

SUDS Monitoring : hydraulic monitoring and sampling strategy for source control stormwater control measures regarding micropollutant removal

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AIMS

Comparing performance...

- Stormwater source control systems (swale, trench, porous parking lot) of small catchment
- “End of pipe” systems (retention/detention basin) draining larger areas

...regarding micropollutant removal (*pesticides, PAHs, metals, PBDE, Alkylphenols*)



Source control BMPs (pervious areas)



End of pipe system



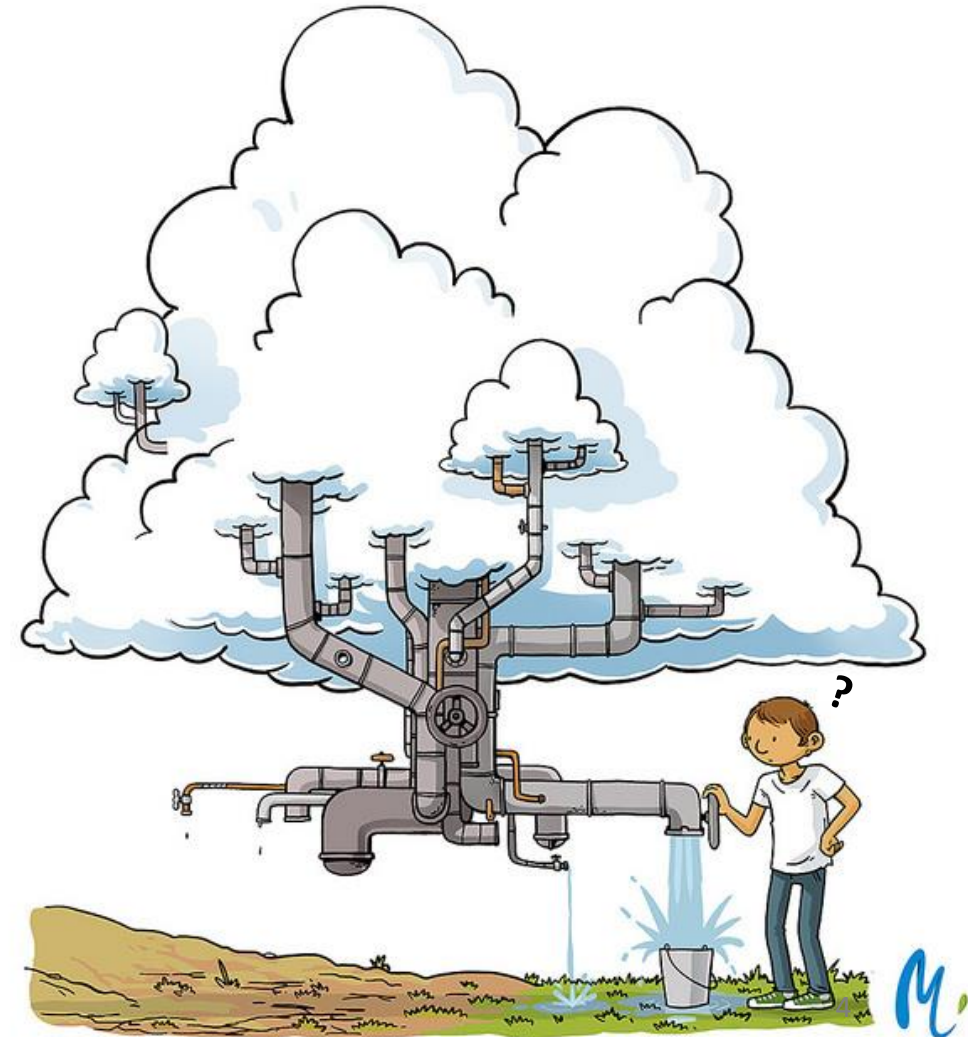
COMPARISON

Based on on-site measurements ...

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- To know the systems (*behavior, structure*)



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- To know the systems (*behavior, structure*)
- Monitor water flows



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Based on on-site measurements ...

- To know the systems (*behavior, structure*)
- Monitor water flows
- Monitor micropollutant loads



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Based on on-site measurements ...

- To know the systems (*behavior, structure*)
- Monitor water flows
- Monitor micropollutant loads



