GreenValley International

LiGrip O2 Lite Product User Manual

Preface

Purpose of the User Manual

This user manual describes the operation processes of the LiGrip O2 Lite, including assembly, data collection, processing, etc.

Scope of Application

Applicable to the LiGrip O2 Lite product.

Safety Technical Tips

Precautions: Please carefully read the areas where you need to pay attention during the operation. Failure to follow the instructions may result in device damage, data loss, incorrect data, system crashes and so on.

Disclaimer

Before operating the device, please make sure to carefully read this user manual, as it will help you use this product better. Our company is not responsible for any losses caused by operating this product without following the instructions in the manual or by misinterpreting the requirements of the user manual. Our company is committed to continuously improving product functions and performance, enhancing service quality, and reserves the right to change the content of the user manual without prior notice.

We have checked the consistency between the content described in the printed materials and the hardware and software, but deviations may still exist. The images in the manual are for reference only. If there are discrepancies with the actual product, please refer to the actual product.

Your Suggestions

If you have any suggestions or comments regarding this manual, please contact us. Your feedback will greatly improve the quality of our manuals.

1. Product Structure

1. 1. Structural Diagram

1. 2. Packing List

 O2 Lite Main Unit (including antenna)	 Smart Battery	 Base Stand
 Charger (Power charger and adapter included)	 USB Drive	 Lidar&Camera Protective Cover
 Phone Holder and accessories	 Packaging Box	

1. 3. Device Indicator Light Introduction

Power Indicator Light	
Power Indicator Light (Button)	Used to control power on/off and display power status.
Not Lit	Device is not powered.
Green Fast Flash	Device is powering on/off.
Green Ever Bright	Device is in power-on state.

Data Collection Status Indicator Light	
Data Collection Status Indicator Light (Button)	Used to control collection and indicate device activation and collection status.
Not Lit	Device is not powered.
Red Ever Bright	Device not activated OR memory below 5%.
Green Ever Bright	Device is ready.
Green Fast Flash	Initializing or in GCP collection.
Green Slow Flash	Collecting data

2. Control Software Download and Login

2. 1. Software Download

APP requirements for phone/tablet:

Android version: System version 8.0 and above; Memory greater than 6 GB.

iOS version: System version iOS 12 and above; Processor A10 and above.

Before collecting data, ensure the APP is up to date. You can upgrade online through the 'Version Upgrade' feature.

Device registration, project management, coordinate system settings, RTK settings, and real-time point cloud browsing must be done through the GreenValley APP.

Download address: https://licloud.greenvalleyintl.com/api/v1/softwares/147/package

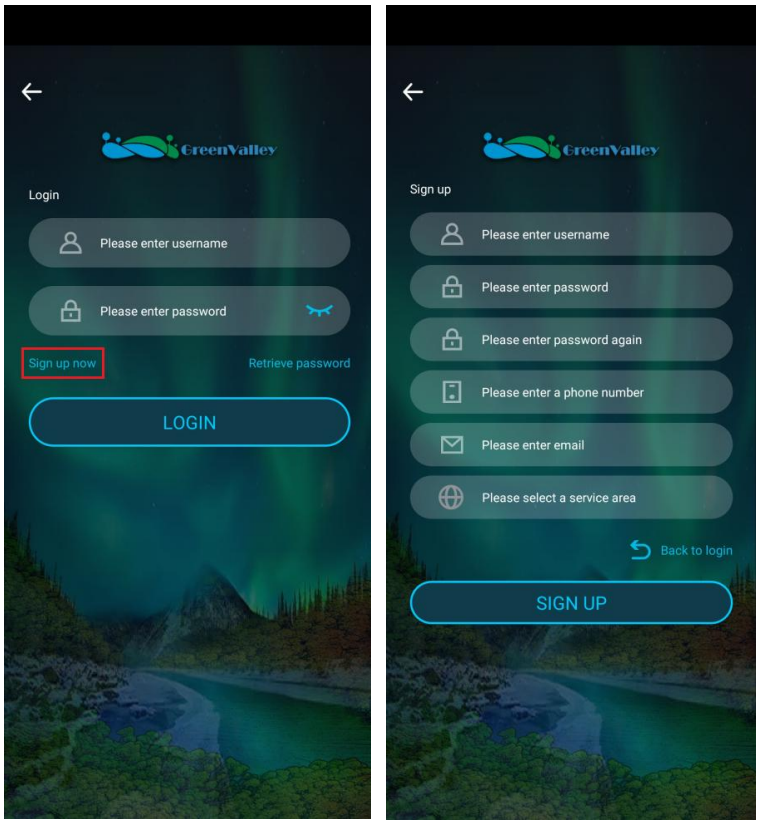
Or scan the QR code below to download (left: iOS, right: Android)

2. 2. Registration and Login

Register and activate using an email.

When logging into the APP for the first time, click 'Sign up now' on the login screen and enter basic information such as email, username, and password to complete registration.

Please ensure the email is entered correctly. If you forget your password, you can retrieve it via email.



3. Device Installation and Disassembly

3. 1. Installation

After unpacking the device, take out the main device, battery, and base stand. Follow the steps below for installation:

 ① Remove the protective cover.	 ② Open the locking handle, align the battery with the groove at the bottom of the device, and slide it in.

<table>
<tr>
<td> 
③ Close the locking handle.</td>
<td> 
④ Align the base stand with the battery ground hole.</td>
</tr>
<tr>
<td> 
⑤ Tighten the screw at the bottom of the base stand.</td>
<td> 
⑥ Device assembly complete.</td>
</tr>
</table>

3. 2. Disassembly

The antenna does not need to be disassembled. Refer to the following steps for disassembly:

		
① Open the locking handle.	② Press the anti-drop button and slide out the battery.	③ Loosen the base stand screw and remove the battery.

4. Device Power On/Off

4. 1. Power On

Press and hold the power button until it flashes, then release. The device will power on automatically. The power indicator light and data collection status indicator light will be solid green, indicating the startup is complete.

Press and hold the power button.

Green light flashes.

Power indicator light and data collection indicator light are solid.

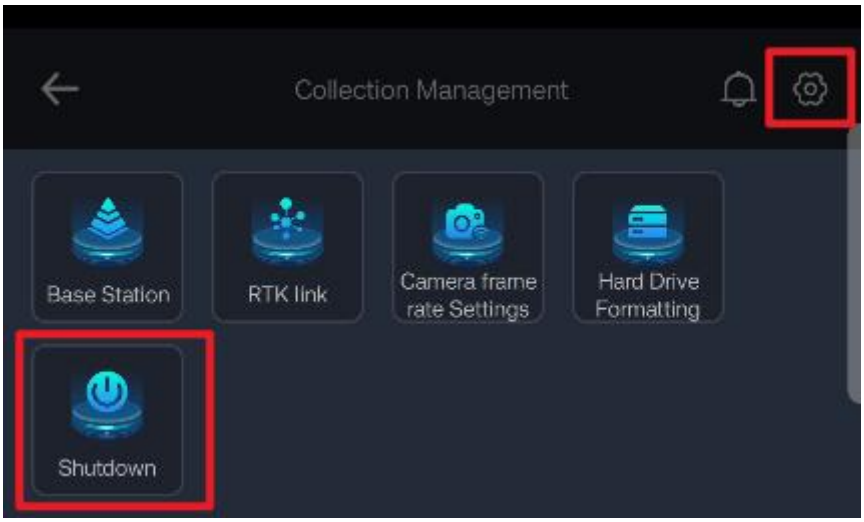
When the device is not activated or available memory is less than 5%, the data collection indicator light will be solid red.

4. 2. Power Off

The device can be powered off in two ways:

（1）Press and hold the power button until the indicator light flashes quickly and then automatically turns off, indicating the device has shut down completely.

（2）Once the app connects to the device, open the settings in the upper right corner, click shutdown, and wait for the indicator light to automatically turn off, indicating the device has shut down completely.



5. Device Connection

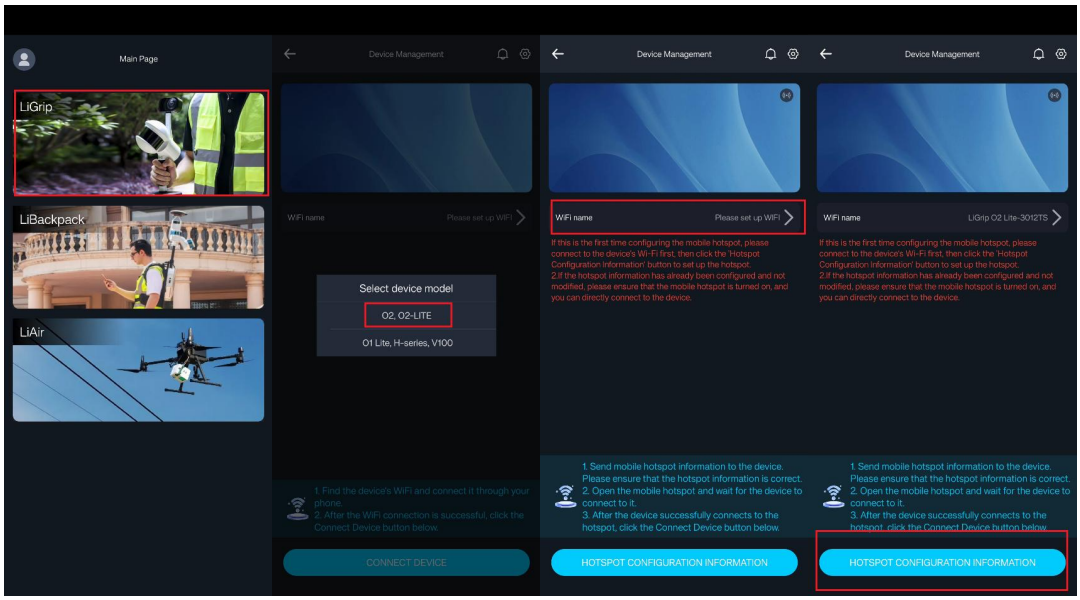
After the device is powered on, open the APP, select LiGrip, select O2 lite for the device model, and connect the device Wi-Fi. then configure the hotspot information of the cell phone (hotspot name and password) and send it to the device, and turn on the cell phone hotspot (if prompted to turn off the cell phone mobile network, please follow the prompts to do so, and you

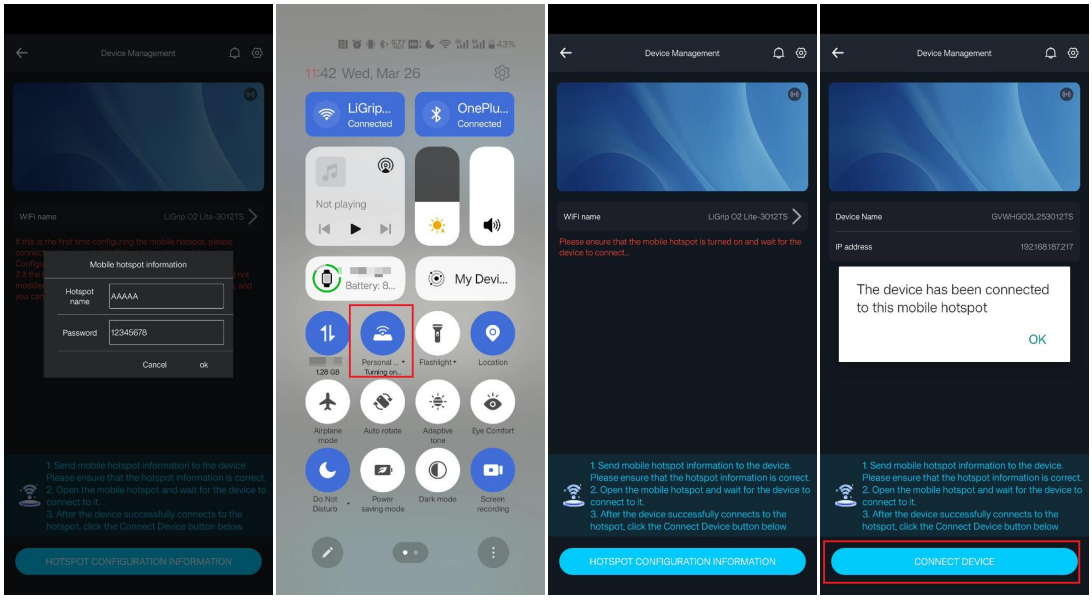
can turn on the cell phone network again when the device is connected successfully), and the device is successfully connected to the cell phone hotspot. After the device is successfully connected to the cellular hotspot, the device name and IP address will appear, then click Connect to complete the connection.

The WiFi name of the device is LiGrip O2 Lite-** (the last four digits of the SN), and the password is: greenvalley.**

Configuring the hotspot is only required when connecting for the first time, you don't need to configure the hotspot again for subsequent connections, just turn on the hotspot and it will connect automatically.

If it is found that the previously connected device cannot be connected, it is necessary to confirm whether the device has been connected to someone else's hotspot. If it has been connected to someone else's hotspot, the device needs to be restarted and someone else needs to disconnect the hotspot.

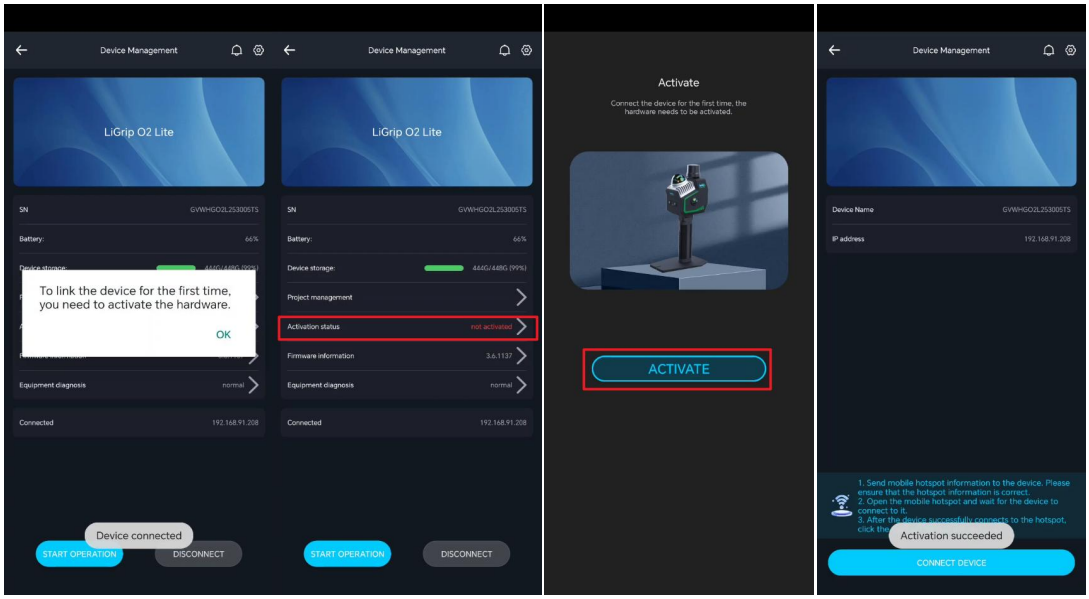




6. Activate Device

When connecting the device for the first time, the activation status bar will display 'Not Activated'. You can click on the activation status to activate it. After the APP pops up the activation window, click 'Activate' and wait for the activation to succeed.

Ensure that the device can access the internet through a mobile network or other external WLAN during activation.



7. Configure GNSS

When configuring GNSS, please do so in an outdoor area with good satellite reception. This step is optional and can be chosen based on actual operational needs.

If data does not require absolute coordinates or a physical base station has already been set up, GNSS configuration can be skipped, and you can proceed directly to the next operation step.

① Network CORS Configuration (RTK Mode)

Click the settings button at the top right corner of the APP, select the RTK link, and then configure it according to the RTK settings parameters provided by the CORS service provider. Once successful, the system will prompt that the configuration is successful. At this point, wait for the APP to display a fixed solution, or move the LiGrip to find a position where it can be fixed.

RTK settings:

(1) Data link: The default is the handheld network.

(2) Communication protocol: The default is CORS.

