

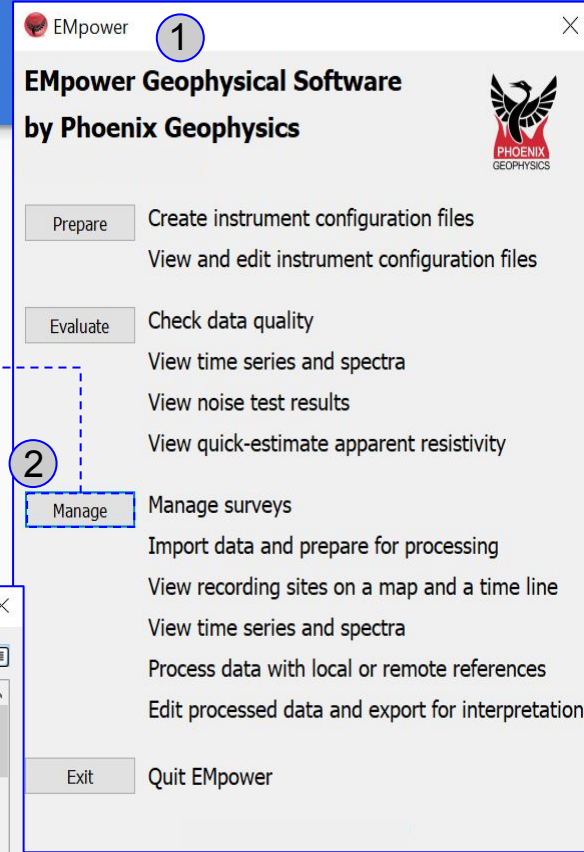
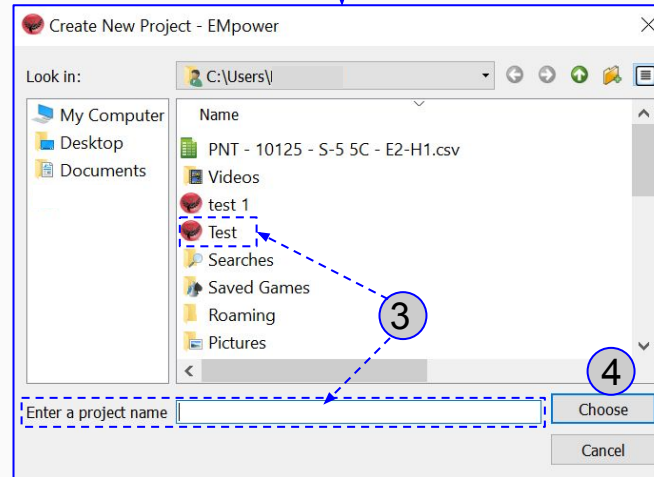
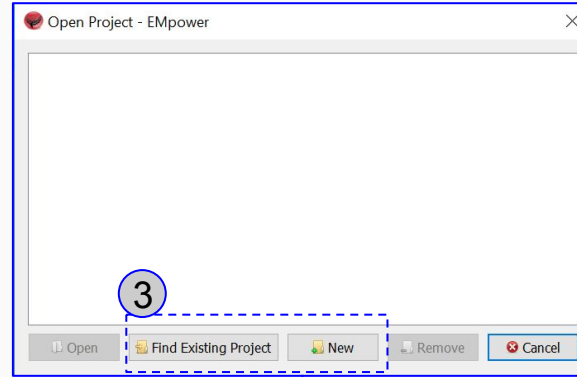
# EMpower Data Management



- Creating or Opening a Project
- Importing Data
- Visual Representation of Sites
- Verifying/Editing Recording Information
  - View Recording Details
  - Recording Details and QC
- Processed MT Data
  - Process Site Creation wizard
- Visualizing Processed MT Data
  - Toolbar (Sites list)
  - Groups
  - Filters
- Editing Cross Powers
  - Polar Editor
  - Time Editor
- Visualizing Processed PNT Data

# Creating or Opening a Project

1. Start **EMpower**
2. Click **Manage**
3. **Open or Create a New Project**
  - **To Open an Existing Project**
    - o Click **Find Existing Project**
    - o Select the Project
  - **To create a New Project**
    - o Click **New**
    - o Type the Project Name
4. Click **Choose**



# Importing Data (Drag and Drop)

1. To add a new recording from the **SD Card**
  - Insert **SD card** in the computer slot or use a USB memory card reader
2. Select the file in the **File Explorer** window
3. Drag and drop the **Recording data** to the Timeline or Map
4. Wait for the import progress to finish

1

2 File Explorer

External disk

3

4

EMpower  
Copying 10125\_5A8F4F8B\_2\_00000047.td1 3%

E1	50.00	50.00	<input type="checkbox"/> Inverted	275.938	477.938	4 x 1 = x4	10000	0
E2	50.00	50.00	<input type="checkbox"/> Inverted	1589.67	252.069	4 x 1 = x4	10000	0

# Visual Representation of Sites

The screenshot displays a software interface with three main views: a Timeline, a Map, and a Recording list. The Timeline view shows a horizontal axis with a date of Feb 06 2018 and a time range from 18:00 to 06:00. Two recording entries are visible: MTU-8A - 10110 (green checkmark) and MTU-5C - 10117 (green checkmark). The Map view shows a topographic map with a yellow circle indicating the location of station PN0515. The Recording list view shows details for recording PN0515 (34 m 57 s), including status (Approved), tools (Time Series, Spectra, Process (Orthogonal)), and recording information (Recording ID: 10110\_2018-02-05-194813, Start time: Feb 05 2018 16:48:14 (Local) America/Fortaleza (GMT-03:00), Duration: 34 m 57 s, Survey name: PN1, Station name: PN0515, Operator(s): KIVIA, Layout Geometry: Orthogonal, Declination: 0.00°). The Electric Channels table is also visible:

Channel	Distance (m) to GND		Polarity	Resistance (Ω)		Gain	LPF [Hz]	DC [V]
	(+) N / E	(-) S / W		(+) N / E	(-) S / W			
E1	50.00	50.00	<input type="checkbox"/> Inverted	275.938	477.938	4 x 1 = x4	10000	0
E2	50.00	50.00	<input type="checkbox"/> Inverted	1589.67	252.069	4 x 1 = x4	10000	0

- **Imported Recordings are shown in synchronized views**

- Timeline
- Map
- Recording list

- **Visual tracking**

- Green** Approved
- Yellow** Unapproved
- Red** Rejected



Selecting recording in any of the views will automatically show update to others views

# Verifying/Editing Recording Information

## Data management (Recording Library)

1. Verify that the following information is correct:
  - Dipole length
  - Declination
  - The inclination (**Azimuth**) of the layout
  - Calibration checkbox
2. Review the recording information and edit the enabled fields
3. Review the information on **View Recording Details** (see next page)
4. To add more information (such as pictures, documents etc.) click the **Attachments** button
5. Export Time Series



Verify that there was not a warning icon on the left of the channels or next to the Recording ID



Recording ID: 10116\_2017-12-03-221659



Approved Unapproved Rejected

Tools: Time Series Spectra Process (Orthogonal)

1 Recording Information

Recording ID: 10125\_2017-08-24-153141  
Start time: Aug 24 2017 09:31:42 (Local) America/Edmonton (GMT-06:00)  
Duration: 24 h 3 m  
Survey name: Kimberley, BC : Aug 2017  
Station name: Remote  
Operator(s): WH+SC+MU  
Layout Geometry: Orthogonal  
Declination: 0.00°  
Notes: High contact resistance  
15 declination  
-12 Azimuth

2

Electric Channels

Channel	Distance (m) to GND		Polarity	Resistance ( $\Omega$ )		Gain	LPF [Hz]	DC [V]
	(+) N / E	(-) S / W		(+) N / E	(-) S / W			
E1	50.00	34.50	<input type="checkbox"/> Inverted	5335	3894.07	4 x 1 = x4	10000	-0.021
E2	50.00	49.00	<input type="checkbox"/> Inverted	3623.18	4096.92	4 x 1 = x4	10000	-0.021

E Azimuth: 0° External Filter: None

Magnetic Channels

Channel	Sensor	Detected	Serial #	Cal	Polarity	Gain	LPF [Hz]	DC [V]
H1	MTC-150	MTC-150	53731	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	-0.011
H2	MTC-150	MTC-150	53880	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	-0.029
H3				<input type="checkbox"/>	<input type="checkbox"/> Inverted	N/A	N/A	N/A

