

# ***SWEing the groundwater data workflow***

*From data collection to reuse,  
opportunities of interoperable  
sensorWeb approaches*



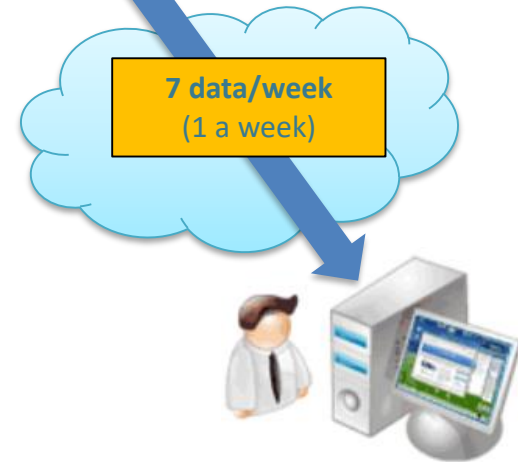
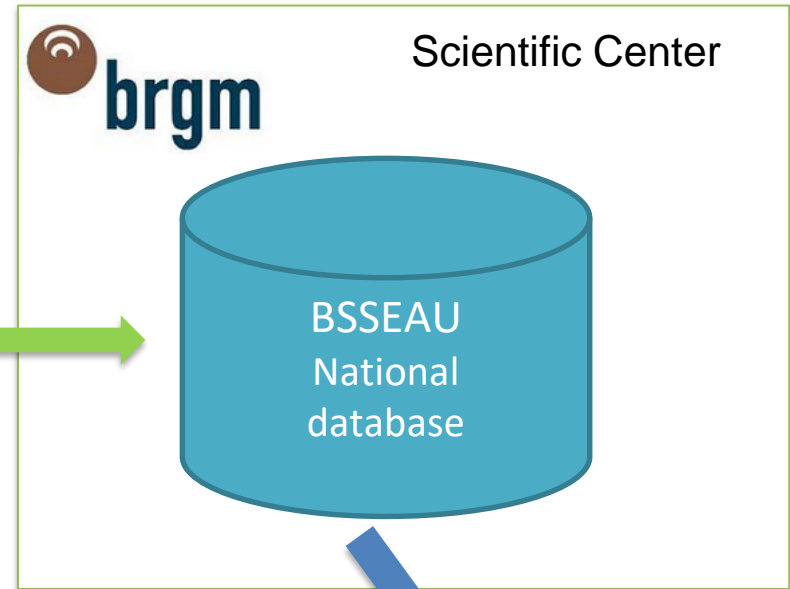
Stéphane LOIGEROT,  
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& Jérôme NICOLAS