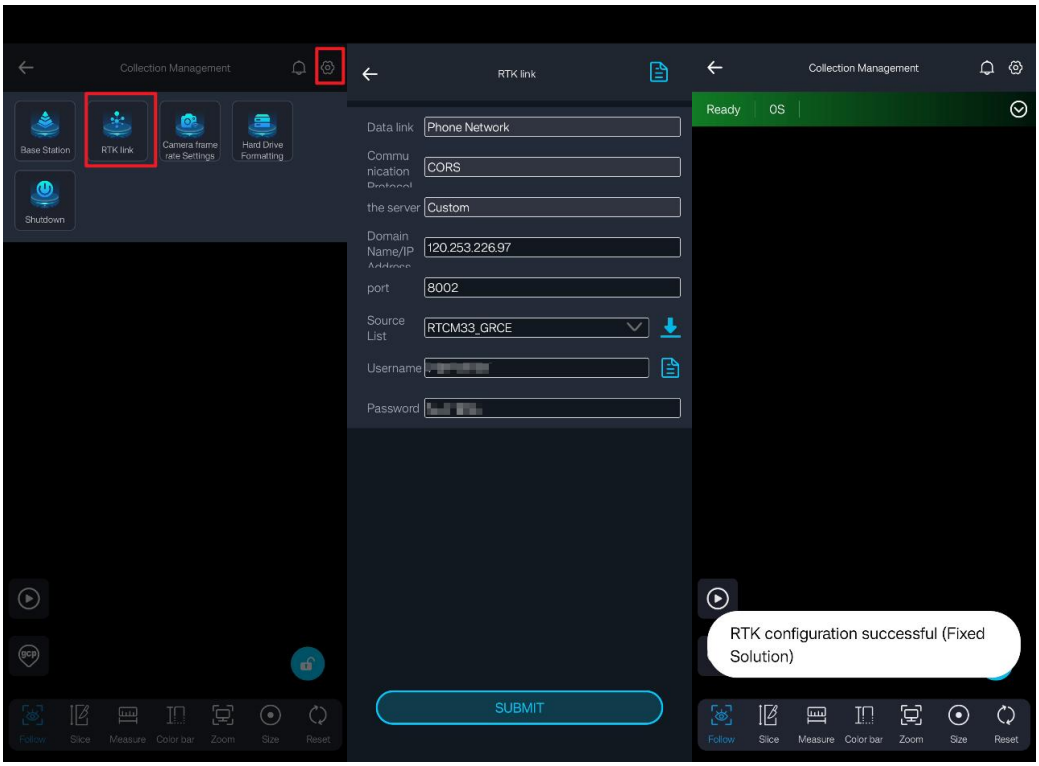
(3) Server: Support customization.

(4) Domain name/IP address: Refers to the domain name/IP address of the currently logged-in CORS account, which varies for different servers.

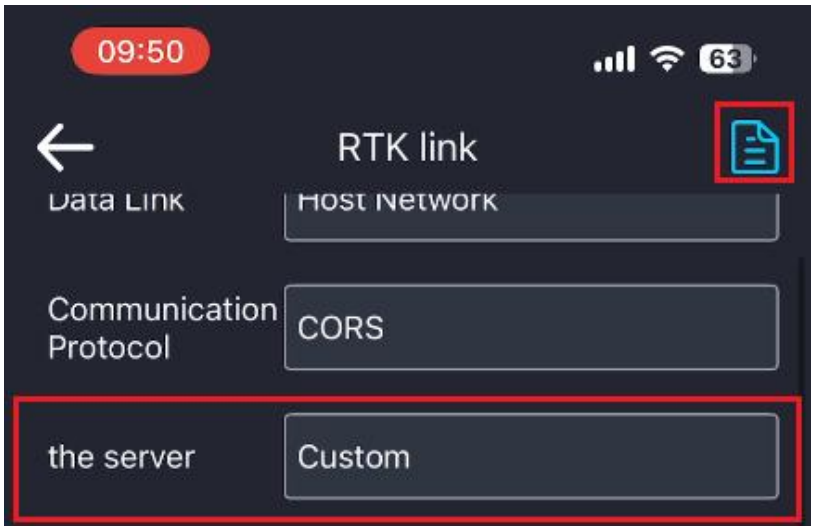
(5) Port: Users can select/input different ports according to the actual coordinate system requirements.

(6) Source List: Users can select/input different source lists according to various differential requirements, or automatically download the source list using the download button.

(7) Username/Password: Refers to the CORS account and password for server login.



For server selection **customized** and successfully configured, you can directly click to access historical configuration records and select previous configuration records for quick configuration.



8. Data Collection Process

Before starting data collection, please check and remove the laser protective cover. If GNSS configuration is needed, please configure it in advance. If the data does not require absolute coordinates or a physical base station is already set up, GNSS configuration is not necessary.

The O2 Lite supports two data collection modes: button-based collection and smartphone APP-based collection.

Button-based collection allows you to operate more freely without relying on a smartphone.

APP-based collection can display real-time point cloud, configure RTK, manage projects, and perform other interactive operations.

	Collection Methods							Real-time Point Cloud	
	Pure SLAM	GCP	RTK	PPK	Breakpoint Continuation Scan	RTK+SLAM (Pole Mode)	Open Area Collection	Display	Save
APP Collection (Recommended)	√	√	√	√	√	√	√	√	√
Button Collection	√	√	×	√	×	×	√（PPK）	×	√

8. 1. Collecting Data Using the APP

8. 1. 1. Regular Data Collection Process

（1）Initialization position selection

The placement of the device before data collection, i.e., the selection of the initialization position, must meet the conditions for the initialization program to run, which is a prerequisite for obtaining better data.

① Choose a stable ground or platform to place the device.
② **Please keep the device stationary during initialization.**
③ There should be no strong electromagnetic interference nearby.
④ Do not initialize facing moving objects, such as in areas with high pedestrian or vehicle traffic.
⑤ If the collection scene is a cave, the device should face the direction of advancement in the cave during initialization.
⑥ If the collection scene is not an open area, do not initialize in an empty area, such as a square or playground.
⑦ If the collection scene is an open area or requires GNSS operation, please perform initialization in an area with a good GNSS satellite signal. It is recommended that the number of satellites be ≥20.

（2）New acquisition

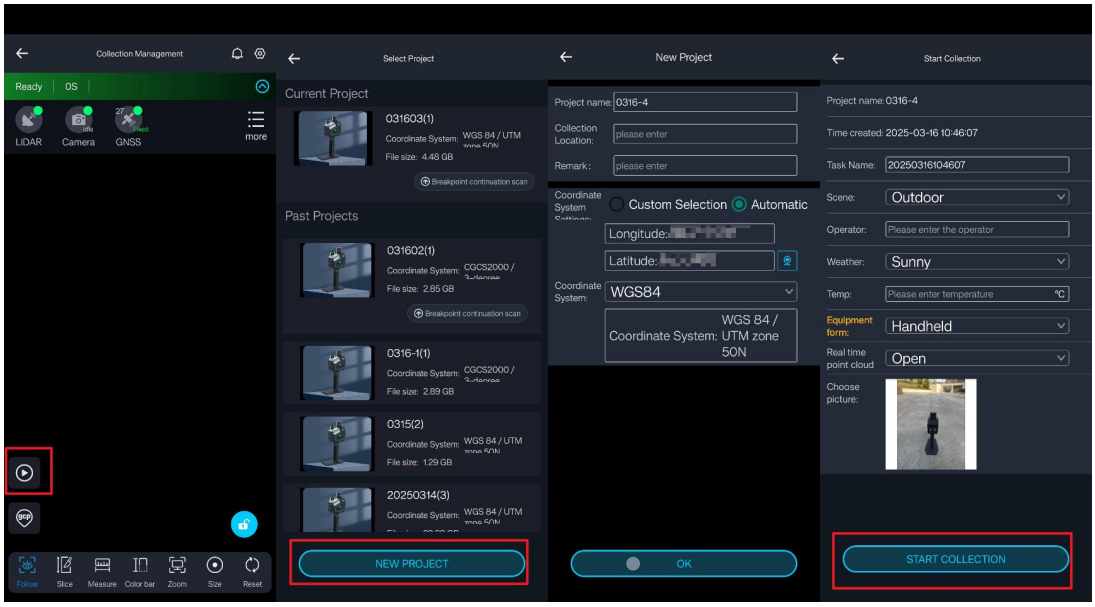
After connecting the device through the APP and configuring the RTK link, there are two methods to create a new acquisition. Click 'Start Operation' to enter the control acquisition interface, click the 'Start Acquisition' button, and choose an existing historical project or create a

new project.

① If you choose to create a new project, fill in the project name, collection location, and set parameters such as the coordinate system. Then select the newly created project to create a new acquisition.

② If you choose a historical project, you can use an already created project and then establish a task.

Tasks will be saved under the selected project, so please be sure to choose the correct project.



Information about the collection task can include the task name, scene, operator, weather, temperature, device form, real-time point cloud, on-site photos, etc.

（1） Project Name: Displays the project to which the current collection task belongs.

（2） Creation Time: Displays the time when the current project was created.

（3） Task Name: The system generates a default task name, and users can modify the name of the current collection task. Try to avoid using spaces.

（4） Scene: Select the collection environment for the current scene, including Outdoor, Indoor, Outdoor+Indoor, and Open Area.

The choice of scene is related to the results and display of the real-time point cloud. Please choose correctly.

Outdoor: Building areas, urban roads.

Indoor: Completely enclosed scenes.

Outdoor+Indoor: Both outdoor and indoor scenes.

Open Area: Completely open outdoor scenarios, such as grasslands, beaches, river

channels, suburban roads, etc.

（5） Operator (optional): Record the current operator.

（6） Weather (optional): Record the current weather conditions.

（7） Temperature (optional): Record the current temperature.

（8） Device Form: Select the mode of the device during operation, including LiGrip and pole.

（9） Collection Mode: RTK+SLAM or SLAM, applicable only to the pole form.

（10） Pole Height: Applicable only to the pole form.

（11） Real-time Point Cloud: Enabled by default, choose whether to save the real-time point cloud; must be enabled when breakpoint continuation scan.

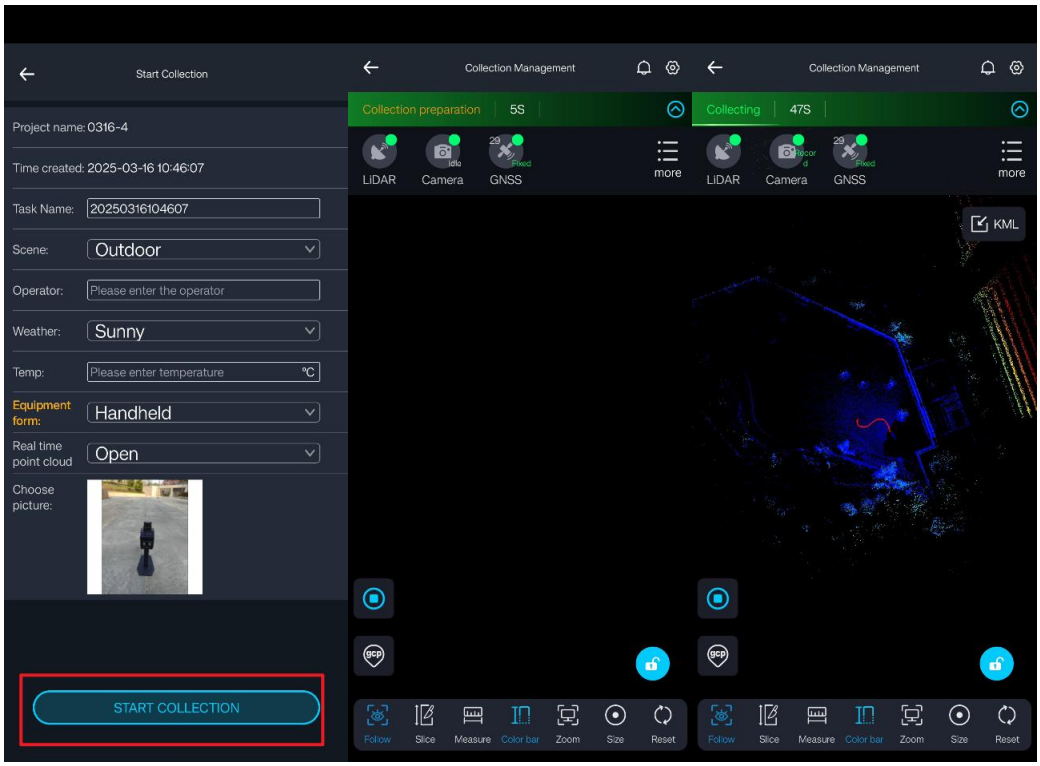
（12） Select Image (Optional): You can take a picture of the current data collection environment to facilitate subsequent data analysis.

Apart from the task name, which is mandatory, all other options are optional. The Device Form and parameters vary depending on the device. The O2 Lite supports both LiGrip and Pole Mode. When using the telescopic pole, please select Pole Mode; in all other cases, use LiGrip mode.

（3）Initialization

After clicking start collection in the previous step, the device enters Initialization, and the APP provides a voice prompt. The Data Collection Status Indicator Light will be in **Fast Flash** state.

Wait for the APP device status to change from '**Preparing for Collection**' to '**Collecting**'. When the APP voice prompts '**Device is collecting**' (status light **Slow Flash**), Initialization is complete.



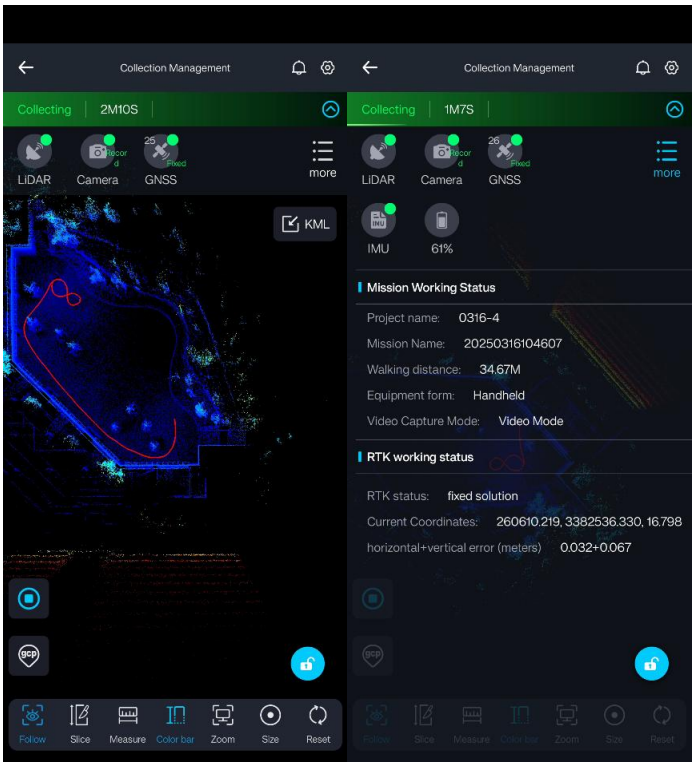
Initialization must be performed while stationary.

（4）Start data collection

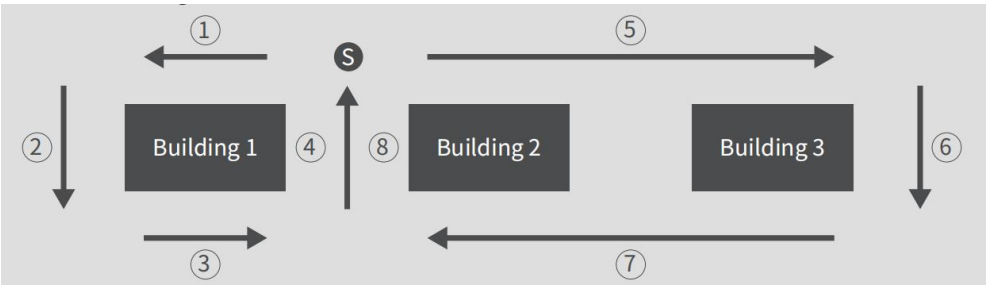
There are two scenarios based on whether an open area was selected when creating the project.

Scenario 1: If a non-open area (indoor, outdoor, indoor + outdoor) is selected when creating the project for data collection.

After initialization is complete, you can slowly pick up the device and proceed with data collection according to the pre-planned route.



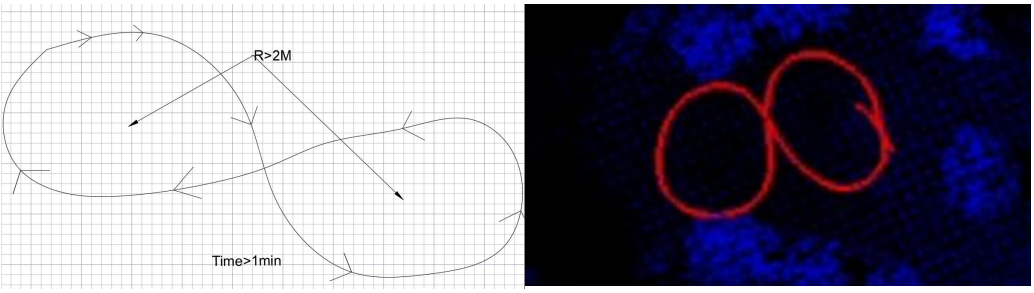
When operating without GNSS or in environments with poor GNSS signals, SLAM's cumulative error requires a close-loop, so you need to plan according to the following route principles.



