EMpower
Data Management

PHOENIX
GEOPHYSICS

Recording Library

Creating / Opening a Project

1. Start **EMpower**
2. Click **Manage**
3. **Open or Create a New Project**

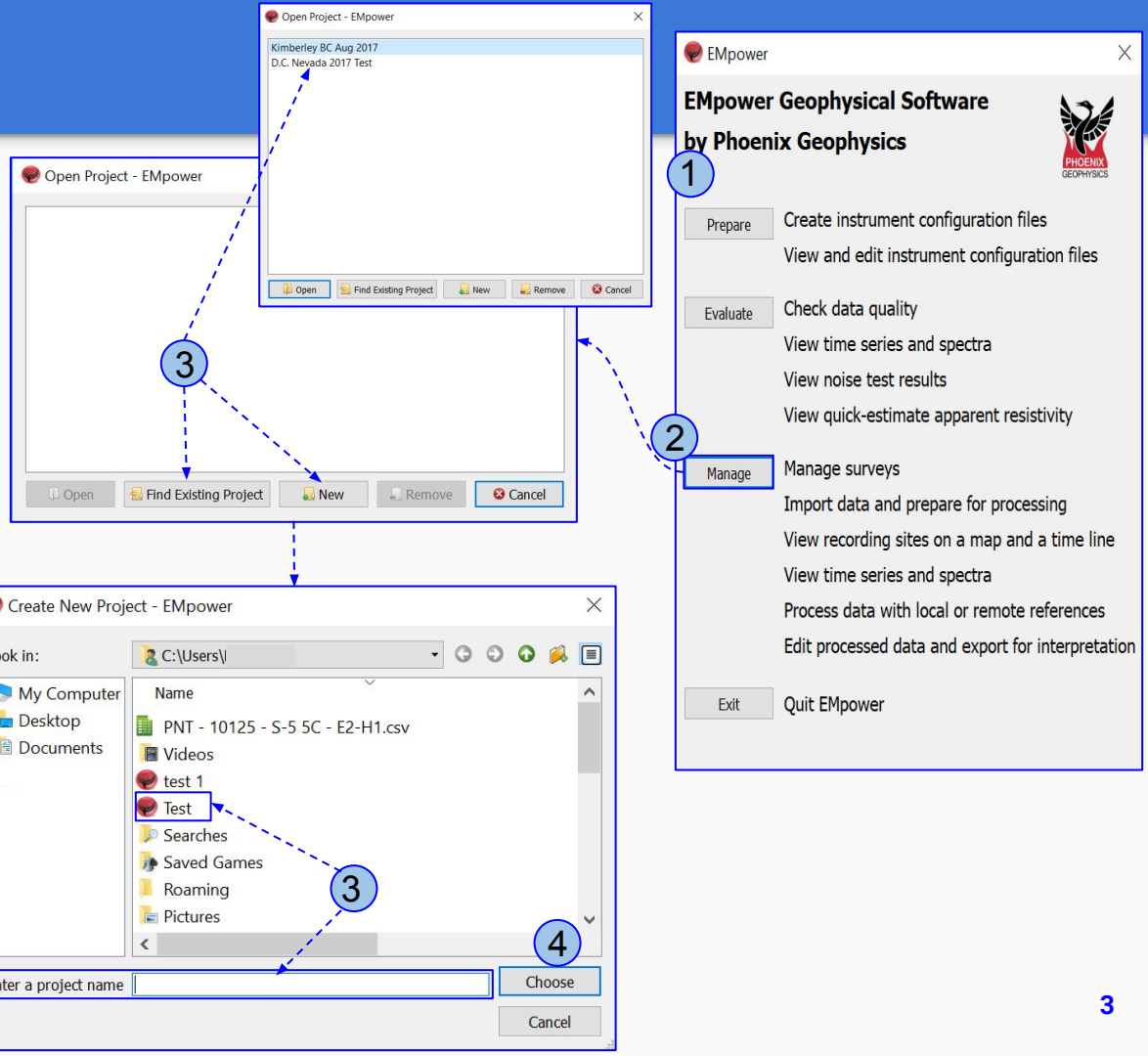
To Open an Existing Project

- 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**



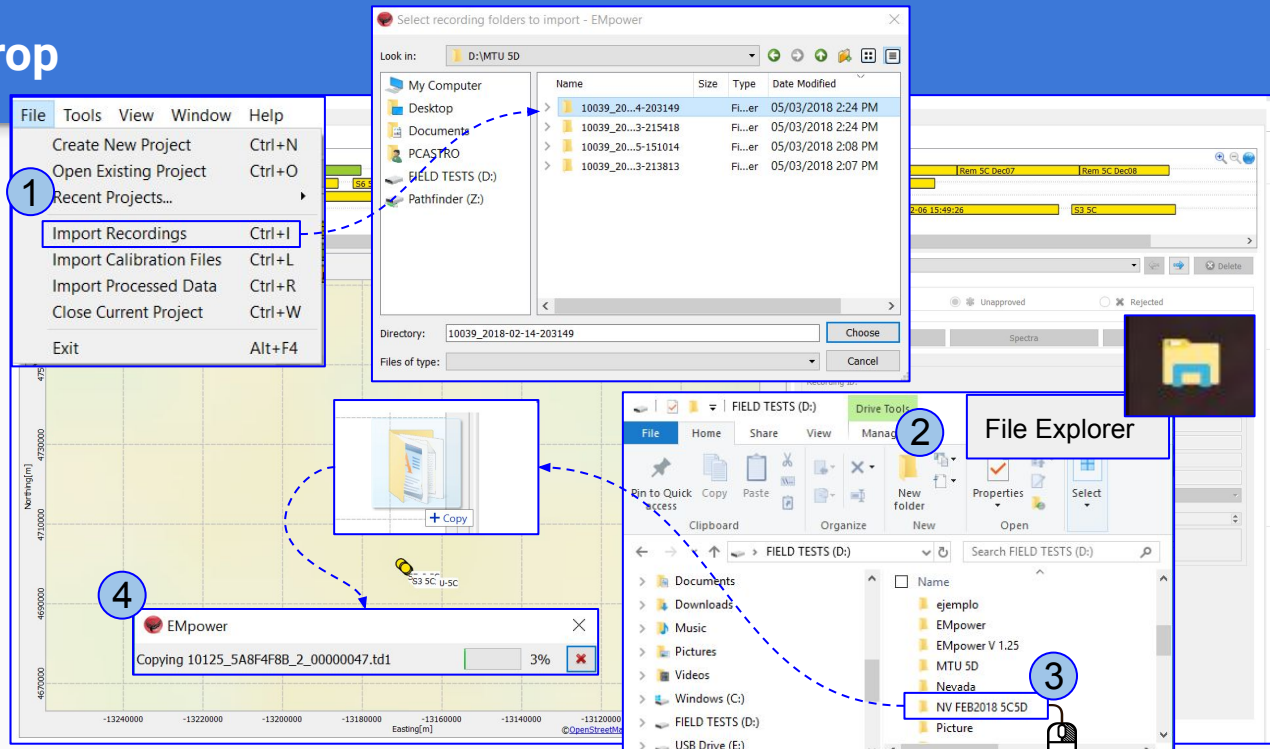
Importing Data / Drag and Drop

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



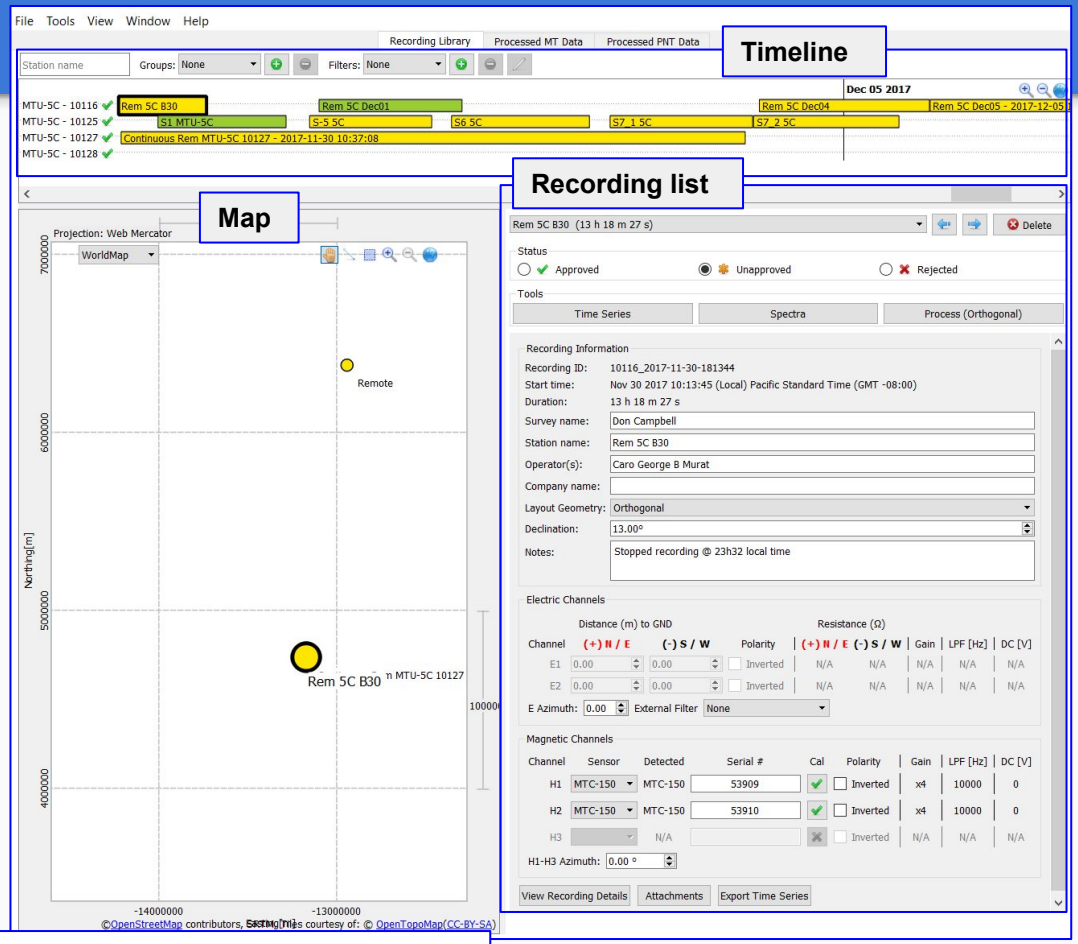
To add a recording from the **SD Card**

- 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

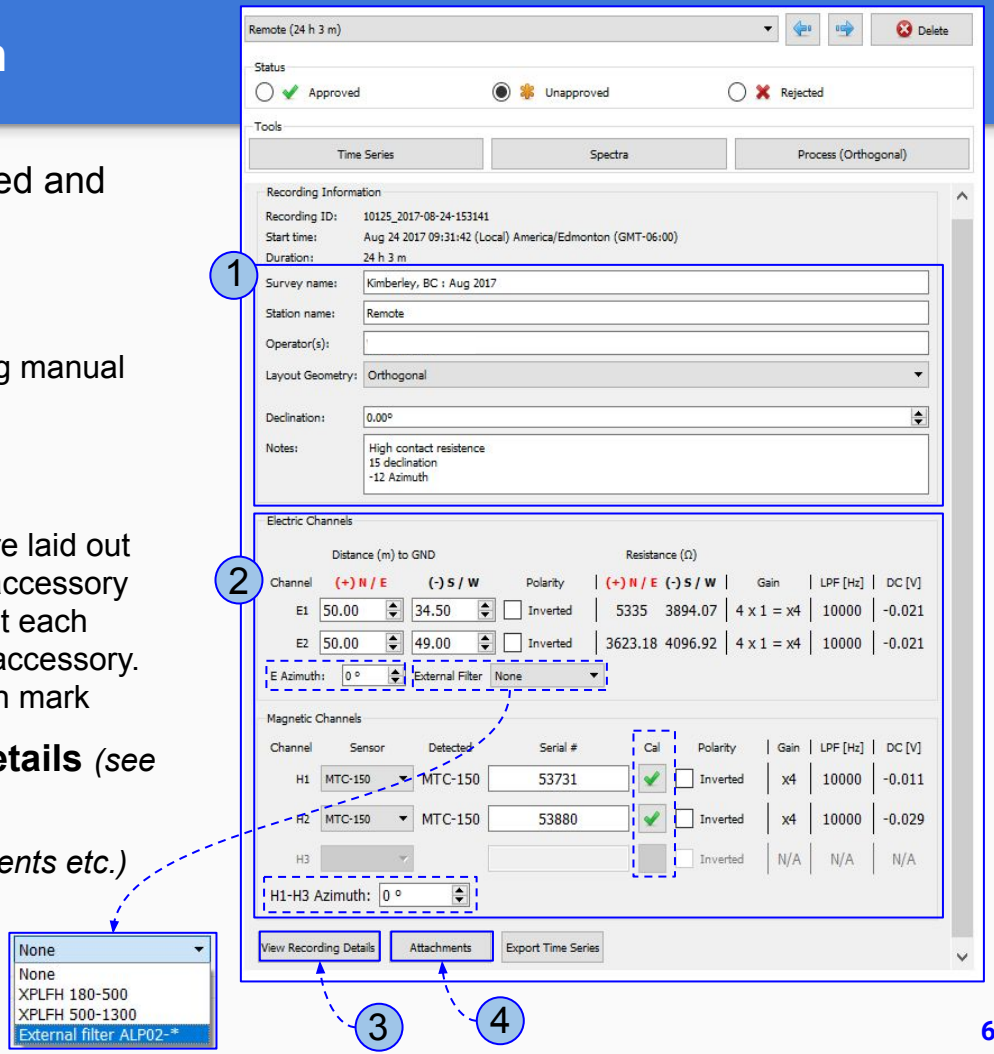


Selecting a recording in any of the views will automatically update the recording information in the other views

