

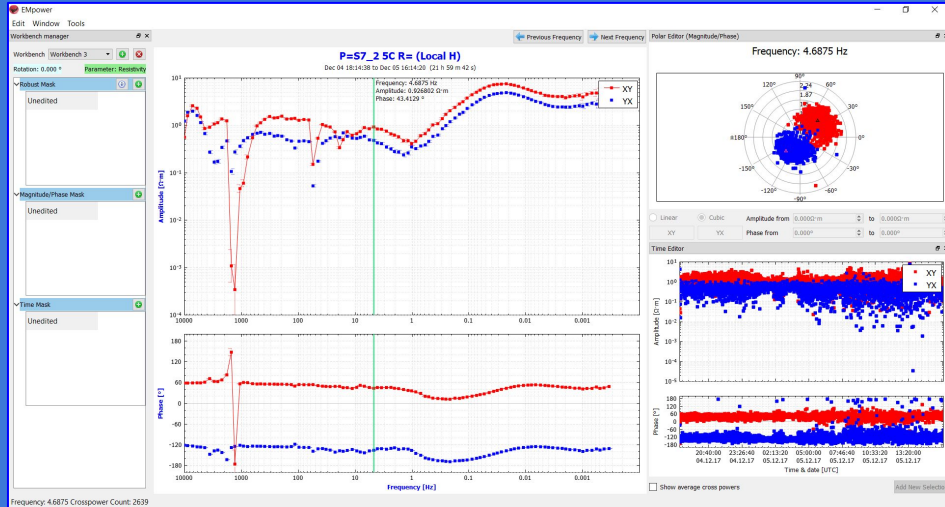
# EMpower Cross Power Editor



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# Cross Power Editor

The Cross Power Editor is designed to improve the quality of processed data



# Processed Sites


Processing might yield a noisy resistivity curve. In such cases, editing the site with the Cross Power Editor can improve the quality of the processed data.

1. The Cross Power Editor is available in the Processed MT Data tab
2. From the processed data list
  - Double click on a processed site
  - Right-click on a processed site and click **Edit Cross Powers**
  - Use the Edit Cross Powers button

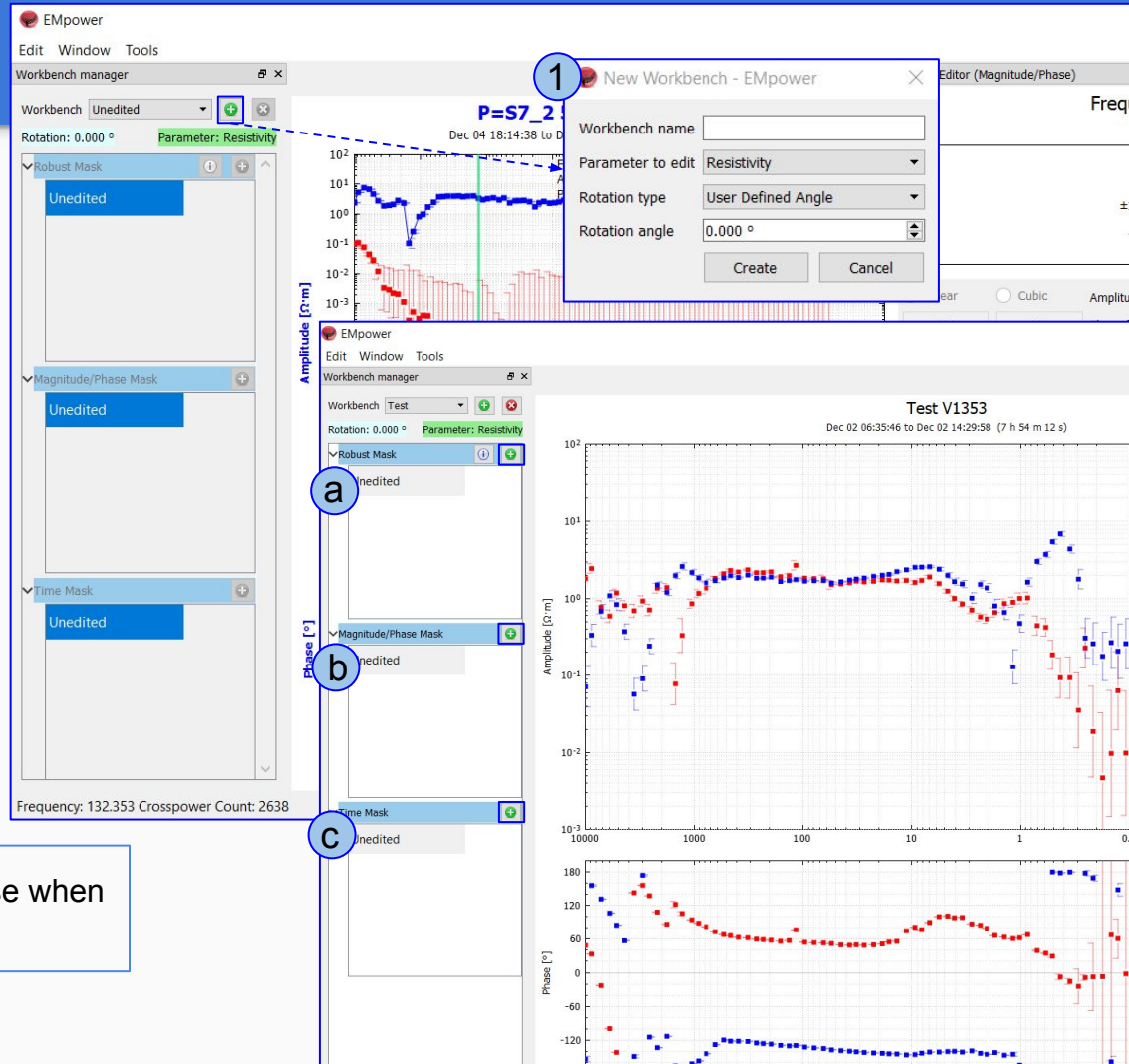
The screenshot displays the software interface for processing MT data. The top menu bar includes File, Tools, View, Settings, Window, and Help. The main window is divided into several panes. On the left, a site list shows three processed sites under 'Workbench 1'. The middle pane shows a map of the United States with a yellow circle indicating the location of the selected site. The right pane shows the 'Processed MT Data' tab for the selected site, displaying a resistivity curve plot. The plot shows Amplitude [p.m] on the y-axis (log scale from 10<sup>0</sup> to 10<sup>2</sup>) and Frequency [Hz] on the x-axis (log scale from 10000 to 0.001). The plot includes two data series: XY (red) and YX (blue). The site name is P=S7\_2 5C R=Rem 5C Dec04 (H) (Workbench 1). The plot also shows Phase [°] on the y-axis (linear scale from -180 to 180) and Frequency [Hz] on the x-axis (log scale from 10000 to 0.001). The site's status is 'Approved' and the recording date is Dec 04 19:07:26 (UTC) to Dec 05 16:14:20 (UTC).