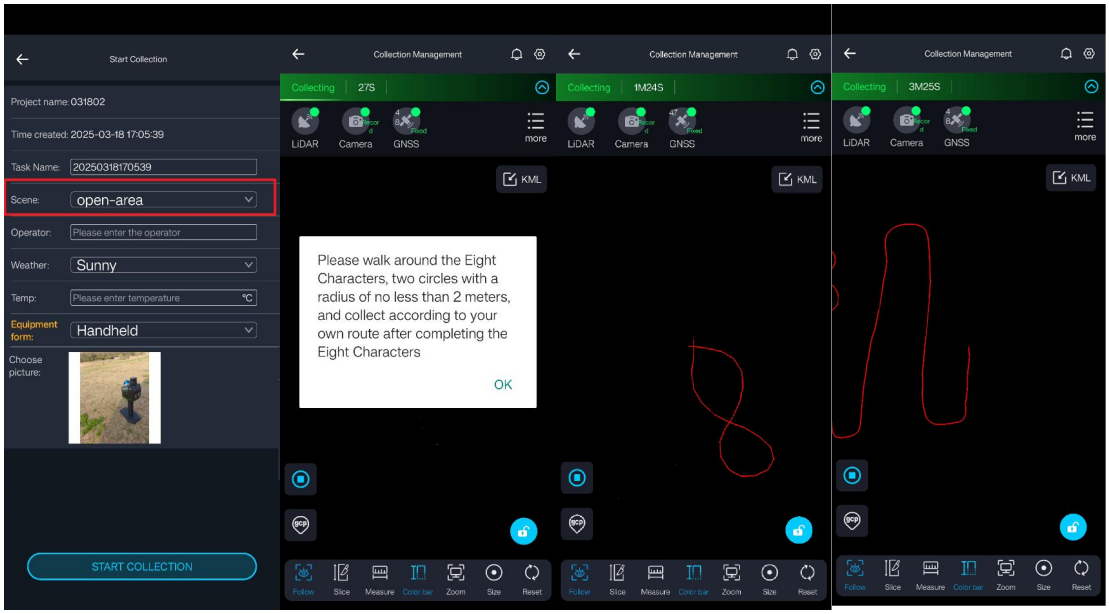
As shown in the diagram above, start from point S, then perform close-loop operations as much as possible (the numbers in the diagram indicate the sequence), and finally return to the original point (repeat the path for 5-10 meters).

Scenario 2: When creating a project during data collection, select an open area environment.

After initialization is complete, follow the software prompts to perform a figure of eight (two circles with a radius of no less than 2 meters). After completing the figure of eight, proceed with data collection along the pre-planned route.



Do not stop while performing the figure of eight.



In an open area scenario, the APP only displays a single frame point cloud.

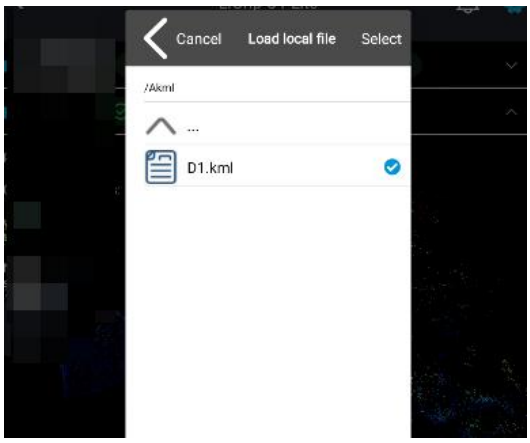
（5）Import KML (Optional operation)

Optional when configuring RTK and performing operations.

When there is an RTK fixed solution, after walking a certain distance during normal collection, an import KML icon 

will appear on the right side of the collection control interface.

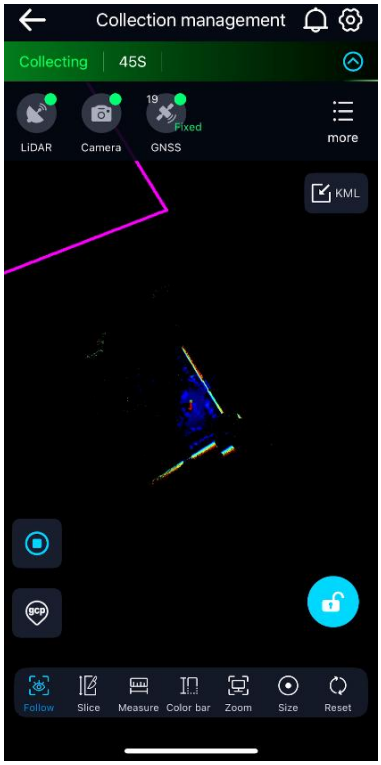
For Android: You need to select the KML file from the local phone file directory.



For iOS system: Before importing a KML file, you should open KML at any location, choose "open with GreenValley",and import it into the GreenValley APP.

Then you need to select the KML file from the GreenValley APP.

During the import process, the system will reset the point cloud display, and after the reset is complete, the point cloud and KML file will be displayed again.



（6）GCP collection (Optional operation)

This is optional when GNSS is not configured, but you want to introduce absolute coordinates to the data through GCP.

For cases where a close-loop is not possible, or absolute coordinates need to be introduced, GCP collection is required to substitute coordinate positions or eliminate accumulated error.

When collecting data on the move, squat down slowly and align the GCP pointer with the

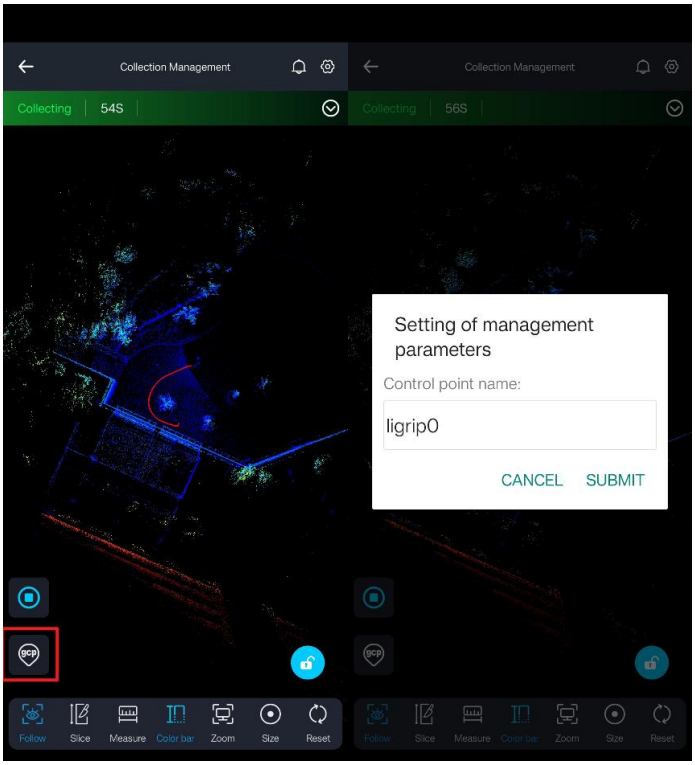
position that needs GCP collection.

Note: During the GCP collection, do not gather people around to avoid affecting the precision of the GCP collection.

Click the "GCP Collection" button on the APP screen (you can change the name of the GCP collection, the default is LiGrip *, where * is a number that automatically increases with each GCP collection). At this time, the device status light will turn to **Fast Flash**.

Note: During the GCP collection, please keep the device stationary.

The GCP collection ends when the APP prompts "GCP collection completed" or when the status light changes to **Slow Flash**.



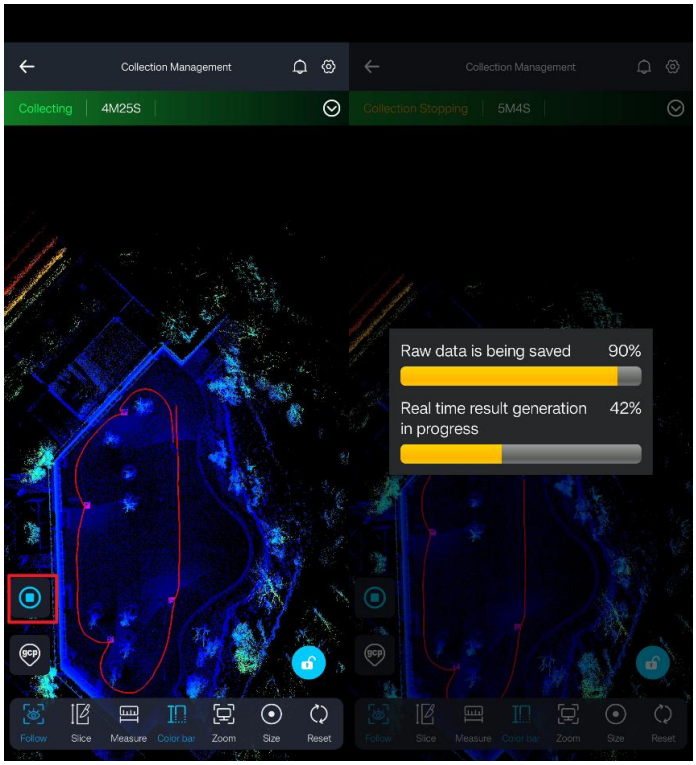
（7）End collection

Whether to perform a figure of eight depends on whether the collection scenario is in open area mode.

Scenario One: If the collection scenario is not in open area mode, there is no need to perform a figure of eight.

Scenario Two: If the collection scenario is in open area mode, please perform a figure of eight as required at the start of open area mode.

When about to finish, please place the device on the ground or a platform. Press the stop collection button (the status light changes to **Fast Flash),** and after the progress bar ends, proceed to the next collection.



After pressing the stop collection button, as long as a progress bar appears, you can move the device and wait for the data to be saved.

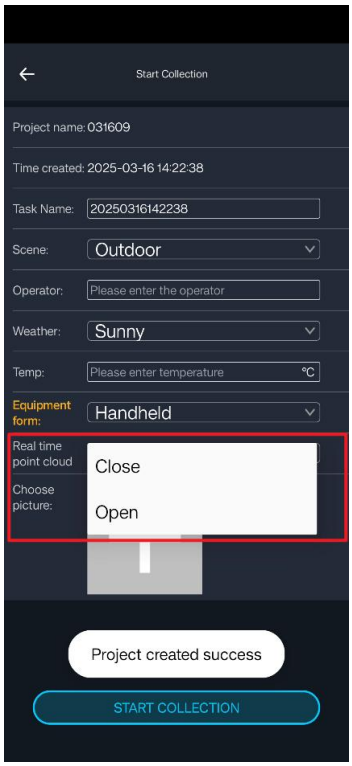
8. 1. 2. Other Collection Functions

（1）Breakpoint continuation scan (Optional operation)

When GNSS collection is unavailable, breakpoint continuation scan allows the spatial data consistency between different flights. It can be performed on tasks with real-time point cloud.

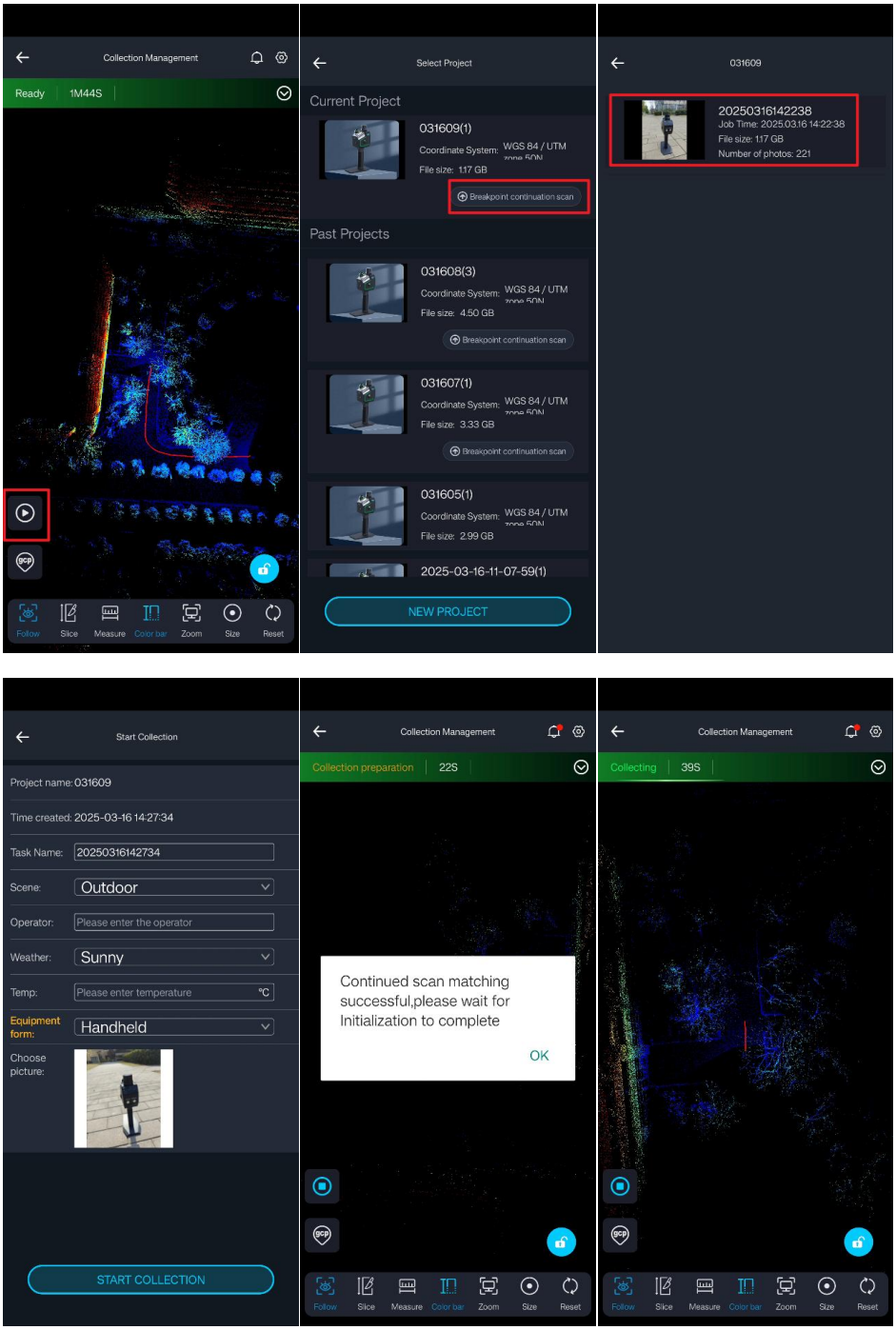
For the first task of resuming scanning, a collection project can be normally created. When starting a new collection task, real-time point cloud must be enabled.

After selecting the task to resume scanning, subsequent tasks will automatically enable real-time point cloud without user selection.



For consecutive stations during the breakpoint continuation scan, the starting point of the next station should ideally be the endpoint of the previous station. Some deviation is allowed, but the distance between the two points must not exceed 2 meters, and the angle difference in device orientation must not exceed 15 degrees.

Create a task for subsequent scanning. When creating a project, you can select a project that allows subsequent scanning and choose the task to be continued for data collection. Wait for the APP to notify you with "**Continued scan matching successful**". When the status bar changes to "**Collecting**", you can proceed with normal data collection.



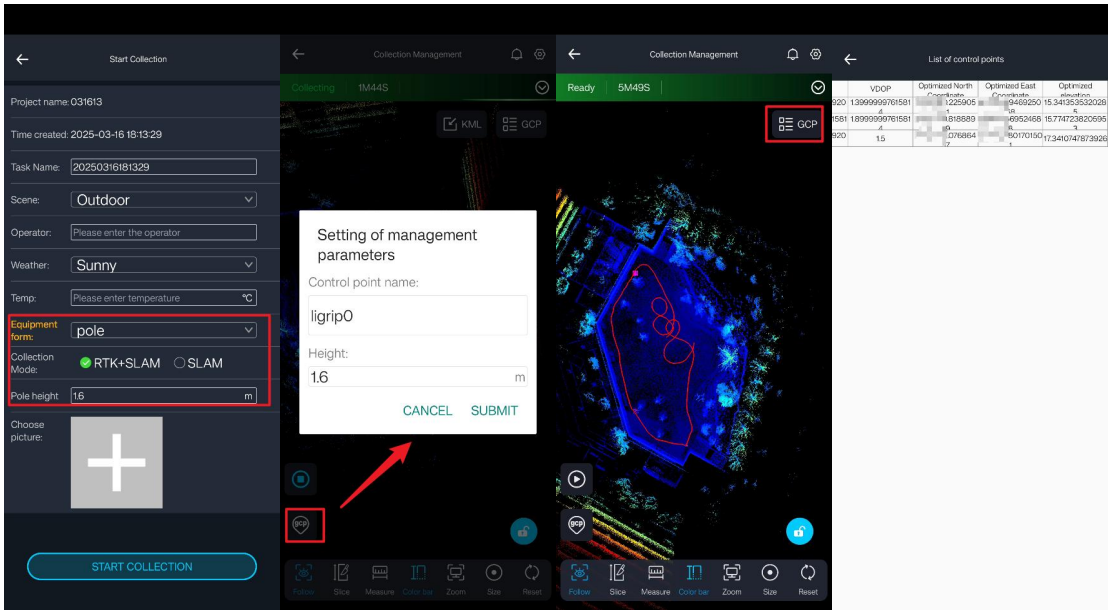
（2）Telescopic pole collection

When using the telescopic pole for collection, it is divided into RTK+SLAM mode and SLAM mode.