# SWEing the groundwater data workflow

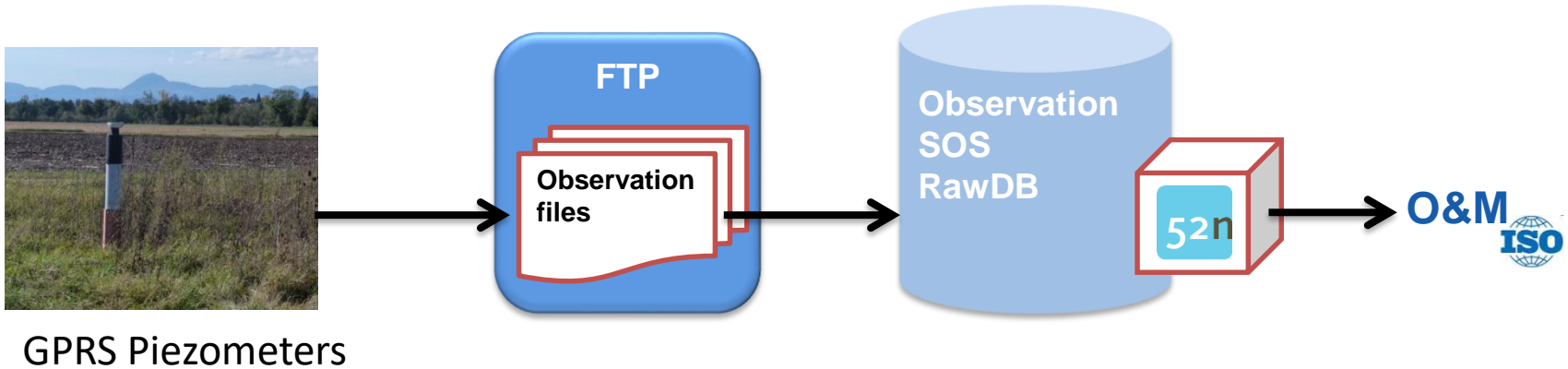
GroundWater level  
– now 2016



GPRS / GSM/SMS  
Every hour



# SWEing the groundwater data workflow



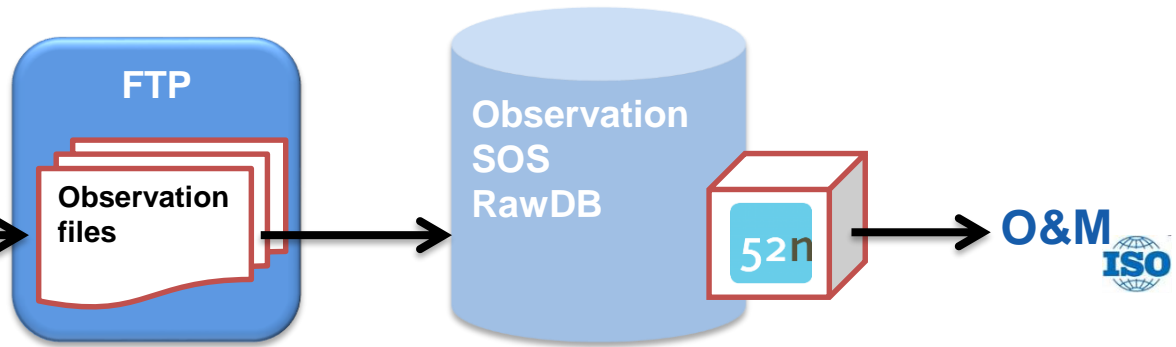
## One pivotal exchange mechanism/format

- Compliant with Inspire Requirements and Recommendations
- SOS 2.0 output, WaterML2.0 encoding

