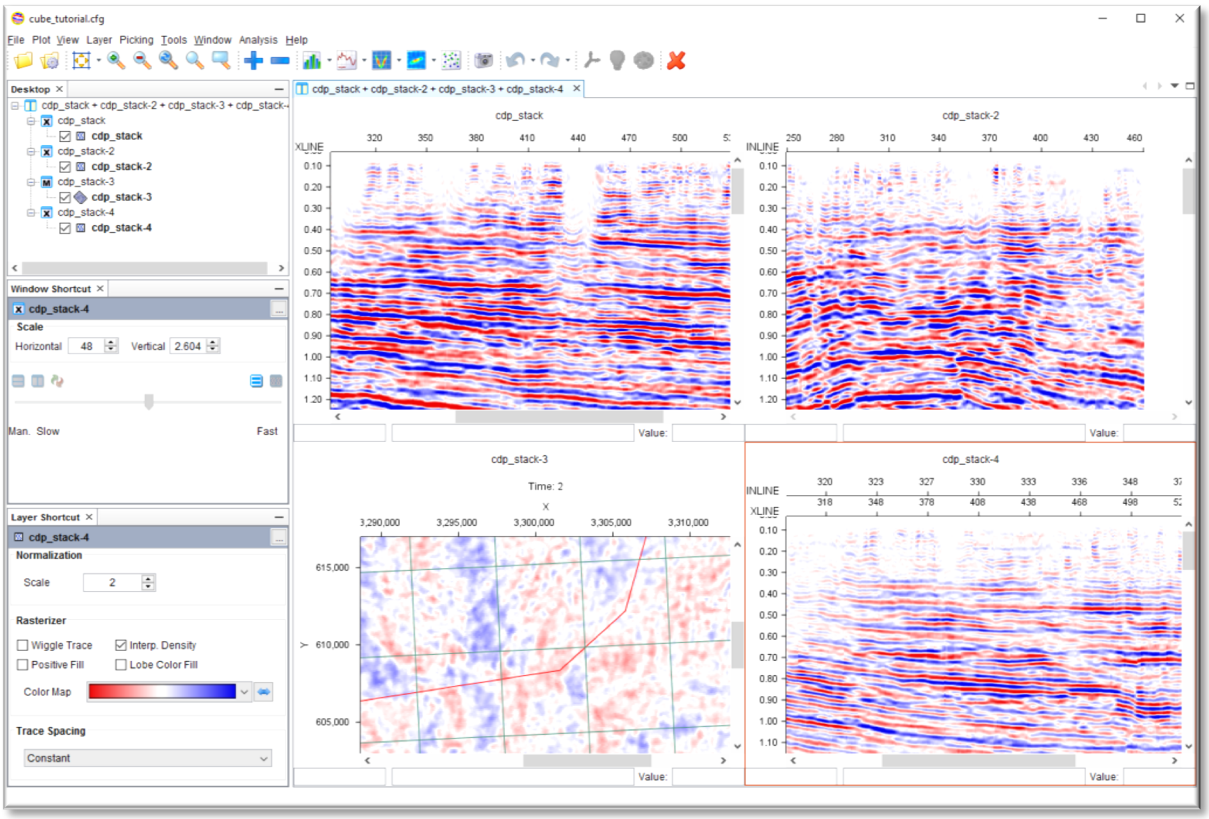
INTViewer Cube Tutorial

This tutorial shows how to use INTViewer to display a seismic cube stored in a Seismic file. Windows created will include INLINE, XLINE, Time Slice and an arbitrary traverse, as shown in the picture below. Because of the size of the data (about 1GB), the dataset used in this tutorial is not provided in the distribution. You should be able to work with this tutorial using your own seismic data, as long as it is available in any format supported by INTViewer.



Step 1 – Indexing the seismic cube

The first step is to index your data cube using the *SeismicIndexer* utility (some supported formats do not require indexing). If you need help executing the SeismicIndexer, please see the tutorial on the SeismicIndexer. An output of indexing is a master file and has an extension beginning with the letter "x". For segy data, the extension is "xgy".

In this tutorial, we have indexed our seismic volume using keys INLINE and XLINE.

Step 2 – Building the INLINE Window

a. Load the data

Start *INTViewer* and select the option:

File → Open in XSection → Seismic…

Select the master file (*cdp_stack.xgy* in our case) that you have created in **Step 1**. Once this is done, you will be presented with a dialog window similar to the one shown below.

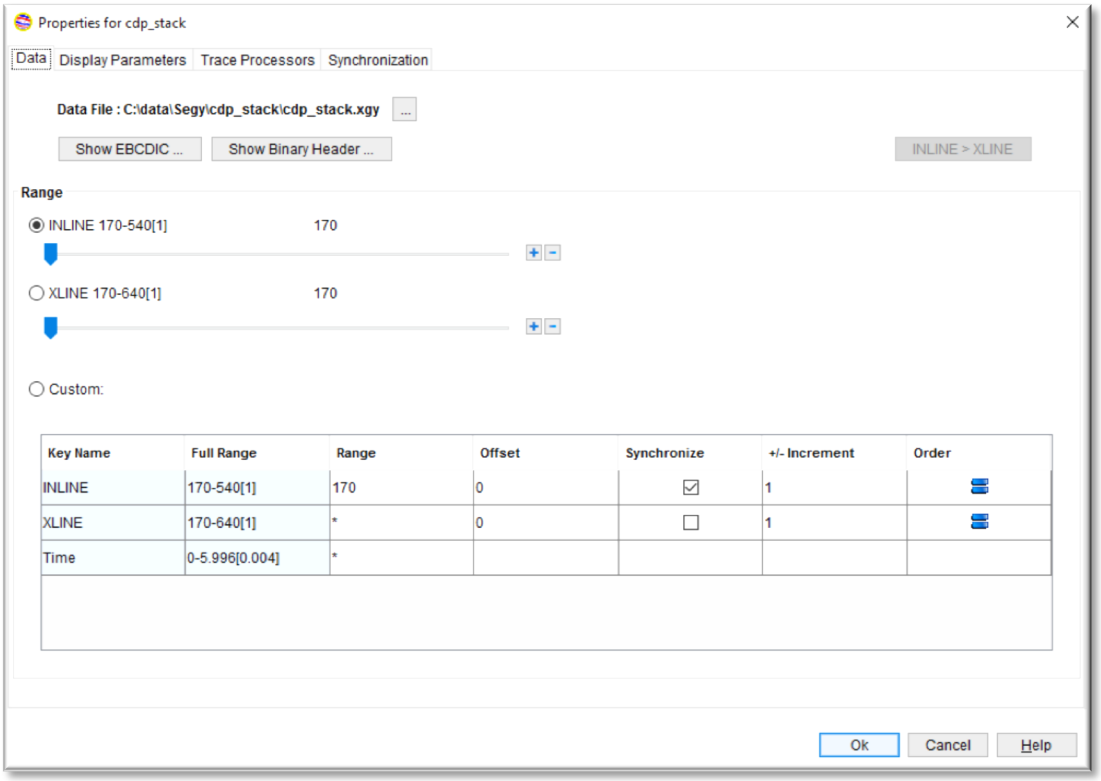


Figure 1 Data Range Selection Dialog

Enter an INLINE value under the **Range** field (we used the INLINE 400 in our example) and also check the **Synchronize** box for INLINE.

