Department of Soil Science and Soil Protection
Czech University of Life Sciences, Prague, Czech Republic

and

PC-Progress, Ltd.

Organize a

HYDRUS Short Course

March 23-25 2020

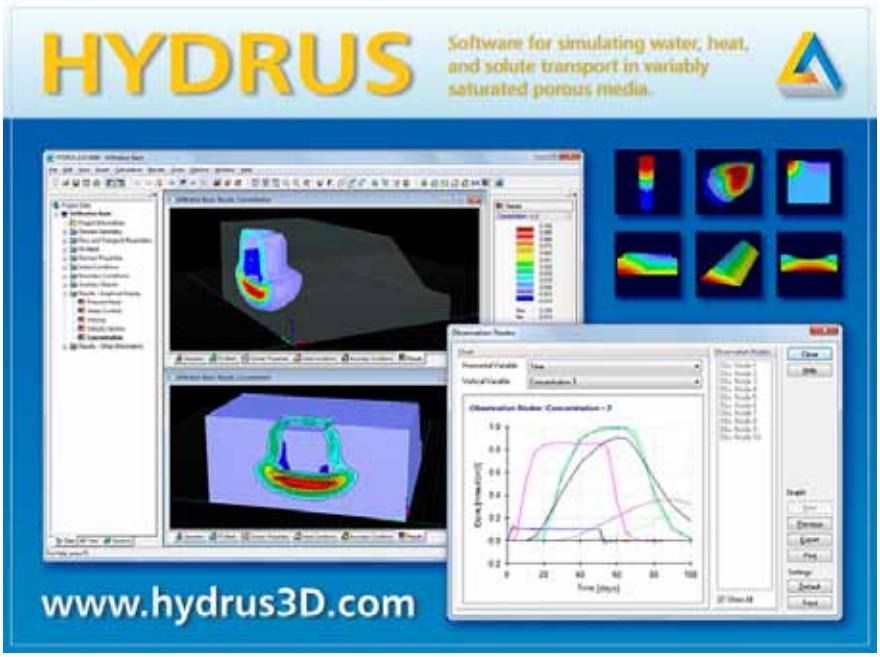
Modeling water flow and contaminant transport in soils and groundwater using the HYDRUS software packages

followed by a

HPx (HYDRUS/PHREEQC) Short Course

March 26-27 2020

Advanced modeling of water flow and biogeochemical transport in porous media using the HPx software packages



Czech University of Life Sciences, Prague
Faculty of Agrobiology, Food and Natural Resources
Kamýcká 129, 165 21 Praha 6 – Suchdol, Czech Republic
http://www.af.czu.cz/en/

HYDRUS Short Course

Course/Workshop Objectives

The short course begins with a detailed conceptual and mathematical description of water flow and solute transport processes in the vadose zone and groundwater, followed by a brief overview of numerical techniques for solving the governing flow and transport equations. Special attention is given to the highly nonlinear nature of the governing flow equations. Alternative methods for describing and estimating the hydraulic functions of unsaturated porous media are also given.

Hands-on computer sessions will provide participants an opportunity to become familiar with the windows-based HYDRUS-1D and HYDRUS (2D/3D) computer software packages, including several additional modules, such as ROSETTA, UNSATCHEM and the Wetlands modules. Emphasis will be on preparation of input data for a variety of one- and multi-dimensional applications such as flow and transport into and through the vadose zone, infiltration from a subsurface source, and two-dimensional leachate migration through the unsaturated zone. Calibration will be discussed and demonstrated using several examples for both water flow and solute transport.

Selected advanced HYDRUS topics will be covered during the second part of the course. Advanced topics will include:

- Coupled movement of water, vapor, and energy (including the surface energy balance)
- Preferential/nonequilibrium water flow and solute transport (using dual-porosity and dual-permeability models)
- Biogeochemical transport and reactions: solute transport of major ions using the UNSATCHEM module
- Modeling flow and transport using the three-dimensional module of HYDRUS (2D/3D)

The latest developments with respect to biogeochemical modeling with HP1/HP2 (HYDRUS-PHREEQC) as well as larger-scale modeling using the HYDRUS package for MODFLOW will also be discussed. Version 3.0 and the Professional Level of HYDRUS (2D/3D) will be used during the course.