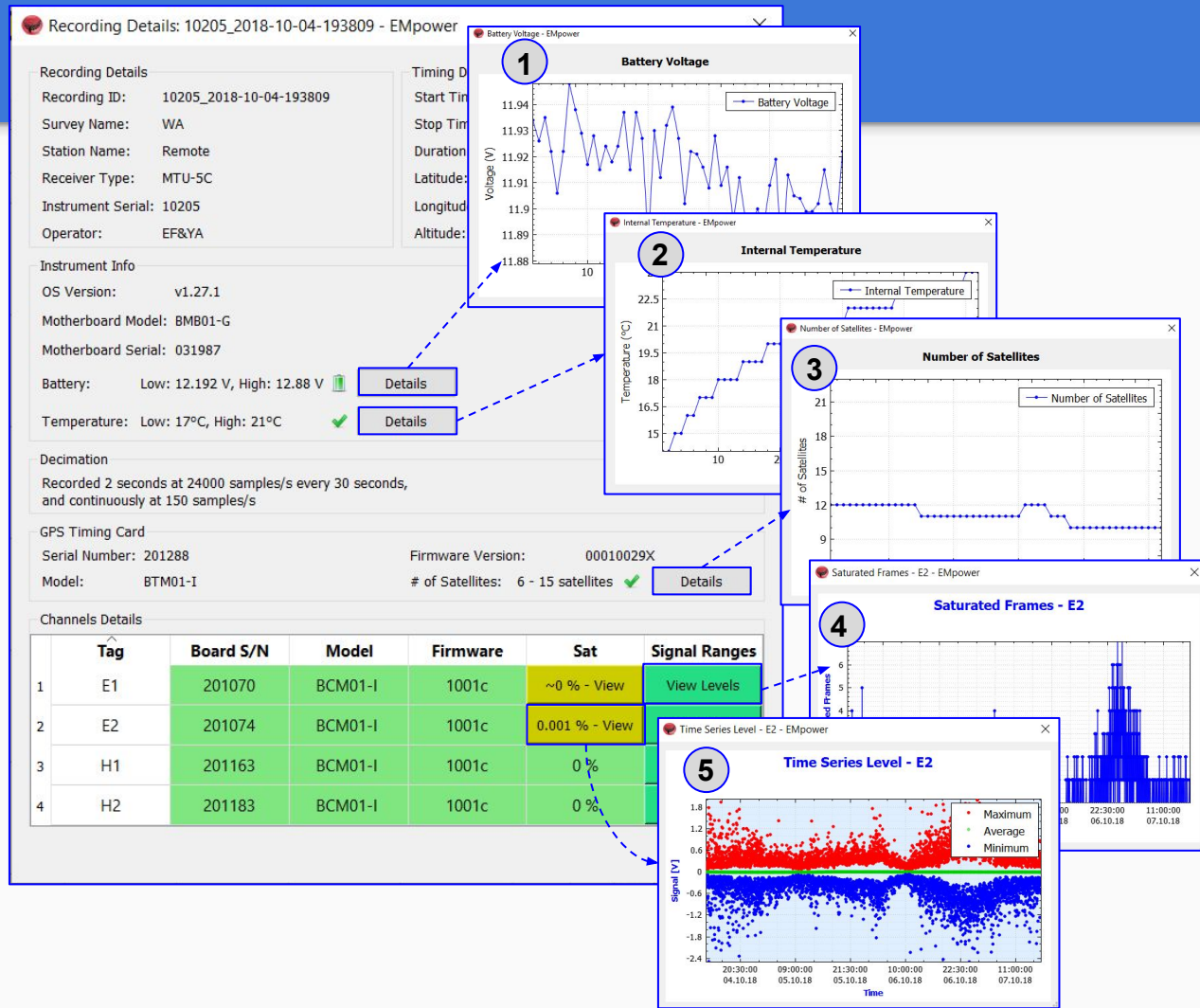
H1-H3 Azimuth: 0°

3 View Recording Details 4 Attachments 5 Export Time Series

# View Recording Details

Review that the following levels are within valid limits for quality control:

1. **Battery**
2. **Temperature**
3. **GPS Timing Card Verify**
4. **Channels Details**  
If saturation is not close to 0%, the gain might be too high and/or there is artificial noise on your site
5. **Signal Ranges**

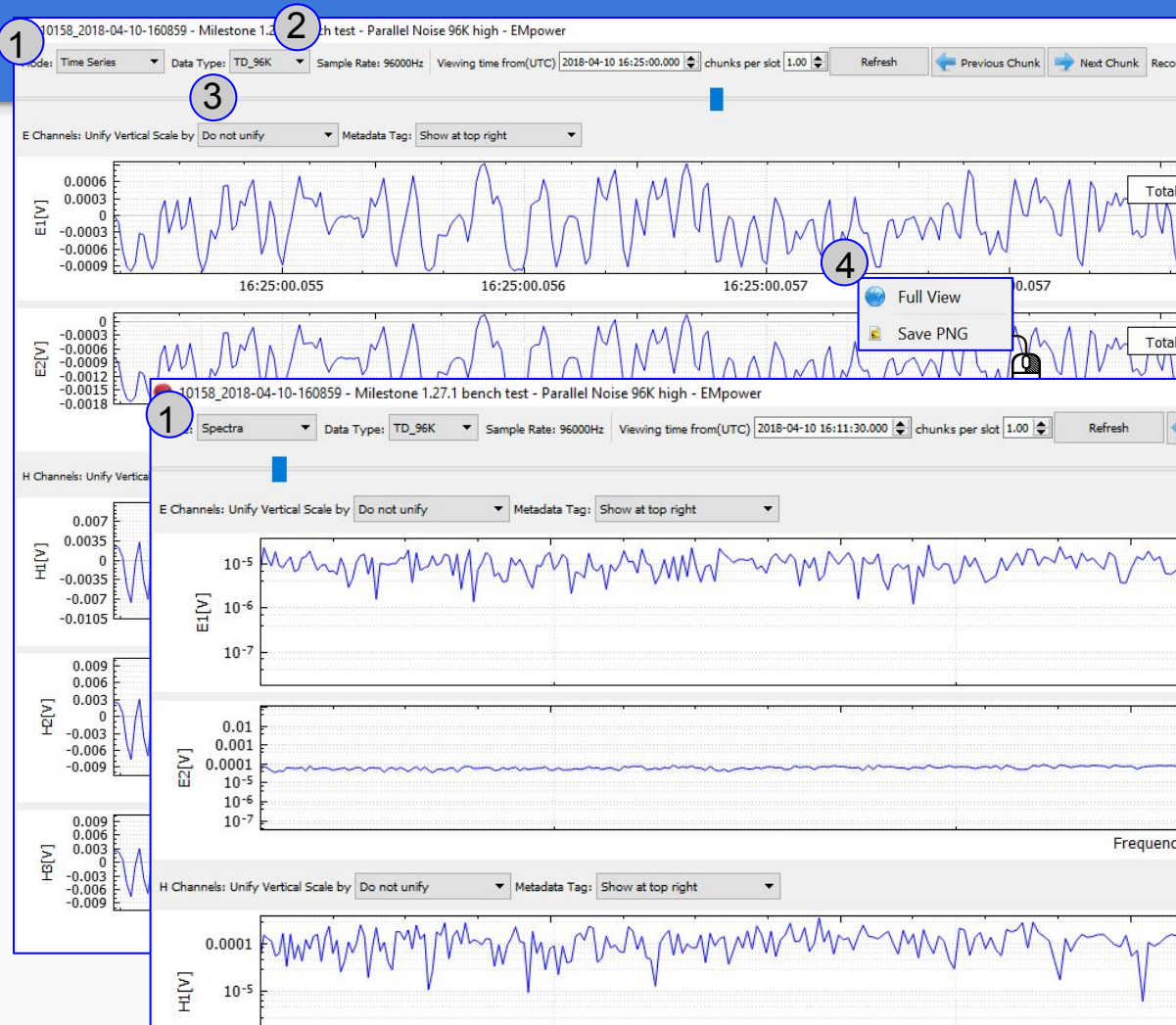




# Recording Details and QC

1. The **Time Series** and **Spectra** views of the data available for QC
2. **Data Type** allow to switch between different rates (96K / 24K / 150 Hz)
3. The **Unify Vertical Scale by**, allows to visualize by Channel scale
4. **Exporting** plot using the right-click on the plot to export to PNG

*\*This features Apply for Time Series and Spectra mode*



# Processing MT Data

From the Recording Library tab:

1. Choose the Recording to process
2. Review the Layout Geometry
3. Process Site Creation Wizard\*:
  - Electric Components
  - Magnetic Components
  - Reference Channels
  - Processing Timeframe
  - Processing Parameters

