ResInsight

ResInsight Advanced User Course

Q3 2024

Ceetron Solutions

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Support and Resources

Main help page

https://resinsight.org/

Yammer

Internal Equinor Yammer channel "*ResInsight users*"
https://web.yammer.com/main/threads/eyJfdHlwZSI6IlRocmVhZCIsImlkIjoiNzM3MzA5MDI1MjgwMDAwIn0

Tutorials – introduction

There are a few tutorials available, and we also have recorded videos for some of them.

https://github.com/CeetronSolutions/resinsight-tutorials
https://www.youtube.com/channel/UCEJoH_ti1YZXz4hPMeAKMgw

Overview of the interface for 3D visualization

https://github.com/CeetronSolutions/resinsight-tutorials/blob/main/tutorials/graphical-user-interface/graphical-user-interface.md

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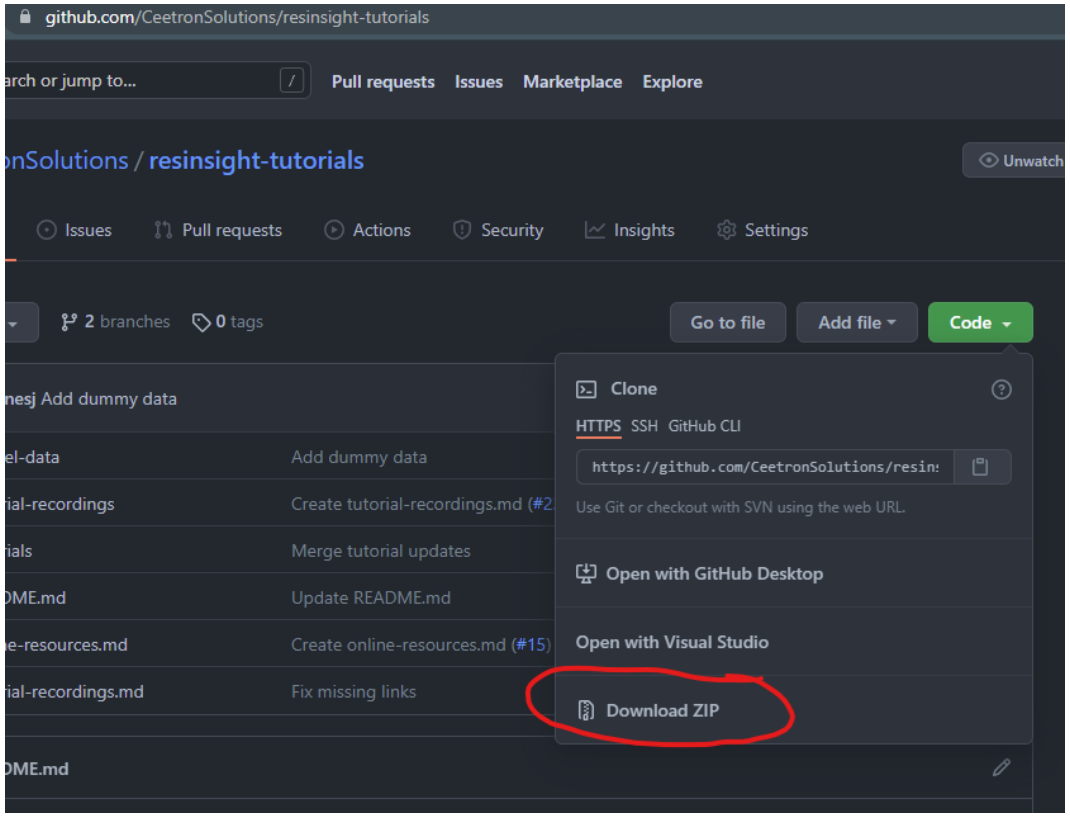
Preparations

Test models used in tutorials are available from https://github.com/CeetronSolutions/resinsight-tutorials
The data to be used in tutorials is in the folder **model-data.**

Either clone the GitHub repository, or select "**Download ZIP**" from the **Code** menu



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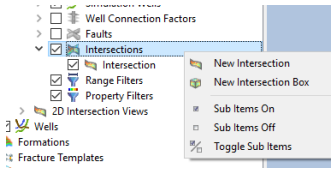
Conventions

In this document, **bold text** indicates an object in the property tree. Menu item text is “written in quotes”.

Example

Select “New Intersection” from **Intersections.**



Tips and tricks

Please close the existing project (“File->Close Project”) before starting a new tutorial. This will help you to avoid confusion caused by data from previous tutorials.

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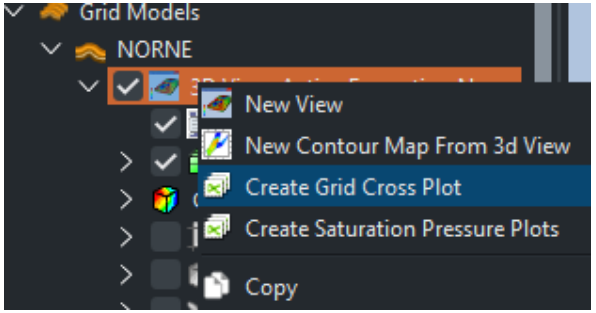
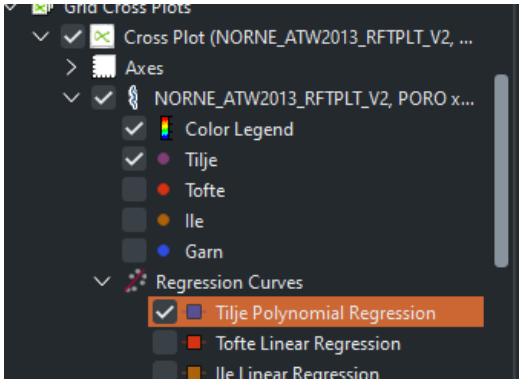
a) Grid Cross Plot with formations

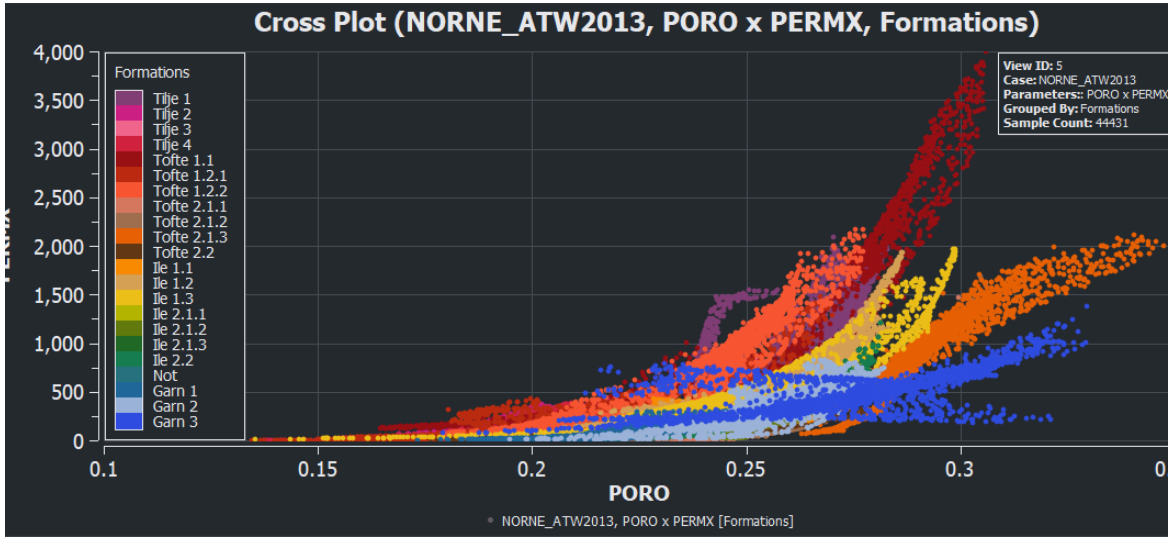
Objective: Create grid cross plot with automated categories based on formations

