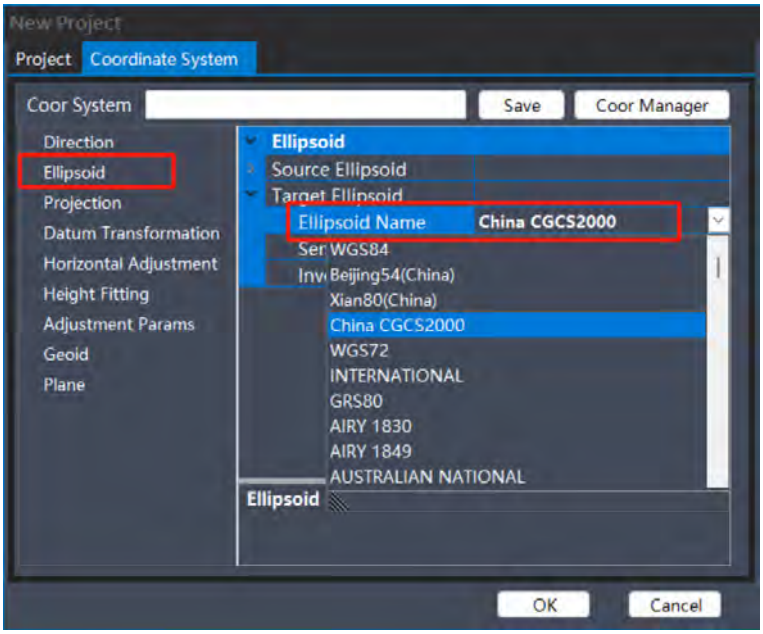
Cancel: cancel the operation and close the current interface.

7.2.1.3 Coordinate System Parameters

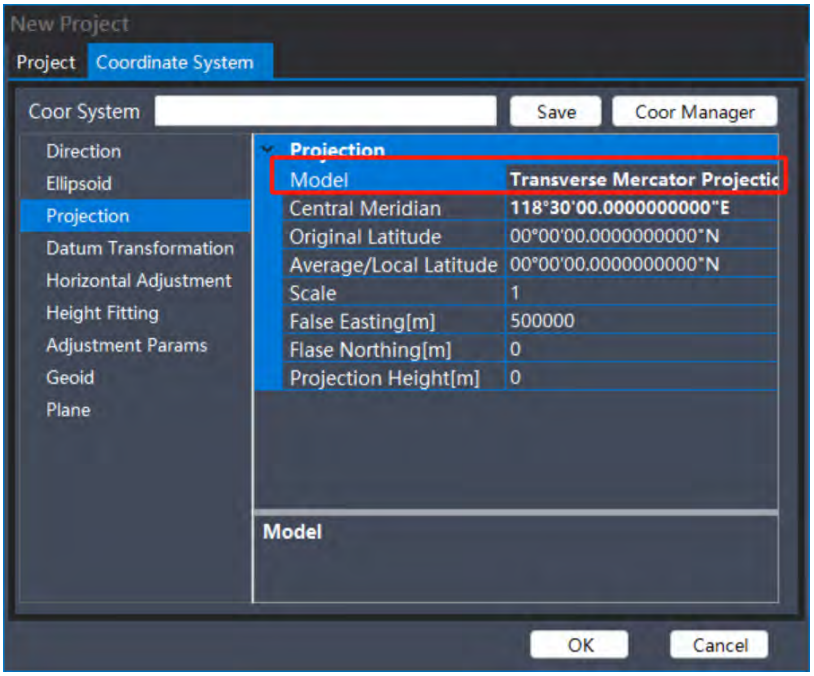
【direction】North East is the positive direction by default. Click the content bar (the red area in the following figure) to pop up the drop-down list button, and select from the drop-down list, the same below.



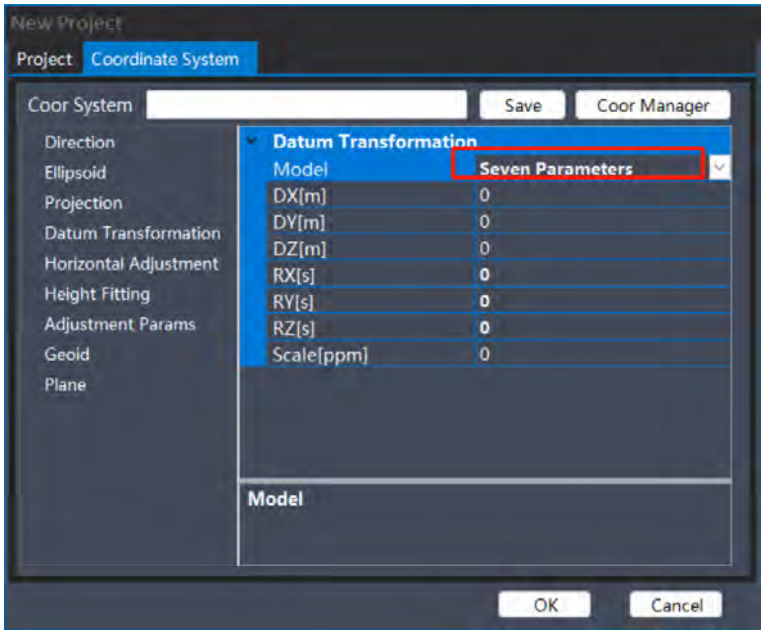
【ellipsoid】The source ellipsoid defaults to WGS84. (Generally, no changes are required. In special cases, other ellipsoids can be selected from the drop-down list.). Select the appropriate ellipsoid name from the drop-down list based on the engineering requirements for the target ellipsoid.



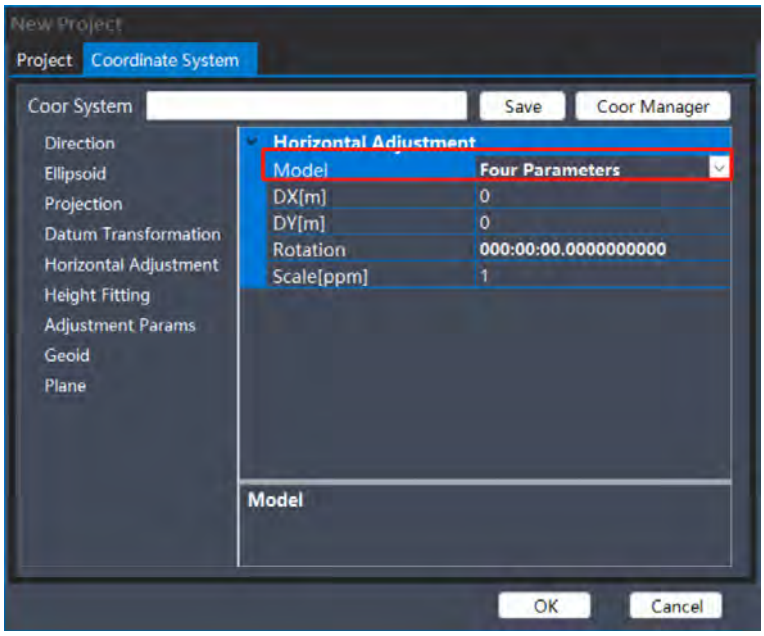
【projection】Select the projection method from the dropdown list as needed, change the central meridian, dimension origin, average latitude, length ratio, eastward constant, northward constant, and projection surface height.



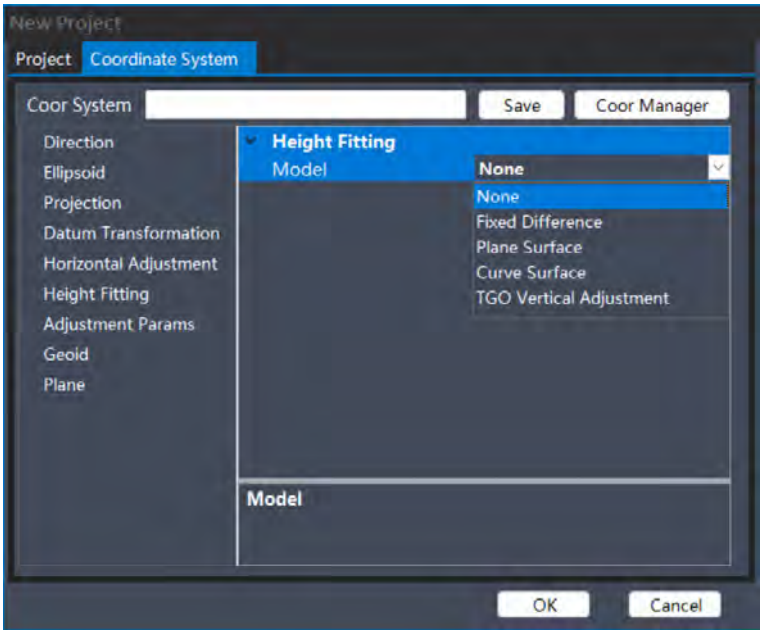
【Datum transformation】In the conversion model, you can choose Bursa-Wolf sevenparameter/three parameters/rigorous seven parameters/grid.



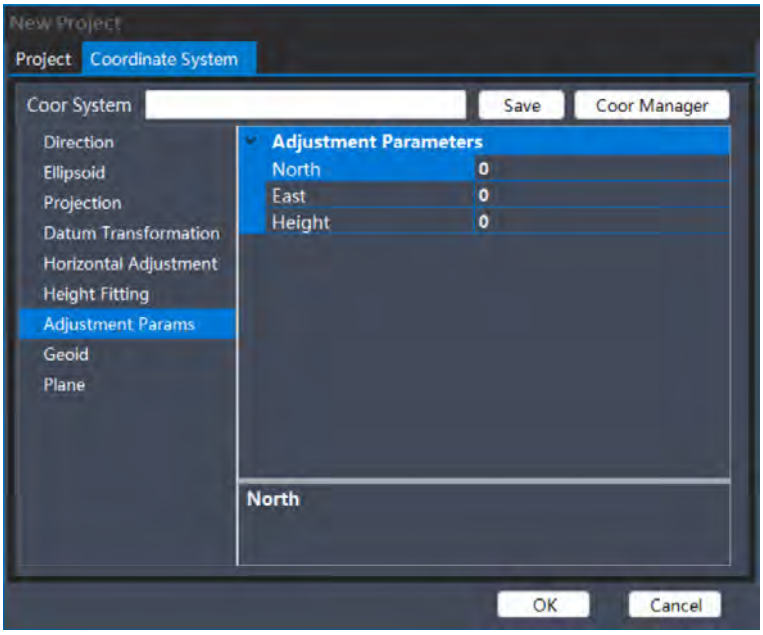
【Horizontal correction】The conversion model for horizontal adjustment can choose between ordinary four parameters and TGO horizontal adjustment.



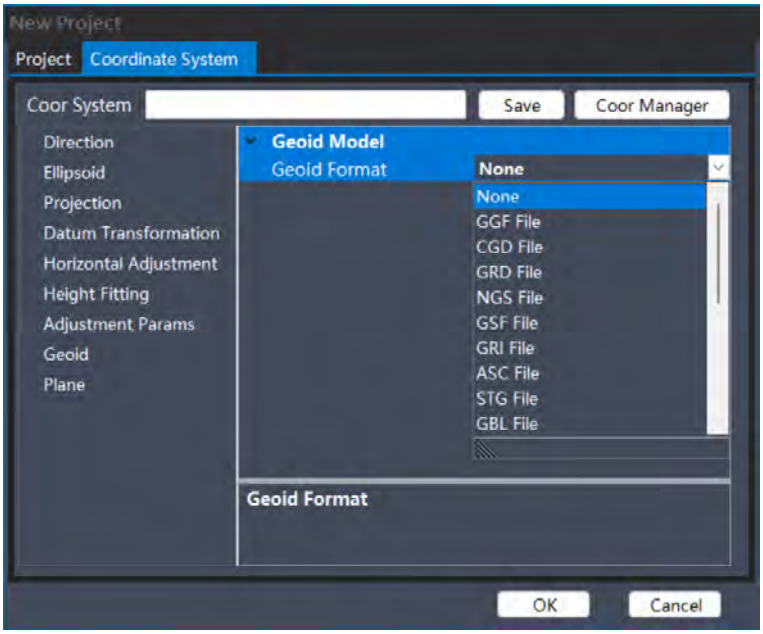
【height fitting】The fitting model can choose from fixed difference, plane fitting, surface fitting, and TGO vertical adjustment.



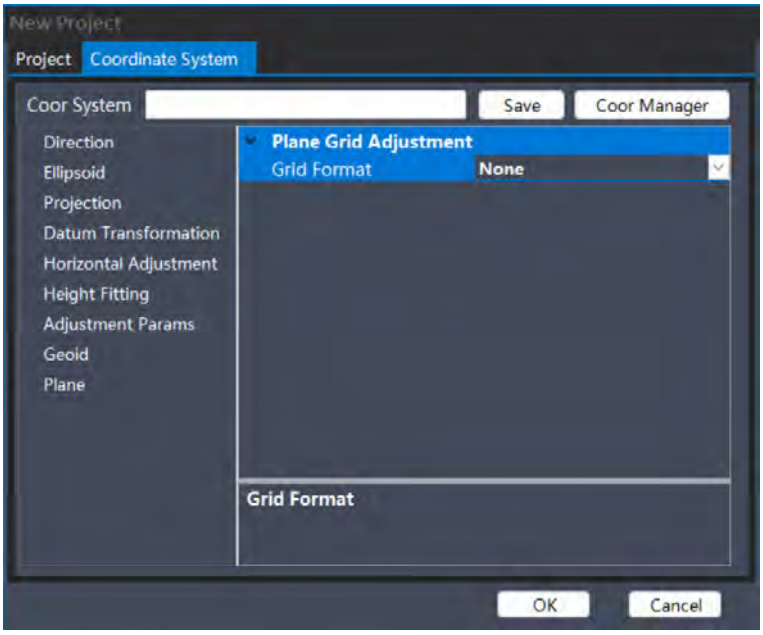
【Adjustment parameters】 You can set offset values such as north offset, east offset, and elevation.



【Geoid】 Select the corresponding format of the geoid model and process the elevation data.

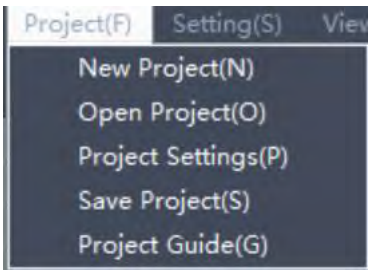


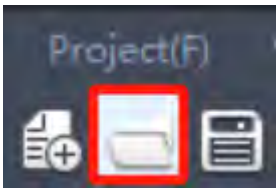
【planar grid】 Select the corresponding format of the flat grid and process the planar data.



7.2.2 Open project

Click on "Project - Open Project" (or click on the "Open Project" icon in the shortcut bar), select the project. nav file you want to open, and click "Open".



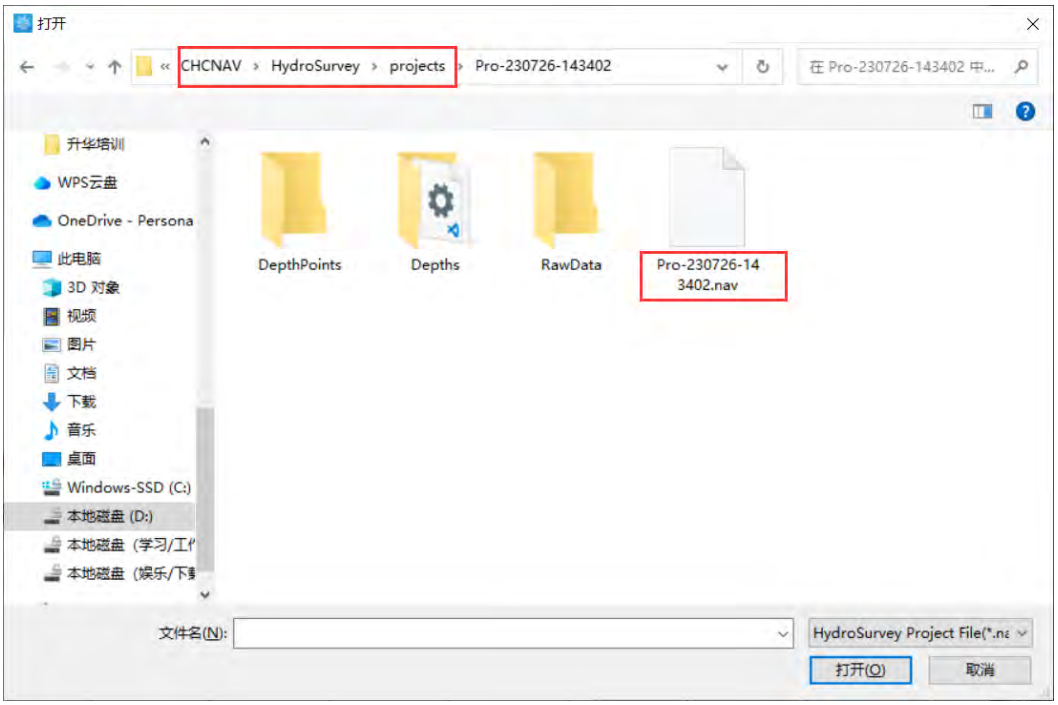


Explanation:

1) Engineering files are saved by default in the HydroSurvey \ projects folder of the software installation directory.