MONITORING

EXPERIMENTAL SITES

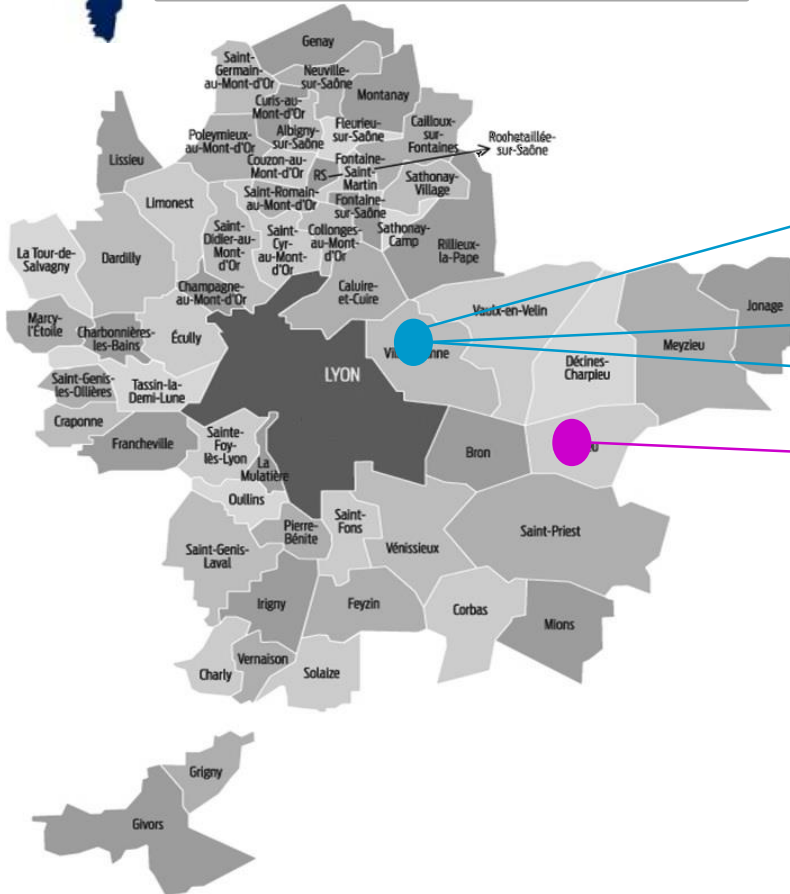


LYON

Sites

Micro Megas

Metropolis of Lyon

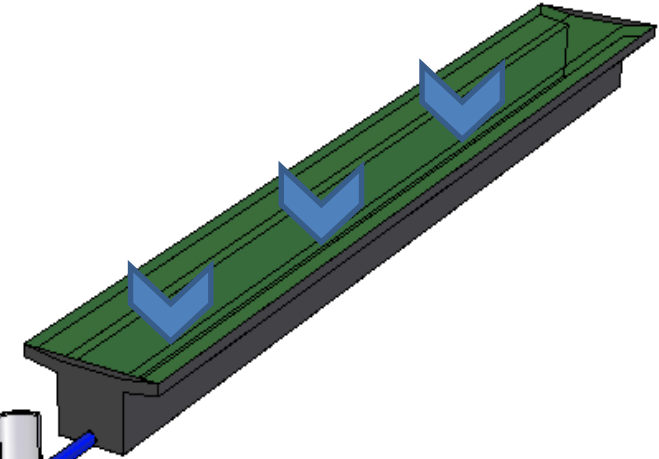


Sites – Source control

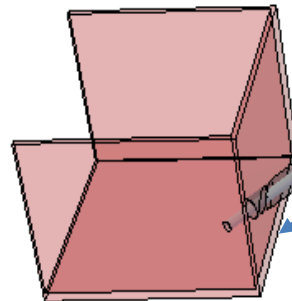
Infiltration Swale



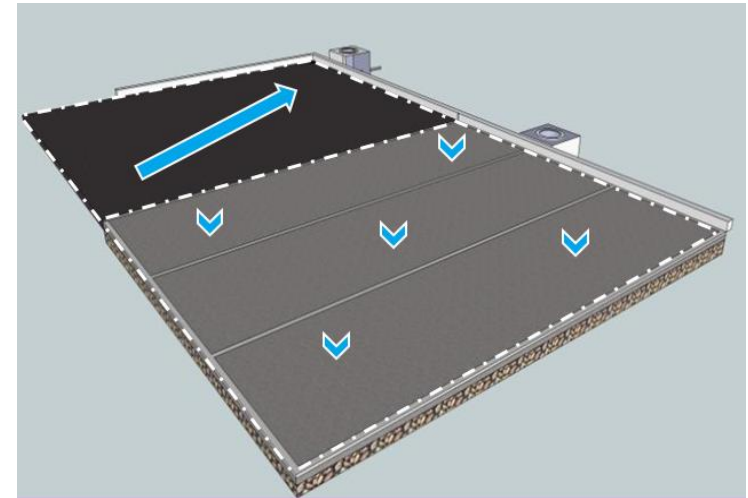
Trench



Reservoir Structure



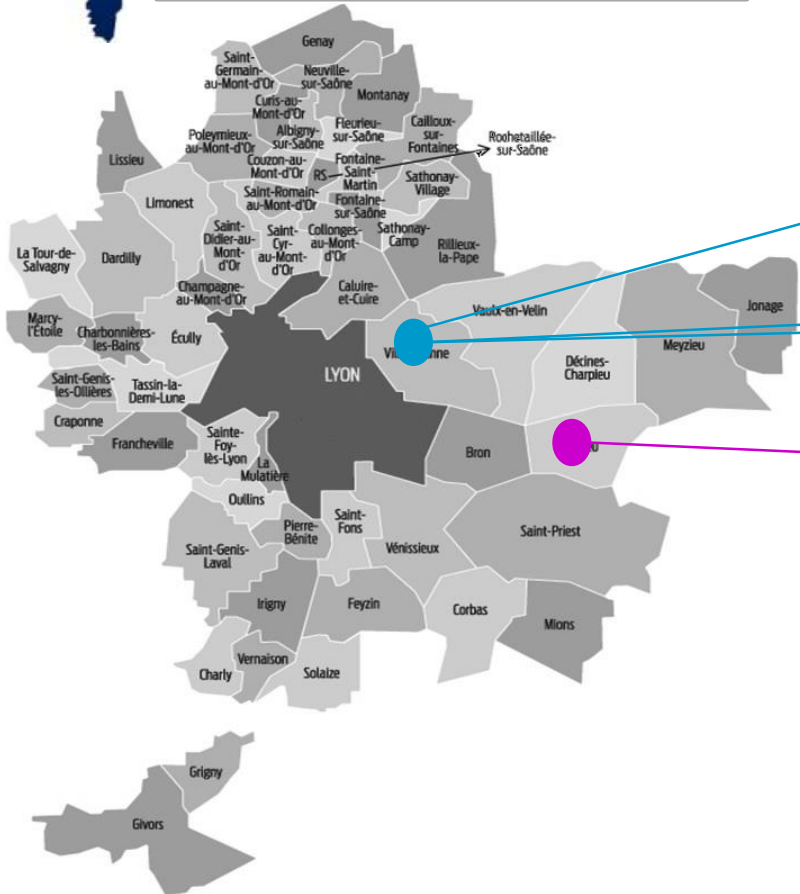
Measurement chambers



Sites



Metropolis of Lyon



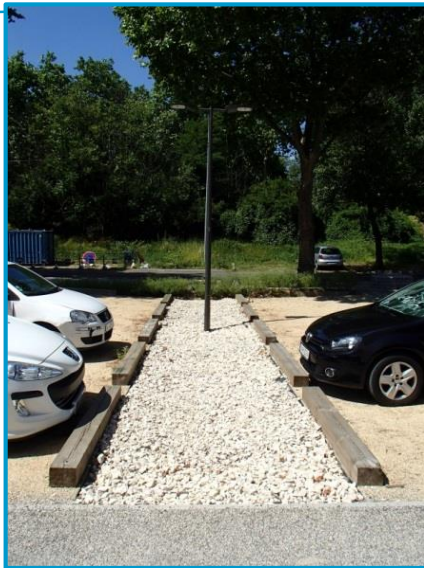
90 m²



280 m²



1.85 km²

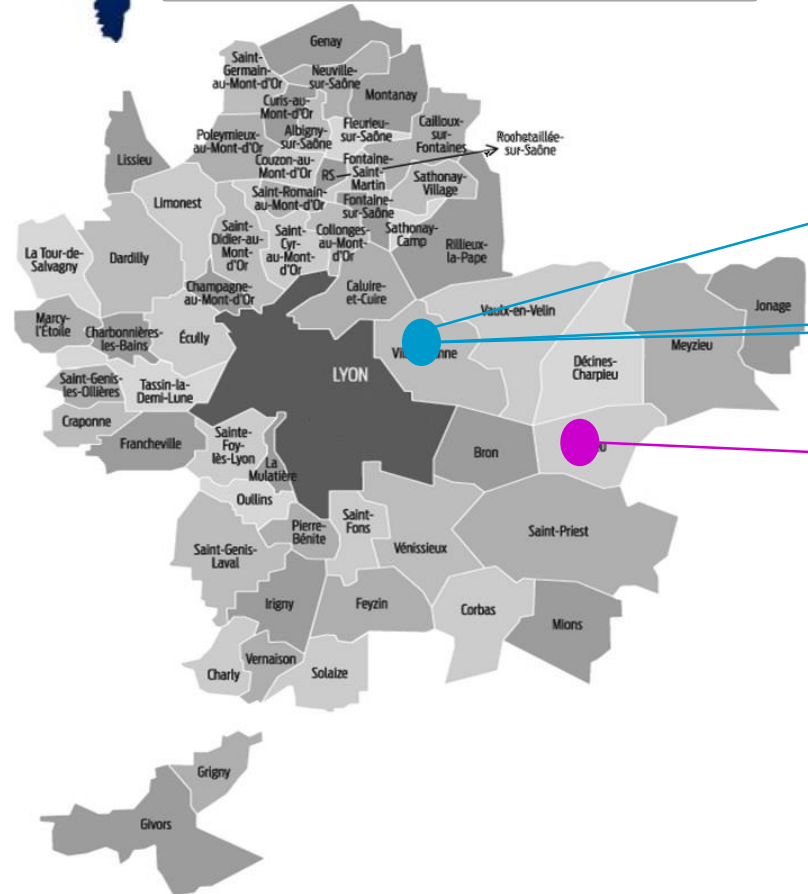


240 m²



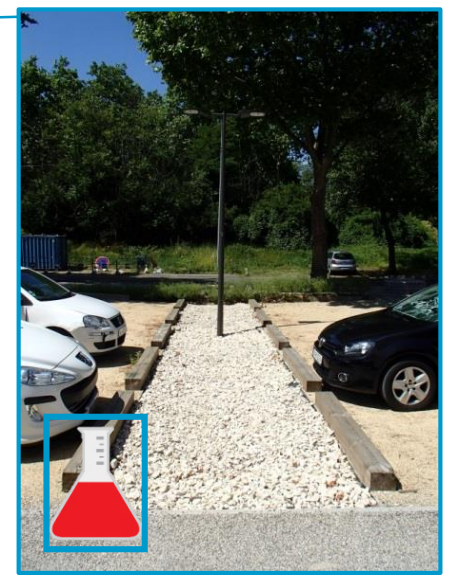
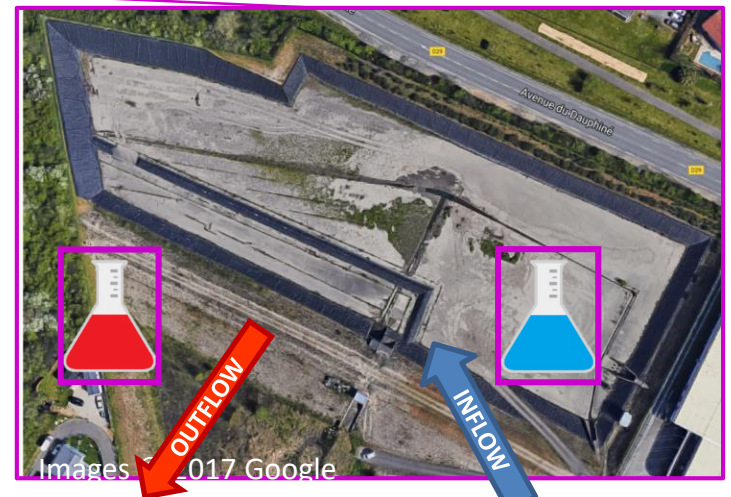
LYON

