

## O-ZNS at the heart of your projects

Many modalities of collaboration can be defined according to the requirements of your project:

- Installation of the monitoring tool at a single or several depths and for variable period of time,
- Monitoring of the alteration, loss of integrity, precision, time drift or eventually the monitoring tool's energy consumption,
- Evaluation of the actual costs of using the monitoring tool,
- Exploitation of the data collected by the monitoring tool,
- Comparison of the data collected by the monitoring tool with those in our database,
- Collaborative projects (conception, implementation, valorization) based on regional, national or European fundings,
- Training/demonstration support.

Insertion of a TDR probe in the soil © A.Isch (PhD thesis) 2016.

The Institute of Earth Sciences in Orléans (ISTO: Institut des Sciences de la Terre d'Orléans) conducts research in the areas of the geosciences, ranging from the internal dynamics of the Earth on up to the surface environments. ISTO is particularly involved in the reactive transport processes in natural porous media and in the functioning and evolution of hydrobiogeosystems for georesources (water, energy, minerals, etc.) and environmental issues including pressure/impact.

The Observatory of Sciences of the Universe in Centre-Val de Loire region (OSUC: Observatoire des Sciences de l'Univers en région Centre) federates a number of laboratories and staff members of the Orléans campus involved in PIVOTS (ISTO, LPC2E, ICARE, UR Sols) and federates the research conducted on the subsurface/ground/atmosphere continuum associated with global change and energy transition.

### CONTACT

Arnaud ISCH - Research engineer  
+33 (0)2 38 49 46 65 • arnaud.isch@cnrs-orleans.fr  
Mohamed AZAROUAL - Deputy director at ISTO  
+33 (0)2 38 64 32 54 • mohamed.azaroual@cnrs-orleans.fr  
O-ZNS Platform managers

ISTO UMR 7327 - CNRS/Université d'Orléans/BRGM  
1A Rue de la Ferrollerie • 45071 Orléans Cedex 2 • France

Design: Kalankea - 02 38 82 14 16 • PIVOTS 09/2018



## PIVOTS

[www.plateformes-pivots.eu](http://www.plateformes-pivots.eu)

PIVOTS is a coordinated set of experimental and analytical platforms dedicated to the development of environmental engineering and metrology for activities with a high consumption of natural resources.

Along the entire value chain, it brings together public and private-sector actors in monitoring the quality of the environment and the sustainable management of natural resources (soil, subsurface, surface water, groundwater, sediment, air).



With the support of:



This operation is co-financed by the European Union. Europe is committed to the Center-Val de Loire region with the European Regional Development Fund.



## PIVOTS

### O-ZNS

Observatory of transport processes in the Non-Saturated Zone

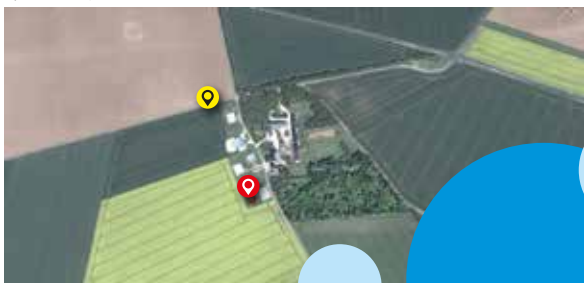
An observation well allowing the access to any level down the Vadose Zone (VZ) and aiming the long-term collection of data on transport of matter (water, solutes, contaminants, gases) and energy (heat) in the VZ under real field conditions.



# Evaluate the performance of your monitoring tools and samplers under real field conditions and over the long term with O-ZNS platform

Located in the Beauce agricultural region (Villamblain - 45310, locality called Les Hôtels), an infrastructure will be set up to tackle two major challenges: i) the first one concerns understanding and quantifying transport processes in the vadose zone in order to define precisely the inertia of the Calcaires de Beauce aquifer, a hydrological system of strategic interest for the Centre-Val de Loire region and, ii) the other one relative to the evaluation of the long-term performance of monitoring tools and samplers under real field conditions. This research infrastructure will consist of a very deep observation well (~ 20 m), wide enough (diameter ~ 4 m) to allow the instrumentation of the whole VZ from the top of the soil down to the water table including the capillary fringe, using innovative sensors and samplers which will be put in place permanently, removed or replaced if necessary along its vertical extension.

Experimental site located in Villamblain (45310 - Les Hôtels). Observation well spotted in red and validated log 03622X0114\_FT1-25 spotted in yellow.

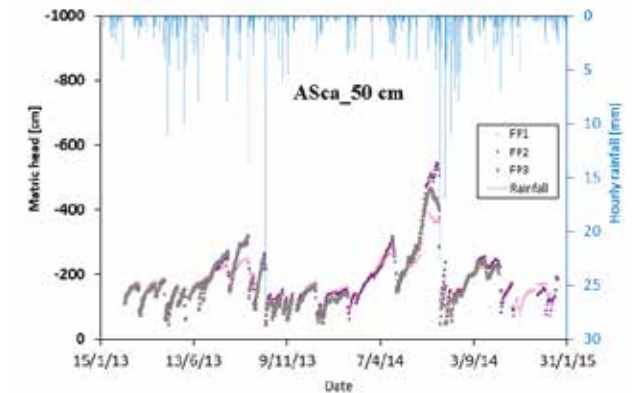
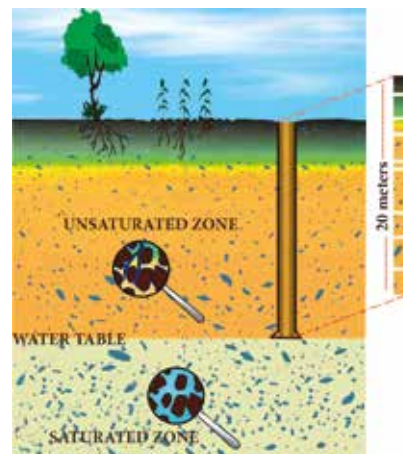


Example of an observation well set up in the vadose zone in New Zealand. © Close et al., 2012.

## Applications of O-ZNS

The applications made possible by O-ZNS include evaluating the performance of monitoring tools and samplers used for characterizing reactive transport processes in the vadose zone over exceptionally long-time periods. Based on the collected data, it will be possible to estimate and quantify the inertia of the hydrological system, and finally to simulate more efficiently the effects of climate and human forcing on the seasonal or multi-annual groundwater dynamics and balances. The mechanism of contaminants and heat transfers throughout the vadose zone column from the soil surface down to the water table will be carefully studied.

Distinction between the non-saturated zone and the saturated zone and access well schematization.



Daily variations of the matric head data for three field plots of a bare loam soil. © A.Isch (Thesis) 2016.

## Available means of study

- Observation well and secure access to any level down the VZ,
- Lithology including a loamy soil, lime gravels, lime marl and fractured and weathered limestone,
- Geological, geophysical, geochemical, microbiological, geomechanical and hydrogeological characteristics of the soil and the VZ,
- Monitoring tools, dataloggers, support software for data acquisition and exploitation and power supply,
- Meteorological data for the site,
- Available team for all the desired provision of services.

Datalogger and modules for power supply of monitoring tools for water dynamics study. © A.Isch (Thesis) 2016.