2) If project A is opened from an external directory, it will be automatically copied as project B in the \ projects directory, so the actual opened or saved project is project B in the \ projects directory.

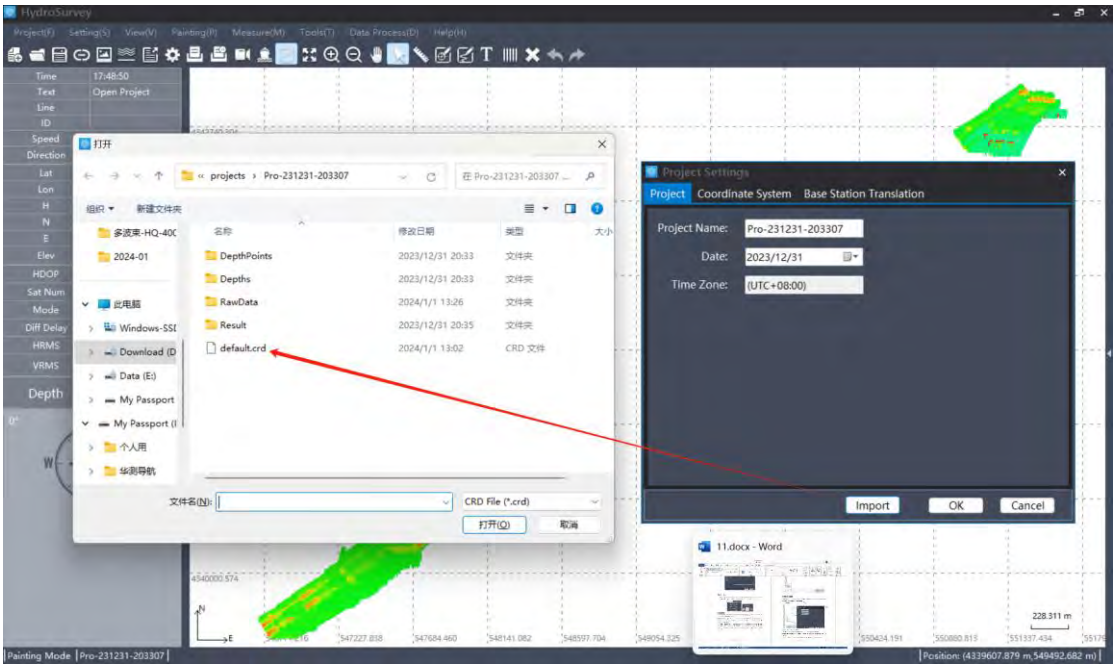
3) If there is already a project named A in the \ projects directory, if you open the same named A project from outside, the original A project will be backed up in the \ Backup directory, and external project A will overwrite the original A project in the \ projects directory.



7.2.3 Project parameters

Click "Projects – project parameters" to change the parameters of the current project, and click "OK" to complete the change.

7.2.3.1 Projects



Project name: Change as needed.

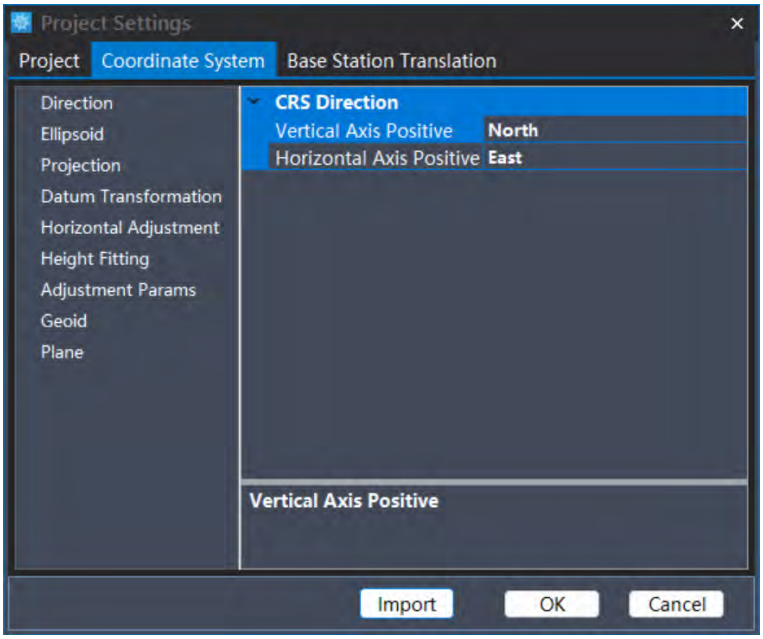
Date: Read the current system date and do not recommend any changes.

Time zone: Automatically recognizes system time zone information and cannot be changed.

Import coordinate system: Select the coordinate system parameter file. crd and click "Open". (The coordinate system parameter file of Geodetic Software LS8 can be directly imported and used)

7.2.3.2 Coordinate System

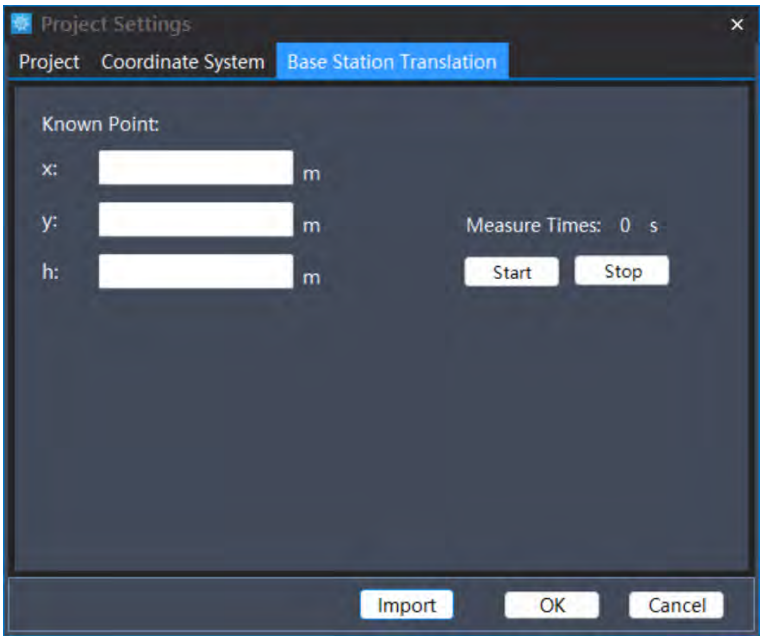
The coordinate system settings can be modified according to steps 1- (2).



7.2.3.3 Base Station Translation

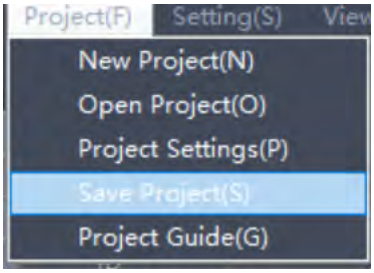
Enter the coordinates of the control points for a known point. (If the fixed difference above has been entered correctly, there is no need to fill in the coordinates)

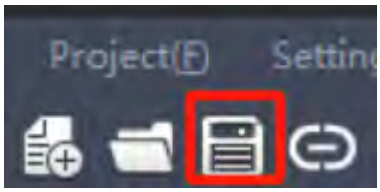
Place the RTK at a known point, click "Start" to collect the required time, and then click "Stop" to calculate the offset.



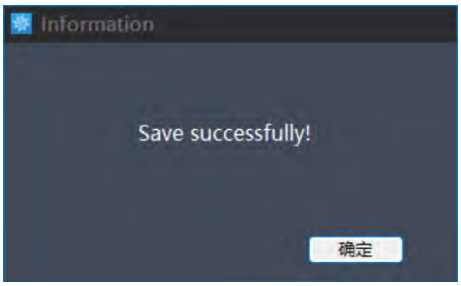
7.2.4 Save project

Click "Project - Save Project" (or click on the "Save Project" icon in the shortcut bar) to save the current project.



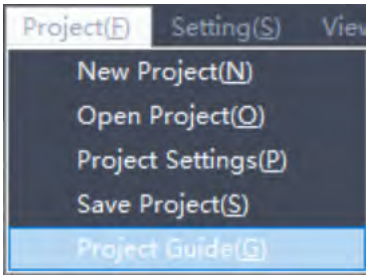


After clicking to save the project, the message "Save Successfully" will pop up to complete the save.



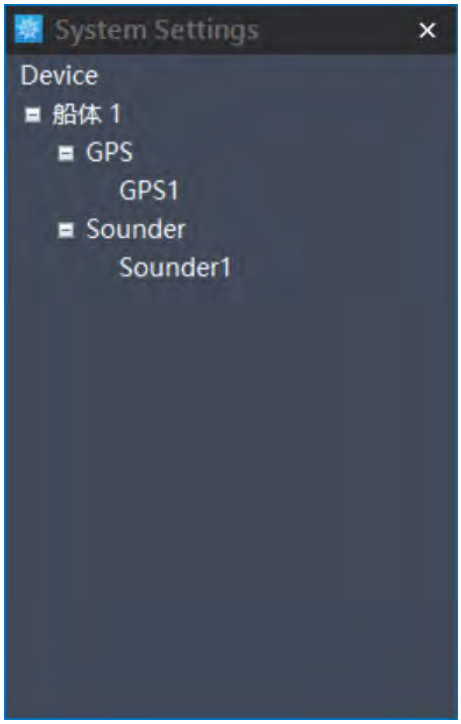
7.2.5 Sounder Wizard

APACHE series USVs can be directly connected by clicking the "one click connection" icon, without the need for this function;



Click on "Engineering - Sounder Wizard" to automatically enter "System Settings". After completing the settings, close "System Settings";

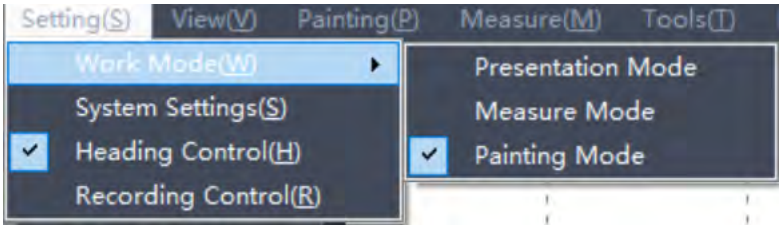
Subsequently, it will automatically enter "Record Control". After turning off "Record Control", it will automatically enter "Measurement Start" and click "OK" to start the measurement. (Specific settings will be explained in detail later)



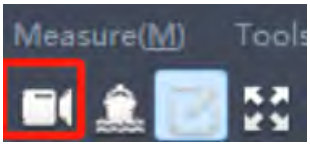
7.3 Settings

7.3.1 Working mode

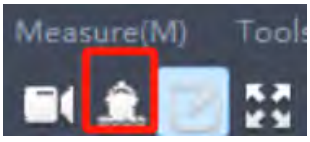
Click on "Settings - Working Mode" and select the software working mode from the drop-down list.



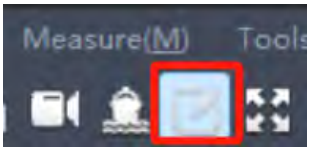
1) Demonstration mode: Simulate field measurement and learn and operate the software. (Click on the "Demonstration Mode" icon in the shortcut bar to enter this mode)



2) Measurement mode: Select this mode to perform measurements. (Click on the "Measurement Mode" icon in the shortcut bar to enter this mode)

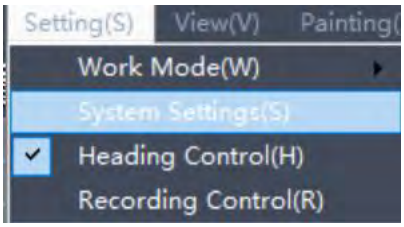


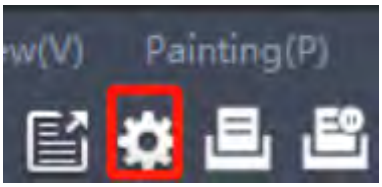
3) Drawing mode: Editing operations such as adding or deleting points and lines on the graph. (Click on the "Drawing Mode" icon in the shortcut bar to enter this mode)

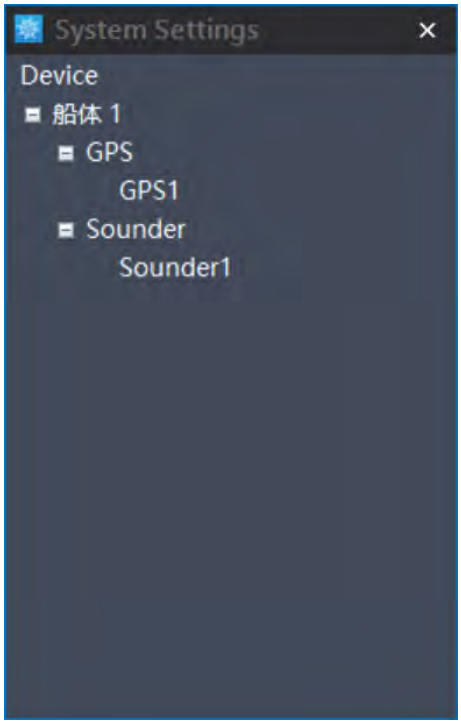


7.3.2 System settings

Click "Settings - System Settings" (or click on the "System Settings" icon in the shortcut bar) to enter the system settings interface.







7.3.2.1 Device

The ship and the measuring equipment carried on board will retain one ordinary hull by default, including two or more hulls. Any one of the hulls can be removed (the same below). Right click on "Equipment" to add "Ordinary Ship" or "USV".

Ordinary ships include GPS, depth sensors, and attitude sensors.

USVs include unmanned hulls.

hull

Right click on "Hull 1" and a dropdown list will pop up, which includes settings, renaming, folding (the "unfold button" in the folding state, the same below), and removal.

1) Settings: Double click on "Hull 1" to enter the Hull Settings interface. The list of ship types includes APACHE 3/4/5/6, ordinary ships, and cutter suction boats.

Check "Fixed Ship Type" to show that the size of the ship remains fixed and unchanged.

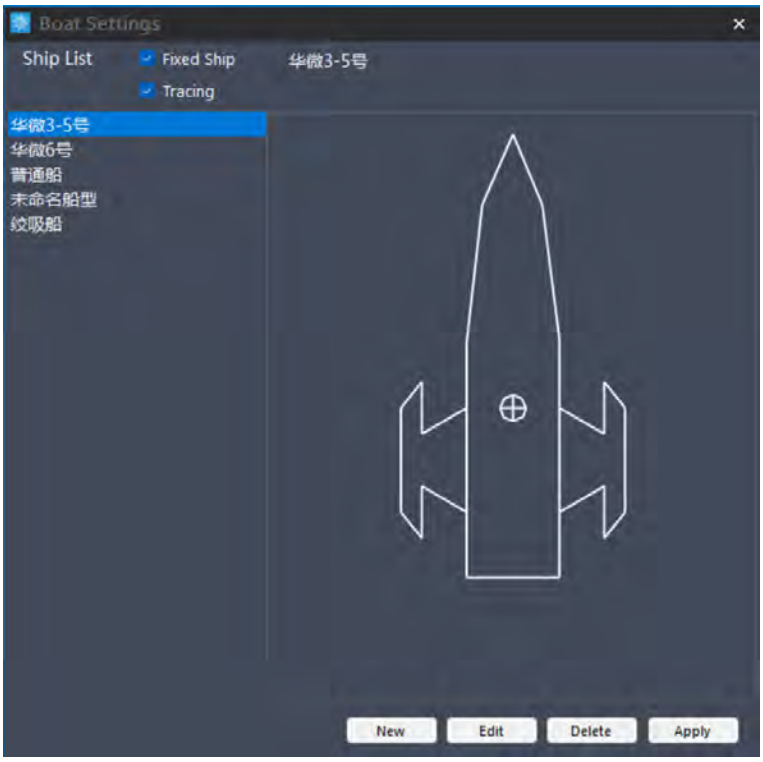
Check "Main Ship Tracking" to always display the position of the main ship.

"New" can draw ship types based on the size of the hull;

"Edit" the selected existing ship size;

"Delete" the selected ship type;

Apply all settings.

