

# RETOUR EXPERIENCE :

SIST – pole INSIDE, Webinaire SensorThings API

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29/09/2022

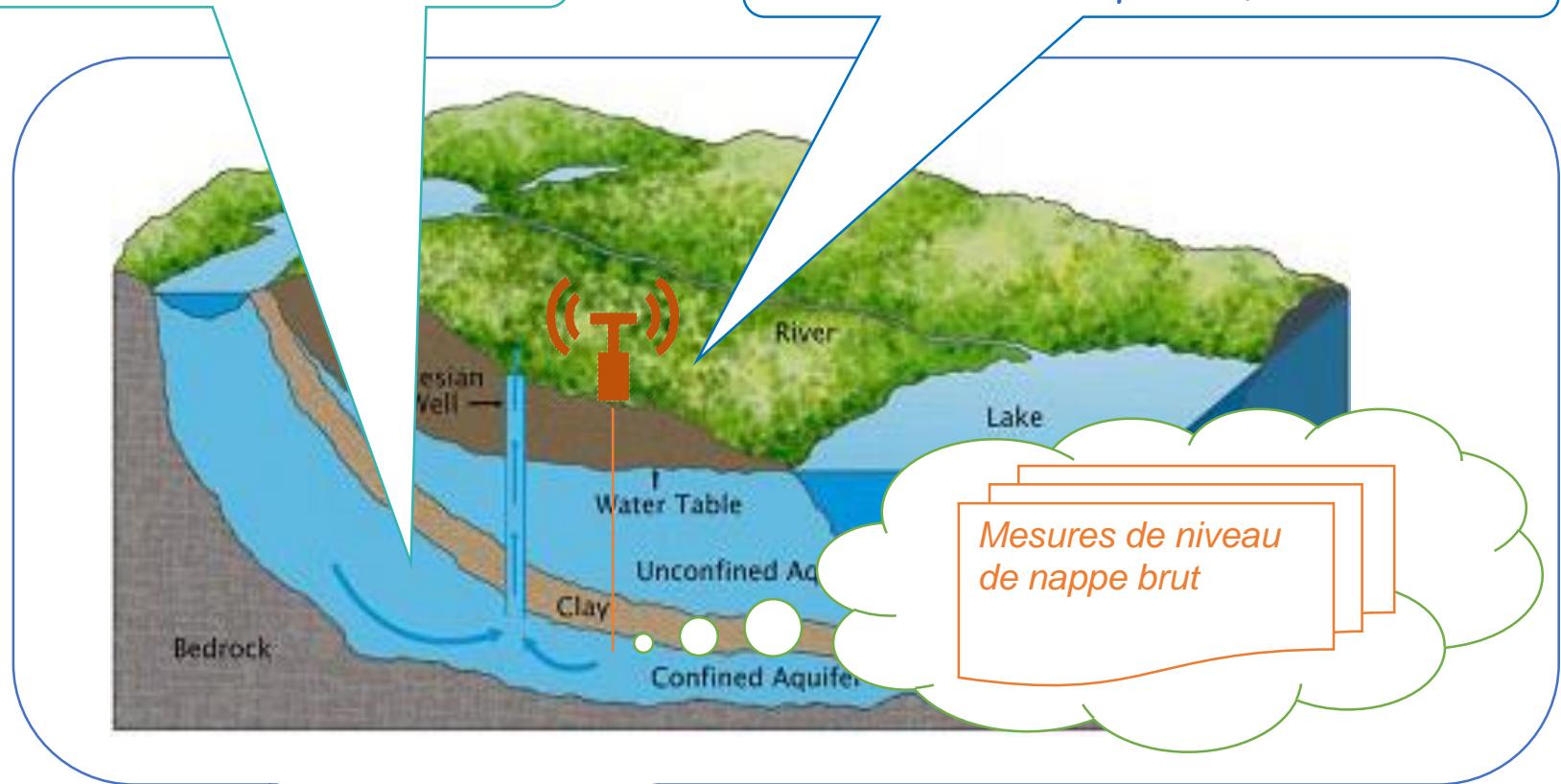
# RETOUR EXPERIENCE :

Capteurs eau souterraine

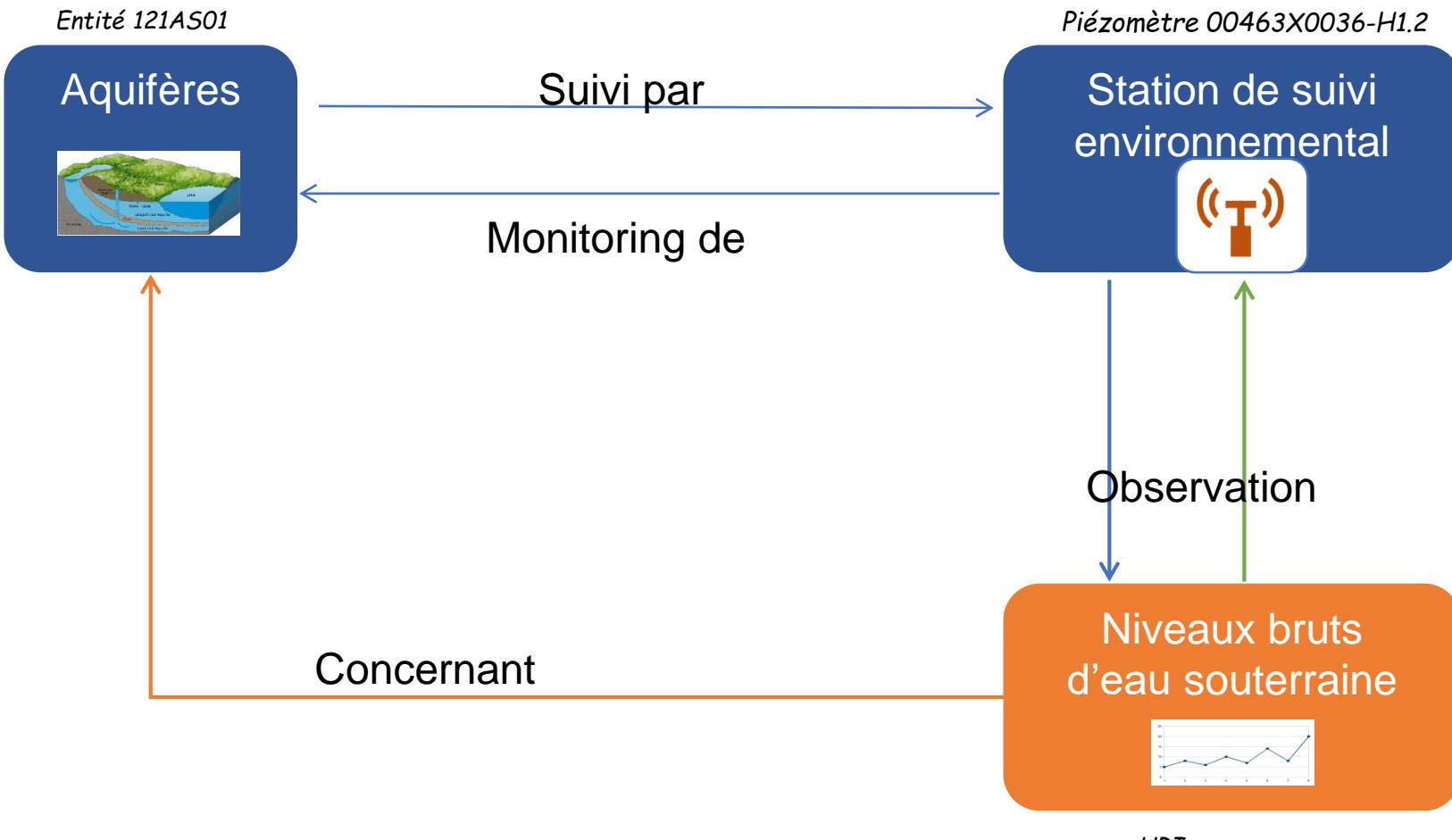
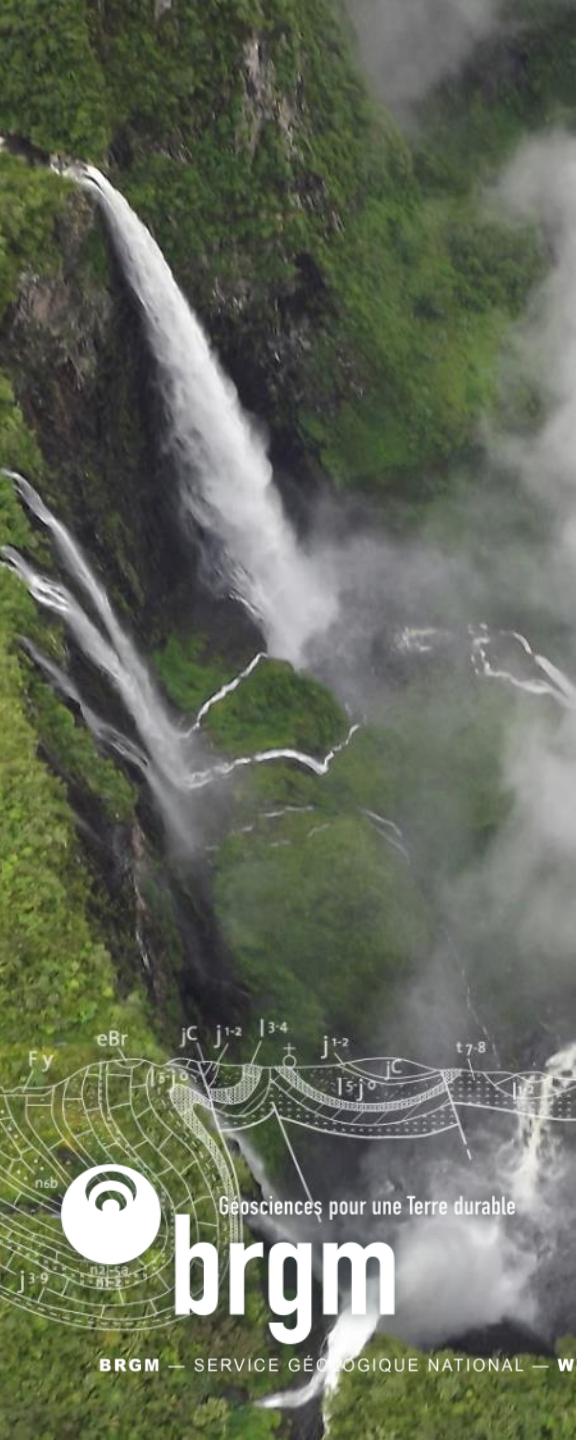


# Contexte métier

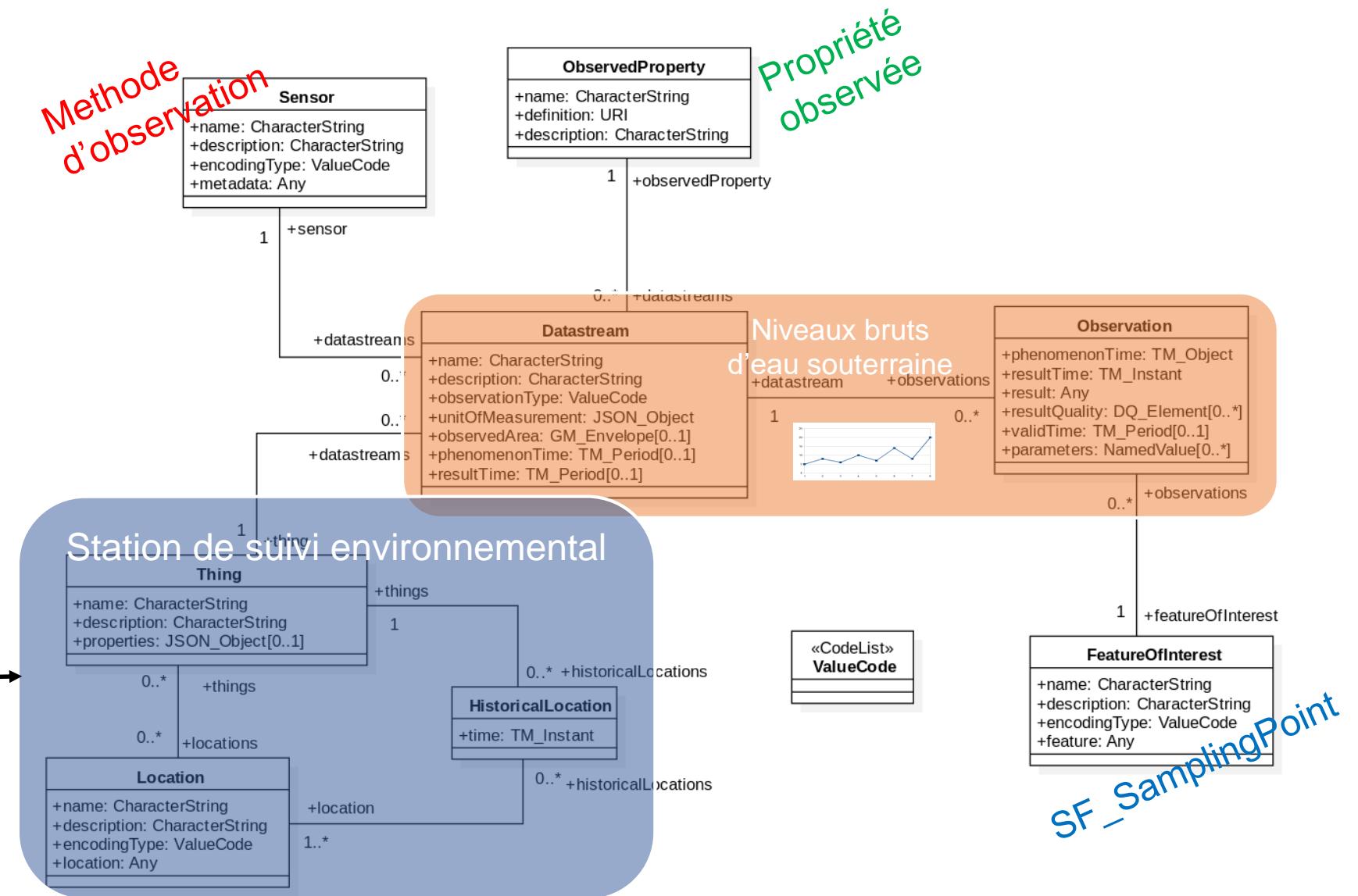
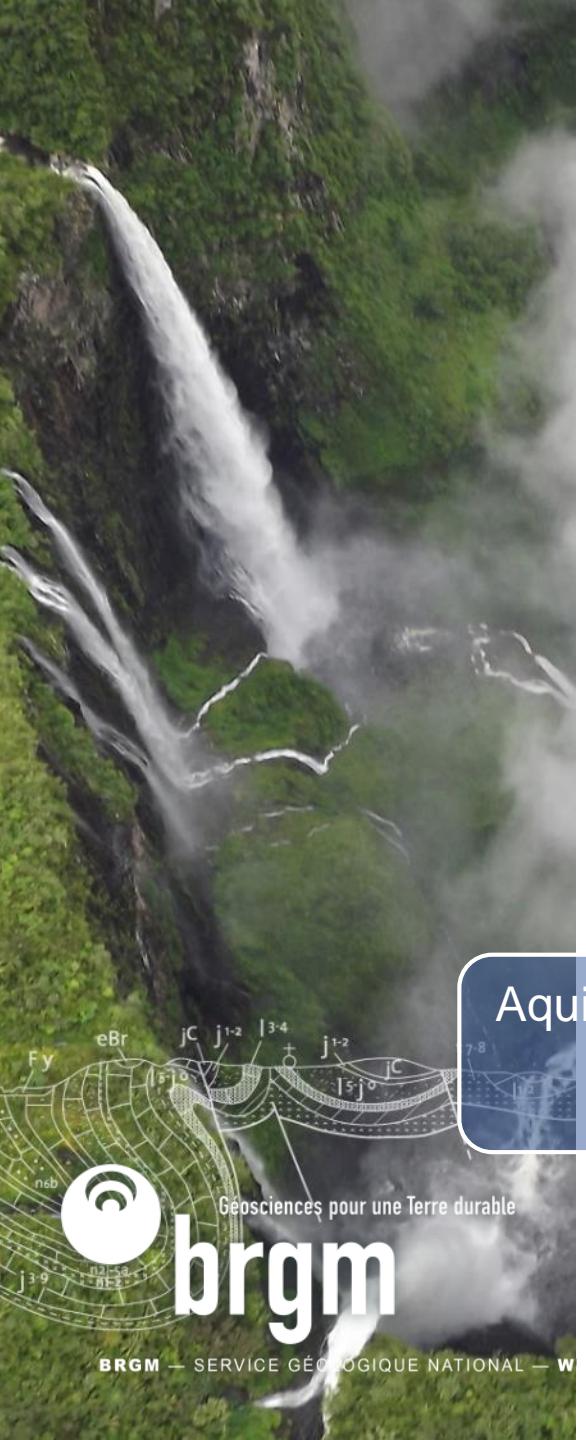
Entité HydroGéologique



