Education evenings 2016

Practical introduction
to groundwater modelling

Computer exercises
03 03 Solute transport simulation

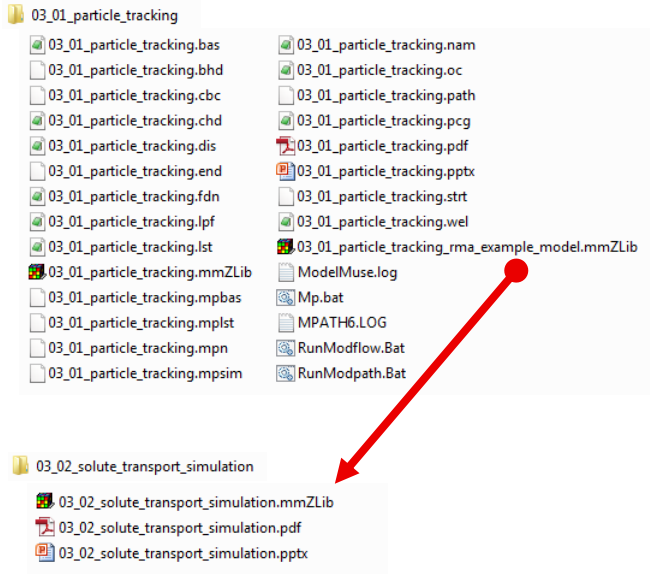
Purpose

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.

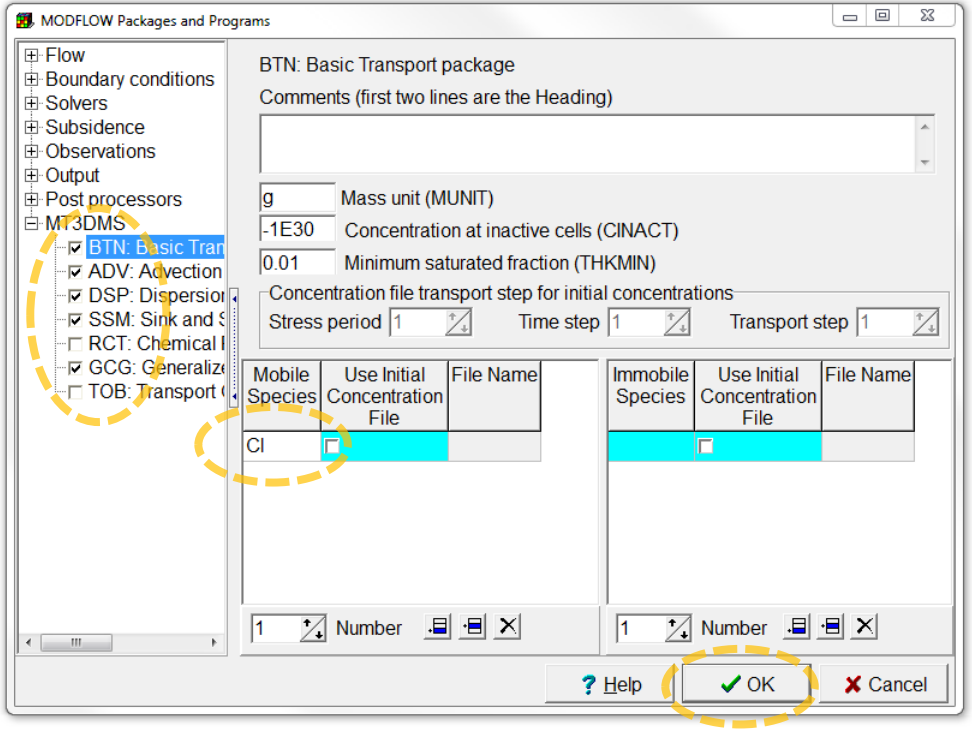
Copy example model

- ✓ 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.