Metropolis of Lyon



Sites

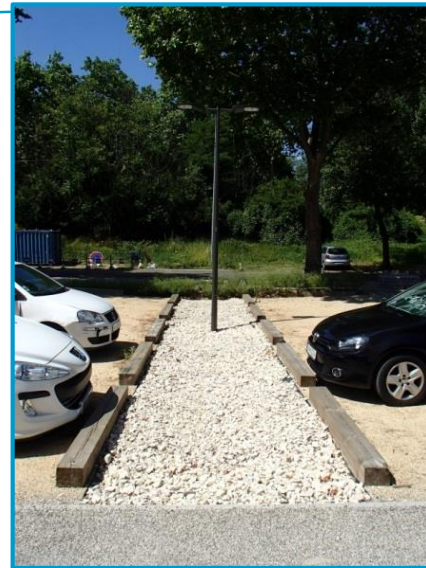
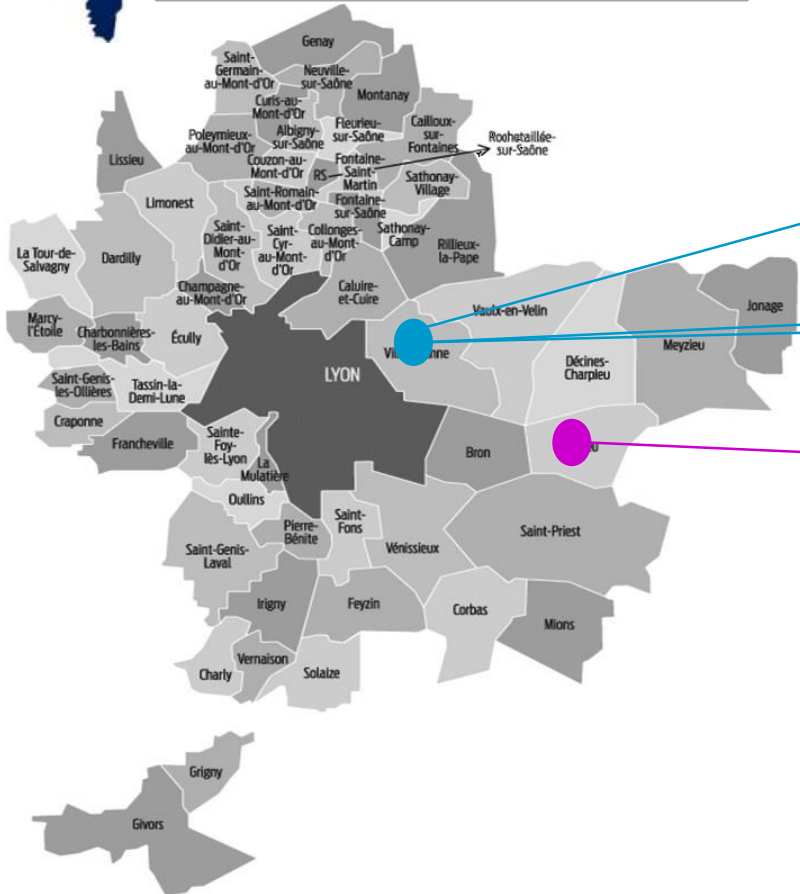
Micro Megas



Sites



Metropolis of Lyon



FIELD EXPERIMENT – KNOWING THE SYSTEMS

On-site



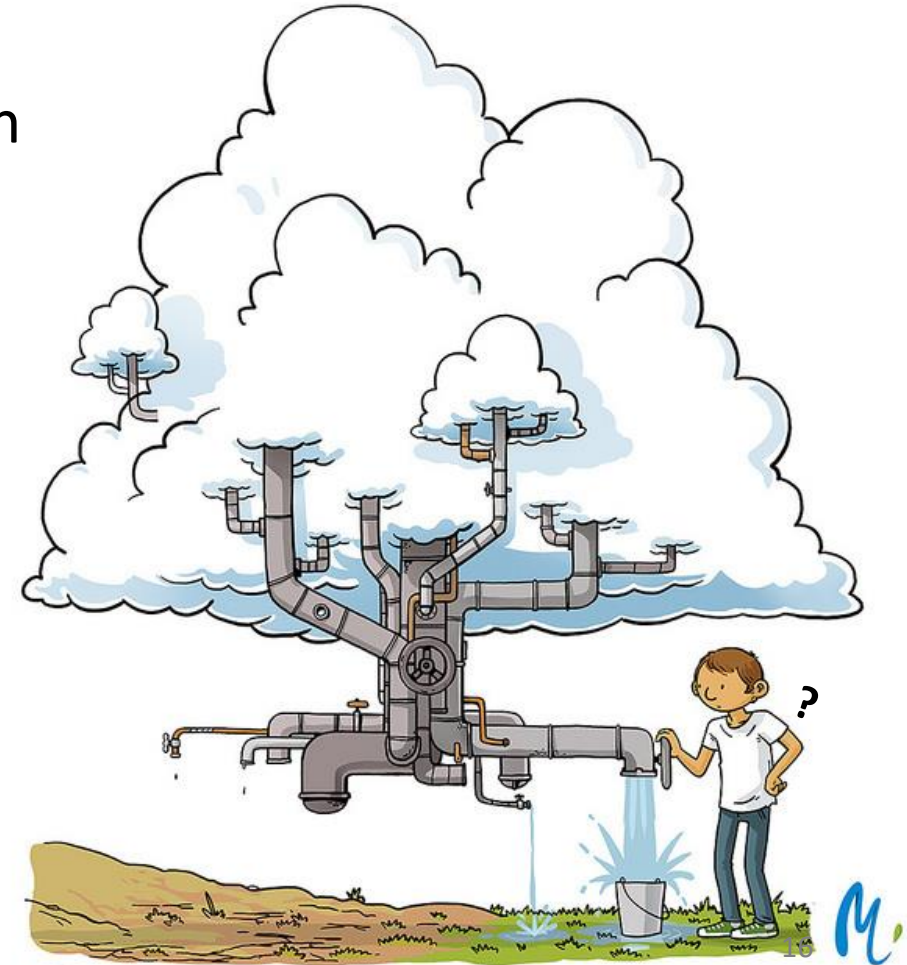
- Usually low control on construction
- Reality hardly known

On-site

- Usually low control on construction
- Reality hardly known



System structure ?
System behavior?