# Contexte métier

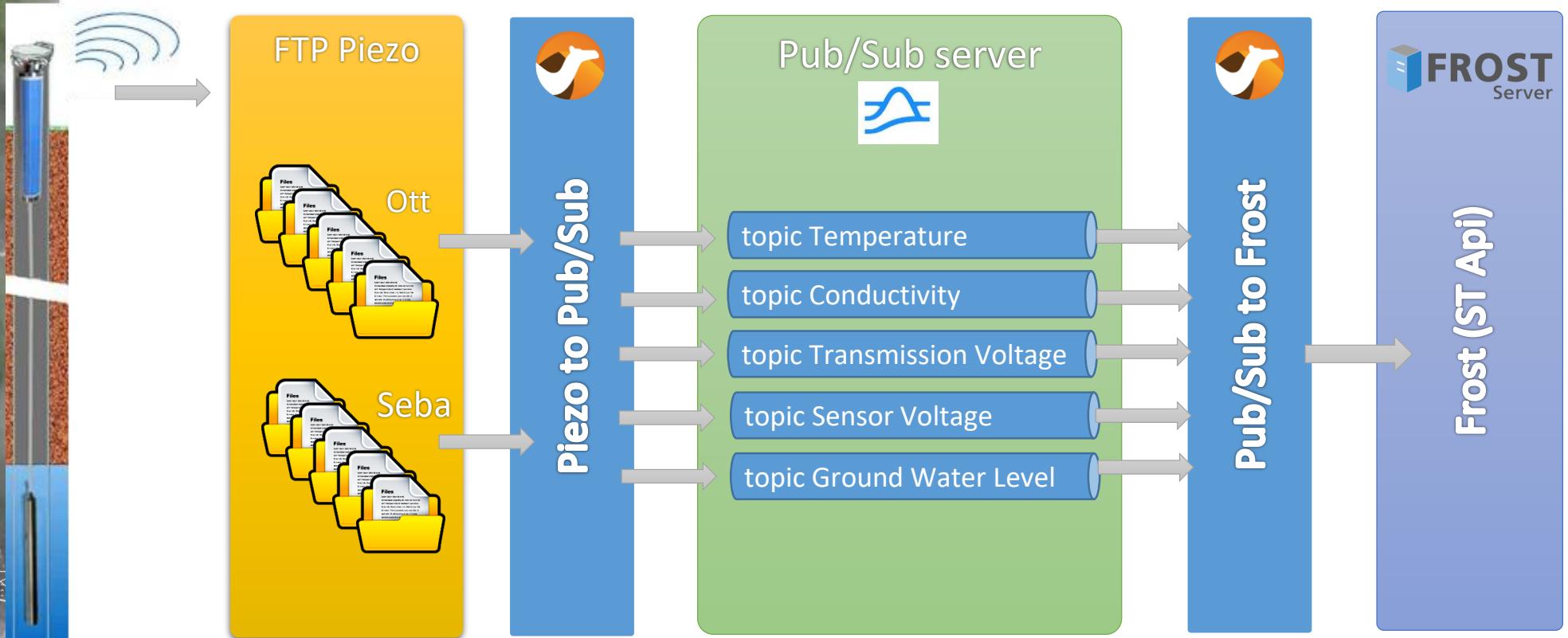


# Objets métier VS le standard



# Alimentation serveur en données

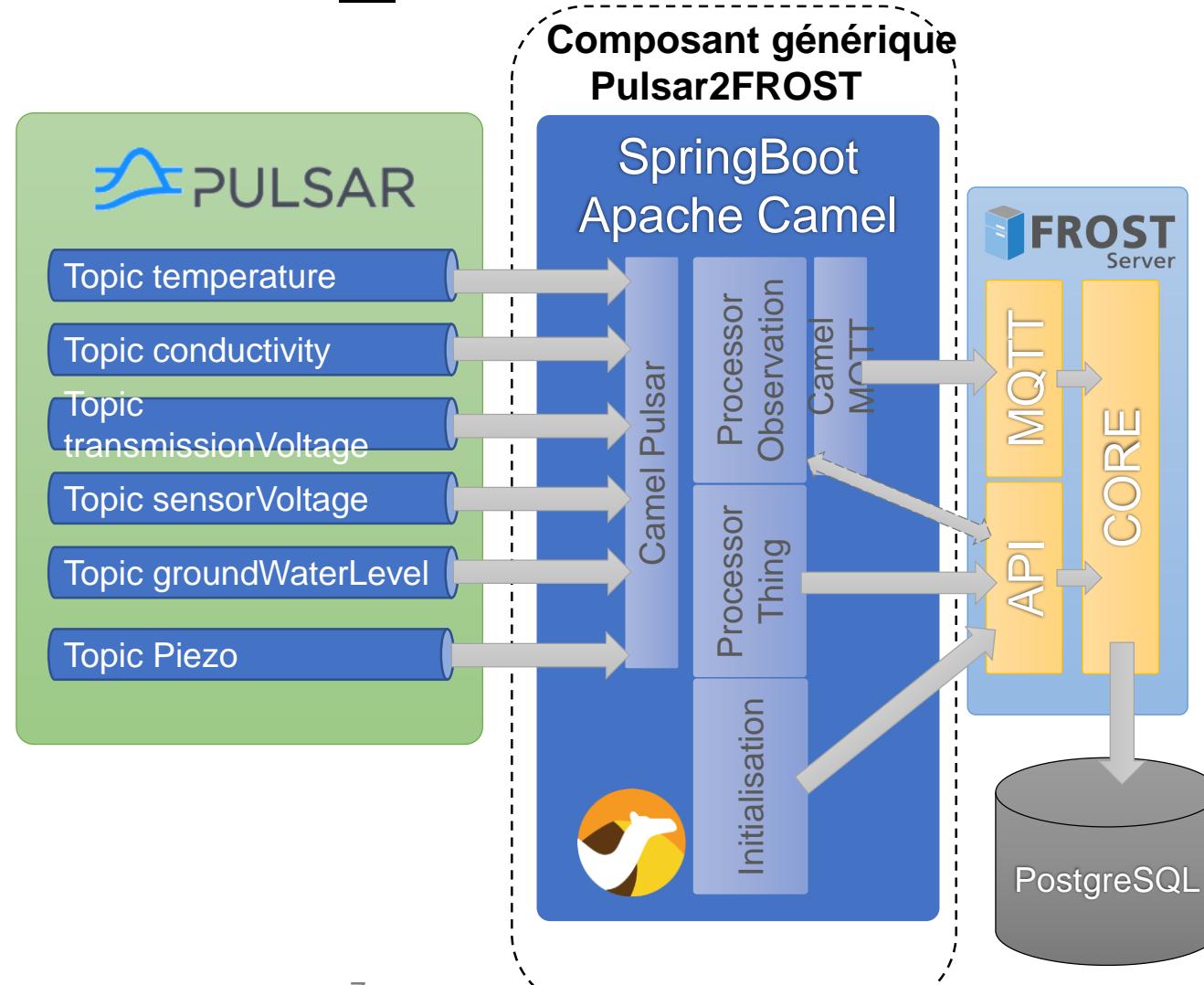
Vision globale





# Alimentation serveur en données

Utilisation FROST en lecture ET écriture





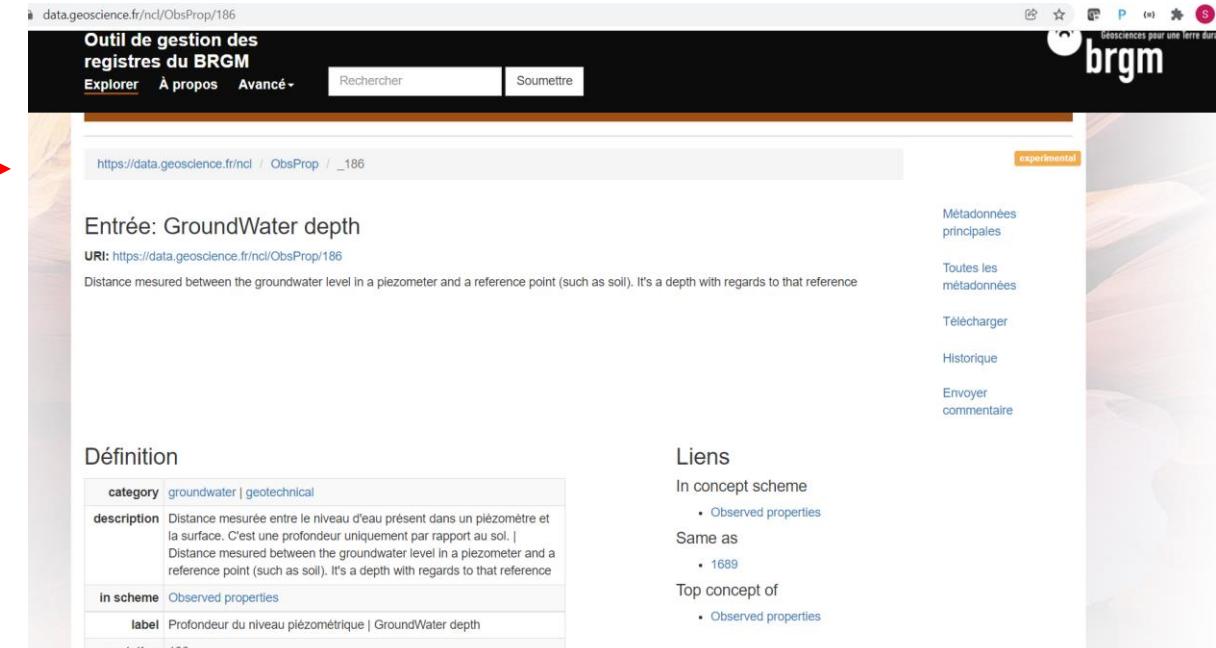
# Lien vers d'autres éléments du SI

Les Observed Properties pointent vers les registres de données liée (via URI)

Ici : <https://data.geoscience.fr/ncl/ObsProp/186>

```
// 20200908145120
// https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties

{
  "value": [
    {
      "name": "GroundWater depth",
      "description": "GroundWater depth",
      "Datastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(1)/Datastreams",
      "MultiDatastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(1)/MultiDatastreams",
      "definition": "https://data.geoscience.fr/ncl/ObsProp/186",
      "@iot.id": 1,
      "@iot.selfLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(1)"
    },
    {
      "name": "Water Temperature",
      "description": "Water Temperature",
      "Datastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(2)/Datastreams",
      "MultiDatastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(2)/MultiDatastreams",
      "definition": "https://data.geoscience.fr/ncl/ObsProp/187",
      "@iot.id": 2,
      "@iot.selfLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(2)"
    },
    {
      "name": "Conductivity",
      "description": "Conductivity",
      "Datastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(3)/Datastreams",
      "MultiDatastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(3)/MultiDatastreams",
      "definition": "https://data.geoscience.fr/ncl/ObsProp/191",
      "@iot.id": 3,
      "@iot.selfLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(3)"
    },
    {
      "name": "Battery voltage in the sensor",
      "description": "Battery voltage in the sensor",
      "Datastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(4)/Datastreams",
      "MultiDatastreams@iot.navigationLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(4)/MultiDatastreams",
      "definition": "https://data.geoscience.fr/ncl/ObsProp/190",
      "@iot.id": 4,
      "@iot.selfLink": "https://sensorthings.brgm-rec.fr/SensorThingsGroundWater/v1.1/ObservedProperties(4)"
    }
  ]
}
```



The screenshot shows a web interface for managing data registers at <https://data.geoscience.fr/ncl/ObsProp/186>. The page title is "Outil de gestion des registres du BRGM". The main content area displays the following information:

**Entrée: GroundWater depth**  
URI: <https://data.geoscience.fr/ncl/ObsProp/186>  
Distance mesured between the groundwater level in a piezometer and a reference point (such as soil). It's a depth with regards to that reference.

