

Aarhus Workbench hands-on course

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Workbench Intro

Introduction

This hands-on introduction to Aarhus Workbench is meant to be use in connection with a demo workspace such as the SkyTEM demo workspace that can be downloaded from the Aarhus Workbench wiki page. The different visualization tools used are however relevant for all data types.

Exercise 1 – GIS Layer manager and Tools

In this exercise we want to use the different GIS options from the GIS ribbon and the GIS layer manager with the GIS layers.

1.1 Navigate on the GIS map

Experiment with the different tools in the GIS ribbon to navigate the GIS map.

- Try to use the different zoom tools including pan, center, zoom, click, layer and mouse wheel. Use the mouse over hints if needed to understand the differences.
- Use the ruler to measure the distance between points.

1.2 GIS layer manager

Try out the different filter options in the GIS layer manager. They are quite useful in large workspaces with a lot of layers.

- Try to add a node from the workspace explorer to the GIS layer manager. Note how they now will be checked identical in the workspace explorer and GIS layer manager no matter where it was checked.
- Use the filter to search out specific layers in the GIS layer manager.
- Use the dropdown for layer types to choose specific type of layers.
- Toggle between visible/not visible layers.
- Remove all filtering so that you again can see all the layers in the layer manager
- Drag layers up and down with the mouse to set the order of the layers. This can also be done by right clicking and choose **Send layer to front/back**.
- A layer can be removed from the layer manager by right clicking and use **Remove layer from GIS**.

1.3 Making use of Use Selection to see borehole reports and show data

The GIS ribbon function called **Use Selection** can be used to select something in an active layer.

- Select the Borehole Selection (the node looks like a brown pin in the workspace explorer), so that it becomes the last selected layer, then use the select **Pointer** from the GIS ribbon to select a borehole on the GIS map. Go to **Use Selection** and pick the **Borehole report** option to see the borehole report for the selected borehole or boreholes.
- Try using the **Polygon** select toll to inspect data from the Model Selection (the node looks like a blue pin in the workspace explorer) a with **Use Selection** and **Show Data**.

1.4 GIS tools - Draw

It can sometimes be practical to be able to draw directly on the GIS. In a few cases such drawn layers are also used directly by Workbench.

- Draw some points and save the layer.

- Draw a polygon. Double click to finish the polygon. Clear the polygon.
- Change the style of a layer after selecting the drawing tool, but before drawing it.

Exercise 2 – Themes and sections

In this exercise we are going to visualize our inversion models with some sample quick themes and sections.

2.1 Mean resistivity maps

- Select a model selection node in workspace explorer, then click **Theme** on the visualization ribbon.
- Create horizontal mean resistivity maps in depth. Create 10 layers going from 0 m to 150 m with an interval length of 15 m. Blind at DOI standard (Depth of Investigation). Press Apply.
- Also create horizontal mean resistivity maps in elevation, but first use the Histogram button to see the topography that affects your model selection. Pick a starting elevation and then create another 10 layers with an interval length of 15 m. Press Apply and then Close.
- Click on the plus in front of the model selection to unfold the model selection and make it possible to select the just created theme nodes. Select the map going from 45-60 m. Click **2D Grid** on the Visualization ribbon.
- Make a grid using the following settings:
 - Search radius 400 m.
 - Node spacing 25 m.
 - Use inverse distance with logarithmic data transform as interpolation.
 - Use the resistivity.avc color scale. Try making this map without Interpolate image.
 - Set it to Add layers to GIS after creation.

Press ok. This will create two nodes, a grid node and an image node. Check the box in front of the image node, you will now see the mean resistivity map on the GIS with a color scale at the bottom.

- Make an additional image of the same grid. Select the grid, and then click **Image** on the visualization ribbon. Use the resistivity.avc color scale, but this time use Interpolate image and set the Grid subdivision factor to 3. Press ok. Add the image to the GIS and compare it with the previously created image.
- Try another grid and image of the same theme, but this time using Kriging as interpolation method. Add the image to the GIS and compare it with the previously created image.

2.2 Sections

- Add the model selection to the map to see the positions of the soundings. Use **Draw** on the Sections ribbon to draw a section along one of the lines with data.
- Select the profile from the workspace manager and add the model selection with **Models** (Add Layers) on the Section ribbon.
- Choose the **Model Selection Nodes** option. Use the resistivity.avc color scale and a fitting search radius. The search radius must be big enough so that the distance from your drawn section line to the soundings that you want in the section is covered. But not so big that you get soundings from too far away.

- Finally go into **Model Display Settings – Model Bars** and set it to Elevation. Press Ok.
- Check the box in front of the profile to open the section. Note that the box here doesn't add or remove the layer from the GIS. To do that for profiles one instead uses **Hide/Show Section** on the Section ribbon.
- Move the mouse along the section to see where the models are on the GIS map.
- Go back to the profile and add the borehole selection with **Lithological Logs** on the Section ribbon.
- Experiment with the section properties:
 - Adjust the axes by clicking on them or right-click on the section and pick the axis.
 - Use the Chart tools to zoom and pan.
- Experiment with the properties when adding the model selection to the profile:
 - Change search radius.
- Try selecting an inversion result node (looks like 3 little 3-layer models) and use (create new) **Model** from the sections ribbon to create sections that follow specific line of the inversion result.

