

WaterML 2.0 ❤️ SensorThings API



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WMO Capacity Building Workshop on Hydrological Data Exchange, Standardization,
Interoperability

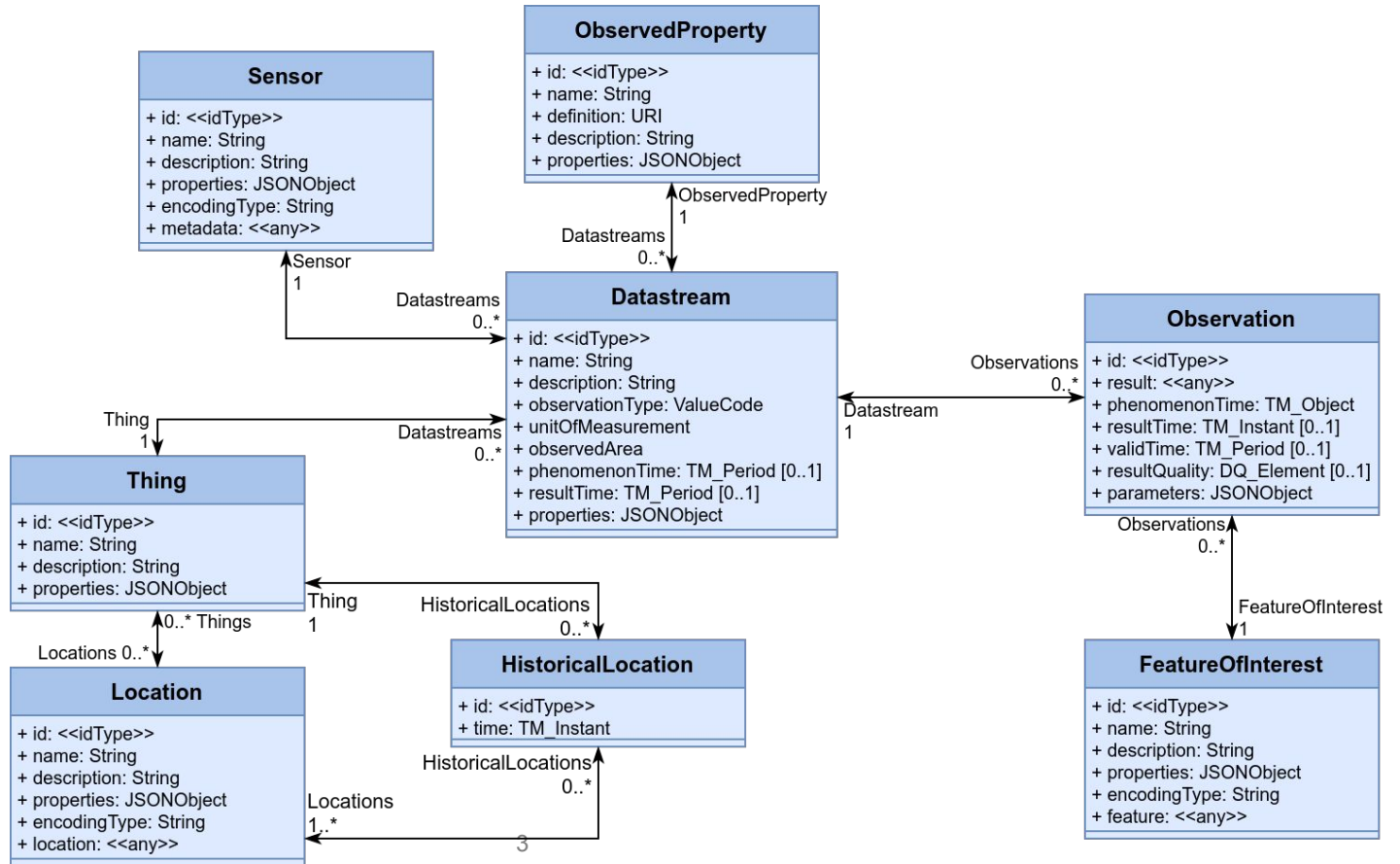




OGC SensorThings API?