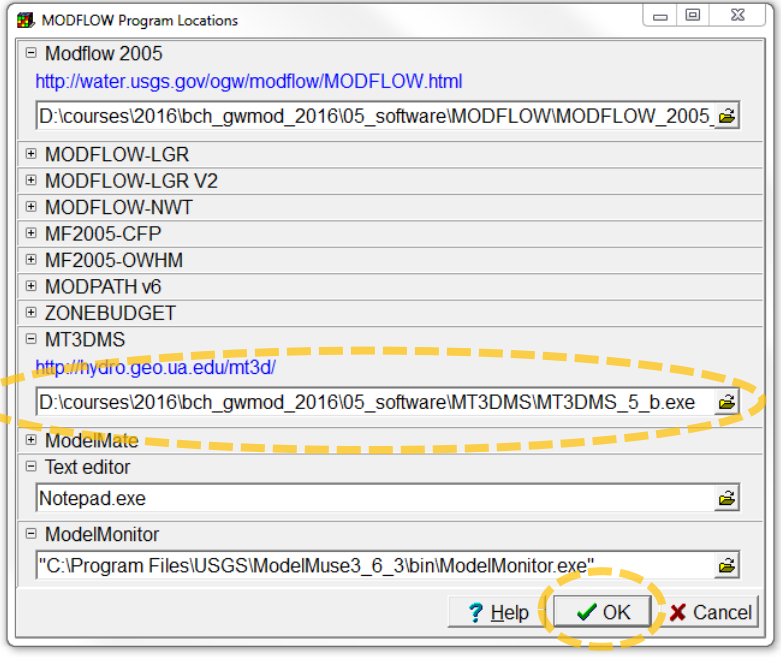
Enable MT3DMS packages

- ✓ Select **Model|MODFLOW Packages and Programs…**,
- ✓ expand **MT3DMS**, 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.



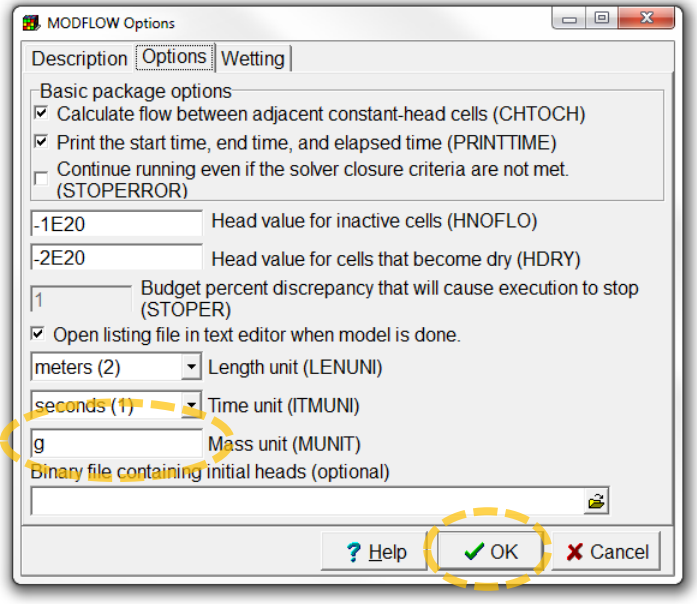
Set the MT3DMS program location

- ✓ Select **Model|MODFLOW Program Locations…**, and
- ✓ fill in the path to the **MT3DMS** executable “MT3DMS_5_b.exe” in folder “/05_software/MT3DMS/”.
- ✓ Then press **OK**.



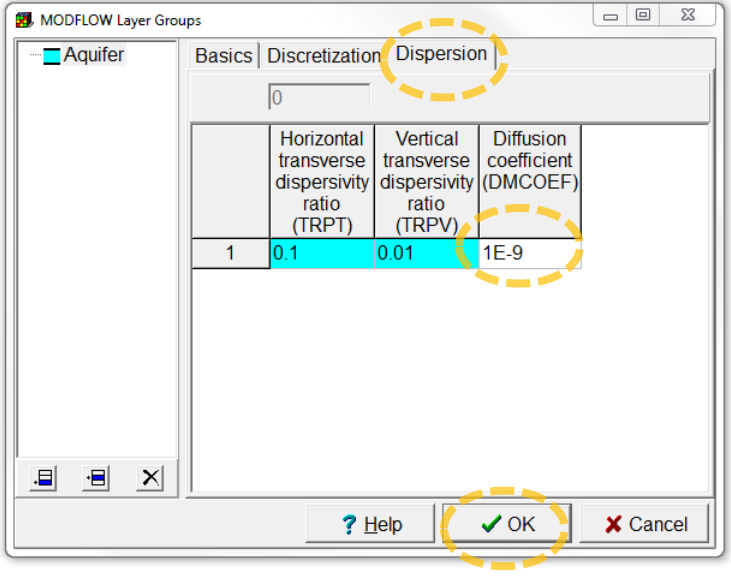
Check mass unit

- ✓ 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.



