Webinar "Create your first iMOD groundwater flow model"
Questions and Answers
19 May 2016

Graphical User Interface iMOD

1. **Is it possible to import ESRI shape files?**
   Yes, it is possible to import and convert SHP files from ESRI into the iMOD GEN format. The GEN format is a simple ASCII format that iMOD uses to display line element. The DBF file associated with a SHP file is converted to a ASCII DAT-file that can be read in iMOD as well.

2. **Is it possible to add any PNG/BMP file as a background image, or do the files need specific properties?**
   Yes, a bitmap (PNG, JPG) can be displayed as a topographical background image. It is most convenient whenever you have a world-file associated with the PNG file as well. For more information, see the iMOD Manual (chapter 5.3 Add Background Image).

3. **How to draw the velocity vector computed from the Darcy's law?**
   The velocity vectors are computed internally by iMODPATH, however, a "simple" vector plotting is possible for IDF Head files. In the *Adjust Legend* window select the draw option "Flow direction" (chapter 6.6 Adjust Legends).

4. **Can you also view several layers on top of each other?**
   Yes, that is possible. It is possible to show transparent grids or use transparency for locations with NODATA (see the *View* menu). Use Ctrl- or Shift- in combination with your left mouse button to select more than one file in the iMOD Manager.

5. **How can the travel times of the flowlines be displayed?**
   First import the IFF file (flowlines) in the iMOD Manager. The flowlines are plotted black. Then select IFF Configure from the menu Map → IFF-Options. In this window you can choose to apply the legend to the item containing the travel time: Time (years). Close the window and use the Apply Legend button to choose/change the legend. Other output variables are Cumulative Travel Times, Distances and Velocities.

Regarding iMODFLOW

6. **Is it possible to run certain areas in the model with a small gridsize, while the rest of the model is simulated in a lager grid size?**
   Yes you can, however, the strength of iMOD is to generate a model for a large area and use the interval scaling and clipping functionality in iMODFLOW to generate submodels. In the runfile it is also possible to change the resolution of the calculations, without first scaling all the input data.
   To be complete, a local refinement can be inserted in the model as well in the IDF-files (non-equidistant cellsizes)

7. **When I run a simulation in IMOD, the iMODFLOW file in the target folder is often different from the RUN-file I created. What is the reason for this?**
   If you select a runfile from the ModelSimulationTool iMOD rewrites that runfile into the selected result folder and gives it the standard name *"imodflow.run"*, among others for documentation-reasons

8. **What are the standard units (SI units) assigned? Can they be changed?**
   In fact iMOD supports the metric system, alterations of units are not supported.

9. **How do I know that e.g. the extraction rate from the well is 500 qm/d, and not maybe qm/s or l/s?**
   iMOD is always using m^3/d, so your input needs to be consistent with that. Along with that, hydraulic conductivity is in m/d. Perhaps we include more units in future.

10. **What kind of solvers are usable with IMOD? Is MODFLOW-SURFACT also possible?**
    The solvers that are used are the solvers that are provided by MF2005. As the PCG is the most popular, that one is supported from the GUI.

11. **Is it possible to use iMOD but run USGS modflow executables?**
    Yes, you can build and visualize the model in IMOD and generate a standard MF2005 model with the standard Modflow files, such as NAM, BAS, LPF, etc.

12. **As the executables for iMOD and MODFLOW itself are separate, is there any possibility of installing the modflow executable includes into a distributed system like a cluster and leave only the GUI in the local computers of the users?**
    If so, is the modflow executable you're including able to be used in parallel mode?
    It is possible to link to a network location for the modflow executable.
    At the moment we are working on parallel computing. This will be available in a later release.
    No, the imodflow-executable is not suited for parallel computing

13. **Can iMOD also be linked with other applications of Deltares and others like FEWS or CLUE?**
    Yes, iMOD has been coupled with e.g. Delft-FEWS.

iMODFLOW pre- and post-processing

14. **Most of required information looks as GIS. How is the relation of iMOD with GIS, especially open source GIS?**
    It is possible to import ESRI Ascii files and Shape files which can be made using for instance QGIS.