**Définition**

category	groundwater   geotechnical
description	Distance mesurée entre le niveau d'eau présent dans un pélomètre et la surface. C'est une profondeur uniquement par rapport au sol.   Distance measured between the groundwater level in a piezometer and a reference point (such as soil). It's a depth with regards to that reference
in scheme	Observed properties
label	Profondeur du niveau piézométrique   GroundWater depth
notation	186

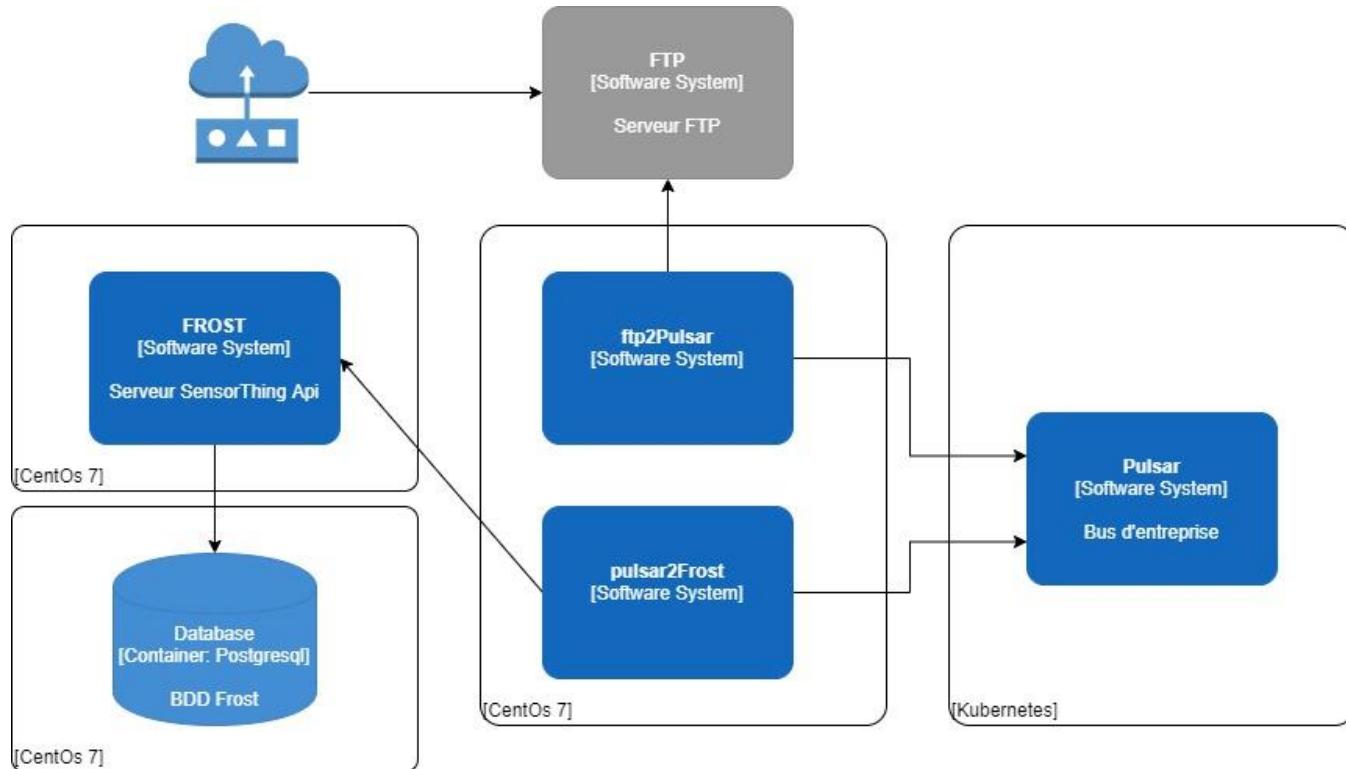
**Liens**

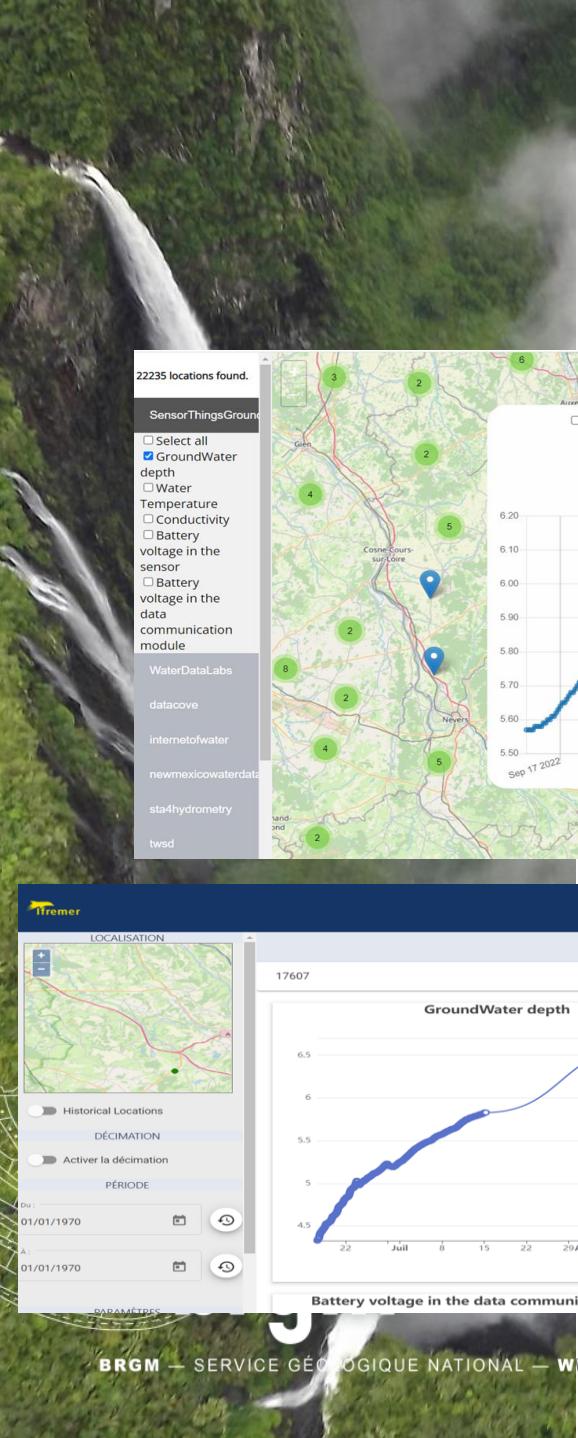
- In concept scheme
  - Observed properties
- Same as
  - 1689
- Top concept of
  - Observed properties



# Déploiement serveur

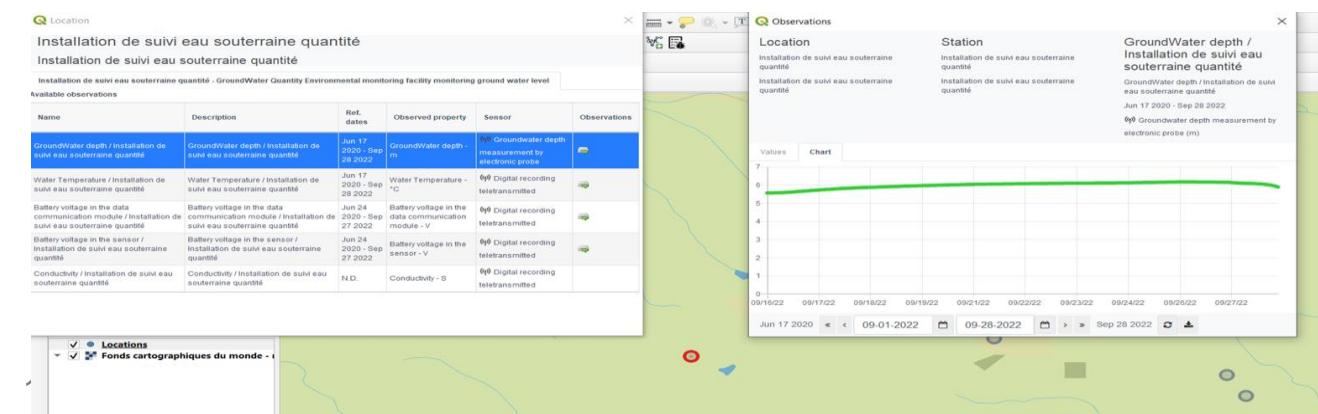
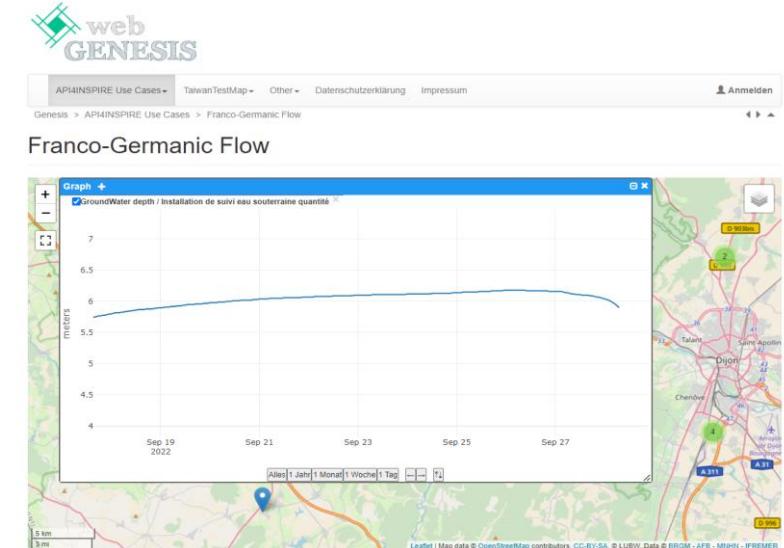
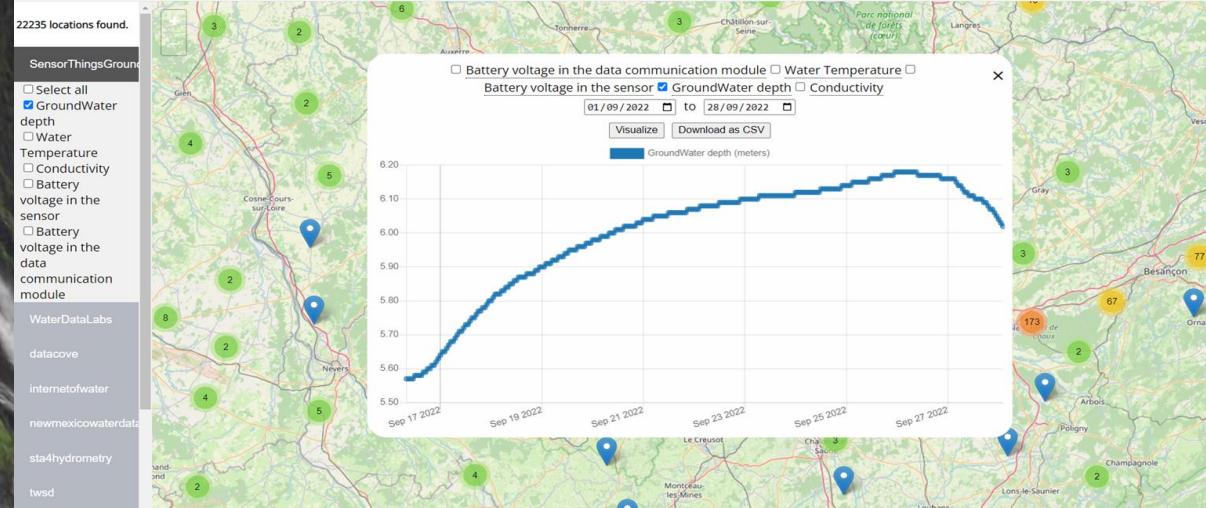
- VM des applications :
  - Centos 7
    - 2 CPU
    - 6 Go RAM
    - HDD 10 Go
  - Java 8
- VM Frost
  - Docker
  - Centos 7
    - 2 CPU
    - 4 Go RAM
    - HDD 10 Go
- VM BDD :
  - Centos 7
    - 2 CPU
    - 8 Go RAM
    - HDD 380 Go
  - Postgresql 11.2

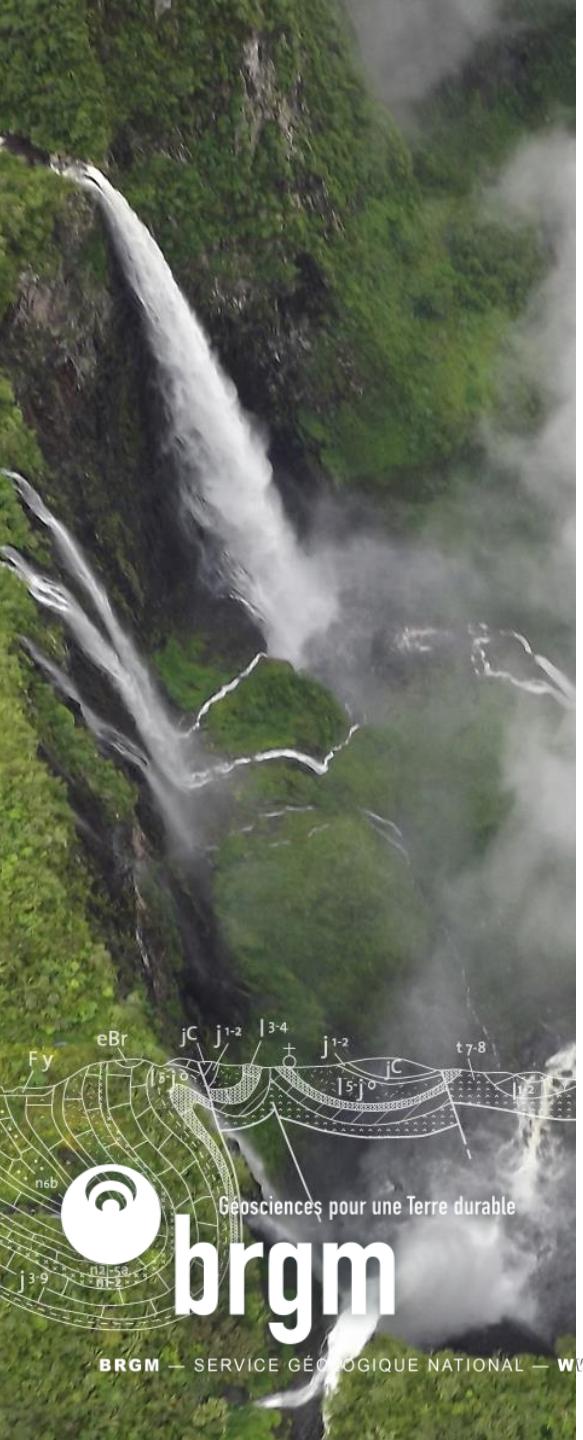




# Clients en place

Pas de client spécifique pour l'instant mais consommation déjà effective dans de nombreux clients





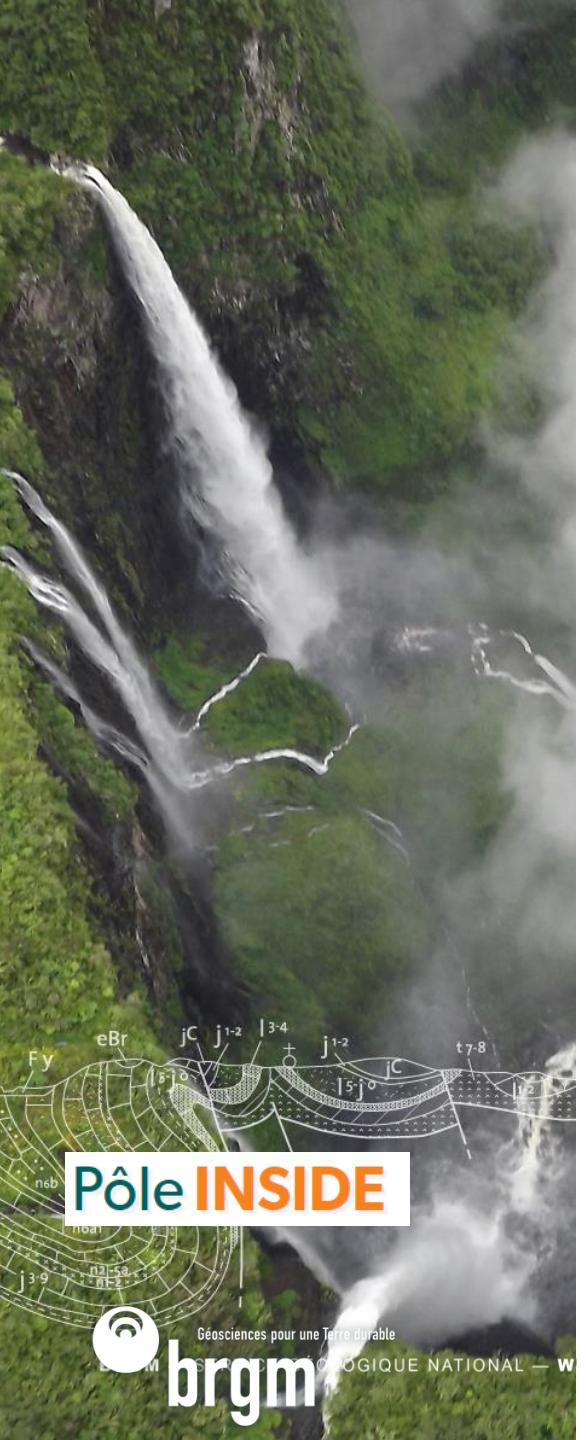
# Retours

- Interne
  - Equipes techniques
    - bien plus facile à appréhender, mettre en place et maintenir que les précédents déploiements SOS
    - l'usage complet Read **ET** Write est un vrai plus pour la facilité de mise en place dans l'infrastructure
  - Métier
    - la capacité de requêtage permet de beaucoup couvrir les Use Case métiers que les précédents travaux sur le SOS
- Externe
  - Intérêt grandissant à travers de nombreux métiers en France et en dehors -> cf ce webinaire