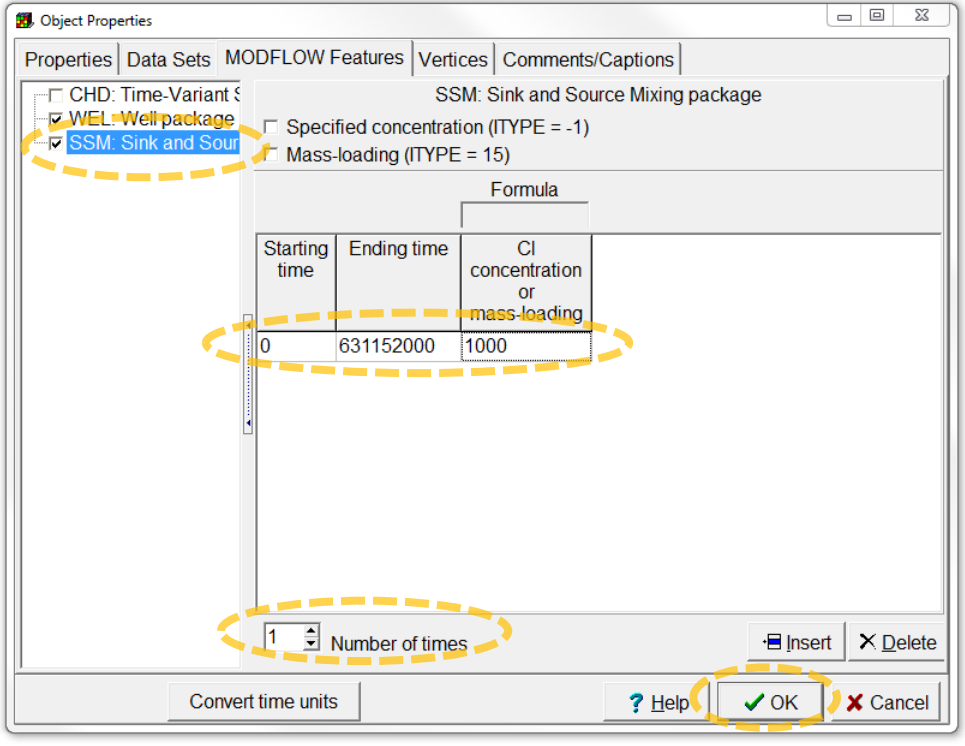
Set dispersion and diffusion parameters

- ✓ 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**.



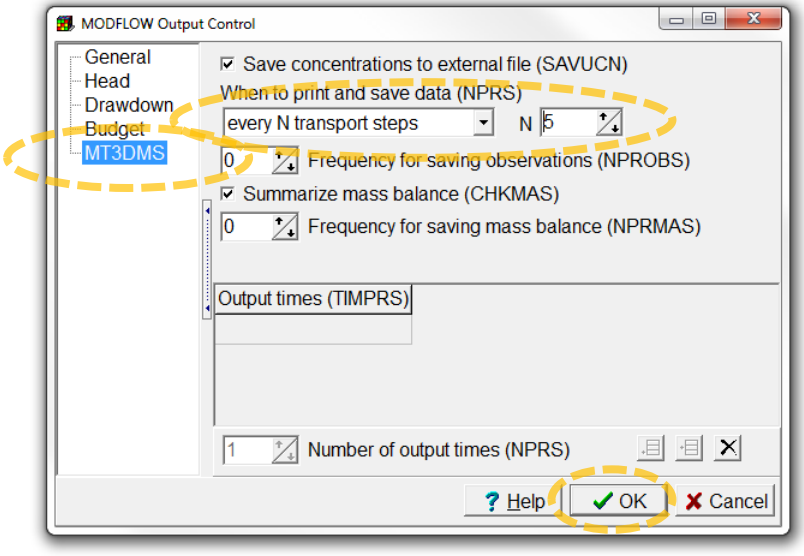
Set the source concentration

- ✓ 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 **Cl concentration** to respectively 0, 631152000, and 1000.
- ✓ Then press **OK**.