Verifying/Editing Recording Information

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

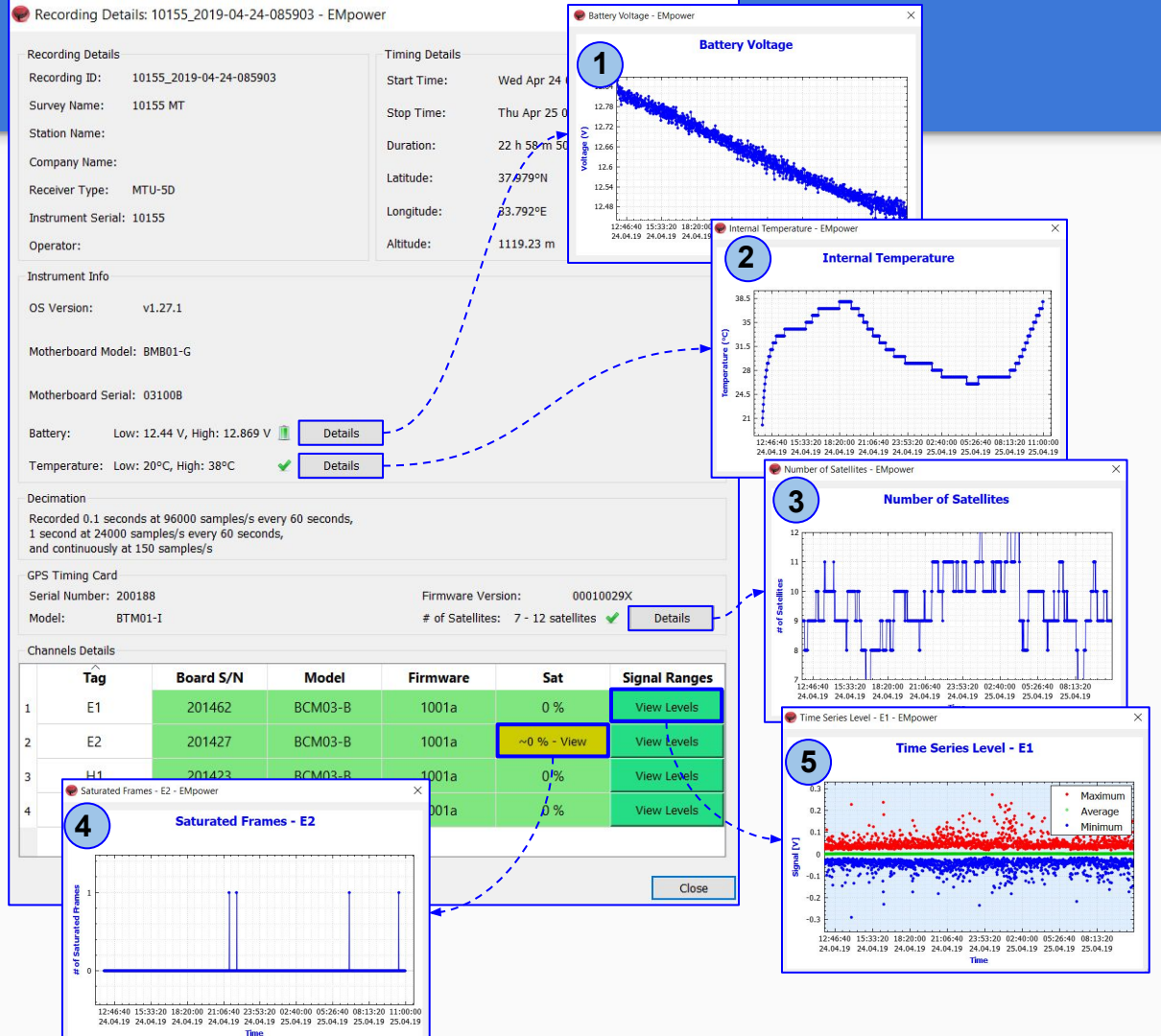
1. Review the Recording Information
   - Edit the enabled fields, if required
   - ⚠ If a warning is found, consult the troubleshooting manual
2. Review the following information:
   - Declination
   - Dipole length
   - The **Azimuth** at which the E and H sensors were laid out
   - Use the External 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 **Cal**ibration 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



View Recording Details

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

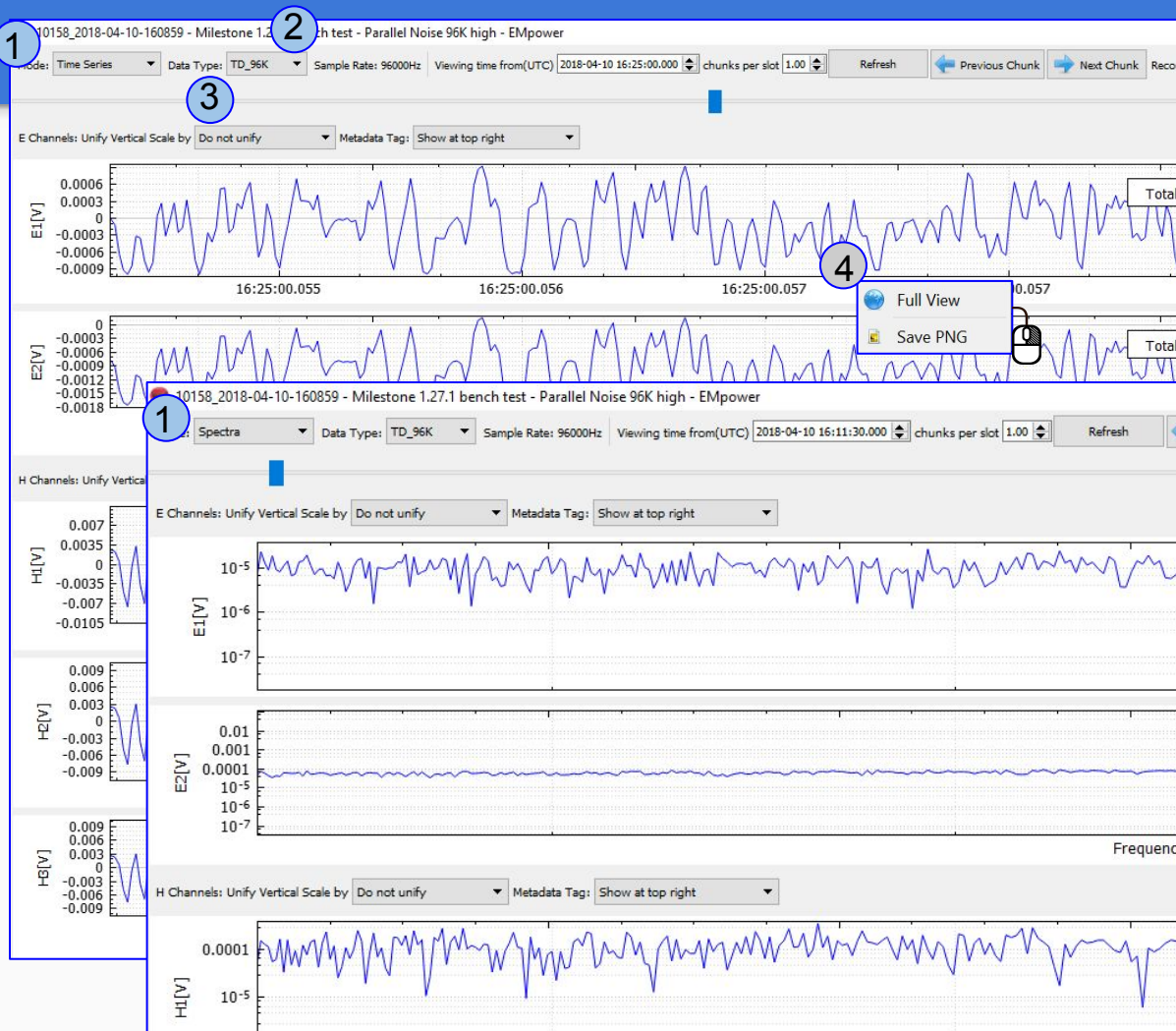
1. **Battery Voltage**
2. **Internal Temperature**
3. **Number of Satellites**
4. **Saturated Frames**
   - If saturation is not close to ~0%, review the channel configuration *(see page 5)*, the gain might be too high and/or there is artificial noise on your site
5. **Time Series Level**



Recording Details 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*



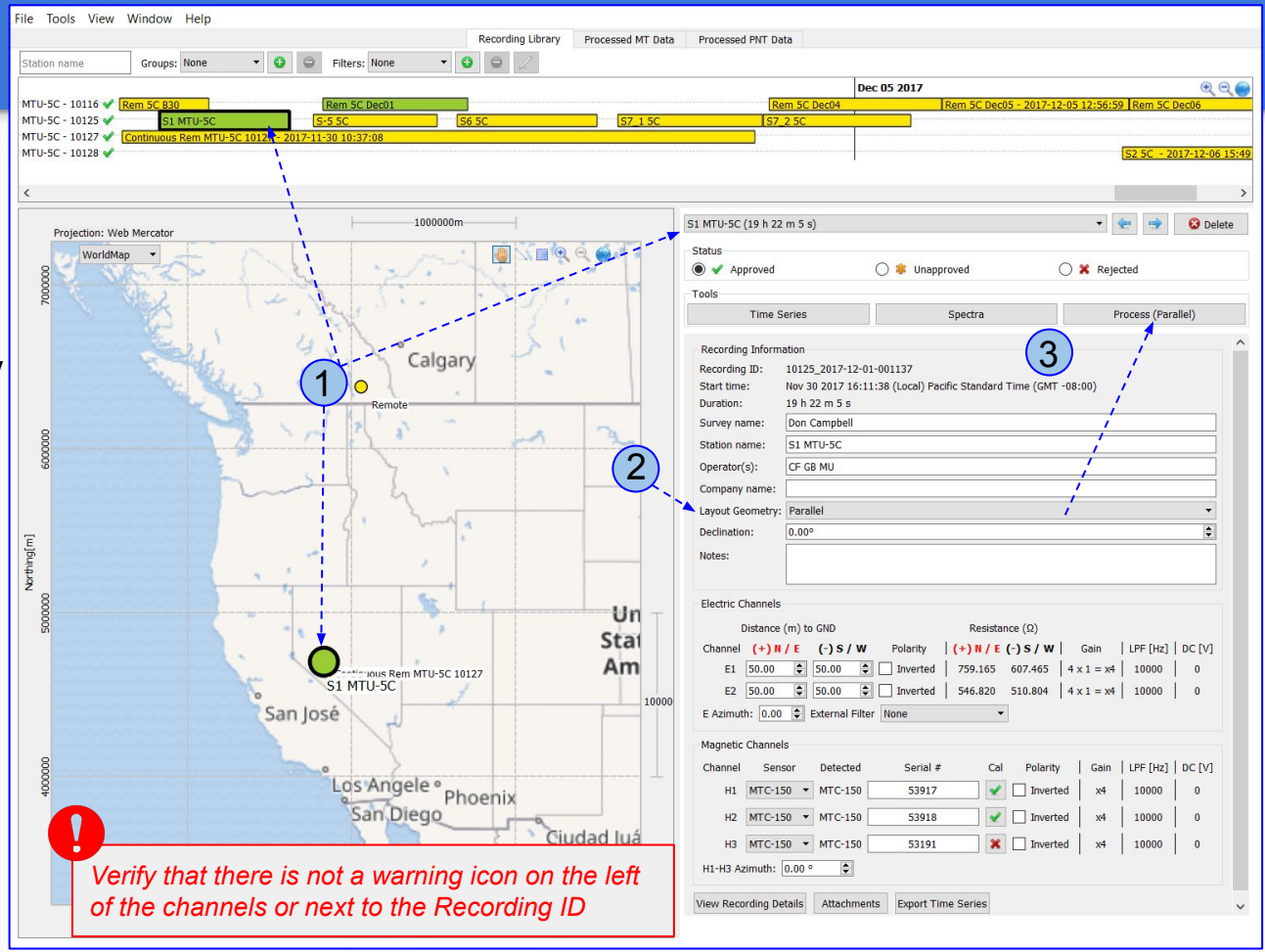
Processing Data

Processing MT Data

From the Recording Library tab:

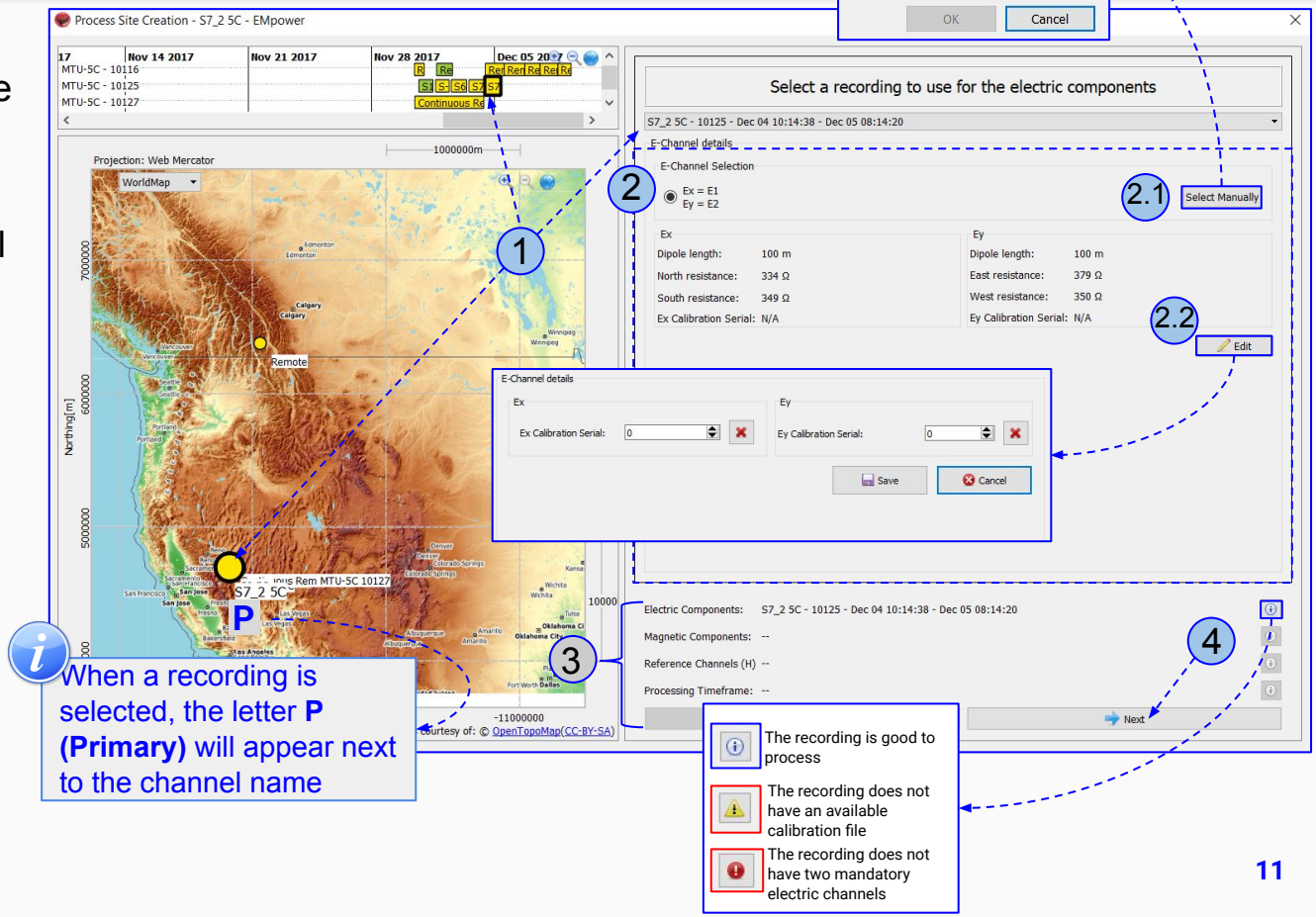
1. Choose a **recording** to process
2. Review the **Layout Geometry**
3. **Run the Process Site Creation Wizard, selecting:**
   - Electric Components
   - Magnetic Components
   - Reference Channels
   - Processing Timeframe
   - Processing Parameters

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



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



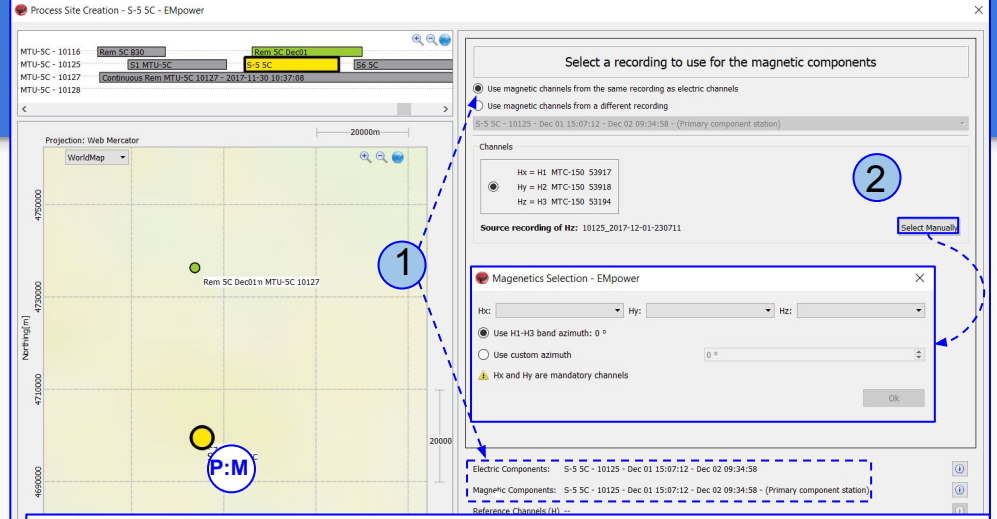
Process Site Creation wizard
Magnetic Channels

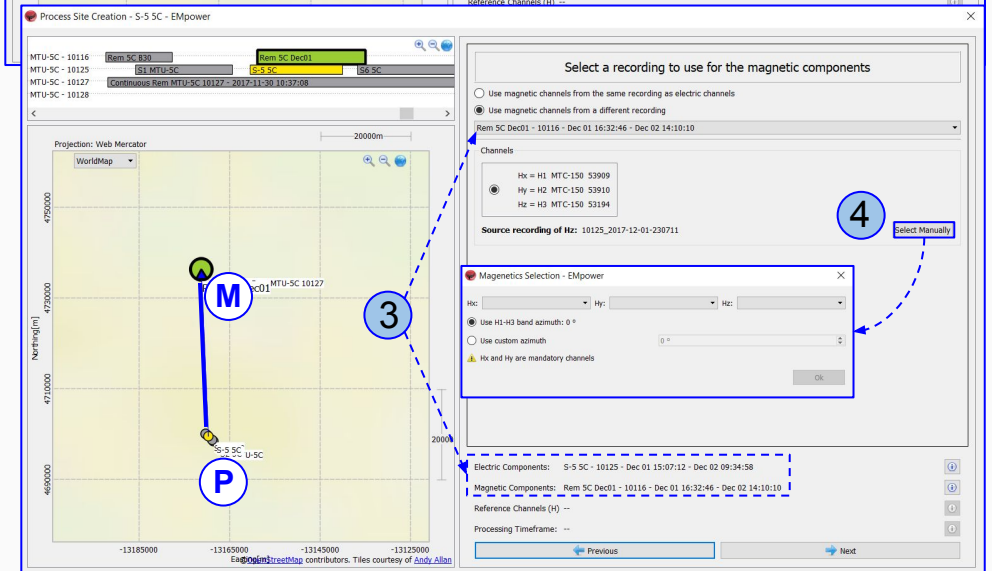
If the desired magnetic channels are in the same recording

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**



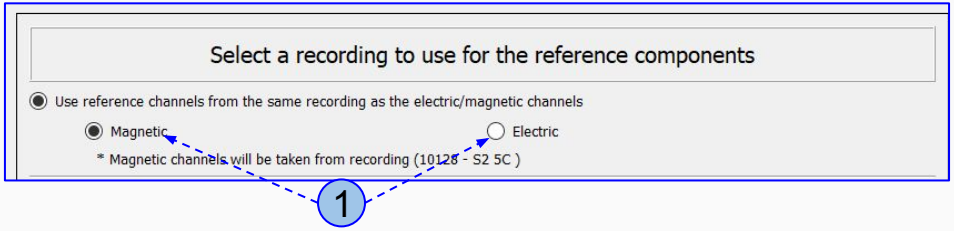


When a magnetic channel is selected from a different recording, an arrow will be pointing to that recording on the map and the letter **M (Magnetic)** will appear next to that recording

Process Site Creation wizard
Reference Channels

Same recording

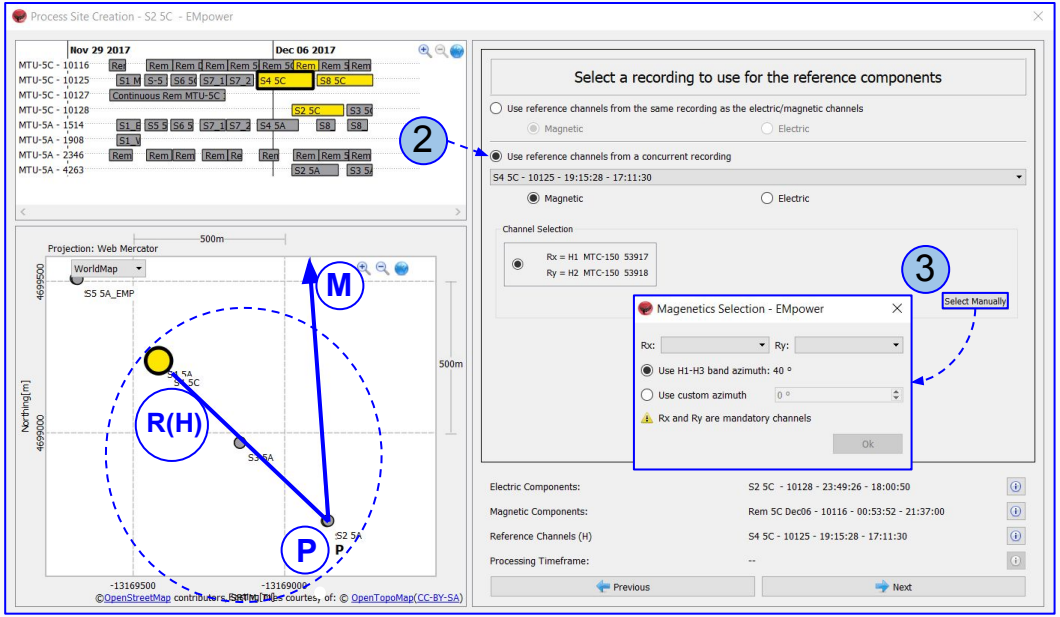
1. To use reference channels from the same recording as the electric/magnetic channels
   - Select either the Magnetic Channels or Electric Channels
   - Click **Next**



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

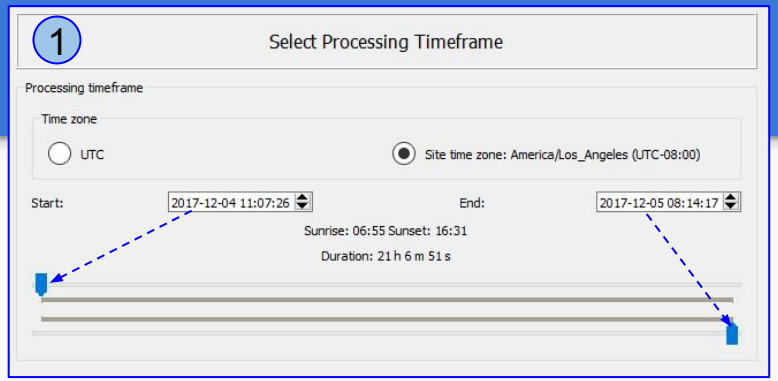
3. Use **Select Manually** as needed
   - Click **Next**

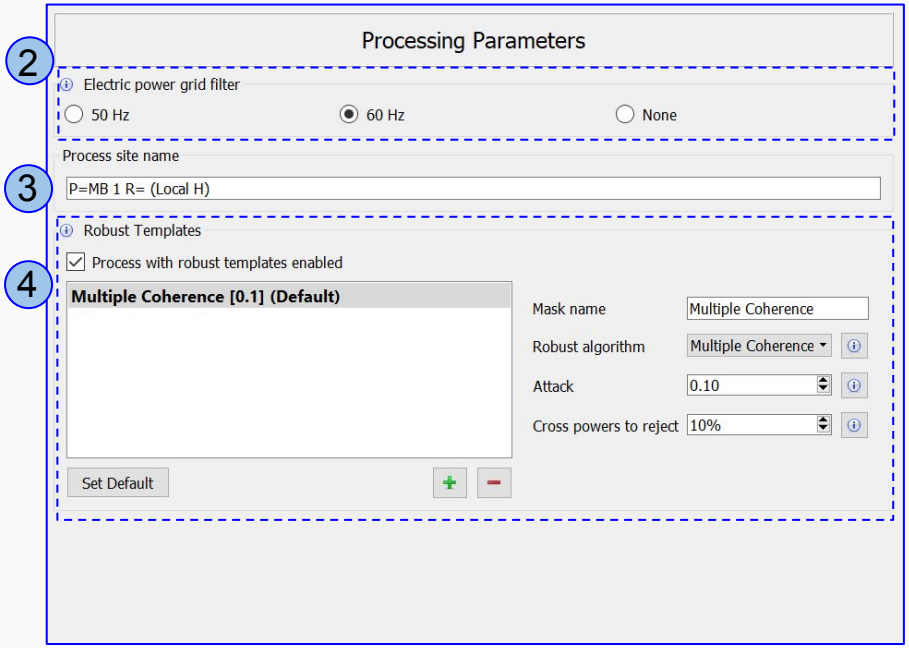


When a channel (**H** magnetic or **E** electric) is selected from a concurrent recording the letters **R(H) or R(E)** appears next to the **R**eference channel name