The RTK+SLAM mode requires pre-configuration of RTK. Please refer to Chapter 7 Configure GNSS. In RTK+SLAM mode, the device can be used as a traditional RTK device and can be introduced indoors through SLAM to obtain real-time indoor and outdoor control points with absolute coordinates. Post-processing can also be performed to obtain more accurate control point coordinates.

Select SLAM mode, and you can perform GCP collection at different inclinations or heights

using an extension pole.



8. 2. Collecting Data Using Buttons

When using button collection, since there is no APP prompt or status display, you need to pay attention to the device's status light (refer to Chapter 1.3 Device Indicator Light Introduction).

8. 2. 1. New Acquisition

（1）Configure GNSS

RTK cannot be configured when using button collection; you can set up a physical base station or a virtual base station in advance.

（2）Initialization position selection

Refer to the initialization position selection when using the APP for collection.

（3）New acquisition

Press and hold the collection button until it **Fast Flashes**, then release to easily create a project.

At this time, the project name is determined by the time.

（4）Initialization

Do not move during initialization; wait for the Data Collection Status Indicator Light to change from **Fast Flash** to **Slow Flash**.

（5）Start data collection

Please refer to the APP for data collection operations.

（6）GCP collection (Optional operation)

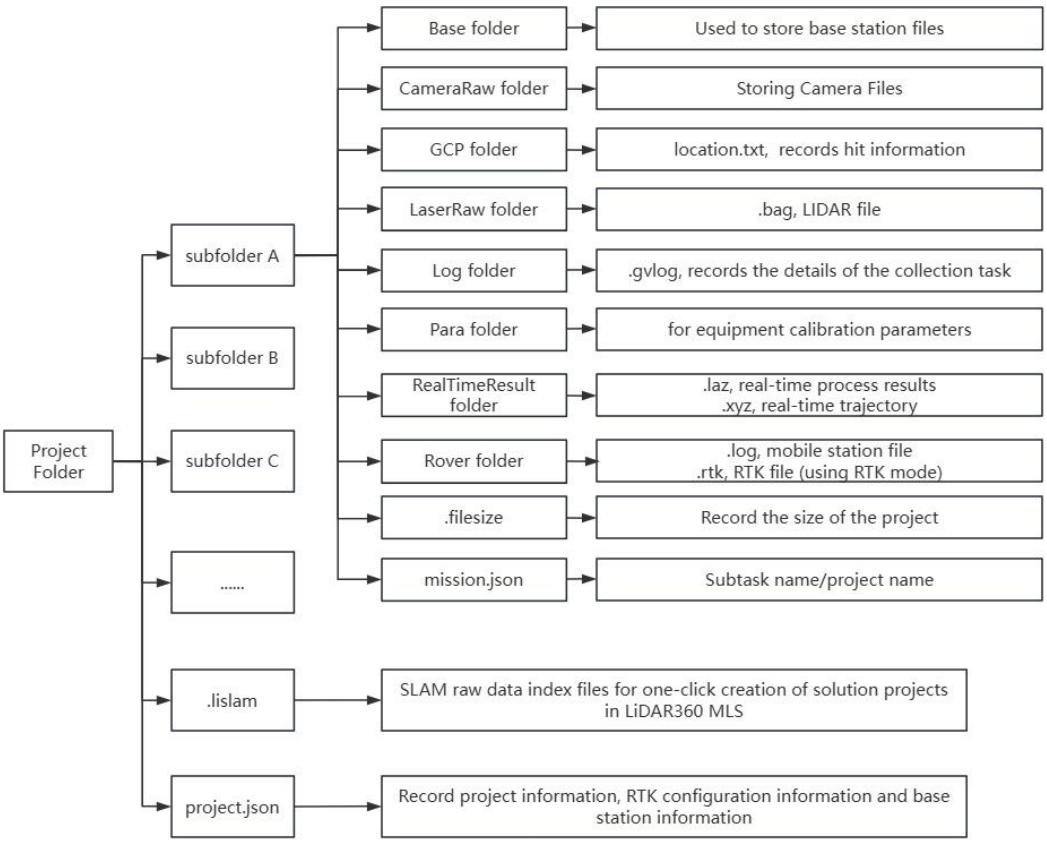
During the GCP collection, press the collection button once, at which point the device status light will turn to **Fast Flash**. Wait until the status light changes to **Slow Flash** to complete the GCP collection.

（7）End collection

Press and hold the collection button until it **Fast Flashes**, then release it. Wait until the status light turns **Ever Bright** before releasing.

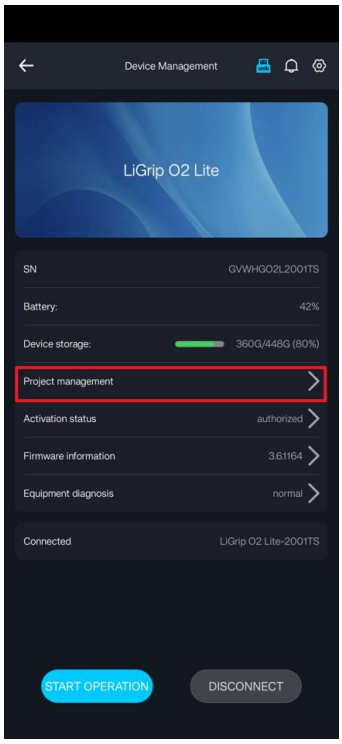
9. Data Transfer

The project folder contains multiple collected task folders, as well as the project.json file and .lislam file. Among them, the task folder includes the Base folder, CameraRaw folder (storing .bin camera files), RealTimeResult folder, and other folders, as well as mission.json, .filesize, and other files. Refer to the diagram below for the specific folder structure and description.

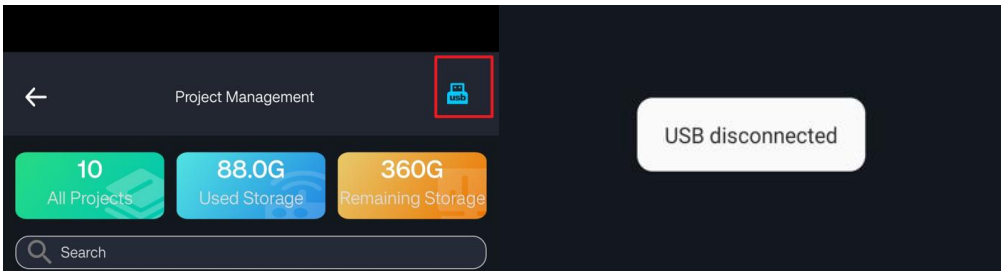


9. 1. Copy Using a Type-C USB Drive

Once the device is powered on, insert a USB drive or external hard drive into the Type-C port of the main unit. Use the GreenValley APP to connect to WiFi and enter the project management interface. Click on Device Management - Project Management, select one or more projects from the project list, and copy the selected project(s) to the USB drive. Wait for the copy to complete and display "**Project copied successfully**", then remove the card reader.



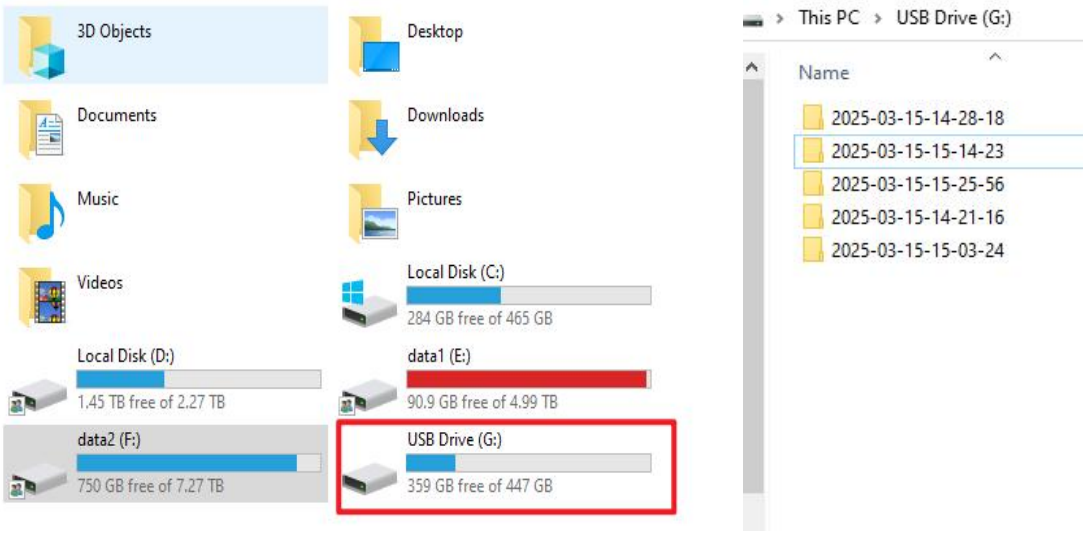
To safely eject the mobile storage device, click the USB icon and wait for the system to confirm success.



9. 2. Copying via Data Cable

Once the device is powered on, connect one end of the Type-C data cable to the device's Type-C slot and the other end to the computer. The computer will automatically recognize the device's internal storage, allowing you to copy files directly to the computer as needed.

Data cable transmission only allows writing out, not writing into the device.

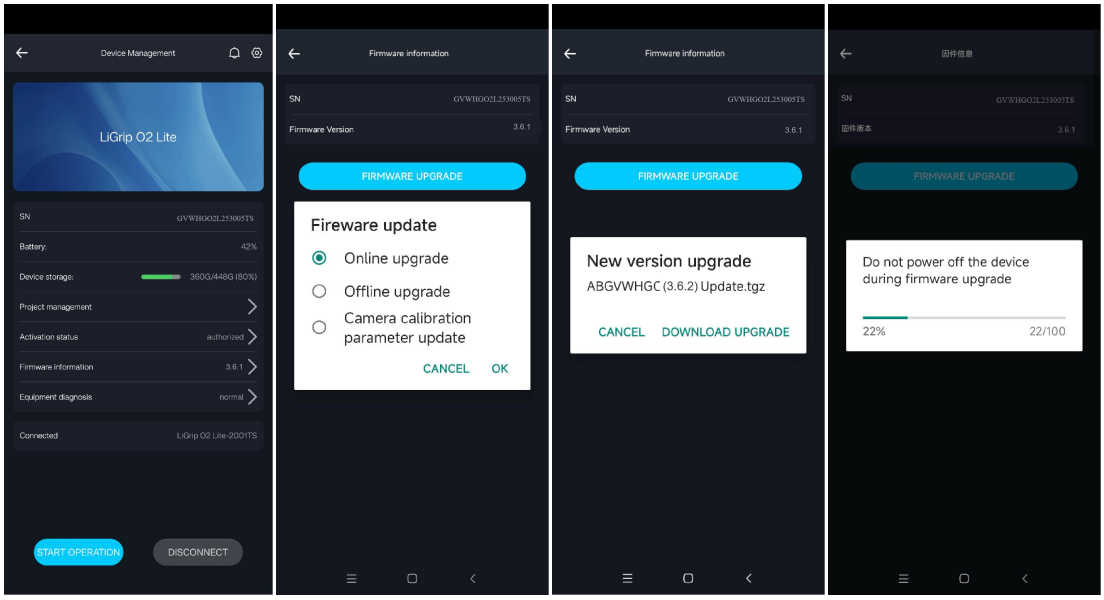


10. Firmware Upgrade

Keep the APP version up to date. Firmware upgrade requires the device to have at least 30% battery. **Firmware upgrade** supports **online upgrade, offline upgrade,** and **camera calibration parameter upgrade.**

10. 1. Online Upgrade

(1) Ensure your phone/tablet can access the internet via 4G/5G or other WiFi;
(2) After connecting the device, in the device management interface, click on "**Firmware information**", and select "**Online Upgrade**". Follow the software prompts to download the updated firmware package;
(3) After downloading, choose to upgrade. The software will prompt whether to upload to the device; choose to upload.
(4) After the upload is complete, the software will prompt you to update the firmware immediately. Choose to update, and the device will perform a firmware upgrade.
(5) During the upgrade process, do not power off the device. After the upgrade is complete, the device will automatically shut down. Please manually power it on and check if the upgrade was successful.



10. 2. Offline Upgrade

（1）Obtain the latest firmware package from technical support or after-sales, and follow the steps under the technical guidance of after-sales or technical support.

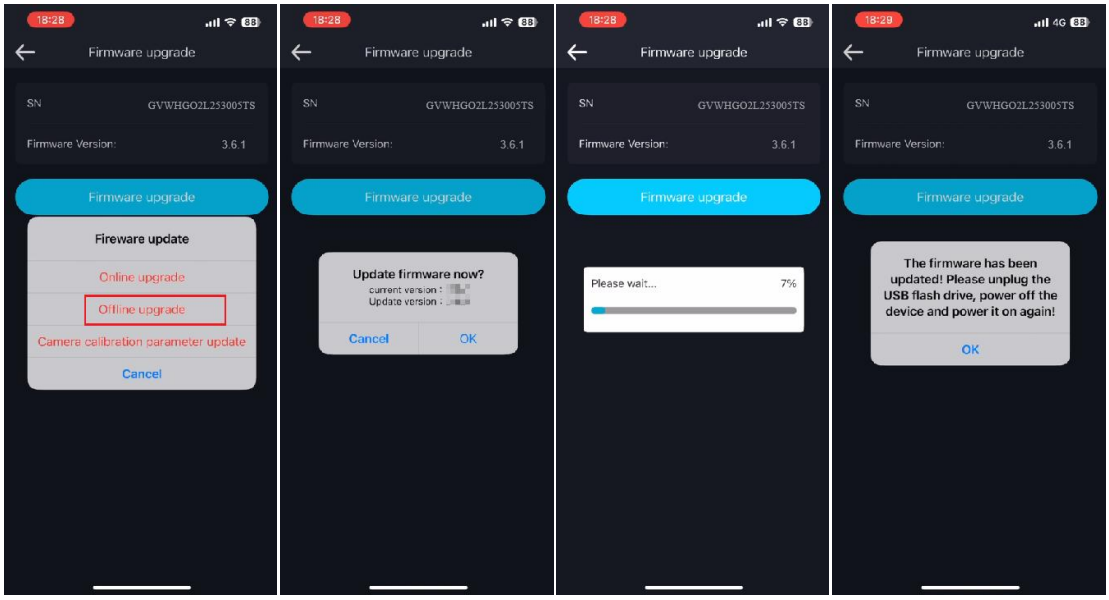
（2）Place the firmware package in the root directory of the USB drive.

（3）Power on the device and use the GreenValley APP to connect to it.

（4）Insert the USB drive **(note to insert it after the device has powered on completely).**

（5）In the device management interface, click '**Firmware information**' and select '**Offline Upgrade**'. Follow the software prompts to upgrade the firmware.

（6）During the upgrade process, do not power off. Once the upgrade is complete, the device will automatically shut down. Please manually power it on and verify if the upgrade was successful.



10. 3. Camera Calibration Parameter Upgrade

For camera calibration parameter upgrades, please refer to the LiDAR360MLS product manual.

For detailed instructions on using the LiDAR360MLS software, please refer to the 'LiDAR360MLS_UserGuide'.

For device operation precautions and problem-solving, please refer to the 'LiGrip General FAQ'.

11. SLAM Process

Please use LiDAR360MLS version 8.2.1 or above for the SLAM process. For hardware requirements of the processing software, please refer to the LiDAR360MLS software operation manual.

The following SLAM process is for reference only. For a detailed introduction and usage of the processing software, please refer to the LiDAR360MLS product manual.

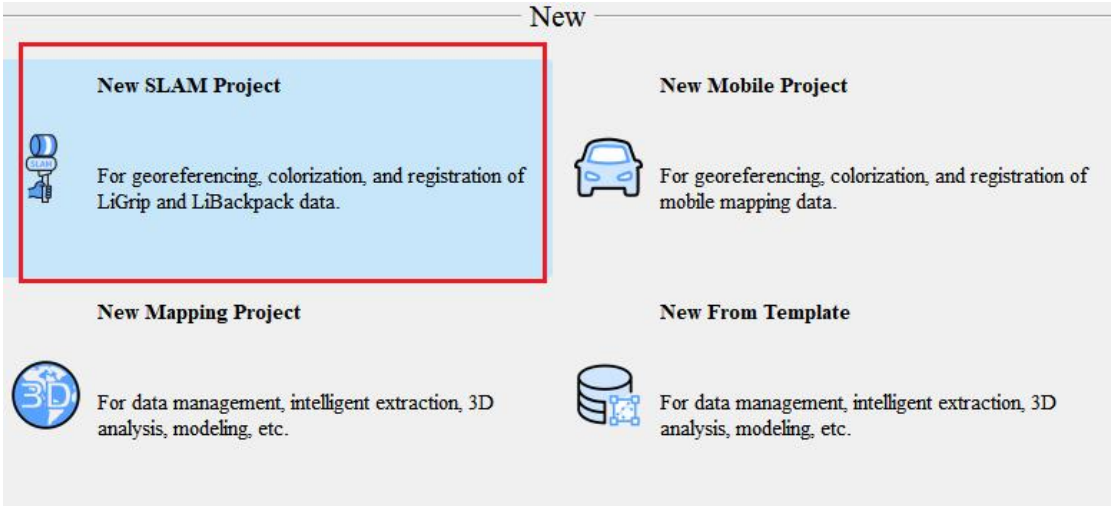
11. 1. One-click Processing via Lislam

One-click processing supports LiGrip O2 lite firmware version 3.6 and later. If the firmware version is earlier than 3.6, please use the project wizard to create a new project.