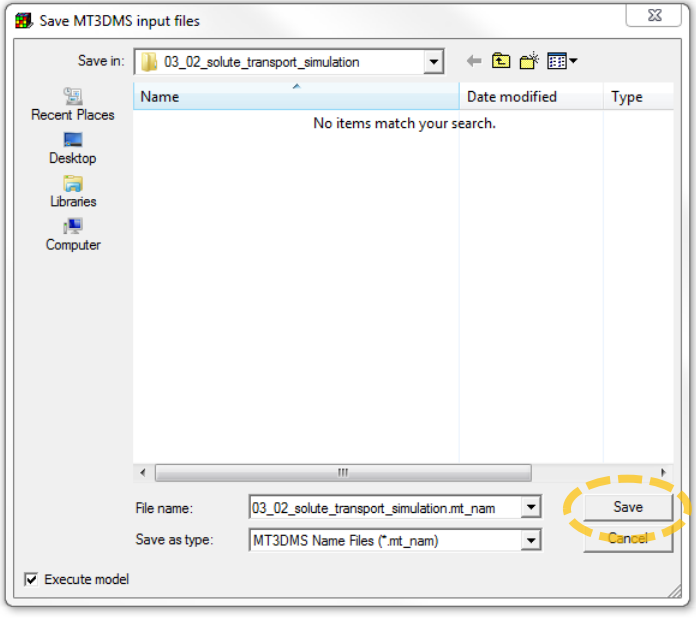
Change output frequency

- ✓ 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**.



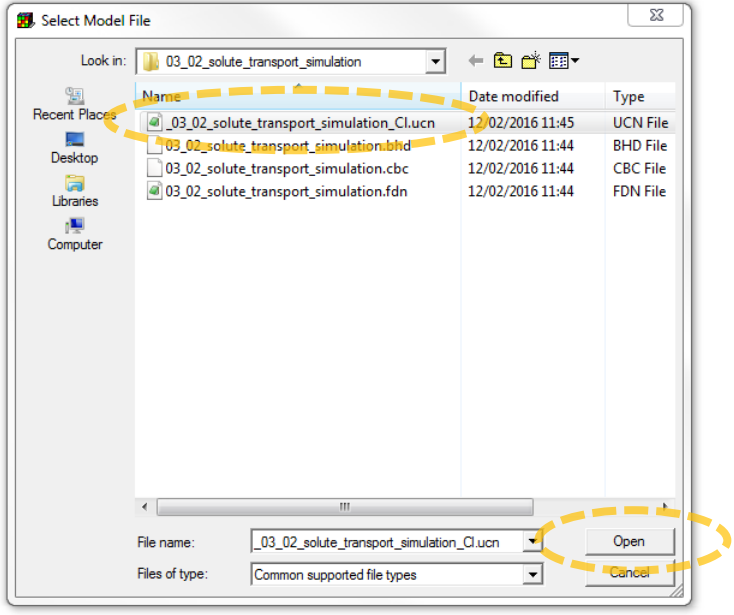
Run MT3DMS

- ✓ 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.



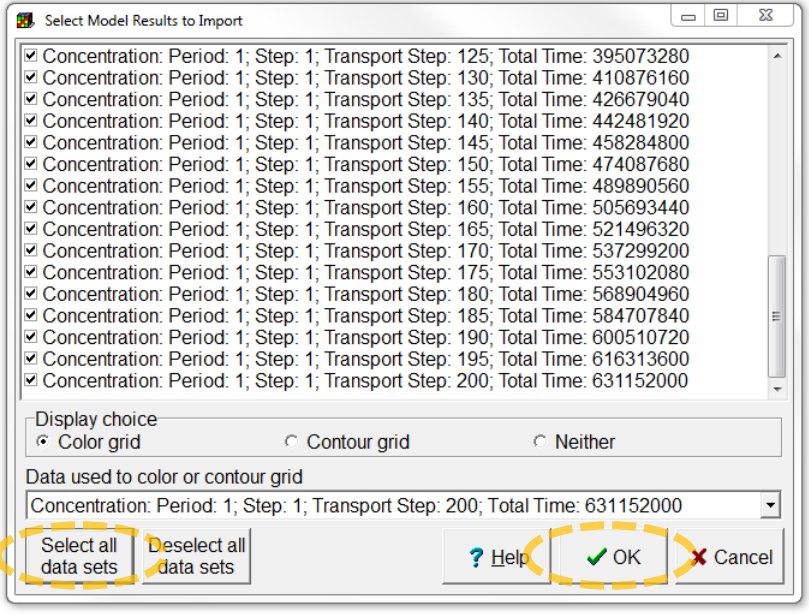
Import MT3DMS results (1/2)

- ✓ Select **File|Import|Model Results**,
- ✓ and choose the "_03_02_solute_transport_simulation_Cl.ucn" file.
- ✓ Then press **Open**.

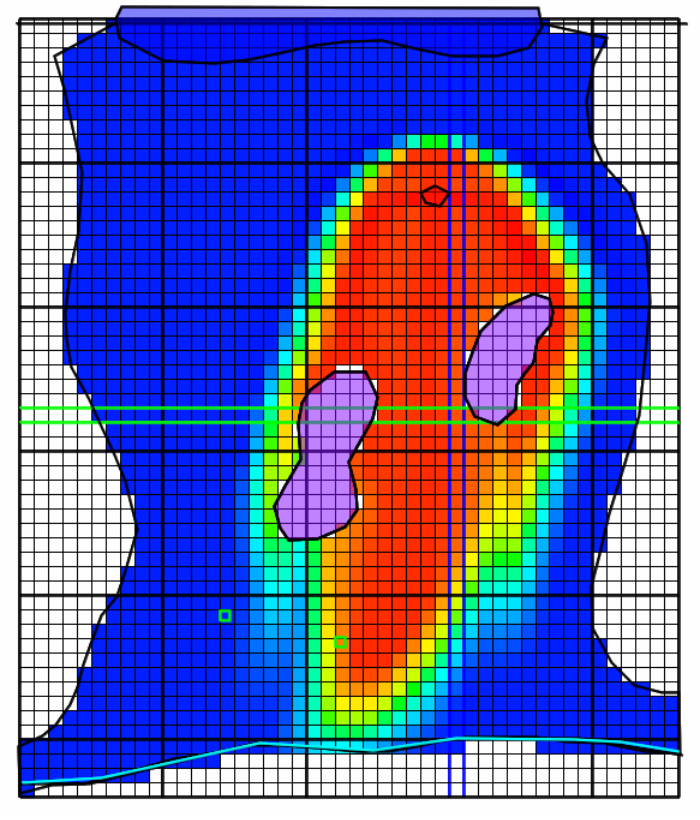


Import MT3DMS results (2/2)

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

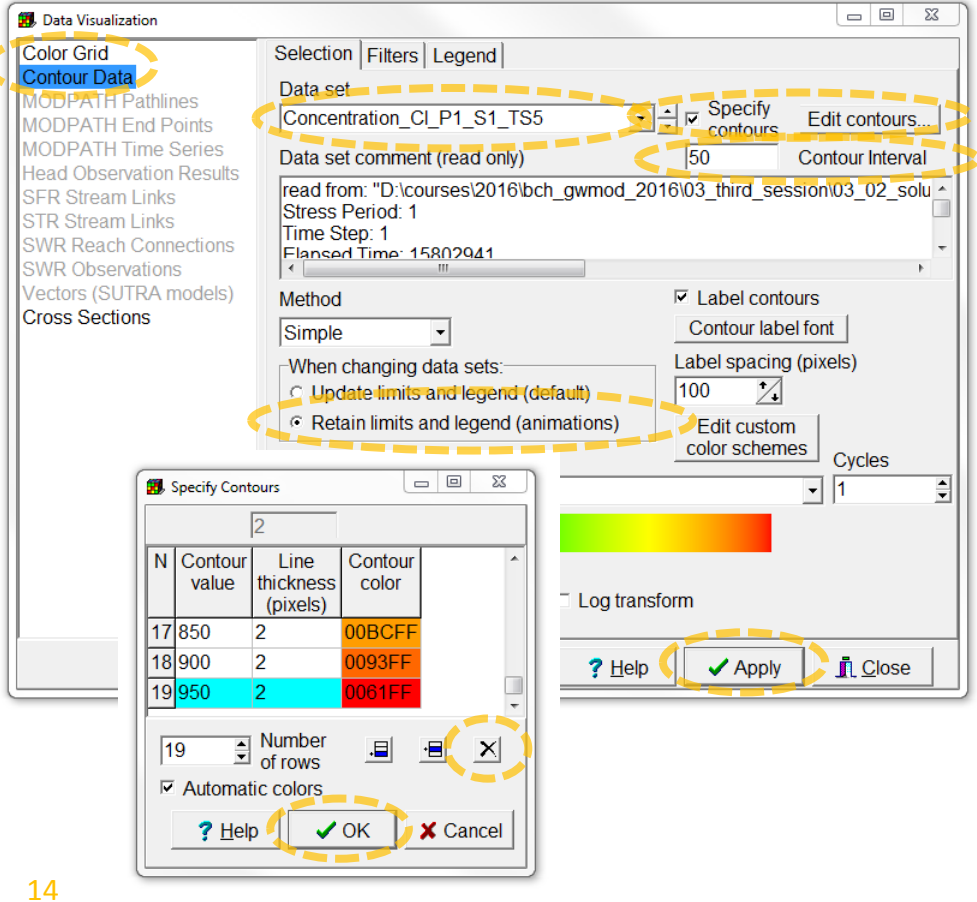


This is what you should get



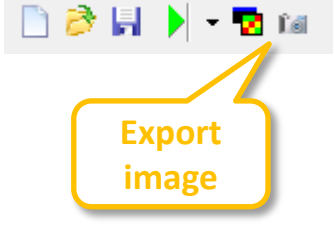
Animate MT3DMS contours (1/3)

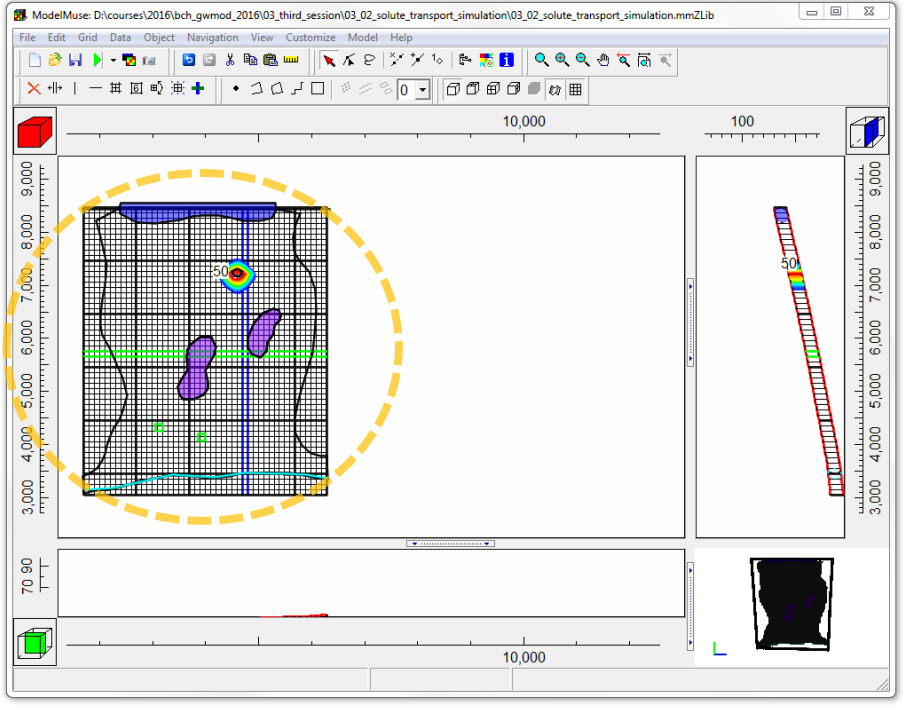
- ✓ Go to the **Data Visualization** dialog box,
- ✓ and set the **Color Grid Data set** to **none**.
- ✓ Then go to **Contour Data** and
- ✓ select the first concentration **Data set**.
- ✓ Set the **Contour Interval** to 50, and click **Apply**.
- ✓ Then check **Specify contours**, click the **Edit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



Animate MT3DMS contours (2/3)

