

# Education evenings 2016

*Practical introduction  
to groundwater modelling*

Computer exercises  
04 01 Grid design

# Purpose

In this exercise, we will

- ✓ modify the default grid manually,
- ✓ specify the grid design using objects,
- ✓ change the active part of the grid,
- ✓ and increase vertical discretization of the default Layer Groups,

in order to get acquainted with some of the ModelMuse grid design possibilities.

# Set initial grid

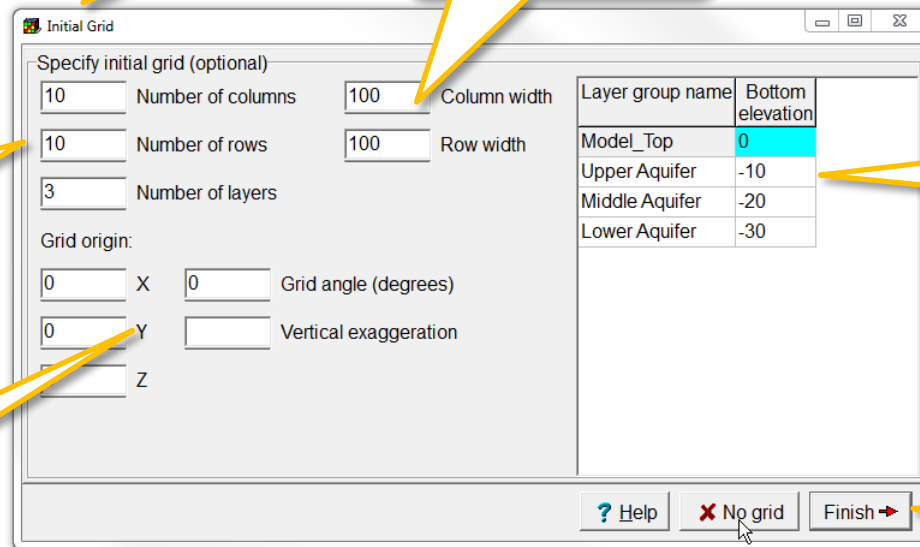
1. Start ModelMuse.

2. We are now at the initial grid window

3. where we can specify the number of cells in each direction

4. the grid origin, angle and vertical exaggeration

5. the horizontal cell dimensions



The 'Initial Grid' dialog box is shown with the following fields and controls:

- Specify initial grid (optional):**
  - Number of columns: 10
  - Number of rows: 10
  - Number of layers: 3
- Grid origin:**
  - X: 0
  - Y: 0
  - Z: 0
- Grid angle (degrees):** 0
- Vertical exaggeration:** 1
- Horizontal cell dimensions:**
  - Column width: 100
  - Row width: 100
- Layer group names and bottom elevations table:**