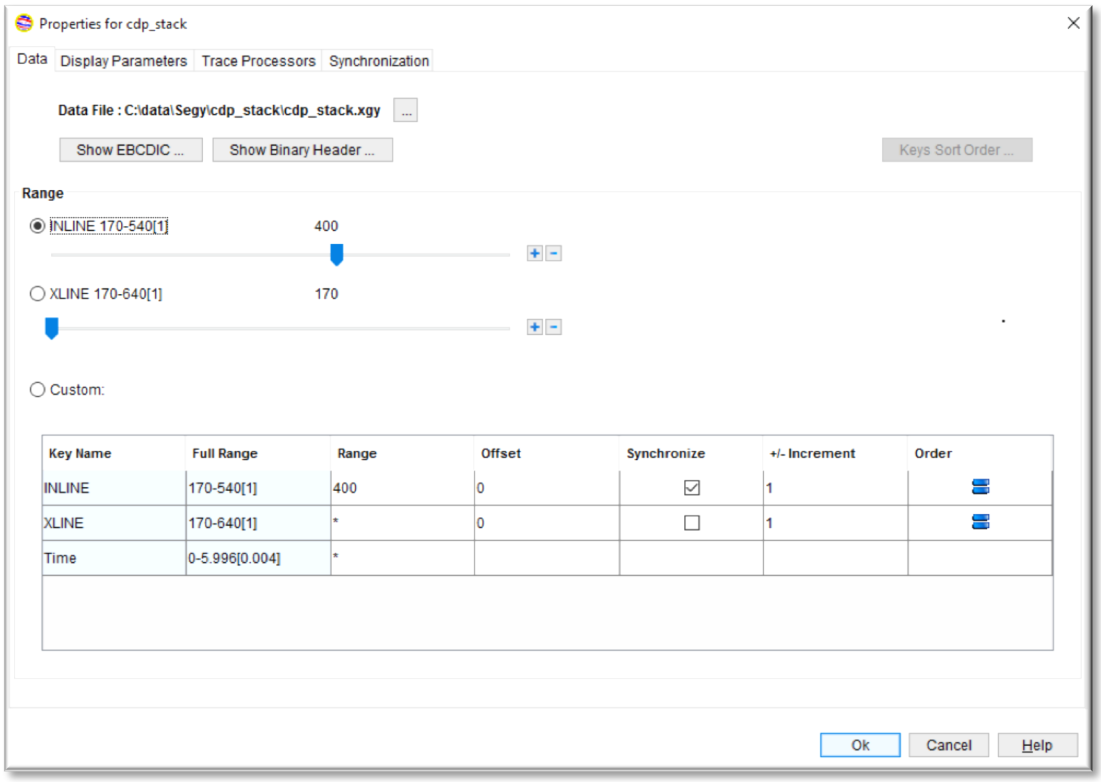


Figure 2: Completed Data Range Dialog

Press OK and you will get INLINE 400 displayed as shown below:

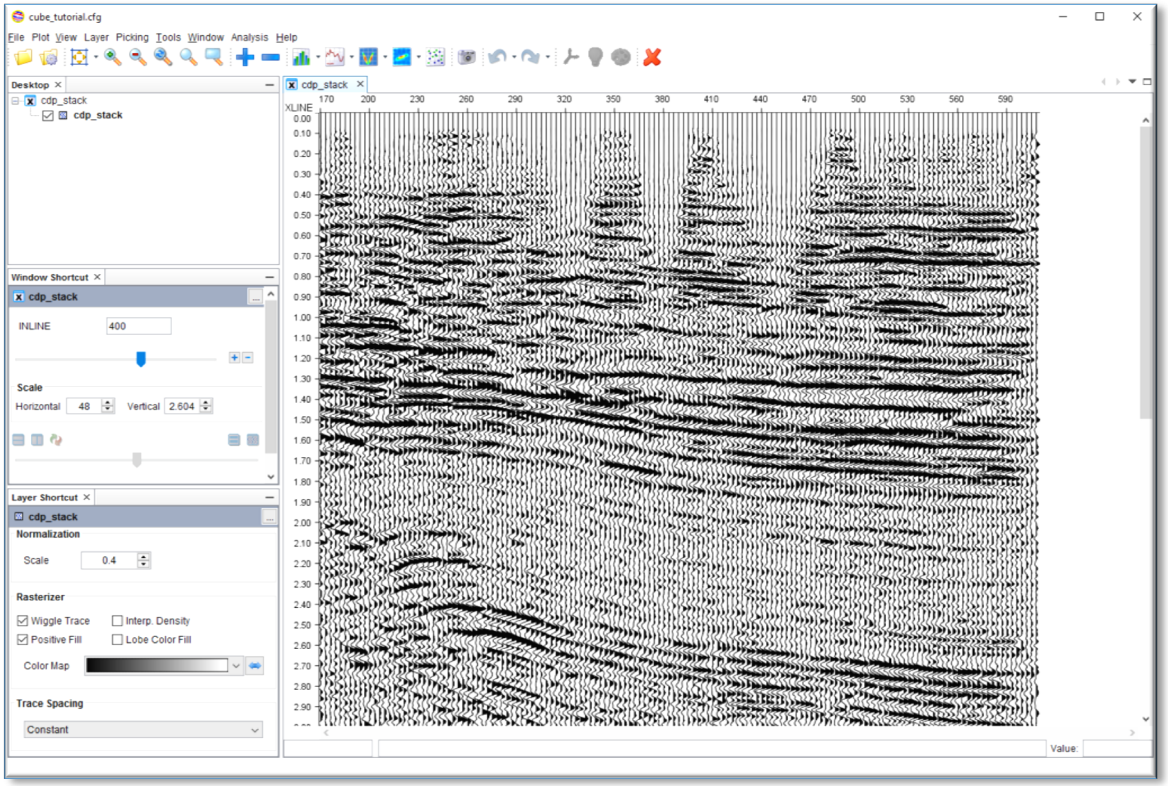


Figure 3: XSectional Window of INLINE 400

b. Configure the Display Parameters

First, you can adjust the display scale using the  or  buttons in the shortcut bar or by selecting menu option **Plot → Scale…**

Some of the frequently used display parameters are immediately available in the **Attributes Shortcut** window usually found at the bottom left of the main window. This window's content changes with the active Display window and provides easy access to some of the display parameters

For the complete listing of all display parameters, double-click on the layer name in the upper left corner (**cdp_stack**) of the newly created window; choose menu option **Layer → Property…;** or right-click on the data and then select **"Properties"** from the popup menu**.** You will obtain a new dialog box. Select tab **Display Parameters** as shown below.