\*These steps will be explained in the next pages

File Window Help

Recording Library Processed MT Data Processed PNT Data

MTU-8A - 10110 ✓ P PMS  
MTU-5C - 10117 ✓ P

18:00 Feb 06 2018 06:00 12:00

Projection: Web Mercator  
WorldMap

10000m

1

PN0515 (34 m 57 s)

Status  
 Approved  Unapproved  Rejected

Tools  
Time Series Spectra Process (Orthogonal)

Recording Information  
Recording ID: 10110\_2018-02-05-194813  
Start time: Feb 05 2018 16:48:14 (Local) America/Fortaleza (GMT-03:00)  
Duration: 34 m 57 s  
Survey name: PN1  
Station name: PN0515  
Operator(s): KIVIA  
Layout Geometry: Orthogonal  
Declination: 0.00°  
Notes:

Electric Channels

Channel	Distance (m) to GND	Polarity	Resistance (Ω)	Gain	LPF [Hz]	DC [V]
E1	50.00	<input type="checkbox"/> Inverted	275.938 477.938	4 x 1 = x4	10000	0
E2	50.00	<input type="checkbox"/> Inverted	1589.67 252.069	4 x 1 = x4	10000	0

E Azimuth: 0° External Filter: None

© OpenStreetMap contributors. Tiles courtesy of Andy Allan



Verify that there was not a warning icon on the left of the channels or next to the Recording ID



# Process Site Creation wizard - Electric components

1. Select the recording by clicking on the Map, Timeline or drop-down list
2. **Review / Edit** the E-Channel details
3. **Navigation bar** Display the components of the processed site being created

The screenshot displays the 'Process Site Creation - S7\_2\_5C - EMpower' window. At the top, a list of recordings is shown, with 'S7\_2\_5C - 10125 - 18:14:38 - 16:14:20' selected. A blue dashed box labeled '1' highlights this selection. Below the list is a map showing the location of the recording, labeled 'Rem Dec02.5Cn MTU-5C 10127'. A blue dashed box labeled '2' highlights the 'E-Channel details' panel on the right, which includes fields for 'E-Channel Selection', 'Ex' (E1, E2), 'Ey' (E1, E2), and various resistance and voltage measurement parameters. A blue dashed box labeled '3' highlights the 'Navigation bar' at the bottom, which shows the 'Electric Components' section with the selected recording name and a 'Next' button.

Select a recording to use for the electric components

S7\_2\_5C - 10125 - 18:14:38 - 16:14:20

E-Channel details

E-Channel Selection

Use the following  
 EX = E1  
 Ey = E2

Select Manually

Ex

Dipole length: 100 m

North resistance: 334.1  $\Omega$

South resistance: 349.1  $\Omega$

Voltmeter measurements (V)

AC: 0  
DC: 0

Ey

Dipole length: 100 m

East resistance: 379  $\Omega$

West resistance: 350.3  $\Omega$

Voltmeter measurements (V)

AC: 0  
DC: 0

Edit

Electric Components: S7\_2\_5C - 10125 - 18:14:38 - 16:14:20

Magnetic Components: --

Reference Components: --

Processing Timeframe: --

Previous Next



When a recording is selected, the letter **P (Primary)** will appear next to the channel name

# Process Site Creation wizard - Magnetic Channels

## Local

1. Use the the same recording as electric channels, use Select Manually / Edit
  - Click Next

## Remote

2. To use another concurrent recording magnetic channels select **“Use magnetic channels from a different recording”**
  - Click Next
3. Simultaneous recordings with valid magnetic sensors will appear (yellow / green) in the Map / Timeline
  - Click Next



When a magnetic channel is selected from a different record, this records will be connected to the map and the letter **M (Magnetic)** appears next to the channel name

The screenshot displays the 'Process Site Creation - S-5 SC - EMapower' wizard. It is divided into two main panels: a map view and a configuration view.

**Step 1:** The top panel shows a map with several recording points. A blue dashed box highlights a recording point labeled 'Rem Dec02 5Cn MTU-SC 10127'. A callout window titled 'Select a recording to use for the magnetic components' is open, showing options to use magnetic channels from the same recording or a different recording. The 'Use magnetic channels from the same recording as electric channels' option is selected. Below this, a table shows magnetic channel data:

Channel	Hx	Hy	Hz
Hx = H1 MTC-150	53917		
Hy = H2 MTC-150		53918	
Hz = H3 MTC-150			53194

The 'Magenetics Selection - EMapower' dialog is also open, showing 'Use custom azimuth' selected with a value of 0°.

**Step 2:** The bottom panel shows the same map, but with a recording point 'Rem 5C Dec01' highlighted in yellow and green. A blue dashed box highlights this point. A callout window titled 'Select a recording to use for the magnetic components' is open, showing the 'Use magnetic channels from a different recording' option selected. Below this, a table shows magnetic channel data:

Channel	Hx	Hy	Hz
Hx = H1 MTC-150	53909		
Hy = H2 MTC-150		53910	
Hz = H3 N/A			N/A

The 'Magenetics Selection - EMapower' dialog is also open, showing 'Use same azimuth as H1+H3 band (0°)' selected.

At the bottom of the wizard, there are sections for 'Electric Components', 'Magnetic Components', 'Reference Channels', and 'Processing Timeframe'. The 'Magnetic Components' section shows 'Rem 5C Dec01 - 10116 - 00:32:46 - 00:32:46'. The 'Previous' and 'Next' buttons are visible at the bottom.

