

EMpower Data Management



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Recording Library

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Creating / Opening a Project

1. Start **EMpower**

2. Click **Manage**

3. Open or Create a New Project

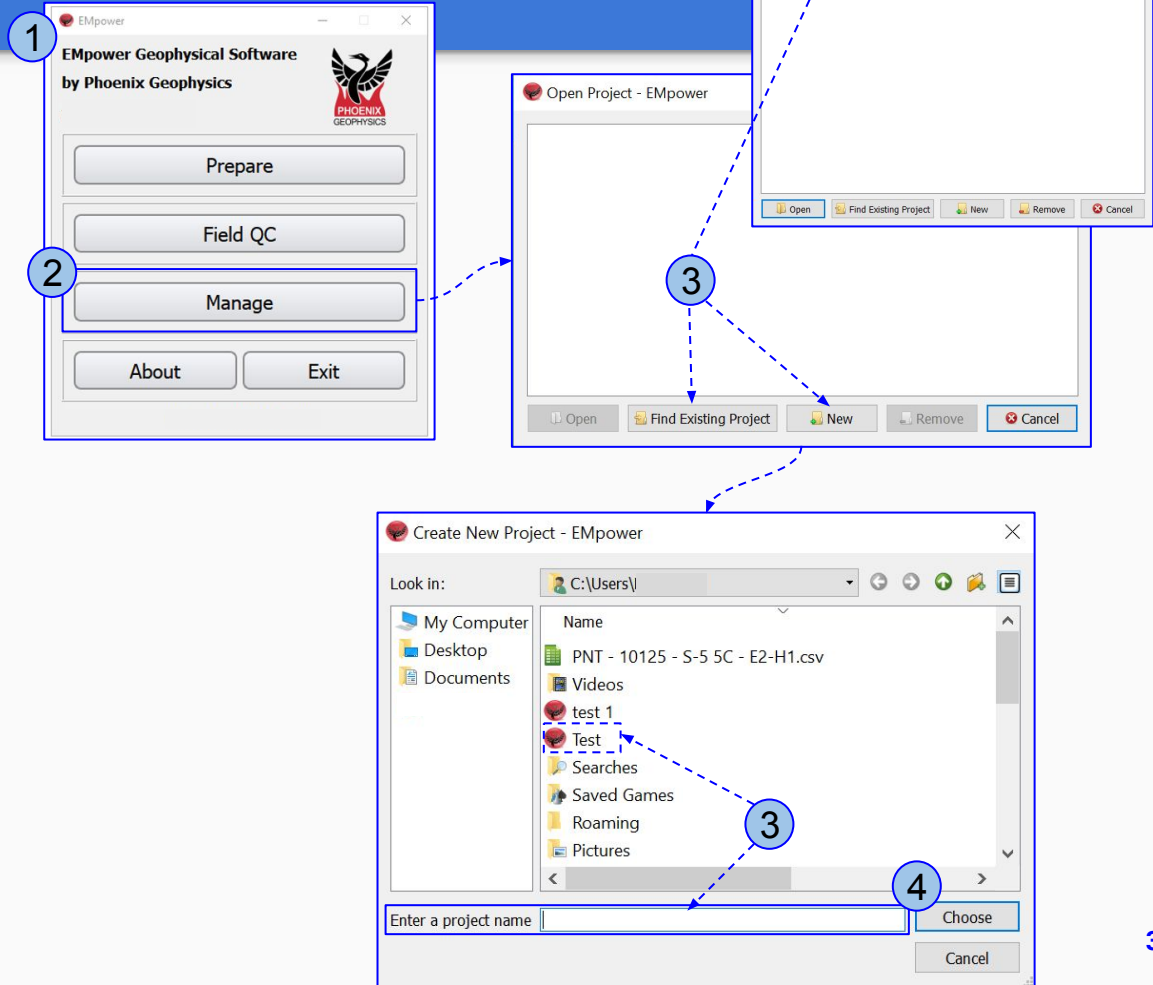
To Open an Existing Project

- Click **Find Existing Project** or select from the list (*previously used*)
- Select the Project

To create a New Project

- Click **New**
- Type the Project Name

4. Click **Choose**



Importing Data / Drag and Drop

Importing Data

1. Select **Importing Recordings** from **File** menu
 - Select the recording and click **Choose**

Drag and drop

2. Select the **recording file** in the **File Explorer** window
3. Drag and drop the **Recording data** to the **Timeline** or **Map**
4. Wait until charging is completed

1

2

3

4



To add a recording from the **SD Card**

- Insert **SD card** in the computer SD Card slot or use an external USB memory card reader

Visual Representation of Sites

- **Imported recordings are shown in three synchronized views**

- Timeline
- Map
- Recording information

- **Visual tracking**

| | |
|--------|------------|
| Green | Approved |
| Yellow | Unapproved |
| Red | Rejected |

The screenshot displays the EMpower software interface for a 'D.C. Nevada 2017 Test'. It features three main views:

- Timeline:** A horizontal view showing recording events for various stations (e.g., MTU-5C-10116, MTU-5C-10125, MTU-5C-10127, MTU-5C-10128) with colored bars indicating their status (Green for Approved, Yellow for Unapproved, Red for Rejected).
- Map:** A geographical map showing the location of the recording sites. A yellow circle highlights the location of 'S7_1 5C' on the map.
- Recording list:** A detailed view for the selected recording 'S7_1 5C (21 h 32 m 56 s)'. It includes fields for Status (Unapproved), Tools (Time Series, Spectra, Process (Orthogonal)), Recording Information (Recording ID, Start time, Duration, Survey name, Station name, Operator(s), Company name, Layout Geometry, Declination), Electric Channels (Channel, Distance (m) to GND, Resistance (Ω), Polarity, Gain, LFF [Hz], DC [V]), and Magnetic Channels.



Selecting a recording in any of the views will automatically update the recording information in the other views

Verifying/Editing Recording Information

The layout and recording information can be consulted and edited using the recording list

1. Review the Recording Information

- Edit the enabled fields, if required

⚠ If a warning is found, consult the troubleshooting manual

2. Review the following information:

- Declination
- Dipole length
- The **Azimuth** at which the E and H sensors were laid out
- Use the External filter selector to indicate if an accessory was used during the recording. For details about each specific accessory, consult the manual of such accessory.
- The correct **Calibration** sensor will show a green mark

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 (see page 9)

Remote (23 h 46 m 23 s)

Status: Approved Unapproved Rejected

Tools: Time Series Spectra Process (Orthogonal)

Recording Information

Recording ID: 10125_2017-08-26-154439
Start time: Aug 26 2017 09:44:40 (Local) Eastern Daylight Time (GMT -06:00)
Duration: 23 h 46 m 23 s

Survey name: Kimberley, BC : Aug 2017
Station name: Remote
Operator(s): WH+SC+MU
Company name:
Layout Geometry: Orthogonal
Declination: 0.00°
Notes: High contact resistance
-12 azimuth
+15 declination

Electric Channels

| Channel | Distance (m) to GND | Polarity | Resistance (Ω) | Gain | LPF [Hz] | DC [V] | |
|---------|---------------------|----------|----------------|----------|------------|--------|--------|
| E1 | 50.00 | Inverted | 4824.383 | 3345.035 | 4 x 1 = x4 | 10000 | -0.022 |
| E2 | 50.00 | Inverted | 2684.518 | 3053.859 | 4 x 1 = x4 | 10000 | -0.019 |

E Azimuth: 0.00 ° External Filter: None

Magnetic Channels

| Channel | Sensor | Detected | Serial # | Cal | Polarity | Gain | LPF [Hz] | DC [V] |
|---------|---------|----------|----------|-----|----------|------|----------|--------|
| H1 | MTC-150 | MTC-150 | 53729 | ✓ | Inverted | x4 | 10000 | -0.011 |
| H2 | MTC-150 | MTC-150 | 53739 | ✓ | Inverted | x4 | 10000 | -0.03 |
| H3 | | N/A | | ✗ | Inverted | N/A | N/A | N/A |

H1-H3 Azimuth: 0.00 °

View Recording Details Attachments (0) Export

6

View Recording Details

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

1. Battery Voltage
2. Internal Temperature
3. Number of Satellites
4. Saturated Frames

- If saturation is not close to ~0%, review the channel configuration (see page 5), the gain might be too high and/or there is artificial noise on your site

5. Time Series Level

Recording Details: 10155_2019-04-24-085903 - EMpower

Recording ID: 10155_2019-04-24-085903
Survey Name: 10155 MT
Station Name:
Company Name:
Receiver Type: MTU-5D
Instrument Serial: 10155
Operator:

Timing Details
Start Time: Wed Apr 24
Stop Time: Thu Apr 25 0
Duration: 22 h 58 m 50
Latitude: 37.679°N
Longitude: 83.792°E
Altitude: 1119.23 m

Instrument Info
OS Version: v1.27.1
Motherboard Model: BMB01-G
Motherboard Serial: 03100B

Battery: Low: 12.44 V, High: 12.869 V Details
Temperature: Low: 20°C, High: 38°C Details

Decimation
Recorded 0.1 seconds at 96000 samples/s every 60 seconds,
1 second at 24000 samples/s every 60 seconds,
and continuously at 150 samples/s

GPS Timing Card
Serial Number: 200188
Model: BTM01-I
Firmware Version: 00010029X
of Satellites: 7 - 12 satellites Details

| Tag | Board S/N | Model | Firmware | Sat | Signal Ranges | |
|-----|-----------|--------|----------|-------|---------------|--|
| 1 | E1 | 201462 | BCM03-B | 1001a | 0% | <input type="button" value="View Levels"/> |
| 2 | E2 | 201427 | BCM03-B | 1001a | ~0% - Yellow | <input type="button" value="View Levels"/> |
| 3 | | | | 1001a | 0% | <input type="button" value="View Levels"/> |
| 4 | | | | 1001a | 0% | <input type="button" value="View Levels"/> |