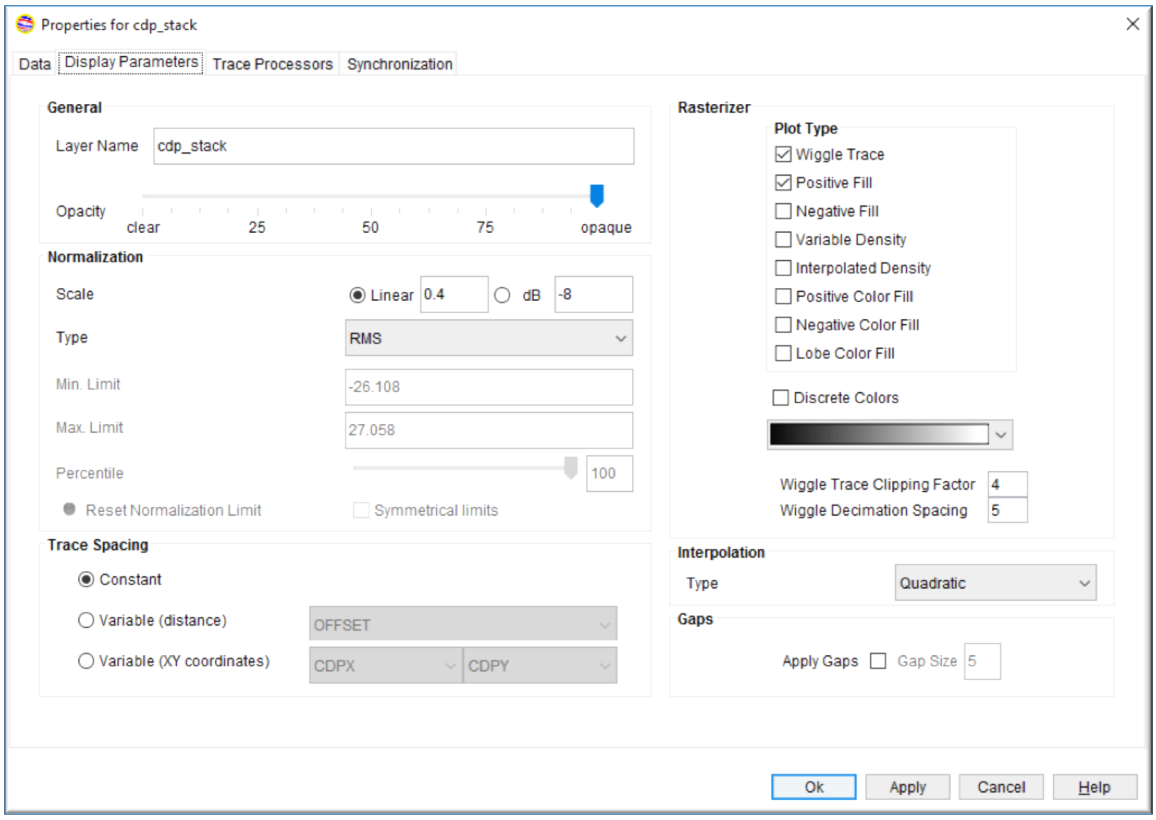


Figure 4: Display Parameters from the XSection Properties Dialog

First, we will change the **Plot Type** to Interpolated Density. To do this, first check the **Interpolated Density** toggle on the right side and uncheck **Wiggle Trace** and **Positive Fill**. Depending on your dataset, you may also want to play with the **Normalization** or **AGC** options to control the gain. A full description of those controls is available from the online Help. Select **OK** when you are done.

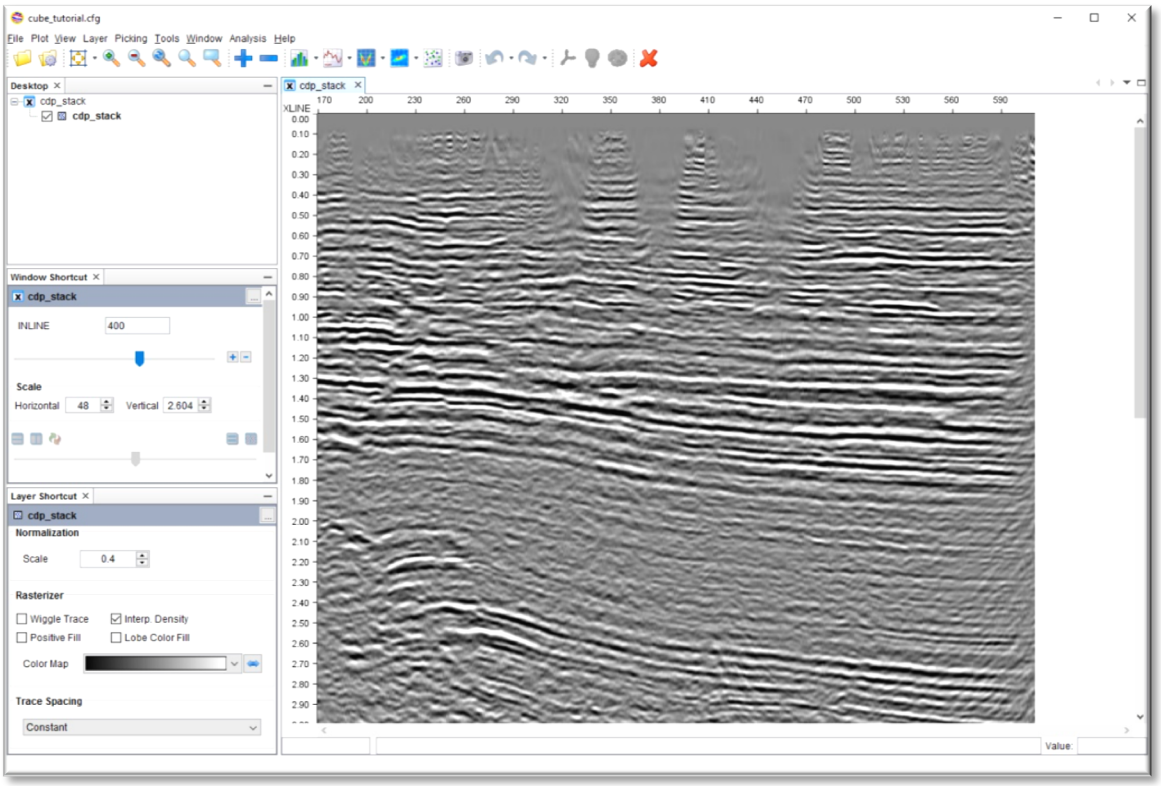


Figure 5: XSectional Window in Interpolated Density Plot Type

The default color map is a grey color map. We can use the color map editor in the Property Editor to change it. Bring back the **Property Editor** by double-clicking on the layer name, and then select the "Display Parameters" tab. In the **Rasterizer** Section, there is a pull down type box that looks like:

Figure 6: Color Bar Pull Down

Put the cursor on the down arrow and left-click to get the list of color bars as shown. The top bar is the one currently selected, in this case a gray scale.

