



Towards a Water Resilient Europe

**Exploring the Pivotal Role
of Open Access Data
for Groundwater
Quality and Quantity Assessments**



The Geological Surveys of Europe



WATER4ALL PARTNERSHIP

Towards an integrated groundwater and surface water information platform developed by the European partnership:
“Water4All – Water security for the planet”

S.Grellet - BRGM

August 27, 2024

WATER4ALL PARTNERSHIP

Sharing of groundwater data, identification of barriers and problems, way ahead and solutions

S.Grellet - BRGM

August 27, 2024





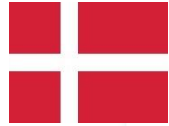
Data exchange context



Different countries / organisations / IT practices / ...

Historical context in each of those is different

- Quick examples taken in couple minutes
- That list will grow in various countries, continents, organisations ...




VanDa



VanDa er Danmarks Miljøportals system for inddatering af data for det rene overfladevand. VanDa indeholder data for sø, vandløb og det marine område, når det drejer sig om kemi, flora og fauna. Har du brug for hjælp så gå til vores [HelpCenter](#)

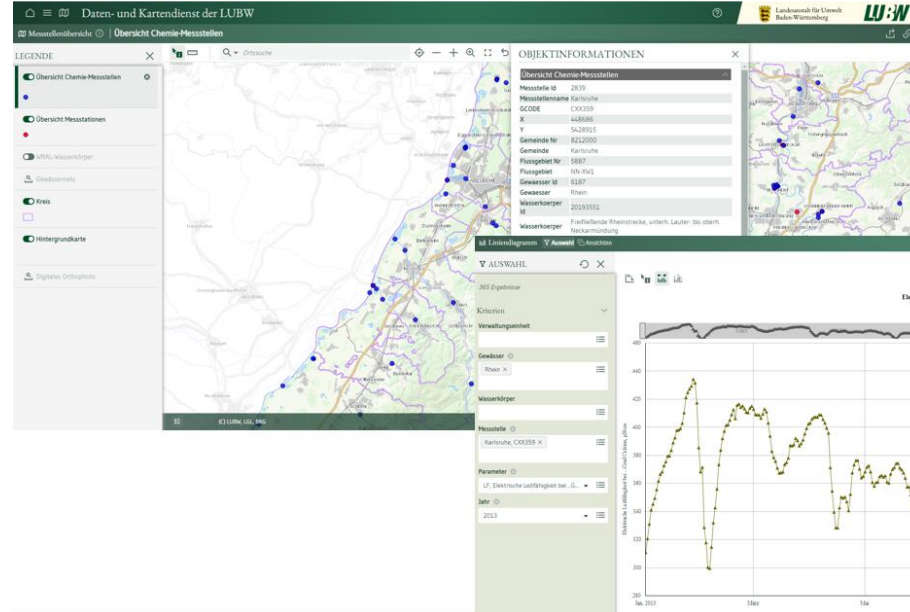
Jupiter - GEUS



NATIONAL BORINGSDATABASE (JUPITER)

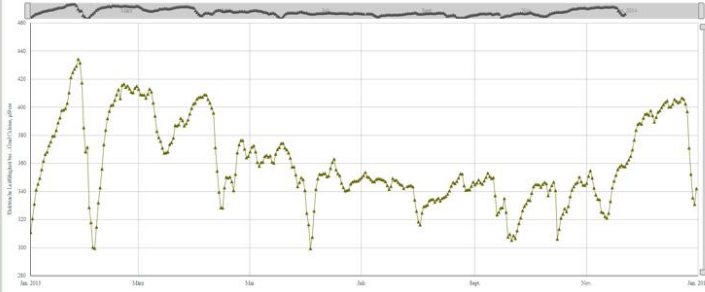
Indberetning i dette system er kun for myndigheder og kræver login. Jupiter er en database under De Nationale Geologiske Undersøgelser for Danmark og Grønland (GEUS), der indeholder data om grundvand, drikkevand, råstof, miljø og geoteknik. Databasen indeholder information om mere end 280.000 borer og kan blandt andet bruges til at tjekke vandkvalitet. Få hjælp og vejledning i vores [HelpCenter](#)

Land Baden-Württemberg



Objektinformationen

Messstelle Id	2839
Messstellenname	Karlsruhe
SCODE	CK3358
X	448696
Y	5428955
Gemeinde Nr	8222000
Gemeinde	Karlsruhe
Postleitzahl	5809
Postgebiet	NW-PUG
Gewässer Id	E337
Gewässer	Rhein
Wasserkörper	20283553
Wasserkörper	Freiflächende Rheinbrücke, unterm. Lauter: bis oberh. Neckararmbrücke

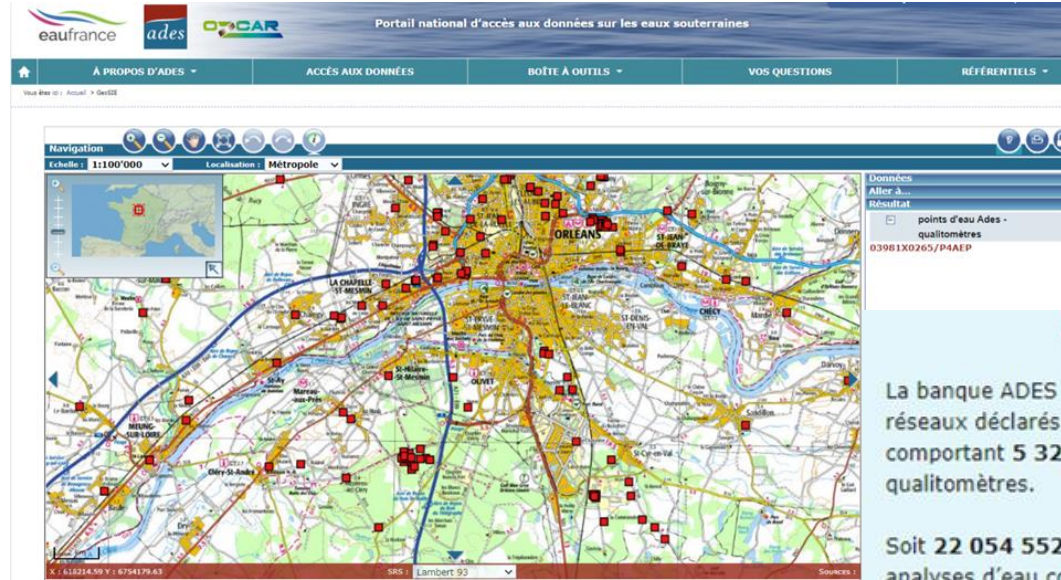


Elektrische Leitfähigkeit bei ... Grad Celsius bei Rhein

Different countries / organisations / IT practices / ...



Ground Water



ADES en chiffres

La banque ADES met à disposition à ce jour 353 réseaux déclarés contenant 82 174 points d'eau comportant 5 329 piézomètres et 78 623 qualitomètres.

Soit 22 054 552 niveaux d'eau et 135 586 152 analyses d'eau consultables en ligne.

Water Agencies



French Geological Survey (BRGM)



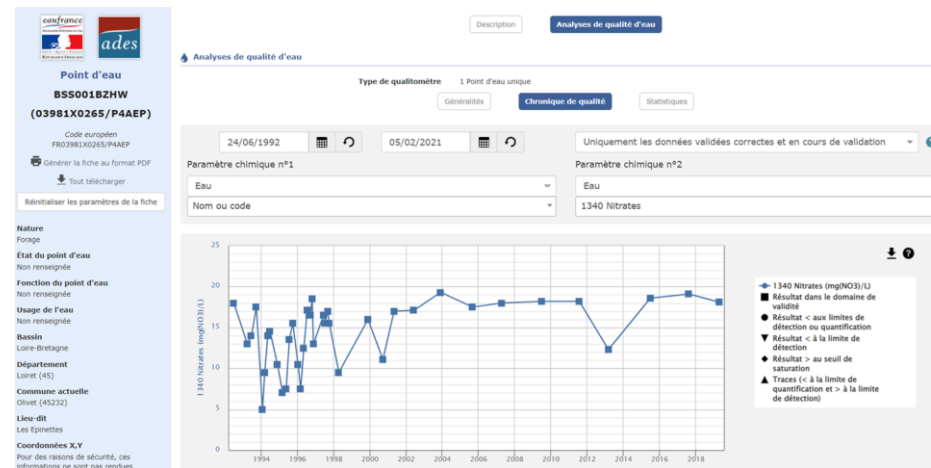
National semantic & technical interoperability



Various ministries (Health, industry,..)



Partner networks (ex : local water councils, ...)



Different countries / organisations / IT practices / ...



Surface Water

Water Agencies



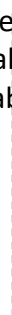
French Biodiversity Office (OFB)



Partner networks (ex : DREAL, ...)