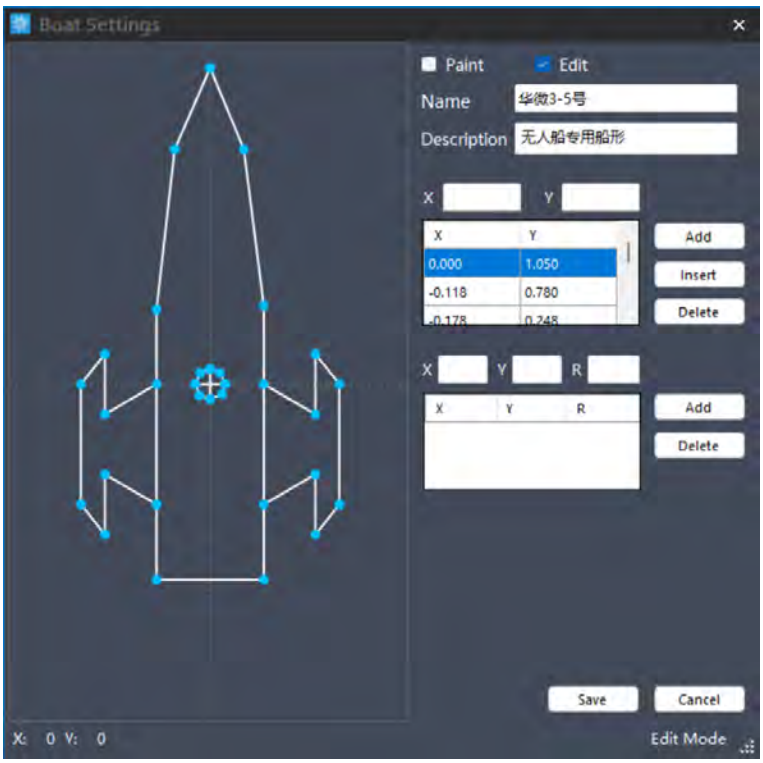


Click "New" or "Edit" to enter the ship type editing interface. Check "Drawing Mode" to draw the feature points of the ship with the left mouse button and end with the right mouse button. Check "Edit Mode" to select the drawn points and drag them. Enter the name of the ship type. Describe the introduction of the ship type.

Enter numerical values in X and Y and click "Add" to add a point; Insert inserts a point after the selected point in the list; Delete the selected point. The coordinates of the first and last points entered are consistent (with the hull closed).

Enter numerical values in X, Y, and radius R, click "Add" to add a circle, and "Delete" the selected circle in the list.

Click "Save" to exit the ship type editing interface, and a new ship type will be added to the ship type list; Click "Cancel" to exit editing.



2) Renaming: Renaming the hull name, the same below.

3) Folding: Hide the device name (you can click on the "+" or "-" before the name to open and collapse).

4) Remove: Delete the hull, the same below.

7.3.2.2 GPS

Double click on "GPS1" to enter the parameter setting interface of the GPS device, which includes "Communication Settings", "Port Monitoring", and "Antenna Coordinates". After setting up, check "Connect" in the bottom left corner and click "OK" in the bottom right corner to complete the GPS setup.

1) Communication settings

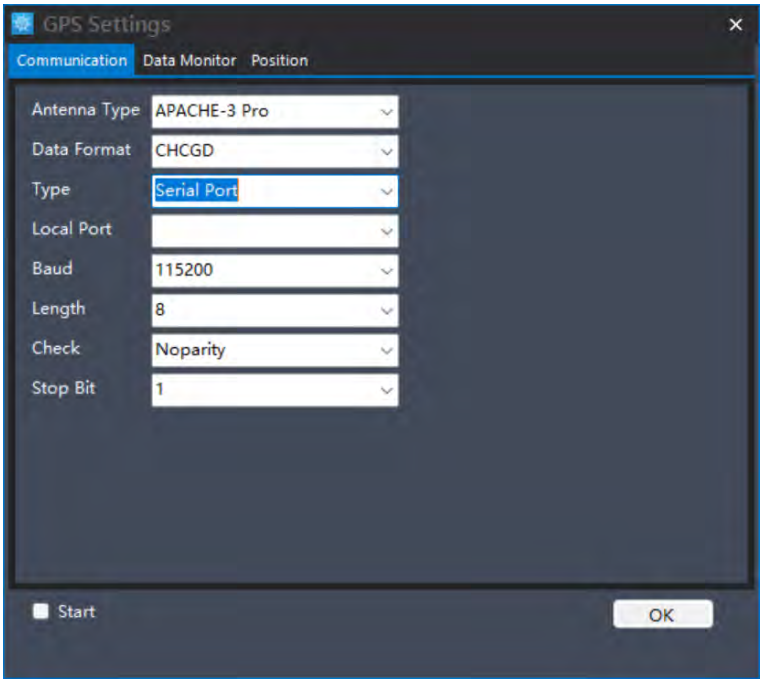
"Antenna Type" Select the "Antenna Model - USV Model (including corresponding antenna coordinate parameters)" (RTK model) to be used in the drop-down list, and select NONE for those not in the list.

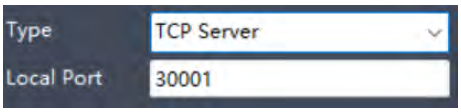
Select the GPS format for parsing processing in the drop-down list.

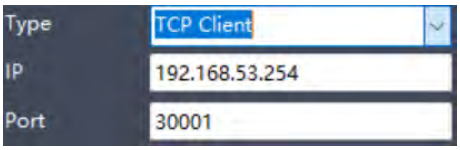
Select from the "Communication Method" dropdown list:

Serial port (select communication port and baud rate);

② TCP and UDP (the server sets the listening port, and the client needs to input the IP address and port of the connecting device);

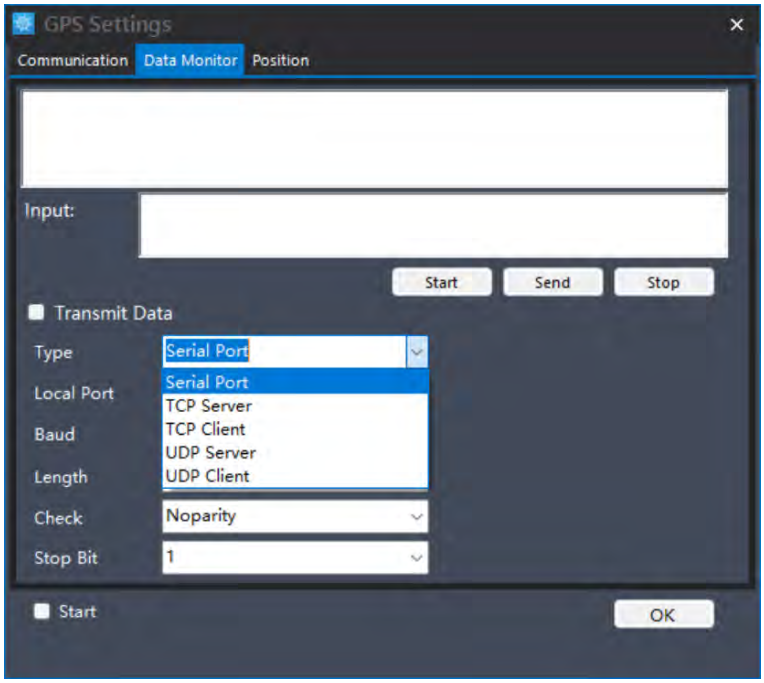






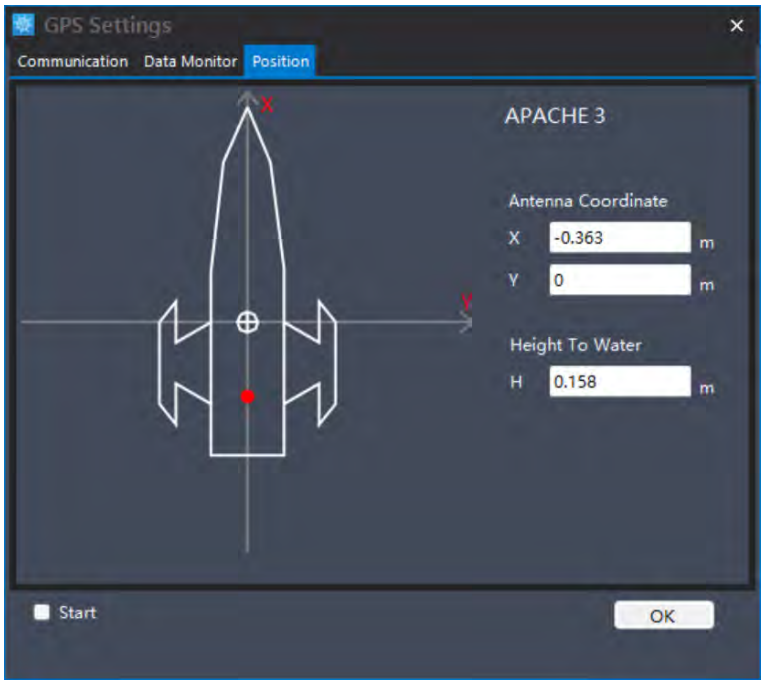
2) Port monitoring: Click "Start" to display the port receiving data; Click the "Stop" button to stop displaying the data received by the port. Enter the command in the "Command Input" column and click the "Send" button to send the command to the device connected to the port.

Check "Data Forwarding" to forward the received data to other devices. Communication methods include serial port, TCP, and UDP, as set above.



3) Antenna coordinates: Input the position of the positioning antenna relative to the transducer (measurement point) in the ship's coordinate system; Input the distance from the bottom of the positioning antenna to the water surface as "base to water surface height".

When selecting NONE as the antenna type in the communication settings, the phase center height needs to be added.



7.3.2.3 Sounder

Double click on "Sounder1" to enter the parameter setting interface of the depth finder, which includes "Communication Settings", "Parameter Settings", "Port Monitoring", "Instrument Coordinates", and "Position Forwarding"; After setting up, check the "Connect" button in the bottom left corner and click "OK" in the bottom right corner to complete the sounder setup.

1) Communication settings

① Select from the "Communication Method" dropdown list:

Serial port (select communication port and baud rate);

TCP and UDP (the server sets the listening port, and the client needs to input the IP address and port of the connecting device);

HydroSound (receiving data directly from the Sound software);

AutoPlanner (receiving data directly from AutoPlanner software).

② "Data Format": Select commonly used formats such as CHCSF, CHCGD (GD version for USVs), and SDDPT according to different depth measuring instrument models. Different formats will have corresponding format setting parameters, and default parameters can be used.

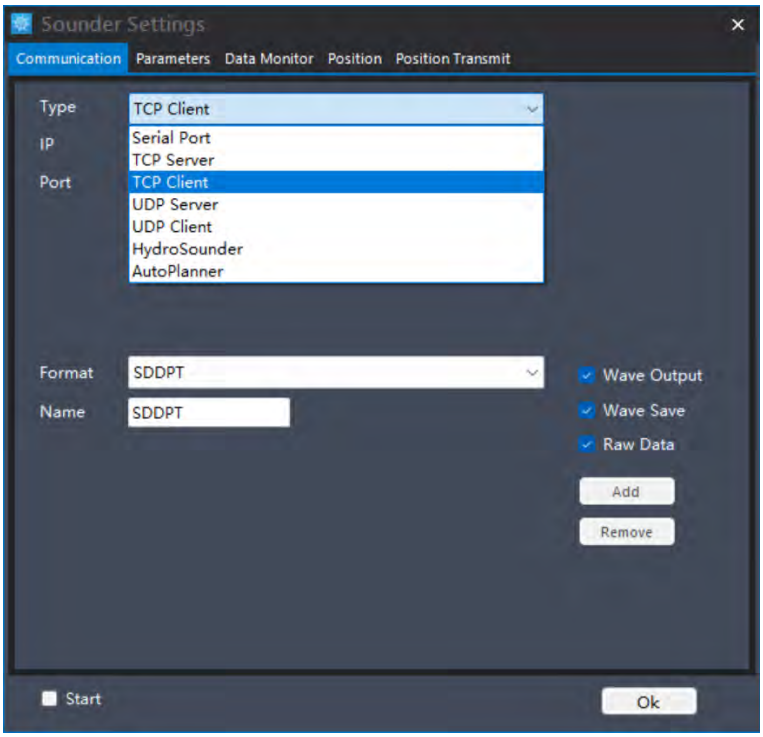
After selecting "Custom" to set the relevant parameters, click the "Add" button to add a new format, and "Remove" to delete the selected data format.

③ Waveform recording:

Check "Waveform Output" to display real-time waveforms on the main interface;

Check "Waveform Storage" to store real-time waveform data simultaneously. During data processing, it can be overlaid with water depth data to facilitate noise processing;

Check "Raw Data" to store the raw data of the depth sounder.



2) Parameter settings: Set the parameters of the depth finder in different measurement environments.

① Draft: The distance from the bottom of the transducer to the water surface;

② Working mode: includes three modes: normal (sonar operation), pause (sonar stop), and status (reading the sounder firmware);

③ Sound Speed: Enter the actual sound speed of the water at that time or check "Temperature and Salinity Calculation" to calculate the sound speed by modifying the temperature and salinity;

④ Gain: The energy gain of the transmitted beam, which can be adjusted in real time according to the actual measurement environment through "automatic" or manually inputted as a fixed value;

⑤ Frame rate: Sound wave emission frequency;

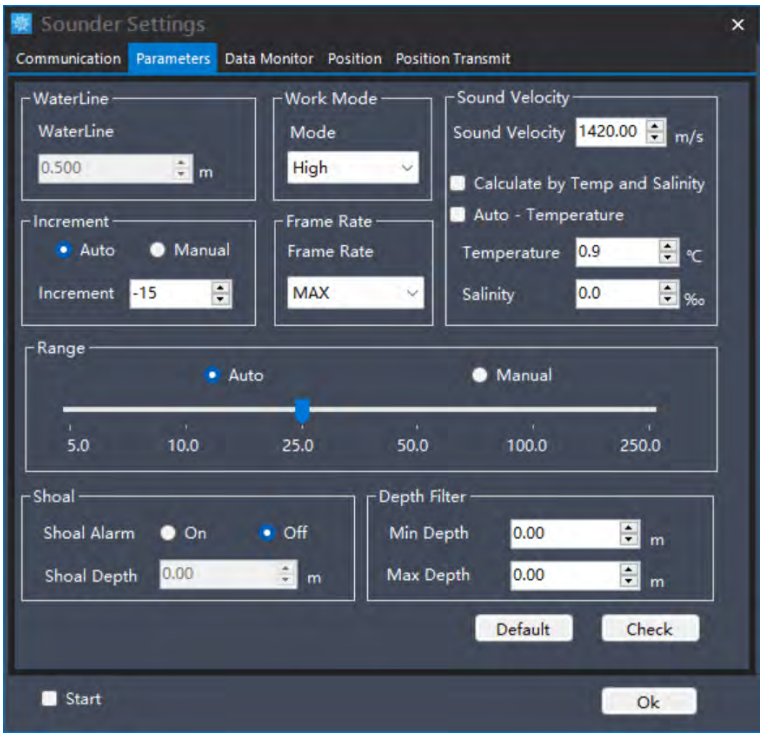
⑥ Range: The maximum water depth that the depth sounder can measure; When the maximum range is close to the actual water depth, the data accuracy is higher. "Automatic" will adjust in real-time based on water depth, and "manual" will select a fixed range;

⑦ Anti interference: Select "normal" or "tracking";

⑧ Water depth filtering: You can choose to collect data within the minimum and maximum water depth ranges;

⑨ Default: Click "Default" to restore the software default settings;

⑩ Self check: Clicking on the "Self check" software will check whether the depth sounder is functioning properly.



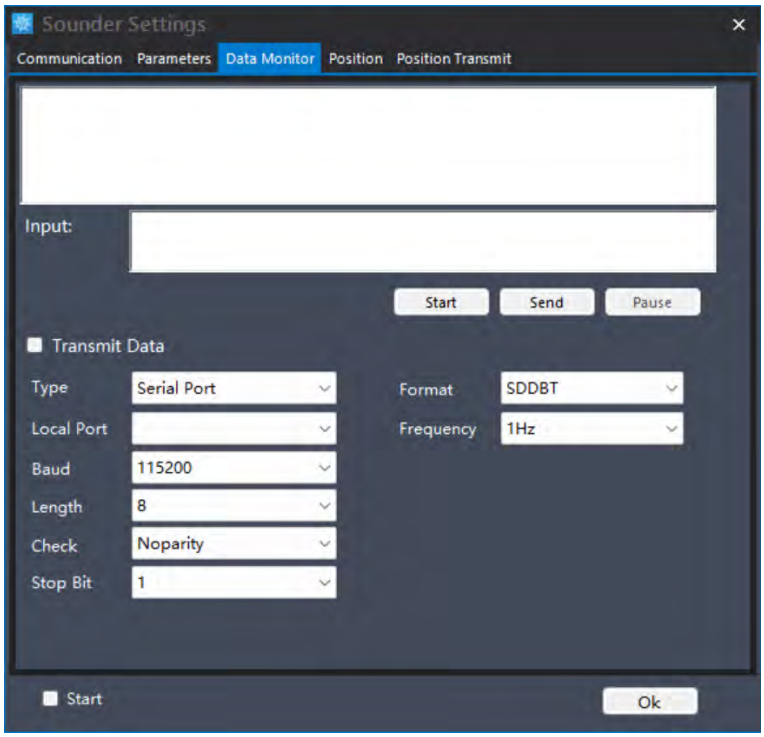
3）Port monitoring

Click the "Start" button to display the received data in real-time;

Click the "Stop" button to stop receiving;

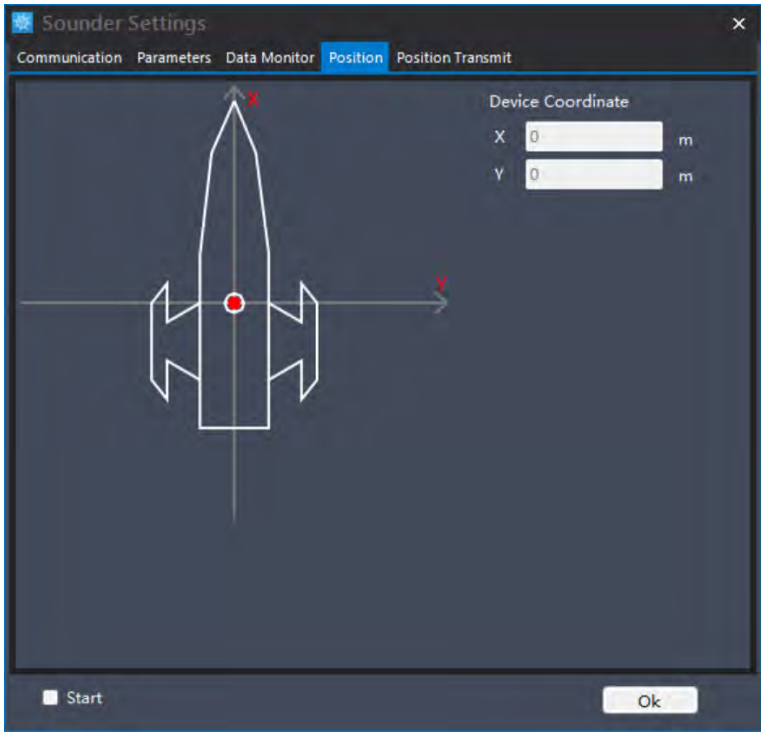
Click the "Send" button to send the commands in the "Command Input" area;

Check the "Data Forwarding" box to send the corresponding format of data to other devices at the set frequency. The communication method is the same as above (GPS port monitoring), and the single beam data forwarding format is SDDPT/SDDBT.