Instructors

Dr. Jirka Šimůnek is a Professor of Hydrology with the Department of Environmental Sciences of the University of California. He received an M.S. in Civil Engineering from the Czech Technical University, Prague, Czech Republic, and a Ph.D. in Water Management from the Czech Academy of Sciences, Prague. His expertise is in numerical modeling of subsurface water flow and solute transport processes, equilibrium and nonequilibrium chemical transport, multicomponent major ion chemistry, field-scale spatial variability, and inverse procedures for estimating the hydraulic properties of unsaturated porous media. He has authored and coauthored numerous peer-reviewed publications and book chapters, and several books. His models are popularly used by many scientists, students, and practitioners simulating water flow, chemical movement, and heat transport in variably-saturated soils and groundwater. Dr. Simunek is a recipient of the Soil Science Society of America's Don and Betty Kirkham Soil Physics Award, is a Fellow of AAAS, AGU, ASA, and SSSA, and

is or was an associate editor of several journals including Vadose Zone Hydrology, Journal of Hydrology, and Water Resources Research.

Dr. Martinus Th. van Genuchten is a vadose zone hydrologist, originally with the U.S. Salinity Laboratory in Riverside, California, and currently with both the Federal University of Rio de Janeiro, Brazil, and Utrecht University, Netherlands. He received a B.S. and M.S. in irrigation and drainage from Wageningen University in The Netherlands, and a Ph.D. in soil physics from New Mexico State University. He has published widely on variably-saturated flow and subsurface contaminant transport processes, analytical and numerical modeling, nonequilibrium transport, preferential flow, characterization and measurement of the unsaturated hydraulic functions, and root-water uptake. Dr. van Genuchten is a recipient of the SSSA‘s Don and Betty Kirkham Soil Physics Award, EGU’s John Dalton Medal, and fellow of AAAS, ASA, AGU and SSSA.

Dr. Radka Kodešová is a professor of Soil Science with the Department of Soil Science and Geology of the University of Life Sciences, Prague, Czech Republic. She received an M.S. in civil engineering and a Ph.D. in irrigation and drainage from the Czech Technical University, Prague, Czech Republic. Her expertise is in numerical modeling of subsurface water flow and solute transport processes, inverse procedures for estimating the hydraulic properties of unsaturated porous media, field and laboratory experimental work, and soil structure analysis.

Registration fee

Before January 31 2020

- 699 EUR (499 EUR for students)
- Together with the HPx short course: 899 EUR (649 EUR for students)

After January 31 2020

- 799 EUR (599 EUR for students)
- Together with the HPx short course: 1099 EUR (749 EUR for students)

Registration includes: course material, lunch, 2 daily coffee breaks, and a short course dinner on April 24.

HPx (HYDRUS/PHREEQC) Short Course

Good knowledge of the HYDRUS modeling environment is a prerequisite for this short course and thus taking the HYDRUS short course first is encouraged.

Course/Workshop Objectives

The short course begins with a detailed conceptual and mathematical description of thermodynamic equilibrium and reactive transport modeling approaches, mostly those related specifically to HPx. This introduction begins with presentation of theoretical concepts of thermodynamic geochemical modeling and is followed by several computer sessions intended to familiarize students with the geochemical code PHREEQC-3. The structure of the thermodynamic database, the definition of the composition of the (initial) solutions, and selected examples of equilibrium reaction path modeling are discussed.

The importance of coupling solute transport with geochemical reactions is illustrated using multiple examples. Basic elements of coupling the advection-dispersion equation with geochemical reactions are discussed, especially with respect to the structure of HP1. The first HP1 example illustrates how the two codes (HYDRUS-1D and PHREEQC-2) and their graphical interfaces are used to set up and interpret reactive transport problems solved with HP1.

The next computer sessions focus on chemical processes involving solid surfaces (ion exchange and surface complexation), both for geochemical equilibrium modeling (PHREEQC-2) and reactive transport (HP1). The final sessions will introduce kinetic reactions into geochemical systems. First, an example is shown how kinetic mineral dissolution or degradation reactions can be included in PHREEQC-3, after which an example is given of a kinetic reaction network in a transport problem.