National semantic & technical interoperability



The screenshot shows a web interface for a research portal. At the top, there is a 'Recherche' (Search) header with a magnifying glass icon. Below it are four main categories: 'Hydrobiologie' (Hydrobiology), 'Hydromorphologie' (Hydromorphology), 'Physicochimie' (Physicochemistry), and 'Température' (Temperature). The 'Physicochimie' section is active, showing a search form with the following fields: 'Quoi ?' (What?) with 'Paramètre' (Parameter) set to '1340 - Nitrates', 'Support' (Support) set to 'Code ou libellé Sandre', and 'Fraction' (Fraction) set to 'Code ou libellé Sandre'. Below this is the 'Pour Quoi ?' (Why?) section with 'Réseau de mesure' (Measurement network) set to 'Code ou nom Sandre'. At the bottom, there are two dropdown menus for 'Qualification de la donnée' (Data qualification) and 'Statut de la donnée' (Data status), both set to 'Indifférent'. The 'Prévisualisation des résultats' (Preview results) section shows a map of Europe with a red overlay indicating the search area, and a sidebar with a list of regions: Métropole, Guadeloupe, Guyane, Martinique, Mayotte, and Réunion. A summary box on the right indicates '10752 Stations', '171192 Opérations de prélèvement', and '171291 Analyses', with a 'Visualiser les résultats' (View results) button.

Since 1969 - around 260 Million Observations on water physics & chemistry

Different countries / organisations / IT practices / ...

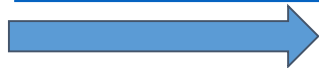


EU country A



EU Reporting according to EU specifications
<https://dd.eionet.europa.eu/>

EU country B



Mostly file based

EU country C



Mainly stations, network, indicators.

Only one with observations

eurBDCCode	euSurfaceWaterBodyC	surfaceWaterBodyNan	surfaceWaterBodyCati	naturalAWBHMWB	swEcologicalStatusOrf	swChemicalStatusVal	qeStatusOrPotentialVr	QE1 - Biological quality elements	QE2 - Hydromorphological quality elements	QE3 - Chemical and physico-chemical quality elements
FRG	FRGR0007F	LA LOIRE DEPUIS LA CONFLUENCE DE LA MAINE JUSQU'A ANCIENS	River water body	Natural water body	Good (2)	Good (2)	Good (2)	Good (2)	none	

Reported Data from the EU WISE portal

Waterbase - Water Quality ICM

Date (Publication): 2024-07-12T13:50:03+00:00
 Citation identifier: eea_waterbase-water-quality-icm_s
 Citation identifier: DAT-240-en

Point of contact
 No information provided.


Continents, countries, sea regions of the world:

- Kosovo (UNSCR 1244/99)
- Ireland
- Iceland
- Estonia
- Netherlands
- Liechtenstein
- Austria
- North Macedonia
- Switzerland
- Croatia
- Denmark
- Lithuania
- Spain
- Albania
- United Kingdom
- Cyprus
- Italy
- Luxembourg
- Romania
- Greece
- Hungary

Reporting obligations:
 WISE SoE - Water quality (WISE-6)

Provided by:
 EEA

Different countries / organisations / IT practices / ...



Home Explore WQP Sites Help & About

New WQX 3.0 profiles are available at waterqualitydata.us/beta/. These profiles will contain recent USGS data added since March 11, 2024, which marks the beginning of limited accessibility for USGS data. Read more about the 3.0 profiles and associated changes [here](#).

This legacy user interface will continue to function for several weeks. However, this user interface only serves WQX2.2 profiles, which do NOT contain USGS data added after March 11, 2024.

Basic **Advanced**

Select Location Parameters

Specify location parameters to describe the spatial extent of the desired dataset. All fields are optional.


Country All Countries	Point Location Within miles of Latitude 0	Bounding Box North: 90 South: -90 East: 180 West: -180	Site Type All Site Types
State All States	Longitude 0	Organization ID All Organization IDs	Site ID All Site IDs
County All Counties	Use my location	HUC All HUCs	

Show upstream downstream mapper BETA

Upstream/Downstream information can be used to help you determine where to collect water quality data based on the flow of water. Select a feature source, and optionally search for a location. Then, click a feature to select upstream/downstream navigation and enter a desired distance. These search criteria will be populated in your query.

Filter Results

Specify data source, date range, and sampling filters to apply to the desired dataset. All fields are optional.



Australian Government Bureau of Meteorology

NSW VIC QLD WA SA TAS ACT NT AUSTRALIA GLOBAL ANTARCTICA

Bureau Home Water Information WDO

Water Information Regulations Standards News and events About

Water Data Online

Search: Enter name or number

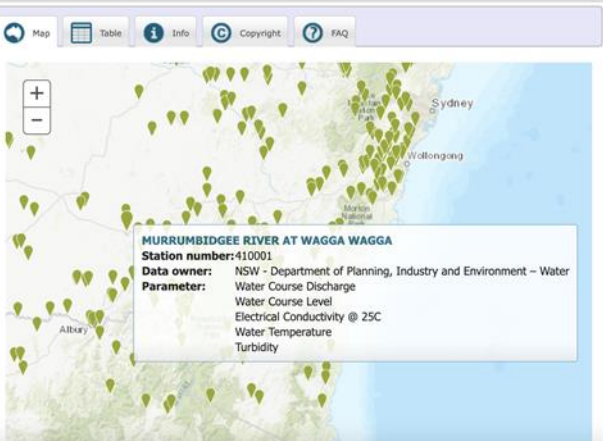
Filter: Parameter: **Electrical Conductivity @ 25C**

Station name: All stations

Station number: All stations

Show advanced search options

Clear filters

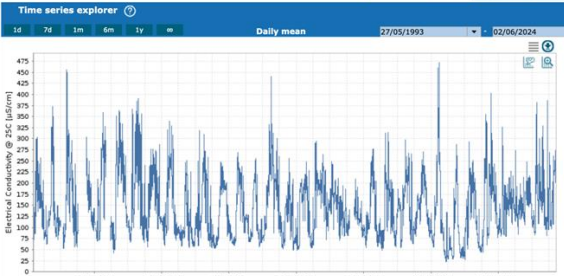


MURRUMBIDGEE RIVER AT WAGGA WAGGA
Station number: 410001
Data owner: NSW - Department of Planning, Industry and Environment - Water
Parameter: Water Course Discharge
Water Course Level
Electrical Conductivity @ 25C
Water Temperature
Turbidity

number: 410001
Latitude: -35.10
Longitude: 147.37
Data owner: NSW - Department of Planning, Industry and Environment - Water

MURRUMBIDGEE RIVER AT WAGGA WAGGA

Watercourse discharge	Time series explorer
Watercourse level	Period of record summary
Water temperature	Quality and gap summary
Electrical conductivity	Daily data summary
Turbidity	Monthly data summary
Data download	Monthly mean statistical analysis
	Yearly data summary
	Monthly mean statistical analysis
	Yearly statistical analysis
	Difference from mean analysis