# New Workbench


Each Workbench can contain multiple masks. All edits are done on a specific mask, and the plot will update as cross powers are added or removed from the selected masks.

1. Click the  button to create a new Workbench. Up to three different types of mask can be added to a Workbench
  - a. Robust Mask
  - b. Magnitude / Phase Mask
  - c. Time Mask

*\*More details in the following pages*





The screenshot displays the EMpower software interface. The 'Workbench manager' window shows a list of workbenches: 'Unedited', 'Robust Mask', 'Magnitude/Phase Mask', and 'Time Mask'. Each mask has an 'Unedited' button and an information icon ('i'). A dialog box titled 'New Workbench - EMpower' is open, showing the following fields: 'Workbench name' (empty), 'Parameter to edit' (Resistivity), 'Rotation type' (User Defined Angle), and 'Rotation angle' (0.000 degrees). The plot shows Amplitude [r.m] and Phase [degrees] vs Frequency. A box highlights the 'i' icon in the Robust Mask section of the Workbench manager.

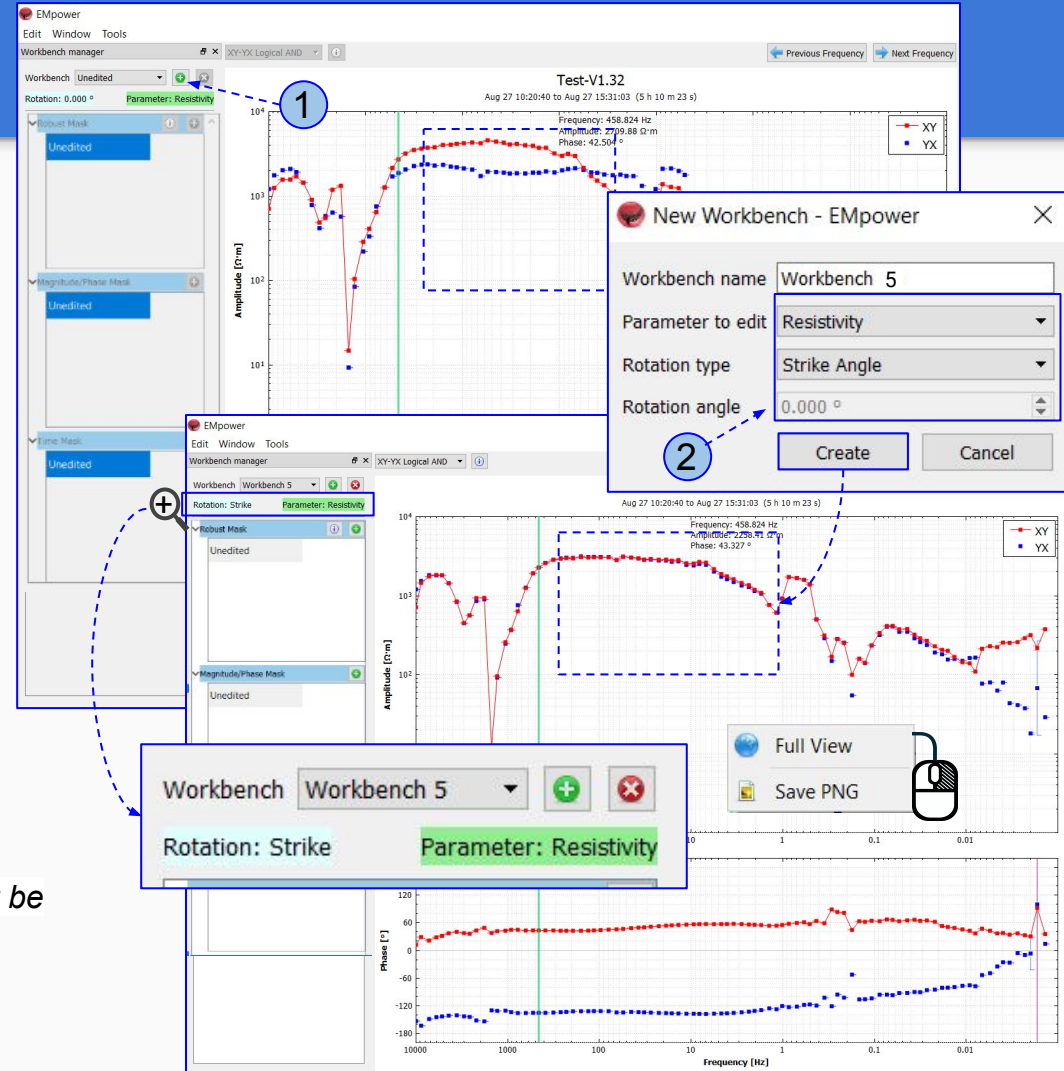
To help in understanding which parameters to use when creating a Robust Mask click on the  icon

# Rotating a Workbench

Workbenches can be rotated to a manually specified angle or automatically rotated to the calculated Strike Angle in the New Workbench dialog.

1. Create a Workbench by clicking the  button
2. Select the Rotation type and angle in the New Workbench dialog

 The **Strike Angle** uses fixed parameters, and cannot be changed.



The screenshot illustrates the process of creating a new workbench and rotating it to a strike angle in EMpower. The main window shows a plot of Amplitude [Frm] vs Frequency [Hz] for a test named 'Test-V1.32'. The plot displays two curves: XY (red) and YX (blue). The frequency range is from 10000 Hz to 0.01 Hz. The amplitude range is from 10<sup>1</sup> to 10<sup>4</sup> [Frm]. The plot shows a resonance peak around 1000 Hz. The current workbench is 'Unedited' and the parameter is 'Resistivity'. The rotation is set to 0.000°.

The 'New Workbench - EMpower' dialog is shown, with the following settings:

- Workbench name: Workbench 5
- Parameter to edit: Resistivity
- Rotation type: Strike Angle
- Rotation angle: 0.000°

The 'Create' button is highlighted. The dialog is shown in two positions, indicating the process of creating the workbench and then rotating it.

The 'Workbench manager' shows the newly created workbench 'Workbench 5' with a rotation of 'Strike' and a parameter of 'Resistivity'. The plot shows the results of the rotation, with the XY curve (red) and YX curve (blue) showing a significant change in amplitude and phase. The frequency range is from 10000 Hz to 0.01 Hz. The amplitude range is from 10<sup>1</sup> to 10<sup>4</sup> [Frm]. The phase range is from -180° to 120°.

The 'Full View' and 'Save PNG' buttons are also visible in the bottom right corner of the plot area.

# Robust Mask

When the processed site contains noise a **Robust Mask** can be created to reduce the noise.

