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CHARACTERIZATION OF STREAM - AQUIFER INTERACTION IN CARBONATE ROCKS

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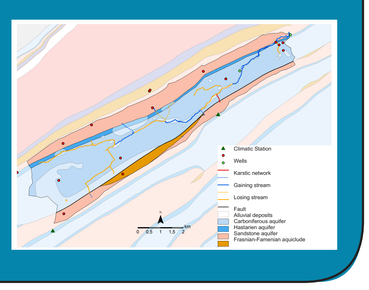
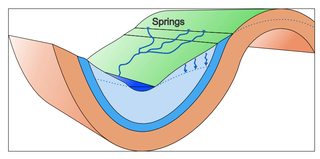
Groundwater - surface water interactions play a fundamental role in terms of quantity and quality of water and in terms of ecological quality of rivers. Moreover, the hyporheic zone influences the mobilization and degradation of many pollutants.

Despite many research efforts and the necessity to better understand such interactions in order to reach effective management of water resources, stream-aquifer exchanges remain poorly understood, in particular in fractured carbonate environments.

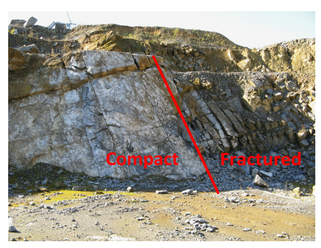


Context

Carbonate systems present a high variability of fluxes because of groundwater flow inside fractures and karstic networks. This leads to transport and dispersion of pollutants and to localized groundwater inflows in the river with high variations in time.

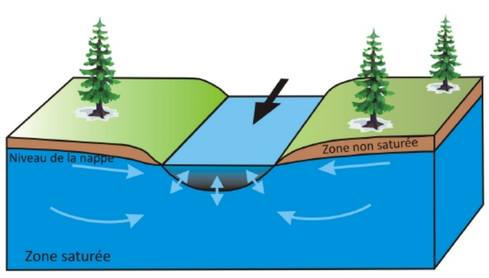


The heterogeneities and the impact of flows are difficult to emphasize in such systems. Therefore, the monitoring setup has to be adapted to be able to catch the dynamic of these environments. This implies the need for increasing the number of spatial and temporal measurements.

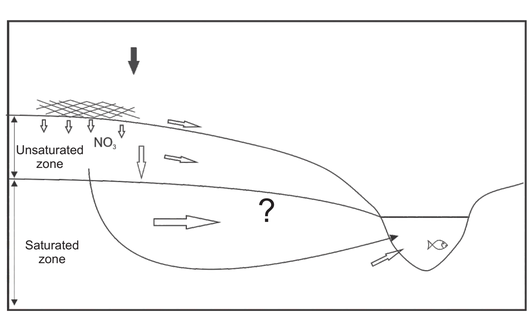


Objectives

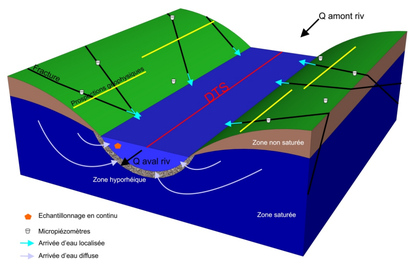
In this context, the overall objective of the project is to identify, characterize and quantify groundwater – surface water interactions in carbonate rocks to assess the impact of these interactions on the ecology of the stream



A seconde objective is to better understand the nitrate pathway from surface to the river (soil - vadose zone - groundwater - hyporheic zone - river).

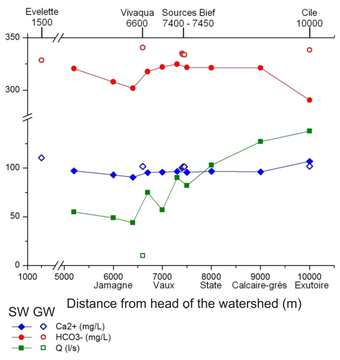


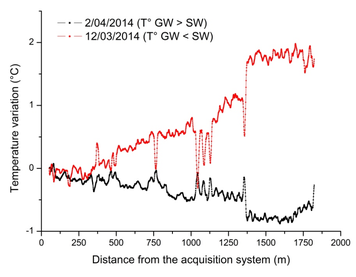
GW-SW method



Monitoring of a stream portion by a dense instrumentation and monitoring

Discharge measurements
Hydrochemical sampling
Temperature profiles
Stream bank characterization



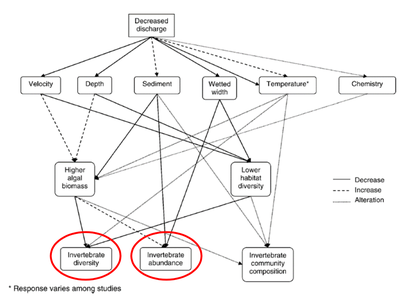


Seepage and hydrochemical run

Temperature profiles (Fiber-Optic DTS)

Location of groundwater incomes

Analysis of key aquatic communites



NO 3 method

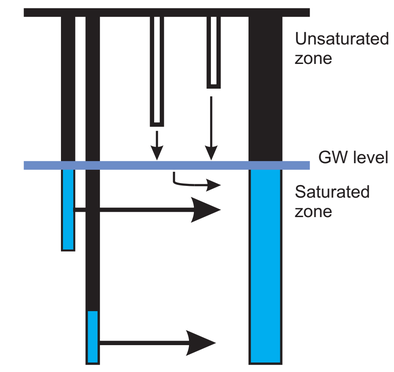
Experimental site with different depth piezometers

Under groundwater level
Above groundwater level

Infiltration test (Unsaturated zone)

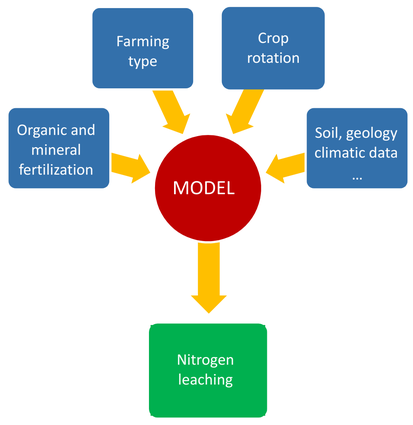
Tracing test (Saturated zone)

Assesment of mechanism and time transfer in saturated and unsaturad zone



Modelling of hydrological behavior and agricultural practices to assess water flows and nitrogen transfer to surface water and groundwater (EPIC-grid)

Input data based on soils sampling to quantify the content of 0-1m depth



Acknowledgement

Public Service of Wallonia for financial support
SPW - DEE - DESO & DESU

Wallonie

Related event: TERENO International Conference 2014
September 29th - October 2nd 2014 Rheinische Friedrich-Wilhelms-Universität Bonn,

Hydrogeology
Environmental Geology

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