



SO FAIR - A generic tool for publishing observation data within an ecosystem of interoperable services

Hervé Squvidant, Mario Adam, Mikael Fauchaux, Ophélie Fovet, Christophe Geneste, Tom Loree, Thierry Morvan, Laurent Ruiz, Zahra Thomas

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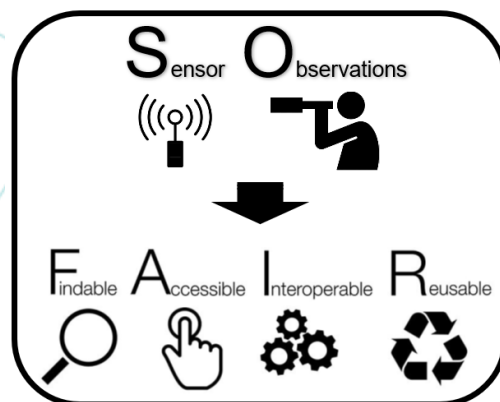
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SO FAIR - A generic tool for publishing observation data within an ecosystem of interoperable services



2nd TERENO-OZCAR Conference 2023

28 september 2023

Herve Squividant, Mario Adam, Mikael Fauchaux, Ophelie Fovet, Christophe Geneste, Tom Loree, Thierry Morvan, Laurent Ruiz & Zahra Thomas.

> Context

- Maturity of FAIRisation of geographic data
 - 2000: OGC W*S standards
 - 2007: INSPIRE directive
 - 2009 : SDI
 - 2010 → ... : Platforms + communities + ...
 - ... birth of the spatial open data ecosystem

- Late start for the "liberation" of temporal data
 - 2006: Standard SOS "orphaned by its WMS
 - 2015: New OGC SensorThings standard
 - 2016: FROST Server
 - 2021 : SensorThings as input of Theia/OZCAR IS

- Complexity of configuring a temporal open data service

- Compartmentalization between FAIR services for "geographic" AND "temporal" data

➤ Question

How to **publish** temporal datas **simply** and **integrate** them into an ecosystem of pre-existing services ?



➤ Our answer

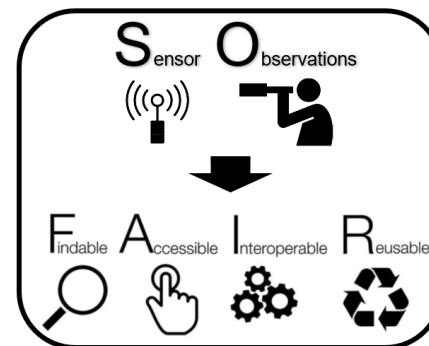
By initiating an internal working group with a mix of different skill profiles : metrologist, scientist, FAIR data scientist, API developer, service deployer / infrastructure manager, ...



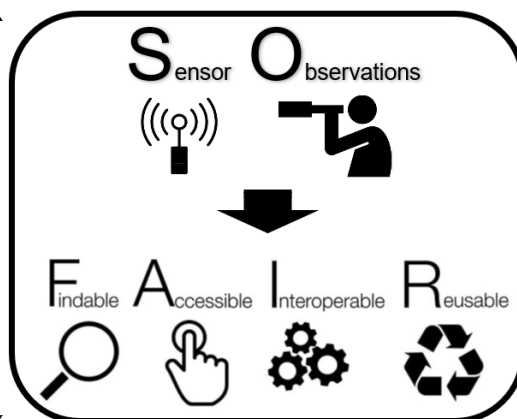
To work together to define a methodological, technical and human chain for routing data from the sensor to the ecosystem of FAIR data services based on subsidiarity as we made before with INSPIRE SDI and geographical data sharing.



The project SO FAIR -> Sensor Observations to FAIR data



➤ SO FAIR middleware service



➤ The SO FAIR project

1 Creating a SensorThings service
→ api.geosas.fr/<MyInstance>/v1.0

2 Configuring a SensorThings service

- Things
- Sensors
- ObservedProperties
- Thesaurii
- ...

3 Feeding datas to service

- Automatic : Lora, ...
- Semi-automatic : Outputs from proprietary software
- Manual : upload CSV
- ...

4 Connection to the service ecosystem

- Automated generation of INSPIRE metadata and OGC layers in SDI
- Dataverse Metadata

5 Automated generation of web-based tools for viewing and downloading time series, with or without spatial inputs.



➤ SO FAIR API Service

➤ New standard



➤ A python implementation of the OGC API



➤ deployed in a beta version

<https://geoslas.fr/sofair-dev/api/>

A screenshot of a web browser showing the "Processes in this service" page on geoslas.fr. The page has a header with the Geoslas.fr logo and a breadcrumb "Home / Processes". A table lists five API processes. The first row, "SensorThings API creation", is highlighted with a yellow border and a yellow circle with the number "1" next to it. The other rows are "Setting up the sensorthings service", "Upload observations", "Publishes a SensorThings service in an IDG", and "Create SensorThings geographic portal".

