

## + EDUCATION

The LHyGeS brings important contributions to the definition and implementation of the courses in environmental sciences proposed by the University (EOST). The lab is therefore a main technical and pedagogic support for the MSc degree ISIE (Engineering and Geosciences for the Environment) and for the specialization HydroG3 (hydro-geophysics, hydrogeology, hydro-geochemistry) at the School of Geophysical Engineers in Strasbourg (EOST). Finally, PhD students of the Doctoral Program in Earth and Environmental Sciences (ED 413) can develop their research activity within the LHyGeS research teams.

## + TRANSFER OF KNOWLEDGE

In addition to the numerous publications appearing in international journals and to the activity in national and international projects, the LHyGeS also deeply imprints the regional research and development strategy, especially through the Realise structure (Alsatian network of laboratories for environmental engineering and sciences).



**ÉCOLE ET OBSERVATOIRE DES SCIENCES DE LA TERRE**

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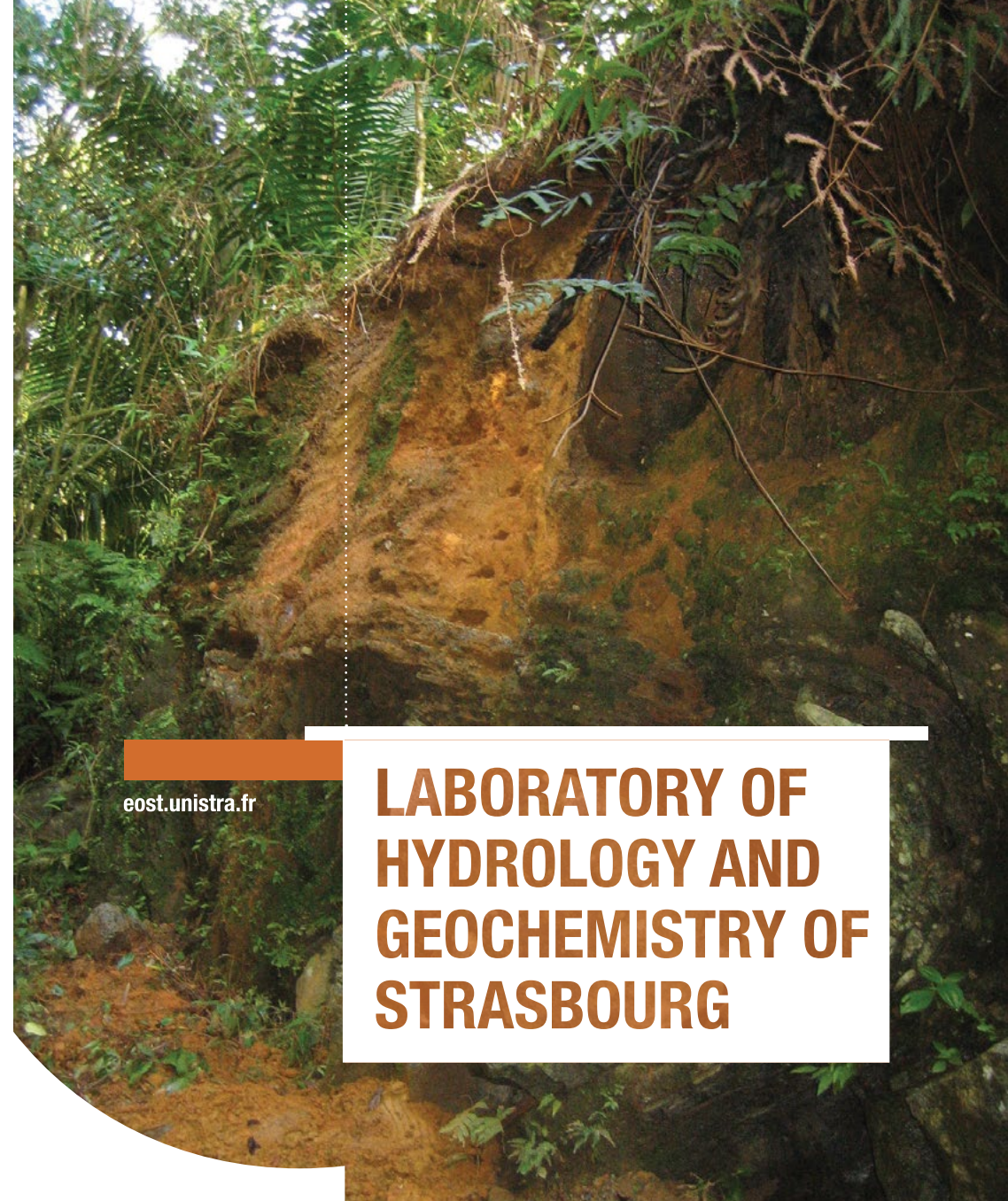
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Photos :

- Spheroidal alteration, Luquillo experimental forest, porto Rico © E. Pelt
- Llancahue thermal springs at Hornopiren in the Chilean Lake region © B. Fritz, 2007
- The Kali Gandaki Valley at the gates of the Mustang district – Central Nepal © M. Granet
- Reactive transport of agricultural contaminants in laboratory mesocosms © E. maillard
- Two-phase flow in a highly heterogeneous porous medium © LHyGeS, MonHyC
- Capillary pressure and water content in a soil (OHGE) © F. Lehmann, 2011
- Field works, MSc ISIE © D. Lemarchand.