- A standard for exchanging sensor data and metadata
 - Historic data & current data
 - JSON Encoded
 - RESTful
 - Adapting OASIS OData URL patterns and query options
 - Supporting ISO MQTT messaging
- Easy to use & understandable
 - Discoverable with only a web browser

SensorThings API 1.1 – Data Model



SensorThings API 1.1 – API

HTTP:

MQTT:

	GET	POST	PATCH	DELETE
v1.1	Get index			
v1.1/Type	Get all of type	Create		
v1.1/Type(id)	Get one of type		Update	Delete
v1.1/Type(id)/Entity	Get linked entity			
v1.1/Type(id)/EntitySet	Get all linked	Create Linked		

1. Subscribe
 - v1.1/Things
 - v1.1/Datastreams(x)
 - v1.1/Datastreams(x)/Observations
 - etc.
2. Get Notified

- Fully Explorable with just a browser
- Composable Responses
- Powerful filtering

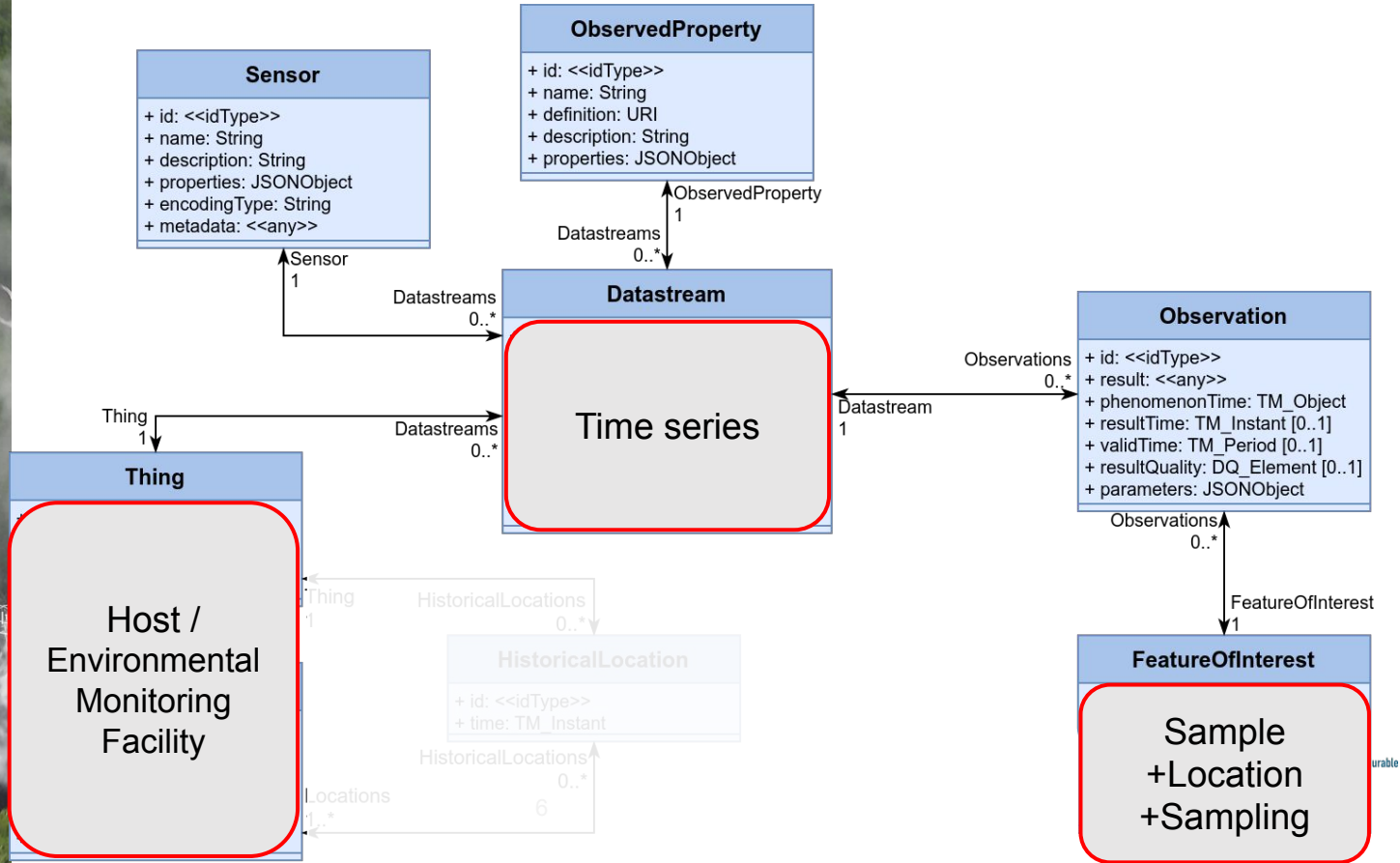
https://datacoveeu.github.io/API4INSPIRE/sensorthingsapi/1_Home.html

