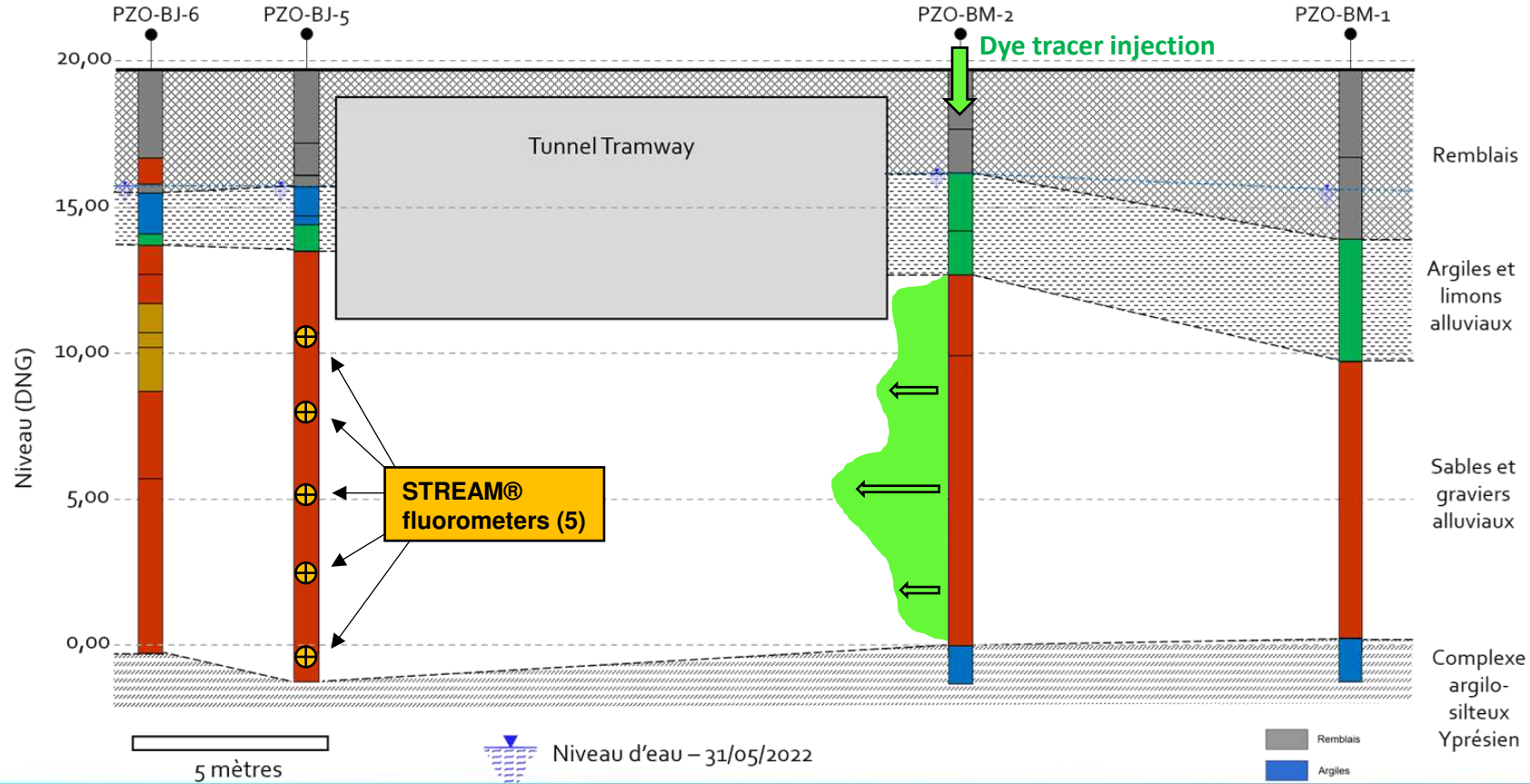