# SWEing the groundwater data workflow



GPRS Piezometers



URI to WFS serving  
SamplingFeature description

URI (Link) to codelist registry entry

+featureOfInterest

+procedure

OM\_Observation

+observedProperty

+result

URI to codelist registry  
entry

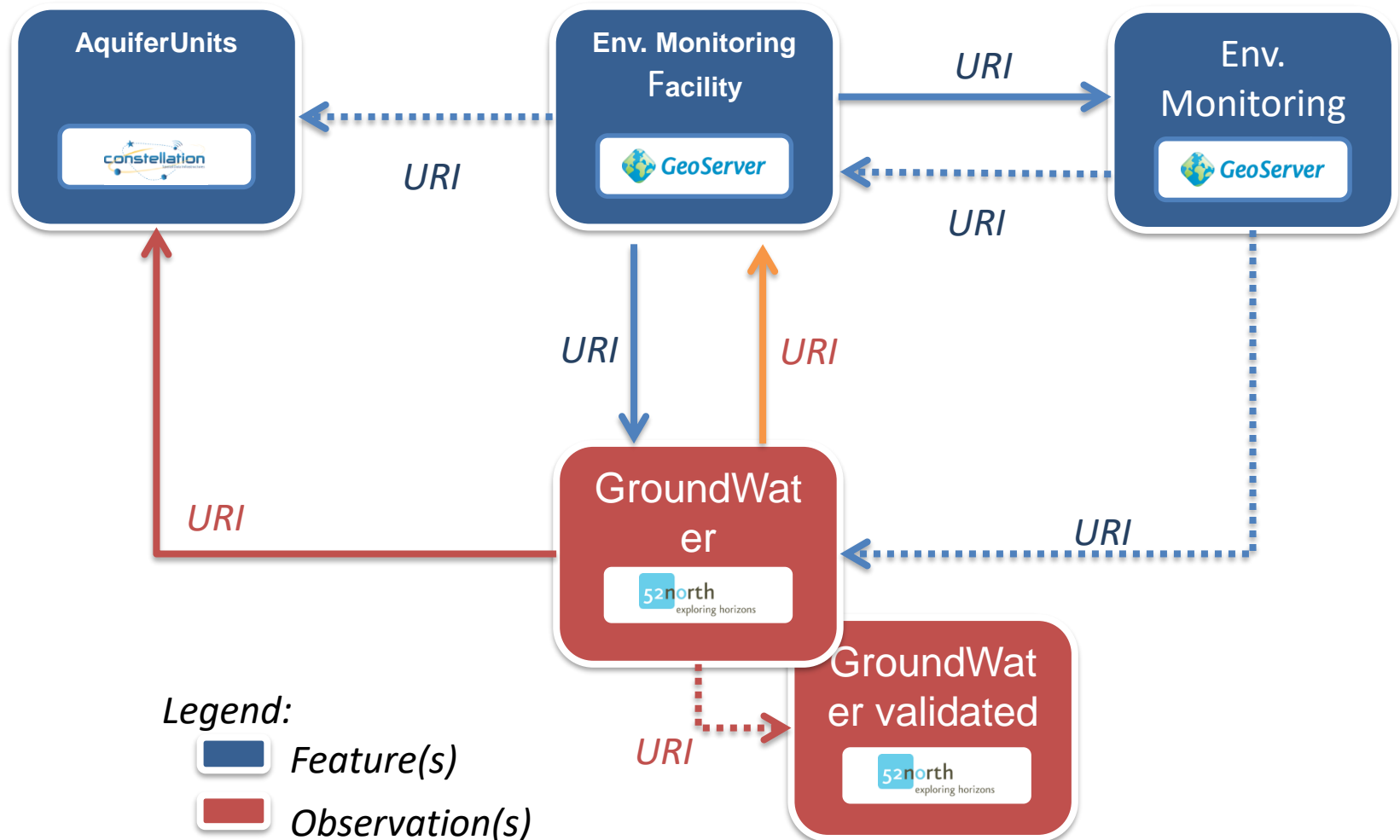
values measured

# SWEing the groundwater data workflow

- Implementation
  - <http://ressource.brgm-rec.fr/> to centralize BRGM data resources
    - **./data** for data objects (e.g. geologic units, piezometers, ...)
    - **./obs** for observations (e.g. groundwater levels, ...)
    - **./vocabs** for controlled vocabularies (e.g. groundwater sampling for quality analysis, ...)
    - **./services** for web services endpoint
  - POC Apache rewriting rules
- Some examples:
  - Latest GroundWaterLevel observation from one piezometer provided in :
    - WaterML 2.0 format: <http://ressource.brgm-rec.fr/obs/RawOfferingPiezo/00463X0036/H1.2&responseFormat=http://www.opengis.net/waterml/2.0&temporalFilter=om%3AphenomenonTime%2Clatest>
    - JSON format: <http://ressource.brgm-rec.fr/obs/RawOfferingPiezo/00463X0036/H1.2&responseFormat=application/json&temporalFilter=om%3AphenomenonTime%2Clatest>

# SWEing the groundwater data workflow

## Groundwater Levels use case: service view



## Feedback during the sos implementation

- Topics of discussion during the implementation
  - Which SOS solution to deploy?
  - How to map to preexisting (non O&M compliant) databases?
  - How to design the rawobservation database?
  - How to link features to observations (at service level)?
- At the moment:
  - Each use case needs its own webapp to be configured and deployed