11. 1. 1. Create SLAM Processing Project

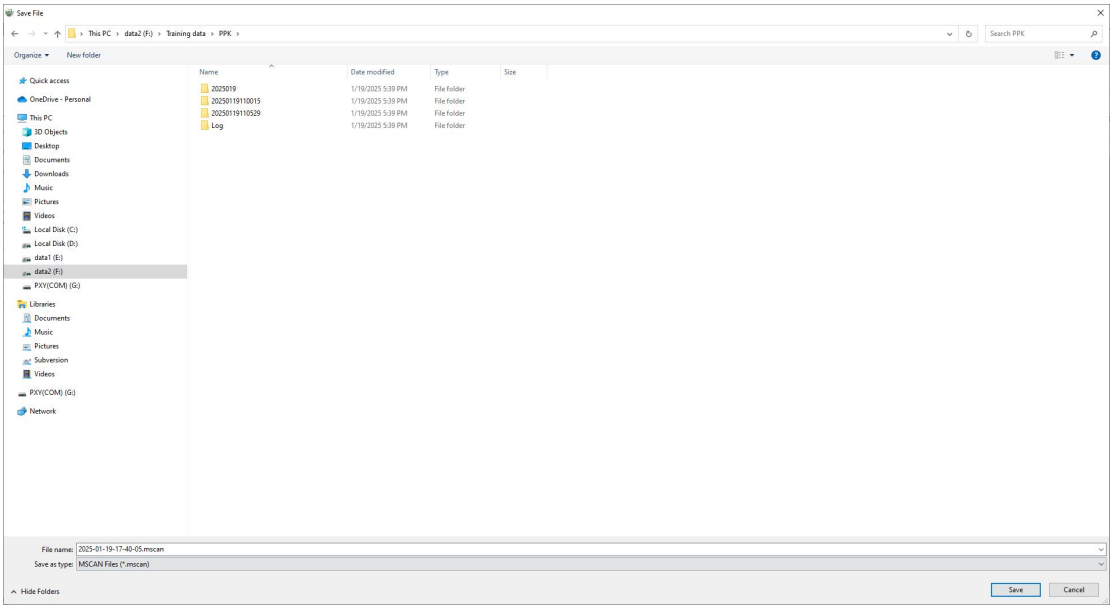
（1）Create New SLAM Processing Project

Click 'New SLAM Project' on the MLS interface, or create a SLAM processing project from 'File' - 'Create New SLAM Processing Project'.



（2）Select Project Save Path

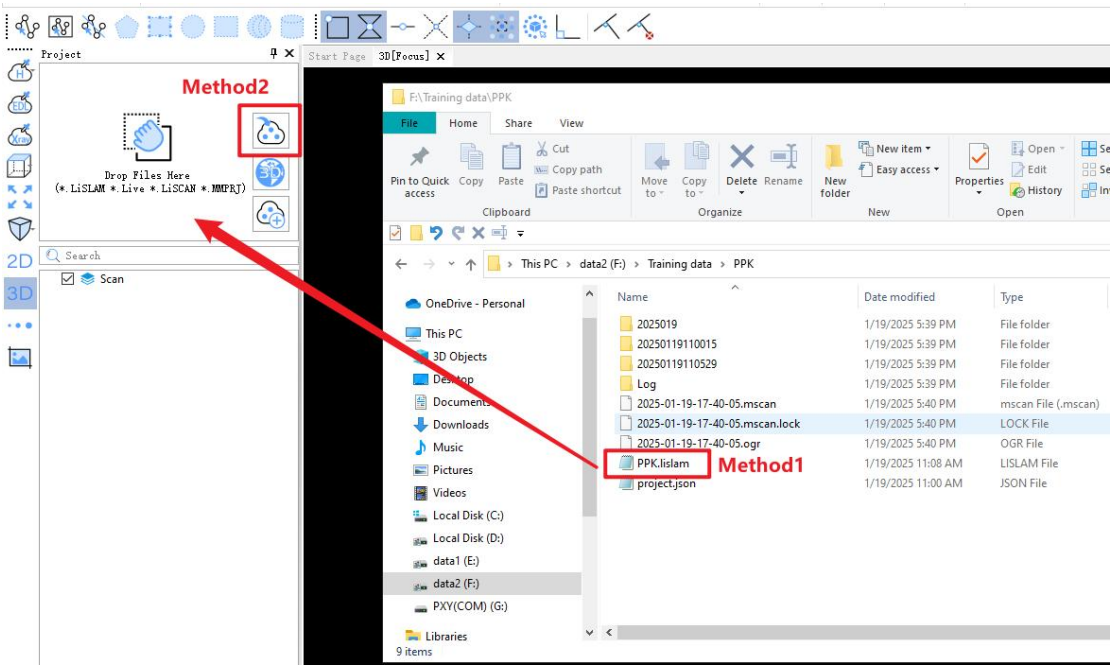
Select the project save path, and the software will create a msacn project with the current time.



11. 1. 2. Add Lislam Project Index File

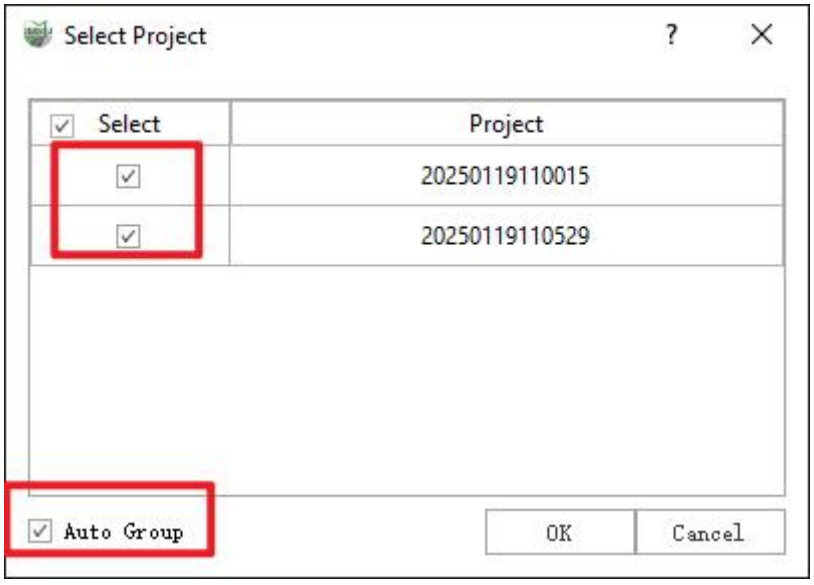
（1）Import lislam file

You can drag the collected project index file xxx.lislam to the project window, or click the 'Add' button to select the project index file.

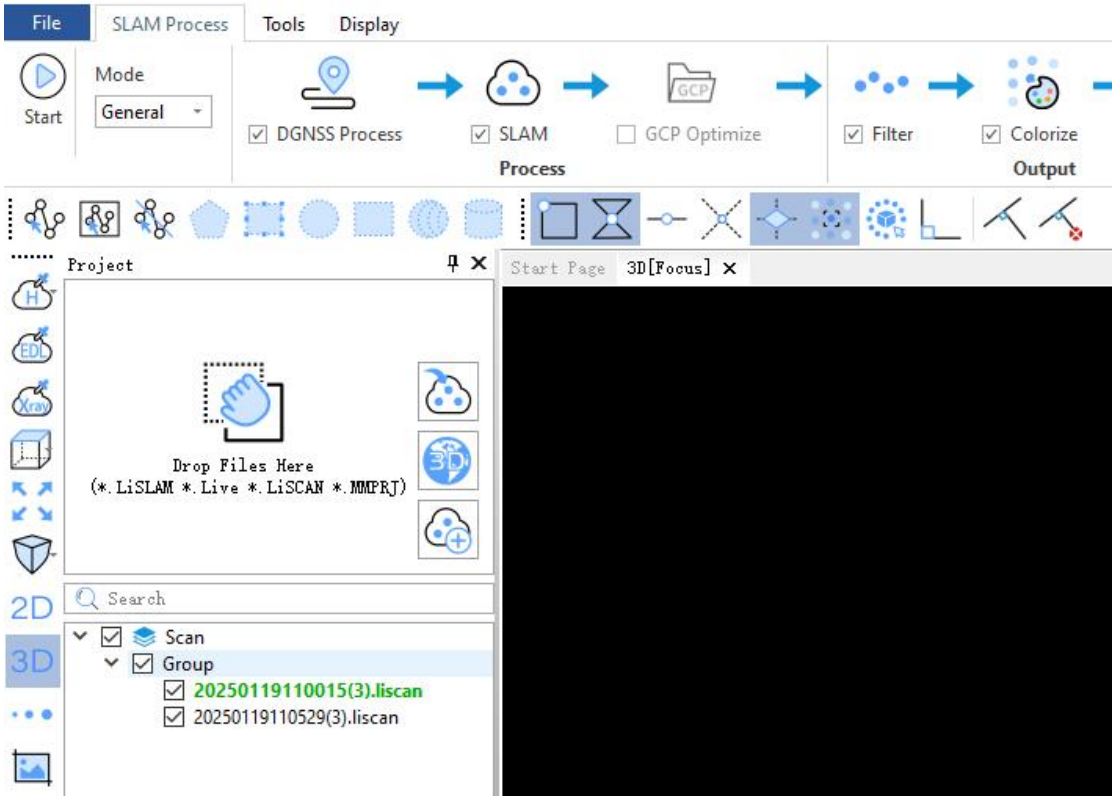


（2）Select import project and configuration group

If there are multiple sub-projects in the index, you can choose to import the project and automatically create a combination. The grouped project will be in the same group once the addition is completed.



Automatically grouped projects:



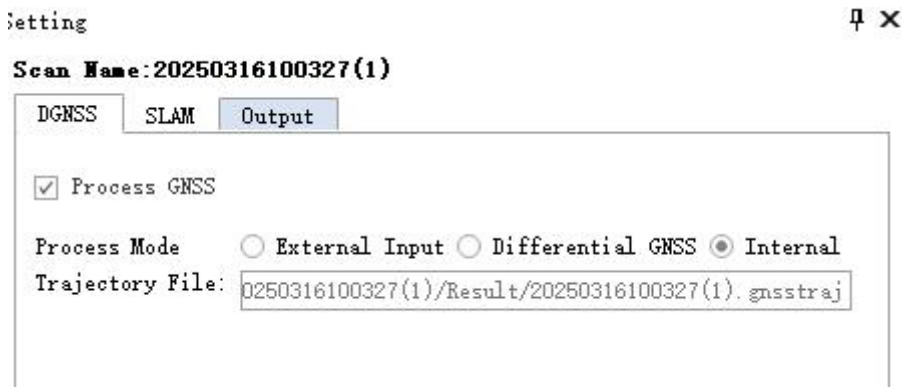
11. 1. 3. GNSS Settings (Optional)

The three operation modes, **Pure SLAM**, **RTK-SLAM**, and **PPK-SLAM**.

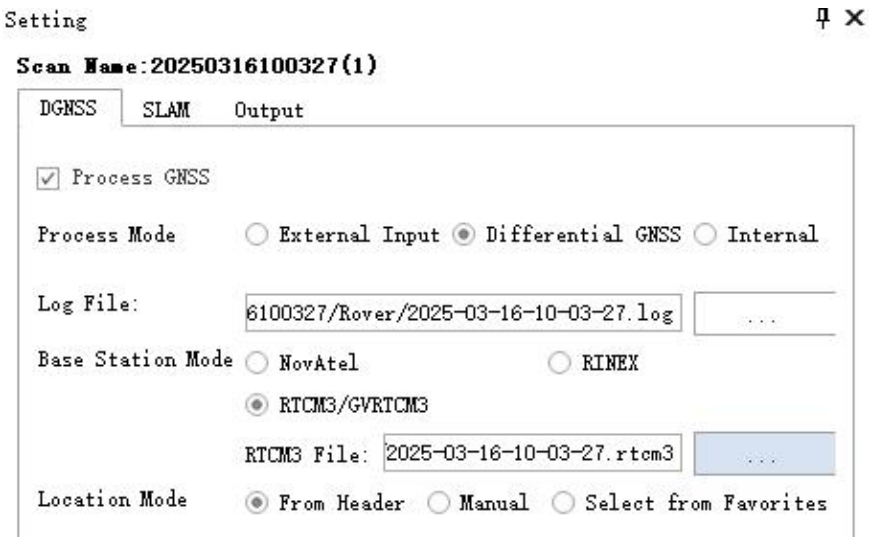
Pure SLAM: No additional settings are required, and subsequent data processing can be performed directly.

RTK-SLAM: No additional settings are required, and subsequent data processing can be performed directly. It varies depending on whether the field collection scene settings are for open area or not.

Scenario One: If the project scene settings are set to non-open area mode during field collection, the software will automatically read and apply the RTK files stored in the Rover folder and convert them into internal trajectories.



Scenario Two: If the project scene settings are set to open area during field data collection, the software will automatically read the rover log and the RTCM3 files under the Base folder.

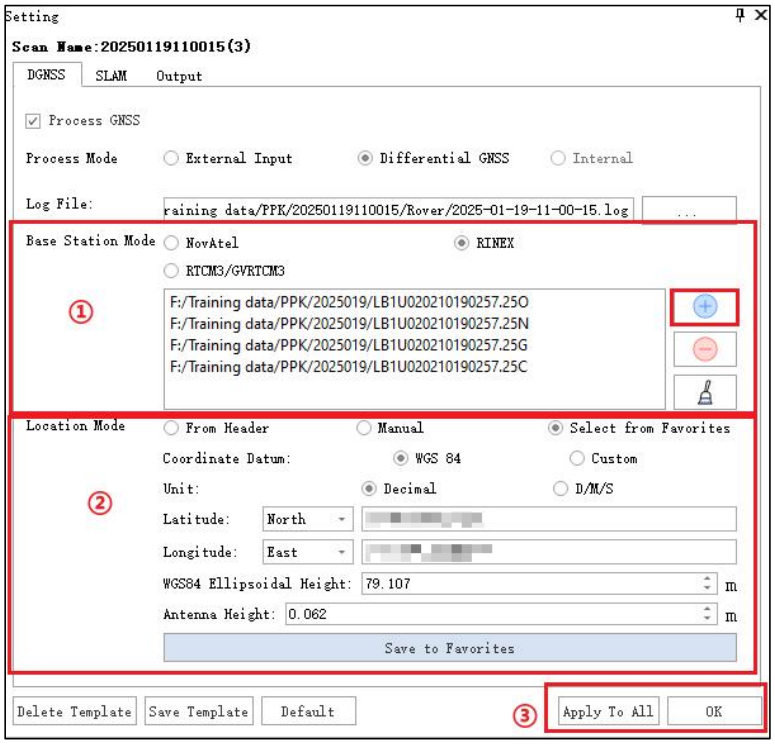


PPK-SLAM: Base station file configuration is required. The software will automatically read the rover files and configure the base station data as follows:

① Select the base station mode and import the base station file. The format may vary depending on the base station mode, using RINEX as an example;

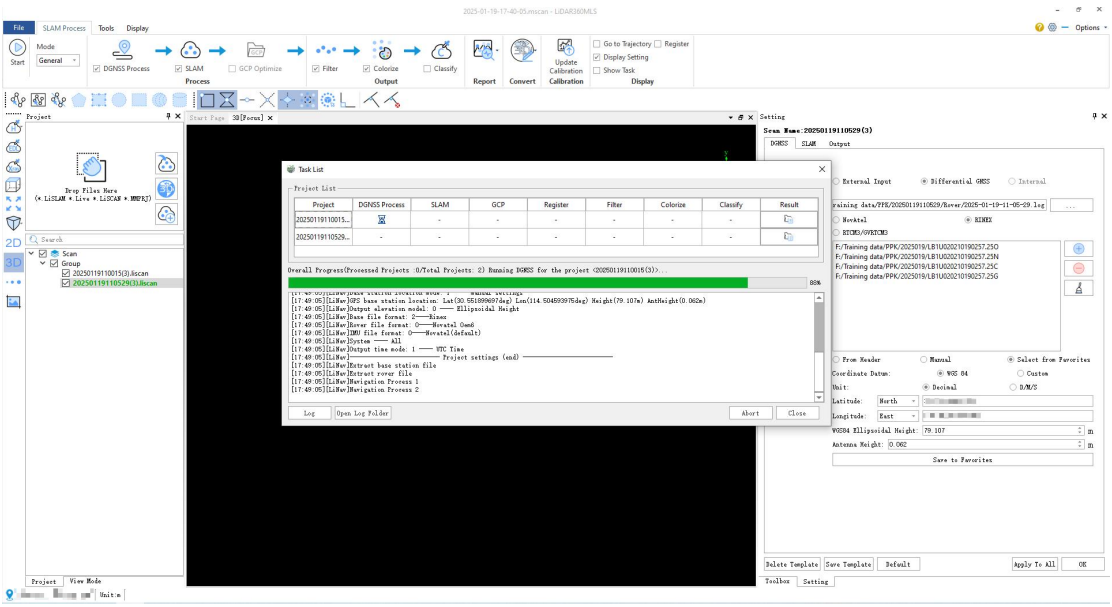
② Configure the positioning mode of the base station, which can be parsed from the data header or manually input the base station coordinates;

③ Click "**OK**" to save. The current base station configuration is only effective for the active project. If multiple projects share one base station, you can click '**Apply To All**'.