Channels Details

1 Saturated Frames - E2 - EMpower

4 Saturated Frames - E2

1 Battery Voltage - EMpower

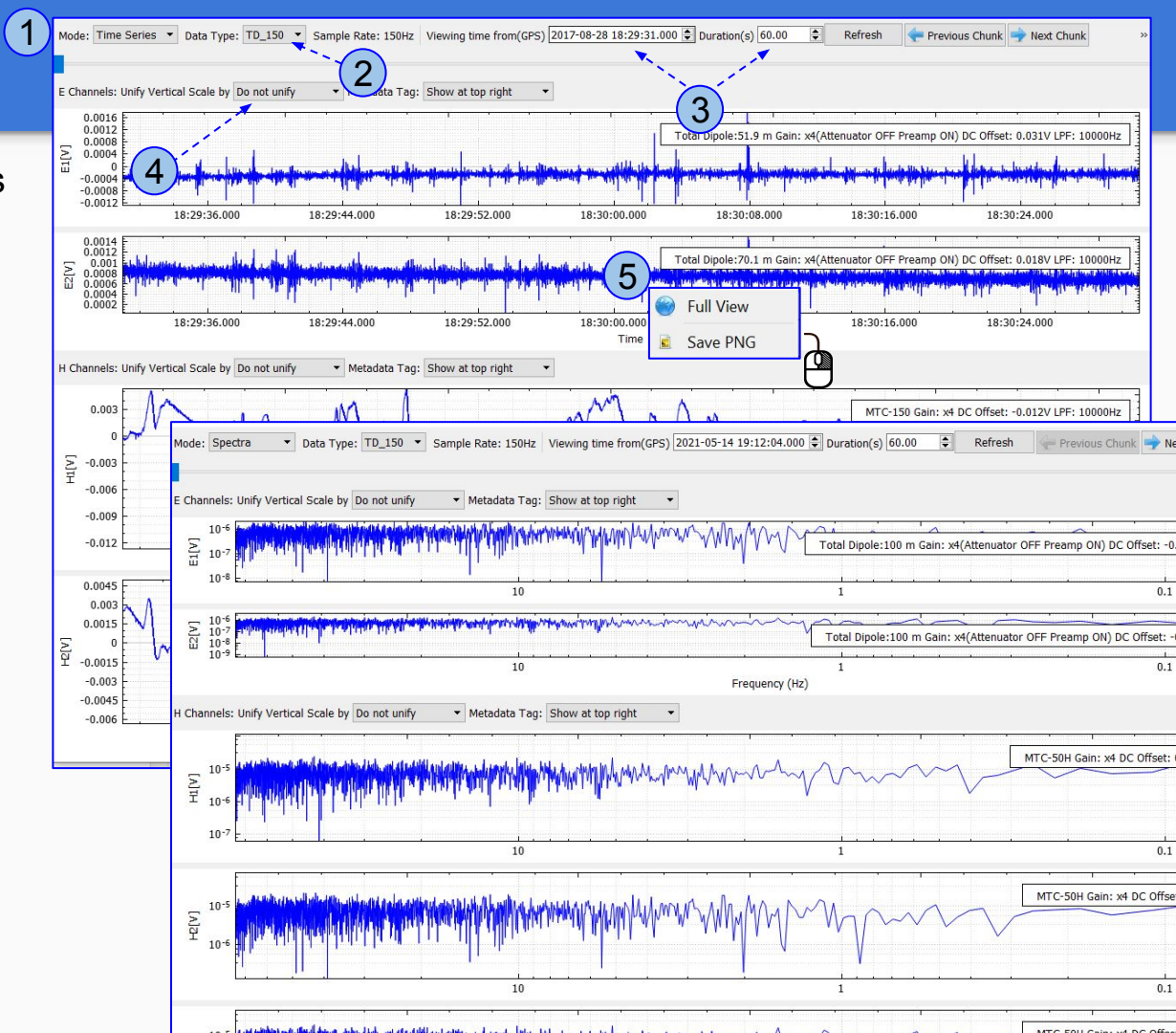
2 Internal Temperature - EMpower

3 Number of Satellites - EMpower

5 Time Series Level - E1 - EMpower

Recording Details and QC

1. The **Time Series** and **Spectra** shows the data available for QC
2. **Data Type** allow to switch between different data sampling rates (96K / 24K / 150 Hz)
3. Define the duration in the plot
 - Select or type the date and/or time as needed and refresh the plot
4. The **Unify Vertical Scale by**, allows to visualize by Channel scale
5. **Exporting**
 - Right-click on the plot
 - Save PNG



Electric Channels Corrections

EMpower is able to correct possible mistakes in the field layout (polarity or connection) by using the **Manage** module.

Review the **Recording Information** and correct the parameters as needed.

1. Polarity Inverted on E1

- Invert the **North** electrode to the **South** connector, and the **South** electrode to the **North** connector.

2. Polarity Inverted on E2

- Invert the **East** electrode to the **West** connector, and the **West** electrode connected to the **East** connector.

3. Connections Interchanged on NS and EW

- When the **North** electrode is connected to the **East** connector, and the **South** electrode is connected to the **West** connector, and vice versa.

In the Electric components section of the Site processing wizard, click **Select Manually** and apply the appropriate correction.

| 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 checked="" type="checkbox"/> Inverted | 505.807 | 1251.798 | 4 x 1 = x4 | 10000 | 0.017 |
| E2 | 50.00 | 50.00 | <input type="checkbox"/> Inverted | 427.056 | 418.831 | 4 x 1 = x4 | 10000 | -0.03 |

E Azimuth: 0.00 ° External Filter: None

| 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 | 505.807 | 1251.798 | 4 x 1 = x4 | 10000 | 0.017 |
| E2 | 50.00 | 50.00 | <input checked="" type="checkbox"/> Inverted | 427.056 | 418.831 | 4 x 1 = x4 | 10000 | -0.03 |

E Azimuth: 0.00 ° External Filter: None

Select a recording to use for the electric components

S-5 SC - 10125 - Dec 01 15:07:12 - Dec 02 09:34:55

E-Channel details

E-Channel Selection

Ex = E1
 Ey = E2

| Ex | Ey |
|--------------------------------|-------------------------------|
| Dipole length: 100 m | Dipole length: 100 m |
| North resistance: 232 Ω | East resistance: 136 Ω |
| South resistance: 141 Ω | West resistance: 175 Ω |
| Ex Calibration Serial: N/A | Ey Calibration Serial: N/A |

Channel Selection - ...

Ex: E1 E2

Ey: E1 E2

S-5 SC - 10125 - Dec 01 15:07:12 - Dec 02 09:34:55



Note:

For (3) repeat the channel mapping procedure every time data needs to be processed with these channels

Magnetic Channels Corrections

EMpower will adjust the parameters to compensate for layout errors.

- H1(Hx) Polarity Inverted:** occurs when the sensor's free end is to the South
 - Check the Inverted checkbox
- H2(Hy) Polarity Inverted:** occurs when the sensor's free end is to the West
 - Check the Inverted checkbox
- H Connections interchanged**
 - Identify the sensors that were plugged to the wrong connector in the receiver. Then, while selecting the Magnetic Components in the Site processing wizard, click on **Select Manually** and choose the appropriate connection mapping from the dropdown lists.



Note:

For (3) repeat the channel mapping procedure every time data needs to be processed with these channels

1

| Channel | Sensor | Detected | Serial # | Cal | Polarity | Gain | LPF [Hz] | DC [V] |
|---------|---------|----------|----------|-------------------------------------|--|------|----------|--------|
| H1 | MTC-150 | MTC-150 | 53909 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Inverted | x4 | 10000 | 0 |
| H2 | MTC-150 | MTC-150 | 53910 | <input checked="" type="checkbox"/> | <input type="checkbox"/> Inverted | x4 | 10000 | 0 |

2

| Channel | Sensor | Detected | Serial # | Cal | Polarity | Gain | LPF [Hz] | DC [V] |
|---------|---------|----------|----------|-------------------------------------|--|------|----------|--------|
| H1 | MTC-150 | MTC-150 | 53909 | <input checked="" type="checkbox"/> | <input type="checkbox"/> Inverted | x4 | 10000 | 0 |
| H2 | MTC-150 | MTC-150 | 53910 | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> Inverted | x4 | 10000 | 0 |

3

Channels

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

Source recording of Hz: 10125_2017-12-01-230711 Select Manually

Magnetics Selection - EMpower

Hx: Hy: Hz:

Use H1-H3 band azimuth: 40 °
 Use custom azimuth

⚠ Hx and Hy are mandatory channels

Ok

Export Recording

Select the Recording(s) from the Timeline, Recording Library or Map

**To export multiple recordings, see [Groups and filters](#)*

1. Use **Export Recordings**

- Right-click over the timeline or map
- **Export** button

2. Choose the Exporting Format

3. the recording(s) not supporting by JSON format will be marked in red

1

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1



Processing Data

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| Process Site Creation wizard (Magnetic) | 15 |
| Process Site Creation wizard (Reference) ... | 16 |
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Processing MT Data

From the Recording Library tab:

1. Choose a recording to process
2. Review the Layout Geometry
3. Run the Process Site Creation Wizard, selecting:

Wizard, selecting:

- Electric Components
- Magnetic Components
- Reference Channels
- Processing Timeframe
- Processing Parameters

**These steps will be explained in the Following pages*

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

The screenshot displays the software interface for processing MT data. At the top, the 'Recording Library' tab is active, showing a list of recordings with status icons (green checkmarks for approved, red X for rejected). A recording 'S7_1 5C' is selected, highlighted in orange. Below the library is a map showing the location of the recording site 'S7_1 5C' in a remote area. The map includes a scale bar and a north arrow. To the right of the map is the 'Process Site Creation Wizard' form. The form is divided into sections: 'Status' (Approved, Unapproved, Rejected), 'Tools' (Time Series, Spectra, Process (Orthogonal)), 'Recording Information' (Recording ID, Start time, Duration, Survey name, Station name, Operator(s), Company name, Layout Geometry, Declination, Notes), 'Electric Channels' (Channel, Distance (m) to GND, Resistance (Ω), Polarity, Gain, LPF [Hz], DC [V]), and 'Magnetic Channels' (Channel, Sensor, Detected, Serial #, Cal, Polarity, Gain, LPF [Hz], DC [V]). The 'Process (Orthogonal)' tool is selected, and the 'Recording ID' field is highlighted with a blue circle. The 'Status' field is also highlighted with a blue circle. The 'Recording Information' section is highlighted with a blue circle. The 'Electric Channels' section is highlighted with a blue circle. The 'Magnetic Channels' section is highlighted with a blue circle. The 'View Recording Details', 'Attachments (1)', and 'Export' buttons are at the bottom.

Process Site Creation wizard

Electric components

1. Select the recording with the desired electric lines from the Map, Timeline or Drop-down list
2. Review / Edit the E-Channel details
 - Use the **Select Manually** button to change the Channel Selection (Ex/Ey)
 - To change or add details use the **Edit** button
3. The **Navigation Bar** will display the components of the processed site being created
4. Click Next to continue

The screenshot displays the 'Process Site Creation - S7_2_5C - EMpower' interface. At the top, a timeline shows recordings from Nov 14 2017 to Dec 05 2017. A map of the western United States shows a yellow dot at 'Remote' and a blue dot at 'S7_2_5C'. A 'P' icon is next to the 'S7_2_5C' recording in the list. The 'E-Channel details' panel on the right shows 'Ex = E1' and 'Ey = E2' selected, with a 'Select Manually' button (2.1) and an 'Edit' button (2.2). A 'Channel Selection - EMpower' dialog box is open, showing 'Ex' and 'Ey' options. The 'Navigation Bar' at the bottom shows 'Electric Components: S7_2_5C - 10125 - Dec 04 10:14:38 - Dec 05 08:14:20' and a 'Next' button (4). A legend at the bottom right explains status icons: a blue 'i' for 'The recording is good to process', a yellow warning triangle for 'The recording does not have an available calibration file', and a red exclamation mark for 'The recording does not have two mandatory electric channels'.

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

2.1 Select Manually

2.2 Edit

3 The recording is good to process

4 The recording does not have an available calibration file

The recording does not have two mandatory electric channels

Process Site Creation wizard

Magnetic Channels

If the desired magnetic channels are in the same recording

1. Keep the option **Use magnetic channels from the same recording as electric channels** selected
2. Use **Select Manually** to modify as needed and click **Next**