Name	Description
SensorThings API creation	This function allows you to create a new instance of a SensorThings service that is immediately accessible online.
Setting up the sensorthings service	This function uploads an XLSX file to create the various objects in the SensorThings service: Things, Sensors, Observed Properties, Locations, Features Of Interest and Datastreams.
Upload observations	This function uploads observations from CSV or XLSX file to the SensorThings service.
Publishes a SensorThings service in an IDG	This process publishes INPIRE-compliant layer and metadata from a SensorThings service to a Spatial Data Infrastructure.
Create SensorThings geographic portal	This function automatically generates a URL pointing to a map portal displaying chronicles of observations from the SensorThings service provided.

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Sample Menu

JD Trifon Ivanov

Admin / Création d'une instance SensorThings

GitHub

Création

Création

Créateur

Name

Email

Service API

FROST

FROST

STEAN

https://frost.geosas.fr/

Titre

Exemple : Observatoire de Recherche en Environnement AgrHyS

Résumé

Créer

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release v1.5.0

GéoSAS.fr

➤ SO FAIR API Service

➤ Un nouveau standard



➤ Une implémentation de l'API OGC en python



➤ Déployée en mode bêta

<https://geoslas.fr/sofair-dev/api/>

A screenshot of a web browser showing the "Processes in this service" page on geoslas.fr. The page has a header with the Geoslas.fr logo and a navigation bar with "Home / Processes". A table lists five API processes. The second row, "Setting up the sensorthings service", is highlighted with a yellow border and a yellow circle with the number "2" next to it. The table has columns for "Name" and "Description".

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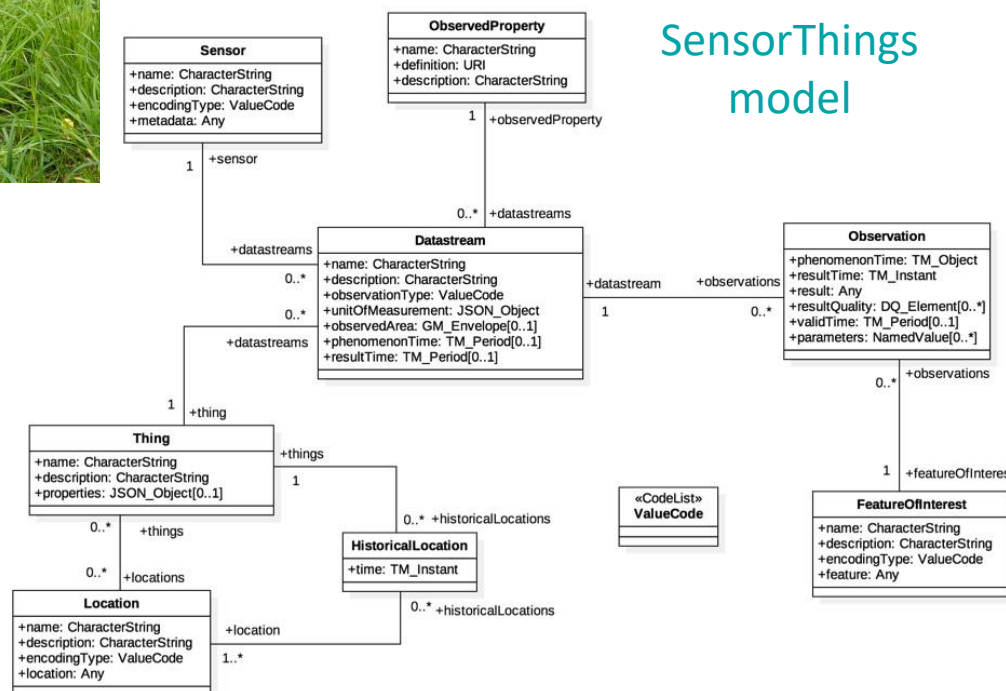
➤ From environmental observatory to SensorThings Model



Reality in the field

How ?