11. 1. 4. Start Process

After configuring the process project, click the '**Start**' button in the upper left corner, and the software will begin the data process.



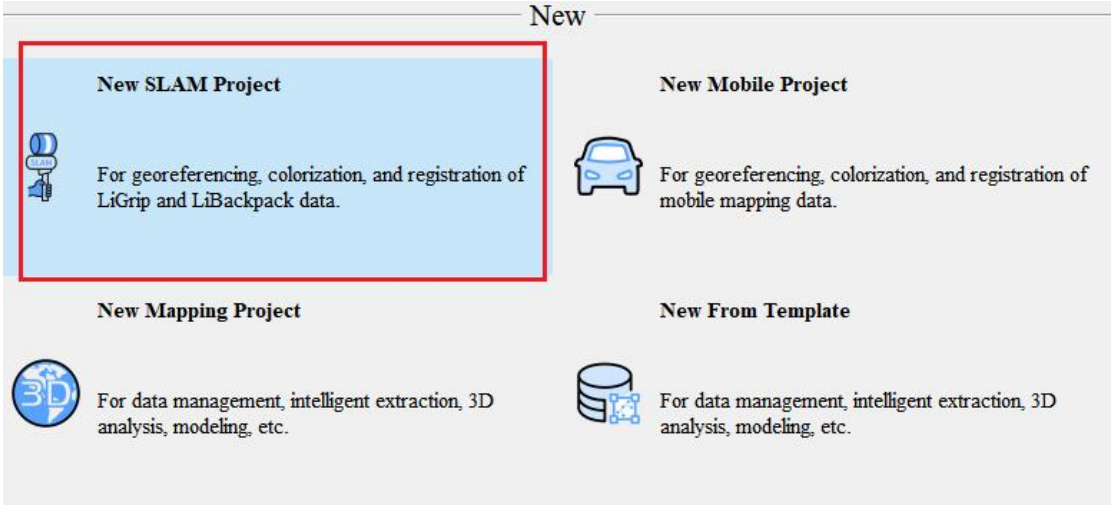
After the program finishes running, the data processing results can be obtained.

11. 2. Create a New Project using the Project Wizard

11. 2. 1. Create a SLAM Processing Project

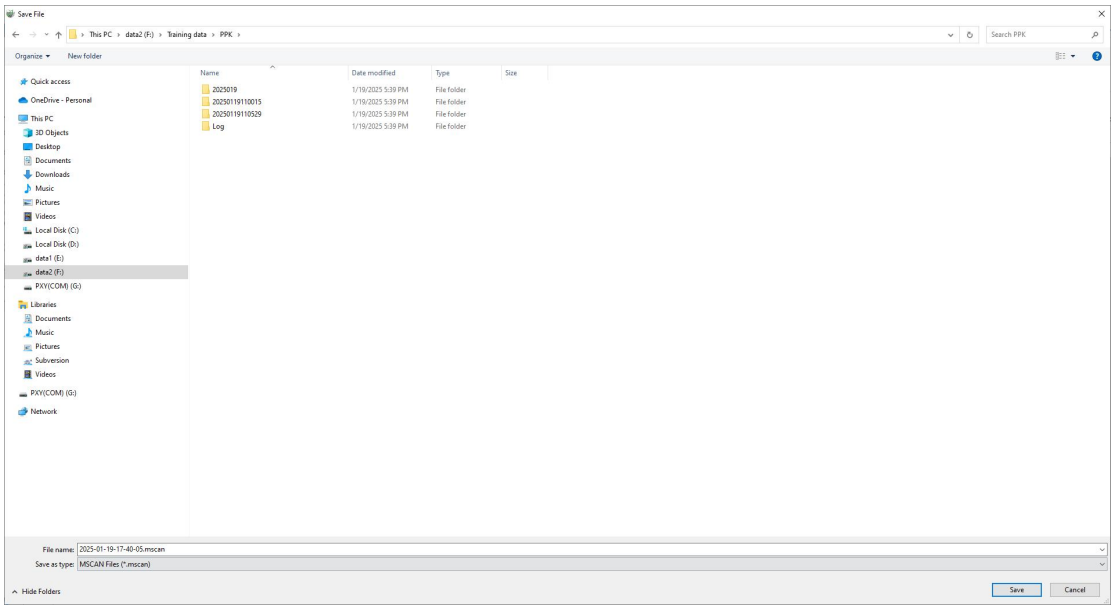
（1）Create new SLAM processing project

Click on the MLS interface "**New SLAM Project**", or create a SLAM processing project from "**File**"－"**Create a new SLAM processing project**".



（2）Select project save path

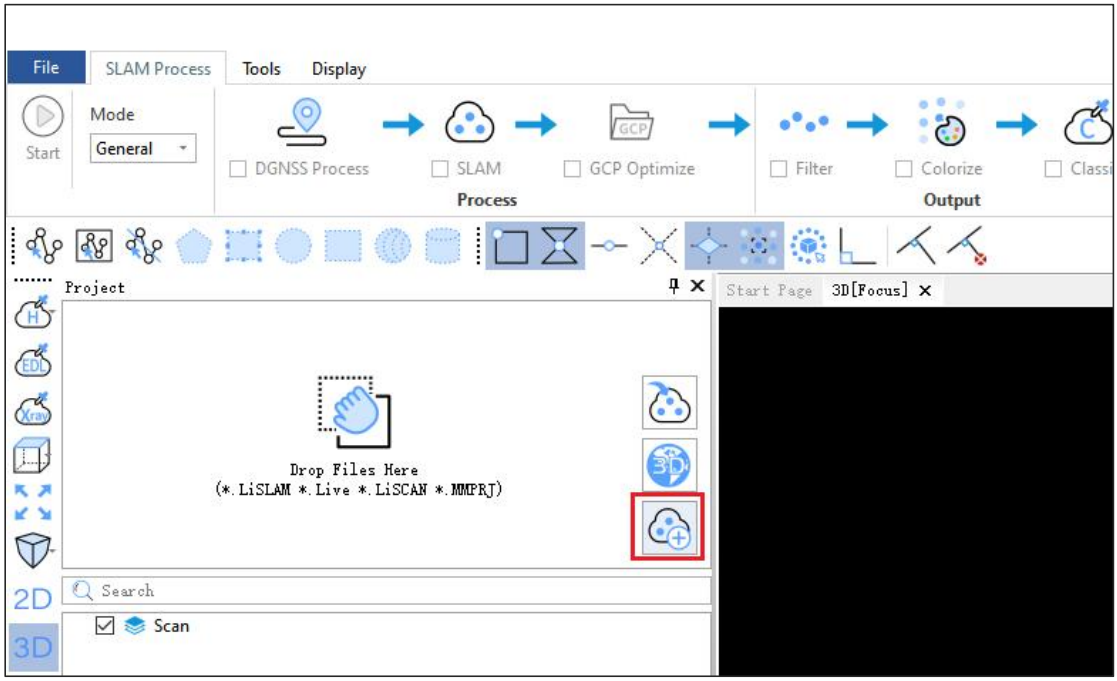
Select the project save path, and the software will create a msacn project with the current time.

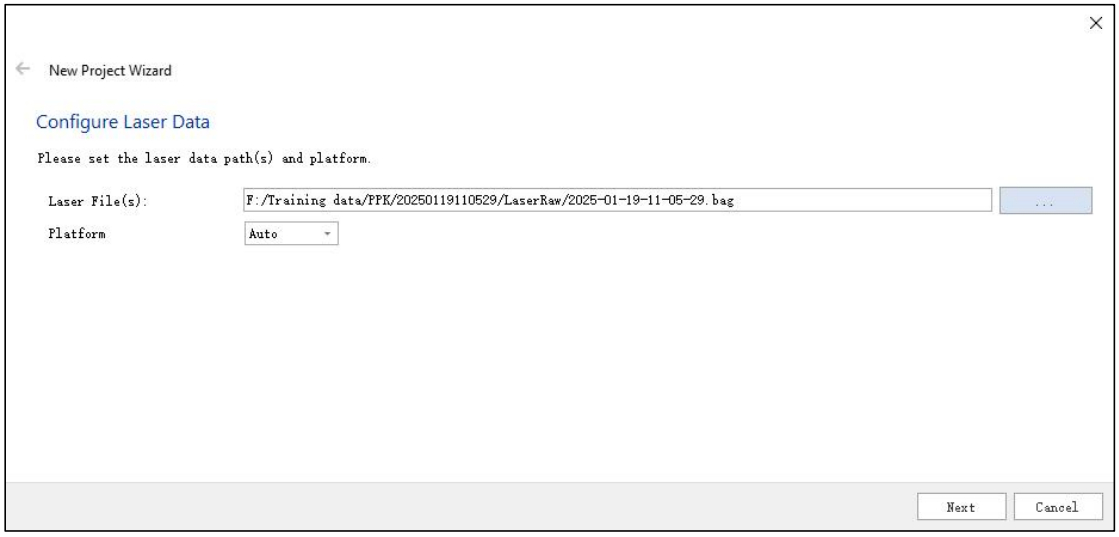


11. 2. 2. Configure Processing Data

（1）Configure LiDAR files

Click  to configure the laser file, which are by default located in the LaserRaw folder of the project. The platform can select by default or manually, then click **'Next'.**

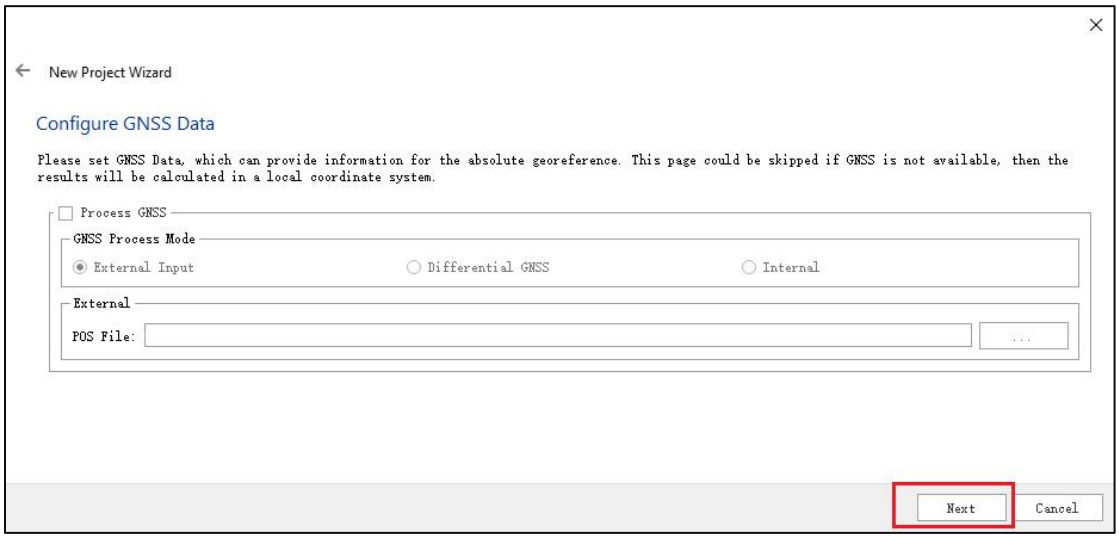




（2）Configure GNSS data and coordinate system.

There are three scenarios for configuring GNSS and coordinate system: ① Pure SLAM; ② RTK-SLAM; ③ PPK-SLAM.

① Pure SLAM: Pure SLAM processing does not require configuring GNSS and coordinate system. Skip this step and directly click **'Next'.**

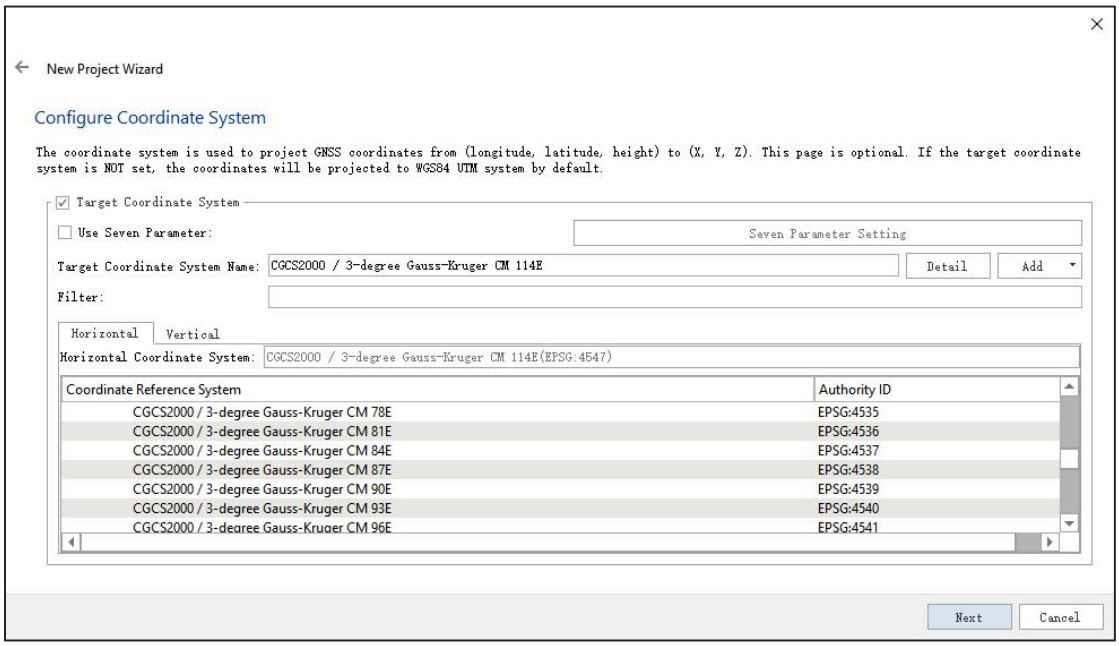


②RTK-SLAM: The RTK-SLAM considers the field scenario as either an open area or a non-open area area.