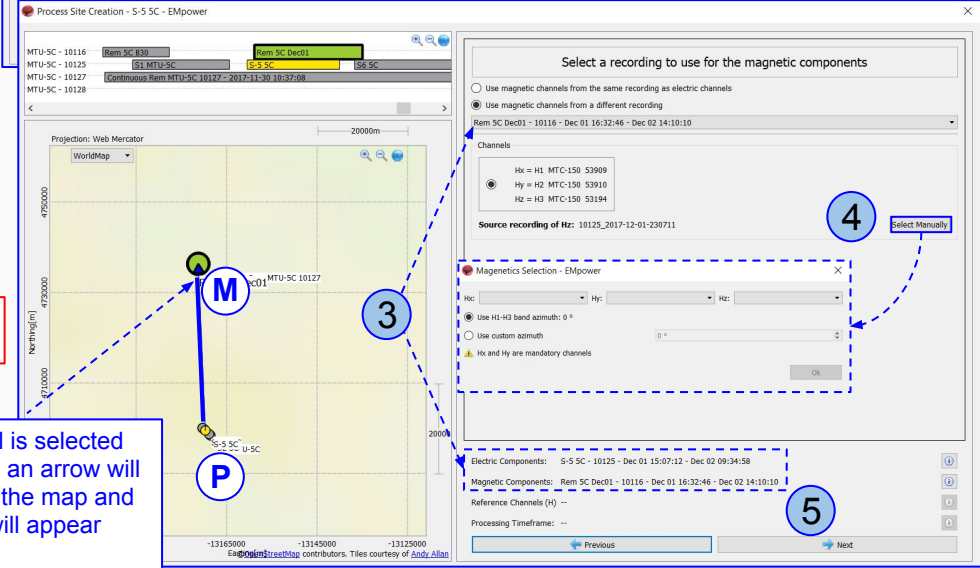
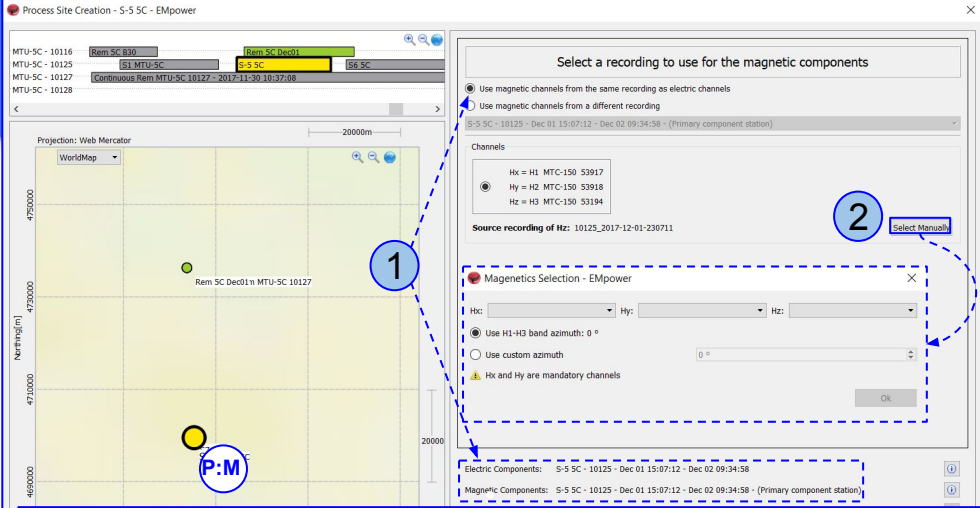
If need to borrow the magnetic channel data from a different recording

3. Select **Use magnetic channels from a different recording**
 - o Select a valid recording/magnetic sensors from the Map / Timeline or using the Drop-down and click **Next**

! Recordings with different Sampling Mode and/or Sampling Rate will not appear on the dropdown list "Use magnetic channels from a different recording".

4. Use **Select Manually**
5. Click **Next**

i When a magnetic channel is selected from a different recording, an arrow will be pointing to that site on the map and the letter **M (Magnetic)** will appear next to that site



Process Site Creation wizard

Reference Channels

Same recording

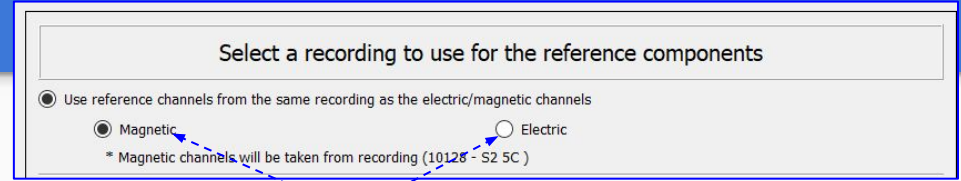
- To use reference channels from the same recording as the electric/magnetic channels
 - Select either the Magnetic Channels or Electric Channels
 - Click **Next**

Remote reference

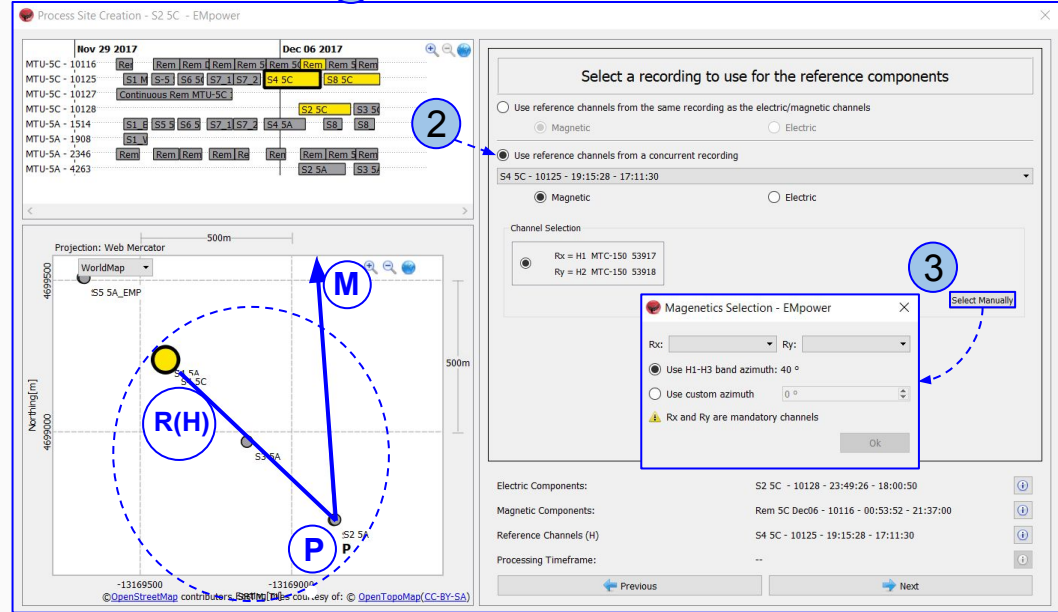
- To use Reference channels from a concurrent recording select **“Use reference channels from concurrent a recording”**
 - A concurrent recording with valid magnetic or electric channels will appear as non-gray in the Map / Timeline and in the drop-down list

! Recordings with different Sampling Mode and/or Sampling Rate will not appear on the dropdown list “Use reference channels from concurrent a recording” .

- Use **Select Manually** as needed
 - Click **Next**



1



2

3



When a channel (**H** magnetic or **E** electric) is selected from a concurrent site the letters **R(H)** or **R(E)** appears next to the Reference site name

Processing Timeframe / Parameters

1. The **Select Processing Timeframe**, allows to select the time segment of the recording that will be processed
 - Use the **Start - End fields** or move the blue indicators in the **Duration** selectors to select the desired Start and End times of the Processing Timeframe.
 - Click Next
2. In the **Processing Parameters** window to reduce the effect of power line noise
 - Select the frequency of the **Electric power grid filter** that corresponds to the frequency carried by the power lines in the region
3. Type the **Process site name**
4. Robust Templates (*see next page*)

1 Select Processing Timeframe

Processing timeframe

Time zone

GPS Site time zone: America/Edmonton (GPS-06:00)

Start: 2017-08-27 10:53:11 End: 2017-08-28 10:34:29

Sunrise: 06:54 Sunset: 20:40

Duration: 23 h 41 m 18 s

2 Processing Parameters

3

4

Electric power grid filter

50 Hz 60 Hz None

Process site name

P=MB 1 R= (Local H)

Robust Templates

Process with robust templates enabled



Multiple Coherence [0.1] (Default)

| | |
|------------------------|--------------------|
| Mask name | Multiple Coherence |
| Robust algorithm | Multiple Coherence |
| Attack | 0.10 |
| Cross powers to reject | 10% |

Set Default + -

Robust Template / Processing Queue

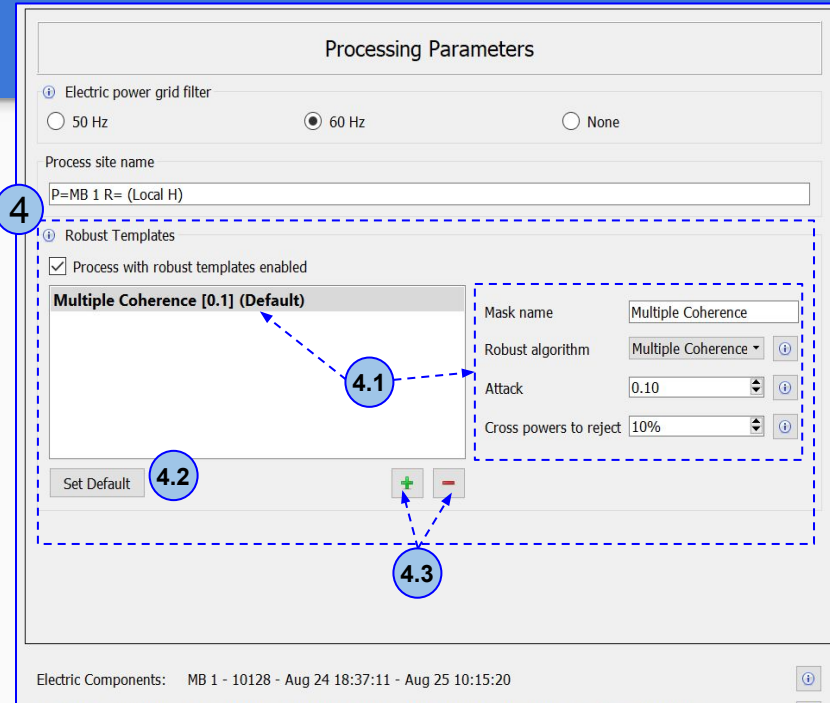
4. Enable Robust Templates by checking **Process with robust templates enabled**

- 4.1. Select the **Robust Mask**
 - Change the parameters as needed
- 4.2. Use the **Set Default** button to change the default Mask for the current processing site(s)
- 4.3. Add  or delete  Robust Mask Template(s)

**All changes will be applied to the current processing task only and subsequent processing will default to the Robust Template configured in the Project Settings.*

5. Click the **Process** button

6. The **Processing Queue** shows the processing of the site(s) selected



Processing Parameters

Electric power grid filter
 50 Hz 60 Hz None

Process site name
P=MB 1 R= (Local H)

Robust Templates
 Process with robust templates enabled

Multiple Coherence [0.1] (Default)

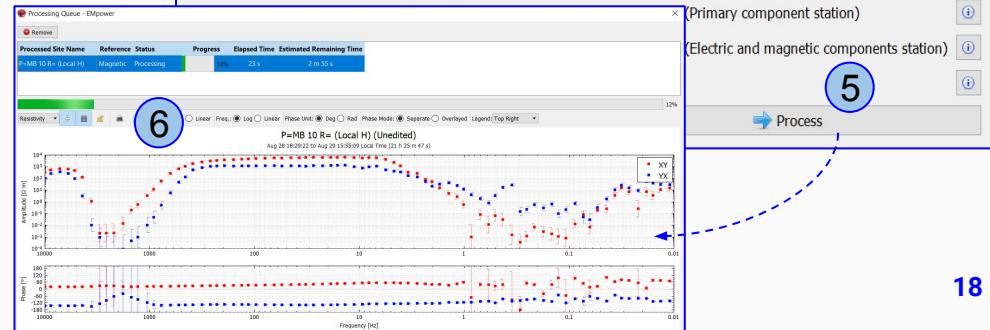
Mask name: Multiple Coherence
Robust algorithm: Multiple Coherence
Attack: 0.10
Cross powers to reject: 10%

Set Default

+

-

Electric Components: MB 1 - 10128 - Aug 24 18:37:11 - Aug 25 10:15:20



Processing Queue - EMpower

| Processed Site Name | Reference | Status | Progress | Elapsed Time | Estimated Remaining Time |
|----------------------|-----------|------------|----------|--------------|--------------------------|
| P=MB 10 R= (Local H) | Magnetic | Processing | 100% | 23 s | 2 m 55 s |

Resolvability: 12%

Amplitude (dB) vs Frequency (Hz)

Phase (deg) vs Frequency (Hz)

Process

All the processing with **Robust Templates** enabled will automatically generate a workbench named "Robust" in the Crosspower Editor (see page 22)