Information system



> Iterative teamwork

2



Scientists

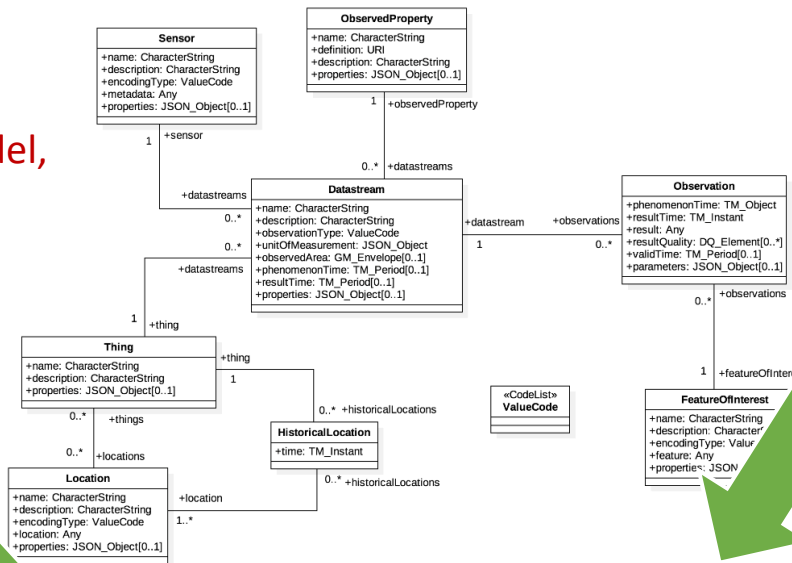
- Need to understand the model,
- Involvement in the choice of concepts and thesaurus definitions.

Metrologist, sensor installer

- Need to understand the model,
- Knowledge of observatory site, sensors, observed properties and data path.



Sensorthings model



FAIR data scientist

- Good knowledge of the model, services & tools,
- Facilitating role to extract knowledge from the scientist and the metrologist.



INRAE

l'institut Agro
agriculture • alimentation • environnement



Example Of AgrHyS Observatory in Brittany

2

File Accueil Insertion Mise en page Formules Données Révision Affichage Développeur Dites-nous ce que vous voulez faire.. Christophe Ge

Calibri 11 A A Renvoyer à la ligne automatiquement Texte

Coller Copier Reproduire la mise en forme Presse-papiers Police Alignement Nombre

Mise en forme conditionnelle Mettre sous forme de tableau Styles de cellules Insérer Supprimer Format Effacer Somme automatique

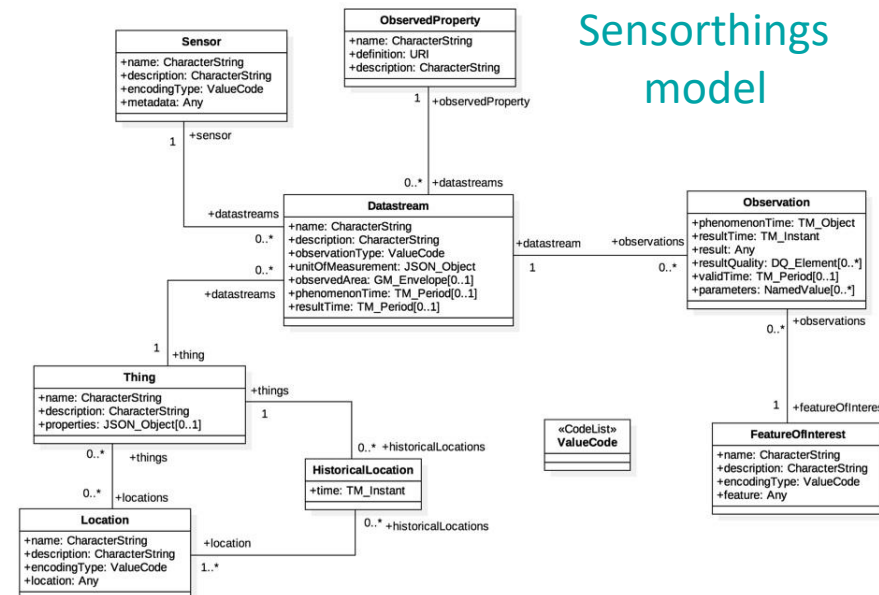
A2 E30_niveau_eau_102

	A	B	C	D	E	F
	name	observationType	description	unitOfMeasurement.name	unitOfMeasurement.symbol	unitOfMeasurement.definition
1	E30_niveau_eau_102	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Niveau du cours d'eau de l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 6 minutes.	meter	m	https://www.bipm.org/en/si-base-units/metre
2	E30_temperature_201	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Température du cours d'eau à l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 10 minutes.	degree Celsius	°C	http://unitsofmeasure.org/ucum.html#para-30
3	E30_niveau_eau_X102	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Niveau du cours d'eau de l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 6 minutes.	meter	m	https://www.bipm.org/en/si-base-units/metre
4	E30_temperature_X222	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Température du cours d'eau à l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 10 minutes.	degree Celsius	°C	http://unitsofmeasure.org/ucum.html#para-30
5	E30_conductivite_224	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Conductivité électrique mesure à l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 10 minutes.	siemens/meter	µS/m	https://fr.wikipedia.org/wiki/Conductivité%3%A9_%C3%A9lectrique
6	E30_temperature_X211	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Température de la zone hyporhéique à l'exutoire du bassin versant du Puits. Fréquence d'acquisition: 10 minutes.	degree Celsius	°C	http://unitsofmeasure.org/ucum.html#para-32
7	E30_niveau_eau_116	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Niveau du cours d'eau de l'exutoire du bassin versant du Puits. Fréquence d'acquisition : 1 heure	meter	m	https://www.bipm.org/en/si-base-units/metre
8						
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24	Exutoire_oxygene_dissous_0368	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement				
25	Exutoire_temperature_X222	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Température du cours à l'exutoire du bassin versant d			
26	Exutoire_conductivite_X0244	http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement	Conductivité électrique mesure à l'exutoire du bassin Kervidy. Fréquence d'acquisition: 10 minutes.			