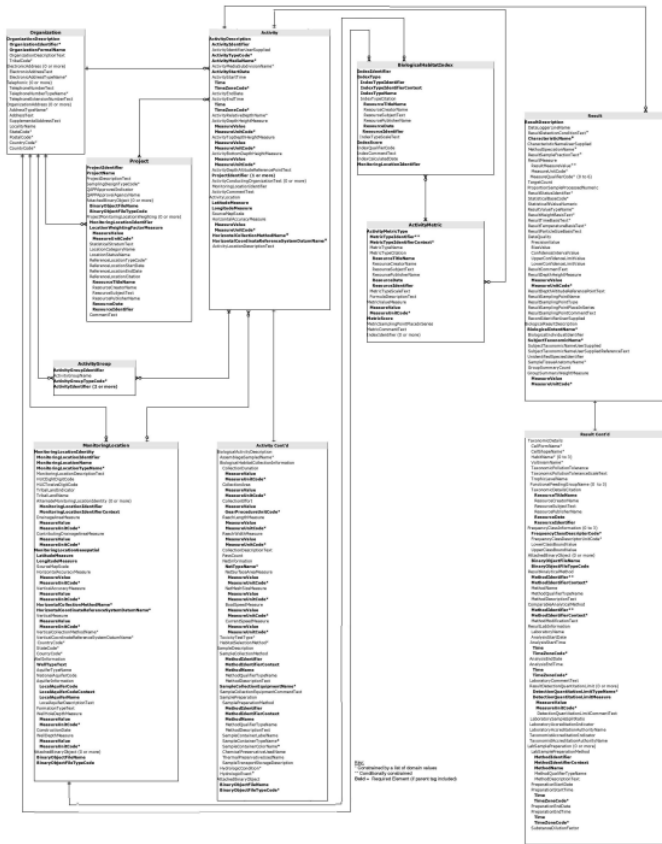


Generated on: 04/09/2024 22:20 EST

Bureau of Meteorology

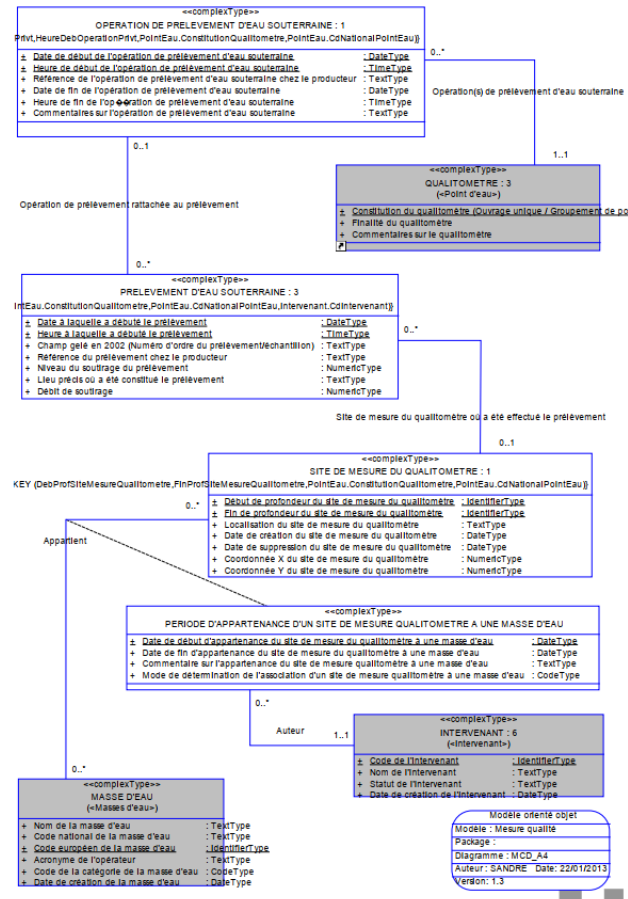
Barriers

Different semantics – to structure data



WQX Schema v3.0
ElementRelationshipDiagram

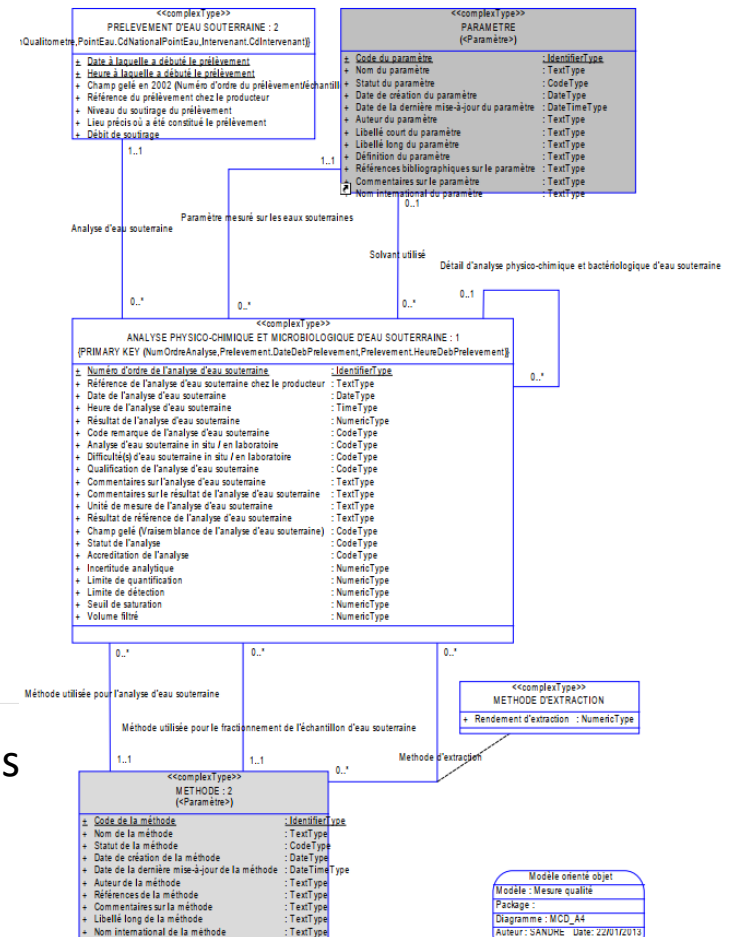
© Sandre – 2013



Sandre « Mesure de la qualité des eaux souterraines » V 1.3



© Sandre – 2013



Modèle orienté objet
Modèle : Mesure qualité
Package :
Diagramme : MCD_A4
Auteur : SANDRE - Date : 22/01/2013

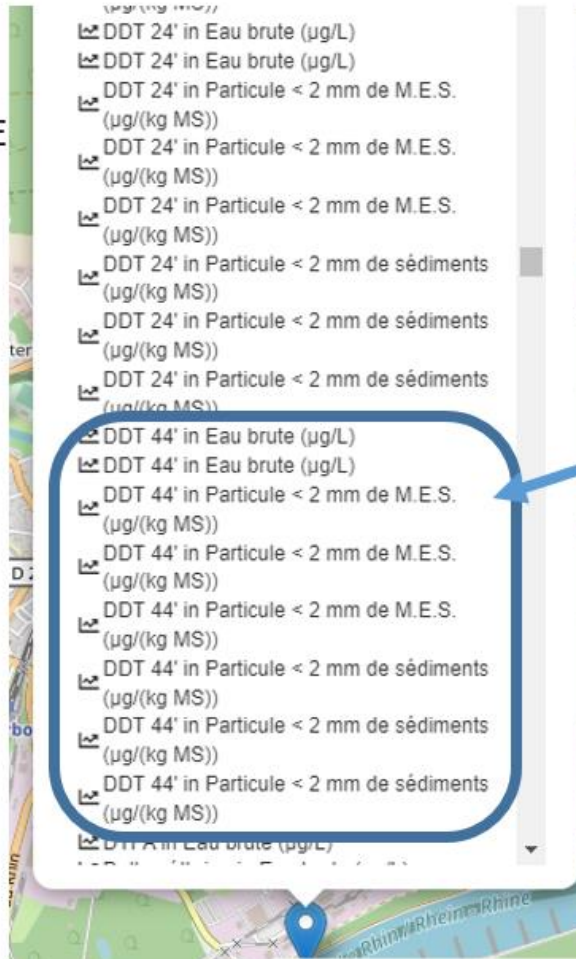
Barriers

Different semantics – to populate data

- E.g: not the same parameter/observed properties

Comparing data from 2 French – German stations on the Rhine close to each other

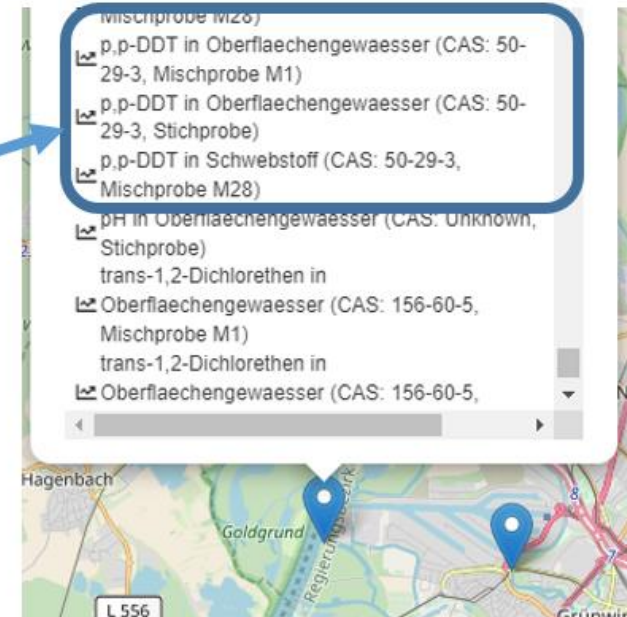
French-OFB:
LE RHIN À
LAUTERBOURG-KARLSRUHE
02047300



DDT 24' in Eau brute (µg/L)
DDT 24' in Eau brute (µg/L)
DDT 24' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 24' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 24' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 24' in Particule < 2 mm de sédiments (µg/(kg MS))
DDT 24' in Particule < 2 mm de sédiments (µg/(kg MS))
DDT 24' in Particule < 2 mm de sédiments (µg/(kg MS))
DDT 44' in Eau brute (µg/L)
DDT 44' in Eau brute (µg/L)
DDT 44' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 44' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 44' in Particule < 2 mm de M.E.S. (µg/(kg MS))
DDT 44' in Particule < 2 mm de sédiments (µg/(kg MS))
DDT 44' in Particule < 2 mm de sédiments (µg/(kg MS))
DDT 44' in Particule < 2 mm de sédiments (µg/(kg MS))



German-LUBW:
Karlsruhe (CXX359)



Mischprobe M28)
p,p-DDT in Oberflaechengewaesser (CAS: 50-29-3, Mischprobe M1)
p,p-DDT in Oberflaechengewaesser (CAS: 50-29-3, Stichprobe)
p,p-DDT in Schwebstoff (CAS: 50-29-3, Mischprobe M28)
pH in Oberflaechengewaesser (CAS: Unknown, Stichprobe)
trans-1,2-Dichlorethen in
Oberflaechengewaesser (CAS: 156-60-5, Mischprobe M1)
trans-1,2-Dichlorethen in
Oberflaechengewaesser (CAS: 156-60-5,

Barriers

Different webservices / APIs – to expose the same type of data

Select Location Parameters

Specify location parameters to describe the spatial extent of the desired dataset. All fields are optional.