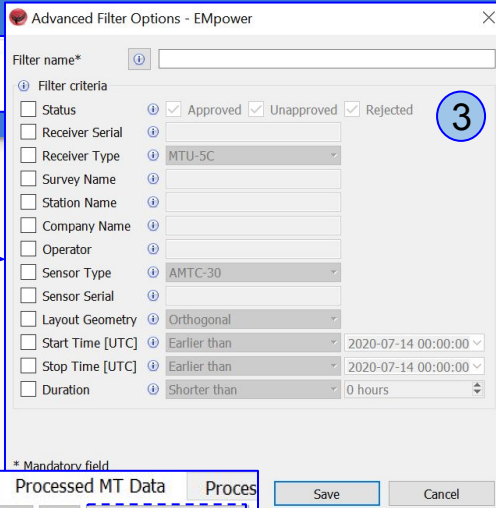
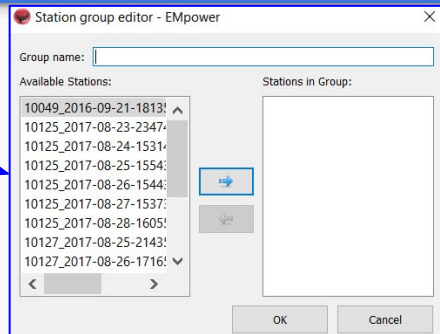
Advanced Search

| | |
|----------------------------|----|
| Toolbar (Sites list) | 20 |
| Groups (Timeline) | 21 |
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Toolbar (Sites list)

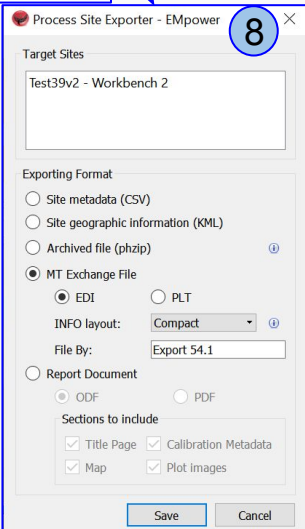
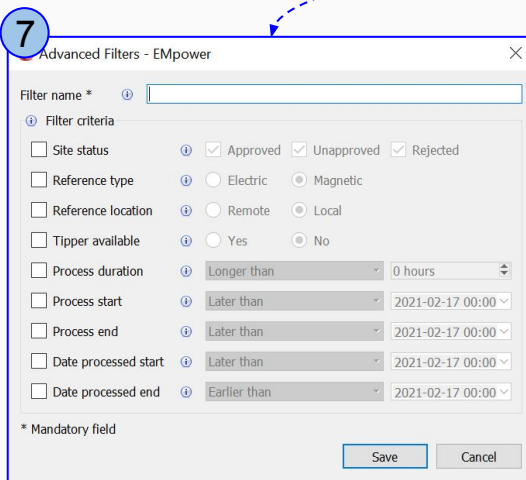
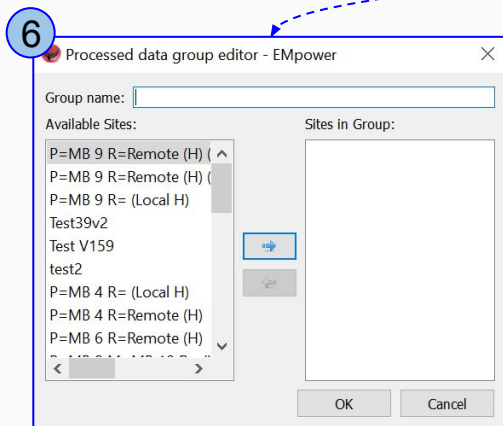
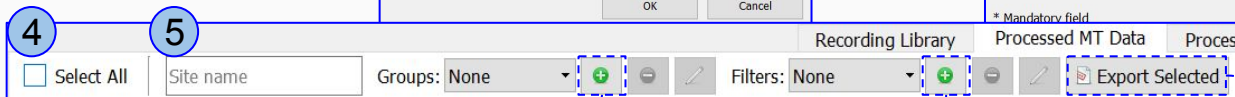
Recording library

1. Quick search by **Site name**
2. **Groups** (Slide 19-20)
3. **Filters** (Slide 21)



Processed MT Data

4. **Select All** the Sites
5. Quick search by **Site name**
6. **Groups** (Slide 19-20)
7. **Filters** (Slide 21)
8. **Export Selected**



Groups (Timeline)

1. Create new group

2. Type the **Group Name**

2.1. Select the sites from the right list using the blue arrow

3. Add sites to an existing group

3.1. Use left-click to select the site and hold down the **Ctrl** key to select multiple sites (release the buttons)

3.2. Select **Add to group** from the Right-click menu and select the existing group

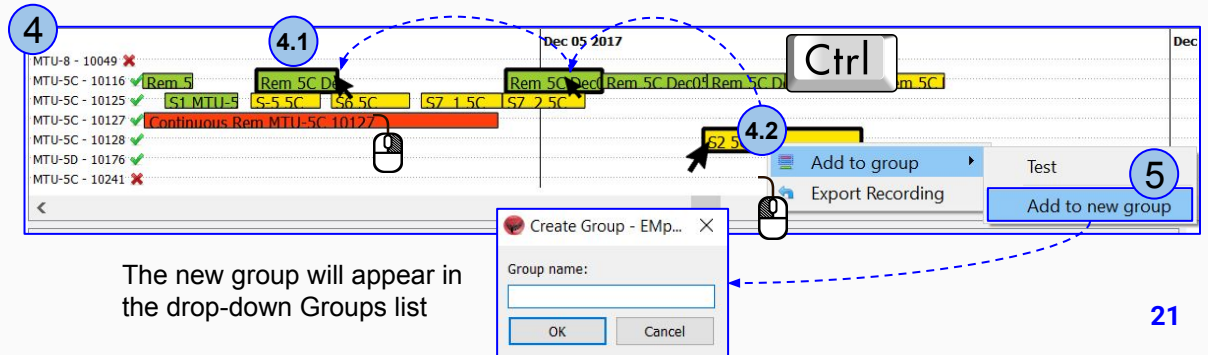
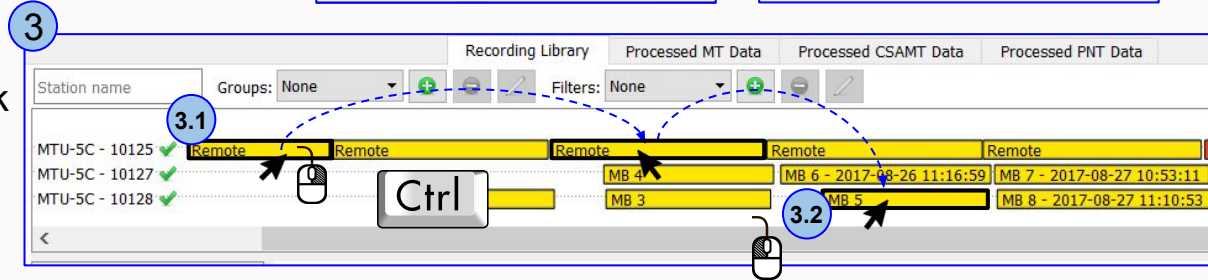
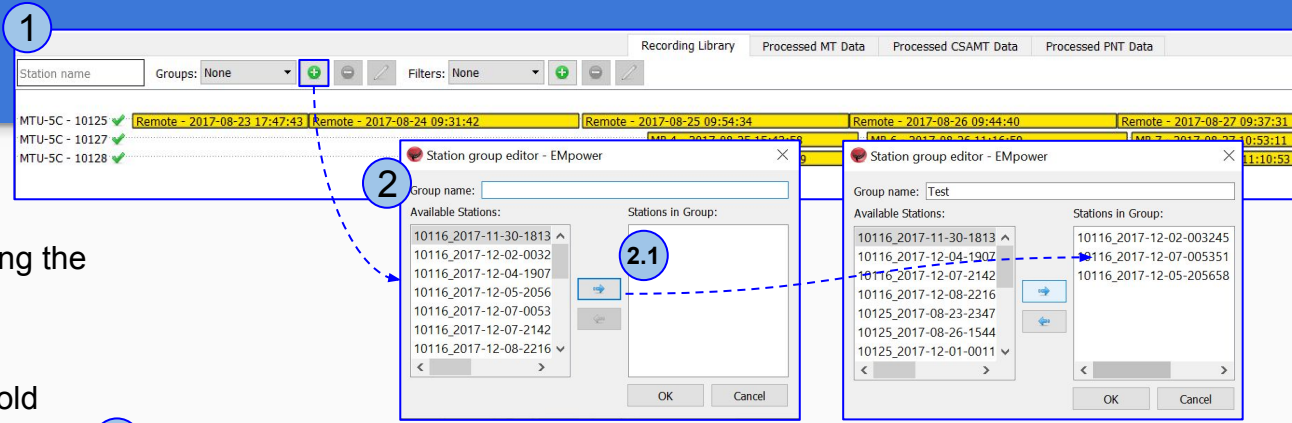
OR

4. Select the sites

4.1. Use left-click to select the site and hold down the **Ctrl** key to select multiple sites (release the buttons)

4.2. Select **Add to group** from the Right-click menu and **Add to new group**

5. Create new group




The new group will appear in the drop-down Groups list


Groups (Map)

Select the sites using one of two options:

1. Use the **Line Selection** tool for specific sites

 Hold down the left-click and draw the line over the sites on the map

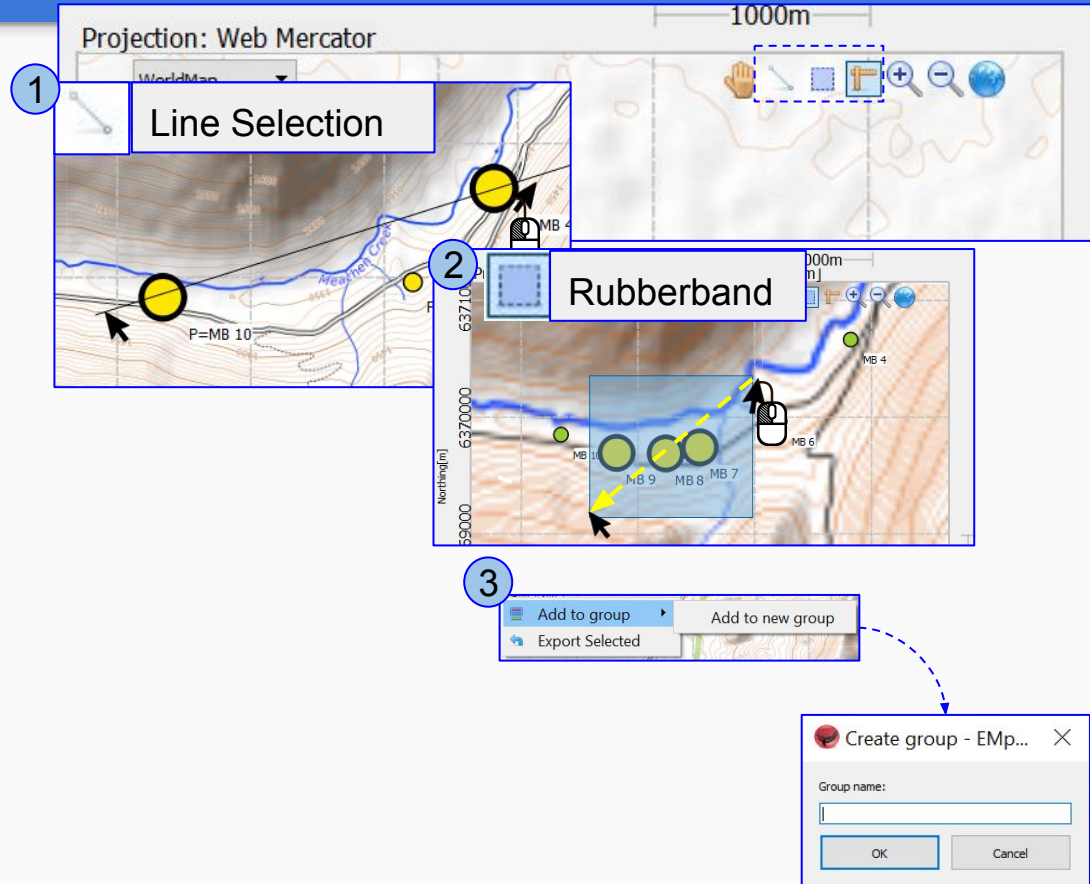
2. Use the **Rubberband** for large ranges