Instructor

Dr. Diederik Jacques is Head of the Engineered and Geosystems Analysis (EGA) unit of the Institute of Environment, Health and Safety (EHS) of the Belgian Nuclear Research Centre (SCK•CEN) in Mol, Belgium. He received a B.S. and M.S. in Bio-engineering land and forest management, a Master of Statistics, and a Ph.D. in soil physics, all from the Catholique University of Leuven, Belgium. His expertise is in modeling water flow and solute transport in unsaturated porous media including characterizing spatial variability and estimating parameters. His current focus is on coupling unsaturated water flow, solute transport and geochemical reactions, including the development and testing of the coupled code HPx, application to (long-term) solute transport in soils and interaction between different systems (clay-concrete and or soil-concrete). He is involved in safety and performance analyses of surface and deep geological waste disposal sites, and radiological site and environmental remediation, including supporting calculations using reactive transport models. He has published widely on all of these topics. Contact: djacques@sckcen.be or Boeretang 200, B-2400, Belgium.

Registration fee

Before January 31 2020

- 399 EUR (249 EUR for students)
- Together with the HYDRUS short course: 899 EUR (649 EUR for students)

After January 31 2020

- 499 EUR (349 EUR for students)
- Together with the HYDRUS short course: 1099 EUR (749 EUR for students)

Registration includes: course material, lunch, 2 daily coffee breaks, and a short course dinner on April 26.

Suggested Accommodation

Since hotels require credit card information for booking, the organizers cannot arrange accommodations for the participants. However, we suggest the following hotels close to CULS (Czech University of Life Sciences) in Prague.

Hotel **WIENNA–GALAXIE,** situated in the villa quarter of Prague–Suchdol, is recommended. The hotel has recently been refurbished completely in a luxurious fashion and provides 150 beds. A Prague local transport bus stop is right in front of the hotel. From there, buses no. 107 and 147 run daily to Dejvická Metro Station on line A of the Prague Metro. For detailed information and contacts, see: http://www.hotelwienna.cz/index.php?lang=4.

Hotel **Penzion JaS**, situated partly in the villa quarter of Prague–Suchdol, is a small but cozy hotel (providing 40 beds). A Prague local transport bus stop is in front of the hotel. From there, buses no. 107 and 147 run daily to Dejvická Metro Station on line A of the Prague Metro. For detail information and contacts, see: http://www.penzionjas.cz/.

Many other reasonably-priced hotels are located in the downtown area of Prague.

HYDRUS short course

Prague, March 23-25, 2020

Application form

Please send to kodesova@af.czu.cz

Family name:

First name:

Affiliation:

Institute:

Mailing address:

Ph.:

Fax:

E-mail:

Registration fee: Please indicate your interest.

Before January 31 2020

- 699 EUR (499 EUR for students)

After January 31 2020

- 799 EUR (599 EUR for students)

Please, make the payment via a bank transfer. An invoice will be sent to participants after registration.

Date: Signature:

If cancellations are made before January 31 2020 (February 28, 2020), the tuition fee will be fully refunded. Cancellations made after January 31 2020, will be refunded for 75% (50%) of the tuition fee.

HPx (HYDRUS-PHREEQC) short course

Prague, March 26-27, 2020

Application form

Please send to kodesova@af.czu.cz

Family name:

First name:

Affiliation:

Institute:

Mailing address:

Ph.:

Fax:

E-mail:

Registration fee: Please indicate your interest.

Before January 31 2020
- 349 EUR (249 EUR for students)

After January 31 2020
- 449 EUR (349 EUR for students)

Please, make the payment via a bank transfer. An invoice will be sent to participants after registration.

Date: Signature:

If cancellations are made before January 31 2020 (February 28, 2020), the tuition fee will be fully refunded. Cancellations made after January 31 2020, will be refunded for 75% (50%) of the tuition fee.

HYDRUS + HPx short course

Prague, March 23-27, 2020

Application form

Please send to kodesova@af.czu.cz

Family name:

First name:

Affiliation:

Institute:

Mailing address:

Ph.:

Fax:

E-mail:

Registration fee: Please indicate your interest.

Before January 31 2020
- 899 EUR (649 EUR for students)

After January 31 2020
- 1099 EUR (749 EUR for students)

Please, make the payment via a bank transfer. An invoice will be sent to participants after registration.

Date: Signature:

If cancellations are made before January 31 2020 (February 28, 2020), the tuition fee will be fully refunded. Cancellations made after January 31 2020, will be refunded for 75% (50%) of the tuition fee.