Country
 United States o...

State
 California (NW...

County
 All Counties

Point Location
 Within
 miles of Latitude
 0
 Longitude
 0
 Use my location

Bounding Box
 North: 90
 South: -90
 East: 180
 West: -180

Site Type
 All Site Types

Organization ID
 All Organization IDs

Site ID
 All Site IDs

HUC
 All HUCs

Show upstream downstream mapper BETA

Upstream/Downstream information can be used to help you determine where to collect water quality data based on the flow of water. Select a feature source, and optionally search for a location. Then, click a feature to select upstream/downstream navigation and enter a desired distance. These search criteria will be populated in your query.

Filter Results

Specify data source, date range, and sampling filters to apply to the desired dataset. All fields are optional.

Sample Media
 Water (NWIS, STEWARDS, S...

Characteristic Group
 All Characteristic Groups

Characteristics
 1,1-Dichloroethene (NWIS)
 1,1,1,2-Tetrachloroethane (...)

Project ID
 All Project IDs

Parameter Code (NWIS ONLY)
 All Parameter Codes

Biological Parameters Assemblage
 All Assemblages

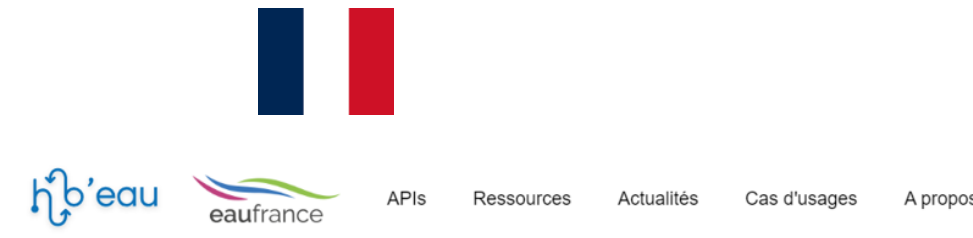
Taxonomic Name
 All Taxonomic Names

Date Range
 Dates should be entered as mm-dd-yyyy from:
 Query URL
 Copy and share the URL of this query.
 https://www.waterqualitydata.us/#countrycode=US&statecode=US%3A06&sampleMedia=Water&characteristicName=1%2C1-Dichloroethene&characteristicName=1%2C1%2C1%2C2-Tetrachloroethane&startDateLo=01-01-1980&startDateHi=26-08-2024&mimeType=csv&providers=NWIS&providers=STORET

Station
 https://www.waterqualitydata.us/data/Station/search?countrycode=US&statecode=US%3A06&sampleMedia=Water&characteristicName=1%2C1-Dichloroethene&characteristicName=1%2C1%2C1%2C2-Tetrachloroethane&startDateLo=01-01-1980&startDateHi=26-08-

cURL
 [{"US:06"}, {"sampleMedia": "Water"}, {"characteristicName": "1,1-Dichloroethene"}, {"characteristicName": "1,1,1,2-Tetrachloroethane"}, {"startDateLo": "01-01-1980"}, {"startDateHi": "26-08-2024"}, {"providers": ["NWIS", "STORET"]} ' https://www.waterqualitydata.us/data/Station/search?mimeType=csv&zip=yes'

WFS GetFeature
 https://www.waterqualitydata.us/ogcservices/wfs/?request=GetFeature&service=wfs&version=2.0.0&typeName=wqp_sites&SEARCHPARAMS=countrycode%3AUS%3Bstatecode%3AUS%3A06%3BsampleMedia%3AWater%3BcharacteristicName%3A1%2C1-Dichloroethene%7C1%2C1%2C1%2C2-



Parameters Try it out

Name	Description
bbox array[number] (query)	Rectangle d'emprise de l'objet demandé, emprise au format : min longitude, min latitude, max longitude, max latitude avec les coordonnées en WGS84 (EPSG:4326), le point doit être utilisé comme séparateur décimal, exemple : 1.6194,47.7965,2.1910,47.9988
bss_id array[string] (query)	Code(s) national de la station (ancien code BSS ou nouveau code BSS, plus d'info ici http://infoterre.brgm.fr/nouveau-code-bss), si plusieurs codes, séparer les codes par une virgule, le nombre maximum de code est 200 Default value : BSS000XUUM
code_bassin_dce array[string] (query)	Code(s) du bassin DCE, si plusieurs code, séparer les codes par une virgule, le nombre maximum de code est 50
code_circonscription_administrative_bassin array[string] (query)	Code(s) de la circonscription administrative de bassin concernée, si plusieurs codes, séparer les codes par une virgule, le nombre maximum de code est 20
code_entite_hg_bdliisa array[string] (query)	Code(s) entité(s) hydrogéologique dans le référentiel bdliisa, si plusieurs codes, séparer les codes par une virgule, le nombre maximum de code est 200
code_fraction array[integer] (query)	Code(s) de la fraction analysée, si plusieurs codes, séparer les codes par une virgule, le nombre maximum de code est 10
code_groupe_parametre array[string]	Code(s) du groupe de paramètres, si plusieurs codes, séparer les codes par une virgule, le nombre maximum de code est 100



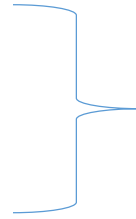
A way ahead



A way ahead

Barriers

- Different semantics – to structure data
- Different semantics – to populate data
- Different webservices/APIs – to expose data



As, often ad'hoc/local solutions in place

Proposal





- Using internationally agreed upon FAIR Water Data Practices

From where ?

- Dynamics are already in place in OGC, W3C, RDA, INSPIRE
- Just need a little more coordination and support

International standardisation dynamics in the water domain

Open Geospatial Consortium

- Standards not only to do web GIS !
- Highly driven through Domain Working Groups (Aviation, Earth Systems Science, Defense and Intelligence Emergency and Disaster Management, Geoscience, **Hydro**, Marine, Meteorology and Oceanography, ...)
- Joint work with 
- Joint groups with  (standards for the web, data exchange on the web)
- Joint efforts with  RESEARCH DATA ALLIANCE
- Highly recommended and implemented
 - in the INSPIRE directive context 🍌
 - in many EU Research Infrastructures and projects 



What is OGC?

A hub for thought leadership, innovation, and standards for all things related to location


Our Vision
Building the future of location with community and technology for the good of society

Our Mission
Make location information Findable, Accessible, Interoperable, and Reusable (FAIR)

Our Approach
A proven collaborative and agile process combining consensus-based standards, innovation project, and partnership building

International standardisation dynamics in the water domain

OGC - Hydro Domain Working Group

- Joint  – World Meteorological Organisation  group
- Target: WaterML 2.0 suite of standards : <https://www.ogc.org/standard/waterml/>
- Organising Interoperability Experiments - (IEs) focused on the water sub-domains
- Entry point : https://external.ogc.org/twiki_public/HydrologyDWG/WebHome

WaterML2.0

- Implemented in WMO Information System
- in those from many organizations : UNESCO, USGS, US EPA, NrCan, NIWA, BRGM, etc...
- And in opensource tools : CUASHI Hydro-Server, Kisters, 52°N etc...
- Updated with a regular contribution from projects involving Hydro DWG partners



Part 1 –
Timeseries

Part 2 –
Ratings,
Gaugings and
Sections

Part 3 –
Surface water
features

Part 4 –
Groundwater

Part 5 –
Water quality
(best practice)
Soon to be updated
by the Water Quality
Interoperability
Experiment

A long history of joint activities

- 2003 - Earth Systems Science Domain Working Group (DWG)
- 2009 - Hydrology DWG
- 2011 - Groundwater Interoperability Experiment (IE)
- 2011 - Water Information Services Concept Development Study
- 2011 - Surface Water Interoperability IE
- 2012 - Hydrology Forecasting IE
- 2013 - Climate-Hydrology Information Sharing Pilot
- 2013 - GroundWater IE2
- 2014 - Water ML 2.0 Standards Working Group (SWG)
- 2015 - Hydrographic Features SWG
- 2015 - Research Data Alliance Global Water Information IG (Hydro DWG sister group)
- 2016 - Groundwater SWG
- 2017 - Geoscience DWG
- 2018 - Environmental Linked Features IE (ELFIE)
- 2019 - Borehole IE
- 2021 - Second ELFIE (SELFIE)
- 2022 - Water Quality IE => on going