15. **What would be a typical tool to build a more complex permeability input file?**
    In iMOD you can apply Kriging interpolation from IPF files and or XY-K files to create spatial distributed permeability files. You can also use the SOLID tool to construct a 3D subsoil. Moreover, other (external) tools can be easily used to generate ASC files that can be imported in iMOD and used in the groundwater flow model.

16. **Where do you enter the Well characteristics like screen depth etc?**
    In the IPF file you can specify the top- and bottom elevation of a screen by adding extra columns. iMODFLOW can assign them to the proper model layer, or alternatively, assign a model layer manually.

17. **Can you also add boundary conditions from a MODFLOW file instead of drawing it yourself?**
    Absolutely, in fact you can use any (external) grid file or import an existing MODFLOW model.

18. **How can we extract an ASCII file of the model outputfor use in another (GIS) package?**
    You can export (a series of) IDF files into the ESRI ASCII format. You find the option from the menu Map → IDF options → IDF export.

19. **Observation wells: Is it possible to display the difference between calculated and measured value of head at the observation points?**
    Absolutely, you can add the IPF with measurement to the runfile and compute the residuals. Moreover, a built-in parameter estimation program (iPEST) makes parameter estimation efficient and easy to use.

20. **Can I have a look at the water balance of the model or parts of the model via IMOD GUI?**
    Yes, see the iMOD manual how to use the tool "Computer Water Balance". We will discuss that probably in a next webinar.

21. **How would we be able to show the recharge in the area through a lake where the rainfall is very less i.e. 300mm only**
    I am not sure to understand your question but the budget from the RECHARGE package is a separate output IDF file that can be displayed as well. Are you interested in the infiltration from the service water to the groundwater then the budget from the RIV package is available in the output directory.

Modelling concepts

22. **Can we use the well file in polygon instead of point?**
    Each well is an individual point, alternatively you can abuse the recharge package to simulate a well for a polygon area.

23. **If I understand this correctly: IMOD is designed to simulate groundwater flow for the purpose of drinking water supply?**
    Not only drinking water supply, the example shown had just an illustrative meaning, almost all groundwater related topics can be done with iMOD.

24. **How deep can you go with these simulations? Is it for shallow depth (0-200 m) or can you do deeper like 1 km?**
    There is no depth limitation from an iMOD-point of view as long as the Darcy law is not violated.

25. **Is iMODPATH already being used in combination with water quality parameters? Like attenuation?**
    We use this current iMODPATH implementation for conservative transport. However we have coupled MT3D to iMOD as well.

26. **How do you put in borehole lithology information etc. and use this information to build your 3D layers for the model?**
    That is an interesting question a bit too much to give you an answer in this session. However, please have a look at the SOLID Tool as described in the iMOD manual and presented in Tutorial 5. In fact you can build a 3D subsurface solid, based on cross-sections and individual points with borehole information.

27. **Can you model fractured rocks with iMOD?**
    Yes, as long as the fractured rock is represented by k-values.
    iMOD does not support dual porosity modelling.

Installing iMOD

28. **How can I install iMOD? Is it free software?**
    The iMOD software is free and open-source. You can request for a download link on the oss iMod website http://oss.deltares.nl/web/imod/get-started.
    How to install iMOD is described in section 2.2 of the iMOD User Manual (see oss.deltares.nl/web/iMOD, 'Download', 'Manual).

29. **When will the new iMOD version (3.4) be released?**
    We hope to be able to release iMOD 3.4 mid June 2016.

30. **How long does it take to receive the link to the files after the request?**
    In most cases your request will be processed within 1 working day with an exceptional maximum of 5 working days; you will receive a reply per email.

Webinar

31. **Will this video available online for future reference?**
    Yes, in a few days it will be available on the iMOD website via http://oss.deltares.nl/web/imod/webinars