Exercise 3 – Batch gridding

In this exercise we want grid all the maps using **2D Grid**.

3.1 Mean resistivity maps – batch gridding

- Select the model selection and press **2D Grid**. Select all the elevation themes we made earlier. Use the search filter and select all.
- Use the following settings:
 - Search radius 400 m. Large enough to reach nearby lines.
 - Node spacing 25 m. No need to make this smaller than your sounding distance.
 - Use logarithmic data transform. Use inverse distance for speed or use Kriging for nicer looking maps. Leave the remaining search, grid and interpolation settings as they are.
 - Use the resistivity.avc color scale.
 - Set it to Add layers to GIS after creation.

Press ok and let the batch process create and add the layers to the GIS.

- Now all the layers can be show or hidden either from the Workspace Manager or GIS layer manager.
- Select one of the image nodes in the workspace manager and press **Images** (Quick Review) on the visualization ribbon.
- Filter so that you only see the themes with depth you just created. Add them all with the arrow icon and press ok.
- Now you can quickly shuffle through all the layers with different depths and see how the geology changes.

Extra Exercise 4 – Color scales and more section functions

In this exercise we are going to look at the advanced section functions like interpolated 3D grid and using a master section.

4.1 Interpolated 3D grids and grids as lines

- Make a new profile or use an existing and add the models plotted with elevation.
- Select the profile and press **Interpolated 3D grid** on the sections ribbon. Use the following settings:
 - Use the resistivity.avc color scale
 - Select all the grids with elevation, but use the filter to make sure not to have multiple elevation grids from the same elevation interval.
 - Pick a grid sample factor at 0.25.
 - Pick extra fine as resolution.
 - Use interpolate logarithmic.
 - Plot as elevation.
 - If the area is very flat one can make do without a DEM, but if there is more topography, it is advisable to use a DEM here to cut the top of the interpolated image. To use a DEM it has to be loaded into the workspace with **Add Elevation Model** on the workspace ribbon and then it will appear in the dropdown here.
 - Don't use fading in this case.
- Make a new theme from the model selection. Use **Layer Parameters** with **Elevation top of layer** for the first layer from the top. This of course returns the topography of the model selection. Then grid the theme. We can of course also make an image with an appropriate color scale, but here we mainly want to create a quick elevation grid that we can add to a section by pressing **Grid as line** in the section ribbon. Try doing so using a grid sampling of 5 m.

4.2 Explore the copy options for Sections using a master section

For larger surveys it is often practical to setup one section and then apply the same setup to the other sections.

- When drawing a new section, it is possible to point to an existing master and get the new section created with the same layers. Try this.
- Select a section and press **Section (copy)** on the sections ribbon to make a copy of a section so that you can have two versions of the same section open at ones. This is useful when comparing different data types on the same section.
- Select a section and press **Shift Section** on the sections ribbon. Choose a low number of steps, shift in both direction and press ok.
- Select a section and press **Layers** on the sections ribbon to copy the layers of that section to the selected section.
- When working with a very large number of Sections, it is often useful use **Batch (Add Layers)** on the sections ribbon to do the copying. Experiment.

Extra Exercise 5 – Making your own color scales

In this exercise we want to make a new color scale.

5.1 Creating a new color scale

- Select a mean resistivity grid and press **Image** on the visualization ribbon. This time press **Edit** to edit the color scale. This opens the color scale wizard. Remember that it is possible to press F1 to access the wiki help if needed.
- The first page is the design page. It holds the setup of the colors to be used, the order of those colors and a smooth or discrete option. If you for instance simply want a resistivity color scale with the reverse colors, that is easy to make.
- The second page is the map data page. It connects the raw colors to the map data. For themes there is a preview of the image with the connections. Often one will want to edit the **user defined data max/min** to an appropriate range and save the color scale. But it is also possible to change how the colors will be distributed in greater details.

Extra Exercise 6 – Geological interpretation on sections

In this exercise we want to draw geological layer boundaries on a section.

6.1 Geological interpretation on sections

- Open the profiles that shows the interpolated 3D grid.
- Press GEO in the upper right corner of the section to open the options for geological surfaces. Press **New Surface** and name the layer (e.g. tertiary clay). The new surface layer is now shown in the list and under the Geological surface node in the Workspace Explorer.
- Select the surface and press the drawing icon above. Start drawing the boundary to the clay.
- When done, choose the next icon (right from the drawing icon), select a drawn point and drag it up or down.
- Select a drawn point and change the uncertainty where the layer boundary is less well defined.
- Try to delete a point with the delete icon.
- If there are many sections, it is possible to draw layer boundaries on all the sections and use these boundaries as a grid.