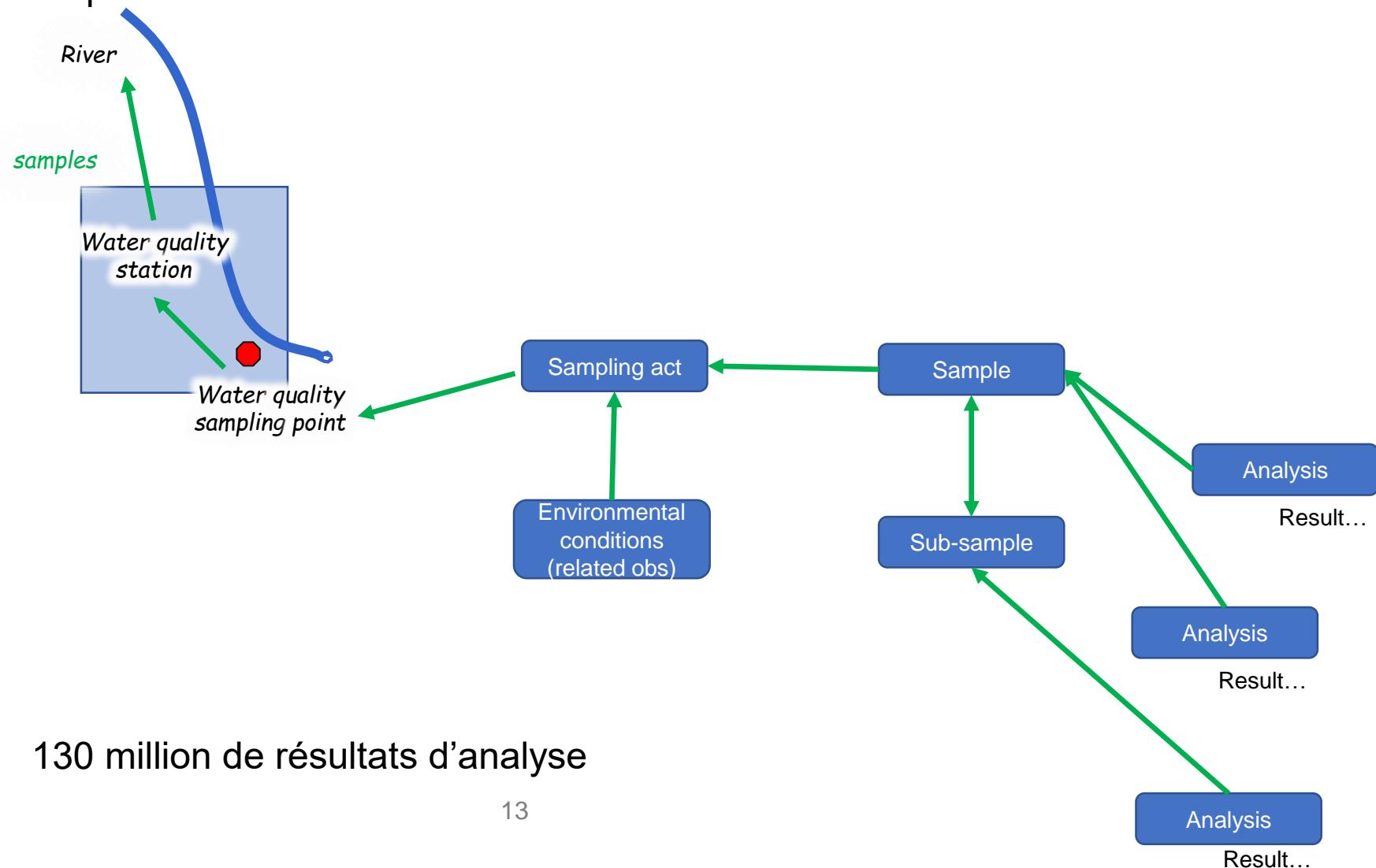
# RETOUR EXPERIENCE :

Données quantité / qualité eau de surface



# Contexte métier

Qualité eau de surface (concentration substances chimiques) – modèle complet

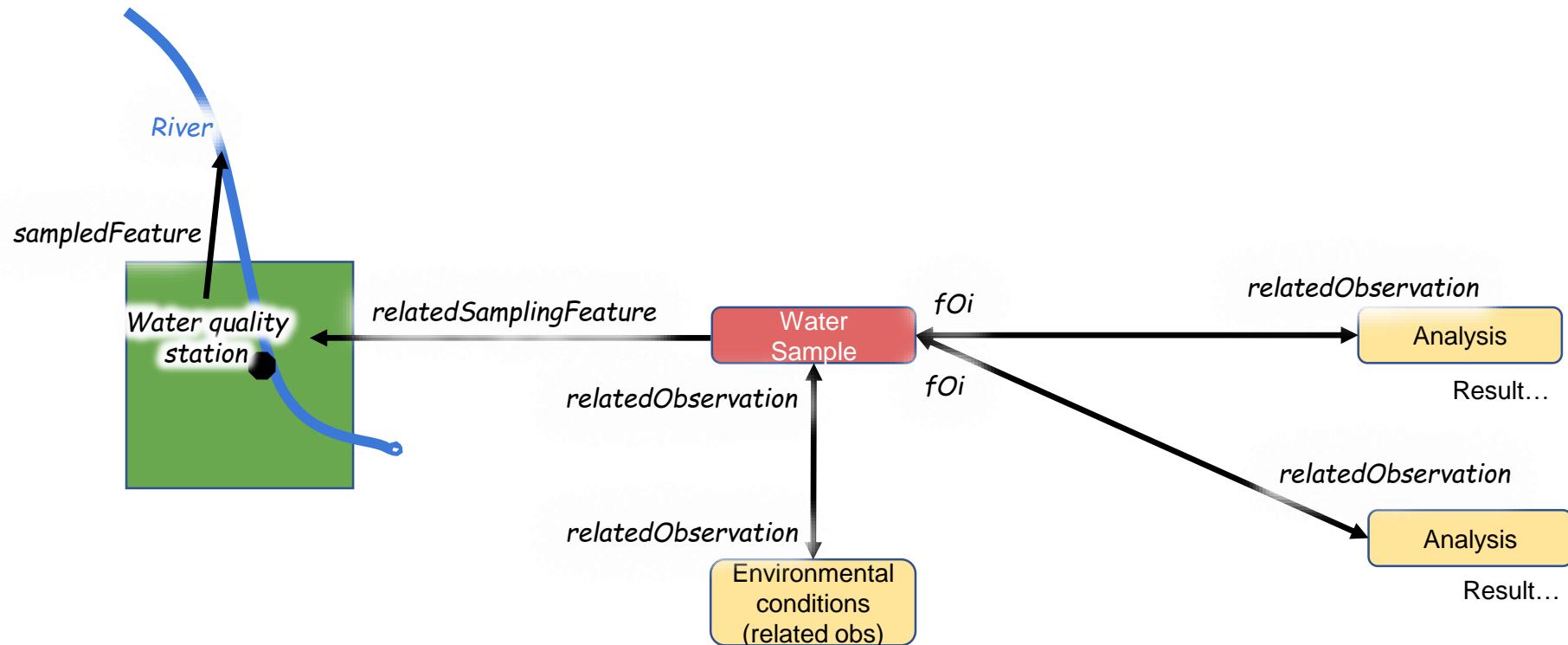


130 million de résultats d'analyse



# Objets métier VS le standard sémantique

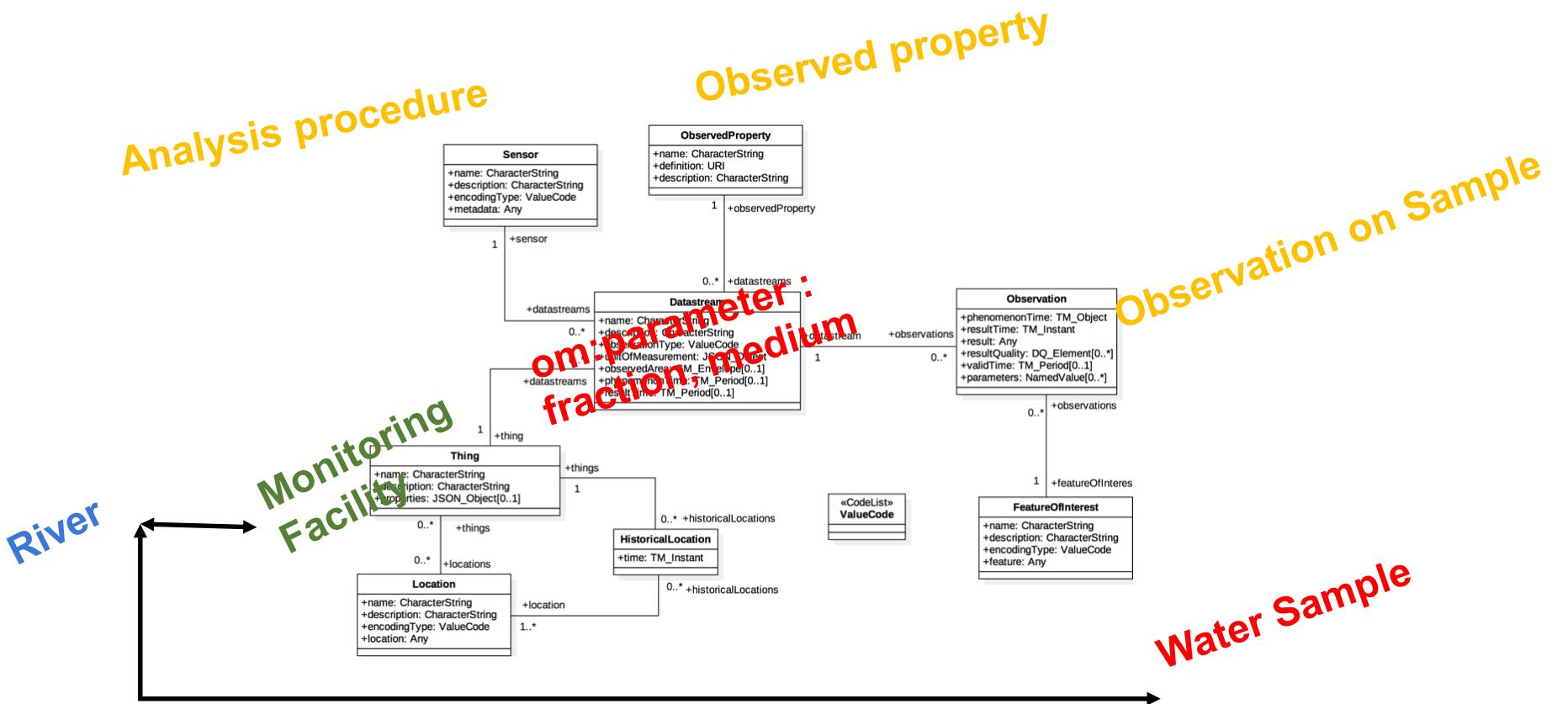
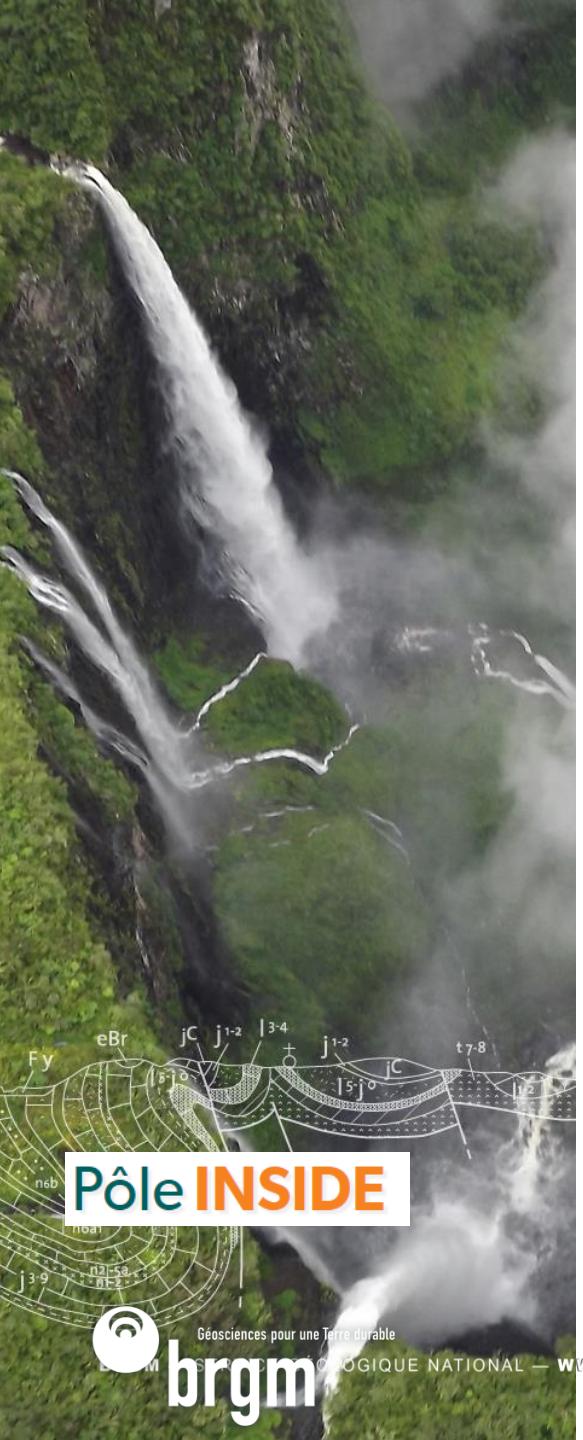
Qualité eau de surface (concentration substances chimiques) – modèle simplifié (et implémenté) mappé sur Observations & Measurements