Structural analyses

Operating tests

Easy - Not very precise

Structural analyses

Complex - More precise

Structural analyses

Operating tests

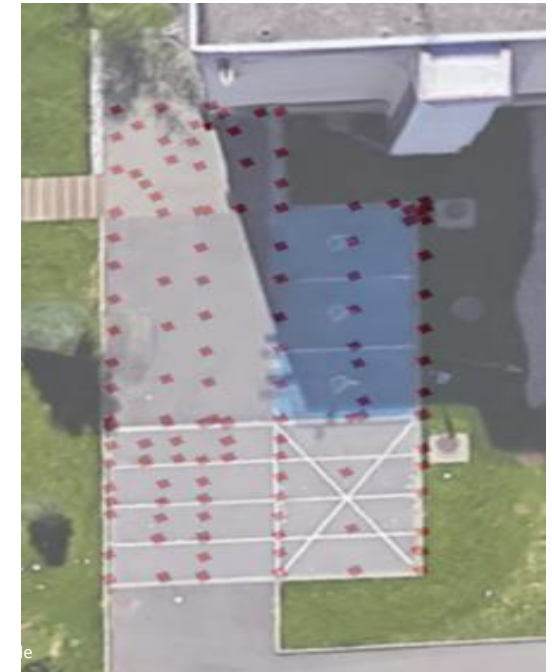
Easy - Not very precise



GPS Mapping

Structural analyses

Complex - More precise



Accurate catchment surfaces

Structural analyses

Operating tests

Easy - Not very precise

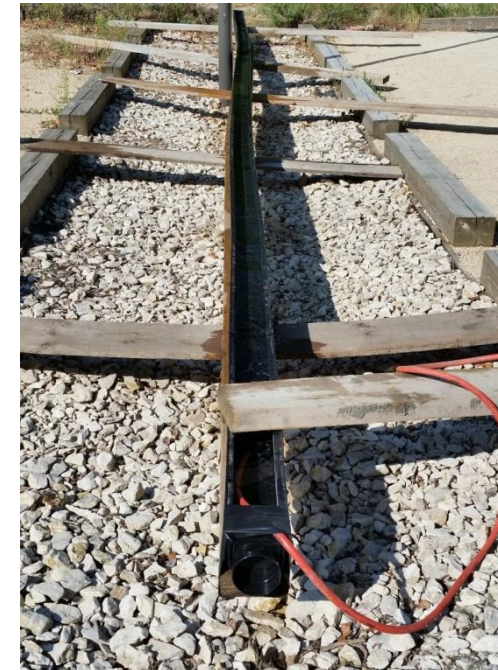


Infiltration

≈ 40% Loss

Structural analyses

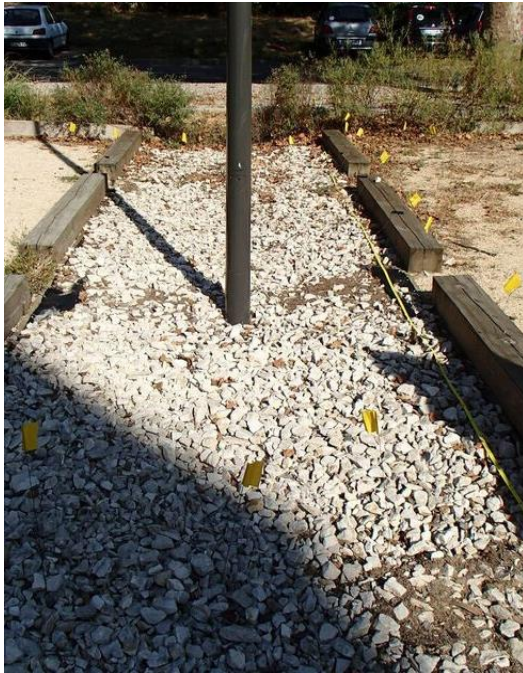
Complex - More precise



Structural analyses

Operating tests

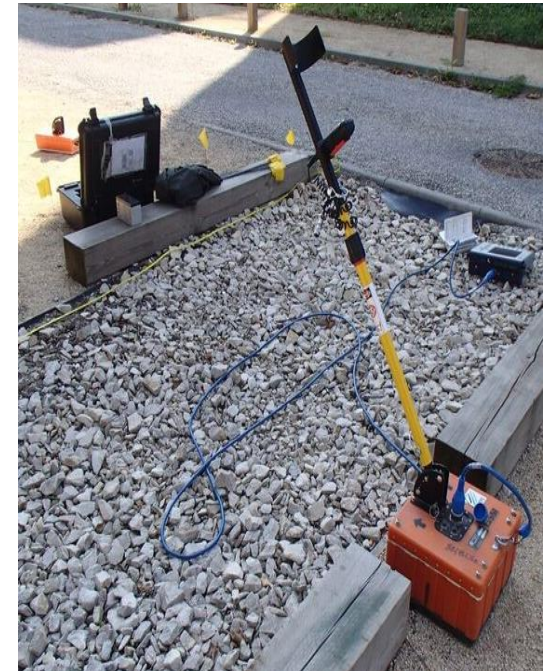
Easy - Not very precise



Structural analyses

Ground Penetrating Radar

Complex - More precise



Structural analyses

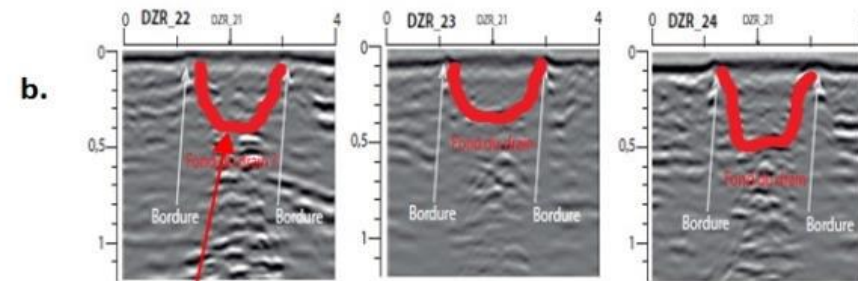
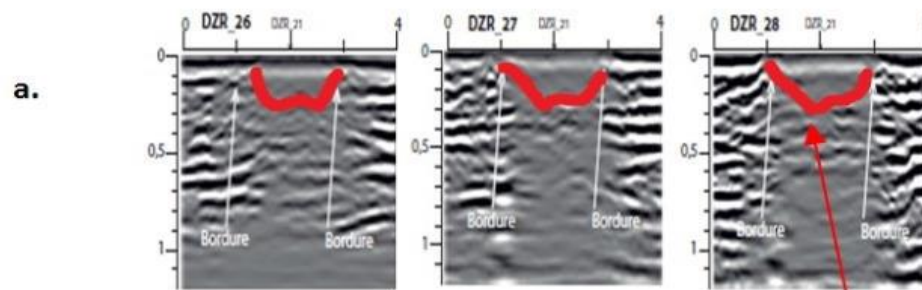
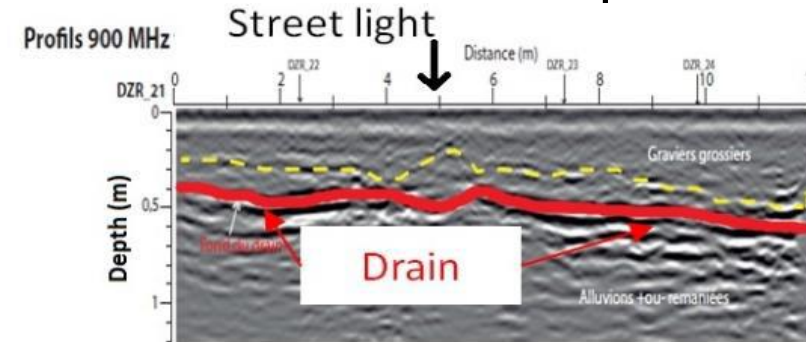
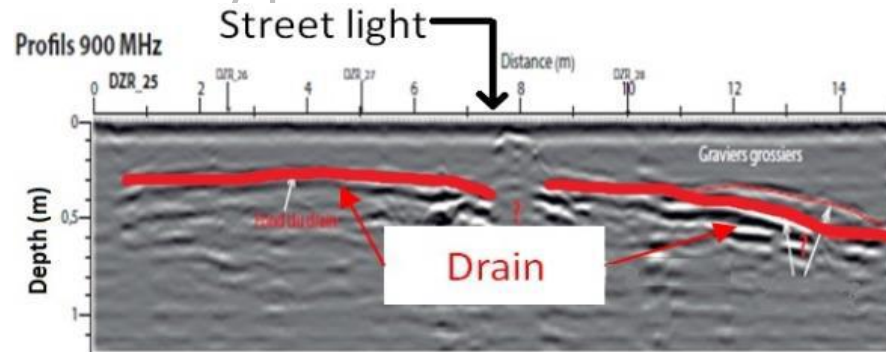
Operating tests

Structural analyses

Easy - Not very precise

Ground Penetrating Radar

Complex - More precise



Bottom

Slope defect of the drain at $\approx 2/3$ length

MONITORING DEVICES – MONITOR WATER FLOWS

On-site water flows

➤ **Wide range of flows :**

- Very small < 100 L/h ($2.8 \text{ e}^{-5} \text{ m}^3/\text{s}$)
- Important > 2000 L/h ($5.6 \text{ e}^{-4} \text{ m}^3/\text{s}$)



On-site water flows

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- **Flow-proportional sampling**
- **Space restriction**