# Process Site Creation wizard - Reference Channels

## Local

1. Select Magnetic or Electric Channel
  - Click Next

## Remote

2. To use Reference channels from a concurrent recording select **“Use reference channels from concurrent a recording”**
  - Concurrent recording with valid magnetic or electric will appear (yellow or green) in the Map / Timeline and the drop-down list
  - Click Next



When a channel (H magnetic / E electric) is selected from a concurrent recording the letters R(H)/R(E) appears next to the channel name

# Process Site Creation wizard

- Processing Time Frame**, allow to select the time segment that will be processed using the **Start - End** or by moving the blue indicators in the **Duration** timeline
  - Click Next
- In the last step the **Processing Parameters** window
  - **Robust outlier rejection** is used for making corrections on the Processed data ([see Troubleshooting guide](#))
- To reduce the effect of noise, select the frequency of the **Electric power grid filter** (North 60 Hz/ Rest of the world 50 Hz)
  - Click Process
- The **Processing Queue** shows the processing of the site(s) selected

**1. Select Processing Timeframe**

Processing timeframe

Time zone:  UTC  Site time zone: America/Los\_Angeles (UTC-08:00)

Start: 2017-12-07 20:13:30 End: 2017-12-07 21:37:00

Duration: 1 h 23 m 30 s

**2. Processing Parameters**

Robust outlier rejection

Granularity of data to analyse Parameter to optimise Acceptable if reached a value of Maximum rejection ratio

Fine rejection (slow)

Electric power grid filter

50 Hz  60 Hz  None

Process site name

**3. Processing Queue - EMpower**

Processed Site Name	Reference	Status	Progress	Elapsed Time	Estimated Remaining Time
P=S7_2_5C R= (Local H)	Magnetic	Done	100%	19 m 58 s	0 s

Data: Resistivity - Amplitude:  Log  Linear Frequency:  Log  Linear Phase:  Degrees  Radians Legend: Top Right

**4. Amplitude [Gm]**

P=S7\_2\_5C R= (Local H) (Unedited)

Dec: 04 18:14:38 to Dec 05 16:14:20 UTC (21 h 59 m 42 s)

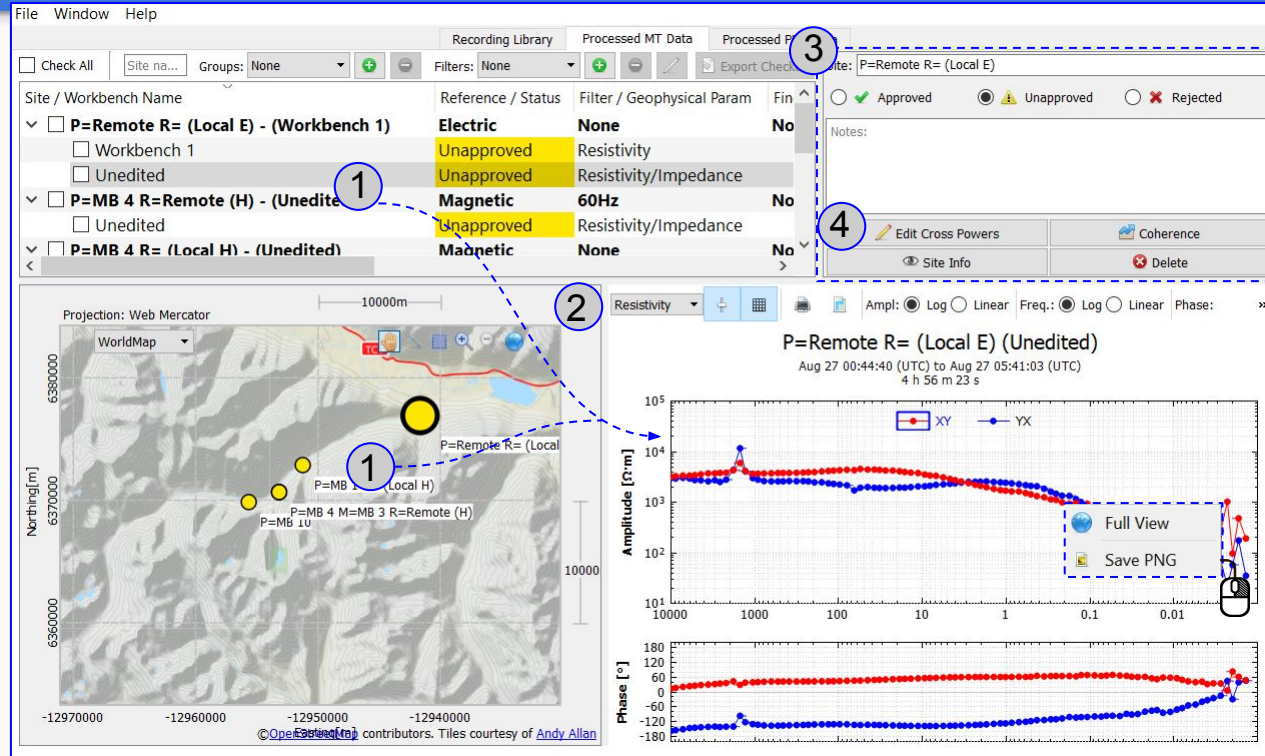
XY (red dots) YX (blue dots)

52 5C - 10128 - 23:49:26 - 18:00:50  
Rem 5C Dec06 - 10116 - 00:53:52 - 21:37:00  
58 5C - 10125 - 20:13:30 - 17:54:00  
Timeframe: 20:13:30 - 21:37:00 Duration: 1 h 23 m 30 s

Previous Process

# Visualizing Processed MT Data

1. Select the **Processed Site** from the Site / Workbench list or Map.
2. The **Plot** shows the Amplitude and Phase of the selected Processed Site
  - Use the **Toolbar plot** for additional features
  - Add Processed Site(s)
3. **Edit Processed Site** (Name, Status and Notes)
4. The **Edit Cross Powers** removes outlying cross powers from the calculation of resistivity, phase, and other geophysical parameters (see pages 15-17)