 Hold down the left-click and drag over the sites on the map (*ensure to cover entirely all the sites needed*)

Create a group


3. Create a Group

- Use the Right-click menu on the Map
- **Add to group**
- **Create new group**
- Type the **Group name**



Filters (Processed MT Data)

The Advanced Filter can work with individual sites or with Groups

1. Name the **Filter** (**mandatory field*)
2. Select the **Filter criteria**
3. Save the **Filter**
4. The new **Filter** will be added to the drop down list
5. Use the Edit  button to add or change **Filter criteria**

Advanced Filters - EMpower

Filter name * 1

2 Filter criteria

Site status ⓘ Approved Unapproved Rejected

Reference type ⓘ Electric Magnetic

Reference location ⓘ Remote Local

Tipper available ⓘ Yes No

Process duration ⓘ Longer than 0 hours

Process start ⓘ Later than 2020-07-14 00:00

Process end ⓘ Later than 2020-07-14 00:00

Date processed start ⓘ Later than 2020-07-14 00:00

Date processed end ⓘ Earlier than 2020-07-14 00:00

* Mandatory field

3 Save Cancel

| Site / Workbench Name | Reference / Status | Filter / Geophysical Param | Sensor |
|---|--------------------|----------------------------|---------|
| ▼ P=S6 5C R=Rem Dec02 5C (H) - (Unedited) | Magnetic | 60Hz | Unknown |
| Unedited | Approved | Resistivity/Impedance | |
| ▼ P=S4 5C R= (Local H) - (Unedited) | Magnetic | 60Hz | MTC-150 |
| Unedited | Approved | Resistivity/Impedance | |
| ▼ P=S1 MTU-5C R=Rem 5C B30 (H) - (Unedited) | Magnetic | 50Hz | MTC-150 |
| Unedited | Approved | Resistivity/Impedance | |



Processed MT Data

| | |
|----------------------------------|----|
| Visualizing Processed Data | 25 |
| Processed Site Selection | 26 |
| Working with multi-sites | 27 |
| Site Info - Coherence | 28 |
| Process Site Exporter | 29 |

Visualizing Processed Data

1. Select the **Processed Site** from the Workbench list or Map
2. Edit the Processed Site (Name, Status and Notes)
3. The **Edit Cross Powers** feature removes outlying cross powers from the calculation of resistivity, phase, and other geophysical parameters
4. Site Info
5. Coherence
6. The **Plot** shows the Amplitude and Phase of the selected Processed Site
 - 6.1. Use the **Plot toolbar** to access additional plot features
 - 6.2. Add Processed Site(s) by selecting the site in the Workbench list

The screenshot displays the software interface for visualizing processed geophysical data. It is divided into several main sections:

- Top Panel (Site List):** A table listing various sites. The selected site is "P=Remote R= (Local E) - (Workbench 1)". The table columns include Site / Workbench Name, Reference / Status, Filter / Geophysical Param, Sensor, Has Remote, Tipper, and Status.

| Site / Workbench Name | Reference / Status | Filter / Geophysical Param | Sensor | Has Remote | Tipper | Status |
|---------------------------------------|--------------------|----------------------------|---------|------------|--------|---------|
| P=Remote R= (Local H) - (Robust) | Magnetic | 60Hz | MTC-150 | Yes | No | 2017-01 |
| Unedited | Unapproved | Resistivity/Impedance | | | | |
| Robust | Unapproved | Resistivity | | | | |
| P=Remote R= (Local E) - (Workbench 1) | Electric | None | MTC-150 | No | No | 2017-01 |
| Workbench 1 | Unapproved | Resistivity | | | | |
| Unedited | Unapproved | Resistivity/Impedance | | | | |
| P=Remote - (Workbench 1) | Magnetic | 60Hz | Unknown | No | No | 2017-01 |
| Workbench 1 | Unapproved | Resistivity | | | | |
| Unedited | Unapproved | Resistivity/Impedance | | | | |
| P=MB test 3 R= (Local H) - (Unedited) | Magnetic | 60Hz | MTC-150 | No | No | 2017-01 |
| Unedited | Unapproved | Resistivity/Impedance | | | | |
| P=MR test 3 R= (Local H) - (Robust) | Magnetic | 60Hz | MTC-150 | No | No | 2017-01 |
- Map:** A map showing the location of the selected site, "P=Remote R= (Local E) (Workbench 1)", marked with a yellow dot. A dashed blue arrow labeled "3" points from the site name in the table to the map.
- Plot:** A plot showing Amplitude [F·m] versus Frequency [Hz]. The plot displays data for "P=Remote R= (Local E); Workbench 1" (red line) and "P=Remote R= (Local H); Robust" (blue line). The plot toolbar includes options for "Full View" and "Save PNG".
- Site Info:** A panel showing details for the highlighted site: "P=Remote R= (Local E); Workbench 1", including the date and time of data collection (Aug 27 00:44:40 to Aug 27 05:41:03) and duration (4 h 56 m 23 s).
- Workbench List:** A list of sites and workbenches, with a dashed blue arrow labeled "6.2" pointing to the selected site.

Process Site Selection

Select:

1. Select all the processed sites
2. Select a group of processed sites
 - 2.1. Left-click on the first site on the list, press and hold the **Shift** key and left-click on the last site

Or

- 2.2. Hold the Left-click on the site and drag up/down to select items

3. To select specific processed sites

- 3.1. Left-click on the first site on the list and hold the **Ctrl** key until the last processed site is selected

*To select site(s) from the map see [page 22](#)

Export:

4. Click the **Export Selected** button
 - 4.1. Complete the information as needed and click the **Save** button

The screenshot displays the 'Workbench list' window with a table of site data. The table has columns for Site / Workbench Name, Reference / Status, Filter / Geophysical Param, Sensor, and Has Remc. The 'Export Selected' button is highlighted in the top right. A 'Process Site Exporter - EMpower' dialog box is open, showing 'Target Sites' and 'Exporting Format' options. The 'MT Exchange File' format is selected, and the 'Save' button is highlighted.

| Site / Workbench Name | Reference / Status | Filter / Geophysical Param | Sensor | Has Remc |
|--|--------------------|----------------------------|---------|----------|
| Test | Magnetic | 60Hz | MTC-150 | Yes |
| Unapproved | Unapproved | Resistivity/Impedance | | |
| Unapproved | Unapproved | Resistivity | | |
| test 4505 2 - (Workbench 1) | Electric | None | 150 | No |
| Workbench 1 | Unapproved | Resistivity | | |
| Unapproved | Unapproved | Resistivity/Impedance | | |
| test 4505 - (Unedited) | Electric | None | MTC-150 | No |
| Unedited | Unapproved | Resistivity/Impedance | | |
| P=Victoria Park R= (Local H) - (Workbench 2) | Magnetic | None | MTC-150 | No |

Process Site Exporter - EMpower

Target Sites

- P=Remote R= (Local E) - Workbench 1
- P=Remote R= (Local H) - Unedited
- P=Remote R= (Local H) - Robust

Exporting Format

- Site metadata (CSV)
- Site geographic information (KML)
- Archived file (phzip)
- MT Exchange File
 - EDI
 - PLT

INFO layout: Compact

File By: Export 54.1

Report Document


Sections to include

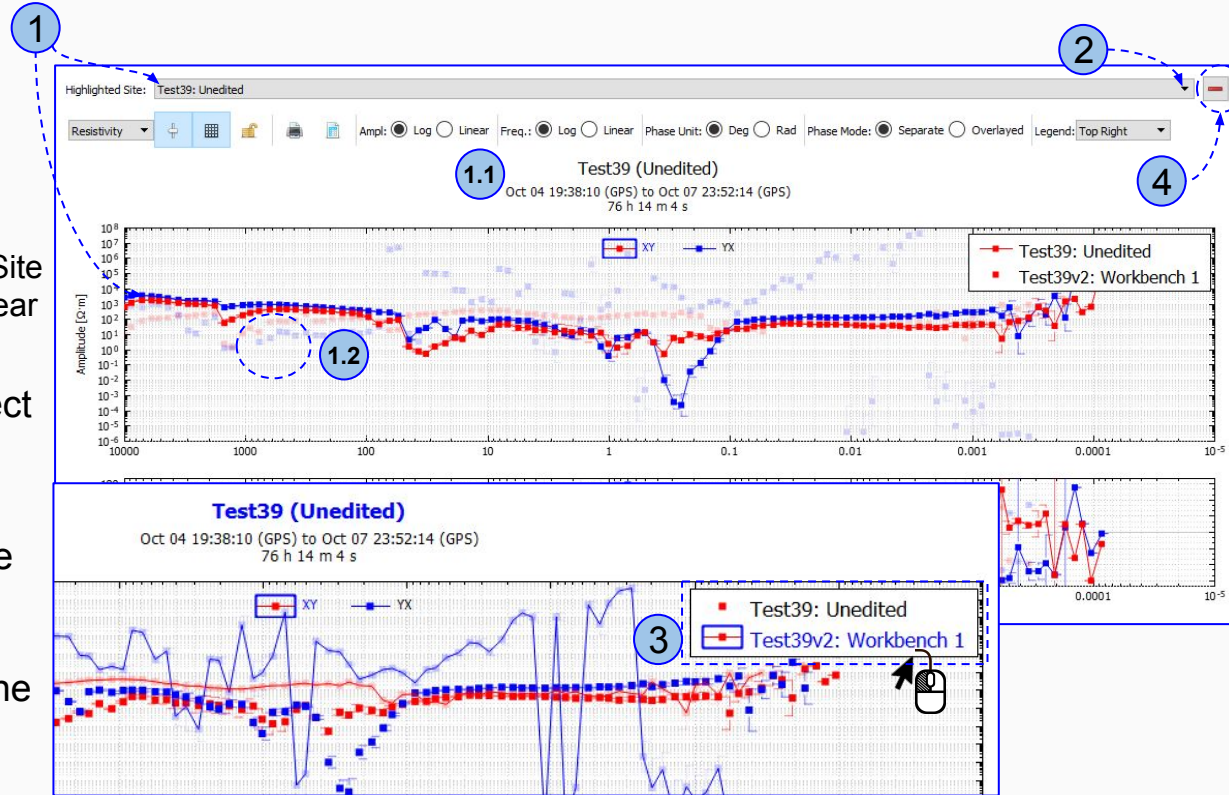
- Title Page
- Calibration Metadata
- Map
- Plot Images

Save Cancel

Working with multi-sites

EMpower has the functionality to work with multiple sites. Select the sites as needed (see *previous page*)

1. The highlighted site will be in the foreground
 - 1.1. The plot title will show the Highlighted Site
 - 1.2. Other selected sites in the plot will appear in attenuated colour
2. To change the Highlighted Site, select the Highlighted Site from the drop down menu
3. To switch between curves, select the site on the plot legend
4. To remove a site from the plot use the button 



Site Info - Coherence

1. General Processing Metadata information

2. Channels details

- Electrics
- Magnetics
- Remote Reference (E)

3. Recording Information

4. Coherence

1 Metadata Viewer: P=S6 5C R=Rem Dec02 5C (H) - EMpower

Processing Metadata

| | | | |
|---------------|--|---------------------|-----------------------------|
| Site ID: | {68d7ac2f-b935-489d-895b-961d3f1d0026} | Tipper Source: | From Local Magnetics |
| Site Name: | P=S6 5C R=Rem Dec02 5C (H) | Reference Type: | Magnetic |
| Survey Name: | Don Campbell | Reference Location: | Remote |
| Company Name: | | Process Date: | Not available |
| Power Grid: | 60Hz | Start Time: | Sat Dec 2 22:26:22 2017 GMT |
| Process Type: | Orthogonal | Stop Time: | Sun Dec 3 17:20:02 2017 GMT |
| Version: | Not Available | Duration: | 18 h 53 m 40 s |
| Site Status: | approved | Frequency Range: | 0.00005 Hz to 12500 Hz |