International test on Surface / Ground Water Quantity / Quality data exchange



OGC Water Quality Interoperability Experiment (WQ IE)

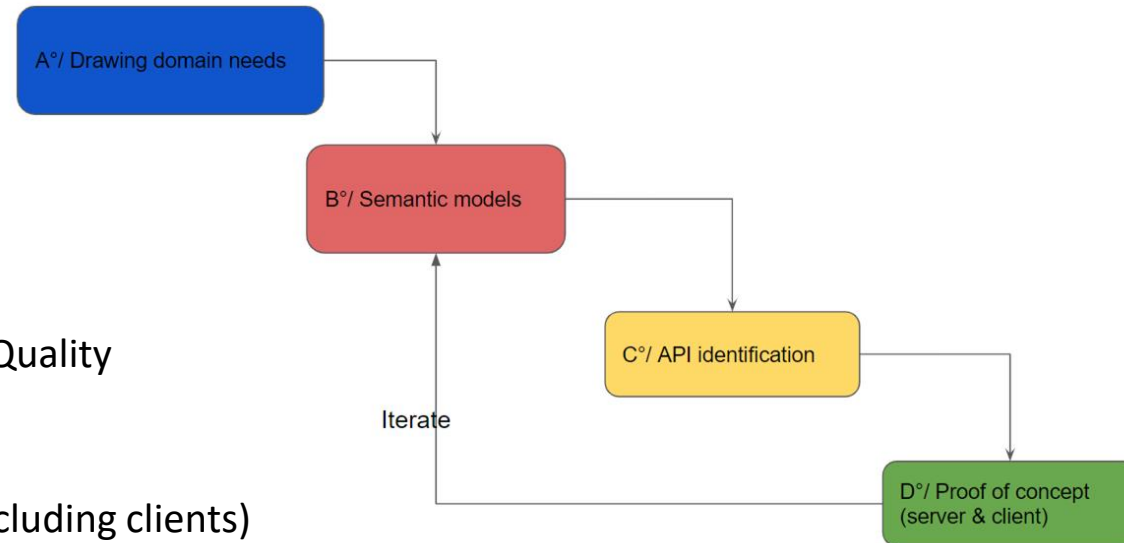
tl;dr;

- 1°/ WMO-UNEP-WHO-UNESCO Water Quality workshop in March 2022 (29-31) : Surface & Ground water
- 2°/ Kick-off 13/09/2022 ... 77 (+ impromptu) meetings later

- A Best Practice on Observations, measurements and samples for Water Quality
- A tooling specification : OGC SensorThings API 1.1
- + WQ extension (reference open-source implementation in FROST)
- Running implementations in various national, organization endpoints (including clients)
- A steadily growing uptake through initial IE partners + 2 important EU projects and WMO members

- 3°/ Engineering Report being written will prepare next steps on
 - a Best Practice for WQ Data Exchange : upgrading OGC WaterML2.0 - Part 5 (OGC 14-003)
 - a review of OGC WaterML2.0 - Part 1 (OGC 10-126r3) : Timeseries

Both to be updated with regards update in the international standard for Observations, measurements and samples change + worldwide change of practices in API deployment



OGC Water Quality Interoperability Experiment (WQ IE)

Quick links

- Full demo – https://external.ogc.org/twiki_public/HydrologyDWG/HydroDWGOGCMemberMeetingJune2024
- Water Quality IE reference point : <https://github.com/opengeospatial/WaterQualityIE>

What -> shared international approach

- Semantics (data-model) : based on OGC/ISO “Observations, measurements & samples” standard -> Water quality profile
- Technical (API) : OGC SensorThings API (mostly)

Who

- EU Water4All
 - project partners -> Ex : BRGM, Danish DEP, ISPRA, Fraunhofer, VITO etc...
 - EU DataSets (ex : EEA)
- Water Quality IE members USGS, USEPA, DataStream (Canada), BRGM, BaFG (Unesco GEMS water), Fraunhofer
- EU GSEU project partners -> EU Geological surveys

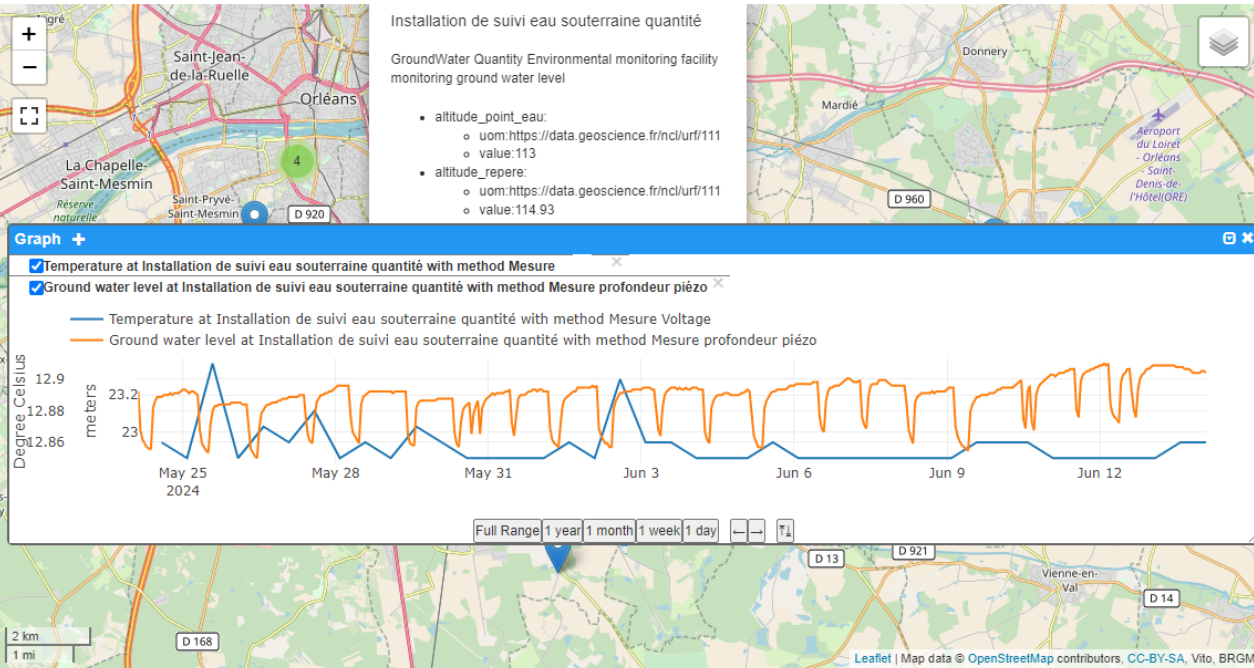
How

- Data Provider side : Deploying the solution according to the documentation provided
- Client side connected to the same APIs (proof of interoperability) : Generic WebMap client (<https://api4inspire.k8s.ilt-dmz.iosb.fraunhofer.de/servlet/is/226/>), QGIS SensorThings API Plugin, R