Scenario One: Field data collection project scenario set as non-open area:

Check **'Process GNSS'**, select **'External Input'**, and choose the POS file, which is by default in the Rover folder of the project, then click **'Next'.**

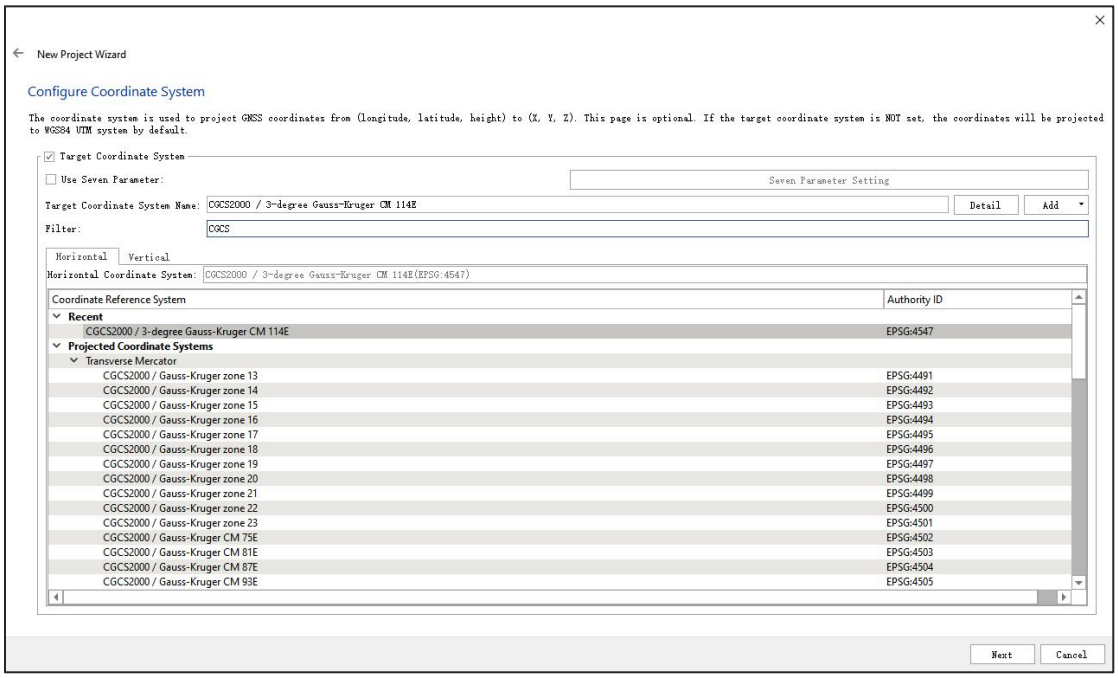
In RTK-SLAM mode, it is usually unnecessary to manually configure the target coordinate system, as the software will use the coordinate system built into the RTK file. You can directly click **'Next'.**



Scenario Two: Field data collection project scenario set as open area:

Check ' **Process GNSS** ', select ' **differential GNSS** ', and choose the log file, which is by default in the Rover folder of the project; after importing the rover log, the IMU mode will pop up, please select O2 lite according to the device model; then select and import the base station data RTCM3 file, which is by default in the Base folder of the project. Then click **'Next'.**

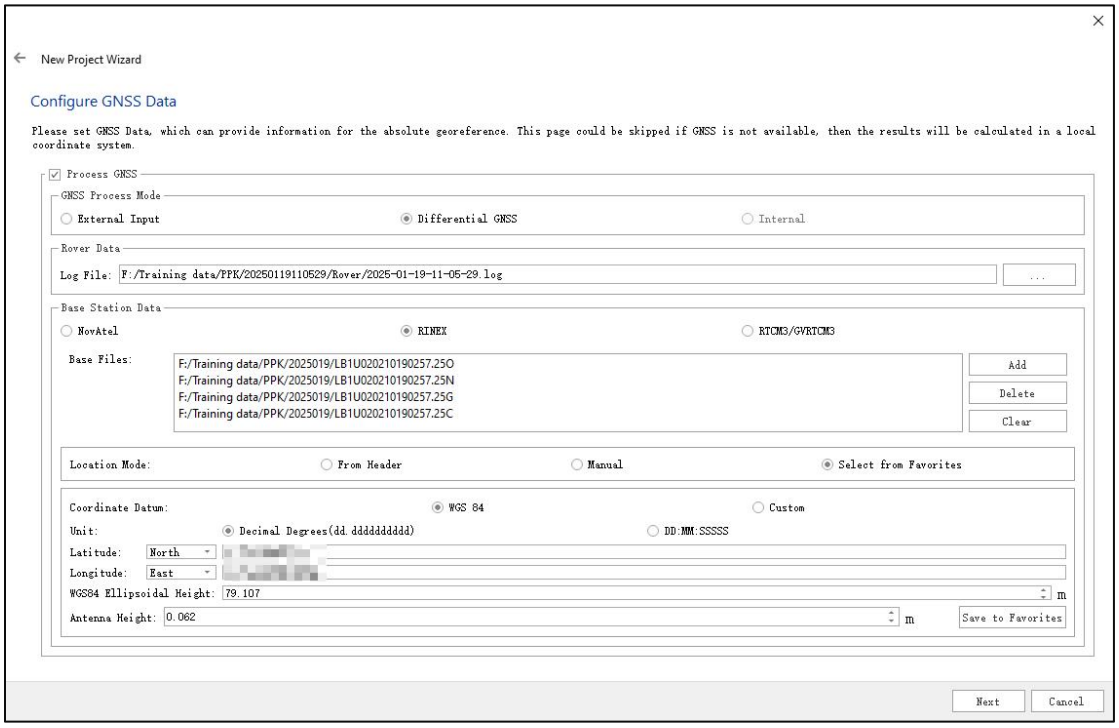
Configure the coordinate system by selecting the target coordinate system. You can quickly select the coordinate system by entering keywords in the "**Filter**" field. If you do not configure it, the default is to configure the coordinate system for the project. After selecting the coordinate system, click '**Next'**.



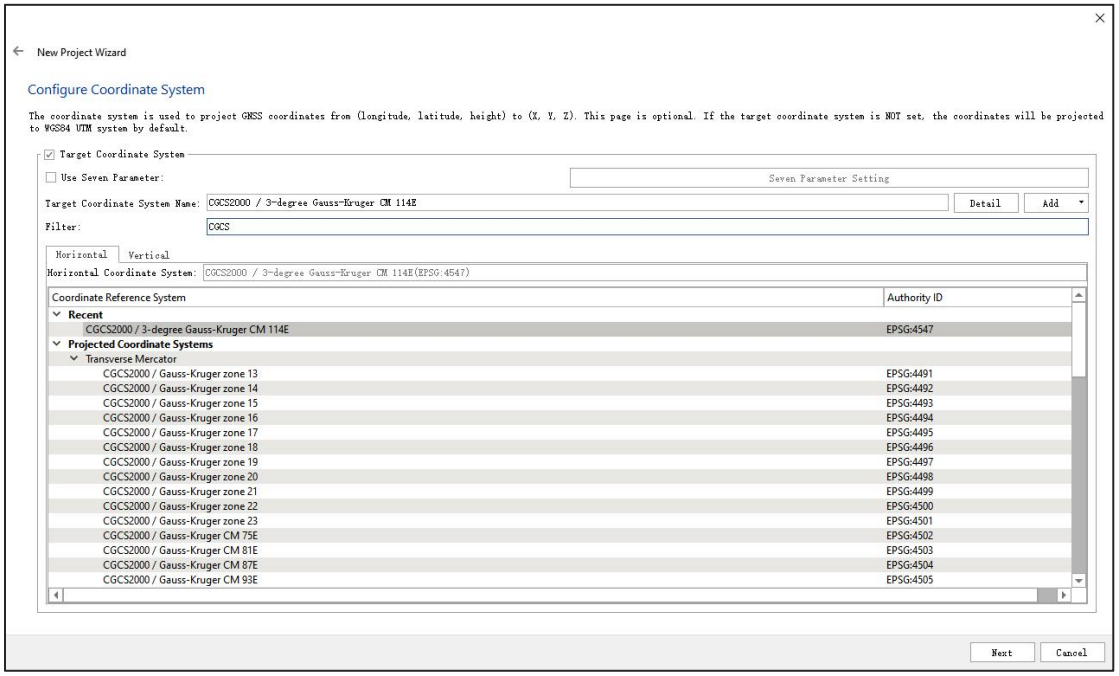
③PPK-SLAM: Before processing PPK, you need to prepare base station data (usually in RINEX format) or use the post-processing base station service. Here, we demonstrate using a physical base station. For operations of post-processing base stations, please refer to the LiDAR360MLS software operation manual.

Check "**Process GNSS**"and select "**Differential GNSS**". Choose the log file, which is by default in the Rover folder of the project, select the RINEX file, configure the coordinates of the base station, and click '**Next'.**

If the field scene is in open area mode, after importing the rover log, please select the correct IMU mode according to the device type.

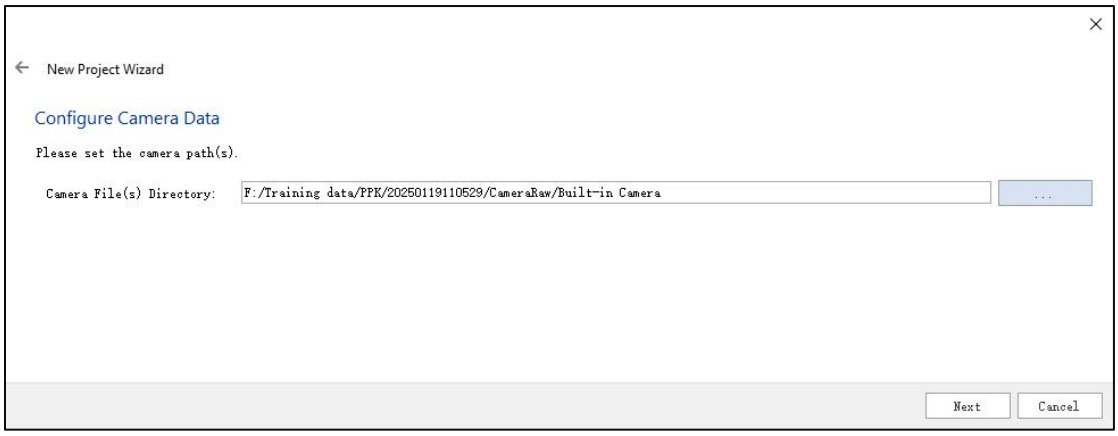


Configure the coordinate system by selecting the target coordinate system. You can quickly select the coordinate system by entering keywords in the "**Filter**" field. After selecting the coordinate system, click '**Next**'.



（3）Configure camera file

Select the file path where the camera is located. LiGrip O2 Lite defaults to the project's CameraRaw/Built-in Camera folder, then click **'Next'**.



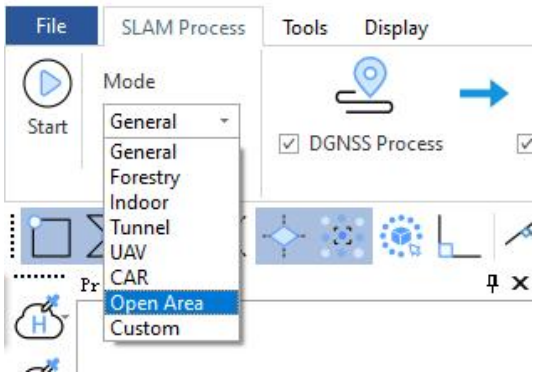
（4）Configure project path

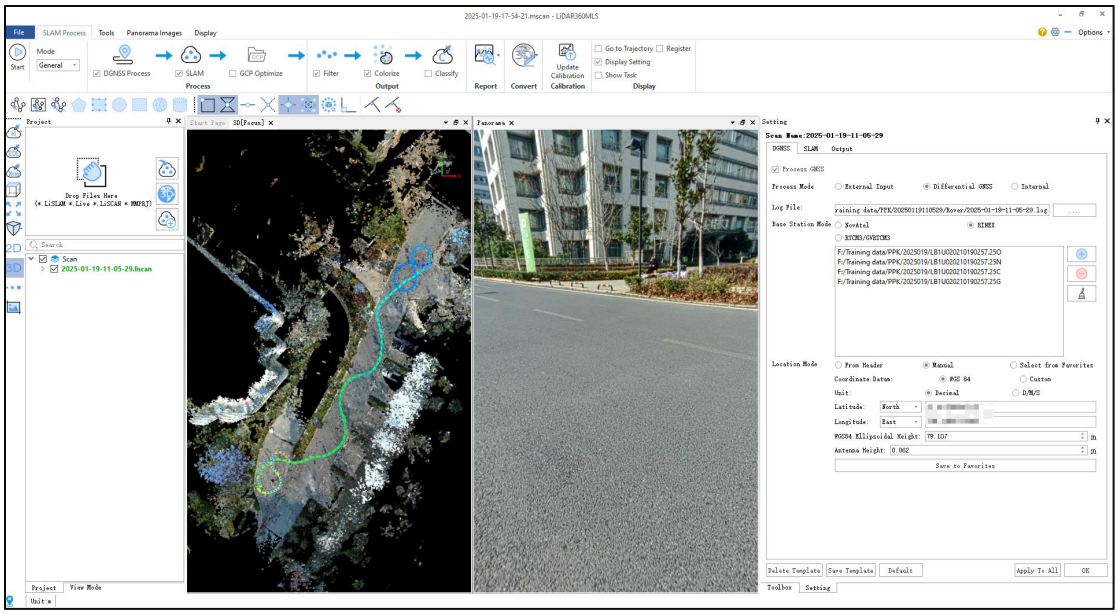
Configure the folder where the project will be saved and the project file name. Usually, the default is sufficient, then click **'Finish'**.

11. 2. 3. Start Processing

After entering the main interface, click the **"Start"** button. Wait for the program to finish running to obtain the final point cloud data results.

If the scene is selected as open area during field collection, the processing mode should be set to open area.





11. 3. Batch Processing

There are two ways to add projects in batch processing, corresponding to the two project creation methods mentioned above:

① A single lislam index can contain multiple sub-projects, and you can also add multiple lislam indexes following the steps in 11.1. All added projects will be displayed in the directory tree on the left.

② Follow the steps in 11.2 to create projects sequentially using the project wizard. All created projects will be displayed in the directory tree on the left.

Both methods of addition can be used in combination for batch processing. Once the projects that require batch processing are added, click to start the process.

The model in the SLAM processing flow is only for the activated project, while the selected processing and output flow applies to all batch-processed data. Therefore, when batch processing, you need to choose the flow that executes the most processes required by the data.

11. 4. SLAM Process with Control Points (GCP)

11. 4. 1. Complete SLAM Data Processing

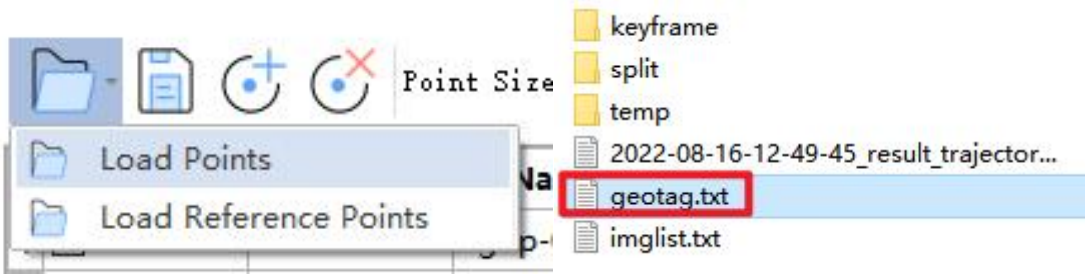
Refer to 11.1 or 11.2 for SLAM data processing to obtain the processed project.

11. 4. 2. GCP Settings

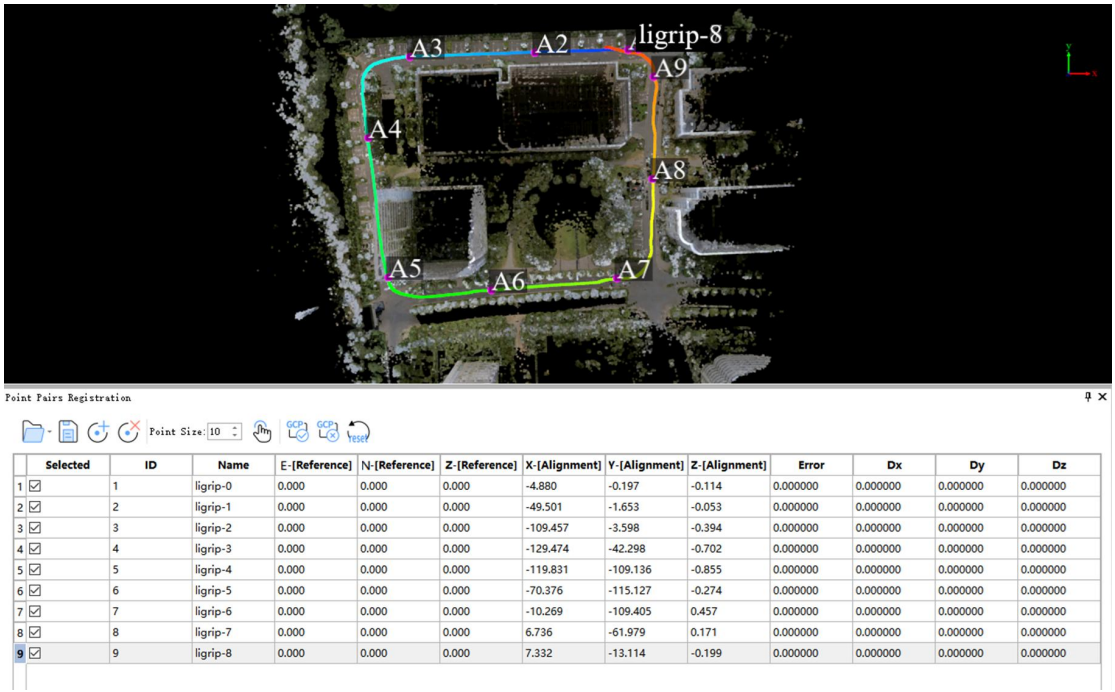
（1）Enable the GCP function

Click on GCP Optimization  in the interface. In the point pairs registration interface,

the software will automatically load the points to be registered, or you can manually select geotag.txt or other files with points to be registered.