Processing Notes

2

| Tag | Polarity Inverted | Gain | LPF | DC | Saturated Frames | Dropped Frames | Pot REsistance(+) | Pot Resistance(-) | Dipole Leng |
|-----|-------------------|------|------------|---------------|------------------|----------------|-------------------|-------------------|-------------|
| Ex | Not Available | No | 0 x 0 = x0 | Not Available | Not Available | 0 | 0 Ω | 0 Ω | 0 m |
| Ey | Not Available | No | 0 x 0 = x0 | Not Available | Not Available | 0 | 0 Ω | 0 Ω | 0 m |

3

Recording Information

Recording ID: 10125_2017-12-02-203505
Station Name: S6 5C
Survey Name: Don Campbell
Operator(s): CF MU and GB
Start Time: Dec 02 2017 12:35:05
Stop time: Dec 03 2017 09:20:02
Duration: 20 h 44 m 57 s
Electric Filter: None
Latitude: 38.8469 °
Longitude: -118.308 °
Altitude: 1250.1 m
Elevation: 0.00
Elevation: 13.000000

Receiver Information

Rx Type: UNKNOWN
Rx ID: 10125
Rx Firmware:
Rx Cal: Not Available

Recording Notes

4

Coherence viewer - EMpower

Channel 1: Ex Channel 2: Ey

P=S1 MTU-5C R=Rem 5C B30 (H)

Dec 01 03:28:38 to Dec 01 05:07:12 (1 h 38 m 34 s)

Coherence

Frequency [Hz]

Site: P=S1 MTU-5C R=Rem 5C B30 (H)

Approved Unapproved Rejected

Notes:

Edit Cross Powers Coherence Site Info Delete

Process Site Exporter

1. Select Site(s) - Processed MT Data
 - Modify Groups/Filters as needed
 - Check the desired processed sites or use Check all the processed sites to export (See [Advanced Search](#))
2. Use the **Export Selected** option to open the Process Site Exporter
3. Select one of the **Exporting Format**
4. **Report Document** give the option to create a customized report, by selecting the sections that will be included

The image illustrates the workflow for using the Process Site Exporter. It consists of several interconnected windows and panels:

- Top Panel:** A site list table with columns for Site / Workbench Name, Reference / Status, Filter / Geophysical Param, and Sensor. The list includes entries like "Approved Resistivity", "Magnetic 60Hz", and "Electric None". A blue dashed box labeled "1" highlights the "Export Selected" button in the top right corner.
- Map View:** A topographic map showing site locations MB 4, MB 6, MB 7, MB 8, and MB 9. A blue dashed box labeled "1" highlights the "Add to group" and "Export Selected" buttons overlaid on the map.
- Process Site Exporter - E-Mpower Window:** A dialog box with the following sections:
 - Target Sites:** A list of selected sites: "P=Remote R= (Local E) - Workbench 1", "P=Remote R= (Local H) - Unedited", and "P=Remote R= (Local H) - Robust".
 - Exporting Format:** Radio buttons for "Site metadata (CSV)", "Site geographic information (KML)", "Archived file (phzip)", and "MT Exchange File". Under "MT Exchange File", there are sub-options for "EDI" (selected) and "PLT".
 - INFO layout:** A dropdown menu currently set to "Compact". A blue dashed box labeled "3" highlights this dropdown.
 - File By:** A text field containing "Export 54.1".
 - Report Document:** Radio buttons for "ODF" (selected) and "PDF".
 - Sections to include:** A list of checkboxes for "Title Page", "Map", "Calibration Metadata", and "Plot Images". A blue dashed box labeled "4" highlights this section.
- Menu:** A screenshot of the application menu with "Export MT Processed Sites" highlighted. A blue dashed box labeled "2" points to this menu item.




Processed data editing Crosspower Editor

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|--|----|
| Editing Cross Powers | 31 |
| Robust Mask | 32 |
| Project Settings - Robust Templates | 33 |
| Polar Editor | 34 |
| Time Editor | 35 |

Editing Cross Powers

Edit Cross Powers, is a tool to create multiple edition masks without changing the original (Unedited) data. Masks can be used to clean noisy sites

1. To create a new **Workbench**

- Click the icon 
- Type the **Workbench name**
- Complete the information as needed
- Click the **Create** button

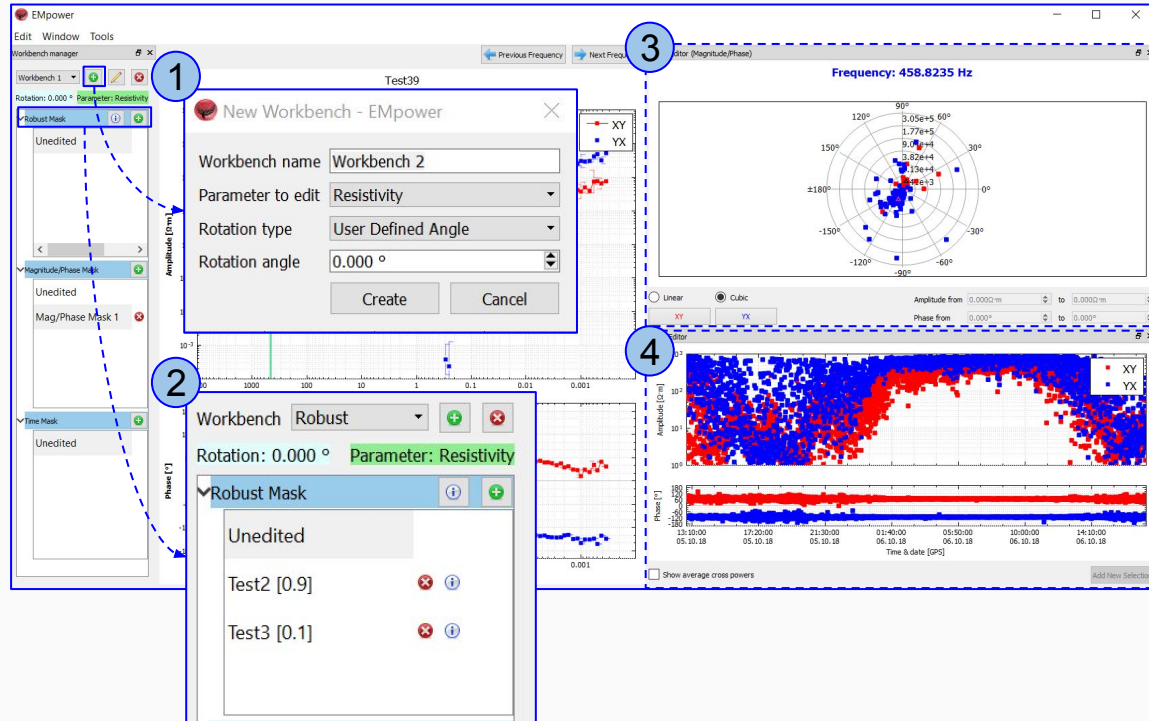
2. When the site is processed using a Robust Template, the Workbench list will include Robust and the Robust mask will display the Robust Templates created on the Project setting (page 8)

3. Polar Editor

- Create a **Polar Editor Mask**(page 24)

4. Time Editor

- Create a **Time Editor Mask**(page 25)



The screenshot displays the EMpower software interface with several key components highlighted by numbered callouts:

- 1**: A 'New Workbench - EMpower' dialog box is open, showing fields for 'Workbench name' (Workbench 2), 'Parameter to edit' (Resistivity), 'Rotation type' (User Defined Angle), and 'Rotation angle' (0.000 °). 'Create' and 'Cancel' buttons are visible at the bottom.
- 2**: The 'Robust Mask' configuration panel is shown, listing 'Unedited', 'Test2 [0.9]', and 'Test3 [0.1]'.
- 3**: The 'Polar Editor' window displays a polar plot of cross powers at a frequency of 458.8235 Hz, with axes for phase and amplitude.
- 4**: The 'Time Editor' window displays a scatter plot of cross powers over time, with axes for amplitude and time.

Robust Mask

The Robust Mask algorithm fixes the most common problems

1. Create a Robust Mask

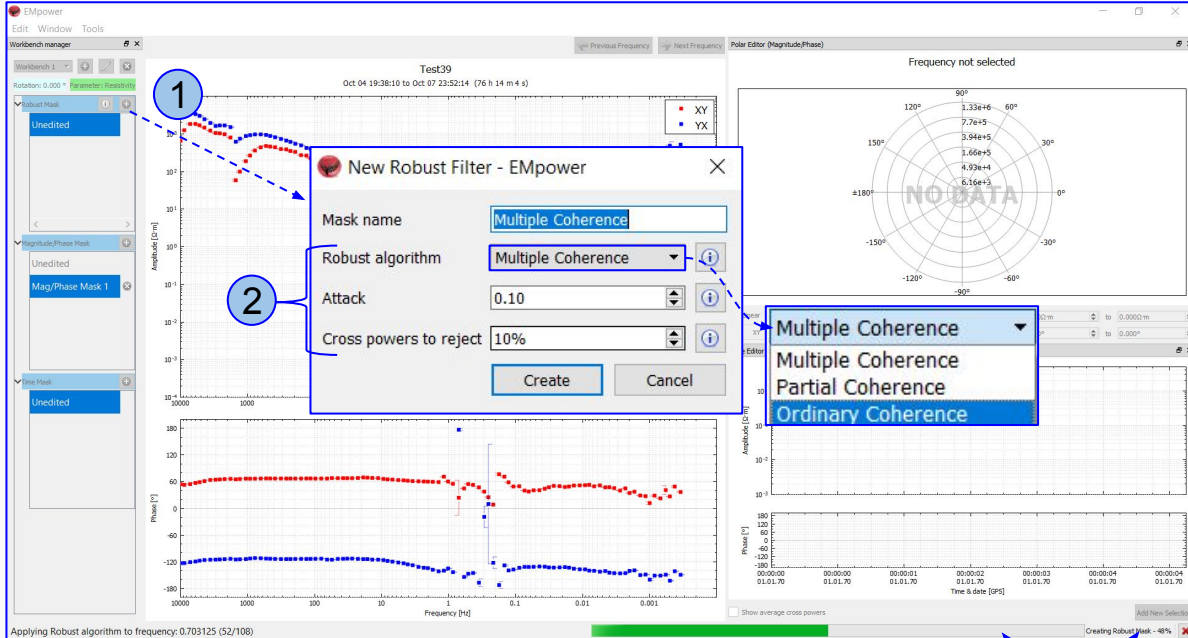
- Type the **Mask Name**

2. Use the different options to obtain the desired information

- Select the **Robust algorithm**
- Define the **Attack**
- Select the percent of **Cross powers to reject**