Instrument coordinates:

The installation position coordinates of the depth sounder (measuring point) cannot be modified. When drawing a boat, the installation position of the depth sounder (measuring point) should be taken as the origin, with coordinates (0,0).



5）Location forwarding: customized development of piling function

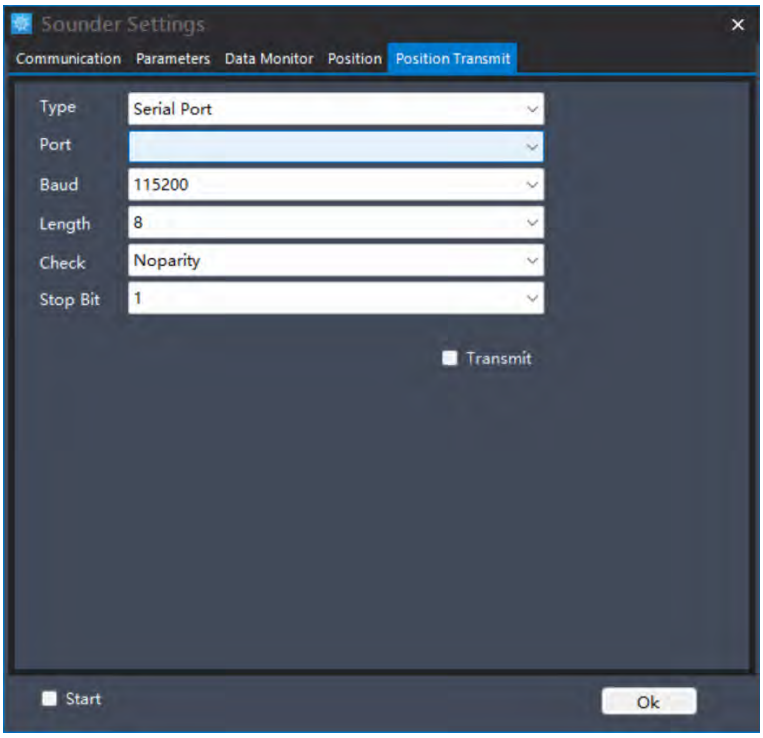
In point navigation mode, the plane coordinates of the measurement point are output $CHCDZ data at a frequency of 1Hz. The ship navigates to the pile point, with a distance of less than 0.02m (coordinate library interface, can be set by oneself). The measurement point turns green, indicating that the current measurement point has completed pile driving.

Data format: $CHCDZ, No, N, E, H, MN, ME, MH \ r \ n; 1Hz 8-bit;

N. E, H, MN, ME, MH: 12 digits do not include positive and negative signs, if not enough, fill in 0, unit: millimeters;

N. E, H: The position of the imported pile points;

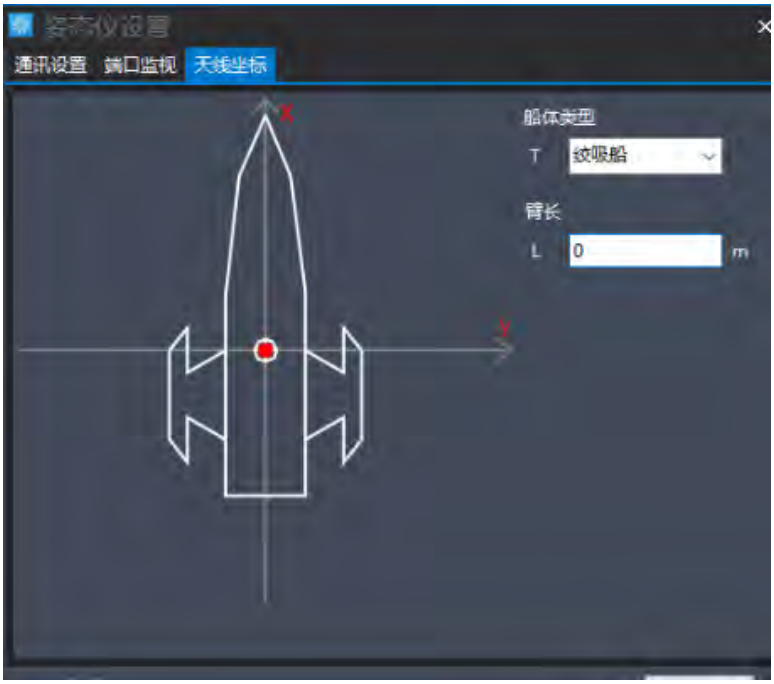
MN, ME, MH: the position of the ship at points 0,0;



7.3.2.4 Motion

Set the relevant parameters of the attitude meter by double clicking on "Motion1" to enter the parameter setting interface of the attitude meter, which includes "Communication Settings", "Port Monitoring", and "Antenna Coordinates". After setting, check "Connect" in the bottom left corner and click "OK" in the bottom right corner to complete the attitude meter setting.

The settings for "communication settings" and "port monitoring" are the same as above, and the "antenna coordinates" need to select "ship type" and "arm length" of the working arm.



7.3.2.5 Heading Control

Control the bow direction of the ship's hull. Click "Settings - Bow Control" to select the control method based on the actual device used. Usually, the default settings are sufficient for heading control.

Intelligent selection: Automatically adjust according to GPS motion direction;

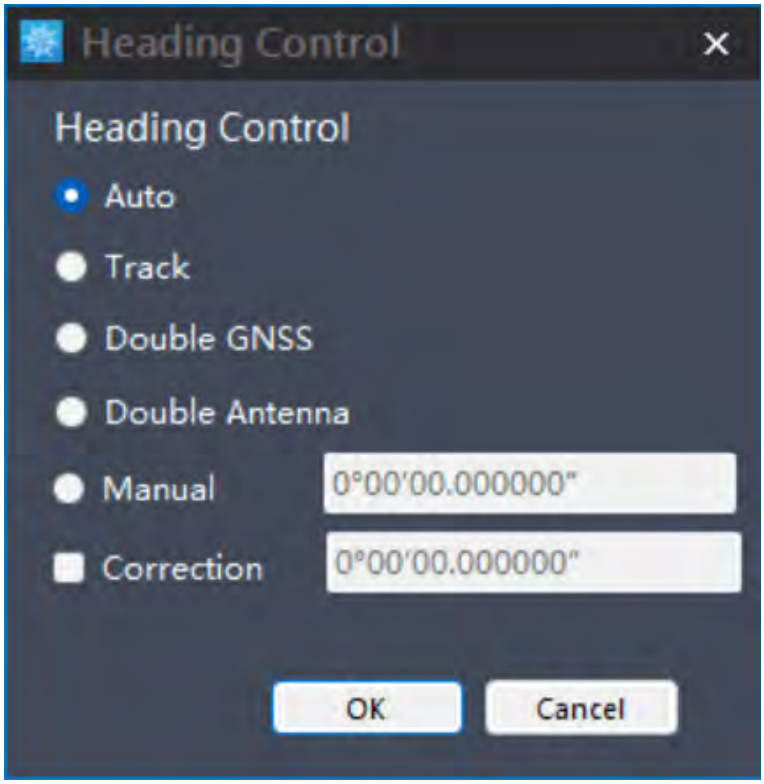
Calculate according to trajectory: Calculate according to the trajectory of the path;

Dual GPS: calculated based on the baseline direction of two GPS installations;

Dual antenna: calculated based on the azimuth angle output by the dual antenna device;

Manual input: Enter a fixed angle;

Bow correction: Correct the difference between the installation of the input device and the actual direction.



7.3.2.6 Record Control

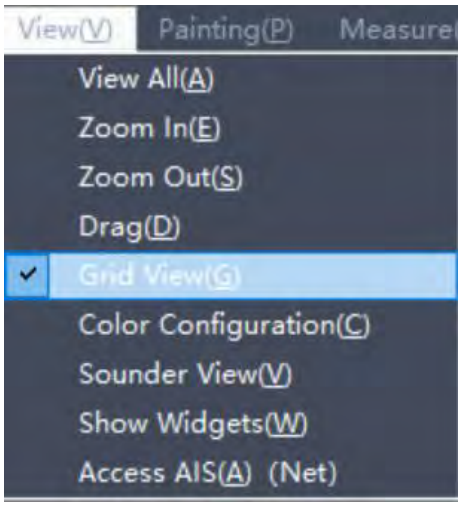
Set data collection parameters. Click "Settings - Record Control" to enter the record control settings interface.

Recording method:
Record by distance: Record data every few meters;
Record by time: Record data every few seconds;
Record by Space: Manually record data by pressing a space once.

Unstate restrictions:
Single point solution: Record "single point solution" and higher accuracy;
Differential decomposition: Record "differential decomposition" and higher accuracy;
"Fixed solution": Record the "fixed solution".

Recording options:
Select the device that needs to record data;

7.4 View

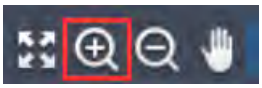


7.4.1 Full image display

Click on "View - Full Image Display" (or click on the shortcut bar's "Full Image Display" icon) to fully display all graphics.

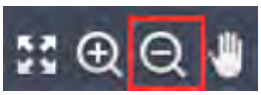
7.4.2 Zoom in

Click "View - Zoom In" (or click the "Zoom In" icon on the shortcut bar) to zoom in on the graphic once.



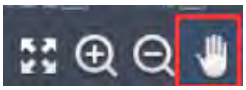
7.4.3 Zoom out

Click "View - Zoom Out" (or click the "Zoom Out" icon on the shortcut bar) to zoom out the graphic once.



7.4.4 Drag the base map

Click on "View - Drag Bottom" (or click on the "Move" icon in the shortcut bar), hold down the left mouse button to drag the bottom.



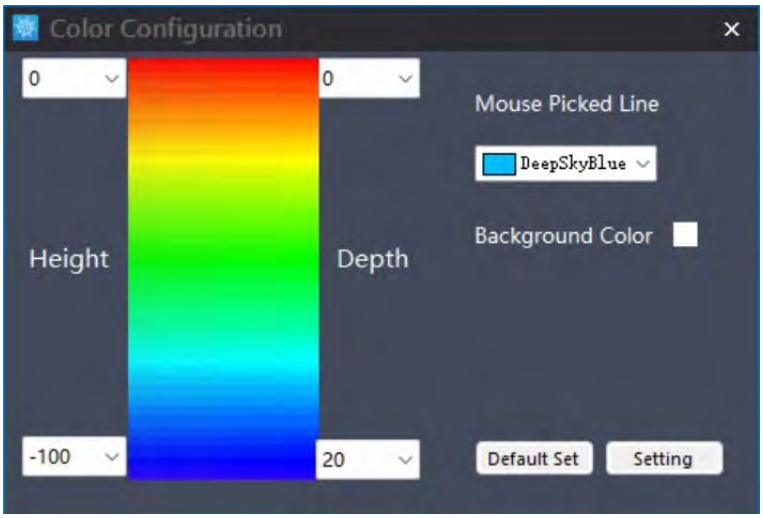
7.4.5 Show grid

Clicking on the "View - Show Grid" checkbox will display the coordinate grid, allowing you to view the current scale bar.

7.4.6 Color profile

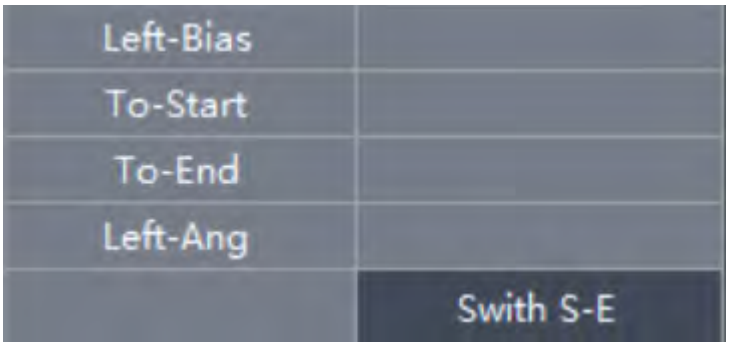
Click "View - Color Settings" to open the color settings interface. Select colors corresponding to different elevation and depth ranges separately;

Select the color of the selected line from the dropdown list of "Pick Line Segment with Mouse"; Select "background color" as black or white, click "settings" to save the changes, and click "default settings" to restore the software's default parameters.



7.4.7 View of sounder

Directly display the default common view settings of the depth sounder in the bottom left corner of the main view.



7.4.8 Small window options

Check the small window that needs to be displayed on the main interface.

1) Hull switching: switching display information between multiple hulls;

2) System: Display time, line name, point number, speed, and heading;

3) Coordinates: Display the current WGS84 longitude and latitude, water surface geodetic height, plane coordinates, and water surface elevation;

4) Data quality: HDOP value, number of satellites, and calculation status;

5) Water depth value window: displays real-time water depth figures;

6) Compass: Real time display of ship's bow direction;

7) Line navigation window: displays whether the ship is currently on the left or right side of the trajectory line (based on the direction from the starting point to the endpoint of the line segment), the distance from the starting point, and the distance from the endpoint (can be opened by clicking the "Line Navigation" button on the shortcut bar);

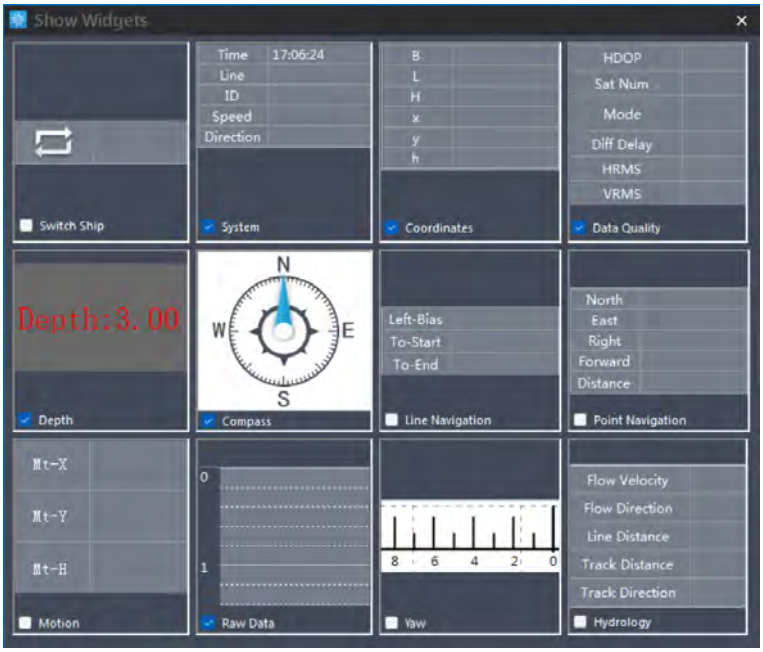
8) Point navigation window: displays information such as heading north, east, right, forward, and distance from the ship's hull to the target point (can be opened by clicking the "Point Navigation" button on the shortcut bar);

9) Attitude instrument coordinate window: displays the northeast elevation information of the attitude instrument;

10) Raw data: Display real-time water depth waveform of the depth sounder;

11) Yaw view: displays a yaw scale bar;

12) Hydrological view: displays hydrological information such as flow velocity, flow direction, and straight-line distance.