SensorThings live demo

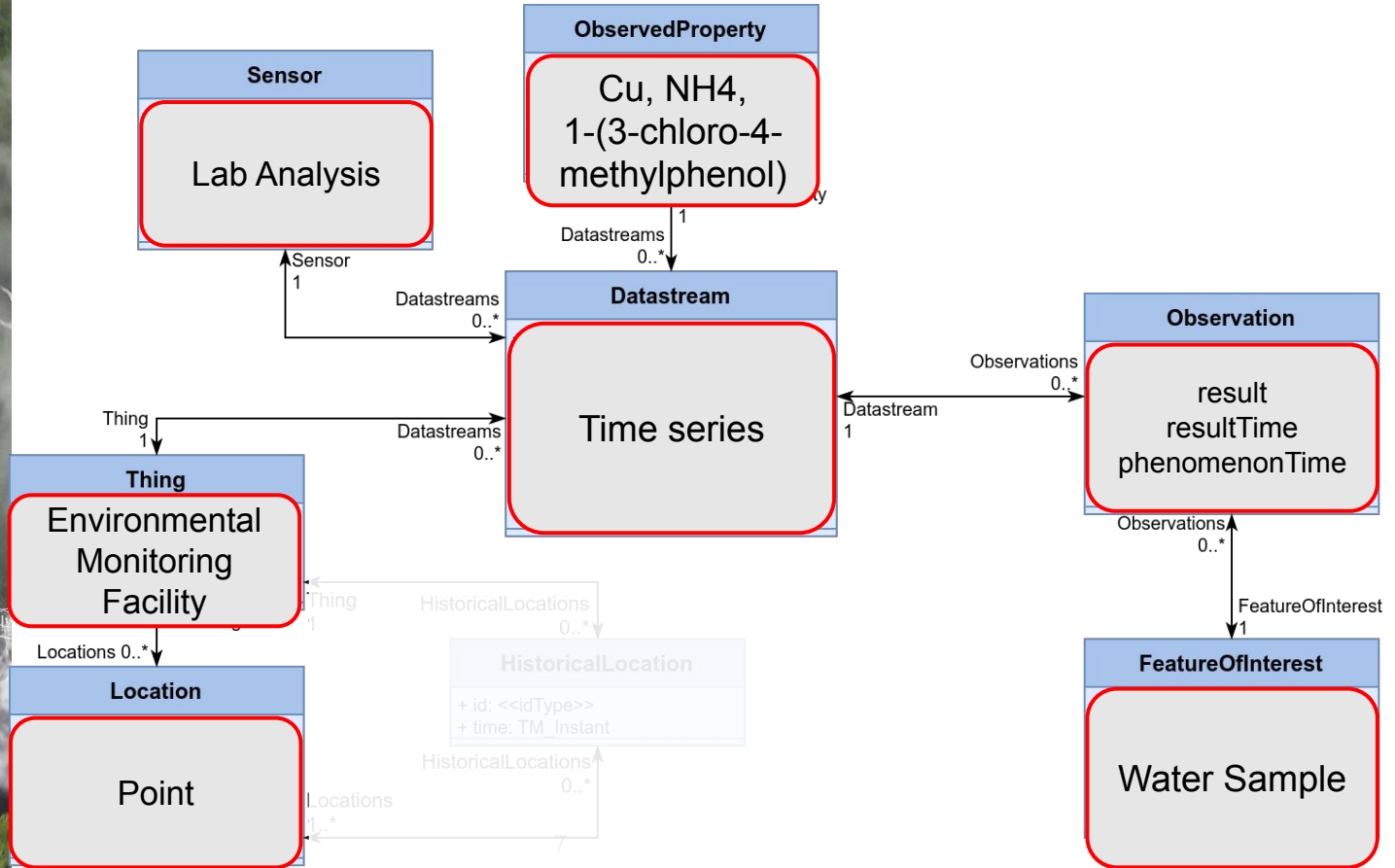
- <https://airquality-frost.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1>
 - ~760 000 000 Observations
 - ~21 000 Datastreams
 - ~5 000 Stations