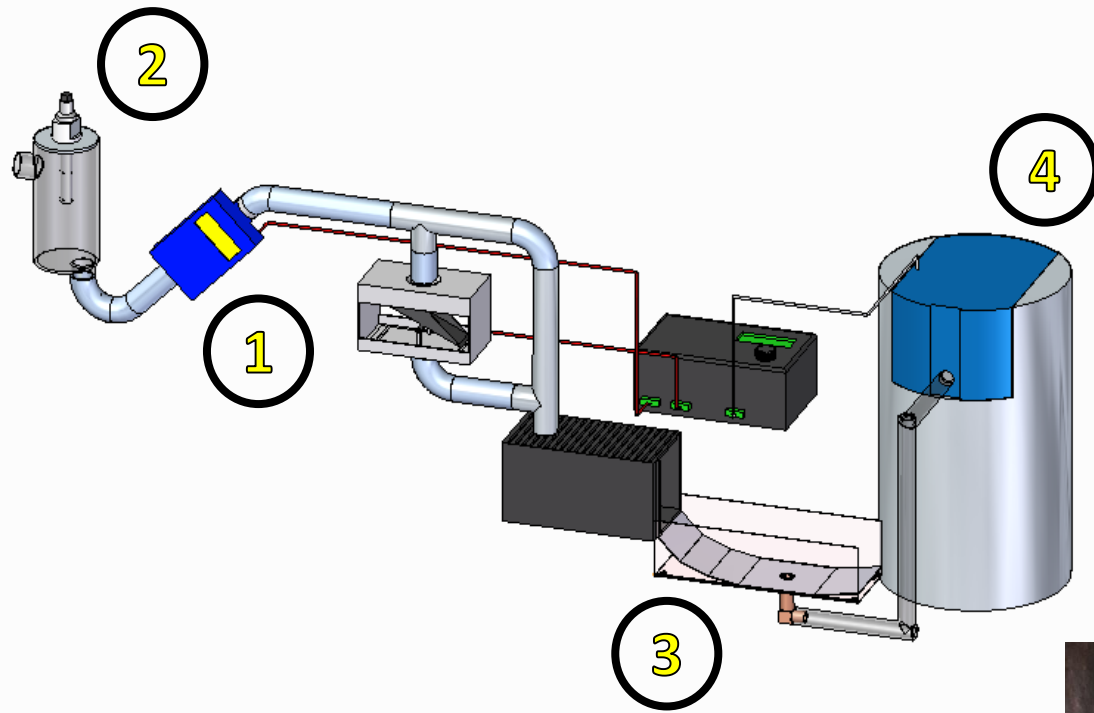


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Monitoring device

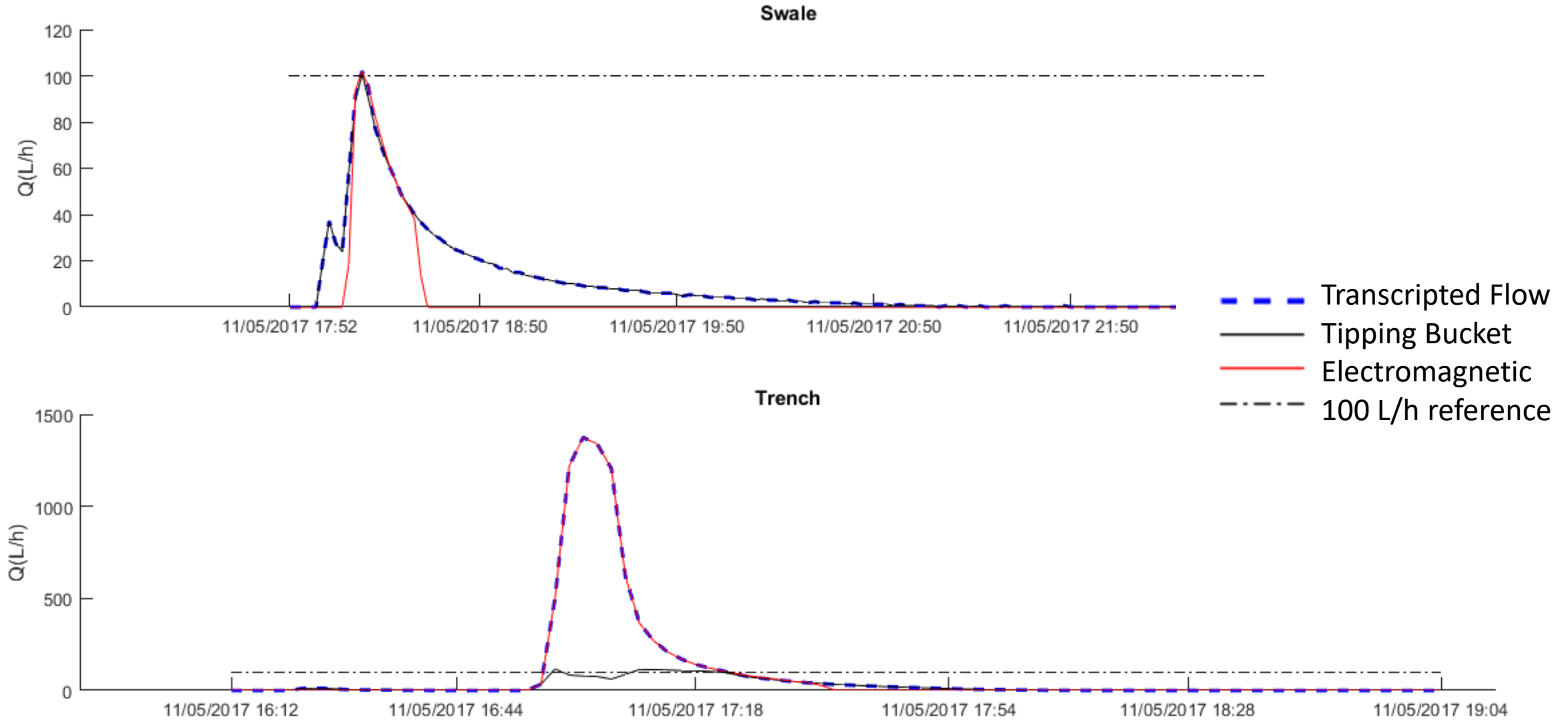


1. Flow
2. Conductivity & T°
3. Sampling bucket
4. Sampler

External rain monitoring



Data acquisition



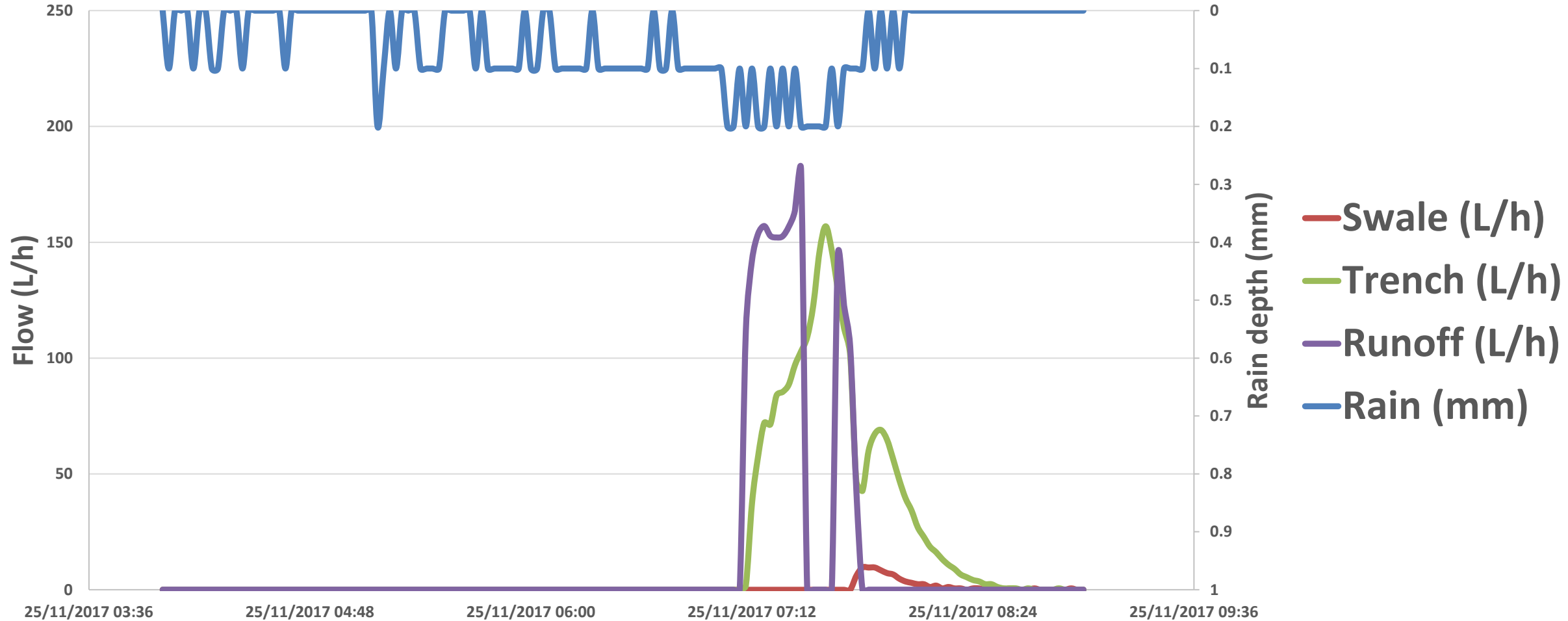
Monitoring device



Flow, Conductivity
& T° monitoring
at the inlet of a
similar swale for
runoff

Data acquisition

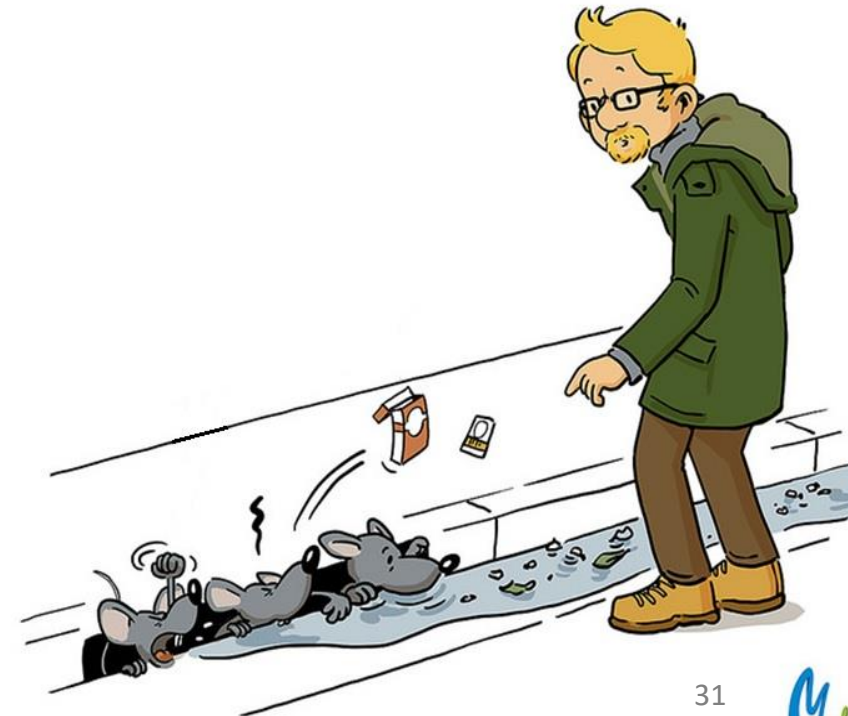