7.4.9 Accessing AIS

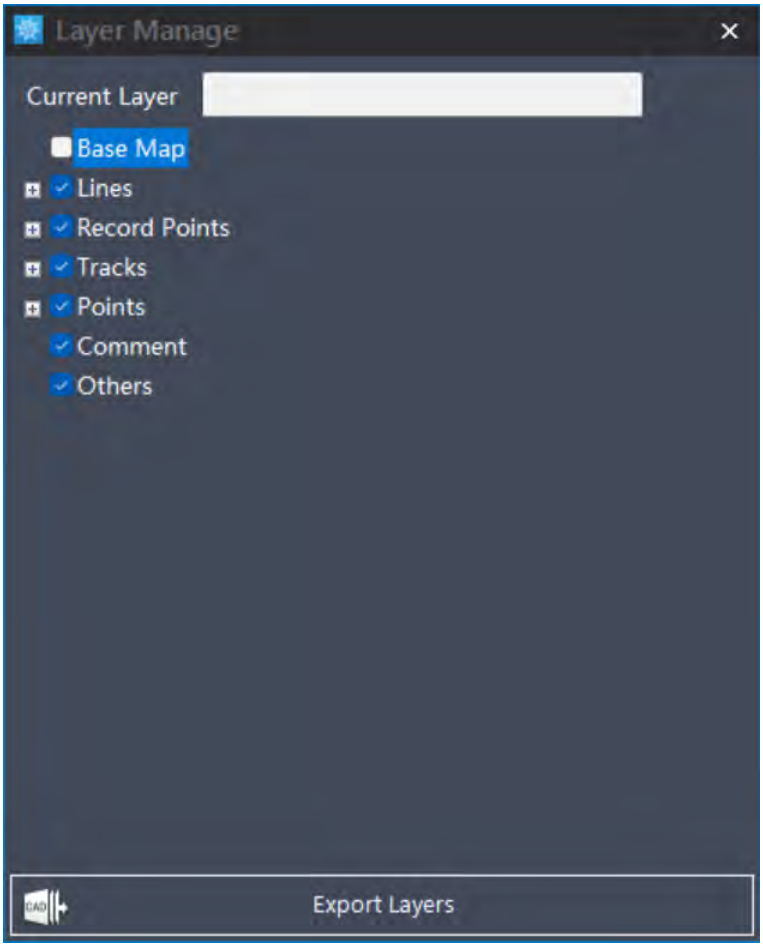
Clicking on "View - Access AIS" will redirect you to the AIS website to view the distribution of surrounding ships.

7.5 Draw

7.5.1 Layer management

Click on "Drawing - Layer Management" or click on the "Layer Management" icon in the shortcut bar to enter the layer management interface.

Check the layer to display it, otherwise it will not be displayed. Click the "+" button to open the dropdown list, and click the "-" button to close the dropdown list.



7.5.2 Base layer

Right click on "Bottom Layer" and click "Import" to select a. dxf or. dwg format bottom file. Right clicking on the imported base image file will pop up a drop-down list:

Click "Edit" to reselect the base image file;

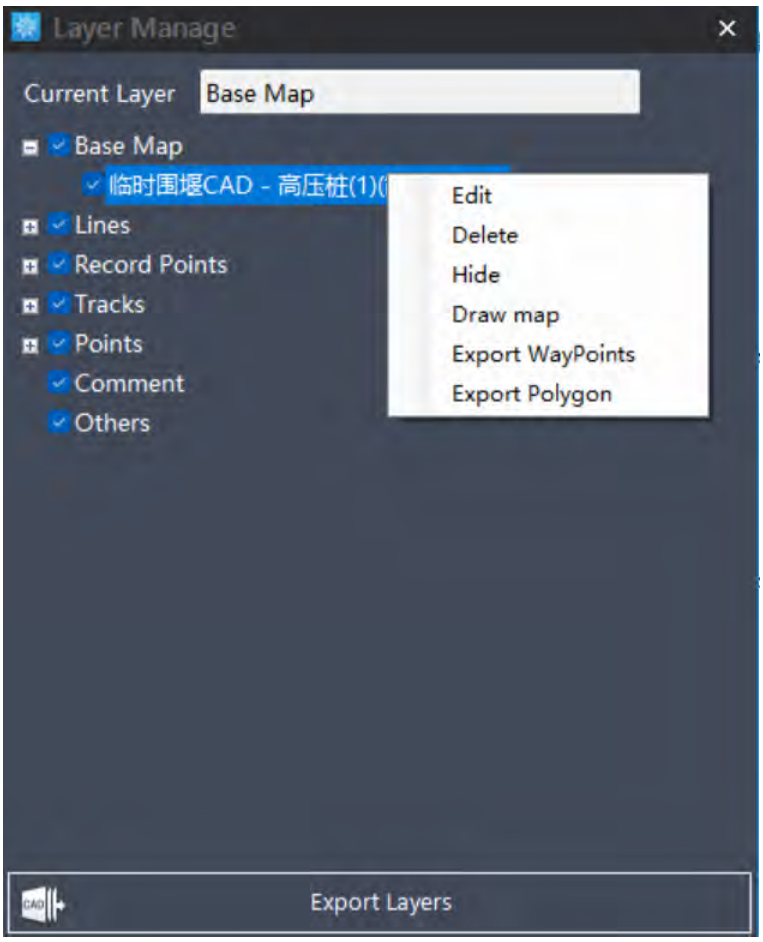
Click "Delete" to delete the imported base map;

Click "hide" to not display the base image;

Click "Draw Bottom Map" to draw the bottom map;

Click "Export WayPoints" to export the. waypoints waypoint file from AutoPlanner software;

Click "Export Polygons" to export the. poly polygon file from AutoPlanner software.



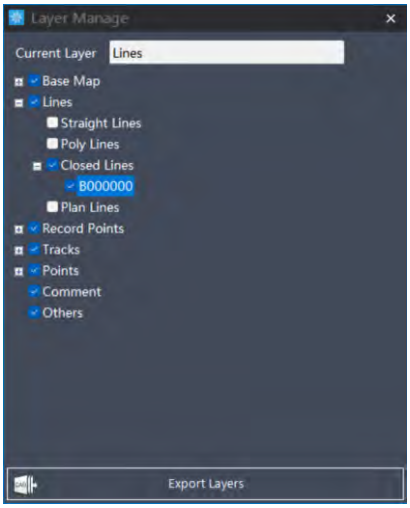
7.5.3 Line layer

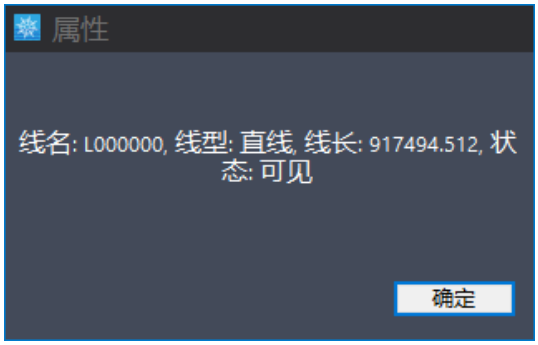
Right click on "Line Layer" to display the line name. The drop-down list includes "Line", "Polyline", "Closed Line", and "Plan Line".

Right click on "Line" and click "Delete" to delete all lines. Click "Hide" to not display all lines;

Right click on the selected line in the drop-down list, click "Delete" to delete the selected line, click "Hide" to not display the selected line, click "Properties" to display the attribute information of the selected line.

The operations for "Polyline", "Closed Line", "Plan Line", and "Line" are the same. (Right click on "Plan Line", click "Export WayPoints", and export the route file of AutoPlanner software)





7.5.4 Trajectory line

Display the trajectory of data collection. Right click on "Trajectory Line", click "Import", select the. dep file to import existing trajectories, click "Enter Path", and enter the trajectory line storage path.

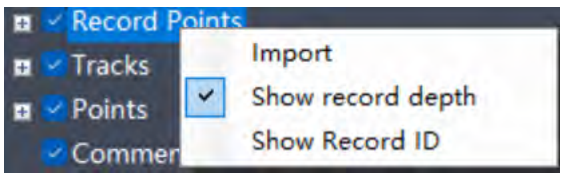
Right click on the file in the dropdown list, and the "delete" and "hide" functions are the same as above.

7.5.5 Record point

Display the collected points. Right click on "Trajectory Line" and click "Import" to select the. dep file to import the collected points;

Click on "Water Depth Display" to display the water depth of the collection point.

Click "Record Point Name Display" to display the name of the collection point. Right click on the file in the dropdown list, and the "delete" and "hide" functions are the same as above.



7.5.6 Point layer

Display manually added points. Right click on "Point Layer". Click "Open" to enter the coordinate library of the point. (Operation method, refer to the coordinate library in Section 2 of this chapter);

Click "Show Point Names" to display the name of the point. Right click on the file in the dropdown list, and the "delete" and "hide" functions are the same as above.

7.5.7 Annotation Layer

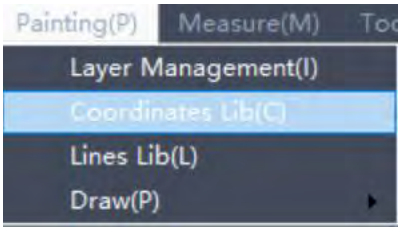
Display annotated text and other information. Right click on the file in the dropdown list, and the "delete" and "hide" functions are the same as above.

7.5.8 Display layer export

Manually drawn graphics can be exported to CAD files in dxf/dwg base format.

Coordinate Library

Click on "Draw Coordinate Library" and enter the coordinates and other information of the points to draw the points.



1) Coordinate type: Select projection coordinate XYH or geodetic coordinate BLH, enter point name, X (B), Y (L), H (H), radius (point symbol), and color.

Simply enter the numerical value in BL, and it will automatically recognize the accuracy in minutes and seconds, selecting the corresponding hemisphere.

2) Pile driving parameters: Enter the pile driving tolerance.

3) Select All: Select all points in the list.

4) Display: Display the selected points in the list on the main interface.

5) Hide: Hides the selected points from the list on the main interface.

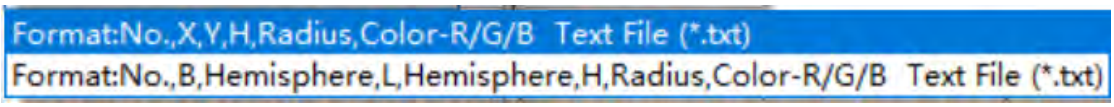
6) Point navigation: navigate to the selected point in the list, and the main interface will display a point navigation view.

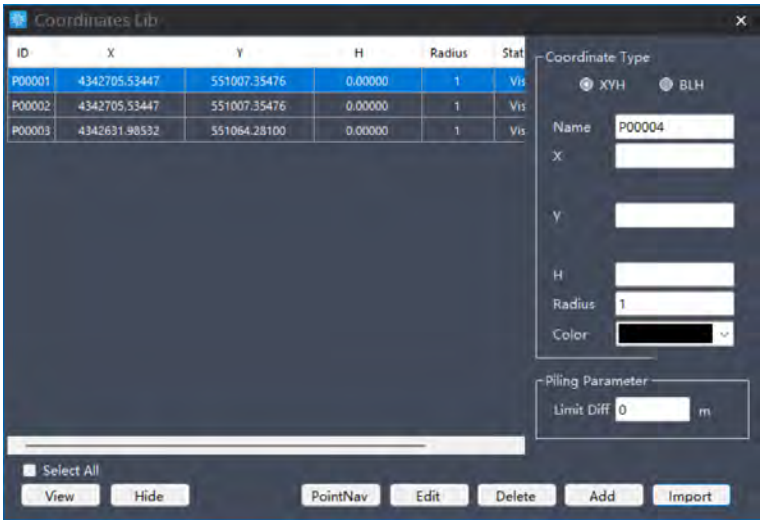
7) Edit: Edits the selected points in the list.

8) Delete: Delete the selected point in the list.

9) Add: Add the edited points in "Coordinate Type".

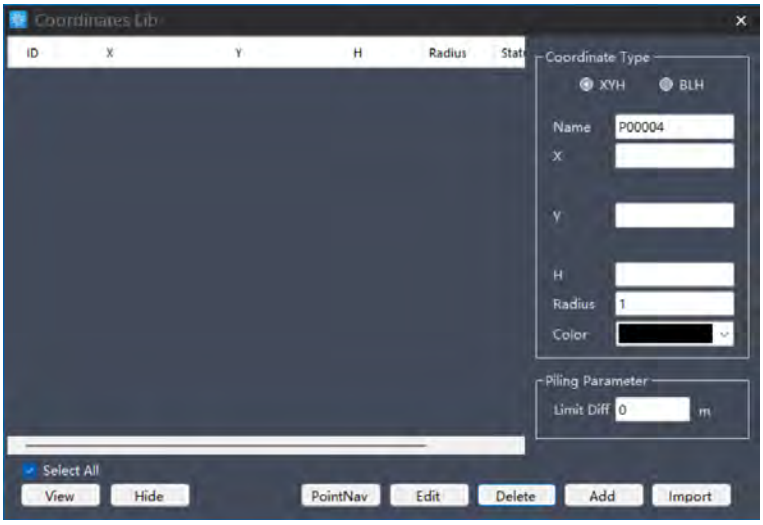
10) Import: Import and edit a fixed format point file. The supported import formats are:





7.6 Line library

Click "Draw - Line Library" to display line information and draw lines based on the points in the coordinate library.



Click "Draw - Line Library" to display line information and draw lines based on the points in the coordinate library.

1) Select All: Select all lines in the list.

2) Display: Display the selected lines in the list on the main interface.

3) Hide: Hides the selected lines from the list on the main interface.

4) Delete: Delete the selected line from the list.

5) Coordinate library drawing lines:

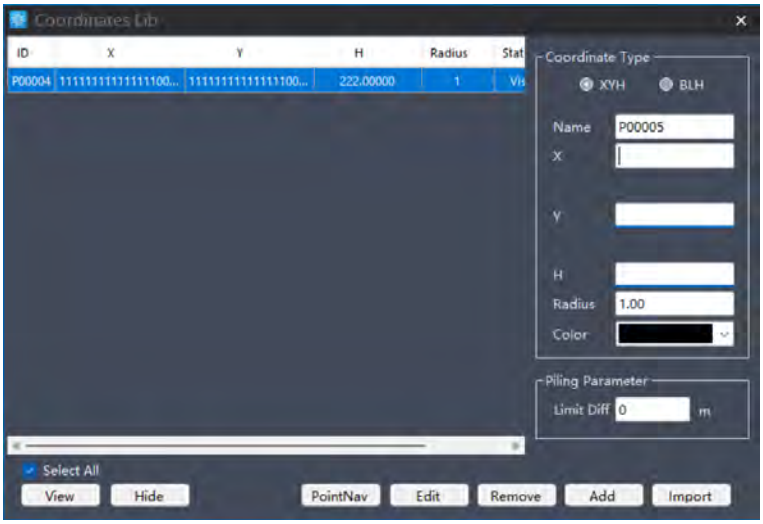
"Linear", select a straight line, polyline, or closed line from the drop-down list;

Select a numerical value from the dropdown list of "line weight";

Select from the "Color" dropdown list;

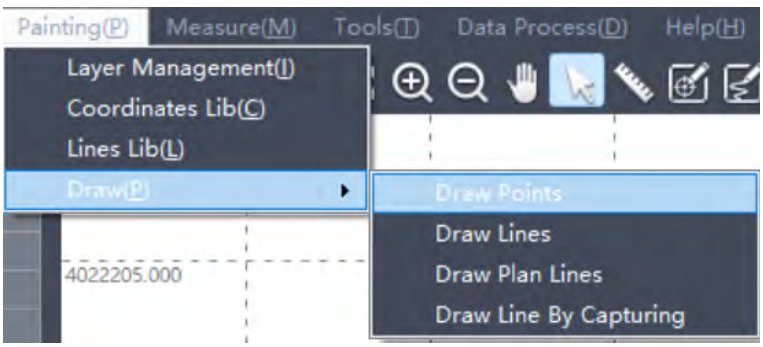
Select points in the point list in order from the starting point to the ending point. The order of selecting points is displayed on the right side. Click "OK" to connect them into a line based on the order of the points. Select 2 points for a straight line, and select more than 3 points for a polyline and a closed line.

Click "undo" to undo the selected point; Click "Back" to return to the line list.



7.7 Manual drawing

Click on "Draw - Manual Drawing" and select "Draw Points", "Draw Lines", "Draw Plan Lines", "Capture Lines" from the drop-down list

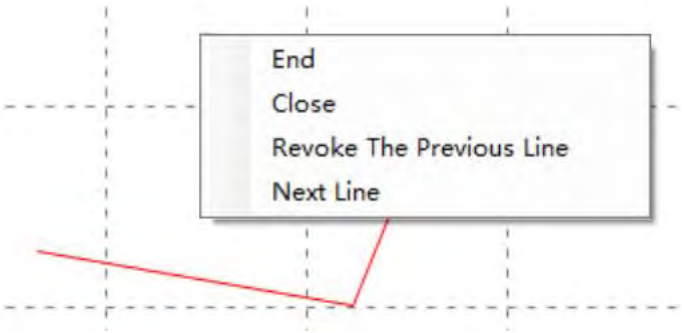


Draw dots

(Click on the "Draw Point" button in the shortcut bar ) Left click on the main interface to manually draw points.

Draw lines

(Click on the "Draw Line" button in the shortcut bar ) Left click on the node for manual drawing on the main interface, right-click and select "End" (End drawing), "Close" (Closed line), "Cancel previous point" (Redraw previous point), "Previous line" (End drawing previous line, start drawing next line).