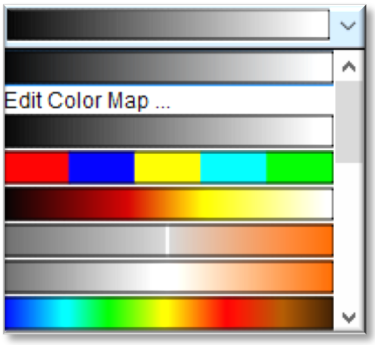


Figure 7: Expanded dialog to select the Color Bar

Either select an existing color bar by clicking on it or click on "Edit Color Map" to create your own. In creating a new color map, you obtain the following editor:

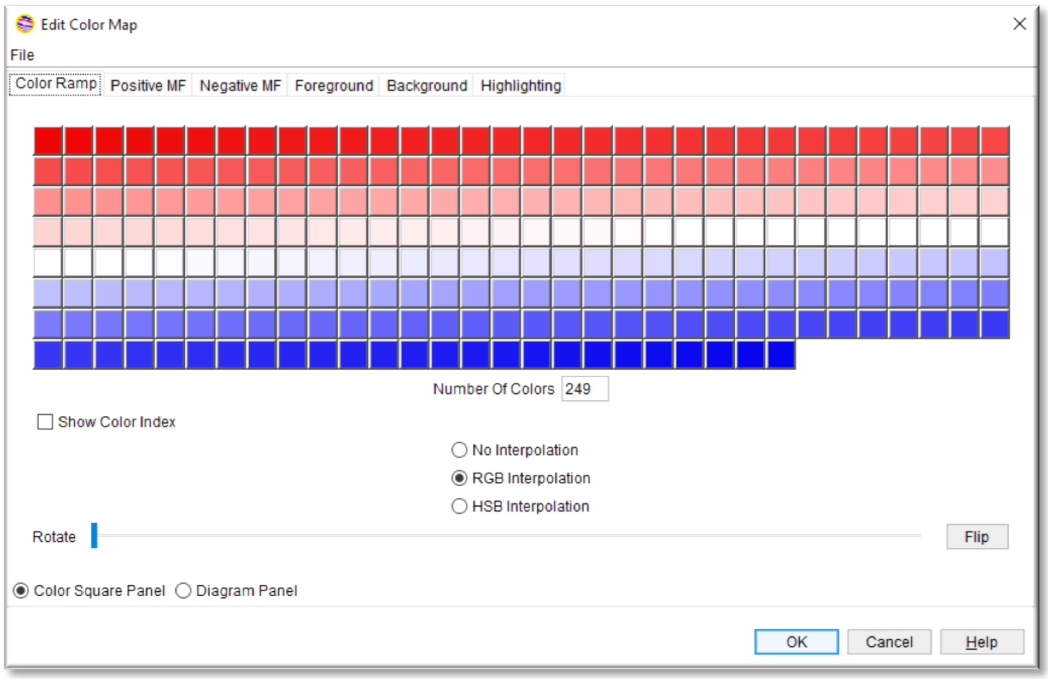


Figure 8: Color Map Editor.

Select toggle **Show Color Index** under the colored squares. Double-click on the black color square (number 0) and select a blue color. Next, double-click on square 100 and select a white color. Then double-click on square 199 and select a red color. When you are done, select **OK**. Adjust again the **Scale** factor as necessary in the **Display Parameters** dialog. The seismic display will be updated as shown below.

Note: To edit an existing color map, Click on the desired color bar, hit **Apply** and then go back to the Color bar pull down and select "**Edit Color Map**…". To save a Color Map there is a "Save" option under the **File** pulldown menu.