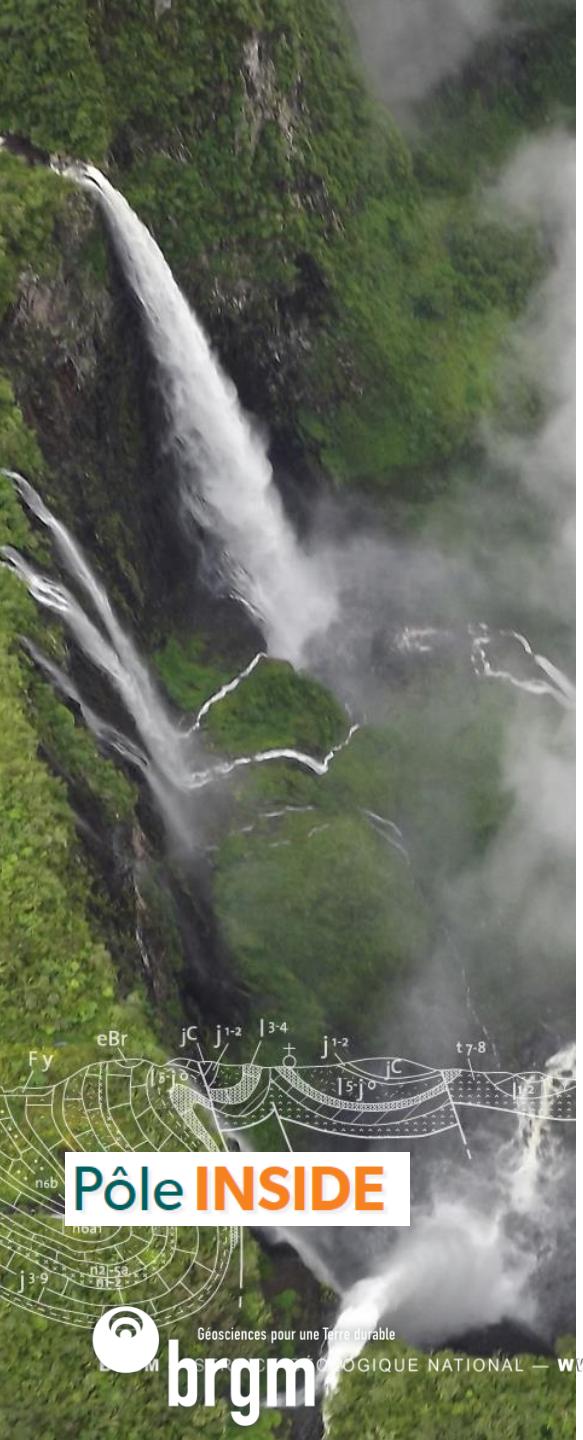


Observation
Observation result
Water Sample (SF_Specimen)
River (ultimate fOI)
Other fOIs on the side (ex : river pertains to river basin)
Environmental Monitoring Facility (EF)
EF associated information

# Objets métier VS le standard d'échange

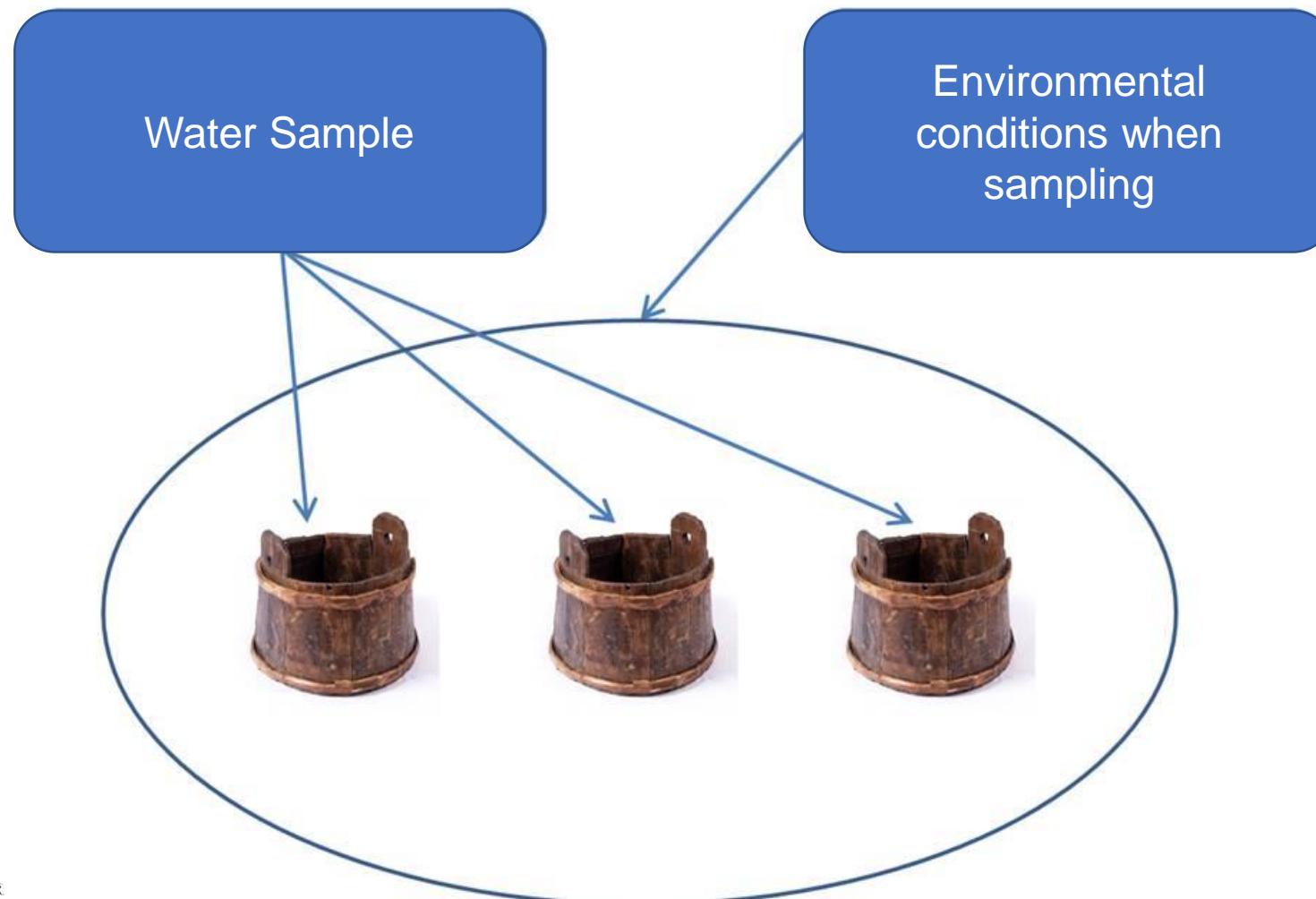
Qualité eau de surface (concentration substances chimiques) – modèle simplifié (et implémenté) mappé sur ST API





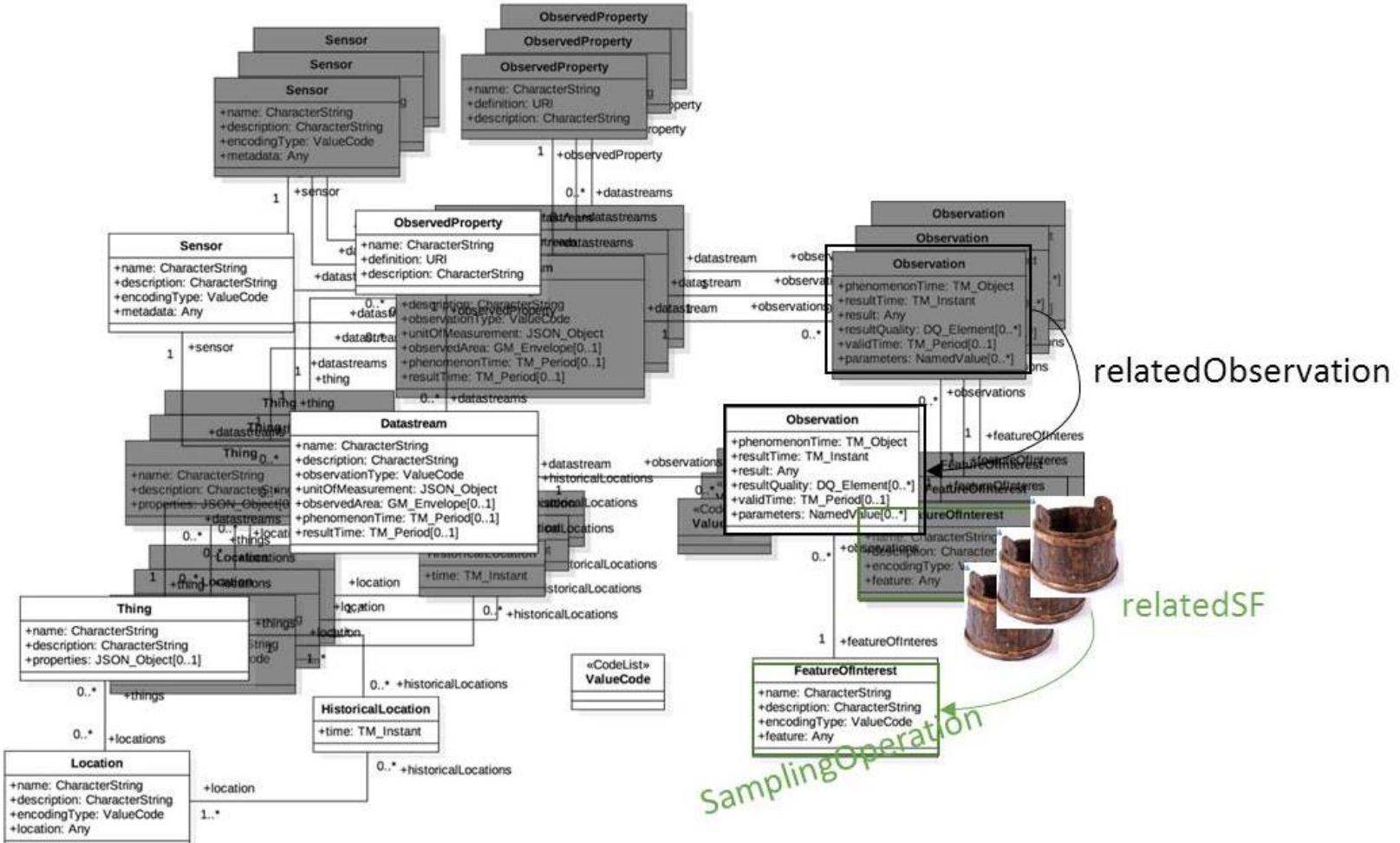
# Objets métier VS le standard d'échange

Ajout des conditions environnementales (ex : météo lors de l'échantillonage, ...)



# Objets métier VS le standard d'échange

Ajout des conditions environnementales (ex : météo lors de l'échantillonage, ...)



Blanc : le datastream sur une condition environnementale (à une station, ...)

Noir : trois water quality datastream (pour une station, observedProperty, procedure données)



Pôle INSIDE

Geosciences pour une Terre durable  
BRGM  
BRGM - BRÉTIGNY SUR ORGE - FRANCE - www.BRGM.FR

# Alimentation serveur en données

# Modèles Sandre



Preuve de concept : travail sur snapshot base, pas de passage pas la chaîne PubSub

# **Simplification**



*1° Mapping vers O&I  
puis ST API*

# Alimentation serveur en données

## Modèles Sandre



Preuve de concept : travail sur snapshot base, pas de passage par la chaîne PubSub

Simplification



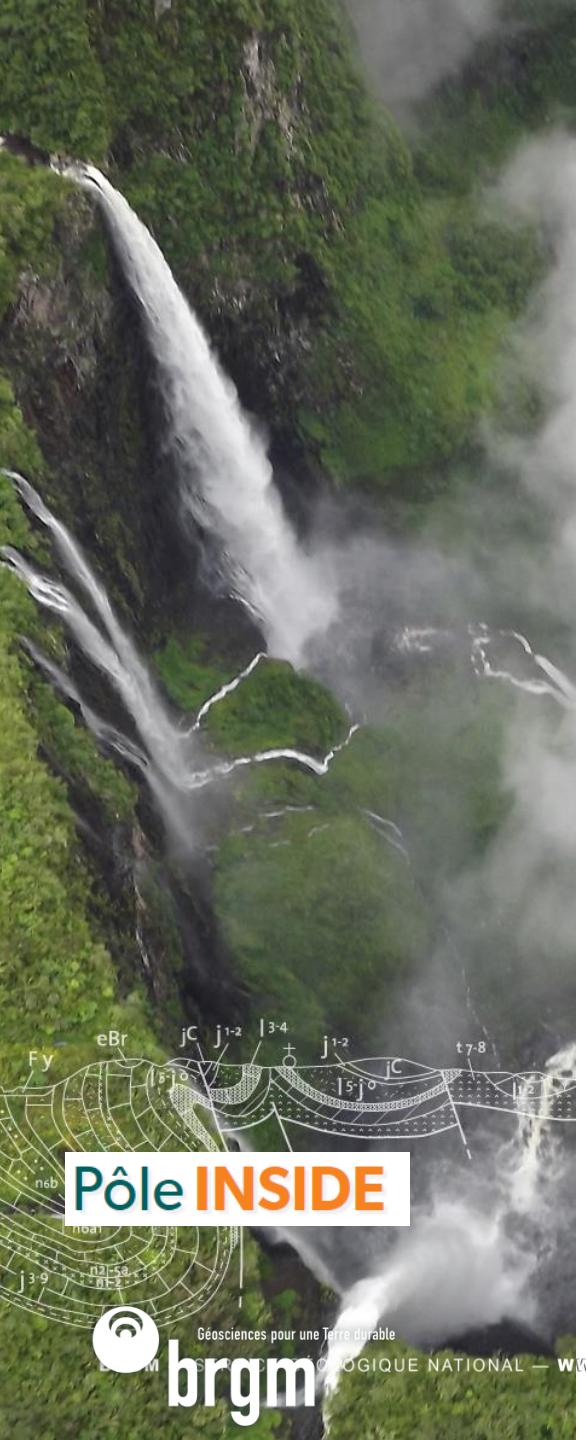
1° Mapping vers O&M

```
CREATE MATERIALIZED VIEW sta."DATASTREAMS" AS
SELECT sta.numeric_id,datstream_id,base.colonnesurveillance,5,'0') ||
       loadbase.coparametre,5,'V') || loadbase.colstationmesureeausurface,8,'0') ||
       sta.cleaning_water || "1" || sta.clean(support_nom) || "0" || sta.clean(action_analyse_nom) || "1" ||
       http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement AS "OBSERVATION_TYPE",
       sta.make_timebase(mindepart,base.minheurepos) AS "PHENOMENON_TIME_START",
       sta.make_timebase(maxdepart,base.maxheurepos) AS "PHENOMENON_TIME_END",
       base.colstationbegin AS "SENSOR_ID",
       base.colstationbegin AS "PROPERTY_ID",
       numeric_id,station.nom AS "THING_NAME",
       unit.symbol AS "UNIT_NAME",
       unit.definition AS "UNIT_DEFINITION",
       http://id.eaufrance.fr/rdf/ || base.colunitmeasure AS "UNIT_DEFINITION",
       sta.cleaning_water || "1" || sta.clean(support_nom) || "0" || sta.clean(action_analyse_nom) || "1" ||
       http://www.opengis.net/def/phenomenonType/OGC-OM/2.0/OM_PhysicalQuantity AS "NAME",
       st_geonfromext(POINT || "1" || sta.latitude || "1" || sta.longitude || "1") AS "OBSERVED_AREA",
       sta.ds_probabilisticsupport,support.nom AS "OBSERVATION_SUPPORT",
       fraction_analyse.nom AS "PROPERTIES"
FROM datstream
LEFT JOIN referential.inteme_station_full ON base.colstationmesureeausurface = sta.colstation
LEFT JOIN referential.support_full ON base.colsupport = support.code
LEFT JOIN referential.fraction_analyse ON base.colfractionanalyse = fraction_analyse.code
LEFT JOIN referential.unite ON unite.code = base.colunitmeasure
LEFT JOIN referential.methode_mana ON mana.code = base.colmethane
```

2° Alimentation  
'Manuelle'

