

EMpower Data Management



Recording Library	2
Processing Data	9
Advanced Search	16
Processed MT Data	21
Processed data editing	25
Processed PNT Data	31
Reports	34



Recording Library

Creating / Opening a Project	3
Importing Data/ Drag and Drop	4
Visual Representation of Sites	5
Verifying/Editing Recording Information	6
View Recording Details	7
Recording Details and QC	8

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**

EMpower

EMpower Geophysical Software
by Phoenix Geophysics

1

- Prepare Create instrument configuration files
View and edit instrument configuration files
- Evaluate Check data quality
View time series and spectra
View noise test results
View quick-estimate apparent resistivity
- Manage** Manage surveys
Import data and prepare for processing
View recording sites on a map and a time line
View time series and spectra
Process data with local or remote references
Edit processed data and export for interpretation
- Exit Quit EMpower

Open Project - EMpower

Kimberley BC Aug 2017
D.C. Nevada 2017 Test

2

Open Find Existing Project New Remove Cancel

Create New Project - EMpower

Look in: C:\Users\

Name

- My Computer
- Desktop
- Documents
- PNT - 10125 - S-5 5C - E2-H1.csv
- Videos
- test 1
- Test**
- Searches
- Saved Games
- Roaming
- Pictures

Enter a project name

3

4

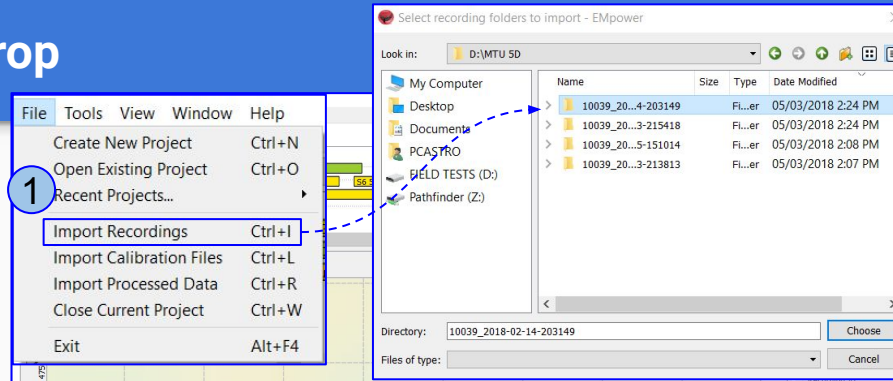
Choose Cancel

Importing Data / Drag and Drop

Importing Data

1. Select **Importing Recordings** from **File** menu

- Select the recording and click **Choose**

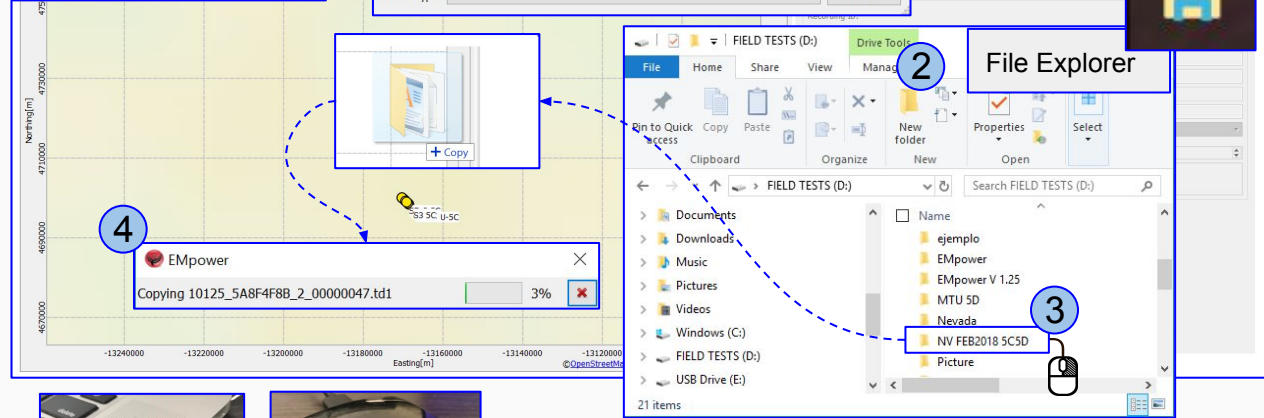


Drag and drop

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



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 a software interface with three main views: Timeline, Map, and Recording list.

- Timeline:** Shows a horizontal bar chart of recordings for stations MTU-SC-10116, MTU-SC-10125, MTU-SC-10127, and MTU-SC-10128. Recordings are color-coded: green for approved, yellow for unapproved, and red for rejected. The timeline spans from Dec 05 2017 to Dec 12 2017.
- Map:** Shows a geographical map with a yellow dot representing a recording location. The map is labeled "Map" and "Remote". The recording location is labeled "Rem SC B30" and "MTU-SC 10127".
- Recording list:** Shows detailed information for a specific recording, "Rem SC B30 (13 h 18 m 27 s)". The status is "Approved". The recording information includes: Recording ID: 10116_2017-11-30-181344, Start time: Nov 30 2017 10:13:45 (Local) Pacific Standard Time (GMT -08:00), Duration: 13 h 18 m 27 s, Survey name: Don Campbell, Station name: Rem SC B30, Operator(s): Caro George B Murat, Company name: (empty), Layout Geometry: Orthogonal, Declination: 13.00°, Notes: Stopped recording @ 23h32 local time.

The Recording list view also includes sections for Electric Channels and Magnetic Channels, with various settings for gain, LPF, DC, and polarity.



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

Remote (24 h 3 m) [Back] [Forward] [Delete]

Status
 Approved Unapproved Rejected

Tools
Time Series Spectra Process (Orthogonal)

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

1
Survey name: Kimberley, BC : Aug 2017
Station name: Remote
Operator(s):
Layout Geometry: Orthogonal
Declination: 0.00°
Notes: High contact resistance
15 declination
-12 Azimuth

2
Electric Channels
Distance (m) to GND Resistance (Ω)
Channel (+) N / E (-) S / W Polarity | (+) N / E (-) S / W Gain | LPF [Hz] | DC [V]
E1 50.00 34.50 Inverted | 5335 3894.07 | 4 x 1 = x4 | 10000 | -0.021
E2 50.00 49.00 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 Inverted x4 10000 -0.011
H2 MTC-150 MTC-150 53880 Inverted x4 10000 -0.029
H3 Inverted N/A N/A N/A
H1-H3 Azimuth: 0 °

3
4
View Recording Details Attachments Export Time Series

None
None
XPLFH 180-500
XPLFH 500-1300
External filter ALP02-*

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
5. Time Series Level

- 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

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 12:46:40
Stop Time: Thu Apr 25 00:00:00
Duration: 22 h 58 m 50 s
Latitude: 37.679°N
Longitude: 123.792°E
Altitude: 1119.23 m

Instrument Info
OS Version: v1.27.1
Motherboard Model: BMB01-G
Motherboard Serial: 031008
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

Channels 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	H1	201423	BCM03-B	1001a	0 %	<input type="button" value="View Levels"/>
4				1001a	0 %	<input type="button" value="View Levels"/>

