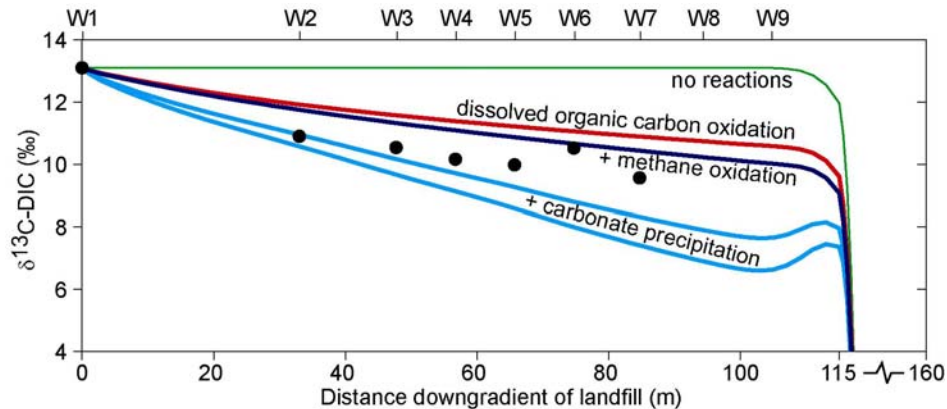


PHREEQC

Hydrochemical & Geochemical Modelling Course



“Carbon isotopes in a landfill leachate plume”

Organized by Earth Sciences Department of
Ferrara University

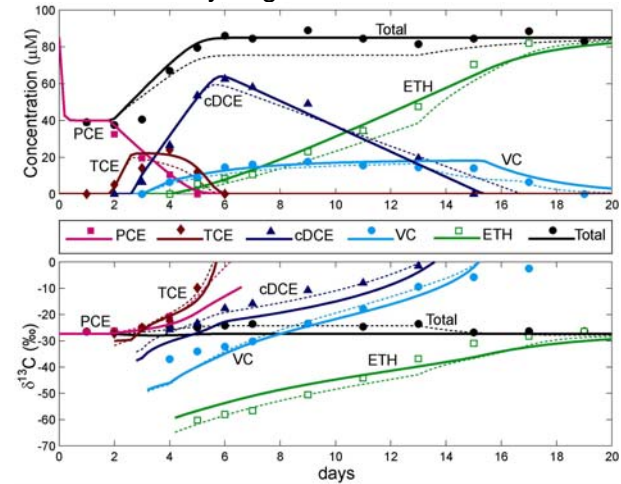
INSTRUCTOR:
Dr. Boris van Breukelen

University of Ferrara, Italy
September 9-11, 2009

OVERVIEW

This three-day course introduces participants to the modeling of hydrochemical and isotope geochemical processes with PHREEQC-2. The basics will be covered in the first two days, while simulation of isotope fractionation in geochemical models is explained at the final day. Simulation of all major hydrochemical processes will be explained and practiced step-by-step starting from simple systems and going towards more complex integrated cases in the end. The course is designed for people who want to refresh their knowledge on (isotope) hydrochemistry and learn how to construct (isotope) biogeochemical models for their own studies. The course focuses on applications in contaminant hydrogeology

and environmental chemistry in groundwater and soils.



“Sequential PCE degradation & isotope fractionation in a lab microcosm”