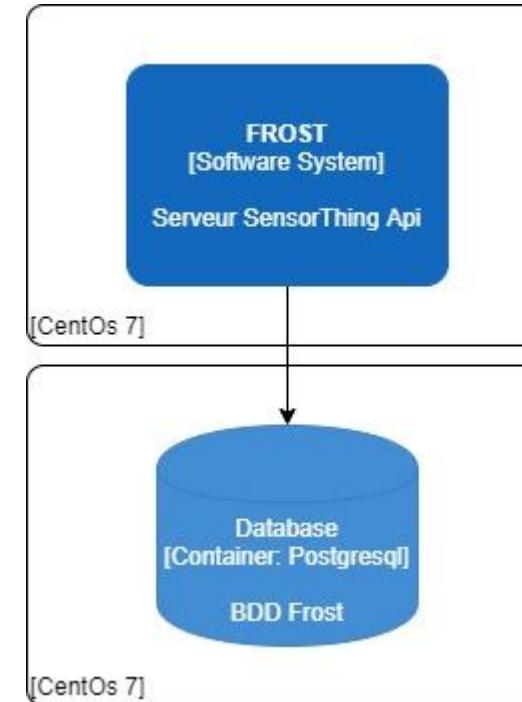


PostgreSQL



# Déploiement serveur

- VM Frost
  - Docker
  - Centos 7
    - 2 CPU
    - 4 Go RAM
    - HDD 10 Go
- VM BDD :
  - Centos 7
    - 2 CPU
    - 8 Go RAM
    - HDD 380 Go
  - Postgresql 11.2





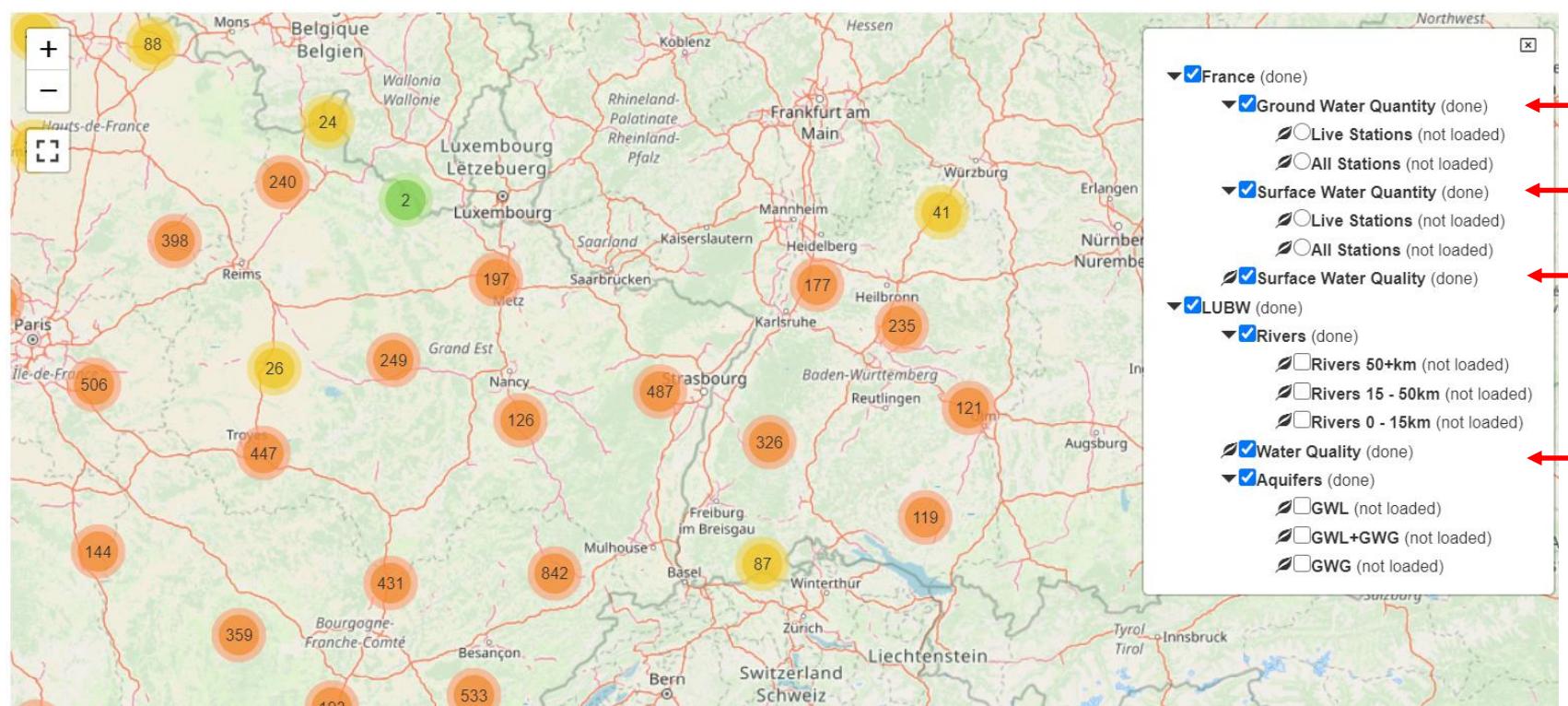
# Clients en place

- Réutilisation client Fraunhofer IOSB (WebGenesis) lors projet API4INSPIRE

Genesis > API4INSPIRE > Franco-Germanic Flow



## Franco-Germanic Flow



ST APIs

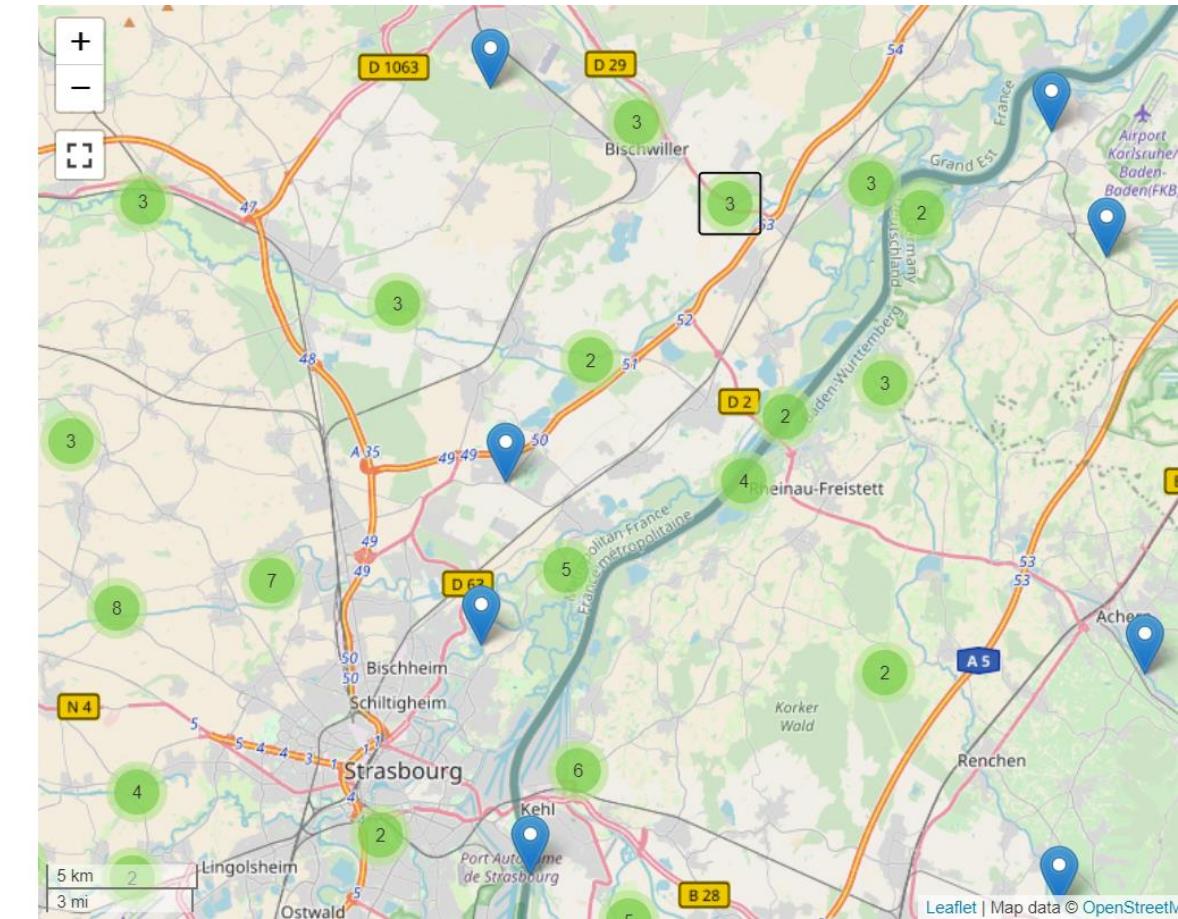
### Data

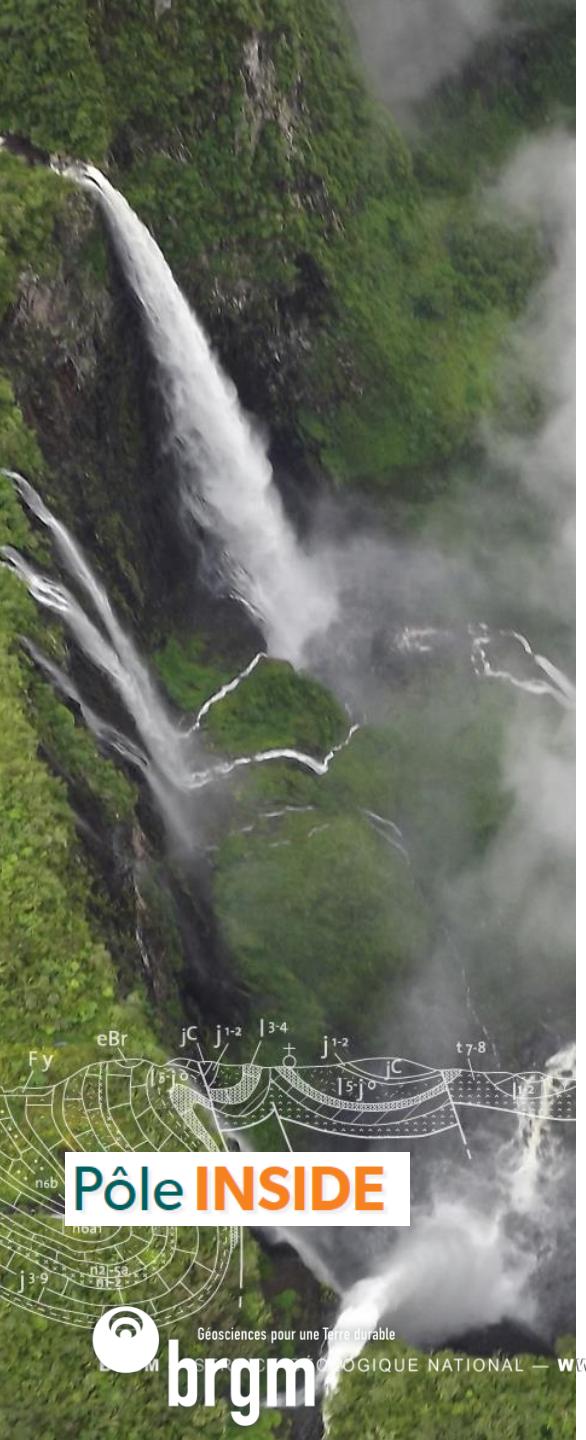
- French Biodiversity Office (OFB) & BRGM
  - Land Baden-Württemberg (LUBW)
- => Several SensorThings API endpoints