4 Saturated Frames - E2 - EMpower

1 Battery Voltage - EMpower

2 Internal Temperature - EMpower

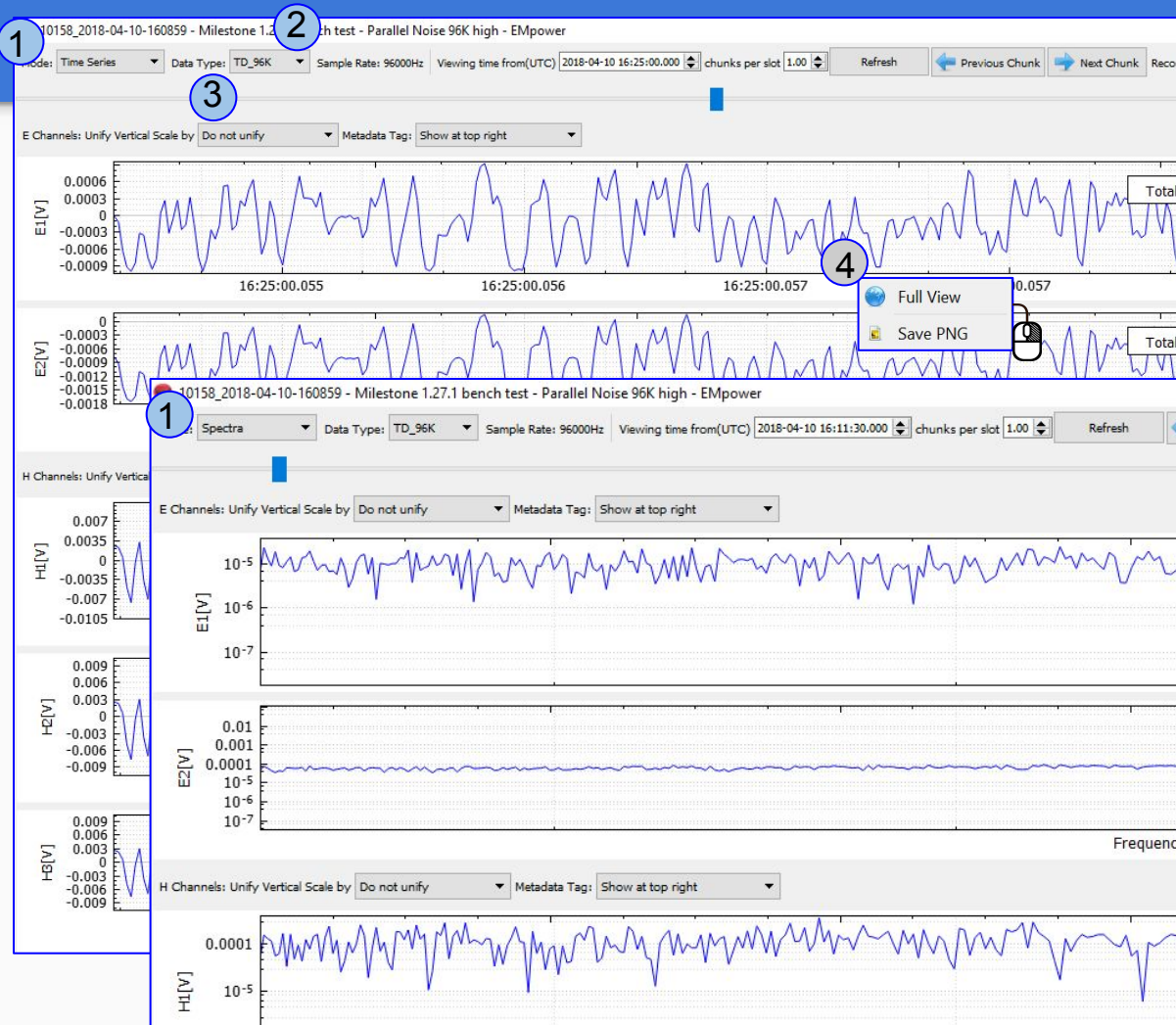
3 Number of Satellites - EMpower

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. The **Unify Vertical Scale by**, allows to visualize by Channel scale
4. **Exporting**
 - Right-click on the plot
 - Save PNG

**This feature applies to the Time Series and Spectra plot*





Processing Data

Processing MT Data	10
Process Site Creation wizard (Electric)	11
Process Site Creation wizard (Magnetic)	12
Process Site Creation wizard (Reference) ...	13
Processing Timeframe / Parameters	14
Robust Template / Processing Queue	15

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

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

File Tools View Window Help

Recording Library Processed MT Data Processed PNT Data

Station name Groups: None Filters: None

Dec 05 2017

MTU-SC - 10116 Rem SC B30 Rem SC Dec01 Rem SC Dec04 Rem SC Dec05 - 2017-12-05 12:56:59 Rem SC Dec06

MTU-SC - 10125 S1 MTU-SC S-5 SC S6 SC S7-1 SC S7-2 SC

MTU-SC - 10127 Continuous Rem MTU-SC 10127 - 2017-11-30 10:37:08

MTU-SC - 10128 S2 SC - 2017-12-06 15:49

Projection: Web Mercator

WorldMap

1000000m

7000000

6000000

5000000

4000000

Northing(m)

Calgary

Remote

Un Stat Am

San José

Los Angeles Phoenix

San Diego Ciudad Juárez

S1 MTU-SC (19 h 22 m 5 s)

Status

Approved Unapproved Rejected

Tools

Time Series Spectra Process (Parallel)

Recording Information

Recording ID: 10125_2017-12-01-001137

Start time: Nov 30 2017 16:11:38 (Local) Pacific Standard Time (GMT -08:00)

Duration: 19 h 22 m 5 s

Survey name: Don Campbell

Station name: S1 MTU-SC

Operator(s): CF GB MU

Company name:

Layout Geometry: Parallel

Declination: 0.00°

Notes:

Electric Channels

Channel	(+) N / E	(-) S / W	Polarity	(+) N / E	(-) S / W	Gain	LPF [Hz]	DC [V]
E1	50.00	50.00	Inverted	759.165	607.465	4 x 1 = x4	10000	0
E2	50.00	50.00	Inverted	546.820	510.804	4 x 1 = x4	10000	0

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	53917	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0
H2	MTC-150	MTC-150	53918	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0
H3	MTC-150	MTC-150	53191	<input checked="" type="checkbox"/>	<input type="checkbox"/> Inverted	x4	10000	0

H1-H3 Azimuth: 0.00 °

View Recording Details Attachments Export Time Series

Verify that there is 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 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' application. At the top, a 'Channel Selection - EMpower' dialog box is open, showing 'Ex' and 'Ey' options with radio buttons for E1 and E2. The main interface features a map of the western United States with a recording location 'S7_2_5C' marked. A 'Select a recording to use for the electric components' dialog is open, showing 'S7_2_5C - 10125 - Dec 04 10:14:38 - Dec 05 08:14:20' and 'E-Channel details' for 'Ex = E1' and 'Ey = E2'. Below this, an 'E-Channel details' dialog shows 'Ex Calibration Serial' and 'Ey Calibration Serial' both set to 0. A 'Navigation Bar' at the bottom right shows 'Electric Components: S7_2_5C - 10125 - Dec 04 10:14:38 - Dec 05 08:14:20' and other site details. A 'Next' button is visible at the bottom right. Callouts 1-4 point to the recording selection, the 'Select Manually' button, the 'P' icon in the navigation bar, and the 'Next' button respectively. A legend at the bottom right explains the 'P' icon and the warning icons.

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

- The recording is good to process
- 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**
 - Select a valid recording/magnetic sensors from the Map / Timeline or using the Drop-down and click **Next**
3. Use **Select Manually / Edit**
4. Click **Next**



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

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

Top Panel (Same Recording): The map shows a recording 'Rem SC Dec01' with a yellow dot. A blue circle '1' is next to it. The configuration window has 'Use magnetic channels from the same recording as electric channels' selected. A blue circle '2' is next to the 'Channels' list. A 'Select Manually' button is highlighted with a blue dashed box. Below the configuration window, a 'Magnetic Selection - EMpower' dialog is shown with 'Use HI-H3 band azimuth: 0°' selected. A blue dashed box highlights the 'Electric Components' and 'Magnetic Components' sections.

