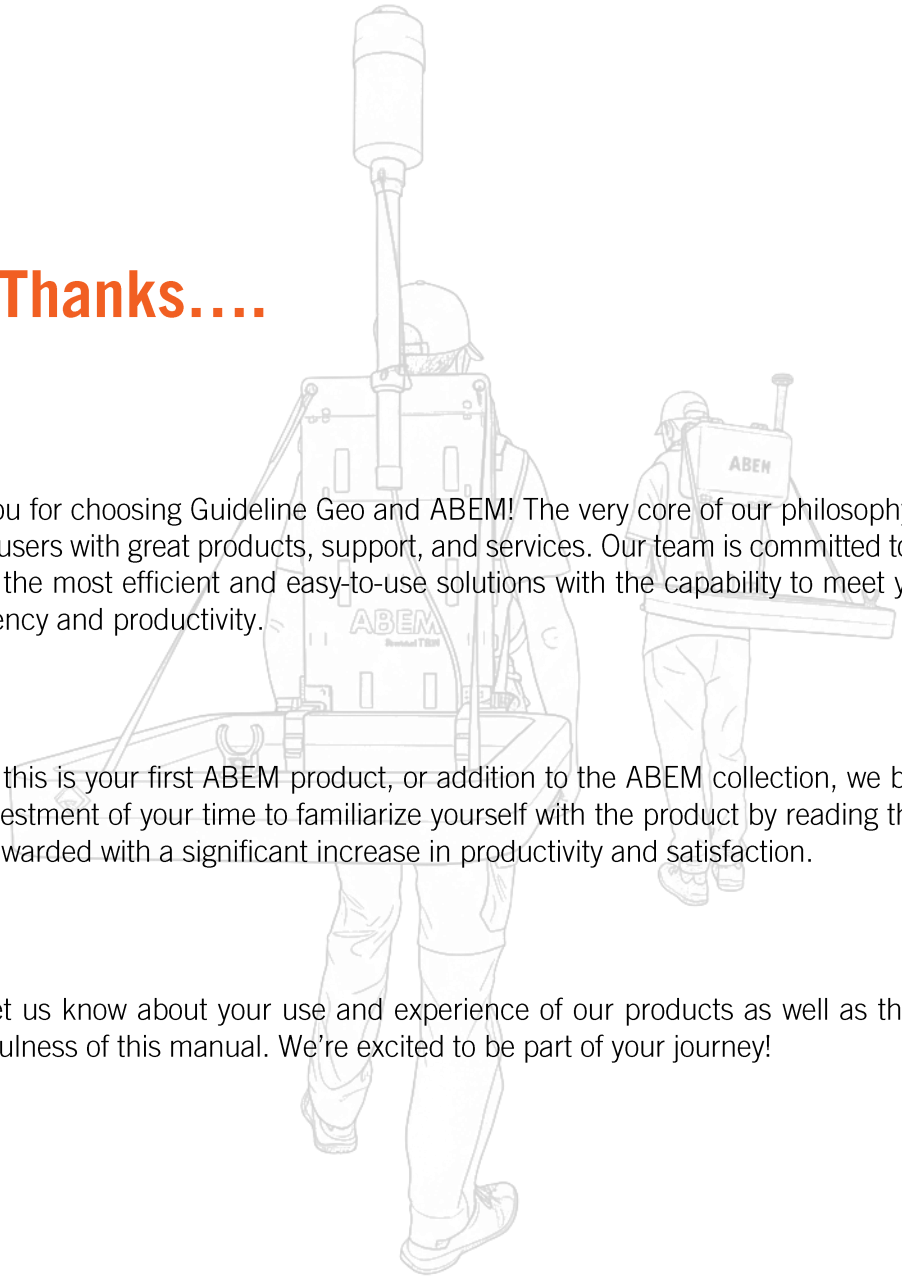
ABEM GroundTEM Trek
User Guide

ABEM GroundTEM Trek



Our Thanks....

Thank you for choosing Guideline Geo and ABEM! The very core of our philosophy is to provide our users with great products, support, and services. Our team is committed to providing you with the most efficient and easy-to-use solutions with the capability to meet your needs for efficiency and productivity.

Whether this is your first ABEM product, or addition to the ABEM collection, we believe that small investment of your time to familiarize yourself with the product by reading this manual will be rewarded with a significant increase in productivity and satisfaction.

Please let us know about your use and experience of our products as well as the contents and usefulness of this manual. We're excited to be part of your journey!

v1.1.4 January 2026

COMING SOON

To download the **GroundTEM Trek App** for Android devices from **Google Play**, scan the QR code on the left

Get the **GroundTEM Trek App** (Android) and other resources from the **Guideline Geo** website, using the QR code to the right

TABLE OF CONTENTS

1. Introduction 3

1.1 What does the user manual contain 3

1.2 The Transient Electromagnetic Method 3

2. The GroundTEM Trek System - components 5

2.1 GroundTEM Trek Tx unit 5

2.2 Coil backpacks 5

2.3 Other parts 6

2.4 Batteries 6

2.5 Battery charging suitcase 2054-2, 2040 7

2.6 Shipping cases 7

3. Field operation guide 8

3.1 Powering the GroundTEM Trek Tx and Rx units on 8

3.2 Assembling receiver backpack 10

3.3 Assembling transmitter backpack 14

3.4 Operation guide 17

3.5 De-mobilize the system 19

3.6 Packing 19

3.7 Transportation 21

4. GroundTEM Trek App 23

4.1 Installation and connection 23

4.2 Interface 23

4.3 Measurements and data display 25

4.4 Premium features and real-time inversion 30

4.5 Export Background Images & Shapes for GroundTEM Trek App 31

5. Planning a survey 33

6. Download and upload data 35

7. Troubleshooting - FAQ 39

7.1 Checking Instrument Functionality in Weak Signal Conditions 41

7.2 How to get access to GroundTEM Trek remotely 42

Appendix I: Software for GroundTEM Trek data 45

1. INTRODUCTION

1.1 What does the user manual contain

This user manual provides both technical and theoretical specifications for the GroundTEM Trek system. Its purpose is to introduce the GroundTEM Trek system and guide users through the necessary procedures before, during, and after a field survey.

- **Section 2** outlines components included in the GroundTEM Trek system.
- **Section 3** presents a detailed field operation guide.
- **Section 4** focuses on the GroundTEM Trek App, its interface and usage.
- **Section 5** offers recommendations for planning your survey effectively.
- **Section 6** explains how to import acquired data for further processing.
- **Section 7** provides troubleshooting tips for the common issues.

1.2 The Transient Electromagnetic Method

The measurements are made by transmitting a direct current through the transmitter coil. This results in a static primary magnetic field. The current is shut off abruptly, which induces an electrical field in the surroundings (Figure 1). In the ground, this electrical field will result in an electrical current which will in turn generate a secondary magnetic field. As time passes, the resistance in the ground will weaken the current (which is converted to heat), and the current density maximum moves downwards and outwards leaving the current density still weaker. In a conductive ground, the current diffuses more slowly down into the ground compared to a resistive ground where the currents will diffuse and decay fast.

The decaying secondary magnetic field is vertical in the middle of the transmitter coil, and an electro-motoric power is induced in the receiver coil - a

voltage – and this is the signal, which is measured as a function of time in the receiver. Just after the current in the transmitter coil is turned off, the current in the ground will be close to the surface, and the measured signal reflects primarily the conductivity of the top layers. At later times the current will run deeper in the ground, and the measured signal contains information about the conductivity of the lower layers. Measuring the current in the receiving coil will therefore give information about the conductivity as a function of depth – this is often called a sounding.

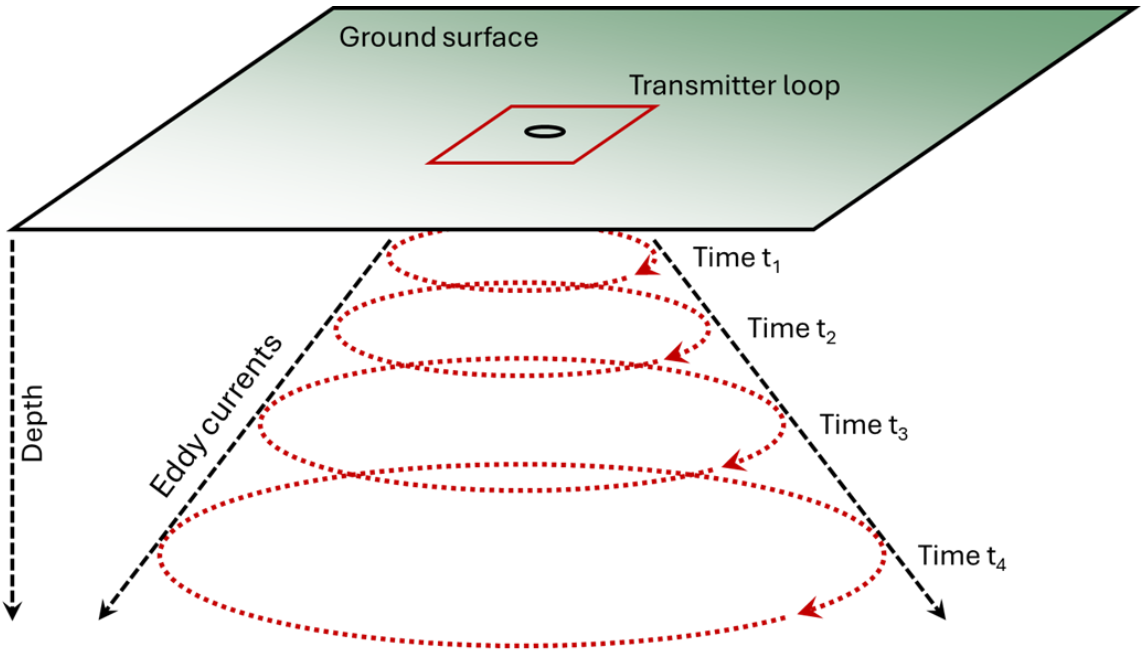


Figure 1: Schematic diagram of the TEM method

2. THE GROUNDTEM TREK SYSTEM - COMPONENTS

2.1 GroundTEM Trek Tx unit

- The instruments transmitter (Tx) unit
- Contains main computer for real-time signal processing, data storage, etc.

Figure 2: Main transmitter unit containing electronics

2.2 Coil backpacks

Figure 3: Assembled transmitter coil backpack (left) & receiver coil backpack (right)

2.3 Other parts

- **Tx mast (GPS)** – Connected to the GroundTEM Trek Tx unit and attached to the transmitter backpack (Figure 4).
- **Receiver unit** - The receiver (Rx) unit is connected to the Rx coil and attached to the receiver backpack (Figure 4).
- **Tx cable** – connects GroundTEM Trek unit with Tx coil (Figure 4).

Figure 4: Tx mast (left), receiver unit & pole (middle), Tx cable (right); not to scale

2.4 Batteries

GroundTEM Trek requires two batteries to operate: 1 x RRC-2054-2 in the transmitter and 1 x RRC-2040 in the receiver (Figure 5). The charge state of the battery is seen by pressing the indicator.

Figure 5: Batteries for powering GroundTEM Trek: RRC-2054-2 (left) & RRC-2040 (right)

2.5 Battery charging suitcase 2054-2, 2040

- Battery charging unit for two batteries (Figure 6).

Figure 6: Battery charging suitcase for both RRC-2054-2 and RRC-2040 batteries. Instructions for use are provided inside the case lid.

2.6 Shipping cases

We provide 2 cases modified specifically for the safe storage and transportation of the GroundTEM Trek system (Figure 7):

Case type	Dimensions (cm/in)	Weight (kg/lbs)
Hard case	60 × 80 × 45 cm (~ 23.6 × 31.5 × 17.7 in)	32 kg (~ 70.5 lbs)
Soft case	77 × 75 × 27 cm (~ 30.3 × 29.5 × 10.6 in)	10 kg (~ 22.0 lbs)

More information on packing is available in Section 3.6.

Figure 7: Storage and transportation cases of the GroundTEM Trek system. Hard case (left) and soft case (right).

3. FIELD OPERATION GUIDE

The workflow for measuring with a GroundTEM Trek involves the following steps:

1. Power on the GroundTEM Trek Tx and Rx units.
2. Assemble the transmitter and receiver backpacks
3. Operate the GroundTEM Trek unit from the GroundTEM Trek App.
4. Start measuring along the desired lines.
5. De-mobilize the GroundTEM Trek system.

The following provide instructions on how to perform the different steps.