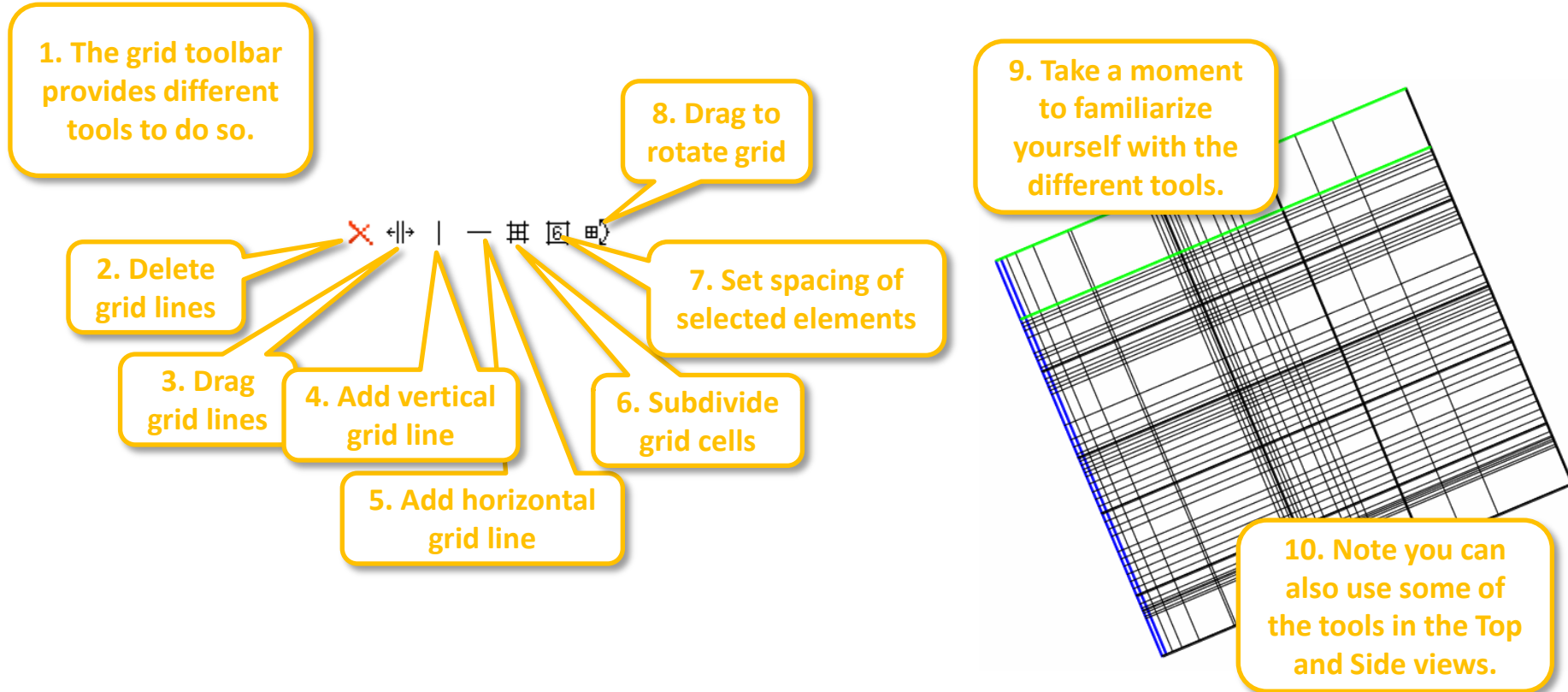
Layer group name	Bottom elevation
Model_Top	0
Upper Aquifer	-10
Middle Aquifer	-20
Lower Aquifer	-30

At the bottom of the dialog are three buttons: '? Help', 'X No grid', and 'Finish →'.

6. and the layer group names and bottom elevations.

7. Accept the defaults and click Finish.

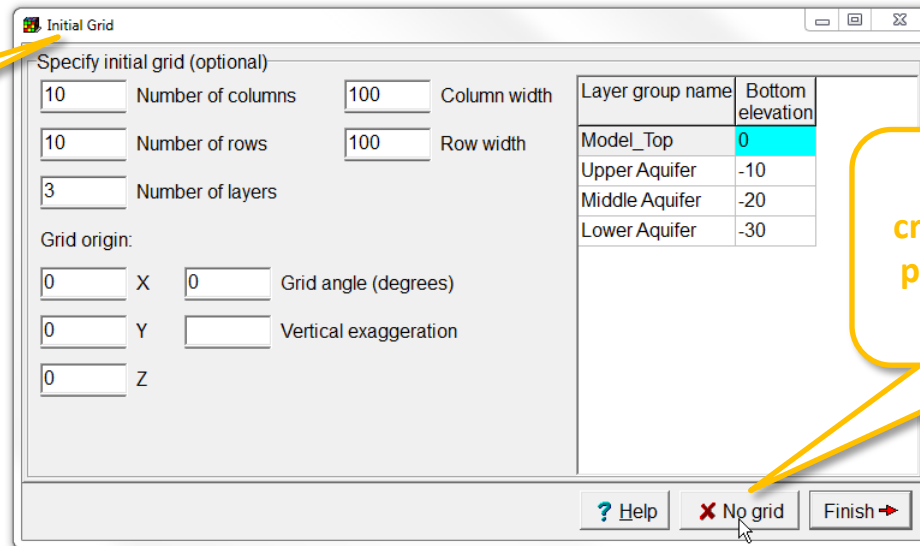
# Modify the grid manually



# Skip creating a grid

1. Start  
ModelMuse  
again

2. We have used  
the initial grid  
window before



The 'Initial Grid' dialog box is shown with the following settings:

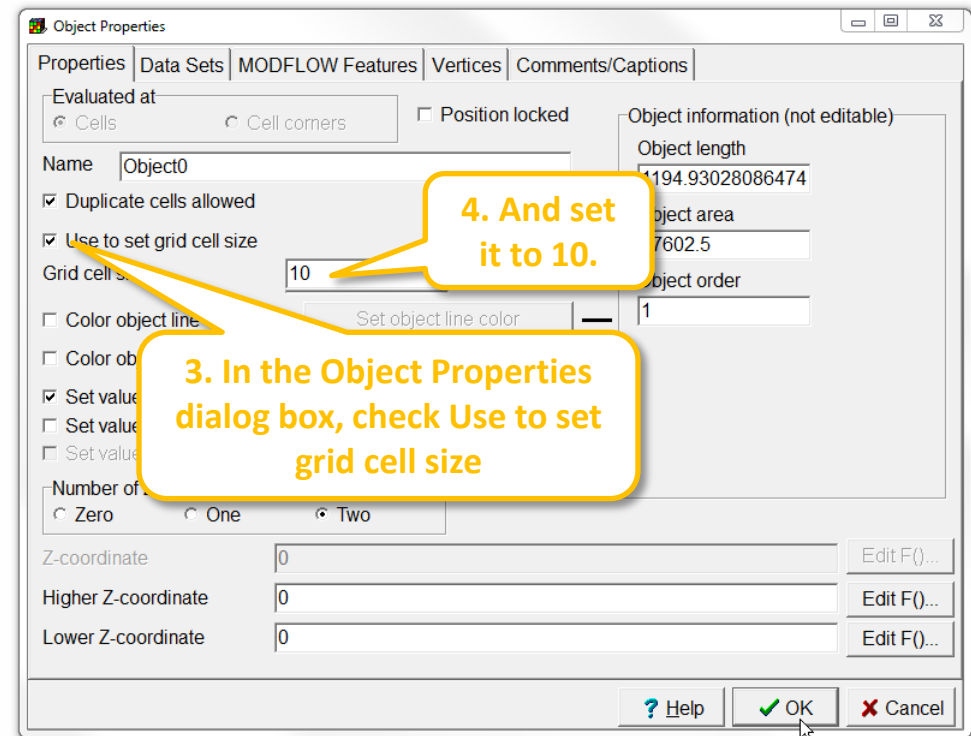
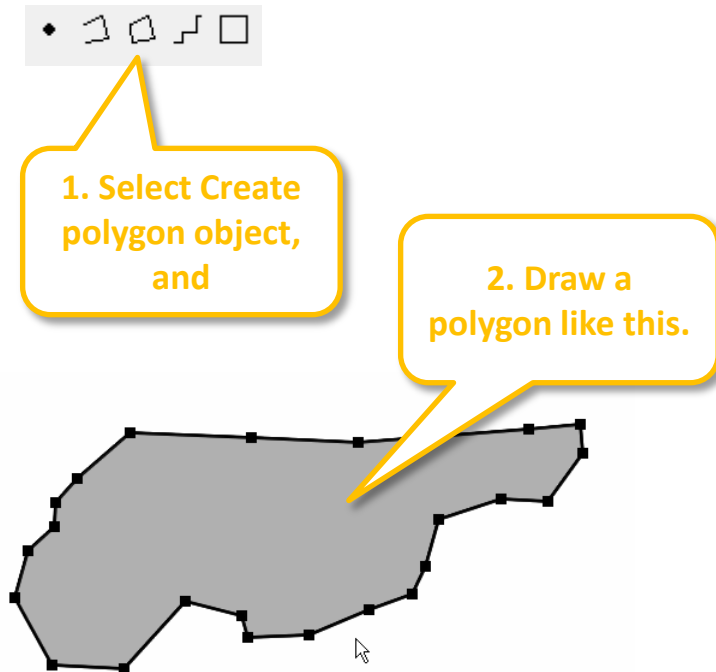
- Specify initial grid (optional):
  - Number of columns: 10
  - Column width: 100
  - Number of rows: 10
  - Row width: 100
  - Number of layers: 3
- Grid origin:
  - X: 0
  - Y: 0
  - Z: 0
- Grid angle (degrees): 0
- Vertical exaggeration: (empty)

Layer group name	Bottom elevation
Model_Top	0
Upper Aquifer	-10
Middle Aquifer	-20
Lower Aquifer	-30

Buttons at the bottom: ? Help, X No grid, Finish →

3. Therefore skip  
creating a grid at this  
point by clicking the  
No grid button

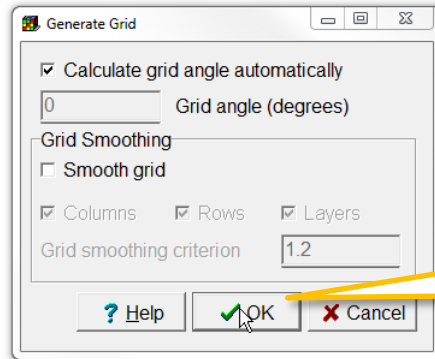
# Use object to set grid cell size



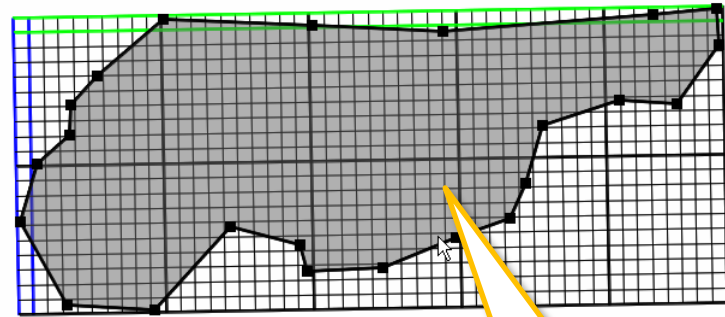
# Generate grid



1. Click the  
Generate  
grid button



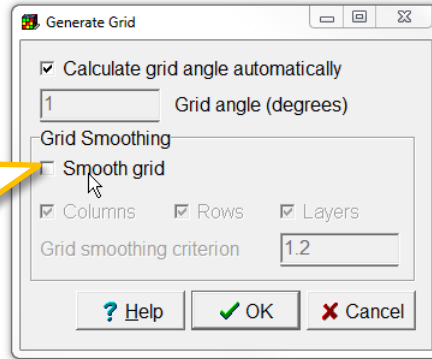
2. Leave the  
default options,  
and press OK.



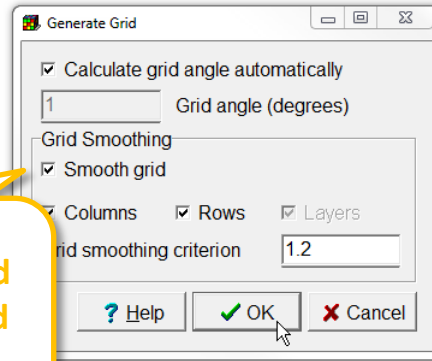
3. This is what  
you should  
get.

# Refine grid with object

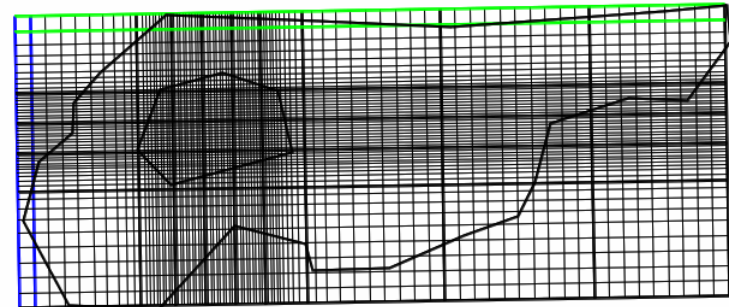
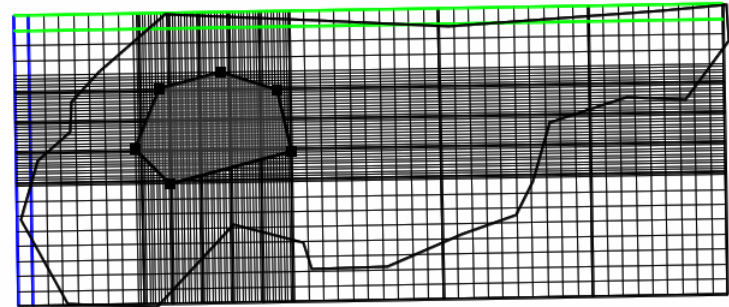
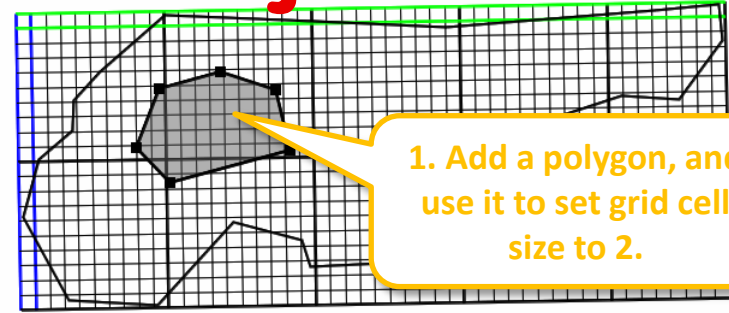
2. Generate the grid again without the Smooth grid option.



3. Then press undo and generate the grid with the Smooth grid option to see the difference.

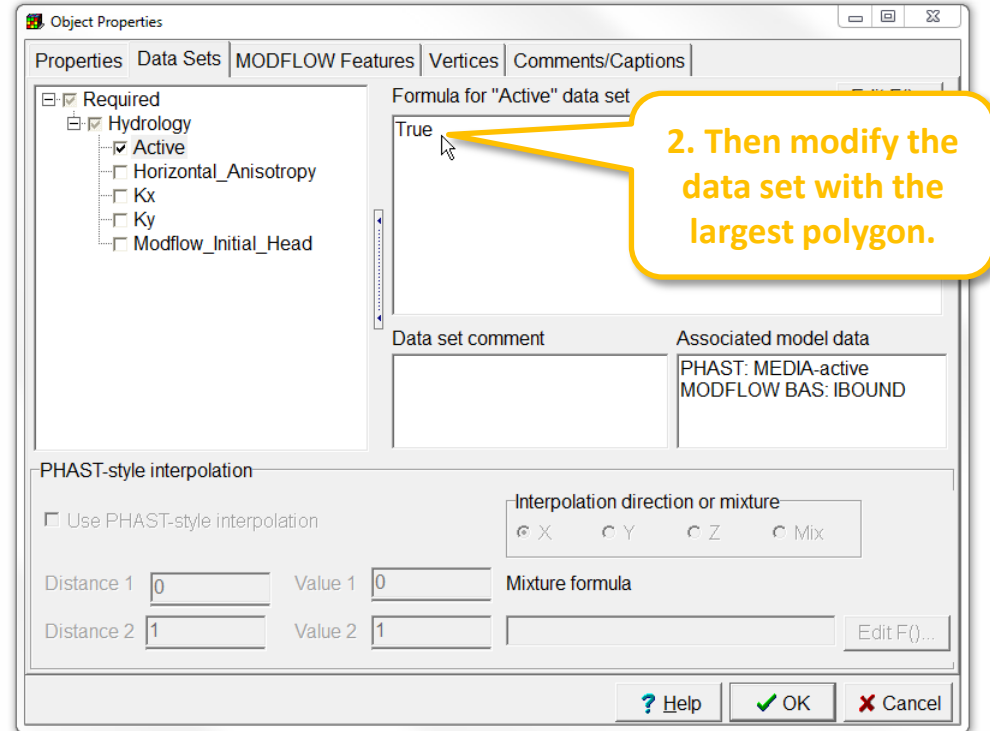
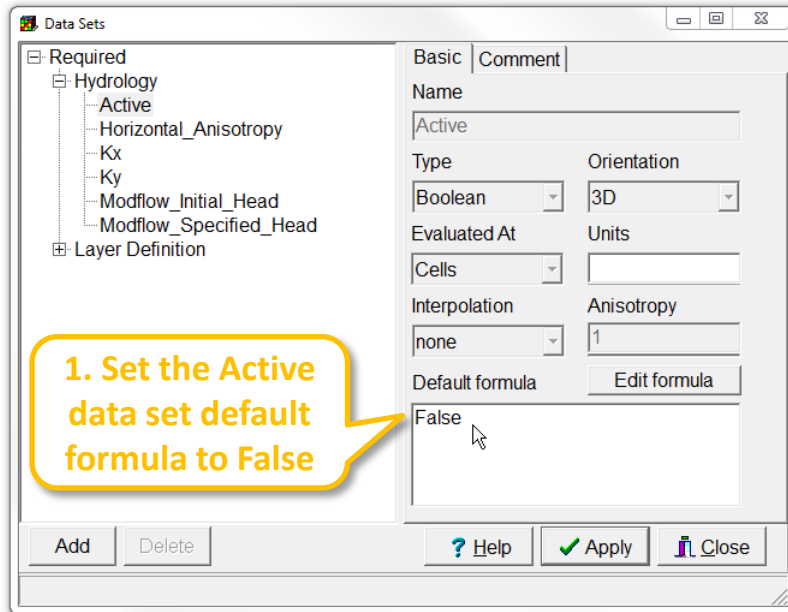


1. Add a polygon, and use it to set grid cell size to 2.

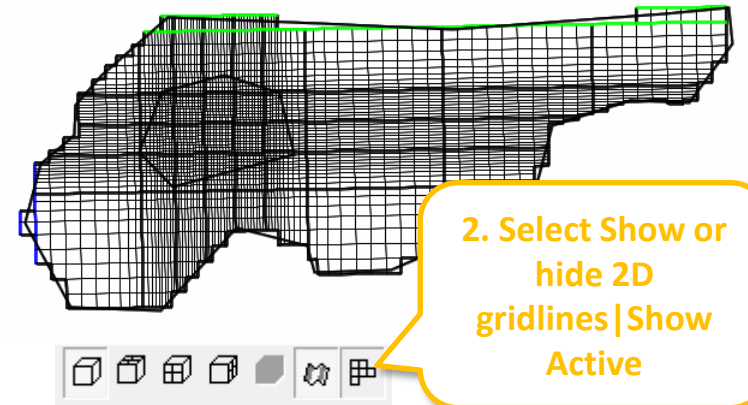
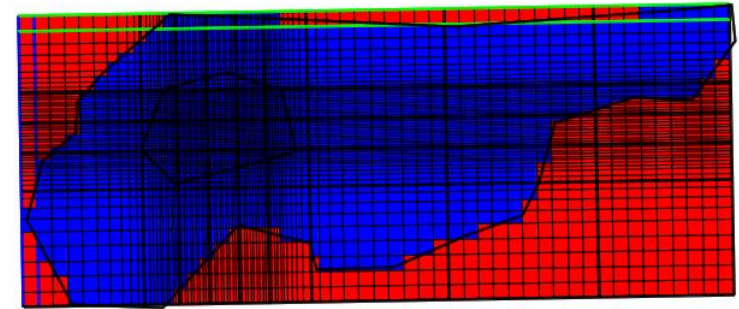
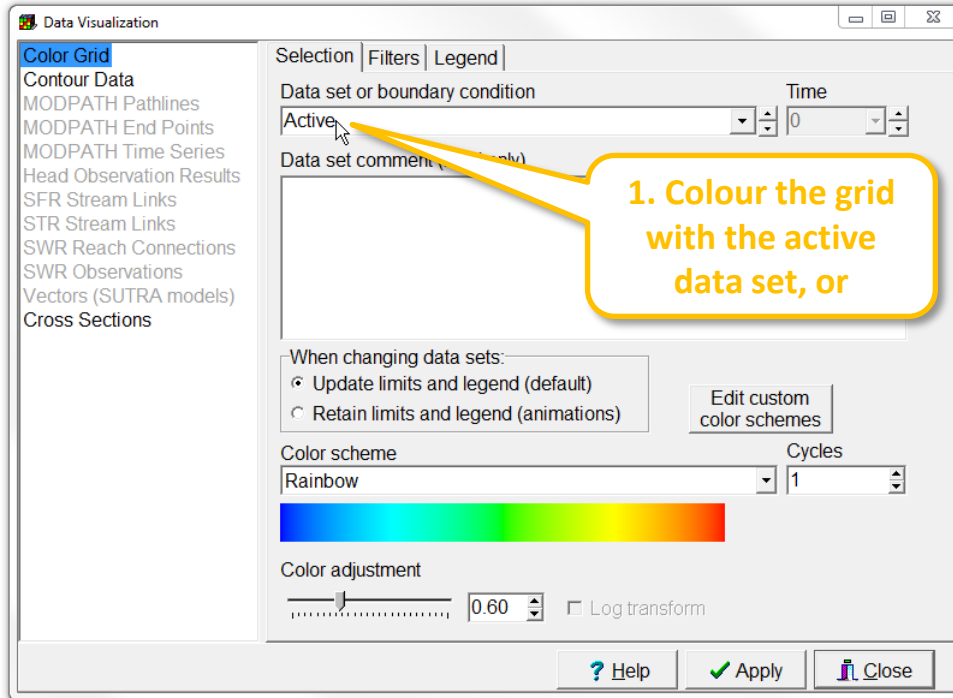




# Set active part of grid with object



# Visualize active part of grid



# Activate Middle and Lower Aquifers again

1. Note only the first layer is active.

2. Set the Lower Z-coordinate of the largest polygon to Lower\_Aquifer\_Bottom to fix this.

Object Properties

Properties | Data Sets | MODFLOW Features | Vertices | Comments/Captions

Evaluated at  
☒ Cells ☐ Cell corners ☐ Position locked

Name: Object0

☒ Duplicate cells allowed

☒ Use to set grid cell size

Grid cell size: 10

☐ Color object line

☐ Color object interior

Object information (not editable)

Object length: 1194.93028086474

Object area: 57602.5

Object order: 1

Set values of enclosed cells

Set values of intersected cells

Set values of cells by interpolation

Number of Z formulas: Two

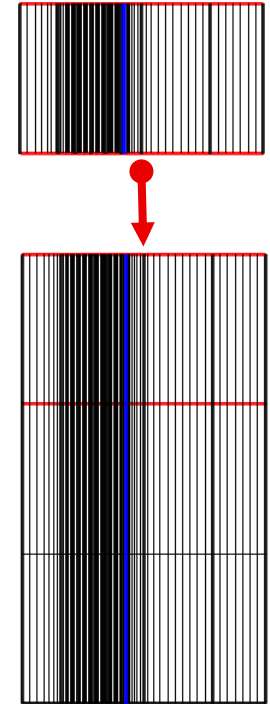
Lower Z-coordinate: Lower\_Aquifer\_Bottom

Set values of enclosed cells:  $(Model\_Top + Upper\_Aquifer\_Bottom) / 2.$

Set values of intersected cells: Model\_Top

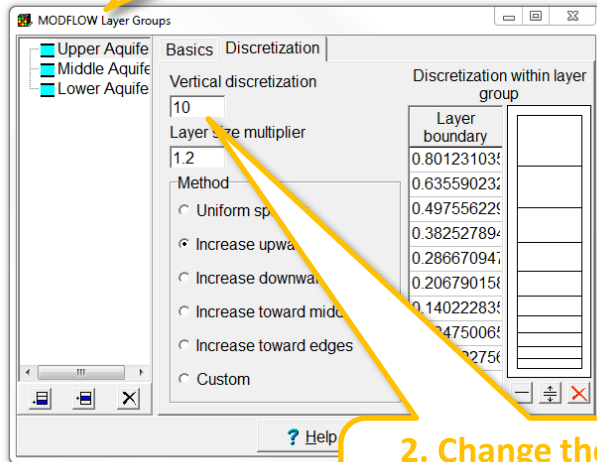
Set values of cells by interpolation: Lower\_Aquifer\_Bottom

Help OK Cancel

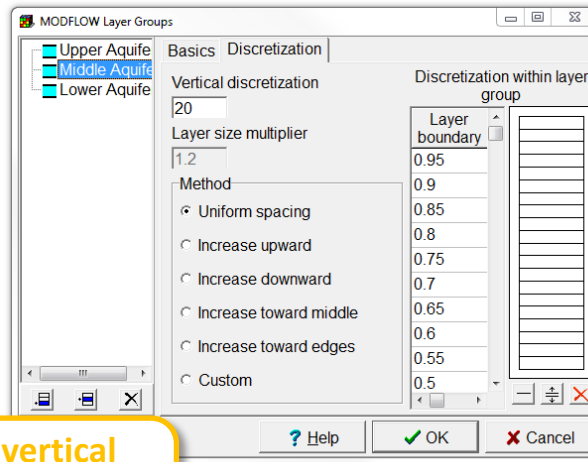


# Refine layer discretization

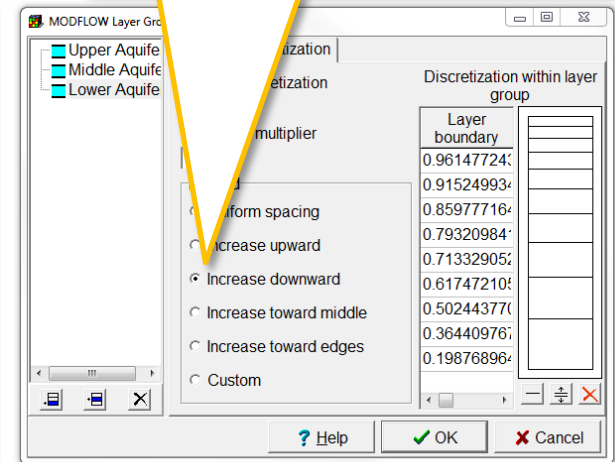
1. Select  
Model | MODFLOW Layer  
Groups,



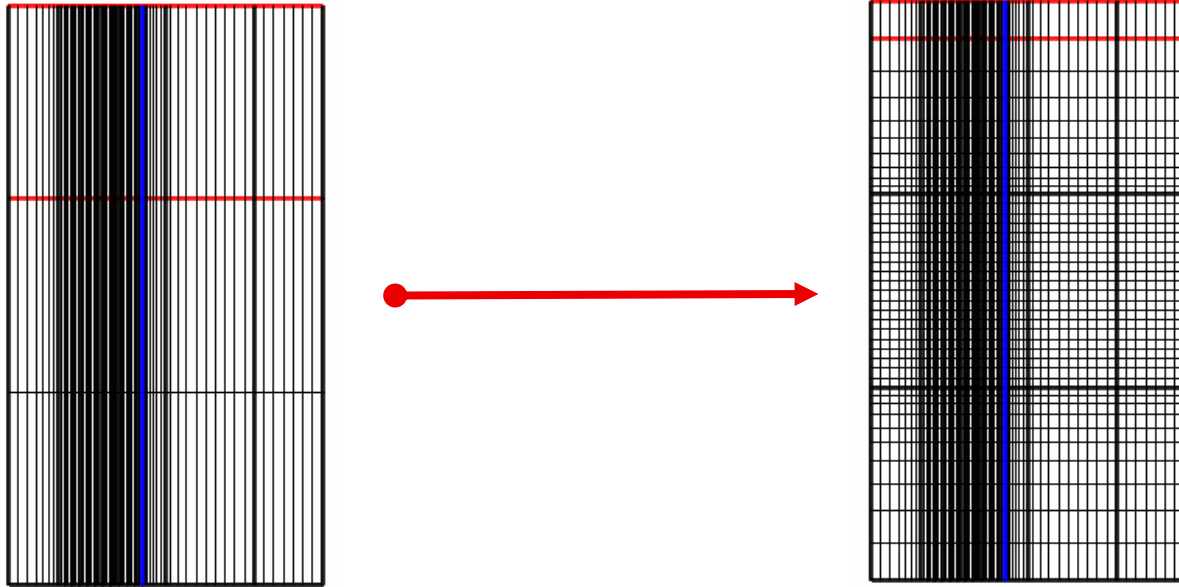
2. Change the vertical  
discretization to 10, 20,  
and 10 respectively,



3. And set the Method to  
Increase upward, Uniform  
spacing and Increase downward.



# This is what you should get



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*Questions? Found an error?  
Please contact B. Rogiers at [brogiers@sckcen.be](mailto:brogiers@sckcen.be).*