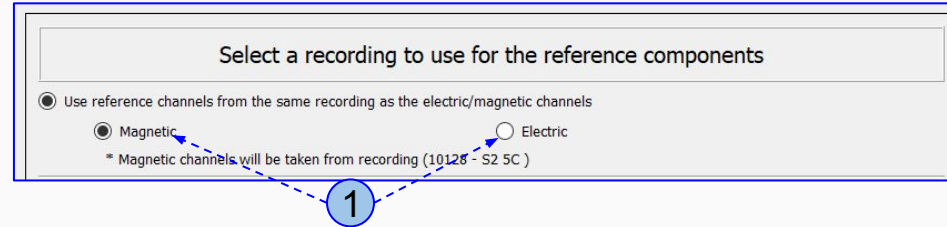
Bottom Panel (Different Recording): The map shows a recording 'Rem SC Dec01' with a green dot and a yellow dot. A blue circle '3' is next to the green dot. A blue arrow points from the green dot to the yellow dot. The configuration window has 'Use magnetic channels from a different recording' selected. A blue circle '4' is next to the 'Channels' list. A 'Select Manually' button is highlighted with a blue dashed box. Below the configuration window, a 'Magnetic Selection - EMpower' dialog is shown with 'Use HI-H3 band azimuth: 0°' selected. A blue dashed box highlights the 'Electric Components' and 'Magnetic Components' sections.

Process Site Creation wizard

Reference Channels

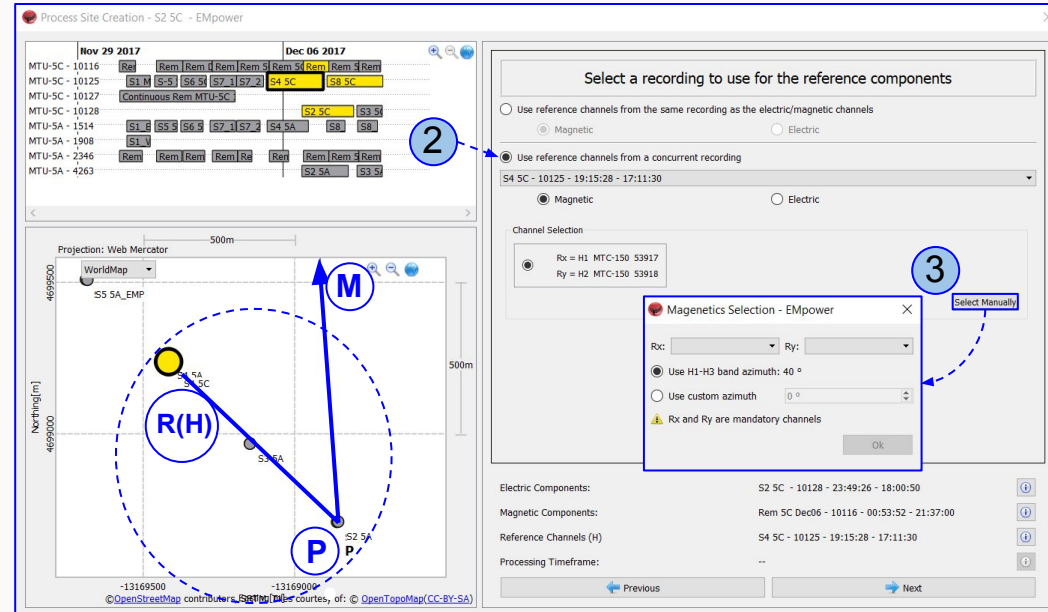
Same recording

1. 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

2. 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
3. Use **Select Manually** as needed
 - Click **Next**



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

UTC Site time zone: America/Los_Angeles (UTC-08:00)

Start: 2017-12-04 11:07:26 End: 2017-12-05 08:14:17

Sunrise: 06:55 Sunset: 16:31

Duration: 21 h 6 m 51 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

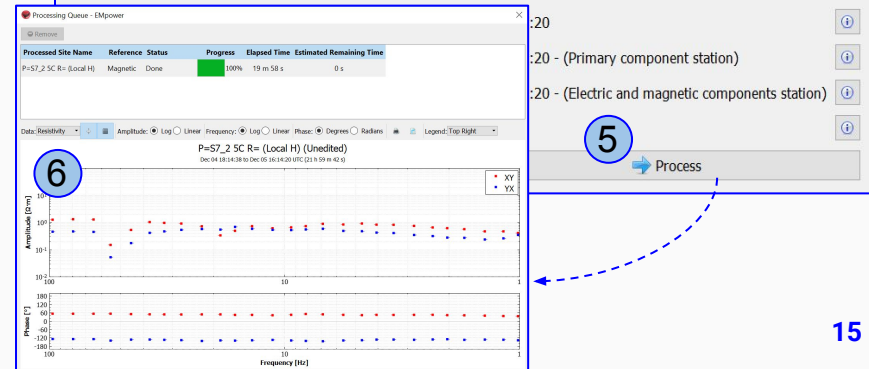
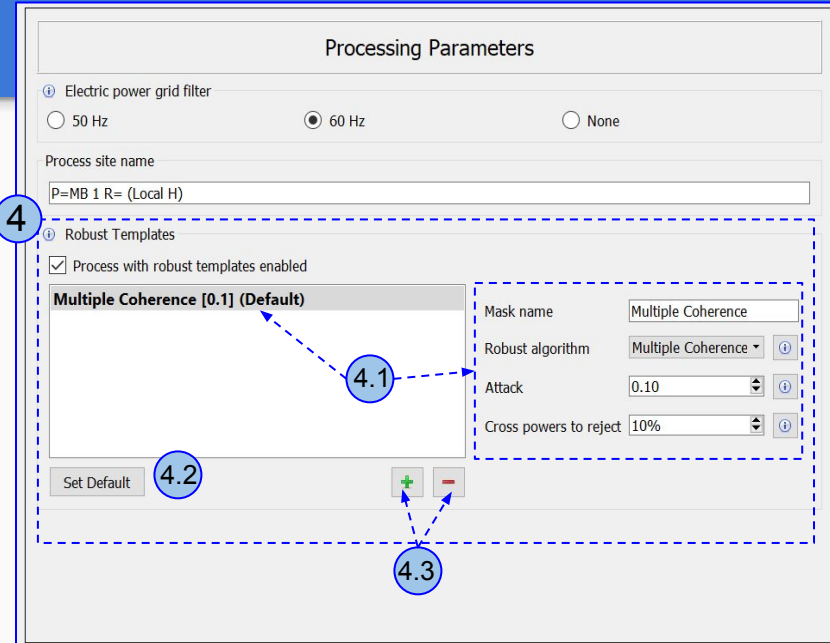
4. Enable Robust Templates by checking **Process with robust templates enabled**

- 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



Processed Site Name	Reference	Status	Progress	Elapsed Time	Estimated Remaining Time
P=57_2 SC R= (Local H)	Magnetic	Done	100%	19 m 58 s	0 s

 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)	17
Groups (Timeline)	18
Groups (Map)	19
Filter	20

Toolbar (Sites list)

Recording Library

Station name

Groups: None

Filters: None

Recording Library

Processed MT Data

Select All

Site name

Groups: None

Add Del Edit

Filters: None

Recording Library

Processed MT Data

Export Selected

1. **Select All** the Sites
2. Quick search by **Site name**
3. **Groups** (Slide 18-19)
4. **Filters** (Slide 20)
5. **Export Selected**, export the site(s) selected in the Workbench list to EDI/PLT or to an archive compressed file

Station group editor - EMpower

Group name:

Available Stations:

- 10116_2017-11-30-1813
- 10116_2017-12-02-0032
- 10116_2017-12-04-1907
- 10116_2017-12-05-2056
- 10116_2017-12-07-0053
- 10116_2017-12-07-2142
- 10116_2017-12-08-2216

Stations in Group:

OK Cancel

Advanced Filter Options - EMpower

Filter name*

Filter criteria

- Status Approved Unapproved Rejected
- Receiver Serial
- Receiver Type
- Survey Name
- Station Name
- Company Name
- Operator
- Sensor Type
- Sensor Serial
- Layout Geometry
- Start Time [UTC] 2020-07-14 00:00:00
- Stop Time [UTC] 2020-07-14 00:00:00
- Duration 0 hours

* Mandatory field

Save Cancel

Process Site Exporter - EMpower

Data format: EDI PLT Archived file

INFO layout:

File By:

Save Cancel

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

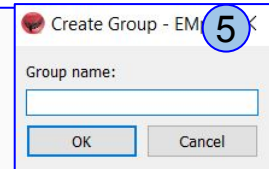
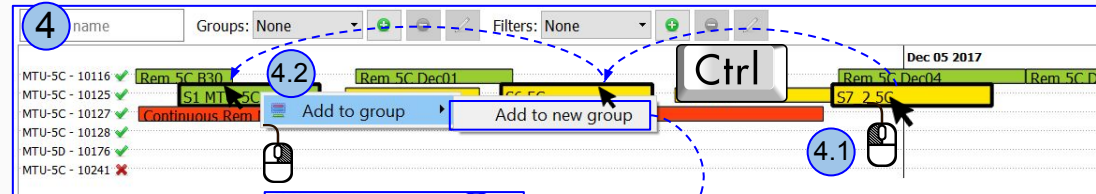
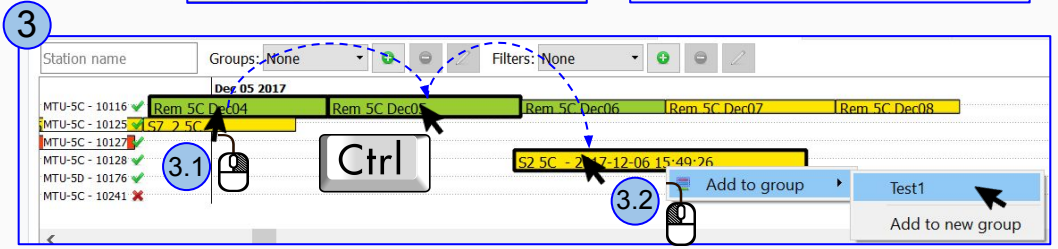
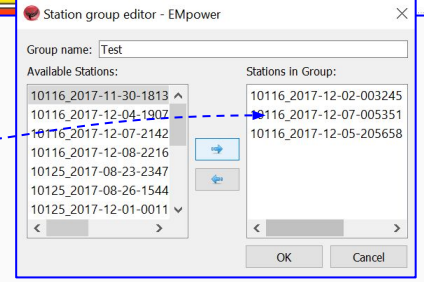
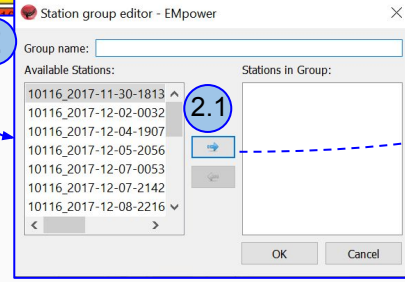
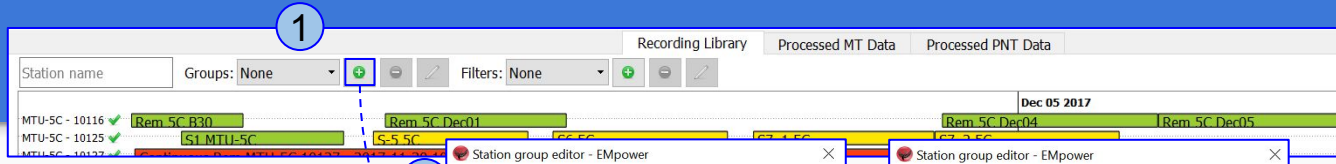
OR

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**

1 **Line Selection**

2 **Rubberband**

3 **Map**

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

Create Group - EMP... X


Group name:

OK Cancel

19

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 *

Filter criteria

Site status Approved Unapproved Rejected

Reference type Electric Magnetic

Reference location Remote Local

Tipper available Yes No

Process duration

Process start

Process end

Date processed start

Date processed end

* Mandatory field

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	22
Processed Site Selection	23
Site Info - Coherence	24

Visualizing Processed Data

1. Select the **Processed Site** from the Workbench list or Map
2. The **Plot** shows the Amplitude and Phase of the selected Processed Site
 - Use the **Plot toolbar** to access additional plot features
 - Add Processed Site(s) by selecting the site in the Workbench list
3. **Edit** the Processed Site (Name, Status and Notes)
4. The **Edit Cross Powers** feature removes outlying cross powers from the calculation of resistivity, phase, and other geophysical parameters (see pages 19-21)
5. Site Info (see page 21)
6. Coherence (see page 21)

The screenshot displays the software interface for visualizing processed data. It includes a site list, a map, and two plots. Numbered callouts 1-6 indicate key features:

- 1:** A site is selected on the map.
- 2:** The plot toolbar is shown, highlighting the 'Full View' and 'Save PNG' options.
- 3:** The site list is shown, highlighting the selected site.
- 4:** The 'Edit Cross Powers' button is highlighted.
- 5:** The 'Site Info' button is highlighted.
- 6:** The 'Coherence' button is highlighted.

The site list shows the following data:

Site / Workbench Name	Reference / Status	Filter / Geophysical Param
P=S7_2 5C R=Rem 5C Dec04 (H) - (Workbench 1)	Magnetic 60Hz	Resistivity
Workbench 1	Unapproved	Resistivity
Unedited	Approved	Resistivity/Impedance
P=S7_2 5A R=Rem 5A Dec04 (H) - (Unedited)	Magnetic 60Hz	Resistivity/Impedance
Unedited	Approved	Resistivity/Impedance
P=S7_1 5C R=Rem 5C Dec04 (H) - (Unedited)	Magnetic 60Hz	Resistivity/Impedance
Unedited	Unapproved	Resistivity/Impedance

The plots show Amplitude [Ω m] and Phase [°] versus Frequency [Hz]. The top plot shows Amplitude [Ω m] on a log scale from 10⁰ to 10² versus Frequency [Hz] on a log scale from 100,000 to 0.001. The bottom plot shows Phase [°] on a linear scale from -180 to 180 versus Frequency [Hz] on a log scale from 100,000 to 0.001. The legend indicates two data series: P=S7_2 5C R=Rem 5C Dec04 (H): Workbench 1 (red) and P=S7_2 5A R=Rem 5A Dec04 (H): Unedited (blue).