# SWEing the groundwater data workflow

## SOS > Current use cases

Data type	Profile	BRGM associated project	Status
Groundwater levels (raw observations)	INSPIRE PointTimeSeriesObs°	Pôle INSIDE	X
Groundwater levels (validated data)	INSPIRE PointTimeSeriesObs°	Pôle INSIDE	WIP
Groundwater quality (validated data)	Under discussion	Pôle INSIDE	Specified
Borehole logs	GWML2 (GeologyLogCoverage)	EPOS	Specified





# SWEing the groundwater data workflow

## •Data broadcast

### •Service SOS – formats :

- WaterML2.0 : <http://ressource.brgm-rec.fr/obs/rawOfferingPiezo/00463X0036/H1/PZ/2&responseFormat=http://www.opengis.net/waterml/2.0&temporalFilter=om%3AphenomenonTime%2Clatest>
- JSON : <http://ressource.brgm-rec.fr/obs/rawOfferingPiezo/00463X0036/H1/PZ/2&responseFormat=application/json>
- Otherformat possible: SWEArrayObservation, ...

### •52N Rest-API

- Provide JSON
- <http://192.168.6.208/52n-sos-rawdb/api/v1/> (explore with id)
- A resort/sensor: <http://192.168.6.208/52n-sos-rawdb/api/v1/stations/1223>
- A timeserie: <http://192.168.6.208/52n-sos-rawdb/api/v1/timeseries/608/getData?timespan=PT12H/2016-06-01>

## •Data consuming

- Rest-API : Big data project – HubEAU (hubeau.fr)

### •SOS

- With a QGIS Client
- With some webapp

# SWEing the groundwater data workflow

## SOS > Positive feedback

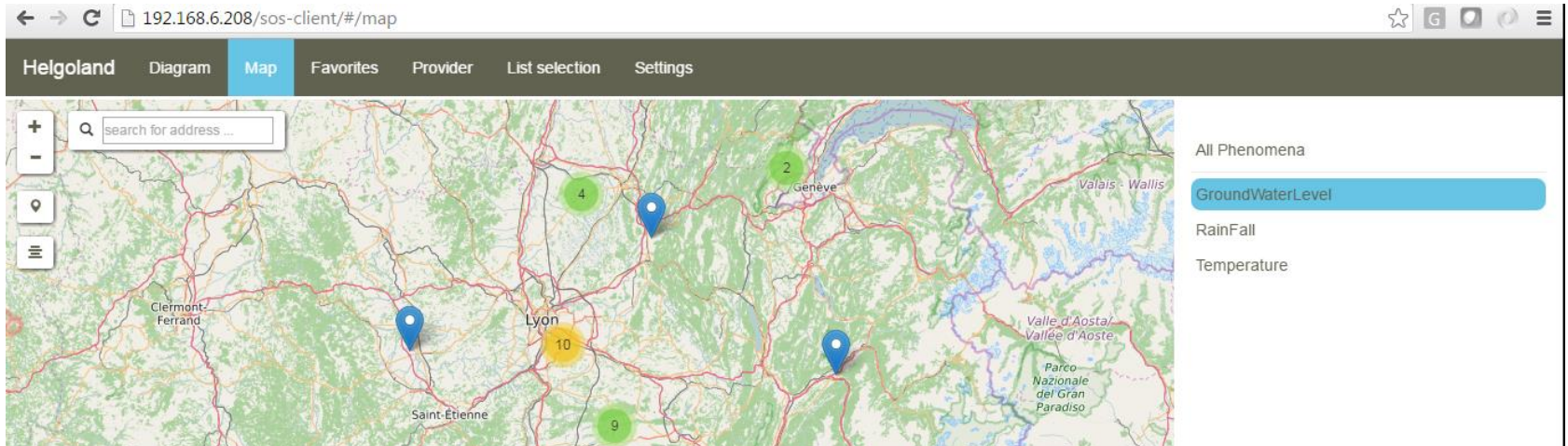
- It worths the effort!
  - Lot of reuse (websites, QGIS client plugin)