3.1 Powering the GroundTEM Trek Tx and Rx units on

It is recommended to turn on the Rx unit first, so that its signal can be detected by the GroundTEM Trek Tx unit. To do so:

- Gently push up the cylindrical plastic cover to reveal the battery slot (Figure 8)
- Insert the battery in the designated slot.
- Press the power button located under the base of the Rx unit.
- The LED indicators should light up, confirming the unit is powered on and that GPS signal is locked.

Figure 8: Steps to power the receiver unit. After inserting the battery and pressing the power button, the two LED lights turn on.

The next step is to turn on the GroundTEM Trek Tx unit:

- Open the unit and insert the RRC 2054-2 battery into the battery slot
- Close the case and place it up-right.
- Press the power button. The Tx LED indicator should light up (Figure 9). The location light should also light up once the Tx mast is connected to the unit

Note:

- It will take 2 min, before the Wi-Fi signal of the unit can be detected by your mobile device.
- Battery life varies depending on usage. The transmitter battery typically lasts up to 80 minutes, while the receiver battery can last up to 8 hours. To extend survey time, ensure you bring extra batteries.

Figure 9: Battery slot of the GroundTEM Trek unit (left) and LED light indicating the unit has been powered on successfully (right).

3.2 Assembling receiver backpack

1. Grab the receiver backpack, the receiver (Rx) coil (Figure 10), the receiver (Rx) unit and pole (Figure 4).

Figure 10: Receiver backpack (left) and receiver coil (right)

2. Place the backpack on a flat, horizontal surface with the black plate facing upward (Figure 10).
3. Insert the receiver pole into the designated bracket, using the track as guidance. Once in place, secure with the clip on the backpack (Figure 11).

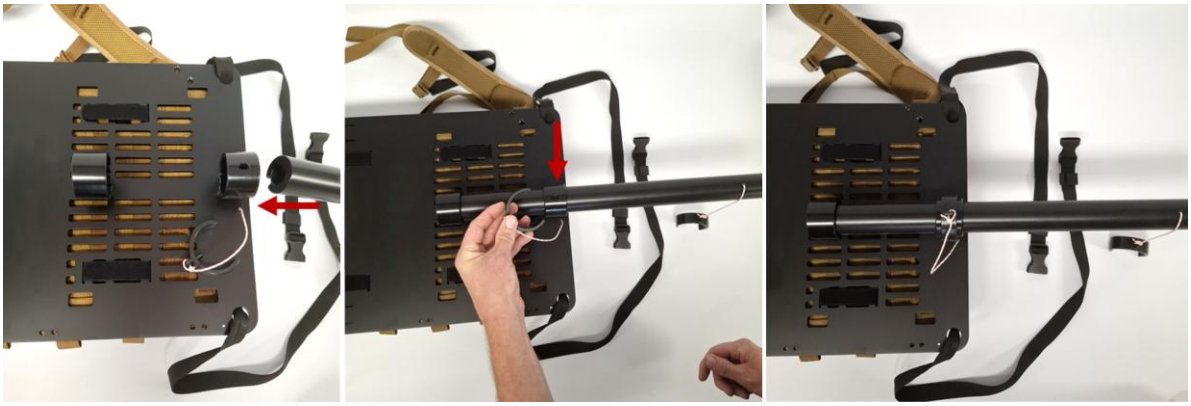


Figure 11: How to secure the receiver pole to the receiver backpack

4. Align the hinges of the Rx coil with those on the backpack. Insert the bolt through the hinges and secure it with the clips on both sides (Figure 12).

Figure 12: How to secure the Rx coil to the receiver backpack

5. Secure the coil to the pole by clipping it into place (Figure 13).

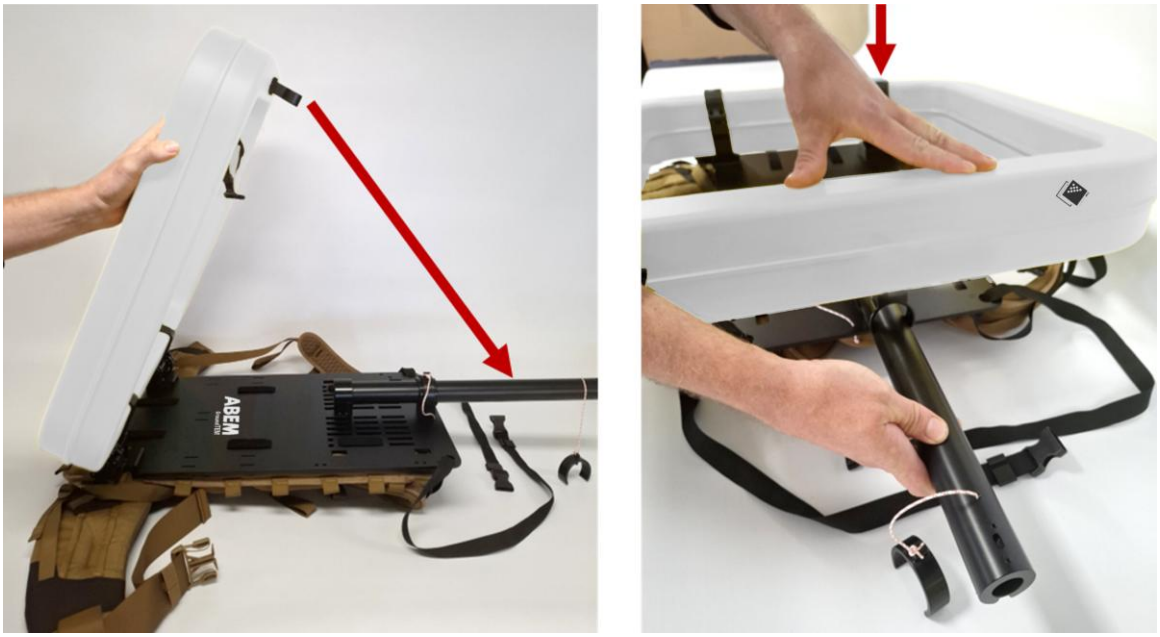


Figure 13: How to secure the Rx coil to the pole on the receiver backpack

6. Attach the coil straps to the backpack straps by fastening the buckle clips on both sides (Figure 14).

Figure 14: How to secure the straps of the Rx coil to the straps of the backpack.

7. Insert the receiver (Rx) unit into the pole (Figure 15):
   - First, thread the cable through the pole until it appears on the other side.
   - Then slide the Rx unit into the pole, using the tracks as guidance.
   - Finally, secure the Rx unit by inserting the clip provided on the pole.

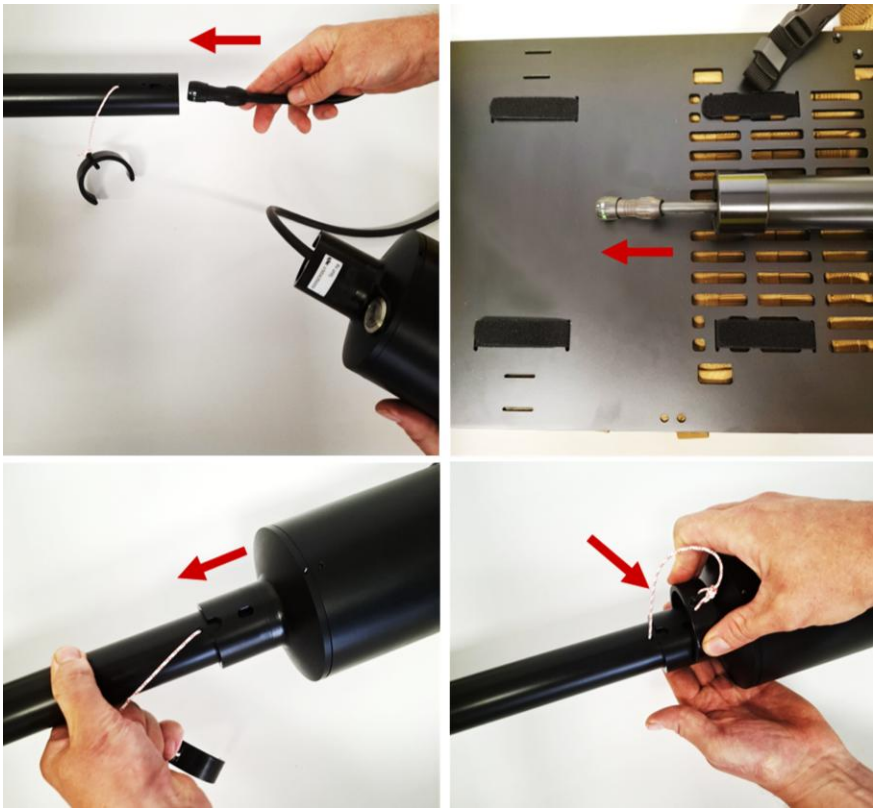


Figure 15: Mounting the Rx unit on the receiver backpack. Insert pole into bracket (left), add Rx unit on top (middle) and secure everything with provided clips (right).

8. Connect the Rx unit to the Rx coil (Figure 16**Error! Reference source not found.**):
    - Ensure the plug is in the unlocked position (white lock indicator).
    - Align the white arrow on the plug with the white line on the connector.
    - Push the plug in, then twist clockwise until it locks (green lock indicator).

Figure 16: How to connect the Rx unit cable to the connector on the Rx coil.

3.3 Assembling transmitter backpack

1. Gather the following components: transmitter backpack, transmitter (Tx) coil (Figure 17), transmitter (Tx) unit (Figure 2), GPS mast, and connecting cable (Figure 4).

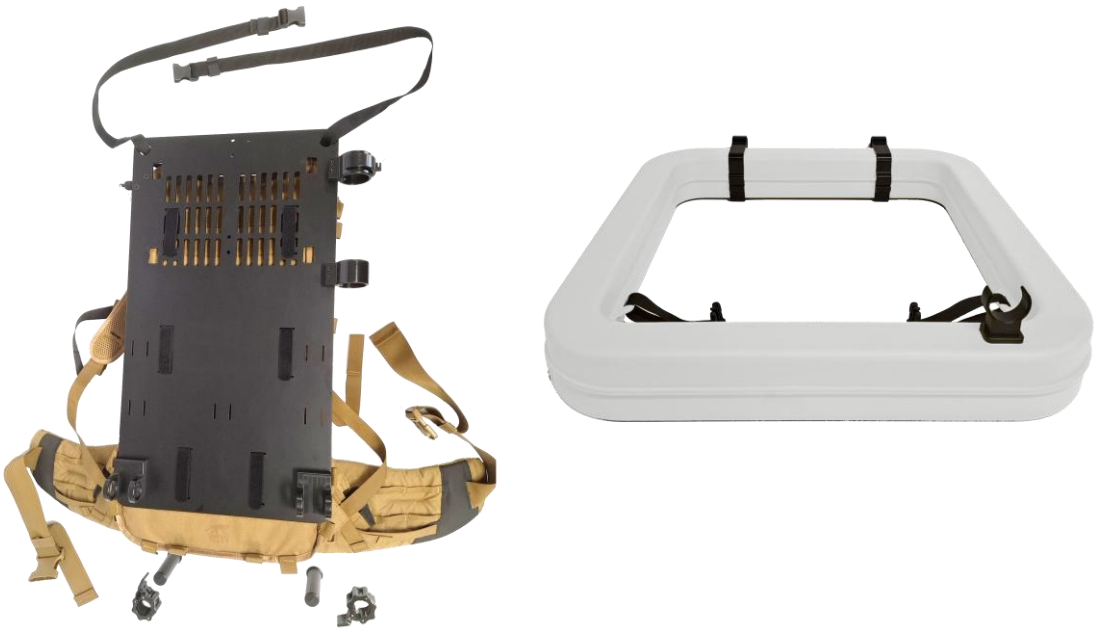


Figure 17: Transmitter backpack (left) and transmitter coil (right)

2. Place the backpack on a flat, horizontal surface with the black plate facing upward (Figure 17).
3. Insert the Tx mast and pole into the designated bracket, using the track as guidance. Once in place, secure it with the clip provided on the backpack (Figure 18).