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)





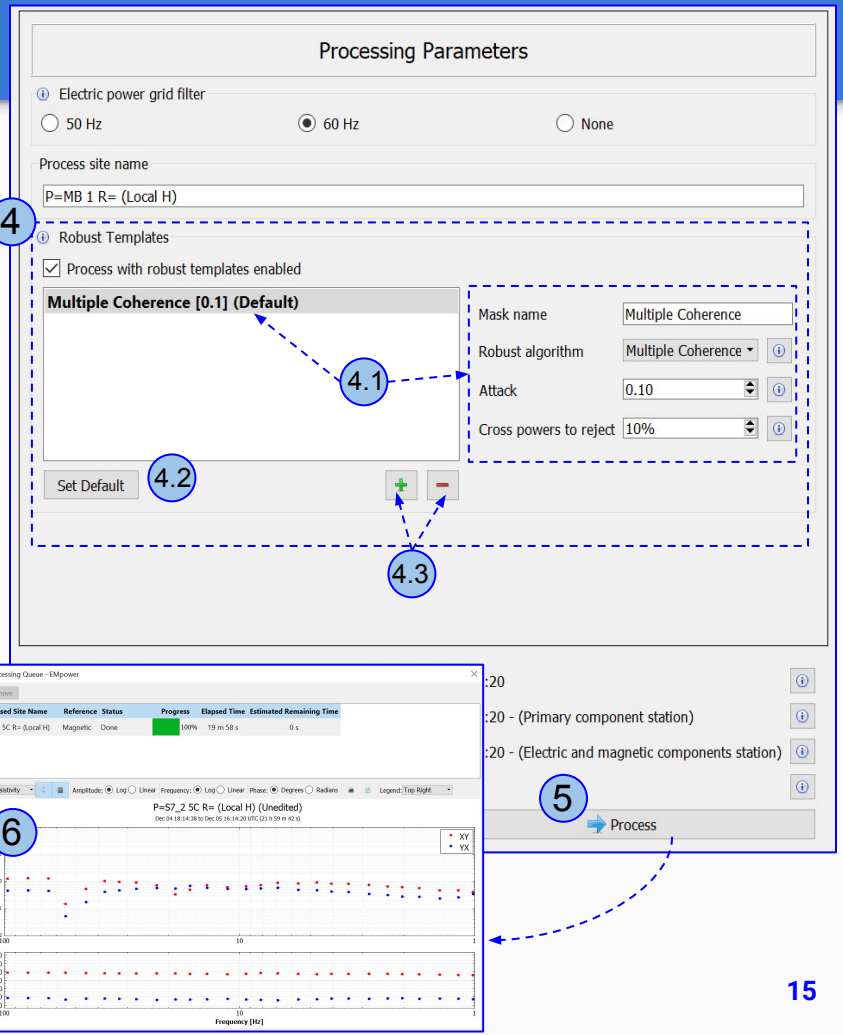
Robust Template / Processing Queue

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



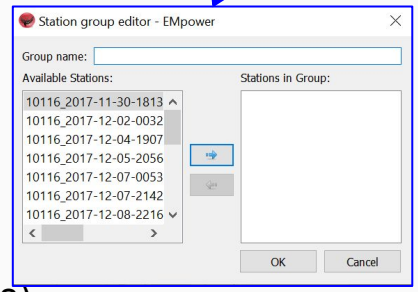
All the processing with **Robust Templates** enabled will automatically generate a workbench named "Robust" in the Crosspower Editor *(see page 22)*

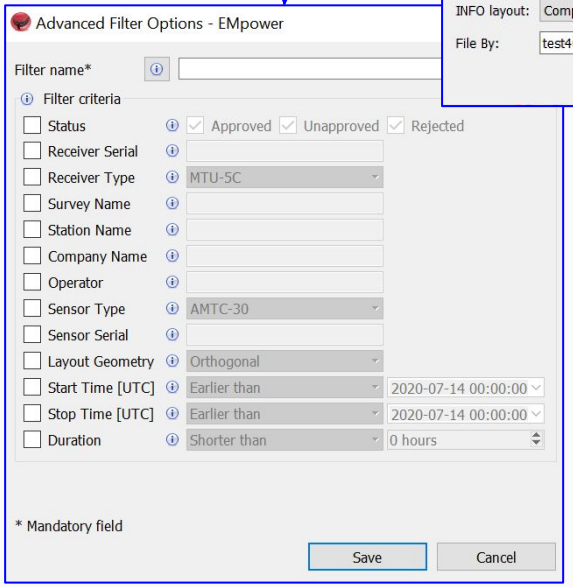
Advanced Search

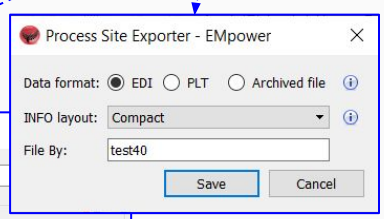
Toolbar (Sites list)

Processed MT Data

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







Groups (Timeline)

1. Create new group 

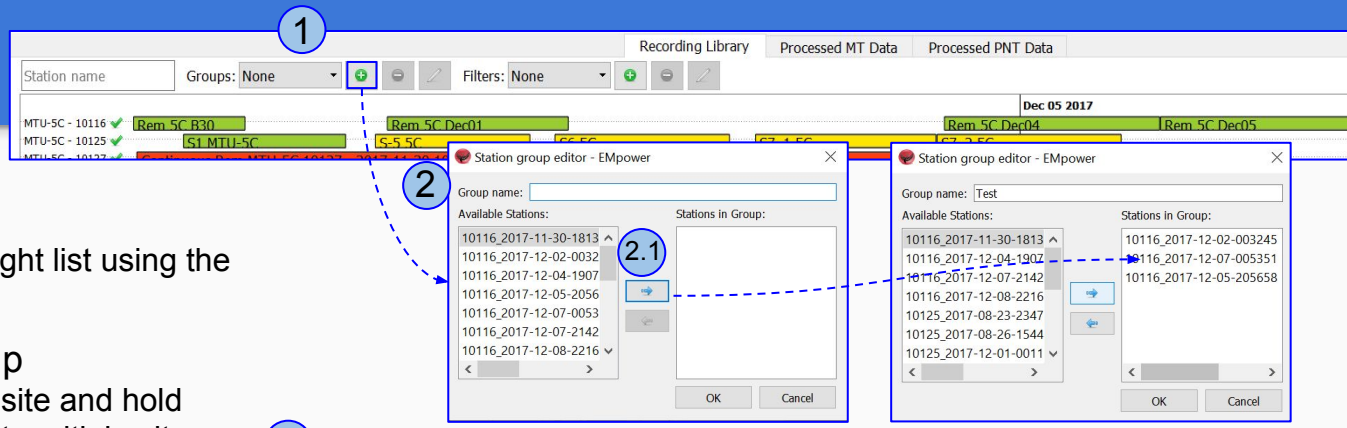
2. Type the **Group Name**
   - 2.1. Select the sites from the right list using the blue arrow

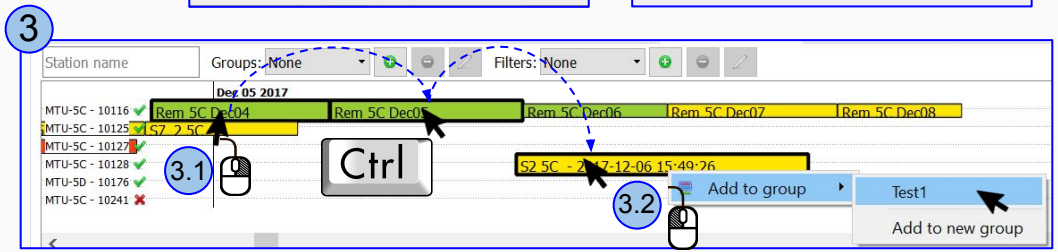
3. Add sites to an existing group
   - 3.1. Use left-click to select the site and hold down the **Ctrl** key to select multiple sites (release the buttons)
   - 3.2. Select **Add to group** from the Right-click menu and select the existing group

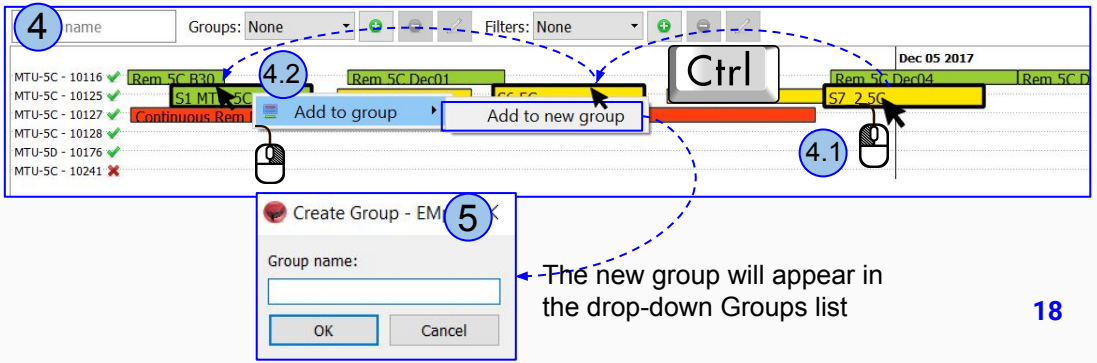
OR

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

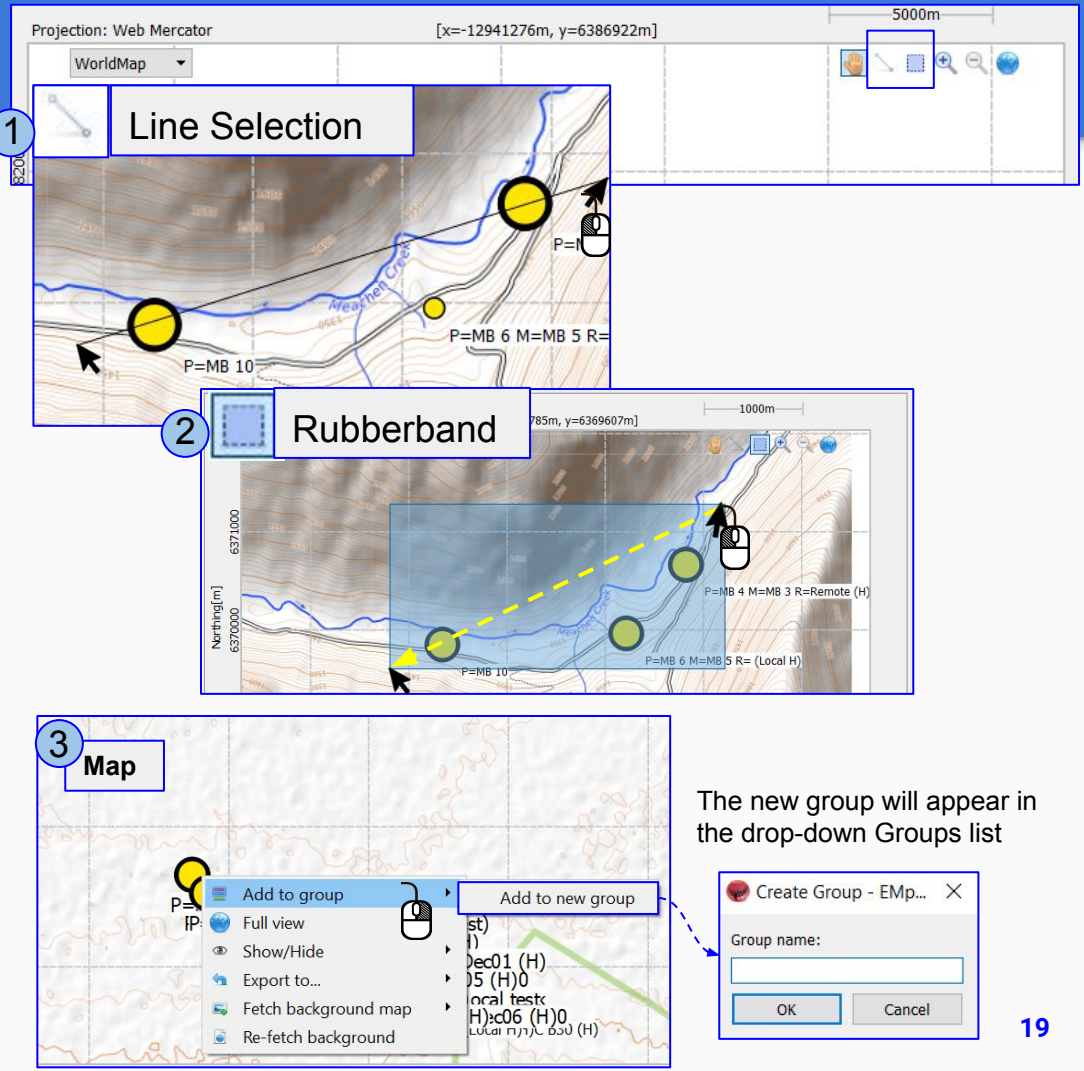
Groups (Map)