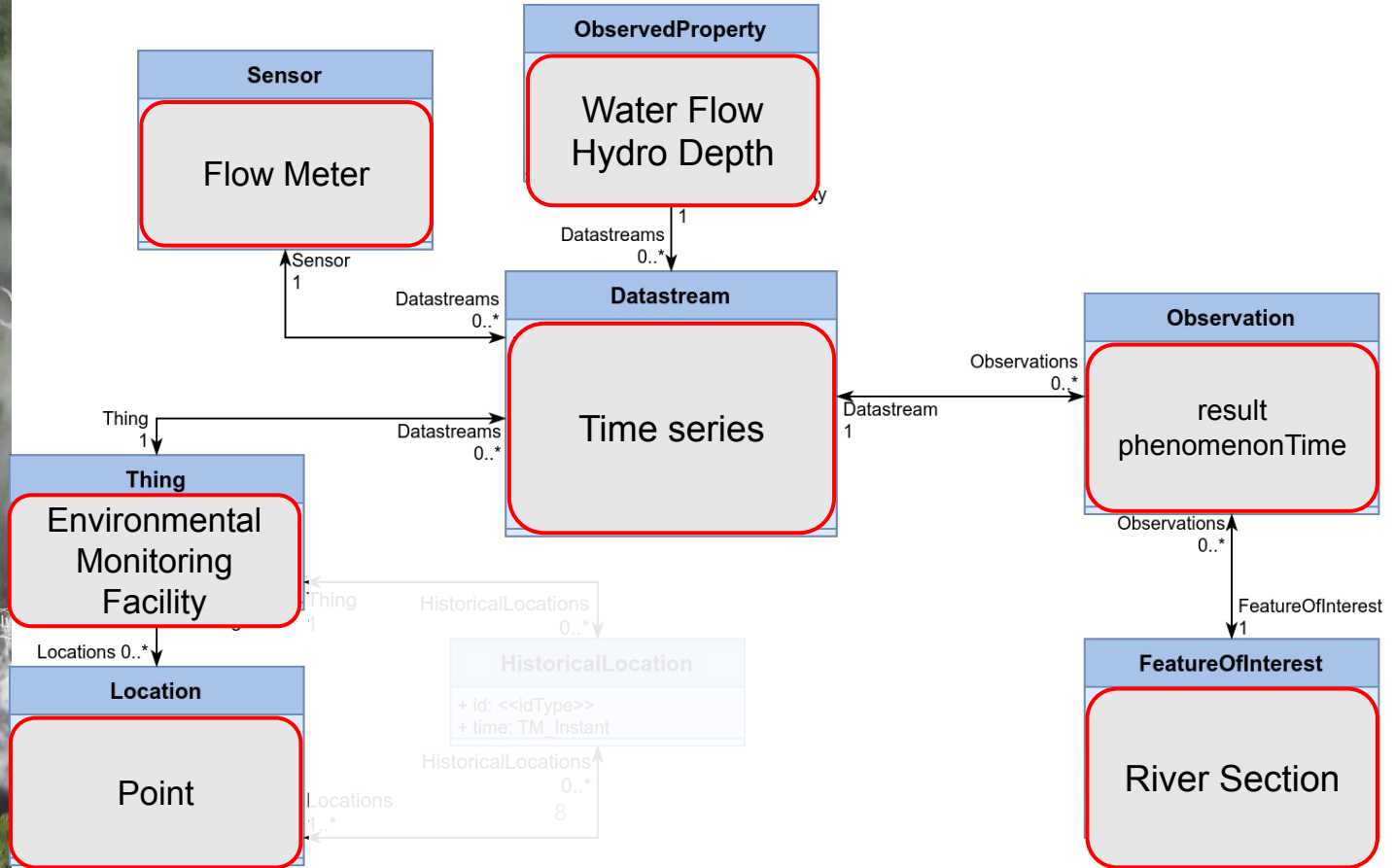
SensorThings API 1.1 – Water Quality / Quantity