Now I can enjoy the taste of INSPIRE



# SWEing the groundwater data workflow

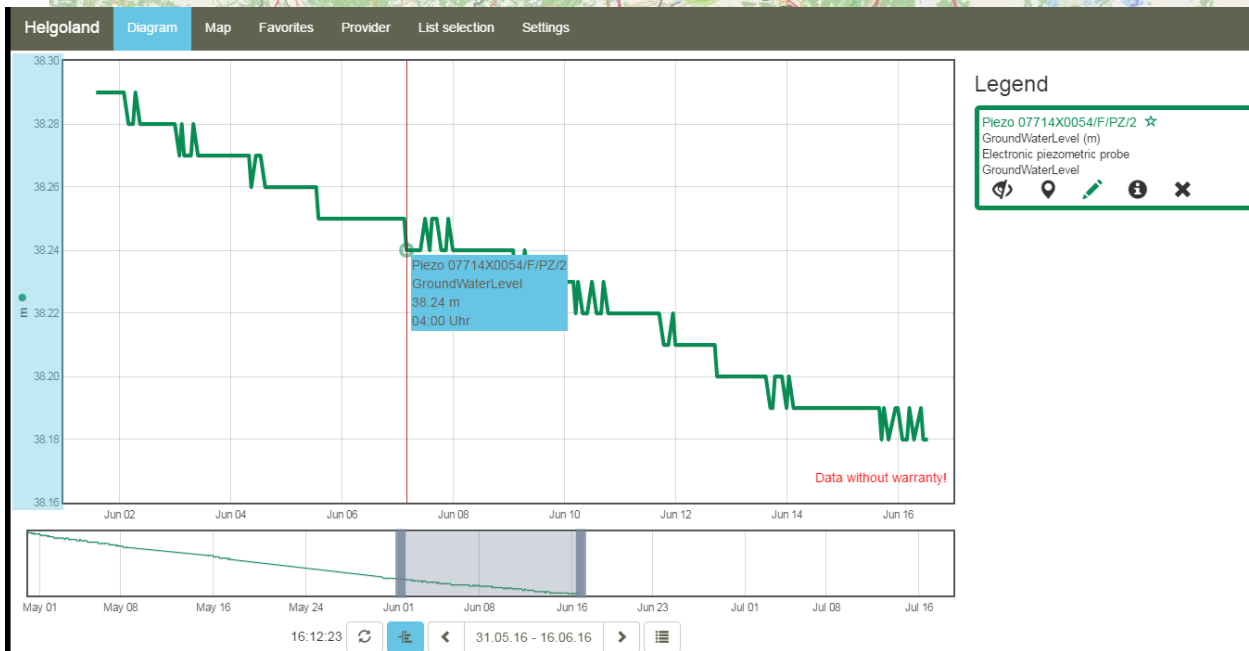


All Phenomena

GroundWaterLevel

RainFall

Temperature



# SWEing the groundwater data workflow

EnvironmentalMonitoringFacility (points) - Feature Attributes

fid: <http://ressource.brgm-rec.fr/data/Piezometre/01368X0008/KG/PZ/1>

description: Water well from national BSS (Banque du Sous-Sol) Data database. Piezometer monitoring ground water level

mediaMonitored: water

XML

Element

- @gml:id
- gml:description
- gml:identifier
  - @codeSpace
- ef:inspireId
  - base:Identifier
    - base:localId
    - base:namespace
    - base:versionId
  - ef:name
  - ef:additionalDescription
  - ef:mediaMonitored
    - @xlink:href
    - @xlink:title
  - ef:legalBackground
  - ef:responsibleParty
    - base2:RelatedParty
      - base2:organisationName
        - gco:CharacterString EAULOR\_S
  - ef:geometry
    - gml:Point
      - @srsName urn:ogc:def:crs:EPSG::4326
      - @gml:id Piezometre.geom.1.01368X0008-KG
      - @srsDimension 2
      - gml:pos 49.1633302224248 5.72742778861341