Conception : S. Miller (DALI Unistra), V. Bertrand - Réalisation : V. Bertrand - © EOST 2014



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# LABORATORY OF HYDROLOGY AND GEOCHEMISTRY OF STRASBOURG



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The Laboratory of Hydrology and Geochemistry of Strasbourg – LHyGeS- is a joint research unit (UMR 7517) appointed and supported by three authorities, i.e. the French National Center for Scientific Research (i.e. CNRS), the University of Strasbourg, and the Ecole Nationale du Genie de l'Eau et de l'Environnement de Strasbourg (ENGEES).

The LHyGeS is a center for research and higher education dedicated to the study of weathering processes and transfers in continental hydro-systems. It belongs to the few French laboratories associating hydrology and geochemistry within various approaches, especially those needing important modeling efforts. Since its beginning – in 2009 from the merging of three former research units – the LHyGeS has developed fundamental knowledge, theories and methods to characterize and understand the functioning of continental hydrosystems. The evolution of this functioning under the modifications of natural forcing and anthropic activity is also investigated.

Two major topics make the heart of the LHyGeS research activity:

- **mathematical hydrology**
- **biogeochemistry and isotopic geochemistry.**

These topics are handled by three teams, the whole research unit being composed of more than 80 people, say, 30 permanent researchers, 25 permanent engineers and administrative staff, and, 30 PhD students and post-doc fellows.

## + RESEARCH TEAMS

### Isotopic and Environmental geochemistry —

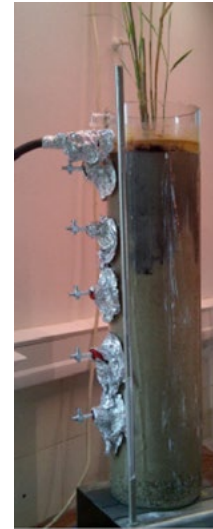
The team GICE is concerned with studying the mechanisms and characteristic times involved in weathering processes and various transfers of matter in continental eco-hydro-systems. These studies are carried out by developing and using the tools of elementary and isotopic geochemistry.

*For example, the research program «ANR Calimero», enrolls the team GICE for its ability to extract traces of weathering processes and climate changes from sediments and climatic archives of the Himalayan Basin.*



### Reactive transfers in hydro-systems —

The team TreHa is involved in experimental studies and models for hydrology and hydrogeology. For example, the team tackles problems such as: understanding the water cycle



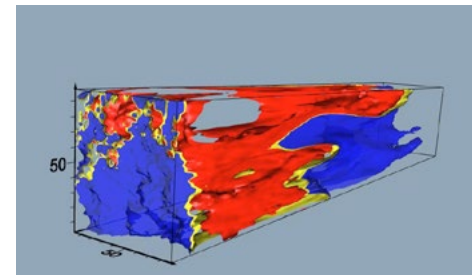
and the migration of associated chemical elements through continental surfaces and its interfaces, the interactions between fluids and solids along natural flow paths, transfers at different scales of time and space...

The research activity also rests on aquifer analogs (e.g., the SCERES platform) and on «natural» experimental sites : the Strengbach or the Rouffach watersheds in the Vosges mountains. Finally, the team develops 3-D simulation tools that are key features to interpret data and to understand chemical, mineralogical, and hydrodynamic evolutions of the studied systems.

### Methods and Numerical Tools for the continental hydrosystems —

The team MONHyC develops a research activity at the interface between geosciences and applied mathematics. The main targeted objectives are:

- **the development of numerical tools and techniques for solving complex problems**
- **the sensitivity analysis of numerical models mimicking fluid flow and fluxes of matter and energy in soils and sub-surface environments.**



*The team is for instance involved in the integrated research program «ANR – Mesonnet» which aim is to shed light on the fundamentals ruling the behavior of nanoparticles in the ecosystems. A better understanding of environmental risks associated with the presence of nanoparticles is also under investigation.*

## + LABORATORY INITIATIVES

The LHyGeS possesses and operates various technical and analytical platforms (for instance, water geochemistry analysis, isotopic analysis) which are conducive to initiatives shared between the different research teams.

### BioGEMO

The project «Biogeochemistry of water-mineral-biological bodies systems» is dedicated to the characterization and modeling of the interactions between biological, chemical and geochemical processes prevailing to the fate of contaminants in surface and sub-surface environments. In this context, it can be dealt for instance with problems at the small scale that are reproduced in the lab by conceiving and then running experiments in mesocosms (experimental devices of small to medium size).

### DysTHyl

The initiative «Dynamics and structure of hydro-geochemical transfers in small watersheds» is mainly interested in the (geometric) characterization of underground reservoirs, their storage capacity, and their main flow paths. The exper-

imental site set up at the Strengbach watershed serves as a natural reference and a three-dimensional modeling of both geological structures and water fluxes is one of the main expected results.

