



# Education evenings 2018

*Practical introduction  
to groundwater modelling*

Computer exercises  
03 03 Solute transport simulation

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## Purpose

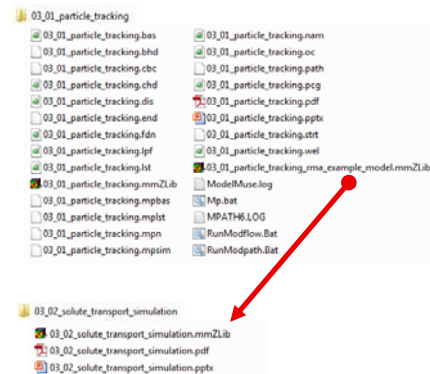
We will now use the same example model as in the last exercise, but instead of forward particle tracking, we will perform

- ✓ solute transport simulation accounting for advection, dispersion and diffusion.

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## Copy example model

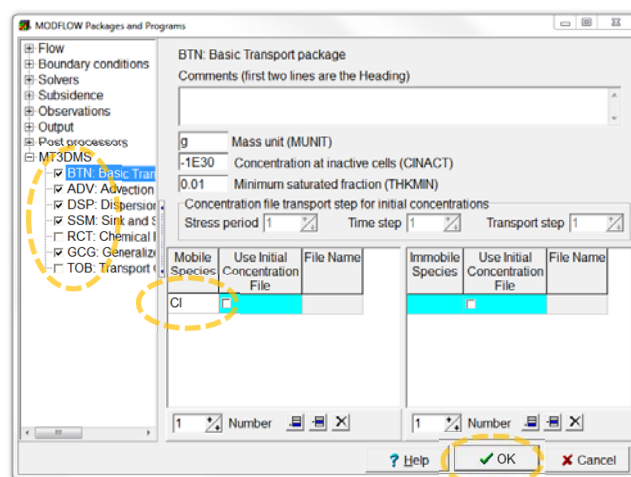
- ✓ Copy the model “03-02\_particle-tracking-rma-example-model.mmZLib” in folder “03-02\_particle-tracking”,
- ✓ to folder “03-03\_solute-transport-simulation” and rename the copied file to “03-03\_solute-transport-simulation.mmZLib”.
- ✓ Double click the new file to open ModelMuse.



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## Enable MT3DMS packages

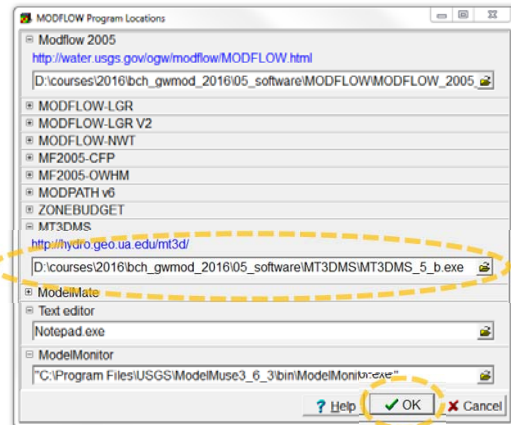
- ✓ Select **Model | MODFLOW Packages and Programs...**,
- ✓ expand **MT3DMS** or **MT3D-USGS**, and select the **BTN**, **ADV**, **DSP**, **SSM**, and **GCG** packages.
- ✓ Also fill in the Mobile Species name, e.g. “Cl”.
- ✓ Then press **OK**,
- ✓ and once more **OK**, in the appearing information dialog box.



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## Set the MT3DMS program location

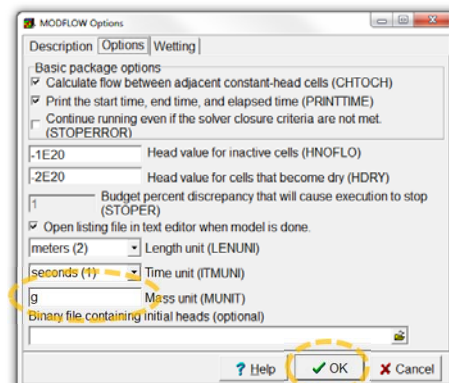
- ✓ Select **Model | MODFLOW Program Locations...**, and
- ✓ fill in the path to the **MT3D-USGS** executable “**mt3d-usgs\_64-bit.exe**” or “**\*\_32-bit.exe**” (depending on your machine architecture) in folder “**/05\_software/mt3d-usgs/**”.
- ✓ Then press **OK**.



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## Check mass unit

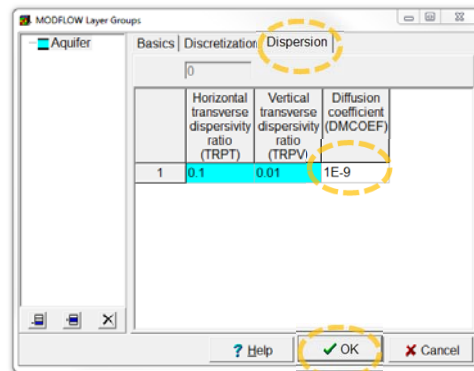
- ✓ Select **Model | MODFLOW Options...**,
- ✓ go to the **Options** tab, and
- ✓ note that by default, the **Mass unit** is set to grams.
- ✓ Just leave the settings as they are,
- ✓ and press **OK** to close the **MODFLOW Options** dialog box.



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## Set dispersion and diffusion parameters

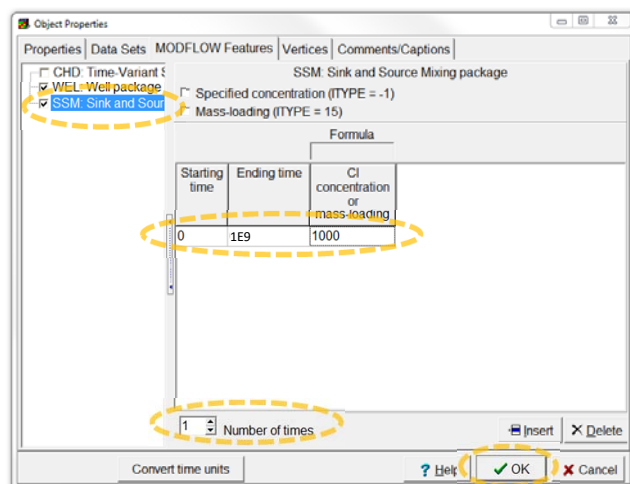
- ✓ Select **Model | MODFLOW Layer Groups...**,
- ✓ and go to the **Dispersion** tab.
- ✓ Leave the dispersivities unchanged, but adjust the **Diffusion coefficient** to 1E-9.
- ✓ Then click **OK**.



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## Set the source concentration

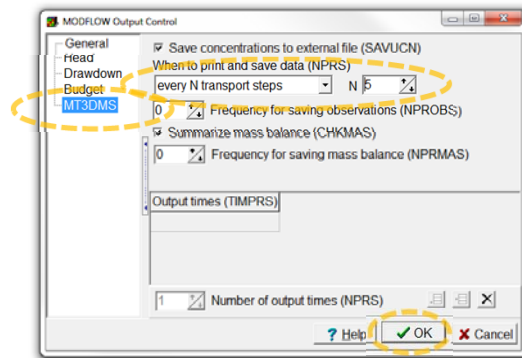
- ✓ Double click the disposal pond object and go to the **MODFLOW Features** tab in the **Object Properties** dialog box.
- ✓ Select the **SSM** package, and set the **Number of times** to 1.
- ✓ Set the **Starting time**, **Ending time**, and **CI concentration** to respectively 0, 1E9, and 1000.
- ✓ Then press **OK**.



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## Change output frequency

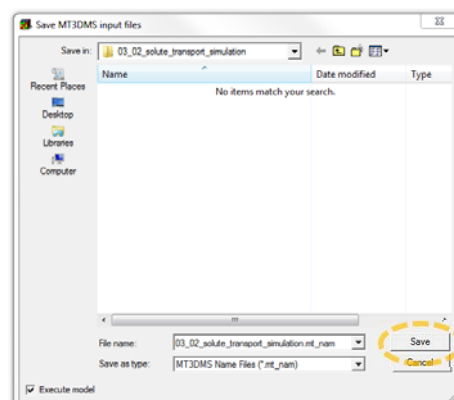
- ✓ Select **Model | MODFLOW Output Control...**,
- ✓ and choose **MT3DMS**.
- ✓ Change **When to print and save data** to **every N transport steps**,
- ✓ and set **N** equal to 5.
- ✓ Then click **OK**.



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## Run MT3DMS

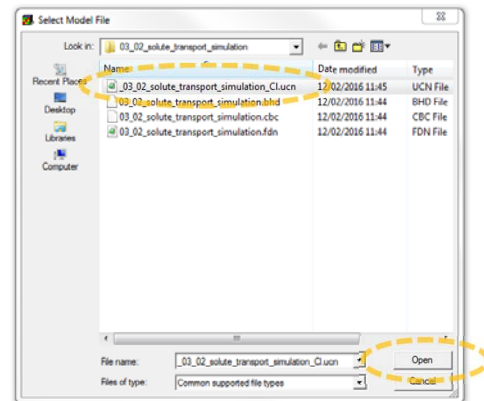
- ✓ First run MODFLOW again,
- ✓ then select **File | Export | MT3DMS Input Files**,
- ✓ and press **Save** in the **Save MT3DMS input files** dialog box.
- ✓ After MT3DMS has finished, close the text and command line windows.



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## Import MT3DMS results (1/2)

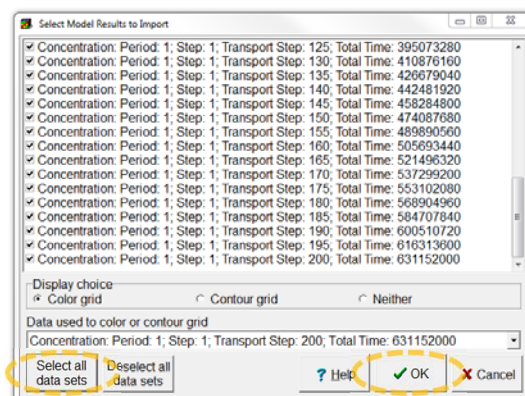
- ✓ Select **File | Import | Model Results**,
- ✓ and choose the “\_03\_03\_solute\_transport\_simulation\_Cl.ucn” file.
- ✓ Then press **Open**.



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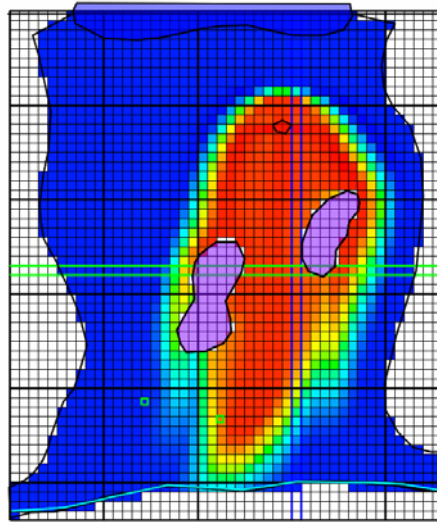
## Import MT3DMS results (2/2)

- ✓ In the **Select Model Results to Import** dialog box, select all data sets, and
- ✓ click **OK**.



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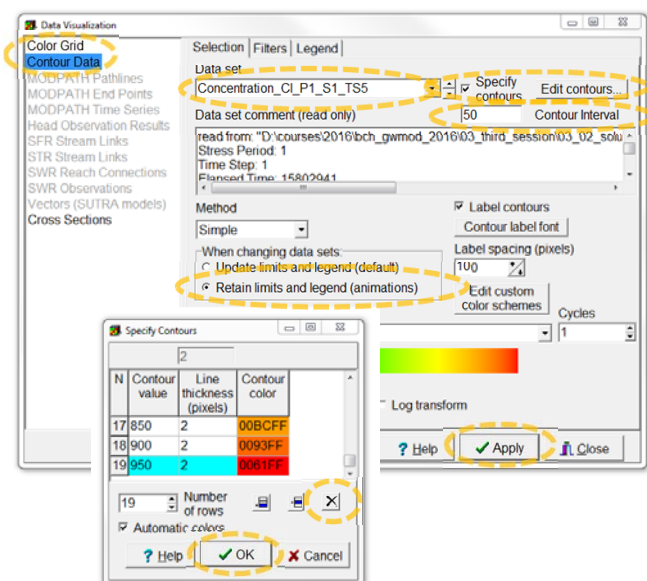
## This is what you should get



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## Animate MT3DMS contours (1/3)

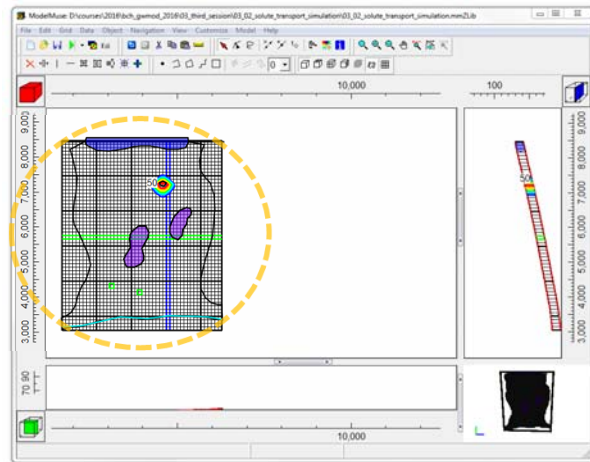
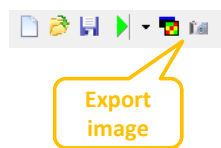
- ✓ Go to the **Data Visualization** dialog box,
- ✓ and set the **Color Grid Data set** to **none**.
- ✓ Then go to **Contour Data** and select the first concentration **Data set**.
- ✓ Set the **Contour Interval** to 50, and click **Apply**.
- ✓ Then check **Specify contours**, click the **Edit contours** button and remove the 0 and 1000 contours.
- ✓ Finally, select **Retain limits and legend**, and press **Apply** again.



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## Animate MT3DMS contours (2/3)

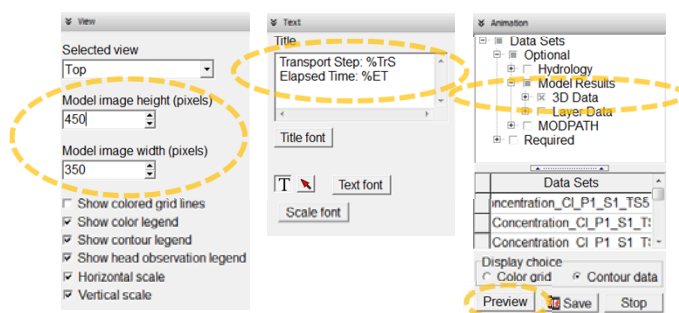
- ✓ Next, move the grid to the left of the Top view pane.
- ✓ Select **File | Export | Image**, or use the corresponding button.



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## Animate MT3DMS contours (3/3)

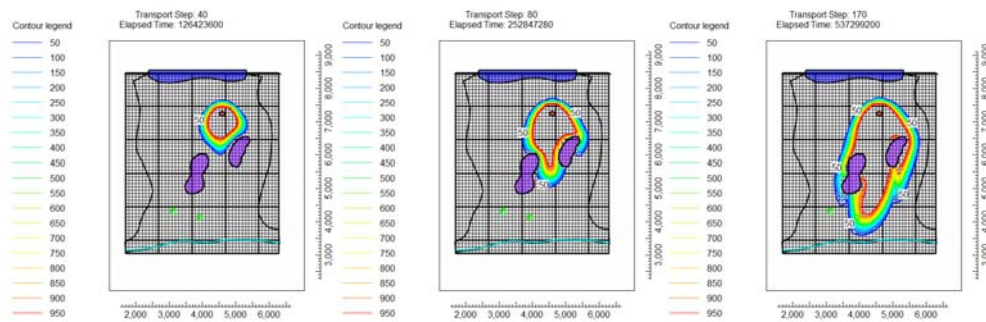
- ✓ In the **View** pane, adjust the **Model image height** and **Model image width**, so the entire grid is visible.
- ✓ In the **Text** pane, add "Transport Step: %TrS  
Elapsed Time: %ET" as title.
- ✓ In the **Animation** pane, select **Data Sets | Optional | Model Results | 3D Data**, and press **Preview**.



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# 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).*

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