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**

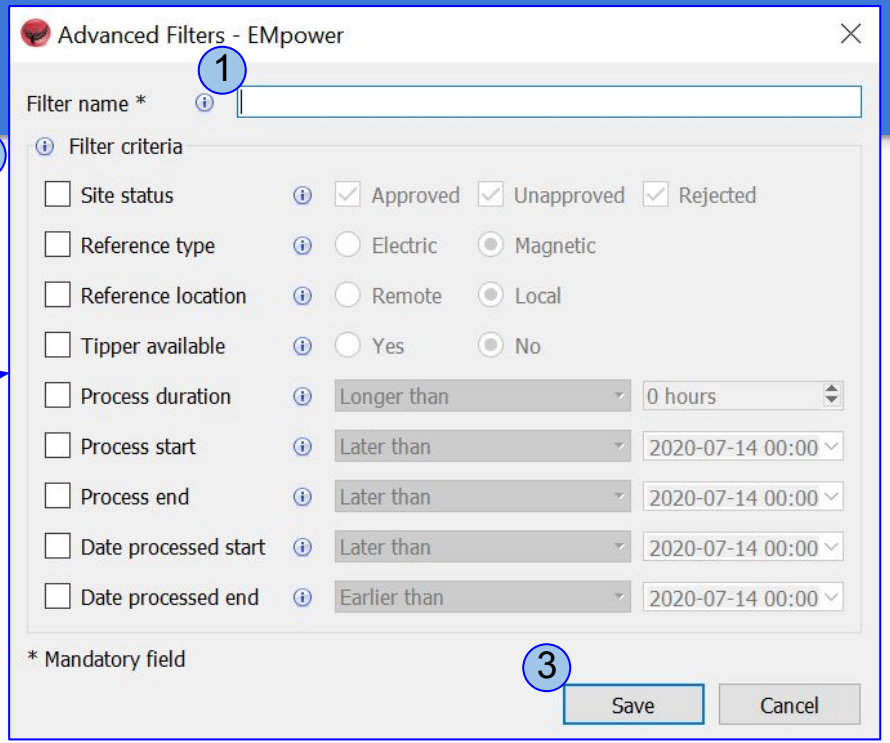


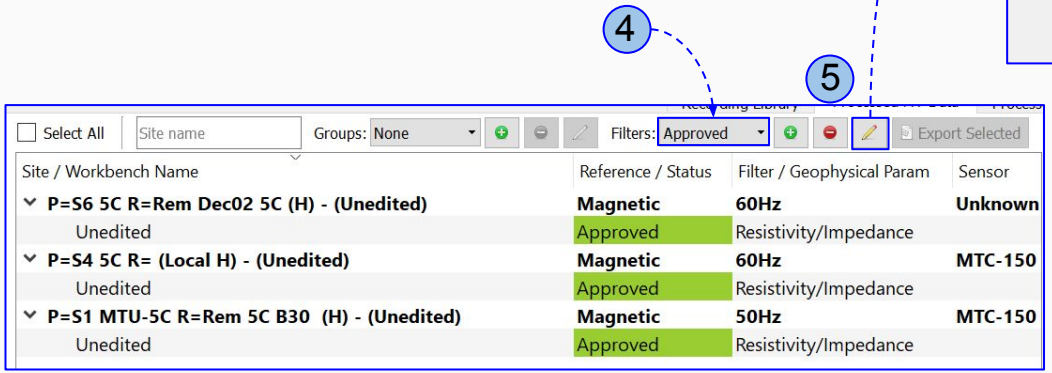
The new group will appear in the drop-down Groups list

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**

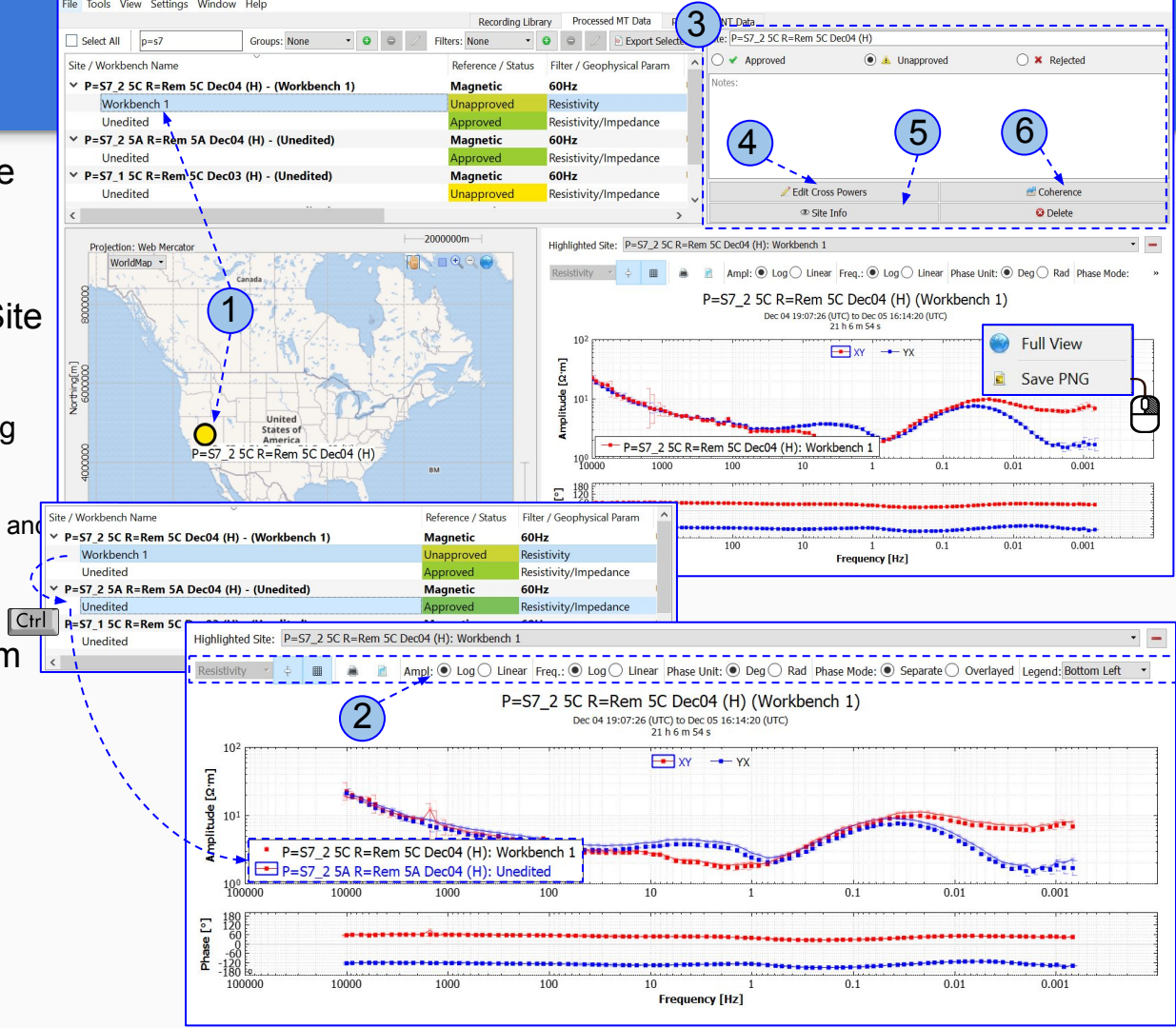




Processed MT Data

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)



Process Site Selection

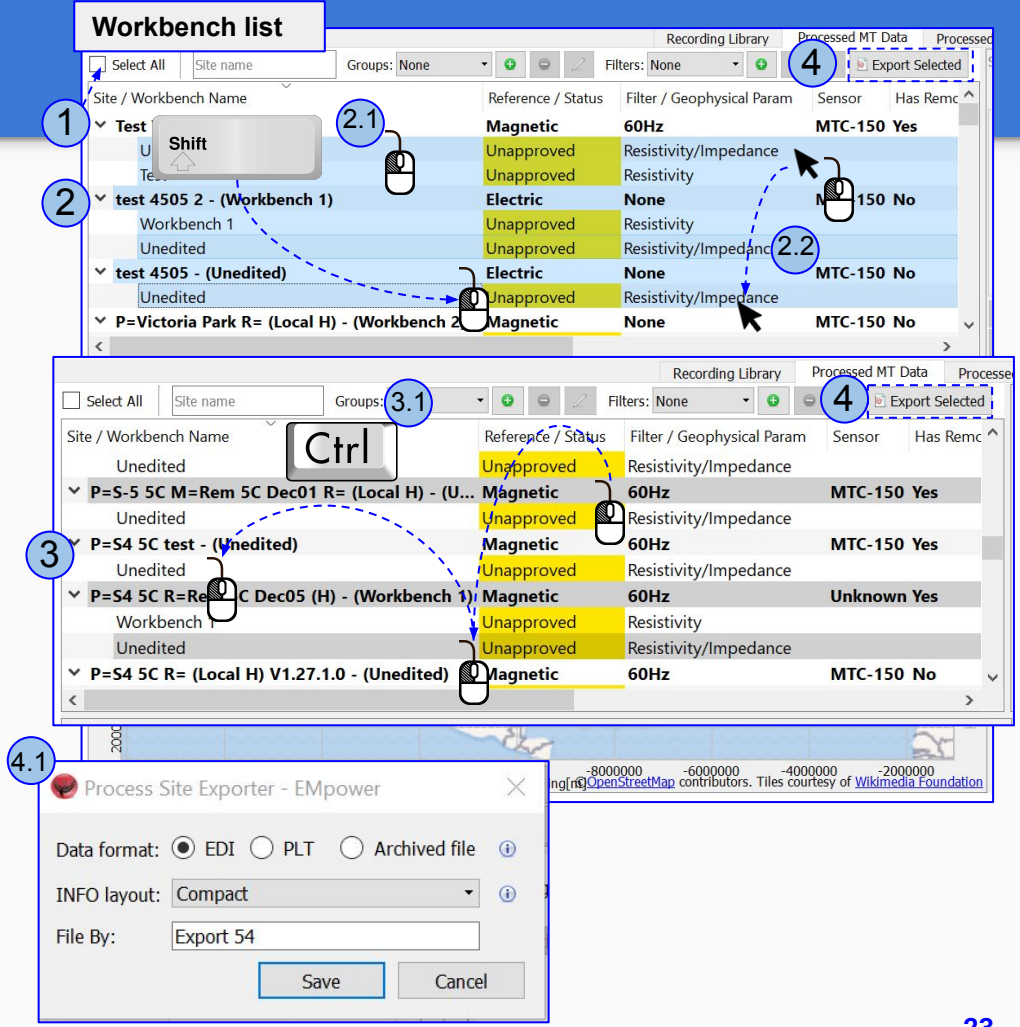
Select:

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

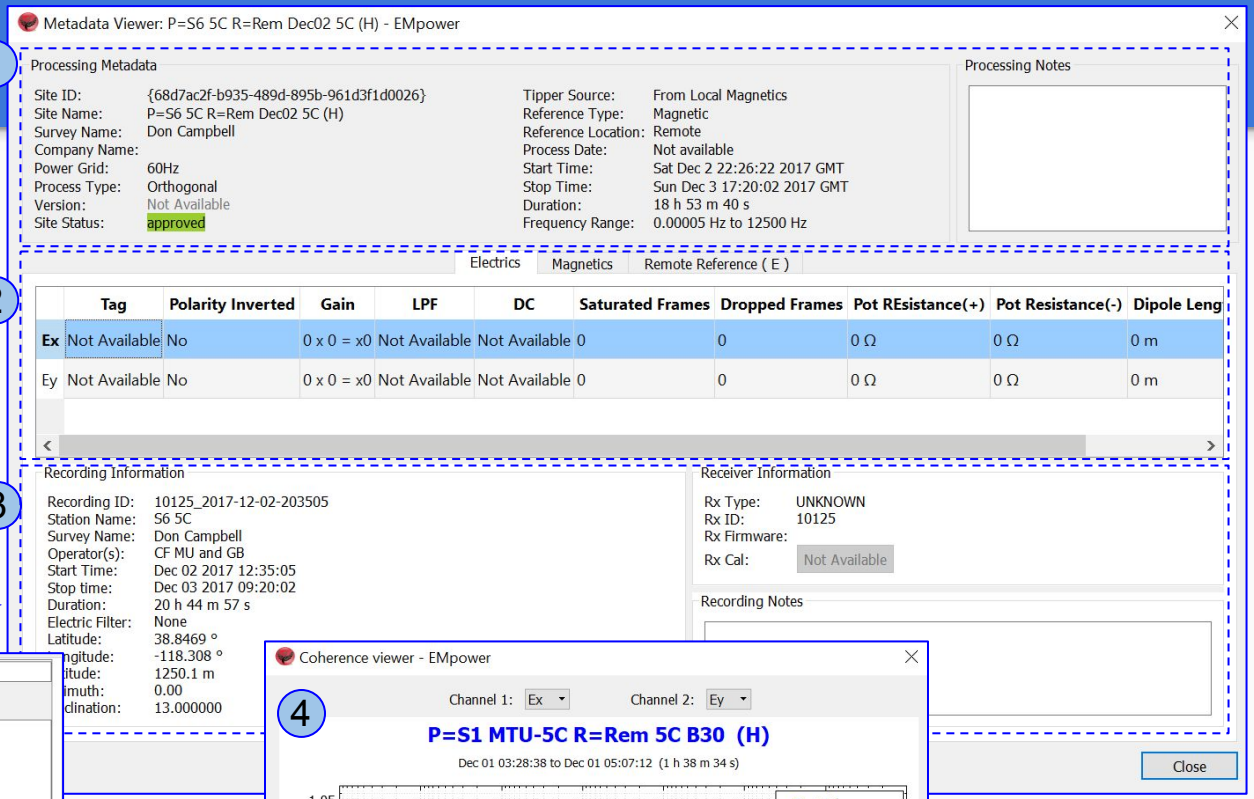
Export:

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**



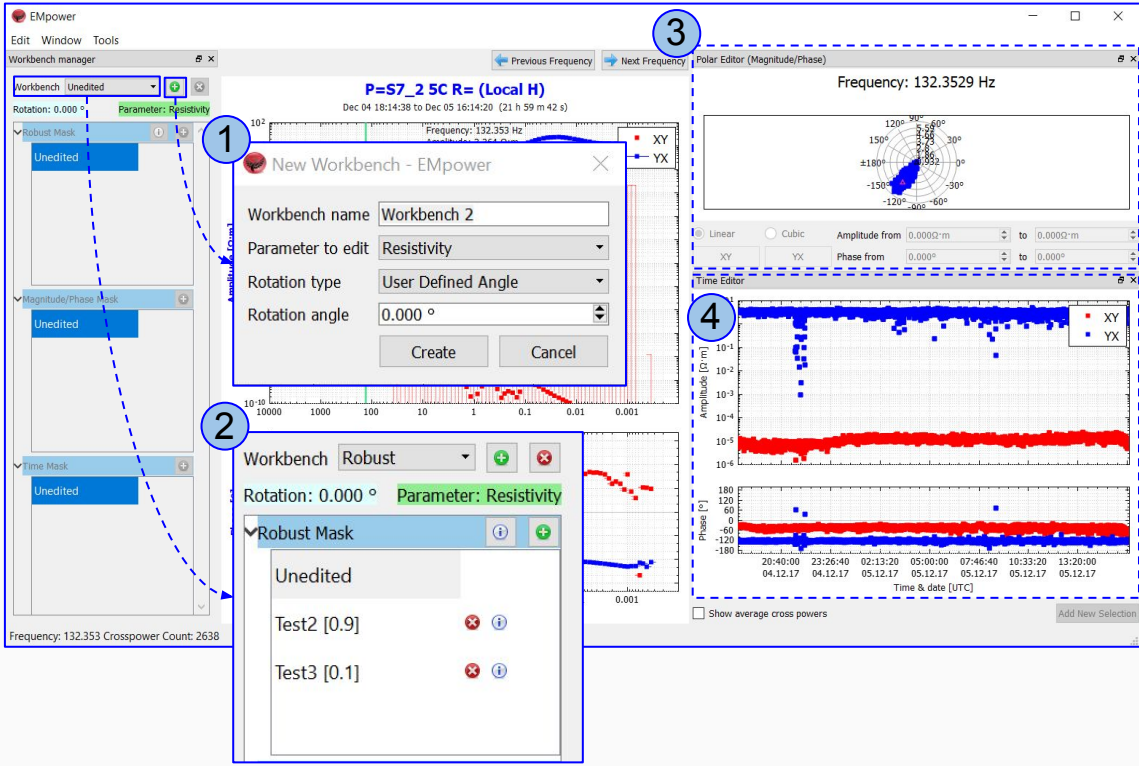
Processed data editing

Crosspower Editor

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)

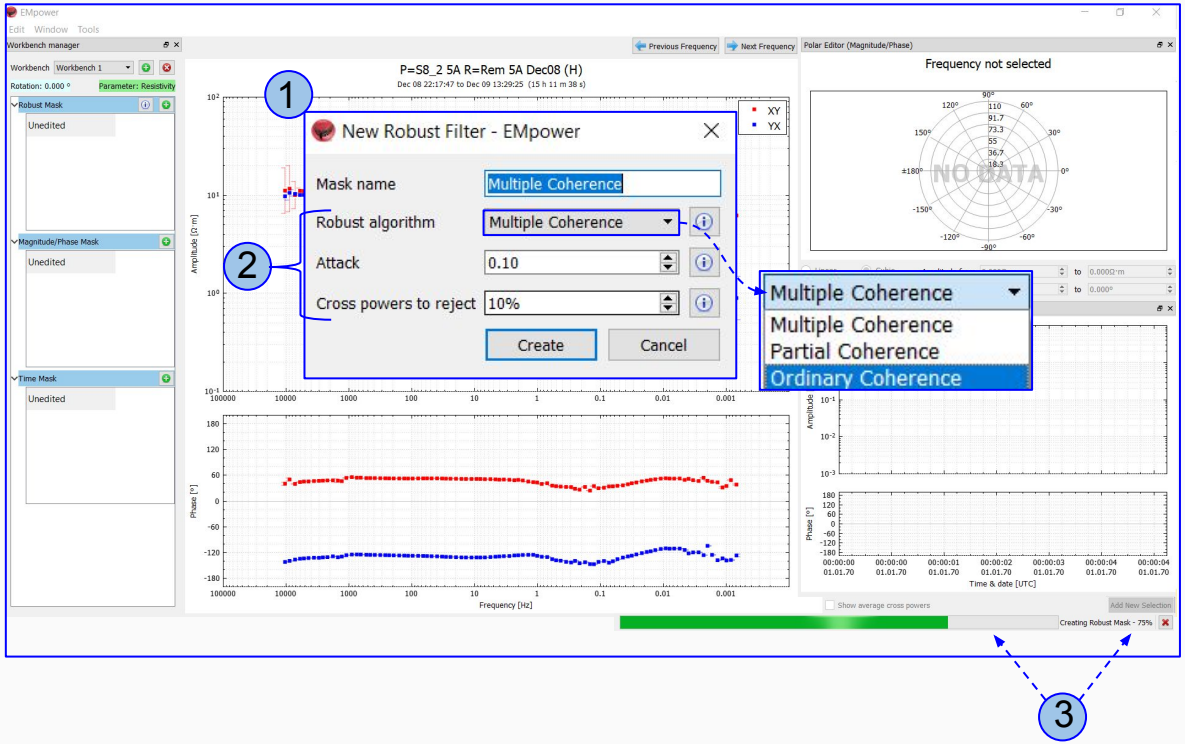


For more details see the Crosspower Editor manual

Robust Mask

The Robust Mask algorithm fixes the most common problems

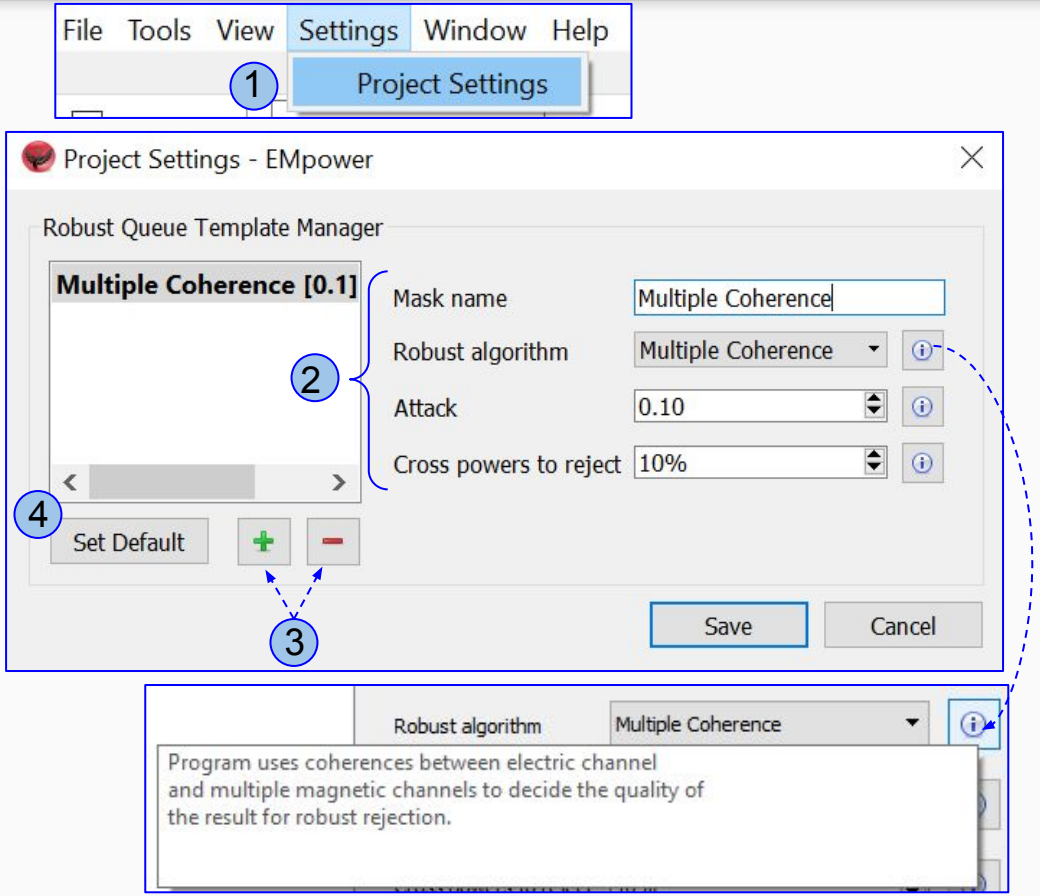
1. Create a **Robust Mask**
   - Type the **Mask Name**
2. Use the different options to obtain the desired information
   - Select the **Robust algorithm**
   - Define the **Attack**
   - Select the percent of **Cross powers to reject**
3. Wait until the process is completed



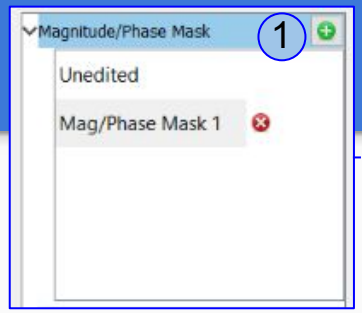
For more details see the Crosspower Editor manual