Lisez-moi 1_datastream 2_observedProperty 3_sensor 4_thing 5_location 6_featureOfInterest

Fichier de configuration

Sensorthings model



➤ SO FAIR API Service

➤ New standard

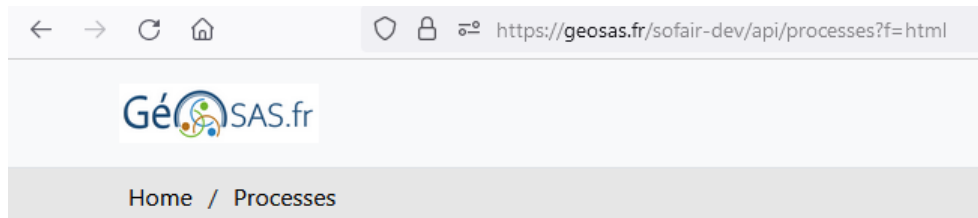


➤ A python implementation of the OGC API



➤ deployed in a beta version

<https://geoslas.fr/sofair-dev/api/>



Processes in this service

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➤ Upload observations in SensorThings API

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GitHub

Excel/CSV

Bdd/Postgres

API

Logiciel propriétaire

Transfert de données via un fichier Excel

Ici vous pouvez alimenter en données votre API SensorThings en important un fichier de données au format XLSX. Des exemples de fichiers de données sont disponibles en téléchargement.

Transfert de données

Service

ORE AgrHyS

Fichier XLSX ou csv

Importer

Données

Transférer

Exemples

	Nom	Fichier	Auteur	Création
AG	Données météo Agri4cast	agri4cast_src.csv	Tom Lorée	22 juin 2022
EF	Données Station Météo EFELE	efele_data_meteo.csv	Tom Lorée	1 mars 2023

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release v1.5.0

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➤ SO FAIR API service

➤ New standard



➤ A python implementation of the OGC API



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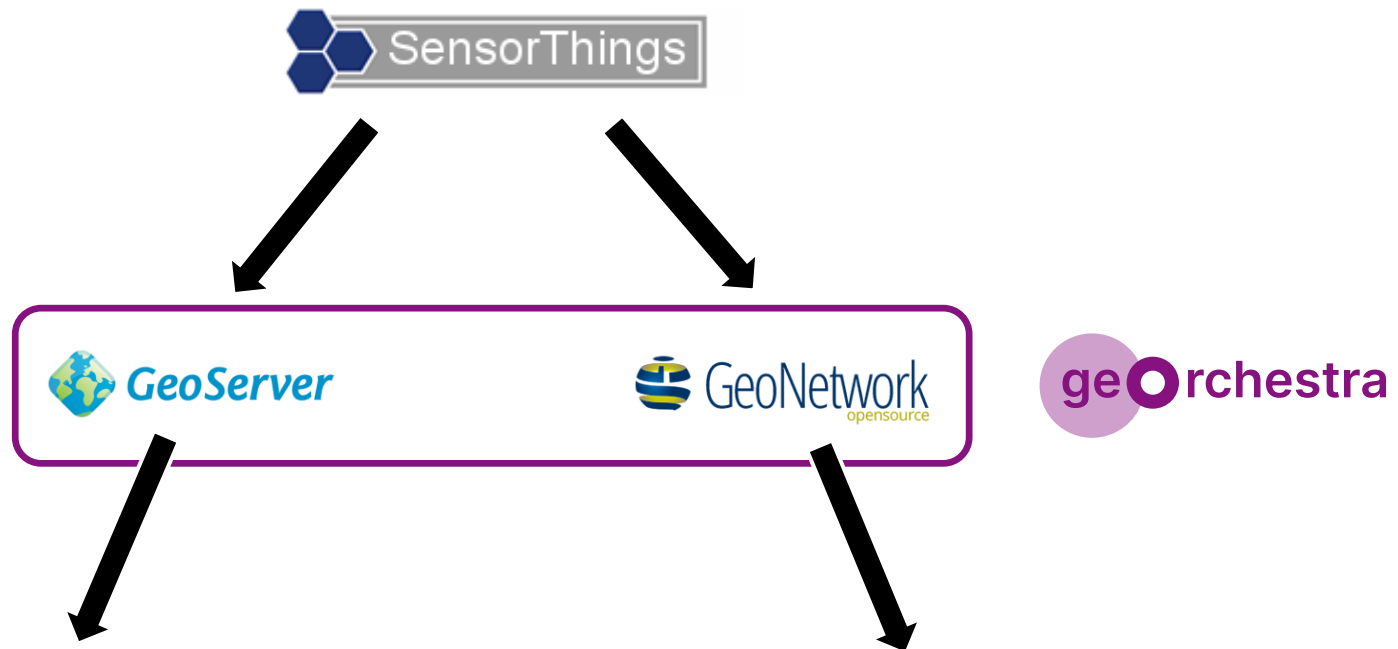
<https://geoslas.fr/sofair-dev/api/>