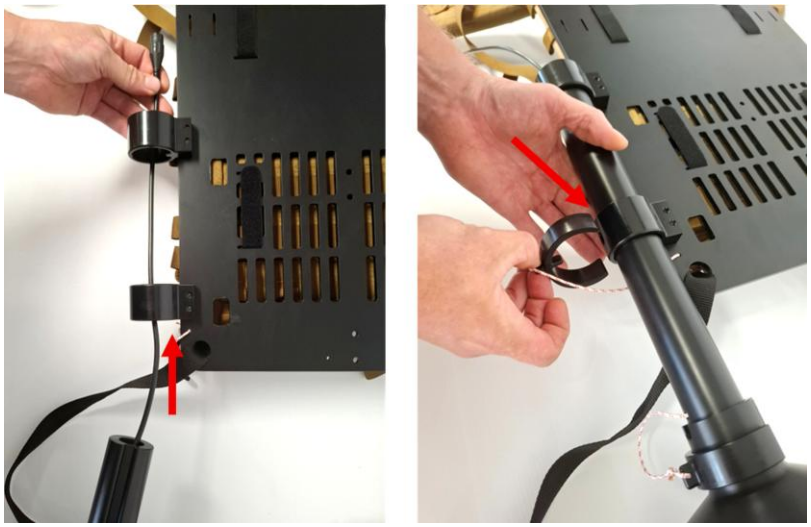


Figure 18: Insert (left) and secure (right) the Tx mast onto the transmitter backpack.

4. Prepare the transmitter (Tx) unit:
    - Connect the connector cable to the plug on the lower side of the unit.
    - To insert properly, align the two white dots on the plug and connector.
    - Push it in and secure by tightening the cap clockwise.

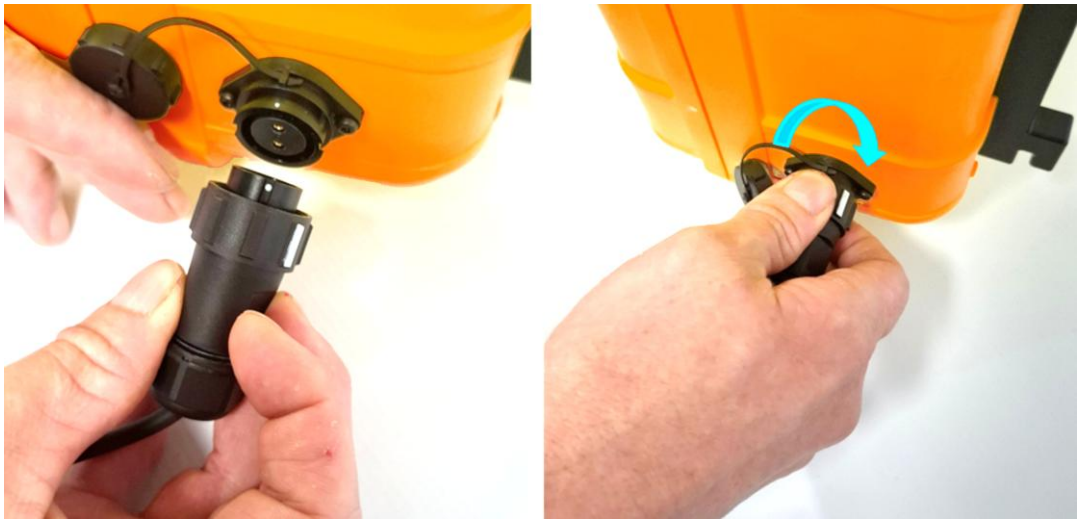


Figure 19: How to plug in the connector to the Tx unit.

5. Mount the Tx unit onto the backpack ():
    - Align the hooks on the back of the unit with the slots on the transmitter backpack.
    - Gently press the unit into place until you hear a click, confirming it is securely locked.

Figure 20: How to mount the Tx unit onto the transmitter backpack.

6. Connect the Tx mast cable to the connector on the upper left side of the unit (Figure 21):
    - Open the protective cap.
    - Push the connector in and twist slightly clockwise.
    - Once GPS lock is achieved, the corresponding LED light will start blinking.

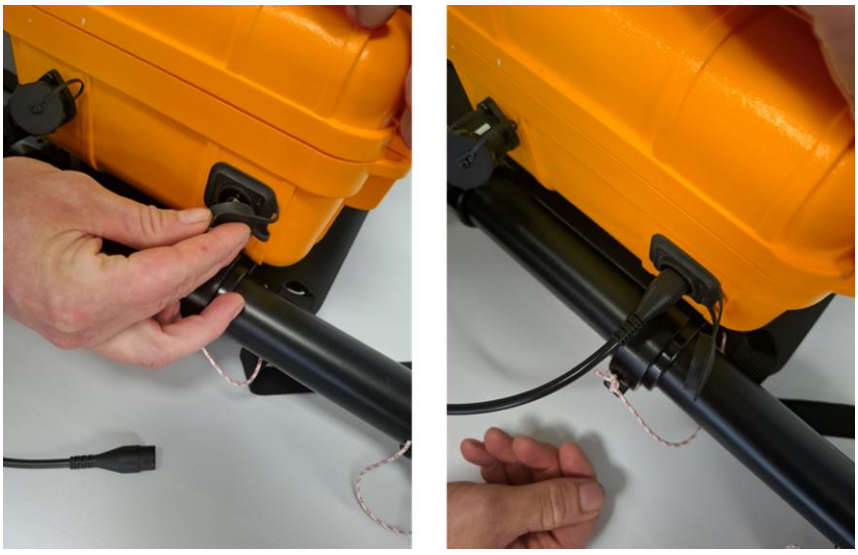


Figure 21: How to connect the Tx mast to the Tx unit

7. Assemble the Tx coil onto the transmitter backpack:
    - Follow the same procedure as in Step 4 of the Receiver Backpack Assembly (align hinges, insert bolt, secure with clips).

- Secure the coil to the GPS mast pole by clipping it into place (Figure 22).

Figure 22: How to secure the Tx coil to the pole on the transmitter backpack

8. Connect the Tx unit to the Tx coil (Figure 23):
   - Remove the protective cap from the coil connector.
   - Align the white dot on the plug with the white dot on the connector. Push the plug in, then screw clockwise until secure.

Figure 23: How to connect the Tx unit cable to the connector on the Tx coil.

3.4 Operation guide

Once the assembly is complete, the field crew should put on their respective backpack. Two people are necessary to operate GroundTEM Trek.

Important:

The user wearing the receiver backpack should not wear any metallic or electronic items (e.g., phone, belt, or excessive jewelry), as these can interfere with the signal and introduce noise into the data.

The user wearing the transmitter backpack is responsible for carrying a mobile device and operating the GroundTEM Trek App. (see section 4)

Before beginning measurements, it is necessary to measure the coil height for both users. These values must be entered into the app when starting a new project.

- The heights, measured in meters, are unique to each user.
- The coils must remain as parallel to the ground as possible during data acquisition (Figure 24). Use the straps to adjust their position for optimal alignment, without needing to hunch over.
- While wearing the backpack, measure the distance from the center of each coil (center rim) to the ground (Figure 24).

Figure 24: Depiction of proper coil height measurement

Once both users are ready, position yourselves at the starting point of the survey line. Maintain an approximate 15-meter distance between the transmitter and receiver—this spacing will also be guided by the GroundTEM Trek App. For more detailed instructions on using the app, please refer to Section 4.

3.5 De-mobilize the system

- Start by turning off GroundTEM Trek Tx unit from the GroundTEM Trek App.
- Power off the GroundTEM Trek Tx unit by pressing the power button.
- Turn off the Rx unit by pressing the power button.
- Disconnect all cables.
- Dismount the GroundTEM Trek Tx unit from the transmitter backpack. To do so, pull on the safety pin on the left of the unit (Figure 25), pull up and away from the backpack's plate.
- Take out the GPS antenna from the bracket of the transmitter backpack.
- Take out the receiver pole from the bracket of the receiver backpack.

Figure 25: Pull safety pin to release and dismount the GroundTEM Trek unit from the backpack.

3.6 Packing

For the safety of the equipment, we provide two custom cases for secure packing and transportation. Both cases are fitted with foam lining to protect all parts of the system.

The soft case is designed to hold the following components:

- Transmitter (Tx) coil
- Receiver (Rx) coil

Figure 26 shows how to pack the coils in the soft case.

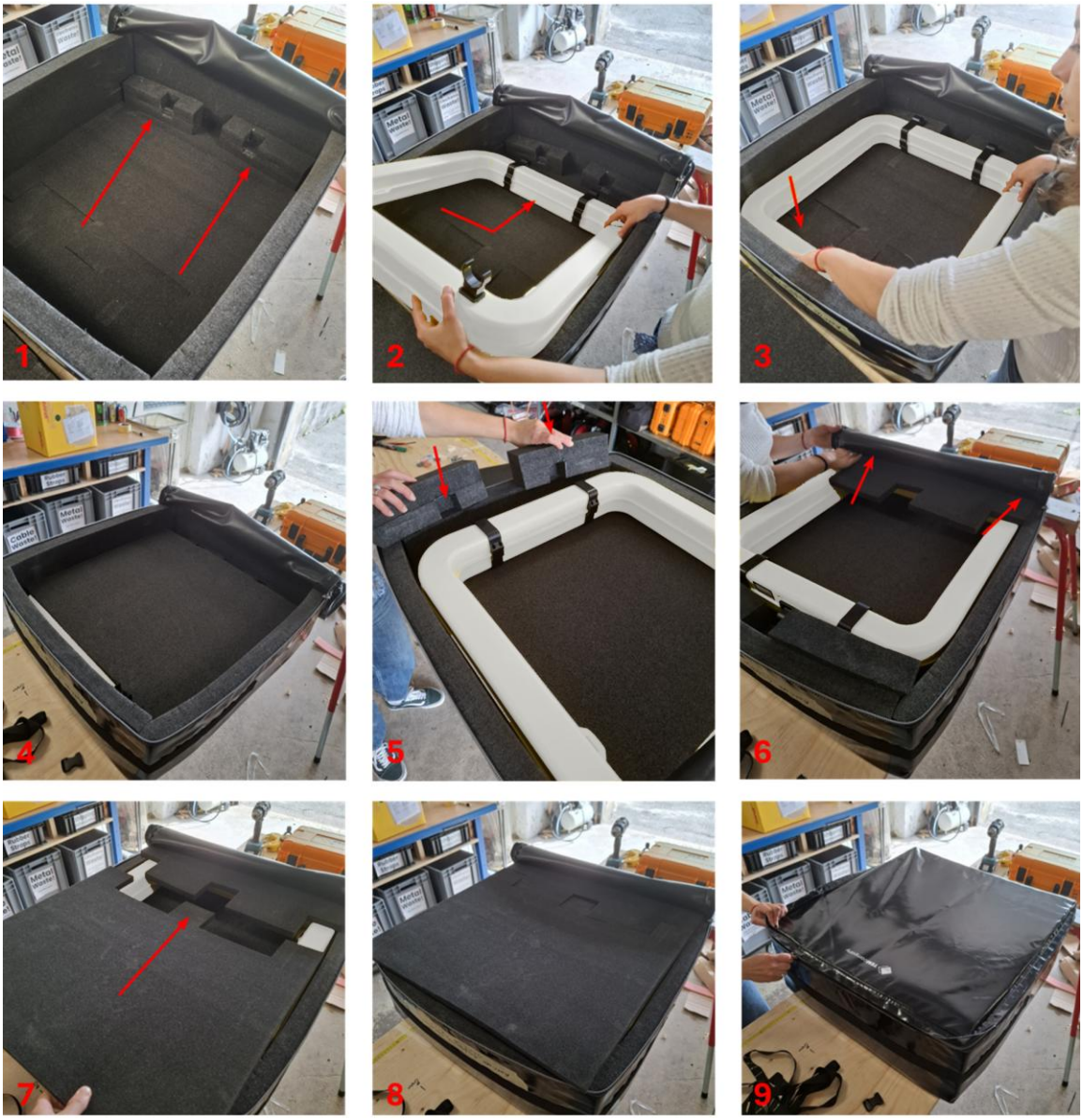


Figure 26: Step by step how to pack the coils in the soft case. Both coils fit perfectly in the case, make sure to use foam blocks to separate and secure the coils in place.

The hard case is designed to hold the following components:

- GroundTEM Trek Tx unit
- Rx unit with pole
- Tx mast (assembled)
- Tx cable
- 3 x RRC-2054-2 batteries and 1 x RRC-2040 battery
- Receiver and transmitter backpacks
- Battery charging suitcase

Figure 27 shows how the above components should be arranged in the hard case.

Figure 27: Packing components in the hard case. Start by packing the smaller components in the designated slots in the foam (up). Next pack the two backpack plates, with the battery charging suitcase located between them (down).

3.7 Transportation

As a general rule, we recommend transporting the equipment in the designated cases for maximum protection. However, we understand that repeated assembly and disassembly between sites can be time-consuming. In such cases, the equipment may be transported *almost fully assembled*, provided extra caution is taken.