Fields

Id	Name	Edit widget	Alias	Type
123 7	mobile	Text Edit		qlonglor
abc 8	specialisedEMFType_href	Text Edit		QString
abc 9	identifier	Text Edit		QString
abc 10	inspireId_Identifier_localId	Text Edit		QString
123 11	geometry_Point_id	Relation Reference		qlonglor
123 12	representativePoint_Point_id	Relation Reference		qlonglor

Relations

Name	Layer	Field
EnvironmentalMonitoringFacility_belongsTo	EnvironmentalM...	Environn...
EnvironmentalMonitoringFacility_hasObservation	EnvironmentalM...	Environn...
EnvironmentalMonitoringFacility_involvedIn	EnvironmentalM...	Environn...
EnvironmentalMonitoringFacility_legalBackground	EnvironmentalM...	Environn...
EnvironmentalMonitoringFacility_mediaMonitored	EnvironmentalM...	Environn...
EnvironmentalMonitoringFacility_name	EnvironmentalM...	Environn...

Label

Columns

- measurementRegime\_title
- measurementRegime\_href
- id
- identifier\_codeSpace
- description
- inspireId\_Identifier\_namespace
- specialisedEMFType\_title
- mobile
- specialisedEMFType\_href
- identifier
- inspireId\_Identifier\_localId
- geometry\_Point\_id
- representativePoint\_Point\_id

1:N Links

- EnvironmentalMonitoringFacility\_operationalActivityPeriod
- EnvironmentalMonitoringFacility\_relatedTo
- EnvironmentalMonitoringFacility\_suspectedBy
- EnvironmentalMonitoringFacility\_involvedIn
- EnvironmentalMonitoringFacility\_resultAcquisitionSource
- EnvironmentalMonitoringFacility\_legalBackground
- EnvironmentalMonitoringFacility\_suspectedBy
- EnvironmentalMonitoringFacility\_belongsTo
- EnvironmentalMonitoringFacility\_observingCapability
- EnvironmentalMonitoringFacility\_reportedTo
- EnvironmentalMonitoringFacility\_purpose
- EnvironmentalMonitoringFacility\_name
- EnvironmentalMonitoringFacility\_mediaMonitored

Buttons: Cancel, OK



## Remaining aspects

- Domain models
  - Aquifer level forecast

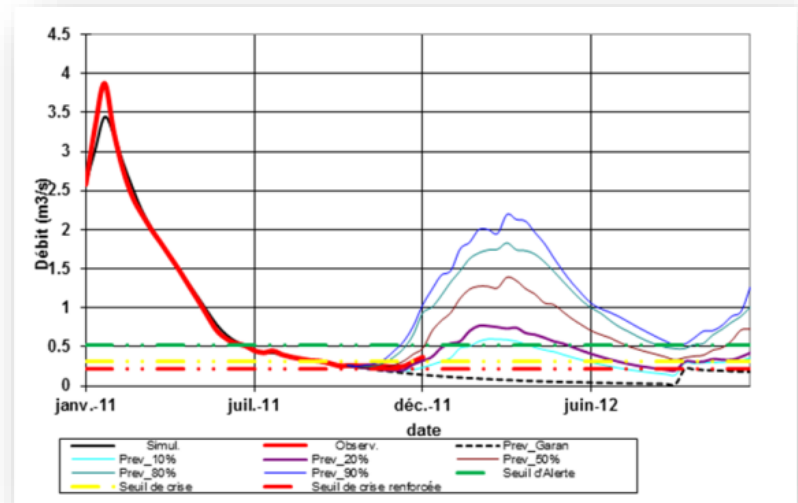
BRGM : Groundwater level SOS

MeteoFrance :  
weather station SOS



3 of them  
to be opened

SCHAPI : stream gages  
JSON



If you need more information :

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- Mickael BEAUFILS :

Merci de votre attention