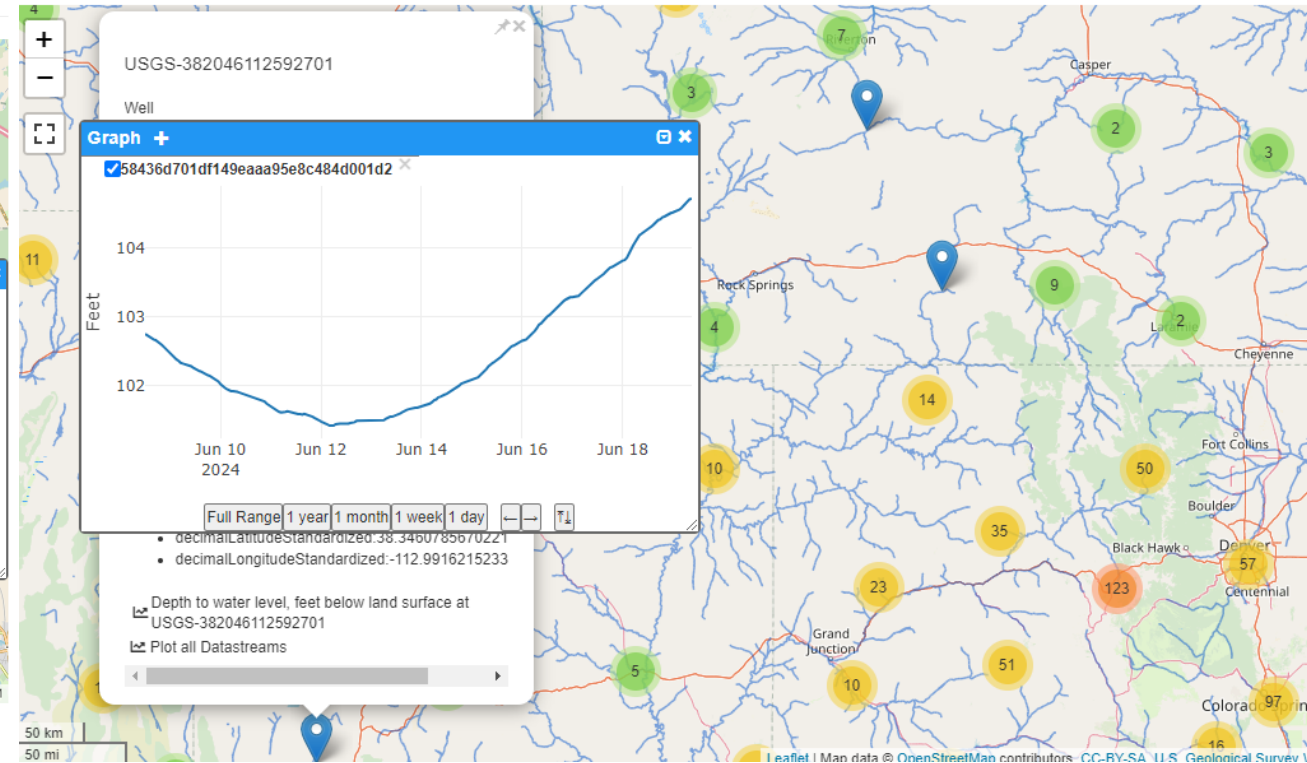
Water4All, Water Quality IE: FAIR Water Data Practices

It works

Water Quality IE / Water 4 All



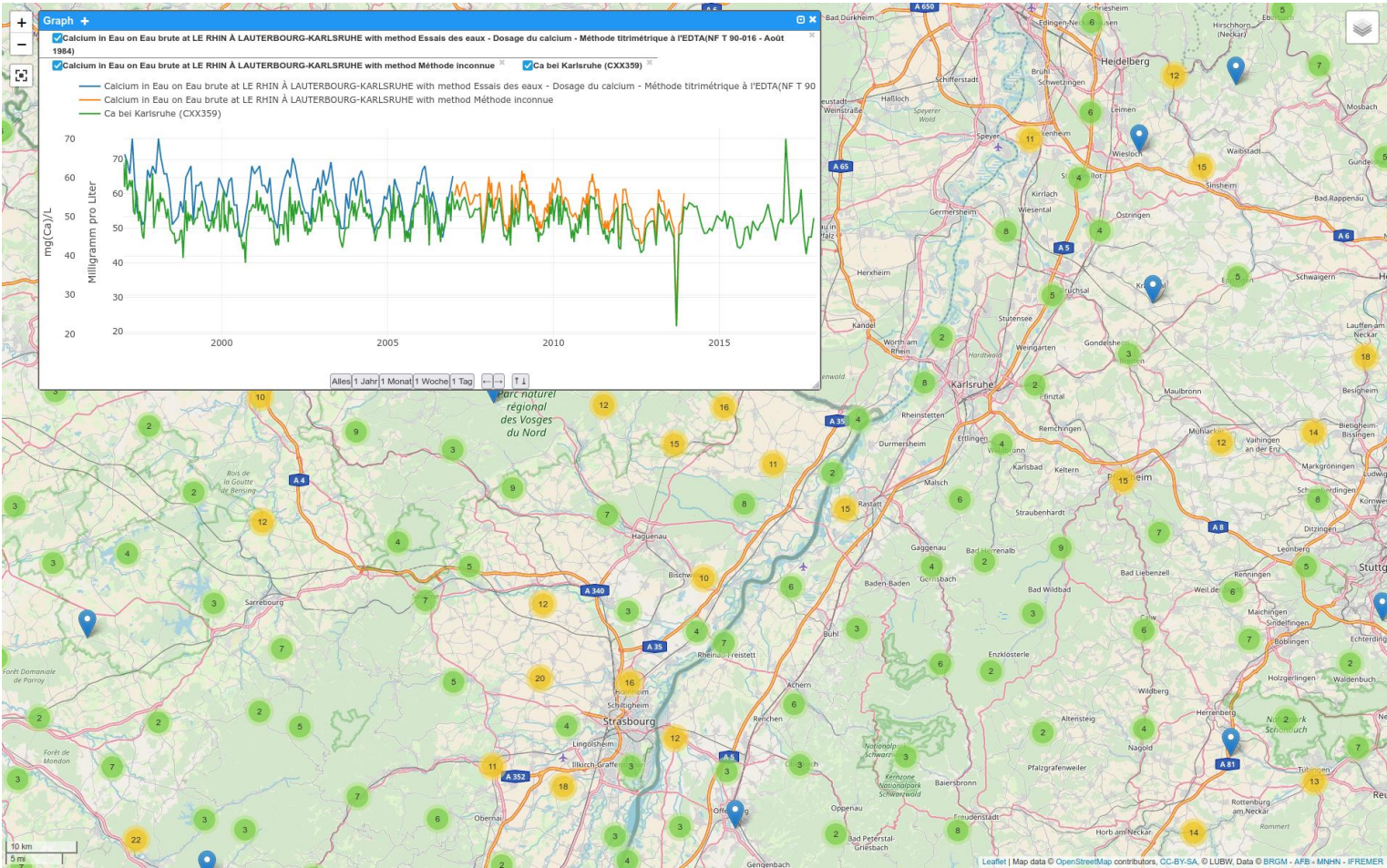
BRGM : raw *in-situ* groundwater quantity & quality



USGS : *in-situ*, groundwater quantity

Water4All, Water Quality IE: FAIR Water Data Practices

It works

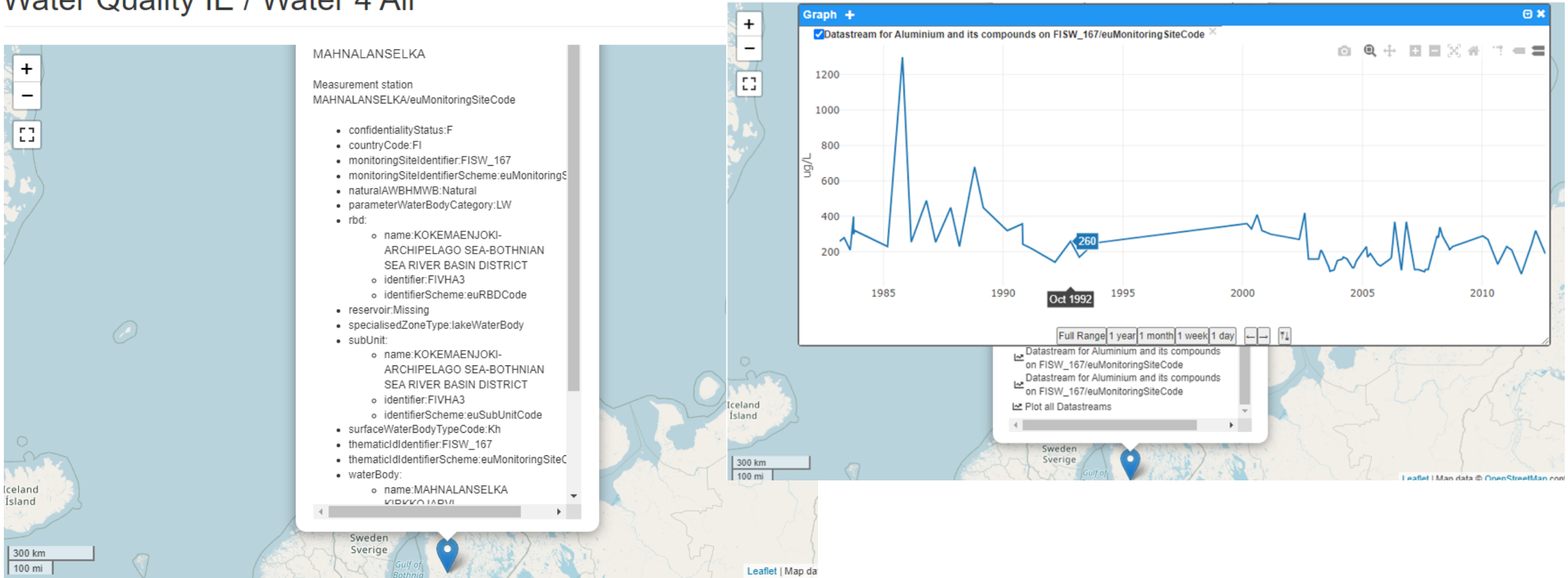


Surface water quality, *ex-situ*,
France - Germany

Water4All, Water Quality IE: FAIR Water Data Practices

It works

Water Quality IE / Water 4 All



Water4All, Water Quality IE: FAIR Water Data Practices

It works – also in desktop tools like QGIS

The screenshot displays the QGIS desktop environment with the following components:

- Project Explorer (Left):** Shows a tree view with layers including 'SensorThings', 'BRGM Water Quality IE', 'Datastreams', 'Features of Interest', 'Historical Locations', 'Locations', 'Points', 'MultiPoints', 'Lines', 'Polygons', 'Observations', 'Observed Properties', 'Sensors', and 'Things'. It also lists 'LUBW - API4INSPIRE' and 'USGS Water Quality IE'.
- Information GPS (Bottom Left):** Includes fields for Latitude and Longitude, and a 'Connecter' button.
- Map (Center):** Shows a map of Karlsruhe with a red circle indicating the location of Station Karlsruhe (CXX359).
- Location Window (Top Center):** Displays 'Karlsruhe (CXX359)' and 'Station Karlsruhe (CXX359)'. It lists 'Available observations' in a table.
- Observations Table (Middle):** A table with the following data:

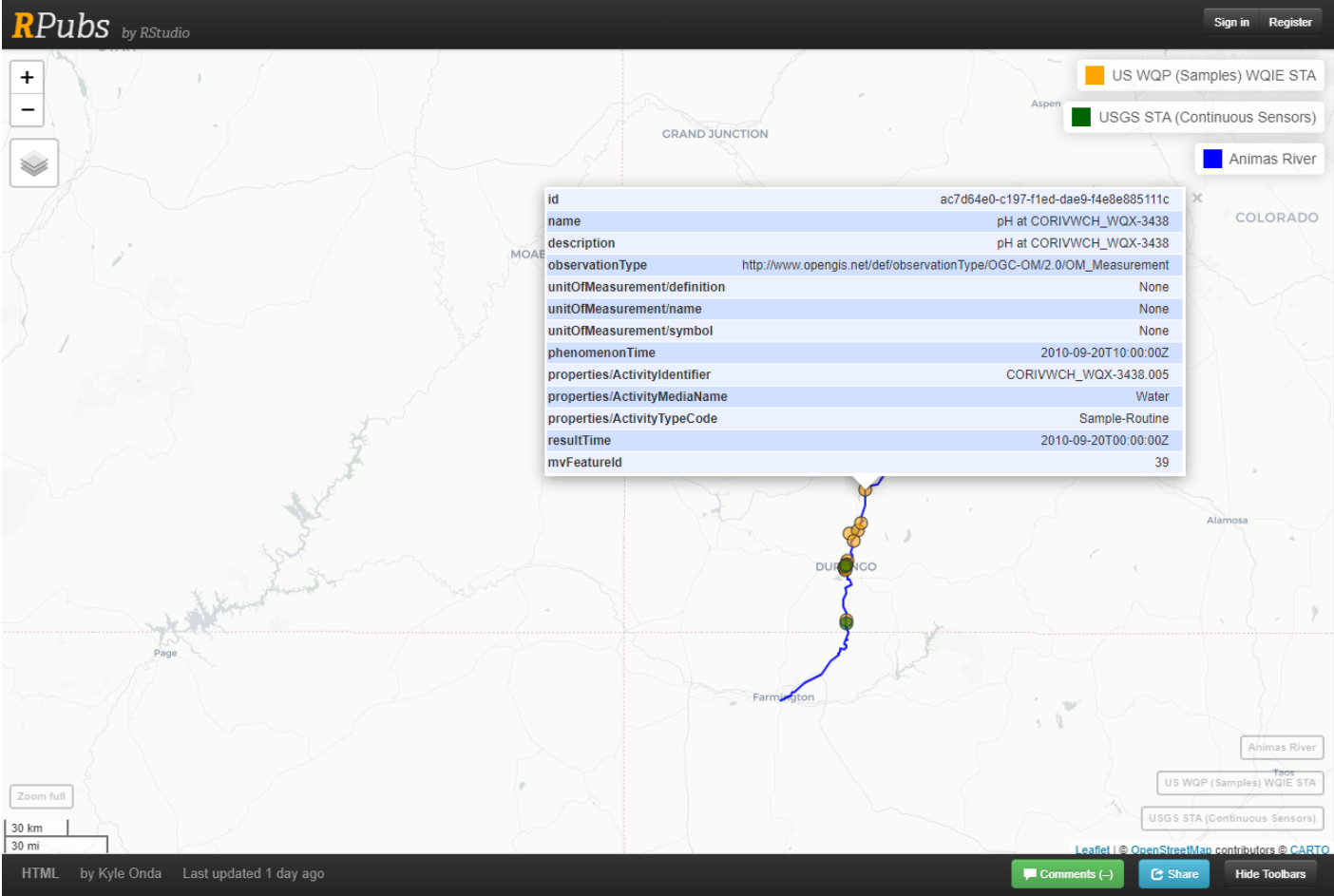
Name	Description	Ref. dates	Observed property	Sensor	Observations
Frigen113 bei Karlsruhe (CXX359)	Frigen113 bei Karlsruhe (CXX359)	Jan 08 1990 - Dec 23 1991	Frigen113 - µg/l	unknownSensor	
Fluoranthen bei Karlsruhe (CXX359)	Fluoranthen bei Karlsruhe (CXX359)	Jan 02 1981 - Dec 04 2017	Fluoranthen - µg/l	unknownSensor	
O2 bei Karlsruhe (CXX359)	O2 bei Karlsruhe (CXX359)	Jan 22 1973 - Dec 18 2017	O2 - mg/l	unknownSensor	
1,2,3-Trichlorbenzol bei Karlsruhe (CXX359)	1,2,3-Trichlorbenzol bei Karlsruhe (CXX359)	Jan 02 1996 - Dec 04 2017	1,2,3-Trichlorbenzol - µg/l	unknownSensor	
2Aminobenz bei Karlsruhe (CXX359)	2Aminobenz bei Karlsruhe (CXX359)	Jan 05 2015 - Dec 04 2017	2Aminobenz - µg/l	unknownSensor	
Iodocarb bei Karlsruhe (CXX359)	Iodocarb bei Karlsruhe (CXX359)	Jan 05 2015 - Dec 04 2017	Iodocarb - µg/l	unknownSensor	
Acetamid bei Karlsruhe (CXX359)	Acetamid bei Karlsruhe (CXX359)	Jan 05 2015 - Nov 07 2016	Acetamid - µg/l	unknownSensor	
3PhenBeSre bei Karlsruhe (CXX359)	3PhenBeSre bei Karlsruhe (CXX359)	Jan 05 2015 - Dec 04 2017	3PhenBeSre - µg/l	unknownSensor	
2,4-DP bei Karlsruhe (CXX359)	2,4-DP bei Karlsruhe (CXX359)	Feb 05 2001 - Dec 04 2017	2,4-DP - µg/l	unknownSensor	
m-tp-Xylol bei Karlsruhe (CXX359)	m-tp-Xylol bei Karlsruhe (CXX359)	Dec 26 2005 - Dec 31 2005	m-tp-Xylol - µg/l	unknownSensor	
DTPA bei Karlsruhe (CXX359)	DTPA bei Karlsruhe (CXX359)	Dec 23 2002 - Dec 04 2017	DTPA - µg/l	unknownSensor	

- Observations Window (Bottom Right):** Shows a chart for 'EDTA bei Karlsruhe (CXX359)'. The chart displays values over time, with a peak around 2003 and a sharp decline thereafter. The x-axis shows dates from 01/08/1996 to 09/02/2013. The y-axis shows values from 0 to 9.