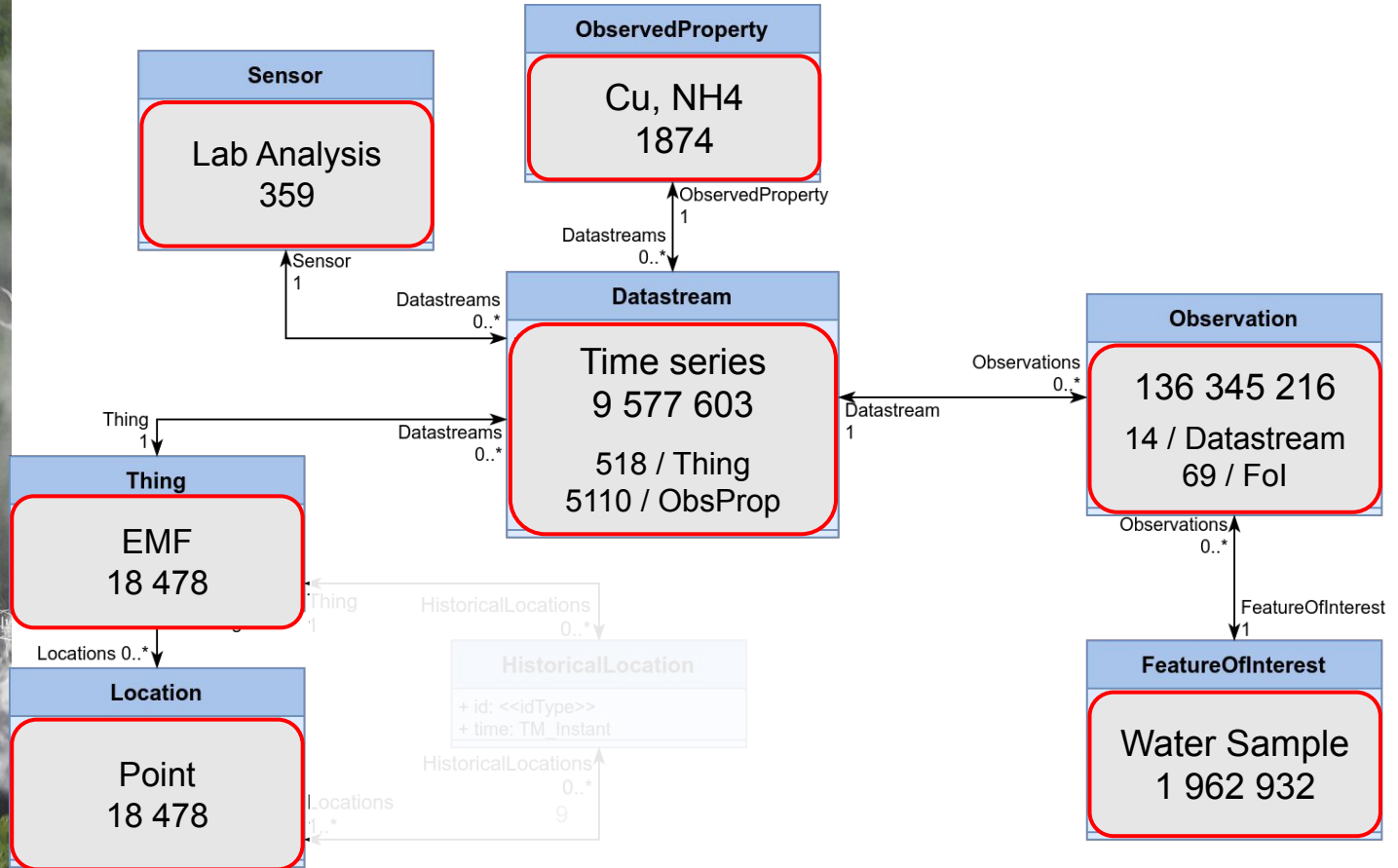
SensorThings API 1.1 – Water Quality



SensorThings API 1.1 – Water Quantity