1. Import grid data using “Import Eclipse Case” from folder “model-data/norne”
2. Import formations from folder “model-data/norne/Norne_subZones.lyr”
3. In **Cell Result**, select **Static->PORO**
4. In the **Project Tree**, open the right-click menu of the view, Select “Create Grid Cross Plot”. The default **X-Axis Property** is defined by the **Cell Result** in the 3D view, and default **Y-Axis Property** is **Depth** with the Y-axis inverted with increasing values at the bottom of the plot
5. Select **PERMX** as the **Y-Axis Property**
6. Click on a sample in the plot to highlight all samples for a group
7. Regression curves
    a. Disable all other cross plot curves except one from Tilje formation
    b. In the **Property Editor**, enable the regression curve for this formation
    c. Adjust the regression curve properties in the **Property Editor**





https://resinsight.org/plot-window/gridcrossplots/



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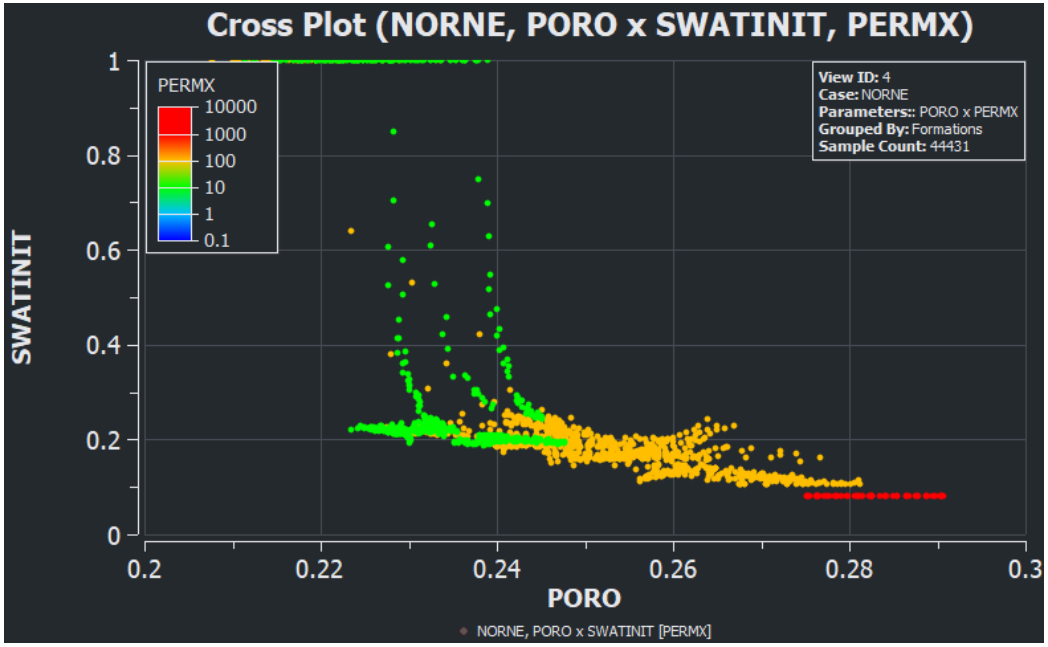
b) Grid Cross Plot with filtering

Objective: Create grid cross plot with filtering

1. Import grid data using “Import Eclipse Case” from folder “model-data/norne”
2. Import formations from folder “model-data/norne/Norne_subZones.lyr”
3. In the 3D view, set **Cell Result** to **Static -> FIPNUM**
4. In the **Project Tree**, open the right-click menu of the view
5. Select “Create Grid Cross Plot”
6. Set Static **PORO** as x-axis
7. Set Static **SWATINIT** as y-axis
8. Set **Group Data by** “Result Property”, select **Static** -> **PERMX**
9. Select color legend in Project three
    a. See how manipulation of “*Number of intervals”* affects the plot
10. In the grid cross plot, select **Filter by 3D view**
11. Go back to the 3D view, and create a property filter based on **FIPNUM**
    a. Select FIPNUM value 6 the category selection (multiple selection is supported)
    b. Hide faults to see the filtered grid cells
12. Make sure both the 3D view and the plot window are open at the same time. Modify the selected FIPNUM values in the property filter and see how the plot is updated as visible cells in the 3D view changes.
13. Right-click the **Cross Plot** in the Plots tree view and select “Show Plot Data” to see the plot values.



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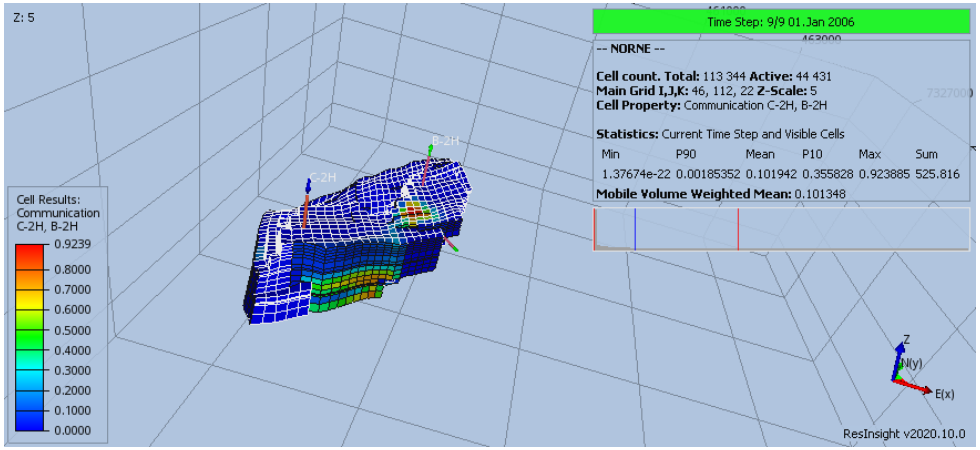
c) Sector model export

Objective: Export a subset of the grid based on visible cells

1. Import grid data using “Import Eclipse Case” from folder “model-data/norne”
2. Move to the last time step as there is no flow at the first time step
3. In the 3D view, set **Cell Result** to **Flow Diagnostics**
4. Select “*By Selection*”
5. Select injector **C-2H** and producer **B-2H**
6. Select **Injector Producer Communication**
7. Create a property filter on communication between **C-2H** and **B-2H**
8. Hide the faults to see the cells
9. In the right-click menu in the 3D view, select “*Export Eclipse Sector Model*”
10. Select Export Folder and additional settings, and click **Export** button
11. Import the exported data
    - **a.** Select “*Import Eclipse Input Case*”
    - b. Select all files exported in the previous step (use multiselect in file dialog)
12. Compare the imported data with the original binary case
    - a. Select **PERMX** in both views
    - b. In the right-click menu in the 3D view, activate **Compare to**

https://resinsight.org/export/sectormodel/



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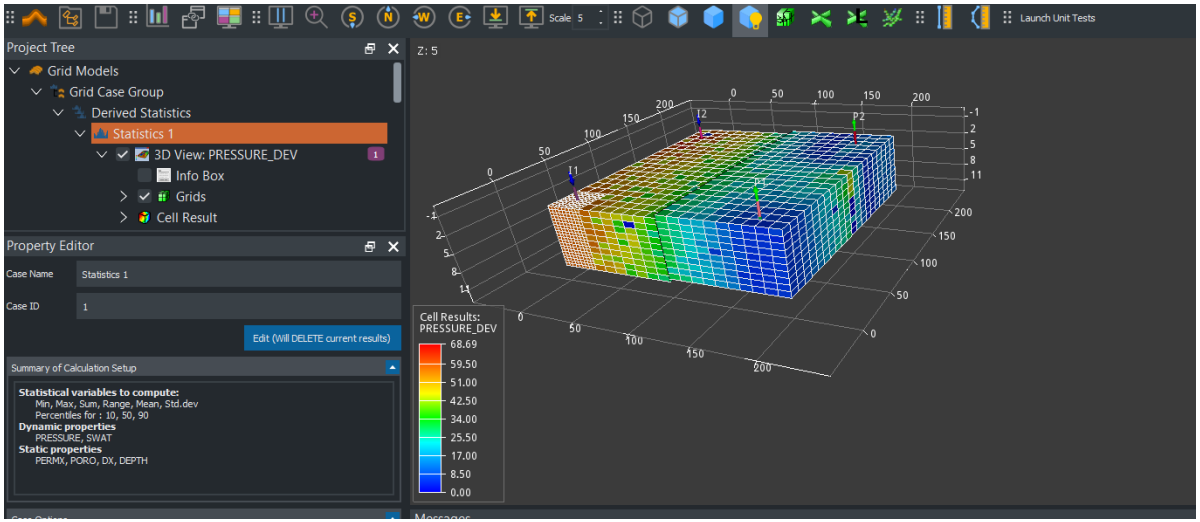
d) Ensemble Grid Case Statistics

Objective: Import an ensemble of grid cases and compute statistics cell by cell



1. Use data located in folder "model-data/grid_ensemble"
2. Import data using "*Create Grid Case Group*"
   Use the **Find** button to search the folder for files matching the search filter.
   The imported cases can be investigated in **Source Cases** folder in the **Project Tree**
3. In the property panel, click the button "Compute" to compute default statistics
4. Select dynamic property **PRESSURE_DEV**, move to last time step
   PRESSURE_DEV represents the standard deviation of pressure based on source cases
5. Select **Statistics 1**, and in the **Property Editor in group Case Options**, select one of the source cases to use for well data. This will display simulation wells in the view.
6. Create a new view and create a property filter
   a. Select **PRESSURE_DEV** (pressure standard deviation) larger than 40
   b. If you will set the cell result to match the property filter, open the right-click menu of a property filter and select **Apply As Cell Result**
7. **[Optional]** Select **Statistics 1**. In the **Property Editor**, click the button "Edit(Will DELETE current result)"
   Add **PORV** to the list of static variables. The user interface for selection of properties supports multiselect of items by pressing and holding **CTRL** key when clicking items in the list.
8. **[Optional]** Handling of inactive cells (Use Zero as Inactive Cell Value)
   a. When computing statistics on **PRESSURE**, it is usually required to leave this option off (total cell count is active)
   b. When computing statistics on **PORO/PERM**, it is usually required to enable this option (total cell count is active + inactive)

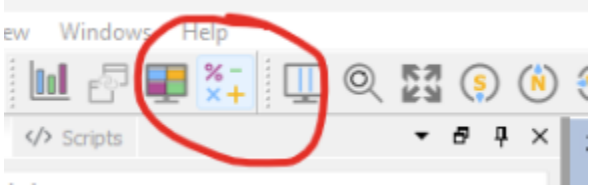
https://resinsight.org/3d-main-window/casegroupsandstatistics/

The statistics case can be used as data source for well log extraction of grid cell data as described in the next section.

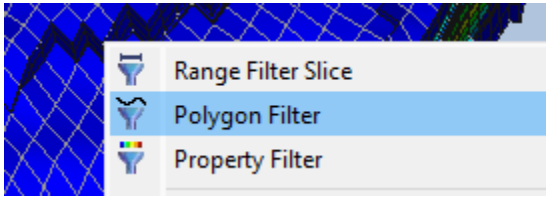
e) Grid Property Calculator

Objective: Compute mobile oil using a grid property calculator

1. Import grid data using “Import Eclipse Case” from folder “model-data/norne”
2. Open the grid property calculator

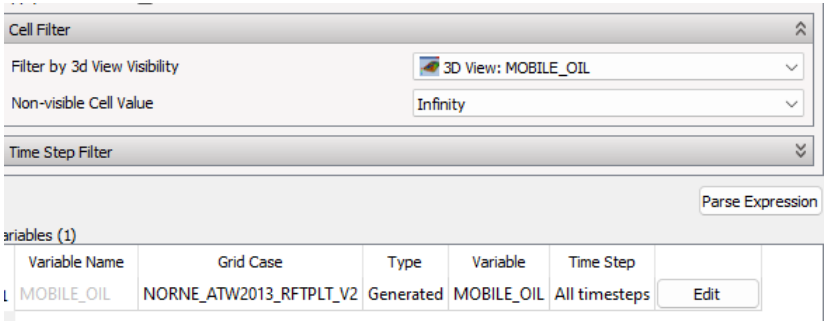


3. Add the expression text and click **Parse Expression**
   MOBILE_OIL := if(((SOIL-SOWCR) < 0.00), 0.00, PORV*(SOIL-SOWCR))
4. Assign corresponding properties to the variables using the **Edit** button
5. Select the **Cell Result** “*Generated ->MOBILE_OIL*”
6. Create a contour map, and set **Map Projection**, “*Result Aggregation->Sum”*
7. In the 3D view, create a polygon cell filter for a section of the grid where there is a lot of mobile oil. Activate the the right click menu, and select “*Polygon Filter”*

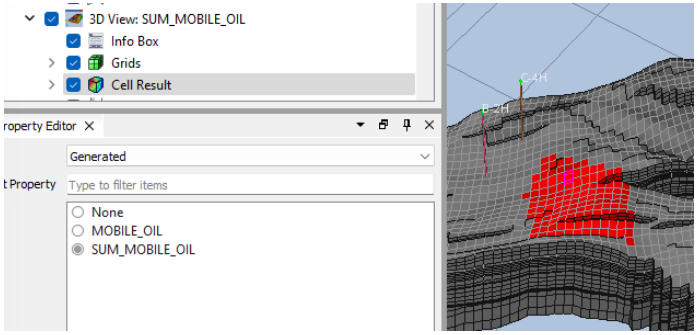


8. Open the Grid Property Calculator, and create a new expression
   SUM_MOBILE_OIL := sum(MOBILE_OIL)
9. Expand the **Cell Filter** group, and for **Filter by 3d View Visibility**, select *“3D View: MOBILE_OIL”*

10. Click **Parse Expression**, an assign the **Generated** variable **MOBILE_OIL**



11. Click on calculate, and create a view of the grid property **SUM_MOBILE_OIL**



The aggregated sum is assigned to all cells participating in the calculation**.** The value can be seen in **Result Info** by clicking on a cell.

Note that expressions can be stored to a text file for reuse in other projects. This is available from button operations in the **Grid Property Calculator**.

https://resinsight.org/calculated-data/gridpropertycalculator/
https://resinsight.org/calculated-data/calculatorexpressions/

See the following description on how to calculate this on an ensemble of grids.
https://github.com/OPM/ResInsight/discussions/10913

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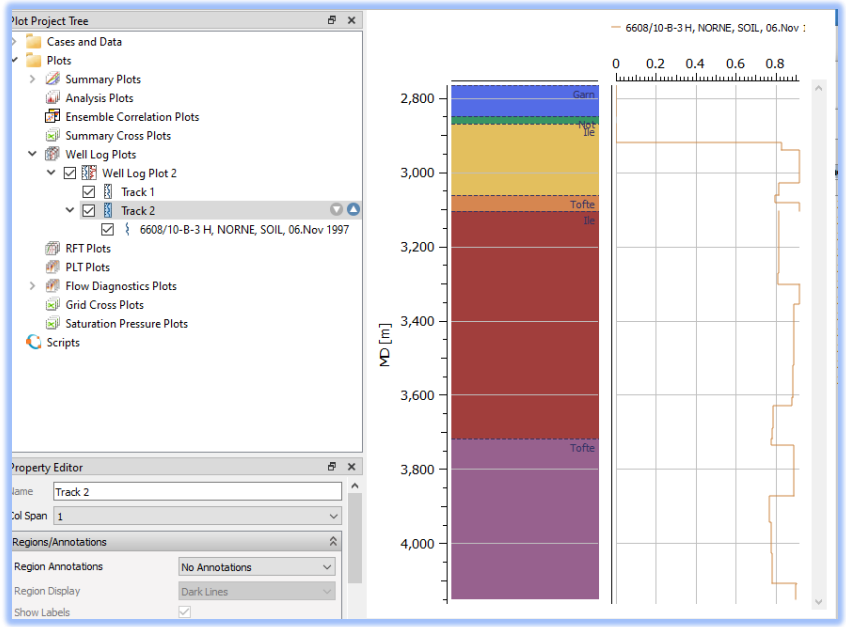
f) Well Log Extraction

Objective: Plot well log extraction curve in 2D plot window

1. In 3D main window
    a. Import grid case from “norne” and import formations from “norne/Norne_Fm.lyr”
    b. Import well path "model-data/norne-well-logdata/dummy-B-3H.dev"
    c. Select cell result **Dynamic -> SOIL**
    d. Select well path **DUMMY-B-3H**, and from the right click menu select “*Well Plots->New Well Log Extraction Curve*”
    e. Activate the plot main window
2. In plot main window
    a. In the project tree, activate right-click menu of the plot and select “New Track”
    b. Select the new track in the Project tree
    c. In the Regions/Annotations group, set **Region Annotation** to **Formations**
    d. Make sure **Formation Case** is set to **Norne** and **Well Path** is set to **DUMMY-B-3H**

https://resinsight.org/plot-window/welllogsandplots/



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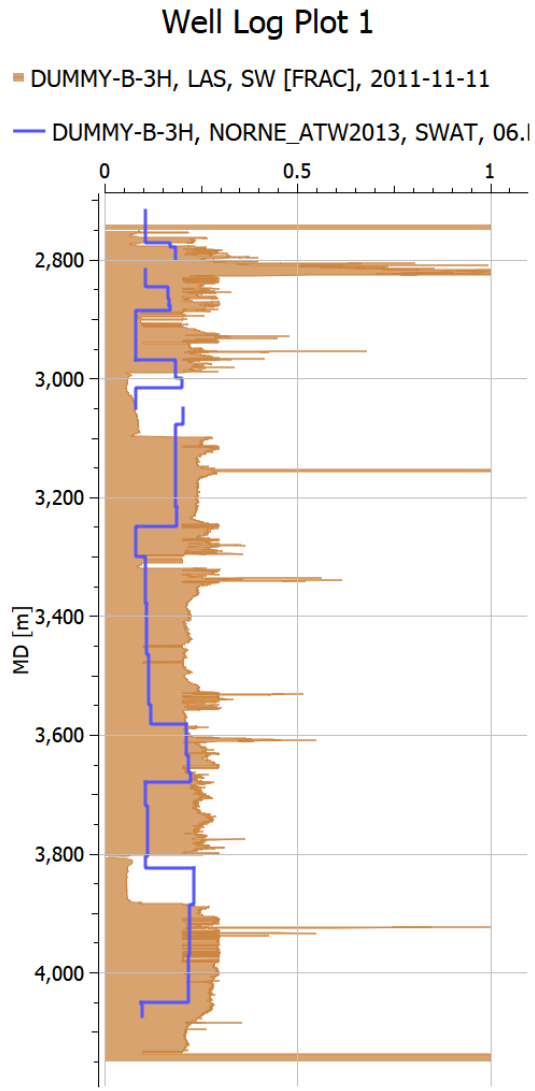
g) Well Log Data

Objective: Plot well log extraction curve in 2D plot window

1. Import grid case from “norne”
2. Import well path "model-data/norne-well-logdata/dummy-B-3H.dev"
3. From the right-click menu of well **DUMMY-B-3H**, select “*Import Well Logs from File*” and select "model-data/norne-well-logdata/dummy-B-3_H.LAS "
4. From the right-click menu of **SW**, select “*Add to New Plot*”
5. From the right-click menu of the track, select “*New Well Log Extraction Curve*”
6. Select **Dynamic** -> **SWAT**
7. Select the **SW** curve object and enable Area fill. Drag and drop curves to make sure the LAS curve is located at the top of the list and will be drawn behind other curves. You can also toggle the curve visibility to control the drawing order.
8. Compare data from the two data sources. They do not have a good match, as the data set contains dummy data

https://resinsight.org/plot-window/welllogsandplots/



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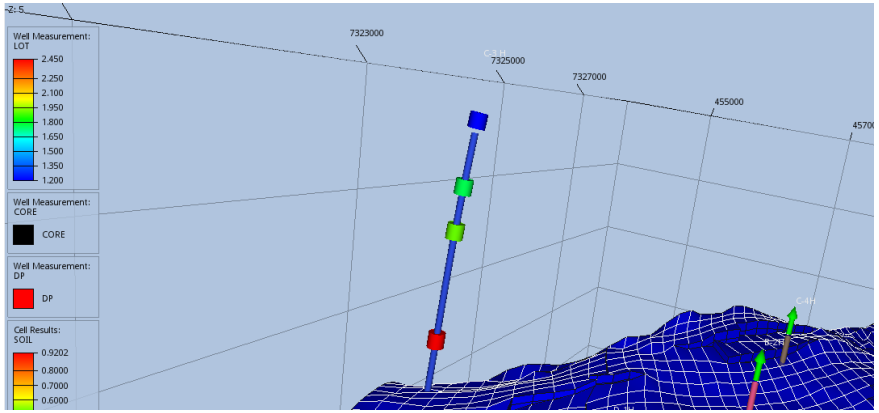
h) Well Measurements in 3D

Objective: Import well measurements, display in 3D view

1. Import norne
2. Import formations for norne
3. Set **Cell Result** to **Static -> PORO**
4. Import well paths **C-3H** and **E-3H** from folder “model-data/norne-well-measurements”. Use multi-select in the file import dialog to import both in one operation.
5. From the right-click menu of **Wells**, select “Import Measurements”
6. Show measurements in the view
   a. Create a new view
   b. Select **Wells** in the **Project Tree**, and disable clipping of wells to be able to see the well path all the way up to the sea surface
   c. Uncheck **Grid Cells** and **Faults.** Optionally uncheck **Simulation Wells** to make the view cleaner.
   d. Make sure the checkbox in front of **Well Measurements** is enabled (Located above **Simulation Wells**)
   e. Manipulate the filtering options for each measurement type in the property editor
7. Continue to next tutorial without closing the project

https://resinsight.org/wells-and-completions/wellmeasurements/



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i) Well Measurements in plots

Objective: Import well measurements, display in plots

1. Import data (see import in previous tutorial or continue with same project)
2. Well log extraction curve for well **C-3H**
   a. Create a **Well Log Extraction** curve for **C-3H**, open the plot window
   b. Show data for **Static -> PORO**
   c. In **Curve** -> **Appearance**, set **Area Fill Style** to **Solid Fill**
3. Create measurement track
   a. Create a new track
   b. From the right-click menu of the track, select “New Well Measurement Curve”
   c. Select well **C-3H** and **XLOT**
   d. Use the zoom all button to make sure all measurements are visible, or toggle visibility of curve to make the well measurements visible
   e. Make the measurement symbols larger
   f. The measurements are outside the grid, and the depth axis min/max values can be defined in the **Depth Axis** section of the plot or by zoom using **CTRL**+mouse wheel
4. Create formation track
      i. Create a new track
      ii. From the property editor of the track, in group **Region/Annotation**, set the **Region Annotation** to **Formations**
      iii. Select case and well path, the formations appear as colors in the track
      iv. Change the color legend to the same as the formations, usually “Category”
5. Use the up/down arrow to the right of a track to modify the ordering of tracks
6. Add formations as lines to the **PORO** track
7. Change the track width distribution
   a. Set col span to 2 for **XLOT**
   b. Set col span to 5 for **PORO** track
8. See next page for an example plot

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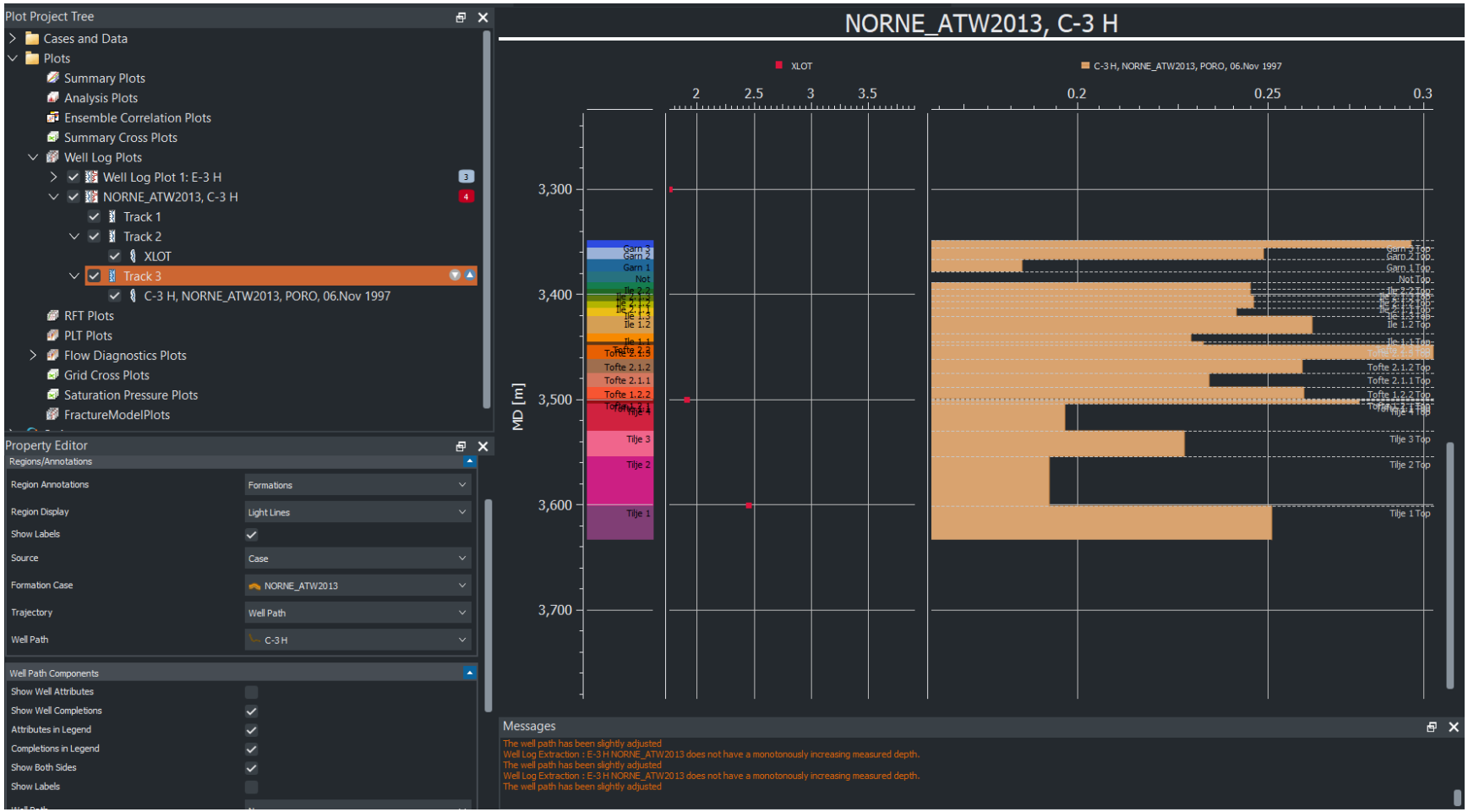

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j) Well Picks

Objective: Import well picks, display in plots

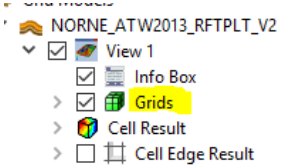
1. Import norne case
2. From folder “model-data/norne-well-picks”, import well path **dummy-B-3H**
3. Open the file “report.csv” in a text editor to see how the well picks are defined
4. From the right-click menu of **Wells**, select “*Import well picks*” and select “model-data/norne-well-picks/report.csv”
5. Create a well log extraction curve, use **PORO**
6. Use area fill for **PORO**
7. Add a new track for formations
8. In Region/Annotations, in dropdown **Region Annotations**, select **Formations**
9. In dropdown **Source**, select **Well Picks for Well Path**
10. Select **DUMMY-B-3H**
11. The well picks are displayed as horizontal lines

https://resinsight.org/3d-main-window/formations/#well-picks

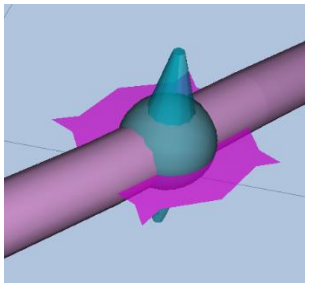
k) Well Path Creation

Objective: Create a new well path using well targets

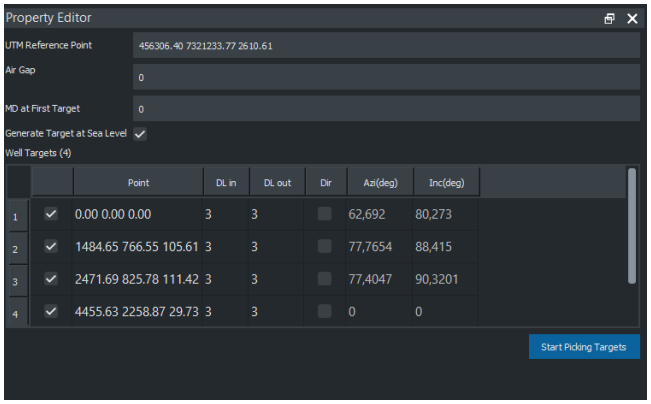
1. Import grid data using “Import Eclipse Case” from “model-data/norne”
2. Create intersection
   a. From the right click menu in 3D view, select “Intersections->Polyline Intersection”
   b. Add points to intersection, and click button “Stop picking points” when you have added all points
   c. Disable **Grids** and **Faults** to see the intersection in the 3D view



3. Select “Create Well Path” from right-click menu of **Wells**
   a. Click on several locations on the intersection to create target points



   b. Manipulate the location by using dragger items in 3D



4. Investigate data when selecting “Show well plan” from the right-click menu of **Well-1**
5. Export the well path to a text file from **Well-1**, “Export Visible well path”. Investigate the exported text file.
6. Import the exported well path using “Import Well Path”, investigate the potential geometry differences as the exported file is discretized
7. Save project, as the created well path is intended to be used in other tutorials

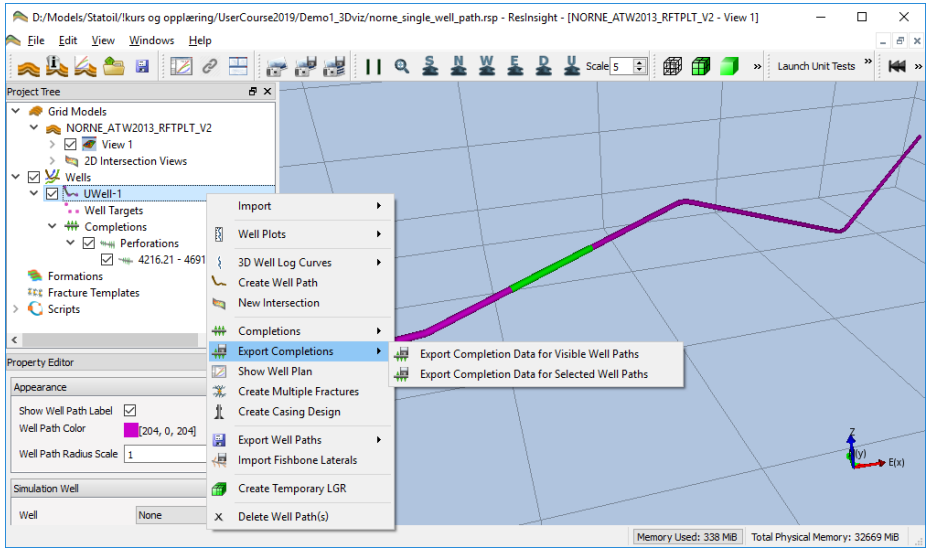
Well target move operations
https://resinsight.org/wells-and-completions/createnewwellpaths/#well-target-interaction-operations

l) Well Path Completions

Objective: Export computed transmissibility factors based on completion along a well path

Continue with the user defined well path from previous tutorial.

1. Find a location along the well path inside the grid, and from right click menu when clicking on the well path in 3D view select "Completions->New Perforation Interval"
2. From **Well Targets**, select "Export Completions for Visible Well Paths". Create a new folder as destination for the export operation. Open the **Messages** window to see the location of the exported file.
   Inspect the exported file in a text editor and try to match the exported data with the perforation intervals in the 3D view.
3. Add one more perforation interval
4. Export completions, and investigate exported text file
5. Combined export
   a. Create fracture template
      i. Select "New Stim Plan Fracture Template" from the right click menu of **Fracture Templates**
      ii. Import template from "/model-data/norne-well-hydrfrac/StimPlan_HydrFrac.XML"
      iii. Find a location for the template, and launch the right click menu in the 3D view when clicking on the well path geometry
      iv. Select "Completions->New Fracture"
      v. Select "3D View"->Fractures"
      Toggle the view if "Fractures" object is missing.
      Select "Result Color->Conductivity [md-ft]"
   b. Add a fishbones section "Completions->New Fishbones"
   c. Export completions, and select **File Split** "Split on Well and Completion Type"
   d. Investigate the exported files in export folder



https://resinsight.org/wells-and-completions/completions/

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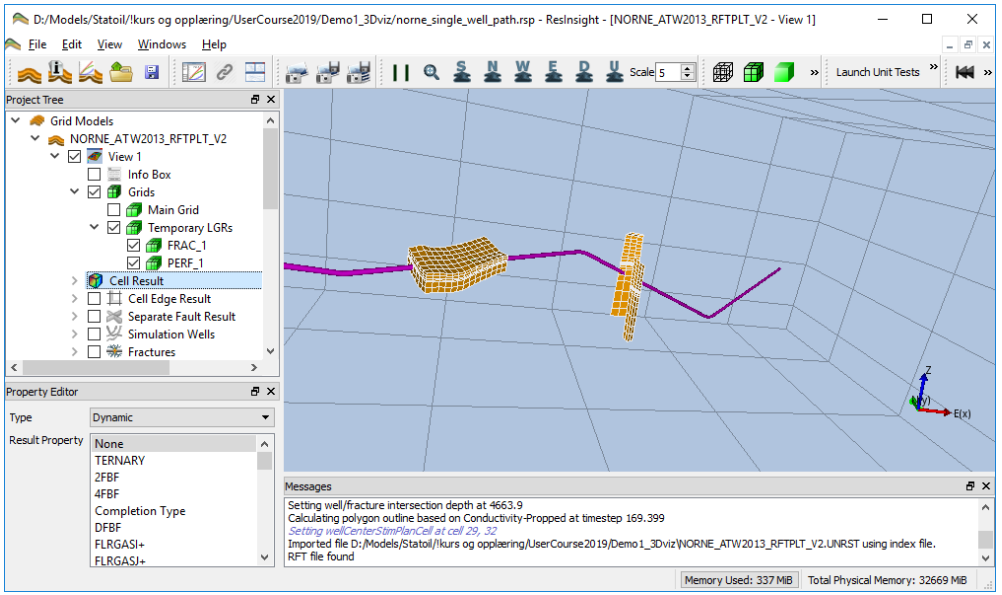
m) Export LGR for Completions

Objective: Create and export local grid refinement (LGR) based on completions

Continue with the user defined well path from previous tutorial.

1. Add two perforation intervals and one fracture to the well path
2. In the Wells folder in the Project Tree, select the well you are working on. From right click menu of this well, select “Create Completions->Create Temporary LGRs”
3. Export completion data into an empty folder
4. Investigate **CARFIN** section in generated file **LGR_Well-1.dat**
5. Untick all filters, and untick **Main Grid** in the **Grids** folder
6. From right click menu of the well, select “Create Completions->Create Temporary LGRs” and set number of cells in K direction to 5
7. Export and Investigate **CARFIN** section in generated file **LGR_Well-1.dat**
8. Add fishbones
9. Optional: Possible to create multiple fractures using Stim Plan fracture
   a. From the right click menu of **Well-1, select “Create Multiple Fracture”**
   b. Select “Replace Fractures” and close the dialog
10. Use the checkboxes in **Grids** to investigate the generated LGR grids



NB! Please note that the temporary LGRs will not be restored if you save the project and open the project again.

https://resinsight.org/wells-and-completions/completionslgr/

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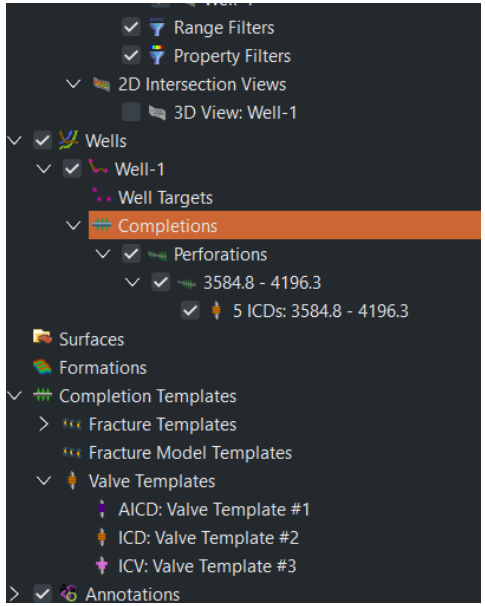
n) Valve Modeling and Export

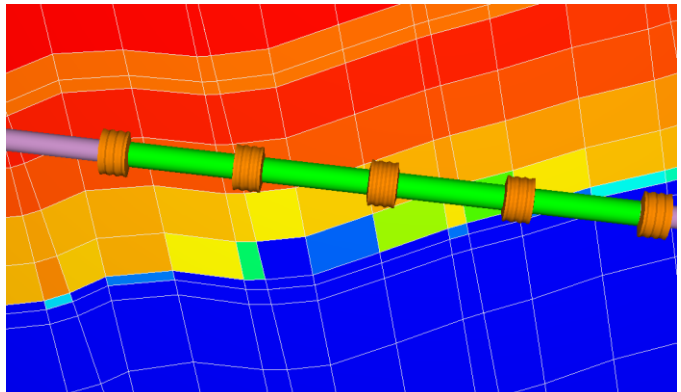
Objective: Create valves and export completion



1. Create a well or import modeled well path from previous tutorial
2. Create a perforation of length 500m
3. Add a valve from the right-click menu of a perforation interval
4. ICD Export
   a. Select an ICD template, and click **Edit** for easy navigation to the valve templates
   b. Set Number of Valves to 5
   c. Select "*Export Completions*" from the context menu of the well
   d. Investigate the exported text files
5. Export AICD
   a. Change valve to **AICD template**
   b. Set the following values in the **AICD template**
      i. Strength of AICD: 1e-5
      ii. Calibration Fluid Density: 1000
      iii. Calibration Fluid Viscosity: 1
      iv. Volume Flow Rate Exponent: 2
      v. Viscosity Function Exponent: 0.7
   c. Select "Export Completions" from the context menu of the well
   d. Investigate the exported text files

Import of templates from text files is supported using the right-click menu of **Valve Templates** and select "*Import Valve Templates*". Valves can be imported from **Completor** or **Eclipse** text files.

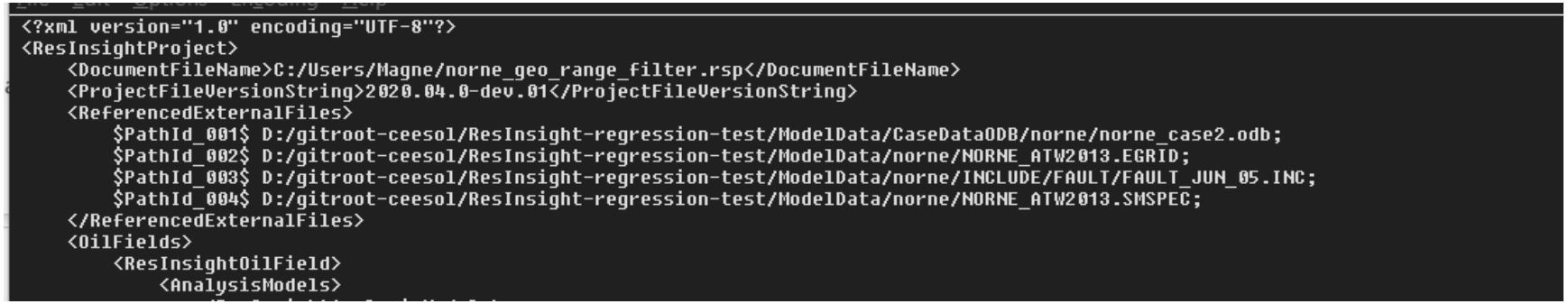
https://resinsight.org/wells-and-completions/completions/#perforation-interval-valves



o) Project file manipulations

Objective: Know how to manipulate selected parts of the project file

- Show path section <ReferencedExternalFiles>
  - Discuss how these can be changed by external scripts
- Show well path targets <WellPathTargets>
  - Discuss how these can be changed by external scripts
  - Create a copy of the well path target project file
  - Move one target 50 meter in x-direction
  - Save project as copy with new name
  - Open copy, and investigate the modified location of the well path target
  - Discuss how to manipulate model from scripting

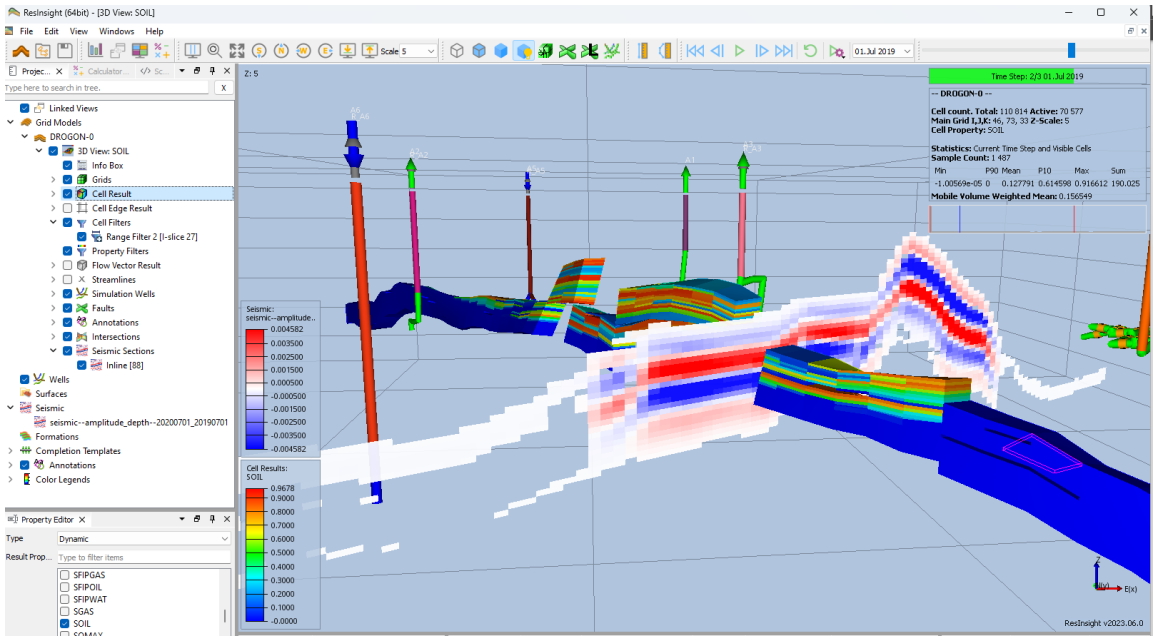


```
<?xml version="1.0" encoding="UTF-8"?>
<ResInsightProject>
    <DocumentFileName>C:/Users/Magne/norne_geo_range_filter.rsp</DocumentFileName>
    <ProjectFileVersionString>2020.04.0-dev.01</ProjectFileVersionString>
    <ReferencedExternalFiles>
        $PathId_001$ D:/gitroot-ceesol/ResInsight-regression-test/ModelData/CaseDataODB/norne/norne_case2.odb;
        $PathId_002$ D:/gitroot-ceesol/ResInsight-regression-test/ModelData/norne/NORNE_ATW2013.EGRID;
        $PathId_003$ D:/gitroot-ceesol/ResInsight-regression-test/ModelData/norne/INCLUDE/FAULT/FAULT_JUN_05.INC;
        $PathId_004$ D:/gitroot-ceesol/ResInsight-regression-test/ModelData/norne/NORNE_ATW2013.SMSPEC;
    </ReferencedExternalFiles>
    <OilFields>
        <ResInsightOilField>
            <AnalysisModels>
```

p) Seismic Data

Objective: Import and visualize seismic data. Compare with reservoir data.

- Import the Drogon grid model from "model-data/drogon/DROGON-0.EGRID"
- Import seismic data from "model-data/drogon/seismic/seismic--amplitude_depth--20180701_20180101.vds"
- In the **Project Tree**, toggle off **Grids** to be able to see seismic data (optionally toggle off **Faults**)
- From the right-click menu of **Seismic Sections**, select "New Inline Section" and investigate seismic data in the view
    - Activate the **Seismic Histogram** dialog to see the value distribution
    - Click on red and blue parts of the seismic slice to see the associated seismic value in the **Result Info** dialog, see how the reported values corresponds to the seismic color legend
    - Select the **Inline** object, and manipulate the **Inline** value in the **Property Editor**
- Select the seismic data source, and adjust the mute and clip values to filter seismic data
    - Set **Clip Value** to 0.003
    - Set **Mute Value** to 0.001
    - Select the **Inline** object, expand the **Experimental** group and activate **Transparent**
    - Move the inline to see how seismic data correlates to grid model geometry



Ceetron Solutions

q) Seismic Data along a well path

Objective: See seismic data along a well path

- Import the Drogon grid model from " model-data/drogon/DROGON-0.EGRID"
- Import seismic data from " model-data/drogon/seismic/seismic--amplitude_depth--20180701_20180101.vds"
- Create a user defined well path
- From the right-click menu of **Intersections**, select "New Intersection". Change intersection type to **Well Path**, and select the well path
- From the right-click menu of the generated intersection, select "Create as Seismic Section"
- Select the **Seismic section**, and set it transparent
- Tile the windows to be able to see both views at the same time
- Show only seismic data in one view and grid model data in the other
- Manipulate the well path targets, and see grid is updated
- Advanced manipulation:
    - Press and hold CTRL to move the target and all downstream well targets
    - From the right-click menu in a view, select **Compare to**

A seismic view can be created independently of the reservoir view. To create this type of view, select **New View** from the right-click menu of **Seicmic Views**.

ResInsight

r) Correlation analysis (taken from ResInsight Intro Course)

Objective: Create and configure a Correlation Plot

- Import a Summary Ensemble, and use import path "model-data/reek_ensemble/3_r001_reek_50/realization-*/iter-1"
- From the right-click of a curve, select "Create Correlation Plot from Curve Point ->New Report Plot"
- Click on individual cells in the **Correlation Matrix**, and see how the cross plot is updated
  Currently selected cell is indicated by a border in green
- Show Pearson calculation
- Change data source to **WOPT** for all wells **OP_1** to **OP_5**
- Click on individual cells in the **Correlation Matrix**, and see how the cross plot is updated
- Right-click in plot, and select **Show Plot Data**

https://resinsight.org/plot-window/correlationplots/

Definition of how the Pearson correlation coefficient is computed

https://en.wikipedia.org/wiki/Pearson_correlation_coefficient#For_a_sample

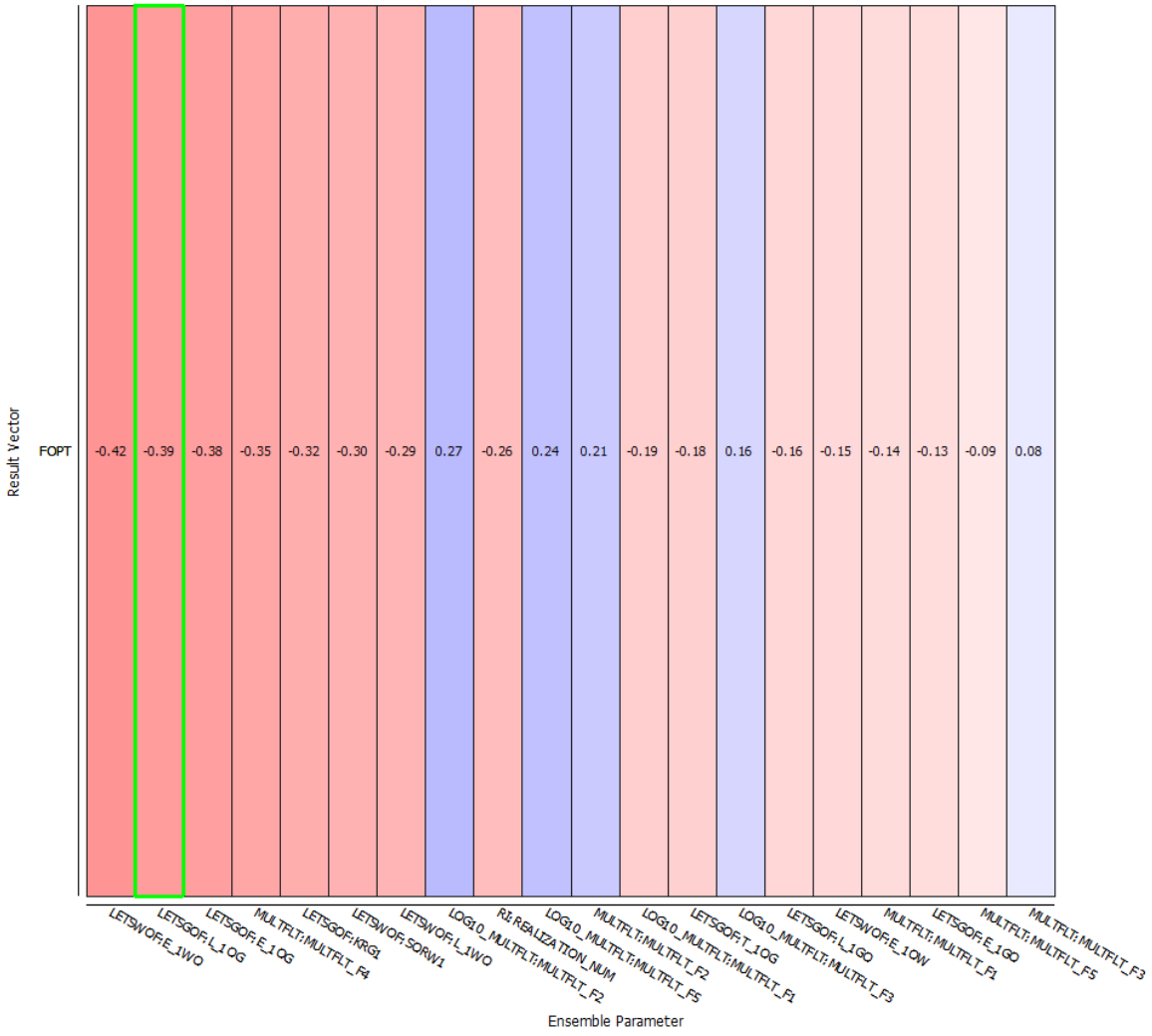
X is input parameter value, Y is simulated value

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}\sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}} \quad \text{(Eq.3)}$$

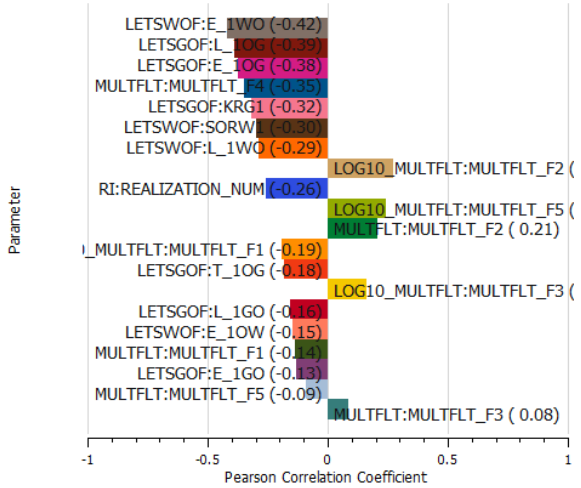
ResInsight

Correlation Report for base_pred at 2004-01-29 00:00

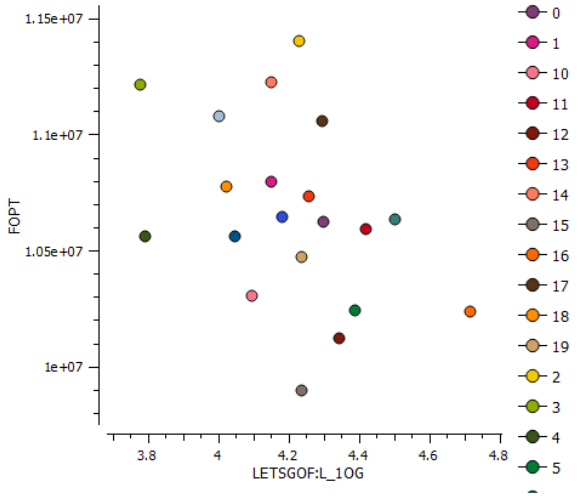
Correlation Matrix for Parameters vs Result Vectors at 2004-01-29 00:00



Correlations for base_pred, FOPT at 2004-01-29 00:00



Cross Plot base_pred, LETSGOF:L_1OG x FOPT at 2004-01-29 00:00



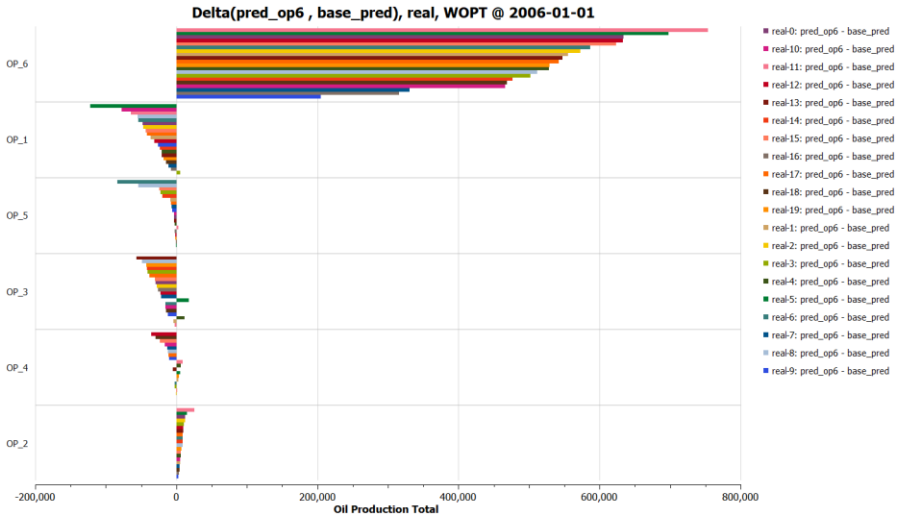
Ceetron Solutions

s) Analysis Plot (taken from ResInsight Intro Course)

Objective: Create and configure an Analysis Plot

- Import a Summary Ensemble, and use import path "model-data/reek_ensemble/3_r001_reek_50/realization-0/base_pred"
- Import a Summary Ensemble, and use import path "model-data/reek_ensemble/3_r001_reek_50/realization-0/pred_op6"
- Select New Delta Ensemble from right-click on **Summary Cases**
  Create a **Delta Ensemble** as the difference between the two cases (pred_op6 - base_pred)
- Select new **Analysis Plot**
- In Property Editor, in group Selected Vectors, click on the button with three dots "…"
  - Set source **Delta ensemble**
  - Select wells **OP_1-5**
  - Select Summary Vector **WOPT**
- Bar Orientation: **Horizontal**
- Select major grouping **Summary Item**
- Select sort by abs(Value)
- Optionally
  - Show legend
  - Bar labels
- Right-click in plot, and select **Show Plot Data**

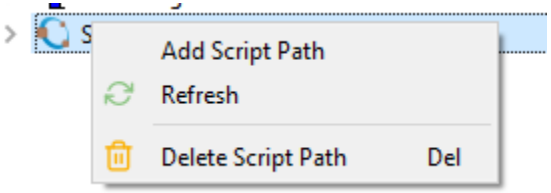
https://resinsight.org/plot-window/analysisplots/



ResInsight

t) Python scripting

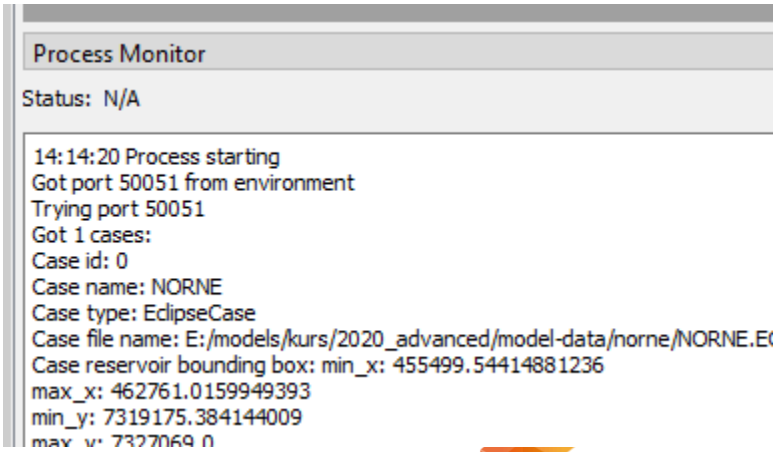
Objective: Learn how to execute a Python script from ResInsight UI



- Configuration of Equinor internal scripts is described in *"ResInsight user Course Preparations 2022.pdf"*
- [Optional] Add a folder containing existing scripts
  - Right-click on **Scripts** item, and select "Add Script Path"
  - Select script folder
  - To edit the text content of a **Script**, select *"Edit"* from the right-click menu
- Use the right-click menu to execute a script
- Investigate the output from the Python script in **Process Monitor**
- It is also possible to execute a Python script directly from a terminal

https://api.resinsight.org

https://api.resinsight.org/en/stable/PythonExamples.html



u) Summary Data from SUMO

Objective: Learn how access and use summary data from SUMO

SUMO is a cloud storage solution for reservoir data. ResInsight support access and visualization of summary data.

- Activate the **Cloud Data** object in the **Cloud** tab. If required, a authorization dialog is diplayed in a web browser window. When authorization is completed, an access token is stored for future connections to this service.
- The data you have access to is displayed in Field, Case and Ensemble displays
- Select ensembles for visualization
- Click button **Add Ensembles**
  Data is retrieved from cloud and visualized in a plot. The ensemble can be visualized similar to ensemble imported from file.

https://resinsight.org/import/cloudservicesauthorization/

https://resinsight.org/import/cloudservices/

v) Description of Flow Diagnostics

A **Flow Diagnostics** simulator developed by **SINTEF** based on **MRST(MATLAB Reservoir Simulation Toolbox)** is included in **ResInsight**. The flow diagnostics simulator as described by **SINTEF**:

"Flow diagnostics are simple and controlled numerical flow experiments run to probe a reservoir model, establish connections and basic volume estimates, and measure dynamic heterogeneity. Flow diagnostic quantities are quick to compute and can thus be used interactively to explore fluid communication in a geological model before or after more comprehensive multiphase flow simulations."

The following table displays the short name used by **ResInsight** and the more detailed description taken from the **SINTEF** documentation.

ResInsight naming	Flow Diagnostics description (SINTEF)
Forward time of flight (injectors) **Reverse time of flight (producers)**	Travel time for mass-less particles that passively follow the flow field from an injector into the reservoir and from a point in the reservoir to the nearest producer
Drainage/flooding regions	Delineate regions drained by given producers or swept (flooded) by given injectors
Injector Producer communication	Determine whether pairs of injectors and producers communicate or not and measure the relative strength of their connection
Tracer Cell Fraction	Determine how flux is allocated between different injectors and producers

Flow diagnostics use the flux field (flow rates) defined per grid cell (FLROIL/FLRGAS/FLRWAT). These cell properties can be exported from a reservoir simulator by adding the keyword **FLORES** to **RPTRST** in both **SOLUTION** section and **SCHEDULE** section. If no flow rate data is available, **ResInsight** will estimate the flow field. Users are encouraged to export flow rates from the simulator for best precision.

https://www.sintef.no/projectweb/mrst/modules/diagnostics/

w) Performance Hints

Some workflows create huge amounts of data. Performance related to transfer of data can in some cases be limited by infrastructure (network disk access, cloud data access, organization of data causing extra delays, ..) ResInsight has settings that can improve the performance in some situations.

Summary Data

Summary data is by default stored in **SMSPEC** and **UNSMRY** files. The organization of data in these files can give bad performance form large files. ResInsight has support for an improved file format called **ESMRY.** This format can be used by selecting **opm-common** summary reader in **Preferences**. ResInsight is also able to convert from **UNSMRY** to **ESMRY**. This is a heavy operation that includes read/transform/write of all summary data, but can give significant improvements for post-processing of summary ensembles.

Grid Data

Grid data can be imported using **resdata** and **opm-common**.

- resdata
  - Used in FMU workflows
  - Maintained over many years, many special cases of import files covered
    - Supports RelPerm/PVT/ flow diagnostics
- opm-common
  - Modern and fast codebase
  - Currently no support RelPerm/PVT/flow diagnostics (Support is planned for 2025)

Available in 2024.12

Some grid cases can have few active cells compared to the total number of cells. By default, ResInsight will import the geometry for all cells. When **Only Active Cells** is activated for **opm-common** reader, the geometry for inactive cells is discarded. This will reduce the memory requirements, and will enable very large grids to be imported.

https://resinsight.org/best-practices/performancehints/

x) Improvements and new features 2024.09

Cloud Services

- Import summary data from SUMO
- Import of well paths from OSDU (production server is currently under upgrading)

Improved VFP plots

https://resinsight.org/getting-started/whats-new/releasenotes_2024_09/

Ceetron Solutions

y) Improvements and new features 2024.03

Polygons

- Import of polygons from file
- Create polygons interactively
- Use polygons to define intersections and filters

Improved Performance Grid Property Calculations

https://resinsight.org/getting-started/whats-new/releasenotes_2024_03/

All release notes https://resinsight.org/getting-started/download-and-install/