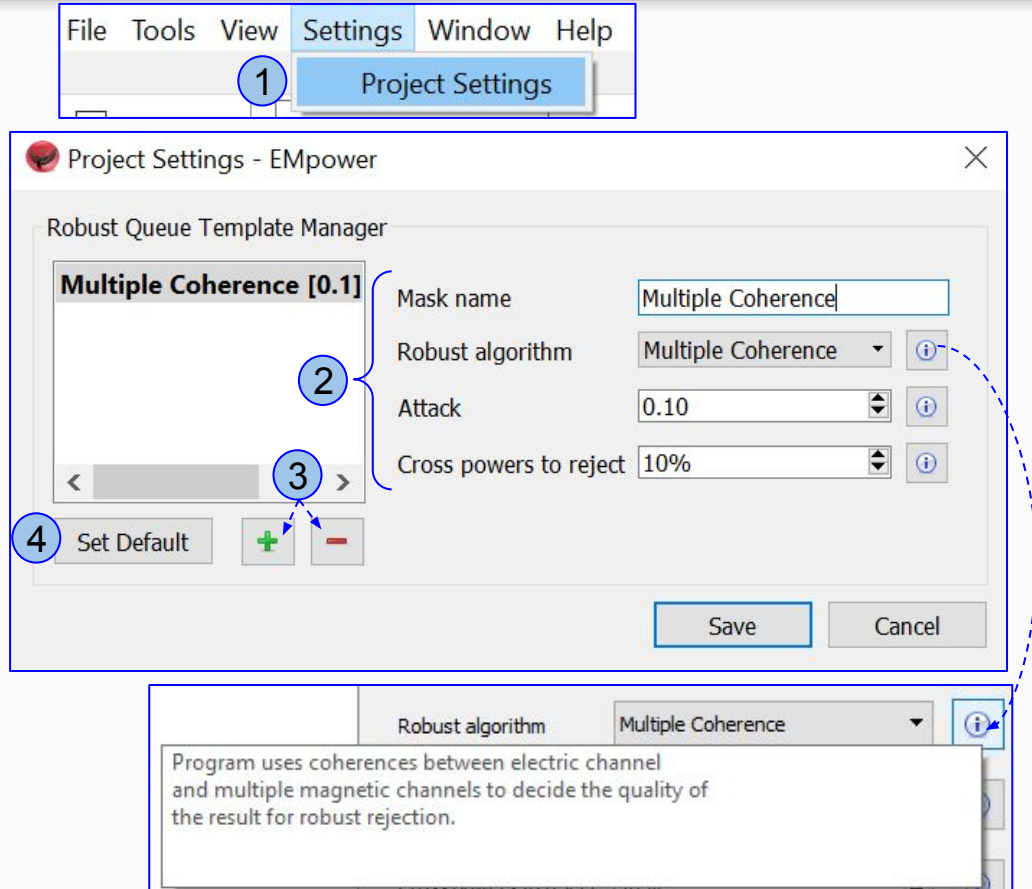
3. Wait until the process is completed

**For more details see the [Crosspower Editor manual](#)*

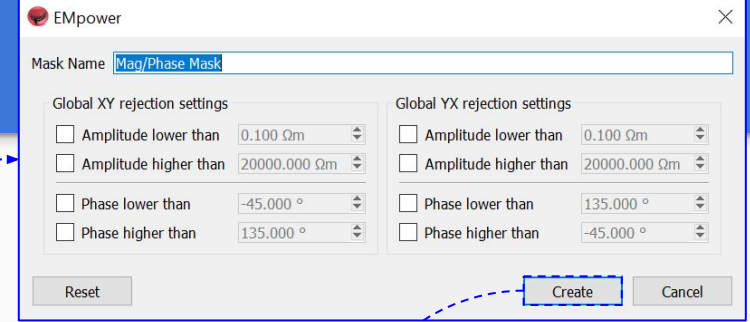


Project Settings - Robust Templates

1. Select **Project Settings** from Setting menu
2. Define the parameters for the **Robust Mask Template**
 - This *template only applies to the current project*
3. Add, Modify or Delete a Robust Mask
4. **Set Default**
 - The "default" in settings will be the robust mask selected after processing for any processing in the project



Polar Editor



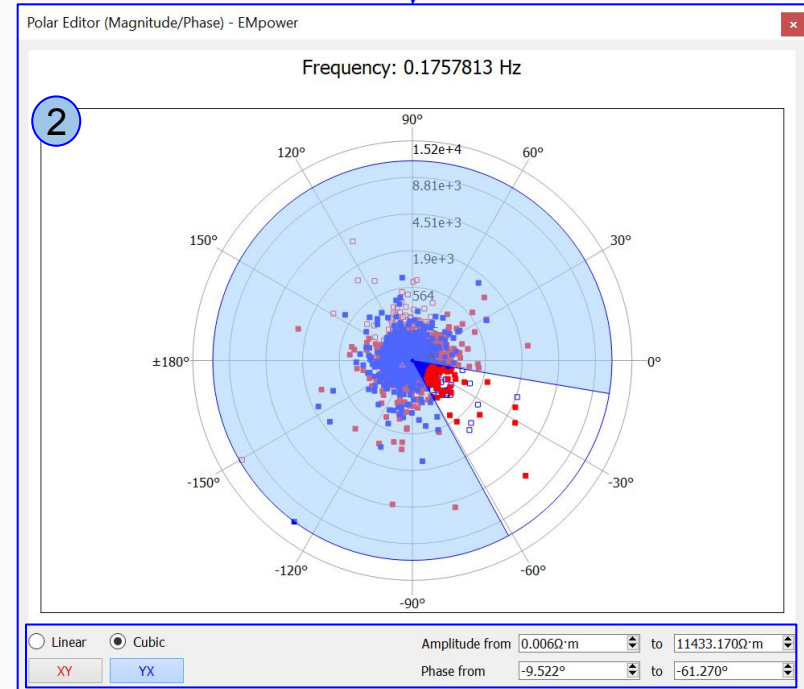
1. Create a New Magnitude/ Phase Editor Polar Masks

- Type the **Mask Name**
- Edit the **Global XY rejection settings** as needed
- Click the **Create** button

2. Use the different tools to obtain the desired information

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

**For more details see the [Crosspower Editor manual](#)*



Time Editor

1. Create a New Time Editor Mask

1.1. The Mask Name can be edited by right-clicking on it

2. To add a new rejection area

2.1. Click the **Add New Selection** button

2.2. Left-click and hold, and start dragging to the left or right to select the area of crosspower rejection

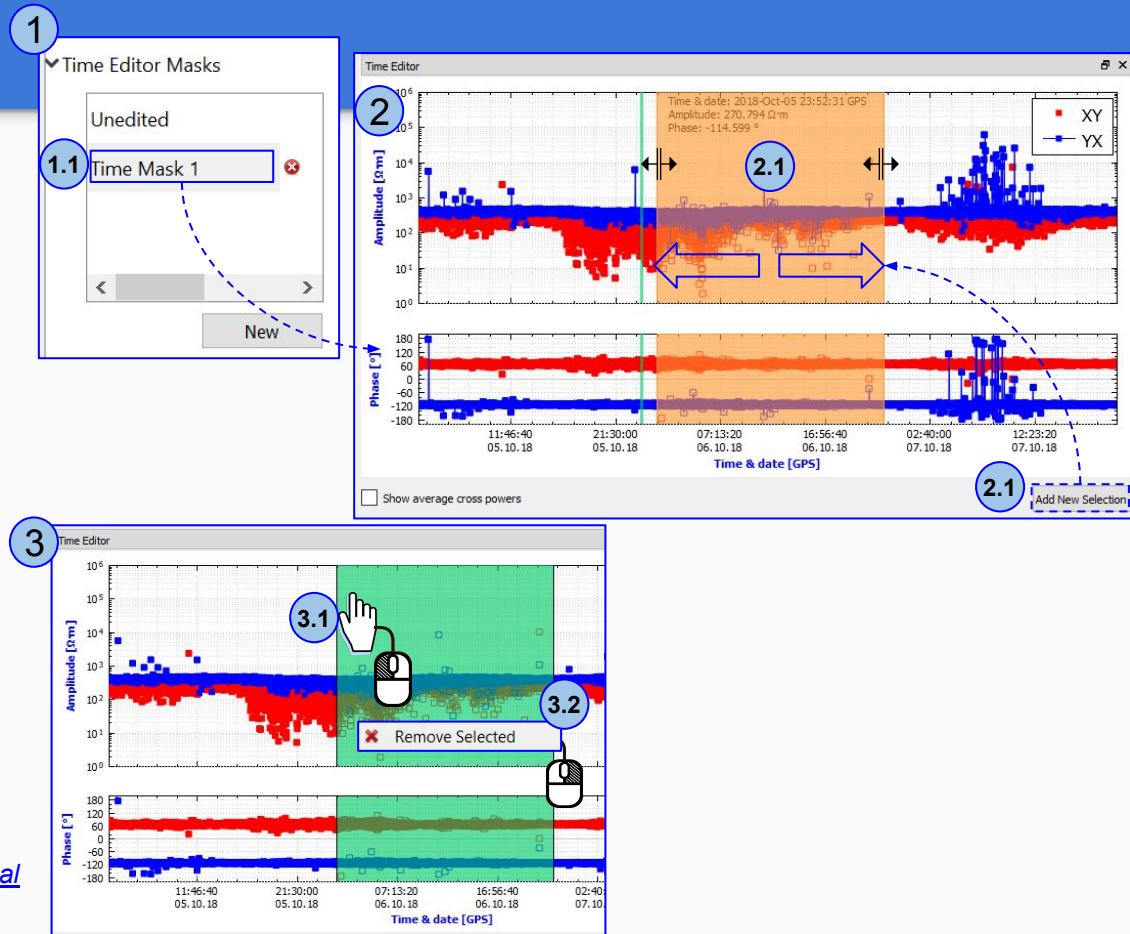
3. To remove an existing rejection area:

3.1. Left-click on the area to be deleted

3.2. Then right-click the option **Remove Selected** that appears on the screen

** The crosspowers rejected in the polar editor will be shown in the time editor and vice versa.*

**For more details see the [Crosspower Editor manual](#)*





Processed PNT Data

| | |
|--------------------------|----|
| Processed PNT Data | 37 |
| Multi-Site PNT | 38 |

Processed PNT Data

This tab shows processed Parallel Noise data




1. Area to Select the Site of interest and view its metadata

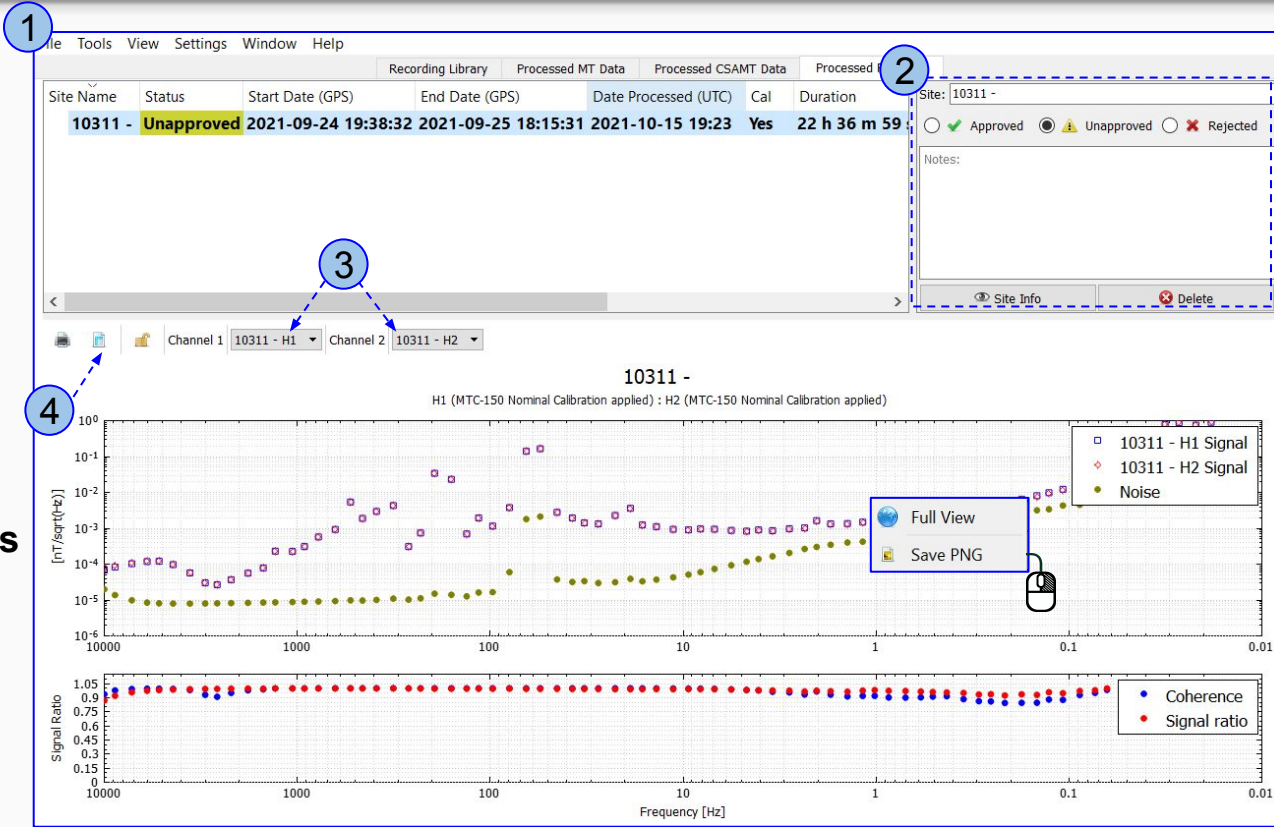
2. Area to edit information of the selected Processed **Site**