Each coil is designed to lock securely onto the mast (Figure 28). To attach it, close the coil until the clip clicks into place on the corresponding mast.

The only part we strongly recommend disassembling is the Rx unit from the pole, as keeping it attached may create a pressure point during transportation.

Additional recommendations:

- Place each assembled backpack on a soft surface, with the backpack handles facing upwards. This helps to relieve tension on the masts.
- Always handle the equipment with care to avoid unnecessary strain on cables and connections.

Figure 28: Assembled transmitter and receiver backpacks in locked position for comfortable transportation.

4. GROUNDTEM TREK APP

4.1 Installation and connection

The GroundTEM Trek system is controlled by the GroundTEM Trek App available for Android (v. 14 and higher) and it can be installed from Google Play (Figure 29)

Figure 29: GroundTEM Trek App icon

To connect to the GroundTEM Trek unit, follow these steps:

- Make sure the GroundTEM Trek unit is turned on. It takes a few minutes to set up the GroundTEM Trek Wi-Fi.
- From the mobile device **connect to the GroundTEM Trek** Wi-Fi network.
  Wi-Fi name: GroundTEM_0### (ID of the GroundTEM Trek instrument)
  Password: 0102030405060708
- Open the GroundTEM Trek App. If it is properly connected it will display the controller interface as shown in Figure.

4.2 Interface

Figure 30 shows the main menu and the different options of the app once you are connected to the unit

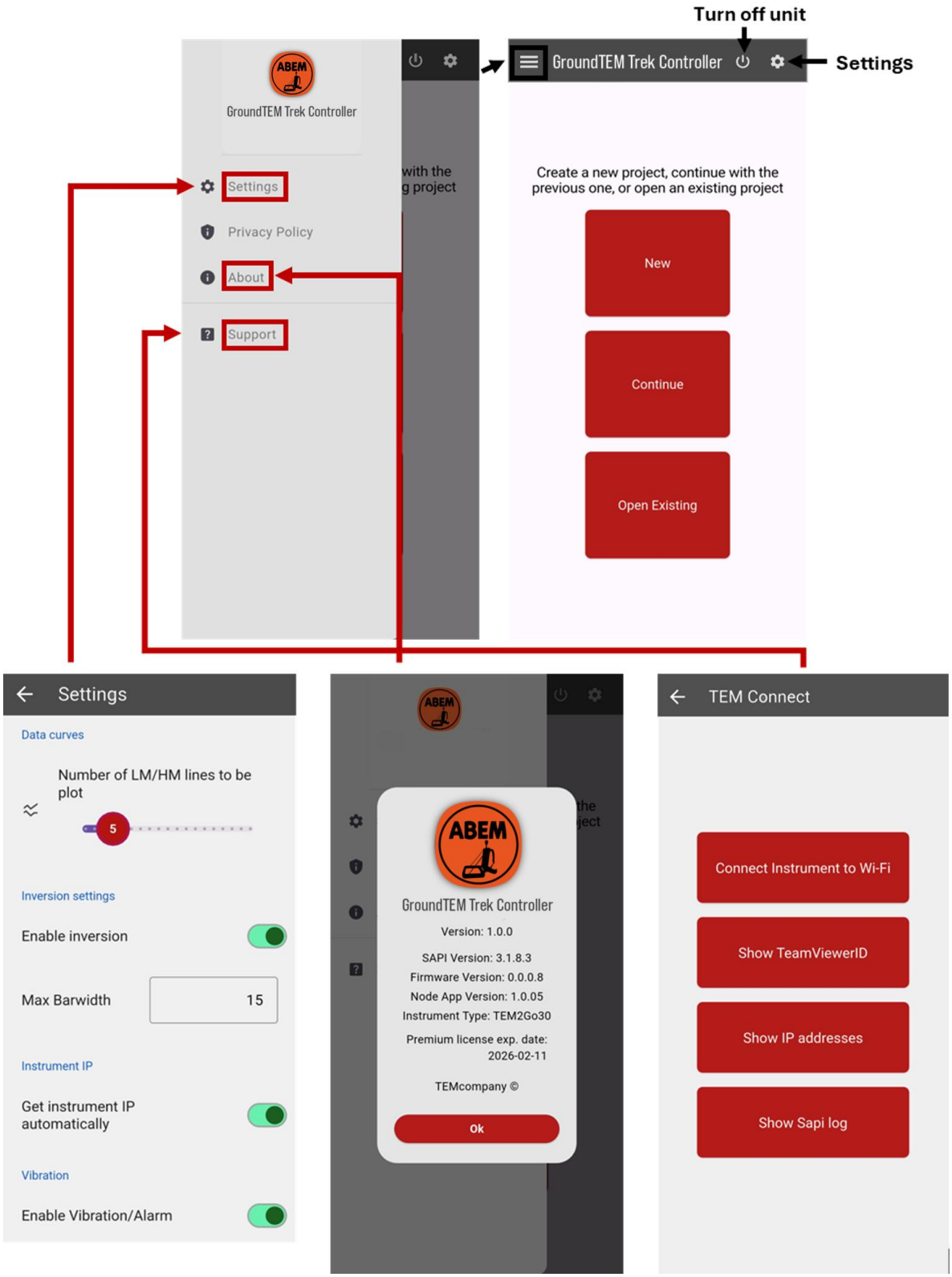


Figure 30: GroundTEM Trek App environment start-up and menu.

4.3 Measurements and data display

Create project

After you have chosen "New" from the starting menu, fill in the fields shown in Figure 31 as explained below:

- Insert "**Project Name**" - provide a name for the project (e.g. Location_date). Special characters and spaces are not allowed (**mandatory field**).
- **Select Map** - select background map. The accepted formats are json, pgw, png (**optional field**). On how to create and import background maps see section 4.5.
- **Select Protocol** – protocols are provided by Guideline Geo for different equipment configurations. Make sure to select the correct one, e.g. Protocol_Trek_Tx63x63_Tx63x63_800us_50Hz.sts (**mandatory field**).
- **Insert Rx and Tx coil height** - these distances are unique to each user, as they depend on the individual wearing the transmitter and receiver backpacks. The coil heights must be measured in meters and accepted values are from 0-3 m (e.g. 0.84 m). While wearing the backpack, measure the distance from each coil to the ground (Figure 24). Enter the measured values in the respective fields (**mandatory field**).

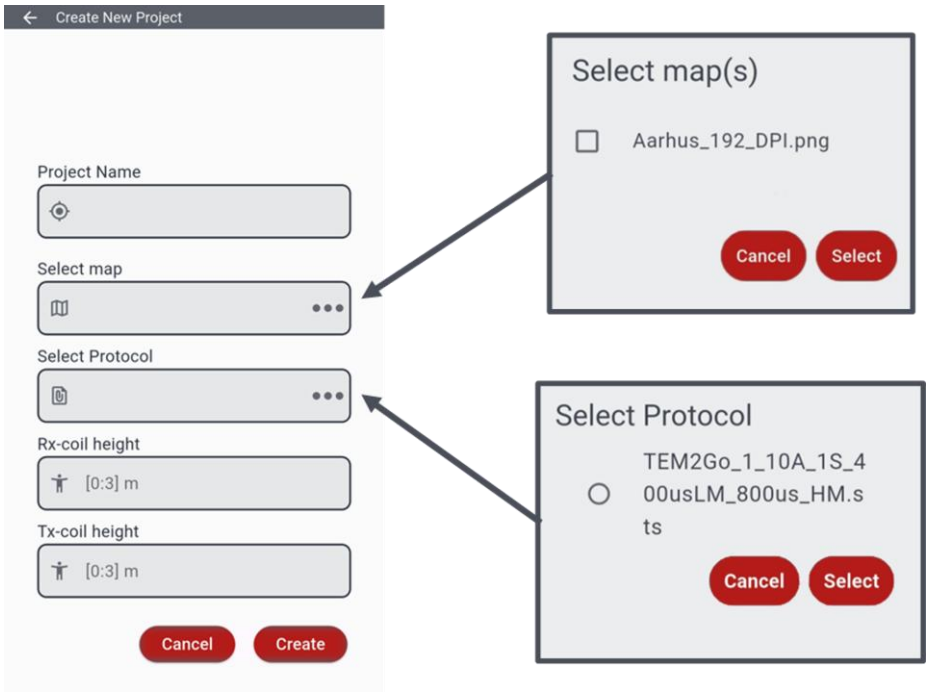


Figure 31: Creating a new project window.

Notes

- To copy the background map to the GroundTEM Trek unit use the **GroundTEM Connect** app to upload the files from the local PC to the "Maps folder" using the "Upload" button (Figure 36).
- The file of the map must not exceed 20 Mb. The map needs to be copied to in the GroundTEM Trek unit before starting the project.
- Maps can be created in free access software (e.g. QGIS). (see Section 4.5)
- Imported maps will show up in alphabetical order, first maps and then lines, points.
- If no background map has been selected, a default map from Open-StreetMap will be available for use.
- When the GroundTEM Trek is connected to both GroundTEM Trek App and GroundTEM Connect it can be turned off only from the GroundTEM Connect. The turn off button on the GroundTEM Trek App is disabled in this case to prevent accidentally turning off the instrument and potential failure in the internal hardware.

Continue project

To continue the same project press "Continue". Alternatively, if a project was made previously press "Open Existing Project" and a window with all the available projects will be displayed to select the desired project (Figure 30).

Starting Screen

When a project is launched, the starting screen (Figure 32) will appear.

- The main view displays a map with your current location marked.

Note: *If the default OpenStreetMap does not load, the unit likely needs internet access. Use the Support option in the Main Menu (☰) to connect to an external Wi-Fi or mobile hotspot. Once online, open your project and zoom in/out to prompt the map to load correctly.*

- If you have uploaded a **custom map**, tap the **"GIS Settings"** icon in the upper-right corner. Here, you can manage your uploaded layers and adjust their opacity.
- To the left of the "GIS Settings" icon, the **"Map Settings"** button allows you to fine-tune additional map visualization options.
- At the top-left above the map, you'll find the Start/Stop Measuring button, along with the Project Name and Line Number.

- The upper-right corner of the map features controls for zoom in/out, north toggle, and map scaling using pinch gestures.
- Directly below the map is the Coil Distance Regulator, which helps users maintain an optimal distance between the transmitter and receiver.
- Beneath the coil distance bar, you'll see status indicators for:
  - Data recording
  - Temperature
  - LM/HM current
  - GPS signal
  - Tx battery life

Note: *The LM and HM current indicators will display red before measurement begins, as the transmitter has not yet started sending a signal.*

- At the bottom of the screen is the **navigation panel**, allowing you to switch between:
  - The **Main tab**
  - The **Real-Time Inversion tab** (if premium features are enabled)
  - The **Additional Info tab**

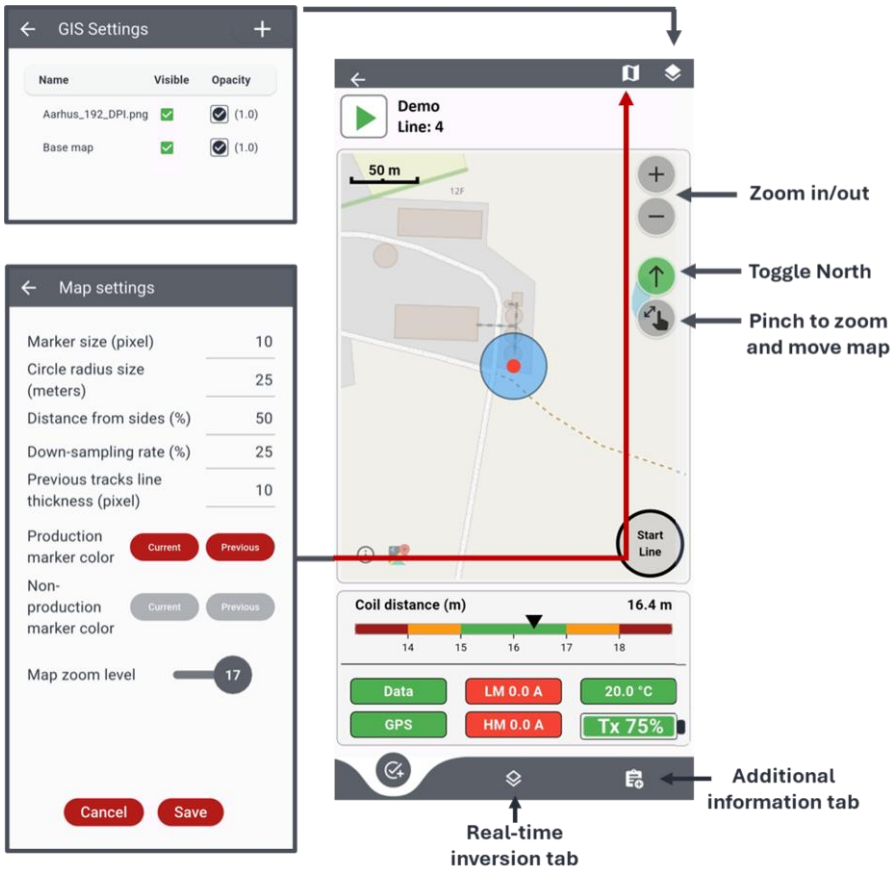


Figure 32: Starting screen and settings tabs once project is created/opened.