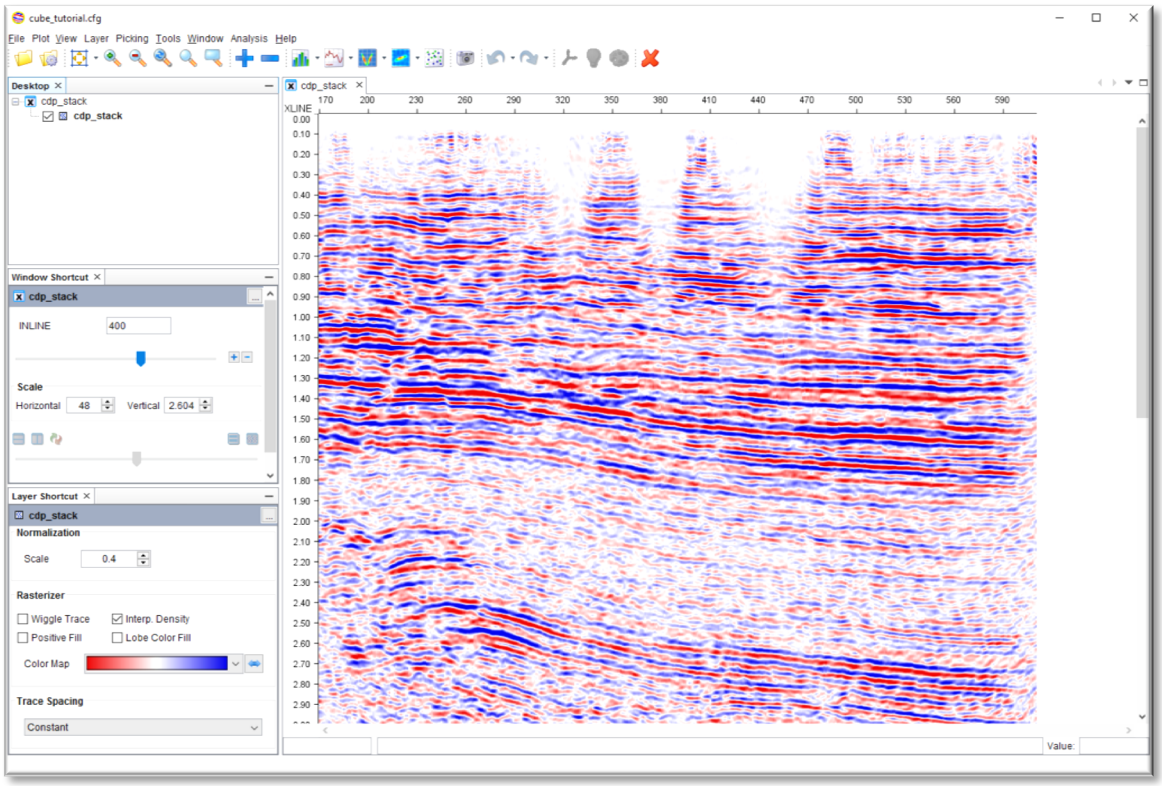


Figure 9: Interpolated Density XSection with new colormap applied

c. Set the attribute synchronization

We have already set the data synchronization in section **a.** for INLINE (more information on how to actually use it will follow). Since we are going to create multiple Windows, it may also help to set synchronization for attributes. By doing so, when we change a synchronized attribute on one Window (color map, scale, etc.) the other Windows will automatically be updated.

To set the attribute synchronization, double-click on the layer name or right-click in the window and select "**Properties**" from the popup menu. Then select the **Synchronization** tab on the attribute editor. You will obtain the dialog shown below. Simply select the toggles for the fields you want to synchronize between the various Windows and enable the Broadcast option.

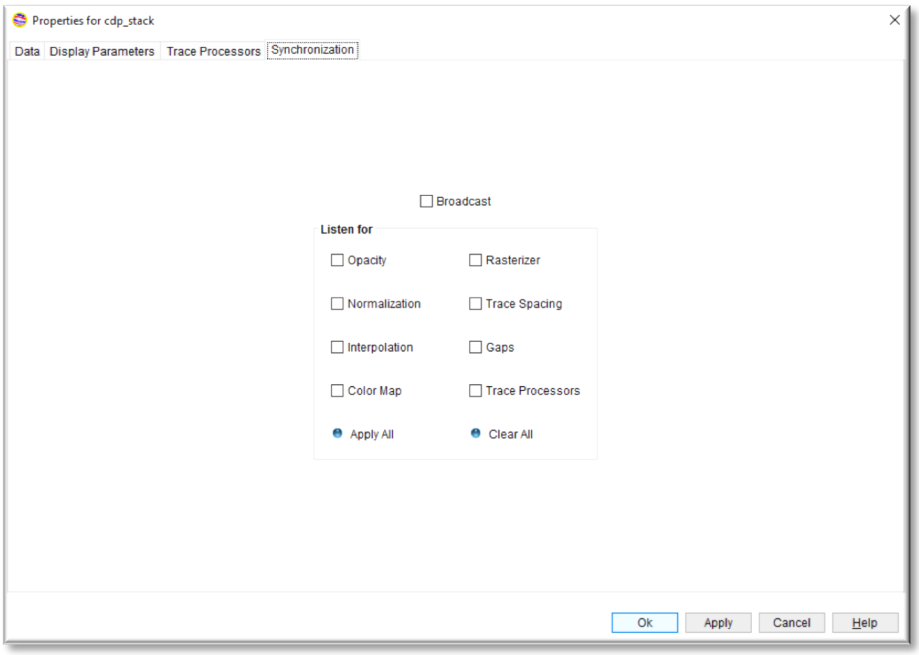


Figure 10: The Synchronization panel of the Properties Dialog

d. Configure the Labels and Annotation

The default Window provides annotation for the XLINE values. If we also want to see the INLINE values, we can configure the INTViewer to display an additional level of annotation. First select menu option **Plot → Annotation...** and select the **Horizontal** tab option. You will obtain a dialog as shown below.

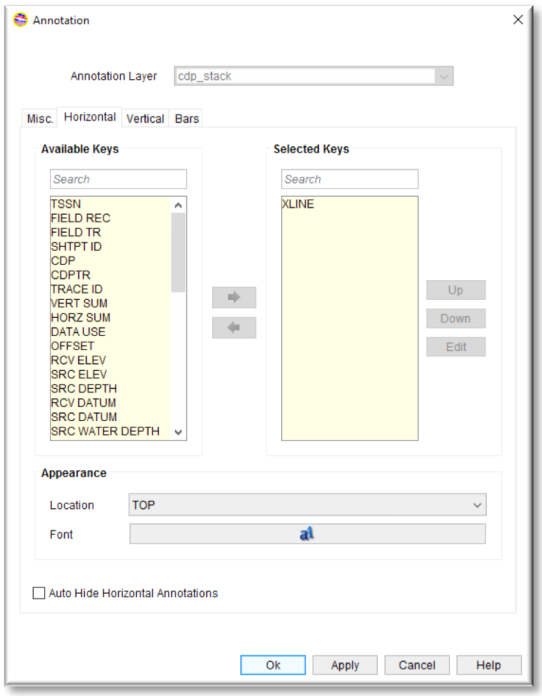


Figure 11: The Plot → Annotation, Horizontal Tab dialog

To add an INLINE axis, simply select **INLINE** in the list of **Available Keys** and press the ☐ key. Then select INLINE again in the **Selected Keys** list and press the **Up** key to display it above the XLINE axis. Press **OK** when done.

*You can also check the **Misc.** tab for additional annotation options, including specifying a plot title and displaying a color bar. You may also insert variables into the labels by surrounding them with the "%" sign. For example, for you put "XLINE=%XLINE%" (without the quotes) into the left label textfield, the current XLINE number will be in the left label and will update with the Window. The spelling and capitalization of the key (XLINE in this case) must be the same as was used by the indexer.*

Step 3 – Building the XLINE Window

To build the XLINE Window will now only be a few steps.

Select option:

File → Open in XSection → Seismic…

Select the master file (*cdp_stack.xgy* in our case). Once this is done, you will see a now familiar dialog window. Please note that this dialog inherits the settings from the previously created INLINE Window (actually the selected window if you already have multiple Windows). Although this does not really help us here, it will help us a lot for the other attributes: everything will be pretty much set the way we want.

To build the XLINE, set the INLINE **Range** field to a value within the specified range (250 in our case) and check the **Synchronize** box for XLINE. You should obtain something similar to the Window shown below.