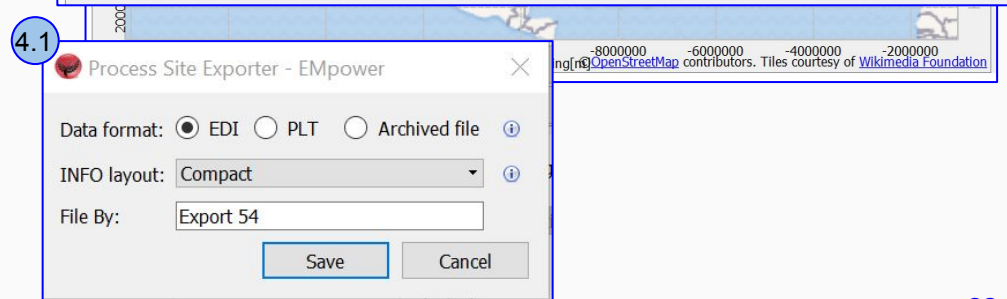
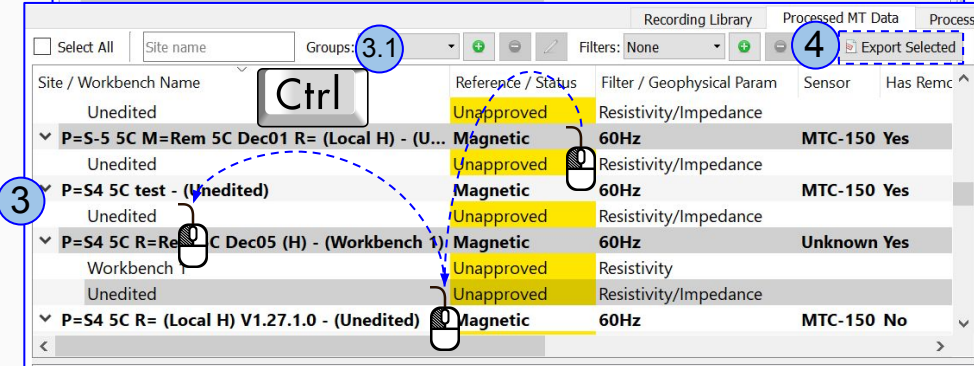
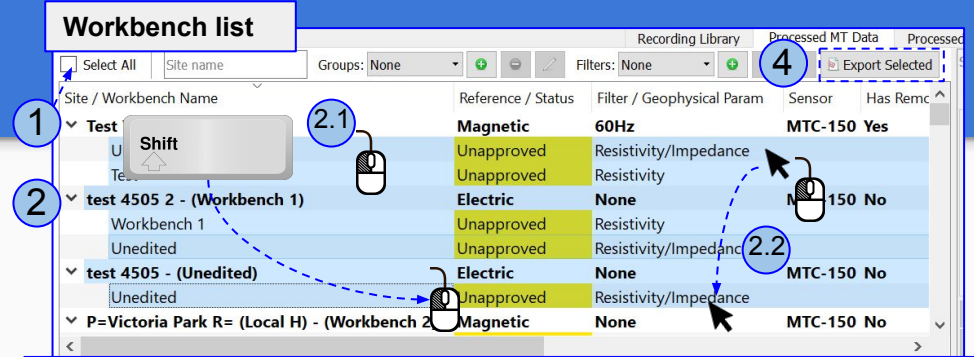
Process Site Selection

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

Export:

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



Site Info - Coherence

1. General Processing Metadata information
2. Channels details
 - Electrics
 - Magnetics
 - Remote Reference (E)
3. Recording Information
4. Coherence

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

1 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

Electrics Magnetics Remote Reference (E)

	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	0 Ω	0 Ω	0 m
Ey	Not Available	No	0 x 0 = x0	Not Available	Not Available	0	0	0 Ω	0 Ω	0 m

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

2

3

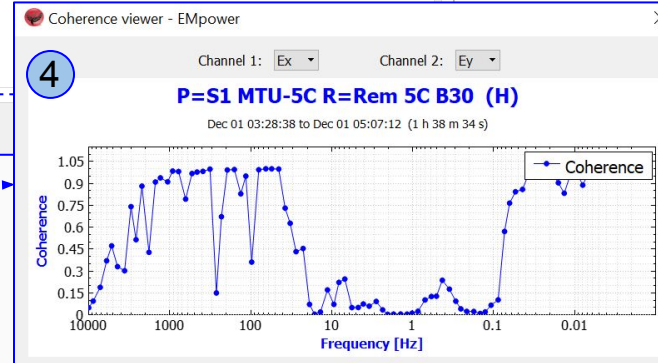
Site: P=S1 MTU-5C R=Rem 5C B30 (H)

Approved Unapproved Rejected

Notes:

Edit Cross Powers Coherence

Site Info Delete






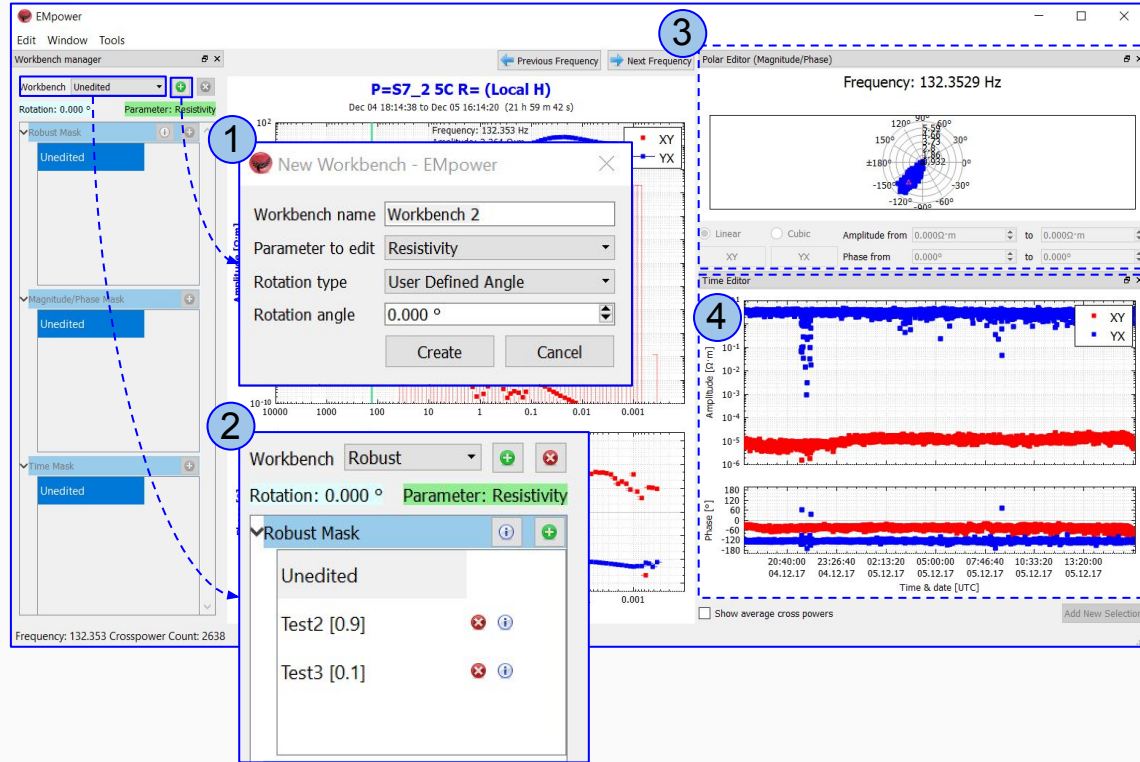
Processed data editing Crosspower Editor

Editing Cross Powers	26
Robust Mask	27
Project Settings - Robust Templates	28
Polar Editor	29
Time Editor	30

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)