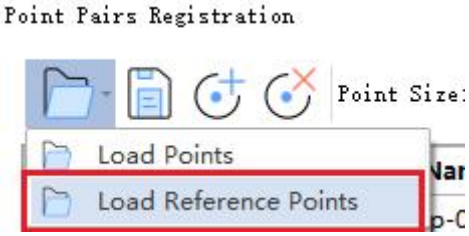
After opening, the interface is displayed as follows:



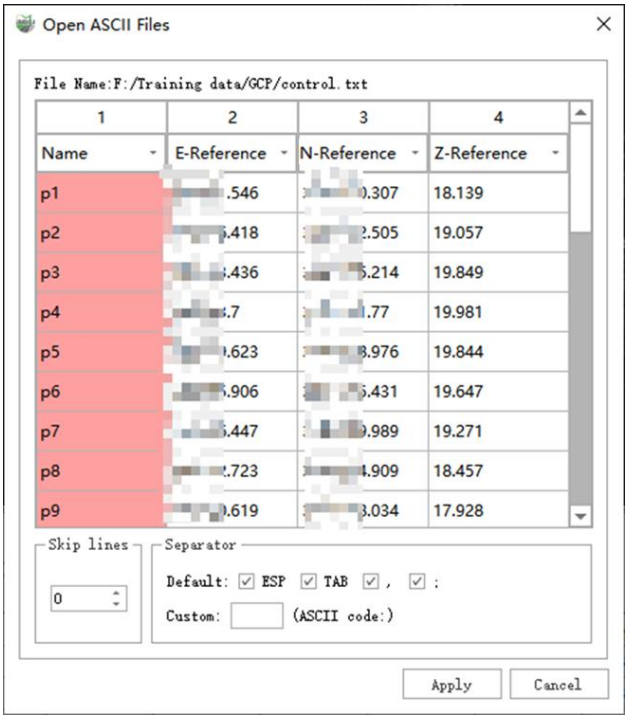
	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	ligrip-0	0.000	0.000	0.000	-4.880	-0.197	-0.114	0.000000	0.000000	0.000000	0.000000
2	☑	2	ligrip-1	0.000	0.000	0.000	-49.501	-1.653	-0.053	0.000000	0.000000	0.000000	0.000000
3	☑	3	ligrip-2	0.000	0.000	0.000	-109.457	-3.598	-0.394	0.000000	0.000000	0.000000	0.000000
4	☑	4	ligrip-3	0.000	0.000	0.000	-129.474	-42.298	-0.702	0.000000	0.000000	0.000000	0.000000
5	☑	5	ligrip-4	0.000	0.000	0.000	-119.831	-109.136	-0.855	0.000000	0.000000	0.000000	0.000000
6	☑	6	ligrip-5	0.000	0.000	0.000	-70.376	-115.127	-0.274	0.000000	0.000000	0.000000	0.000000
7	☑	7	ligrip-6	0.000	0.000	0.000	-10.269	-109.405	0.457	0.000000	0.000000	0.000000	0.000000
8	☑	8	ligrip-7	0.000	0.000	0.000	6.736	-61.979	0.171	0.000000	0.000000	0.000000	0.000000
9	☑	9	ligrip-8	0.000	0.000	0.000	7.332	-13.114	-0.199	0.000000	0.000000	0.000000	0.000000

（2）Load reference points

In the point pairs registration interface, click **'Load Reference Points'**.



Configure NEZ corresponding columns, then click **'Apply'**.

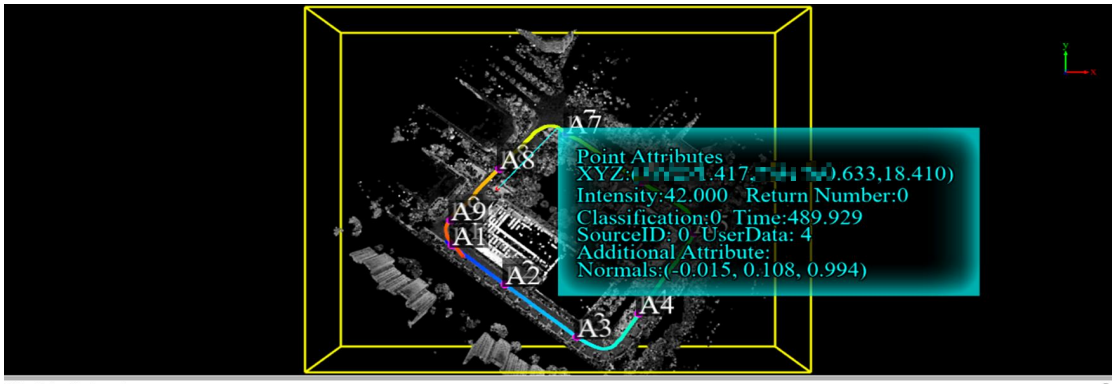


（3）Apply GCP transformation

Click 

apply GCP conversion.

	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	p1	.546	0.307	18.139	-4.880	-0.197	-0.114	0.042185	-0.000936	-0.006903	-0.041606
2	☑	2	p2	.418	2.505	19.057	-49.501	-1.653	-0.053	0.069943	-0.064742	-0.026051	0.004676
3	☑	3	p3	.436	5.214	19.849	-109.457	-3.598	-0.394	0.056285	0.011567	0.026472	0.048306
4	☑	4	p4	.700	1.770	19.981	-129.474	-42.298	-0.702	0.070690	-0.040021	0.057276	-0.010715
5	☑	5	p5	.623	8.976	19.844	-119.831	-109.136	-0.855	0.120849	-0.055356	0.090231	-0.058297
6	☑	6	p6	.906	5.431	19.647	-70.376	-115.127	-0.274	0.068684	0.034026	-0.048084	0.035321
7	☑	7	p7	.447	9.989	19.271	-10.269	-109.405	0.457	0.106846	0.083890	-0.056820	0.033913
8	☑	8	p8	.723	4.909	18.457	6.736	-61.979	0.171	0.029528	0.021980	-0.006774	-0.018518
9	☑	9	p9	.619	8.034	17.928	7.332	-13.114	-0.199	0.031641	0.009592	-0.029347	0.006919



Point Pairs Registration

Point Size: 10

	Selected	ID	Name	E-[Reference]	N-[Reference]	Z-[Reference]	X-[Alignment]	Y-[Alignment]	Z-[Alignment]	Error	Dx	Dy	Dz
1	☑	1	p1	.546	.307	18.139	.547	.309	18.136	0.000000	0.000000	0.000000	0.000000
2	☑	2	p2	.418	.505	19.057	.419	.504	19.054	0.000000	0.000000	0.000000	0.000000
3	☑	3	p3	.436	.214	19.849	.435	.213	19.848	0.000000	0.000000	0.000000	0.000000
4	☑	4	p4	.700	.770	19.981	.701	.769	19.982	0.000000	0.000000	0.000000	0.000000
5	☑	5	p5	.623	.976	19.844	.624	.976	19.844	0.000000	0.000000	0.000000	0.000000
6	☑	6	p6	.906	.431	19.647	.906	.432	19.646	0.000000	0.000000	0.000000	0.000000
7	☑	7	p7	.447	.989	19.271	.445	.989	19.271	0.000000	0.000000	0.000000	0.000000
8	☑	8	p8	.723	.909	18.457	.724	.908	18.457	0.000000	0.000000	0.000000	0.000000
9	☑	9	p9	.619	.034	17.928	.617	.034	17.935	0.000000	0.000000	0.000000	0.000000

（4）GCP restoration (optional step)

If the effect after GCP conversion is not ideal, or if there is an error in the control point input, you can click 

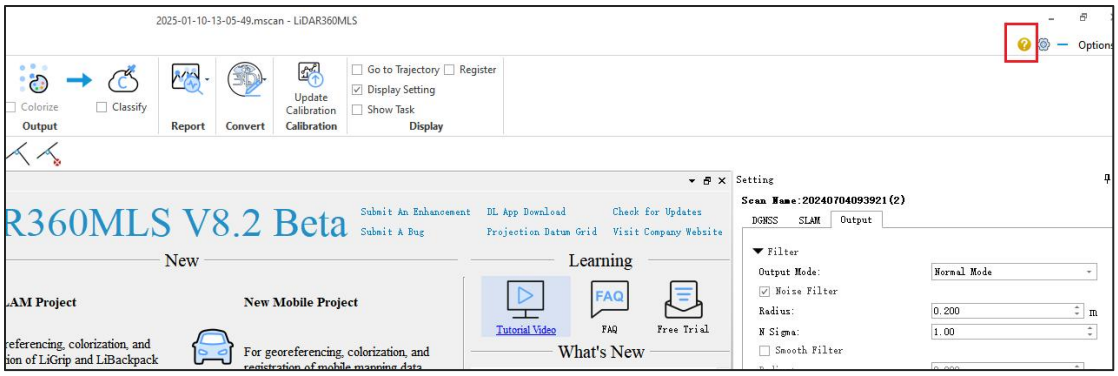
to restore the point cloud to its original state.

12. Other Tools

For functions such as data export, accuracy check, point cloud extraction, and merging, please refer to the LiDAR360MLS product manual.

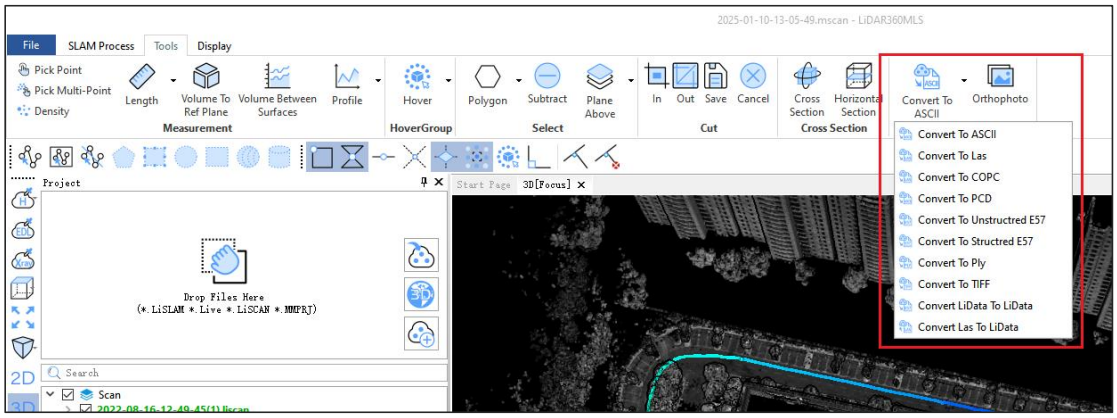
12. 1. Open the LiDAR360MLS Manual

After opening the software, click the **'Help'** button in the upper right corner  .



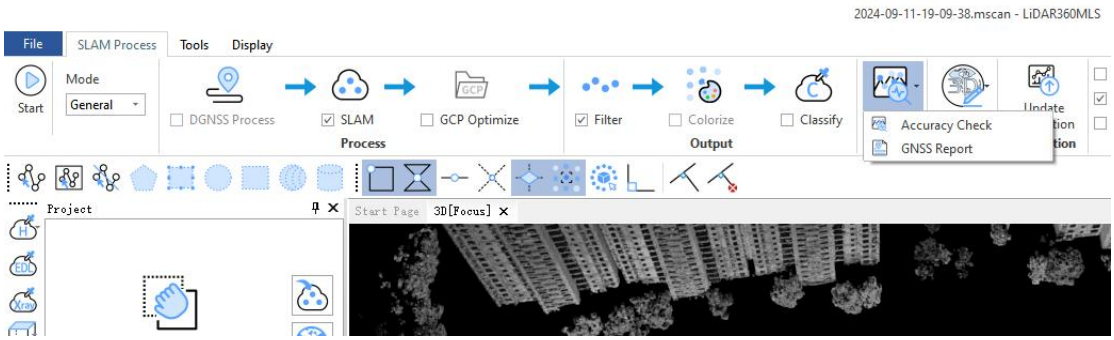
12. 2. Data Export

In the tool tab, the export function can export point clouds in formats such as ASCII, Las, COPC, PCD, E57, Ply, TIFF, etc.



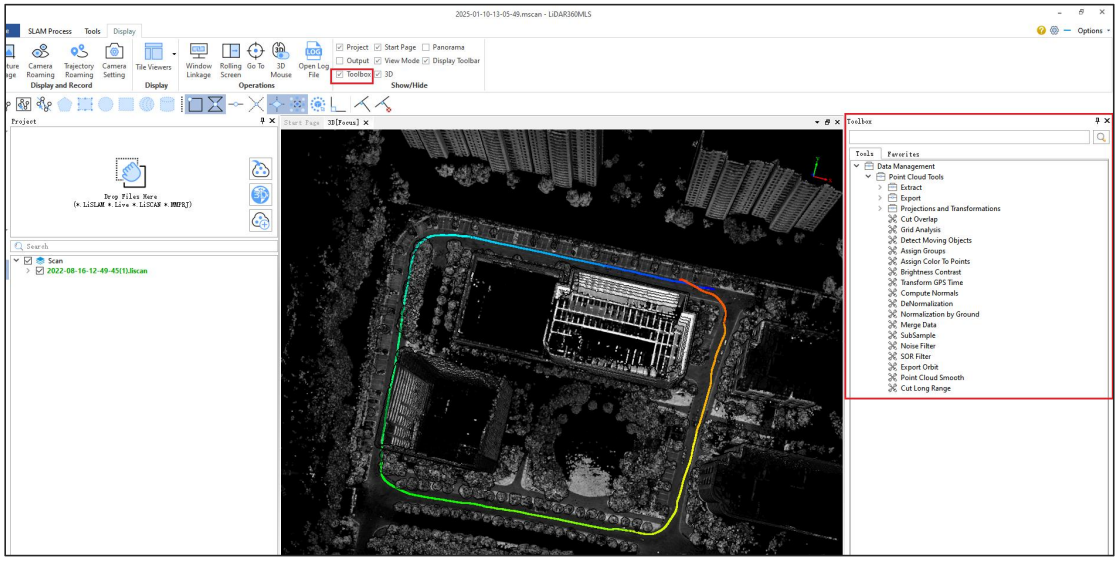
12. 3. Accuracy Check

The accuracy check function can verify the absolute accuracy of the data by importing checkpoints.



12. 4. Toolbox

The toolbox includes point cloud extraction, export, projection and coordinate transformation, and other point cloud tools.



13. Description of Other Accessories

13. 1. Telescopic Pole Adapter

The LiGrip O2 Lite installs the telescopic pole through the adapter, supporting data collection and GCP collection in Pole Mode.

Installation steps (except for the main device, the installation order is not critical):

① Tighten the connector with the RTK joint.

② Install the phone holder clamp and holder (skip if not installing the phone holder).

③ Install the battery clamp by sliding it from top to bottom into the telescopic pole, with the narrow end at the bottom and the wide end at the top.

④ Remove the base stand, align the screw hole at the bottom of the battery with the adapter, and tighten.

⑤ Secure the battery clamp.

The installation is completed as follows:

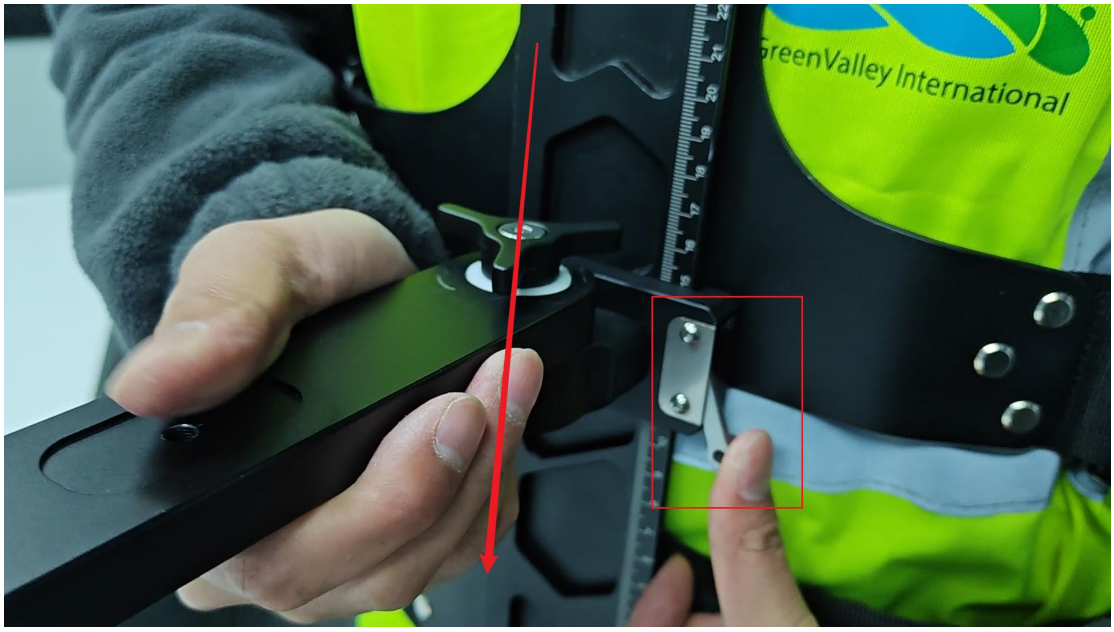
13. 2. Frontpack Kit

The frontpack kit can secure the device and phone, with adjustable angles in all directions, completely freeing your hands for flexible operation.

Installation Steps:

① Wear the frontpack kit and fasten all buckles.

② Open the support device latch, slide the support device into the corresponding slot from above, and secure the latch once it reaches the appropriate position.



③ Tighten the support device fixing screw to prevent horizontal sway.

④ Align the holes to install the phone holder and tighten the knob (if the phone holder is not needed, it can be omitted).

⑤ Remove the device base.

⑥ Align the battery with the support bracket's positioning hole and tighten the screw to secure it.

Installation complete: