# GeoDExcel

User Guide

GeoDict release 2022

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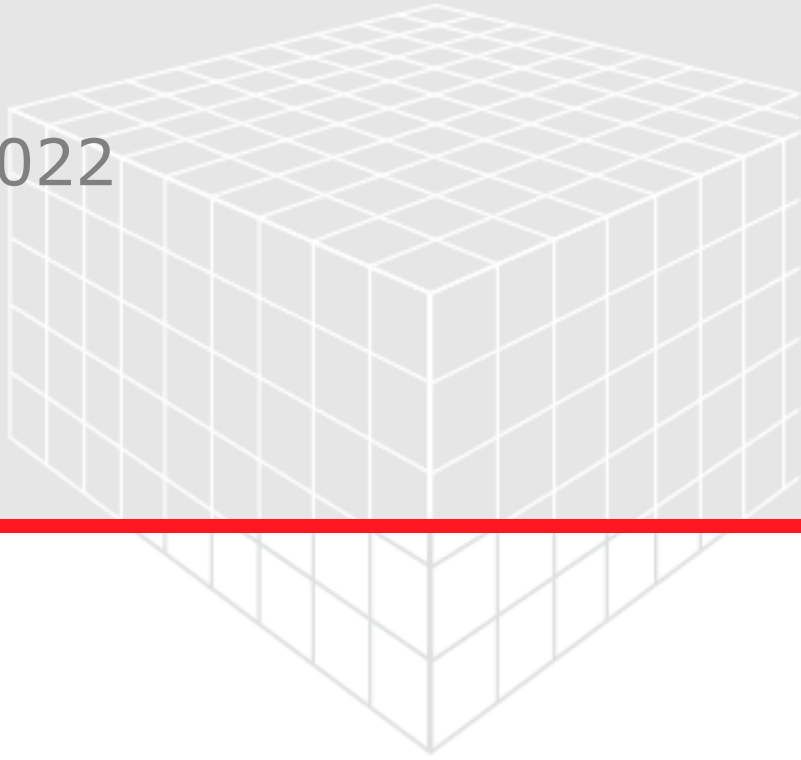

GeoDict

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# ANALYZING AND PLOTTING GEODICT RESULT FILE DATA WITH GEODEXCEL

After GeoDict simulations, the results obtained from any Dict-module can be studied in detail using the visualization options of the modules. Additionally, the results can be evaluated and plotted using the GeoDexcel add-in or the MATLAB® interface GeoLab. GeoDexcel and GeoLab are included in the GeoDict package. To use GeoDexcel, Microsoft Excel™ must be installed on the computer. Using GeoDexcel requires Excel 2016 or newer and Windows 10. Since GeoDict 2022, additionally a python-based version of the generic export from the GeoDict Result Viewer is available. It can be used to export data in .xlsx format, even without Excel installation on the computer, e.g. on Linux systems.

GeoDexcel allows a deeper analysis of the solver results by loading the GDR (GeoDict Result) file into a spreadsheet and, from it, automatically locating, organizing, and loading the necessary data to generate the most appropriate chart to plot and compare the results.

GeoDexcel provides four different options to import a GeoDict result file for further analysis in Excel.

The **Specific** import includes predefined analysis, which is specific for a certain module. It provides predefined charts, e.g., the change of the pressure drop over time in a filter life time simulation, which can be plotted for different simulations in one graph to compare different results. Results of a parameter study of a single geometry or a comparison of different geometries can be plotted in one figure. The **Specific** import is available for the modules ElastoDict, FilterDict, FlowDict, PoroDict, MatDict, and SatuDict.

The **Single Table** import loads scalar values for each GeoDict result file in one single row in an Excel sheet. With this import, the user can summarize different simulated properties of a geometry such as pressure drop, largest through pore etc. and compare them with the corresponding results of different geometries or analyze the influence of different parameters in a parameter study. The **Single Table** import is available for all modules.

The **Generic** import reads the complete result map and, if chosen, the input and the log map of a single GeoDict result file, in one Excel spreadsheet. Here, the user has access to all parameters / result values and can do his/her own analysis. The **Generic** import is available for all modules. Plots shown in the GeoDict **Result Viewer** are created in the Excel spreadsheet as well.

The **Chart** import allows to import only the data of the graphs created in the GeoDict **Result Viewer**, and to create the same charts in the Excel spreadsheet.

## GeoDexcel Installation

The GeoDict installer takes charge of copying and installing GeoDexcel in the installation folder and adding the GeoDexcel 2022 icon on the desktop.

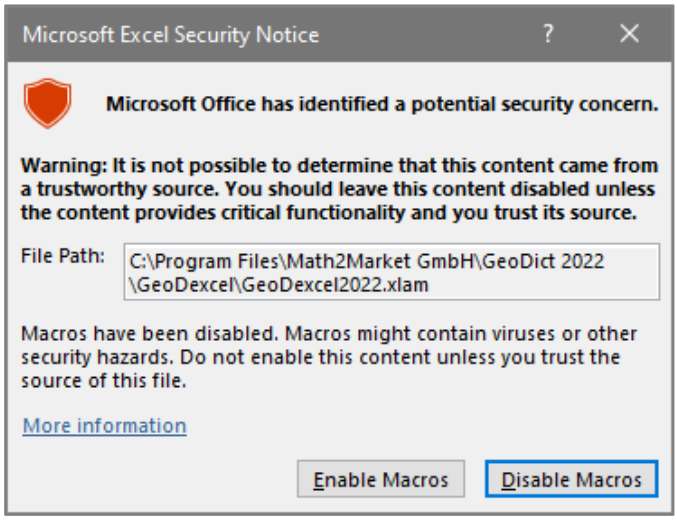

The GeoDexcel add-in does not work for Macintosh, which considers it an attempt to access the system files.

## Starting GeoDexcel

GeoDexcel can be started in several ways:

1. Start GeoDexcel through the windows **Start** menu, upon installation of GeoDict.
2. A shortcut is created by the installer on the user's desktop. Load the GeoDexcel add-in by clicking this shortcut.
3. The user copies (or moves) **GeoDexcel.xlam** from C:\Program Files\Math2Market GmbH\GeoDict 2022\Dexcel\ into a folder and creates a link. The user must then manually start the add-in by double-clicking the link.
4. By clicking an Excel button in an opened GeoDict **Result Viewer** of a GDR file.
5. Via the "LoadGDRToExcel" command from a GeoDict (Python) macro.

When GeoDexcel is started, the system usually asks whether the macros contained in the add-in should be run.




The popping-up of this warning message can be suppressed for trusted macros by clicking **Enable Macros**.

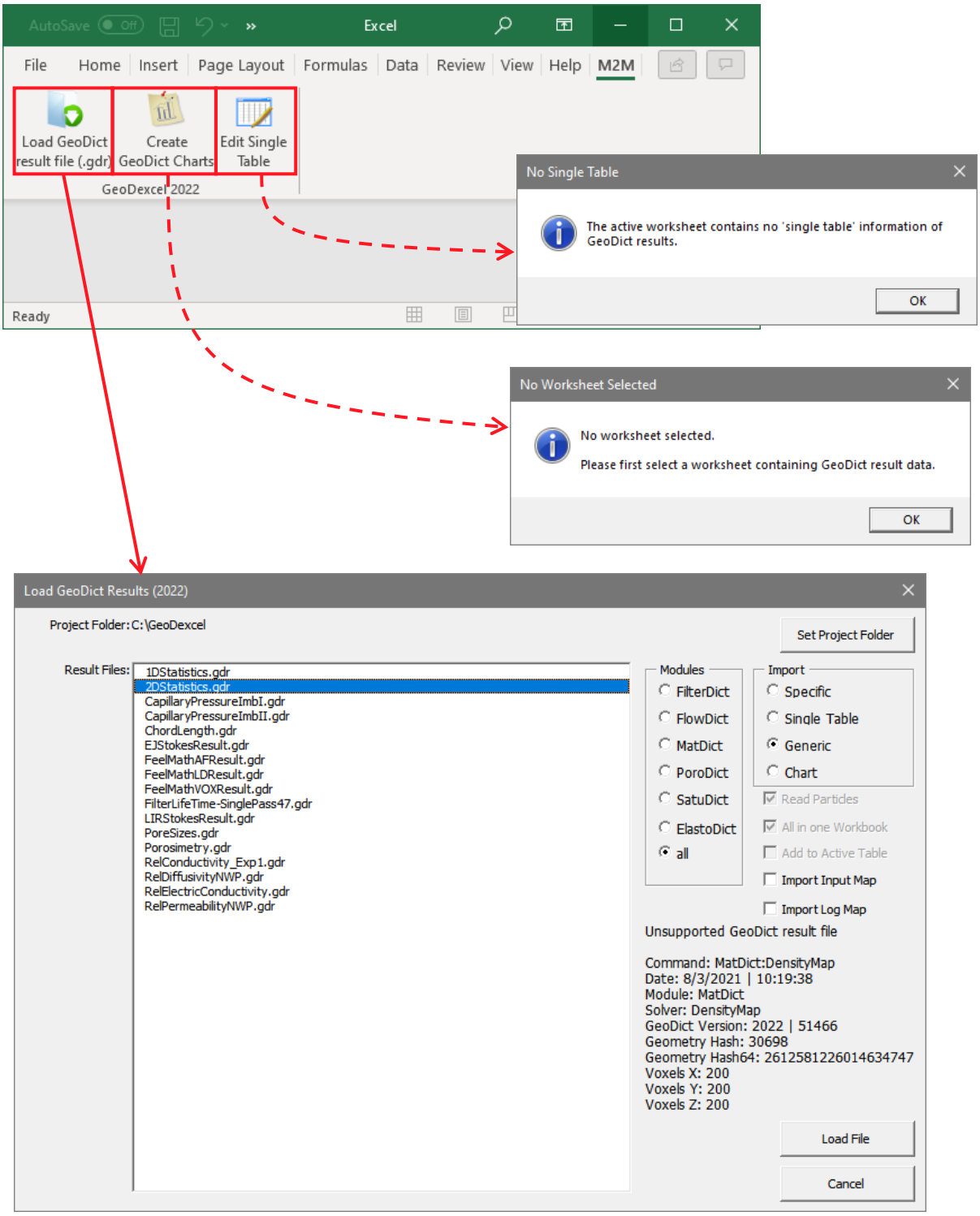
If it appears in the warning, click **Trust all from publisher**. Then, the warning only appears for unknown macros and the macros must either be enabled or disabled every time.

Not recommended is to minimize the macro security, by checking in Microsoft Excel™ **File** → **Options** → **Trust Center** → **Trust Center Settings...** button → **Macro Settings** → check **Enable all macros (not recommended; potentially dangerous code can run)**. In newer versions of Microsoft Excel™, the setting is called **Enable VBA macros (not recommended; potentially dangerous code can run)**. It is not recommended to use this option.

# GeoDexcel add-in Toolbar

After starting GeoDexcel, click the **M2M** tab in the menu bar. Three icons for the control of the program (**Load GeoDict result file (.gdr)**, **Create GeoDict Charts**, and **Edit Single Table**) appear in the **GeoDexcel 2022** group.

Three corresponding dialog boxes, to load result files in Microsoft Excel™, to generate predefined charts and to edit single result tables, start when clicking the icons. Of course, **Create GeoDict Charts** and **Edit Single Table** only work after a worksheet has been opened by clicking the **Load GeoDict result file (.gdr)** icon resp. if single table data is loaded. Otherwise, a warning message appears.

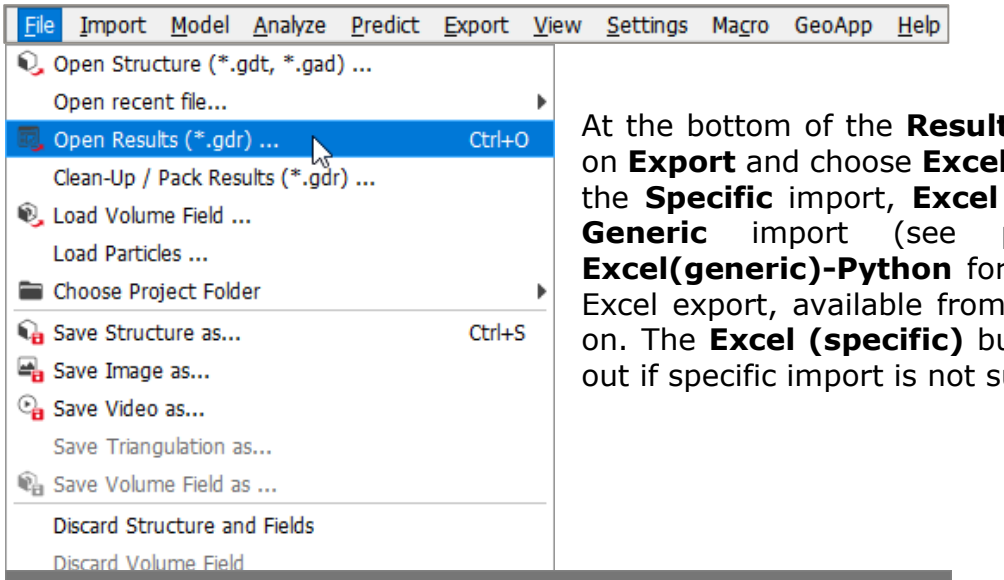


# LOAD GEODICT RESULT FILE (GDR)

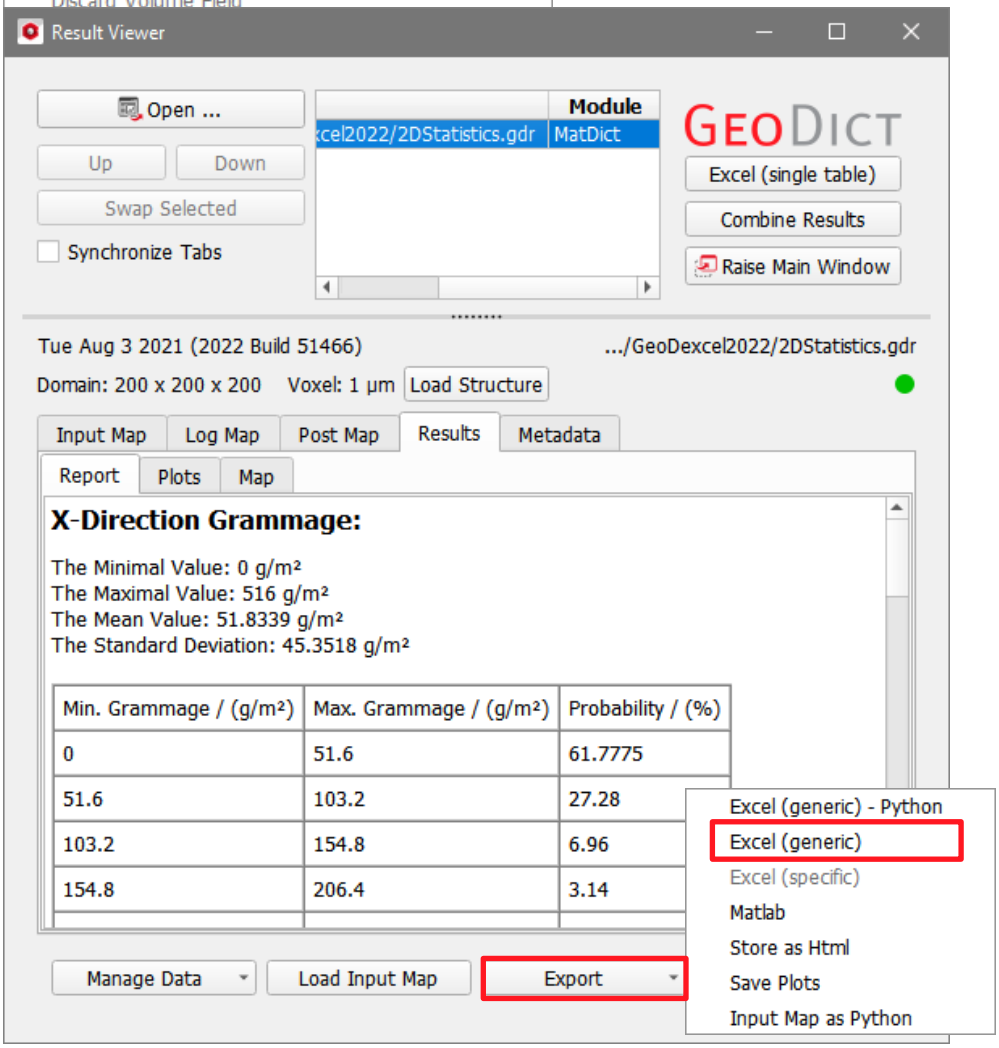
To load a GeoDict result file (GDR) into GeoDexcel there are three options:

## LOAD DIRECTLY FROM THE RESULT FILE

Open the GDR file in GeoDict by selecting **File → Open Results (*.gdr)...** in the menu bar. Select the GDR file to open.




At the bottom of the **Result Viewer**, click on **Export** and choose **Excel (specific)** for the **Specific** import, **Excel (generic)** for **Generic** import (see page 1) or **Excel(generic)-Python** for python-based Excel export, available from GeoDict 2022 on. The **Excel (specific)** button is greyed out if specific import is not supported.

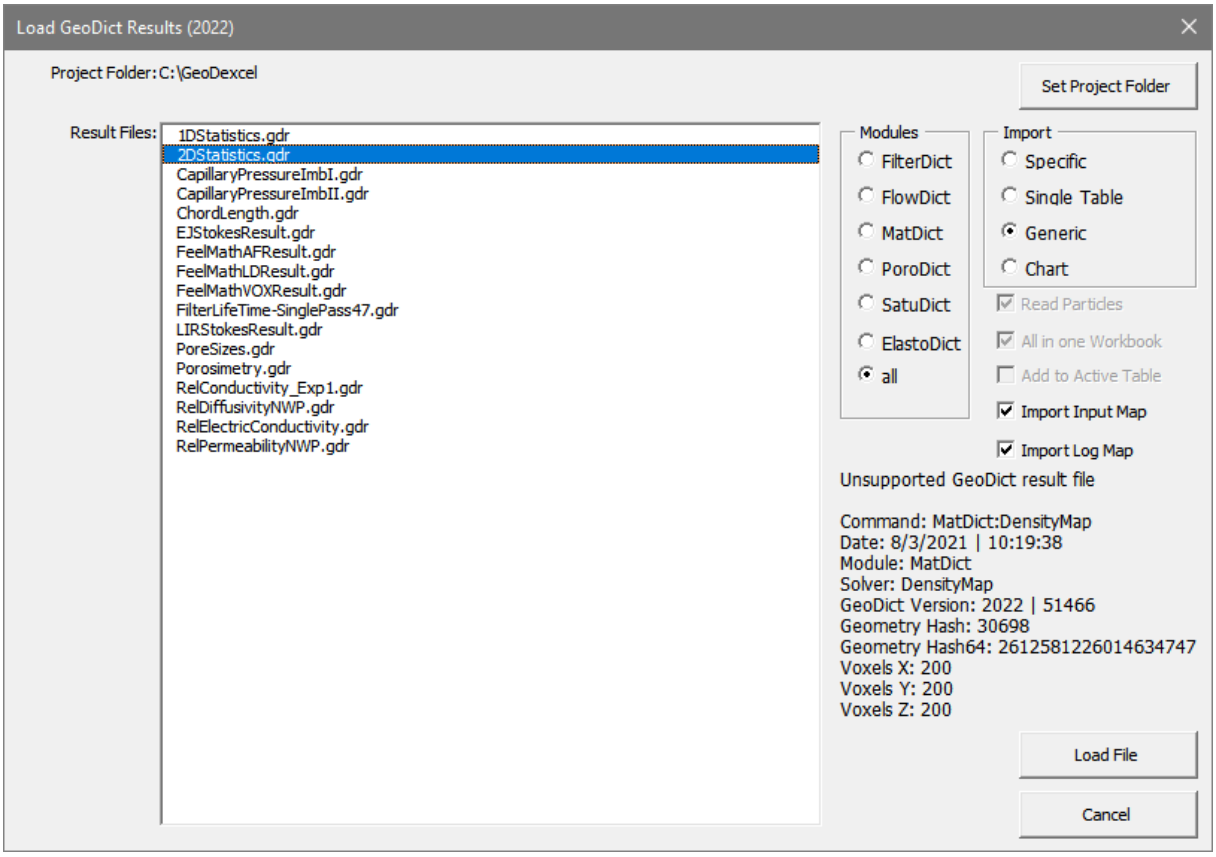


To compare two or more GDR files, the **Single Table** import can be used. In this case the user can select multiple GDR files in the **Result Viewer** and click **Excel (single table)** in the upper right part of the Result Viewer.

If one of these export options from the Result Viewer is used, GeoDexcel opens with the information from the result file(s), and the information is already saved to an .xlsx file with the same file name as the .gdr file.

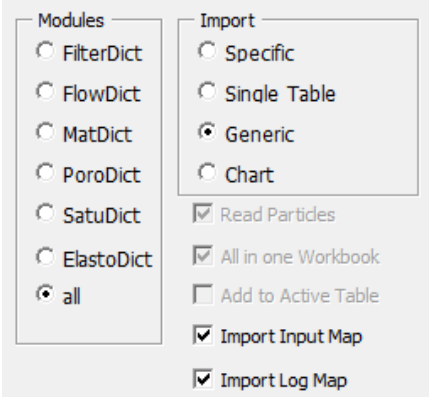
## LOAD INTO GEODEXCEL

Start GeoDexcel, click the **M2M** tab, and the **Load GeoDict result file (.gdr)** icon, as described in page 3. To load a GeoDict result file, click **Set Project Folder**, and find the folder where the result file(s) in GDR format from the simulation(s) of interest were saved. The path to the current folder (**Project Folder**) is shown at the top left of the **Load GeoDict Results** dialog box.




In the **Import** panel on the right, check the type of file import.

- Specific
- Single Table
- Generic
- Chart

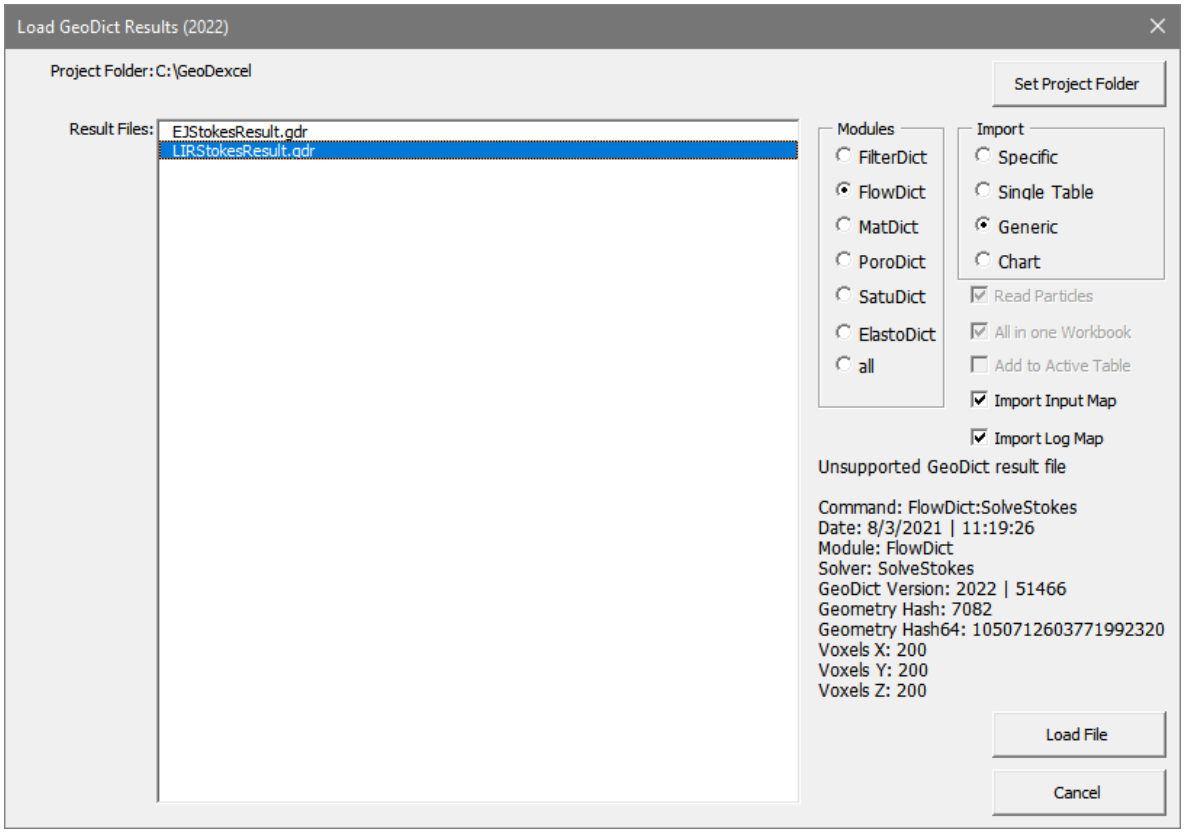



The options that can be checked underneath the **Import** panel (**Read Particles**, **All in one Workbook**, etc.), change with the selected import type and module. These options are described below for each of the import types, starting on page 8.

In the **Modules** panel, check the name of the GeoDict module that produced the GDR file of the results of interest: FilterDict, FlowDict, MatDict, PoroDict, SatuDict, or ElastoDict.

Check **all** to load result files produced by other GeoDict modules with **Single Table**, **Generic** or **Chart** import type.

After checking one of the modules, the **Result Files** field on the left contains the list of the GDR files obtained with the selected module, residing in the current project folder. Only the GDR files for which the import type chosen is available are shown in the field. Multiple files can be selected by clicking the name of the files while holding down the Ctrl key.




If the user checks **all**, all GDR files for which the import type chosen is available are shown in the **Result Files** field.

After selecting one result file from the list, the information from the result file header is displayed below the **Modules** and the **Import** panels. This information cannot be shown when more than one result file has been selected.

Clicking **Load File(s)** starts the loading of the result file(s) data into the Excel spreadsheet.

## LOAD USING A (PYTHON) MACRO:

Load GeoDict results via macro by using the following commands in a Python macro, and in the old (deprecated) GMC macro (no longer supported from GeoDict 2021 on):

```
LoadGDRToExcel_args_1 = {
   'ResultFileName'      : 'EJStokesResult.gdr',
   'ExcelMode'           : 'Generic',
   'SaveExcelFile'       : False,
   'ExcelFileName'       : 'gdrFile.xlsx',
   'LoadInputMap'        : False,
   'UseGhostParticles'   : True,
   'AddToActiveWorkbook' : False,
   'CloseExcelWorkbook'  : False,
   'CloseExcel'          : False,
   }
gd.runCmd("GeoDict:LoadGDRToExcel", LoadGDRToExcel_args_1, Header['Release'])
```

```
<Macro>

GeoDict:LoadGDRToExcel {
  ResultFileName      EJStokesResult.gdr
  ExcelMode           Generic
  SaveExcelFile       false
  ExcelFileName       gdrFile.xlsx
  LoadInputMap        false
  UseGhostParticles   true
  AddToActiveWorkbook false
  CloseExcelWorkbook  false
  CloseExcel          false
}

</Macro>
```

Further information about using GeoDict macros can be found in the Automation by scripting with GeoPy handbook of the GeoDict User Guide.

The key `ResultFileName` defines the GeoDict result file to be loaded. The key `ExcelMode` defines the type of file import (**SingleTable**, **Specific**, **Generic** or **GenericPy**).

To save the resulting Excel file, `SaveExcelFile` must be set to true. The key `ExcelFileName` specifies the name of the saved file in format *.csv or *.xlsx.

For **Generic** import, the input and log map of the GeoDict result file can be loaded into the Excel file by setting `LoadInputMap` to true. The key has no effect for **Specific**, **SingleTable** or **GenericPy**.

When loading a result from FilterDict, it is possible to take ghost particles into account for the efficiency results by setting the key `UseGhostParticles` to true. The key has no effect on results from other modules.

Setting the key `CloseExcelWorkbook` to true determines that the Excel file is closed after the GeoDict result file is loaded. This key set to false keeps the workbook open, to repeat the macro block and add several GeoDict result files to one single Excel workbook. In the same way, the key `CloseExcel` defines whether Excel is closed or kept open after reading the file.

## SPECIFIC

The **Specific** import includes a predefined, specific analysis for a certain module. The specific import provides access to plotting predefined charts.

For example, the change of the pressure drop over time in a filter life time simulation, which can additionally be plotted for different simulations in one graph to compare different results. In this fashion, the user can plot the results of a parameter study of a single geometry or compare different geometries in one figure.

The **Specific** import is available for the FilterDict, FlowDict, MatDict, PoroDict, SatuDict and ElastoDict modules.

The **Specific** import can be started directly from the GeoDict GUI by clicking **Export→ Excel (specific)** in the **Result Viewer** of the GDR file, through **Load GeoDict result file (.gdr)** after starting GeoDexcel from the desktop icon, or through the macro command `LoadGDRToExcel` with `ExcelMode` set to **Specific**.

## SPECIFIC IMPORT FOR FILTERDICT

**Specific** import can be used for FilterDict results to obtain predefined charts and to combine several result files in one plot.

The data obtained with the calculations **Filter Media - Filter Efficiency**, **Filter Media** - **Filter Life Time** and **Filter Element - Filter Life Time** can be analyzed and plotted in GeoDexcel. The data sheet layout for them contains the complete information gathered in the simulations and is very similar.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then the **Load GeoDict result file (.gdr)** icon as described above in page 3.

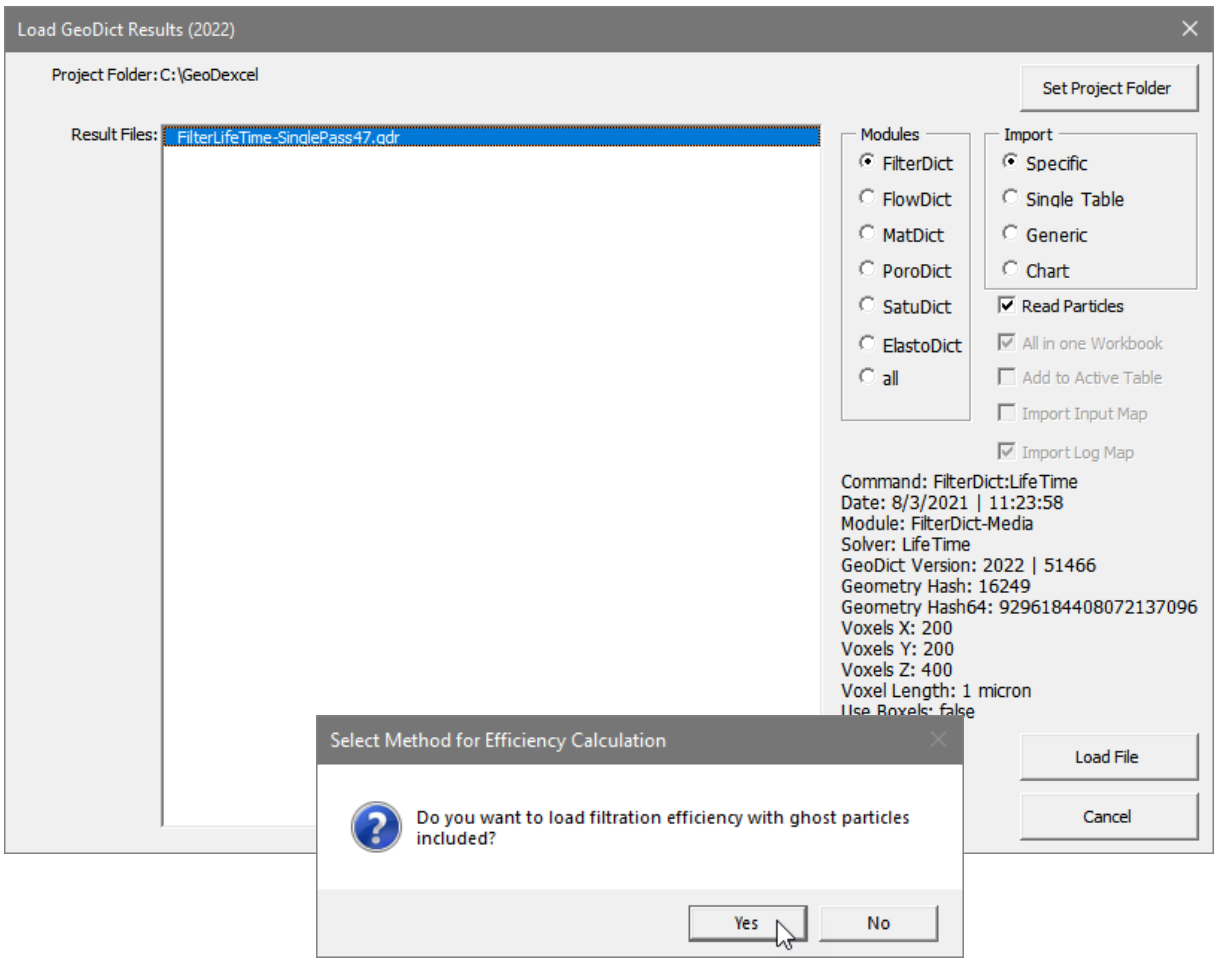
In the opening dialog, click **Set Project Folder** (top right) and navigate to the result folder. Make sure **Specific** is checked as **Import** type and FilterDict is checked in **Modules**.

Check **Read Particles** to import also the particle information from the simulation, which is contained in the result file. Failure to do so excludes essential data needed for several automatically generated plots. See page 12.

**All in one Workbook** is checked by default, if two or more GDR files are selected. They are loaded into the same workbook and an automated comparison can proceed.

Highlight the file to load (here FilterLifeTime-SinglePass47.gdr) and click **Load File**.

The user is asked if the ghost particles should be included when loading the filtration efficiency results:




If the user decides to load efficiency results including ghost particles, all loaded efficiency results are computed with ghost particles.

| Total Filtration Efficiency by Count (ghost particles included) | Total Filtration Efficiency by Weight (ghost particles included) | Deposited Dust | Undefined Particles | Particle Volume Added | Particle Volume Lost | 0.67 micron | 0.72 micron | 0.771 micron | 0.846 micron |
|---|---|---|---|---|---|---|---|---|---|
| 27.13 % | 84.53 % | 1.0626 g/m^2 | 0 | 15917.6 micron^3 | 0.76 % | 11.27 % | 14.10 % | 15.85 % | 20.00 % |
| 30.46 % | 85.73 % | 0.8407 g/m^2 | 0 | 12500.9 micron^3 | 1.54 % | 17.71 % | 15.57 % | 19.47 % | 19.91 % |
| 32.26 % | 86.51 % | 0.6606 g/m^2 | 0 | 9891.9 micron^3 | 0.85 % | 18.34 % | 18.42 % | 20.15 % | 20.56 % |

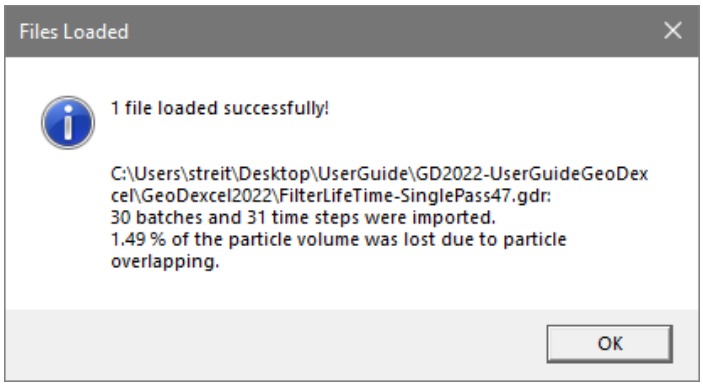
If the user decides to load efficiency results without ghost particles, all loaded efficiency results are computed without ghost particles.

| Total Filtration Efficiency by Count | Total Filtration Efficiency by Weight | Deposited Dust | Undefined Particles | Particle Volume Added | Particle Volume Lost | 0.67 micron | 0.72 micron | 0.771 micron | 0.846 micron |
|---|---|---|---|---|---|---|---|---|---|
| 27.26 % | 87.16 % | 1.0626 g/m^2 | 0 | 15917.6 micron^3 | 0.76 % | 11.27 % | 14.10 % | 15.85 % | 20.00 % |
| 30.41 % | 86.16 % | 0.8407 g/m^2 | 0 | 12500.9 micron^3 | 1.54 % | 17.71 % | 15.57 % | 19.47 % | 19.91 % |
| 31.81 % | 83.02 % | 0.6606 g/m^2 | 0 | 9891.9 micron^3 | 0.85 % | 18.34 % | 18.42 % | 20.15 % | 20.56 % |

The differences can be seen for the total filtration efficiencies. For the fractional efficiencies, the ghost particles are more important for particles with larger diameters which have a small count probability. More information on ghost particles can be found in the FilterDict handbook of the GeoDict User Guide.

A window informs the user that the file is loaded and gives information on the file, such as location of the result files, number of batches, number of time steps, and particle volume loss.

After clicking **OK**, the file opens in an Excel workbook.




The filtration simulation results shown here as an example, were obtained for the filtration of 30 batches with 36 particle sizes. To improve clarification, cells in the spreadsheet have been shaded in red, blue, dark green, yellow, orange, grey, violet, brown, cyan, and green.

After the information from the result file header, the next cells in the spreadsheet contain the description of the structure model and the process settings.

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | Module | FilterDict-Media | | | | | |
| 2 | Solver | LifeTime | | | | | |
| 3 | Version | 2022 \| 51466 | | | | | |
| 4 | File | C:\GeoDexcel2022\FilterLifeTime-SinglePass47.gdr | | | | | |
| 5 | Date of Run | 8/3/2021 \| 12:01:45 | | | | | |
| 6 | User | streit | | | | | |
| 7 | AddIn | GeoDexcel 2022 : 2021-09-29 11:28:40 | | | | | |
| 10 | Legend | FilterLifeTime-SinglePass47 | | | | | |
| 11 | | | | | | | |
| 12 | **Geometry:** | | | | | | |
| 13 | Hash | 16249 | | | | | |
| 14 | Hash64 | 9296184408072137096 | | | | | |
| 15 | FileName | Structure.gdt | | | | | |
| 16 | NX | 200 | | | | | |
| 17 | NY | 200 | | | | | |
| 18 | NZ | 400 | | | | | |
| 19 | UseBoxels | false | | | | | |
| 20 | VoxelLength | 0.000001 m | | | | | |
| 21 | Macro Parameter: | | | | | | |
| 22 | BatchesPerFlowField: | 1 | | | | | |
| 23 | UseEStatic: | FALSE | | | | | |
| 24 | ElectrostaticSurfaceCharge: | 1e-06 [C/m^2] | | | | | |
| 25 | Type: | SinglePassConstFlow | | | | | |
| 26 | PumpFlowRate: | 60 [l/min] | | | | | |
| 27 | FilterArea: | 100 [cm^2] | | | | | |
| 28 | TestDustConcentration: | 0.001 [g/l] | | | | | |
| 29 | TimeStepMode: | 0 | | | | | |
| 30 | DesiredVFPerBatch: | 0.000993381 | | | | | |
| 31 | ParticlesPerBatch: | 4417 | | | | | |
| 32 | BCFlowDirection: | Periodic | | | | | |
| 33 | BCTangentialDirections: | Periodic | | | | | |
| 34 | TimePerBatch: | 10 [s] | | | | | |
| 35 | UseMaxTime: | TRUE | | | | | |
| 36 | MaxTime: | 300 [s] | | | | | |
| 37 | UseMaxDepositedDust: | FALSE | | | | | |
| 38 | MaxDepositedDust: | 1 [kg/m2] | | | | | |
| 39 | UseMaxPressureDropIncrease: | TRUE | | | | | |
| 40 | MaxPressureDropIncrease: | 100000 [Pa] | | | | | |
| 41 | UseMaxPressureDrop: | FALSE | | | | | |
| 42 | MaxPressureDrop: | 100000 [Pa] | | | | | |
| 44 | Direction | Flowdirection | | | | Batches: | 30 |
| 45 | X | 0 | | | | Total Lost Volume: | 1.49 % |
| 46 | Y | 0 | | | | Particle Types: | 36 |
| 47 | Z | 1 | | | | Layers in Flow direction: | 400 |

Next is the general batch table, containing the data on the total filtration efficiency, the deposited dust, the added particle volume, the volume lost, and the fractional filtration efficiency for each particle size.

| | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 49 | Batch | Time | Legend | Total Filtration Efficiency by Count | Total Filtration Efficiency by Weight | Deposited Dust | Undefined Particles | Particle Volume Added | Particle Volume Lost | 0.67 micron | 0.72 micron | 0.771 micron |
| 50 | 1 | 5 s | FilterLifeTime-SinglePass47 (Batch 1) | 27.26 % | 87.16 % | 1.0626 g/m^2 | 0 | 15917.6 micron^3 | 0.76 % | 11.27 % | 14.10 % | 15.85 % |
| 51 | 2 | 15 s | FilterLifeTime-SinglePass47 (Batch 2) | 30.41 % | 86.16 % | 0.8407 g/m^2 | 0 | 12500.9 micron^3 | 1.54 % | 17.71 % | 15.57 % | 19.47 % |
| 52 | 3 | 25 s | FilterLifeTime-SinglePass47 (Batch 3) | 31.81 % | 83.02 % | 0.6606 g/m^2 | 0 | 9891.9 micron^3 | 0.85 % | 18.34 % | 18.42 % | 20.15 % |
| 53 | 4 | 35 s | FilterLifeTime-SinglePass47 (Batch 4) | 34.00 % | 86.17 % | 0.8025 g/m^2 | 0 | 11975.9 micron^3 | 1.14 % | 20.18 % | 19.48 % | 22.74 % |
| 54 | 5 | 45 s | FilterLifeTime-SinglePass47 (Batch 5) | 36.54 % | 86.48 % | 0.7357 g/m^2 | 0 | 11009.5 micron^3 | 0.90 % | 22.24 % | 22.28 % | 20.99 % |

In the time step table, the values of pressure drop and the deposited dust between time steps are listed.

| | A | B | C | D |
|---|---|---|---|---|
| 81 | TimeStep | Time | Pressure Drop | Total Deposited Dust |
| 82 | 0 | 0 s | 9.545 Pa | 0.000 g/m^2 |
| 83 | 1 | 10 s | 9.874 Pa | 1.0626 g/m^2 |
| 84 | 2 | 20 s | 10.254 Pa | 1.9033 g/m^2 |
| 85 | 3 | 30 s | 10.547 Pa | 2.5639 g/m^2 |
| 86 | 4 | 40 s | 10.874 Pa | 3.3664 g/m^2 |
| 87 | 5 | 50 s | 11.343 Pa | 4.1021 g/m^2 |
| 88 | 6 | 60 s | 11.788 Pa | 4.8004 g/m^2 |

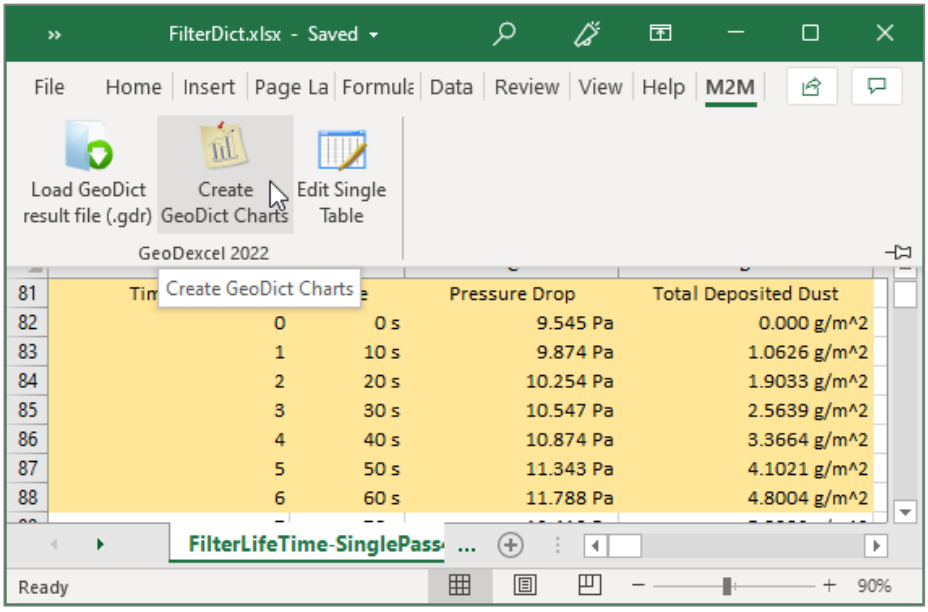
**Read Particles** was checked when loading the files, and, thus, for each batch (Batch 1, Batch 2, etc.) the number of particles (cumulative) and the total number of particles per batch, the filtered and non-filtered particles, and the corresponding particle volumes are available. Also given are these data for each of the 36 particle sizes.

| | A | B | C | D | E | F | J | K | L |
|---|---|---|---|---|---|---|---|---|---|
| 525 | Batch 2 | | | | | Particle sizes: | 0.67 micron | 0.72 micron | 0.771 micron |
| 526 | Particles from inflow (cumulative): | | 12677 | 2.04764E-12 | | | 1242 | 1194 | 1073 |
| 527 | Deposited particles (cumulative): | | 6265 | 2.04042E-12 | | | 180 | 177 | 189 |
| 528 | Outflow particles (cumulative): | | 6412 | 7.22177E-15 | | | 1062 | 1017 | 884 |
| 529 | Particles from inflow (batch): | | | | 6354 | 1.02384E-12 | 621 | 591 | 524 |
| 530 | Deposited particles (batch): | | | | 3215 | 1.02035E-12 | 110 | 92 | 102 |
| 531 | Time-out particles (batch): | | | | 0 | 0 | 0 | 0 | 0 |
| 532 | Outflow particles (batch): | | | | 3139 | 3.48314E-15 | 511 | 499 | 422 |

The data sheet then displays the filtration results per Layer and per particle size and layer for that batch.

| | A | B | C | D | E | F | J | K | L |
|---|---|---|---|---|---|---|---|---|---|
| 525 | Batch 2 | | | | | Particle sizes: | 0.67 micron | 0.72 micron | 0.771 micron |
| 533 | Layer | Position | Particles (cumulative) | Particlevolume (cumulative) | Particles (batc | Particlevolume (batch) | | | |
| 534 | 1 | 1.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |
| 535 | 2 | 2.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |
| 536 | 3 | 3.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |
| 537 | 4 | 4.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |
| 538 | 5 | 5.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |
| 539 | 6 | 6.0 micron | 0 | 0.00E+00 m^3 | 0 | 0.00E+00 m^3 | 0 | 0 | 0 |

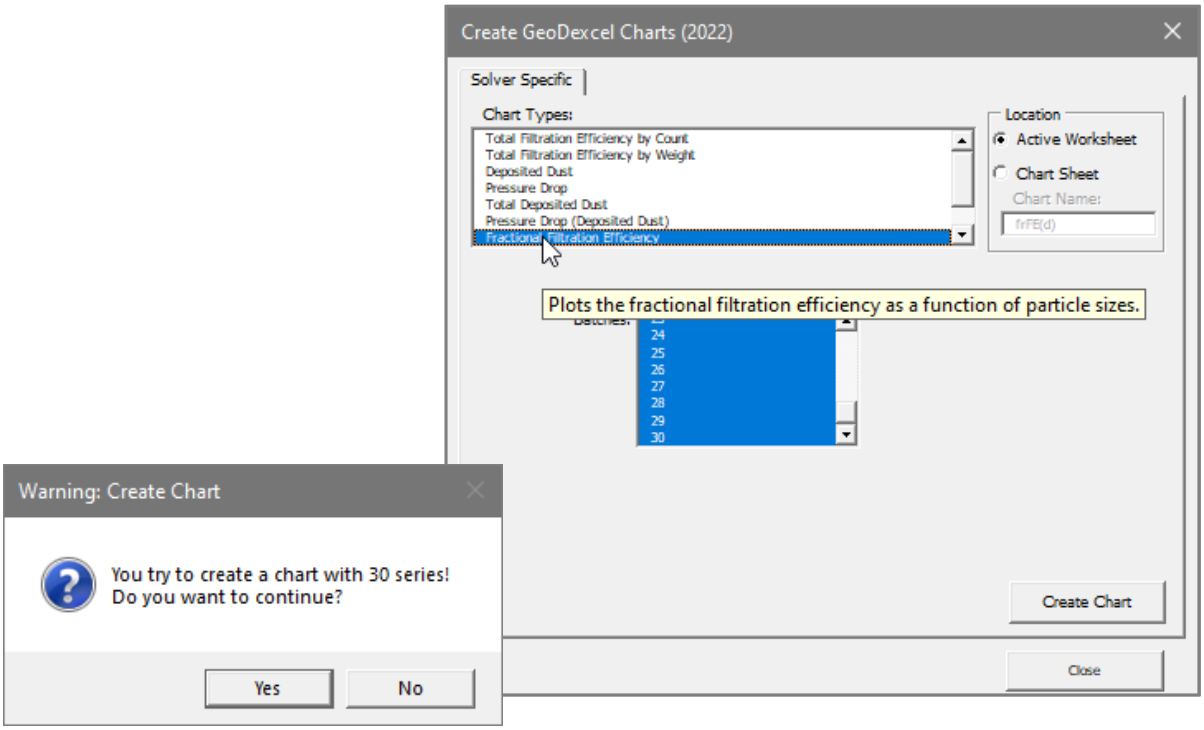
Clicking **Create GeoDict Charts** in the toolbar makes GeoDexcel automatically select ranges of data from the spreadsheets to create a variety of charts.




For FilterDict, several different **Chart Types** are available. A tool tip appears when selecting a **Chart Type** name and describes the data to be plotted.

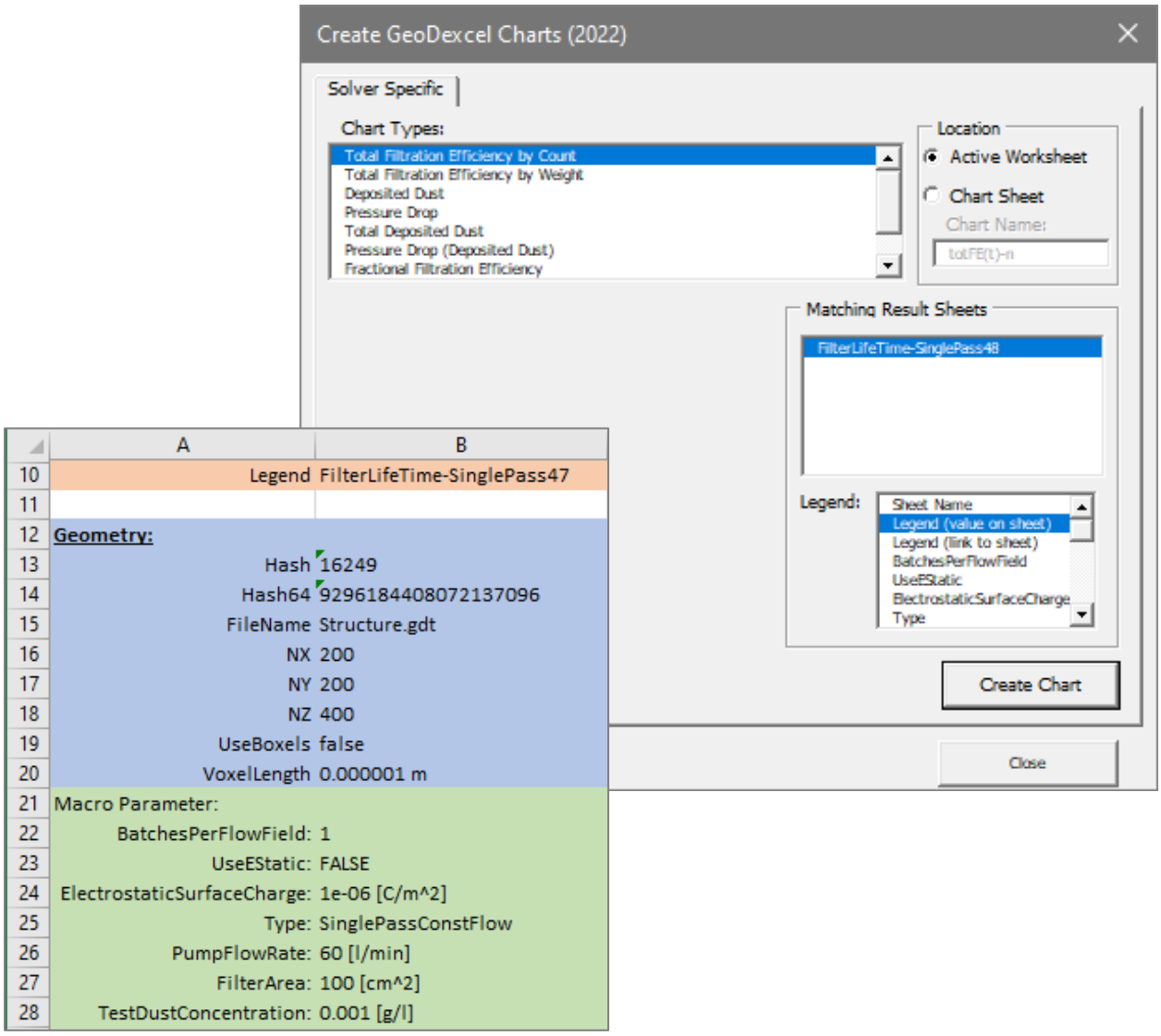
For the last three types (**Fractional Filtration Efficiency**, **Layerwise Filtration Efficiency**, and **Particle Deposition**), the user can choose the batches or particle types of interest.

If the data for plotting in the chart is too large (e.g. too many batches/series), a warning pops up. This can happen when trying to plot the **Fractional Filtration Efficiency** for all batches. It is recommended to reduce the selection.



On the top right side of the dialog, in the **Location** panel, decide if the chart should be plotted in the **Active Worksheet** or in an extra **Chart Sheet** with the entered **Chart Name**. In this case, an extra sheet with the name frFE(d) is created in the same workbook. If the choice is **Active Worksheet**, the chart is created on top of the spreadsheet, superimposing the data and, when there is more than one chart, overlaying each other. However, charts can be moved and arranged manually.

If more than one GeoDict result file was loaded into the workbook, there is the possibility to select the result sheets that should be plotted together with the current ones in the **Matching Result Sheets**.



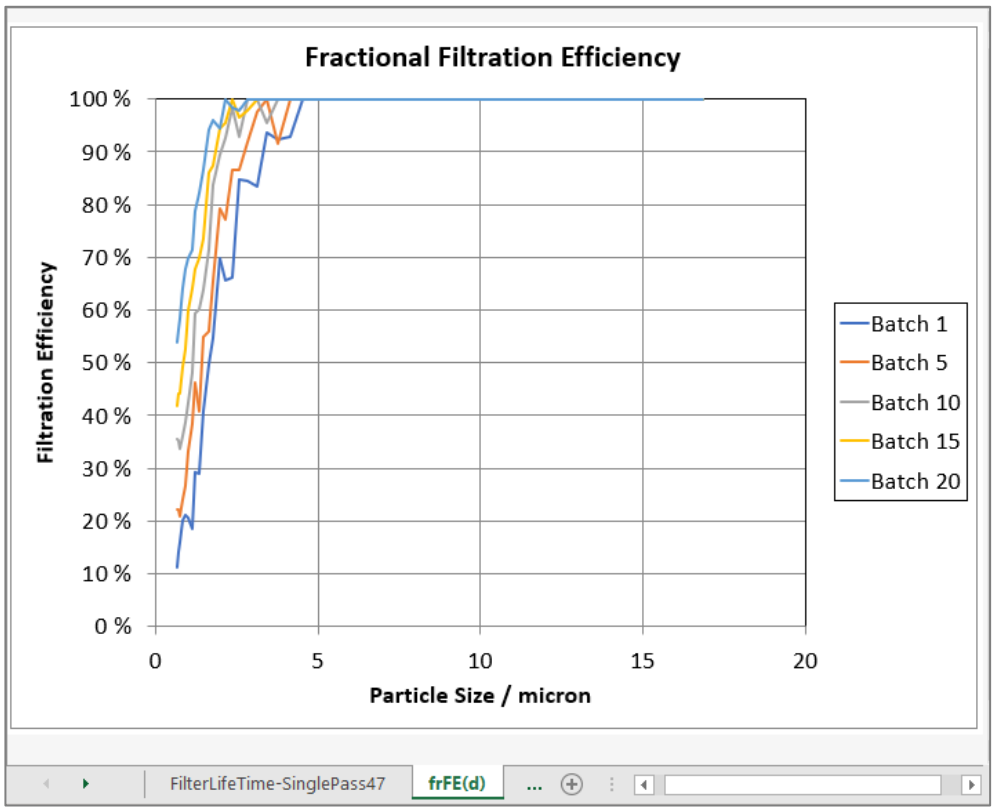

| | A | B |
|---|---|---|
| 10 | Legend | FilterLifeTime-SinglePass47 |
| 11 | | |
| 12 | **Geometry:** | |
| 13 | Hash | 16249 |
| 14 | Hash64 | 9296184408072137096 |
| 15 | FileName | Structure.gdt |
| 16 | NX | 200 |
| 17 | NY | 200 |
| 18 | NZ | 400 |
| 19 | UseBoxels | false |
| 20 | VoxelLength | 0.000001 m |
| 21 | Macro Parameter: | |
| 22 | BatchesPerFlowField: | 1 |
| 23 | UseEStatic: | FALSE |
| 24 | ElectrostaticSurfaceCharge: | 1e-06 [C/m^2] |
| 25 | Type: | SinglePassConstFlow |
| 26 | PumpFlowRate: | 60 [l/min] |
| 27 | FilterArea: | 100 [cm^2] |
| 28 | TestDustConcentration: | 0.001 [g/l] |

In the **Legend** box, choose the legend entries for the plot.

Choose between **Sheet Name**, **Legend (value on sheet)**, **Legend (link to sheet)**, and any of the parameters in the **Macro Parameter** block if there is more than one result file loaded.

For example, when comparing two different simulations with different number of particles per batch, choose **ParticlePerBatch**. When choosing **Legend (link to sheet)**, the plot legend can be changed by modifying the cell legend (here B10) even after the chart has been created.

When clicking **Create Chart** the corresponding plot is created and can be modified with the Excel chart tools.

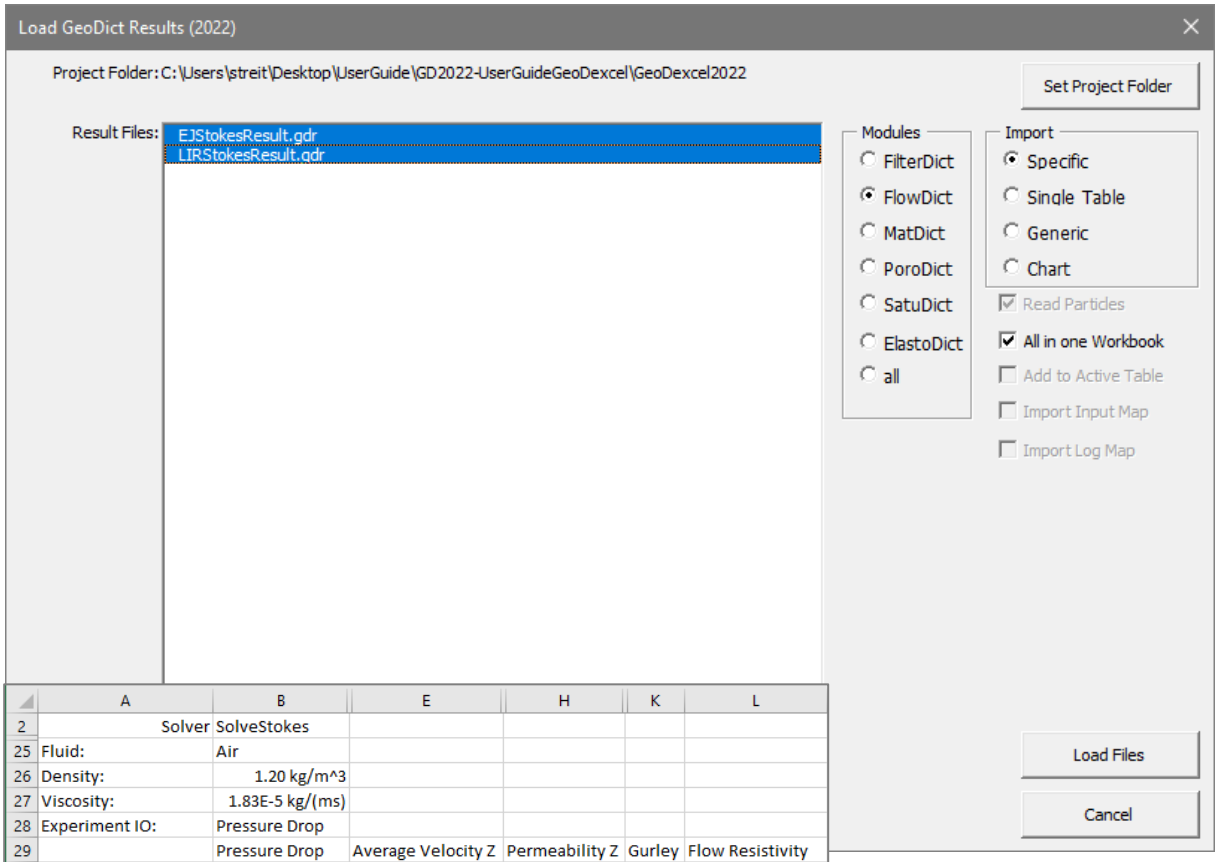



The **Create GeoDexcel Charts** dialog box remains open after creating the chart. This way, the user can choose to create other charts right away and compare them.

## SPECIFIC IMPORT FOR FLOWDICT

**Specific** import can be used for FlowDict to obtain a layered pressure chart. This chart plots the pressure in each layer as a function of the position of the layer.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then the **Load GeoDict result file (.gdr)** icon as described above in page 3. In the opening dialog, make sure **Specific** is checked as **Import** type and FlowDict is checked in **Modules**.



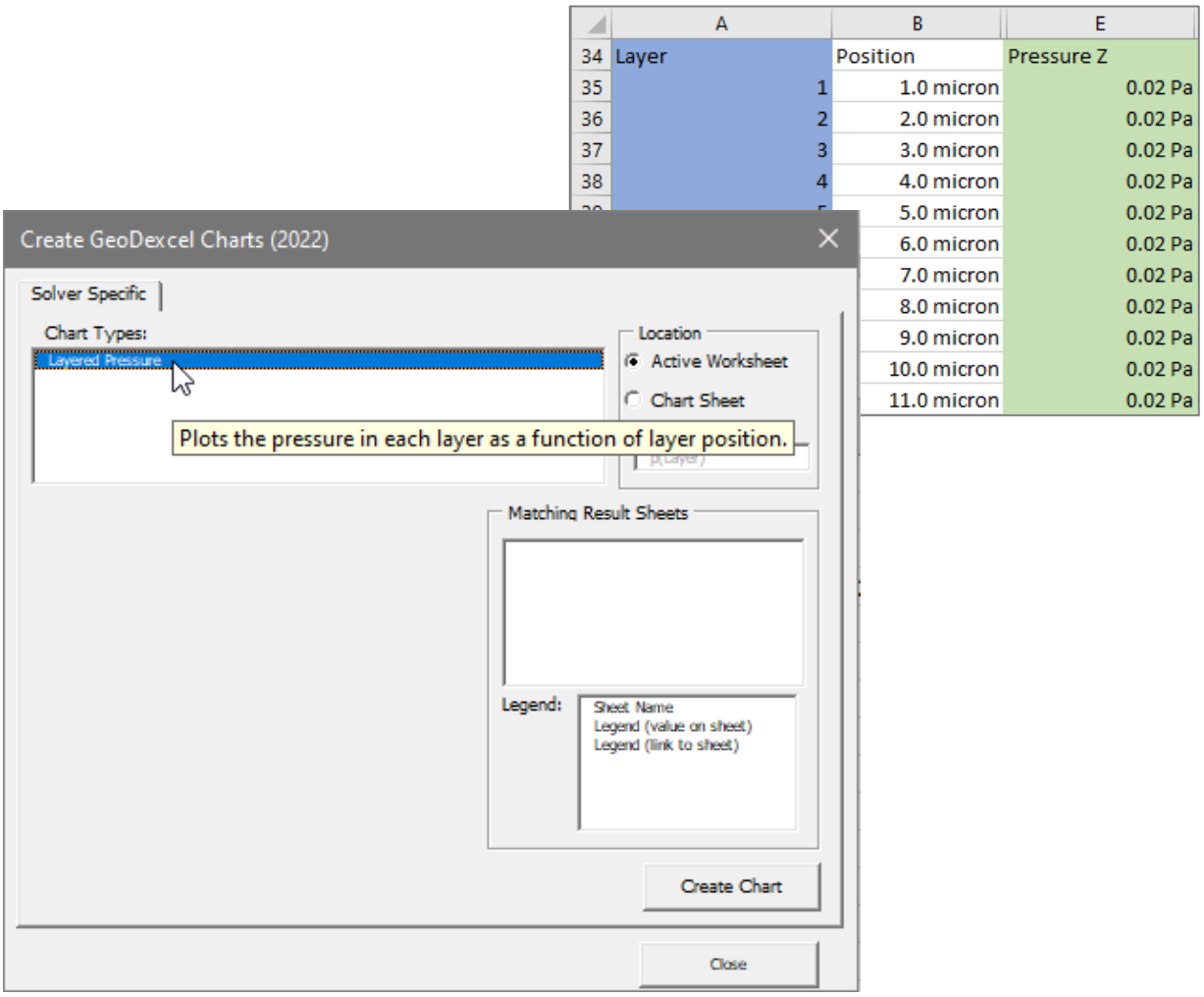

| | A | B | E | H | K | L |
|---|---|---|---|---|---|---|
| 2 | Solver | SolveStokes | | | | |
| 25 | Fluid: | Air | | | | |
| 26 | Density: | 1.20 kg/m^3 | | | | |
| 27 | Viscosity: | 1.83E-5 kg/(ms) | | | | |
| 28 | Experiment IO: | Pressure Drop | | | | |
| 29 | | Pressure Drop | Average Velocity Z | Permeability Z | Gurley | Flow Resistivity |
| 30 | X-Direction: | | | | | |
| 31 | Y-Direction: | | | | | |
| 32 | Z-Direction: | 0.02 Pa | 2.10 E-4 m/s | 3.85 E-11 m^2 | 0.012 s | 476517 kg/(m^3s) |
| 33 | | | | | | |
| 34 | Layer | Position | Pressure Z | | | |
| 35 | 1 | 1.0 micron | 0.02 Pa | | | |
| 36 | 2 | 2.0 micron | 0.02 Pa | | | |
| 37 | 3 | 3.0 micron | 0.02 Pa | | | |
| 38 | 4 | 4.0 micron | 0.02 Pa | | | |
| 39 | 5 | 5.0 micron | 0.02 Pa | | | |
| 40 | 6 | 6.0 micron | 0.02 Pa | | | |
| 41 | 7 | 7.0 micron | 0.02 Pa | | | |
| 42 | 8 | 8.0 micron | 0.02 Pa | | | |
| 43 | 9 | 9.0 micron | 0.02 Pa | | | |
| 44 | 10 | 10.0 micron | 0.02 Pa | | | |
| 45 | 11 | 11.0 micron | 0.02 Pa | | | |

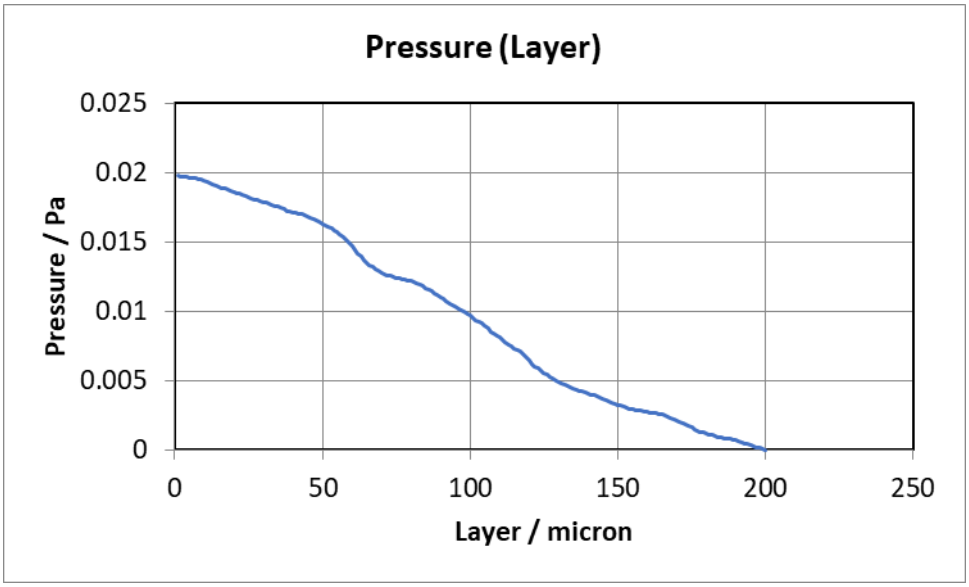
Check **All in one Workbook** to import several result files to the same workbook.

After the general and the geometry information, the user gets access to data on the pressure drop, the average velocity, the permeability, the Gurley value, the flow resistivity, the flow rate etc. and to the pressure per layer, in all computed directions.

In the example shown, only the flow in Z-direction was computed.

In the toolbar, click **Create GeoDict Charts** and select **Layered Pressure**. GeoDexcel automatically selects ranges of data from the spreadsheet to create the chart.

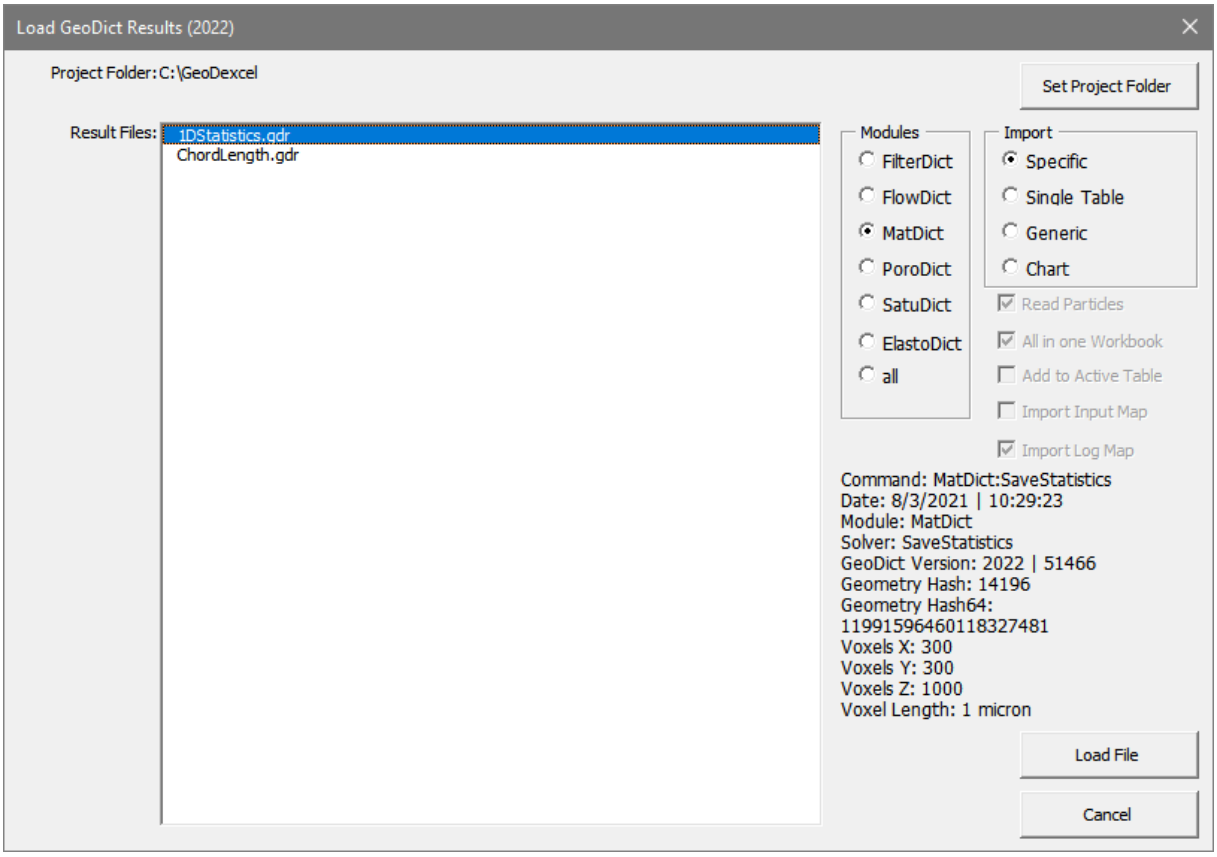


## Specific import for MatDict

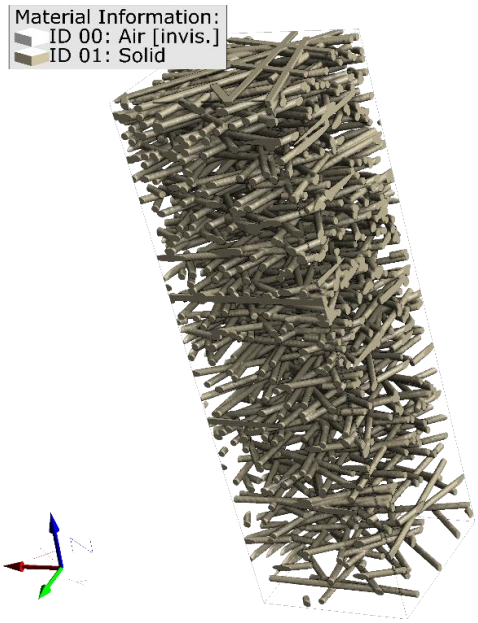
**Specific** import can be used for MatDict results, to analyze result files obtained with the **1D Statistics** analysis and **Chord Length Distribution**.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then the **Load GeoDict result file (.gdr)** icon as described above in page 3. In the opening dialog, make sure **Specific** is checked as **Import** type and MatDict is checked in **Modules**. Highlight the file to load and click **Load File**.




## 1D Statistics Results

In our example, a nonwoven filter media with increasing fiber density has been analyzed in Z-direction.

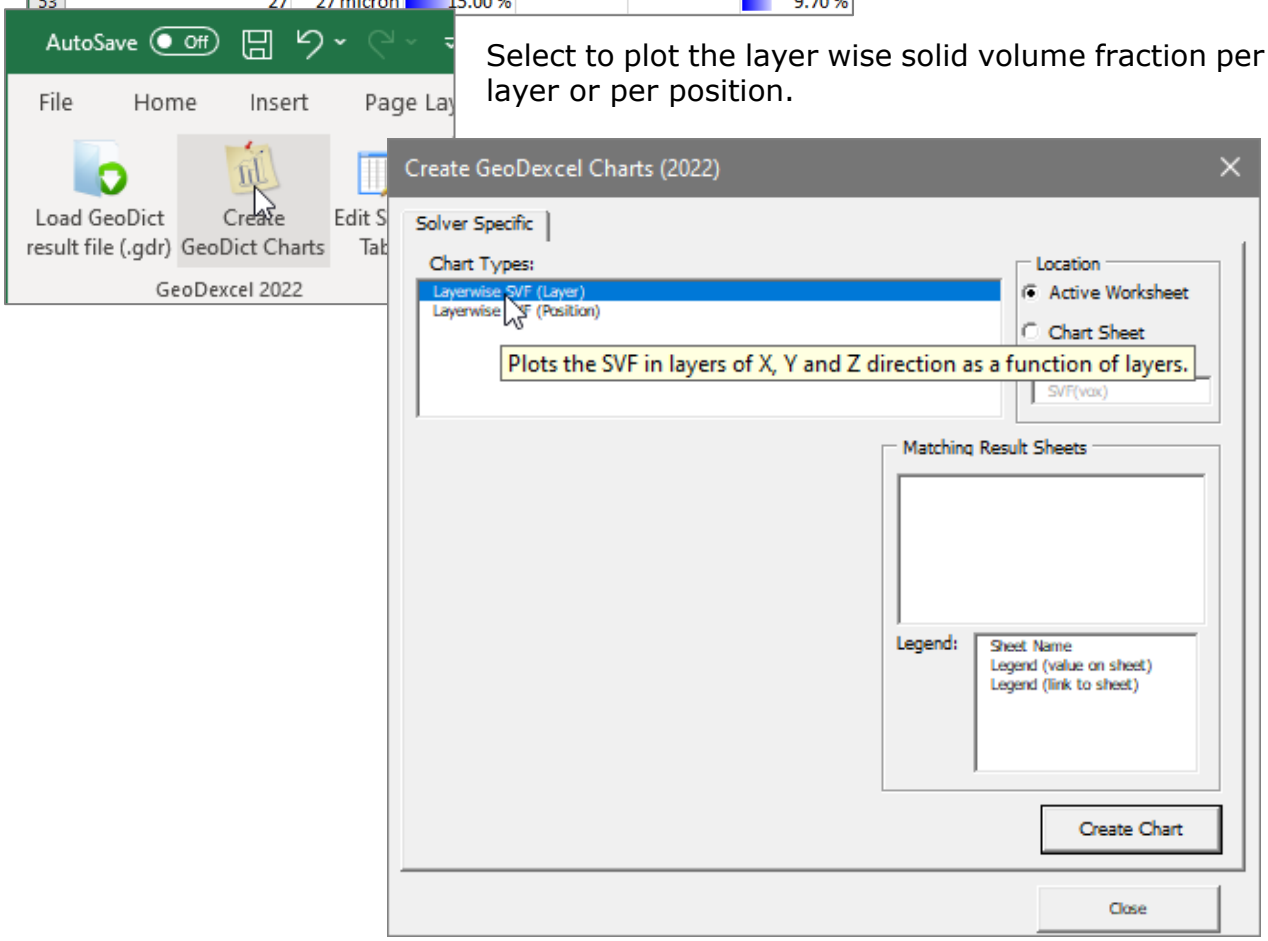


After the general and the geometry information, the user can scroll down to access the solid volume fraction per layer and per position, for the computed direction.

In addition, the mean solid volume fraction of the geometry is shown.

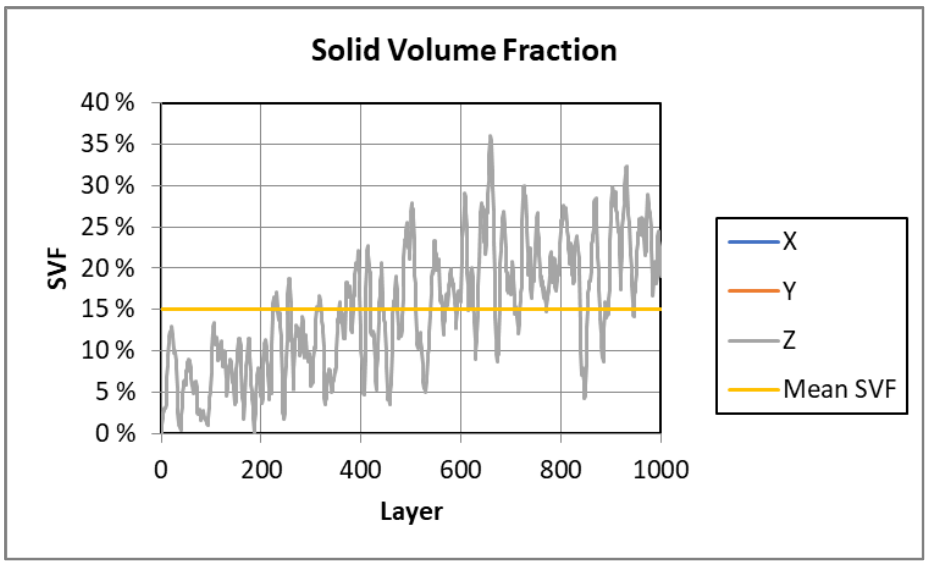
| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 25 | | | SVF Mean - 1DStatistics | SVF X - 1DStatistics | SVF Y - 1DStatistics | SVF Z - 1DStatistics |
| 26 | Layer | Position | SVF Mean | SVF X | SVF Y | SVF Z |
| 27 | 1 | 1 micron | 15.00 % | | | 0.00 % |
| 28 | 2 | 2 micron | 15.00 % | | | 1.13 % |
| 29 | 3 | 3 micron | 15.00 % | | | 1.87 % |
| 30 | 4 | 4 micron | 15.00 % | | | 2.40 % |
| 31 | 5 | 5 micron | 15.00 % | | | 2.75 % |
| 32 | 6 | 6 micron | 15.00 % | | | 2.97 % |
| 33 | 7 | 7 micron | 15.00 % | | | 3.08 % |
| 34 | 8 | 8 micron | 15.00 % | | | 3.09 % |
| 35 | 9 | 9 micron | 15.00 % | | | 3.02 % |
| 36 | 10 | 10 micron | 15.00 % | | | 3.46 % |
| 37 | 11 | 11 micron | 15.00 % | | | 5.41 % |
| 38 | 12 | 12 micron | 15.00 % | | | 6.86 % |
| 39 | 13 | 13 micron | 15.00 % | | | 8.15 % |
| 40 | 14 | 14 micron | 15.00 % | | | 9.39 % |
| 41 | 15 | 15 micron | 15.00 % | | | 11.04 % |
| 42 | 16 | 16 micron | 15.00 % | | | 11.82 % |
| 43 | 17 | 17 micron | 15.00 % | | | 12.35 % |
| 44 | 18 | 18 micron | 15.00 % | | | 12.43 % |
| 45 | 19 | 19 micron | 15.00 % | | | 12.12 % |
| 46 | 20 | 20 micron | 15.00 % | | | 12.23 % |
| 47 | 21 | 21 micron | 15.00 % | | | 12.98 % |
| 48 | 22 | 22 micron | 15.00 % | | | 11.98 % |
| 49 | 23 | 23 micron | 15.00 % | | | 11.91 % |
| 50 | 24 | 24 micron | 15.00 % | | | 11.59 % |
| 51 | 25 | 25 micron | 15.00 % | | | 10.14 % |
| 52 | 26 | 26 micron | 15.00 % | | | 9.71 % |
| 53 | 27 | 27 micron | 15.00 % | | | 9.70 % |

In the toolbar, click **Create GeoDict Charts**.




Select to plot the layer wise solid volume fraction per layer or per position.

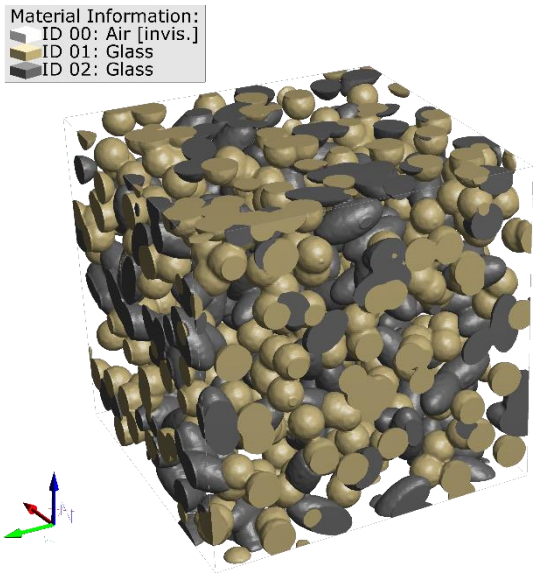
GeoDexcel automatically selects the appropriate ranges of data from the spreadsheet to create the chart(s).




The increasing solid volume fraction in Z direction is visible in the plot.

## CHORD LENGTH DISTRIBUTION RESULTS

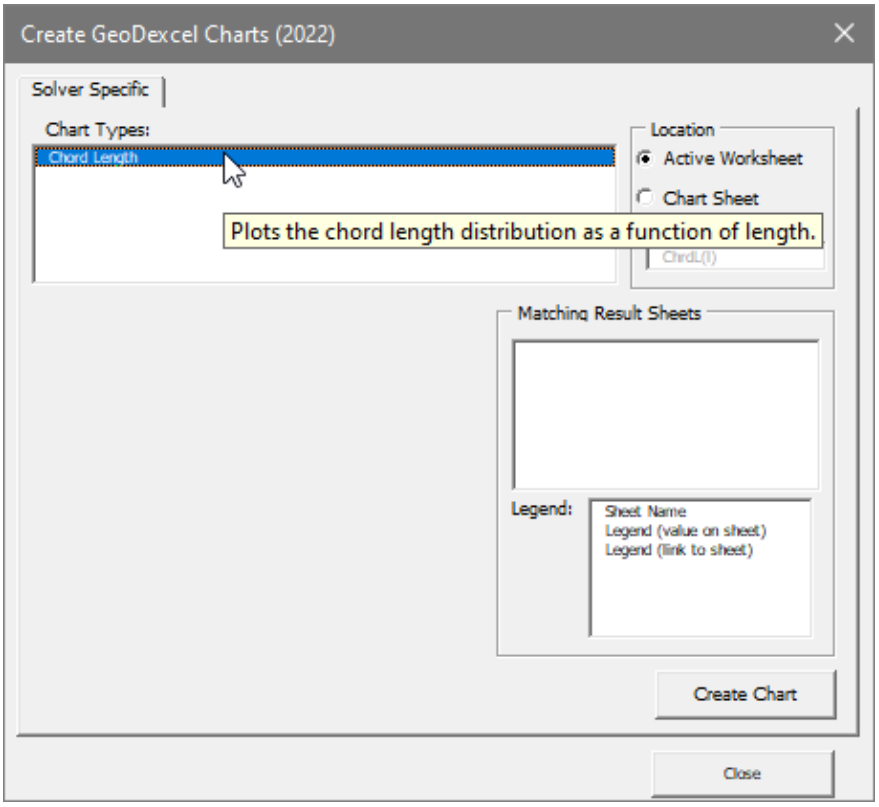
In our example, a granular structure has been analyzed in all directions.

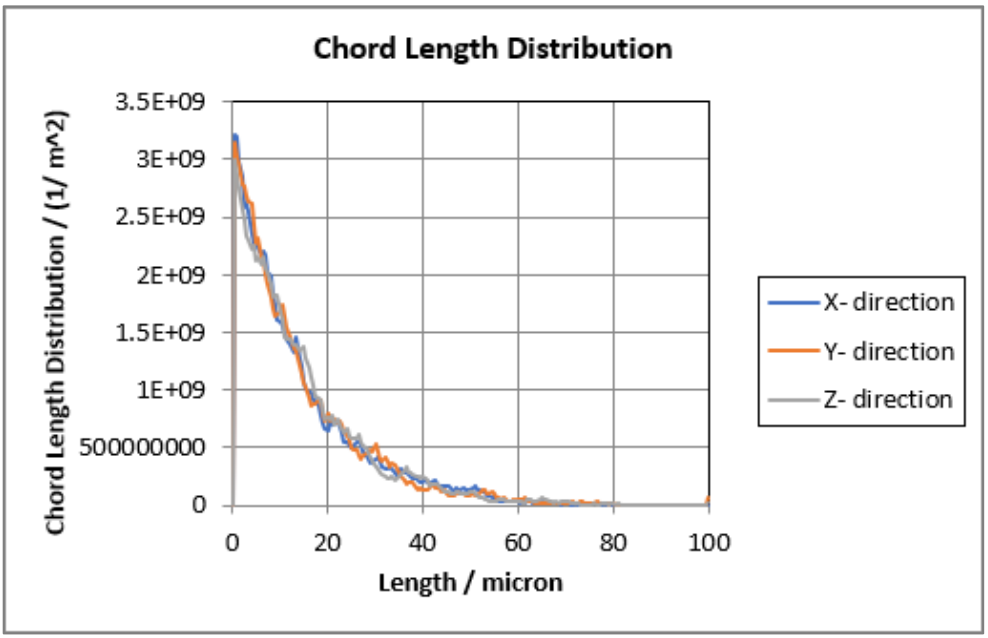



When loading results for the **Chord Length Distribution**, the user gets access to the number of chords and normalized distribution of chords of certain lengths in each direction.

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Module | MatDict | | | | | | |
| 2 | Solver | ChordLengthDistribution | | | | | | |
| 12 | **Geometry:** | | | | | | | |
| 13 | Hash | 72559 | | | | | | |
| 14 | Hash64 | 6212959420369137849 | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | |
| 16 | NX | 200 | | | | | | |
| 17 | NY | 200 | | | | | | |
| 18 | NZ | 200 | | | | | | |
| 19 | UseBoxels | false | | | | | | |
| 20 | VoxelLength | 0.0000005 m | | | | | | |
| 21 | Macro Parameter: | | | | | | | |
| 25 | | L10: | L50: | L90: | Medium Chord Length: | | | |
| 26 | Fraction Lengths X: | 1.45 micron | 9.69 micron | 33.49 micron | 14.30 micron | | | |
| 27 | Fraction Lengths Y: | 1.50 micron | 9.76 micron | 32.05 micron | 14.27 micron | | | |
| 28 | Fraction Lengths Z: | 1.59 micron | 10.24 micron | 32.25 micron | 14.39 micron | | | |
| 29 | | | | | | | | |
| 30 | Length (Voxels) | Length | Number of chords (X) | Normalized Distribution (X) | Number of chords (Y) | Normalized Distribution (Y) | Number of chords (Z) | Normalized Distribution (Z) |
| 31 | 0 | 0.00 micron | 0 | 0.00E+00 | 0 | 0.00E+00 | 0 | 0.00E+00 |
| 32 | 1 | 0.50 micron | 6439 | 3.22E+09 | 6279 | 3.14E+09 | 5982 | 2.99E+09 |
| 33 | 2 | 1.00 micron | 6385 | 3.19E+09 | 6066 | 3.03E+09 | 5714 | 2.86E+09 |
| 34 | 3 | 1.50 micron | 5977 | 2.99E+09 | 5937 | 2.97E+09 | 5506 | 2.75E+09 |
| 35 | 4 | 2.00 micron | 5713 | 2.86E+09 | 5564 | 2.78E+09 | 5125 | 2.56E+09 |
| 36 | 5 | 2.50 micron | 5173 | 2.59E+09 | 5539 | 2.77E+09 | 4983 | 2.49E+09 |
| 37 | 6 | 3.00 micron | 5219 | 2.61E+09 | 5360 | 2.68E+09 | 4679 | 2.34E+09 |

In the toolbar, click **Create GeoDict Charts** and select **Chord Length**. GeoDexcel automatically selects the ranges of data from the spreadsheet to create the chart.




Chord Length Distribution
Chord Length Distribution / (1/ m^2)
3.5E+09
3E+09
2.5E+09
2E+09
1.5E+09
1E+09
500000000
0
0
20
40
60
80
100
Length / micron
X- direction
Y- direction
Z- direction

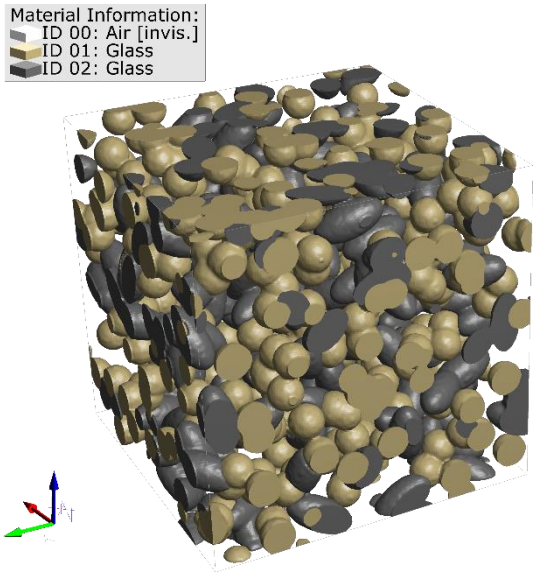
## Specific import for PoroDict

**Specific** import can be used for PoroDict results, to analyze result files obtained with PoroDict's **Pore Size Distribution (Granulometry)** and **Pore Size Distribution (Porosimetry).**

Start GeoDexcel, click the **M2M** tab in the menu bar, and then the **Load GeoDict result file (.gdr)** icon as described above in page 3.

In our example, a granular structure has been analyzed in all directions.

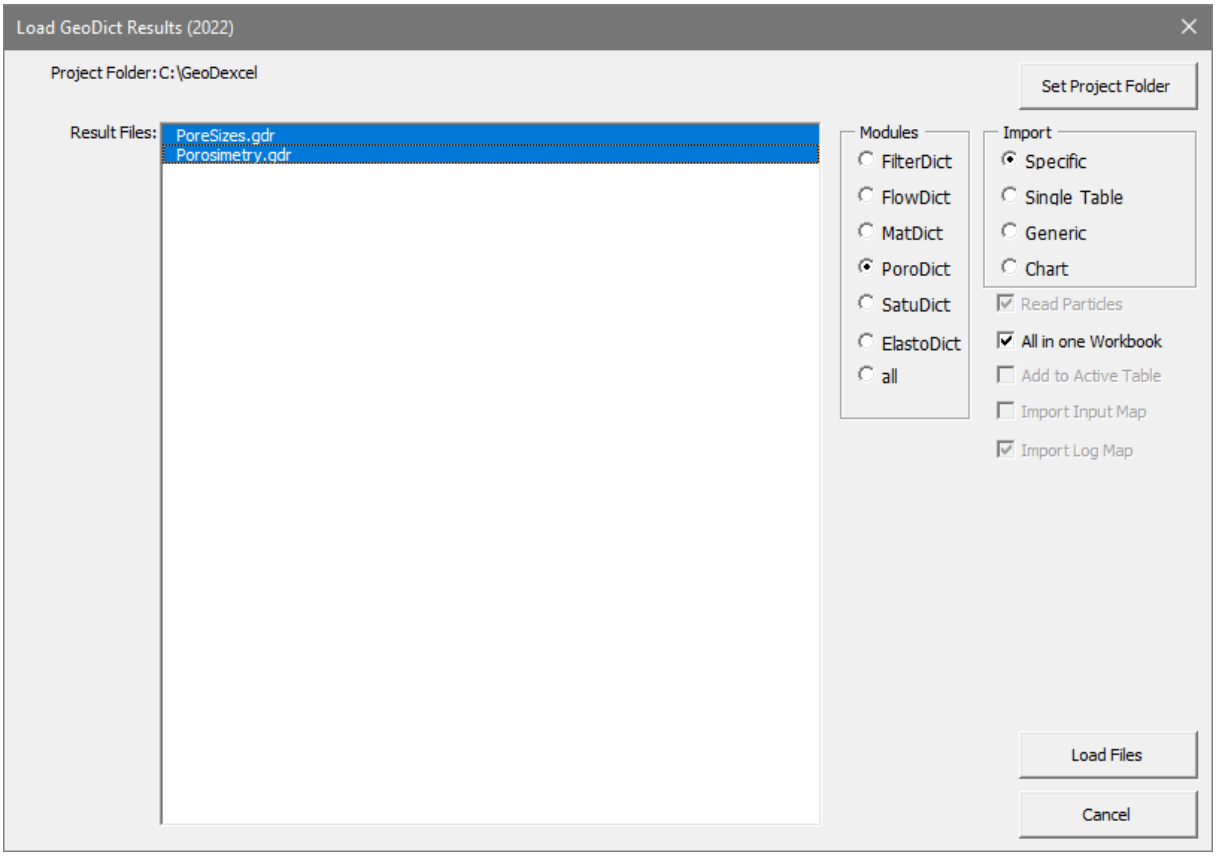
In the opening dialog, make sure **Specific** is checked as **Import** type and PoroDict is checked in **Modules**. Highlight the files to load and click **Load Files**.




## Pore Size Distribution results

Here, result files of the two methods implemented in PoroDict to calculate the pore size distribution (PoreSizes.gdr and Porosimetry.gdr) are loaded.

Check **All in one Workbook** to load both results to the same workbook.



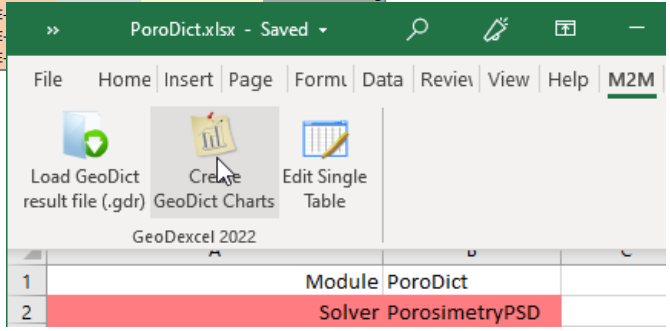
The spreadsheets from the result files of the two methods for calculating the pore size distribution provide essentially the same type of information, but the values obtained by the two solver methods (GeometricPSD and PorosimetryPSD) may differ. See the PoroDict2022 handbook of the GeoDict User Guide for information on how these two methods work.

The information includes the characteristic diameters and the fraction, the pore volume, the cumulative fraction, the density and the differential pore volume distribution for pores of a given size.

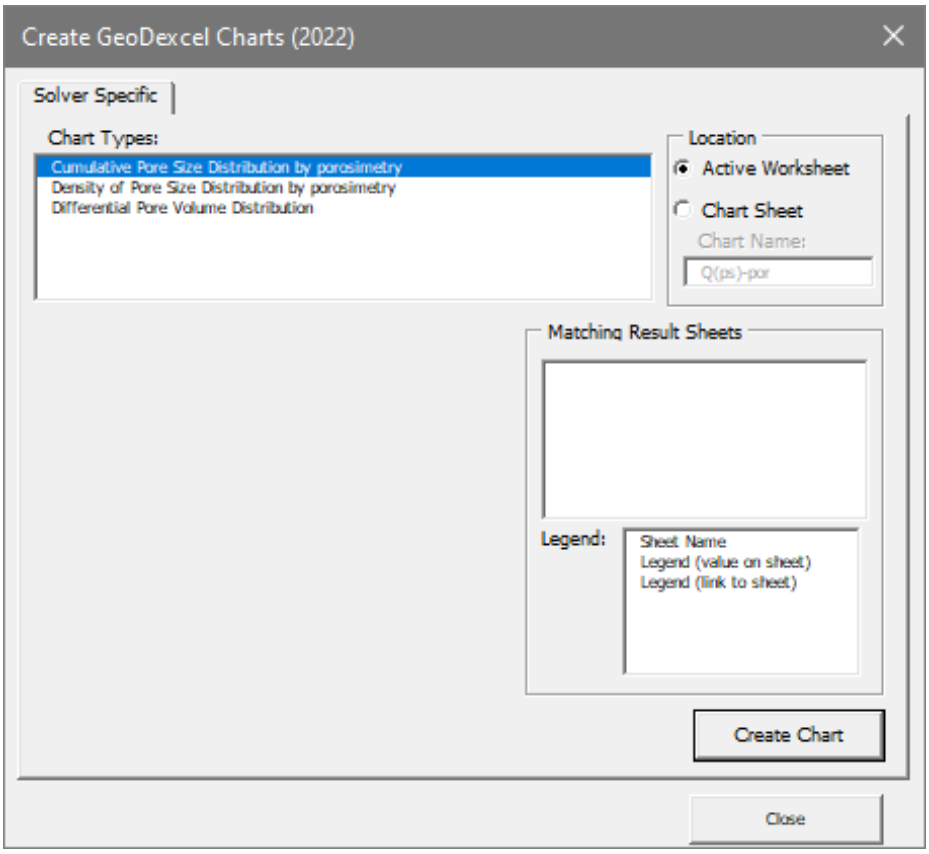
| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Module | PoroDict | | | | | | |
| 2 | Solver | GeometricPSD | | | | | | |
| 12 | **Geometry:** | | | | | | | |
| 13 | Hash | 72559 | | | | | | |
| 14 | Hash64 | 6212959420369137849 | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | |
| 16 | NX | 200 | | | | | | |
| 17 | NY | 200 | | | | | | |
| 18 | NZ | 200 | | | | | | |
| 19 | UseBoxels | false | | | | | | |
| 20 | VoxelLength | 0.0000005 m | | | | | | |
| 21 | Macro Parameter: | | | | | | | |
| 22 | StructureDescription: | PoreSizes | | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/PoreSizes/Structure.gdt | | | | | | |
| 25 | **Characteristic Diameters:** | | | | | | | |
| 26 | $D_{10}$: | 5.35 micron | | | | | | |
| 27 | $D_{50}$: | 11.63 micron | | | | | | |
| 28 | $D_{90}$: | 17.97 micron | | | | | | |
| 29 | | | | | | | | |
| 30 | **Geometric Pore Size Distribution:** | | | | | | | |
| 31 | x min | x max | x mean | Fraction | Pore Volume | Cumulative | Density | dVdLogDiameter |
| 32 | 0.00 micron | 1.00 micron | 0.50 micron | 0.44 % | 2.89 E-15 m^3 | 0.44 % | 0.00444 1/micron | 0.00 cm^3/g |
| 33 | 1.00 micron | 2.00 micron | 1.50 micron | 0.91 % | 5.93 E-15 m^3 | 1.36 % | 0.00913 1/micron | 0.00948 cm^3/g |
| 34 | 2.00 micron | 3.00 micron | 2.50 micron | 1.87 % | 1.21 E-14 m^3 | 3.22 % | 0.01867 1/micron | 0.03318 cm^3/g |
| 35 | 3.00 micron | 4.00 micron | 3.50 micron | 1.85 % | 1.20 E-14 m^3 | 5.08 % | 0.01851 1/micron | 0.04635 cm^3/g |
| 36 | 4.00 micron | 5.00 micron | 4.50 micron | 3.59 % | 2.34 E-14 m^3 | 8.67 % | 0.03592 1/micron | 0.11596 cm^3/g |
| 37 | 5.00 micron | 6.00 micron | 5.50 micron | 3.85 % | 2.51 E-14 m^3 | 12.52 % | 0.03854 1/micron | 0.15227 cm^3/g |
| 38 | 6.00 micron | 7.00 micron | 6.50 micron | 4.60 % | 2.99 E-14 m^3 | 17.12 % | 0.04598 1/micron | 0.21488 cm^3/g |
| 39 | 7.00 micron | 8.00 micron | 7.50 micron | 5.83 % | 3.79 E-14 m^3 | 22.95 % | 0.05832 1/micron | 0.31459 cm^3/g |
| 40 | 8.00 micron | 9.00 micron | 8.50 micron | 7.12 % | 4.63 E-14 m^3 | 30.07 % | 0.07121 1/micron | 0.43552 cm^3/g |
| 41 | 9.00 micron | 10.00 micron | 9.50 micron | 7.99 % | 5.19 E-14 m^3 | 38.06 % | 0.0799 1/micron | 0.54624 cm^3/g |

| | A | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | Module | PoroDic | | | | | | |
| 2 | Solver | PorosimetryPSD | | | | | | |
| 12 | **Geometry:** | | | | | | | |
| 13 | Hash | 72559 | | | | | | |
| 14 | Hash64 | 6212959420369137849 | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | |
| 16 | NX | 200 | | | | | | |
| 17 | NY | 200 | | | | | | |
| 18 | NZ | 200 | | | | | | |
| 19 | UseBoxels | false | | | | | | |
| 20 | VoxelLength | 0.0000005 m | | | | | | |
| 21 | Macro Parameter: | | | | | | | |
| 22 | StructureDescription: | PoreSizes | | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/PoreSizes/Structure.gdt | | | | | | |
| 25 | **Characteristic Diameters:** | | | | | | | |
| 26 | $D_{10}$: | 5.28 micron | | | | | | |
| 27 | $D_{50}$: | 9.31 micron | | | | | | |
| 28 | $D_{90}$: | 11.29 micron | | | | | | |
| 29 | | | | | | | | |
| 30 | **Geometric Pore Size Distribution:** | | | | | | | |
| 31 | x min | x max | x mean | Fraction | Pore Volume | Cumulative | Density | dVdLogDiameter |
| 32 | 0.00 micron | 1.00 micron | 0.50 micron | 0.45 % | 2.90 E-15 m^3 | 0.45 % | 0.00446 1/micron | 0.00 cm^3/g |
| 33 | 1.00 micron | 2.00 micron | 1.50 micron | 0.92 % | 5.97 E-15 m^3 | 1.36 % | 0.00918 1/micron | 0.00954 cm^3/g |
| 34 | 2.00 micron | 3.00 micron | 2.50 micron | 1.88 % | 1.22 E-14 m^3 | 3.24 % | 0.0188 1/micron | 0.03341 cm^3/g |
| 35 | 3.00 micron | 4.00 micron | 3.50 micron | 1.87 % | 1.22 E-14 m^3 | 5.11 % | 0.0187 1/micron | 0.04682 cm^3/g |
| 36 | 4.00 micron | 5.00 micron | 4.50 micron | 3.68 % | 2.40 E-14 m^3 | 8.80 % | 0.03685 1/micron | 0.11895 cm^3/g |
| 37 | 5.00 micron | 6.00 micron | 5.50 micron | 4.33 % | 2.82 E-14 m^3 | 13.13 % | 0.04331 1/micron | 0.17109 cm^3/g |
| 38 | 6.00 micron | 7.00 micron | 6.50 micron | 5.29 % | 3.44 E-14 m^3 | 18.42 % | 0.05291 1/micron | 0.24723 cm^3/g |
| 39 | 7.00 micron | 8.00 micron | 7.50 micron | 8.84 % | 5.75 E- | | | |
| 40 | 8.00 micron | 9.00 micron | 8.50 micron | 16.82 % | 1.09 E- | | | |
| 41 | 9.00 micron | 10.00 micron | 9.50 micron | 18.78 % | 1.22 E- | | | |

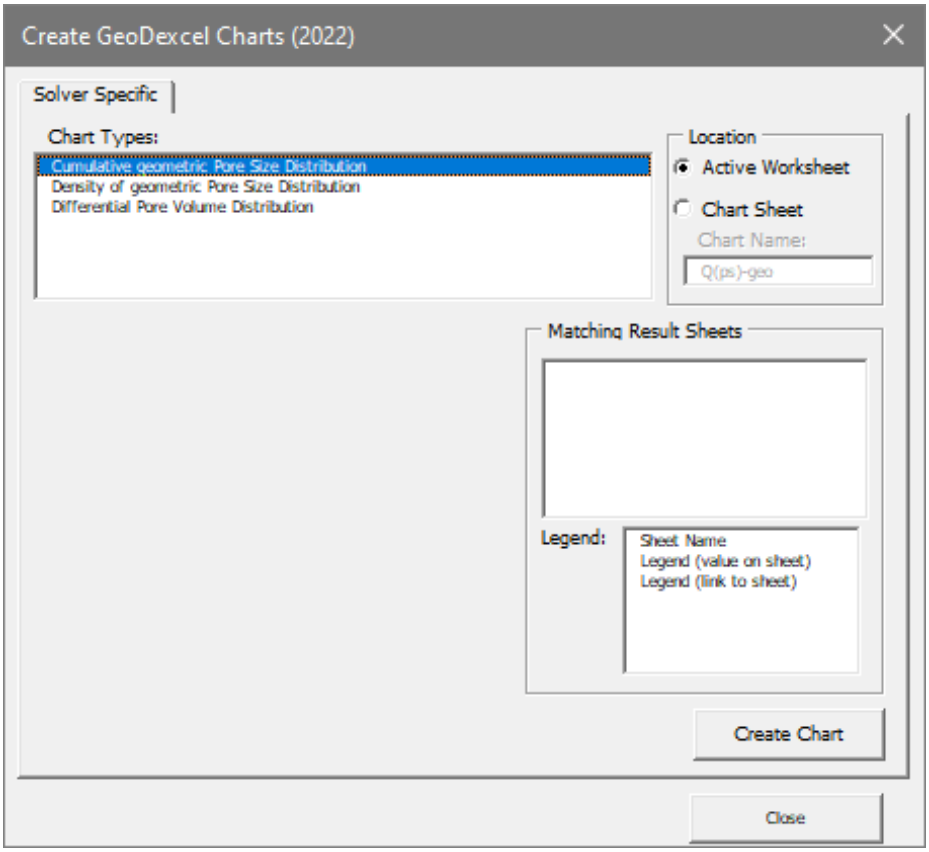
In the toolbar, under the **M2M** tab, click **Create GeoDict Charts** for the spreadsheets of the results from both methods.



For the Porosimetry PSD, sequentially select to plot the **Cumulative Pore Size Distribution by porosimetry**, the **Density of Pore Size Distribution by porosimetry**, and the **Differential Pore Volume Distribution**.



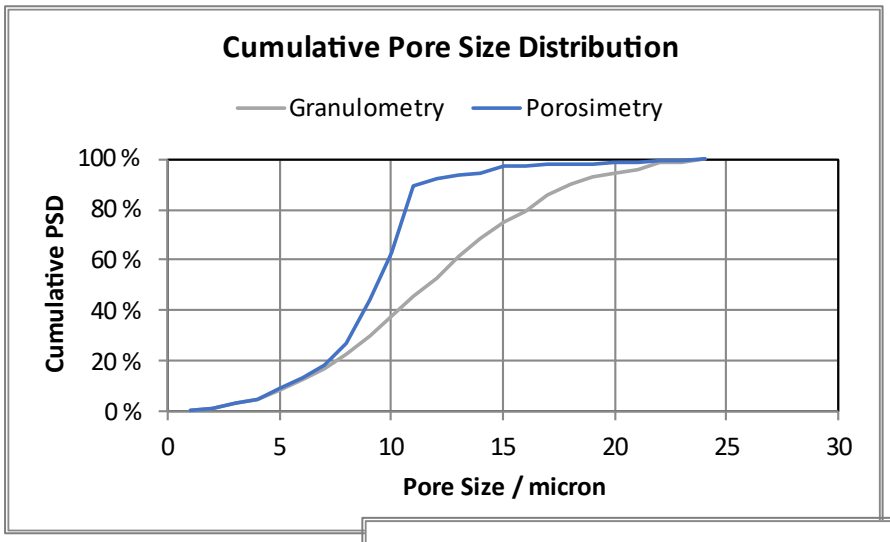

For the Geometric PSD (granulometry), select to plot the **Cumulative geometric Pore Size Distribution**, the **Density of geometric Pore Size Distribution**, and the **Differential Pore Volume Distribution**.

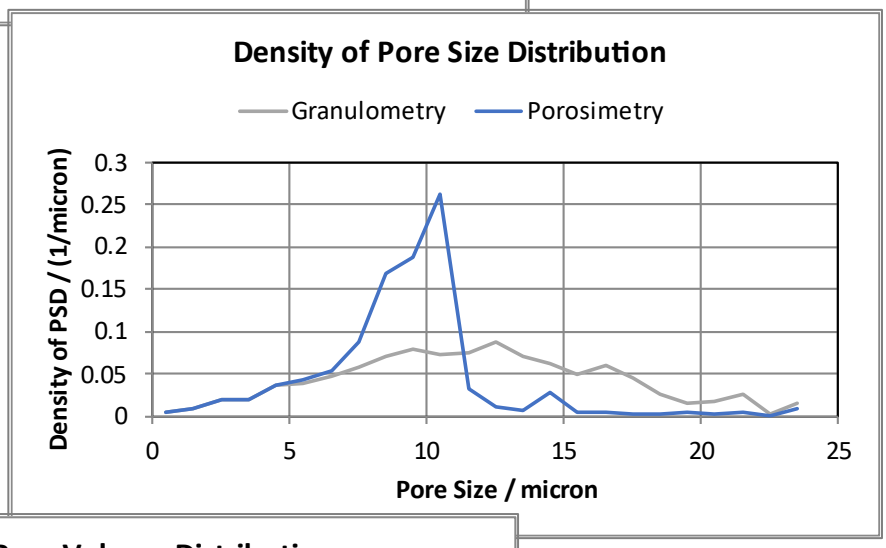


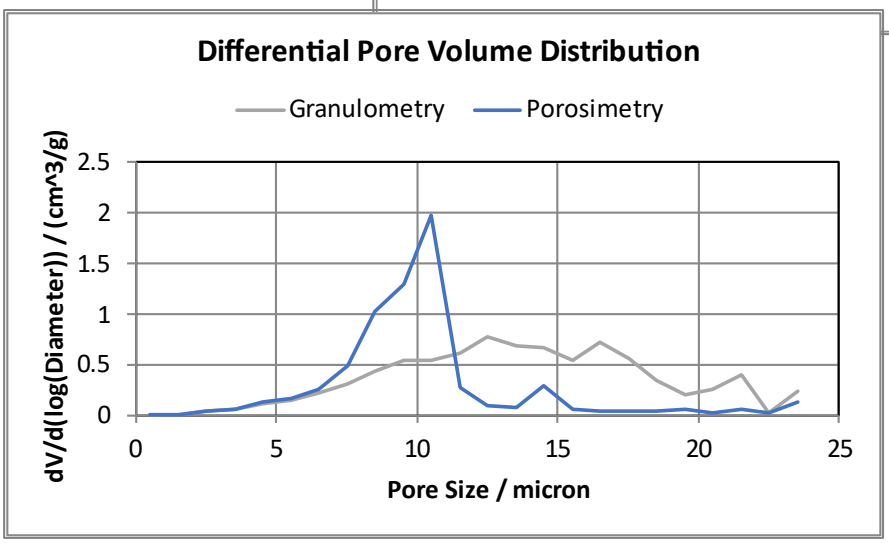
GeoDexcel automatically selects ranges of data from the spreadsheets to create the charts.

The results of PSD by porosimetry and by granulometry can be compared by creating charts with the results from both methods and combining them. Simply go to the **Porosimetry** worksheet, select a porosimetry chart, copy it (CTRL-C); go to the **Granulometry** worksheet, select the corresponding granulometry chart and paste it (CTRL-V).

After adding the legend and editing the titles, the charts are ready.



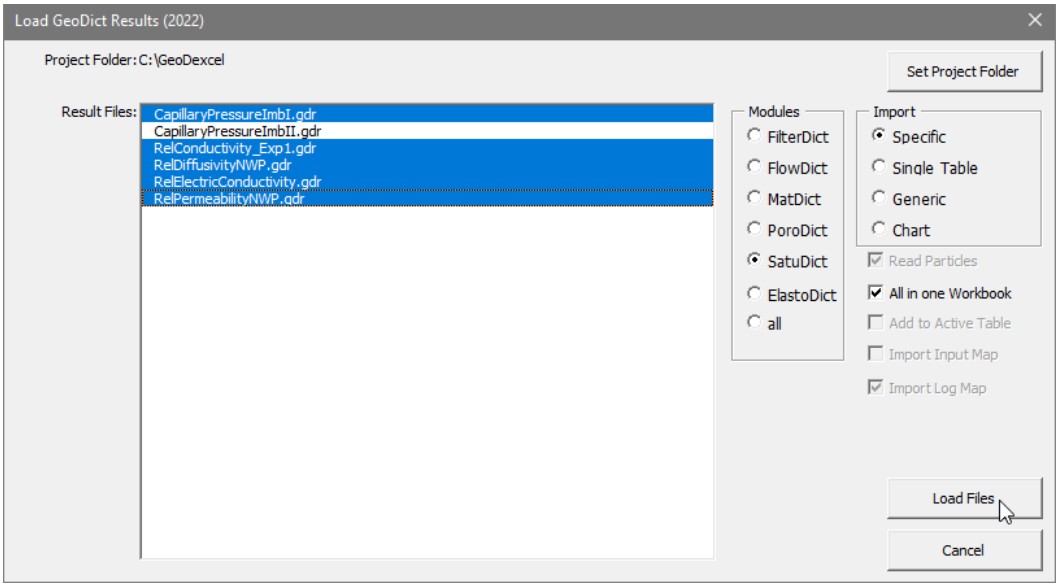



## SPECIFIC IMPORT FOR SATUDICT

**Specific** import can be used to analyze all types of result files generated with SatuDict: **Capillary Pressure Curve**, **Relative Permeability**, **Relative Gas Diffusivity**, **Relative Thermal Conductivity** and **Resistivity Index**.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then, the **Load GeoDict result file (.gdr)** icon as described above in page 3. In the opening dialog, make sure **Specific** is checked as **Import** type and SatuDict is checked in **Modules**. Highlight the files to load and click **Load Files**.

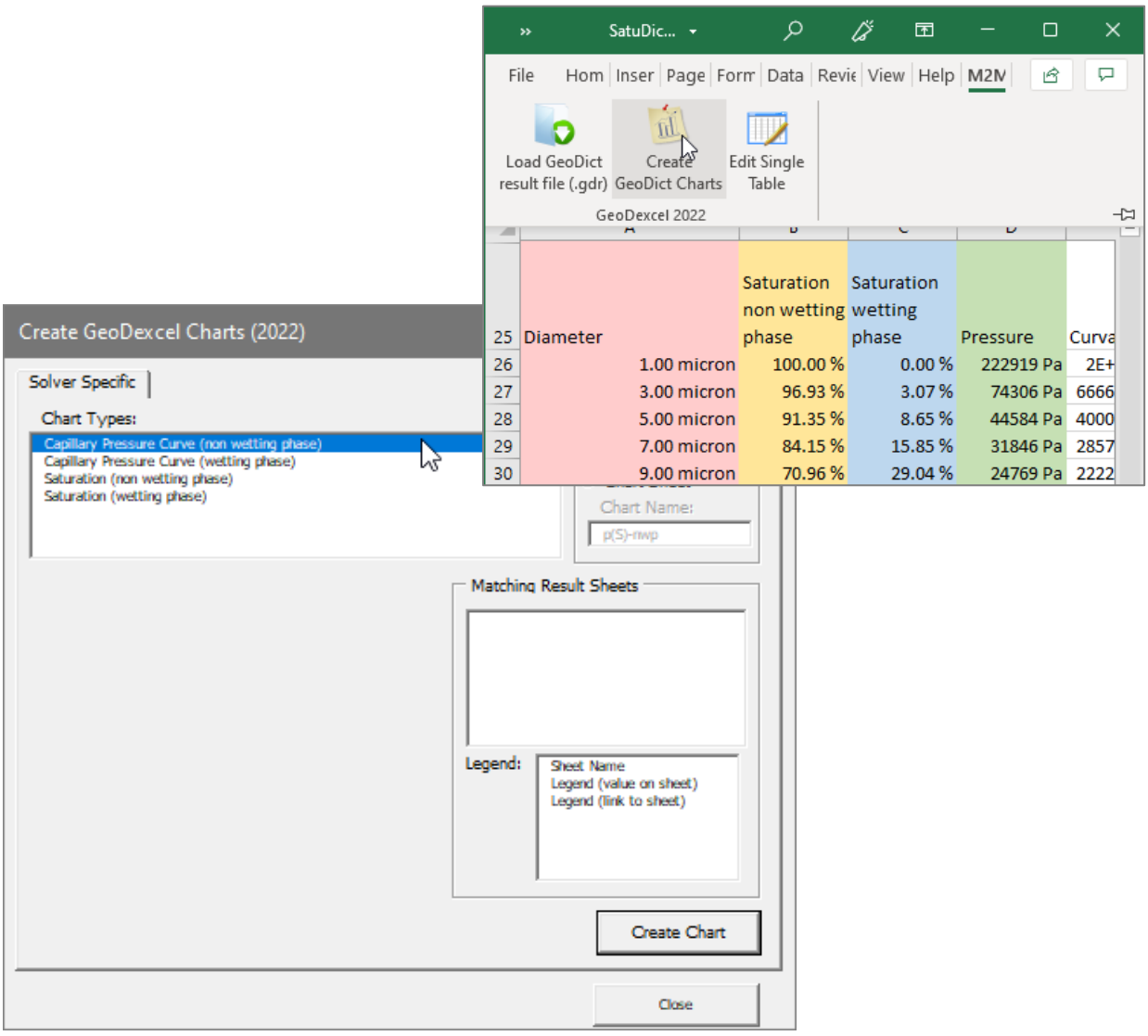



## CAPILLARY PRESSURE CURVE RESULTS

For example, for **Capillary Pressure Curve** result files, the relationship between the pressure and the saturation of both phases (non-wetting phase and wetting phase) is given for each step size (per diameter).

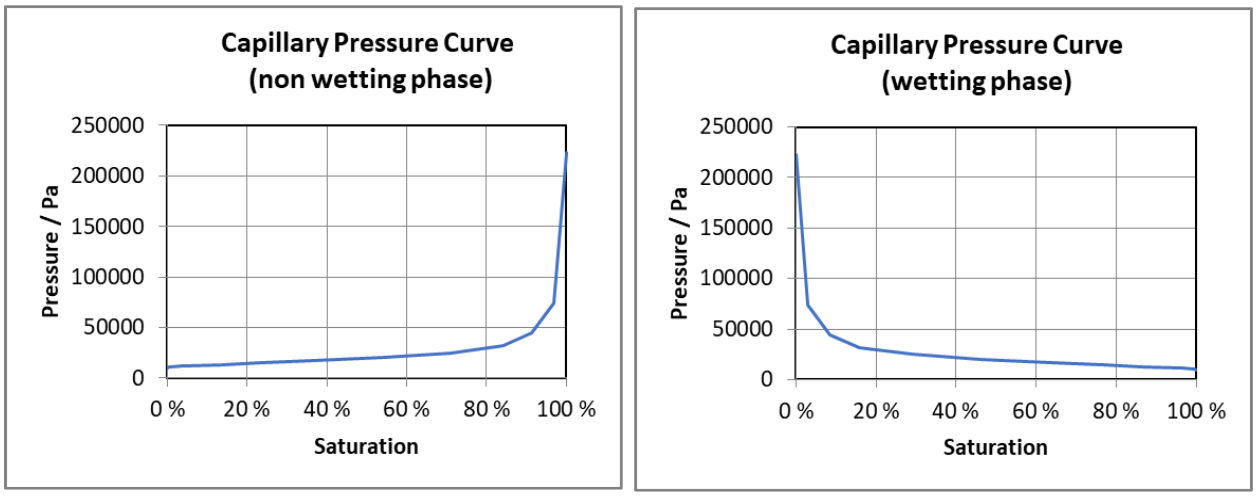
| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | Module | SatuDict | | | |
| 2 | Solver | CapillaryPressure | | | |
| 12 | **Geometry:** | | | | |
| 13 | Hash | 67477 | | | |
| 14 | Hash64 | 3246378455930288055 | | | |
| 15 | FileName | Structure.gdt | | | |
| 16 | NX | 100 | | | |
| 17 | NY | 100 | | | |
| 18 | NZ | 100 | | | |
| 19 | UseBoxels | false | | | |
| 20 | VoxelLength | 0.000001 m | | | |
| 21 | Macro Parameter: | | | | |
| 22 | StructureDescription: | CapillaryPressureImbI | | | |
| 23 | StructureFile: | C:/GeoDexcel/CapillaryPressureImbI/Structure.gdt | | | |
| 25 | Diameter | Saturation non wetting phase | Saturation wetting phase | Pressure | Curvature |
| 26 | 1.00 micron | 100.00 % | 0.00 % | 222919 Pa | 2E+06 1/m |
| 27 | 3.00 micron | 96.93 % | 3.07 % | 74306 Pa | 666667 1/m |
| 28 | 5.00 micron | 91.35 % | 8.65 % | 44584 Pa | 400000 1/m |
| 29 | 7.00 micron | 84.15 % | 15.85 % | 31846 Pa | 285714 1/m |
| 30 | 9.00 micron | 70.96 % | 29.04 % | 24769 Pa | 222222 1/m |
| 31 | 11.00 micron | 53.81 % | 46.19 % | 20265 Pa | 181818 1/m |
| 32 | 13.00 micron | 36.17 % | 63.83 % | 17148 Pa | 153846 1/m |

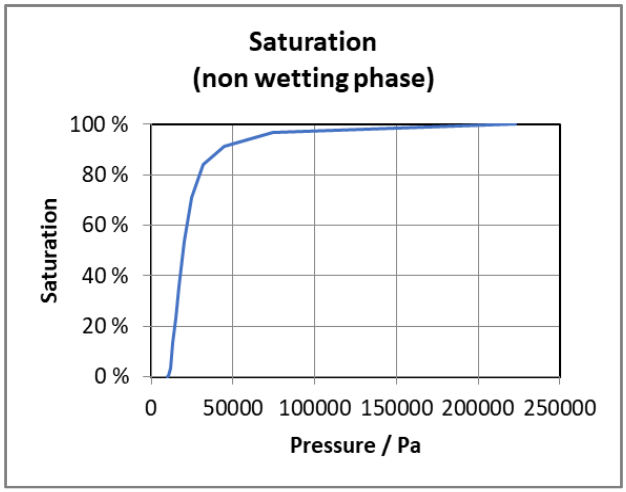
In the toolbar, click **Create GeoDict Charts**.

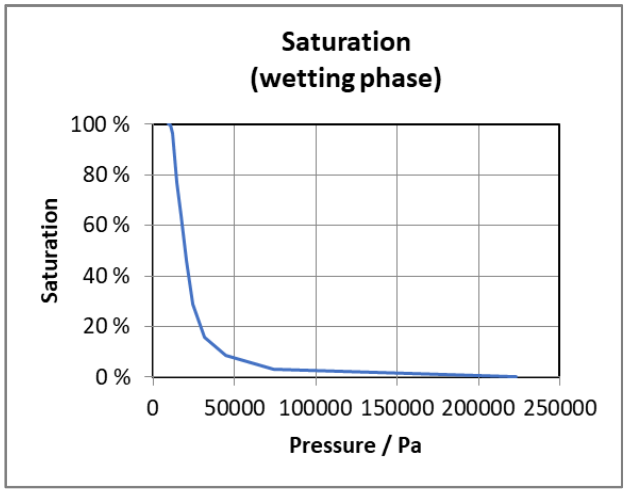



Select **Capillary Pressure Curve (non-wetting phase)**, **Capillary Pressure Curve (wetting phase)**, **Saturation (non-wetting phase)**, or **Saturation (wetting phase)**.

GeoDexcel automatically selects ranges of data from the spreadsheet to create the charts.





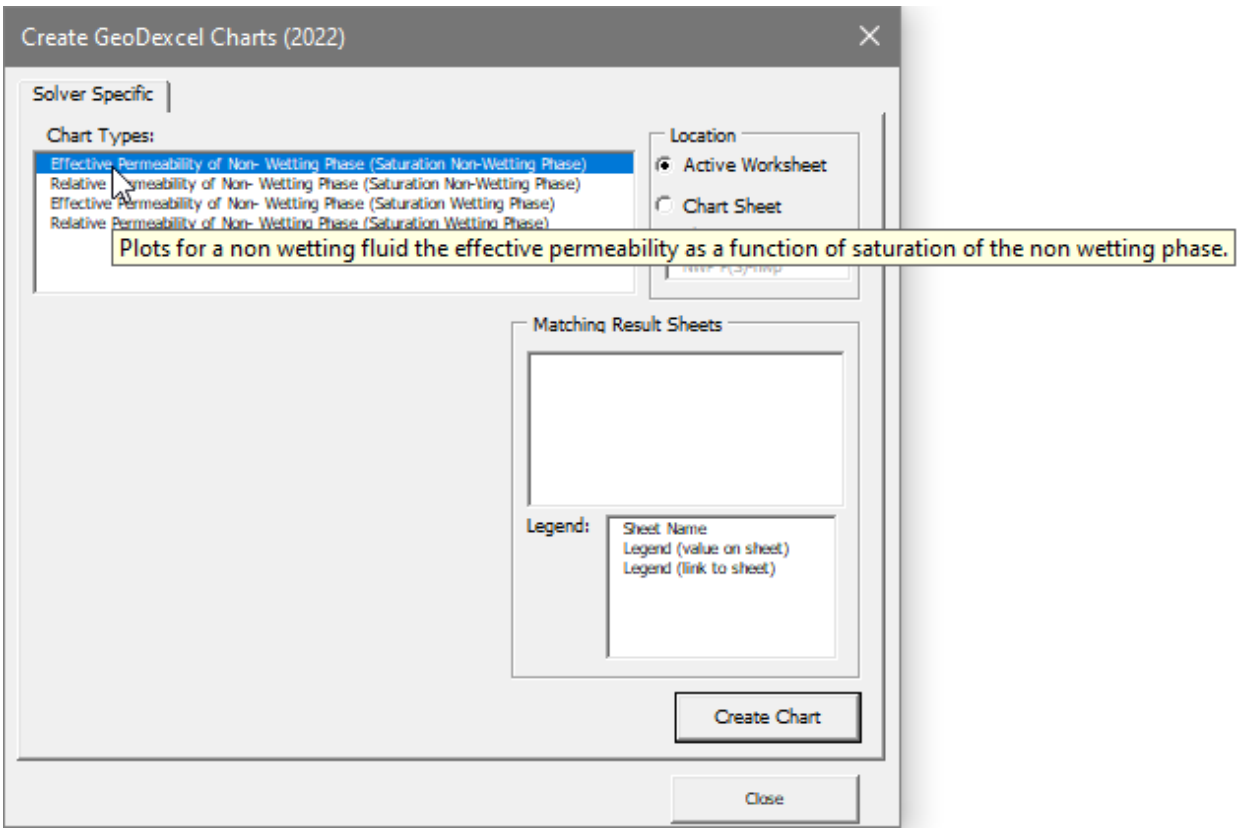




## Relative Permeability results

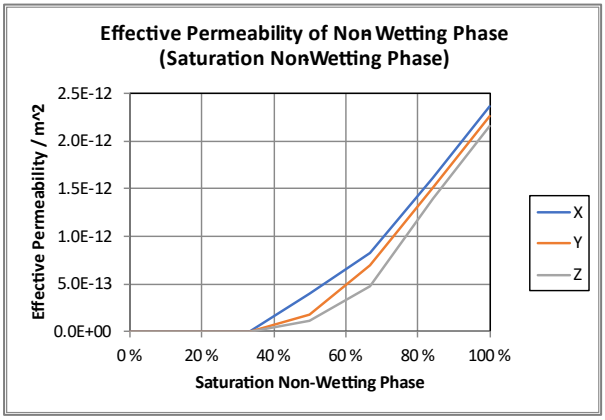
In **Relative Permeability** result files, the user obtains the effective permeability and the relative permeability for all computed directions (here highlighted for the Z component of a flow in Z-direction), for the saturation of non-wetting phase and the corresponding saturation of the wetting phase. To which phase the effective permeability corresponds to in the simulated experiment, is indicated in the loaded result file (here in cell A28).

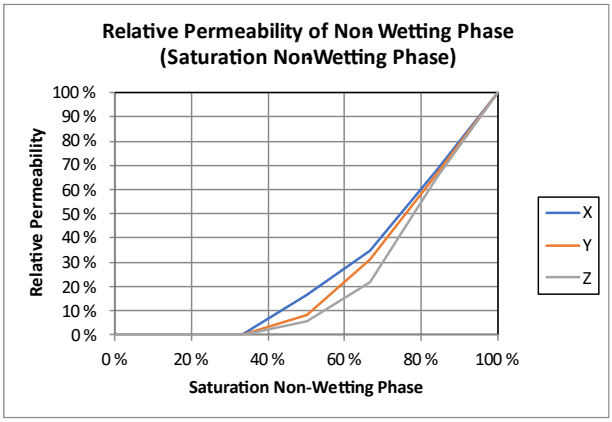
| | A | B | K | L | M | N | O |
|---|---|---|---|---|---|---|---|
| 1 | Module | SatuDict | | | | | |
| 2 | Solver | RelativePermeability | | | | | |
| 12 | **Geometry:** | | | | | | |
| 13 | Hash | 67477 | | | | | |
| 14 | Hash64 | 3246378455930288055 | | | | | |
| 15 | FileName | Structure.gdt | | | | | |
| 16 | NX | 100 | | | | | |
| 17 | NY | 100 | | | | | |
| 18 | NZ | 100 | | | | | |
| 19 | UseBoxels | false | | | | | |
| 20 | VoxelLength | 0.000001 m | | | | | |
| 21 | Macro Parameter: | | | | | | |
| 22 | StructureDescription: | RelDiffusivityNWP | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/RelDiffusivityNWP/Structure.gdt | | | | | |
| 25 | X-Direction: | TRUE | | | | | |
| 26 | Y-Direction: | TRUE | | | | | |
| 27 | Z-Direction: | TRUE | | | | | |
| 28 | Non Wetting Phase | | | | | | |
| 29 | Saturation non wetting phase | Saturation wetting phase | K33 | | Relative Permeability X | Relative Permeability Y | Relative Permeability Z |
| 30 | 0.00 % | 100.00 % | 0.00E+00 m^2 | | 0 | 0 | 0 |
| 31 | 16.70 % | 83.30 % | 0.00E+00 m^2 | | 0 | 0 | 0 |
| 32 | 33.01 % | 66.99 % | 0.00E+00 m^2 | | 0 | 0 | 0 |
| 33 | 50.01 % | 49.99 % | 1.18E-13 m^2 | | 0.166615203 | 0.079298314 | 0.054809763 |
| 34 | 66.73 % | 33.27 % | 4.73E-13 m^2 | | 0.345958407 | 0.309180186 | 0.219183949 |
| 35 | 84.20 % | 15.80 % | 1.40E-12 m^2 | | 0.682177508 | 0.667270296 | 0.646709914 |
| 36 | 100.00 % | 0.00 % | 2.16E-12 m^2 | | 1 | 1 | 1 |

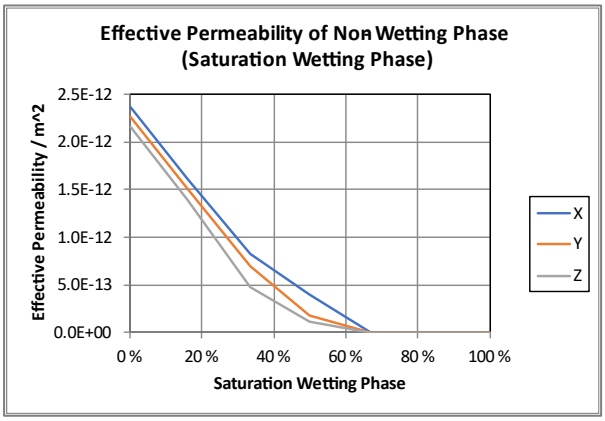
For this example, where the file corresponds to the results for the non-wetting phase, click **Create GeoDict Charts** in the toolbar and select to chart the effective or relative permeability of the non-wetting phase with respect to the saturation of the non-wetting or the wetting phase.

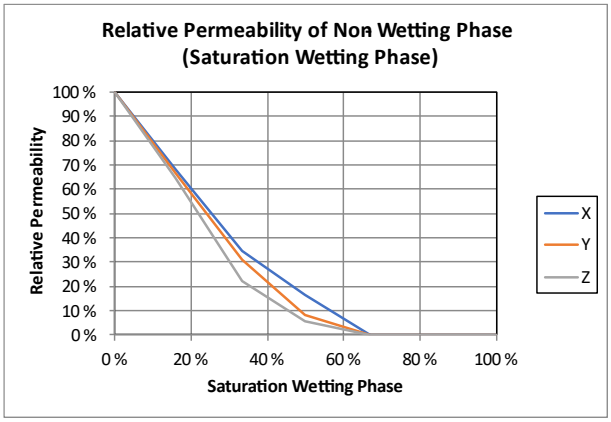



GeoDexcel automatically selects ranges of data from the spreadsheet to create the charts of the permeability of the non-wetting phase as a function of the wetting or non-wetting saturation.



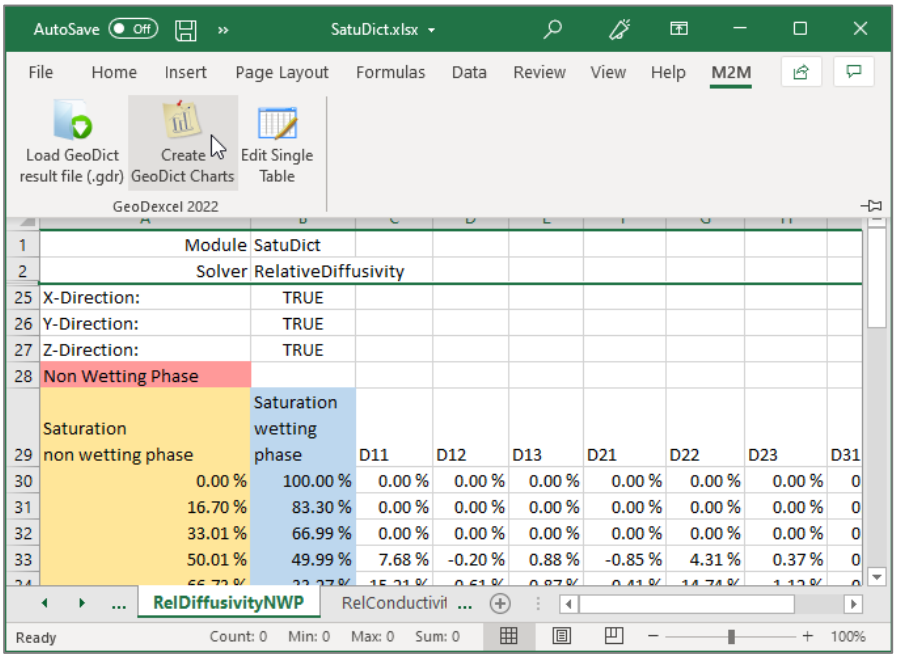



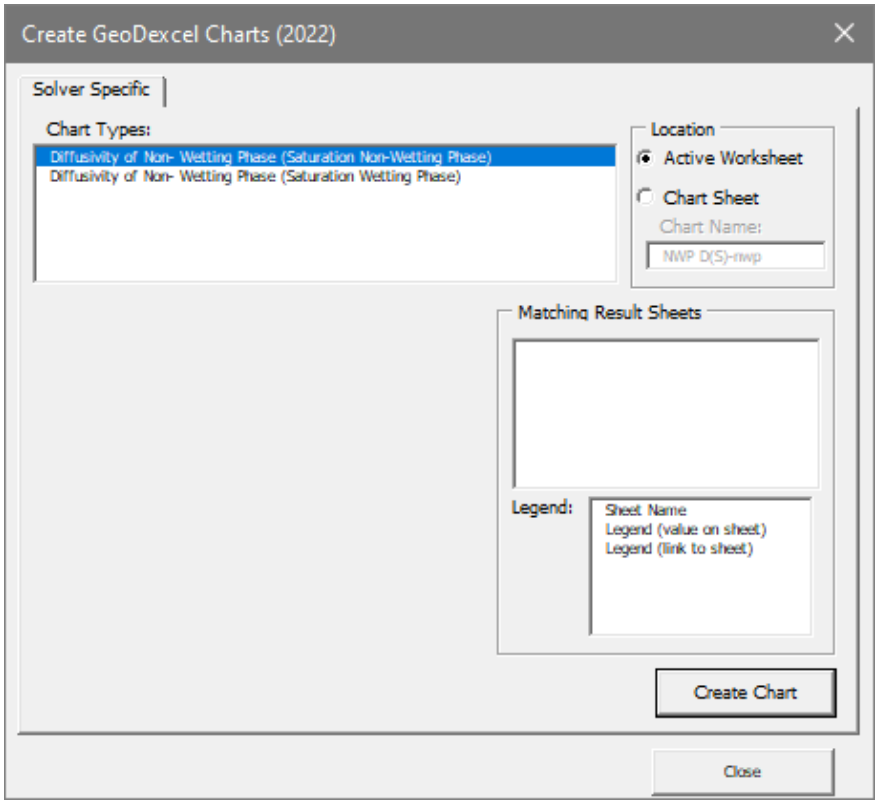
## Relative Gas Diffusivity Results

From **Relative Gas Diffusivity** result files, the user obtains the relationship between relative diffusivity tensor for all computed directions (here highlighted for the Z component of the diffusion in Z-direction) and the saturation of non-wetting phase and the saturation of the wetting phase. To which phase the relative gas diffusivity corresponds to in the simulated experiment, is indicated in the loaded result file (here in cell A28).

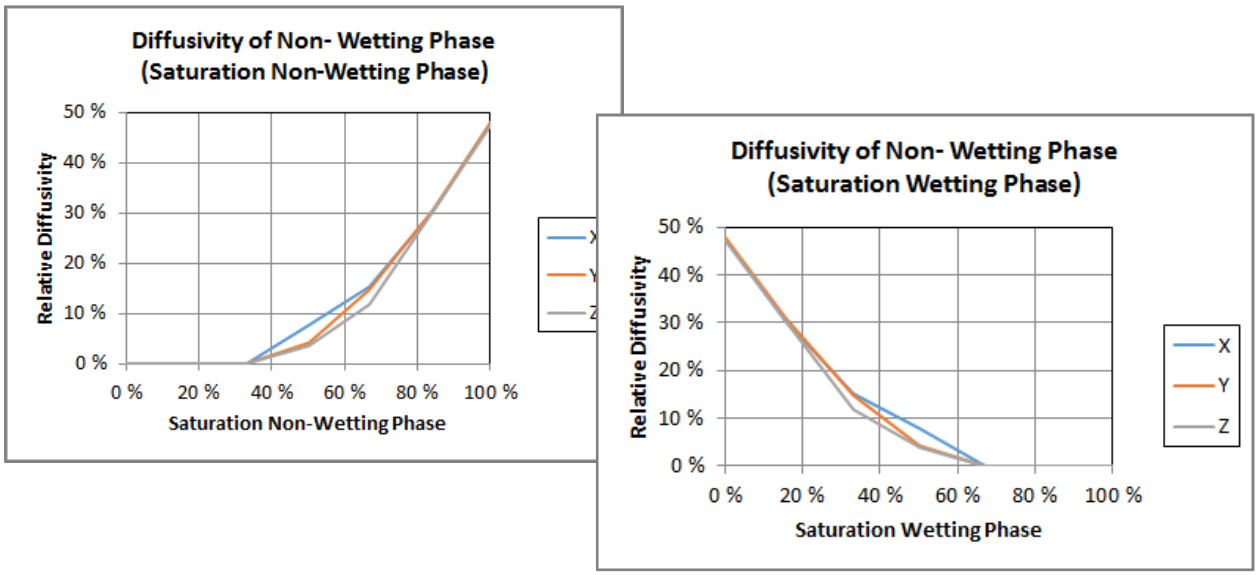
| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Module | SatuDict | | | | | | | | | |
| 2 | Solver | RelativeDiffusivity | | | | | | | | | |
| 12 | **Geometry:** | | | | | | | | | | |
| 13 | Hash | 67477 | | | | | | | | | |
| 14 | Hash64 | 3246378455930288055 | | | | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | | | | |
| 16 | NX | 100 | | | | | | | | | |
| 17 | NY | 100 | | | | | | | | | |
| 18 | NZ | 100 | | | | | | | | | |
| 19 | UseBoxels | false | | | | | | | | | |
| 20 | VoxelLength | 0.000001 m | | | | | | | | | |
| 21 | Macro Parameter: | | | | | | | | | | |
| 22 | StructureDescription: | RelDiffusivityNWP | | | | | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/RelDiffusivityNWP/Structure.gdt | | | | | | | | | |
| 25 | X-Direction: | TRUE | | | | | | | | | |
| 26 | Y-Direction: | TRUE | | | | | | | | | |
| 27 | Z-Direction: | TRUE | | | | | | | | | |
| 28 | Non Wetting Phase | | | | | | | | | | |
| 29 | Saturation non wetting phase | Saturation wetting phase | D11 | D12 | D13 | D21 | D22 | D23 | D31 | D32 | D33 |
| 30 | 0.00 % | 100.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % |
| 31 | 16.70 % | 83.30 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % |
| 32 | 33.01 % | 66.99 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % | 0.00 % |
| 33 | 50.01 % | 49.99 % | 7.68 % | -0.20 % | 0.88 % | -0.85 % | 4.31 % | 0.37 % | 0.17 % | 0.33 % | 3.73 % |
| 34 | 66.73 % | 33.27 % | 15.21 % | -0.61 % | 0.87 % | -0.41 % | 14.74 % | 1.12 % | 0.27 % | 1.14 % | 11.83 % |
| 35 | 84.20 % | 15.80 % | 30.38 % | -0.75 % | 0.66 % | -0.69 % | 30.74 % | 0.71 % | 0.44 % | 0.81 % | 30.39 % |
| 36 | 100.00 % | 0.00 % | 47.87 % | -0.60 % | 0.03 % | -0.57 % | 48.09 % | 0.13 % | -0.16 % | 0.16 % | 47.46 % |

For this example, where the file corresponds to the results for the non-wetting phase, click **Create GeoDict Charts** in the toolbar and select to chart the diffusivity of the non-wetting phase with respect to the saturation of the non-wetting or the wetting phase.






GeoDexcel automatically selects ranges of data from the spreadsheet to create the charts.

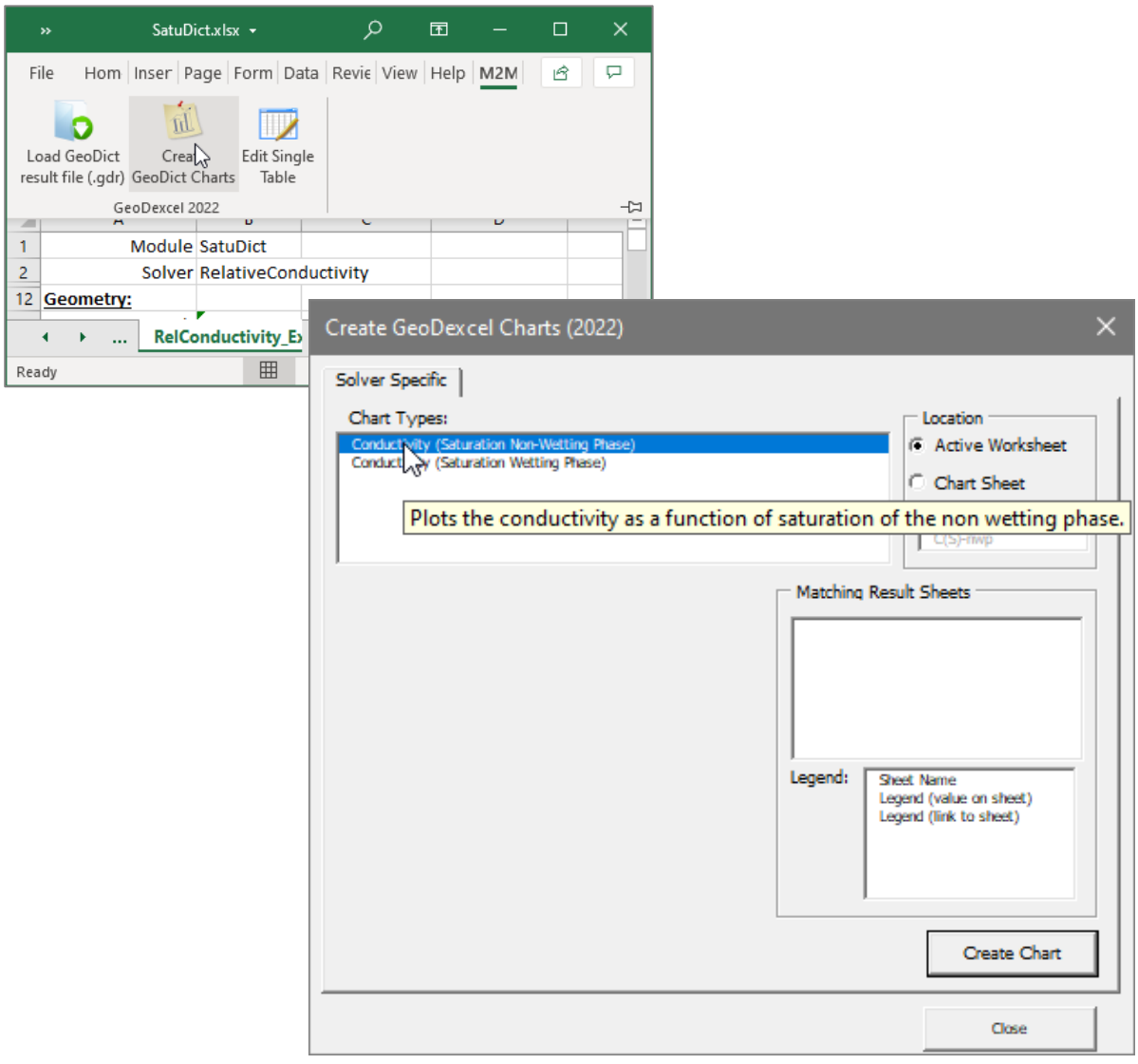



## Relative Thermal Conductivity Results

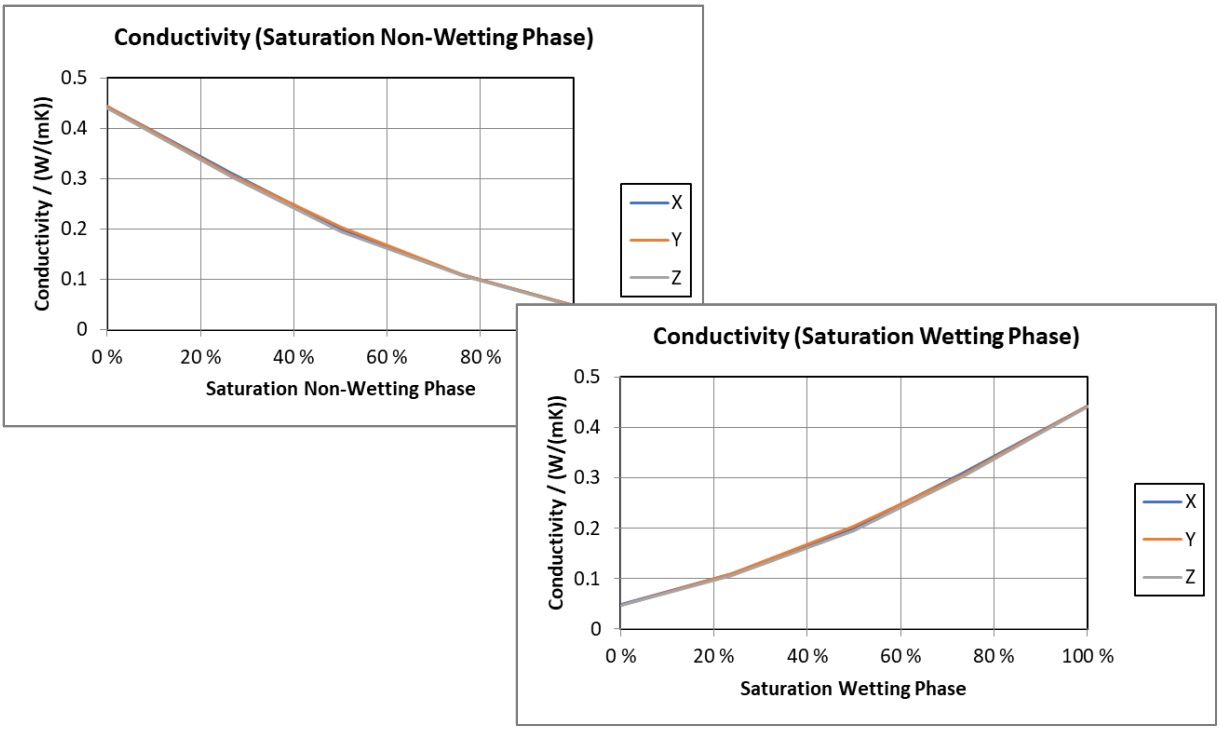
From **Relative Thermal Conductivity** result files, the user obtains the relationship between thermal conductivity tensor for all computed directions (here highlighted for the Z component of the conduction in Z-direction) and the saturation of non-wetting phase and the saturation of the wetting phase.

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Module | SatuDict | | | | | | | | | |
| 2 | Solver | RelativeConductivity | | | | | | | | | |
| 12 | **Geometry:** | | | | | | | | | | |
| 13 | Hash | 33639 | | | | | | | | | |
| 14 | Hash64 | 14976188463154961491 | | | | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | | | | |
| 16 | NX | 100 | | | | | | | | | |
| 17 | NY | 100 | | | | | | | | | |
| 18 | NZ | 100 | | | | | | | | | |
| 19 | UseBoxels | false | | | | | | | | | |
| 20 | VoxelLength | 0.000001 m | | | | | | | | | |
| 21 | Macro Parameter: | | | | | | | | | | |
| 22 | ctureDescription: | RelConductivity_Exp1 | | | | | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/RelConductivity_Exp1/Structure.gdt | | | | | | | | | |
| 25 | X-Direction: | TRUE | | | | | | | | | |
| 26 | Y-Direction: | TRUE | | | | | | | | | |
| 27 | Z-Direction: | TRUE | | | | | | | | | |
| 28 | Saturation non wetting phase | Saturation wetting phase | Beta11 | Beta12 | Beta13 | Beta21 | Beta22 | Beta23 | Beta31 | Beta32 | Beta33 |
| 29 | 100.00 % | 0.00 % | 0.0480 W/(mK) | 0.0000 W/(mK) | -0.0002 W/(mK) | 0.0000 W/(mK) | 0.0478 W/(mK) | -0.0001 W/(mK) | -0.0002 W/(mK) | -0.0001 W/(mK) | 0.0473 W/(mK) |
| 30 | 76.18 % | 23.82 % | 0.1092 W/(mK) | -0.0023 W/(mK) | -0.0007 W/(mK) | -0.0028 W/(mK) | 0.1096 W/(mK) | -0.0003 W/(mK) | -0.0004 W/(mK) | 0.0006 W/(mK) | 0.1068 W/(mK) |
| 31 | 50.21 % | 49.79 % | 0.2004 W/(mK) | -0.0027 W/(mK) | -0.0005 W/(mK) | -0.0041 W/(mK) | 0.2040 W/(mK) | 0.0009 W/(mK) | 0.0002 W/(mK) | 0.0022 W/(mK) | 0.1951 W/(mK) |
| 32 | 26.70 % | 73.30 % | 0.3100 W/(mK) | 0.0022 W/(mK) | -0.0031 W/(mK) | 0.0004 W/(mK) | 0.3063 W/(mK) | 0.0018 W/(mK) | -0.0026 W/(mK) | 0.0023 W/(mK) | 0.3027 W/(mK) |
| 33 | 0.00 % | 100.00 % | 0.4432 W/(mK) | 0.0002 W/(mK) | -0.0010 W/(mK) | 0.0002 W/(mK) | 0.4431 W/(mK) | -0.0001 W/(mK) | -0.0011 W/(mK) | -0.0001 W/(mK) | 0.4409 W/(mK) |

Click **Create GeoDict Charts** in the toolbar and select to chart the **Conductivity (Saturation Non-Wetting Phase)** or the **Conductivity (Saturation Wetting Phase)**.



GeoDexcel automatically selects ranges of data from the spreadsheet to create the charts of the conductivity as a function of the wetting and non-wetting saturation.



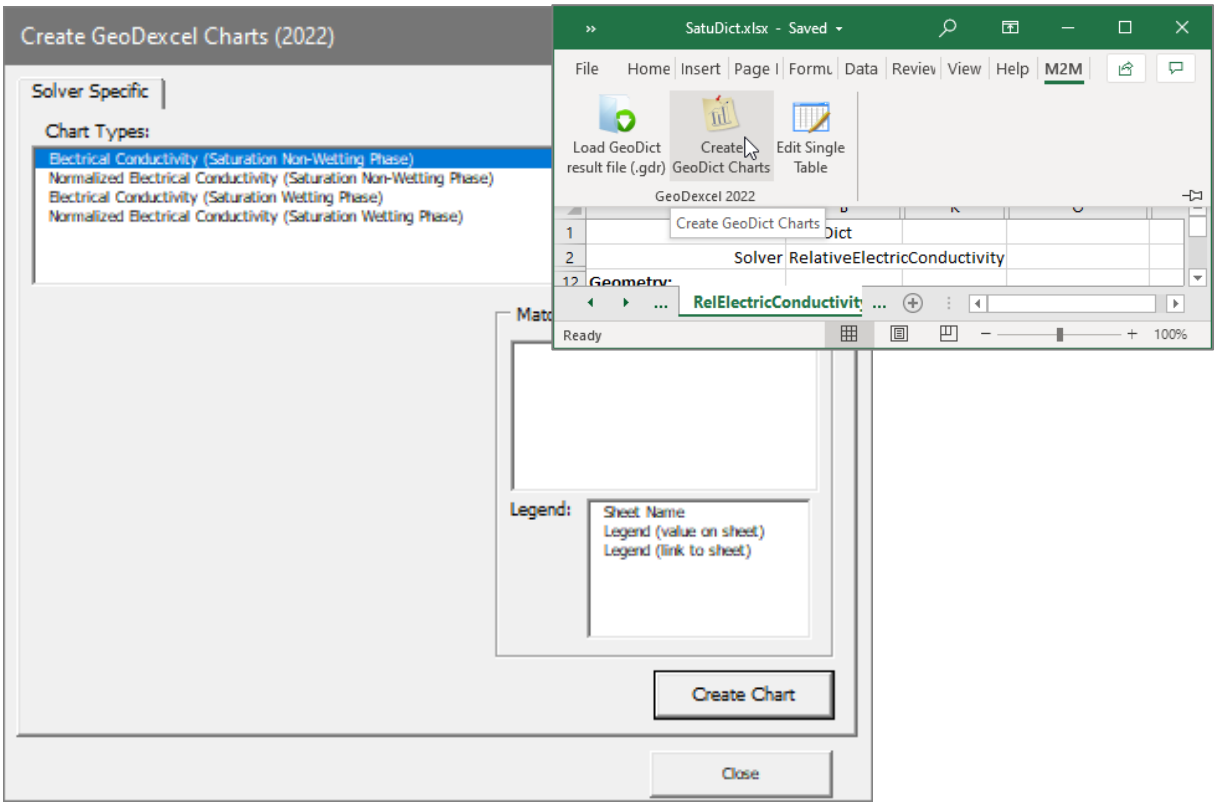

## Resistivity Index Results

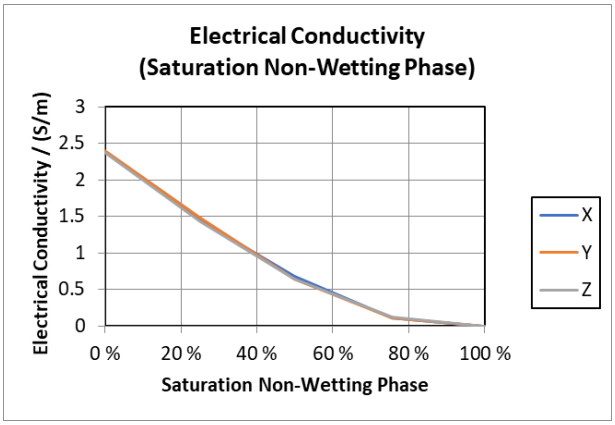
From the **Resistivity Index** result files, the user obtains the relationship between electrical conductivity, the relative electrical conductivity and the resistivity index for the computed directions (here only highlighted for the Z component, other columns are hidden in the Excel worksheet) and the saturation of non-wetting phase and the saturation of the wetting phase.

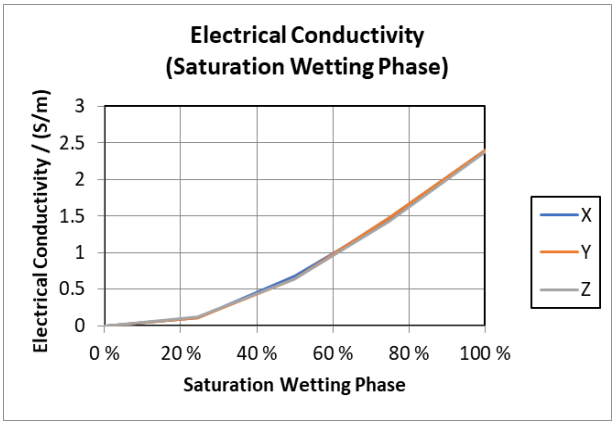
| | A | B | K | O | S |
|---|---|---|---|---|---|
| 1 | Module | SatuDict | | | |
| 2 | Solver | RelativeElectricConductivity | | | |
| 12 | **Geometry:** | | | | |
| 13 | Hash | 67477 | | | |
| 14 | Hash64 | 3246378455930288055 | | | |
| 15 | FileName | Structure.gdt | | | |
| 16 | NX | 100 | | | |
| 17 | NY | 100 | | | |
| 18 | NZ | 100 | | | |
| 19 | UseBoxels | false | | | |
| 20 | VoxelLength | 0.000001 m | | | |
| 21 | Macro Parameter: | | | | |
| 22 | StructureDescription: | RelDiffusivityNWP | | | |
| 23 | StructureFile: | C:/GeoDexcel/RelDiffusivityNWP/Structure.gdt | | | |
| 25 | X-Direction: | TRUE | | | |
| 26 | Y-Direction: | TRUE | | | |
| 27 | Z-Direction: | TRUE | | | |
| 28 | Saturation non wetting phase | Saturation wetting phase | Beta33 | Relative Electrical Conductivity Z | Resistivity Index Z |
| 29 | 100.00 % | 0.00 % | 0.0000 S/(m) | 0 | 0 |
| 30 | 75.56 % | 24.44 % | 0.1173 S/(m) | 0.049419647 | 20.2348675 |
| 31 | 50.01 % | 49.99 % | 0.6374 S/(m) | 0.268618225 | 3.7227556 |
| 32 | 25.13 % | 74.87 % | 1.4291 S/(m) | 0.602239198 | 1.6604698 |
| 33 | 0.00 % | 100.00 % | 2.3730 S/(m) | 1 | 1 |
| 34 | | | | | |

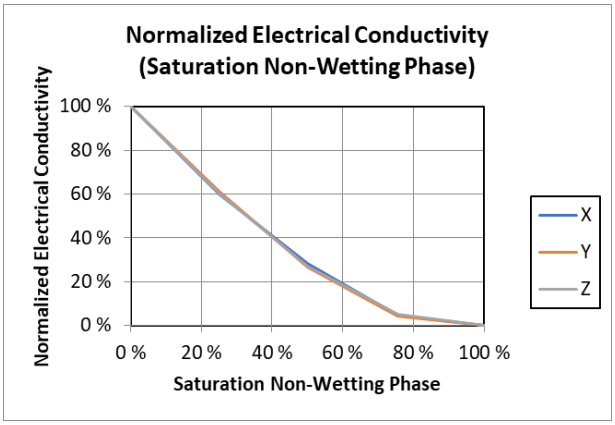
Click **Create GeoDict Charts** in the toolbar and select to chart the **Electrical Conductivity** or the **Normalized Electrical Conductivity** (i.e. the relative electrical conductivity) with respect to the saturation of the non-wetting or the wetting phase.

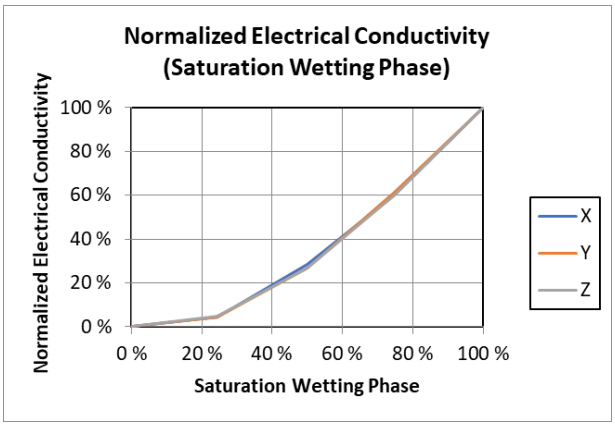
GeoDexcel automatically selects ranges of data from the spreadsheet to create the charts of the electrical conductivity as a function of the wetting or the non-wetting saturation.



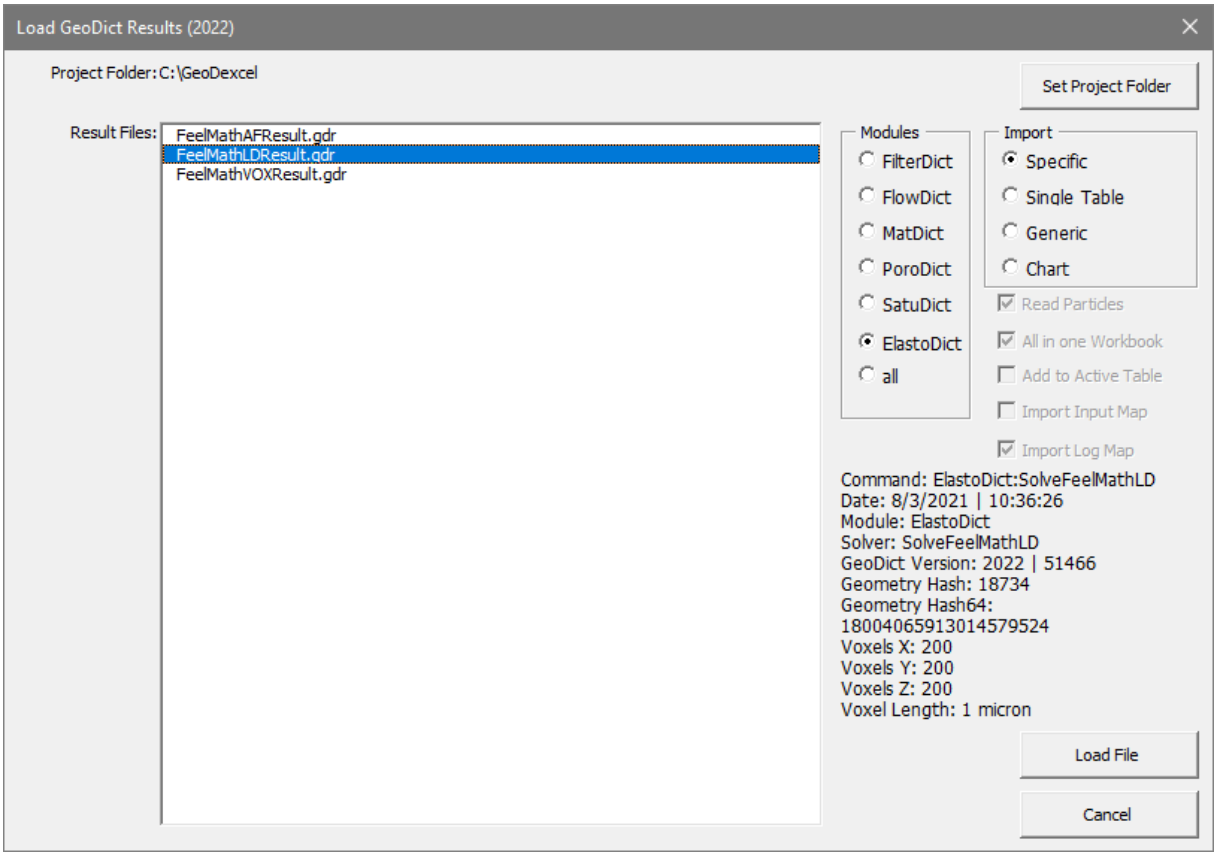



## Specific Import for ElastoDict

**Specific** import is available for all ElastoDict results, i.e. result files from simulations of deformations with **FeelMath-LD** or computations of the effective stiffness with **FeelMath-VOX** or **FeelMath-AF**.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then, the **Load GeoDict result file (.gdr)** icon as described above in page 3. In the opening dialog, make sure **Specific** is checked as **Import** type and ElastoDict is checked in **Modules**. Highlight the files to load and click **Load File**.

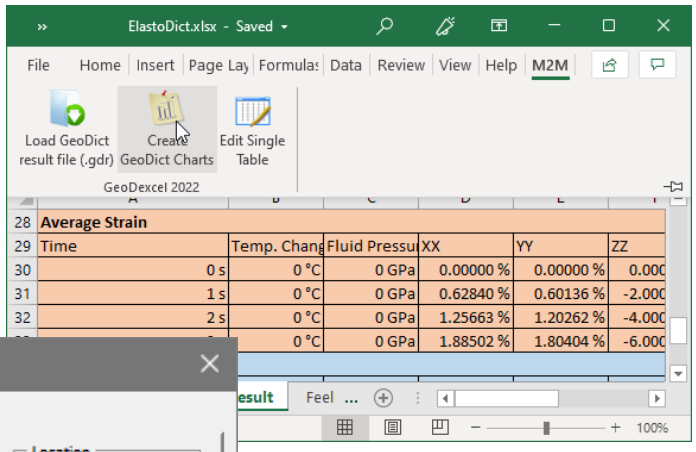


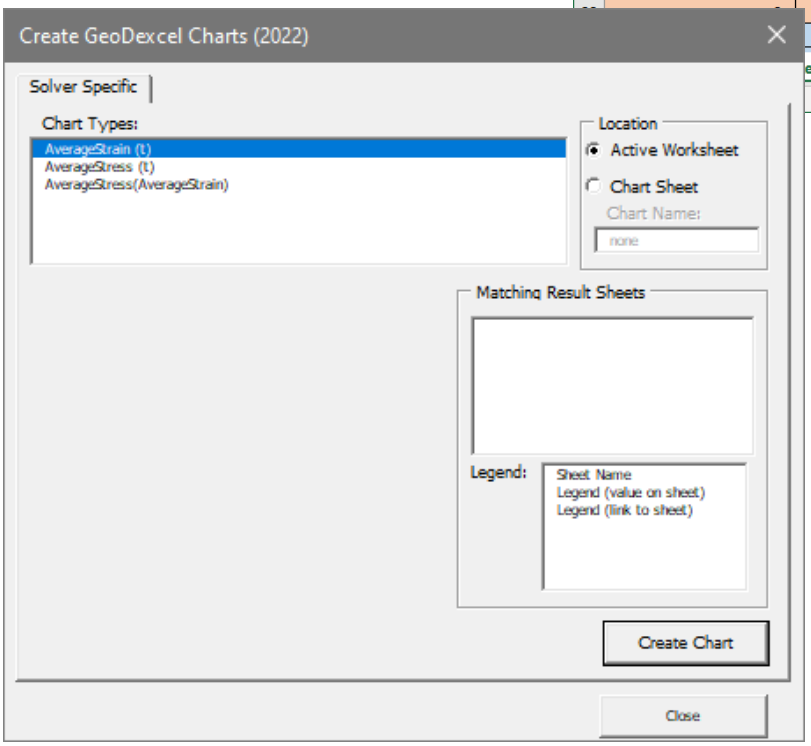

## Deformations with FeelMath-LD

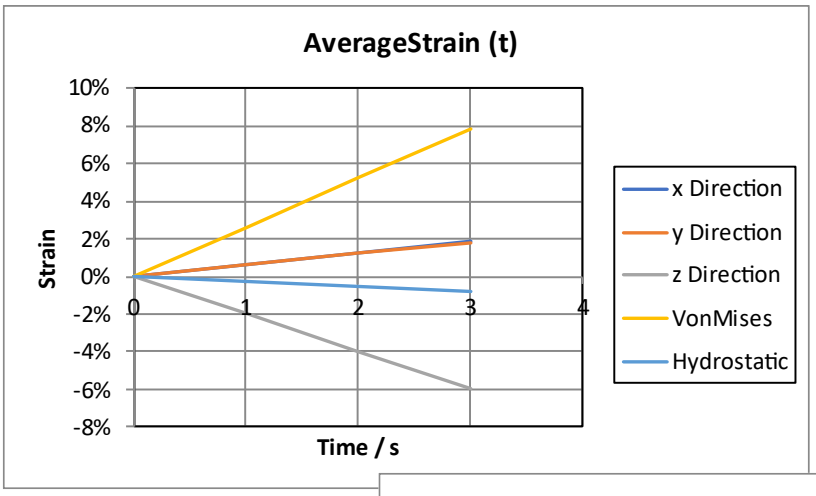
For a deformation result of a **FeelMath-LD** simulation (in the example shown here for a compression in Z-direction in 3 steps), the worksheet contains the information about the coordinate system, as well as the average strain and average stress for each time step

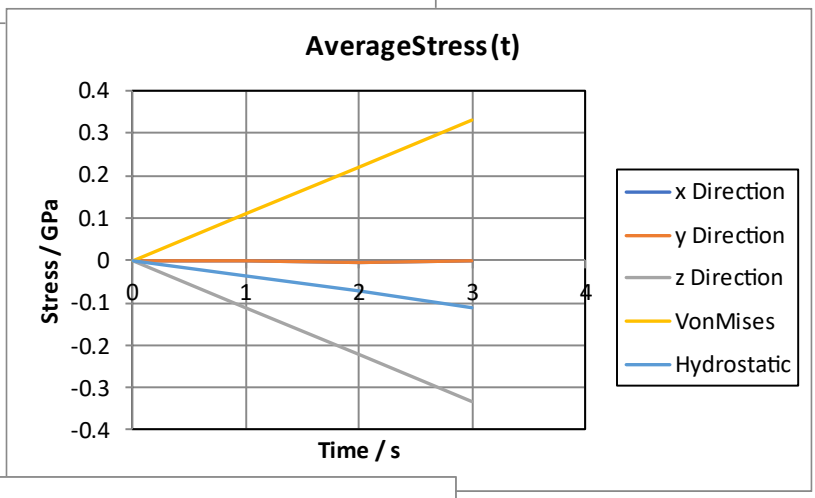
| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Module | ElastoDict | | | | | | | | | |
| 2 | Solver | SolveFeelMathLD | | | | | | | | | |
| 12 | **Geometry:** | | | | | | | | | | |
| 13 | Hash | 18734 | | | | | | | | | |
| 14 | Hash64 | 18004065913014579524 | | | | | | | | | |
| 15 | FileName | Structure.gdt | | | | | | | | | |
| 16 | NX | 200 | | | | | | | | | |
| 17 | NY | 200 | | | | | | | | | |
| 18 | NZ | 200 | | | | | | | | | |
| 19 | UseBoxels | false | | | | | | | | | |
| 20 | VoxelLength | 0.000001 m | | | | | | | | | |
| 21 | Macro Parameter: | | | | | | | | | | |
| 22 | StructureDescription: | FeelMathAFResult | | | | | | | | | |
| 23 | StructureFile: | C:/GeoDexcel/FeelMathLDResult/Structure.gdt | | | | | | | | | |
| 25 | | | | | | | | | | | |
| 26 | **Coordinate System** | | | | | | | | | | |
| 27 | The coordinate system of the experiment is aligned with the coordinate axis in GeoDict. | | | | | | | | | | |
| 28 | **Average Strain** | | | | | | | | | | |
| 29 | Time | Temp. Chang | Fluid Pressu | XX | YY | ZZ | YZ | XZ | XY | VonMises | Hydrostatic |
| 30 | 0 s | 0 °C | 0 GPa | 0.00000 % | 0.00000 % | 0.00000 % | 0.00000 % | 0.00000 % | 0.00000 % | 0.00000 % | 0.00000 % |
| 31 | 1 s | 0 °C | 0 GPa | 0.62840 % | 0.60136 % | -2.00000 % | -0.01307 % | 0.01874 % | 0.05467 % | 2.61700 % | -0.25675 % |
| 32 | 2 s | 0 °C | 0 GPa | 1.25663 % | 1.20262 % | -4.00000 % | -0.02620 % | 0.03755 % | 0.10892 % | 5.23384 % | -0.51358 % |
| 33 | 3 s | 0 °C | 0 GPa | 1.88502 % | 1.80404 % | -6.00000 % | -0.03939 % | 0.05638 % | 0.16313 % | 7.85083 % | -0.77031 % |
| 34 | **Average Stress** | | | | | | | | | | |
| 35 | Time | Temp. Chang | Fluid Pressu | XX | YY | ZZ | YZ | XZ | XY | VonMises | Hydrostatic |
| 36 | 0 s | 0 °C | 0 GPa | 0 GPa | 0 GPa | 0 GPa | 0 GPa | 0 GPa | 0 GPa | 0 GPa | 0 GPa |
| 37 | 1 s | 0 °C | 0 GPa | 5E-06 GPa | 4E-06 GPa | -0.1105 GPa | 4E-07 GPa | -2E-06 GPa | 1E-05 GPa | 0.1105 GPa | -0.0368 GPa |
| 38 | 2 s | 0 °C | 0 GPa | -6E-06 GPa | -9E-06 GPa | -0.221 GPa | 3E-06 GPa | -1E-06 GPa | 5E-06 GPa | 0.221 GPa | -0.0737 GPa |
| 39 | 3 s | 0 °C | 0 GPa | -1E-06 GPa | -9E-07 GPa | -0.3315 GPa | 1E-06 GPa | -1E-06 GPa | 6E-06 GPa | 0.3315 GPa | -0.1105 GPa |

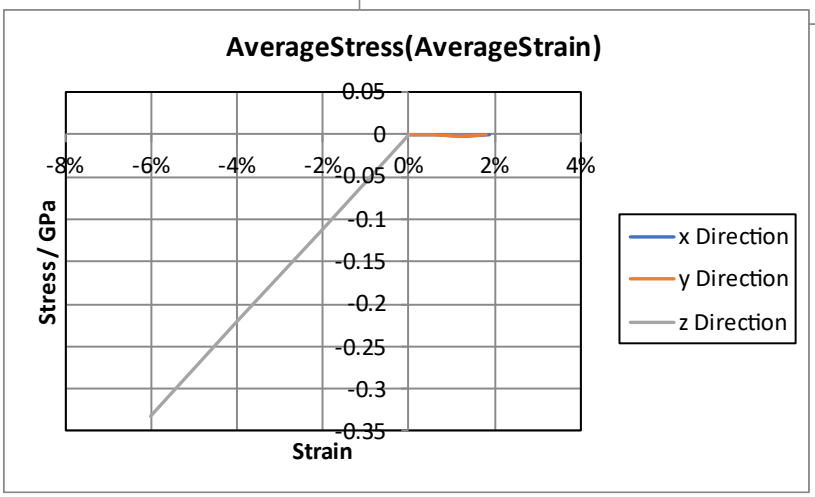
Click **Create GeoDict Charts** in the toolbar to create a chart with the **Average Strain** or **Average Stress** with respect to time, or a chart with **Average Stress** over **Average Strain**.




AverageStrain (t)
10%
8%
6%
4%
2%
0%
-2%
-4%
-6%
-8%
Strain
0
1
2
3
4
Time / s
x Direction
y Direction
z Direction
VonMises
Hydrostatic


AverageStress(t)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
Stress / GPa
0
1
2
3
4
Time / s
x Direction
y Direction
z Direction
VonMises
Hydrostatic


AverageStress(AverageStrain)
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
-0.3
-0.35
-8%
-6%
-4%
-2%
0%
2%
4%
Stress / GPa
Strain
x Direction
y Direction
z Direction

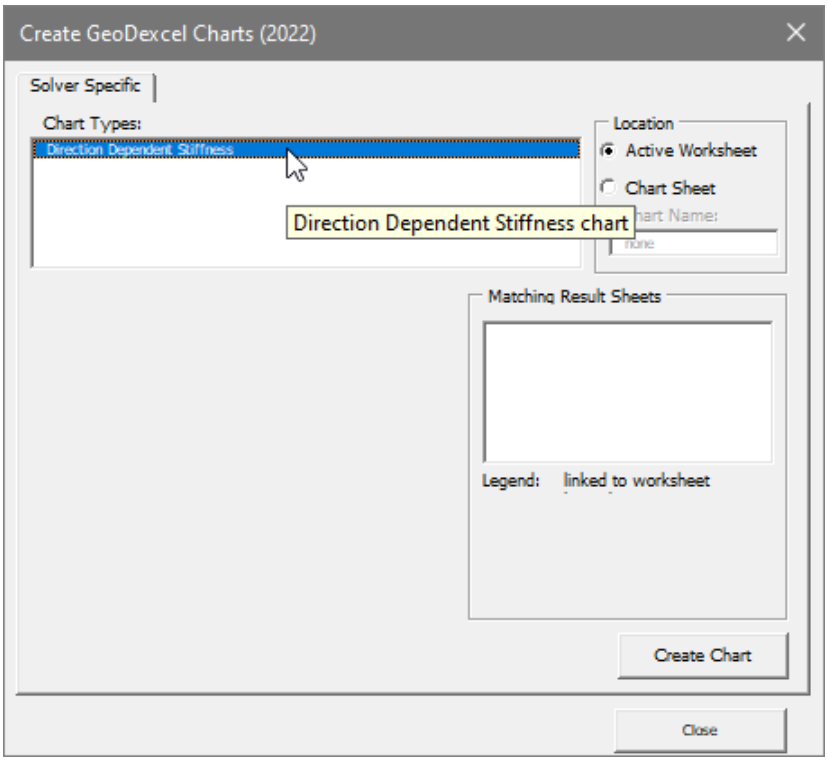
## Effective Stiffness with FeelMath-VOX

For the result of a **FeelMath-VOX** computation, the engineering parameters in different coordinate systems, the direction dependent stiffness, the anisotropic elasticity tensor as well as different approximations of the elasticity tensor with respect to different coordinate systems are contained in the worksheet. For more information about the engineering parameters and the elasticity tensor, see the ElastoDict 2022 handbook of the GeoDict User Guide.

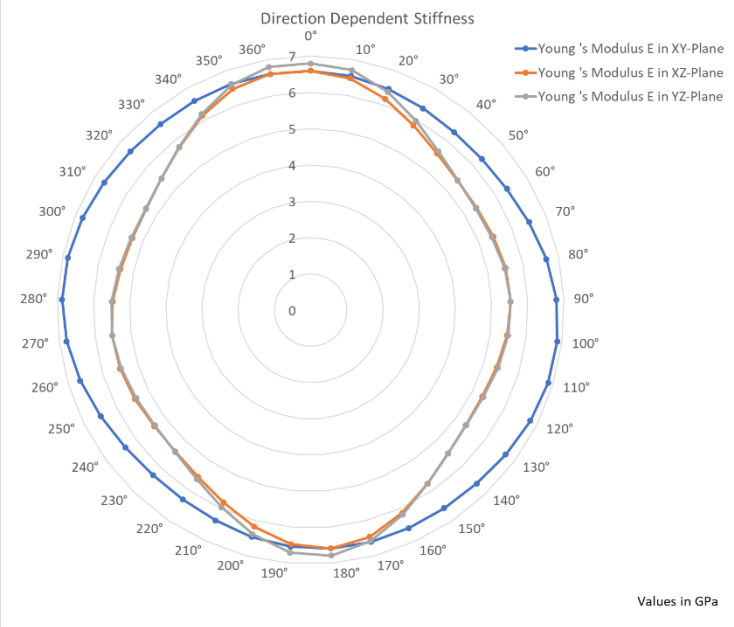
| | | | | |
|---|---|---|---|---|
| 26 | **Engineering Parameters** | | | |
| 27 | (green): error <= 1 %; (yellow): 1 % < error <= 10 %; (red): error > 10 %. | | | |
| 28 | Isotropic Approximation | | | |
| 29 | | Strain Equiva | Energy Equiv | Mean value |
| 30 | Young 's Modulus E | 5.9209 GPa | - | - |
| 31 | Poisson Ratio | 0.3444 | - | - |
| 32 | Shear Modulus G | 2.2020 GPa | - | - |
| 33 | Lame Modulus | 4.8748 GPa | - | - |
| 34 | Bulk Modulus K | 6.3428 GPa | - | - |

| | | | | |
|---|---|---|---|---|
| 140 | **Direction Dependent Stiffness** | | | |
| 141 | (The stiffness value is the value of the strain equivalence.) | | | |
| 142 | Stiffness in the Planes of the Original Coordinate System | | | |
| 143 | Angle | Young 's Modulus E in XY-Plane | Young 's Modulus E in XZ-Plane | Young 's Modulus E in YZ-Plane |
| 144 | Legend extension: | FeelMathVOXResult | FeelMathVOXResult | FeelMathVOXResult |
| 145 | 0° | 6.5960 GPa | 6.5960 GPa | 6.7940 GPa |
| 146 | 10° | 6.5460 GPa | 6.4773 GPa | 6.7132 GPa |
| 147 | 20° | 6.4598 GPa | 6.1717 GPa | 6.3830 GPa |
| 148 | 30° | 6.3656 GPa | 5.8231 GPa | 5.9687 GPa |
| 149 | 40° | 6.3012 GPa | 5.5488 GPa | 5.6204 GPa |
| 150 | 50° | 6.2971 GPa | 5.4013 GPa | 5.4112 GPa |
| 151 | 60° | 6.3660 GPa | 5.3774 GPa | 5.3477 GPa |
| 152 | 70° | 6.4969 GPa | 5.4341 GPa | 5.3917 GPa |
| 153 | 80° | 6.6558 GPa | 5.5045 GPa | 5.4755 GPa |
| 154 | 90° | 6.7940 GPa | 5.5244 GPa | 5.5244 GPa |
| 155 | 100° | 6.8674 GPa | 5.4702 GPa | 5.4966 GPa |
| 156 | 110° | 6.8595 GPa | 5.3752 GPa | 5.4111 GPa |
| 157 | 120° | 6.7892 GPa | 5.3069 GPa | 5.3346 GPa |

Click **Create GeoDict Charts** in the toolbar to create a chart of the **Direction Dependent Stiffness**.



Young's Modulus in XY-, XZ- and YZ-Plane is shown with the angle resolution of 10°.




## Effective Stiffness with FeelMath-AF

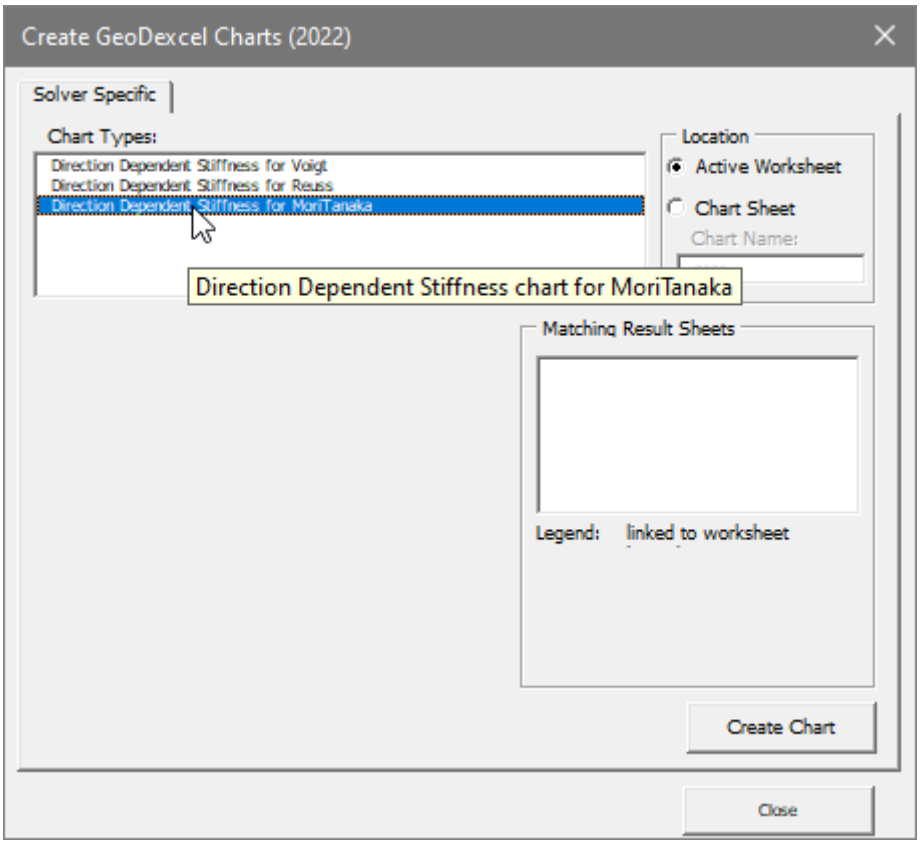
For the result of a **FeelMath-AF** computation, the engineering parameters in different coordinate systems and with the approximations selected when running **FeelMath-AF** (**Reuss**, **Voigt**, **Mori-Tanaka**), the corresponding direction dependent stiffness as well as the approximations of the elasticity tensor are contained in the worksheet.

For more information about **FeelMath-AF** approximations, see the ElastoDict handbook of the GeoDict User Guide.

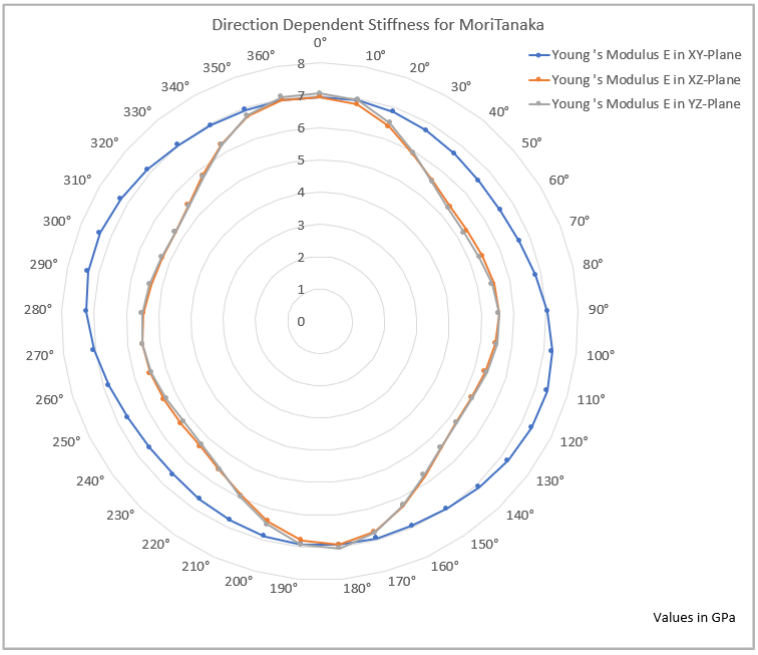
| **Engineering Parameters** | | | |
|---|---|---|---|
| Isotropic Approximation | | | |
| | Voigt | Reuss | Mori Tanaka |
| Young 's Modulus | 11.2349 GPa | 4.6804 GPa | 6.0576 GPa |
| Poisson Ratio | 0.2919 | 0.3641 | 0.3431 |
| Shear Modulus | 4.3483 GPa | 1.7156 GPa | 2.2551 GPa |
| Lame Modulus | 6.0975 GPa | 4.5945 GPa | 4.9317 GPa |
| Bulk Modulus | 8.9964 GPa | 5.7383 GPa | 6.4350 GPa |

| 106 | **Direction Dependent Stiffness for Voigt** | | | |
|---|---|---|---|---|
| 107 | Stiffness in the Planes of the Original Coordinate System | | | |
| 108 | Angle | Young 's Modulus E in XY-Plane | Young 's Modulus E in XZ-Plane | Young 's Modulus E in YZ-Plane |
| 109 | Legend extension: | FeelMathAFResult | FeelMathAFResult | FeelMathAFResult |
| 110 | 0° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 111 | 10° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 112 | 20° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 113 | 30° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 114 | 40° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 115 | 50° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 116 | 60° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 117 | 70° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 118 | 80° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 119 | 90° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 120 | 100° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 121 | 110° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |
| 122 | 120° | 11.2349 GPa | 11.2349 GPa | 11.2349 GPa |

Clicking **Create GeoDict Charts** in the toolbar, a **Direction Dependent Stiffness** plot for the approximation selected can be created.




A plot, showing Young's Modulus E in XY-, XZ- and YZ-Plane with the angle resolution of 10° is created.



## SINGLE TABLE

The **Single Table** import loads scalar values for each GeoDict result file in one single row in an Excel sheet.

With **Single Table**, the user can summarize several simulated properties of a geometry such as pressure drop, largest through pore etc. and compare them with the corresponding results for different geometries or analyze the influence of different parameters in a parameter study. The **Single Table** import is available for all modules.

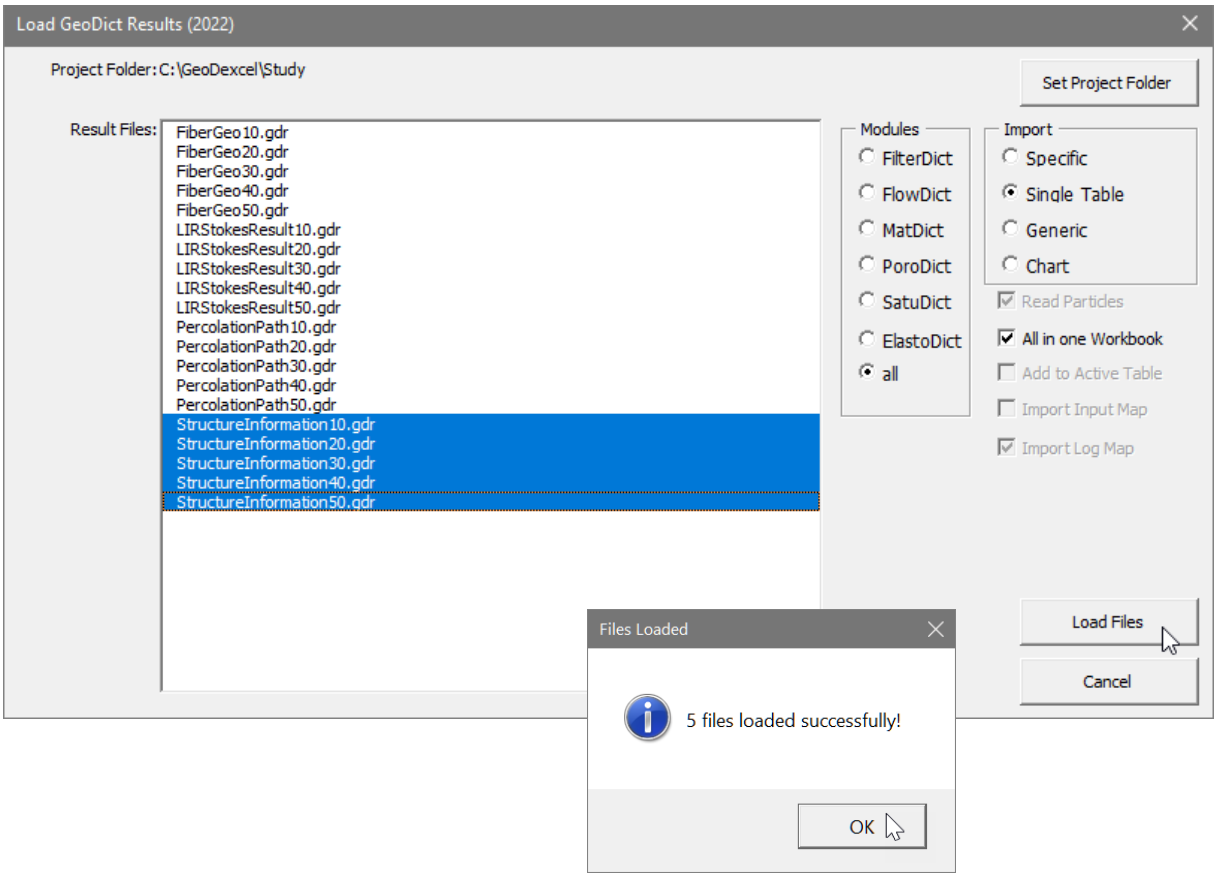
The **Single Table** import can be started by clicking **Load GeoDict result file (.gdr)**, after starting GeoDexcel from the desktop icon, through the macro command `LoadGDRToExcel` with `ExcelMode` set to **SingleTable** or by clicking **Excel (single table)** in the GeoDict Result Viewer.

In the following, the features of the **Single Table** import are shown using a small case study.

For five structures generated with FiberGeo with different predefined solid volume fractions, the largest through pore was computed with MatDict (**Material Characterization - Percolation Path**) as well as the structure information (**Material Statistics - Structure Information**).

As a first step, to check that the realized solid volume fractions of the generated structures are as predefined in FiberGeo, GeoDexcel is started and **Load GeoDict result file (.gdr)** is clicked.

Choose **Single Table** import, check **all** (or MatDict) in the **Modules** panel and highlight all the StructureInformation*.gdr files.

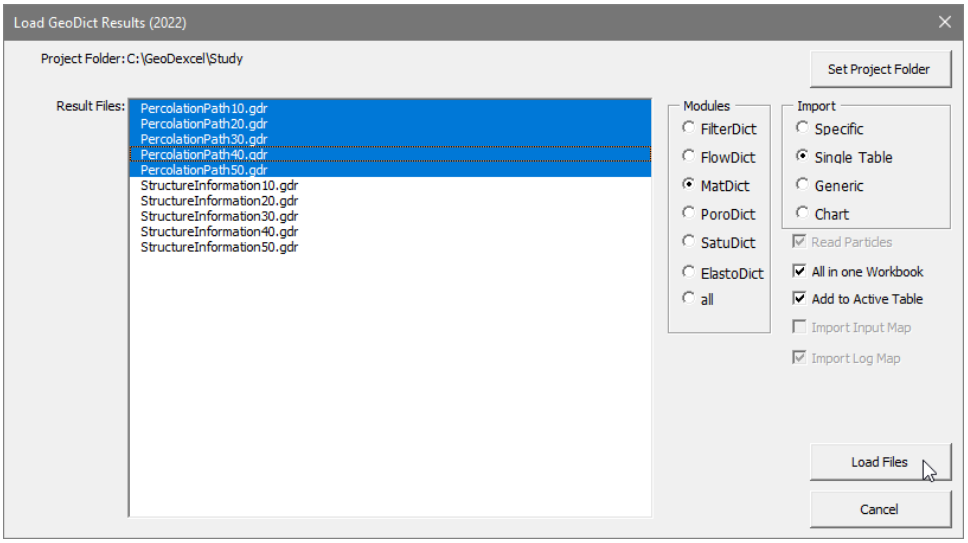


After clicking **Load Files**, the five result files are loaded, and the following lengthy table is displayed in the spreadsheet.

| Legend | StructureInformation | | | | | | |
|---|---|---|---|---|---|---|---|
| #Data | | | | | | | |
| Result File Name | Result File Directory | Legend | Porosity | Solid Volume Fraction | Number Of Gad-Objects | Mass | Grammage X-Direction |
| StructureInformation10.gdr | C:\GeoDexcel\Study | FiberGeo10 | 89.95 % | 10.05 % | 107 | 2.0734E-09 kg | 0.0518 kg/m^2 |
| StructureInformation20.gdr | C:\GeoDexcel\Study | FiberGeo20 | 79.99 % | 20.01 % | 254 | 4.1311E-09 kg | 0.1033 kg/m^2 |
| StructureInformation30.gdr | C:\GeoDexcel\Study | FiberGeo30 | 69.99 % | 30.01 % | 406 | 6.1942E-09 kg | 0.1549 kg/m^2 |
| StructureInformation40.gdr | C:\GeoDexcel\Study | FiberGeo40 | 59.95 % | 40.05 % | 579 | 8.2670E-09 kg | 0.2067 kg/m^2 |
| StructureInformation50.gdr | C:\GeoDexcel\Study | FiberGeo50 | 50.01 % | 49.99 % | 753 | 1.0318E-08 kg | 0.2580 kg/m^2 |

It can be observed that the solid volume fraction predefined in FiberGeo and indicated in the result file names is nearly identical to the realized solid volume fraction computed with MatDict.

Next, let us observe how the solid volume fraction influences the size of the largest through-pore. For that, click again **Load GeoDict result file (.gdr)** under the **M2M** tab. Choose **Single Table** in the import panel, and MatDict in the **Modules** panel. Select all PercolationPath*.gdr files and check **Add to Active Table** below these panels.




When clicking **Load Files**, the five result files for the **Percolation Path** are added as new rows in the existing spreadsheet.

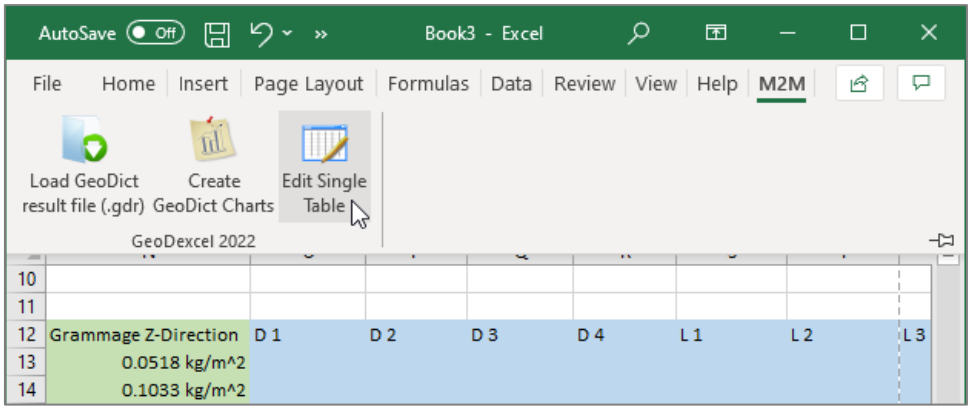
Information common to all MatDict result files (Structure Information and Percolation Paths), such as the results file name, the hash of the structure, number of voxels (NX, NY, NZ), Voxel Length or module, are added in the columns already present for MatDict results.

| | A | B | C | H | I | J |
|---|---|---|---|---|---|---|
| 10 | Legend | StructureInformation | | | | |
| 11 | #Data | | | | | |
| 12 | Result File Name | Result File Directory | Legend | Porosity | Solid Volume Fraction | Number Of Gad-Objects |
| 13 | StructureInformation10.gdr | C:\GeoDexcel\Study | FiberGeo10 | 89.95 % | 10.05 % | 107 |
| 14 | StructureInformation20.gdr | C:\GeoDexcel\Study | FiberGeo20 | 79.99 % | 20.01 % | 254 |
| 15 | StructureInformation30.gdr | C:\GeoDexcel\Study | FiberGeo30 | 69.99 % | 30.01 % | 406 |
| 16 | StructureInformation40.gdr | C:\GeoDexcel\Study | FiberGeo40 | 59.95 % | 40.05 % | 579 |
| 17 | StructureInformation50.gdr | C:\GeoDexcel\Study | FiberGeo50 | 50.01 % | 49.99 % | 753 |
| 18 | PercolationPath10.gdr | C:\GeoDexcel\Study | FiberGeo10 | | | |
| 19 | PercolationPath20.gdr | C:\GeoDexcel\Study | FiberGeo20 | | | |
| 20 | PercolationPath30.gdr | C:\GeoDexcel\Study | FiberGeo30 | | | |
| 21 | PercolationPath40.gdr | C:\GeoDexcel\Study | FiberGeo40 | | | |
| 22 | PercolationPath50.gdr | C:\GeoDexcel\Study | FiberGeo50 | | | |

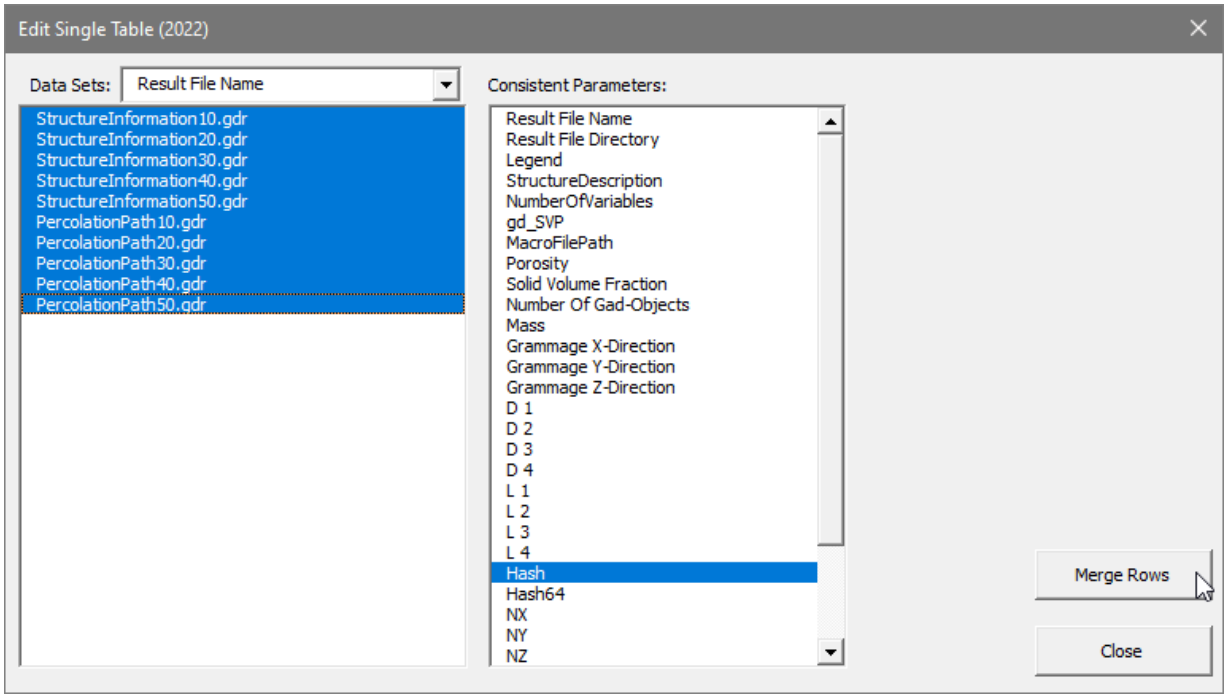
**Percolation Path** specific results such as diameter and length of the largest through pore are added in new columns.

| | N | O | P | Q | R | S | T | U | V | W | X | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | Grammage Z-Direction | D 1 | D 2 | D 3 | D 4 | L 1 | L 2 | L 3 | L 4 | Hash | Hash64 | NX |
| 13 | 0.0518 kg/m^2 | | | | | | | | | 30698 | 2612581226014634747 | 200 |
| 14 | 0.1033 kg/m^2 | | | | | | | | | 31984 | 9019124571179469383 | 200 |
| 15 | 0.1549 kg/m^2 | | | | | | | | | 18595 | 1161417184851543237 | 200 |
| 16 | 0.2067 kg/m^2 | | | | | | | | | 67910 | 3936645654049834970 | 200 |
| 17 | 0.2580 kg/m^2 | | | | | | | | | 5044 | 3188795843620176002 | 200 |
| 18 | | 33 micron | 29 micron | 28 micron | 27 micron | 289 micron | 259 micron | 264 micron | 301 micron | 30698 | 2612581226014634747 | 200 |
| 19 | | 21 micron | 18 micron | 18 micron | 17 micron | 242 micron | 231 micron | 343 micron | 273 micron | 31984 | 9019124571179469383 | 200 |
| 20 | | 15 micron | 14 micron | 13 micron | 12 micron | 291 micron | 287 micron | 424 micron | 297 micron | 18595 | 1161417184851543237 | 200 |
| 21 | | 11 micron | 10 micron | 10 micron | 10 micron | 264 micron | 371 micron | 263 micron | 276 micron | 67910 | 3936645654049834970 | 200 |
| 22 | | 8 micron | 8 micron | 7 micron | 7 micron | 333 micron | 372 micron | 321 micron | 400 micron | 5044 | 3188795843620176002 | 200 |

To merge the **Structure Information** and **Percolation Path** results for the predefined solid volume fractions click **Edit Single Table** under the **M2M** tab.