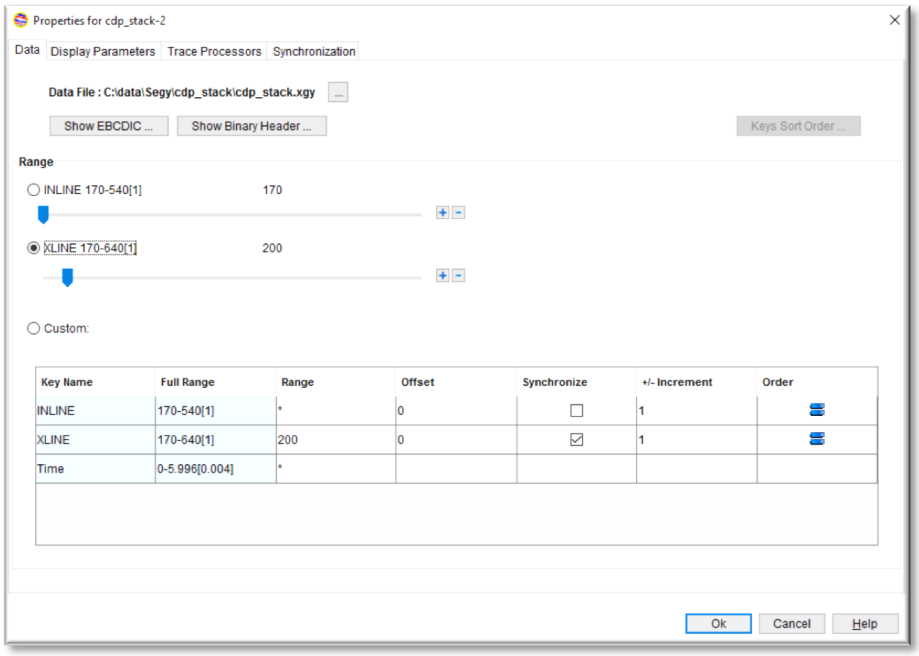


Figure 12: The XLINE Data Range Selection

Once you are done, press **Ok**. You can then use option **View → Combine All** to obtain the image below.

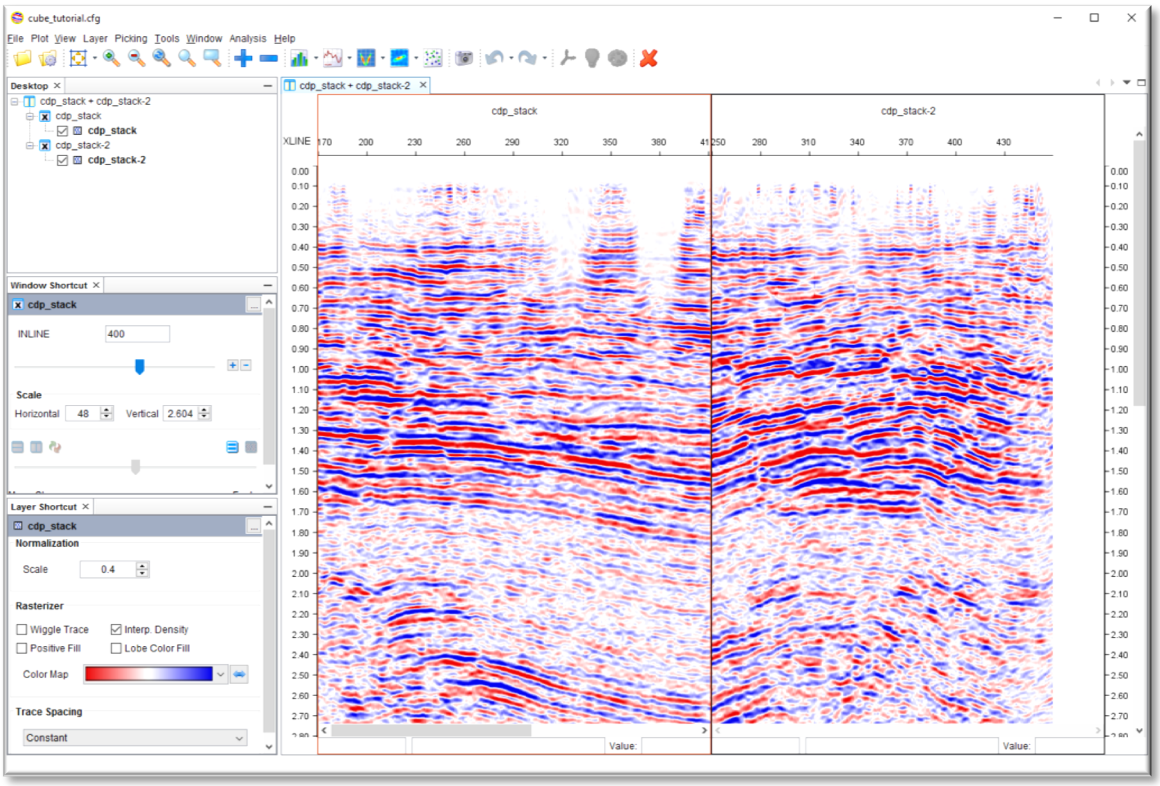


Figure 13: INLINE and XLINE XSections

The final step is to configure the top annotation to show INLINE and XLINE values which you can do as described in **Step 2**-section **d**.

Synchronization
Before we continue, let's review some of the synchronization features.

a. <u>Cursor synchronization</u>
Select one of the Windows using the left mouse button. Move the cursor around. See how the cursor is synchronized in the other Window. Cursor synchronization for a window is controlled in the **Synchronization...** option under **Plot** menu.

b. <u>Scrolling synchronization</u>
Move the vertical scrollbar around for one Window and see how the other Window is scrolled in coordination. Scrolling synchronization for a window is controlled in the **Synchronization...** option under menu **Window**.

c. <u>Data synchronization</u>
This is one of the most powerful features of INTViewer. Select one of the Windows with left mouse button. Right-click on one of the traces, and then click on "Broadcast Selected Point" in the popup menu. See how the other Window is changed to show the INLINE or XLINE corresponding to the trace you have selected.

When you double-click on a Window using the right mouse button**,** the INTViewer broadcasts the key values (including time) at that location. If another window is synchronized on one of those keys, it will automatically update its view with the new key value – Remember how we set the **Synchronize** flag for INLINE when building the INLINE Window and for XLINE when building the XLINE Window?

Specifying the Seismic Data Order

In the **Display Parameters** tab of the **Properties** dialog the order of the traces can be specified. At the far right of the table is the sort order. The default condition is noted by the icon " " meaning the data is displayed in the same order as read from the file. To sort ascending, left-click in this field until the icon " " is showing, To sort in a descending order use the icon "". To show an INLINE (constant INLINE value) in some sorted order, the order must be specified in the XLINE parameter line as shown below.