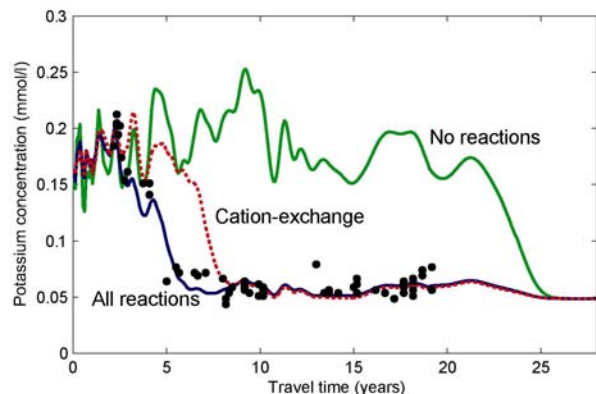
COURSE CONTENTS AND GOALS

- Learn to make a conceptual hydrochemical model (which processes and parameters are relevant, extent of complexity)
- How to program a conceptual model in a PHREEQC input file, extend the database file, and inspect the model outcome
- How to simulate the major hydrochemical processes: complexation, mineral dissolution/precipitation, cation exchange, surface complexation, redox processes and biodegradation
- When and how to formulate reactions as kinetic instead of equilibrium
- Which cases require batch, mixing, inverse, 1D flow path, and 3D models (in PHT3D)
- Model calibration, sensitivity, and uncertainty analysis
- How to simulate isotope fractionation processes in geochemical (transport) models

Most of the course time is devoted to computer labs. Computer exercises will be introduced by short lectures and explained afterwards in class. Simplified exercises based on real-world problems will help participants to translate theory into practice.

COURSE INSTRUCTOR

The course will be presented by the international expert **Dr. Boris van Breukelen**, Assistant Professor Hydrochemistry at the VU University Amsterdam and specialist for modeling of biogeochemical processes and associated isotope fractionation in (polluted) groundwater environments.



“Retardation of potassium during artificial recharge”

COURSE AUDIENCE

The course is aimed at researchers, PhD-students, consultants, and engineers who (plan to) undertake hydrochemical modeling as part of their work or studies. The use of PHREEQC both as research tool and practical instrument will be shown.

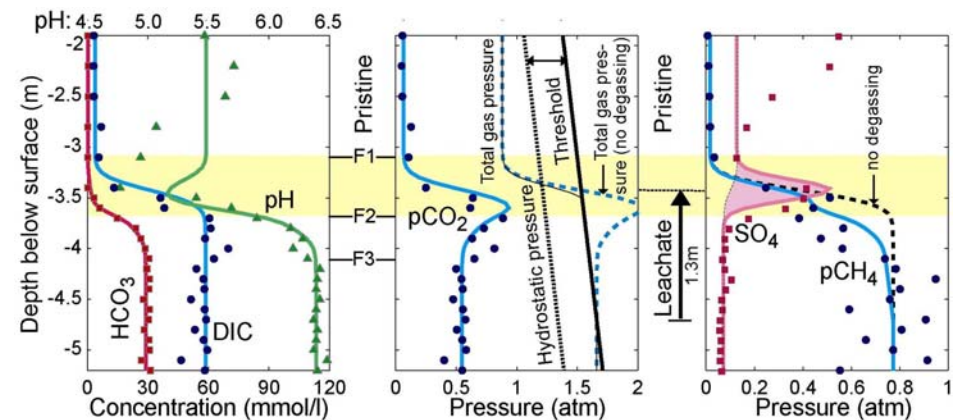
PREREQUISITES

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.

ENROLLMENT & REGISTRATION

The fee for the short course is € 800 and € 650 for PhD students. The fee covers instruction, course notes, refreshments, and certificate of participation. Full payment must be received prior to the beginning of the course. The registration fee may be paid by check, VISA, MasterCard or purchase order. If a cancellation is made before the 9 August 2009, tuition fees will be refunded. Cancellations made after that date will forfeit a €150 processing fee in addition to the €100 deposit. In the event of a cancellation, the right to course material is also forfeited. Substitutions are permitted at any time prior to the start of the course. Please be advised that

if the program is cancelled due to insufficient enrollment, CFR will return all course fees, but will not be liable for any other expenses incurred by the prospective attendees.



“Hydrochemical processes and degassing during uplift of a pollution plume”

COURSE LOCATION, TRANSPORTATION, AND LODGING

The course will be held at the Scientific & Technologic Pole of Ferrara University, 30 minutes east of Bologna, 1 hour west of Venice. Both International Airports of Bologna and Venice can be reached by taxi, train + airport shuttle or rental car. Lodging is available in Ferrara, within walking distance of the campus. Detailed information regarding transportation, parking, and lodging will be sent upon registration.

Technical Assistants:

Micòl Mastrocicco, Earth Sciences Department, University of Ferrara
Nicolò Colombani, Earth Sciences Department, University of Ferrara

FURTHER INFORMATION & REGISTRATION

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<http://www.conorzioferrararicerche.it/>