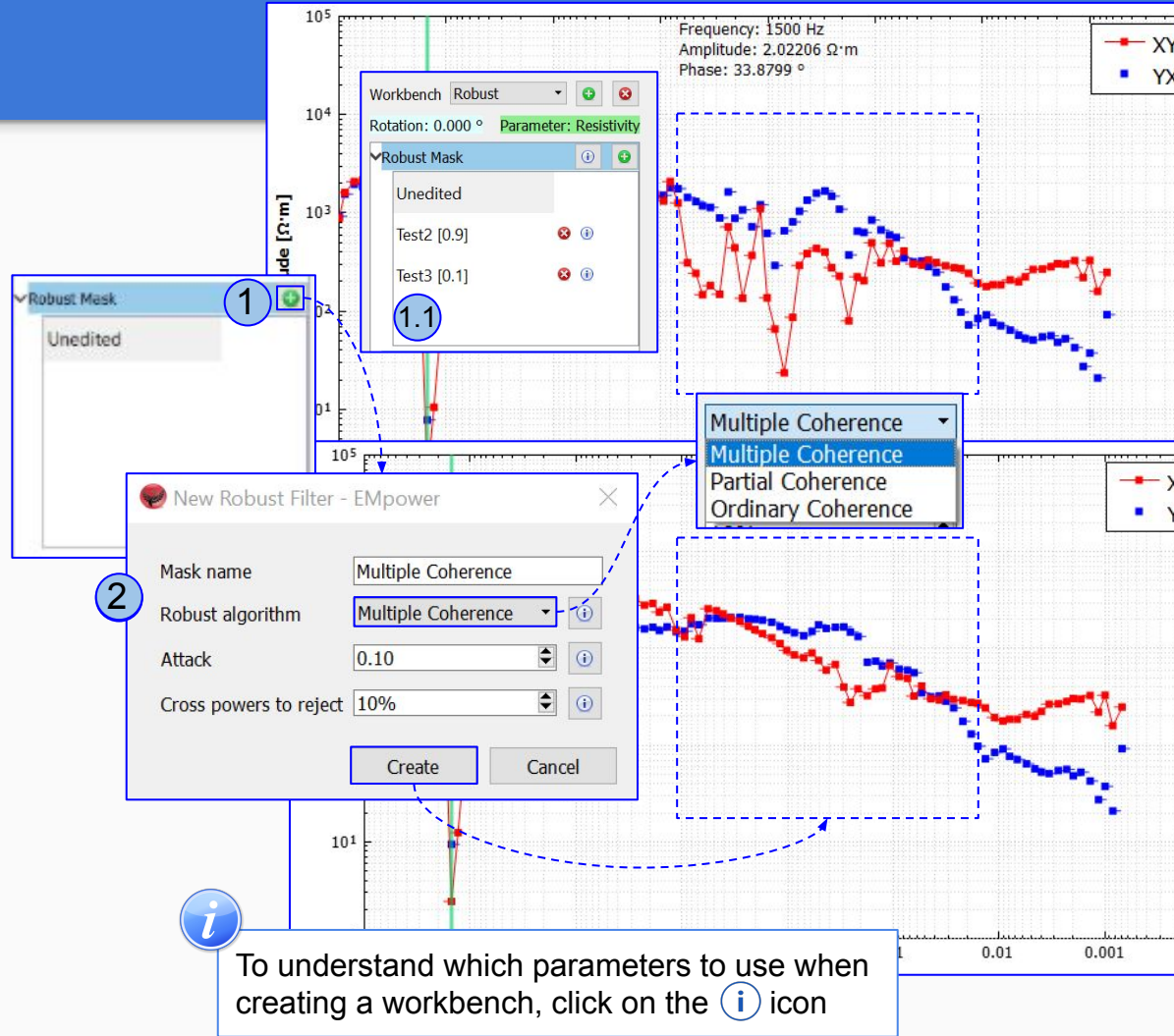
## 1. Create a Robust Mask

1.1 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 (see *Data Management Manual*)

## 2. Define the parameters needed

- Robust algorithm
- Attack
- Cross powers to reject

If the result of applying the Robust Mask is unsatisfactory, try a new Robust Mask with new parameters.