Operation

1. Start Data Collection

Tap the Run button in the top-left corner.

- The transmitter will activate, and the LM/HM current indicators should turn green to confirm transmission (Figure 33).

2. Check Tx/Rx Positioning and Distance

Before starting the survey, make sure that:

- The Tx and Rx are separated by at least 5–6 meters (16–20 ft).
- Both coils are in a horizontal position.

Note: *If the Tx and Rx are too close or not level, incorrect polarity detection may occur (see Polarity Detection Issue in Section 7), and the measurement gate could become saturated.*

Once users are aligned in a relatively straight line and the Coil Distance Regulator shows green, press Start Line to begin the survey.

Note: *The Coil Distance Regulator continuously monitors spacing between the two users during measurement. If the distance exceeds or falls below acceptable limits, the indicator moves into the red zone, and the device will vibrate to alert the person operating it. Also, the Rx will beep alerting the person with the receiver backpack. Reposition as needed before continuing.*

3. Complete or End a Line

When you've finished a line and are ready to start a new one (or end the session), press End Line.

Tip: *You can also tap anywhere on the screen to start or end a line if needed.*

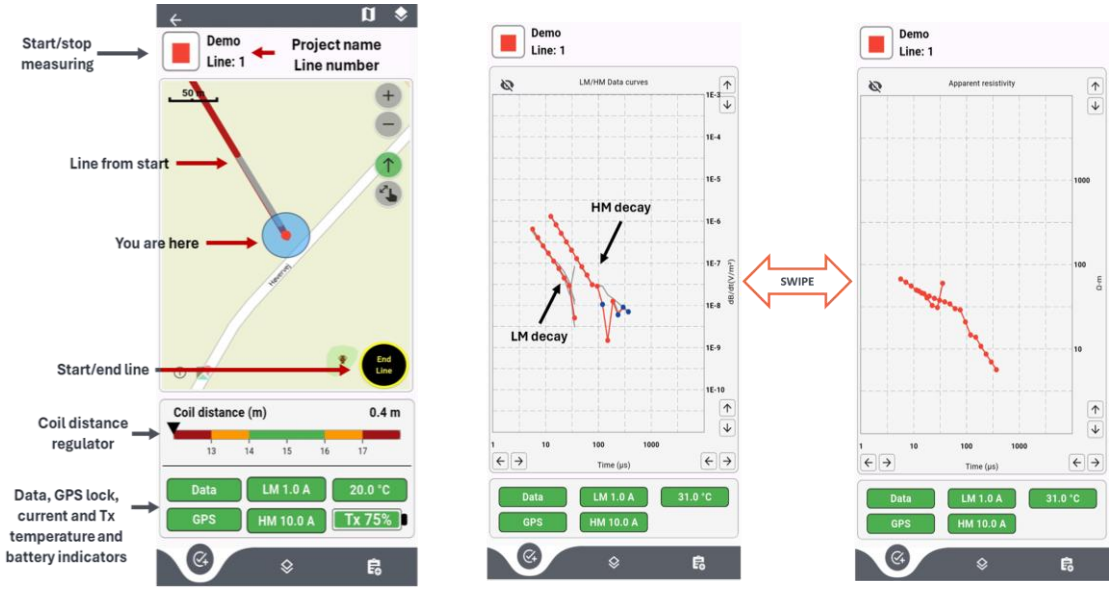


Figure 33: Display after measurement has started. Home screen (left), data can be seen as decay curves by swiping left on the screen. There are two ways to visualize the measurements: as LM/HM decay curves (middle) and as apparent resistivity curves (right).

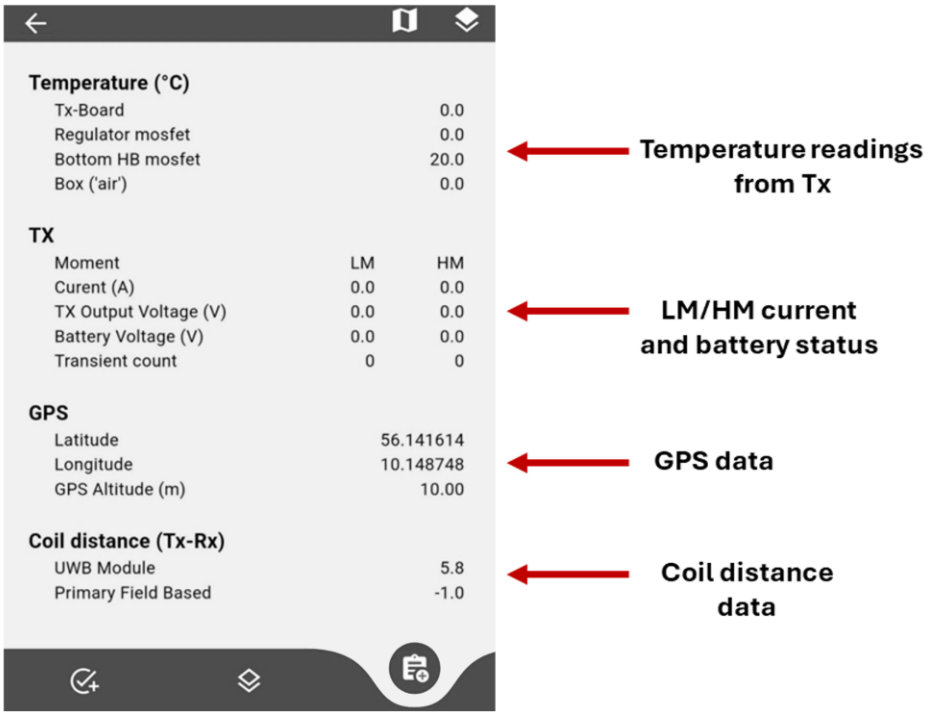


Figure 34: Additional information tab

4.4 Premium features and real-time inversion

If you have access to the Premium features package, you will have access to the real-time inversion option in the GroundTEM Trek App. It is designed to provide immediate insights into your subsurface data while you're still in the field. As data is collected, the instrument will automatically perform a preliminary 1D inversion, using a smooth model. When measuring along a line, this will result in the display of pseudo-2D sections by interpolating the individual 1D models — giving you a quick overview of lateral variations (Figure 35). The app provides insight into the depth of investigation (DOI).

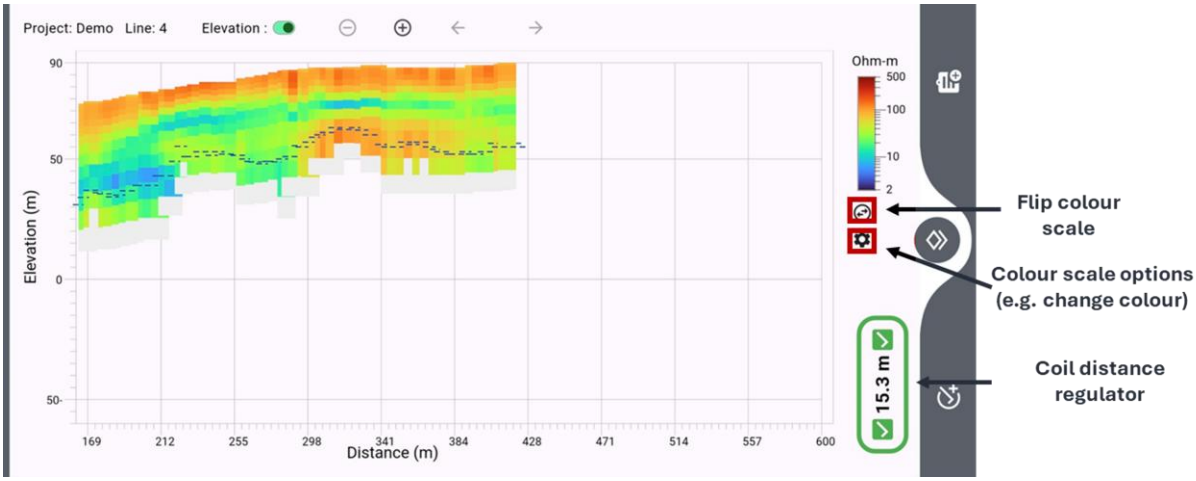


Figure 35: Real-time inversion tab. You can see a pseudo-2D resistivity section of several 1D interpolated models measured in a line. DOI is shown as the dotted lines.

Real-time inversion Troubleshooting

There are two common situations where an inversion model may not appear:

1. **A grey model is displayed**
   The grey model bar is a dummy bar, that is displayed when the inversion process is running, but the automatic processing rejects too much data for the inversion to be able to run. This usually indicates that the collected data is of poor quality, possibly due to noise, couplings, Induced polarization, 3D effects or something. The relevant log file will display the following message:

   Sapi.InversionThread: Lupus inversion returned error {type: ValueError, message: Not enough data points, has 0, expect at least 5}

2. **The inversion window is completely blank**
   This typically points to a problem with the inversion function itself, rather than the data. This can happen due to the following reasons
   a) Inversion is turned off – Go to **Settings** and make sure inversion is enabled (Figure 30).
   b) License issue - The instrument does not have a Premium Functionality License, or it has expired. Check the expiry date under the **About** section. Contact support@guidelinegeo.com for information on how to get it renewed.
   c) Inversion process not running – If the above two are fine, then contact support@guidelinegeo.com for help.

4.5 Export Background Images & Shapes for GroundTEM Trek App

GroundTEM Trek app supports commonly used **EPSG3857** (WGS 84 / Pseudo-Mercator) and **EPSG4326** (WGS 84) Coordinate Reference Systems (used by Google Maps, OpenStreetMap, Bing ArcGIS, ESRI, QGIS, etc.).

In **EPSG3857** the coordinates are in meters and use Mercator projection, while **EPSG4326** uses latitude and longitude for coordinates. Both CRSs are based on the World Geodetic System 1984.

*The suggested software is QGIS since it is an open-source software.

Background Images

To display satellite images exported from QGIS in GroundTEM Trek app the world file is required. World files contain georeferenced information for the image and must have the same name as the image file name. Extension will be .pgw for PNG and .jgw for JPG file (i.e. image.pgw & image.jgw).

Before export, make sure that the correct CRS (Coordinate Reference System) has been selected. From the menu bar on the top select “Project” then “Import/Export” and “Export Map to Image” to export map as image.

Make sure that “Append georeferenced information (embedded or via world file)” checkbox has been selected. This is necessary to create the world file that contains georeferenced information for the created image.

Exporting shapes (points, lines, polygons) from QGIS

To export shapes from QGIS, right click on the shape layer in “Layers” section of QGIS, select “Export” then “Save Features As…”. In the dialog window, select CRS (“EPSG: 4326 – WGS 84” or “EPSG:3857 – WGS 84 / Pseudo-Mercator”).

If you need to export more layers, you need to do the same for each layer separately, so each layer is contained in a separate file.

Upload Map Files to GroundTEM Trek instrument

See Download and upload data for more information on how to upload the created files.

5. PLANNING A SURVEY

General Guidelines

- **Do not connect or disconnect cables while data is being recorded.**
  This may lead to equipment malfunction and/or data loss
- **If connection is lost, try connecting again before rebooting**
  If a reboot is necessary, wait a few minutes before trying to reconnect.
- **Avoid using damaged plugs or cables.**
  If you notice any damage, please contact Guideline Geo or your local reseller for repair or replacement options.
- **Never connect plugs if the internal connectors are wet or dirty.**
  Moisture or debris can cause short circuits or permanent damage to the equipment.
- **Always use the transport case for storage and transport outside of field operations.**
  This ensures the instrument is protected during handling, shipping, or long-term storage.