In the **Edit Single Table** dialog, keep as **Data Sets: Result File Name** and choose as **Consistent Parameters: Hash**.



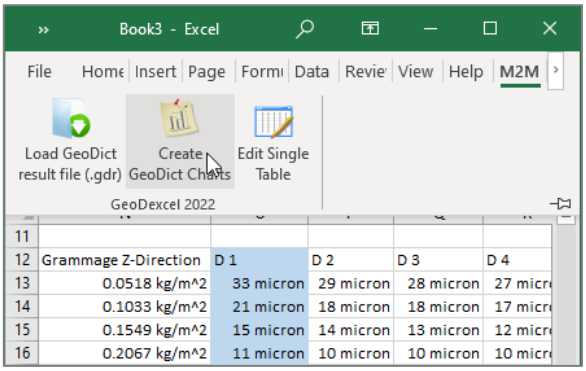

After clicking **Merge Rows**, the results are combined in five rows, according to the five different structures with different structure hash. Column A and B, with the result file name and the result file directory now contain the names and directories of the merged files.

| | A | B | H | I |
|---|---|---|---|---|
| 11 | #Data | | | |
| 12 | Result File Name | Result File Directory | Porosity | Solid Volume Fraction |
| 13 | \|StructureInformation10.gdr\|PercolationPath10.gdr | \|C:\GeoDexcel\Study\|C:\GeoDexcel\Study | 89.95 % | 10.05 % |
| 14 | \|StructureInformation20.gdr\|PercolationPath20.gdr | \|C:\GeoDexcel\Study\|C:\GeoDexcel\Study | 79.99 % | 20.01 % |
| 15 | \|StructureInformation30.gdr\|PercolationPath30.gdr | \|C:\GeoDexcel\Study\|C:\GeoDexcel\Study | 69.99 % | 30.01 % |
| 16 | \|StructureInformation40.gdr\|PercolationPath40.gdr | \|C:\GeoDexcel\Study\|C:\GeoDexcel\Study | 59.95 % | 40.05 % |
| 17 | \|StructureInformation50.gdr\|PercolationPath50.gdr | \|C:\GeoDexcel\Study\|C:\GeoDexcel\Study | 50.01 % | 49.99 % |

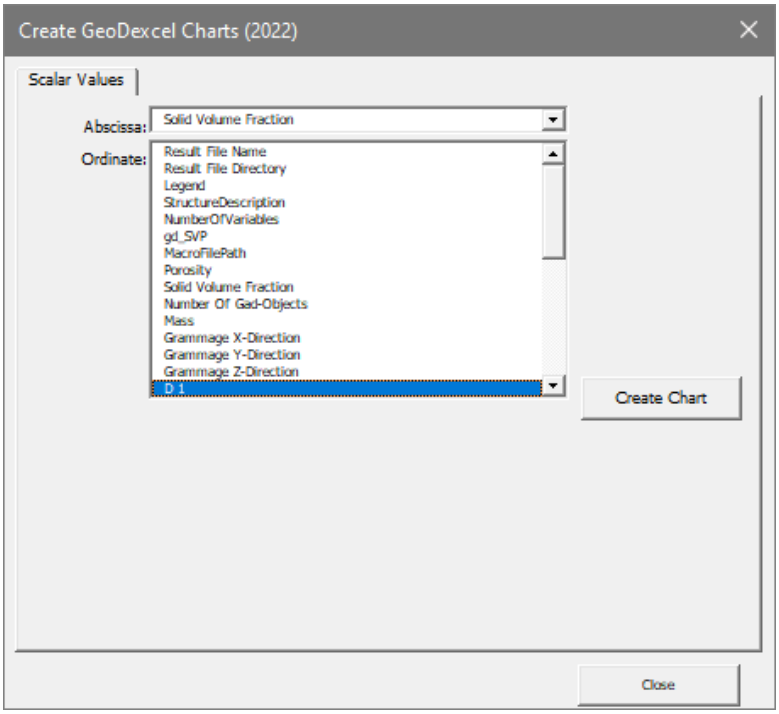
| | N | O | P | Q | R | S | T | U | V |
|---|---|---|---|---|---|---|---|---|---|
| 11 | | | | | | | | | |
| 12 | Grammage Z-Direction | D 1 | D 2 | D 3 | D 4 | L 1 | L 2 | L 3 | L 4 |
| 13 | 0.0518 kg/m^2 | 33 micron | 29 micron | 28 micron | 27 micron | 289 micron | 259 micron | 264 micron | 301 micron |
| 14 | 0.1033 kg/m^2 | 21 micron | 18 micron | 18 micron | 17 micron | 242 micron | 231 micron | 343 micron | 273 micron |
| 15 | 0.1549 kg/m^2 | 15 micron | 14 micron | 13 micron | 12 micron | 291 micron | 287 micron | 424 micron | 297 micron |
| 16 | 0.2067 kg/m^2 | 11 micron | 10 micron | 10 micron | 10 micron | 264 micron | 371 micron | 263 micron | 276 micron |
| 17 | 0.2580 kg/m^2 | 8 micron | 8 micron | 7 micron | 7 micron | 333 micron | 372 micron | 321 micron | 400 micron |

Next, we want to plot the largest through pore diameter (D1, in column O) as a function of the computed solid volume fraction.

Therefore, click **Create GeoDict Charts** under the **M2M** tab**.**



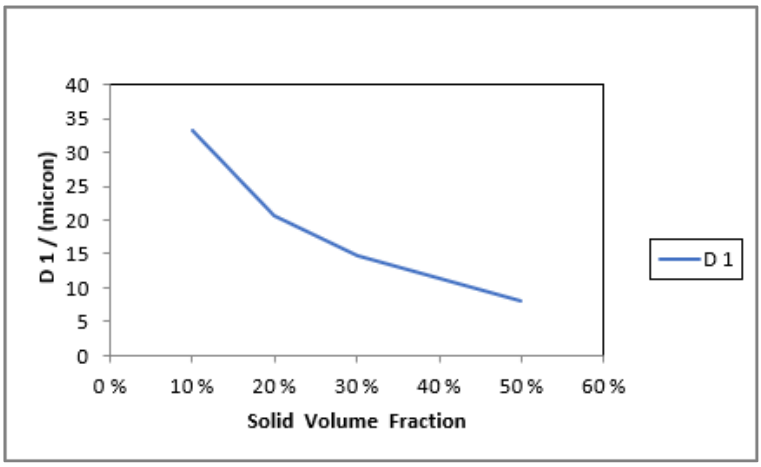
Choose **Solid Volume Fraction** from the **Abscissa** pull-down menu (horizontal axis) and **D1** from the **Ordinate** pull-down menu (vertical axis).




Clicking **Create Chart** generates the chart with the selected values, and the axis labels corresponding to them.

The units of these values in the spreadsheet are used as units for the chart.

The first column of the spreadsheet cannot be deleted. Doing so disables all entries for abscissa and ordinate in the dialog, and no charts can be created.




The **Create GeoDexcel Charts** dialog remains open, so that the user can continue creating other charts, combining different abscissas and ordinates, and compare them.

The chart is created on top of the spreadsheet superimposing the data, and, when there is more than one chart, overlaying each other. However, charts can be moved and arranged manually.

## GENERIC IMPORT

The **Generic** import reads the complete result map and, if chosen, the input and the log map of a single GeoDict result file in one Excel sheet. Here, all parameters / result values are accessible for the user's own analysis. **Generic** import is available for all modules.

The **Generic** import can be started directly from the GeoDict GUI by clicking **Export → Excel (generic)** in the **Result Viewer** of the GDR file, through **Load GeoDict result file (.gdr)** after starting GeoDexcel from the desktop icon, or through the macro command `LoadGDRToExcel` with `ExcelMode` set to **Generic**.

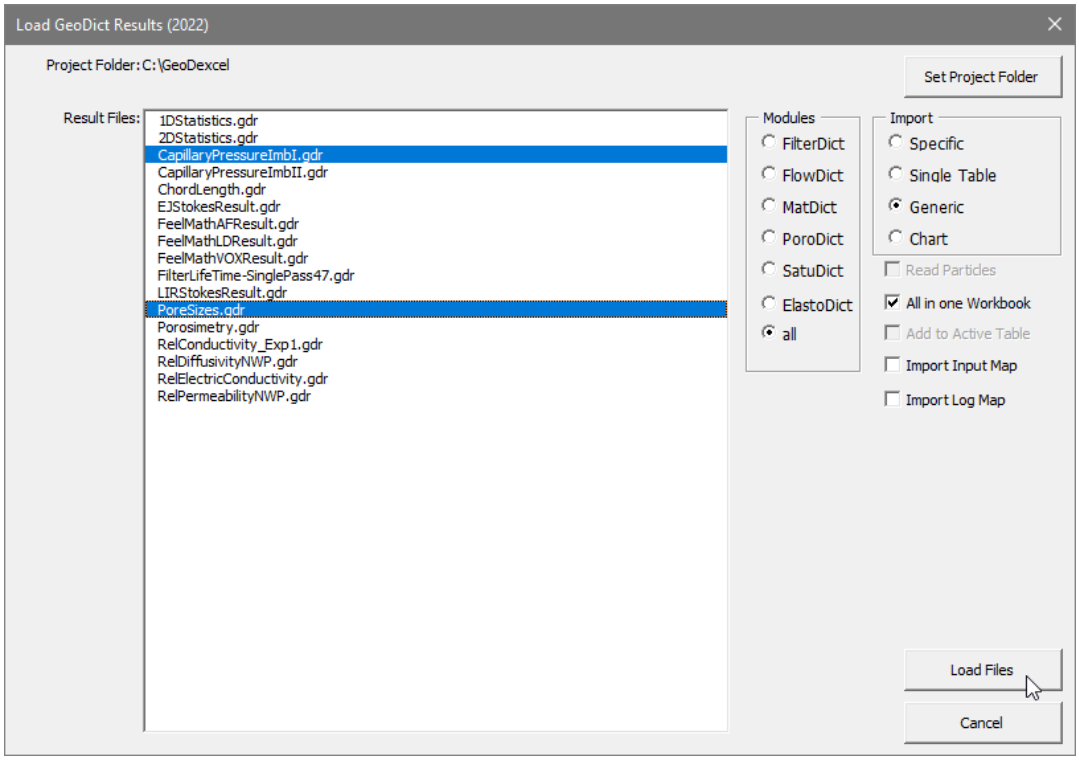
Since GeoDict 2022, additionally a python based version of the generic export is available in the **Result Viewer**. Click **Export → Excel (generic) - Python** to use this feature. It allows to export results in Excel format, even if no Excel installation is available on the machine, e.g. on Linux systems. The excel file created is the same as using the Excel based **Export → Excel (generic)**.

Start GeoDexcel, click the **M2M** tab in the menu bar, and then, the **Load GeoDict result file (.gdr)** icon as described above in page 3. Multiple files can be selected by clicking the name of the files while holding down the CTRL or the SHIFT key. Check **All in one Workbook**, to load two or more GDR files into the same workbook and an automated comparison can proceed. Uncheck it to load the files into several workbooks.

When checking **Import Input Map,** the input map contained in the result file(s) is loaded in addition to the result map. Since GeoDict 2022, the input map is loaded after the result map to the Excel file.

Select **Import Log Map** to load additionally the information of the log map, i.e. system information and the runtime of the computation.

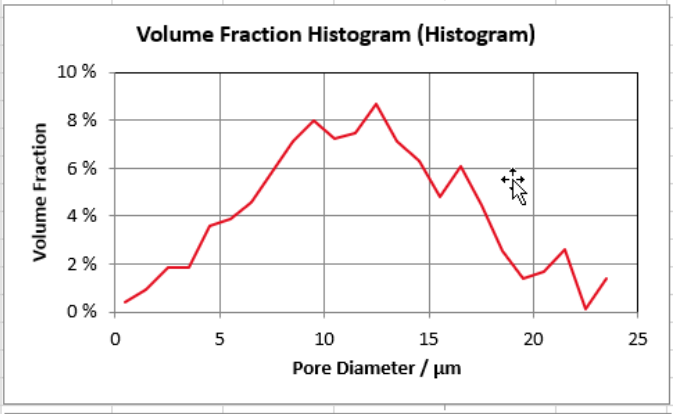
If the result file is imported by clicking **Export → Excel (generic)** or **Export → Excel (generic) - Python** in the **Result Viewer** of the GDR file, Input Map and Log Map are always added to the Excel file.

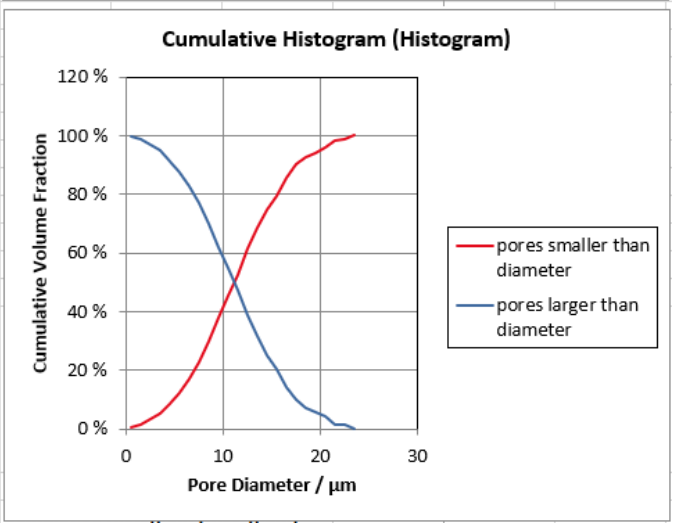


Of course, the results in the GeoDict files can also be plotted after loading them with **Generic** import. The user can manually select the data to be taken for the charts.

However, result plots available in the GeoDict result file, that are plotted if the file is opened in the GeoDict **Result Viewer**, are created automatically in GeoDexcel if a result file is opened with the **Generic** import.

| | A | B | C |
|---|---|---|---|
| 10 | Legend | PoreSizes | |
| 11 | | | |
| 12 | **Geometry:** | | |
| 13 | Hash | 72559 | |
| 14 | Hash64 | 6212959420369137849 | |
| 15 | FileName | Structure.gdt | |
| 16 | NX | 200 | |
| 17 | NY | 200 | |
| 18 | NZ | 200 | |
| 19 | UseBoxels | false | |
| 20 | VoxelLength | 5E-07 m | |
| 21 | **Result Map** | | |
| 22 | MinDiameter | 0 m | 0.000001 m |
| 23 | MaxDiameter | 0.000001 m | 0.000002 m |
| 24 | MeanDiameter | 5E-07 m | 1.5E-06 m |
| 25 | VolumeFraction | 0.00444159 | 0.00912562 |
| 26 | VolumeAbsolute | 3E-15 m^3 | 6E-15 m^3 |
| 27 | olumeFractionCumulative | 0.00444159 | 0.01356721 |
| 28 | Saturation | 1 | 0.99555841 |
| 29 | Weight | 9.03E-10 kg | |
| 30 | dVdLogDiameter | 0 cm^3/g | 0 cm^3/g |
| 31 | dVdLog10Diameter | 0 cm^3/g | 0 cm^3/g |
| 32 | Fractions | 10.00 % | 50.00 % |
| 33 | CharacteristicDiameters | 5.35E-06 m | 1.16E-05 m |
| 34 | Porosity | 0.65016125 | |
| 35 | **Parameter Map** | | |
| 36 | StructureDescription | PoreSizes | |
| 37 | StructureFile | C:/GeoDexcel/PoreSizes/Structure.gdt | |
| 38 | **Plots** | | |
| 39 | **Volume Fraction Histogram (Histogram)** | | |

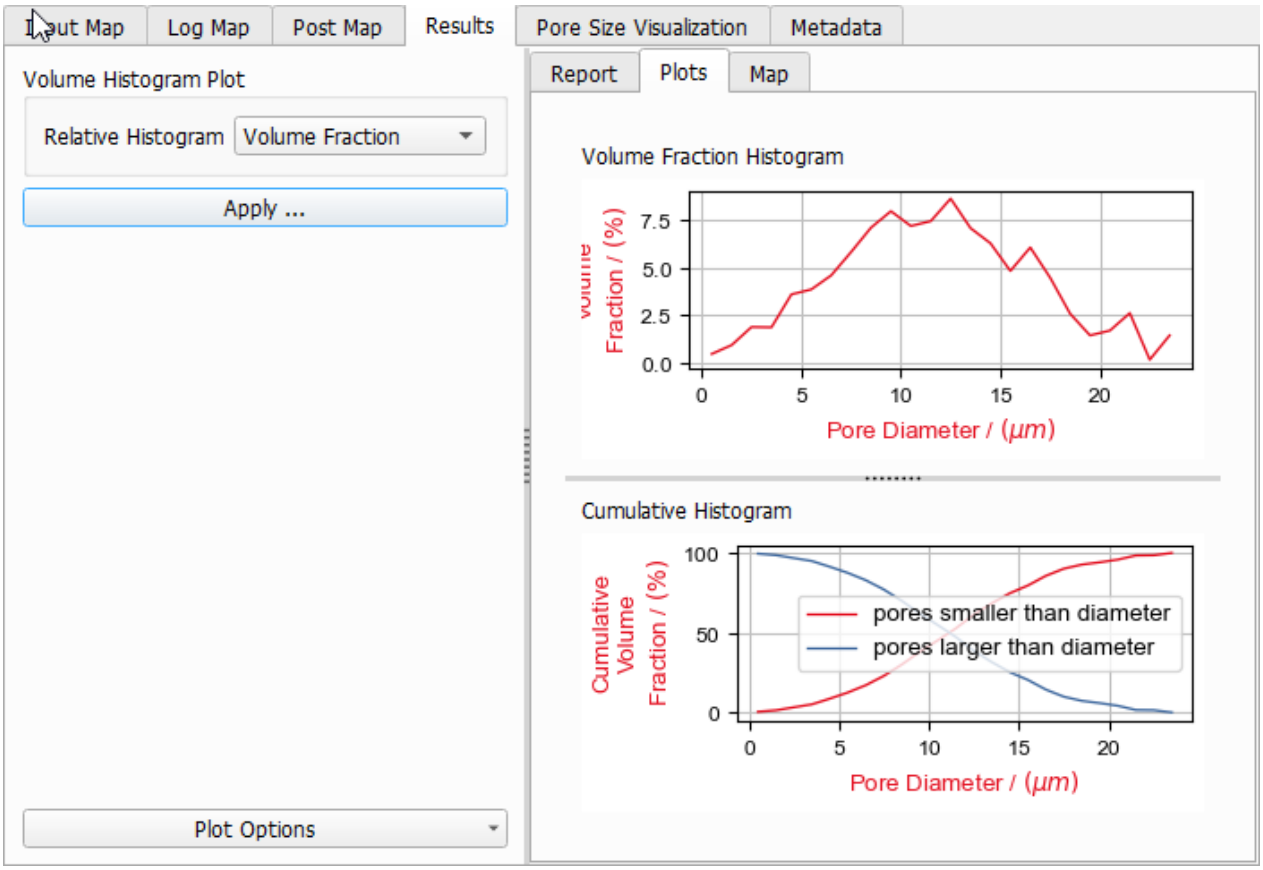



Like for the **Chart** import (see below), modifications of the charts made in the GeoDict **Result Viewer** are also available in the **Generic** Import, the next time the file is opened in GeoDexcel.

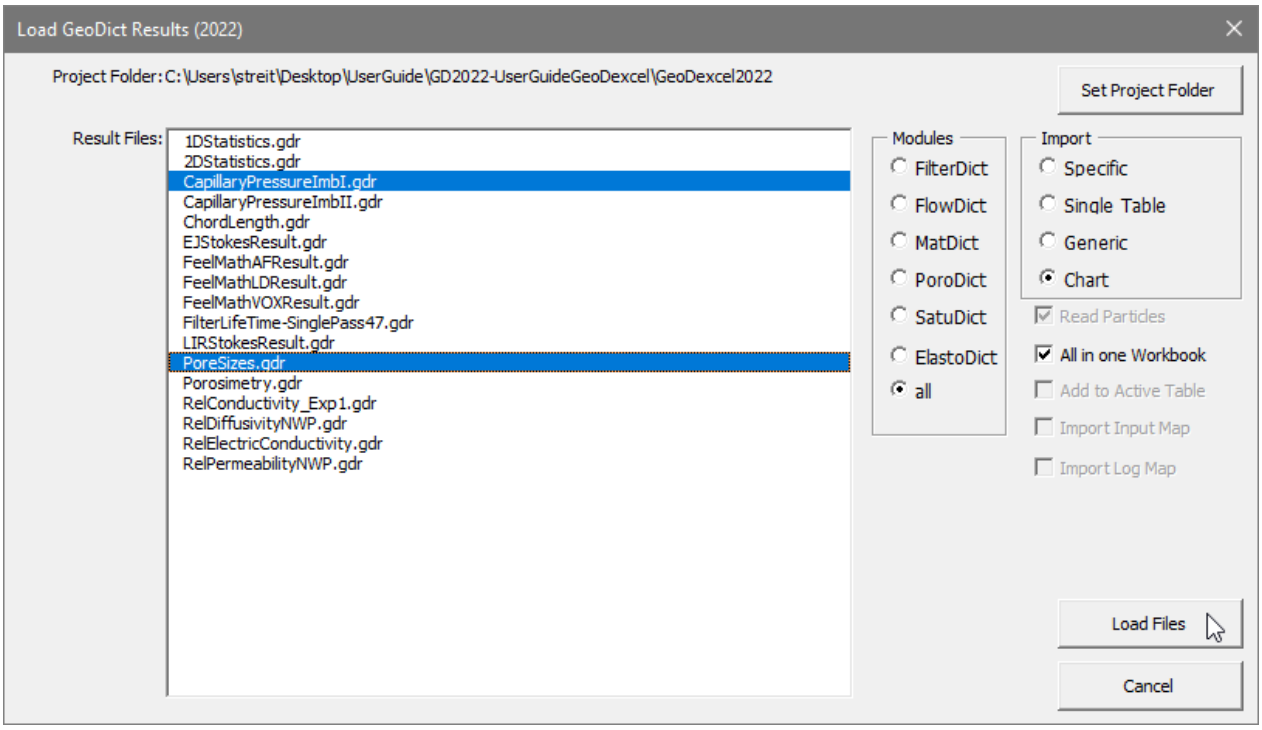
## CHART IMPORT

The **Chart** import imports the data of all charts contained in the GeoDict result file only. This are the plots visible in the GeoDict **Result Viewer** on the tab **Results** under the subtab **Plots** if the result file is opened in GeoDict.



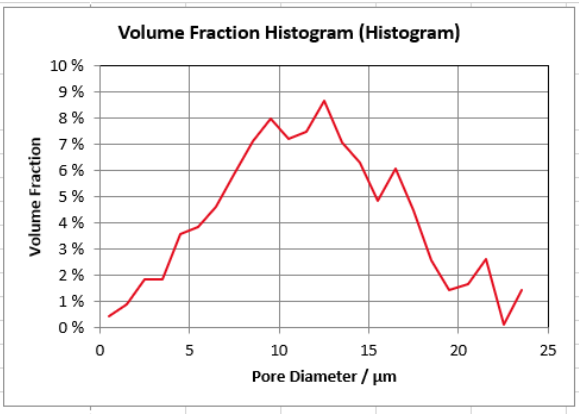

If the plots are modified in GeoDict, clicking the **Apply** button saves the changes to the GeoDict result file itself and the modified plots will be also created in the Excel worksheet the next time the file is opened in GeoDexcel.

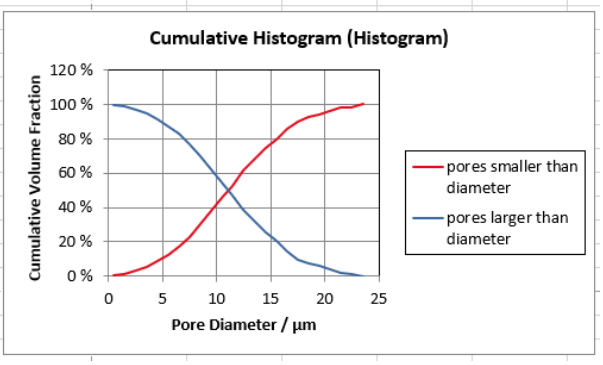
Start GeoDexcel, click the **M2M** tab in the menu bar, and then, the **Load GeoDict result file (.gdr)** icon as described above in page 3. Select **Chart** as Import type, select one or several files and click **Load Files**.




Only the charts and the data to create them is imported to Excel.

| | Volume Fraction Histogram | | Cumulative Histogram (Histogram) | | | |
|---|---|---|---|---|---|---|
| 22 | Pore Diameter | pore diameter | Pore Diameter | pores smaller than diameter | Pore Diameter | pores larger than diameter |
| 23 | 0.5 µm | 0.44 % | 0.5 µm | 0.44 % | 0.5 µm | 99.56 % |
| 24 | 1.5 µm | 0.91 % | 1.5 µm | 1.36 % | 1.5 µm | 98.64 % |
| 25 | 2.5 µm | 1.87 % | 2.5 µm | 3.22 % | 2.5 µm | 96.78 % |
| 26 | 3.5 µm | 1.85 % | 3.5 µm | 5.08 % | 3.5 µm | 94.92 % |
| 27 | 4.5 µm | 3.59 % | 4.5 µm | 8.67 % | 4.5 µm | 91.33 % |
| 28 | 5.5 µm | 3.85 % | 5.5 µm | 12.52 % | 5.5 µm | 87.48 % |
| 29 | 6.5 µm | 4.60 % | 6.5 µm | 17.12 % | 6.5 µm | 82.88 % |
| 30 | 7.5 µm | 5.83 % | 7.5 µm | 22.95 % | 7.5 µm | 77.05 % |
| 31 | 8.5 µm | 7.12 % | 8.5 µm | 30.07 % | 8.5 µm | 69.93 % |
| 32 | 9.5 µm | 7.99 % | 9.5 µm | 38.06 % | 9.5 µm | 61.94 % |
| 33 | 10.5 µm | 7.21 % | 10.5 µm | 45.27 % | 10.5 µm | 54.73 % |
| 34 | 11.5 µm | 7.46 % | 11.5 µm | 52.73 % | 11.5 µm | 47.27 % |
| 35 | 12.5 µm | 8.65 % | 12.5 µm | 61.39 % | 12.5 µm | 38.61 % |
| 36 | 13.5 µm | 7.09 % | 13.5 µm | 68.48 % | 13.5 µm | 31.52 % |
| 37 | 14.5 µm | 6.29 % | 14.5 µm | 74.77 % | 14.5 µm | 25.23 % |
| 38 | 15.5 µm | 4.83 % | 15.5 µm | 79.61 % | 15.5 µm | 20.39 % |
| 39 | 16.5 µm | 6.07 % | 16.5 µm | 85.68 % | 16.5 µm | 14.32 % |
| 40 | 17.5 µm | 4.47 % | 17.5 µm | 90.15 % | 17.5 µm | 9.85 % |
| 41 | 18.5 µm | 2.57 % | 18.5 µm | 92.72 % | 18.5 µm | 7.28 % |
| 42 | 19.5 µm | 1.42 % | 19.5 µm | 94.15 % | 19.5 µm | 5.85 % |
| 43 | 20.5 µm | 1.68 % | 20.5 µm | 95.83 % | 20.5 µm | 4.17 % |
| 44 | 21.5 µm | 2.61 % | 21.5 µm | 98.43 % | 21.5 µm | 1.57 % |
| 45 | 22.5 µm | 0.14 % | 22.5 µm | 98.57 % | 22.5 µm | 1.43 % |
| 46 | 23.5 µm | 1.43 % | 23.5 µm | 100.00 % | 23.5 µm | 0.00 % |



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