# Magnitude / Polar Editor

## 1. Create a Magnitud Mask

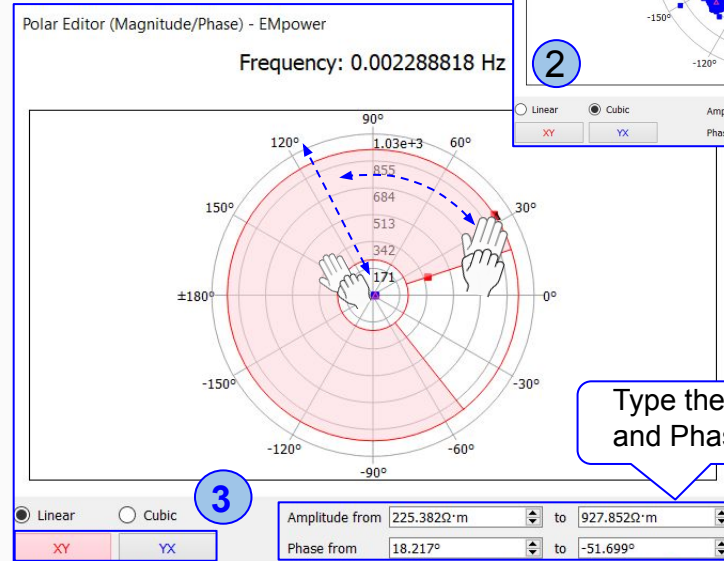
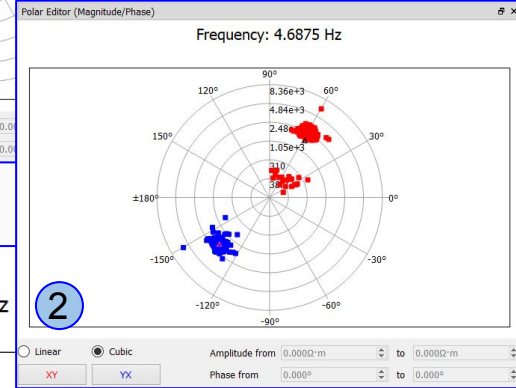
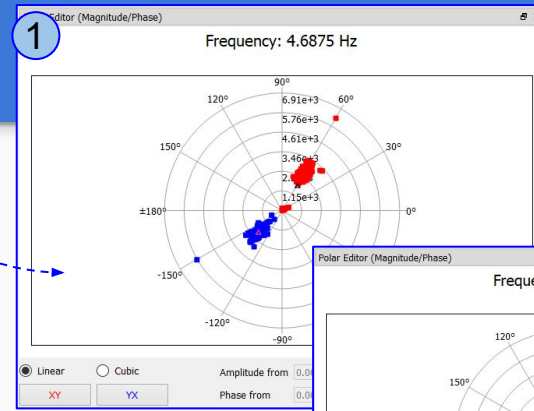
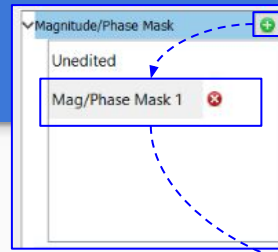
- The Polar Editor can view information in two ways: Linear or Cubic

## 2. The Cubic view changes the scale logarithmically, which can make it easier to see data trends

## 3. To select ranges

- Click **XY** or **YX** button to switch between ranges.
- Edit the ranges by either dragging the handles with your mouse or manually entering values into the spin boxes.

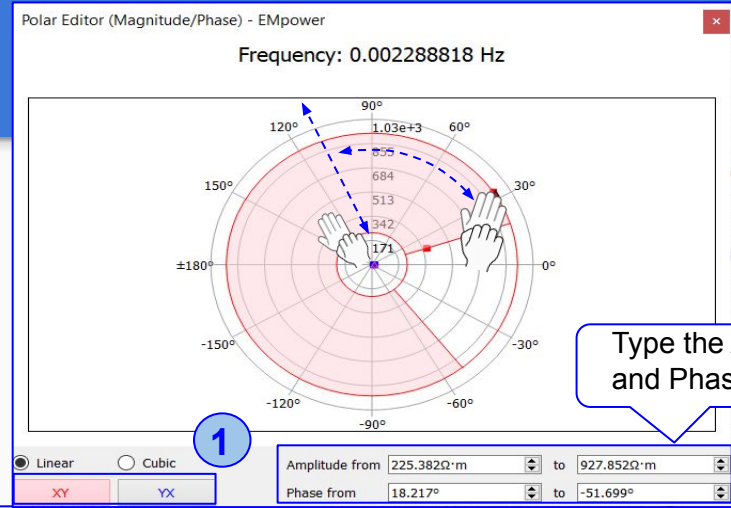
*\*This tool offers minimal improvement to some data sets, but it should be used sparingly.*




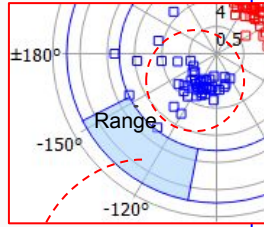
# Copying Ranges (Magnitude / Polar)


1. Select the range
2. Hold down the **Ctrl** button and use **Right or Left Arrow** keys.
  - o The **XY** and **YX** ranges will be copied to the next frequency.