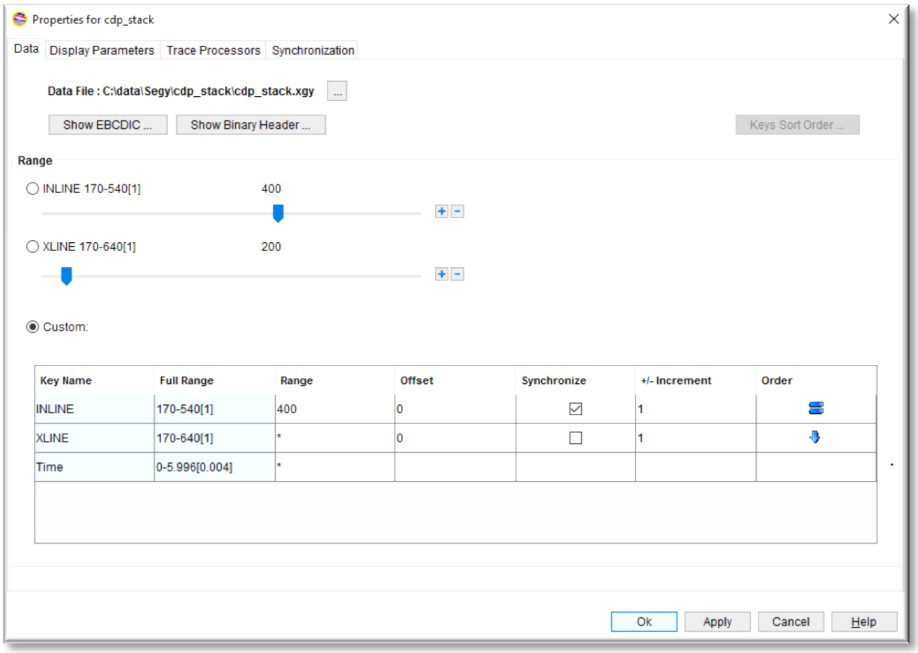


Figure 14: Properties setup for Descending sort order

Step 4 – Transposing the cube

First run the transpose wizard **Tools → Transpose Seismic…** or execute the SeismicTransposer script. If you need help running the transposer, see the TransposeTutorial.

Step 5 – Creating the Time Slice

a. Loading the data

Select menu option

File → Open in Map → Time Slice…

Specify the regular filename (*cdp_stacked.xgy* in our case). Open up the Property editor by double-clicking on the layer name on the upper left corner of the map Window or right-clicking in the map Window and selection "Properties" from the popup menu.

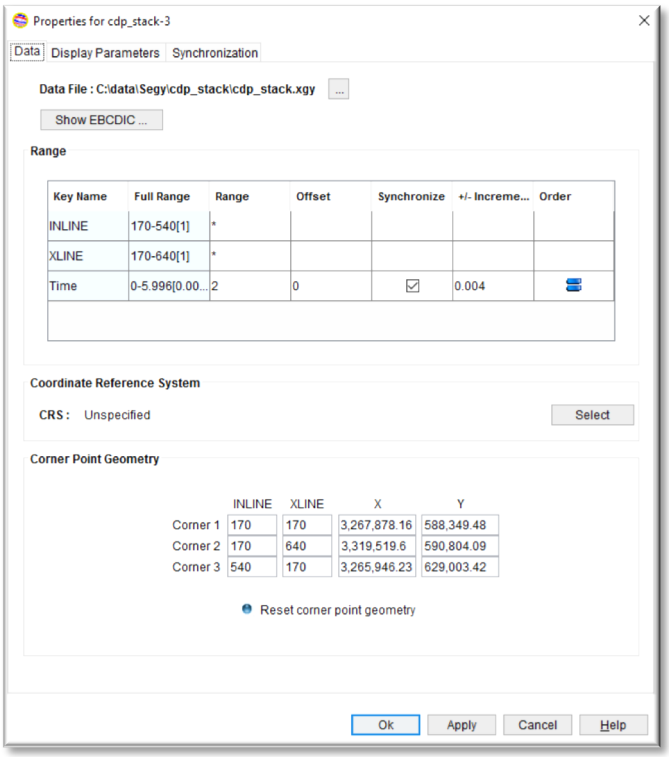


Figure 15: Data Range Dialog for Map Windows

Select a different Time value (**Range** field) if you wish, and check the **Synchronized** box for Time. Press **Ok** when done.

Adjust the display scale using the  or  icon buttons in the shortcut bar or by selecting menu option **Plot → Scale…**

b. Setting the map attributes

First we need to set the same color map as the one used in the INLINE and XLINE displays. The easiest is to bring up the Property editor by double-clicking on the layer name for the map window. From the properties dialog, select the Synchronization tab and check the **Listen to Color Map** box. Close the Property dialog by pressing **Ok**.

Then, bring the property editor for the INLINE Window by double-clicking on the layer name for the INLINE window. Select **Display Parameters** and press on the **Edit Colormap...** button. Don't change any colors but just select **Ok**. This will broadcast the color map. Since the map has been synchronized to listen to color map changes it will automatically update itself.

Finally, adjust the color amplitudes by adjusting the **Scale** and/or **Colormap min** and **Colormap max** values in the map property editor (under tab **Display Parameters**). Use the **View → Combine All** option to get a display similar to the screenshot below.