Draw plan line

(Click on the "Draw Line" button in the shortcut bar ) Before drawing the plan line, draw a closed line in the measurement area. Select the closed line and the plan line parameter interface will pop up.

Rotate the measuring line clockwise in the north direction;

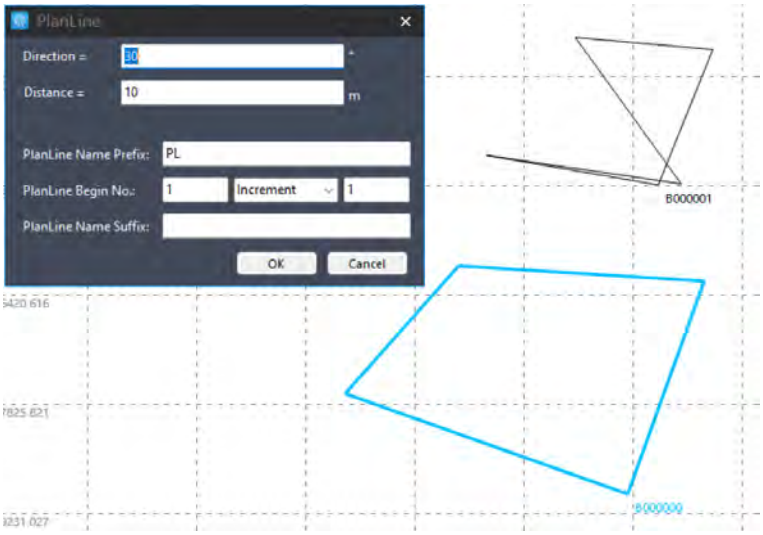
The width of the interval between the "line distance" lines;

Prefix is the prefix of the planned line name;

The number in the name of the "number" plan line;

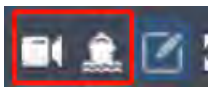
Select "Increment", "Decrement", and "Fixed" from the drop-down list, and then enter the step value;

The suffix for the planned line name.



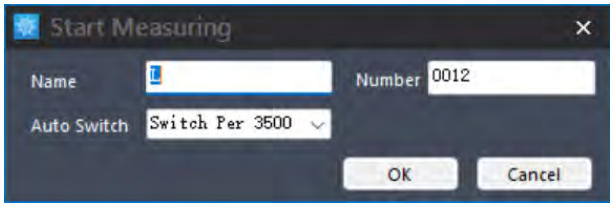
7.8 Measure

The measurement function can only be used by selecting "Demonstration Mode" or "Measurement Mode" in "Settings - Working Mode".



7.8.1 Start

Click on "Measurement - Start" (or click on the shortcut "Start" button)  afterwards, settings will be made for "Line Name" (prefix), "Line Number" (automatically increasing with a number step of 1), and "Automatic Line Change Method" (no automatic line change, 500 point automatic line change, 1000 point automatic line change, 2000 point automatic line change).



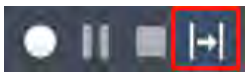
7.8.2 Pause

Click on "Measurement - Pause" (or click on the "Pause" button in the shortcut bar)  pause measurement.

7.8.3 End

Click on "Measurement - End" (or click on the "End" button in the shortcut bar ) end measurement.

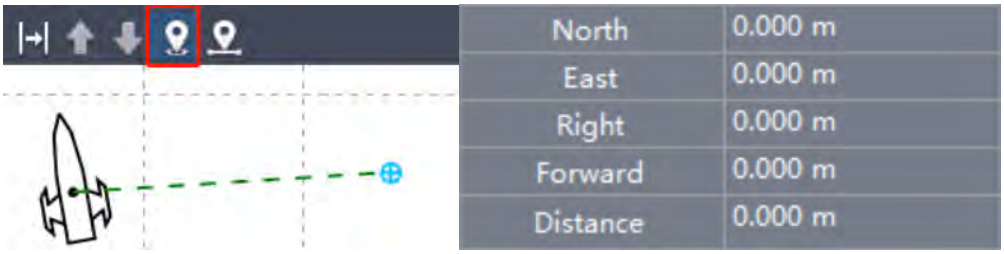
7.8.4 Quick Line Change

Click on "Measurement - Quick Line Change" (or click on the "Quick Line Change" button in the shortcut bar)  In measurement mode, the current measurement line stops recording data and directly starts the measurement of the next measurement line.

7.8.5 Click navigation

Click "Measurement - Point Navigation" (or click the "Point Navigation" button on the shortcut bar) to pop up a point navigation window, where the navigation point is highlighted in blue and the green dashed line represents the navigation line.

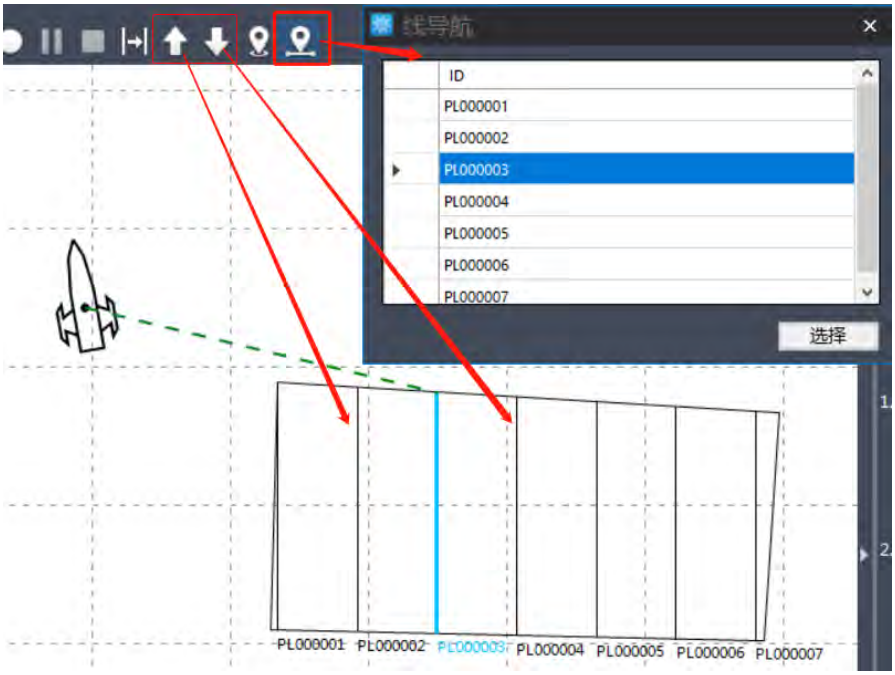
Point data and line data can be added by importing or manually drawing.



7.8.6 Line navigation

Click on "Measurement - Line Navigation" (or click on the "Line Navigation" button in the shortcut bar) to pop up a line navigation window. The navigation line is highlighted in blue, and the green dashed line represents the navigation line;

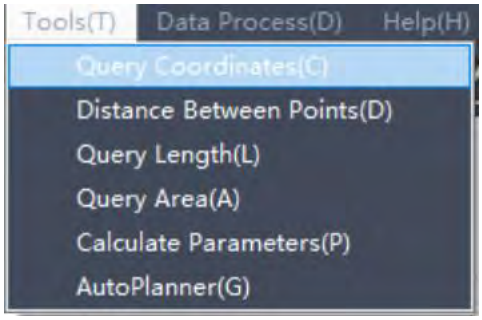
Click the "Navigation Previous Line" or "Navigation Next Line" button to switch navigation lines.



7.9 Tools

7.9.1 Query point coordinates

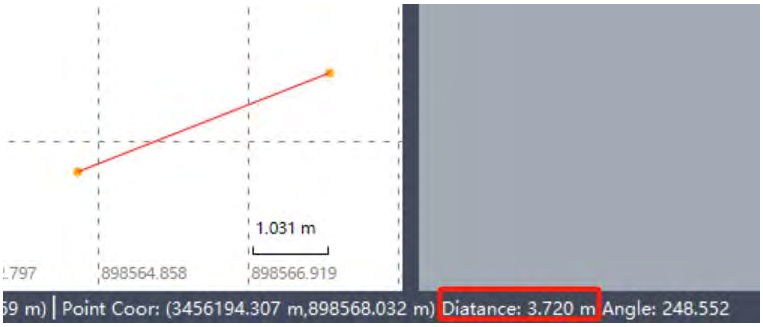
Click on "Tools - Query Point Coordinates" to query the manually added point coordinates. Select the point and highlight it in blue, with the value displayed in the bottom right corner of the software.



7.9.2 Query the distance between two points

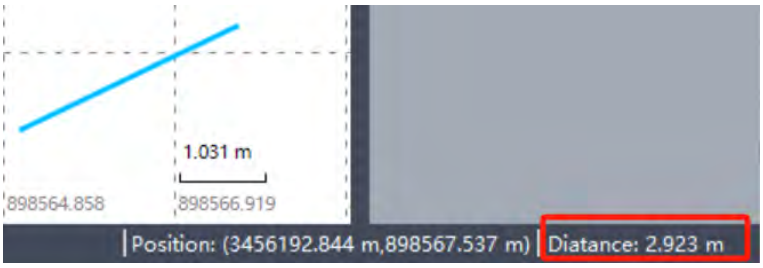
Click on "Tools - Query Two Point Distance" (or click on the "Two Point Distance" button in the shortcut bar)

) Query the distance and azimuth of any two points on the base map, and display the values in the bottom right corner of the software.



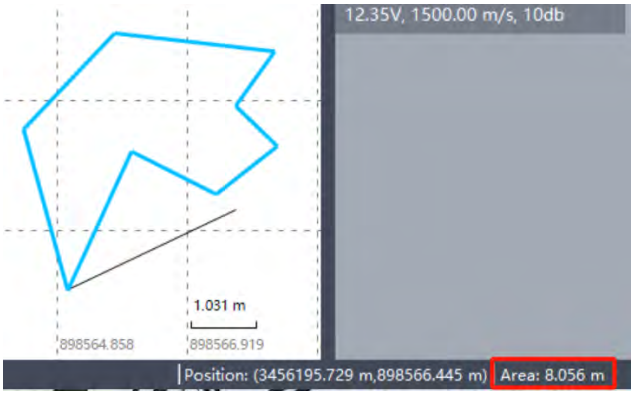
7.9.3 Query Line Length

Click on "Tools - Query Line Length" to check the length of the manually added line. Select the line and highlight it in blue, with the value displayed in the bottom right corner of the software.



7.9.4 Query area

Click "Tools - Query Area" to query the manually added closed line area, and the numerical value is displayed in the bottom right corner of the software.



7.9.5 Calculate coordinate conversion parameters

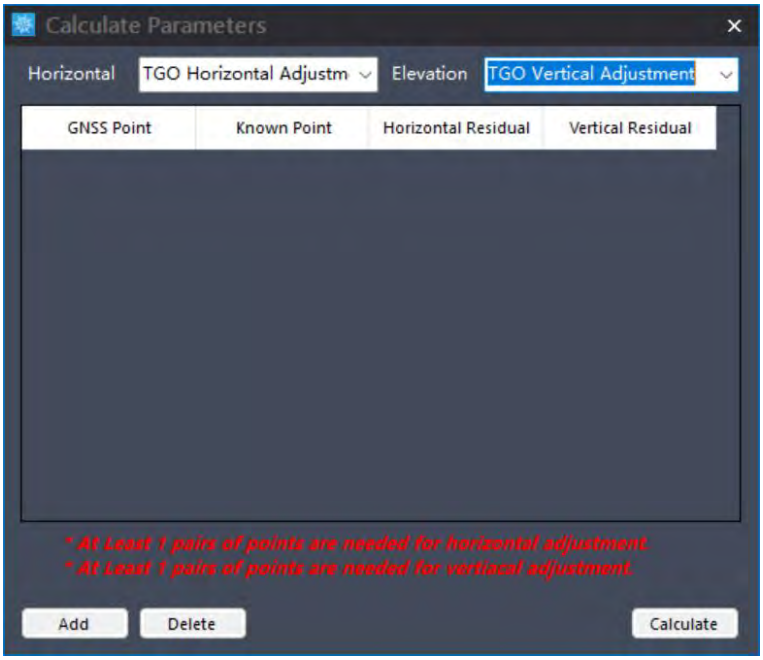
Click on "Tools - Calculate Coordinate Conversion Parameters" to input WGS 84 coordinates and local coordinates to calculate the conversion parameters. The horizontal transformation model includes TGO horizontal adjustment and ordinary four parameters; The vertical transformation model includes fixed difference, surface fitting, and TGO vertical adjustment.

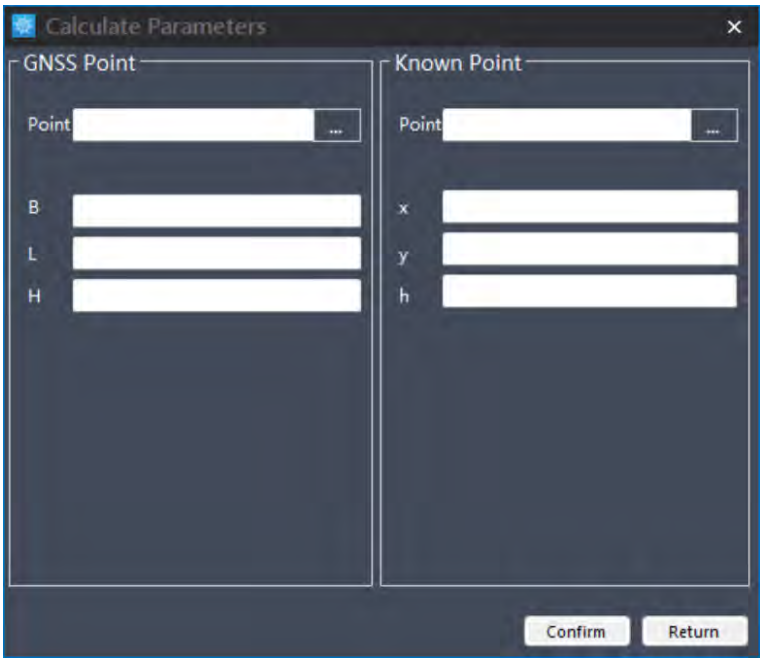
Click the "Add" button, the GNSS point is the WGS 84 coordinate, and the known point is the local plane coordinate.

Click the "List" button to select the corresponding point pairs in the coordinate library.

Click the "Delete" button to delete the selected point pairs from the list.

Click "Calculate" and then click "Apply" to remind whether to apply to the engineering coordinate system.

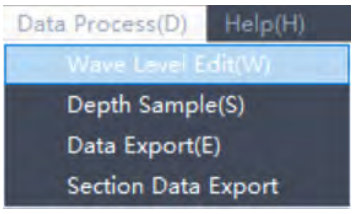


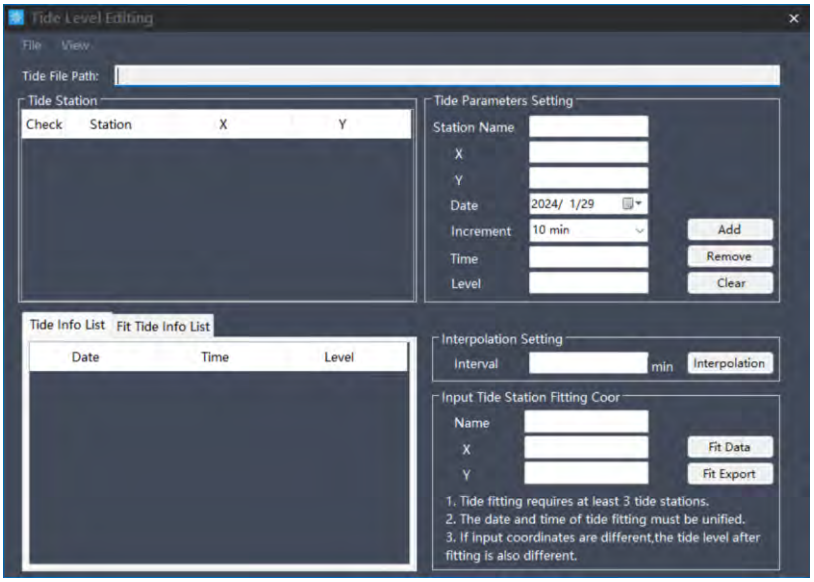


7.10 Data processing

7.10.1 Tidal level editing

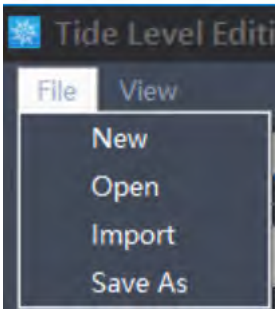
Click on "Data Processing - Tide Level Editing" to edit the tide level file, making it easier to correct the tide level during data processing.





File

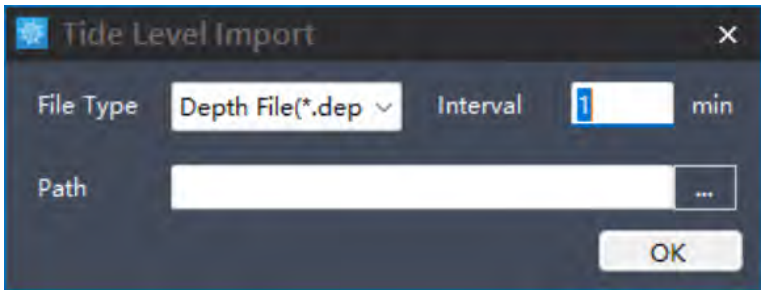
Select "File", the dropdown list includes "New", "Open Tidal Sounder", "Import Water Depth", and "Save As".