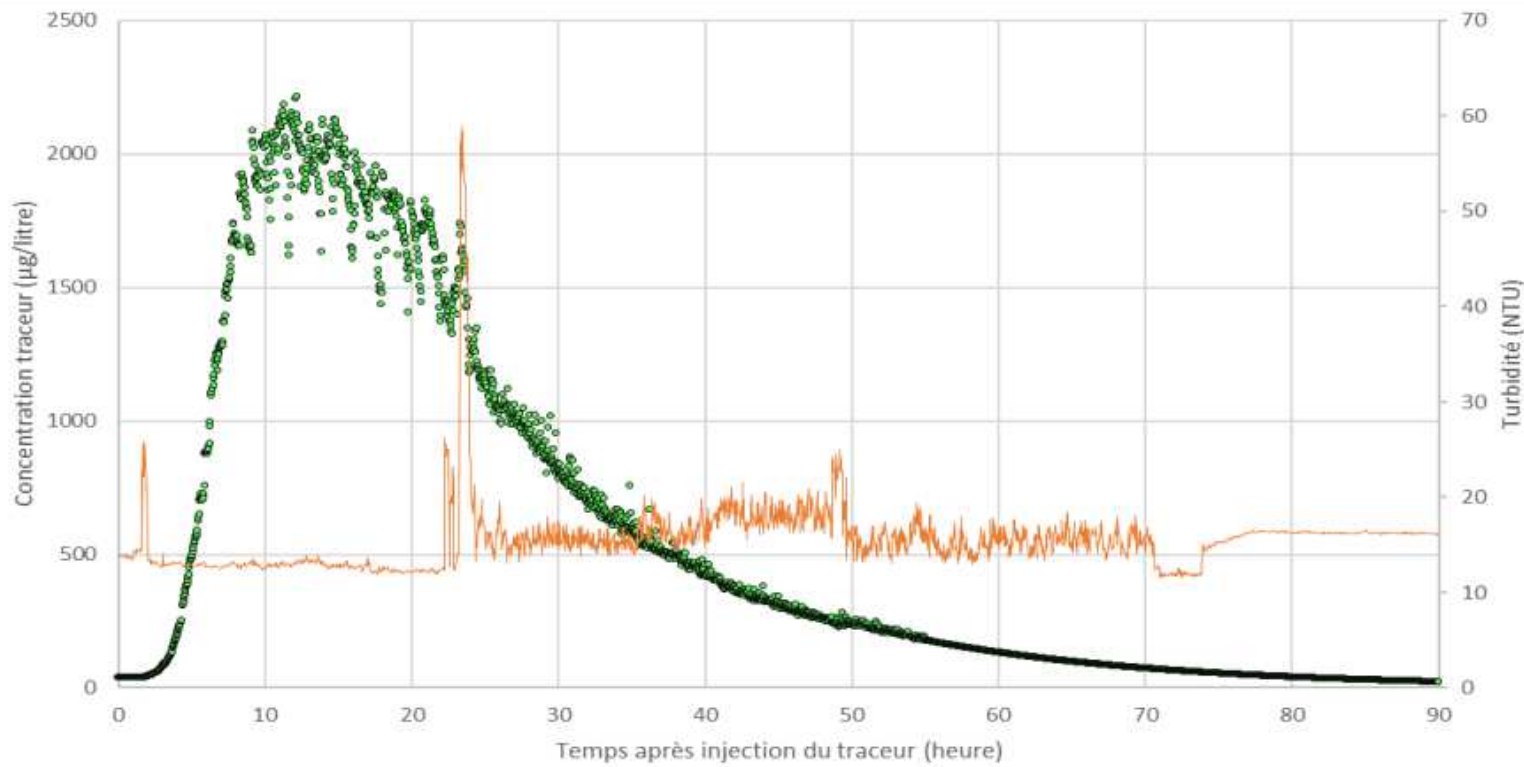