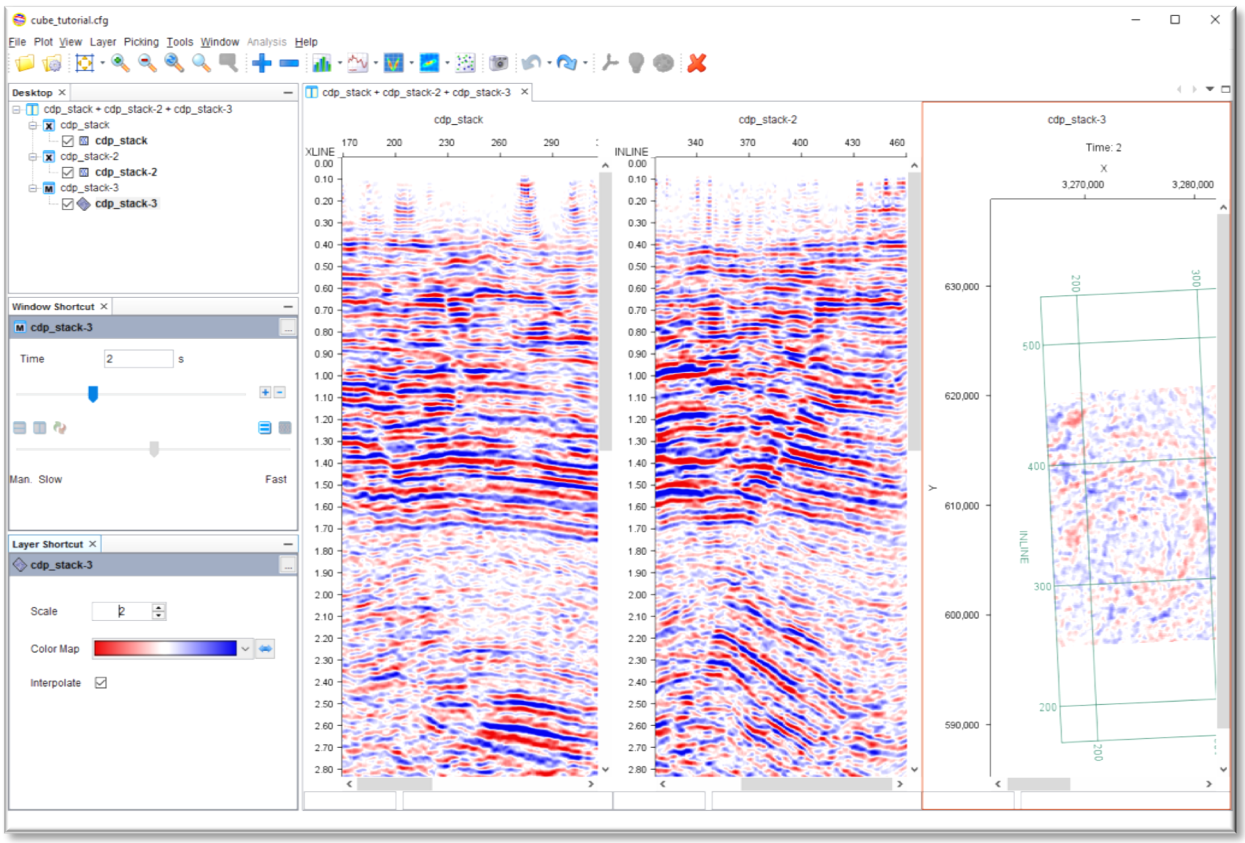


Figure 16: Display with Map Window added.

Synchronization

We can now experiment with some additional synchronization features. First, if you click on a point within the map window with then click with the Right Button and select **"Broadcast Selected Point"**, see how the INLINE and XLINE Windows are updated. Next if you click on a point within a XSection Window and then click with **Right Button** and select "**Broadcast Selected Point**" see how the map and the other XSection Windows are updated to show the new time value and position that you have selected.

Step 6 – Creating the Arbitrary Traverse

The final step is to create the arbitrary traverse. This will be quick.

First, select the Map window by click within the window. On the desired starting point of the Arbitrary traverse, hold down the Control Key and left-click the mouse for the first point, then click along the desired path for the arbitrary traverse. A right-click will terminate the line. A second right-click will bring up a popup menu; select "**Create Arbitrary X Section**". An XSectional window will appear containing the arbitrary traverse.

The Arbitrary Traverse is anchored and will not change if other windows broadcast points, however you can broadcast from the Arbitrary traverse and update other windows. Use the **View → Combine All** option to get a display similar to the screenshot below.

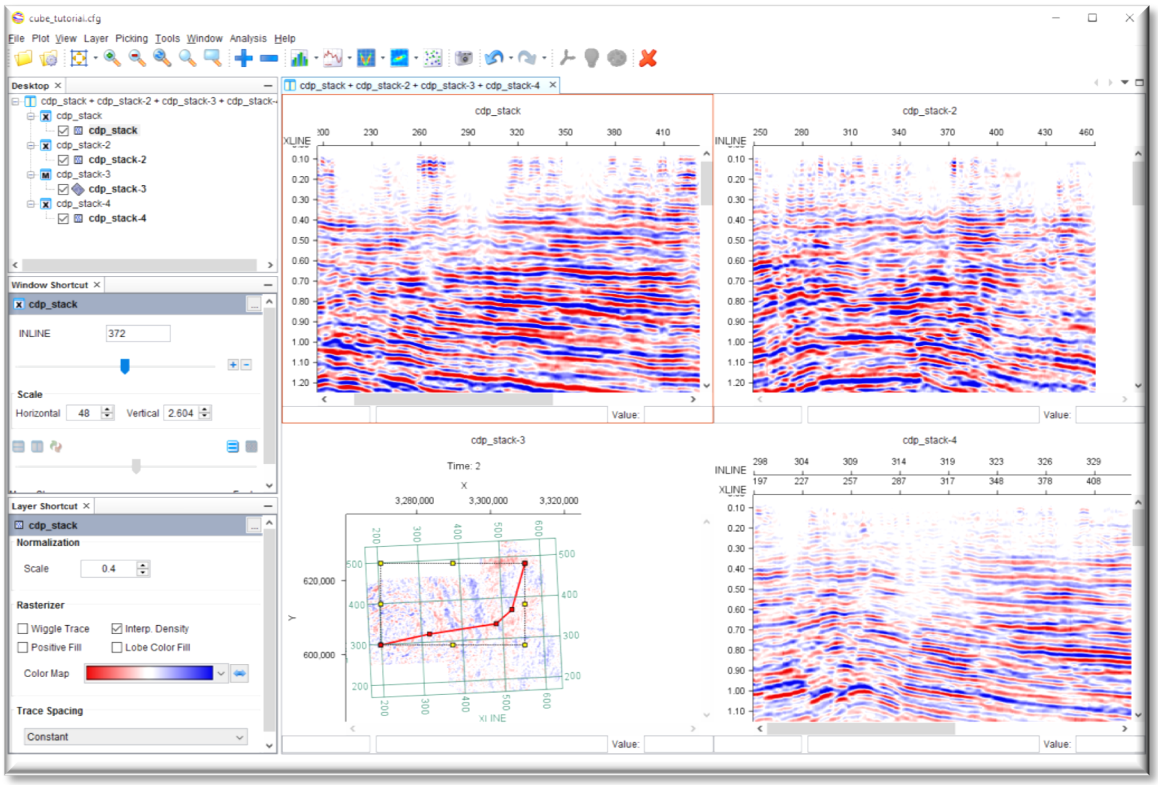


Figure 17: Display with Arbitrary Line Added at Lower Right.

You can move the cursor along the arbitrary section. Watch the cursor follow the line on the map display.

*To delete an arbitrary line on the map, select it with **Left Mouse Button** and press the **Right Mouse Button**. A popup menu will appear with options **Broadcast** and **Delete**. Select **Delete** to remove the line. Removing the line from the Map Window will not remove the arbitrary Traverse cross section.*

*The definition of the arbitrary traverse (INLINE-XLINE Value pairs) can be saved in a polyline (.xpl) file by selecting the arbitrary traverse line in the Map Window, and then right-click and select **Save Arbitrary Line** from the popup menu. A similar process can load this file.*

Step 7 – Saving your work

You can easily save the entire display you just created using option **File → Save Session…** You will be prompted for a filename where to save the session. The session can be later on restored using option **File → Open Session…** It will be restored exactly as you saved it.