Monday, May 20th 2019

Short course nº 5

By Dr. Catalin Stefan, Jana Glass, Ralf Junghanns (TU Dresden, Germany), Russel Martin (WGA, Australia)

Theme: MAR modeling

Title: Web-based numerical modeling and optimisation of MAR applications using the free INOWAS platform

Themes

- Numerical groundwater modeling
- Capacity development using free software
- Web-based tools for water management

Objectives

1. Emphasize the role of modeling in MAR planning and assesment
2. Promote free, open source modeling software
3. Introduce web-based INOWAS platform: MODFLOW-based model setup and calculation including user-friendly scenarios analysis and web-based optimisation using genetic algorythm.

Description

The training course aims at promoting the use of free, web-based software for planning and assessment of MAR applications. During the short-course, the participants will learn how to use the open source INOWAS platform (https://inowas.hydro.tu-dresden.de). Some selected tools will be presented and, with the help of presenters, the participants will be able to solve small assignments using the INOWAS tools. The web-based toolkit contains tools grouped in three categories of various complexities based on empirical, analytical and numerical equations:

- low complexity: databases and tools derived from data mining such as the global MAR portal or tools supporting GIS-based MAR suitability mapping;
- medium complexity: simple tools based on analytical equations including the estimation of groundwater mounding beneath an infiltration basin, assessment of saltwater intrusion, calculation of SAT basins area, estimation of pumping-induced river drawdown etc.;
- high complexity: MODFLOW-based tools for setting up and calculating a groundwater flow model, including user-friendly scenarios management and analysis and model optimisation with the help of web-based genetic algorithm.

PowerPoint presentations will be used to introduce the INOWAS platform and the individual tools that will be used during the workshop. Participants can log-in to the web-based platform and solve different assignments with help provided by the presenters. Participants are encouraged to bring their own laptop (Wi-Fi enabled, Google Chrome browser installed).

PROGRAM. The workshop program includes:

1. Introduction of agenda and course objectives (C. Stefan)
2. Keynote talk: Numerical modelling to support Managed Aquifer Recharge applications (R. Martin)
3. Empirical tools for MAR assessment. Example: Global MAR portal (C. Stefan)
4. Analytical tools for MAR assessment: overview and short exercise (J. Glass)
5. Setup, calculation and optimisation of a numerical groundwater flow model using the specific MODFLOW-based INOWAS toolkit (R. Junghanns)
6. Web-based simulation of different MAR scenarios (R. Junghanns, all attendees)
7. Feedback and discussion, collective summary (all attendees) & final photo.

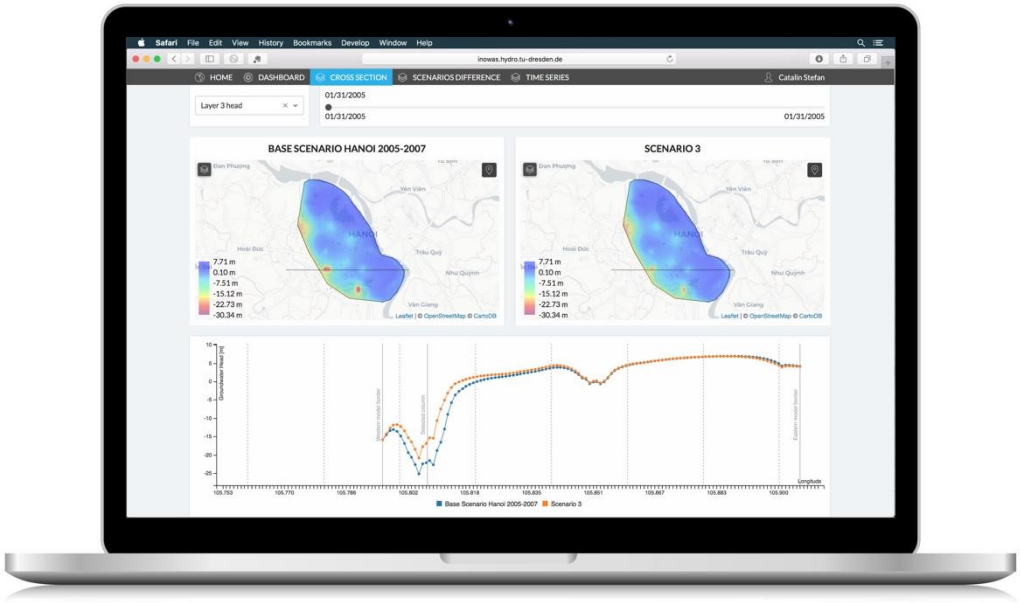
Proposer CVs:

Russel Martin is Principal Hydrogeologist with WGA, Australia. He has over 30 years of extensive technical and management experience in geology, hydrogeology and petrophysics, has successfully delivered over 40 MAR systems, and is routinely engaged to peer review the design and operation of various MAR schemes in Australia and worldwide.

Dr. Catalin Stefan is the head of the Research Group INOWAS at TU Dresden, Germany, and the head of the Working Group “Global MAR Inventory” at IAH-MAR Commission. Experience in planning and assessment of MAR schemes using web-based simulation tools.

Jana Glass is in the last phase of her PhD studies at TU Dresden, Germany. her work focuses on the development and application of smart modeling tools for MAR under the Research Group INOWAS.

Ralf Junghanns is the main IT developer of the free web-based INOWAS platform under the Reserch Group INOWAS of TU Dresden, Germany. Has solid experience of the development of web applications in different programming environments.



Screenshot of MODFLOW-based groundwater numerical modeling tool using the free, open source INOWAS platform

(https://inowas.hydro.tu-dresden.de)