Couplings and noise

TEM measurements taken near man-made conductors are often heavily distorted and unusable. These conductors can generate bias signals in the data due to coupling with the transmitted electromagnetic (EM) field.

Common sources of coupling/noise include:

- Power lines and buried cables
- Railways and fences
- Buildings and gas pipelines
- Wind turbines and vehicles

To minimize interference, it is advisable to maintain a minimum distance of 50 meters between Tx-coil and potential coupling sources. The optimal distance may vary depending on both the source type and local ground conductivity.

Batteries charging

- Do not charge batteries when the ambient temperature is below 0 °C.

- Ensure the battery temperature itself is above 0 °C before initiating charging.

Cold environment

When operating the system in cold conditions, please keep the following in mind:

- Avoid powering on the GroundTEM Trek unit immediately after bringing it indoors from the cold. Allow it to reach room temperature first to prevent condensation and potential short circuits.
- When very cold, casings, cables and plugs may become more brittle, increasing the risk of damage.
- Battery performance may be reduced, although the batteries are rated for use down to -20 °C.

Warm environment

To protect the instrument from overheating:

- The GroundTEM Trek unit will automatically shut down if its internal temperature exceeds 75 °C.
- The internal temperature can be monitored via the controller app.
- Ensure good airflow around the cooling plate and, where possible, provide shade for the unit during use.

Water conditions

The system is water-resistant, but not waterproof. This means that rainy conditions should not be a problem, but the equipment should be handled with caution in extreme precipitation or in case saltwater enters any of the components.

Bring a Multimeter

It is highly recommended to bring a multimeter when going into the field. This simple tool can be very helpful for checking the functionality of components such as cables, connectors, and batteries. By quickly identifying potential issues on site, you can minimize downtime and keep the survey running smoothly.

6. DOWNLOAD AND UPLOAD DATA

The recorded data is downloaded/copied from the GroundTEM Trek unit to a PC using the *GroundTEM Connect* program. *GroundTEM Connect* program is available from the Guideline Geo website (www.guidelinegeo.com/help-center/resources). This section is written for version 2025.2.0.7.

Connecting to GroundTEM Trek Wi-Fi

The first step is connecting the *Local PC* to the Wi-Fi of the unit. To do so:

- Insert the battery into the GroundTEM Trek unit and turn it on.
- Insert the battery into the Rx unit and turn it on.
- From the *Local PC* connect to GroundTEM Trek Wi-Fi network.
  Wi-Fi name: GroundTEM_0###, Password: 0102030405060708

GroundTEM Connect program

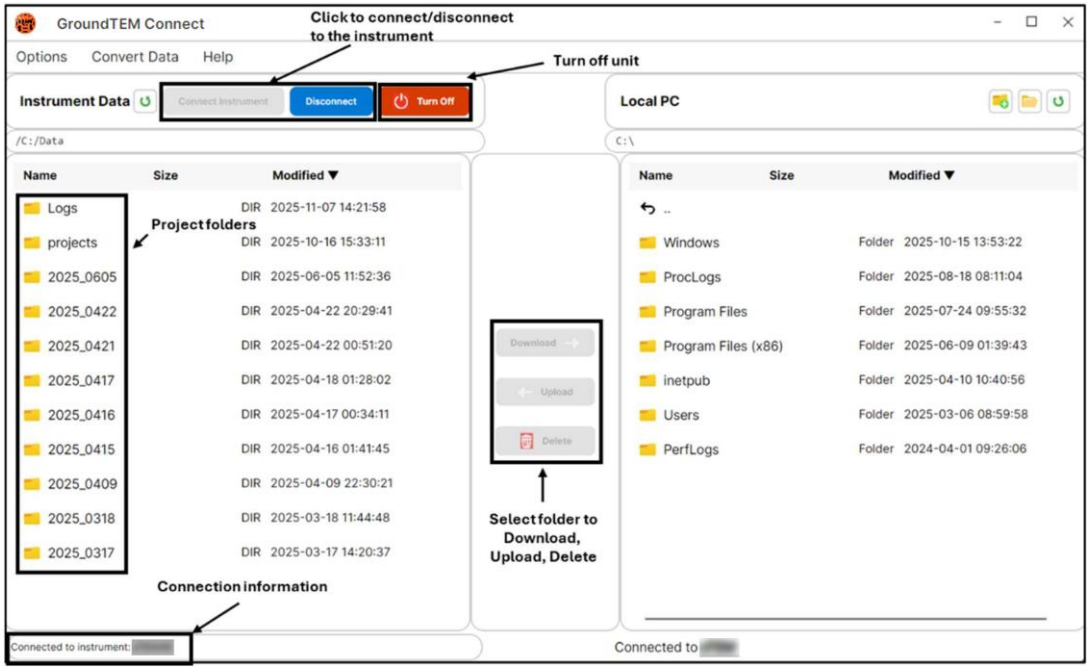


Figure 36: Steps for copying data from unit to Local PC (after connecting to the instrument).

To copy data from Instrument to Local PC

- Press *Connect to Instrument* to display the data folders on the unit
  - The TEM data on the instrument is sorted in main folders named by (yyyy_mmdd)

- Select main- or sub-folder(s) to copy to Local PC and set a target folder on the Local PC.
- Turn off the Instrument PC from the controller app before turning off the unit.

Note

- Folders/files with date/time names are named using UCT-time (GPS date/time).
- Data from a line is created both on the Rx and Tx units but will appear as a joined .stb file that can be then uploaded for processing.
- Before deleting data from the instrument, verify that the data files are copied to your Local PC.

Additional options in GroundTEM Connect

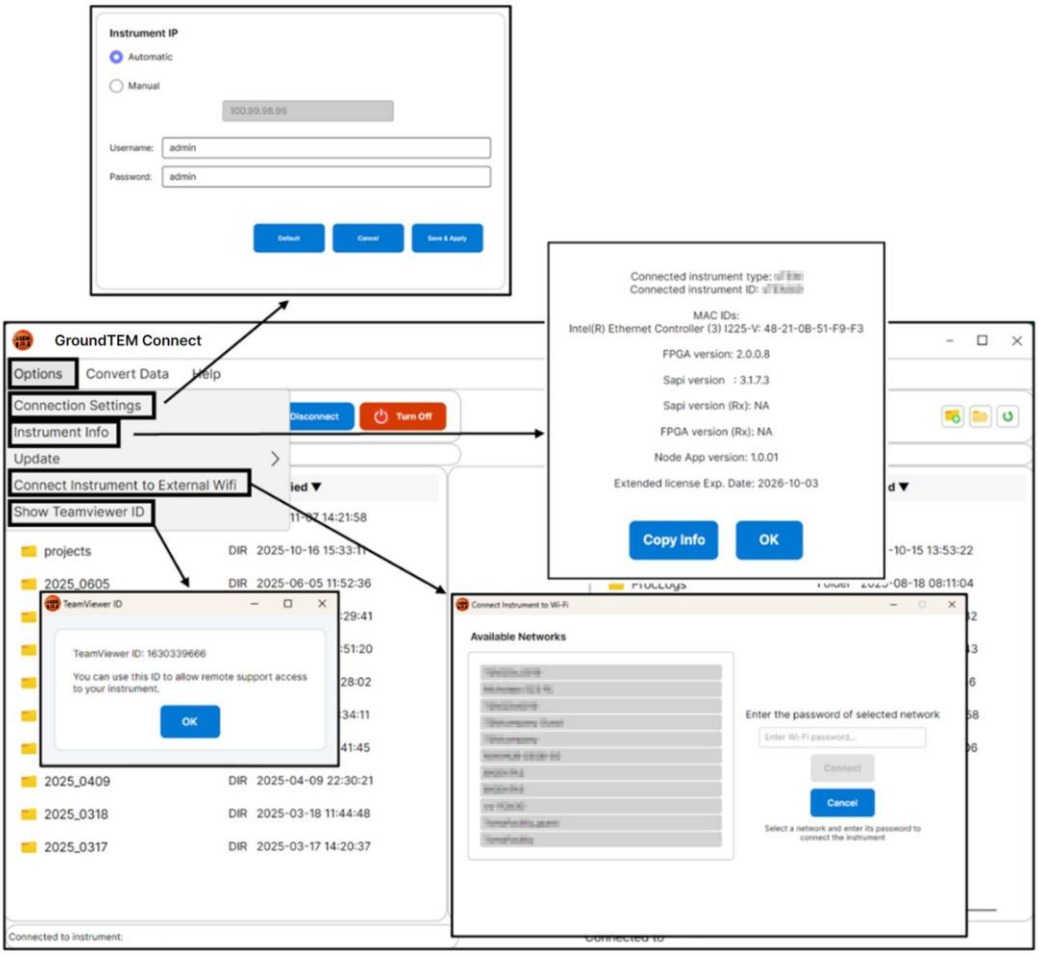


Figure 37: Settings and Options in GroundTEM Connect

Figure 37 illustrates several additional menus available in the TEM Data Manager application:

- **Connection Settings** - The default setting is "Automatic", which connects to the instrument currently paired with your device. This option should not be changed unless specifically advised by support.
- **Instrument Info** - Displays key information about your unit, including the MAC address, firmware/ SAPI/ node versions, and license expiration date. This information is particularly useful when contacting support, as it helps us identify your system.
- **Connect Instrument to External Wi-Fi** and **Show TeamViewer ID** - These two options are primarily used to enable remote support. To allow our support team to access your unit, first connect the instrument to the internet, then share the Teamviewer ID provided in this menu.

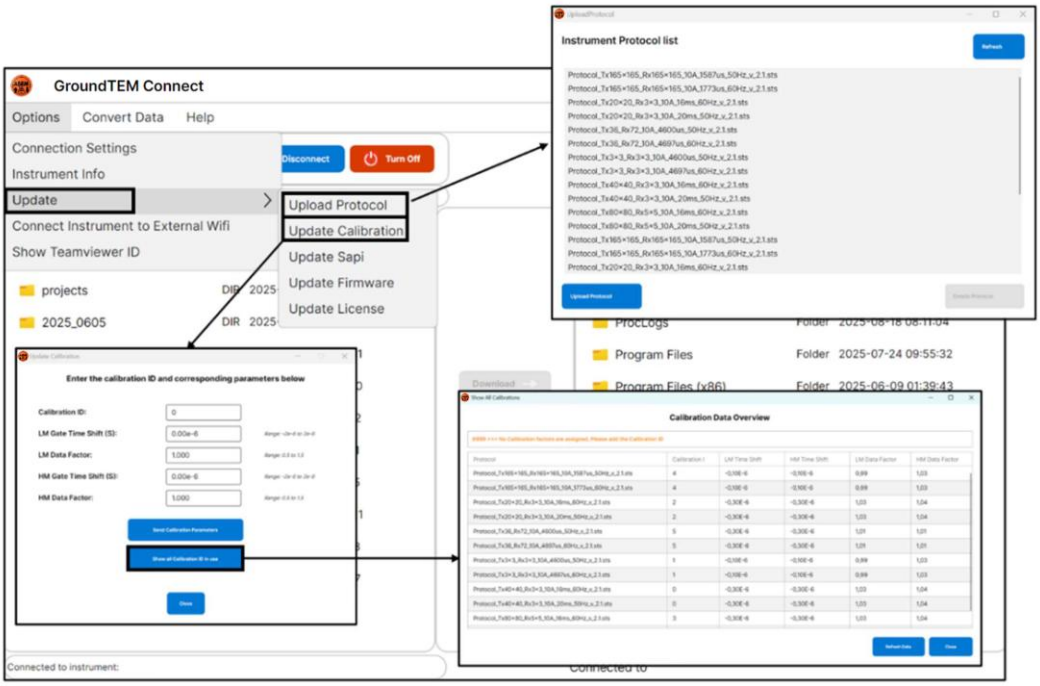


Figure 38: Settings and Options in GroundTEM Connect

Figure 38 illustrates the Update menu which provides several important maintenance and configuration options:

- **Upload Protocol** - Displays a list of all current protocols. From here, you can delete outdated protocols or upload new ones. This action should only be performed if specifically advised by support.

- **Update Calibration** - Each protocol relies on calibration factors that are unique to the system configuration. These values are preset by our team and should not be modified unless instructed to do so by support.
- **Update SAPI / Firmware / License** - These options are used when software updates, firmware upgrades, or license renewals are required. If any of these updates are necessary, our support team will provide detailed instructions and the required files.

Additionally, the program includes a **Convert Data** option (Figure 39), which allows you to convert acquired data into various output formats according to your needs. Supported formats include XYZ files, raw USF files, and formats compatible with TEMImage, AGS Workbench, and SPIA. Data can be converted either upon download (while connected to the unit) or after download (using locally stored data, no active connection required).