4

The screenshot shows a web browser at the URL <https://geoslas.fr/sofair-dev/api/processes?f=html>. The page header includes the "GéoSAS.fr" logo and a navigation bar with "Home / Processes". The main content area is titled "Processes in this service" and contains a table with two columns: "Name" and "Description". The table lists five processes, with the second one, "Publishes a SensorThings service in an IDG", highlighted with a yellow border.

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➤ Creating Métadata and layers in SDI



- View/download/request by OGC W*S
- Solves the problem of large number of Things or Features
- Increase SensorThings API visibility in the INSPIRE platform ecosystem via multiple harvesting mechanisms
- Openness to other standard, other catalog?

➤ SO FAIR API service

➤ New standard



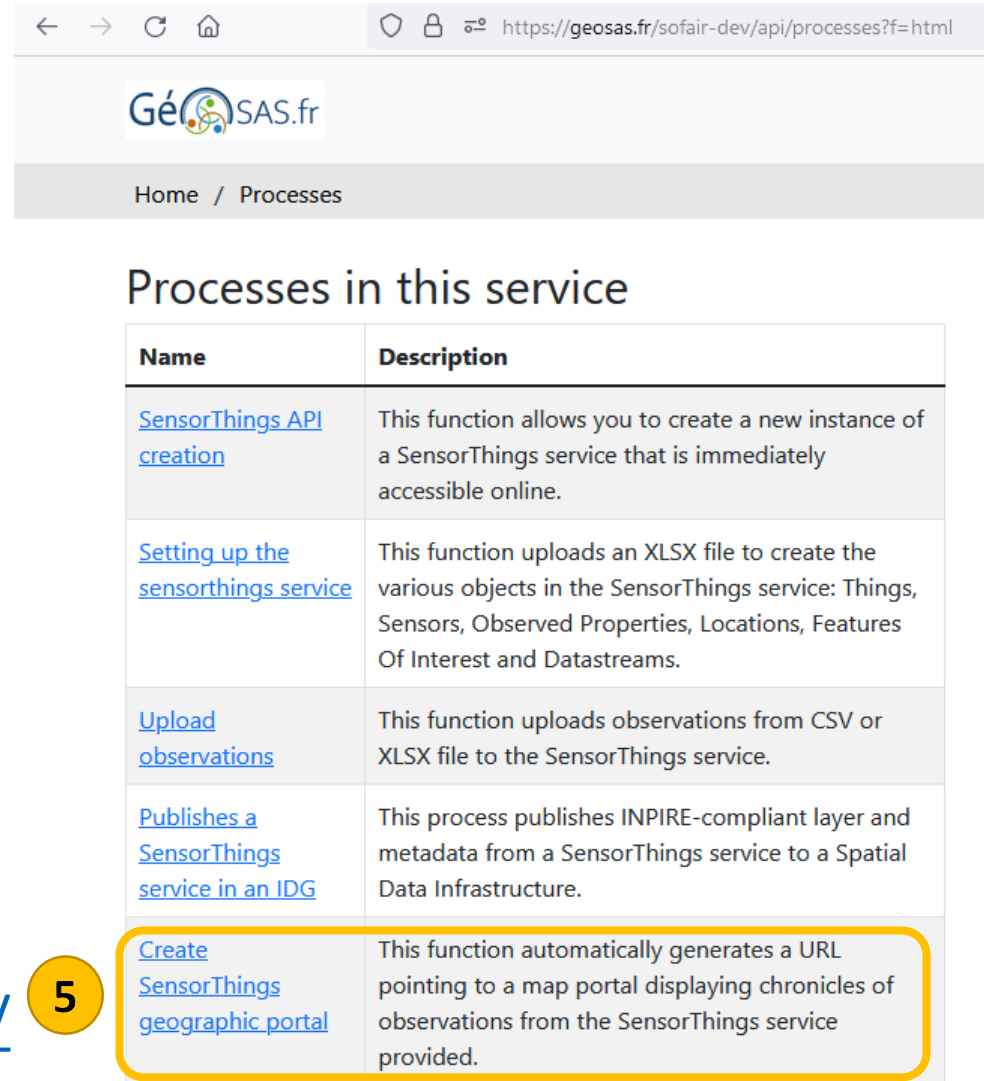
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5



