Education evenings 2016

Practical introduction to groundwater modelling

Computer exercises
03 04 What else?

1

ModelMuse

Much more functionality to be discovered!

Refer to:

- ✓the ModelMuse manual
- ✓the ModelMuse videos
- ✓the ModelMuse help

2

ModelMuse and MODFLOW

- ✓ Many more packages available to use
- ✓ Compatibility with MODFLOW versions other than the core MODFLOW-2005
  - ✓ MODFLOW-LGR
  - ✓ MODFLOW-NWT
  - ✓ MODFLOW-OWHM
  - ✓ MODFLOW-CFP

3

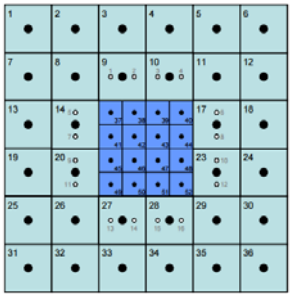
MODFLOW packages

We only used a few…

4

MODFLOW-LGR

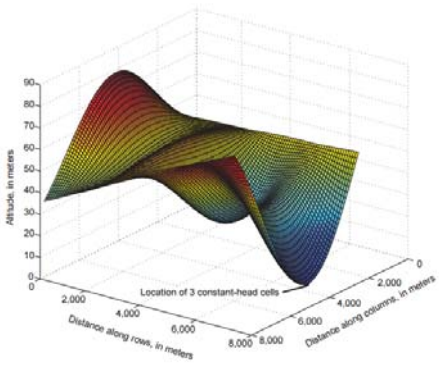
- ✓ MODFLOW-LGR allows smaller parts of a larger model domain to be refined without refining the entire model.



5

MODFLOW-NWT

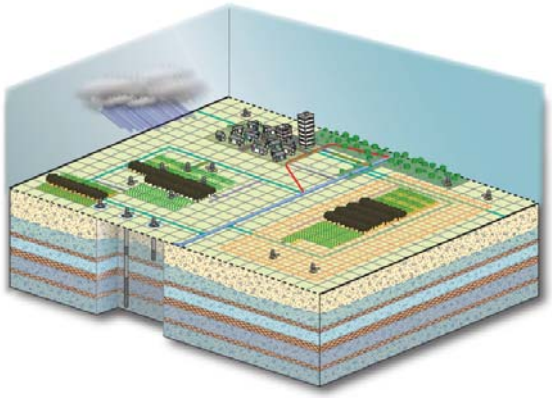
- ✓ MODFLOW-NWT is a Newton-Raphson formulation for MODFLOW-2005 to improve solution of unconfined groundwater-flow problems.
- ✓ It is intended for solving problems involving drying and rewetting nonlinearities of the unconfined groundwater-flow equation.



6

MODFLOW-OWHM

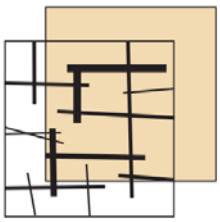
- ✓ MODFLOW-OWHM, or the One-Water Hydrologic Flow Model, is an integrated hydrologic flow model (IHM).
- ✓ It is designed for the analysis of a broad range of issues related to the combined use of groundwater and surface water.
- ✓ It allows the simulation, analysis, and management of human and natural water movement within a physically-based supply-and-demand framework.



7

MODFLOW-CFP

MODFLOW-CFP has the ability to simulate turbulent or laminar groundwater flow conditions by:



- ✓ coupling the traditional groundwater flow equation with formulations for a 1-dimensional discrete network of cylindrical pipes (Mode 1, CFPM1),
- ✓ inserting a high-conductivity flow layer that can switch between laminar and turbulent flow (Mode 2, CFPM2), or
- ✓ simultaneously coupling a discrete pipe network while inserting a high-conductivity flow layer that can switch between laminar and turbulent flow (Mode 3, CFPM3).

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Beyond the GUI

Several scripting language interfaces to MODFLOW exist, or are in development:

- ✓ Flopy (python)
- ✓ Mflab (matlab)
- ✓ RMODFLOW (R)

These are useful for:

- ✓ Parameter estimation or uncertainty quantification that goes beyond MODFLOW parameters and/or UCODE algorithms
- ✓ Geostatistical simulation for *e.g.* material properties
- ✓ Quickly converting database information to input files
- ✓ Reproducible reporting
- ✓ …

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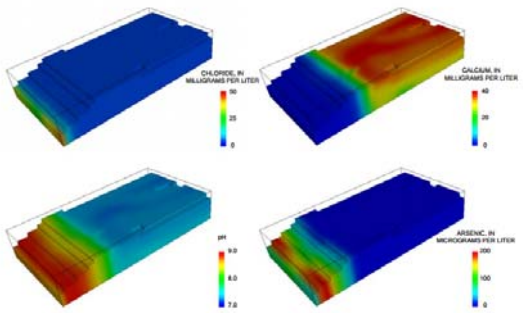
ModelMuse and PHAST

PHAST is a Computer Program for Simulating

- ✓ Groundwater Flow,
- ✓ Solute Transport, and
- ✓ Multicomponent Geochemical Reactions,

for which it uses PHREEQC.



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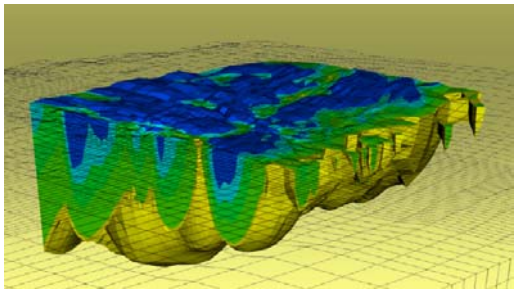
ModelMuse and SUTRA

SUTRA is a model for

- ✓ saturated-unsaturated,
- ✓ variable-density ground-water flow,
- ✓ with solute
- ✓ or energy transport.



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BELGIUM

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

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