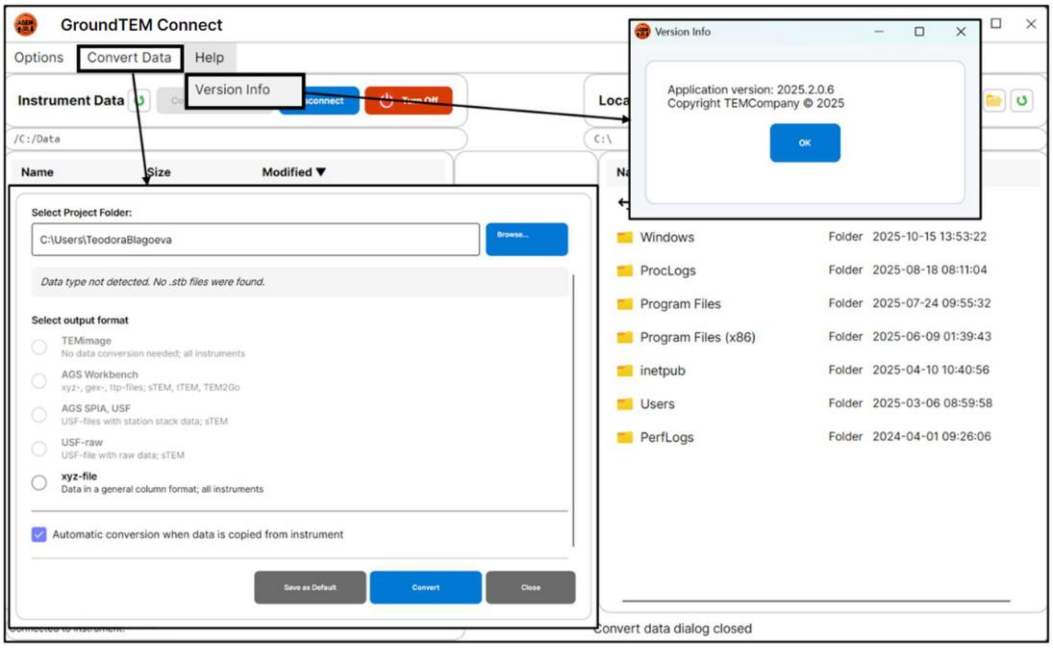


Figure 39: Settings and Options in GroundTEM Connect

Finally, the **Help** menu includes a **Version Info** section, where you can verify whether your application is up to date.

7. TROUBLESHOOTING - FAQ

Problem	Solution
The GroundTEM Trek Wi-Fi does not show up on mobile device	• Note that it takes a few minutes from turning on the GroundTEM Trek unit until GroundTEM Trek Wi-Fi is available. • Check GroundTEM Trek Tx and Rx unit is on . • Check that Wi-Fi is turned on, at mobile device. • Refresh available Wi-Fi list on mobile device. • Move closer to the GroundTEM Trek unit. • Re-start the GroundTEM Trek unit via the power button.
GroundTEM Trek App/GroundTEM Trek Wi-Fi keep disconnecting	• Ensure that mobile data is turned off on your mobile device. • Move closer to the GroundTEM Trek unit to improve the connection. • Turn off Battery Saving Mode on your mobile device. • Add the GroundTEM Trek App to the "Never Sleep" category so it can run continuously in the background. • Allow notifications for the GroundTEM Trek App (important for proper background operation).
Can't get GPS lock / GPS LED is not flashing	• Note that it can take a few minutes from turning on the GroundTEM Trek unit until GPS lock is obtained. • Make sure that the GPS-antenna is pointing up and is not covered/shielded. • If the mobile device can obtain a GPS-position, this position will be stored in the stn-data file and used if GPS data from GroundTEM Trek unit is not available. • At some locations GPS-signal can't be obtained. A GPS-position can then, manually, be associated with the data in the later data processing.

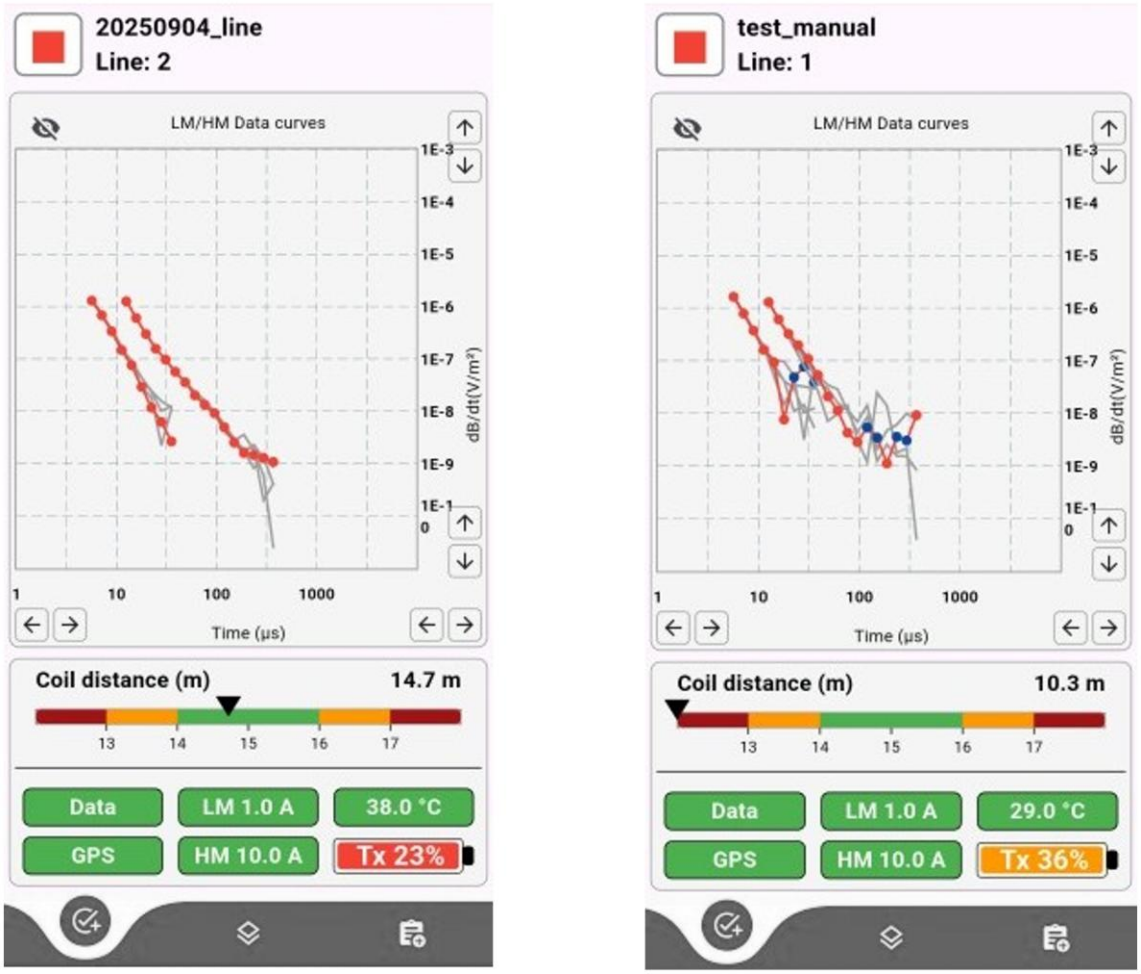
LM/HM current is not stable and/or not within the green zone of the of the meter	• **Stop the measurement (!)** • Check Tx coil connection to the GroundTEM Trek unit (clean plugs if needed). • Check the stage of charge of the batteries / replace batteries.
"Alternating sign pattern not detected" error	• Very strong noise sources/couplings can cause disturbances in the sign pattern. • Constant "Alternating sign pattern not detected" errors from multiple locations can indicate general instrument errors and service might be needed.
Not able to stop a measurement	• Only the mobile device that started a measurement can stop it again manually. • Double-check the instrument is still connected to your mobile device
The TEM signal looks very noisy	• Check connections between receiver coil and receiver pole/or transmitter coil and GroundTEM Trek unit.
My data curves are negative (blue)	• GroundTEM Trek automatically detects and corrects the polarity of the TEM signal.
Polarity Detection Issue	• If the data stream starts positive and then switches to negative, this indicates the polarity has been detected incorrectly. • Possible cause: Tx and Rx were too close or not properly positioned. • In this case, stop the measurement, increase the Tx/Rx distance to at least 5–6 meters (or more), and restart.
My data curve changes sign (blue and red) above the noise level	• If part of the data, above the noise level, is negative, it is most likely caused by a strong noise/coupling source (data cannot be used) or induced polarization (IP) effect in the ground (review the literature of IP in TEM measurements).

7.1 Checking Instrument Functionality in Weak Signal Conditions

A very resistive subsurface can produce a weak signal, sometimes even below the natural background noise level. To determine whether this is caused by the ground conditions or by the malfunction of the instrument, follow this quick check:

1. Bring the transmitter and receiver coils close together.

If this results in a strongly biased signal in the receiver (



2. Figure 40), the instrument is functioning properly.
3. If the signal does not change, there may be an issue with the instrument, and you should contact support.

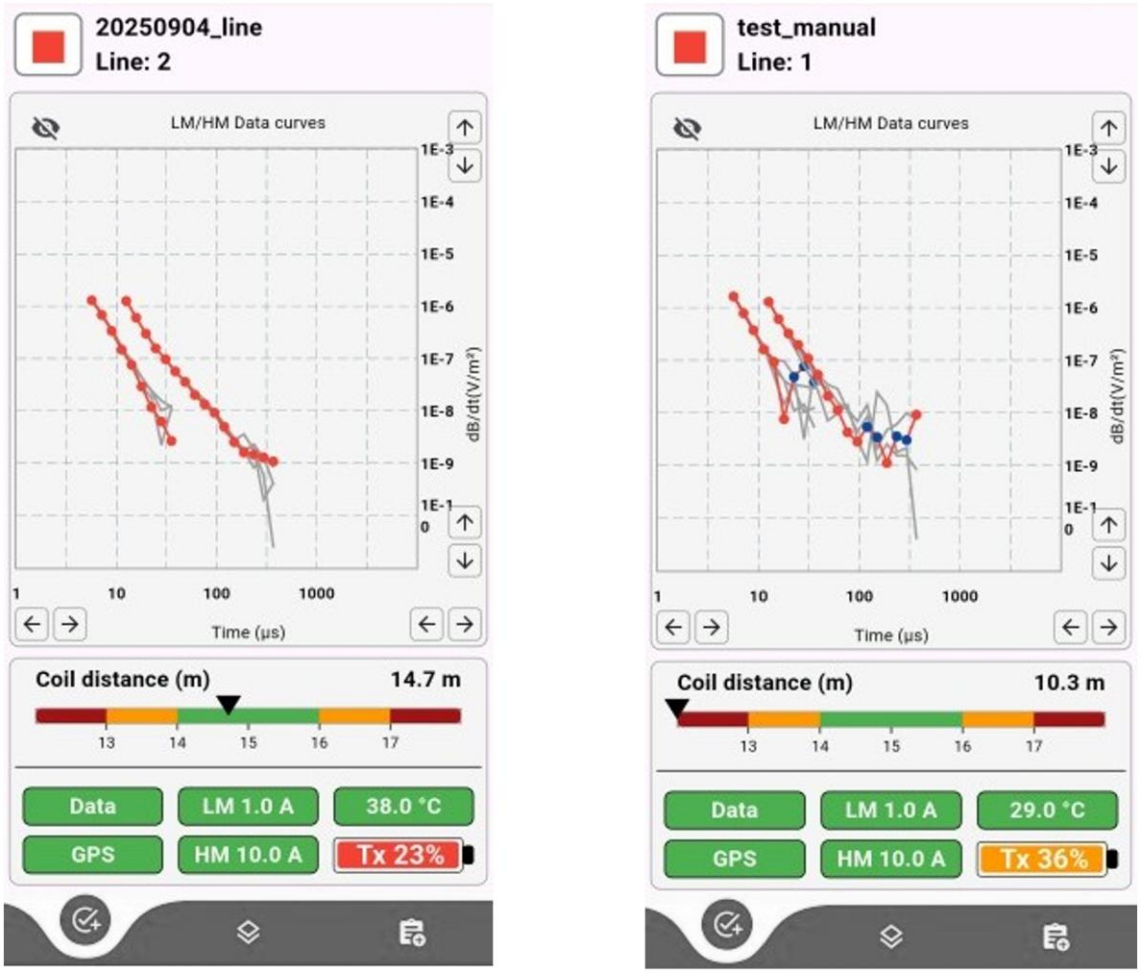


Figure 40: Examples of good data (left) and biased data (right) due to close distance between coils (<10m)

7.2 How to get access to GroundTEM Trek remotely

If neither of the above solves the issue, Guideline Geo support can help by accessing the unit remotely. To do this the GroundTEM Trek unit must be connected to the internet, and we need to get the TeamViewer ID and password to access it remotely.