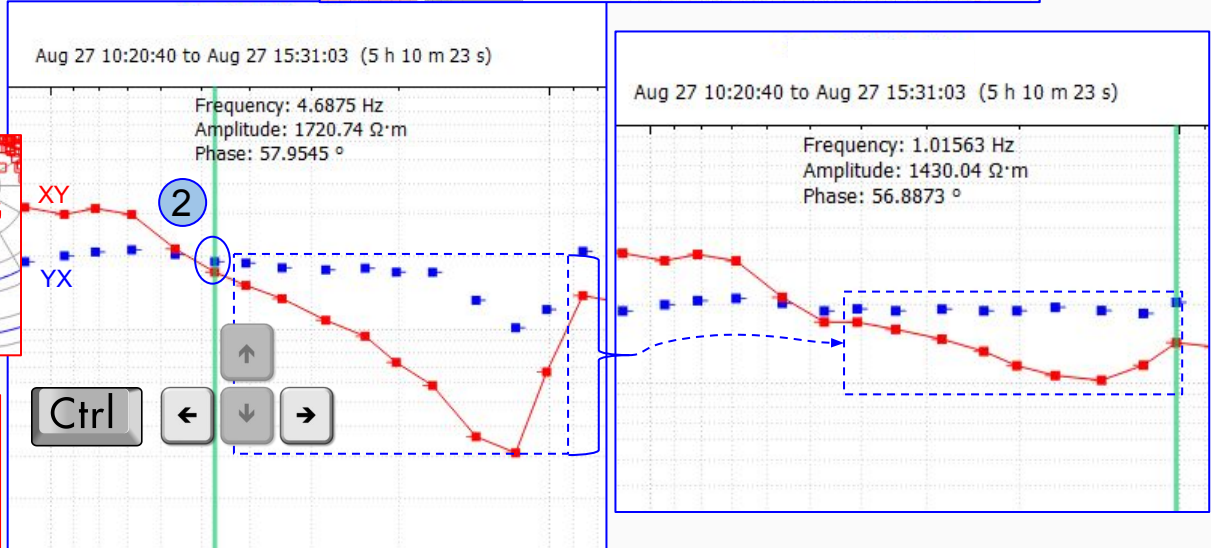
*\*This tool offers minimal improvement to some data sets, but it should be used sparingly.*



 Use this tool only after the Robust mask is applied.



 When the range copied is higher or lower than the frequency, the frequency points will disappear on the plot.



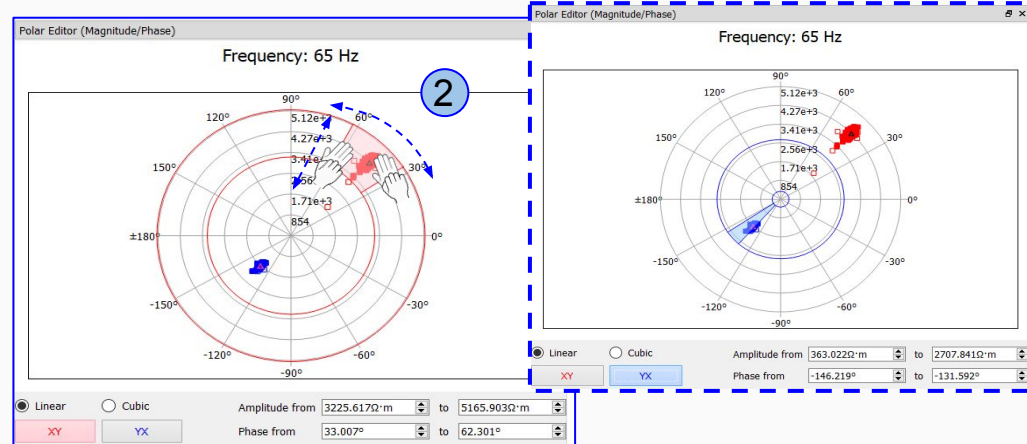
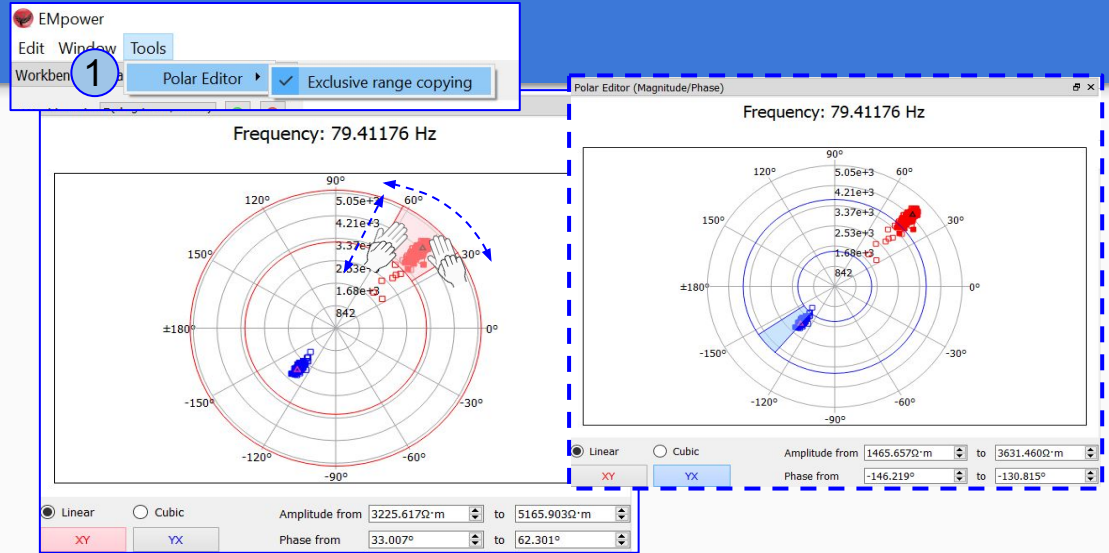


# Exclusive Range Copying (Magnitude/Phase)

The Exclusive Range option on the Tools menu allows for editing one curve at a time

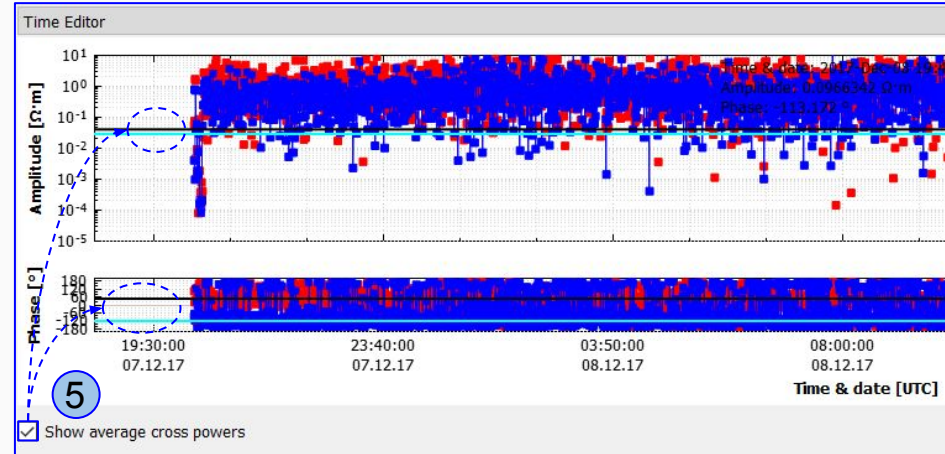
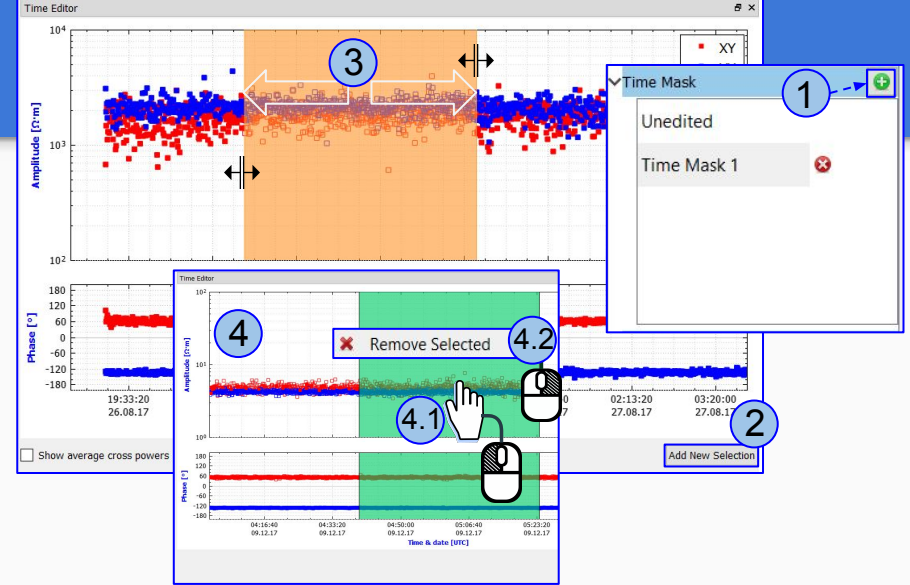
1. Select **Polar Editor** option to enable Exclusive Range copying
  - Select the **XY** (or **YX**) button on a selected Magnitude/Polar Mask
  - Copy the selected frequency
2. Observe that the range of **XY** (or **YX**) has been copied, but the range of **YX** has not been.