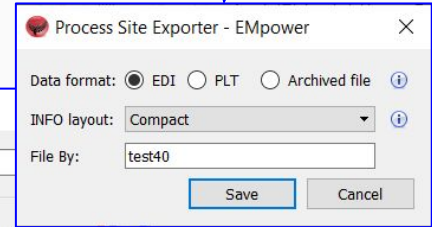
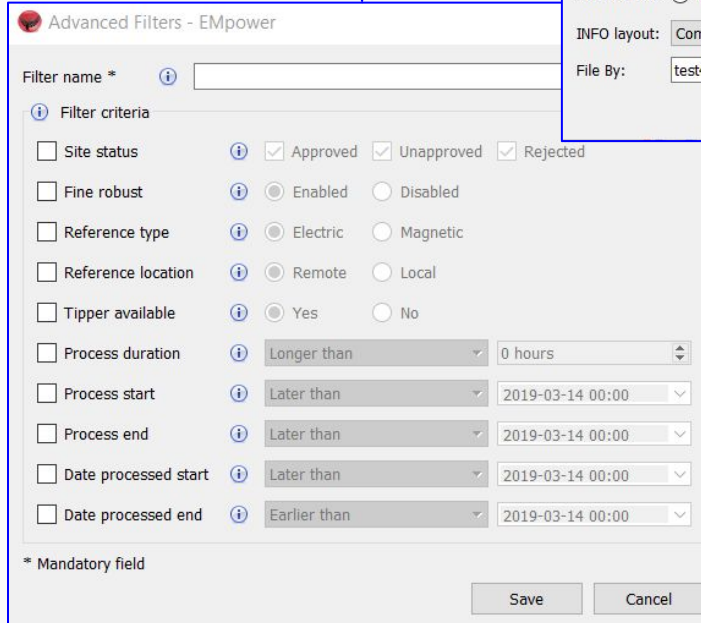
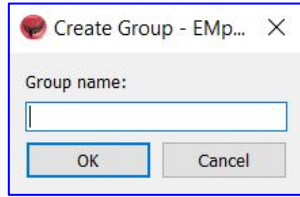




# Toolbar (Sites list)




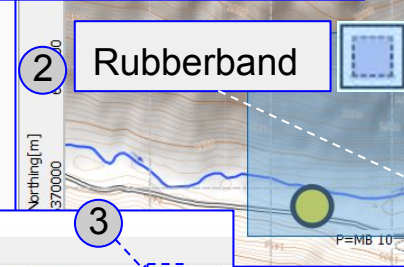
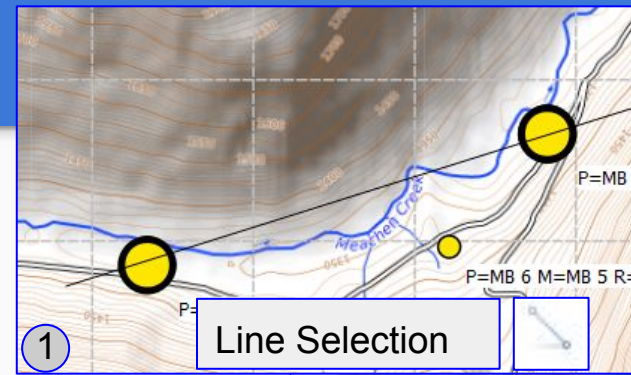
1. **Check All** the Sites
2. Quick search by **Site name**
3. **Groups** (Slide 15)
4. **Filters** (Slide 16)
5. **Export Checked**, export all the checked process to EDI/PLt or to an archive compressed file



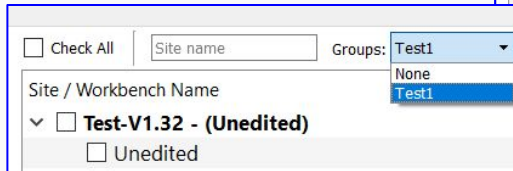
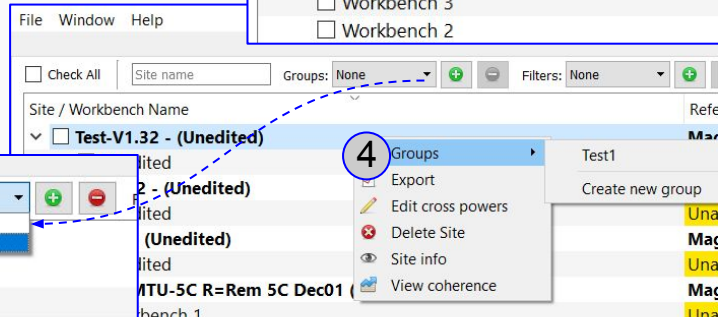
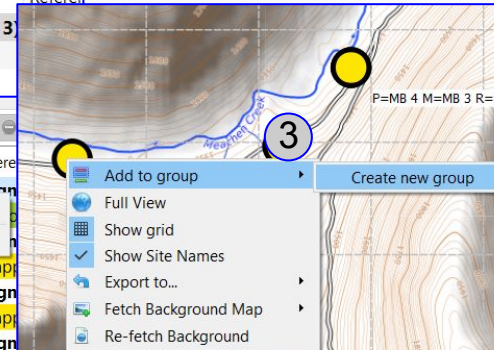
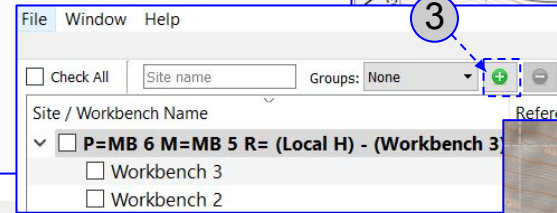
# Groups

This feature can be used to organize or categorize the sites related

1. Use the **Line Selection** for specific sites
  - Click and draw the line over the sites on the map
2. Use the **Rubberband** for large ranges
  - Click and drag over the sites on the map
3. Create a Group
  - Right-click on the map or Click the button 
  - Name the **Group**
4. To add a specific site
  - Select from the list table
  - Right-click and select the group  
Or choose the group from the drop down list