Case study 1 - tunneling

New M3 Metro Line – Brussels (Belgium)

Groundwater flow velocities evaluation in alluvial aquifer for the implementation of a ground freezing technique. Analysis of heterogeneity in natural flow conditions.



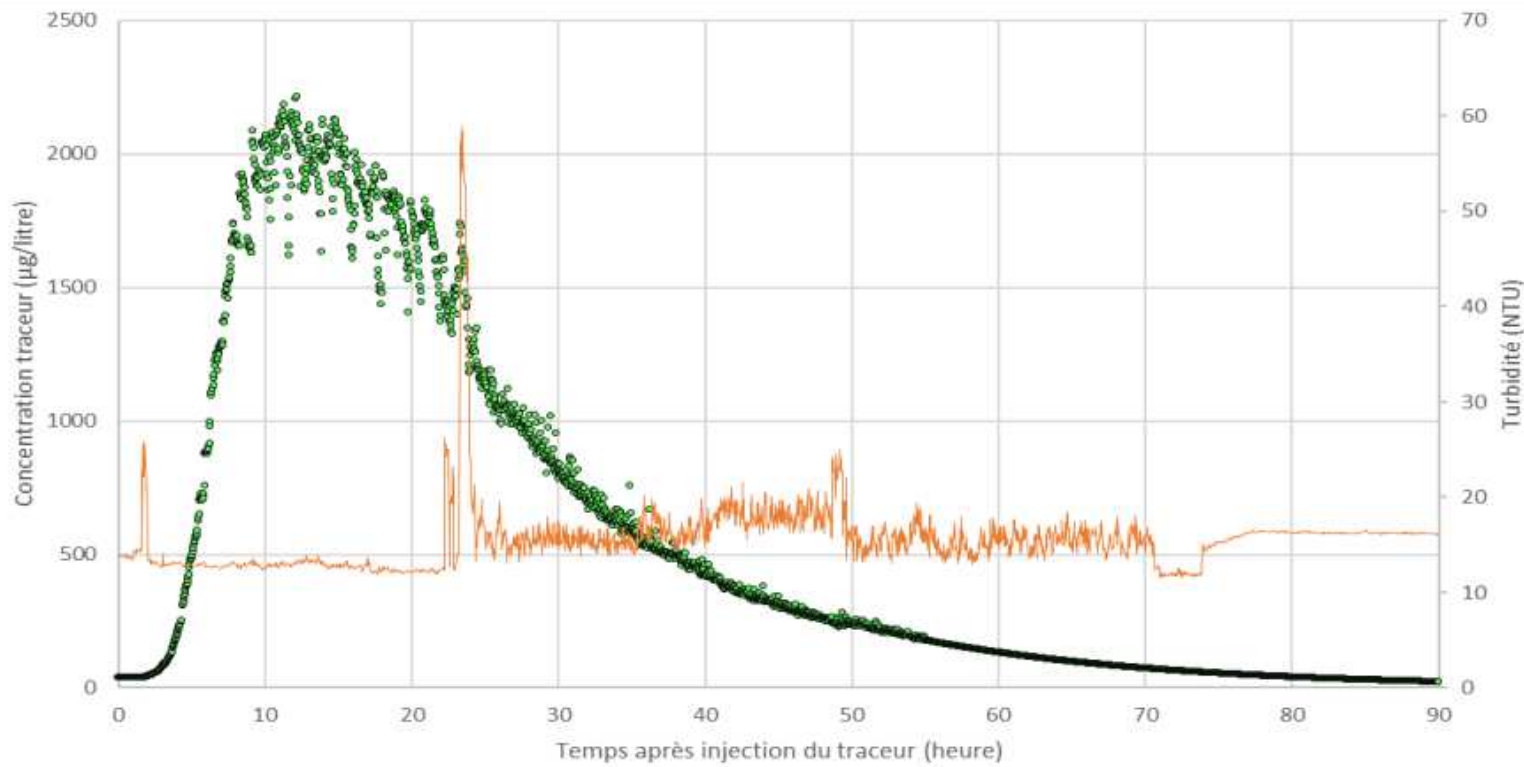


New M3 Metro Line – Brussels (Belgium)

Groundwater model calibration using radial-convergent dye tracing (borehole to borehole)

- Apparent velocity calculation
- Effective porosity calibration
- Real velocity model based on groundwater heads





New M3 Metro Line – Brussels (Belgium)

Dye tracing under natural conditions at variable depth using high resolution screening of dye restitution in boreholes

- Homogeneous injection in one borehole
- High resolution measurement in downstream borehole for 4 weeks (10 fluorimeters, 1 measure/5 minutes)



Case study 1

New M3 Metro Line – Brussels (Belgium)

Groundwater flow velocities evaluation in alluvial aquifer for the implementation of a ground freezing technique. Analysis of heterogeneity in natural flow conditions.

Take-home message

- Direct testing of groundwater **transport** is useful to support numerical models
- High temporal and spatial resolution of data matters :
 - High velocities
 - Heterogeneous alluvial aquifer
- Deadlines and context don't always allow sampling/lab analysis