1) Click "New" to create a blank tide level editing table. After editing, a reminder will be given to save the edited tide level file;

2) Click "Open Tide Sounder" to open the edited tide level file;

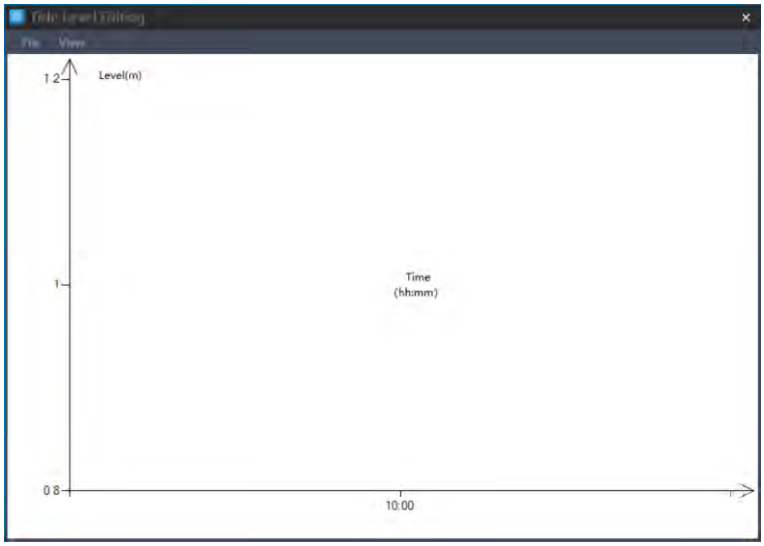
3) Click "Import Water Depth", select the file type as dep, enter the sampling interval, select the file path, and extract the ground height of the water surface inside as the tide level;



4）Click "Save As" to save the edited tide level file.

Chart style

Select "Chart Style", the dropdown list includes "Chart Style" and "Table Style".



Tide measurement parameter settings

You can enter the site name, coordinates X and Y, select the date and step, and enter the tide level to record the time and tide level.

After completing the input, click "Add" to add a tidal level and start inputting the tidal level for the next time period. Repeat the above steps;

Click "Delete" to delete the selected data in the tide level information table;

Click "Clear" to clear all data in the tide level information table.

Interpolation settings

In the tide level information table, interpolate one tide level data at every interval (linear interpolation algorithm).

Fit site/coordinate input

Fit the data from multiple tidal stations into a curved surface, and based on the input coordinate positions, fit the tidal information for the corresponding positions.

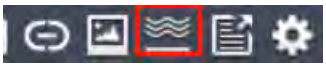
Note:

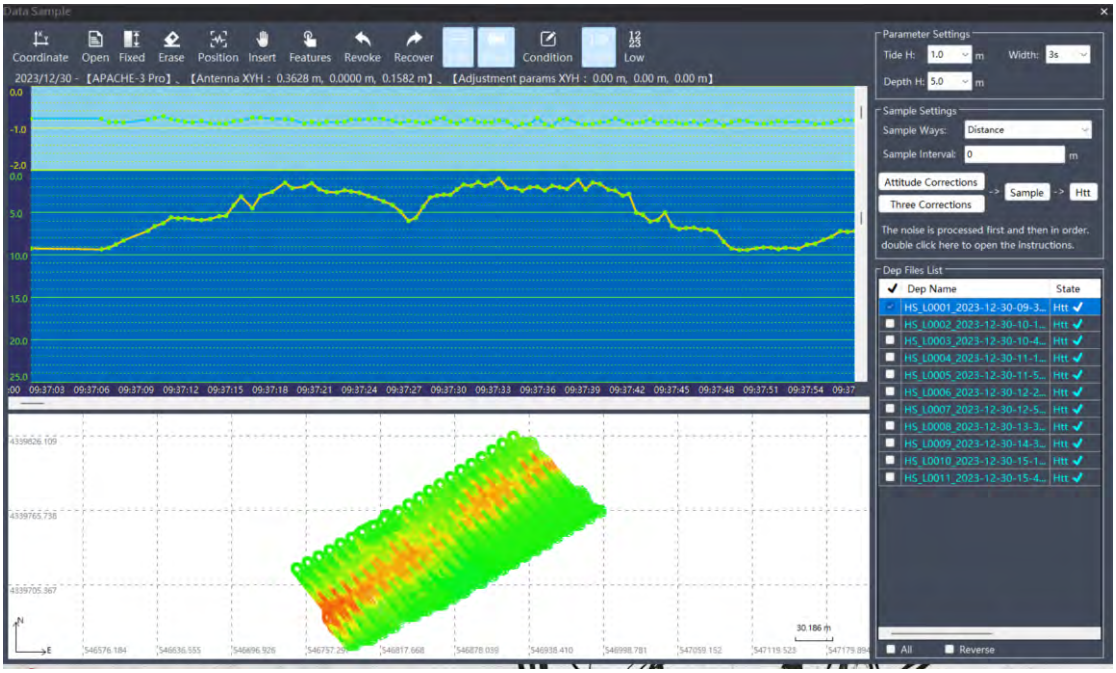
① At least 3 tidal stations are required for data fitting.

② The date and time of tidal level information from multiple tidal stations need to be consistent in order to perform the fitting function;

7.10.2 Water depth sampling

7.10.2.1 Fast Data Processing

1) Click on "Data Processing - Water Depth Sampling", or click on the "Water Depth Sampling" button in the shortcut bar ). Inspect/correct each measuring line in external measurement. Double click to open the survey line dep file, which will then display views such as base map, water depth, and waveform.



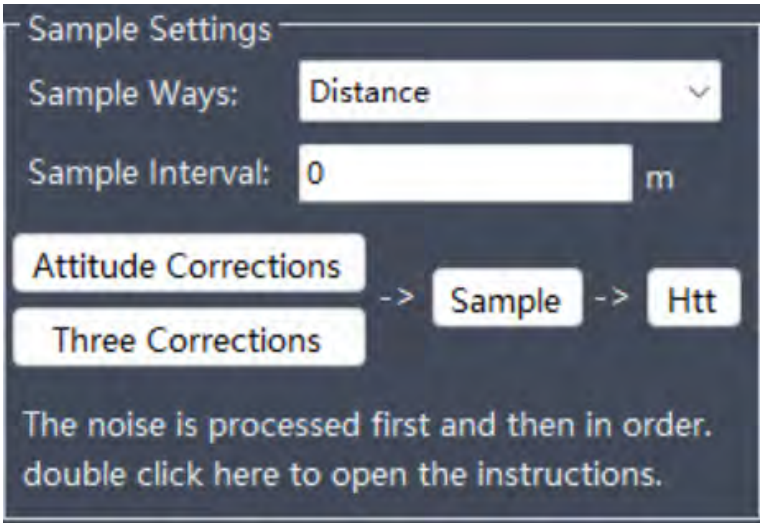
The main process of data processing (select the steps in parentheses as needed): noise processing → (data interpolation) → data correction → equidistant sampling → (manual sampling) → generate htt.

2) Inspect and denoise each measuring line for external measurement, and dilute it. According to the principle of terrain consistency, use an eraser to delete false water depth points that do not match the waveform, or drag the water depth points with the mouse until they match the waveform, as well as perform fixed interpolation and manual insertion operations.

3) Posture correction or three corrections, choose one of the operations and do not repeat the operation to avoid overwriting the previously processed data. (When making three corrections, simply click "skip" for the content that does not need to be corrected.)

4) Select the sampling method and sampling interval as needed, and click "Isometric Sampling".

If some areas are not sampled, you can click "Manual Sampling" to manually sample some feature points. If this function is not needed, skip the manual sampling step.



Click the "Generate htt" button to save to .htt file.

7.10.2.2 Top Toolbar Functions

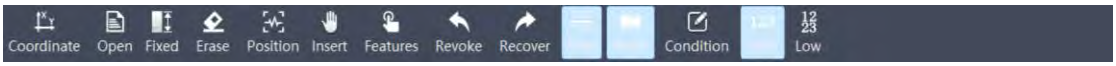
On the top toolbar, you can view the data collection date, antenna type, antenna deviation, and calibration parameters.

Measurement date: The date when the opened DEP file was collected.

Antenna type: The antenna type or USV type used in the opened DEP file.

Antenna deviation: The deviation between the antenna coordinates of the opened DEP file and the transducer coordinates.

Correction parameter: The northeast high offset of the coordinate parameters in the opened DEP file.

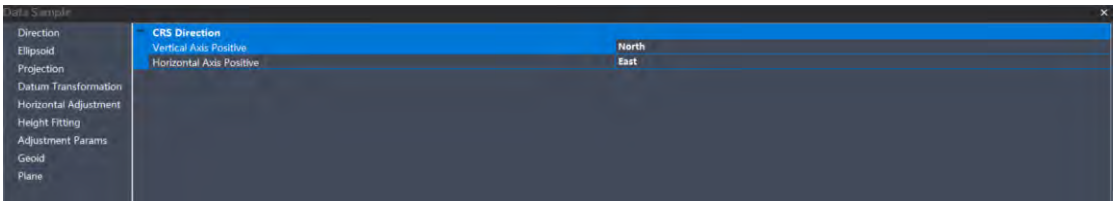


⚠Notes:

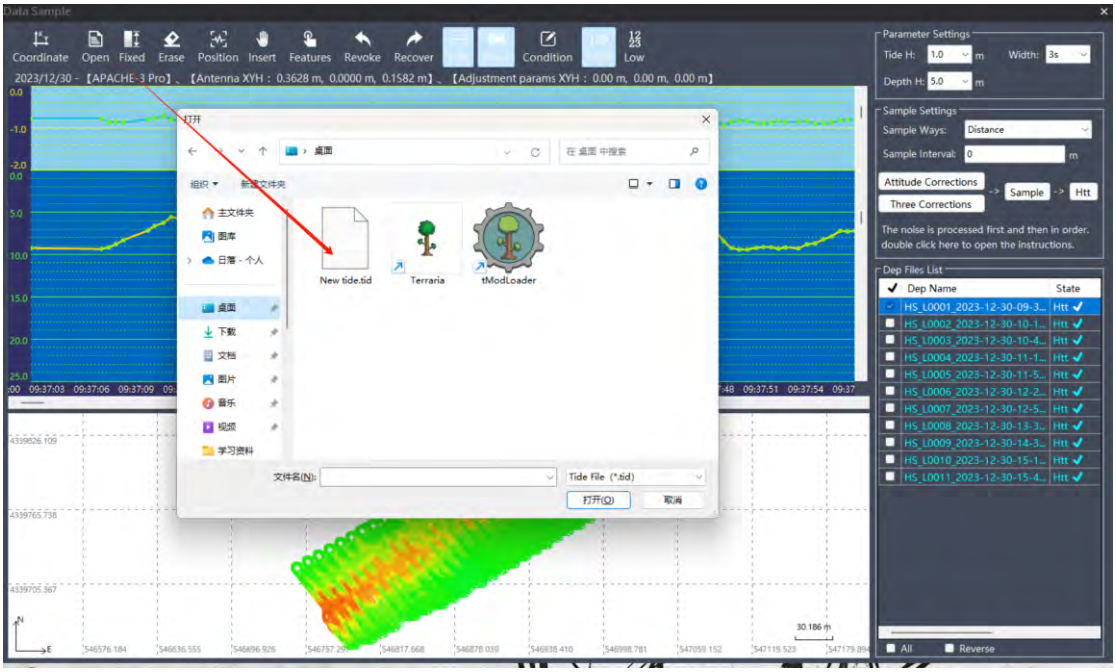
Before processing the data, it is necessary to check whether the ship type above corresponds to the USV model during measurement. If there is no corresponding model, the original dep file header needs to be manually modified before data processing.

1) Coordinate parameters:

View the coordinate system parameters of the current open project, but cannot make parameter modifications.



2）Open tide sounder: Import tide sounder files (*. tid). First, open the dep survey line, and then import the tid. The tid date and time should include the dep date and time. After importing, the water surface elevation will be processed using the elevation data in the tid file.



3) Fixed interpolation: Automatically correct water surface elevation data for non fixed solutions. Double click to open the dep survey line and select this button.

4) Eraser: After selecting this button, select or drag the water depth point with the mouse to delete the water depth data.

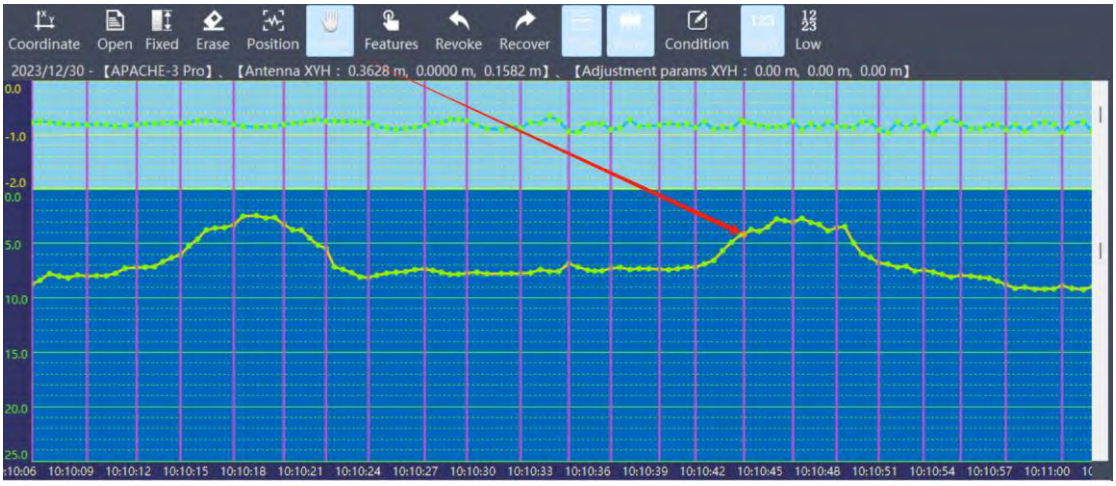
5) Waveform centered: The red waveform is displayed in the center.

6) Manual insertion: Manually insert custom record points before data correction operations.Within the depth view range, click on the waveform with the mouse to insert a new recording point at the corresponding time and water depth.

After inserting multiple points, post-processing can continue in order (data correction - isometric sampling - generating Htt).

7) Manual sampling: After the equidistant sampling operation, for the point data that has not been sampled, manual sampling can be performed, that is, feature point sampling.

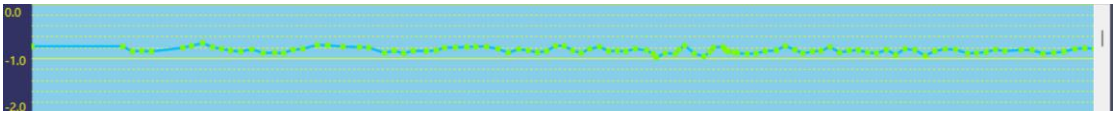
Select this button, select any non equidistant sampling point with the mouse, and a red sampling line will be automatically generated. After multiple operations, click "Generate Htt" finally.



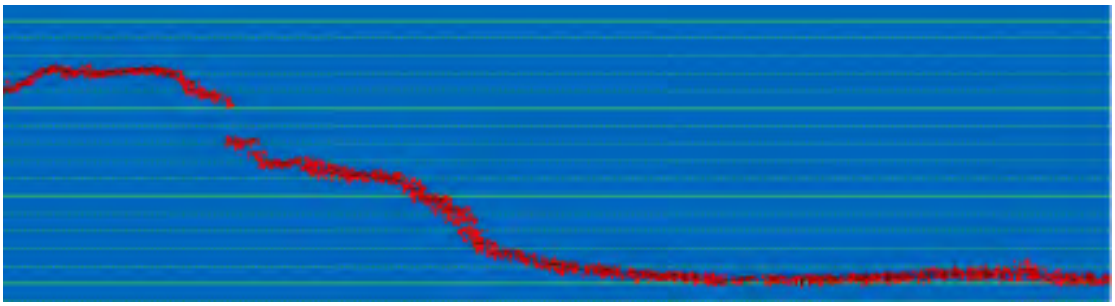
8) Revoke: Return to the previous step (drag point/delete point/add/delete feature point sampling line).

9) Restore: Restore the previous operation (drag point/delete point/add/delete feature point sampling line).

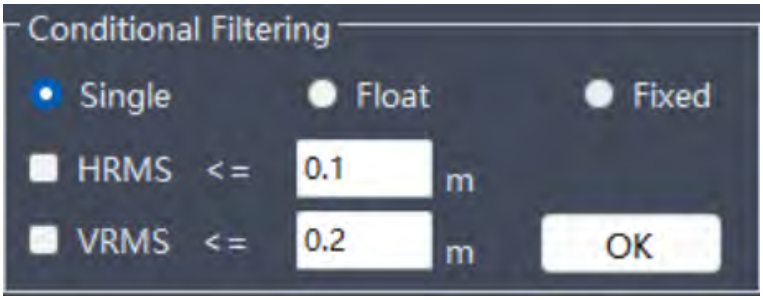
10) Tidal view: displays the elevation view of the water surface.