Add   Del



# Filters

## The Advance Filter can work individually or with Groups

1. Name the **Filter** (*\*mandatory field*)
2. Select the **Filter criteria**
  - a. **Status**
  - b. **Type/ Reference**
  - c. **Time**
3. Save the **Filter**
4. The new **Filter** is added to the drop down list
5. Use the Edit  button for add or change criteria

Advanced Filters - EMpower

Filter name \* 1 Approved

Filter criteria 2

- Site status  Approved  Unapproved  Rejected
- Fine robust  Enabled  Disabled
- Reference type  Electric  Magnetic
- Reference location  Remote  Local
- Tipper available  Yes  No
- Process duration
- Process start
- Process end
- Date processed start
- Date processed end

3 Save Cancel

Filters: Approved


Site / Workbench Name	Reference	Filter
<input type="checkbox"/> P=S7_2 5C R= (Local H) - (Unedited)	Magnetic	Approved
<input type="checkbox"/> Unedited		Approved
<input type="checkbox"/> P=S6 5C R=Rem Dec02 5C (H) - (Unedit.	Magnetic	Approved
<input type="checkbox"/> Unedited		Approved
<input type="checkbox"/> P=S4 5C R= (Local H) - (Unedited)	Magnetic	Approved
<input type="checkbox"/> Unedited		Approved

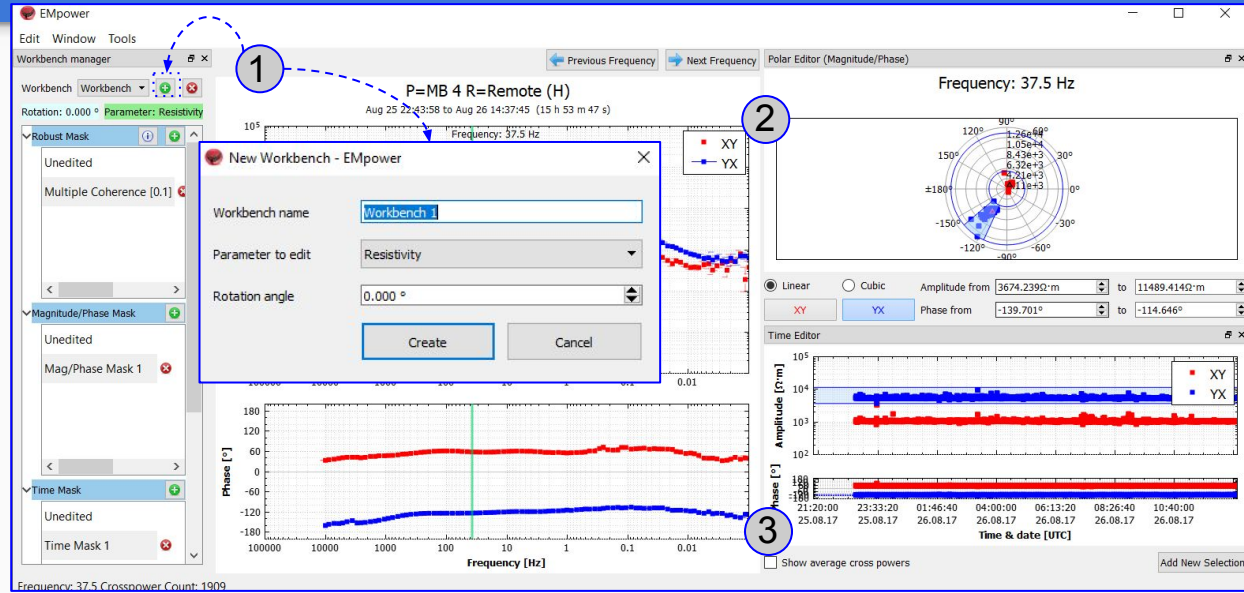
4

5

# Editing Cross Powers

**Edit Cross Powers**, is a tool to create multiple edition masks without changing the original (*Unedited*) Data to clean noisy sites

1. To create a new **Workbench** click the green  icon, complete the information and click **Create**
2. **Polar Editor**
  - Create a **Polar Editor Mask**(see page 16)
3. **Time Editor**
  - Create a **Time Editor Mask**(see page 17)



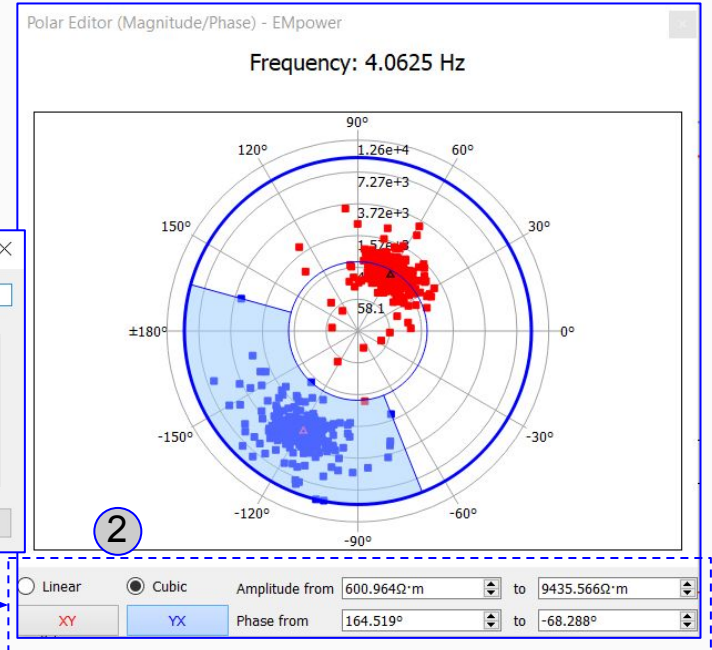
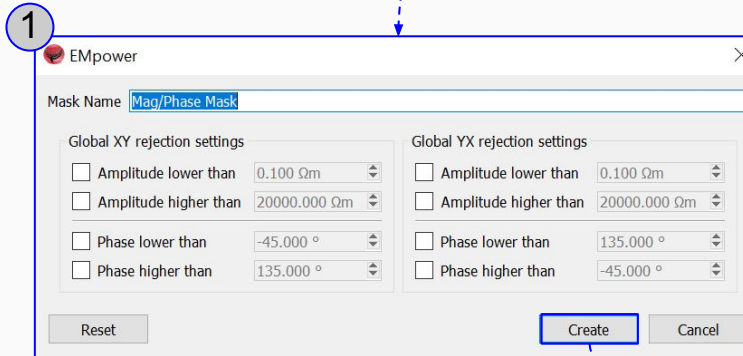
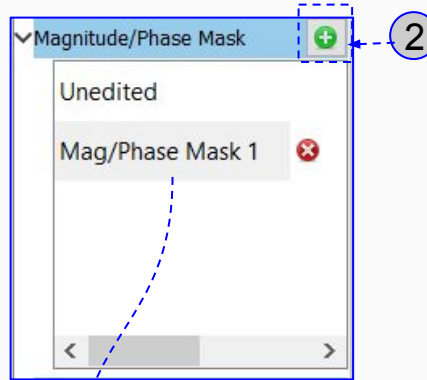
# Polar Editor