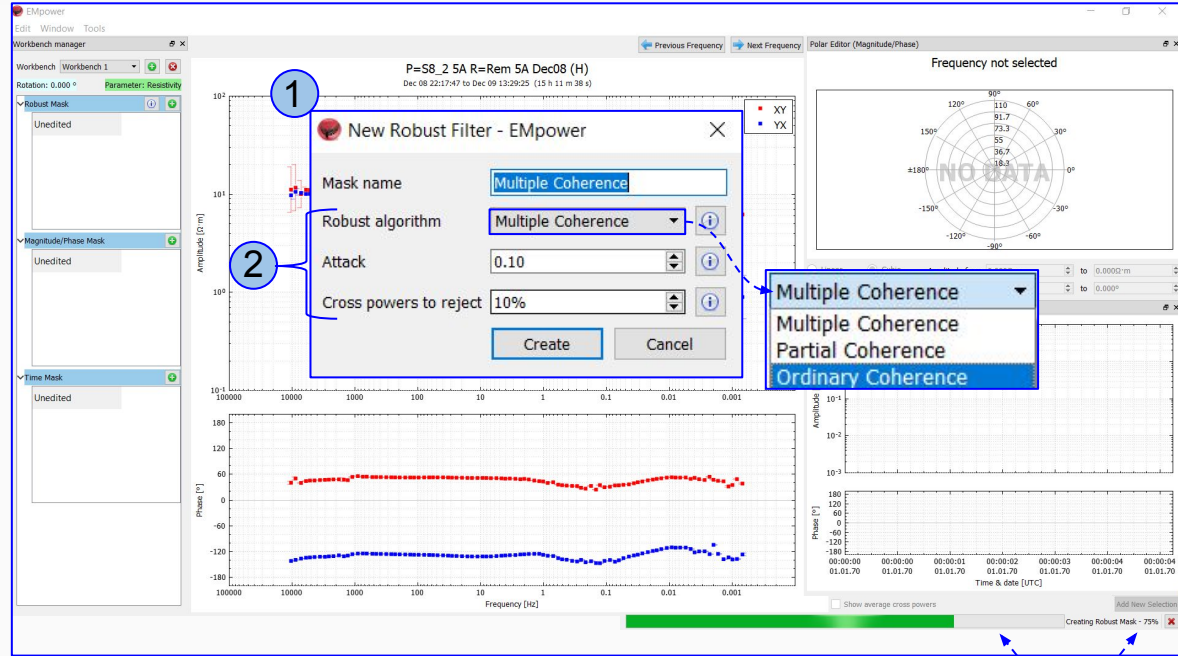
The screenshot displays the EMpower software interface. The main window shows a plot of Amplitude [G/m] versus Frequency [Hz] for a site labeled 'P=S7_2 5C R= (Local H)'. The plot shows data for XY and YX components. A 'New Workbench - EMpower' dialog box is open, allowing the user to create a new workbench. The dialog fields are: Workbench name: 'Workbench 2', Parameter to edit: 'Resistivity', Rotation type: 'User Defined Angle', and Rotation angle: '0.000 °'. The 'Create' button is highlighted. In the background, the 'Workbench manager' window shows a list of workbenches: 'Unedited', 'Robust Mask', 'Magnitude/Phase Mask', and 'Time Mask'. The 'Robust Mask' is selected, and its configuration is shown in a separate window, including a list of masks: 'Unedited', 'Test2 [0.9]', and 'Test3 [0.1]'. The 'Polar Editor (Magnitude/Phase)' window shows a polar plot of the data at a frequency of 132.3529 Hz. The 'Time Editor' window shows a plot of Amplitude [G/m] versus Time & date [UTC].

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

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

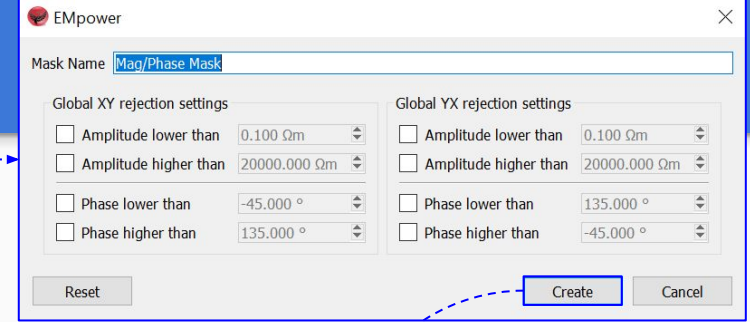
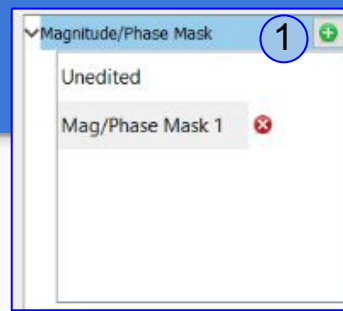
1. Select **Project Settings** from Setting menu
2. Define the parameters for the **Robust Mask Template** - *This template only applies to the current project*
3. Add, Modify or Delete a Robust Mask
4. **Set Default**
 - The "default" in settings will be the robust mask selected after processing for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

The screenshot shows the 'Project Settings - EMpower' dialog box. The 'Settings' menu is highlighted in the top menu bar, and 'Project Settings' is selected. The 'Robust Queue Template Manager' section contains a table with the following data:

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

Below the table are buttons for 'Set Default', '+', and '-'. The 'Save' and 'Cancel' buttons are at the bottom right. A callout box provides a description of the 'Multiple Coherence' algorithm:

Program uses coherences between electric channel and multiple magnetic channels to decide the quality of the result for robust rejection.



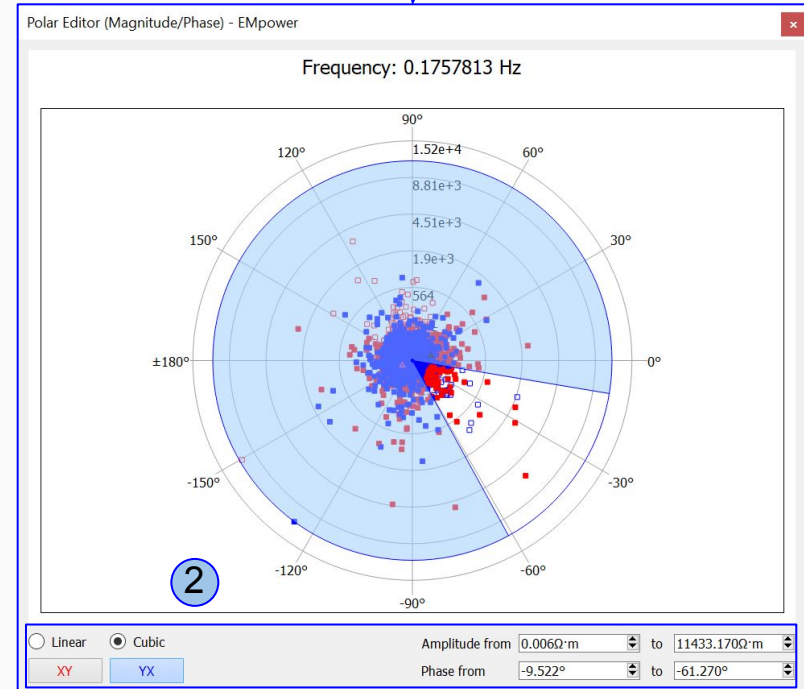
1. Create a New Magnitude/ Phase Editor Polar Masks