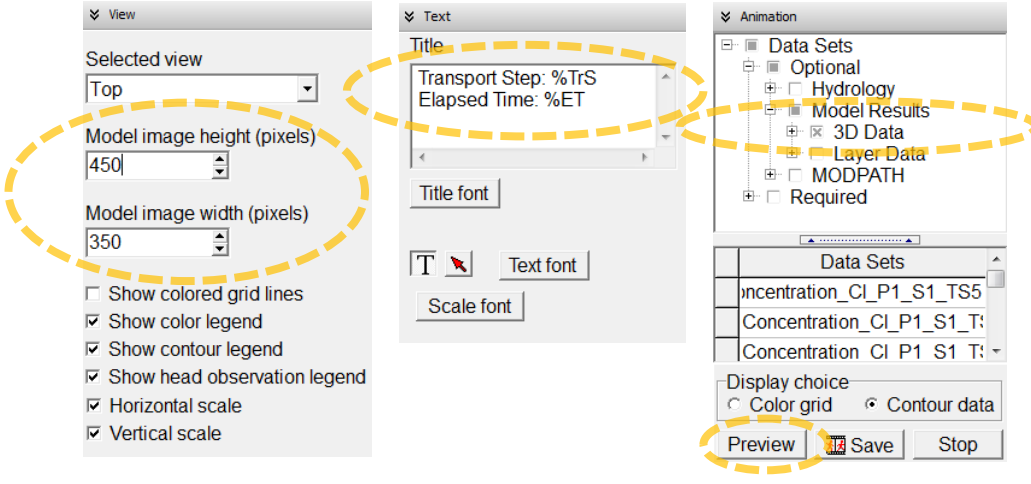
- ✓ Next, move the grid to the left of the Top view pane.
- ✓ Select **File|Export|Image**, or use the corresponding button.



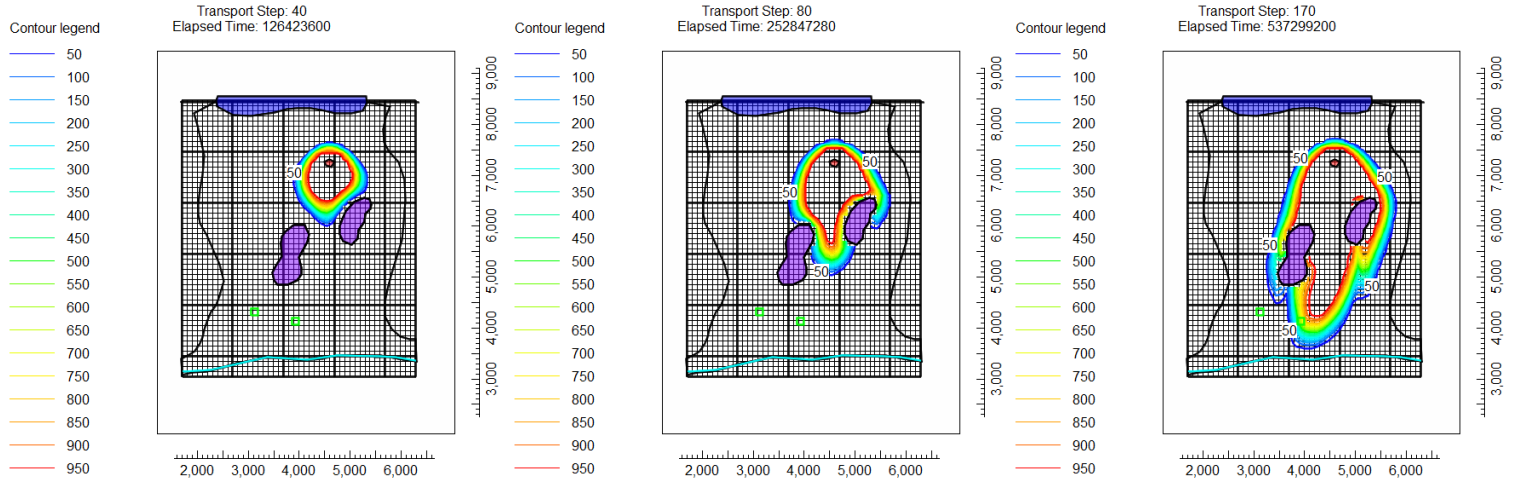


Animate MT3DMS contours (3/3)

- ✓ 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**.



This is what you should get



BELGIUM

Education evenings 2016

Practical introduction to groundwater modelling

Computer exercises
03 03 Solute transport simulation

Questions? Found an error?
Please contact B. Rogiers at brogiers@sckcen.be.