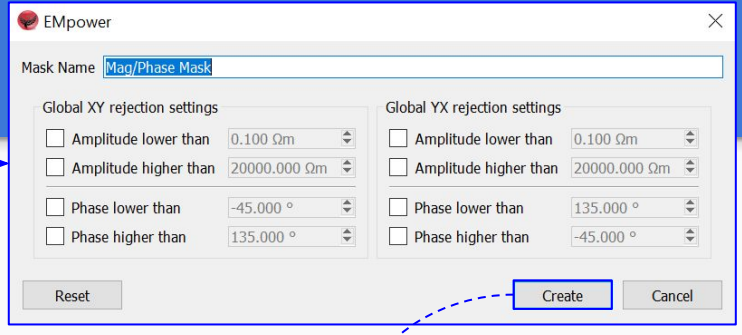
Project Settings - Robust Templates

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



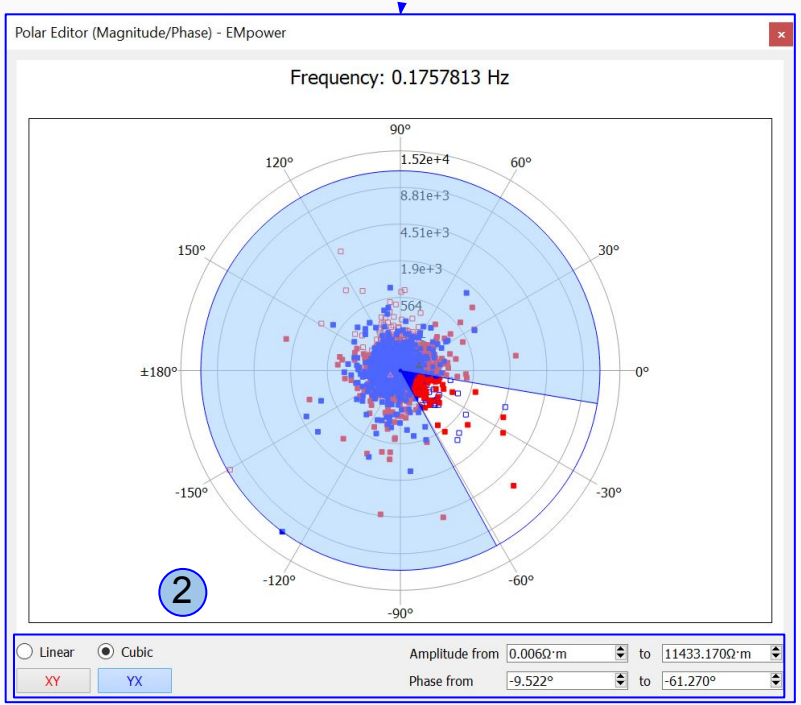
Polar Editor





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 rage

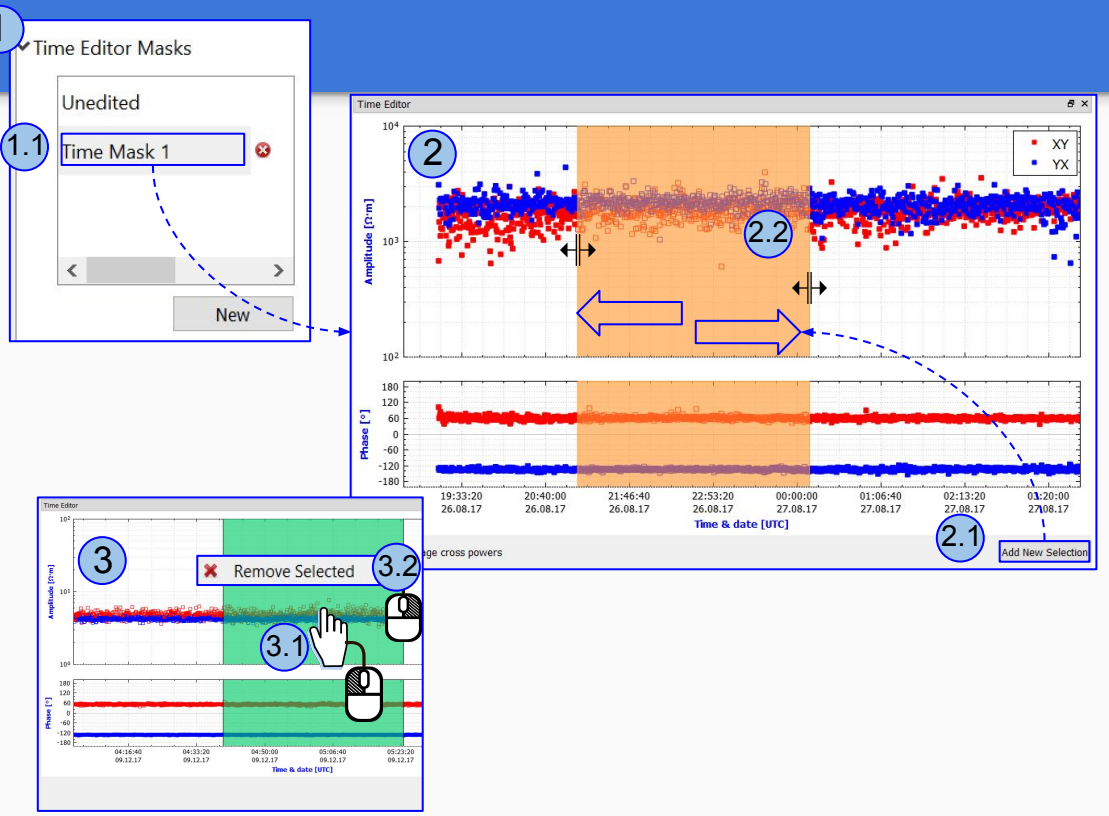
**For more details see the Crosspower Editor manual*



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.*



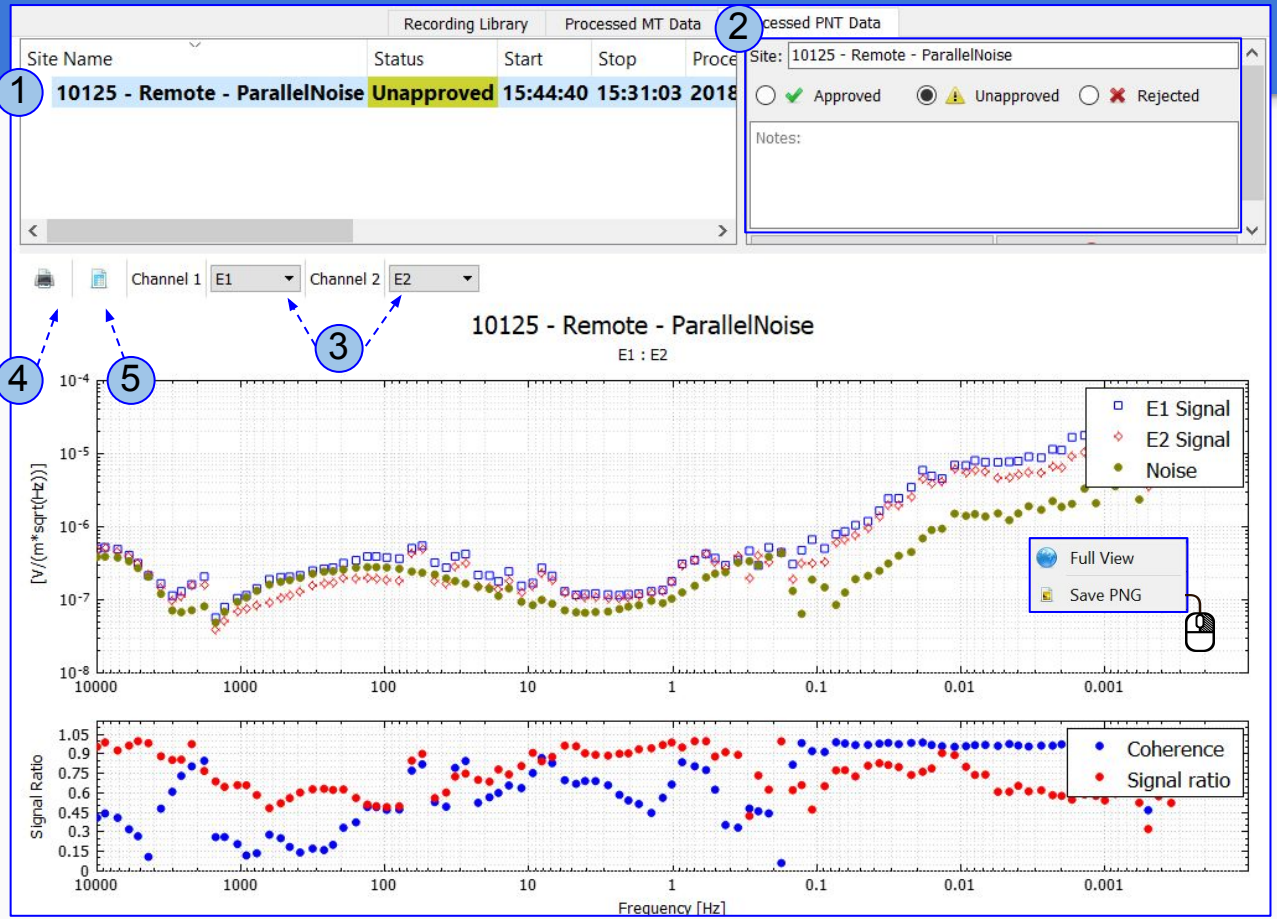
**For more details see the Crosspower Editor manual*

Processed PNT Data

Processed PNT Data

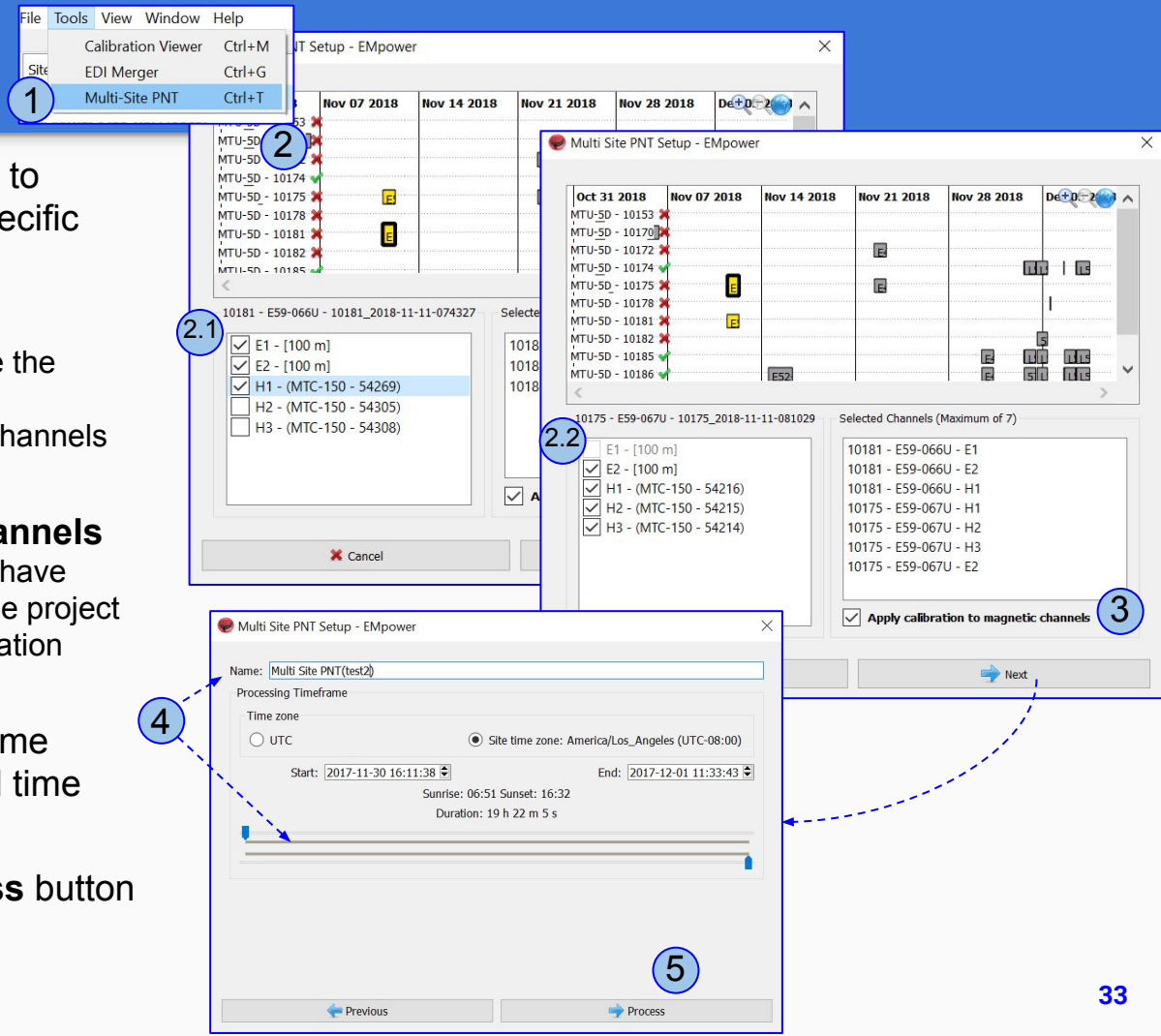
This tab shows processed Parallel Noise data

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

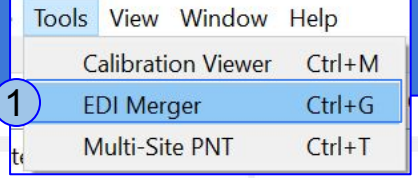
1. Use the **Multi-Site PNT (Ctrl+T)** tool to process Parallel Noise data using specific channels from different sites
2. Select the recording(s)
   - 2.1. Select the first Recording and define the channels
   - 2.2. Select for another recording(s) the channels that will be used (no more than 7)
3. ☑ **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