- 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

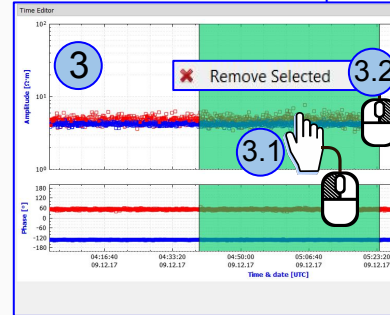
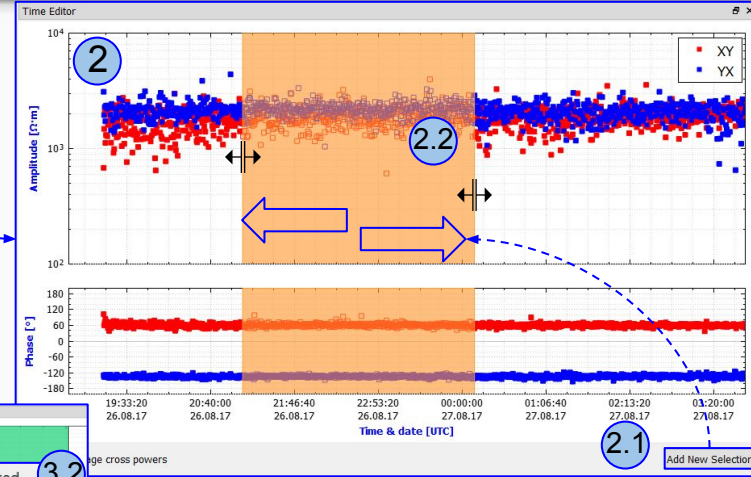
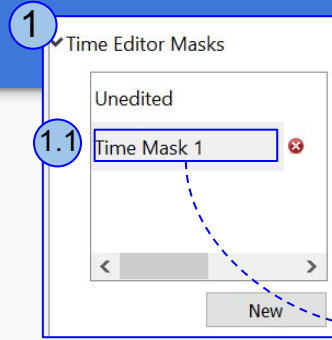
2.2. Left-click and hold, and start dragging to the left or right to select the area of crosspower rejection

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](#)*



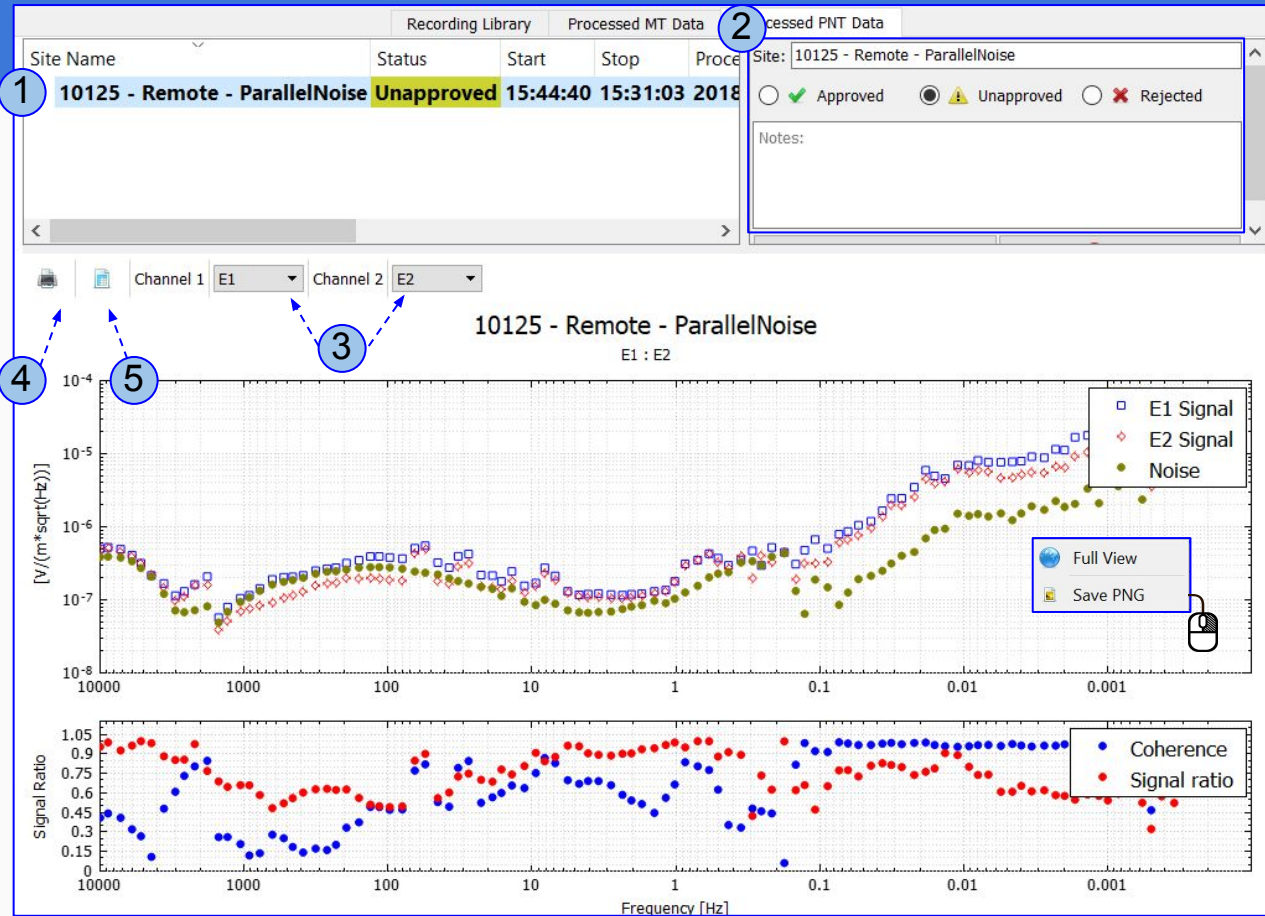
Processed PNT Data

Processed PNT Data	32
Multi-Site PNT	33

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. **Print** tool
5. CSV (excel) **Export** tool



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

The screenshot shows the 'Multi Site PNT Setup - EMpower' application. At the top, a menu bar includes File, Tools, View, Window, and Help. The 'Tools' menu is open, showing 'Multi-Site PNT' (Ctrl+T) highlighted. Below the menu, a grid of recordings is displayed with columns for dates from Nov 07 2018 to Dec 01 2018. A recording '10181 - E59-066U - 10181_2018-11-11-074327' is selected. A dialog box titled 'Selected Channels' is open, showing a list of channels with checkboxes: E1 - [100 m], E2 - [100 m], H1 - (MTC-150 - 54269), H2 - (MTC-150 - 54305), and H3 - (MTC-150 - 54308). Another dialog box for a different recording '10175 - E59-067U - 10175_2018-11-11-081029' shows selected channels: E1 - [100 m], E2 - [100 m], H1 - (MTC-150 - 54216), H2 - (MTC-150 - 54215), and H3 - (MTC-150 - 54214). A 'Selected Channels (Maximum of 7)' list is also visible, containing entries for both recordings. A checkbox labeled 'Apply calibration to magnetic channels' is checked. The 'Next' button is highlighted. A third dialog box shows the 'Name' field set to 'Multi Site PNT(test2)', 'Processing Timeframe' section with 'Time zone' set to 'Site time zone: America/Los_Angeles (UTC-08:00)', 'Start' time '2017-11-30 16:11:38', 'End' time '2017-12-01 11:33:43', 'Sunrise: 06:51', 'Sunset: 16:32', and 'Duration: 19 h 22 m 5 s'. At the bottom, 'Previous' and 'Process' buttons are visible.