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➤ Dynamic creation of a cartographic web portal

➤ Automatic URL generation

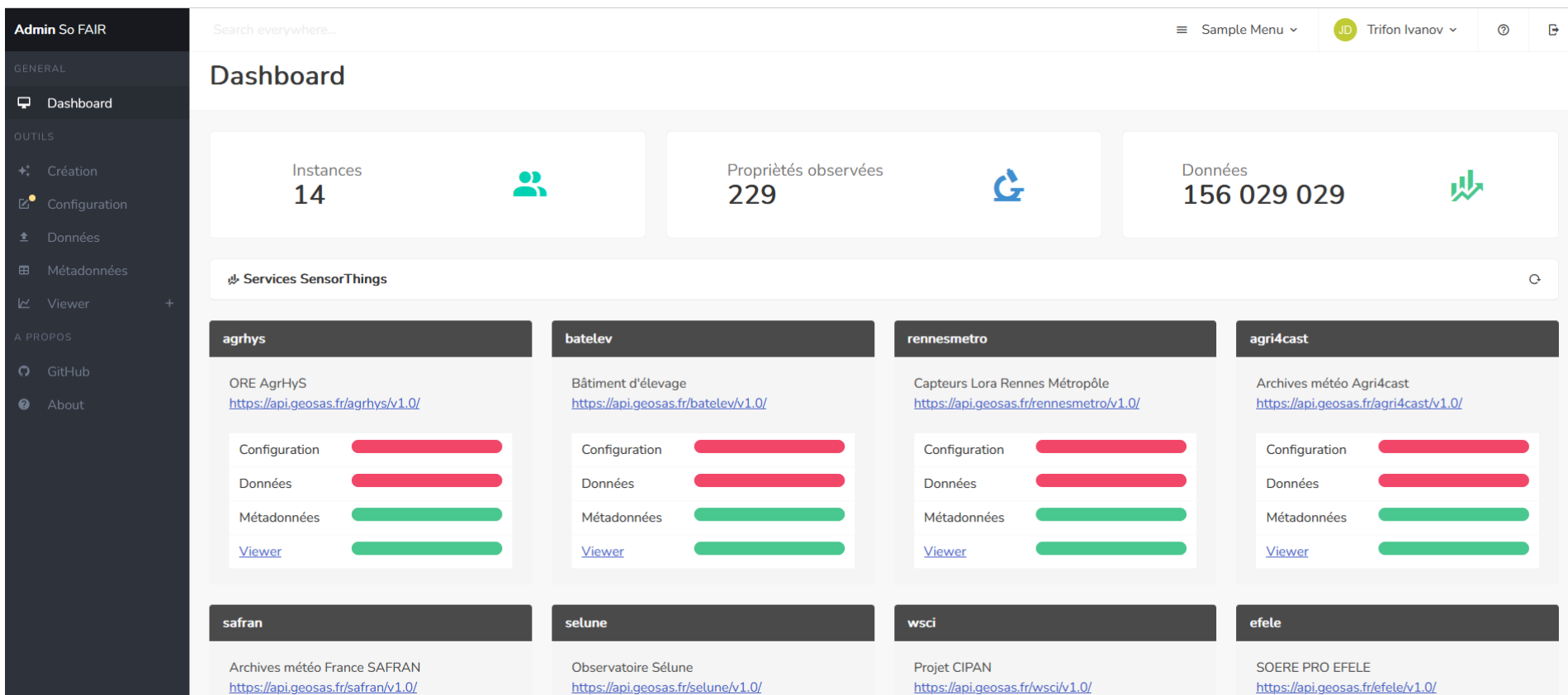
e.g. : <https://geosas.fr/mviewer-dev/?config=/apps/efele/config2.xml>

➤ co-visualization of spatial data / temporal data



➤ SO FAIR Portal

➤ Dashboard of deployed ST services



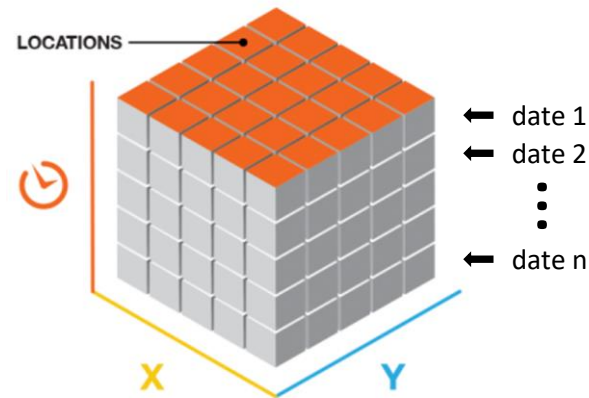
- Simple access to API functions
- Embedded in the API URL : <https://geosass.fr/sofair-dev/>

➤ Prospects

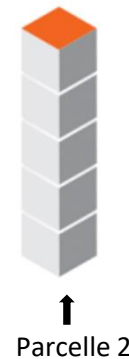
SO FAIR, missing link Spatial and temporal data Infrastructures - S&TDI ?