# Clients en place

- 3°/ Prototype demo
  - Focus on surface water quality stations





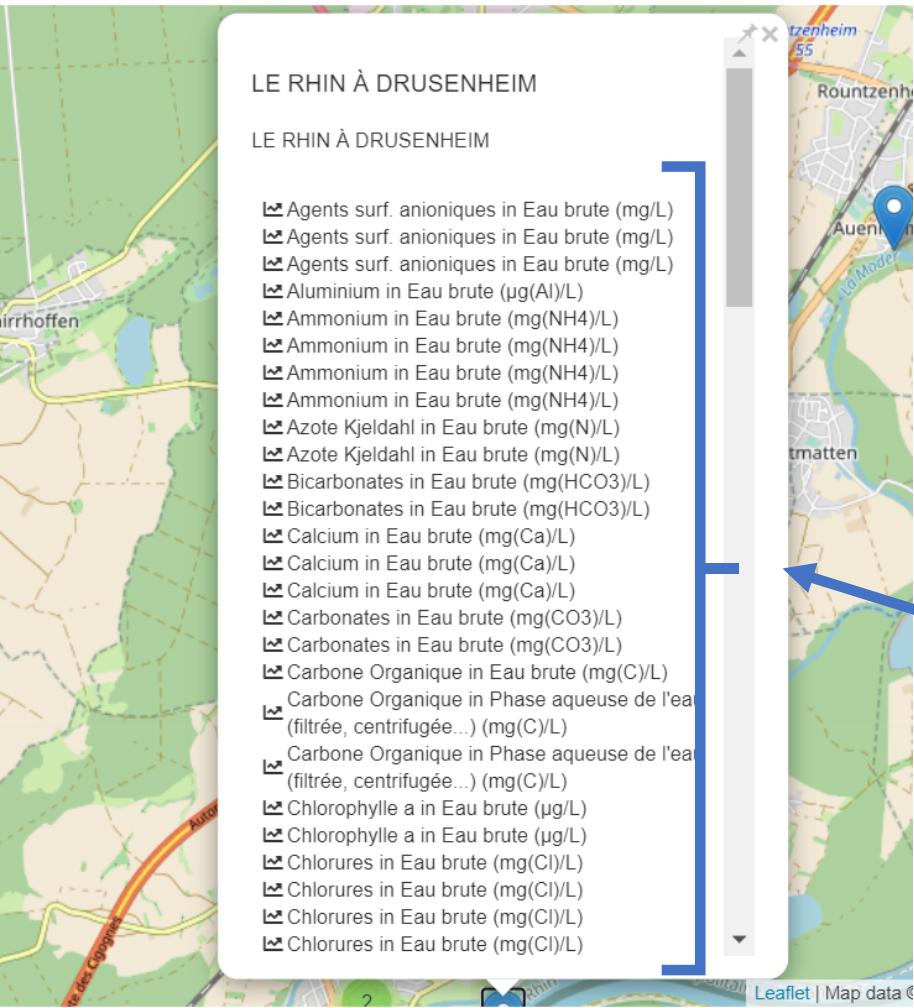
# Clients en place





# Clients en place

- 3°/ Prototype demo



LE RHIN À DRUSENHEIM

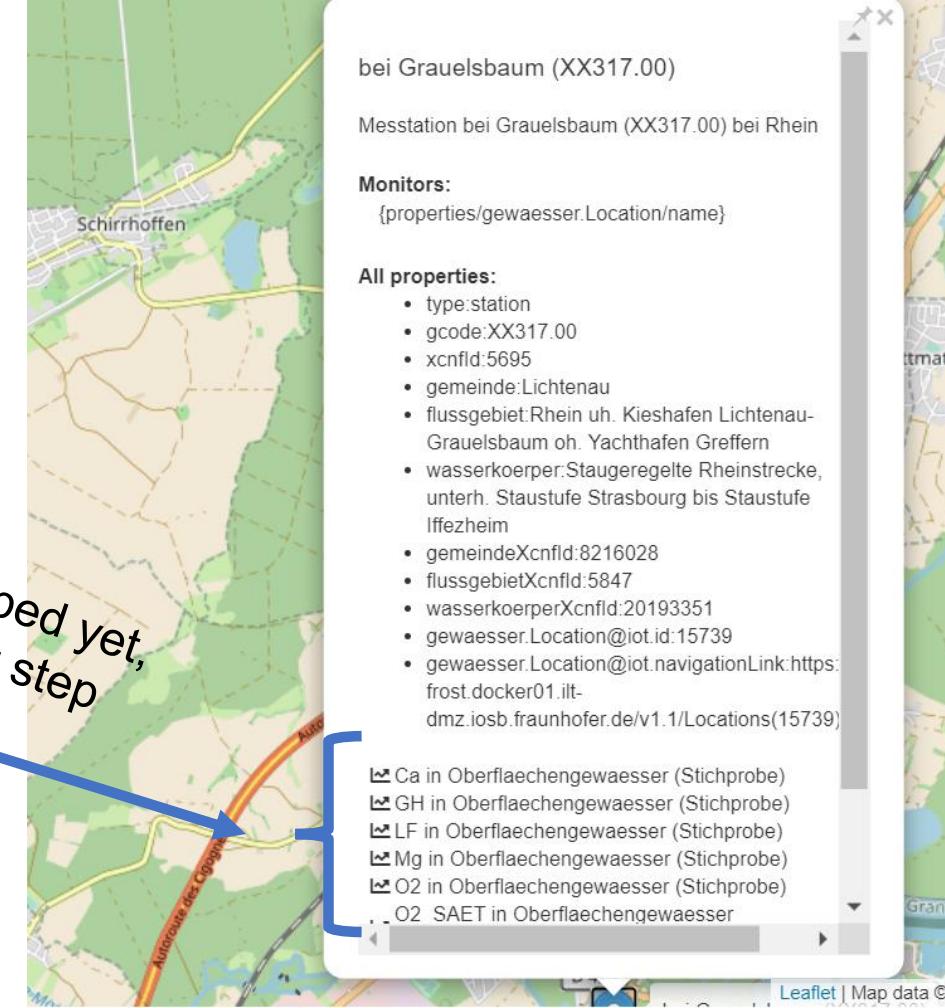
LE RHIN À DRUSENHEIM

- Agents surf. anioniques in Eau brute (mg/L)
- Agents surf. anioniques in Eau brute (mg/L)
- Agents surf. anioniques in Eau brute (mg/L)
- Aluminium in Eau brute ( $\mu\text{g}(\text{Al})/\text{L}$ )
- Ammonium in Eau brute ( $\text{mg}(\text{NH}_4)/\text{L}$ )
- Azote Kjeldahl in Eau brute ( $\text{mg}(\text{N})/\text{L}$ )
- Azote Kjeldahl in Eau brute ( $\text{mg}(\text{N})/\text{L}$ )
- Bicarbonates in Eau brute ( $\text{mg}(\text{HCO}_3)/\text{L}$ )
- Bicarbonates in Eau brute ( $\text{mg}(\text{HCO}_3)/\text{L}$ )
- Calcium in Eau brute ( $\text{mg}(\text{Ca})/\text{L}$ )
- Calcium in Eau brute ( $\text{mg}(\text{Ca})/\text{L}$ )
- Calcium in Eau brute ( $\text{mg}(\text{Ca})/\text{L}$ )
- Carbonates in Eau brute ( $\text{mg}(\text{CO}_3)/\text{L}$ )
- Carbonates in Eau brute ( $\text{mg}(\text{CO}_3)/\text{L}$ )
- Carbone Organique in Eau brute ( $\text{mg}(\text{C})/\text{L}$ )
- Carbone Organique in Phase aqueuse de l'eau (filtrée, centrifugée...) ( $\text{mg}(\text{C})/\text{L}$ )
- Carbone Organique in Phase aqueuse de l'eau (filtrée, centrifugée...) ( $\text{mg}(\text{C})/\text{L}$ )
- Chlorophylle a in Eau brute ( $\mu\text{g}/\text{L}$ )
- Chlorophylle a in Eau brute ( $\mu\text{g}/\text{L}$ )
- Chlorures in Eau brute ( $\text{mg}(\text{Cl})/\text{L}$ )

Leaflet | Map data ©

Vocabularies not mapped yet,  
would be the ideal next step

24



bei Grauelsbaum (XX317.00)

Messtation bei Grauelsbaum (XX317.00) bei Rhein

Monitors:

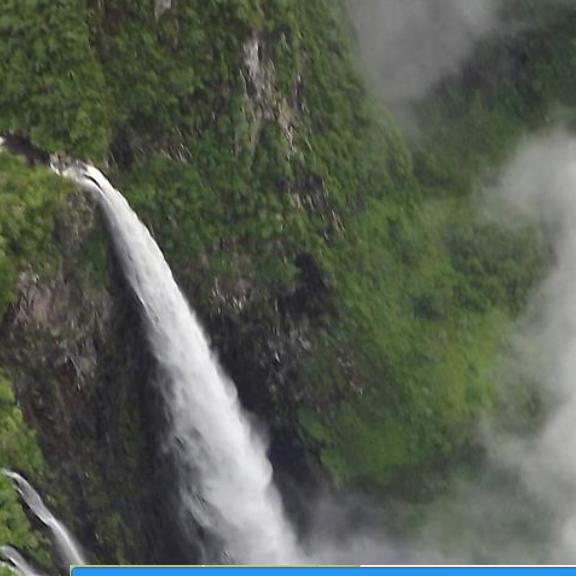
```
{properties/gewaesser.Location/name}
```

All properties:

- type:station
- gcode:XX317.00
- xcnfld:5695
- gemeinde:Lichtenau
- flussgebietRhein uh. Kieshafen Lichtenau-Grauelsbaum oh. Yachthafen Greffern
- wasserkoerper:Staugeregelte Rheinstrecke, unterh. Staustufe Strasbourg bis Staustufe Ilfzeheim
- gemeindeXcnfld:8216028
- flussgebietXcnfld:5847
- wasserkoerperXcnfld:20193351
- gewaesser.Location@iot.id:15739
- gewaesser.Location@iot.navigationLink:[https://frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1/Locations\(15739\)](https://frost.docker01.ilt-dmz.iosb.fraunhofer.de/v1.1/Locations(15739))

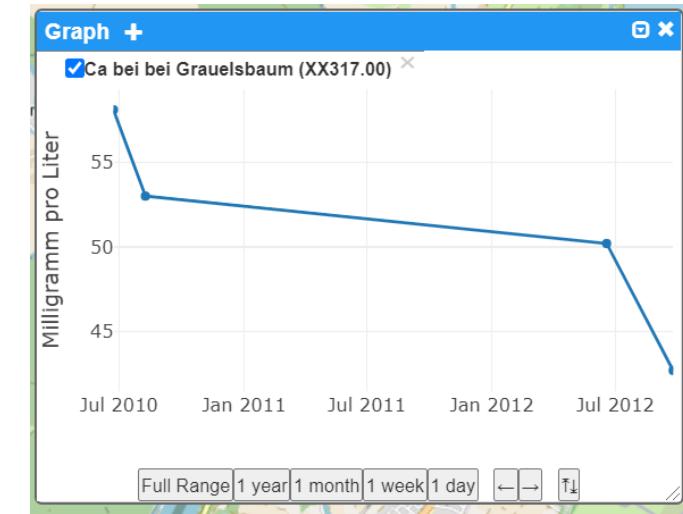
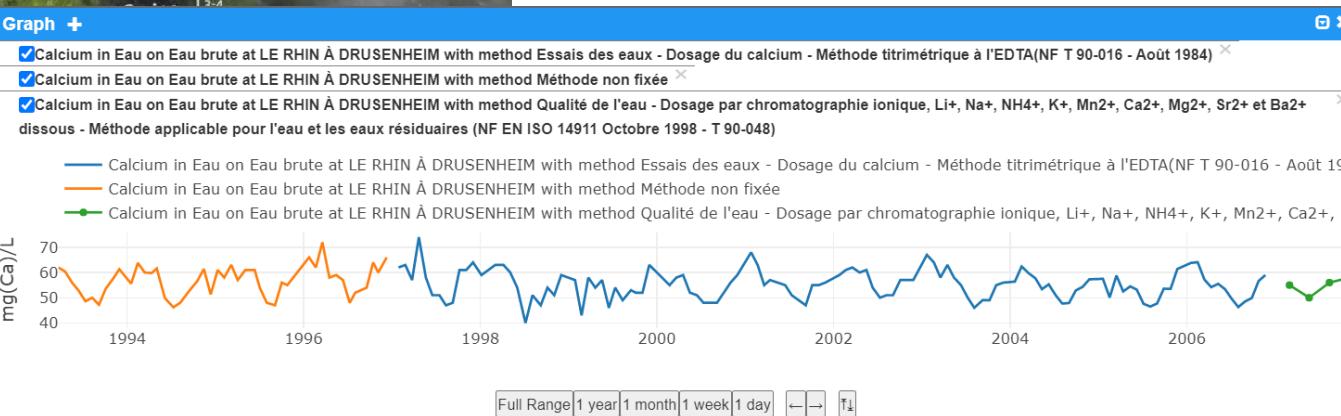
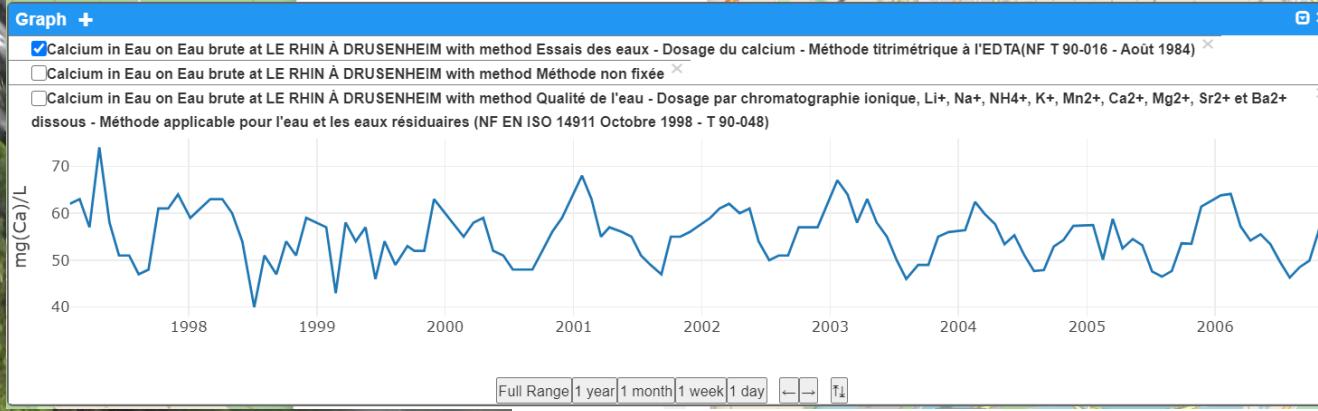
Ca in Oberflaechengewaesser (Stichprobe)  
GH in Oberflaechengewaesser (Stichprobe)  
LF in Oberflaechengewaesser (Stichprobe)  
Mg in Oberflaechengewaesser (Stichprobe)  
O2 in Oberflaechengewaesser (Stichprobe)  
O2 SAET in Oberflaechengewaesser