Event of the 25th of november 2017



WATER SAMPLING – MICROPOLLUTANT LOAD MONITORING

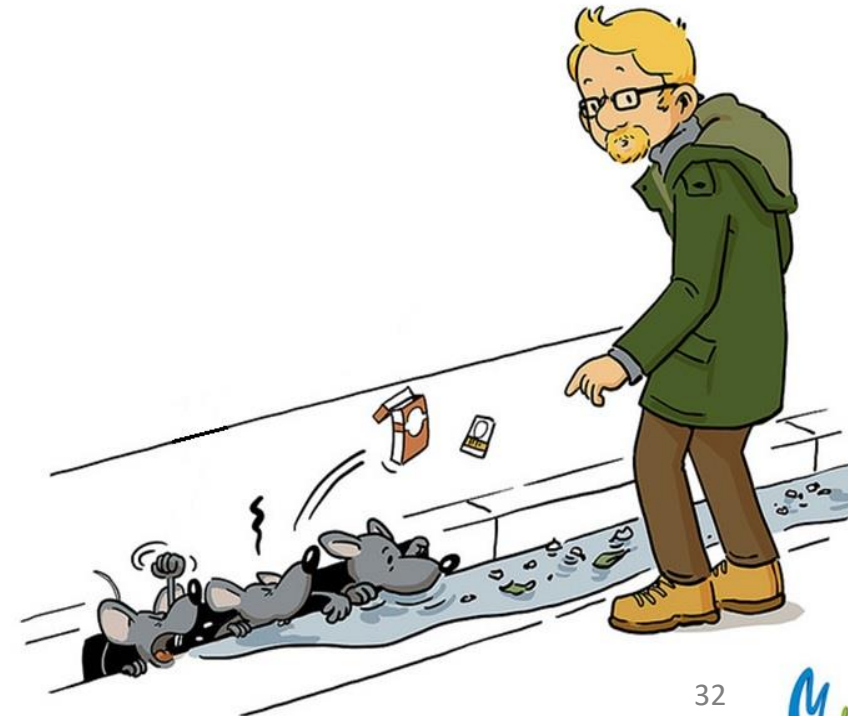
On-site sampling

- **Representative sampling of event mean concentration**
 - Flow-proportional sampling
 - Good mixing while sampling
 - No (few...) sampling bias
 - Good forecast of events for sampling strategy



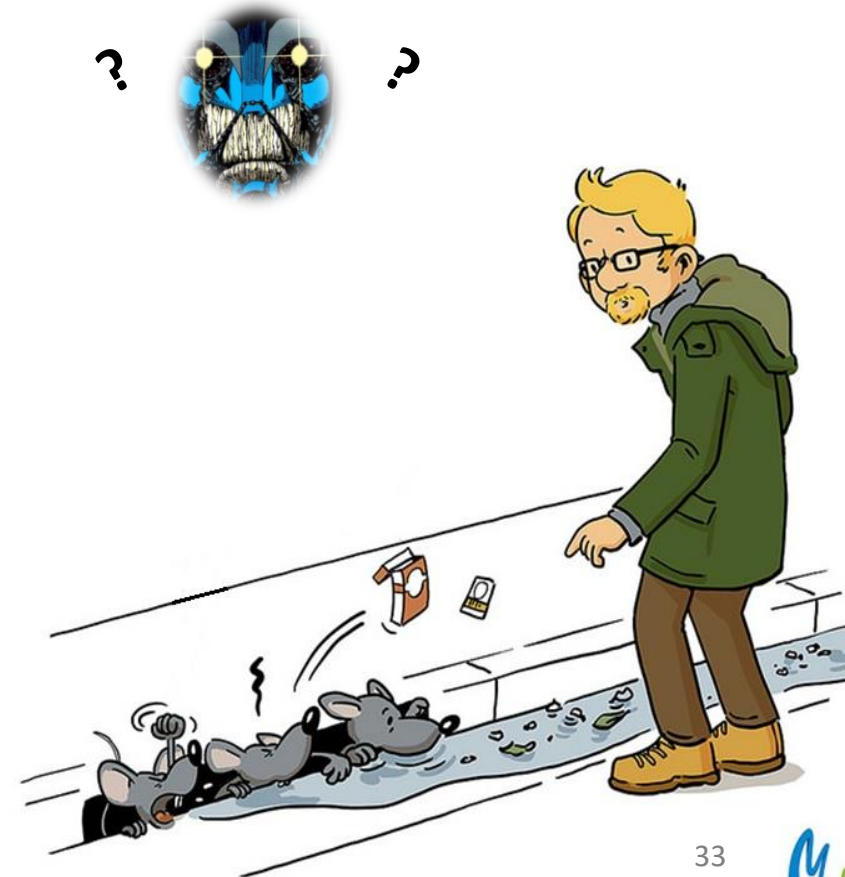
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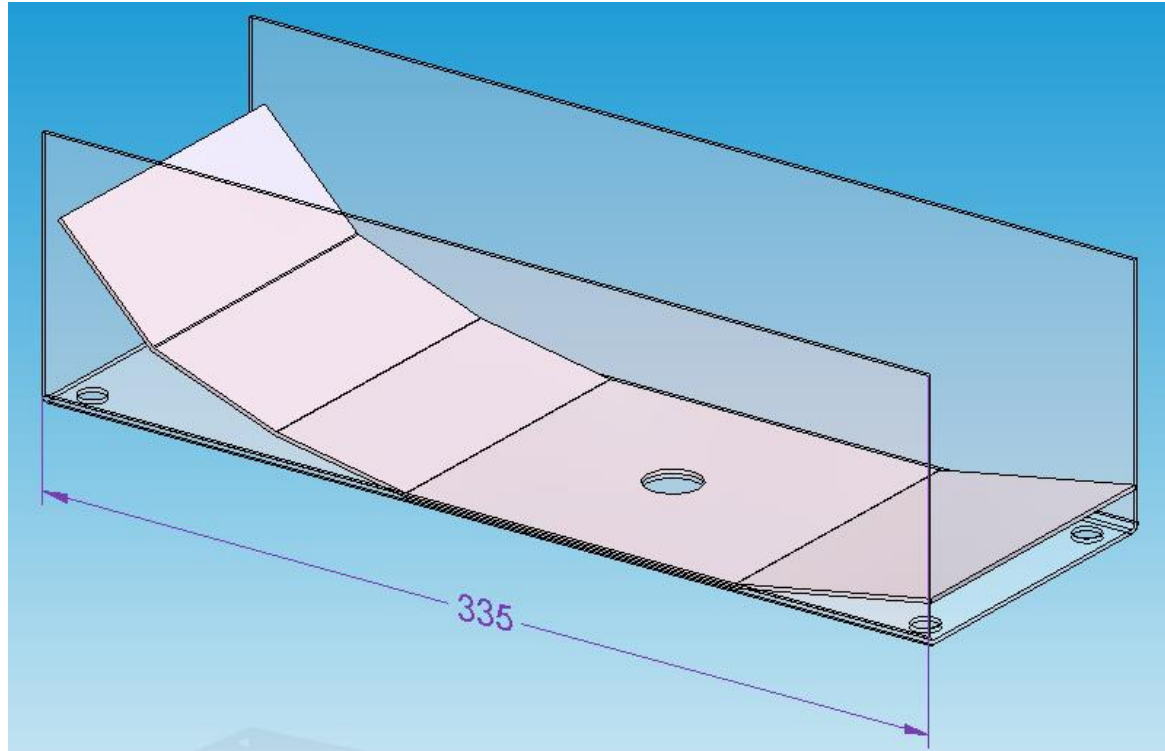