1. **Create a New Magnitude/Phase Editor Polar Masks,** define a Mask Name, choose the Amplitude and Phase ranges

- Click Create button

2. The polar editor plot has been created. Use the different tools to obtain the desired information

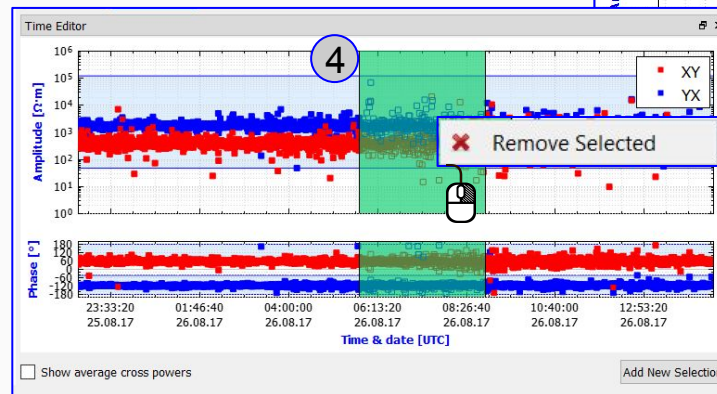
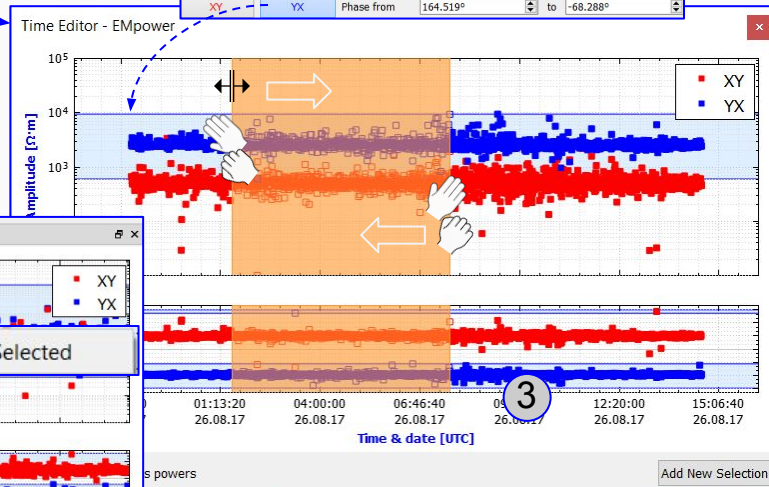
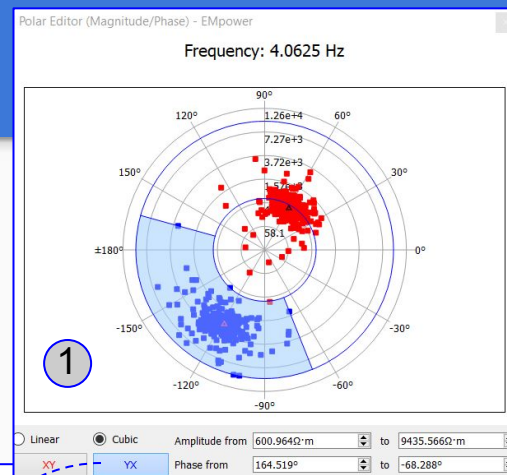
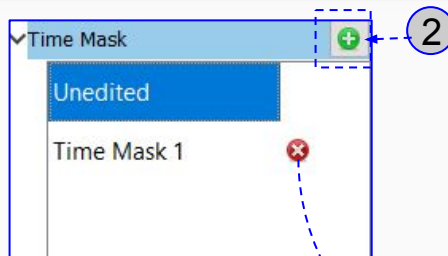
- Linear / Cubic
- XY / YX
- Amplitude range
- Phase range





# Time Editor

1. When a polar editor plot has been created **XY / YX** will be reflected on the Time Editor
2. **Create a New Time Editor Masks**
  - Mask Name (*double click left to assign the name*)
3. **To Add New Selection**
  - Click, drag and drop
4. **To delete one selection**
  - click the selection (*changes to green*)
  - Right click
  - Click Remove Selected



# Visualizing Processed PNT Data

This tab shows the Parallel Noise recordings

1. **Edit Processed Site** (*Name, Status and Notes*)
2. Select the **Site**
3. Select the **Channels Signal** that will be displayed
4. **Print** the graphic
5. **Export** the values in CSV format