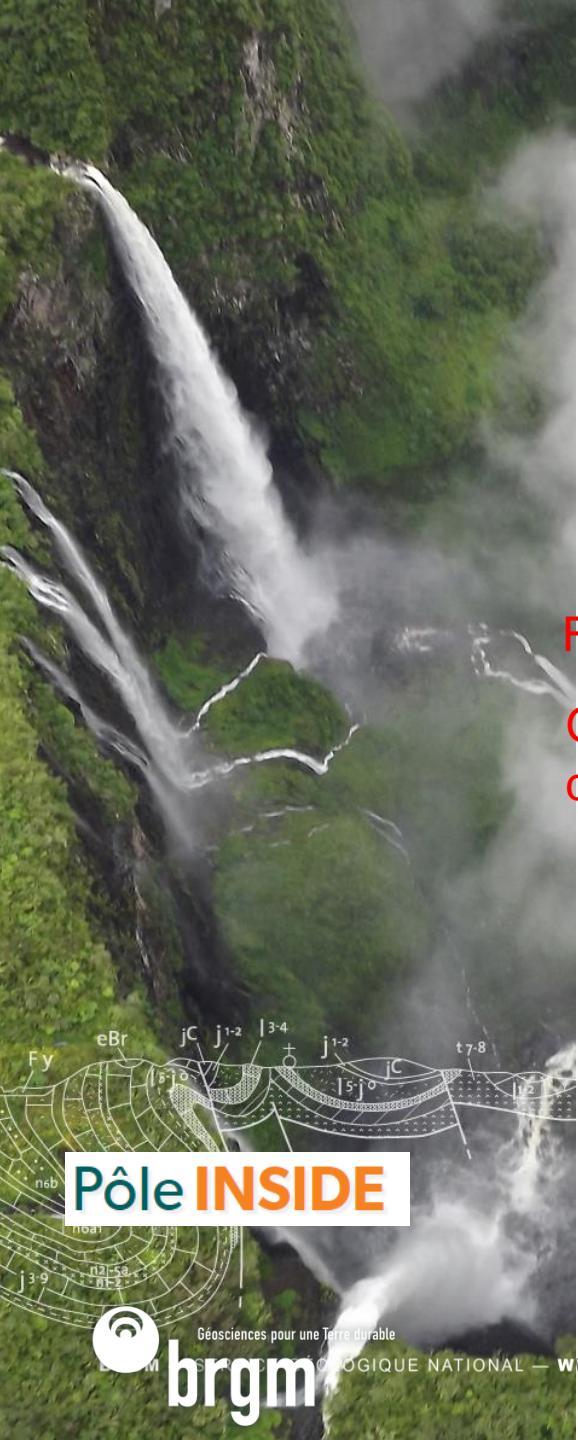
Leaflet | Map data ©



# Clients en place

- 3°/ Prototype demo
  - Observations regarding Calcium

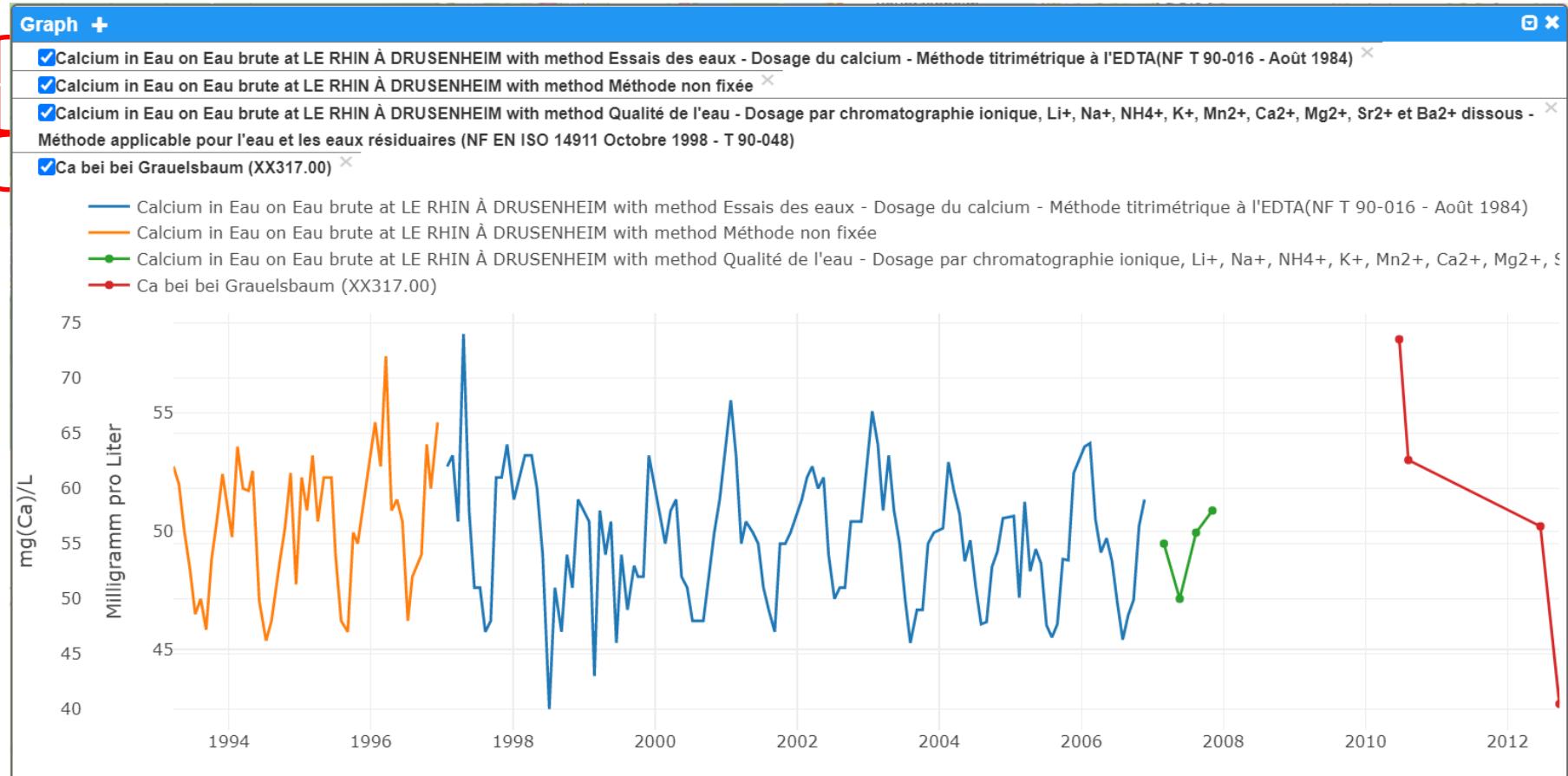


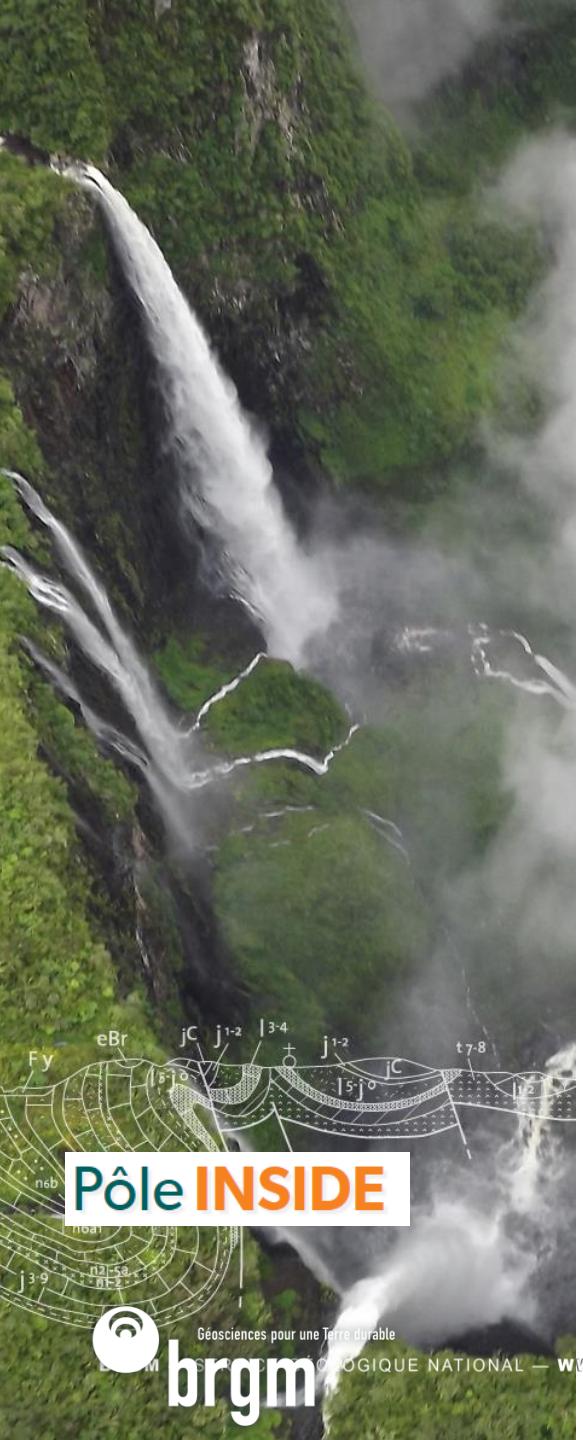


# Clients en place

- 3°/ Prototype demo
  - Observations regarding Calcium

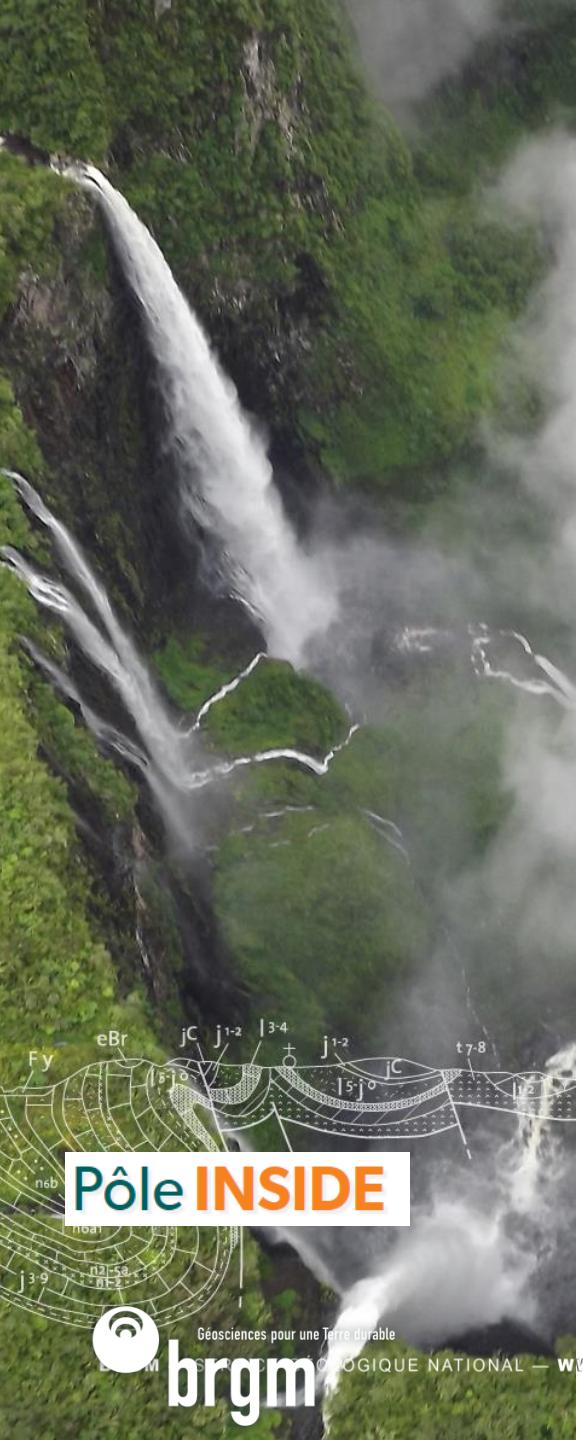
French  
German  
data





# Retours

- Idem que le travail sur l'eau souterraine
- En complément
  - Test de performances sur les 130 Millions d'observation (JMeter)
    - Sur requêtes classiques du portail national (<https://naiades.eaufrance.fr/>)
    - Déploiement aussi rapide que le cluster BigData en place (Hub'Eau) en faisant tourner FROST et Postgresql sur des machines virtuelles assez standard





# Cohérence avec les services WFS/OGC API - F

Ex : sur Quantité eau de surface

- Cf : <https://github.com/INSIDE-information-systems/API4INSPIRE>
- Pour les observations, le même motif que pour la quantité eau souterraine est appliqué à la différence près que ce sont les services du SCHAPI qui sont ré-exposés en SensorThings API (et non des données issues des capteurs temps-réel)
- Pour les stations et le réseau hydro
  - Mise en place d'un graph de données à partir des référentiels ST Sandre (BD Carthage et Station hydrométriques)
  - Déploiement de service WFS / OGC API Features
  - Avec des URI pour mettre les éléments en relations

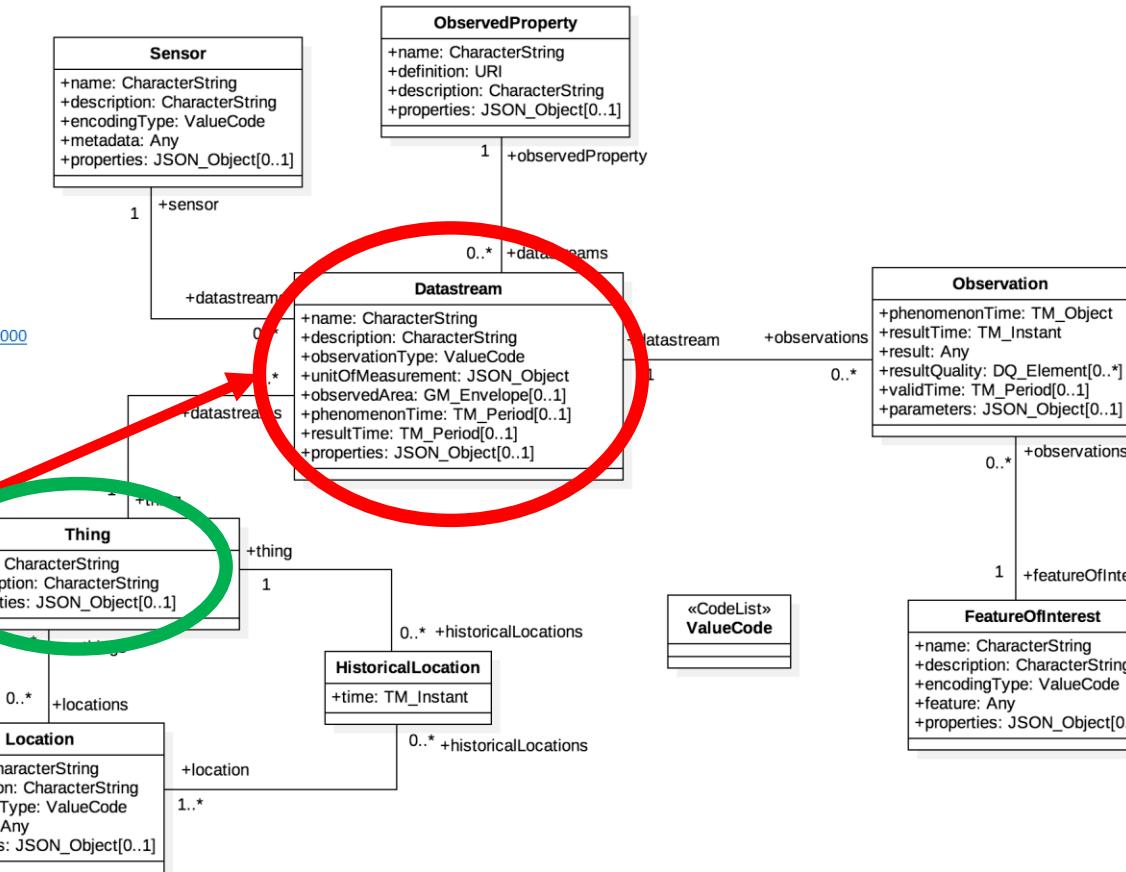
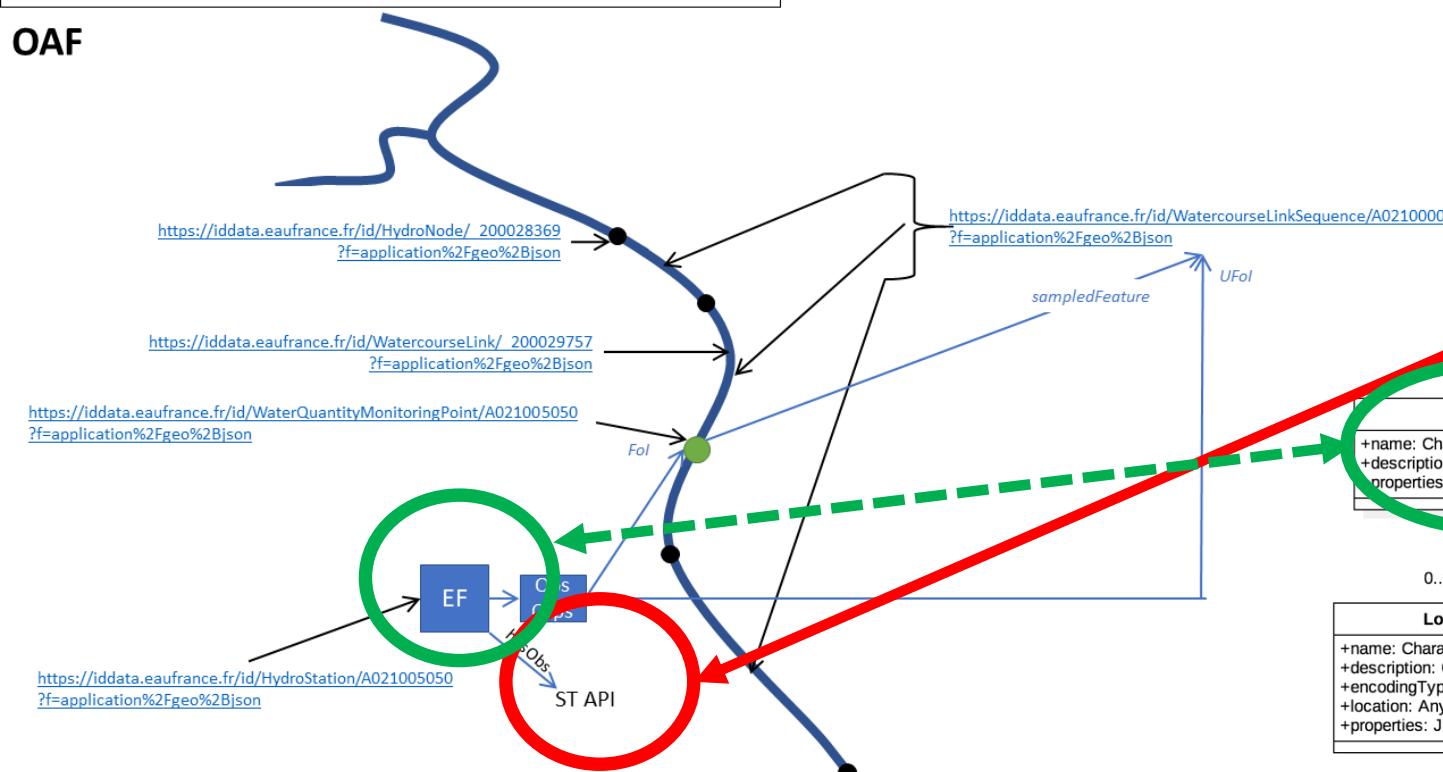
# Cohérence avec les services WFS/OGC

## API - F



<https://iddata.eaufrance.fr/api/hydroFAPI/ogc/features/collections/>

OAF



# Thank you & thanks to

s.grellet@brgm.fr  
e.lecaude@brgm.fr  
a.feliachi@brgm.fr  
h.bressan@brgm.fr  
m.beaufils@brgm.fr

Kathi@DataCove.eu  
hylke.vanderschaaf@iosb.fraunhofer.de