→ able to publish spatio-temporal data in a variety of complementary representations :

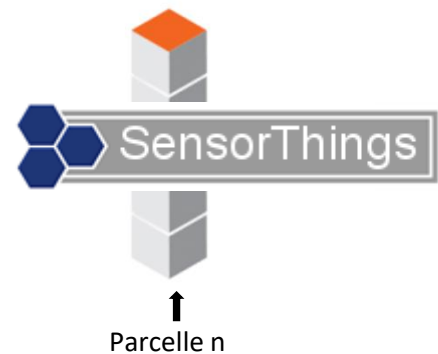
- using time series of georeferenced raster or vector layers



- Using time series associated with each geographical object

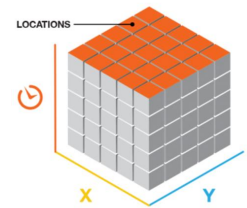
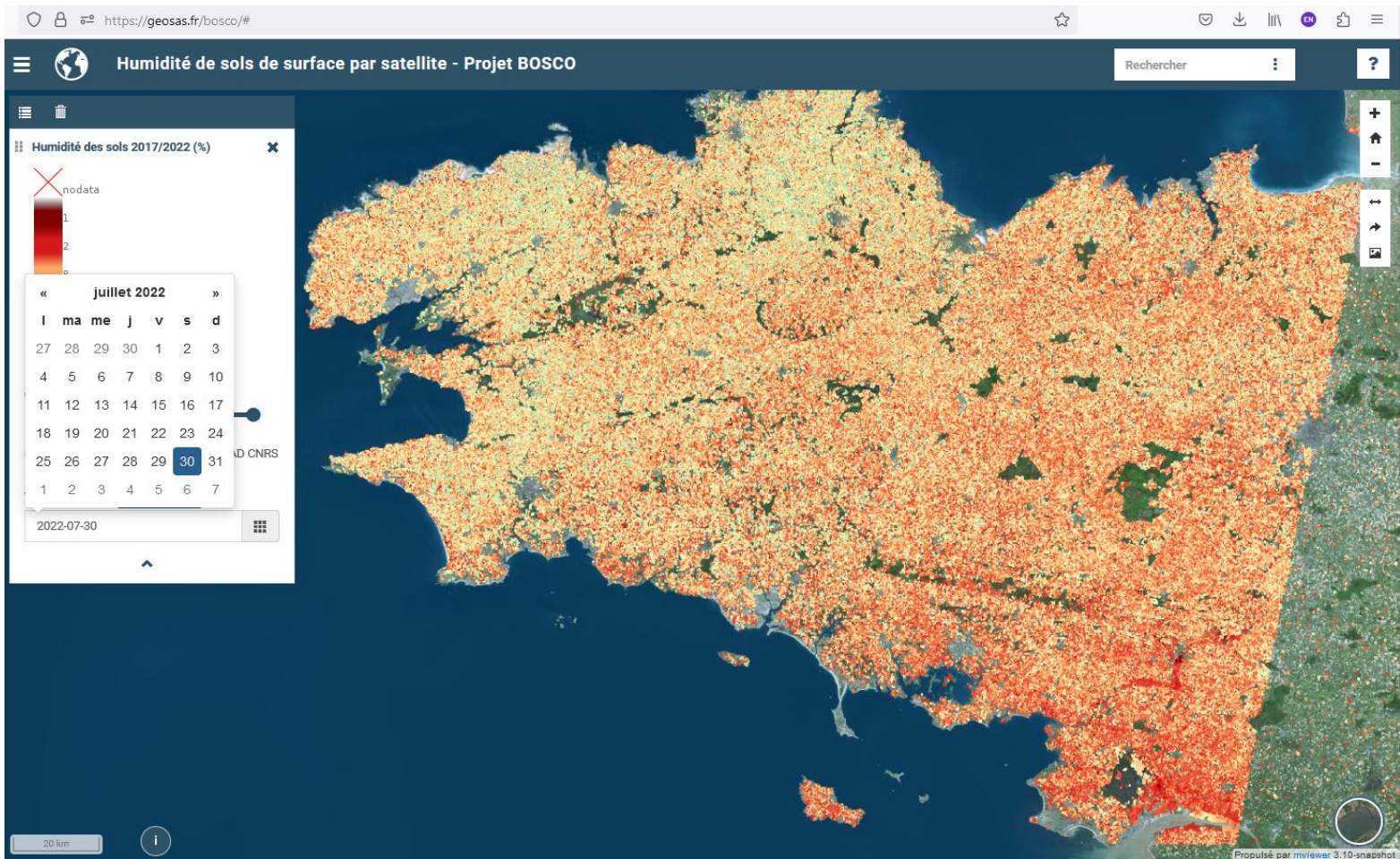


...