*\*This applies to both XY and YX*



# Time Editor

1. Create the **Time Mask**
2. Click the **Add New Selection** button
3. To Add a New rejection area
  - Select the area by dragging the handles with your mouse to the right or left.
  - All cross powers in that selected area will be excluded from the calculation
4. To delete the selection
  - 4.1 Left-click on the area to be deleted
  - 4.2 Then right-click the option **Remove Selected** that appears on the screen
5. The **Show average cross powers** checkbox will show or hide the average **XY** and **YX** amplitude and phase values

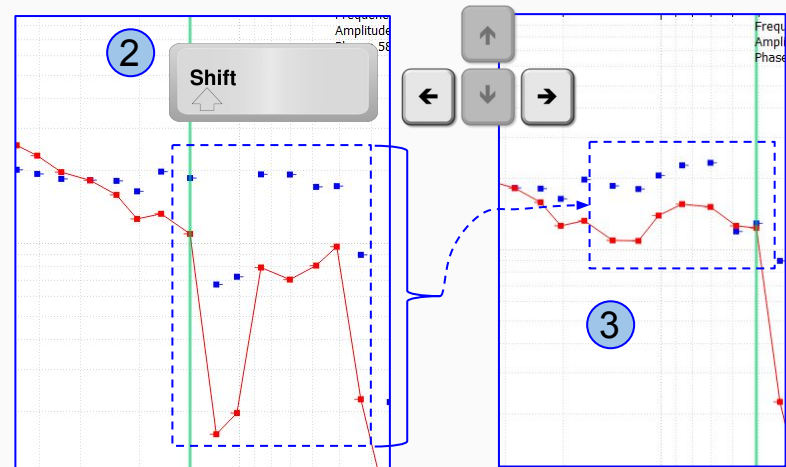
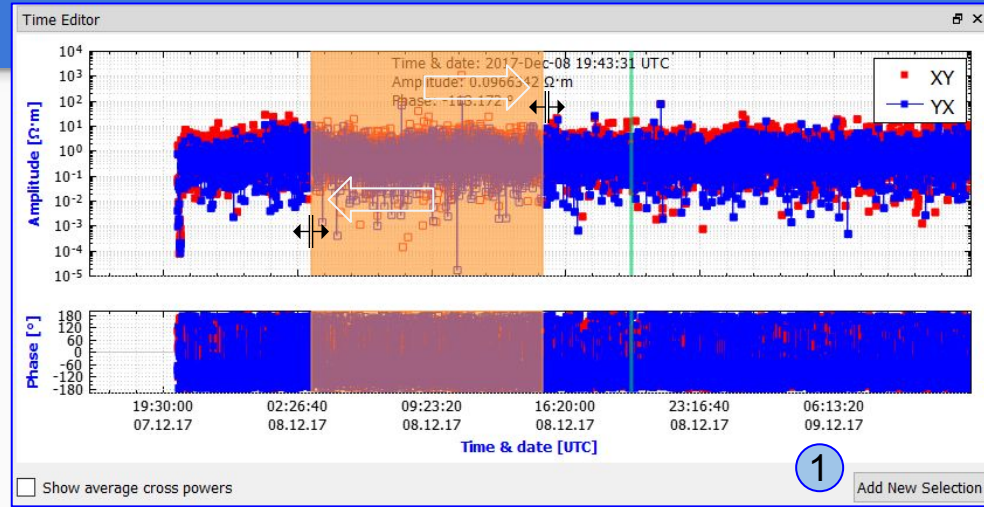


# Copying Ranges (Time Editor)

1. Create a **Time Mask**
  - **Add New Selection**
  - Select the time interval on the plot Right to Left or Left to Right
2. Hold **Shift** and use the **Right or Left Arrow** keys to move
3. The time interval selected will be copied to the next frequency

\*Sometimes the point on the plot may disappear. This happens when all cross powers have been removed for that frequency (Review the time interval)

*\*This tool offers minimal improvement to some data sets, but it should be used sparingly.*



# Workflow <Best Editing Practices>

## Processed Sites

Processing the Site could fix some problems, but not always remove all ambient noise from the recording, and the data may need to be adjusted.

*(See the Data Management Manual for more information)*

## Cross Power Editor

The Cross Power Editor helps to improve the data, by using different tools for filtering out the noise. Always create a 'Robust Mask' first. This algorithm fixes the most common problems.

## Mask Editor

Besides the Robust mask, EMpower has additional masks available such as the Time Editor or Magnitude/Phase Mask.

Although those tools have many options for fine-tuning, it is recommended to use them modestly because they may also introduce invalid results.

# Shortcuts

Shortcuts	Description
CTRL+C	Copy frequency masks
CTRL+V	Paste frequency masks
CTRL+Right arrow button	Copy the current ranges in Polar plot to next frequency
Shift+Right arrow button	Copy the current ranges in Times plot to next frequency
CTRL+Shift+Right arrow button	Copy the current ranges in Polar and Times plot to next frequency