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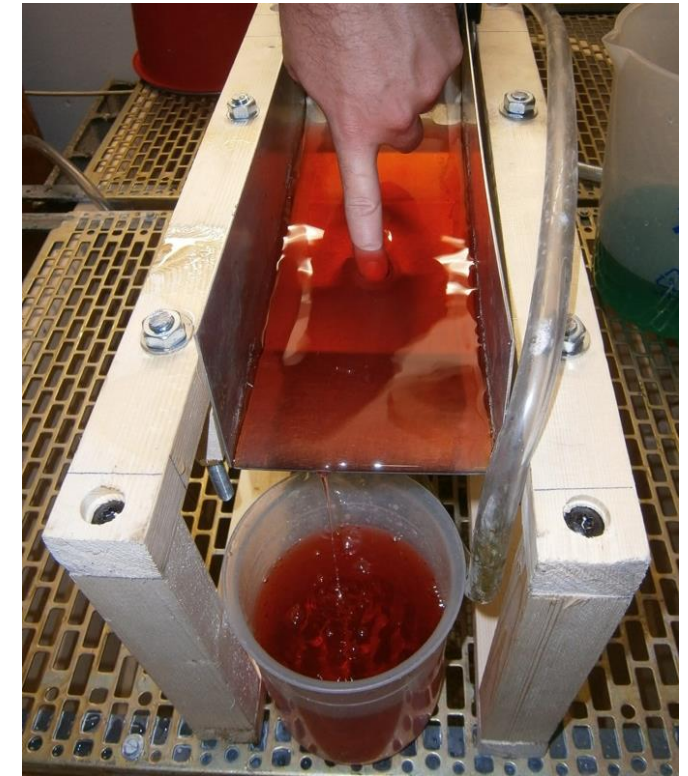
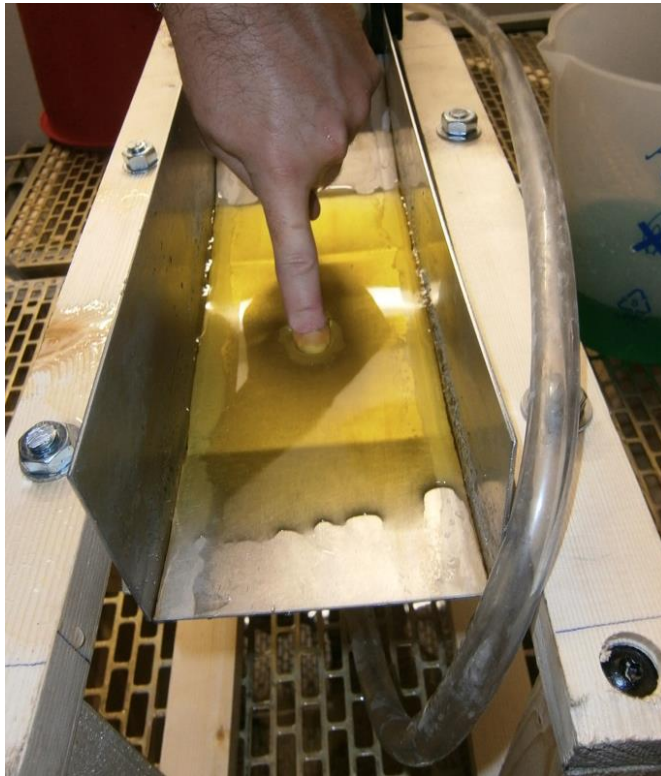