11) Display waveform: Display the waveform of the same time recorded in the opened DEP file (waveform file is. sd, stored in the project folder - RawData folder).



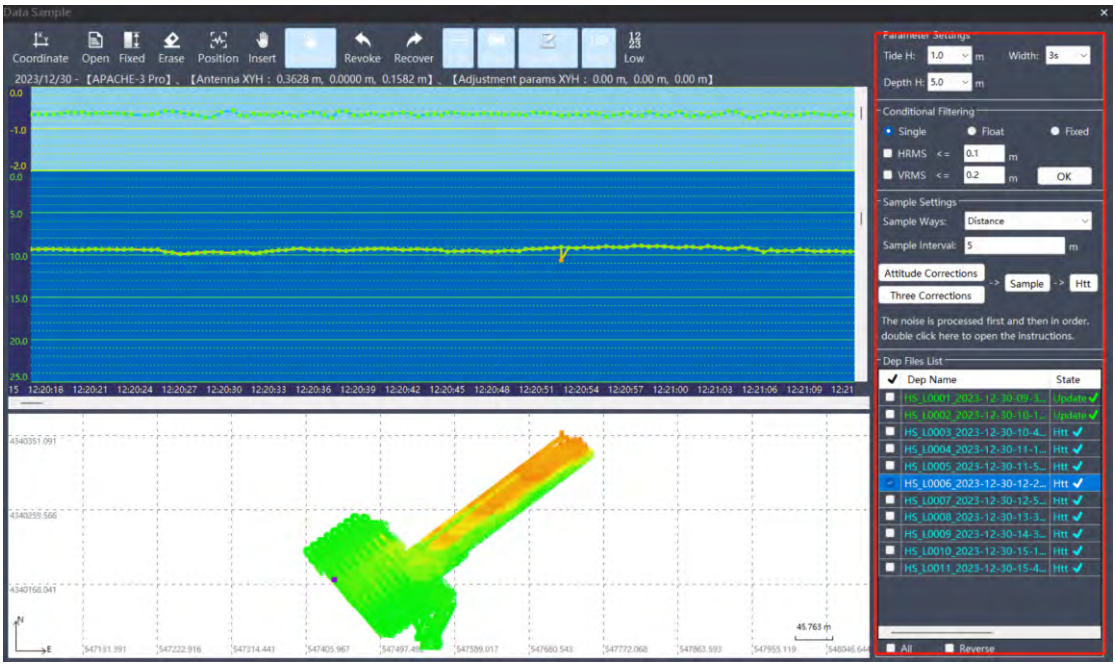
12) Filter criteria: Show/hide filter criteria.



13) High frequency: Single frequency sounder data (USV dep, D230, D270).

14) Low frequency: Dual frequency depth sounder data (D580).

7.10.2.3 Right Parameter Bar Function



1) Parameter settings

① Tidal height measurement: the vertical elevation interval of the tidal view;

② Water depth vertical height: the water depth interval in the longitudinal direction of the water depth view;

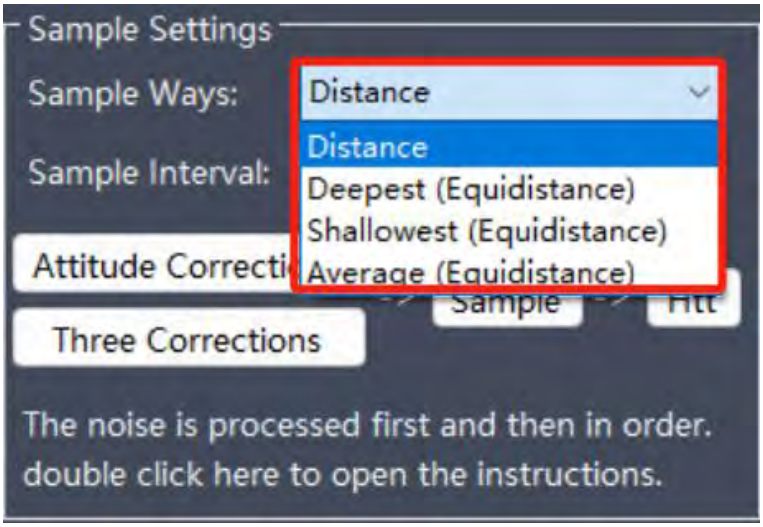
③ Horizontal width: The horizontal time interval of the view. For dense data, the horizontal width can be reduced to make it easier to handle.

2) Conditional filtering

Set filtering parameters (solution status/RMS accuracy), then double-click on the dep line in the line list to filter and display it in the view;

Alternatively, double-click on the dep line, select the filtering criteria, and click the "OK" button to display it in real-time.

3）Sampling settings



① Distance sampling: Take a point every X distance (>=X, unit: meters);

② Deepest (within equidistant intervals): Within equidistant distances X, take the deepest water depth point data as the sampling point;

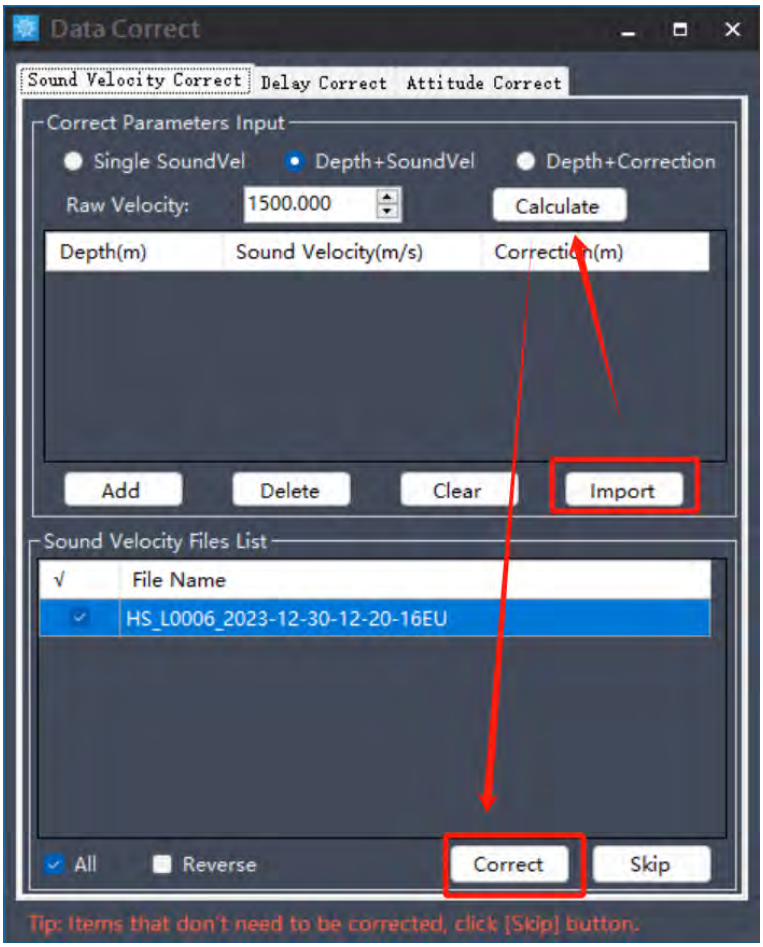
③ Shallow (within equal spacing): within equal spacing X distance, take the shallowest water depth point data as the sampling point;

④ Average value (within equal intervals): Within an equal interval of X distance, take the average of all water depth data as the water depth point, and the sampling point is determined by distance sampling;

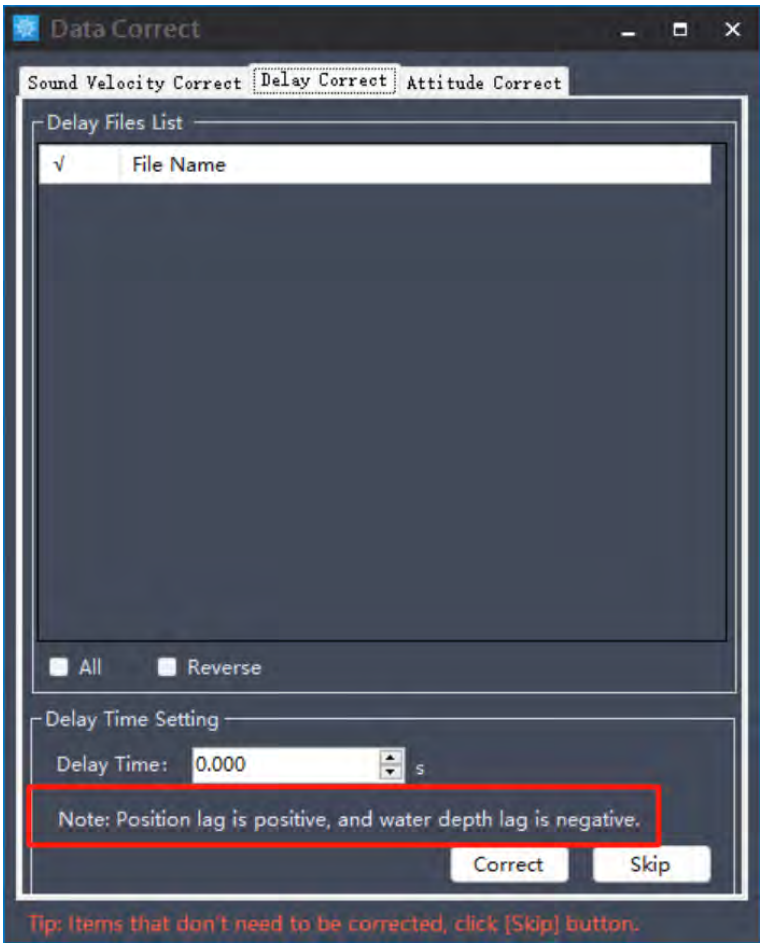
4) Attitude correction: only perform attitude compensation correction;

5) Three corrections: speed correction/delay correction/attitude correction;

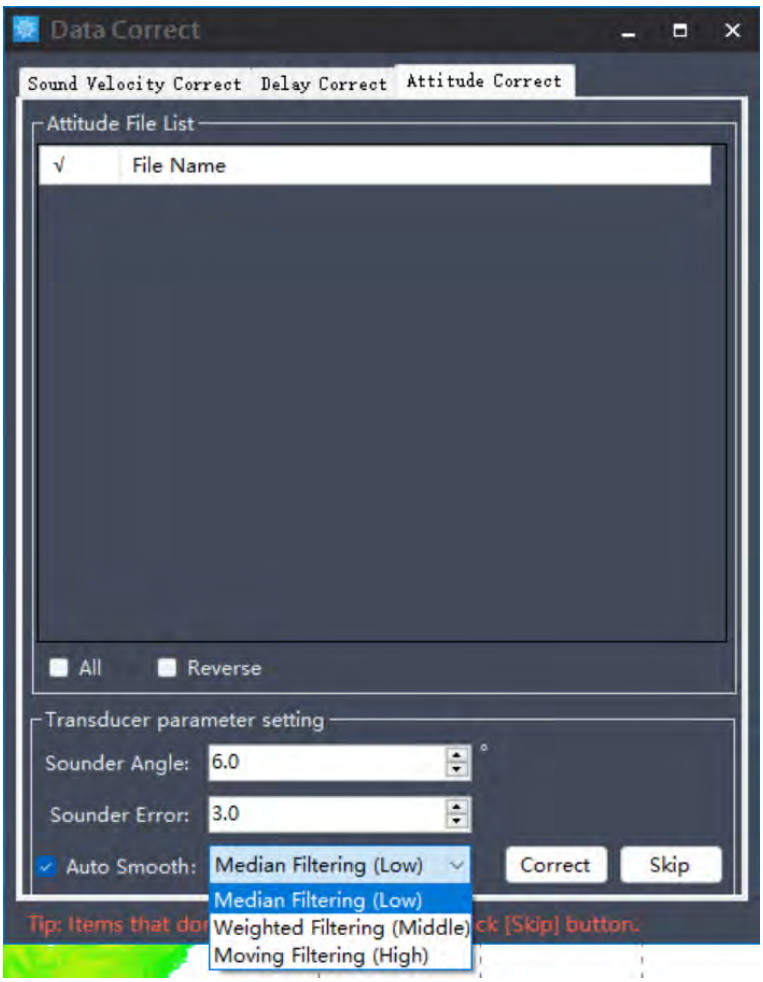
Sound speed correction: Three correction modes can be used: "single sound speed", "depth+sound speed", and "depth+correction value". After completing the parameter input, click "Sound Speed Correction" to complete the correction or click "Skip" to enter "Delay Correction".



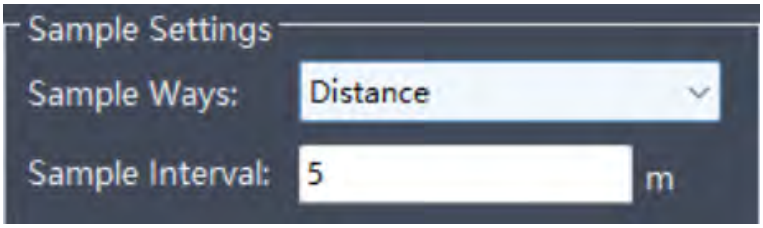
Delay correction: Enter the delay time for water depth and position. The position lag is positive and the water depth lag is negative. Click "Delay Correction" to complete the correction or "Skip" to enter "Attitude Correction".



Attitude correction: Input the opening angle of the transducer, the installation error of the transducer, select the automatic filtering method (median filtering, weighted filtering, sliding filtering), click "delay correction" to complete the data correction, or click "skip" to not make the correction.



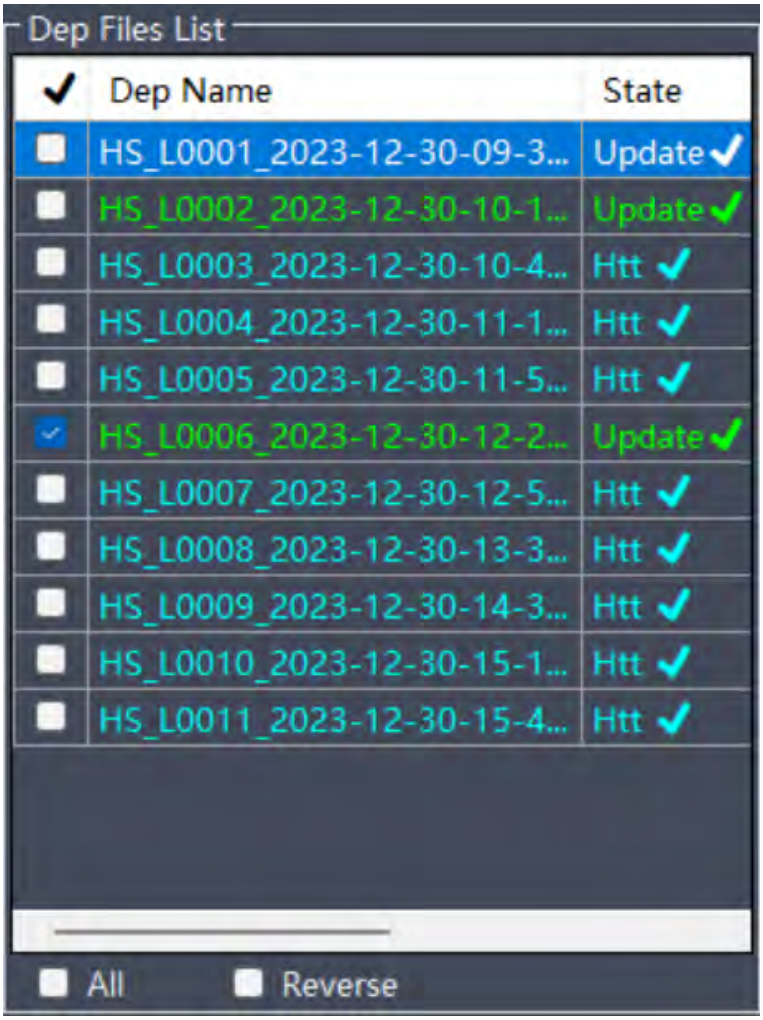
Equidistant sampling: After data correction and correction, sparse sampling is performed according to the sampling interval (the points on the pink line are equidistant sampling points);



7) Generate htt: Dilute the sampled data and record it in the HTT file (the data export function will automatically open this directory);

8) Line List: Display the line (DEP) files included in the task, as well as the line processing status. Double click to open the line.

After opening the survey line, the water depth data and elevation data will be displayed. Moving the mouse over the water depth point or elevation point will display detailed information.



7.10.2.4 Precautions

1）Data post-processing must be executed in order. If it is found that noise needs to be reprocessed after isometric sampling is completed, it needs to be executed in order to take effect after the noise processing is completed. The main process of data processing is as follows (select the steps in parentheses):

Noise processing → (Data interpolation) → Data correction → Isometric sampling → (Manual sampling) → Generate htt.

2）When using tidal data, the time range of the measuring line data should be within the time range of the tid tide level. After importing the tide level file of tid, it is applicable to each measuring line. Secondly, after importing tid, the horizontal time range of its view is within the time range of tid.

7.11 Data export