Reports

EDI Merger <Create>	35
EDI Merger <Edit and Save>	36
Multi-Rec Edit	37
Recordings Report	38

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

Tools View Window Help

Calibration Viewer	Ctrl+M
EDI Merger	Ctrl+G
Multi-Site PNT	Ctrl+T

EDI Merger - EMpower

Select an EDI to be used for the upper frequencies - EMpower

Look in: C:\Users\PCASTRO\Desktop

Name	Size	Type	Date
Desktop			
Documents			
PCASTRO			
FIELD TESTS (G:)			
P_MB_4_R_Remote_H_Workbench_1.edi	7..B e...e	26/03	
P_Remote_R_Local_E_Workbench_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

- Resistivity
- Impedance
- Tipper

Amplitude [Ω·m]

Phase [°]

Frequency [Hz]

Merged Result

Browse for EDI

Browse for EDI

Browse for EDI

Resistivity

Remove Frequency

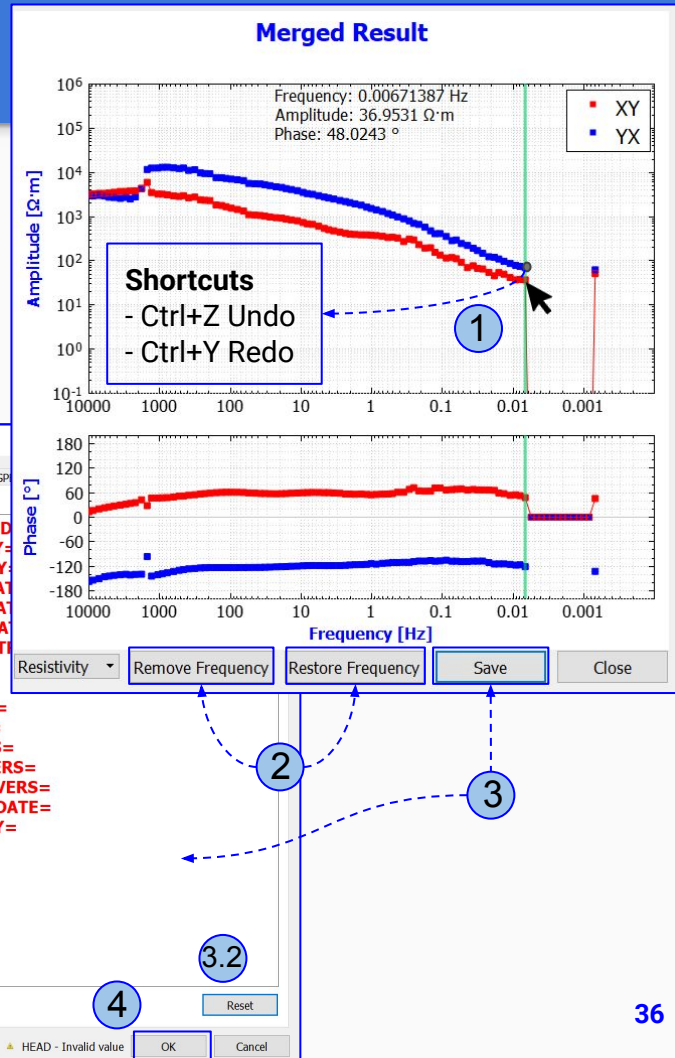
Restore Frequency

Save

Close

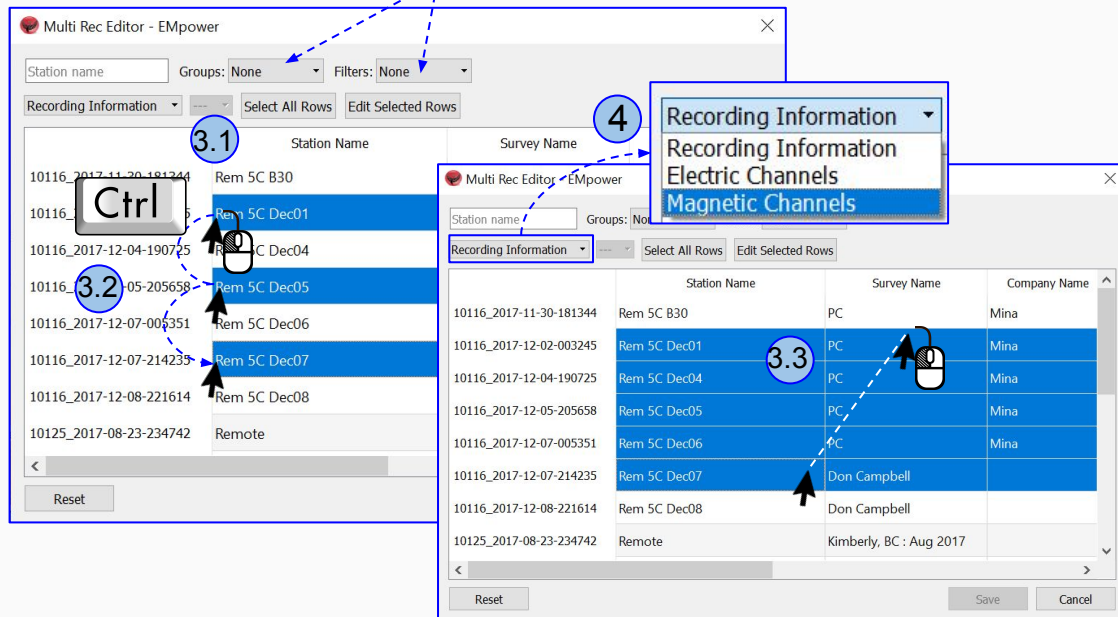
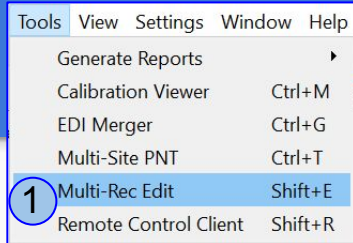
EDI Merger <Edit and Save>

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
----	----	---	---

Recordings Report

1. Select **Recordings Report** from Generate Reports Tools menu
2. The recording(s) not exported before will be checked by default
 - 2.1. Modify **Groups/Filters** as needed
 - 2.2. Check the desired recording(s) or use **Check all** the recordings to export
3. Click **Generate CSV** button
4. Open the **CSV file** (*Use separated by Comma*)

The screenshot shows the software interface for generating a recordings report. The 'Tools' menu is open, and 'Recordings Report' is selected. The 'Select Recordings For The Report - EMpower' dialog box is open, showing a table of recordings. The 'Check all' checkbox is checked. The 'Generate CSV' button is highlighted.

Recording ID	Station Name	Last Exported
<input checked="" type="checkbox"/> 10125_2017-08-23-234742	Remote	---
<input checked="" type="checkbox"/> 10125_2017-08-24-153141	Remote	---
<input checked="" type="checkbox"/> 10125_2017-08-25-155433	Remote	---
<input type="checkbox"/> 10116_2017-11-30-181344	Rem 5C B30	Jul 27 2020
<input checked="" type="checkbox"/> 10116_2017-12-02-003245	Rem 5C Dec01	Jul 27 2020
<input type="checkbox"/> 10116_2017-12-04-190725	Rem 5C Dec04	Jul 27 2020
<input type="checkbox"/> 10116_2017-12-05-205658	Rem 5C Dec05	Jul 27 2020

	A	B	C	D	E	F	G
1	Station Name	Start Time	Instrument ID	H1 serial	H2 serial	H3 serial	H4 serial
2	Site 2	Wed May 06 2015 16:23:06 UTC	10043	53918	53920	53925	N/A
3	Site 2	Wed May 06 2015 18:55:36 UTC	10043	53918	53920	53925	N/A
4	Site 2	Wed May 06 2015 21:24:38 UTC	10043	53919	53921	53926	N/A
5	Site 3	Thu May 07 2015 16:32:04 UTC	10043	53918	53920	53925	N/A
6	Site 3	Thu May 07 2015 19:10:23 UTC	10043	53918	53920	53925	N/A
7	Site 1	Wed May 06 2015 18:27:07 UTC	10049	53918	53920	53925	0
8	Site 1	Wed May 06 2015 20:12:06 UTC	10049	53919	53921	53926	0
9	Site 1	Wed May 06 2015 21:41:34 UTC	10049	53918	53920	53925	0
10	Site 3	Thu May 07 2015 16:19:48 UTC	10049	53919	53921	53926	0
11	Site 3	Thu May 07 2015 19:20:23 UTC	10049	53918	53920	53925	0