There are 2 ways to connect the instrument to an external Wi-Fi network and get the TeamViewer ID and password.

1. **By using the GroundTEM Trek App** (Figure 41)
    - Launch the app on a mobile device

- Tap the **Menu** (☰ three horizontal lines in the upper-left corner).
- Select "**Support**."
- Tap "**Connect Instrument to Wi-Fi.**"
- Choose your local Wi-Fi network and enter the password.
- In the same menu click on "**Show TeamViewer ID**"

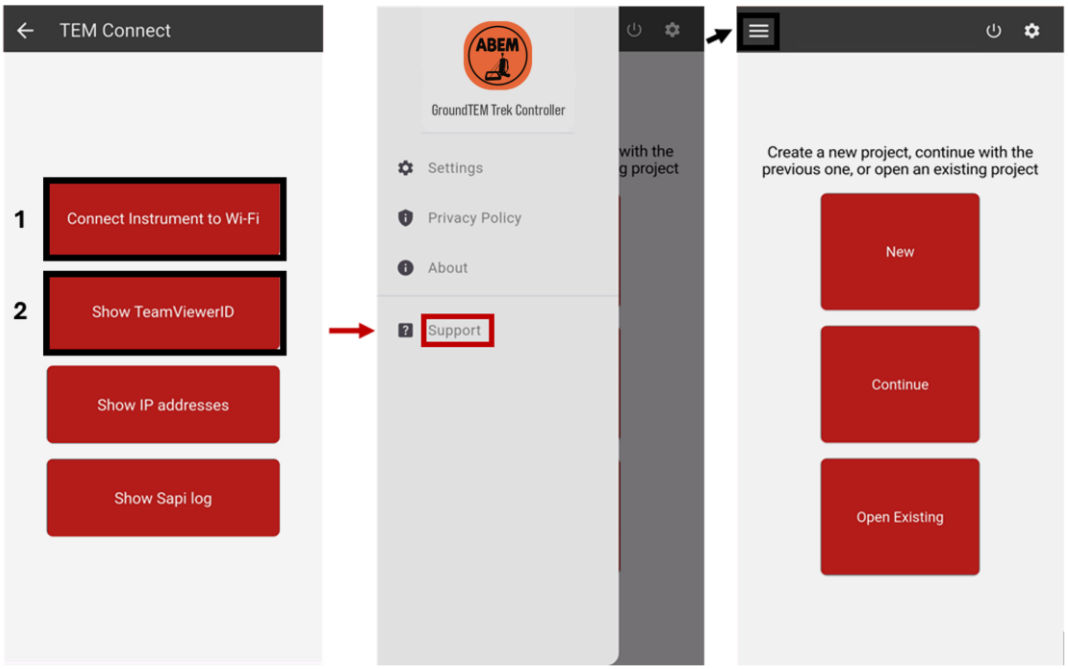


Figure 41: How to connect the unit to external Wi-Fi by using the App

2. **By using the GroundTEM Connect program** (Figure 42)
   - Use a PC to connect to the instrument's Wi-Fi. **Wi-Fi password is: 0102030405060708**
   - Launch the GroundTEM Connect and open the **Options** menu.
   - Select "**Connect Instrument to External Wi-Fi**."
   - In the window that appears, choose your Wi-Fi network and enter the password.
   - Once connected, open the **Options** menu again and click on "**Show TeamViewer ID**"

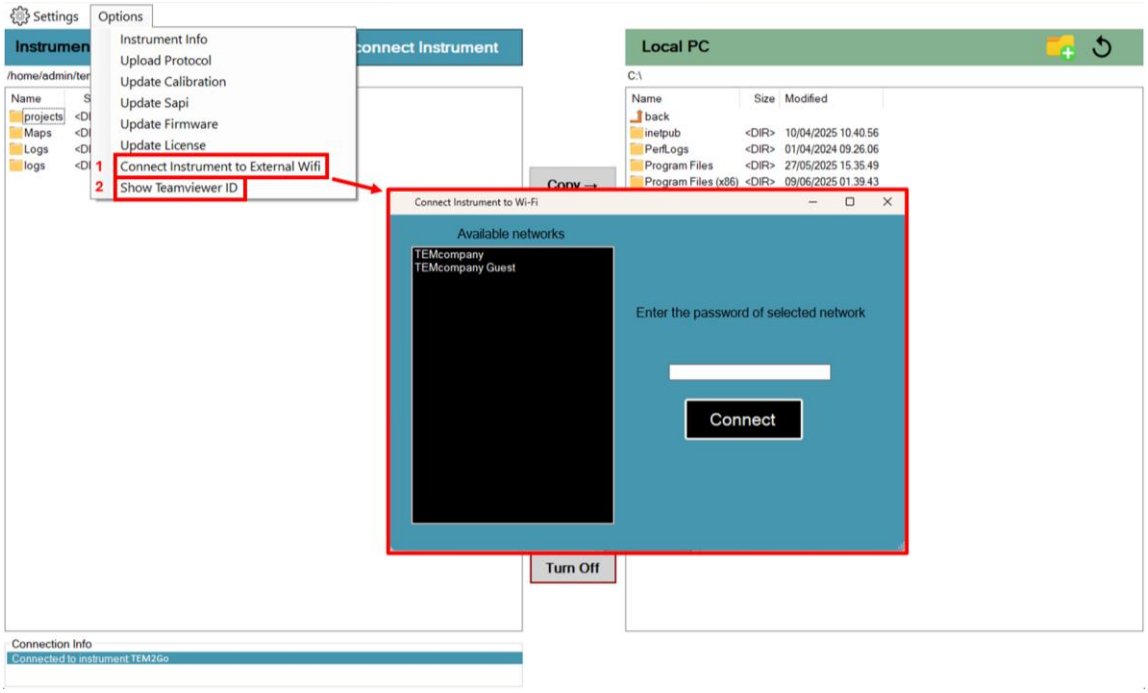


Figure 42: How to connect the unit to external Wi-Fi by using the GroundTEM Connect

APPENDIX I: SOFTWARE FOR GROUNDTEM TREK DATA

To get the most value out of your GroundTEM Trek measurements, the collected data can be further processed, analyzed, and visualized using specialized software tools. These tools help transform the raw survey data into clear and interpretable results for decision-making.

For data processing, TEMcompany have developed their own in-house software, specifically designed for TEM data, called **TEMImage**. In addition, once **Workbench version 2025.2** becomes available, it will also support the processing and visualization of GroundTEM Trek data.

For data visualization, we can provide **TEM Model Viewer**, a dedicated free tool for displaying and exploring processed models in an intuitive way.

GroundTEM Trek Data in TEMImage

TEMImage is a user-friendly software designed to view collected data, remove unwanted or poor-quality data points, and perform inversions to generate resistivity sections. A variety of settings and visualization options are available to suit different customer needs. The software is available through subscription; however, if you are interested in exploring its features, please contact us to request a complimentary 3-month trial.

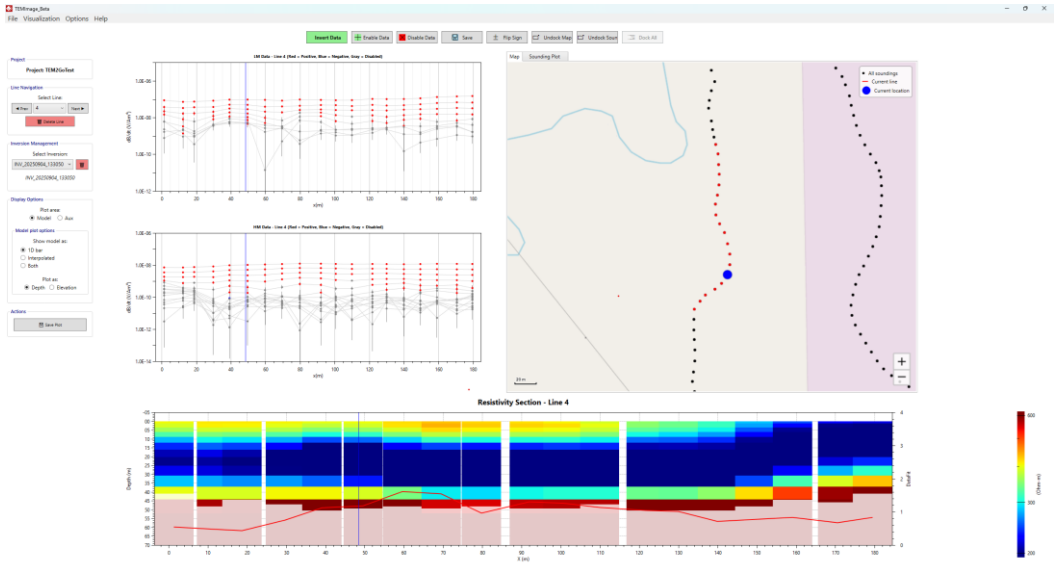


Figure 43: Main window in TEMImage

TEM Model viewer

This software is designed exclusively for viewing real-time inversion models generated during data collection in the field. To get started, go to www.guide-linegeo.com/help-center/resources and download the software for free.

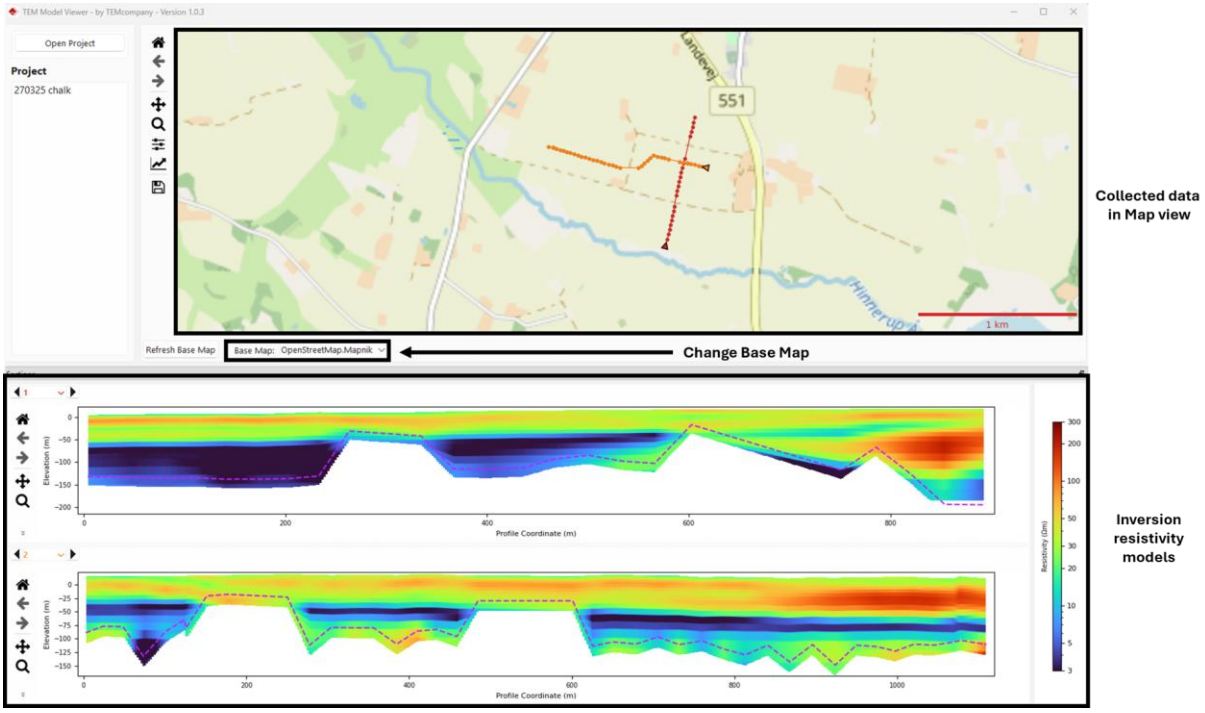


Figure 44: Main window in TEM Model Viewer once you open a project