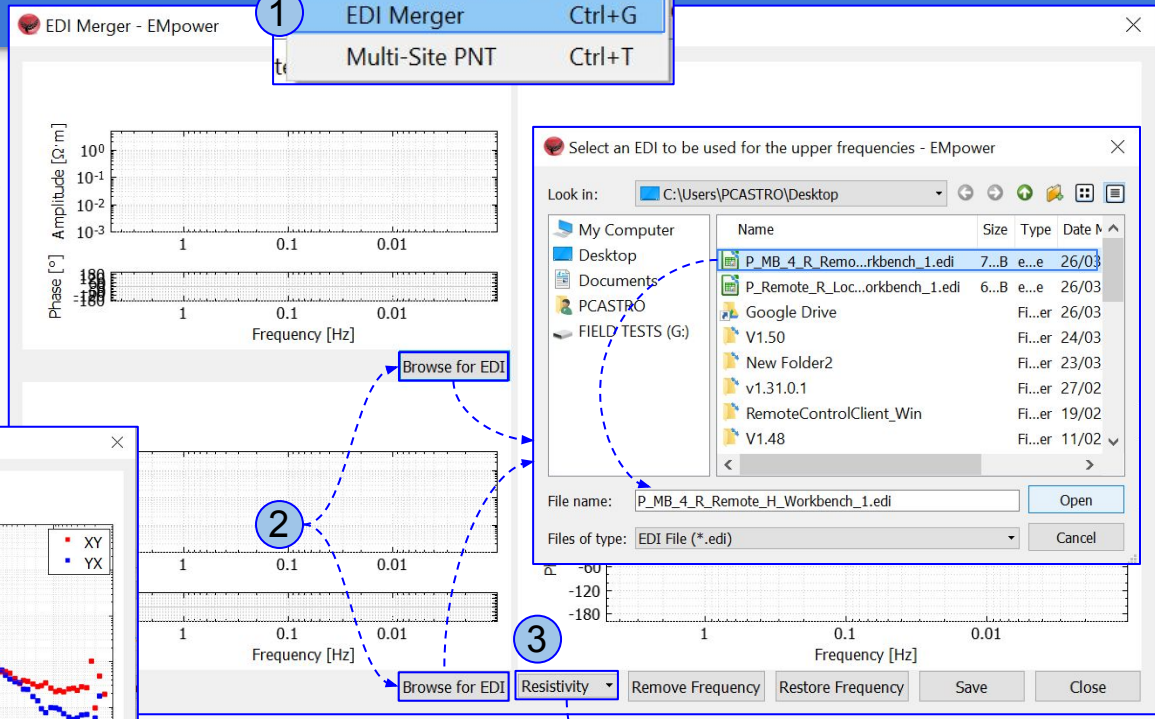


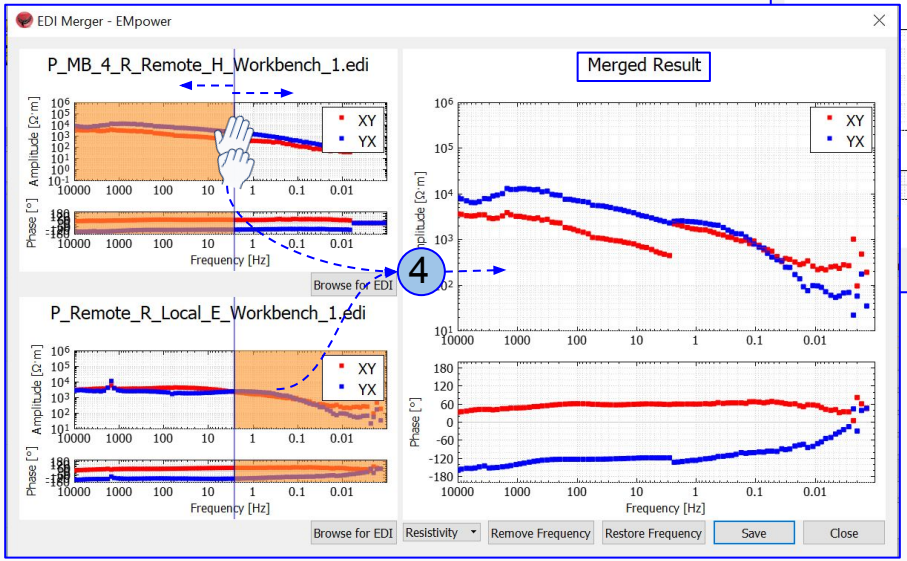
Reports

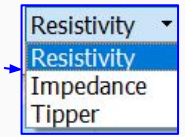
EDI Merger <Create>

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



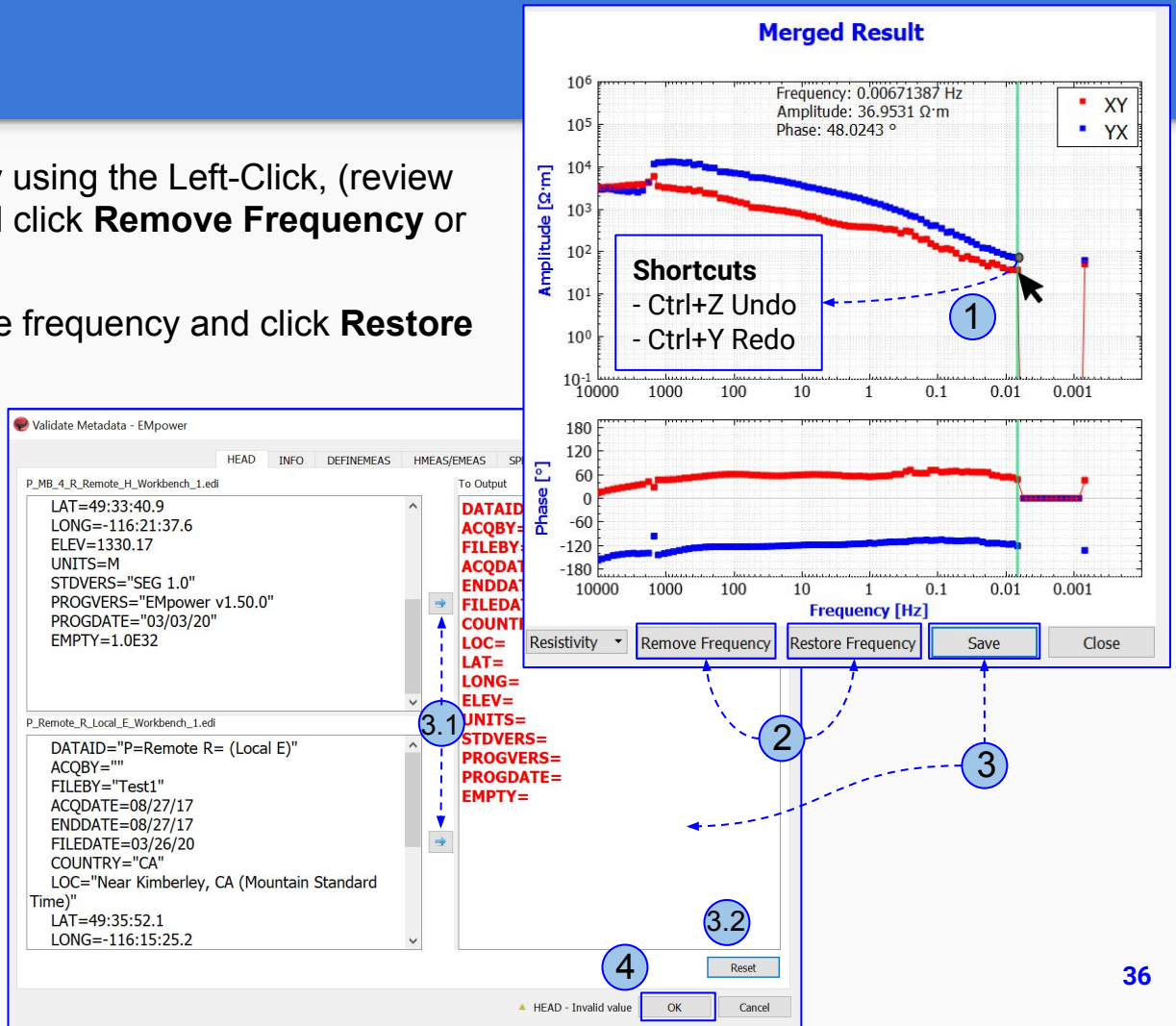






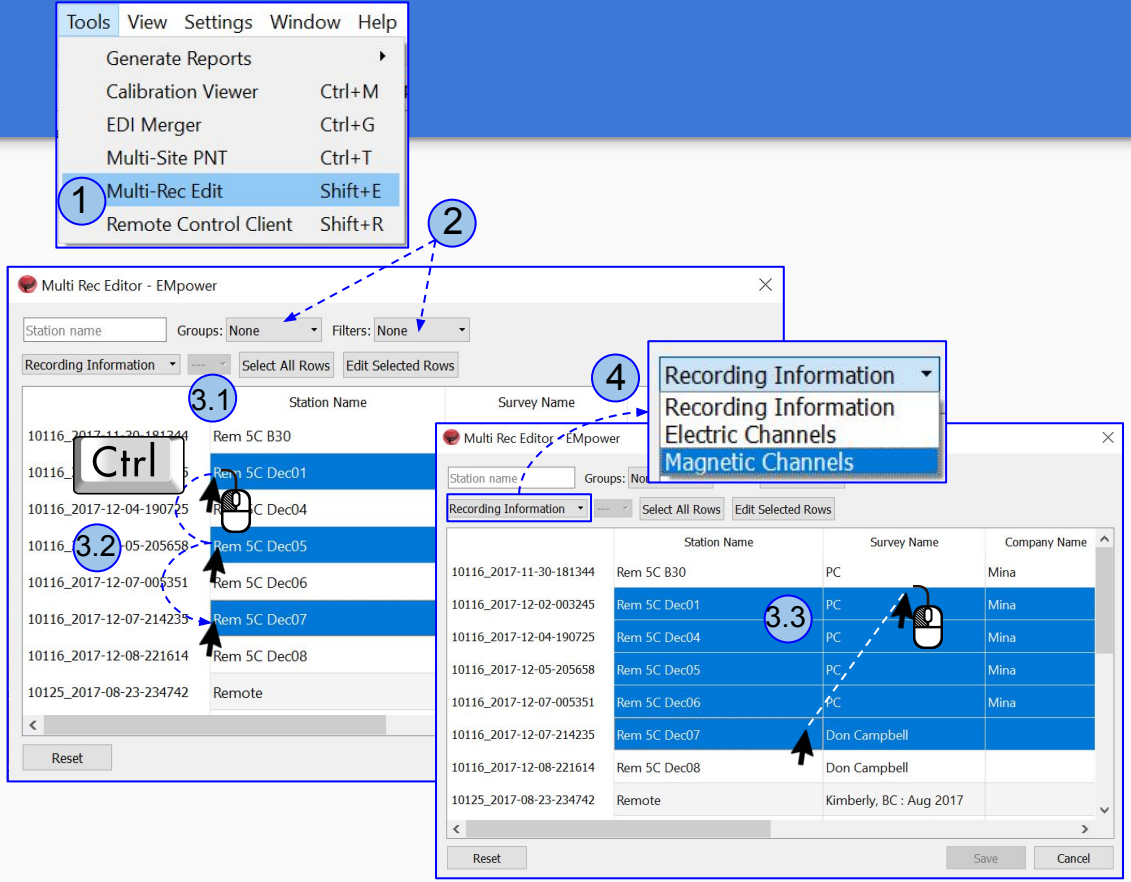
EDI Merger <Edit and Save>

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
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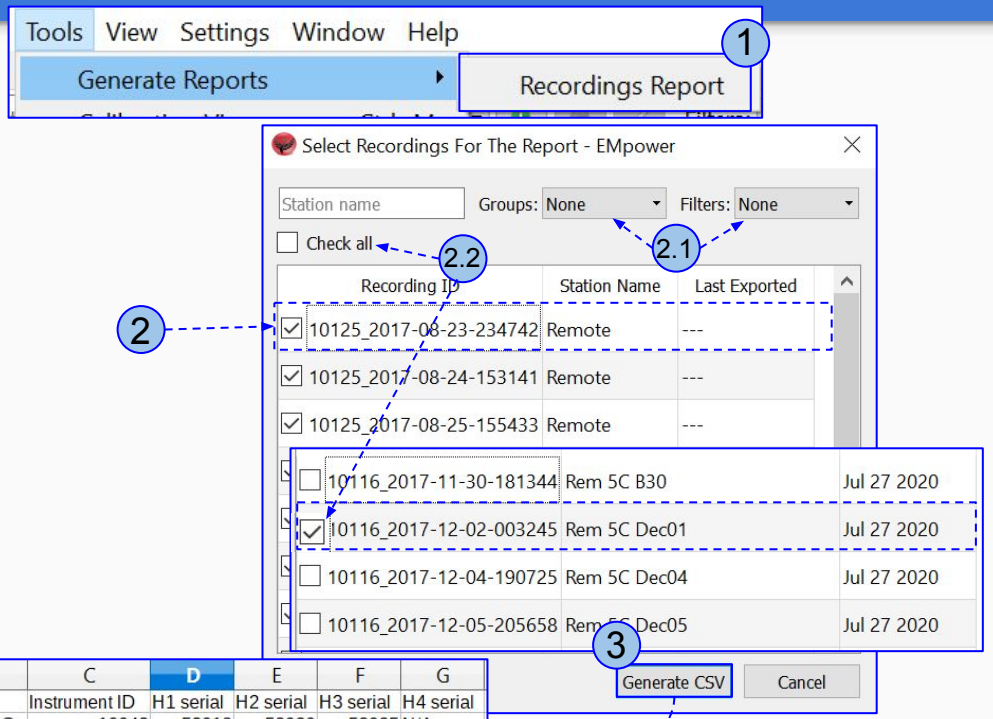
Recordings Report

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)*



4

	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