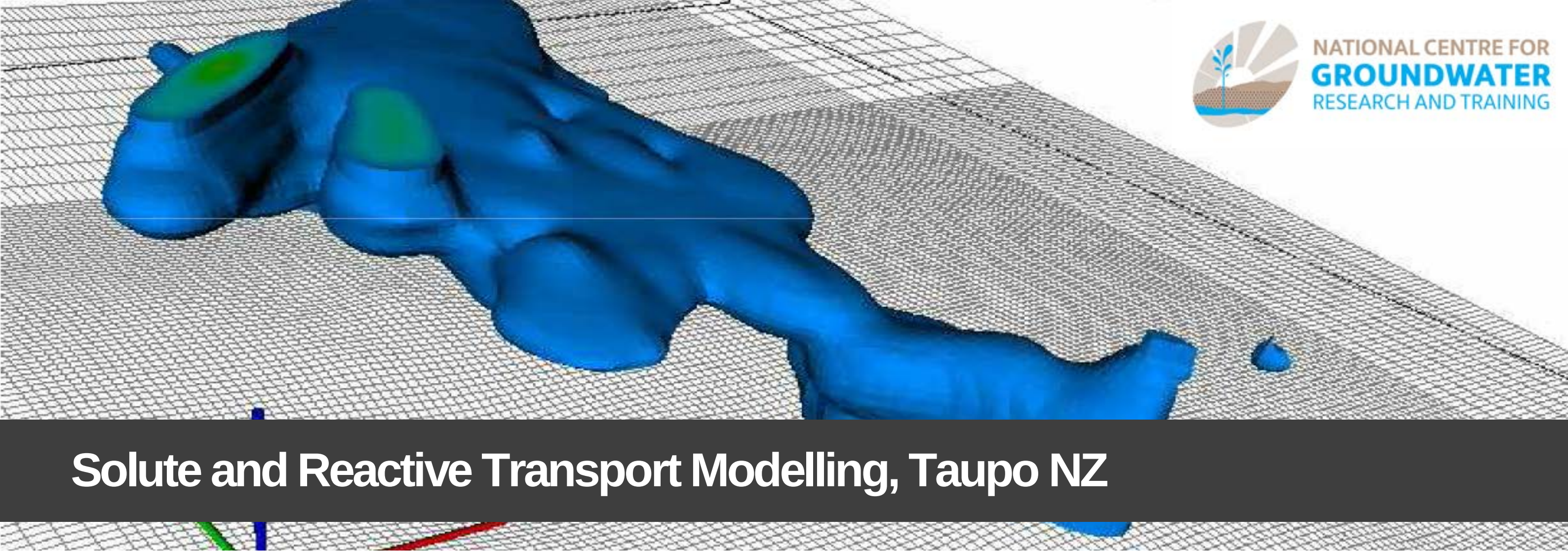
NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING



Solute and Reactive Transport Modelling, Taupo NZ

WHY IS THIS COURSE IMPORTANT?

Coupled numerical models that simultaneously account for the quantification of both subsurface fluid flow and biogeochemical processes have become increasingly important tools for interpreting groundwater quality data and processes relevant to natural and contaminated aquifer systems. Solute and reactive transport models help to provide insights into the past and present behaviour of a wide range of groundwater constituents (including organic and inorganic pollutants) and allow to predict future groundwater quality evolution under multiple water quality management scenarios.

WHO SHOULD ATTEND?

The course is designed for environmental consultants, government scientists, researchers and postgraduate students who want to undertake or assess numerical modelling studies of groundwater flow, transport and geochemical reactions as part of their work or research.

Participants will benefit the most from this course if they have a working knowledge of groundwater (flow/transport) processes and at least a basic understanding of geochemical processes. Prior modelling experience is not an absolute requirement but it will increase the benefits from the course significantly.

WHO IS PRESENTING?

The course will be presented by a team of interdisciplinary scientists with long-standing experience in numerical model development and applications. Presenters include

- Doug Kent (US Geological Survey)
- Henning Prommer (University of Western Australia / CSIRO)
- Catherine Moore, Troy Baisden, Mike Toews (GNS Science)

WHAT WILL THE COURSE COVER?

- Major concepts of solute transport and geochemical modelling
- Basic theory of coupled reactive transport modeling.
- Illustrative case studies of reactive transport model applications to a wide range of real-world groundwater quality problems.
- Hands-on experience with the modeling tools MODFLOW, MT3DMS, PHREEQC and PHT3D (which couples MT3DMS and PHREEQC)
- Modelling groundwater age.
- Modelling nitrogen movement in groundwater and how biogeochemical reactions (such as denitrification) affect concentrations.

GROUP DISCOUNTS

If you are a part of an organisation and wish to enrol a group (2 or more) for the course please contact us at enquiries@groundwater.com.au for considerable discount.

Discounts also apply for GNS employees, Hydrosoc members and IAH members.

Email us at enquiries@groundwater.com.au for more information.

