

The challenge of studying low permeability materials: Laboratory, *in situ* (field) and numerical methods

December 2-3, 2014, Université de Cergy-Pontoise, France

Organized by GEC Laboratory

The characterization of fluid flow in low permeability porous materials remains a challenge nowadays. Low permeability media may classically include materials with a permeability lower than about 10-16 m² (i.e. 0.1 mD). Different areas are concerned among them **geological sciences** (cap rocks like clays, shales and salt rocks, tight reservoir rocks, volcanic, crystalline and metamorphic rocks), **material sciences** (synthetic porous materials such as concrete and glass, in particular when used for confining radioactive waste) and **biological sciences** (bones for example).

A Workshop to discuss :

- Which permeability – intrinsic, apparent, relative – should be the best approximation for fluid flow process.
- The state of the art in experimental techniques for low permeability measurements.
- The accuracy and range of validity of these techniques.
- The link with microstructures.
- The relevance of classical laws (Darcy, Klinkenberg, Poiseuille) for low permeability rocks.
- The relevance of the measurements performed at different scales.
- The relevance of the proxies employed.
- The upscaling issue and associated effects of anisotropy and heterogeneity (both in the matrix and the fluids).
- Which models are more suitable for fluid flow processes at a given scale.

Workshop Format :

- 3 sessions of oral presentations (30' duration including questions)
- Posters scheduled during coffee breaks and lunch time
- Launching of a permeability benchmark

- **Session 1:** Intrinsic, apparent and relative permeability measurements in the laboratory.

Keywords: constant, transient and oscillatory flow techniques, multiphase flow, fluid effects, link with microstructures.

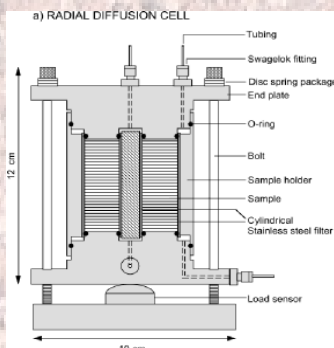
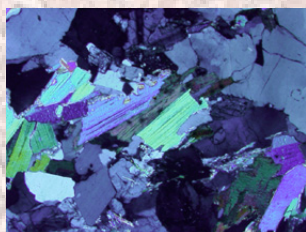
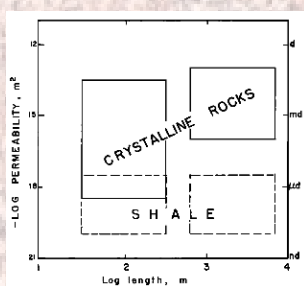
- **Session 2:** Intrinsic and extrinsic effects on permeability at various scales.

Keywords: heterogeneity, anisotropy, fractures, damage, REV, upscaling, simulation of in situ conditions, measurements in and between boreholes.

- **Session 3:** Relevance of permeability proxies and numerical modelling.

Keywords: diffusion, transmissivity, storativity, capillarity, electrical conductivity, fluid-induced microseismicity, logging tools, microscale and macroscale models for permeability, effective medium models.

+ **Benchmark proposal:** several laboratories measure the permeability of samples from a selected rock or artificial material using their own know-how.



Figures from:
Brace (1984) and
Van Loon et al. (2004).

Scientific Committee

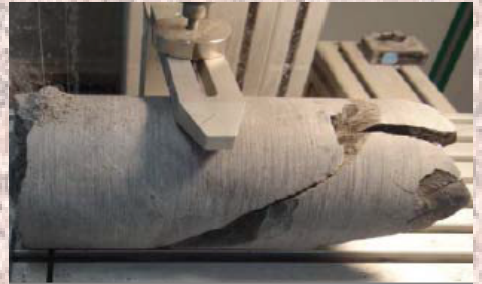
Pierre M. Adler (CNRS-UPMC), Pierre Bérest (LMS, École Polytechnique),
Catherine Davy (École Centrale Lille), Maï-Linh Doan (Isterre), Yves Guéguen (ENS Paris),
Marc Fleury (IFPEN), Jean-Michel Matray (IRSN), Benoît Noetinger (IFPEN),
Christophe Nussbaum (Swisstopo), Jörg Renner (Univ. Bochum),
Jean Talandier (ANDRA), Sophie Violette (UPMC).

Registration and Abstract submission

For registration, please contact the organizers :

Jérôme Wassermann : jerome.wassermann@u-cergy.fr

Christian David : christian.david@u-cergy.fr



Abstract submission

Abstract (one page max) should be sent **before September 30th** to the organizers.

The selection will be made by the scientific committee.

Workshop fee

Participation to the workshop cost : 20 euros to be paid cash at the workshop

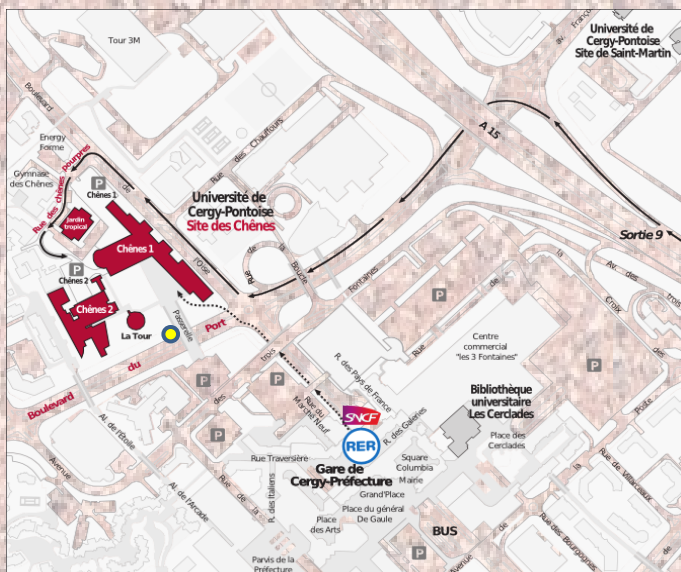
Location and Venue

Auditorium "Salle de Conférences" , Les Chênes 1,

University Cergy-Pontoise,

33, Boulevard du Port

95011 Cergy-Pontoise, France



By car

A15 to Cergy-Pontoise, exit 9;

By train

RER A Direction Cergy-le-Haut, station « Cergy-Préfecture »

Instructions for travel by air, by train or by car are available;

facilities for lodging at Cergy-Pontoise are also available : please contact the organizers.