Same French & German Data
In QGIS version 3.36+ (Water4all, funding)

Water4All, Water Quality IE: FAIR Water Data Practices

It works – also ingesting this data in R



USGS Water Quality Portal data + continuous sensor (ex: pH)

Water4All, Water Quality IE: FAIR Water Data Practices

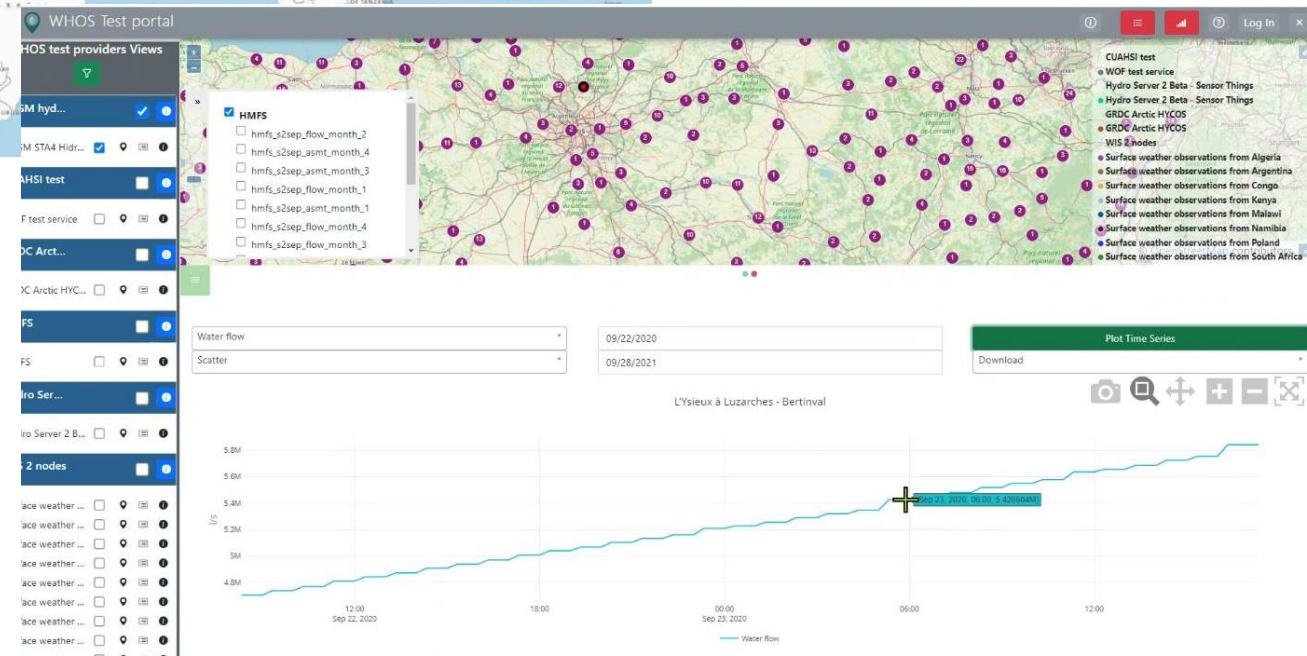
It works – also connecting with institution systems (ex : World Meteorological Organisation)



Being based on a **standard communication protocol**, it was very easy to test and integrate to WHOS in the way to the workshop!



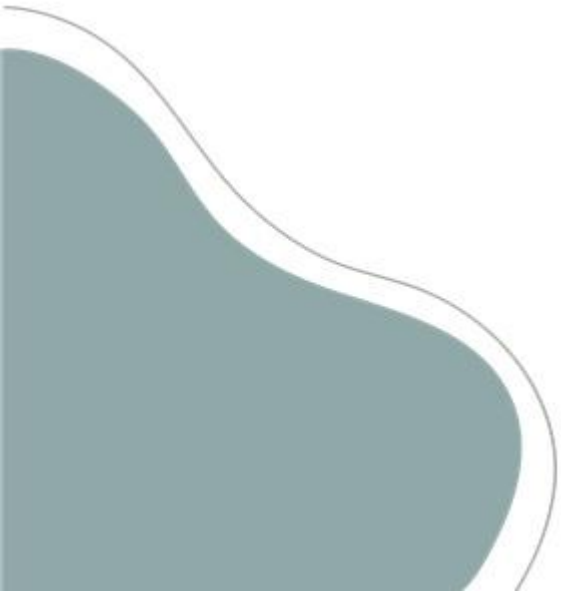
Description of the service and some suggestions are reported after preliminary integration tests in the next slides, with the **aim of further improving the connection to WHOS**.



Surface water quantity – France data ingested in WMO Hydrological Observing System (WHOS)



Shaping an integrated groundwater and surface water information platform



Other Water4All components

Shared vocabularies

[Home](#) > [Vocabularies Home](#) > [Vocabularies](#) > [Observed properties](#) > [nitrate concentration](#)

nitrate concentration

IRI <https://data.water4all-partnership.eu/ncl/ObsProp/620>

Type [Quantity Kind](#), [Concept](#), [Chemical Observed Property](#), [Groundwater Observed property](#)

Observation de la quantité de nitrates exprimée par une concentration massique ou molaire

category	https://data.geoscience.fr/ncl/structure/Category/4
unit	https://data.geoscience.fr/ncl/uom/406 https://data.geoscience.fr/ncl/uom/49 https://data.geoscience.fr/ncl/uom/502 https://data.geoscience.fr/ncl/uom/525 https://data.geoscience.fr/ncl/uom/573
seeAlso	https://parameterlisten.miljoeportal.dk/parameter/2608abe8-a72d-4bee-8e49-93681252d8fe
alternative label	[NO3-] xsd:string
is in scheme	Observed properties
notation	620 xsd:string
has related match	http://id.eaufrance.fr/par/1340 https://chem.nlm.nih.gov/chemidplus/rn/14797-55-8 https://w3id.org/ozcar-theia/c_7a8c53c6
is top concept in scheme	Observed properties
status	http://inspire.ec.europa.eu/registry/status/valid

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W4ALL
entry

Danish Env Portal

French Water Information System

PubChem

A French Water Research Infra

Other Water4All components

Shared vocabularies

[Home](#) > [Vocabularies Home](#) > [Vocabularies](#) > [Observed properties](#) > [4,4'-DDT concentration](#)

4,4'-DDT concentration

IRI <https://data.water4all-partnership.eu/ncl/ObsProp/621>

Type [Quantity Kind](#), [Concept](#), [Chemical Observed Property](#), [Groundwater Observed property](#)

Observation de la quantité de 4,4'-DDT exprimée par une concentration massique ou molaire

category	https://data.geoscience.fr/ncl/structure/Category/4
unit	https://data.geoscience.fr/ncl/uom/502 https://data.geoscience.fr/ncl/uom/573
seeAlso	https://parameterlisten.miljoeportal.dk/parameter/3283527d-830b-401b-8267-2e241e928150
alternative label	[4,4'-DDT] xsd:string Clofenotane concentration en Dicophane concentration en concentration en dichloro diphenyl trichloroétane pp' fr concentration en pp'DDT fr
is in scheme	Observed properties
notation	621 xsd:string
has related match	http://id.eaufrance.fr/par/1148 https://chem.nlm.nih.gov/chemidplus/rn/50-29-3
is top concept in scheme	Observed properties
status	http://inspire.ec.europa.eu/registry/status/valid

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W4ALL
entry

Danish Env Portal

French Water Information System

PubChem

Other Water4All information platform components

FAIR water data specification

To support FAIR Water Data Practices standardization work, share specification and guide providers/users
Next steps : stabilize Interoperability Experiments findings in standards, provide support to more new comers

Open-source tools for the community

To lower the entry ticket for both the data provision and client sides

Next steps :

- Data Provision : stabilize in standard the proposed version, continue joint effort with WMO
- Client : continue momentum, more mature & simple clients, add Virtual Research Environment component

Metadata catalogue & repository

To support discovery of datasets and corresponding services

Next steps : enrich as other partners join the effort

LinkedData Resolver

To foster data discovery and enable Linking data

Next steps : resolve to more resources

Water data FAIRifier

To help those not having the capacity/knowledge to share data directly according to FAIR Water Data Practices

Next steps : more testers for a more robust solution

Water4All information platform entry point

Information
platform GUI

Graphical User Interface: visible tip of the iceberg (*most of the screenshots from this presentation come from here*)
Next steps : enhance prototype, test Virtual Research Infrastructure component

Water Quality IE / Water 4 All



Water4All information platform – next Use Cases

1°/ Surface Water (SW) Quantity Observation

2°/ SW Quality Observation

- 2a Direct in-situ sensor (ex: Temp, conductivity)
- 2b. Ex-situ observation (involving samples from Lab)
- 2c Biodiversity observation

3°/ Ground Water (GW) Quantity Observation

4°/ GW Quality Observation

- 4a Direct in-situ sensor (ex: Temp, conductivity)
- 4b. Ex-situ observation (involving samples from Lab)

5°/ Sharing reference datasets (river, lakes, aquifers, ...)

6°/ Water level forecast : Surface, Ground

7°/ Water abstraction

8°/ Industrial emission

9°/ Waster water discharge

10°/ ...

We focused on those

Now

- moving to the others
- while making the other more mature (TRL)



Conclusion



Water4all approach

Setting up international FAIR water data practices
that fulfill community needs



Deploy those solutions within the community

Support open-source solutions
in implementing those practices

Water4all approach towards a virtuous cycle

Setting up international FAIR water data practices
that fulfill community needs



Deploy those solutions within the community

Support open-source solutions
in implementing those practices

Thank you

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Are you too busy to improve?



Håkan Forss @hakanforss <http://hakanforss.wordpress.com>

This illustration is inspired by and in part derived from the work by Scott Simmerman, "The Square Wheels Guy" <http://www.performancemanagementcompany.com/>

