

Contact for the training course:

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The Training course is
arranged in collaboration
between:

Charles University,
Prague
www.cuni.cz

EPFL, Lausanne
www.epfl.ch

Imperial College,
London
<http://www.imperial.ac.uk/>

Universitat Politècnica
de Catalunya
www.upc.edu

Université de Liège
www.uliege.be

Svensk
Kärnbränslehantering
AB www.skb.se



Beacon Project Consortium Partners:

Svensk Kärnbränslehantering AB	SKB	SE
Radioactive Waste Repository Authority	SURAO	CZ
Posiva OY	POSIVA	FI
Agence Nationale pour la Gestion des Dechets Radioactifs	ANDRA	FR
Nationale Genossenschaft fuer die Lagerung Radioactiver Abfaelle	NAGRA	CH
Empresa Nacional de Residuos Radioactivos S.A.	ENRESA	ES
Radioactive Waste Management Limited	RWM	GB
Miljöorganisationernas Kärnavfallsgranskning	MKG	SE
Universitat Politecnica de Catalunya	UPC	ES
Gesellschaft fur Anlagen und Reaktorsicherheit	GRS	DE
Ceske Vysoke Ucení Technické v Praze	CTU	CZ
Univerzita Karlova v Praze	CU	CZ
Commisariat a l'Énergie Atomique et aux Energies alternatives	CEA	FR
Teknologian tutkimuskeskus VTT Oy	VTT	FI
Université de Liege	ULg	BE
Bundesanstalt fuer Geowissenschaften und Rohstoffe	BGR	DE
Karlsruher Institut fuer Technologie	KIT INE	DE
Lietuvos Energetikos Institutas	LEI	LT
Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas	CIEMAT	ES
Clay Technology AB	Clay Tech	SE
Ecole Polytechnique federale de Lausanne	EPFL	CH
Imperial College of Science Technology and Medicine	ICL	GB
Quintessa Limited	Quintessa	GB
Natural Environment Research Council	NERC	GB
Jyväskylän Yliopisto	JYU	FI

BEACON

Bentonite Mechanical Evolution

Training Course

Hydromechanical behaviour of bentonite: constitutive and numerical modelling

17th to 19th January 2018

Campus Nord,
Universitat Politecnica de Catalunya
(UPC)

www.upc.edu

This project receives funding
from the Euratom research
and training programme
2014-2018 under grant
agreement No 745942



The Training course

Scope: The course aims to give an overview of the current approaches and capabilities concerning the constitutive and numerical modelling of the hydromechanical behaviour of bentonite and other swelling clays. Although the context of the course is the field of nuclear waste management, the concepts and methods presented have a much wider scope of application. The topics of the course are:

1. The fundamental science behind the mechanical and hydraulic properties of bentonite
2. Current constitutive modelling approaches
3. Numerical modelling and examples of application
4. The issues around the mechanical evolution of bentonite in nuclear waste management
5. Hands-on training with a computer code

The course is addressed to the nuclear waste management community as well as to students in areas of soil and material science and civil, environmental and mechanical engineering.

Schedule

17 January afternoon

- Introductory lecture on issues around the mechanical evolution of bentonite in nuclear waste management (P. Sellin, SKB)
- An introduction to the mechanical behaviour of bentonite (A. Ferrari, EPFL)
- Hydraulic behaviour of bentonite (F. Collin, ULg)
- Experimental techniques for bentonite testing (A. Ferrari, EPFL)

18 January morning

- A double-porosity constitutive framework for expansive clays (L. Zdravkovic, IC)
- Constitutive modelling for the mechanical behaviour of expansive clays (R. Charlier, ULg)
- Constitutive modelling for expansive clay: a hypoplastic approach (D. Mašin, Charles U.)

18 January afternoon

- General features of numerical modelling for saturated and unsaturated soils (D. Mašin, Charles U.)
- Formulation and numerical modelling for THM problems (D. Potts, IC)
- Examples of application I (A. Gens, UPC)
- Examples of application II (F. Collin, ULg)

19 January (all day)

Hands-on training using CODE_BRIGHT

Registration to the training course

To register please use this link

<https://simplesignup.se/event/105969>

Deadline for registration 15th December

Please, note that the number of participants is limited to 25 and early registration is advised.

Fee

The participation fee of the training course is covered by the Beacon project.

Travel and accommodation

Please note that travel and accommodation are **the responsibility of each participant**. Neither costs nor arrangements are taken care of by the project or the organizers of the course.

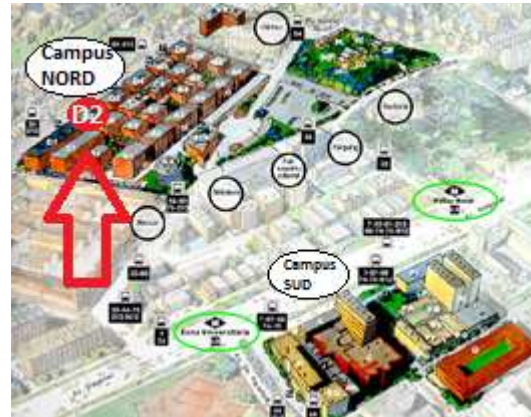
The venue is easily accessible by public transport (Metro station: Zona Universitària, Line 3). Both local and downtown hotels are suitable for attending the course.

Limited student accommodation (within walking distance to the venue) may be booked at:
<https://www.resa.es/en/residences/barcelona/residence-hall-torre-girona/residence/>

Location

Building D2, Room 212. Departamento de Ingeniería del Terreno. Jordi Girona 1-3, Campus Nord, Universitat Politècnica de Catalunya (UPC), Barcelona.

How to find your way <http://maps.upc.edu/?lang=en> write D2



The Beacon project addresses key technical issues that must be tackled to support the implementation of planned geological disposal projects for high-level radioactive wastes across the EU. The overall objective of the project is to evaluate the performance of an inhomogeneous bentonite barrier. This will be achieved by cooperation between design and engineering, science and performance assessment.

The overall objective is to evaluate the performance of an inhomogeneous bentonite barrier from an installed engineered system to a fully functioning barrier. This will require an increased understanding of material properties and fundamental processes that lead to homogenisation as well as improved capabilities for numerical modelling.

The output will be a verification of the performance of current designs for buffers, backfills, seals and plugs and an improved handling of mass losses in long-term assessments.

To achieve this goal, e.g. the following activities are planned during the Beacon 4 year project:

- I. Compilation of a well-documented and communicated collection of the available knowledge prior to the project
- II. Re-evaluation of a large part of the existing database to extract the important information, compilation of the qualitative and quantitative observations and the development of conceptual understanding
- III. Development of enhanced, robust and practical numerical tools, firmly grounded on a good conceptual understanding, that have the required predictive capabilities concerning the behaviour of engineered barriers and seals
- IV. Acquisition of a complete experimental database for the need of the assessment models
- V. Model verification based on experimental results from experiments in different scale
- VI. Workshops dedicated to the mechanical issues in bentonite open to the scientific community
- VII. A training course

www.beacon-h2020.eu

Contact for the project: mary.westermark@skb.se