COURSE DETAILS

DATE
5-9 September 2016

VENUE
GNS Science
114 Karetoto Rd, Wairakei, Taupo, New Zealand

COURSE FEES
NZ $1800.00
AUD $2000.00 incl GST

GNS staff: 30% off.
Student & Group (2 or more): 20% off.
Australian delegates: 20% off.
Hydrosoc & IAH members: 10% off.

Contact enquiries@groundwater.com.au for more information

This includes course notes, classroom teaching, tutorials, morning and afternoon teas and lunches.

Attendees are to arrange their own travel and laptop.

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Program

Solute and Reactive Transport Modelling

GNS Science: 114 Karetoto Rd, Wairakei, New Zealand

Day 1		Monday 5 September 2016	
Time	**Session**	**Topic**	
0830		**Coffee & Registration**	
0900	1	**Welcome, general introduction and course overview**	
0930	2	**Introduction to solute transport modelling I**	
1030		**Morning tea**	
1100	3	**Introduction to solute transport modelling II**	
1230		**Lunch**	
1330	4	**Introduction to MT3DMS: Theoretical background and solution techniques**	
1400	5	**Introduction to the graphical user interface (GUI) ipht3d**	
1430	6	**MT3DMS Exercise: Conservative transport simulation**	
1500		**Afternoon tea**	
1530	7	**MT3DMS Exercise: Conservative transport simulation (continued)**	
1630	8	**Case Study: Solute transport modelling of nitrate in a coupled groundwater and surface water system**	
17:30		**End of Day 1**	

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Day 2	Tuesday 6 September 2016	
Time	**Session**	**Topic**
0830	1	**Introduction to geochemical modelling**
0930	2	**Introduction to PHREEQC**
1030		**Morning tea**
1100	3	**Mineral dissolution and precipitation**
1130	4	**PHREEQC Exercises: water composition/mineral dissolution/redox reactions**
1230		**Lunch**
1330	5	**Introduction to PHT3D: Coupling of transport and chemistry**
1415	6	**PHT3D Exercise: Mineral dissolution/precipitation**
1500		**Afternoon tea**
1530	7	**PHT3D Exercise: Mineral dissolution/precipitation (continued)**
1630	8	**Use of nitrogen isotopes as groundwater provenance indicator**
17:30		**End of Day 2**

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Day 3	Wednesday 7 September 2016	
Time	**Session**	**Topic**
0830	1	**Ion exchange: principles, types of exchangers, modeling with PHREEQC**
1000	2	**Case Study: Ammoniacal liquor contamination at the Rexco site/UK**
1030		**Morning tea**
1100	3	**PHT3D Exercise ion exchange: Ammonium plume at the Rexco site/UK**
1230		**Lunch**
1330	4	**Surface complexation: theory/types of surface complexation models/model applications**
1430	5	**Surface complexation modeling with PHREEQC**
1500		**Afternoon tea**
1530	6	**Modeling kinetic reactions with PHREEQC: incorporation of kinetic rate expressions**
1630	7	**PHREEQC Exercise: Kinetically controlled denitrification**
1700	8	**Modelling of kinetic isotope effects**
17:30		**End of Day 3**

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Day 4	Thursday 8 September 2016		
Time	**Session**	**Topic**	
0830	1	**Case Studies: Nitrogen dynamics during managed aquifer recharge**	
0915	2	**PHT3D Exercise: Reactive processes during deepwell injection**	
1030		**Morning tea**	
1100	3	**PHT3D Exercise: Reactive processes during deepwell injection (continued)**	
1130	4	**Case Study: Biogeochemical and isotopic dynamics in a nitrate-polluted pyritic aquifer**	
1230		**Lunch**	
1330	5	**PHT3D Exercise: Long-term biogeochemical dynamics in a nitrate-polluted pyritic aquifer – Modelling groundwater age**	
1400	6	**PHT3D Exercise: Long-term biogeochemical dynamics in a nitrate-polluted pyritic aquifer – Reactive processes**	
1500		**Afternoon tea**	
1530	7	**Hydrologic and biogeochemical controls on nitrogen, phosphorus, and other contaminant fluxes at the groundwater/surface-water interface.**	
1630	8	**PHREEQC Exercise: Redox titrations including denitrification and iron reduction: impacts on phosphate and arsenic**	
17:30		**End of Day 4**	

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Day 5	Friday 9 September 2016	
Time	**Session**	**Topic**
0830	1	**Model calibration**
0915	2	**Assessing and quantifying model uncertainty**
1030		**Morning tea**
1100	3	**Case Study: Calibrating a nitrate transport model and quantifying model uncertainty.**
1130	4	**Case Study: Modelling groundwater mean age and distributions of groundwater age.**
1230		**Lunch**
1330	5	**Team Exercises:** **Translating groundwater quality data into conceptual and numerical models** **(Participants are encouraged to bring their own data/problems)**
1500		**Afternoon tea**
1600	6	**Team presentations**
1630	7	**Discussion and close**
17:00		**End of course**