- Site Name
- Mark the site as Approved, Unapproved or Rejected
- Relevant Notes for the processing

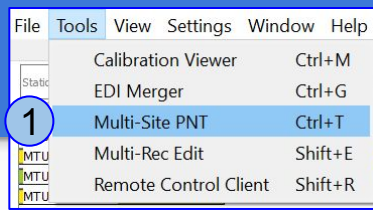
3. Selectors to choose the **Channels** to be analysed and displayed

4. Tools

-  **Print** the plot
-  **Export** the values in CSV format
-  **Lock / Unlock** plot scale



Multi-Site PNT



1. Use the **Multi-Site PNT (Ctrl+T)** tool to process Parallel Noise data using specific channels from different sites

2. Select the recording(s)

2.1. Select the first Recording and define the channels

2.2. Select for another recording(s) the channels that will be used (no more than 7)

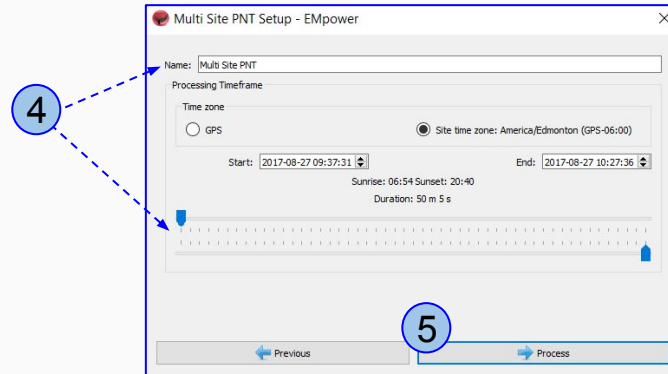
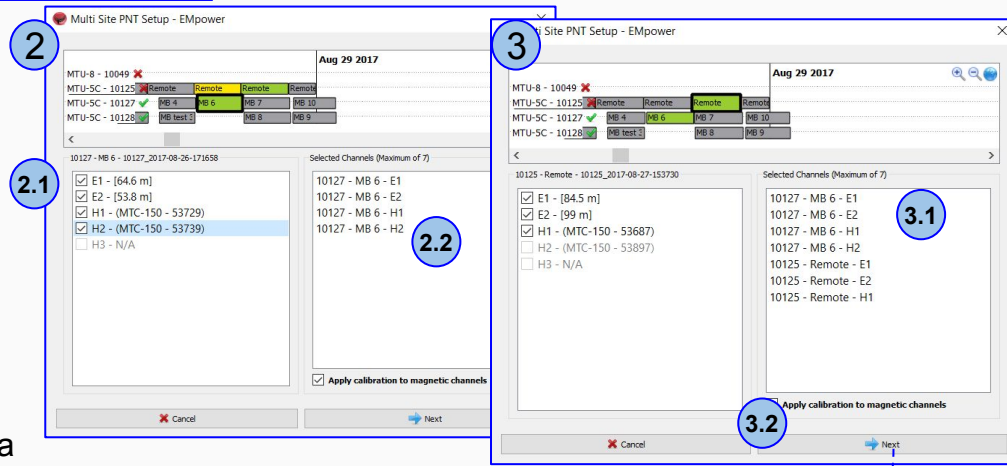
3. **Apply calibration to magnetic channels**

3.1. When the selected sensor does not have associated calibration available in the project **EMpower** will apply a generic calibration

3.2. Click **Next**

4. Define the Name and Duration, the time available depends on the overlapped time between all the recordings selected

5. To begin processing click the **Process** button





Tools

| | |
|----------------------------------|----|
| EDI Merger <Create> | 40 |
| EDI Merger <Edit and Save> | 41 |
| Multi-Rec Edit | 42 |

EDI Merger <Create>

1. **EDI Merger (Ctrl+G)** tool is used to combine two EDI files into one.
2. Select the EDI files by using the **Browse for EDI** button
3. Choose one of the Geophysical Mode
4. The **Merged Results** plot shows the highlighted area on the EDI plots

File Tools View Settings Window Help

- Calibration Viewer Ctrl+M
- EDI Merger Ctrl+G**
- Multi-Site PNT Ctrl+T
- Multi-Rec Edit Shift+E
- Remote Control Client Shift+R

EDI Merger - EPower

Amplitude [$\Omega \cdot m$]

Phase [$^{\circ}$]

Frequency [Hz]

Browse for EDI

Look in: C:\Users\PCASTRO\Desktop

| Name | Size | Type | Date M |
|---------------------------------|-------------|---------|--------|
| Desktop | | | |
| Documents | | | |
| PCASTRO | | | |
| FIELD TESTS (G:) | | | |
| P_MB_4_R_Remote...rkbench_1.edi | 7...B e...e | 26/03 | |
| P_Remote_R_Loc...orkbench_1.edi | 6...B e...e | 26/03 | |
| Google Drive | | Fi...er | 26/03 |
| V1.50 | | Fi...er | 24/03 |
| New Folder2 | | Fi...er | 23/03 |
| v1.31.0.1 | | Fi...er | 27/02 |
| RemoteControlClient_Win | | Fi...er | 19/02 |
| V1.48 | | Fi...er | 11/02 |

File name: P_MB_4_R_Remote_H_Workbench_1.edi

Files of type: EDI File (*.edi)

Resistivity

Remove Frequency Restore Frequency Save Close

EDI Merger - EPower

P_MB_4_R_Remote_H_Workbench_1.edi

Merged Result

Amplitude [$\Omega \cdot m$]

Phase [$^{\circ}$]

Frequency [Hz]

Browse for EDI

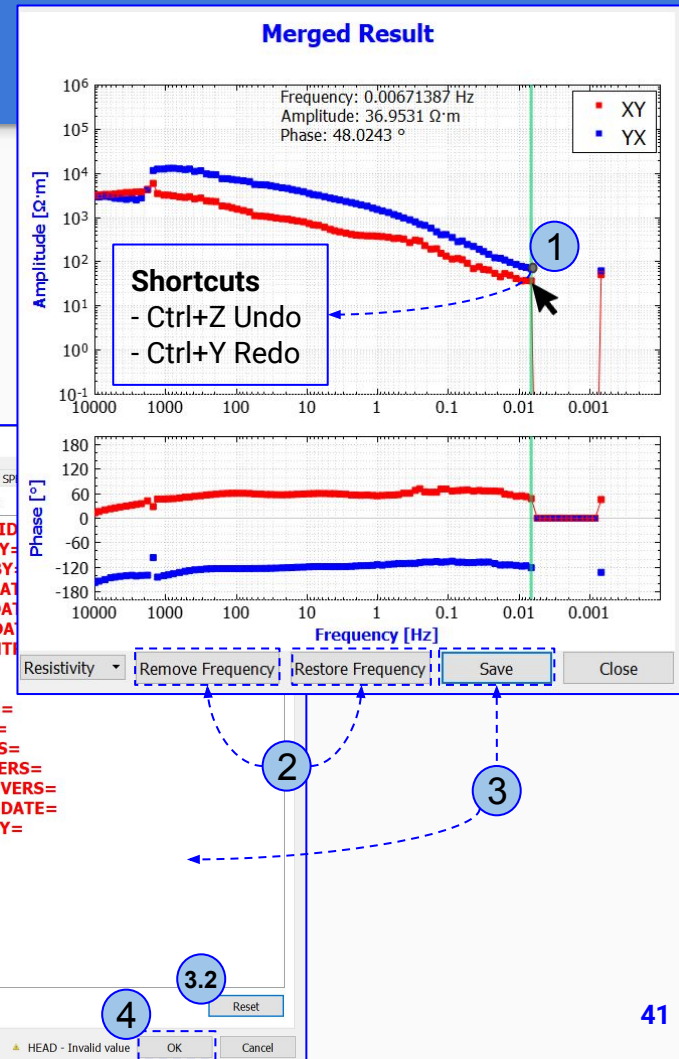
P_Remote_R_Local_E_Workbench_1.edi

Resistivity

Remove Frequency Restore Frequency Save Close

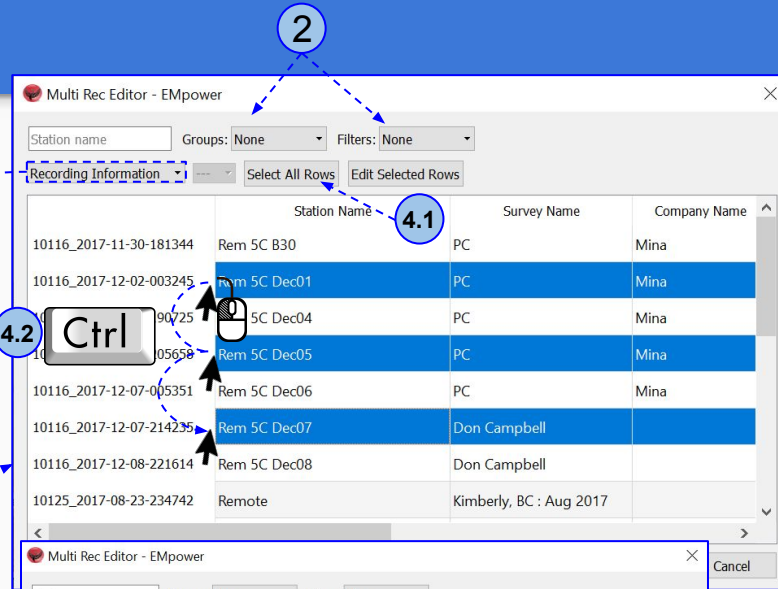
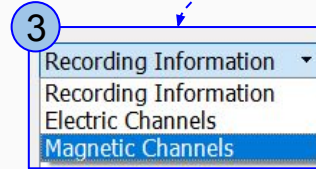
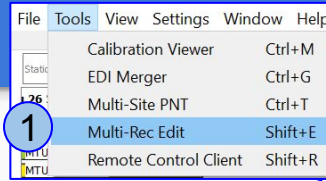
EDI Merger <Edit and Save>

1. To exclude a frequency, select it by using the Left-Click, (*review the information on the top plot*) and click **Remove Frequency** or use the Delete key
2. To recover the frequency, select the frequency and click **Restore Frequency**
3. Click **Save** button and fill out the metadata of the merged EDI in each tab
 - 3.1. Use the blue arrows to select the information from respective EDI file. This information can be manually edited in the merger EDI file.
 - 3.2. To clear the selection use the **Reset** button
4. Once the all the Metadata has been filled click **OK** button to save the merged EDI



Multi-Rec Edit

1. Select **Multi-Rec Edit** from the Tools menu or use the shortcut Shift+E
2. Choose the filters/groups as needed
3. Select to view recording Information or Channels
4. Use the different options to select
 - 4.1. Select all by using **Select All Rows**
 - 4.2. Use left-click to select the site and hold down the Ctrl key to select multiple sites (*release the buttons*)
 - 4.3. To select a group of sites, left-click and hold, and start dragging to the up/down to select the group of sites



Rows with "----" consist of either disabled channels or not applicable channels of receiver type.

| Channel Tag | Sensor Type Name | Sensor Serial Number | Polarity Inverted |
|-------------|------------------|----------------------|-------------------|
| H1 | MTC-150 | 53874 | false |
| H1 | MTC-150 | 53729 | false |
| ---- | ---- | ---- | ---- |



Please check out the [FAQs](#)

<https://phoenixgeophysics.freshdesk.com/>

Or email us at: support@phoenix-geophysics.com