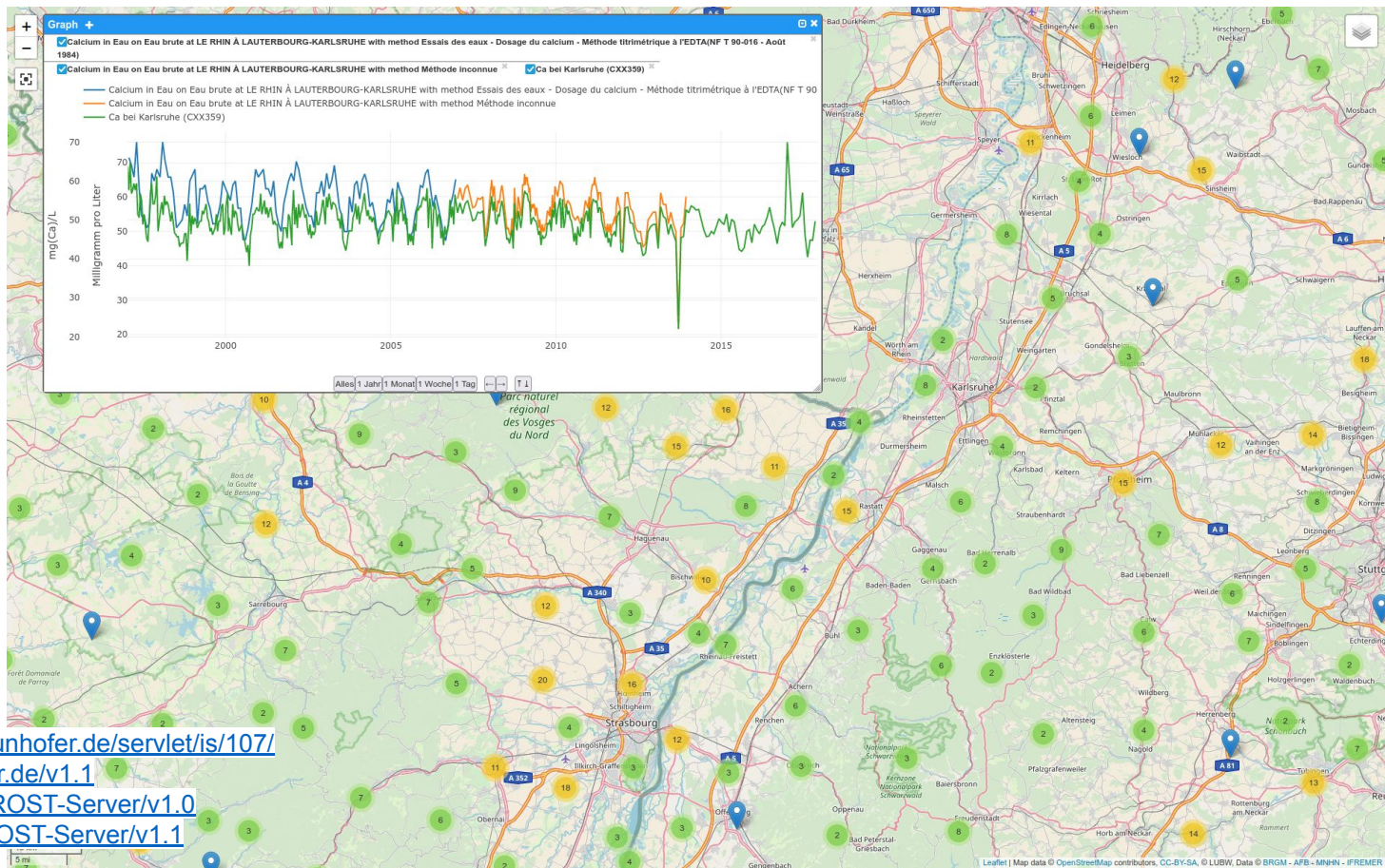
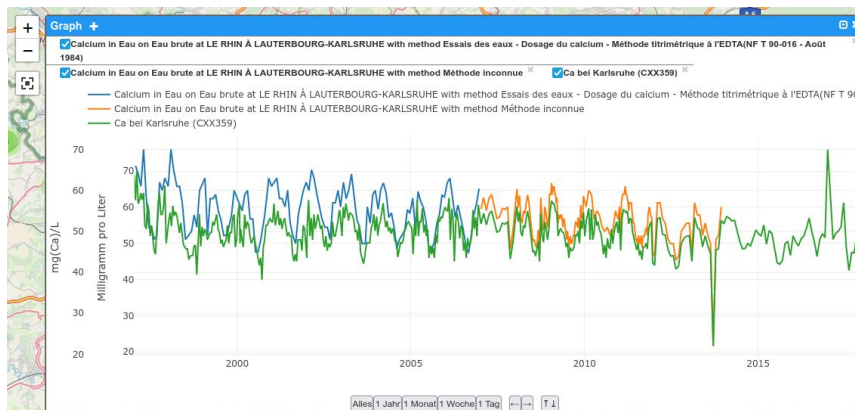
SensorThings API 1.1 – Data Model