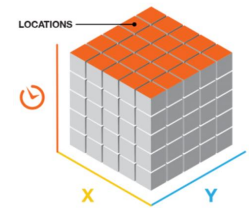
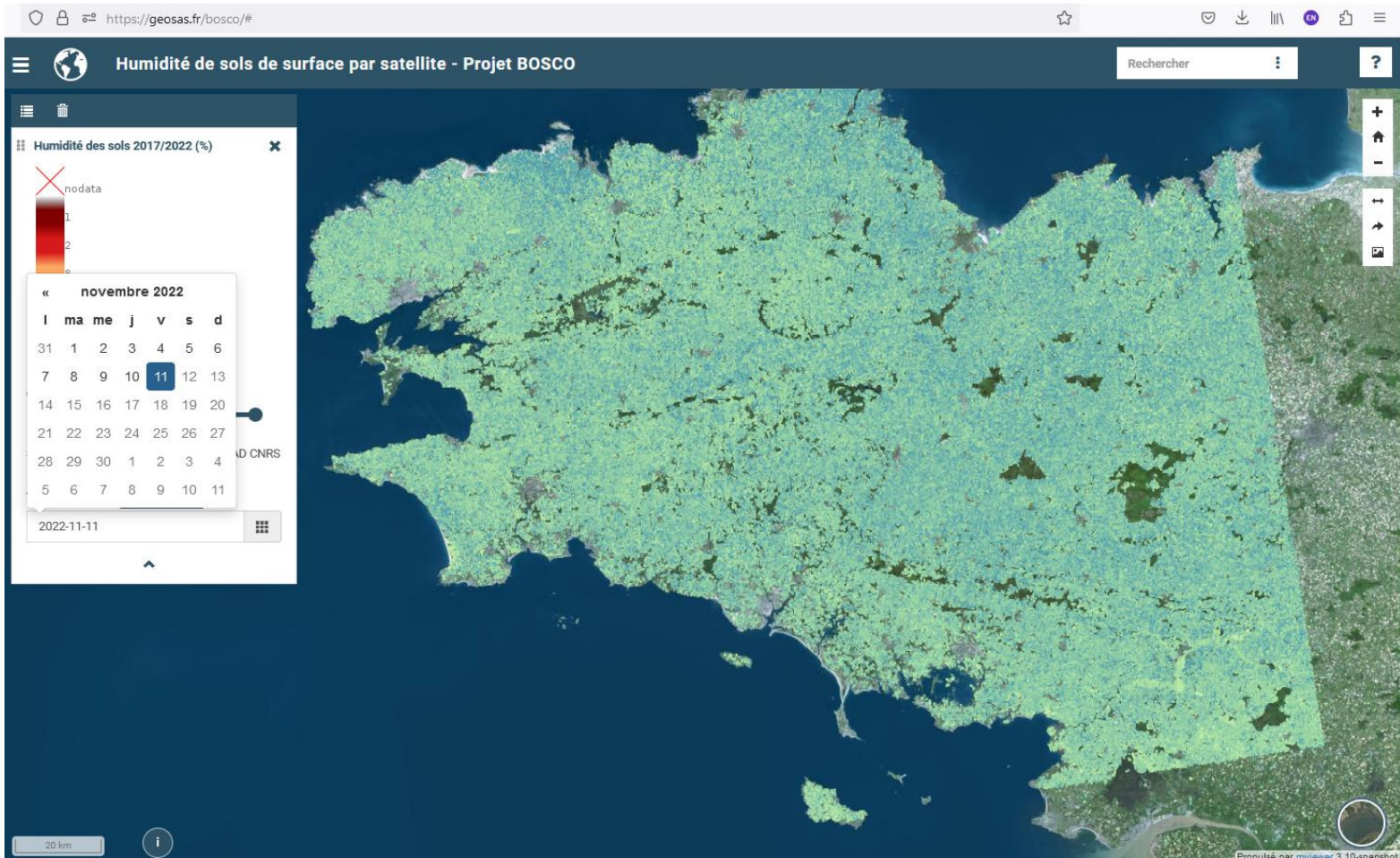
➤ Prospects : BOSCO project example

- Time series of raster images representing soil surface moisture at 10 m resolution



➤ Prospects : BOSCO project example

- Time series of raster images representing soil surface moisture at 10 m resolution



➤ Prospects : BOSCO project example

- Time series representing soil surface moisture on each crop plot



Thank you / Questions ?

Git SO FAIR project : ***<https://github.com/geosas/sofair>***

Git STEAN : ***<https://github.com/Mario-35/STEAN>***

Our research unit SDI GéoSAS : ***<https://geosas.fr>***