Homemade sampling device



Homemade sampling device

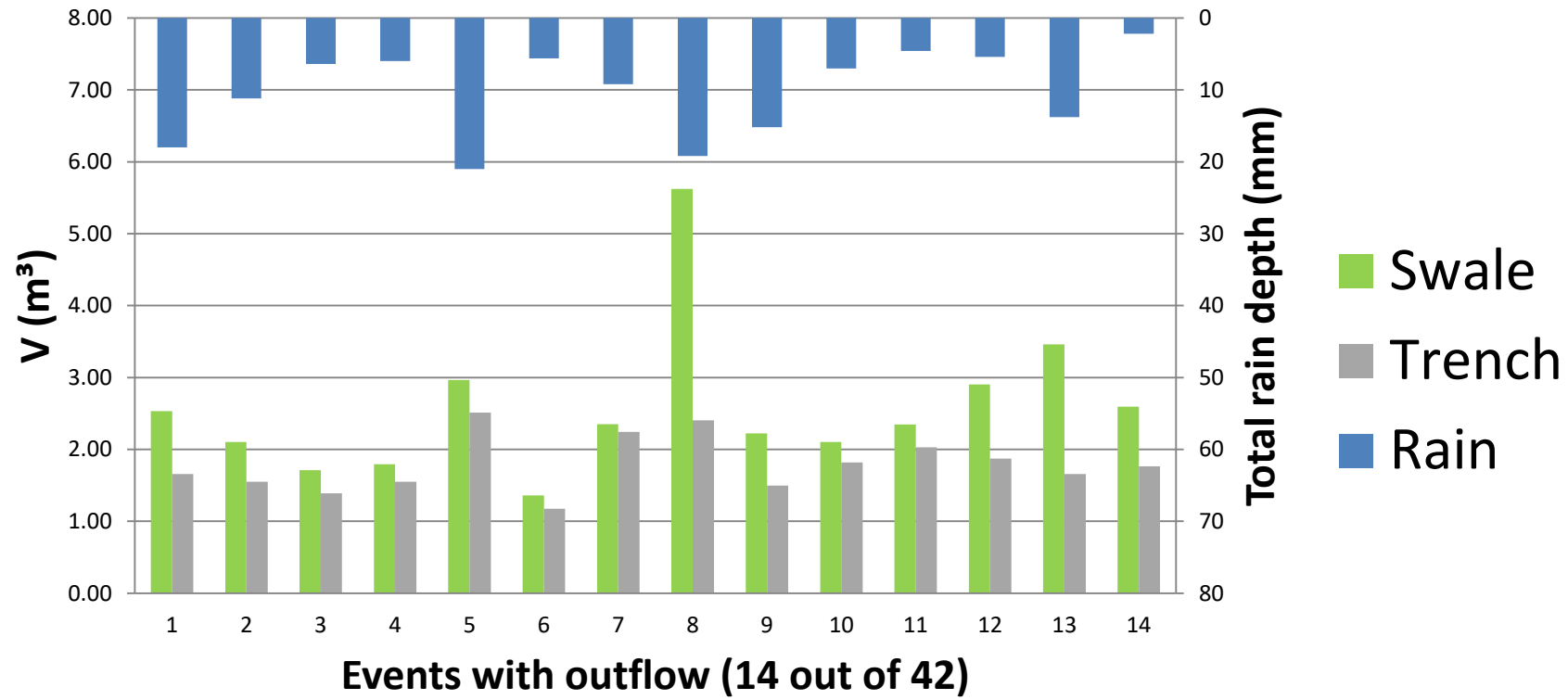
- *Visual test (mixing and renewal)*



- *Conductivity test on site (dissolved element)*

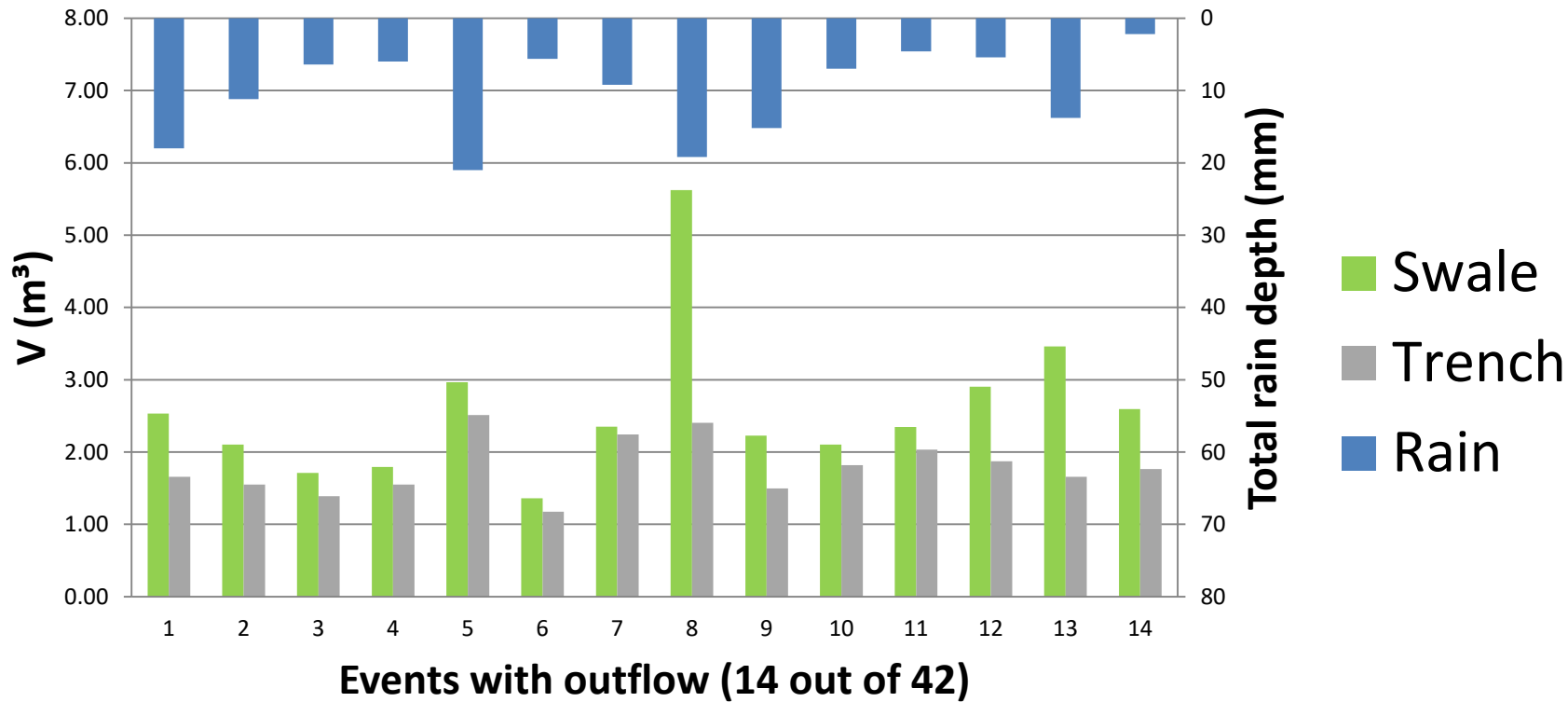
Data Acquisition & Forecast

Volume of rainfall at first outflow time step



Data Acquisition & Forecast

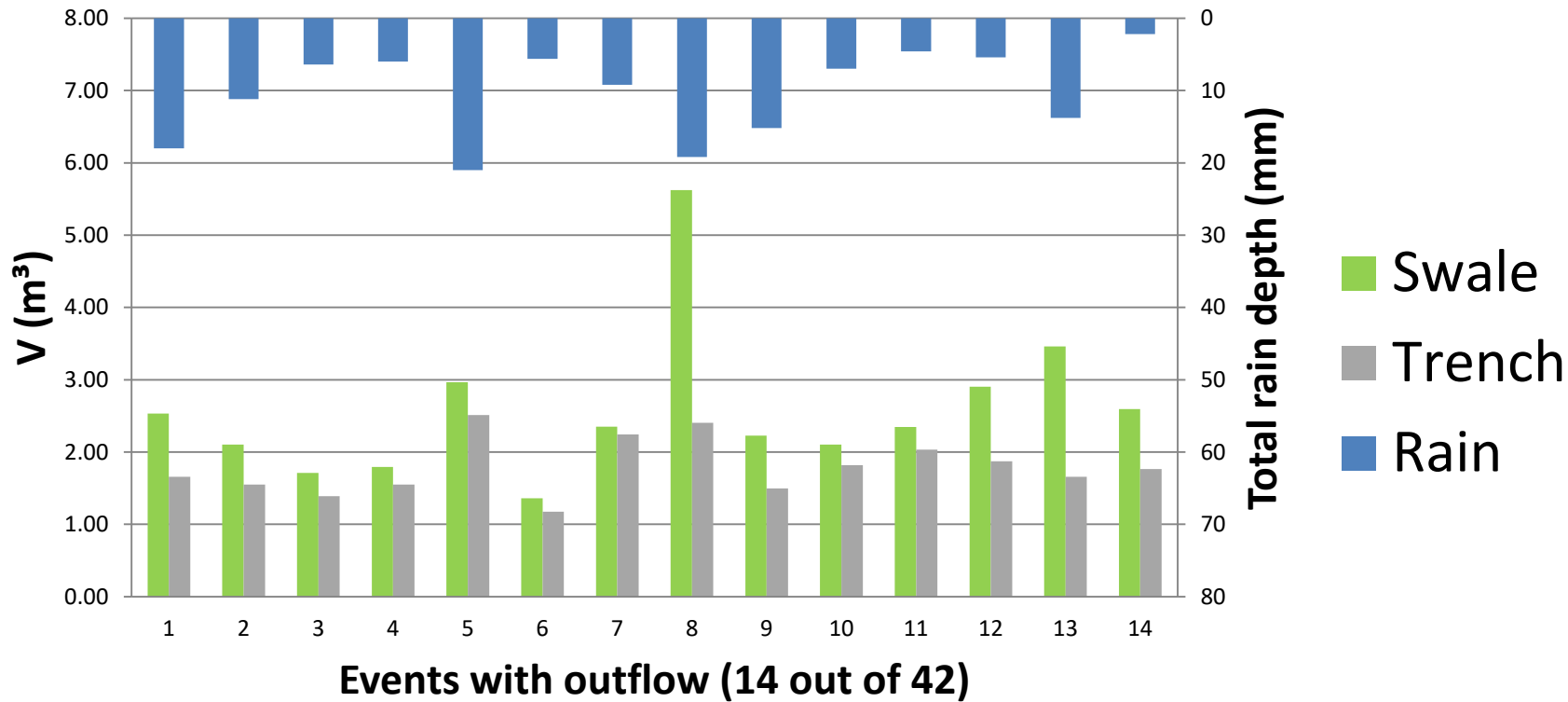
Volume of rainfall at first outflow time step



Rainfall > 8 mm

Data Acquisition & Forecast

Volume of rainfall at first outflow time step



Rainfall > 8 mm

Issues due to inexact rain forecast

THANK YOU!

More informations on the Project : www.micromegas-lyon.org
Only available in french for the moment !