FrancoGermanic Flow – API4INSPIRE



- French & German Data
- 1 Map



<https://api4inspire.k8s.ilt-dmz.iosb.fraunhofer.de/servlet/is/107/>

<https://lubw.k8s.ilt-dmz.iosb.fraunhofer.de/v1.1>

<https://sensorthings-wq.brgm-rec.fr/FROST-Server/v1.0>

<https://sta4hydrometry.brgm-rec.fr/FROST-Server/v1.1>



This Works !

- But can we improve on it?

=> could water quantity time series (a.k.a Water ML 2.0 Part 1) benefit from this experience ?

Should we push this to Standards/Best Practice ?

- Feedback from various implementers between
 - The previous OGC Pattern : using OGC WebService (like Sensor Observation Service) based on XML
 - And of the new pattern : using OGC APIs (like SensorThings API) based on JSON and REST full pattern

=> most have decommissioned their SOS and replaced them by SensorThings API

=> the learning curve is drastically different : both for IT and domain experts

=> observation data filtering via SensorThings API is way better than what is feasible in solutions such as SOS 2.0 (ex: which station observed a river flow above threshold 'xxx' in 2022, near Paris)

=> truly REST ful APIs work fine on read but also, in creation/update mode. Which is a gamechanger when deploying in running systems

=> need to fit the modern web approaches

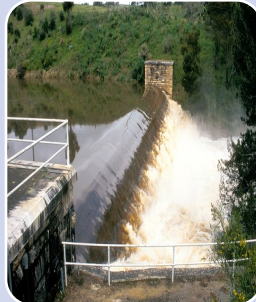


Ok, let's push this to Standards/Best Practice

- Suggestion from the Water Quality IE experience
 - We plan to contribute back to the standard baseline
 - Water ML2.0 Part 1 'Timeseries'
 - Needs to be updated to take into account the revision of O&M (ISO 19156:2011) => Observations, Measurements and Samples a.k.a 'OMS' (ISO 19156:2023)
 - And also TimeSeries ML (issued from Part 1) : also currently integrating OMS
 - And define a best practice to expose it using SensorThings API
 - Water ML 2.0 Part 5 'Water Quality'
 - Building on the output of the Water Quality IE
 - High chance the IE will recommend in its engineering report to
 - Generate a Best Practice document
 - And also revise Part 1 (as we touched quantity during the IE)
 - => more details on the IE itself on the 29th

Ok, let's push this to Standards/Best Practice

- Suggestion from the Water Quality IE experience



Part 1 -
Timeseries

Suggestion : to be updated

Part 2 –
Ratings,
Gaugings and
Sections

Out of scope of
our current work

Part 3 –
Surface water
features

Mainly feature model
=> out of scope in this
context

Part 4 –
Groundwater

Part 5 –
Water quality
(best practice)

Suggestion : to be updated



Ok, let's push this to Standards/Best Practice

- Some supporting national/EU projects from our end



PROGRAMME NATIONAL
DE RECHERCHE SUR L'EAU



- French Research project, 53 Million €, 10 years
- <https://www.onewater.fr/en> (ANR project : 22-PEXO-0009)
- Many domain objectives including FAIR (interoperable) Water Data Exchange



- EU joint research partnership
- <https://www.water4all-partnership.eu/>
- 31 countries, 7 years, 81 Million € for the 2 years.
- Many domain objectives including FAIR (interoperable) Water Data Exchange

- Both are running now => join the effort !





Thank you

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