

Program



NATIONAL CENTRE FOR
GROUNDWATER
RESEARCH AND TRAINING

Environmental Tracers in Groundwater Hydrology: Tools for Improved Process Understanding

TIME		THEME/TOPIC	PRESENTER
8.45		Registrations and Coffee	
9.00	1	Welcome & Introductions Course Introduction: tracers as forensic tools Groundwater conceptual models and environmental tracers	Glenn Harrington Andrew Herczeg
10.00	2	Groundwater Chemistry 1 Introduction to water and solutes, units and charge balance and groundwater chemistry as a tracer.	Andrew Herczeg
11.00		Morning Tea	
11.30	3	Environmental Isotopes 1 Introduction to basic concepts of stable isotopes of water as tracers	Glenn Harrington
12.30	4	Groundwater Chemistry 2 Sources of solutes and evolution through the hydrosphere in groundwater	Andrew Herczeg
13.30		Lunch	
14.15	5	Environmental Isotopes 2: Radioactive tracers & groundwater 'age' Constraining time scales of recharge and groundwater flow in a hydrogeological conceptual framework.	Glenn Harrington
15.15	6	Tutorial 1: Recharge and mixing Stable isotopes and chloride mass balance. Estimation of recharge rates, recharge mechanisms and groundwater mixing.	Glenn Harrington Andrew Herczeg
16.15		Afternoon Tea	
16.30		Open Discussion	All
17.00		End Day 1	

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8.45		Arrival Tea and Coffee	
9.00	7	Groundwater Chemistry 3: Data analysis and interpretation Practical methods for interpreting hydrochemical data, including graphical methods	Andrew Herczeg
10.00	8	Choosing appropriate wells and boreholes. Sampling and on-site measurement techniques.	Glenn Harrington
11.00		Morning Tea	
11.30	9	Environmental Isotopes 3: Young groundwater Estimation of groundwater recharge rates and flow rates using ^3H , CFCs and SF_6	Glenn Harrington
12.30	10	Groundwater Chemistry 4: Chemical equilibria, speciation, acid generation, heavy metal mobilisation and redox reactions What are the main chemical reactions in soil and groundwater? Introduction to use of basic groundwater chemical models.	Andrew Herczeg
13.30		Lunch	
14.15	11	Environmental Isotopes 4: Tracers for evaluating inter-aquifer mixing and water rock interactions: ^{13}C , ^{34}S , and $^{87}\text{Sr}/^{86}\text{Sr}$ etc.	Andrew Herczeg
15.45		Afternoon Tea	
16.00	12	Tutorial session 2 Review of charge balance calculations, water chemistry and aquifer types, graphical interpretation methods.	Andrew Herczeg Glenn Harrington
17.00		End Day 2	

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TIME		THEME/TOPIC	PRESENTER
8.15		Arrival Tea and Coffee	
8.30	13	Environmental Isotopes 5: Age tracers over long time scales Radiocarbon dating and where and when to use various correction schemes. Very long time scales tracers (^{36}Cl and ^4He)	Glenn Harrington
9.30	14	Environmental Isotopes 6: Further applications of isotopes of C, S, H, O for tracing processes associated with coal mining and unconventional gas extraction	Andrew Herczeg
10.30		Morning Tea	
11.00	15	Using tracers in aquitard porewater to evaluate aquifer connectivity and inter-aquifer leakage: Examples from various groundwater systems in Australia	Glenn Harrington
12.00	16	Surface water – groundwater interactions: Examples using ^{222}Rn , ^4He , SF_6 and other tracers.	Glenn Harrington
13.00		Lunch	
13.45	17	Case Studies Application of chemistry and isotopes to mining and other sectors	Andrew Herczeg Glenn Harrington
14.45	18	Incorporating chemical and isotopic studies into project design Discussion of rationale of how to make the most of routinely collected data (major ion chemistry) and incorporate relevant tracers (minor ions, stable and ratio-isotopes) to solve problems. Also discuss how isotopes can help to constrain conceptual and numerical models.	Andrew Herczeg Glenn Harrington
15.15		End Day 3	